en **Service manual**

Wheel loader

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Manufacturer: Liebherr-Werk Bischofshofen GmbH
Valid for: L 542-1269

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Symbol	Meaning
—	**List** Identifies individual items of a list.

Tab. 3: Symbols

010.1.2 Intended use

010.1.2.1 Laws, rules, guidelines and safety regulations

To ensure safe operation:
- Ask work site manager for safety regulations at place of use.
- Adhere to safety regulations at place of use.
- Adhere to traffic regulations.
- Adhere to valid guidelines from insurers (for example employers' professional liability insurance companies, accident insurance et cetera).
- Avoid working methods that can endanger safety.
- Adhere to all intervals specified for recurrent checks and inspections in this operator's manual.

010.1.2.2 Intended use

Wheel loader is used to pick up, move and dump following materials:
- Soil
- Stones
- Broken rocks
- Bulk materials

This applies to a standard machine in normal operating conditions. Special applications are described in a separate options operator's manual.

To ensure intended use:
- Adhere to operator's manual.
- Adhere to maintenance intervals.
- Observe inspection and maintenance tasks.
- Adhere to specifications in the technical data.
- When using machine on public roads, make sure it complies with applicable national regulations.
- Only lift loads with intended working attachments (fork prongs, crane boom), which must be fitted and functioning.
- Make sure that machines used underground (mining and tunnel construction) are fitted with systems to reduce exhaust emissions (such as diesel particulate filters).
- Adhere to individual country's requirements for underground operation.
- For special uses use special working attachments and if necessary special safety equipment.
- Exclusively mount and use special working attachments with approval and as per stipulations of manufacturer of basic machine.
- Only use approved tyres.
- A suitably equipped workshop is absolutely essential for performing repair work.

Note

▶ Any other use or use beyond the stated use is improper use.

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010.1.6.3 Transporting machine

Danger to life

Machine tipping

- Make sure that the transport vehicle is authorised for the machine weight and machine size.
- Do not manoeuvre while driving on ramps.
- Before driving on ramps, clean mud, snow and ice off tyres or travel gear.
- Make sure that a spotter is available if necessary.
- To load and unload machine, use only sturdy, stable loading ramps.
- Make sure that width and angle of ramps match the gauge and climbing ability of machine.

Incorrect transport

- Park machine on level ground during preparation for transport (disassembly, cleaning).
- Secure machine against rolling away.
- Apply parking brake.
- Pull out ignition key.
- Leave operator's cab.
- All doors, windows and service access points are closed.
- Make sure that nobody is on the machine during transport.
- If necessary, dismantle a portion of working attachment from machine for duration of transport.
- Make sure that the road to be travelled is known.
- Make sure that all applicable limitations for width, height and weight are known.
- Drive carefully under electric cables and bridges.
- Drive carefully through tunnels.

010.1.6.4 Access to machine

Injury

Incorrect entry and exit

- Clean dirt, oil, ice and snow from steps, ladders, anti-slip mats, handrails and handles.
- Enter and exit carefully on muddy roads, ice, snow, traffic on access roads and in narrow conditions.
- Regularly check steps, ladders, anti-slip mats, handrails and handles and have them repaired if necessary.
- Before entering machine, clean mud, grease, ice and snow from shoes and climbing aids.
- Put on gloves for secure grip.
- Do not climb up or down using tyres, wheel hubs or rims.
- When exterior influences (for example wind) make opening and closing the door more difficult: Always guide door with your hand.
- Make sure that the opened or closed door has engaged properly.
- If the machine is still moving: Do not stand up from the operator's seat.
- Never jump off machine.
- Enter and leave the machine exclusively using the access system.
- Do not use control elements as handles.
- Keep your face towards machine during entry and exit.

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Designation	ID number	Use	Remarks
Mounting sleeve 110	9170509	Z-bar kinematics lift cylinder	Fitting the seals
Expansion sleeve	9170511	Z-bar kinematics lift cylinder	Fitting the seals

Tab. 6: Special tools for Z kinematics lift cylinder

010.2.4 Special tools for Z kinematics tilt cylinder

Designation	ID number	Use	Remarks
Piston spanner	9600418	Z kinematics tilt cylinder	Fitting the piston
Mounting sleeve 140	9998623	Z kinematics tilt cylinder	Fitting the seals
Expansion sleeve	9110409	Z kinematics tilt cylinder	Fitting the seals

Tab. 7: Special tools for Z kinematics tilt cylinder

010.2.5 Special tools for P kinematics lift cylinder

Designation	ID number	Use	Remarks
Piston nut wrench 65/70	9921123	P kinematics lift cylinder	Fitting the piston nut
Piston wrench 75/12	8007364	P kinematics lift cylinder	Fitting the piston
Mounting sleeve 110	9170509	P kinematics lift cylinder	Fitting the seals
Expansion sleeve	9170511	P kinematics lift cylinder	Fitting the seals

Tab. 8: Special tools for P kinematics lift cylinder

010.2.6 Special tools for P kinematics tilt cylinder

Designation	ID number	Use	Remarks
Piston wrench 60/10	9131362	P kinematics tilt cylinder	Fitting the piston
Mounting wrench 76/9	0541665	P kinematics tilt cylinder	Fitting the piston rod bearing

Tab. 9: Special tools for P kinematics tilt cylinder

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Metric standard threads and fine threads				Metric standard threads and fine threads			
At least one element of the bolted joint (bolts, washers, nuts etc.) with the following surface: flZn = zinc flake coating (LH standard 10021432, LH standard 10215295 flZnnc-480h-L valid ≥M6)				All elements of the bolted joint (bolts, washers, nuts etc.) with the following surface: Black oxide or phosphated Galvanised (LH standard 10215295 Fe// ZnNi(12)5//Cn//T2)			
Minimum total coefficient of friction μ_G= 0.09				Minimum total coefficient of friction μ_G= 0.11			
Thread	Strength class	Assembly prestressing forces F_M in kN	Tightening torques M_A in Nm	Thread	Strength class	Assembly prestressing forces F_M in kN	Tightening torques M_A in Nm
M 33	8.8	370	1550	M 33	8.8	370	1800
	10.9	550	2250		10.9	540	2600
	12.9	640	2600		12.9	630	3100
M 33 x 1.5	8.8	430	1650	M 33 x 1.5	8.8	420	1950
	10.9	630	2450		10.9	620	2900
	12.9	740	2800		12.9	730	3400
M 33 x 2	8.8	420	1600	M 33 x 2	8.8	410	1900
	10.9	610	2400		10.9	600	2800
	12.9	720	2800		12.9	700	3300
M 36	8.8	440	1950	M 36	8.8	430	2300
	10.9	650	2900		10.9	630	3400
	12.9	760	3400		12.9	740	3900
M 36 x 1.5	8.8	520	2150	M 36 x 1.5	8.8	510	2600
	10.9	760	3200		10.9	750	3800
	12.9	890	3700		12.9	870	4400
M 36 x 3	8.8	470	2050	M 36 x 3	8.8	460	2400
	10.9	690	3000		10.9	680	3500
	12.9	810	3500		12.9	790	4100
M 39	8.8	530	2500	M 39	8.8	520	3000
	10.9	770	3700		10.9	760	4400
	12.9	910	4400		12.9	890	5100
M 39 x 1.5	8.8	610	2800	M 39 x 1.5	8.8	600	3300
	10.9	900	4000		10.9	880	4800
	12.9	1050	4700		12.9	1030	5600
M 39 x 3	8.8	560	2600	M 39 x 3	8.8	550	3100
	10.9	820	3900		10.9	810	4500
	12.9	960	4500		12.9	940	5300

Tab. 19: Bolt prestressing forces and tightening torques

*The tightening torques for flZn bolts <M10 are non-binding because no fixed friction coefficient window is defined in the LH10215295 standard. According to the

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020.4 Travel hydraulics

020.4.1 Travel pump

Valid for: L542-1269/24755-;

Description	Unit	Value
Type		A4VG 85 EP
Series		40
Variable displacement pump - maximum displacement per turn	cm^3	85
Variable displacement pump - maximum flow rate at upper engine speed	l/min	194
Power	kW	90
Replenishing pump - displacement per turn	cm^3	24.5
Replenishing pump - flow rate at upper engine speed	l/min	56
Swivel restrictor diameter	mm	1.8
Weight	kg	77

020.4.2 Travel motor 1

Valid for: L542-1269/24755-;

Description	Unit	Value
Type		A6VM 60 HA1R
Series		71
Minimum displacement per turn	cm^3	41.5
Maximum displacement per turn	cm^3	60
Minimum angle adjustment	°	16.4
Maximum angle adjustment	°	25
Maximum output speed	rpm	4560
Output speed at Δp 400 bar	Nm	395
Weight	kg	28

020.4.3 Travel motor 2

Valid for: L542-1269/24755-;

Description	Unit	Value
Type		A6VM 150 EP

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020.10 Axles and drive shafts

020.10.1 Front axle

Valid for: L542-1269/24755-;

Description	Unit	Value
Type		113/162
Differential locking value	%	45
Track width	mm	1900
Flange size	mm	1920
Wheel nut spanner size	mm	30
Wheel nut tightening torque	Nm	650
Differential transmission ratio		3.09
Wheel hub transmission ratio		6
Overall transmission		18.54
Weight	kg	720

020.10.2 Rear axle

Valid for: L542-1269/24755-;

Description	Unit	Value
Type		319/113/96
Differential locking value	%	45
Track width	mm	1900
Flange size	mm	1920
Wheel nut spanner size	mm	30
Wheel nut tightening torque	Nm	650
Differential transmission ratio		3.09
Wheel hub transmission ratio		6
Overall transmission		18.54
Pendulum angle per side		6°
Weight	kg	840

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Customer:.....Machine type:.....Serial no.:.....Operating hours:.....Date:.....

Maintenance / inspection after service hours							Tasks to be performed			
On handover	All 8-10 h	All 50 h	All 500 h	All 1000 h	All 2000 h	Other intervals	Additional labelling	**By maintenance staff** ■ Once-only activity ● Repeat interval ✦ If necessary ❄ Annually before the winter **By authorised specialist staff** ☐ Once-only activity ❍ Repeat interval ✧ If necessary **Additional labelling** Assistance required Have this task carried out exclusively by a certified electrician	Confirm tasks	See page
			❍	❍	❍			Checking the condition and function of the windscreen washer system		
						✦		Checking and topping up the windscreen washer reservoir		030-126
						✦		Checking the seals on the driver's cab		030-127
			❍	❍	❍			Checking the indicator bead in the air conditioning dryer-collector unit (option)		030-127
			❍	❍	❍			Testing the heating and air conditioning unit		030-128
Lubrication system										
☐		●	❍	❍	❍			Checking the lubrication system grease reservoir level		030-129
☐		●	❍	❍	❍			Checking the pipes, hoses and lubrication points of the lubrication system		030-130
☐		●	❍	❍	❍			Checking whether metered quantities are adequate at the bearing points (grease collars) of the lubrication system		030-130

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Emulsifying anti-corrosion oils are prohibited.

030.3.8.2 Water (fresh water)

Water that is colourless, clear, free of mechanical contamination, drinkable tap water featuring the following restricted analysis values is suitable.

Seawater, brackish water, brine and industrial wastewater are unsuitable.

Designation	Value
Water hardness	0.6 mmol/l to 3.6 mmol/l (3 to 20°d)
PH level at 20 °C	6.5 to 8.5
Chloride ion content	maximum 80 mg/l
Sulphate ion content	maximum 100 mg/l

Tab. 33: Fresh water quality

Water analyses must be requested from the communal authorities responsible.

030.3.8.3 Coolant - Mixing ration

The cooling system must contain at least 50% by volume antifreeze and corrosion protection agent **all year round**.

Outside temperature up to	Mixing ratio	
	Water %	Antifreeze and corrosion inhibitor %
-37 °C	50	50
-50 °C	40	60

Tab. 34: Mixing ratio of water and antifreeze/corrosion inhibitor depending on the temperature

NOTICE
Too much antifreeze and corrosion inhibitor in the coolant.
The engine will overheat and can be damaged.

▶ Do not use more than 60% antifreeze and corrosion inhibitor.

030.3.8.4 Approved antifreeze and corrosion inhibitors

Product designation	Manufacturer	Contains silicates
Liebherr Antifreeze OS Concentrate	Liebherr	Yes

Tab. 35: Approved antifreeze and corrosion inhibitors

Note
If Liebherr coolant is not available at your location:

▶ Use coolant that meets the coolant specifications 11657930 for Liebherr engines (consult customer service).

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– Changing filters

030.4.2.1 Maintenance positions

Valid for: L542-1269/24755-;

The maintenance position depends on the maintenance task to be performed.

The two basic maintenance positions 1 and 2 are described below.

They enable you to access the individual maintenance points.

Maintenance position 1

To move the machine into maintenance position **1**, carry out the following steps.

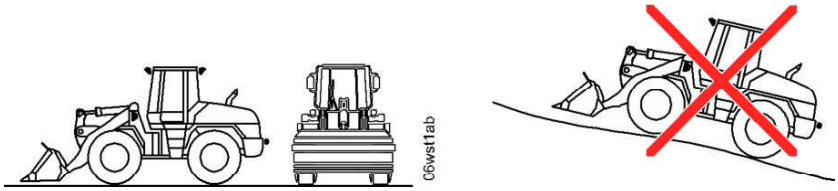

Fig. 28: Maintenance position 1

- ▶ Park the machine on level ground.
- ▶ Lower the lift arms.
- ▶ Lay the bucket flat on the ground.
- ▶ Engage the parking brake.
- ▶ Turn off the engine.
- ▶ Take out the ignition key.
- ▶ Turn off the battery main switch.

Maintenance position 2

To move the machine into maintenance position **2**, carry out the following steps.

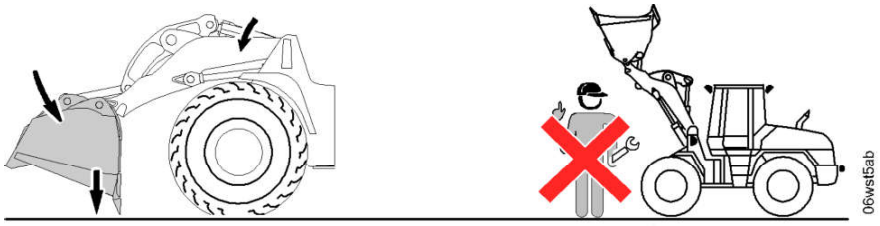

Fig. 29: Maintenance position 2

- ▶ Park the machine on level ground.
- ▶ Engage the articulation lock.
- ▶ Lower the lift arms.
- ▶ Tilt the bucket out and set it down on the ground on its teeth or cutting edge.
- ▶ Engage the parking brake.
- ▶ Turn off the engine.

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▷ The engine oil is circulated.

▶ Turn off the engine.

▶ Put the machine in maintenance position 1.

CAUTION
Beware of burns from hot surfaces on the exhaust system.

▶ Do not touch hot surfaces.

▶ Insert the sampling hose through the dipstick tube to 5 cm below the oil level **A**.

▶ Fill the sample container using the hand pump.

▶ Put the dipstick **1** back in again.

Coolant circuit

The coolant sample is taken from the cooler.

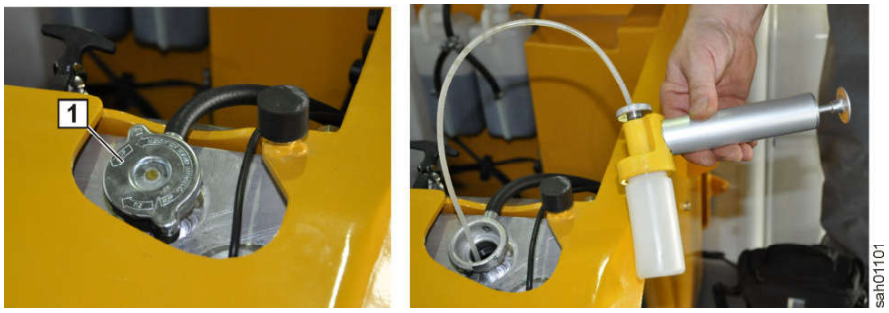

Fig. 35: Sampling point for coolant

▶ Start the engine.

▶ Turn the heating system to the maximum temperature and wait for three minutes.
▷ The coolant is circulated.

▶ Turn off the engine.

▶ Put the machine in maintenance position 1.

CAUTION
Beware of injury due to coolant escaping under pressure

▶ The coolant temperature must not exceed 45 °C.

▶ Wear protective clothing and safety glasses.

▶ Carefully open the cap.

▶ Carefully open the cap **1**.

▶ Insert the sampling hose and take an oil sample.

▶ Close the cap **1**.

Transmission

The coolant sample is taken from the transmission.

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Checking and adjusting the valve clearance

The valve clearance of all inlet and outlet valves must be checked.

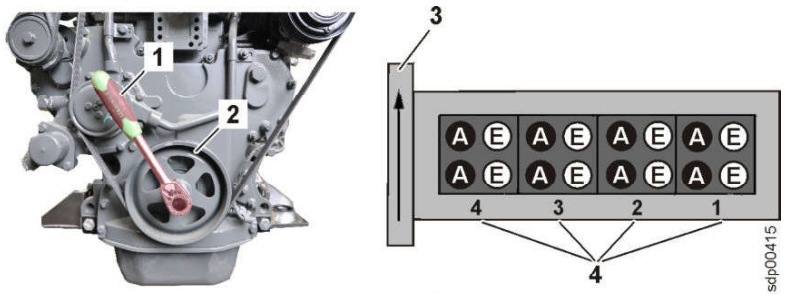

Fig. 48: Cranking the diesel engine / valve layout

1 Ratchet
2 Crankshaft pulley
3 Flywheel end
4 Cylinder numbering
A Outlet valve
E Inlet valve

You can turn the diesel engine using the pulley **2** with a ratchet **1**.

The top dead centre between the compression stroke and the power stroke is called the ignition TDC.

▶ Bring cylinder 1 or cylinder 4 into the ignition TDC.
  ▷ The valves can be checked in terms of the checking the valve clearance table.

Cylinder	4		3		2		1	
Valve	A	E	A	E	A	E	A	E
Cylinder 1 in ignition TDC			Check			Check	Check	Check
Cylinder 4 in ignition TDC	Check	Check		Check	Check			

Tab. 49: Checking the valve clearance

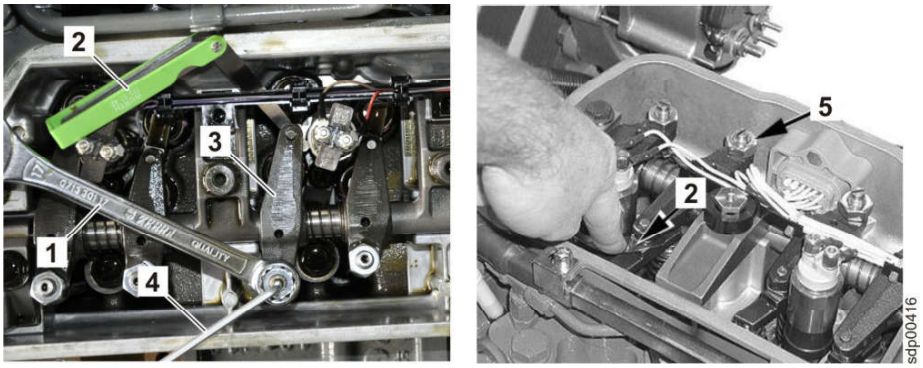

Fig. 49: Checking and adjusting the valve clearance

1 Spanner
2 Feeler gauge
3 Rocker arm
4 Hex key
5 Hex nut

▶ Push a feeler gauge **2** between the rocker arm **3** and the valve bridge and check the valve play.

❑ The engine has cooled down.

DANGER
Beware of fire

▶ Naked flames and smoking are prohibited.

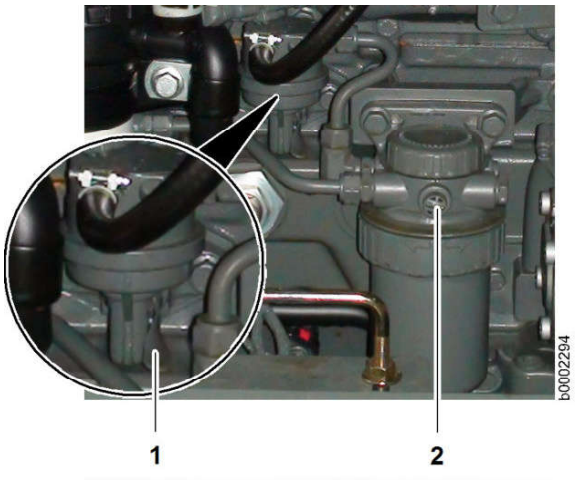

Fig. 57: Bleeding the fuel system

1 Hand pump **2** Fuel fine filter bleeder screw

CAUTION
Beware of fuel spurting out.

▶ Wear safety glasses.

▶ Unscrew the fuel fine filter bleeder screw **2** by 2 or 3 turns.

▶ Operate the hand pump **1** until fuel comes out of the bleeder screw without bubbles.

▶ Tighten the fuel fine filter bleeder screw **2**.

▶ Continue to operate the hand pump until you feel strong resistance.

030.4.4.15 Cleaning the air filter service cover and dust discharge valve

Valid for: L542-1269/24755-;

Note
If the valve is damaged, the dust discharge function is impaired and the filters become clogged more quickly.

▶ With the engine running at lower idle speed, you should clearly feel air pulsating at the dust discharge valve.

Make sure that the following requirements are fulfilled:
❑ The machine is in maintenance position 1.
❑ The service access is open.
❑ The engine has cooled down.
❑ Suitable protective equipment is used.

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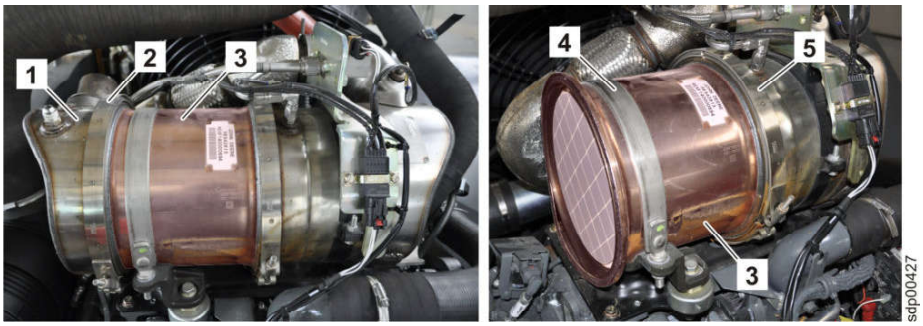

Fig. 70: Installing the diesel particulate filter / installing the output module

1 Output module
2 Output module clip
3 Diesel particulate filter
4 Diesel particulate filter mounting clip
5 Input module clip

▶ Tighten the clip **5** (tightening torque: 20 Nm).

To ensure the clip is properly in place:
▶ Knock at various points around the clip carefully with a rubber mallet.

▶ Tighten the clip **5** again (tightening torque: 20 Nm).

▶ Install the diesel particulate filter with the mounting clip **4** on the engine.

▶ Place on the clip **2** on the diesel particulate filter.

When placing on the output module, take account of the fitting position, as otherwise problems can occur when mounting the exhaust pipe.

▶ Place on the output module on the diesel particulate filter.

▶ Tighten the clip **2** (tightening torque: 20 Nm).

To ensure the clip is properly in place:
▶ Knock at various points around the clip carefully with a rubber mallet.

▶ Tighten the clip **5** again (tightening torque: 20 Nm).

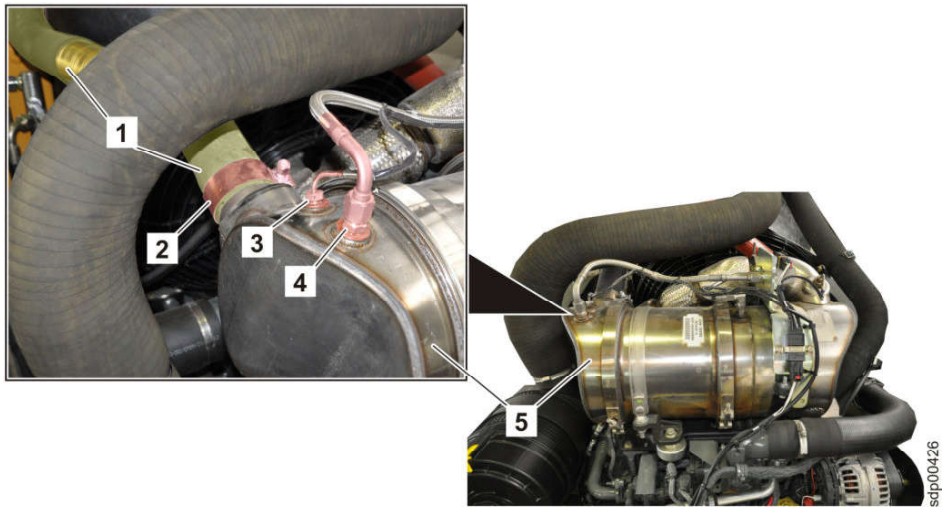

Fig. 71: Fitting the diesel particulate filter

1 Exhaust pipe
2 Diesel particulate filter outlet clip
4 Differential pressure sensor line
5 Output module

See next page for continuation of the image legend

CAUTION
Risk of scalding due to hot coolant escaping while under pressure.

- ▶ Let the machine cool down. Check the coolant temperature on the display unit.
- ▶ Carefully open the sealing caps.

Check coolant level in water cooler:

- ▶ Check whether the radiator sight glass **5** is completely filled with coolant.

If the radiator sight glass **5** is not completely filled with coolant:

- ▶ Carefully open the cooler cap **3**.
- ▶ Completely fill the water cooler **4** with coolant.

Fill coolant into the equalizing reservoir:

- ▶ Carefully open the equalising reservoir sealing caps **2**.
- ▶ Fill coolant in both equalising reservoirs **1** until the coolant level is between the markings **MIN** and **MAX**.
- ▶ Check the coolant level after one hour of operation. (For more information see: Checking the coolant level, page 030-75)

030.4.5.5 Changing the coolant

Valid for: L542-1269/40517-;

Make sure following preconditions are met:

- ❑ The machine is cold.
- ❑ The machine is in maintenance position 1.
- ❑ The service hatches are open.
- ❑ You have a drain hose ready.
- ❑ You have a suitable collecting pan ready.
- ❑ The specified coolant is at hand. (For more information see: 030.2.3 Recommended operating fluids, page 030-15)

Draining the coolant

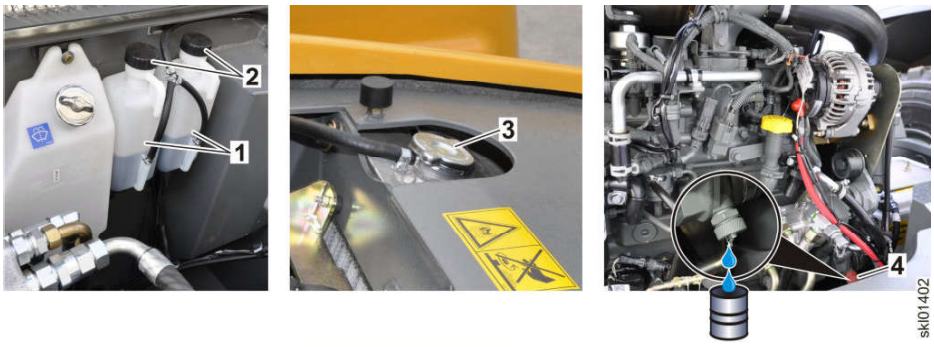

Fig. 84: Draining the coolant

1	Equalising reservoir	**3**	Cooler cap
2	Equalising reservoir sealing caps	**4**	Drain valve for coolant

Note
If a different hydraulic oil is used to the one used before.

- ▶ Make sure that the oils can be mixed.
- ▶ Set the type of hydraulic oil using the Sculi diagnostic software. (For more information see: Hydraulic control system – hydraulic oil adjustment, page 030-196)

Draining hydraulic oil

Fig. 96: Draining hydraulic oil

1	Breather filter	**3**	Cover of return strainer
2	Plug	**4**	Hydraulic tank drain valve

- ▶ Insert the plug **2** in the breather filter **1**.
  ▷ The anti-twist device of the breather filter is released.
- ▶ Unscrew the bleeder filter **1**.
  ▷ The tank pre-tension is released.
- ▶ Unscrew the cap of the drain valve on the hydraulic tank **4**.

CAUTION
Risk of scalding due to hot hydraulic oil.

- ▶ Avoid contact with the skin.
- ▶ Wear protective clothing (oil-proof gloves and safety glasses).

- ▶ Screw the drain hose on to the drain valve of the hydraulic tank **4**.
- ▶ Drain the hydraulic oil into the collecting pan.
- ▶ Unscrew the drain hose and screw on the sealing cap.
- ▶ Unscrew the return strainer cover **3**.
- ▶ Take out the return strainer.
- ▶ Check the return strainer for excessive dirt and coarse particles.

Note
Excessive dirt and coarse particles in the return strainer indicate damage in the hydraulic system.

- ▶ Check the hydraulic system for damage if the return strainer is very dirty.

- ▶ Clean the return strainer.
- ▶ Put in the return strainer.

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WARNING
Inadvertently engaging parking brake!
Crushing injuries.

- ▶ Make sure no-one can enter operator's cab.
- ▶ Make sure that main switch cannot be operated.

- ▶ Force variable ***QWmgFnrParkB*** to maximum value ***65535***.
  ▷ Parking brake opens.
- ▶ Unscrew the protective cap.
- ▶ Unscrew counter nut **5**.
- ▶ Loosen adjusting screw **4** by three to four turns.
- ▶ Push back the thrust pin **2** with a screwdriver.
- ▶ Remove the cotter pin from the upper guide pin **6** and unscrew the castle nut **7**.
- ▶ Pull out the upper guide pin **6**.
  ▷ The brake calliper **8** can be folded out.
- ▶ Fold out the brake calliper **8**.
- ▶ Put on the new brake shoes **1**.
- ▶ If brake shoes **1** do not stick to solenoids **2**: clean solenoids **2**.
- ▶ Fold brake calliper **8** back in.
- ▶ Put in the upper guide bolt **6** and screw on the castle nut **7**.
- ▶ Insert the cotter pin.
- ▶ Adjust the gap. (For more information see: Adjusting gap, page 030-103)

Adjusting gap

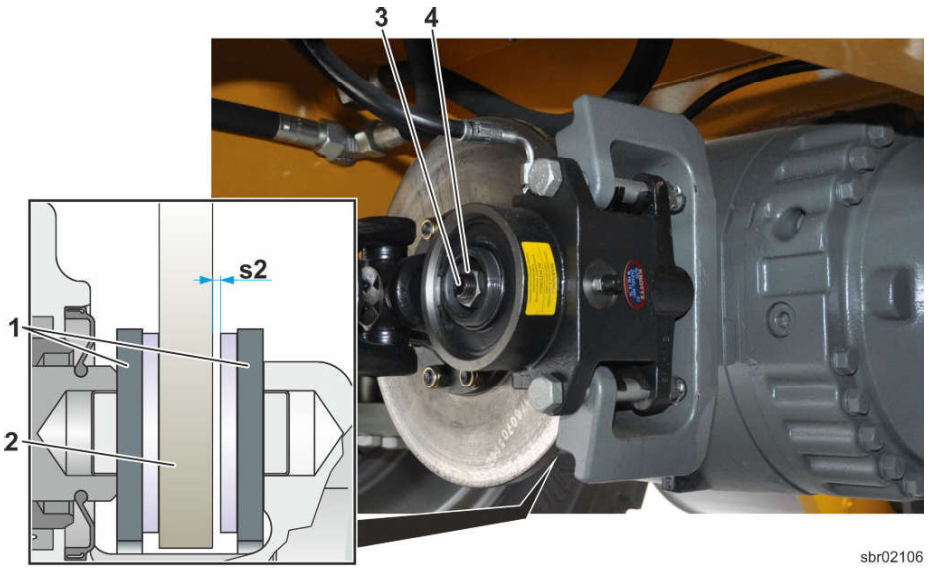

Fig. 108: Adjusting gap

1 Brake shoe
2 Brake disc
3 Adjusting screw
4 Counter nut
s2 Gap

Make sure the following preconditions are met:
- ❑ The axles are at operating temperature.
- ❑ The machine is in maintenance position 2.
- ❑ The specified axle oil is at hand. (For more information see: 030.2.1 Recommended lubricants, page 030-14)
- ❑ You have a suitable collecting pan ready.

CAUTION
Risk of scalding by hot, pressurised oil.

▶ Open the screw plugs carefully.

▶ Wear protective clothing (oil-proof gloves and safety glasses).

Changing the oil in the main housings

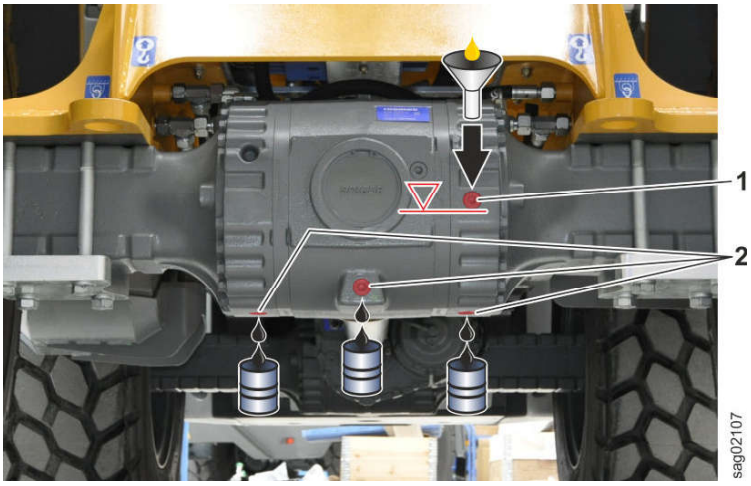

Fig. 117: Changing the oil in the main housings

1 Filling plug **2** Drain plug (3x)

▶ Carefully open the filling plug **1** on the main housing of both axles.

▶ Check that the oil level is up to the bottom of the opening.

▶ If the oil level is too high (oil comes out of the opening): check the service brake for defects (oil coming from the service brake into the axle).

▶ If the oil level is too low: check the axle for leaks.

▶ Place a receptacle under the machine.

▶ Carefully open all the drain plugs **2** on the main housing of both axles.
▷ Oil drains off.

▶ Drain all the oil from both axles into the receptacles.

▶ Screw in all the drain plugs **2** and tighten them.

▶ Fill oil through the openings in the filling plugs **1** on both axles until the oil level is up to the opening.

▶ Screw in the filling plugs **1** on both axles and tighten them.

▶ Change the oil in the wheel hubs.

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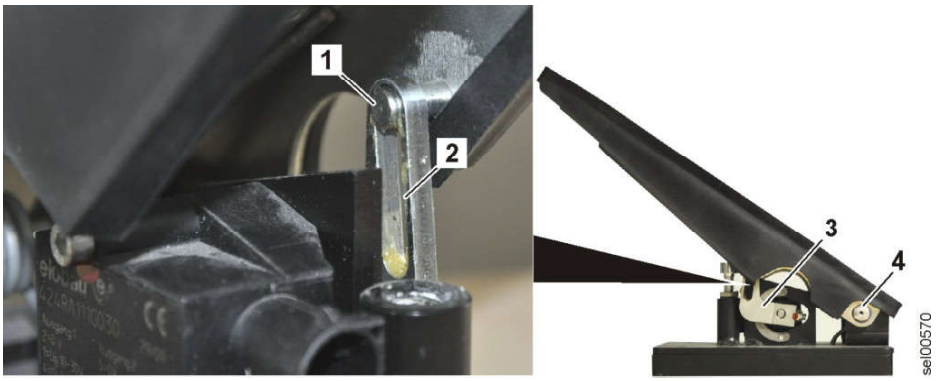

Fig. 130: Lubricating the elongated hole on the accelerator pedal and checking the bearing

1	Flight pin	**3**	Linkage
2	Elongated hole	**4**	Bearing

▶ Clean the accelerator pedal.

▶ Clean the bearing **4**.

▶ Clean the flight pin **1** and the elongated hole **2**.

▶ Lubricate the flight pin and the elongated hole.

▶ Check that the bearing **4** moves easily.
▷ If the bearing is stiff. Replace the accelerator pedal.

▶ Check that the bearing is not loose.

If the bearing has too much play, the tolerance range of the angle sensor on the accelerator pedal is exceeded. This triggers service codes that are saved in the Analyzer.

If you notice any play:
▶ Connect the Sculi diagnostic software to the machine.

▶ Use the Analyzer to check whether it contains any service codes indicating a fault with the accelerator pedal.

If service codes indicating a fault with the accelerator pedal have been stored.
▶ Replace the accelerator pedal.

030.4.15.2 Cleaning the fresh and recirculated air filters

Valid for: L542-1269/24755-;

Make sure that the following requirements are fulfilled:
❑ The machine is in maintenance position 1.
❑ Suitable protective equipment is used.

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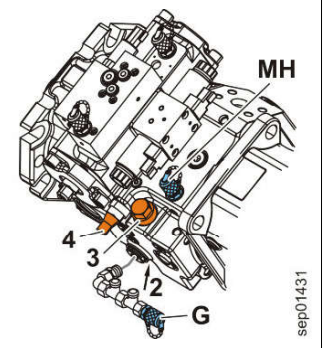
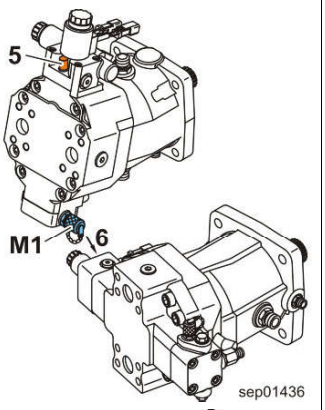
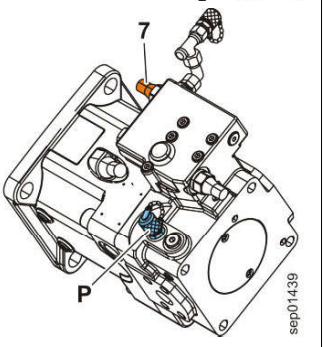
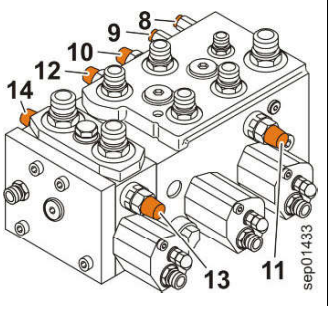
Testing / adjustment	1000 h	2000 h	Unit	Required value	Measured	Adjusted	Adjusting point	Test point	Figure
⇒ Travel pump high pressure relief valves									
Forward travel direction: High pressure at maximum engine speed A)	○	○	bar	$495^{\pm 10}$			2	MH	
Reverse travel direction: High pressure at maximum engine speed A)	○	○	bar	$495^{\pm 10}$			3	MH	
⇒ Travel pump pressure cut-off									
High pressure at maximum engine speed	○	○	bar	$440^{\pm 5}$			4	MH	
Engine droop at upper idling speed with active pressure cut-off valve	○	○	rpm	<50					
⇒ Travel pump block curve calibration									
High pressure at engine speed of 930 rpm	○	○	bar	$150^{\pm 10}$				MH	
High pressure at engine speed of 1300 rpm	○	○	bar	$270^{\pm 10}$				MH	
High pressure at engine speed of 1600 rpm	○	○	bar	$370^{\pm 10}$				MH	
High pressure at engine speed of 1900 rpm	○	○	bar	$430^{\pm 10}$				MH	
⇒ Travel motor 1 start of regulation									
High pressure at servo pressure of $50^{\pm 10}$ bar	○	○	bar	$350^{\pm 10}$			5	MH M1	
Travel motor 2 automatic calibration									
Perform automatic calibration	○	○					6		
Engine performance									
Engine speed at high pressure of 350 bar		◊	rpm	2250^{-100}				MH	
Working hydraulics									
Working hydraulics pump flow regulator (standby pressure)									
High pressure at lower idling speed		◊	bar	30^{+2}			7	P	
Z kinematics control valve block secondary pressure relief valves									
Opening pressure for tilting in B)		○	bar	$220^{\pm 5}$			10	P	
Opening pressure for tilting out B)		○	bar	$220^{\pm 5}$			11	P	
Opening pressure for lifting B)		○	bar	$250^{\pm 5}$			12	P	
Opening pressure for 3rd function A3 (optional)		○	bar	$250^{\pm 5}$			13	P	
Opening pressure for 3rd function B3 (optional)		○	bar	$250^{\pm 5}$			14	P	









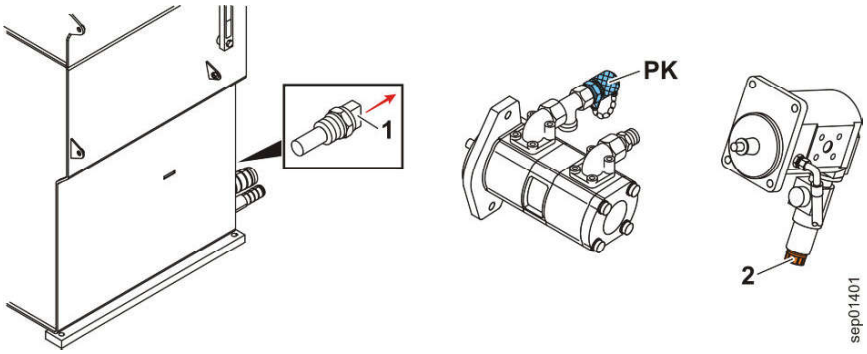


Fig. 149: Fan gear motor proportional pressure relief valve

1 Hydraulic oil temperature sensor

2 Proportional pressure relief valve

PK Cooling system high pressure test connection

Testing the pressure relief and proportional valve and adjusting the rated current

CAUTION
Hot components can cause injury.

▶ Keep a safe distance from the engine and exhaust system.

▶ Unplug the hydraulic oil temperature sensor **1**.

▶ Connect a pressure gauge (250 bar) to the high pressure test connection **PK** on the fan gear pump.

▶ Start the engine.

▶ Increase the engine speed to the upper idling speed.

▶ Check that the high pressure **PK** is correct.

Description	Unit	Value
High pressure **PK**	bar	$150^{\pm 10}$

When the value is correct:

▶ Turn off the engine and take out the ignition key.

▶ Plug in the hydraulic oil temperature sensor **1**.

▶ Disconnect the pressure gauge from the high pressure test connection **PK**.

If the value is not correct:

▶ Connect the Sculi diagnostic software to the machine.

▶ In the variables editor in the group structure, select the ***Check cooling system*** folder.

▶ Change value of the ***CDfanINenn*** variable.

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Testing and adjusting

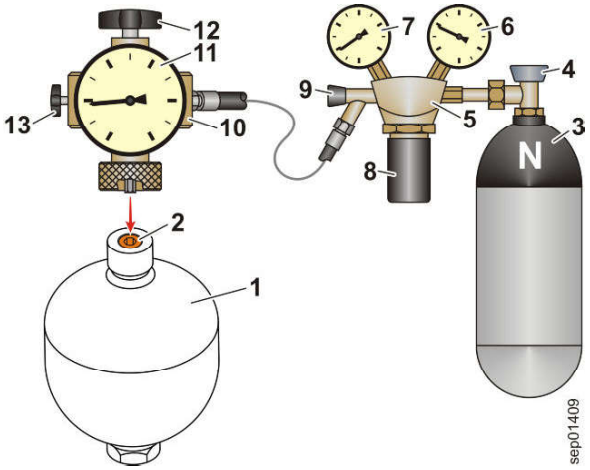

Fig. 156: Nitrogen filling of ride control hydro accumulator

1	Hydro accumulator ride control	**8**	Pressure control valve
2	Hydro accumulator plug	**9**	Output valve of the pressure reducer
3	Nitrogen cylinder	**10**	Testing and filling device
4	Cylinder valve	**11**	Hydro accumulator filling pressure gauge
5	Pressure reducer	**12**	Handwheel
6	Cylinder pressure gauge	**13**	Drain valve
7	Output pressure gauge		

▶ Unscrew the protective cap on the hydro accumulator **1**.

Note
The hydro accumulator **1** does not have an integrated check valve.

▶ Only loosen the hydro accumulator plug **2** before attaching the testing and filling device.

▶ Only screw on the hydro accumulator plug **2** with the handwheel of the testing and filling device.

▶ Loosen the hydro accumulator plug **2** (spanner size 6 mm).

▶ Screw the testing and filling device **10** on to the hydro accumulator.
▷ The hydro accumulator plug **2** can be opened with the handwheel **12**.

▶ Open the hydro accumulator plug **2** with the handwheel **12**.

▶ Check that the hydro accumulator filling pressure **11** is correct.

Description	Unit	Value
Filling pressure at a hydro accumulator temperature of 0 °C	bar	$23^{\pm 2}$
Filling pressure at a hydro accumulator temperature of 10 °C	bar	$24^{\pm 2}$
Filling pressure at a hydro accumulator temperature of 20 °C	bar	$25^{\pm 2}$

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Fig. 167: Cracks on the clamping sleeve or blisters on the outer jacket

- ▶ Take the machine out of operation and secure it against restarting.
- ▶ Replace the damaged hydraulic line immediately.

030.6.7 Travel hydraulics

030.6.7.1 Travel pump replenishing pressure relief valve

Valid for: L542-1269/24755-;

Make sure that the following requirements are fulfilled:
- ❑ Machine is in the maintenance position for testing and adjustments.
- ❑ The service access is open.

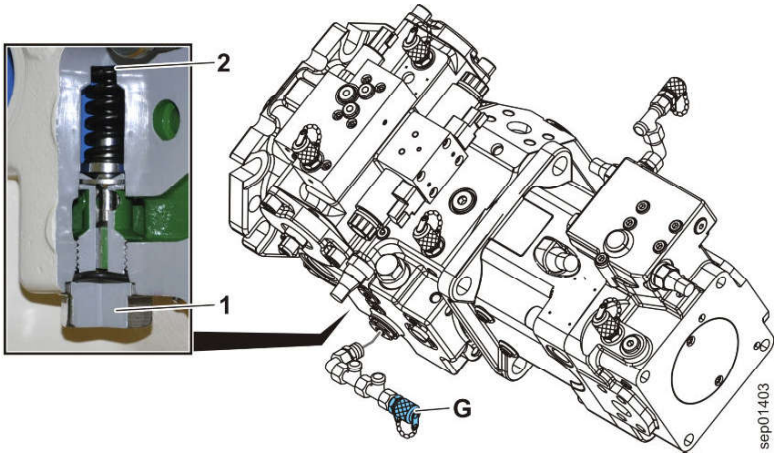

Fig. 168: Travel pump replenishing pressure relief valve

- ▶ Connect a pressure gauge (40 bar) to the replenishing pressure test connection **G** on the travel pump.
- ▶ Start the engine.
- ▶ Increase the engine speed to the upper idle speed.
- ▶ Check that the replenishing pressure **G** is correct.

Description	Unit	Value
Replenishing pressure **G**	bar	$33^{\pm 2}$

❑ The operating pressures of the travel hydraulics were checked in terms of the adjustment checklist.

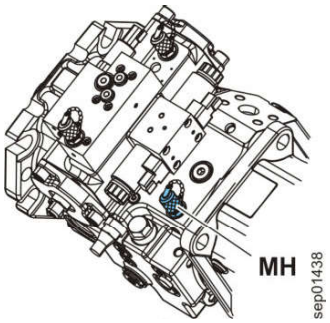

Fig. 175: Checking the engine power output

▶ Connect a pressure gauge (600 bar) to the test connection **MH**.

▶ Connect the Sculi diagnostic software to the machine.

▶ In the variables editor in the group structure, select the ***Check diesel engine*** folder.

▶ Set the ***CXdrPmpInchOff*** variable to ***1***.
▷ The inching function is deactivated.

WARNING
Beware of accidents caused by the machine pulling away unintentionally.

▶ Keep the area in front of the machine and right next the machine clear of people.

▶ Be ready to brake when increasing the engine speed.

▶ Start the engine, select fixed gear 1 and forward travel direction.

▶ Hold the machine with the service brake and run it at full throttle.

▶ Slowly release the service brake and check whether the required engine speed is reached at the set test pressure.

Machine	Test pressure	Required engine speed value
L524	270 bar	2250^{-100} rpm
L528	320 bar	2250^{-100} rpm
L538	350 bar	2250^{-100} rpm
L542	350 bar	2250^{-100} rpm

Tab. 61: Checking the required engine output values

If the required values are not reached:
▶ Troubleshoot the engine (air filter, fuel filter) or the travel hydraulics (check the operating pressures).

Once the test has been completed:
▶ Reset the ***CXdrPmpInchOff*** variable to ***0***.
▷ The inching function is activated.

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– Camera
– Air conditioning controller

Note
Adjustment data may become lost if a malfunction occurs during software update.

▶ Create a service file before the software update.

Note
If a weighing device with a printer is installed, after the software update, the layout of the weighing card may be defective.

▶ Before the software update: note down the layout of the weighing card.

▶ After the software update: check layout of the weighing card and correct if necessary. For more information, see operator's manual of the weighing device.

Preparing memory card

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

Make sure that following tools are ready:
❑ A formatted flash card (item code: 10223095)
❑ A flash card reader (item code: 11000491)

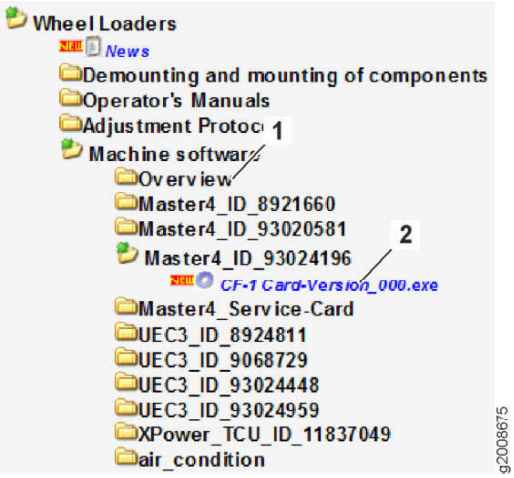

Fig. 190: Software in the Liebherr service documentation

1 Software overview **2** Example for software

The software can be downloaded from the Liebherr service documentation.

Liebherr service documentation contains an overview **1** of machine types and corresponding software.

The software in the Liebherr service documentation is a compressed file. The file must be extracted and saved on the flash card.

▶ Select the “Run” command to save the software on a formatted memory card.
▷ The compressed file is extracted.
▷ The software is saved in form of individual files on the memory card.

To ensure that no LiDAT files are lost when updating the software, following files must be transferred from the existing card in the central control unit (slot CF1) to the new memory card:

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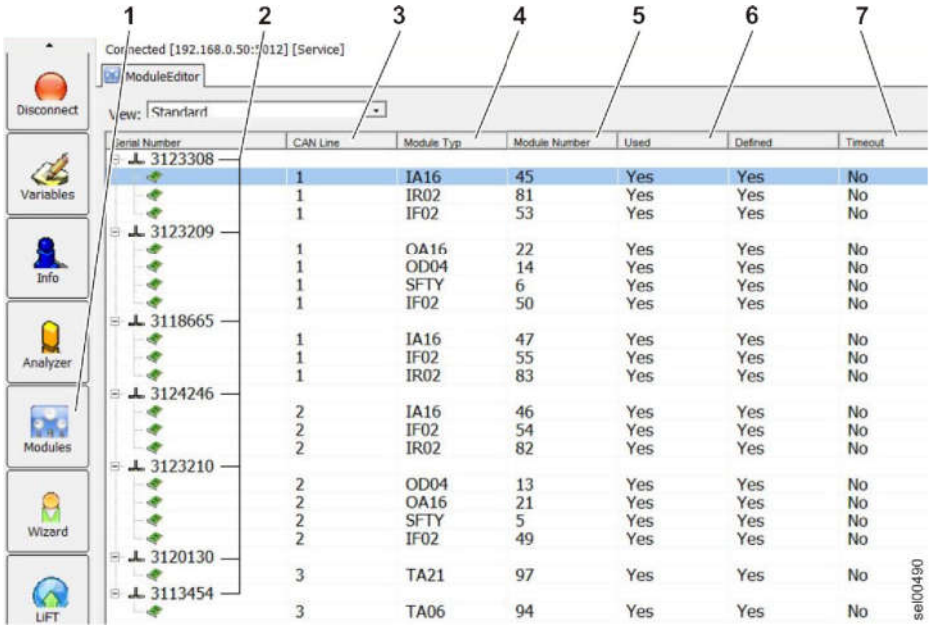

Fig. 200: Module editor in Sculi

1 Module editor button
2 Serial number of connected modules
3 CAN line connecting the module to the central control unit
4 Module identification
5 Address set for the module
6 Indicates whether the module is being used
7 Indicates whether the module is active

The serial number **2** indicates the module. The serial number **2** is on the type plate of the module.

▶ Open the module editor with the Modules button **1**.

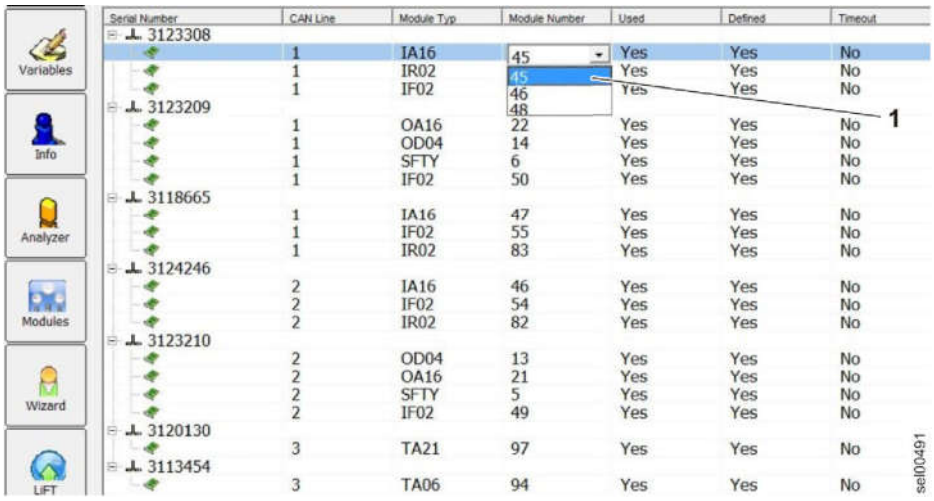

Fig. 201: Module editor with drop-down window for address selection

▶ Select the module and open the drop-down window **1**.

▶ Select the address and confirm with the Enter key.

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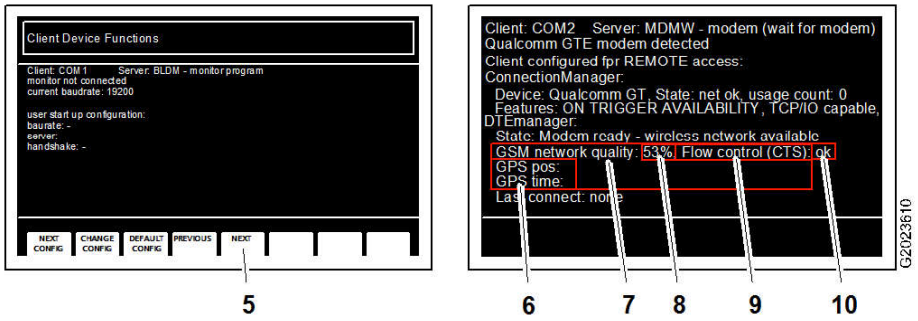

Fig. 213: Checking connection status

5 *Next* button
6 GPS connection status
7 GSM connection
8 GSM connection status
9 Cable connection
10 Cable connection status

▶ Press the button **5**.
▷ Connection data is displayed. This may take up to 5 minutes.

▶ Check the GSM connection **7**.
▷ The displayed value **8** must be greater than 40%.

▶ Check GPS connection status **6**.
▷ GPS data must be displayed.

▶ Check cable connection **9**.
▷ Status OK **10** must be displayed.

030.6.13.2 LiDAT: activating data transmission manually

Valid for: L542-1269;

The LiDAT data is transferred between the machine and the LiDAT server via a GSM connection. The LiDAT data is transferred at multiple, predefined transmission times during the course of the day. The transmission times can be set by the LiDAT user.

If a GSM connection is not available at any of the transmission times, manual data transmission must be activated in an area with GSM connection. This ensures that LiDAT data is transmitted.

Examples for uses without GSM connection:
– Tunnel operation
– Operating the machine in closed halls
– Operating the machine in places without a GSM signal

Creating a GSM connection

▶ Park the machine in a place with an available GSM signal.

▶ Switch on the ignition.

▶ Check connection status.

Activating data transmission manually

If there is a GSM connection available, the data transmission can be started.

Make sure that the following requirements are fulfilled:
❑ A GSM connection is available.

The machine can still be operated by bypassing the CAN line until a new fuel level sensor has been fitted. The *fuel level reserve* symbol field flashes. A service code is not shown.

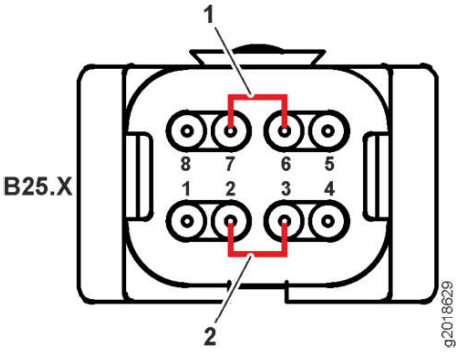

Fig. 222: Plug B25.X

1 CAN High jumper **2** CAN Low jumper

In order to bypass the fuel level sensor, first unplug the connector **B25.X** .

Then connect pin 7 to pin 6 and pin 2 to pin 3 on the connector **B25.X** .

The fuel level sensor is thereby bypassed in the CAN line and the machine can continue being operated.

040.1.2.3 Fuel pre-filter

Valid for: L542-1269/24755-;

1 Layout

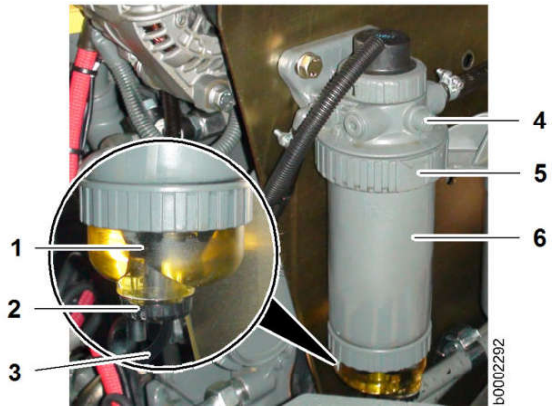

Fig. 223: Fuel pre-filter

1 Water separator container
2 Drain valve
3 Electrical connection for water sensor
4 Bleeder screw
5 Snap ring
6 Filter cartridge

The fuel pre-filter is mounted on a bracket on the engine.

2 Function

The fuel pre-filter protects the fuel system of the engine (fuel pre-delivery pump, pump elements, injection valves, pistons and valves) from most dirt and water

Symbol	Meaning	Notes
 B)	The diesel particulate filter is overloaded. This results in greatly reduced engine power. Regeneration must be carried out by Liebherr customer service.	Beware of damaging the filter. Turn off the engine.

Tab. 73: Symbols in the display

A) Yellow symbol
B) Red symbol

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2.2 Output speed

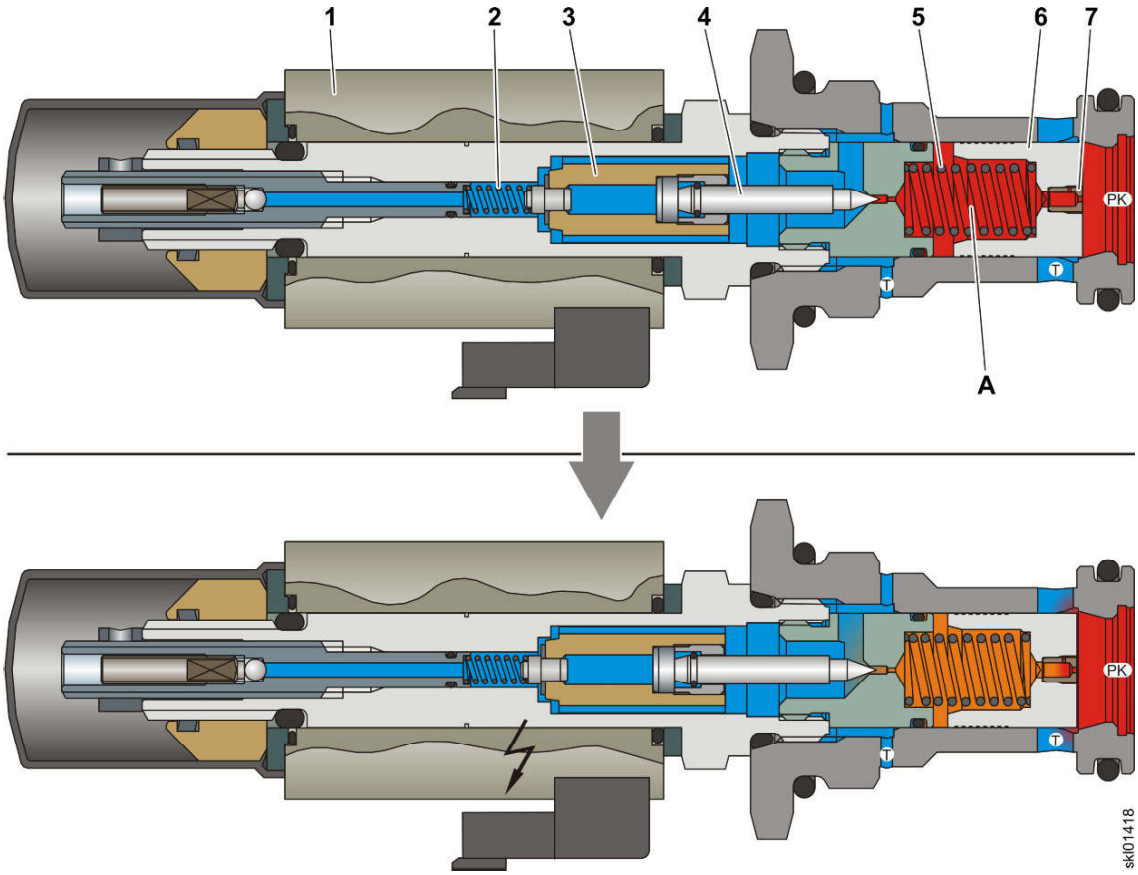

Fig. 243: Proportional solenoid energised/de-energised

1	Proportional solenoid Y13	**4**	Secondary piston	**7**	Restrictor
2	Secondary spring	**5**	Primary spring	**A**	Pressure chamber
3	Stay	**6**	Primary piston		

The proportional pressure relief valve regulates the output speed by directing oil past the gear motor. The more oil that flows through the bypass, the lower the output speed.

When it is not energised, the proportional pressure relief valve acts as a pilot-controlled pressure relief valve.

The high pressure from the gear pump pushes against the primary piston **6**. At the same time, oil flows through the restrictor **7** to the pressure chamber **A**. The oil pressure in the pressure chamber **A** and the primary spring **5** keep the primary piston **6** closed.

If the high pressure exceeds the set value, it pushes the secondary piston **4** against the secondary spring **2**. This lowers the pressure in the pressure chamber **A**. The high pressure pushes the primary piston **6** against the primary spring **5**. The oil flows to the tank connection.

The central control unit energises the proportional solenoid **1** depending on the hydraulic oil temperature. The magnet force pushes the anchor **5** against the secondary spring **2**. This causes oil to flow out of the pressure chamber **A** to the tank connection. The high pressure pushes the primary piston **6** against the primary spring **5** and oil flows to the tank connection.

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2 Function

2.1 Basic function

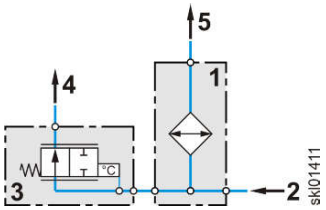

Fig. 253: Hydraulic diagram of the hydraulic oil cooler

1 Hydraulic oil cooler
2 Collector pipe
3 Temperature valve
4 Bypass to the hydraulic tank
5 To the hydraulic tank

The hot oil of the travel hydraulics (leak oil and discharged oil) collects in the collector pipe **2** and flows to the hydraulic oil cooler **1**.

The fan draws ambient air in through the hydraulic oil cooler. The cooler fins transfer the heat from the oil into the ambient air.

The cooled oil flows into the hydraulic tank **5**.

2.1.1 Temperature valve

The temperature valve **3** assists the hydraulic oil in reaching operating temperature faster.

If the oil temperature is below 55 °C, the temperature valve is open. Due to the lower flow-rate resistance, most of the oil flows straight into the hydraulic tank via the bypass line **4** and past the hydraulic oil cooler **1**. If the oil is warmer than 55 °C, the temperature valve closes progressively, until the entire oil quantity flows through the hydraulic oil cooler.

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2 Function

2.1 Basic function

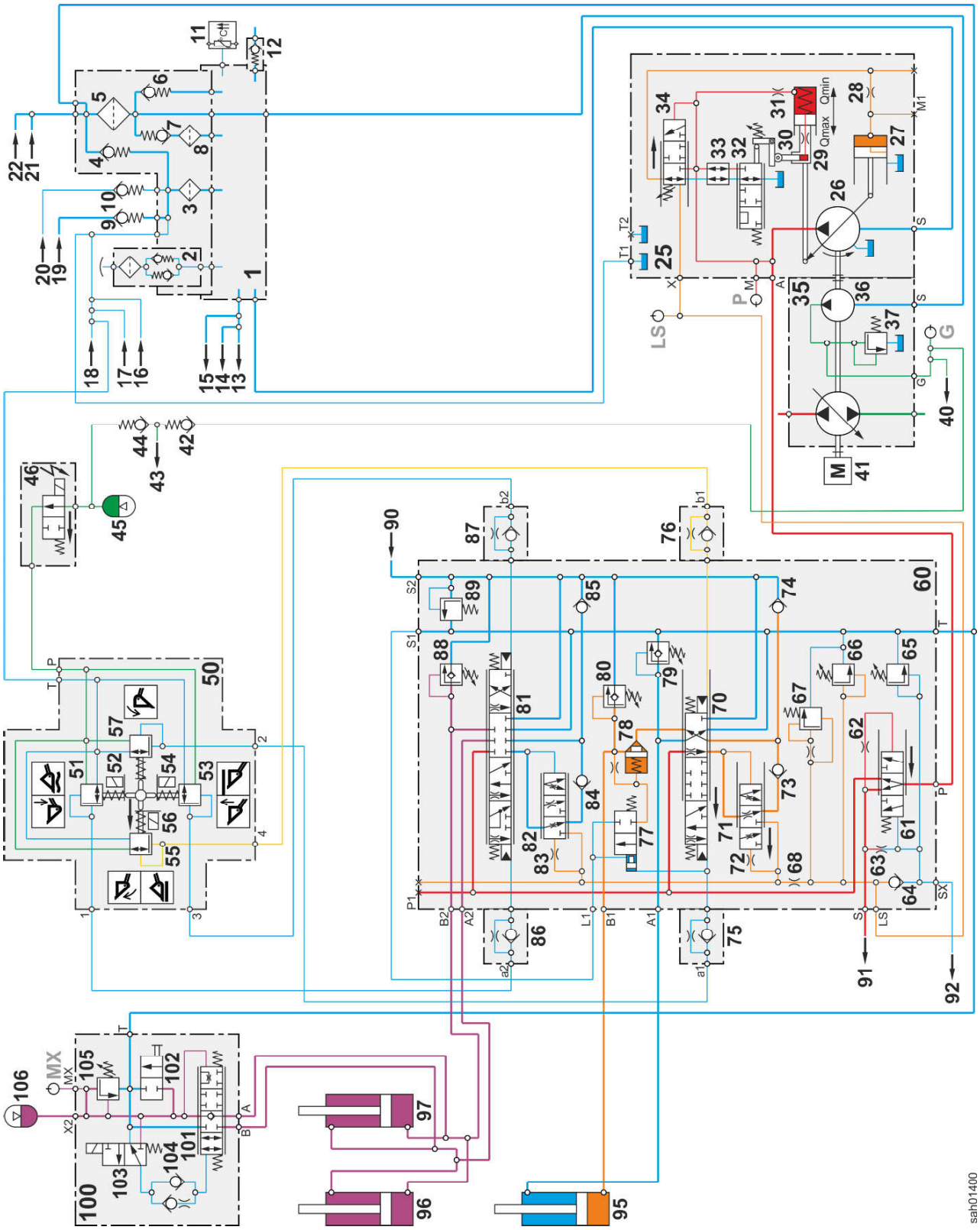

Fig. 259: Diagram of the working hydraulics for z-bar kinematics

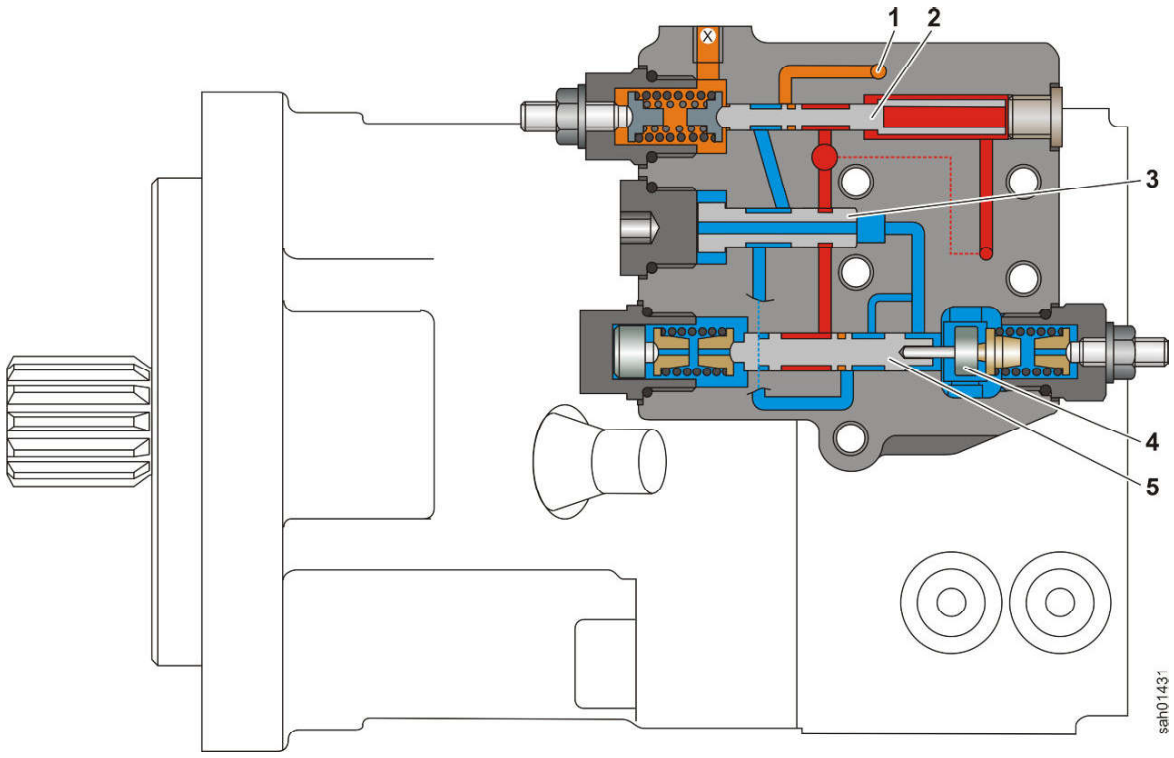

Fig. 264: Sectional view of the regulation unit

1	To the return piston	**3**	Dummy piston	**5**	Power regulator
2	Flow regulator	**4**	Regulating lever		

2 Function

2.1 Basic function

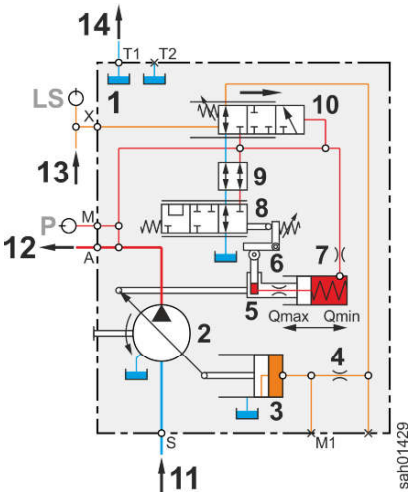

Fig. 265: Hydraulic diagram of the working hydraulics pump

1	**Working hydraulics pump**	**9**	Dummy piston
2	Axial piston pump	**10**	Flow regulator
3	Return piston	**11**	Working hydraulics pump suction port

See next page for continuation of the image legend

3 Restrictor check valve
4 Spool stroke adjusting screw
7 Lift cylinder pressure balance with restrictor
8 Secondary pressure relief valve for lifting
11 Float position stop pin
12 Restrictor check valve

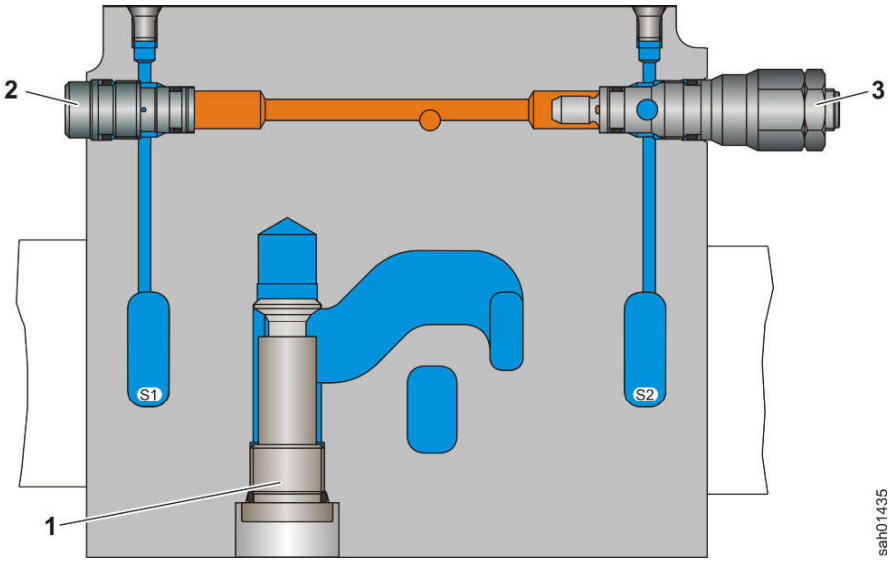

Fig. 276: Sectional view of LS valves

1 Tilt cylinder load retaining valve
2 Flow regulating valve
3 LS working hydraulics pressure cut-off

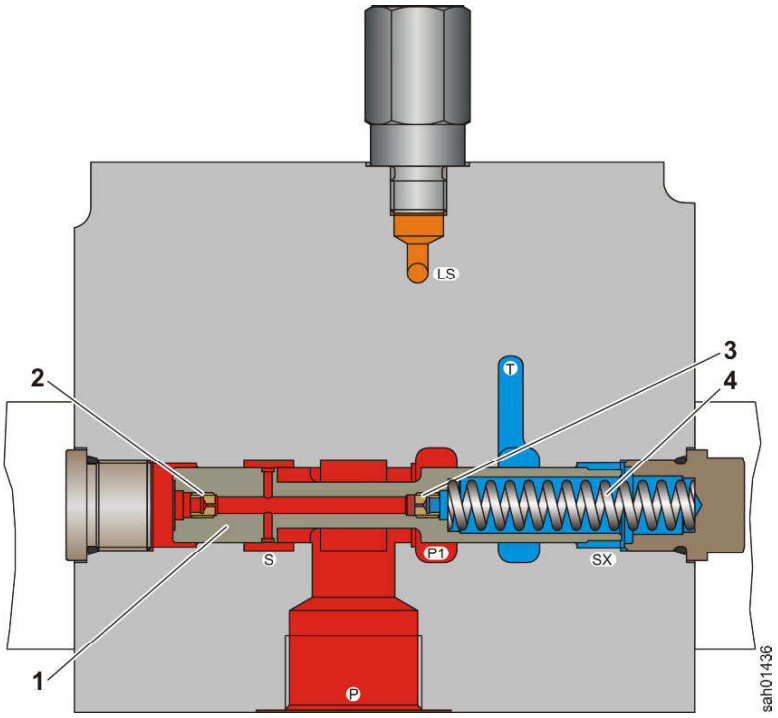

Fig. 277: Sectional view of priority valve

1 Priority valve
2 Restrictor
3 Restrictor
4 Regulating spring

060.6.4 Pilot control hydro accumulator

Valid for: L542-1269/24755-;

1 Layout

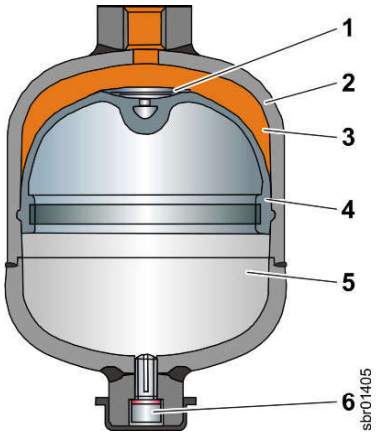

Fig. 289: Pilot control hydro accumulator

1	Plunger	**4**	Membrane
2	Accumulator	**5**	Nitrogen chamber
3	Oil chamber	**6**	Plug

The pilot control hydro accumulator is attached to the pilot control solenoid valve.

The pilot control hydro accumulator is divided into two chambers by a membrane **4**. The chamber **5** is filled with nitrogen.

2 Function

The pilot control hydro accumulator enables the spools in the control valve block to be actuated even when the engine is at a standstill. This means that the lift arms can be lowered or the bucket tilted out when the engine is at a standstill.

When the engine is running, the oil chamber **3** is filled with oil by the replenishing pump.

When the engine is at a standstill, the nitrogen filling **5** presses the membrane **4** against the oil.

LBH/11657128/10/211-20191203_0814418/en

060.8.1.2 Z kinematics tilt cylinder

Valid for: L542-1269/24755-;

1 Layout

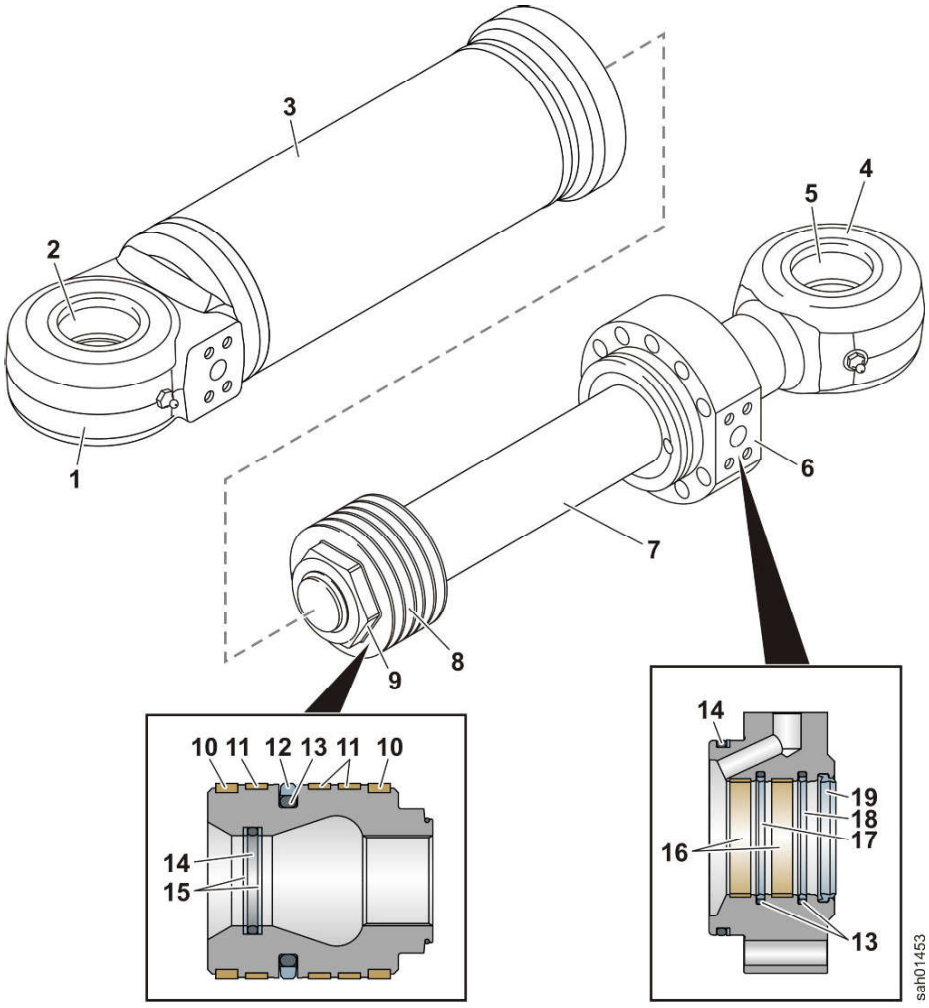

Fig. 299: Lift cylinder

1	Piston-side cylinder bearing	**11**	Slide rings
2	Bearing bushing	**12**	Glyd Ring seal
3	Cylinder tube	**13**	Support rings
4	Ring-side cylinder bearing	**14**	O-rings
5	Bearing bushing	**15**	Support rings
6	Piston rod bearing	**16**	Slide rings
7	Piston rod	**17**	Stepseal
8	Piston	**18**	Rimseal
9	Nut	**19**	Scraper ring
10	Slide rings		

The piston-side cylinder bearing **1** is designed as a fork.

The piston-side cylinder bearing **1** and the ring-side cylinder bearing **3** are links with a bearing bushing.

The piston **8** is bolted to the piston rod **7** and secured with the nut **9**.

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11	Hydraulic oil temperature sensor B8	**40**	Control pressure proportional valve Y59	**71**	Gear motor
12	Drain valve	**41**	Fine strainer	**72**	Proportional pressure relief valve
13	Working hydraulics pump suction port	**42**	Check valve	**73**	Restrictor
14	Brake system gear pump suction port	**43**	Pilot control, gear shifting	**74**	Primary piston
15	Emergency steering pump suction port	**45**	**Travel motor 2**	**75**	Secondary piston with proportional solenoid Y13
16	Transmission return flow	**46**	Axial piston pump	**76**	80 µm in-line filter
17	Compact brake valve return flow	**47**	Check valve	**77**	Hydraulic oil cooler
18	Pilot control unit return flow	**48**	Check valve	**78**	Temperature valve
19	Working hydraulics pump leak oil	**49**	Proportional valve and control piston Y57	**79**	Collector pipe
20	Servostat return flow	**50**	Servo piston	**80**	0.25 bar check valve
21	Control valve block return flow	**51**	Discharge valve	**X1**	Forward travel direction servo pressure
25	**Travel pump**	**52**	Orifice	**G**	Replenishing pressure
26	Replenishing pump	**53**	Pressure relief valve	**MH**	Travel pump high pressure
27	Towing bypass valve	**55**	**Travel motor 1**	**M1**	Travel motor 1 servo pressure
28	Shuttle valve	**56**	Axial piston pump	**M2**	Travel motor 2 servo pressure
29	Pressure cut-off valve	**57**	Check valve	**PK**	Cooling system high pressure
30	Forward high pressure relief valve	**58**	Check valve		
31	Reverse high pressure relief valve	**59**	Servo piston		

The travel hydraulics is a closed circuit. This means that after leaving the consumers (travel motors), the oil flows directly back to the pump (travel pump).

The travel hydraulics function hydrostatically. The travel pump **25** converts the rotary movement of the engine **66** into a piston stroke movement (axial piston pump). The piston stroke pumps the oil. The travel motors also use a piston stroke movement to convert the flow of oil into a rotary movement (axial piston motor). There is no slip with this kind of drive.

Leakages in the rotary groups and the discharge **51** of travel motor 2 mean that oil constantly flows out of the closed circuit. This oil is collected in the collector pipe **79** and then cooled in the hydraulic oil cooler **77**.

The replenishing pump **26** replaces the missing oil. The replenishing pump **26** draws up oil from the hydraulic tank **1** and pumps into the closed circuit on the low pressure side.

The replenishing pump **26** also provides the two travel motors with oil. This oil lubricates and cools the travel motors.

2.2 Travel direction

The travel direction is determined by the flow direction of the oil in the closed circuit. To change the travel direction, the high pressure and low pressure are swapped. The travel pump does this by moving over the zero position in the opposite direction.

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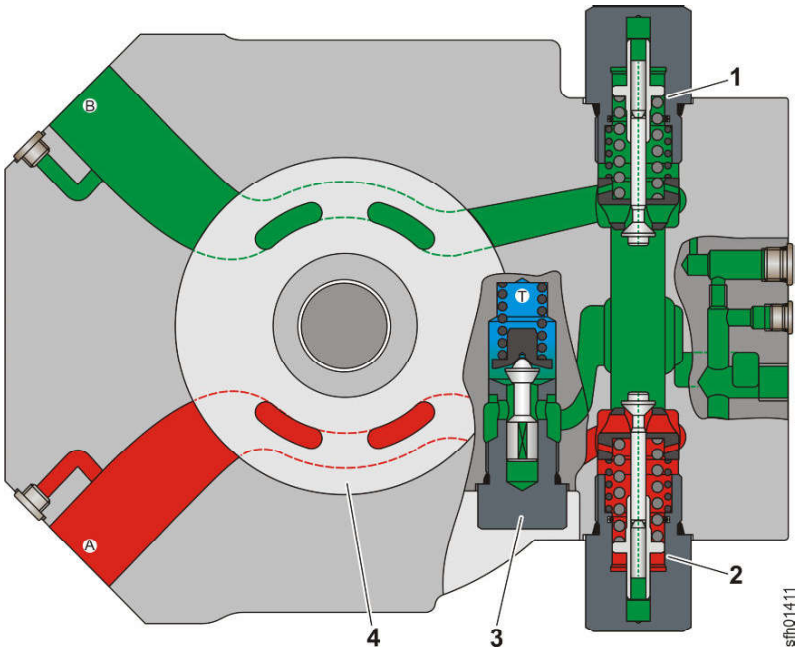

Fig. 309: Sectional view of front side

1 Reverse high pressure relief valve
2 Forward high pressure relief valve
3 Replenishing pressure relief valve
4 Control lens

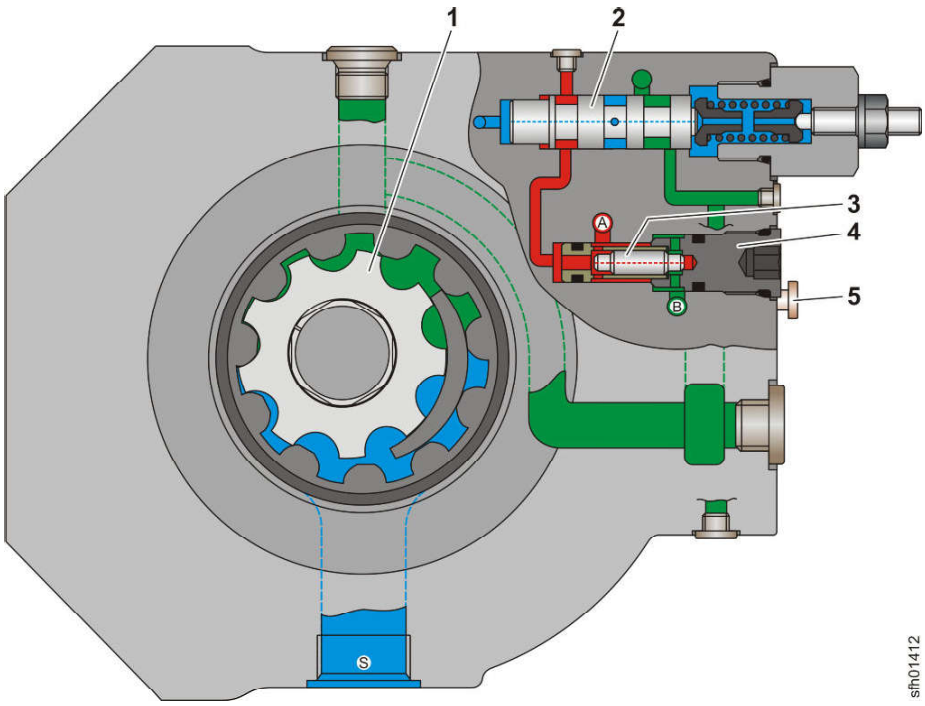

Fig. 310: Sectional view of replenishing pump

1 Replenishing pump
2 Pressure cut-off valve
3 Shuttle valve
4 Towing bypass valve
5 Stop bolt for towing bypass valve

2.9 High pressure relief valve

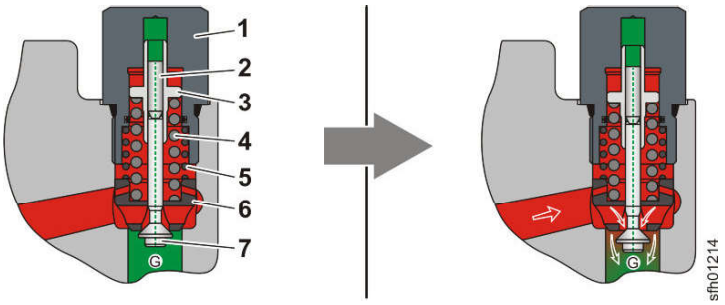

Fig. 320: High pressure relief valve closed / open (excess pressure)

1 Plug
2 Lock screw
3 Valve bearing
4 Pressure relief compression spring
5 Replenishing compression spring
6 Valve seat
7 Valve piston

The high pressure relief valves protect the closed circuit from excess pressure.

The high pressure relief valves always react faster than the pressure cut-off. They therefore primarily relieve pressure peaks such as those that arise when driving into a pile of material too quickly.

The valve piston **7** is pushed against the pressure relief compression spring **4**. Oil flows from the high pressure side through the replenishing pressure duct **G** to the low pressure side.

2.10 Replenishing function

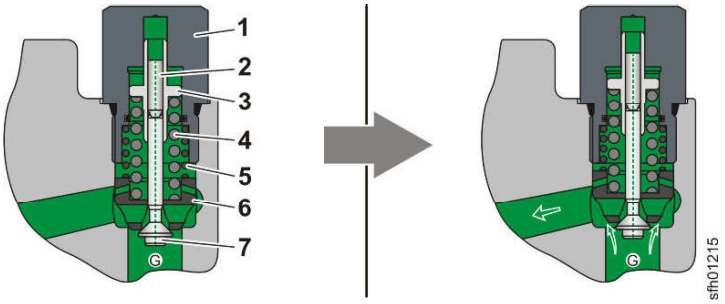

Fig. 321: High pressure relief valve closed / open (replenishing)

1 Plug
2 Lock screw
3 Valve bearing
4 Pressure relief compression spring
5 Replenishing compression spring
6 Valve seat
7 Valve piston

The replenishing function of the high pressure relief valve replaces lacking oil in the closed circuit with replenishing oil. The oil is supplied on the low pressure side.

Oil is lost from the closed circuit due to:
– Leakage in the variable displacement pump
– Leakages in the travel motors
– Discharge in travel motor 2 (cooling)

When replenishing, the valve plate **6** is pushed against the replenishing compression spring **5**. Oil flows from the replenishing pressure duct **G** to the low pressure side of the closed circuit.

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If no travel direction is selected (neutral travel direction), both chambers of the servo cylinder are relieved towards the pump housing **T**. The springs **4** and **5** hold the servo cylinder **2** in the zero position (0° angle). The pump does not deliver any oil.

If a travel direction is selected, one of the two chambers of the servo cylinder **2** is acted on by control pressure **9**. The servo cylinder **2** is pushed against the compression springs **4** and **5**. The variable displacement pump is moved to a greater angle. The angle depends on the amount of control pressure and on the high pressure (restoring force).

The oil displaced from the depressurised side by the movement of the servo cylinder **2** flows into the pump housing **T**. The swivel restrictors **6** and **11** reduce the oil flow and restrict the movement.

2.6 Regulation of the variable displacement pump

The flow rate depends on:
- Plate angle
- Engine speed

In turn, the plate angle depends on:
- Selected travel direction (travel direction valve)
- Energisation of the control pressure proportional valve
- Load (operating pressure)

2.6.1 Travel direction valve

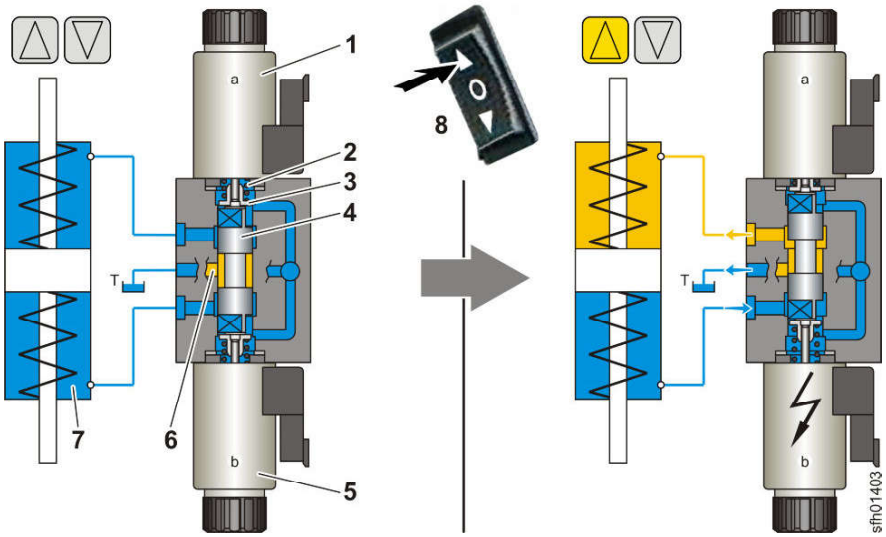

Fig. 332: Neutral/forward travel direction valve

1	Reverse travel direction solenoid Y3	**5**	Forward travel direction solenoid Y2
2	Return spring	**6**	Control pressure
3	Spring cup	**7**	Servo cylinder
4	Valve piston	**8**	*Travel direction* switch

The travel direction valve determines the swivel direction (+/-) and thus the direction of flow of the variable displacement pump, by the valve piston **4** directing control oil to one side of the servo cylinder **7**. The valve piston **4** is moved by the two magnets for forward travel direction **5** and reverse travel direction **1**.

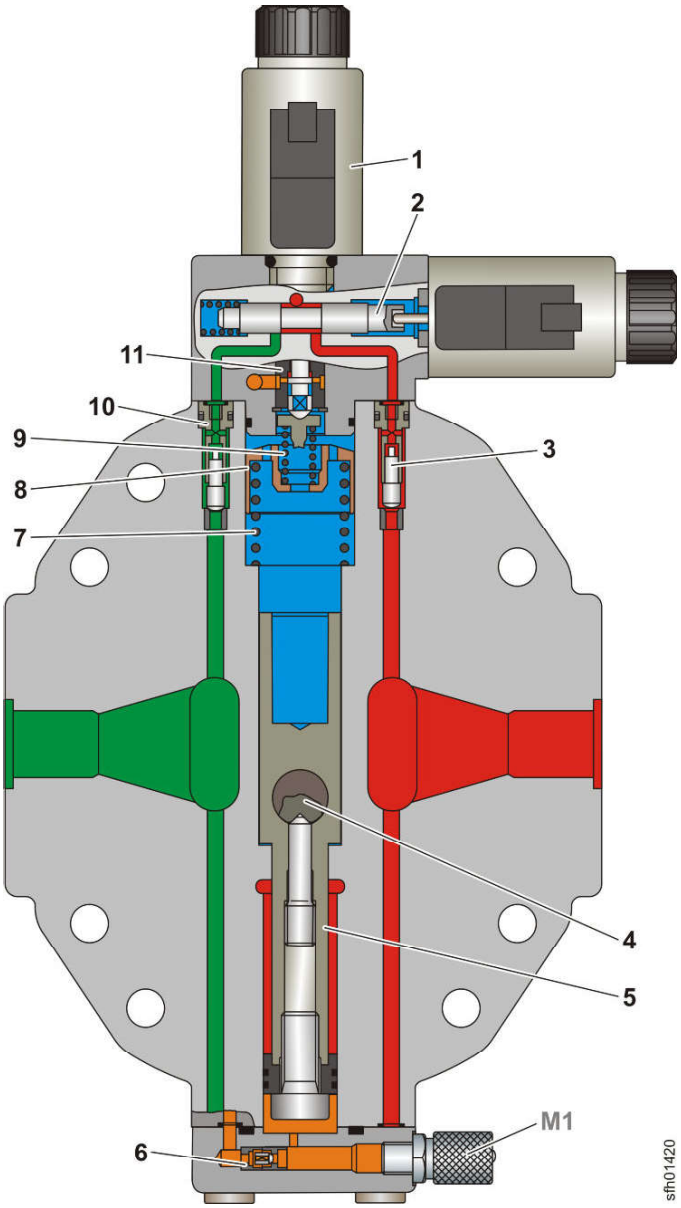

Fig. 342: Sectional view of Positioning piston

1	Travel range 1 solenoid Y58	**7**	Return spring
2	Travel direction solenoid valve Y26	**8**	Spring bushing
3	Check valve	**9**	Regulating spring
4	Control pin	**10**	Check valve
5	Positioning piston	**11**	Control piston
6	Swivel restrictor	**M1**	Travel motor 1 servo pressure test connection

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variable displacement motor moves to the smaller angle until the spring force and solenoid force are in equilibrium again.

2.2.1 Supply of current

The proportional solenoid Y57 is energised by the central control unit.

The central control unit calculates the current needed. When doing so, the following parameters are considered:
- Gear
- Accelerator pedal position, travel speed
- Controlling the maximum load
- Overspeed

Gear

In 1st gear, the proportional solenoid Y57 is always supplied with the maximum current. This keeps the variable displacement motor at the maximum angle.

In 2nd gear, the proportional solenoid Y57 is supplied with varying current levels.

In 3rd gear, travel motor 2 is decoupled. The proportional solenoid Y57 is not energised. The variable displacement motor is at the minimum angle.

Accelerator pedal position, travel speed

In 2nd gear, the proportional solenoid Y57 is supplied with current according to the travel speed.

The faster the machine travels, the less current is supplied to the proportional solenoid Y57.

Controlling the maximum load

If too much power is taken from the engine, the engine speed is suppressed.

The central control unit increases the current to the proportional solenoid Y57. This moves the variable displacement motor to a larger angle. The output torque rises. The power taken drops.

Overspeed

If, when travelling downhill, the engine speed is too high, the central control unit reduces the current to the proportional solenoid Y57. This moves the variable displacement motor to a smaller angle. The hydrostatic braking effect falls.

2.3 Discharging (cooling)

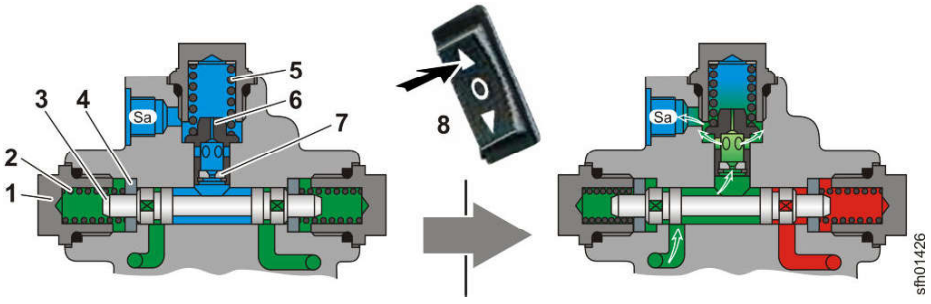

Fig. 352: Discharge valve - machine stationary / machine moving forward

1	Cap	**5**	Regulating spring
2	Return spring	**6**	Pressure relief valve piston
3	Discharge valve piston	**7**	Orifice
4	Spring cup	**8**	*Travel direction* switch

The filtered oil that is not required by the replenishing pump flows into the steel tank via the pre-tension valve.

2.6 Bypass valve

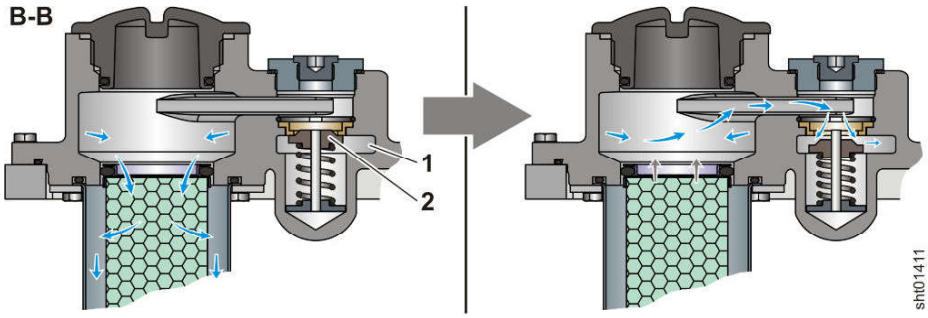

Fig. 361: Bypass valve closed / open

The bypass valve **1** protects the filter unit from excessive pressure.

If insufficient oil passes through the return suction filter because the hydraulic oil is cold or the return suction filter is very dirty, some of the oil flows via the bypass valve **1** into the return strainer **2**.

This prevents the hydraulic components being damaged.

080.1.3 Breather filter

Valid for: L542-1269/24755-;

1 Layout

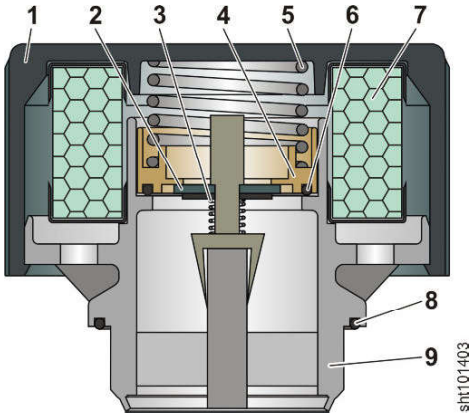

Fig. 362: Breather filter

1	Filter housing	**6**	O-ring
2	Inlet valve	**7**	Fine filter
3	Compression spring	**8**	O-ring
4	Outlet valve	**9**	Inner housing
5	Compression spring		

The breather filter consists of an oil-resistant, corrosion-proof plastic housing **1** and **9**, in which a fine filter **7** folded in a star shape is inserted. The breather filter contains a spring-loaded inlet valve **2** and a spring-loaded outlet valve **4**.

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9 9 bar check valve
10 2.5 bar bypass valve
11 Hydraulic oil temperature sensor B8
12 Drain valve
13 Replenishing pump suction port
14 Fan gear pump suction port
15 Brake system gear pump suction port
16 Transmission return flow
17 Compact brake valve return flow
18 Pilot control unit return flow
19 Fan gear motor leak oil
20 Travel pump leak oil
21 Hydraulic oil cooler return flow
22 Hydraulic oil cooler bypass return flow
33 Dummy piston
34 Flow regulator
35 **Travel pump**
36 Engine
40 **Control valve block**
41 Priority valve
42 Restrictor
43 Check valve
44 LS steering pressure cut-off
45 LS working hydraulics pressure cut-off
46 Flow regulating valve
47 Compact brake valve (housing preheating)
48 Ride control
50 **Emergency steering pump**
60 **Servostat**
61 Valve spool
62 Metering pump
63 Secondary pressure relief valve for steering to the left
64 Secondary pressure relief valve for steering to the right
65 Left replenishing valve
66 Right replenishing valve
67 Left steering cylinder
68 Steering damper hydro accumulator (optional)
69 Steering damper hydro accumulator (optional)
70 Right steering cylinder
P Working hydraulics pump high pressure
P1 Steering system high pressure
LS Working hydraulics load sensing pressure

The steering system is supplied with oil by the working hydraulics pump **25** via the control valve block **40**.

When steering, the servostat **60** generates a load sensing signal. This load sensing signal activates the priority valve **41** in the control valve block and the working hydraulics pump **25** via the check valve **43**.

The priority valve **41** in the control valve block supplies the oil in the working hydraulics pump from the working hydraulics to the servostat **60**. The oil supply for the steering system has priority. Only the amount of oil actually needed by the steering system is supplied. The working hydraulics are only supplied with what is left over.

If the working hydraulics pump fails to supply the oil, the central control unit activates the emergency steering function. Here the electrically powered emergency steering pump **50** pumps oil to the servostat and enables further steering movement.

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090.5 Emergency steering

090.5.1 Emergency steering overview

Valid for: L542-1269/24755-;

1 Layout

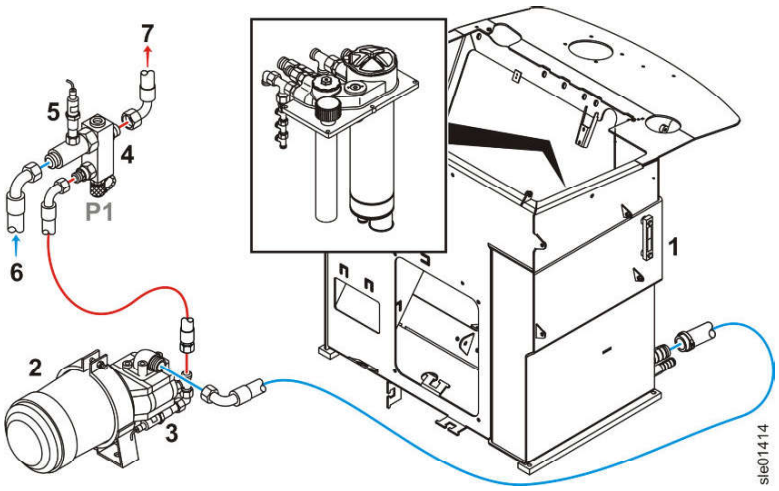

Fig. 380: Emergency steering is active

1	Hydraulic tank	**5**	Emergency steering pressure switch B3
2	Emergency steering pump	**6**	Control valve block and working hydraulics pump
3	Emergency steering check pressure switch B3a	**7**	Servostat
4	Valve block	**P1**	Steering system high pressure test connection

The emergency steering system consists of the following components:
- Hydraulic tank (For more information see: 080.1.1 Overview of the hydraulic tank, page 080-2)
- Emergency steering pump (For more information see: 090.5.2 Emergency steering pump, page 090-20)
- Valve block (For more information see: 090.5.4 Valve block, page 090-25)
- Electronic control unit (For more information see: Overview of the electronic control system, page 090-22)

2 Function

The emergency steering supplies the servostat with oil for a brief time if the working hydraulics pump fails. As the emergency steering pump works electrically with power from the vehicle battery, the emergency steering is still able to work even when the engine is not running.

When the emergency steering is activated, the emergency steering pump draws oil from the hydraulic tank and pumps it to the valve block. The oil then flows from the valve block to the servostat.

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– Brake system gear pump
– Compact brake valve

The following components are also part of the service brake (For more information see: 100.3.1 Overview of the service brake, page 100-12) :
– Service brake hydro accumulator
– Brake light pressure switch
– Accumulator charge pressure switch
– Wet disc brakes (axles)

The following components are also part of the parking brake (For more information see: 100.4.1 Overview of the parking brake, page 100-18) :
– Disc brake
– Parking brake hydro accumulator

2 Function

The brake system gear pump draws up oil from the hydraulic tank and pumps it to the compact brake valve. The hydraulic accumulators of the brake system are charged via the compact brake valve.

Once the hydraulic accumulators are charged, the oil flows back into the hydraulic tank via the control block.

The oil from the hydraulic accumulators is used for braking (engaging the service brake or releasing the parking brake).

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- Brake system gear pump (For more information see: 100.2.1 Brake system gear pump, page 100-4)
- Compact brake valve (For more information see: 100.2.2 Compact brake valve, page 100-5)
- Service brake hydro accumulator (For more information see: 100.3.2 Service brake hydro accumulator, page 100-15)
- Brake light pressure switch (For more information see: 100.3.3 Brake light pressure switch , page 100-16)
- Accumulator charge pressure switch (For more information see: 100.3.4 Accumulator charge pressure switch, page 100-17)
- Wet disc brakes (axles) (For more information see: Service brake (wet disc brake), page 130-5)

2 Function

2.1 Basic function

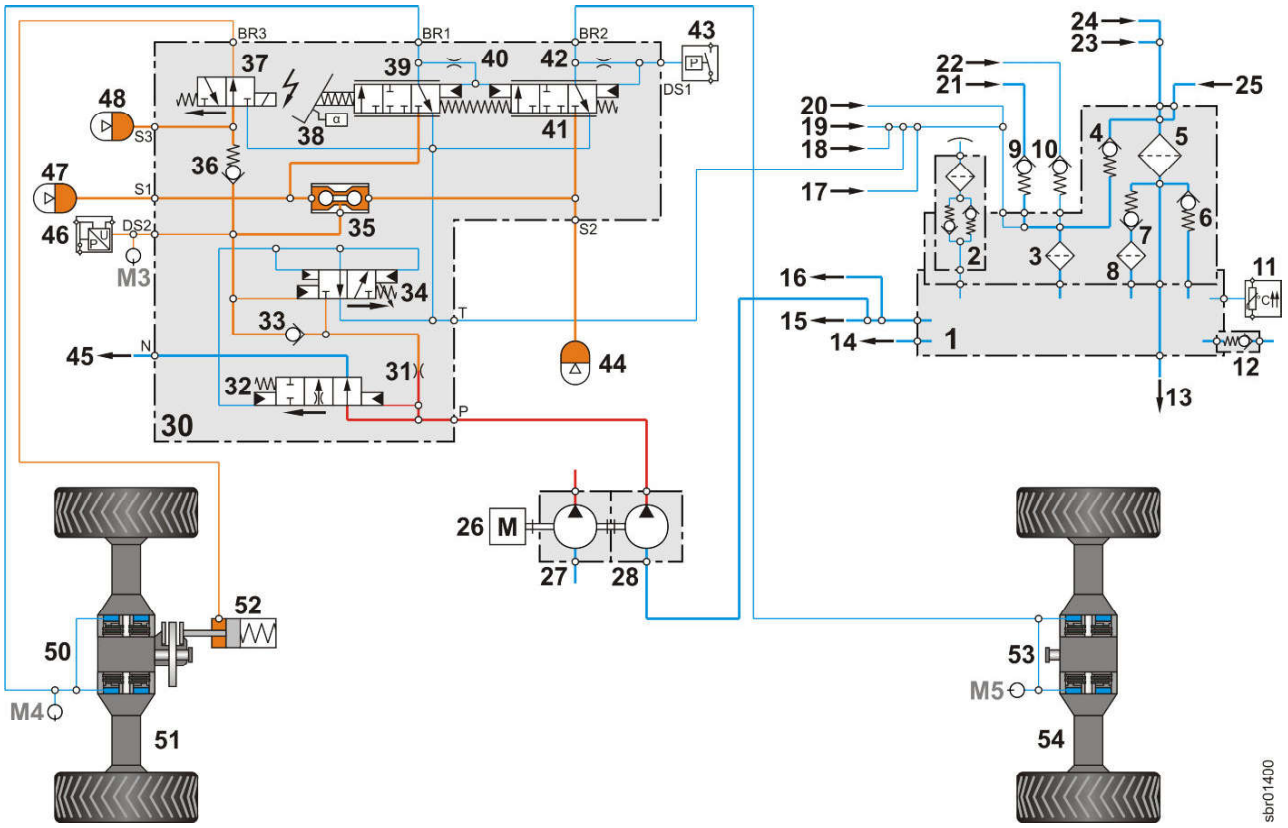


Fig. 406: Hydraulic diagram of the brake system

1	**Hydraulic tank**	**20**	Working hydraulics pump leak oil	**40**	Restrictor
2	Breather filter	**21**	Servostat return flow	**41**	Pressure regulator piston for 2nd brake circuit
3	Return strainer	**22**	Travel pump leak oil	**42**	Restrictor
4	Bypass valve	**23**	Hydraulic oil cooler return flow	**43**	Brake light pressure switch B12
5	Return suction filter	**24**	Hydraulic oil cooler bypass return flow	**44**	Service brake hydro accumulator (rear axle)

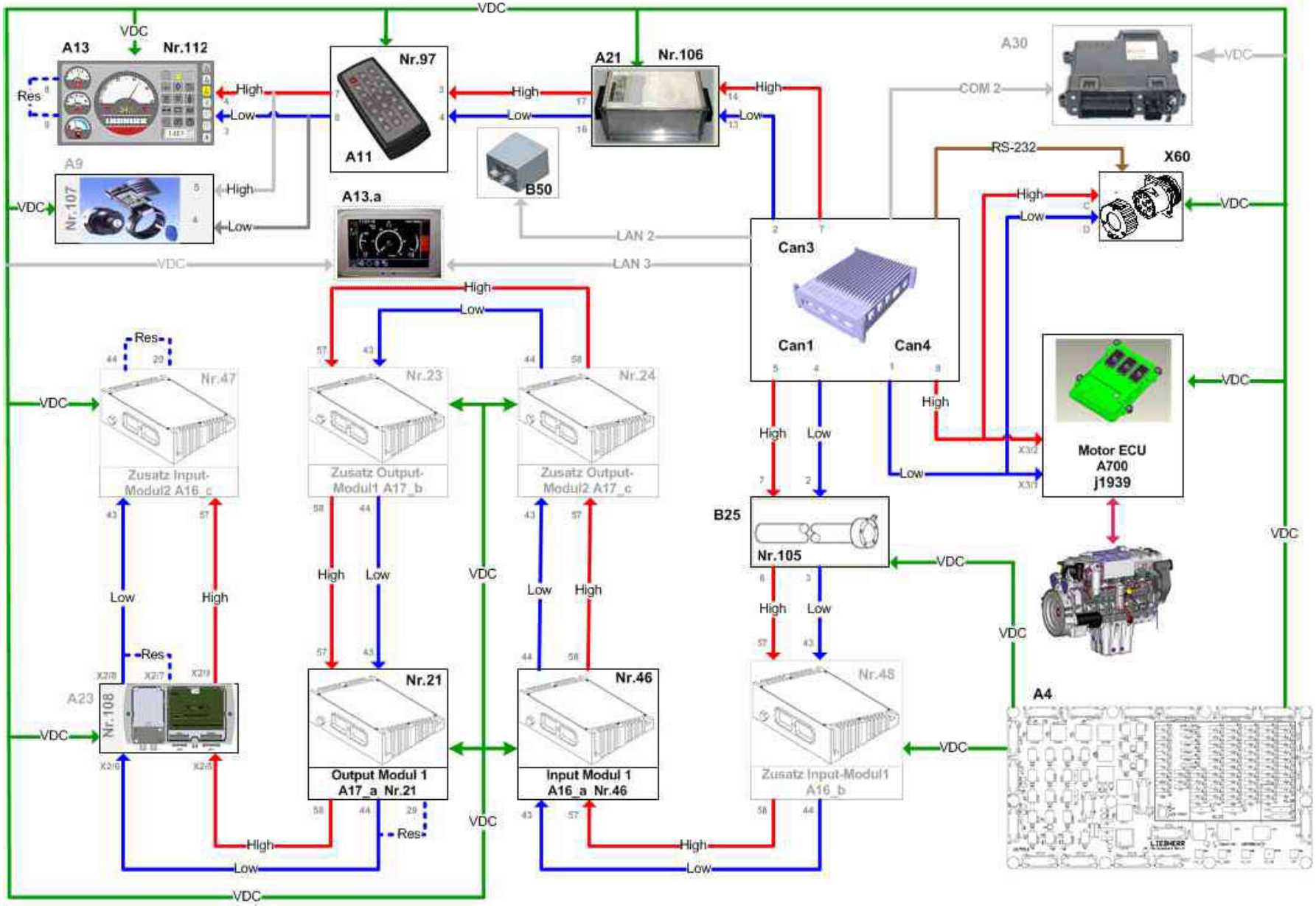
See next page for continuation of the image legend

110 Electrical system

Contents

LBH/11657128/10/211-20191203_0814418/en

BLOCKSCHALTBILD L524/1266 – L542/1269



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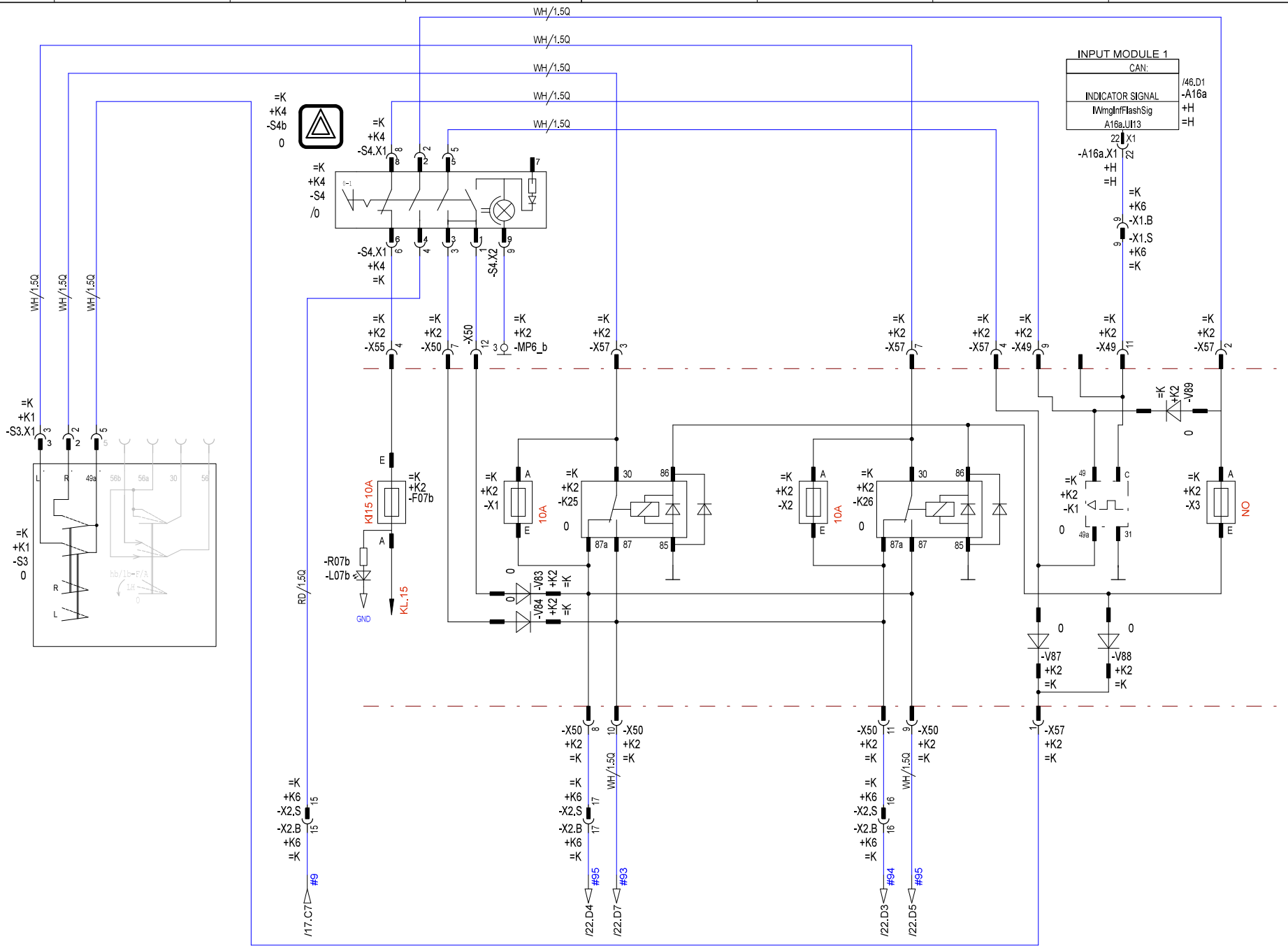
TYPE:	ab: bis: O	LIEBHERR BISCHOFSHOFEN	BLOCK DIAGRAM	SIDE: 1 88 DATE: 03.03.2014 15:24

BMK	SYSTEM	PLACE	FUNCTION	SHEET
-MP6_p *	=K	+K2	MASS GROUPING BLOCK	/75.F3
-MP6_r *	=K	+K2	MASS GROUPING BLOCK	/76.F6
-MP6_s *	=K	+K2	MASS GROUPING BLOCK	/77.D2
-MP6_t *	=K	+K2	MASS GROUPING BLOCK	/85.E6
-MP6_u *	=K	+K2	MASS GROUPING BLOCK	/86.F5
-MP6_v	=K	+K2	MASS GROUPING BLOCK	/87.F3
-MP7_a	=K	+K3	MASS GROUPING BLOCK	/23.F4
-MP7_b	=K	+K3	MASS GROUPING BLOCK	/35.F7
-OLE300 *	=K	+K4	LINE END	/36.B8
-OLE301 *	=K	+K4	LINE END	/36.B7
-OLE301 *	=K	+K2	LINE END	/36.B8
-OLE310 *	=K	+K4	LINE END	/39.B5
-OLE312 *	=K	+K2	LINE END	/24.C8
-OLE318 *	=K	+K2	LINE END	/35.C2
-P1	=K	+K1	WORKING HOUR METER	/18.E7
-P1.X1	=K	+K1	PLUG WORKING HOUR METER	/18.E7
-P1.X2	=K	+K1	PLUG WORKING HOUR METER	/18.E7
-R1	=K	+K6	INCH PEDAL	/34.C3
-R1	=K	+K2	DROP RESISTOR	/40.B5
-R1.X	=K	+K6	PLUG INCH PEDAL	/34.C3
-R2	=K	+K2	DROP RESISTOR	/22.B5
-R3	=K	+K2	DROP RESISTOR	/22.B5
-R4	=K	+K2	DROP RESISTOR	/22.B6
-R5	=K	+K2	DROP RESISTOR	/22.B6
-R5	=K	+K6	SPEED-PEDAL	/34.C7
-R5.X	=K	+K6	PLUG SPEED-PEDAL	/34.C6
-R6	=K	+K2	DROP RESISTOR	/22.B4
-R6a *	=K	+K3	MIRROR HEATING LEFT	/36.D1
-R6a.X *	=K	+K3	PLUG MIRROR HEATING LEFT	/36.D1
-R6b *	=K	+K3	MIRROR HEATING RIGHT	/36.D2
-R6b.X *	=K	+K3	PLUG MIRROR HEATING RIGHT	/36.D2
-R7	=K	+K2	DROP RESISTOR	/22.B4
-R8	=K	+K2	DROP RESISTOR	/35.B1
-R8a	=K	+K2	DROP RESISTOR	/35.B2
-R9	=K	+K2	DROP RESISTOR	/33.B2
-R9a	=K	+K2	EXCITATION 100 OHM	/18.B3

BMK	SYSTEM	PLACE	FUNCTION	SHEET
-R9b	=K	+K2	EXCITATION 220 OHM	/18.B4
-R07b	=K	+K2	DROP RESISTOR	/21.D3
-R10	=K	+K2	DROP RESISTOR	/28.B4
-R11	=K	+K3	REAR WINDOW HEATER	/36.D3
-R11	=K	+K2	DROP RESISTOR	/27.B2
-R11.X1	=K	+K3	PLUG REAR WINDOW HEATER	/36.D3
-R11.X2	=K	+K3	PLUG REAR WINDOW HEATER	/36.D3
-R12	=K	+K2	DROP RESISTOR	/32.B2
-R13	=K	+K2	DROP RESISTOR	/32.B3
-R13 *	=M	+M	FUEL PREHEATING	/78.E4
-R13.X *	=M	+M	PLUG FUEL PREHEATING	/78.E4
-R14	=K	+K2	DROP RESISTOR	/63.B5
-R15	=K	+K2	DROP RESISTOR	/19.C5
-R16	=K	+K2	DROP RESISTOR	/17.D4
-R17	=K	+K2	DROP RESISTOR	/17.D6
-R18	=K	+K2	DROP RESISTOR	/24.B2
-R19	=K	+K2	DROP RESISTOR	/44.B6
-R19a	=K	+K2	DROP RESISTOR	/44.B7
-R20	=K	+K2	DROP RESISTOR	/24.B8
-R21	=K	+K2	DROP RESISTOR	/38.C8
-R22	=K	+K2	DROP RESISTOR	/23.C7
-R23	=K	+K2	DROP RESISTOR	/31.B5
-R24	=K	+K2	DROP RESISTOR	/62.C1
-R25	=K	+K2	DROP RESISTOR	/36.B5
-R26	=K	+K2	DROP RESISTOR	/30.C4
-R27	=K	+K2	DROP RESISTOR	/23.C6
-R28	=K	+K2	DROP RESISTOR	/39.C2
-R29	=K	+K2	DROP RESISTOR	/17.D3
-R30	=K	+K2	DROP RESISTOR	/35.B6
-R31a	=K	+K2	DROP RESISTOR	/25.D3
-R31a1	=K	+K2	DROP RESISTOR	/25.D5
-R31a2	=K	+K2	DROP RESISTOR	/26.C2
-R31a3	=K	+K2	DROP RESISTOR	/26.C5
-R35	=K	+K2	DROP RESISTOR	/69.C3
-R36	=K	+K2	DROP RESISTOR	/37.B2
-R37	=K	+K2	DROP RESISTOR	/37.B3



93012460_003
93012460
1269 00090 01 00 003

TYPE:

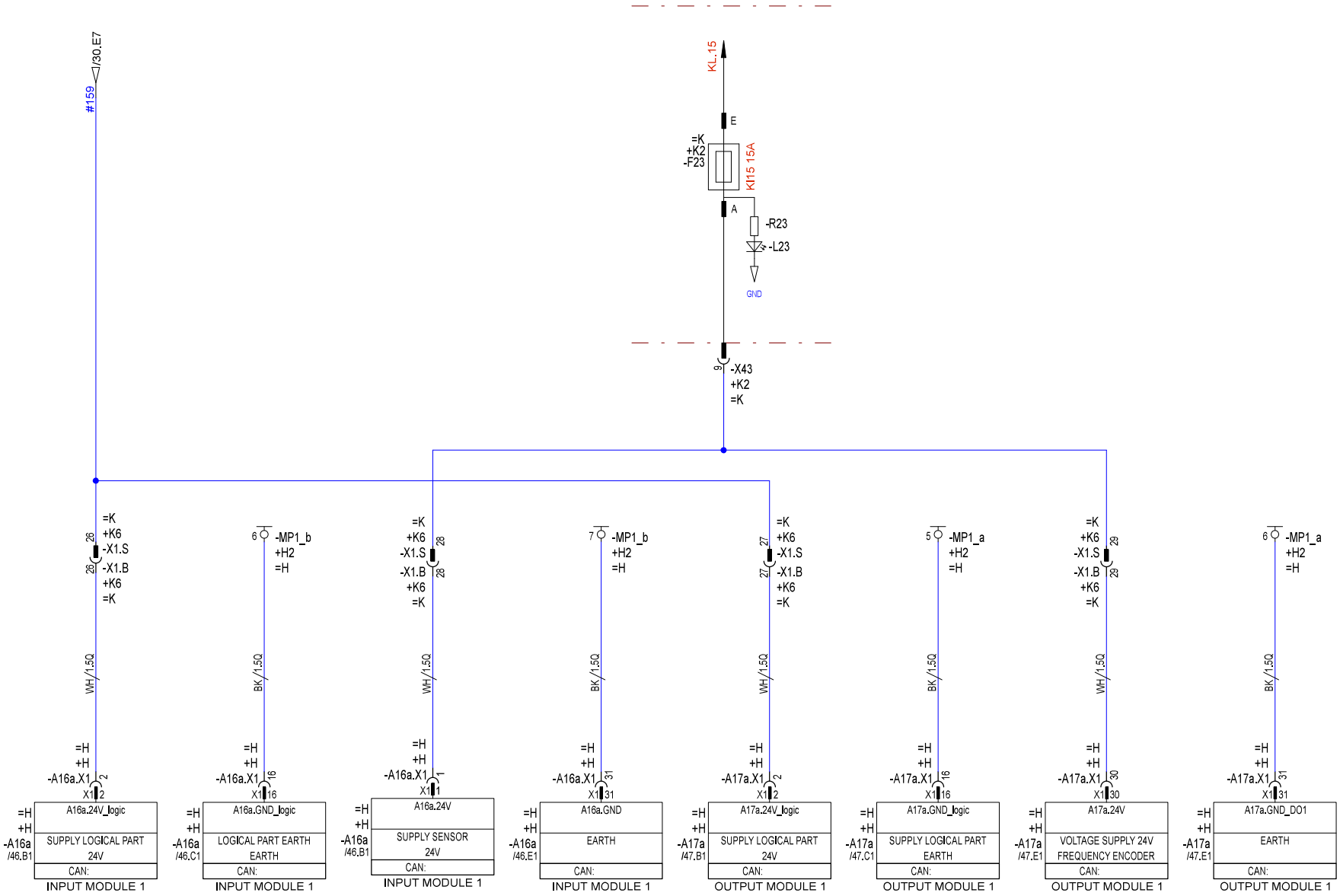
ab:
bis: 0

LIEBHERR
BISCHOFSHOFEN

SELECTION INDICATOR

SIDE: 21 88

DATE: 03.03.2014 15:24



TYPE:

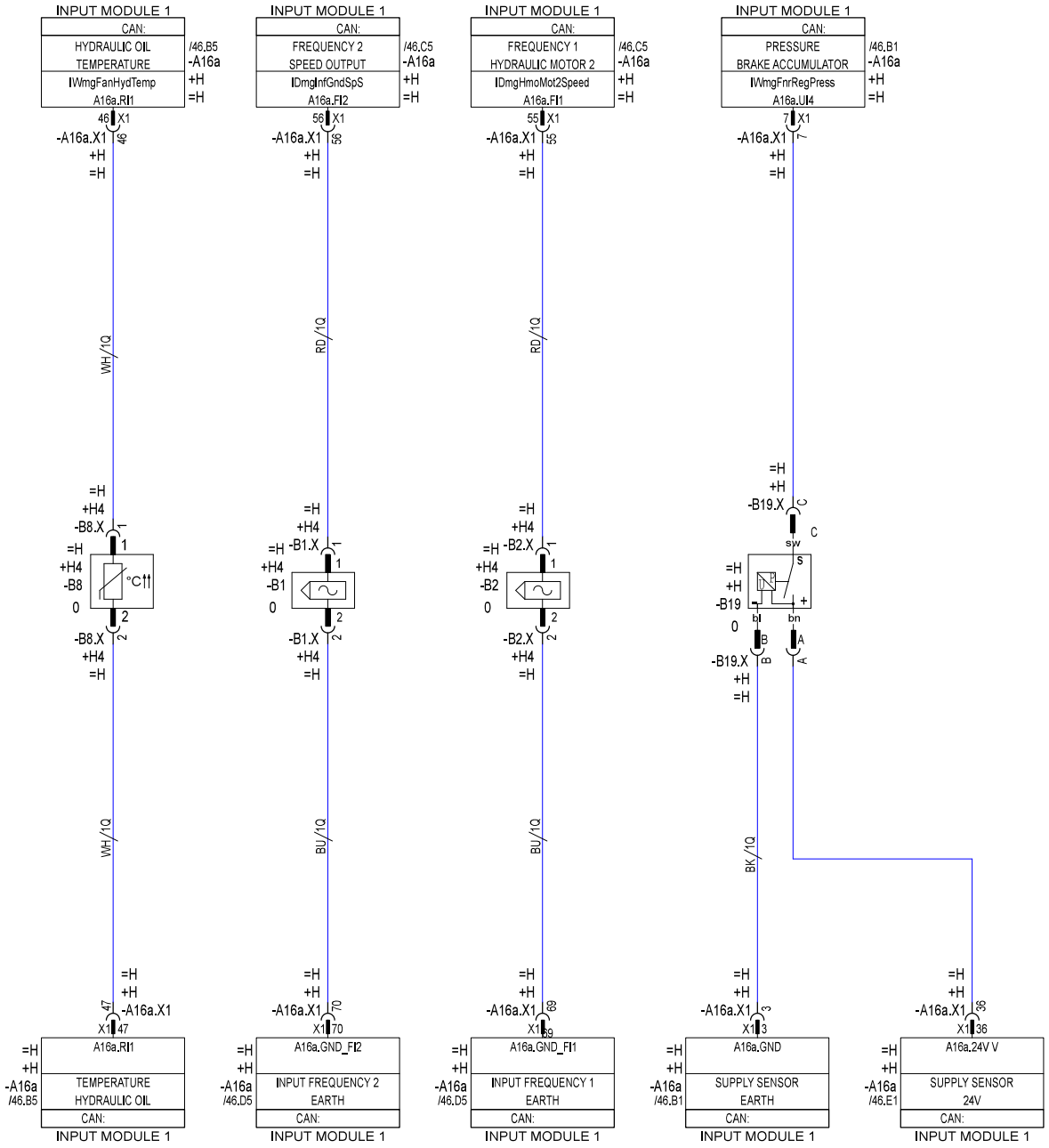
ab:
bis: O

LIEBHERR
BISCHOFSHOFEN

SUPPLY MODULES

SIDE: 31 88

DATE: 03.03.2014 15:24



93012460_003
93012460
1269 00090 01 00 003

TYPE:

ab:
bis: O

LIEBHERR
BISCHOFSHOFEN

TEMPERATURE SPEED AND PRESSURE SENSOR

SIDE: 41 88

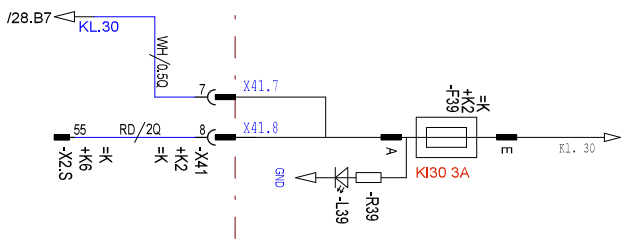
DATE: 03.03.2014 15:24

93012460_003
93012460
1269 00090 01 00 003

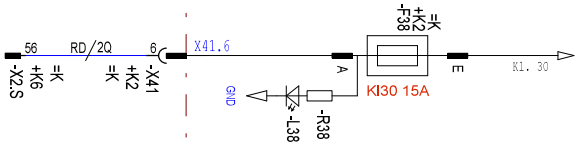
TYPE:

ab:
bis: 0

SUPPLY DOSING PUMP
(RESERVE)

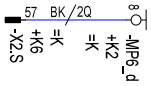


SUPPLY FUEL PUMP
(RESERVE)

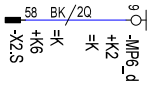


LIEBHERR
BISCHOFSHOFEN

EARTH DOSING PUMP
(RESERVE)



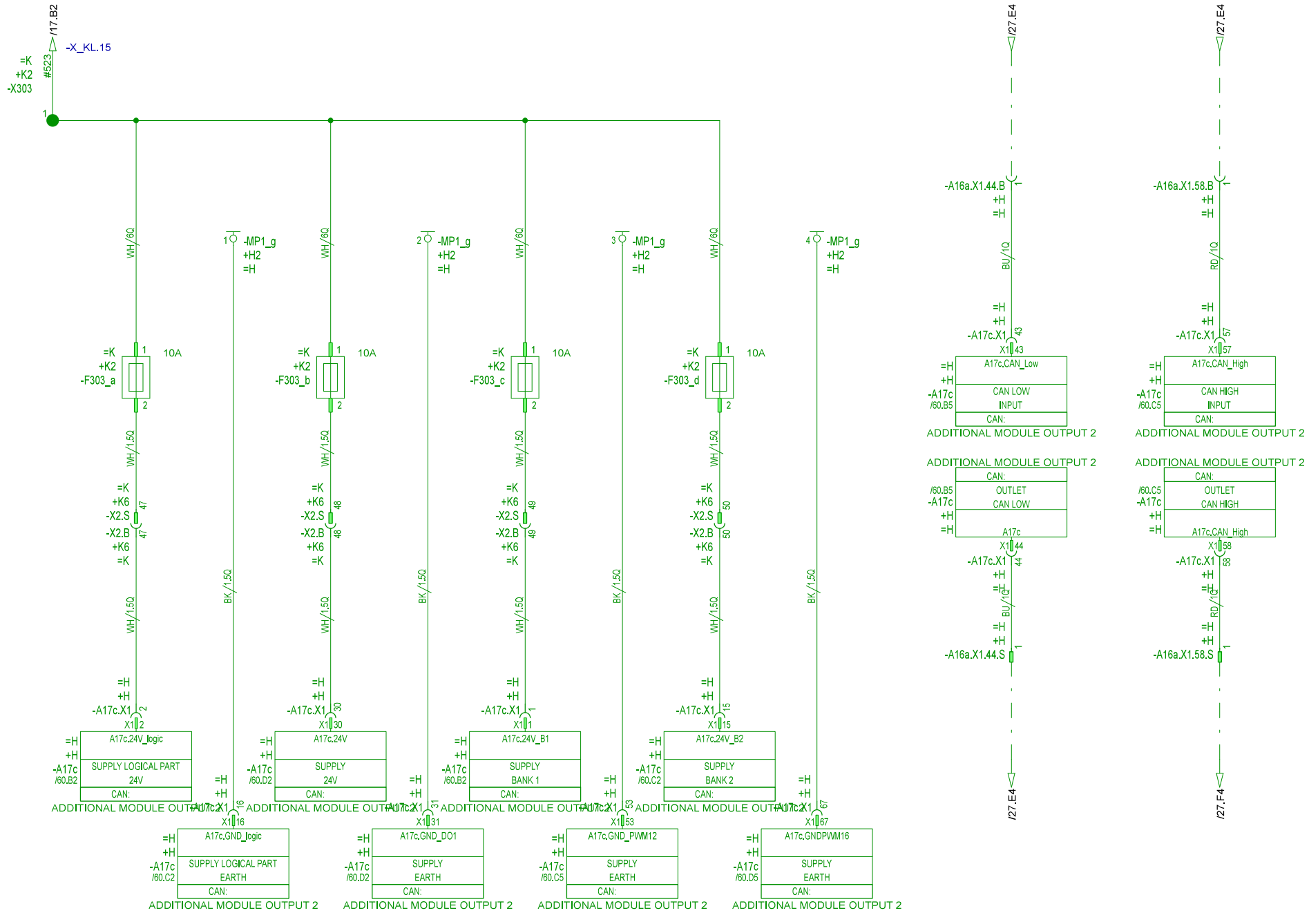
EARTH FUEL PUMP
(RESERVE)



RESERVE FUSES
OPTION

DATE: 03.03.2014 15:24

SIDE: 51 88



TYPE:

ab:
bis: O

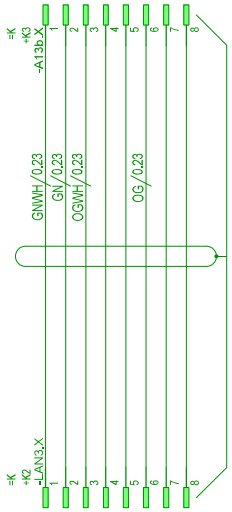
LIEBHERR
BISCHOFSHOFEN

SUPPLY ADDITIONAL MODULE OUTPUT 2

SIDE: 61 88

DATE: 03.03.2014 15:24

93012460_003
93012460
1269 00090 01 00 003



PLUG CONTROL DEVICE LAN 3

-A13a.X
+K3
=K

WH/1.5Q
BK/1.5Q

/28.C4
#533

=K
+K2
-MP6_k

PLUG CONTROL DEVICE LAN 2

-X_KL.15
/17.B2
#523

-KL.15
+K2
=K

WH/8Q

=K
+K2
-F10a
2A

-MP6_I
+K2
=K

BK/1.5Q
WH/1.5Q

=K
+K2
-A50.X3

=K
+K2
-A50.X2
BK/0.23
RD/0.23

GNWH/0.23
GN/0.23
OGWH/0.23
OG/0.23

=K
+K2
-A50.X1

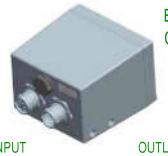
-LAN2
+K2
=K

Y-CON
RJ45

=K
+K2
-A50

=K
+K2
-A51

=H
+H
-B50



ETHERNET
CAMERA

INPUT
ETHERNET
TX+
RX+
GND
TX-
RX-
+28V

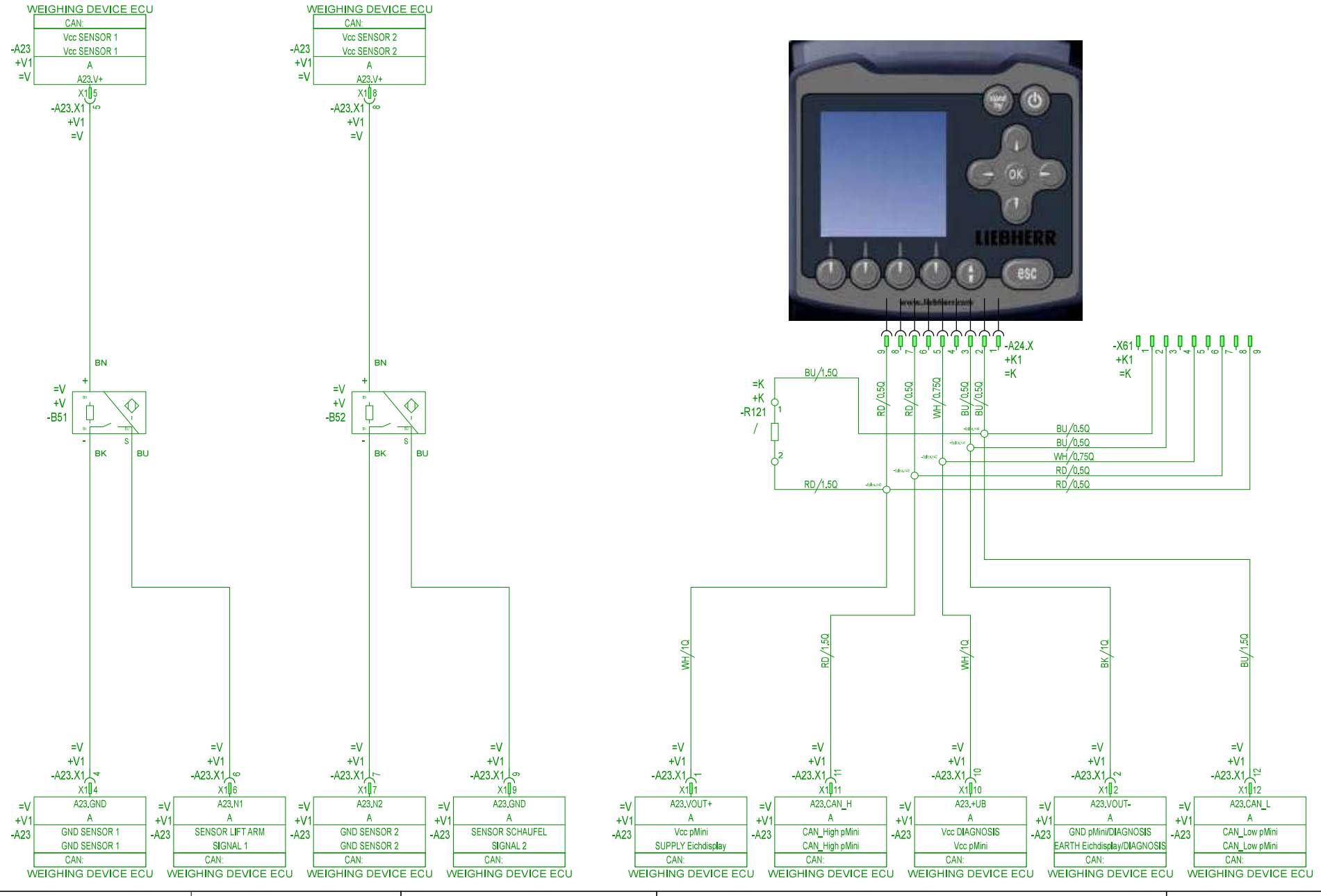
OUTLET
ETHERNET
RX+
TX+
GND
RX-
TX-
+28V

-B50.X1
+H
=H

TYPE:	ab: bis: O	LIEBHERR BISCHOFSHOFEN	PME DISPLAY AND BACK UP CAMERA

SIDE: 71 88
DATE: 03.03.2014 15:24

93012460_003
93012460
1269 00090 01 00 003



TYPE:	ab: bis: O	LIEBHERR BISCHOFSHOFEN	WEIGHING DEVICE LIEBHERR	SIDE: 81 88 DATE: 03.03.2014 15:24

ENGINE

4045HFC92

WITH ENGINE ELECTRONICS

93024689_000
93024689
1269 00091 01 00 000

TYPE:

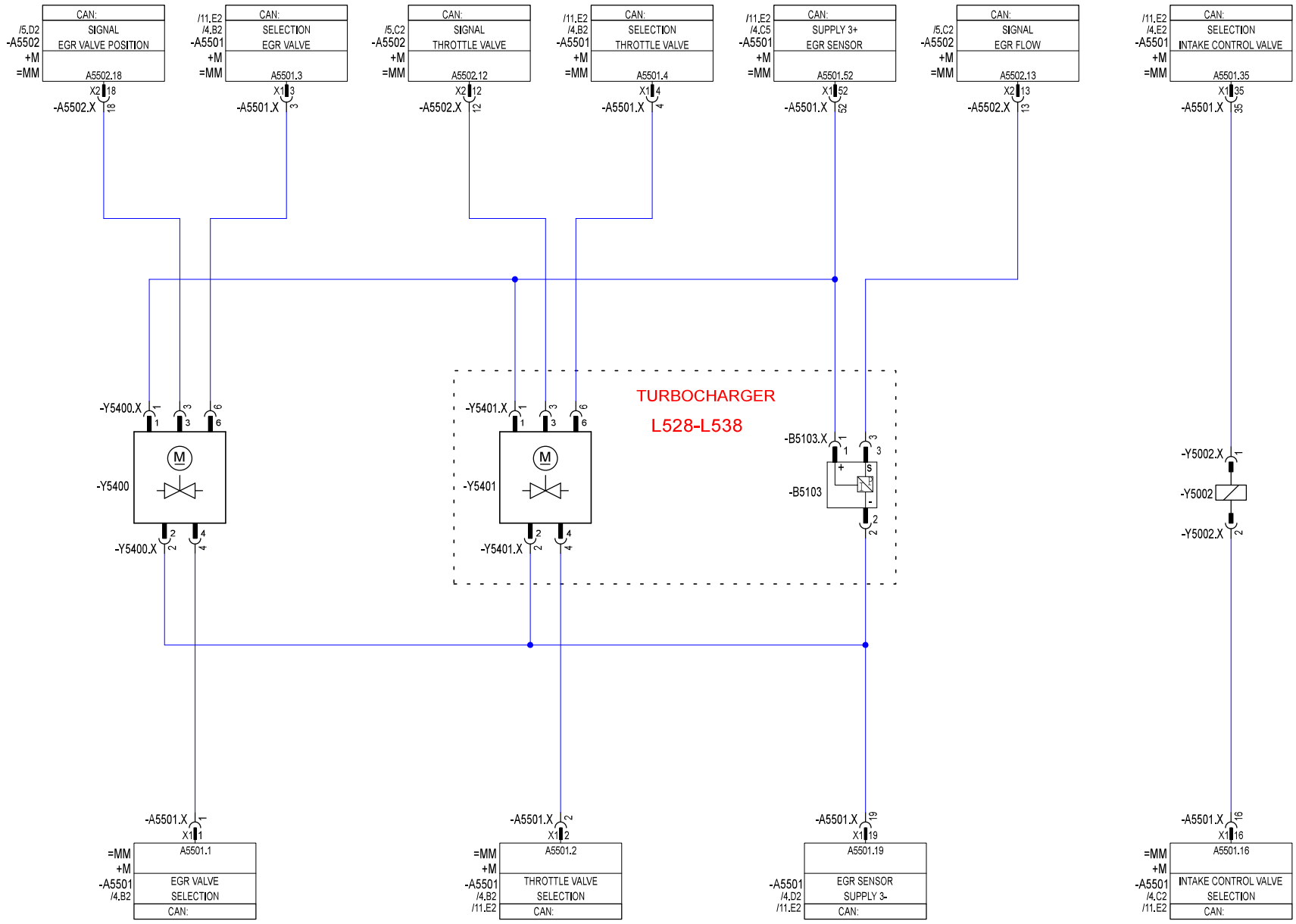
ab:
bis: O

LIEBHERR
BISCHOFSHOFEN

CIRCUIT DIAGRAM

SIDE: 1 12

DATE: 09.12.2013 08:05



TYPE:

ab:
bis: O

LIEBHERR
BISCHOFSHOFEN

VALVE EXHAUST RETURN, THROTTLE VALVE,
INTAKE CONTROL VALVE,PRESSURE EXHAUST RETURN

SIDE: 11 12

DATE: 09.12.2013 08:05

and encoders are read and evaluated by the input modules. (For more information see: Input modules , page 110-20)

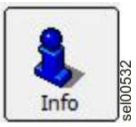
The output modules are part of the control system and are linked to the central control unit (Master4) via a CAN bus interface. The central control unit can specify the current from the outputs via the CAN bus. The module regulates what currents are required from the outputs. The output module actuates, for example, solenoid valves, proportional valves and relays. (For more information see: Output modules , page 110-22)

The tightening torque for the plugs on the modules is 3 Nm.

2.2 CAN module addresses

Component	BMK	Address	Setting when replaced	Status in the system
Input module 1	A16a	46 (82, 54)	No	Mandatory
Input module 2 (optional)	A16b	48 (84, 56)	Yes	Optional
Input module 3 (optional)	A16c	47 (83, 55)	Yes	Optional
Output module 1	A17a	21 (13, 5, 49)	No	Mandatory
Output module 2 (optional)	A17b	23 (15, 7, 51)	Yes	Optional
Output module 3 (optional)	A17c	24	Yes	Optional

Tab. 91: Module addresses



The CAN addresses can be called up in the Sculi diagnostic software using the *INFO* button.

For more information see: Addressing the CAN module (For more information see: Addressing the CAN module and checking the system information, page 030-192)

2.3 Supply to the banks

Each bank supply is designed so that it can withstand a permanent load of 13 A. Each bank is protected by a 10 A safety fuse.

Each output module has four banks. Each bank consists of four output stages for actuating the consumers.

LBH/11657128/10/211-20191203_081418/en

2.2 Working headlight safety functions

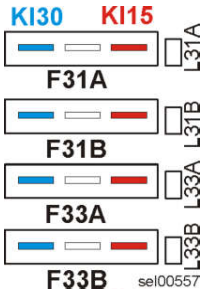


Fig. 445: Working headlight safety functions

Fuse	Function	Fuse	Function
F31A	Front left working headlight	F33A	Rear left cab roof working headlight
F31B	Front right working headlight	F33B	Rear right cab roof working headlight

Tab. 99: Working headlight safety functions

The function of the working headlights can be selected by connecting the fuses F31A, F31B, F33A and F33B:
- When the fuses are connected to terminal 30, the working headlights already function when the battery main switch is switched on.
- When the fuses are connected to terminal 15, the working headlights do not function until the ignition is switched on.

A mixed function is also possible, for example with the front working headlights on terminal 15 and the rear working headlights on terminal 30.

2.3 Fuse test

The fuses on the relay and fuse board are divided into three categories.
- Fuses for the power supply from terminal 30.
- Fuses for the power supply from terminal 15.
- Fuses for protecting various functions (e.g. low beam, profile light, parking light).

Each fuse has an LED and can be tested by pressing the button S1.

If an LED does not light up, the fuse is defective.

The testing of the fuses depends on the status of the electrical system.

You can only test the fuses in the active circuit:
- When the battery main switch is on (terminal 30), only the LEDs of the terminal 30 power supply fuses light up when you press the button S1.
- When the ignition is on (terminal 15), the LEDs of the fuses for power supply from terminal 30 and terminal 15 light up when you press the button S1.
- The LEDs of the fuses to protect the various functions only light up when the corresponding function is activated.

LBH/11657128/10/211-20191203_081418/en

2.2 Clutch

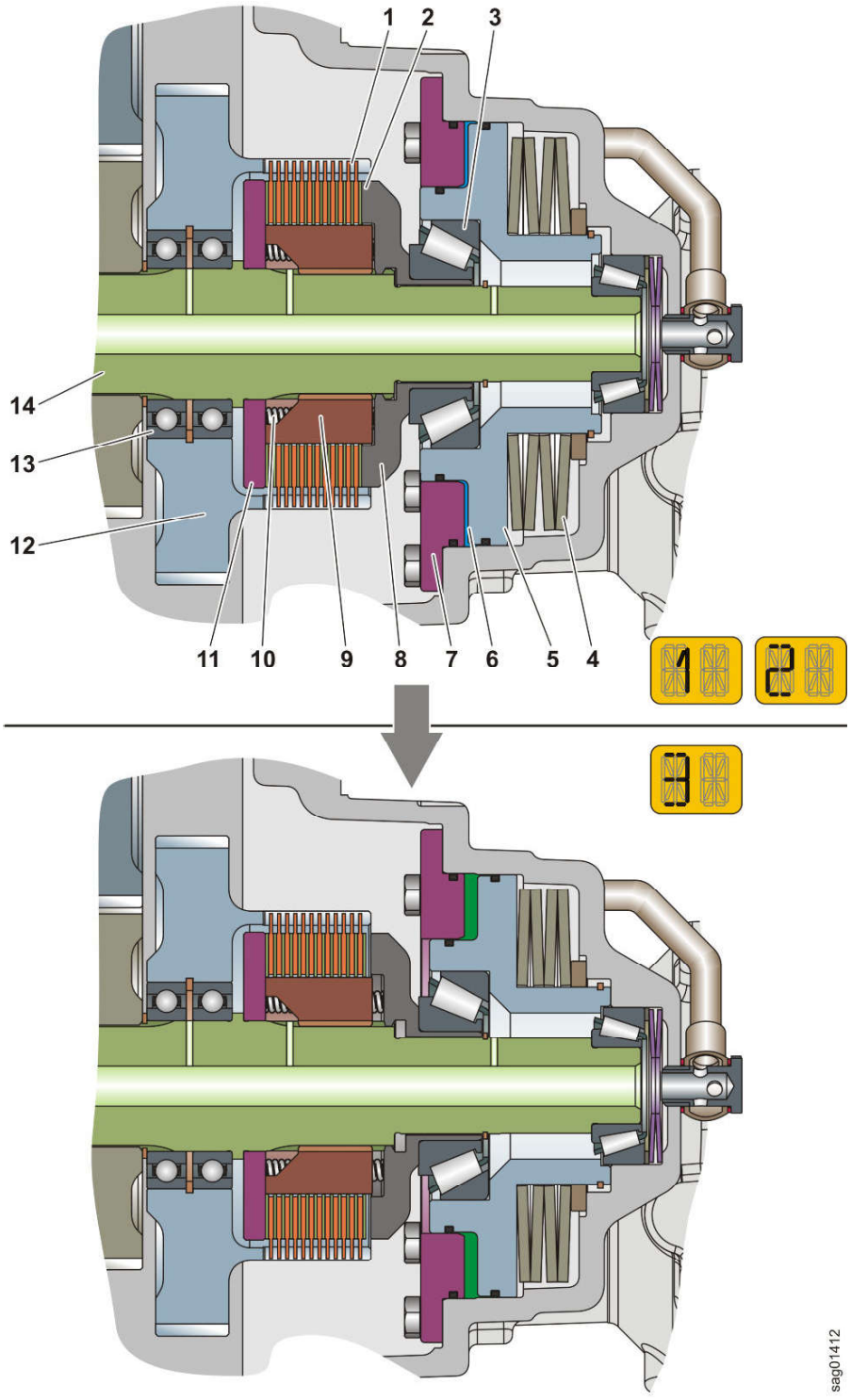


Fig. 453: Sectional view of closed / open clutch

1	Outer discs	**8**	Pressure piston
2	Inner discs	**9**	Coupling hub
3	Roller bearing	**10**	Pressure piston return spring

See next page for continuation of the image legend

130 Axles and drive shafts

Contents

LBH/11657128/10/211-20191203_0814418/en

140.1.2 Articulation lock

Valid for: L542-1269/24755-;

1 Layout

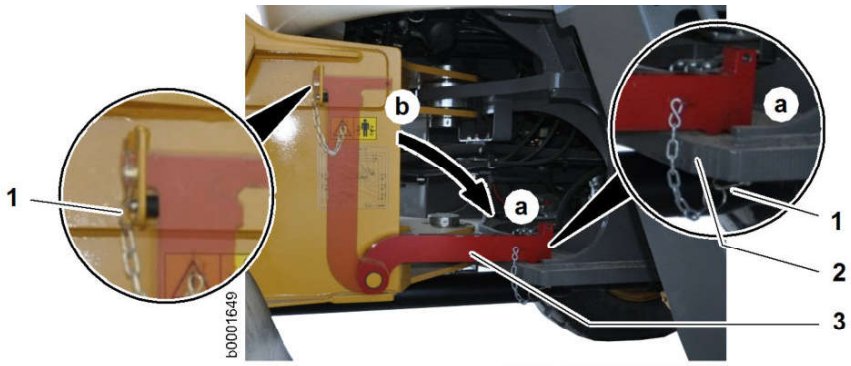


Fig. 470: Engaging the articulation lock

1	Split pin	**a**	Articulation lock engaged
2	Bracket	**b**	Articulation lock released
3	Locking bar		

The articulation lock is fitted between the front and rear sections.

2 Function

The articulation lock creates a rigid connection between the front and rear sections. Steering is no longer possible.

This means the steering is blocked, for example, when transporting the machine or for maintenance.

LBH/11657128/10/211-20191203_0814418/en

5 Device support

10 Control valve block (high pressure working hydraulics connection)

2 Function

2.1 Basic function

With the quick coupler, the working attachment (bucket, forklift, etc.) can be attached and removed without additional tools.

2.2 Hydraulics

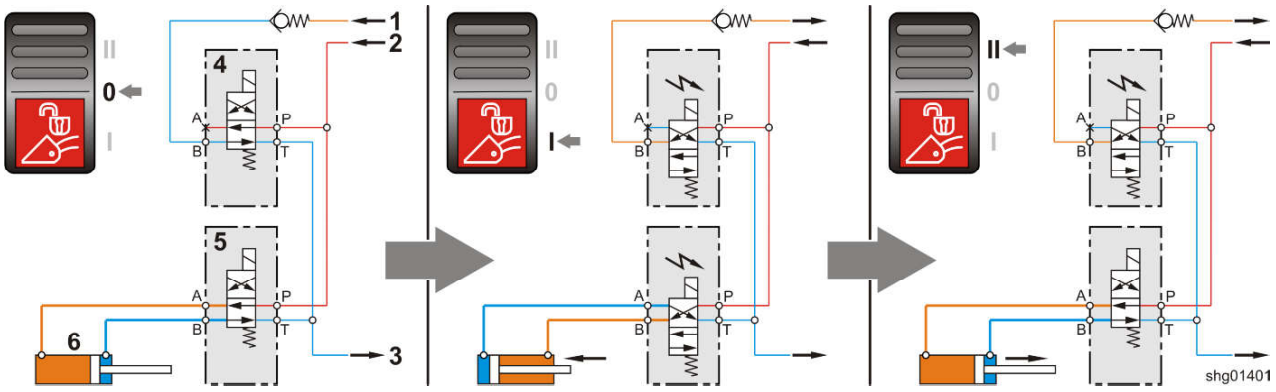


Fig. 478: Quick coupler unactuated / unlocked / locked

1 Control valve block (working hydraulics LS connection)

2 Control valve block (high pressure working hydraulics)

3 Hydraulic tank

4 Quick coupler solenoid valve LS signal Y53a

5 Quick coupler solenoid valve Y53

6 Hydraulic cylinder quick coupler

I Unlock *quick coupler* button

II Lock *quick coupler* button

When the quick coupler is not actuated, the quick coupler solenoid valve **5** and the quick coupler solenoid valve LS signal **4** are not energised. The quick coupler solenoid valve **5** connects the piston side of the hydraulic cylinder **6** with the high pressure of the working hydraulics **2**. As the high pressure of the working hydraulics is always on the piston side, the quick coupler can not be unlocked unintentionally.

When the quick coupler is unlocked, the quick coupler solenoid valve **5** and the quick coupler solenoid valve LS signal **4** are energised. The quick coupler solenoid valve **5** connects the ring side of the hydraulic cylinder **6** with the high pressure of the working hydraulics **2**. Thequick coupler solenoid valve LS signal **4** also connects the high pressure of the working hydraulics **2** with the LS connection of the working hydraulics **1** and thus generates a load sensing signal. The load sensing signal causes the working hydraulics pump to swing out. The hydraulic cylinder **6** pulls in the two locking pins. The quick coupler unlocks.

When the quick coupler locks, only the quick coupler solenoid valve LS signal **4** is energised. The quick coupler solenoid valve **5** connects the piston side of the hydraulic cylinder **6** with the high pressure of the working hydraulics **2**. Thequick coupler solenoid valve LS signal **4** also connects the high pressure of the working hydraulics **2** with the LS connection of the working hydraulics **1** and thus generates a load sensing signal. The load sensing signal causes the working hydraulics pump to swing out. The hydraulic cylinder **6** extends the two locking pins. The quick coupler locks.

LBH/11657128/10/211-20191203_081418/en

The buttons have LEDs, which can signal the following conditions:
Button with switch function: all three LEDs ON or OFF
Button with touch function: all three LEDs only light up when the button is pressed
Button with control function: the LEDs go on or off individually each time the button is pressed

The functions of each button are described in the operating manual for the machine in question.

2.2 Function test

When the ignition is turned on, all the LEDs light up for the duration of the test.

If there is a fault or failure in a module (CAN bus module) the LEDs remain lit after the test (safety-critical condition). In this case, the system cannot be started.

2.3 Plug assignment

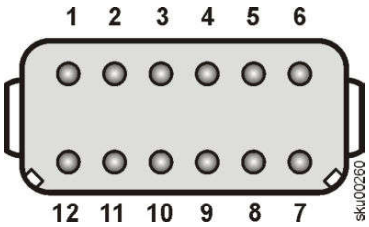


Fig. 483: Plug A11/X1

1	+24 V power supply F71 (connected to pin 5)	**7**	CAN bus CAN High 2
2	Earth (connected to pin 6)	**8**	CAN bus CAN Low 2
3	CAN bus CAN High 1	**9**	Terminating resistor
4	CAN bus CAN Low 1	**10**	Unassigned
5	Unassigned	**11**	Unassigned
6	Unassigned	**12**	Unassigned

2.4 Special ventilation flap calibration function

Press the *Recirculated air* button to start the automatic calibration of the ventilation flaps. This must be done whenever the software of the heating and air conditioning system is updated and after work has been carried out on the heating and air condition actuator motors.

When you calibrate the servo motors, the position and the zero position of the servo motors is determined by the resistors. Depending on the position, a voltage signal is sent to the heater/air conditioning control electronics. The calibration should be always carried out with the engine running, because the voltage signals can vary between when the engine is turned off and when it is running.

To start the automatic calibration, press and hold the *Recirculated air* button (for about 5 s) with the engine running. The LEDs start flashing and the calibration starts.

Calibration takes about 30 seconds. If the calibration is complete, the LEDs stop flashing and remain off.

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The expansion valve **1** is attached to the heating and air conditioning unit **2**. The heating and air conditioning unit is fitted on the right of the driver's cab.

The air conditioning compressor **4** is fitted to the engine **3**.

The dryer **5** and the condenser **7** are located in the cooler mount. The air conditioning pressure switch **6** is attached to the dryer.

2 Function

2.1 Basic function

The driver's cab is equipped with hot water heating.

An optional air conditioning unit or a system with automatic air conditioning can be installed on request.

2.2 Hot water heating function

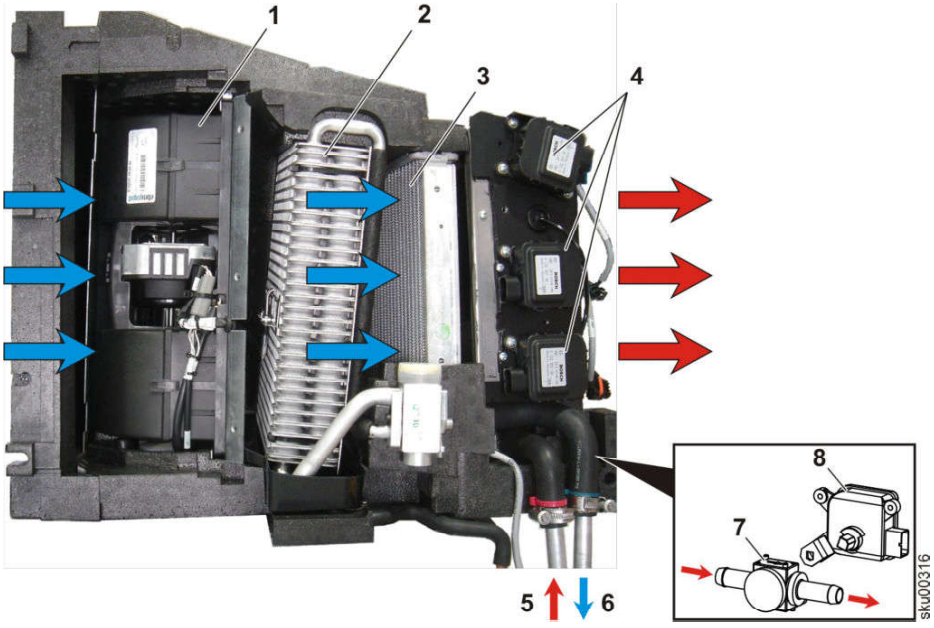

Fig. 493: Hot water heating function

1	Blower	**5**	Coolant forward flow from the engine
2	Evaporator (optional)	**6**	Coolant return flow from the heating and air conditioning unit
3	Heat exchanger	**7**	Water valve
4	Ventilation flaps of the driver's cab	**8**	Water valve servo motor

The pressure in the heating circuit is limited by a pressure relief valve on the engine.

The heat exchanger **3** is heated by hot coolant from the engine.

The blower **1** draws in ambient air. The air drawn in is forced through the evaporator **2** and the heat exchanger **3**.

The air is heated while it flows through the heat exchanger. The heated air is distributed in the driver's cab through the ventilation flaps of the driver's cab **4**.

The heat output can be controlled by the coolant flow rate and the air flow.

The air flow is controlled by the various speeds of the blower **1**.

LBH/11657128/10/211-20191203_0814418/en

2 Function

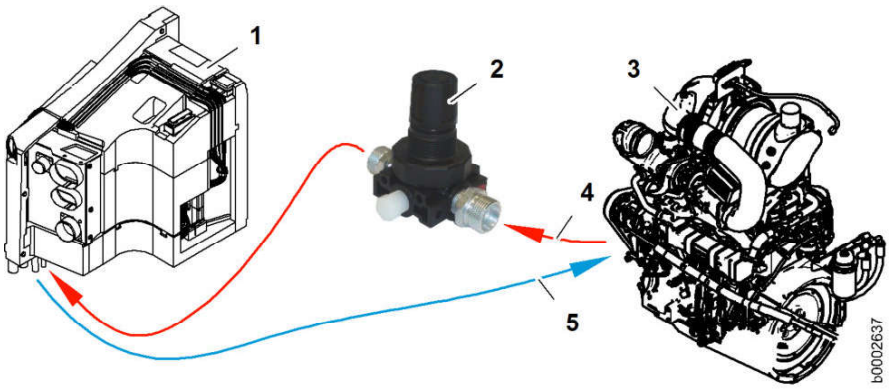

Fig. 504: Heating circuit

1 Heating and air conditioning unit
2 Heating circuit pressure relief valve
3 Engine
4 Coolant forward flow from the engine
5 Coolant return flow from the heating and air conditioning unit

NOTICE
Beware of damaging the heating and air conditioning unit.
The high pressures in the cooling circuit can damage the heating and air conditioning unit.

▶ Make sure that the heating circuit pressure relief valve is set correctly.

Under certain conditions, the pressure in the cooling circuit may exceed the permitted value of the heating and air conditioning unit **1**.

The heating circuit pressure relief valve **2** protects the components of the heating and air conditioning unit against excessive pressure from the cooling circuit of the engine **3**. The pressure in the heating circuit may not exceed 2 bar.

The heating circuit pressure relief valve is adjustable and must be set to 2 bar.

Adjusting the heating circuit pressure relief valve: (For more information see: Adjusting the heating circuit pressure relief valve, page 030-196)

LBH/11657128/10/211-20191203_081418/en

160.4.6 Evaporator

Valid for: L542-1269/24755-;

1 Layout

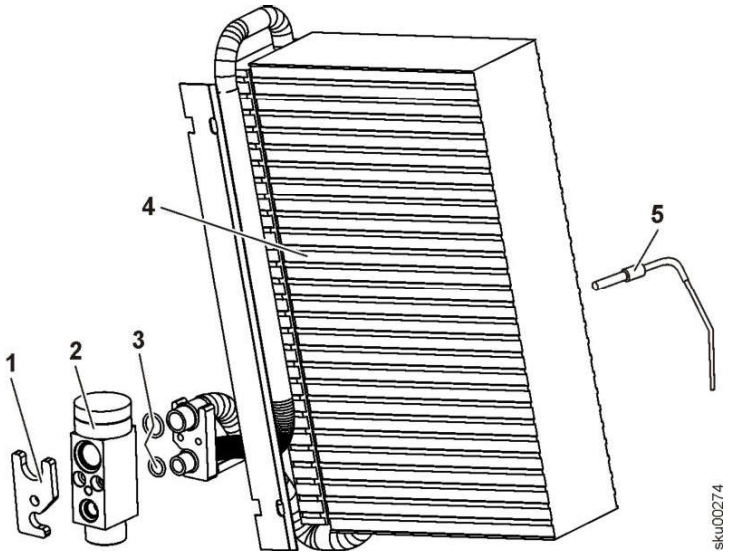

Fig. 513: Evaporator with expansion valve

1	Holder (for fastening the air conditioning hoses)	**4**	Evaporator
2	Expansion valve	**5**	Temperature sensor in the evaporator (anti-icing protection)
3	Air conditioning sealing rings		

The evaporator **4** is integrated in the heating and air conditioning unit and forms part of the refrigerant circuit. The heating and air conditioning unit is installed in the driver's cab, on the right.

2 Function

2.1 Basic function

The evaporator **4** acts as a heat exchanger to cool the cab air.

The pressurised refrigerant is injected into the evaporator via the expansion valve **2**. The refrigerant evaporates as a result of the drop in pressure that develops.

Energy is required for evaporation. The evaporator takes this energy from the ambient air in the form of thermal energy. This significantly cools down the air. The cooled air is conducted into the driver's cab via nozzles.

Cooling the air down reduces the moisture in the air. This moisture settles on the evaporator in the form of condensation water. This condensation water also absorbs the suspended solids contained in the air. The evaporator not only cools and dehumidifies the air but also cleans it at the same time, which results in a markedly improved interior environment when the air conditioning system operates.

The temperature sensor protects the evaporator from excessively cold temperatures and icing up. (For more information see: 160.4.7 Anti-icing temperature sensor, page 160-38)

LBH/11657128/10/211-20191203_0814418/en

Malfunction	Cause	Remedy
No grease collar on any lubrication points	Pump not working	See: Pump not working
	Excessive pauses or lubrication time too short	Reduce the pause time or increase the lubrication time
	System blocked	See: Grease escaping from pressure relief valve
No grease collar on several lubrication points	Line to auxiliary distributor broken or leaking	Replace the line
	Leaky screw connections	Tighten or renew the screw connections
Pump speed decreased	High system pressure	Check the bearing points
Grease escaping from pressure relief valve	System pressure too high	Check the system
	Progressive distributor blocked	Renew the progressive distributor
	Valve spring defective	Replace the pressure relief valve

Tab. 115: Troubleshooting

tion as well as the operation of the machines, and thereby enables efficient management, optimised deployment planning and remote monitoring.

With LiDAT all important machine data can be viewed at all times. The data is updated several times a day and can be called up using a web browser at any time. Information that is particularly important can also be requested, such as the machine leaving a predefined zone or reports on certain operating statuses or parameters.

2.2 LiDAT on machines without PME1 (without central controller Master4)

The diesel engine transmits a speed signal to the radio module LiTU1 **5**.

Radio module LiTU determines the location of the machine via GPS and determines the operating times of the machine via the diesel engine's speed signal. Radio module LiTU transmits the data to the Liebherr LiDAT Server **12** via GSM/GPRS.

Customers and dealers can request the following data from the Liebherr LiDAT server:
- Position data
- Operating hours
- Use data (machine status at each time: off, idling, operation)
- Service interval information
- Equipment deployment planning
- Equipment rental
- Equipment management

2.3 LiDAT on machines with PME1 (with central controller Master4)

All machine data can be requested from machines with central control (Master4).

The central control unit (Master4) transmits all available machine data to the radio module LiTU **5**.

Radio module LiTU transmits the machine data to the Liebherr LiDAT Server **12** via GSM/GPRS.

Customers and dealers can request the following data from the Liebherr LiDAT server:
- Position data
- Operating hours
- Use data (machine status at each time: off, idling, operation etc.)
- Service interval information (warnings, confirmations)
- Equipment deployment planning
- Equipment rental
- Equipment management
- Monitoring the geographic deployment area
- Monitoring the operating times
- Reporting critical operating conditions
- All machine data which is provided by the central control unit (Master4) (e.g.: fuel consumption, service codes, sensor data etc.).

Remote diagnosis and LiDAT teleservice are also possible on machines with central control unit (Master4).

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If the weighing device can be calibrated, an assessment by Pfreundt must be carried out in respect of changes to the following components:

- Lift arm (a change to the lifting lever)
- Bucket (a change to the lifting lever)
- Lift cylinder
- Proximity switch
- Weighing module (pBase)

The weighing device displays an incorrect weight:

If the weighing device displays what is clearly an incorrect weight, the weighing device must be readjusted by Pfreundt.

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