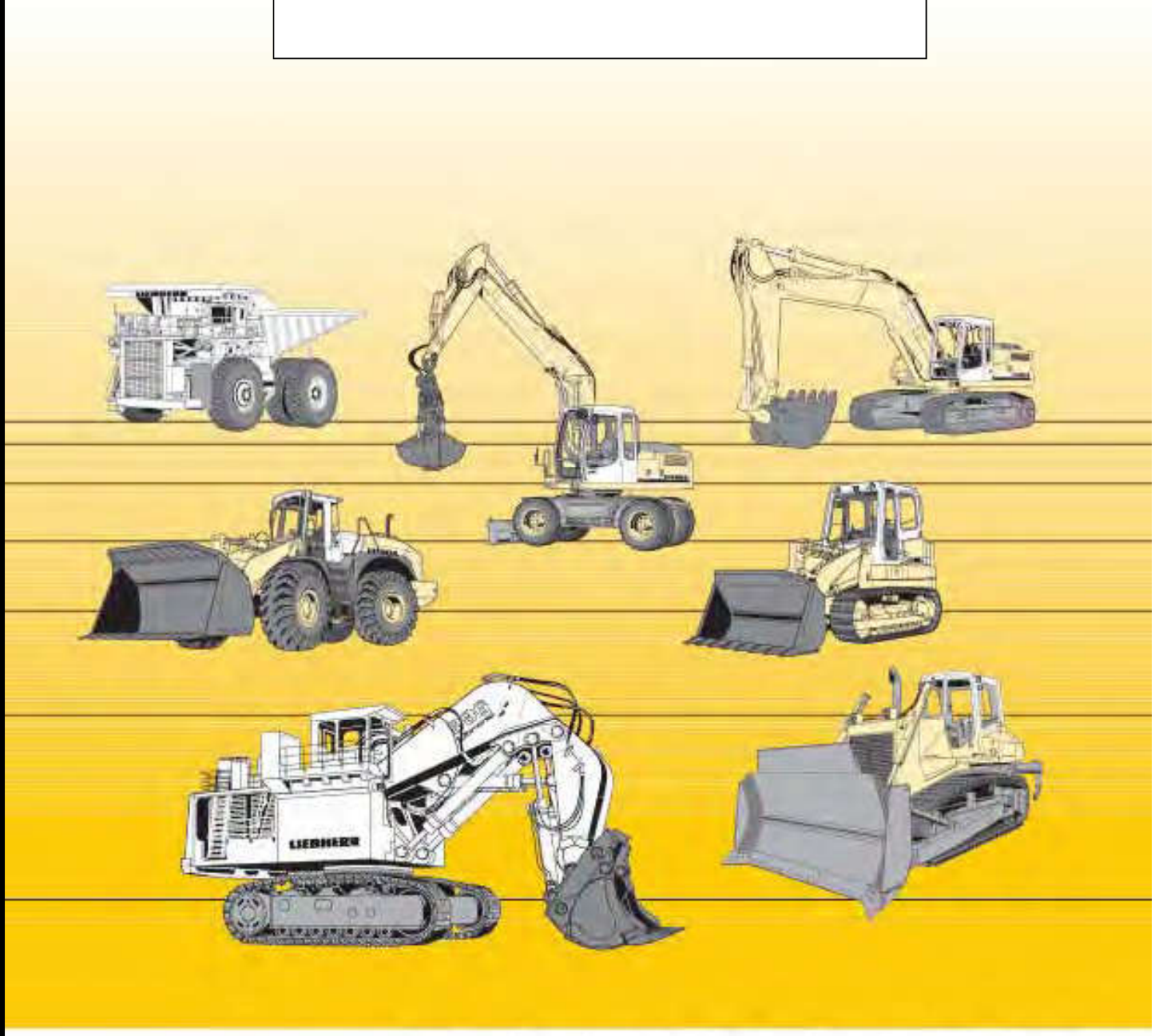
en

Service Manual

Wheel Loader

L524 / L534 / L538



1.1 Safety regulations

Working on the machine poses safety risks to the operator, driver or maintenance engineers. You can prevent risks and accidents by regularly reading and observing the various safety instructions.

This is especially important for personnel who only occasionally work on the machine, for example, carrying out rigging or maintenance work. The safety regulations listed below, if conscientiously followed, will ensure your own safety and that of others, and will prevent the machine from being damaged.

Whenever tasks which could cause danger to personnel or damage to the machine are described, the necessary safety precautions are explained in this manual.

These are indicated by the headings Danger, Warning or Caution.

1.1.1 Introduction

1. **The symbols below have the following meanings:**

Danger 

Danger

Warning that without appropriate precautions, certain procedures could result in fatal accidents.

Warning 

Warning

Warning that without appropriate precautions, certain procedures could result in severe physical injuries.

Caution 

Caution

Warning that without appropriate precautions, certain procedures could result in minor physical injuries or damage to the machine.

2. **Observance of these instructions does not exempt you from following any additional rules and guidelines that may apply**

The following should also be observed:

– The safety rules in force at the operating site
– Legally enforceable road traffic regulations
– Guidelines issued by trade associations

Description	Value	Unit
Bucket capacity as per ISO 7546	1.7	m³
Bucket width	2500	mm
Specific material weight	1.8	t/m³
A Dump height at maximum lifting height and 45° tilt-out angle	2815	mm
B Dump height	3380	mm
C Maximum bucket base height	3500	mm
D Maximum bucket pivot point height	3750	mm
E Maximum bucket top height	4895	mm
F Reach at maximum lifting height and 42° tilt-out angle	1030	mm
G Digging depth	55	mm
H Height above the cab	3150	mm
I Height above exhaust	3090	mm
J Ground clearance	520	mm
K Wheel base	2700	mm
L Overall length	6890	mm
Turning radius over bucket outer edge	5530	mm
Lifting force (SAE)	89	kN
Breakout force (SAE)	80	kN
Tipping load when straight	7100	kg
Tipping load articulated at 40°	6250	kg
Angle of articulation (to each side)	40	°
Swing angle (to each side)	6	°
Operating weight	10200	kg
Tractive force	76.2	kN
Travel speed in travel range 1, forward and reverse	0 - 8.0	km/h
Travel speed in travel range 2, forward and reverse	0 - 33.0	km/h
Sound pressure level in the cab – L_{pA}	75	dB (A)

Wheel loader with Z lift arms

Valid for: ***L534*** *- 434 / from 0101*

The values stated refer to the standard version of the machine:

– With Z lift arms (2500 mm), without hydraulic quick-change device.
– With 20.5 R25 Goodyear GP-2B tyres.
– Tipping loads and weights include all lubricants, full fuel tank, ROPS/FOPS cab and driver.

Tyre sizes and additional attachments affect the operating weight and tipping load.

LBH/Version 02/07.2005/en/lbhlor0/22.05.2006

Description	Value	Unit
Starter operating voltage	24	V
Starter power consumption	5.4	kW
Alternator voltage output	28	V
Alternator current output	55	A
Auxiliary power take-off transmission	1:1.275	
Weight	740	kg
Emission levels comply with	EU – RL 97/68/EC Stage II	

Fuel tank

Valid for: ***L524*** *- 438 / from 0101;* ***L534*** *- 434 / from 0101;* ***L538*** *- 432 / from 0101; ID no. 7622943*

Description	Value	Unit
Tank capacity, FULL	160	l
Tank capacity, RESERVE	30	l

Fuel pre-filter (stage I)

Valid for: ***L524*** *- 438 / 0101 - 8795;* ***L534*** *- 434 / 0101 - 8961; ID no. 7090480*

Description	Value	Unit
Filtration grade	min. 0.6 max. 0.8	mm mm

Valid for: ***L538*** *- 432 / 0101 -8507; ID no. 7381876*

Description	Value	Unit
Filtration grade	min. 0.6 max. 0.8	mm mm

Fuel pre-filter (stage II)

Valid for: ***L524*** *- 438 / from 8796;* ***L534*** *- 434 / from 8962; ID no. 7090562*

Description	Value	Unit
Filtration grade	10	µm

Valid for: ***L538*** *- 432 / from 8508; ID no. 7382133*

Description	Value	Unit
Filtration grade	30	µm

Fuel fine filter (stage I)

Valid for: ***L524*** *- 438 / from 0101;* ***L534*** *- 434 / from 0101; ID no. 7090528*

Description	Value	Unit
Filtration grade	5	µm

Valid for: ***L538*** *- 432 / 0101 - 8507; ID no. 7381643*

Description	Value	Unit
Filtration grade	5	µm

Description	Value	Unit
Cardan speed at 34 km/h	2895	min^{-1}
Speed sensor	Inductive	

Speed sensor

Description	Value	Unit
Type	Inductive sensor	-
Distance to spur gear “A”	min. 1.2 max. 1.8	mm mm

2.1.10 Axles and tyres

Front axle

Valid for: ***L524*** *- 438 / from 0101*

Description	Value	Unit
Self-locking differential level	45	%
Width	1900	mm
Wheel lug tightening torque	650	Nm
Wheel lug spanner size	30	mm
Weight	490	kg

Valid for: ***L534*** *- 434 / from 0101;* ***L538*** *- 432 / from 0101*

Description	Value	Unit
Self-locking differential level	45	%
Width	1900	mm
Wheel lug tightening torque	650	Nm
Wheel lug spanner size	30	mm
Weight	600	kg

Rear axle

Valid for: ***L524*** *- 438 / from 0101*

Description	Value	Unit
Self-locking differential level	45	%
Swing angle (to each side)	6	°
Width	1900	mm
Wheel lug tightening torque	650	Nm
Wheel lug spanner size	30	mm
Weight	600	kg

Valid for: ***L534*** *- 434 / from 0101;* ***L538*** *- 432 / from 0101*

Description	Value	Unit
Self-locking differential level	45	%
Swing angle (to each side)	6	°
Width	1900	mm

Customer: …….. Machine type: ……..… Ser. no.: ……..…… Service hours: ……..…… Date: ……..……

Maintenance / inspection after service hours							TASKS TO BE PERFORMED
On handover	Every 10	Every 50	Every 500	Every 1000	Every 2000	Special intervals	**By maintenance staff** ■ Once-only activity ● Repeat interval ★ As necessary ❄ Annually before the winter **By authorised specialist staff** ❑ Once-only activity ❍ Repeat interval ☆ As necessary
Cooling system							
❑	●	●	❍	❍	❍		Check the coolant level
			❍	❍	❍		Change the coolant filter (L538 only)
			❍	❍	❍	❄	Check the coolant antifreeze concentration (L538 with DCA 4 component)
						★	Clean the cooling system
						3000h	Change the coolant and antifreeze (L538 with DCA 4 component) (or every 2 years)
Working hydraulics							
❑	●	●	❍	❍	❍		Check the hydraulic tank oil level (take an oil sample every 500 hours for bio oil)
			❍	❍	❍		Drain off condensate and sediment from the hydraulic tank
					❍		Change the oil in the hydraulic tank and check the return strainer
❑		■	❍	❍	❍	250h	Check and clean the magnetic rod on the hydraulic tank
			❍	❍	❍		Change the hydraulic tank return suction filter
				❍	❍		Change the hydraulic tank bleeder filter
				❍	❍		Lubricate the pilot control device solenoids, universal joints and tappets
Steering system							
❑	●	●	❍	❍	❍		Check that the steering is working
❑		●	❍	❍	❍		Lubricate the bearing points on the steering cylinders
Brake system							
❑	●	●	❍	❍	❍		Check the service brake and parking brake
				❍	❍	★	Check the gap and wear on the parking brake linings
Electrical system							
❑	●	●	❍	❍	❍		Check the indicator lamps and lighting
			❍	❍	❍		Check the batteries, fluid level and terminals
Transfer gear							
❑			❍	❍	❍		Check the transfer gear oil level
			❑	❍	❍		Change the transfer gear oil
Axles and tyres							
❑		■	❍	❍	❍		Check the tightness of the wheels (once after 50, 100 and 250 h)
❑			❍	❍	❍		Check the axle oil levels
			❑	❍	❍		Change the axle oil
❑		●	❍	❍	❍		Check and lubricate the cardan shaft(s)
❑						★	Check the tyre pressure

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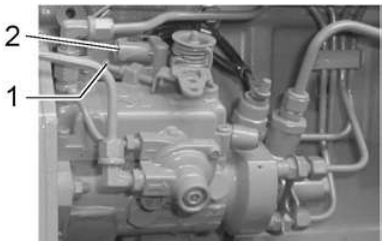
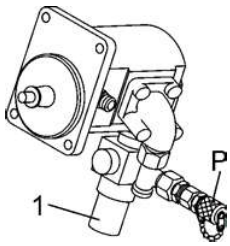
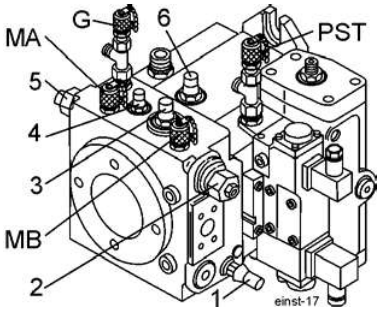
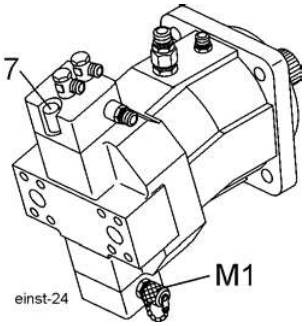
Costumer:	**L 534** S/N: 434 /
	Operating hours:
	Type of application:
Job site:	Checked by:
	Checked on date:

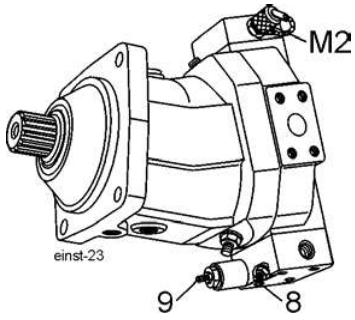
Check / Adjustment	1000 Bh.	2000 Bh.	Unit	Adjust. values	Value before adjust	Value after adjust	Adjust. point	Test point
Diesel engine								
Diesel engine RPM	○	○						
Low idle RPM			min^{-1}	$850^{\pm 50}$			1	
High indle RPM			min^{-1}	2550^{+80}			2	
Cooling system								
Cooling System (fan control)	○	○						
Hydraulic oil 31 - 55 °C Coolant below 78 °C								
Fan at high Diesel engine RPM/ Sensor unplugged			bar	$175^{\pm 5}$			1	P
Fan at high Diesel engine RPM			bar	$65^{\pm 10}$				P
Fan at low Diesel engine RPM			bar	$30^{\pm 10}$				P
Travel hydraulic								
Replenisihing pressure	○	○						
At high idle RPM			bar	$32^{\pm 2}$			4	G
Regulation-begin-var. Displ. pump	○	○						
High pressure			bar	50	50	50	3	MA (MB)
Diesel engine RPM			min^{-1}	$1050^{\pm 50}$				
Control pressure			bar	$6^{\pm 2}$				PST
Pump performance at 380 bar	○	○						
High pressure			bar	380	380	380	6	MA (MB)
Diesel engine RPM			min^{-1}	$1900^{\pm 100}$				
Control pressure			bar	$16^{\pm 2}$				PST
High pressure relief valves	○	○						
Forward			bar	$470^{\pm 10}$			2	MA
Reverse			bar	$470^{\pm 10}$			5	MB
Pressure cut off	○	○						
High pressure			bar	$430^{\pm 5}$			1	MA (MB)
Engine speed drop, max. difference to high idle RPM			min^{-1}	50				
Control pressure			bar	$22^{\pm 2}$				PST
Variable displ. motor 1 in regulating range	○	○						
High pressure when travelling at 6 - 7 km/h			bar	$260^{\pm 5}$			7	MA
Aktivating pressure			bar	130				M1
Variable displ. motor 2 Control pressure regulating	○	○						
Aktivating pressure			bar	0 ↗				M2
Control pressure			bar	$6^{\pm 1}$			8	PST
Pressure regulating	○	○						
Aktivating pressure			bar	50	50	50		M2
High pressure			bar	$290^{\pm 5}$			9	MA











▌= Blocked Machine

3.4 Lubrication chart and filling quantities

3.4.1 Table of filling quantities (L524)

Valid for: ***L524*** *- 438 / from 0101*

Specifications in the medium column:

- The standard lubricants and fuels required for central European climate conditions are stated here.
- Before you change or top up the oil in the hydraulic system (hydraulic tank), always check if it is filled with petroleum or bio oil.
- For more detailed information about the required lubricants and service fuels, see the section on lubricants and fuels.

Specifications in the dosage column:

- The values stated for the filling quantities in the table are only guidelines.
- The dipstick and level markings are always mandatory.
- Each time the oil is replaced or topped up, check the level in the unit in question.

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Description	Medium	Dosage	Unit
Diesel engine cooling system total capacity	Coolant	24.5	l
Diesel engine (with filter change)	Engine oil SAE 10W - 40	12.0	l
Transfer gear	Gear oil SAE 90 LS	2.1	l
Front axle differential	Gear oil SAE 90 LS	12.2	l
Front axle wheel hub (each)	Gear oil SAE 90 LS	2.4	l
Rear axle differential	Gear oil SAE 90 LS	12.7	l
Rear axle wheel hub (each)	Gear oil SAE 90 LS	2.5	l
Hydraulic tank	Engine oil SAE 20W - 20	100	l
Hydraulic system total capacity	Engine oil SAE 20W - 20	130	l
Air-conditioning system	Refrigerant R 134a	1400	g

3.4.2 Table of filling quantities (L534)

Valid for: ***L534*** *- 434 / from 0101*

Specifications in the medium column:

- The standard lubricants and fuels required for central European climate conditions are stated here.
- Before you change or top up the oil in the hydraulic system (hydraulic tank), always check if it is filled with petroleum or bio oil.

3.5.5 Checking the engine oil level (L524, L534)

Valid for: ***L524*** *- 438 / 0101;* ***L534*** *- 434 / 0101*

The oil filler neck is on the top of the engine on the valve cover.

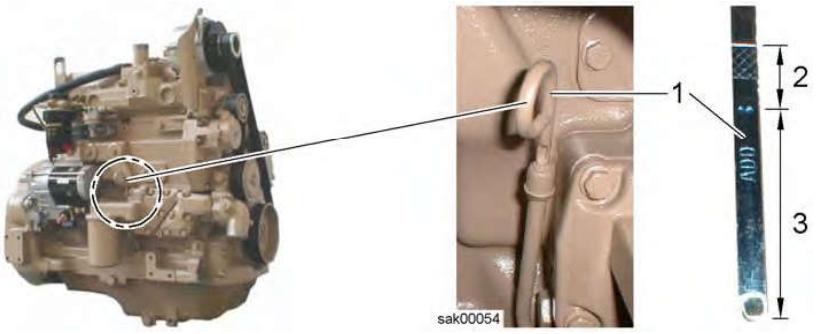
Make sure that:

– The machine is in maintenance position 1.
– The engine compartment hood is open.
– The engine is level and has not been running for 2 to 3 minutes.

Procedure

- Pull out the dipstick 1, wipe it clean, and re-insert it.
- Pull out the dipstick 1 once again and read off the oil level.

The oil level must be within the cross hatching 2.



Diesel engine dipstick

- If the oil level is in the range 3 or below:
  Top up with engine oil. For the oil quality, see the section on lubricants and fuels.

Checking the engine oil level (L538)

Valid for: ***L538*** *- 432 / 0101*

The oil filler neck is on the top of the engine on the valve cover.

Make sure that:

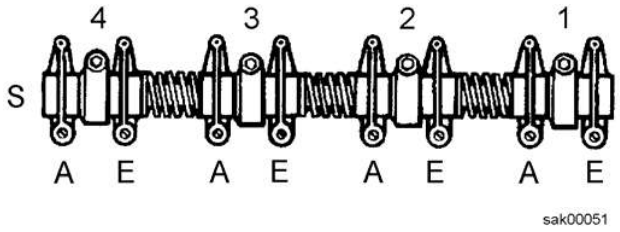
– The machine is in maintenance position 1.
– The engine compartment hood is open.
– The engine is level and has not been running for 1 to 2 minutes.

Procedure

- Pull out the dipstick 3, wipe it clean, and re-insert it.
- Pull out the dipstick 3 once again and read off the oil level.

The oil level must be within the cross hatching 2.

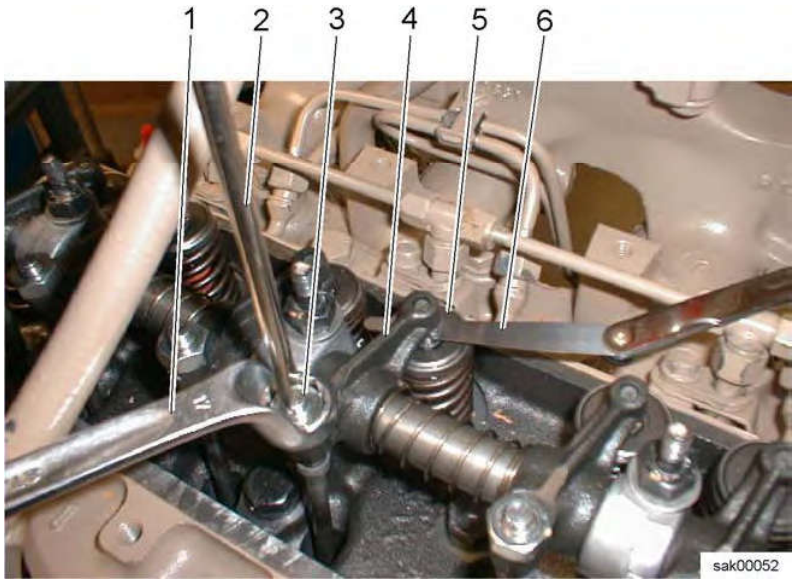
- If the oil level is too low:
  Top up with oil. For the oil quality, see the section on lubricants and fuels.



Valve layout

S Flywheel end
A Outlet valve
E Inlet valve
1 Cylinder 1
2 Cylinder 2
3 Cylinder 3
4 Cylinder 4

- Turn the crankshaft in the direction of rotation until the valves of the fourth cylinder overlap.
- Adjust the valves of the first cylinder.



Adjusting the valves

- Push a feeler gauge 6 between the valve 5 and the rocker arm 4 and check the valve play.
- If the valve play is not correct:
  Loosen the counter nut 3 of the adjusting screw for the rocker arm in question 4 using a 17 mm ring spanner 1, and correct the setting using a screwdriver 2. Tighten the counter nut again.
- Check the valve play again after you tighten the counter nut 3.
- Check the other cylinders and adjust them as necessary by turning the crankshaft until the valves overlap as shown in the table.
- After checking and adjusting the valves, put on the valve cover with new seals.
- Put the belt guard and intake line back on.

- Open the bleeder screw 6.
- Push in the stop cock on the drain valve 10 and open it anticlockwise. Drain the condensate into a suitable receptacle.
- Release the fixing screws 7 and take off the cover.
- Take out the filter insert 2 along with the spring cartridge 3.
- Dispose of the filter insert 2.
- Clean the filter housing and the seal faces.
- Put in a new filter insert 2.
- Check the seal 4, replacing it if necessary, and assemble it in the reverse order.
- Bleed the fuel system.

Bleeding the fuel system

Procedure: see the section on bleeding the fuel system.

3.5.22 Replacing the fuel fine filter (L524, L534)

Valid for: ***L524*** *- 438 / 0101 - 8795;* ***L534*** *- 434 / 0101 - 8961*

Make sure that:

– The machine is in maintenance position 1.
– The engine compartment rear hatch is open.

Procedure for changing the fuel fine filter

- Carefully clean the fuel fine filter and the area around it.
- Place the receptacle under the fuel fine filter (possibly attaching a suitably sized hose to the drain valve 4).
- Open the drain valve 4 and drain off the fuel.
- Push up the snap ring 1 and turn it a quarter turn anticlockwise.
- Pull down the filter cartridge 2 and the snap ring 1.
- Unscrew the water separator 3 from the filter cartridge.
- Dispose of the old filter cartridge.

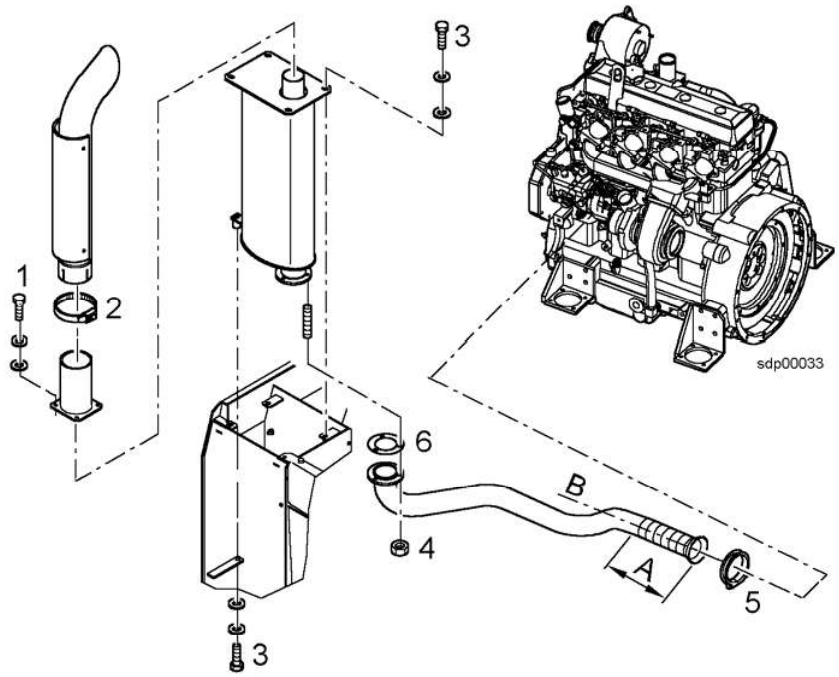
3.5.32 Checking the exhaust lines for leaks and tight fitting (L524)

Valid for: ***L524*** *- 438 / from 0101*

Make sure that:

– The machine is in maintenance position 1.
– The engine compartment door is open.

Procedure



- Check that the clip 5, nuts 4 and seal 6 on the exhaust pipe between the turbocharger and the silencer are tightly fastened and do not leak.
- Check that the clip 2, tailpipe bolts 1 and silencer bolts 3 are tight.
- Also check that the flexible pipe is flush B (along both axes) and the length is balanced A (the effective length must be between the maximum and minimum lengths of the flexible section).

Using coolant without antifreeze

Using DCA 4 without antifreeze and corrosion inhibitor

In exceptional cases and when outside temperatures never fall below freezing, such as tropical zones, where it is demonstrable that no approved antifreeze and corrosion inhibitor is available, the coolant may be composed solely of water and DCA 4.

In order to protect the cooling system from corrosion in this case:

– About twice as much DCA 4 must be used in relation to the mixing ratio of antifreeze and corrosion inhibitor and DCA 4.
– The DCA 4 concentration must be between 0.6 - 1.06 units per litre.
– The coolant must be replaced once a year.

The Fleetguard CC 2602 M test kit is recommended for testing.

Using anti-corrosion agent without antifreeze

In exceptional cases and when outside temperatures never fall below freezing, such as tropical zones, where it is demonstrable that no approved antifreeze and corrosion protection agent is available, corrosion inhibitors may be used.

The coolant must be replaced once a year.

The mixing ratio must consist of 7.5 % corrosion inhibitor and 92.5 % water.

The Gefo 2710 refractometer is recommended for testing.

Procedure for checking the coolant corrosion inhibitor concentration

Caution

There is a danger of scalding due to coolant escaping under pressure

! Only open the sealing cap on the filler neck when the engine has cooled down - the coolant temperature indicator in the indicator unit should be in the lower third of the segment field.

- Carefully open the sealing cap on the filler neck.
- Check the antifreeze concentration with a 2710 refractometer from GEFO.

Checking the mixing ratio with a refractometer

GEFO refractometer no. 2710

Refractometer

– Screw for adjusting to zero line (water line)
– The focus is set by turning the eyepiece
– Soft eyepiece flap
– Sturdy metal housing
– Reinforced rubber grip

Measuring procedure

– Clean the cover and the prism carefully
– Place 1 or 2 drops of test fluid on the prism

3.5.52 Checking the service brake and parking brake

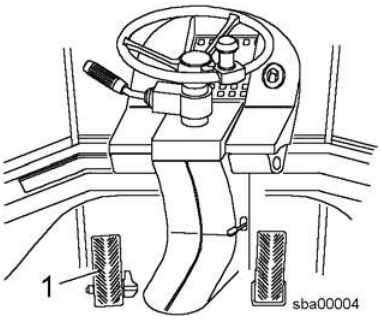
Procedure for checking the service brake

Make sure that there is enough room to check the service brake.

Warning

There is a danger of driving into bystanders or obstacles.

! Do not allow anyone into the danger area while these tests are being conducted.



- Start the machine, and drive it forwards in travel range 1 at around 8 km/h.
- Push the inch/brake pedal 1 all the way down. The machine must come to an **abrupt** stop.

Troubleshooting

If the braking effect is too slight or entirely absent:

- Contact LIEBHERR CUSTOMER SERVICE.

Procedure for checking the parking brake

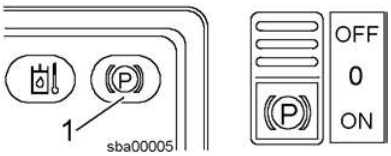
Make sure that there is enough room to check the parking brake.

Warning

There is a danger of driving into bystanders or obstacles.

! Do not allow anyone into the danger area while these tests are being conducted.

! Perform the test on level ground with no obstacles.



- Start the machine, select travel range 1 and forward travel direction.
- Drive the machine forwards at around 3 km/h and press the parking brake switch.

The symbol field 1 for the parking brake lights up.

The machine must come to an **abrupt** halt.

Troubleshooting

If the braking effect is too slight or entirely absent:

- Contact LIEBHERR CUSTOMER SERVICE.

3.5.53 Checking the gap and wear on the parking brake linings

Wear on the brake pads can increase the gap between them and the brake disc. If the gap is too wide, it must be adjusted.

Make sure that:

– The machine is in maintenance position 2.
– Wedges are in place to secure the machine against rolling away.

Procedure for checking the wear on the brake linings

- Visually check the thickness of the lining on both pads 8.
- If the lining is less than 1 mm, change the pads as follows.
- Start the engine and press the parking brake switch (the brake is open, under oil pressure).
- Unscrew the cap 7, loosen the nut 5 and unscrew the adjusting screw 6.
- Take out the cotter pin 4 and unscrew the castle nut 3.
- Remove the guide pin 1 and swing out the entire brake caliper.
- Replace the worn brake pads 2 with new ones.
- Fit the brake caliper and the guide pin 1 in the reverse order.

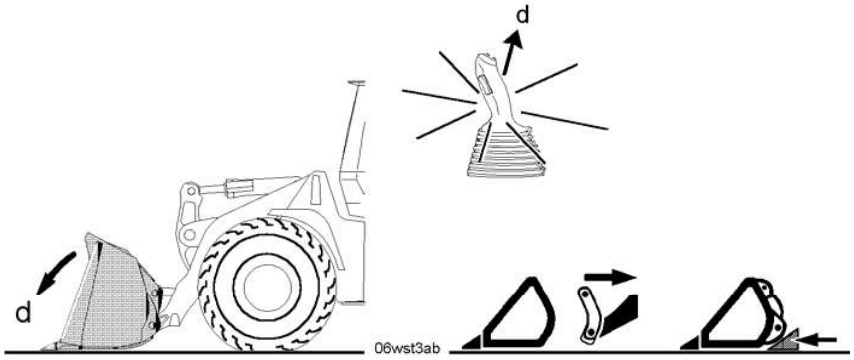
The filling level can vary due to temperature fluctuations. It also sinks in time due to natural leakage. This does not impair operation.

If the cooling performance deteriorates, one of the causes can be a low refrigerant level.

In normal circumstances, one filling lasts for three to five years.

3.5.67 Checking and lubricating the bearings and lubrication points on Z lift arms

Make sure that the machine is in maintenance position 1.

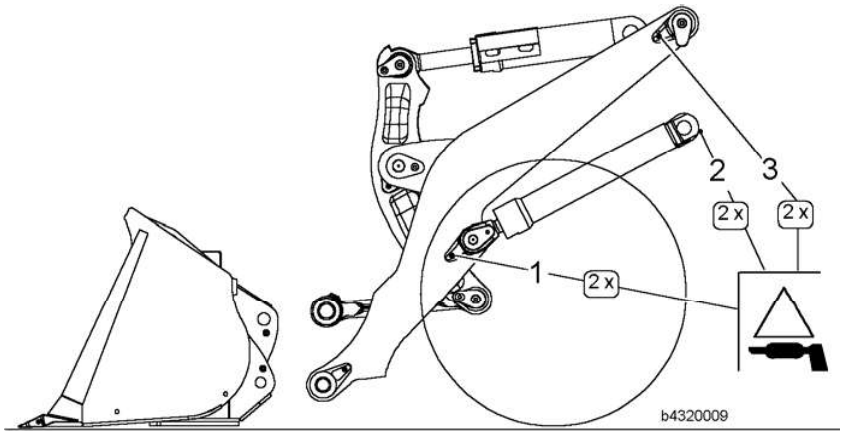


Lift arm maintenance position

If the lubrication points near the bucket coupling are poorly accessible, make sure the working attachment is detached.

Z lift arms without quick-change device

Lubricating the lift arms and cylinders



Lubrication points on lift arms and lift cylinder

1 Front lift cylinder lubrication point
2 Rear lift cylinder lubrication point
3 Top lift arm lubrication point

- Lubricate the bearing at the top of the lift arms: lubrication point 3 on the left and point 3 on the right.
- Lubricate the two points 1 and 2 on the left lift cylinder.
- Lubricate the two points 1 and 2 on the right lift cylinder.

- If it is not correct:
  Adjust the pressure relief valve on the proportional valve 3 (using the adjusting screw and a 5 mm open-end spanner - the lock nut is a round nut).

1 Fan pump 2 Hydraulic oil temperature sensor

Turn **clockwise** to increase the pressure and **anticlockwise** to reduce it.

- Remove the cap 5.
- Adjust the screw 4 on the proportional valve 3.
- Plug in the disconnected plug again.

Description	Value	Unit
Fan pressure	175 $^{\pm 5}$	bar
Fan speed	2130 $^{\pm 50}$	min^{-1}

Checking the fan at a hydraulic oil temperature of 31 °C to 55 °C and coolant temperature below 71 °C

The fan speed (system pressure) is tested here in the stated temperature range.

- Bring the hydraulic oil and coolant up to the required temperatures.
- Start the engine and bring it to top idle speed.
- Check whether the pressure is correct at top engine idle speed.
- If it is not correct:
  Find and rectify the fault.

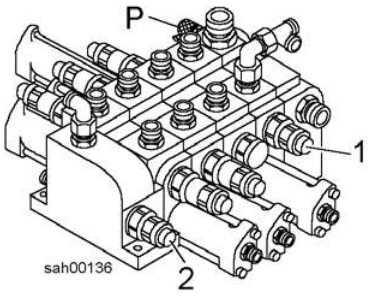
Description	Value	Unit
Fan motor pressure	65 $^{\pm 10}$	bar
Fan speed	1200 $^{\pm 100}$	min^{-1}

3.6.17 Checking the LS pressure cut-off on the control block L524

Valid for: ***L524*** *- 434 / from 0101*

Procedure

The LS pressure cut-off 2 for the working hydraulics and the LS pressure cut-off 1 for the steering take the form of a valve in the control block.



- Connect a manometer (600 bar) to the test connection P.
- Start the machine and let the engine run at lower idling speed.
- Raise the lift arms to the limit.
- Check that the pressure is correct.
- If it is not correct:
  Turn the adjusting screw on the LS pressure cut-off 2 (working hydraulics) until the pressure is correct.
- Turn the steering as far as it will go and continue moving the steering wheel.
- Check that the pressure is correct.
- If it is not correct:
  Turn the adjusting screw on the LS pressure cut-off 1 (steering) until the pressure is correct.

Description	Value	Unit
LS working hydraulics pressure cut-off (2)	305 ±5	bar
LS steering pressure cut-off (1)	210 ±5	bar

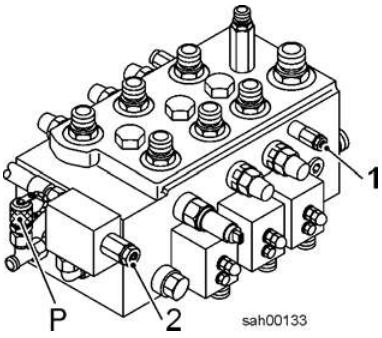
3.6.18 Checking the LS pressure cut-off on the control block

L534, L538

Valid for: ***L534*** *- 434 / 0101 - 6943;* ***L538*** *- 432 / 0101 - 6943*

Procedure

The LS pressure cut-off 1 for the working hydraulics is a valve screwed into the control block. There is another LS pressure cut-off 2 on the control block for the steering.



- Connect a manometer (600 bar) to the test connection P.
- Start the machine and let the engine run at lower idling speed.
- Raise the lift arms to the limit.
- Check that the pressure is correct.
- If it is not correct:
  Turn the adjusting screw on the LS pressure cut-off 1 (working hydraulics) until the pressure is correct.
- Turn the steering as far as it will go and continue moving the steering wheel.
- Check that the pressure is correct.
- If it is not correct:
  Turn the adjusting screw on the LS pressure cut-off 2 (steering) until the pressure is correct.

Description	Value	Unit
LS working hydraulics pressure cut-off (1)	305 ±5	bar
LS steering pressure cut-off (2)	210 ±5	bar

Outside temperature °C	Winter diesel fuel %		Additive %	
	-15 °C	-20 °C	-15 °C	-20 °C
0 to -10	100	100	- -	- -
-10 to -15	100	100	- -	- -
-15 to -20	70	100	30	- -
-20 to -25	50	70	50 *	30

Mixing ratio for winter diesel fuel

* If an additive of 50 % is necessary, only paraffin may be used (not two-star petrol).

Diesel fuel additives (flow improvers)

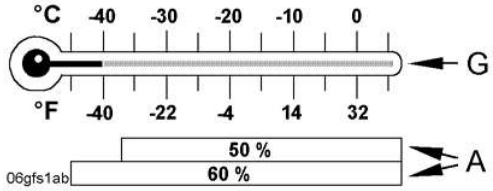
Flow improvers available on the market will also improve the cold weather performance of the diesel fuel. Their use requires the observance of quantity and application recommendations stipulated by the manufacturer.

3.7.4 Engine coolants (L524, L534)

Valid for: ***L524*** *- 438 / from 0101;* ***L534*** *- 434 / from 0101*

Coolant

The coolant must contain at least 50 % by volume of antifreeze and corrosion protection agent. This protects against freezing down to around -37 °C.



Mixing ratio of antifreeze and corrosion protection agent according to temperature

G Frost protection to -10 °C A Proportion in % of antifreeze

Fresh water quality when using corrosion inhibitor/antifreeze

Description	Value and unit
Water hardness	0.6 to 3.6 mmol/l (3 to 20° d)
pH value at 20 °C	6.5 to 8.5
Chloride ion content	max. 80 mg/l
Sulphate ion content	max. 100 mg/l

Fresh water quality

4.1 Diesel engine (emissions stage I)

(Id. Nr. 9739010, 9739011, 9880051 emissions stage 1)

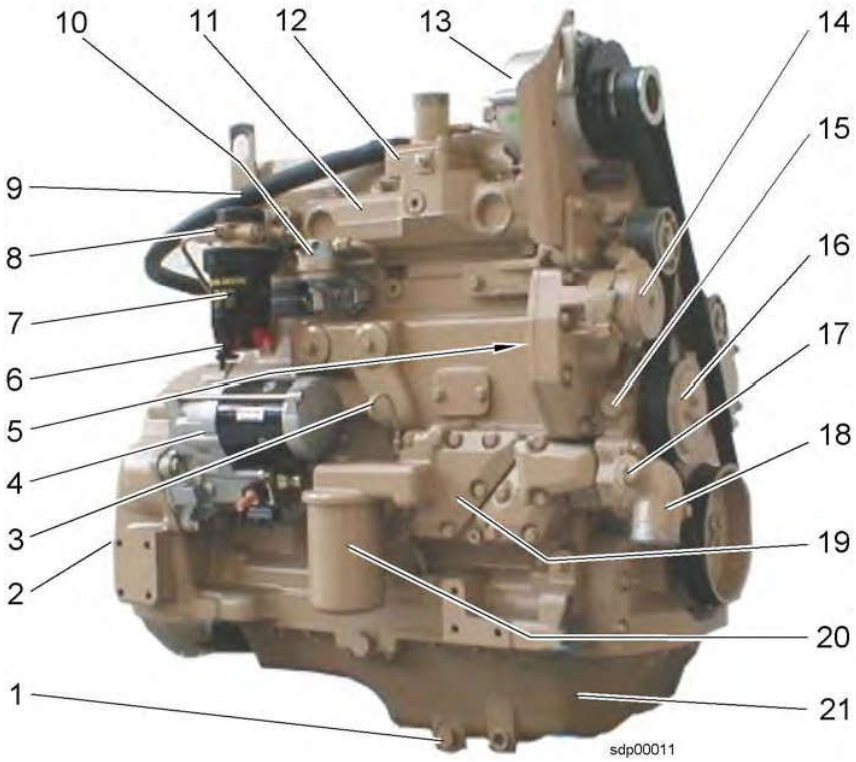
Design

Valid for: ***L524*** *- 438 / 0101 - 8795;* ***L534*** *- 434 / 0101 - 8961*

The diesel engine is a water-cooled, four-stroke in-line engine with direct injection, turbocharger and charge air cooling (L534, L538).

The engine is fitted transversely in the rear section and elastically supported on rubber elements. The flywheel end faces left.

Cylinder 1 is at the water pump end and cylinder 4 is at the flywheel end.



Diesel engine components / starter view (front)

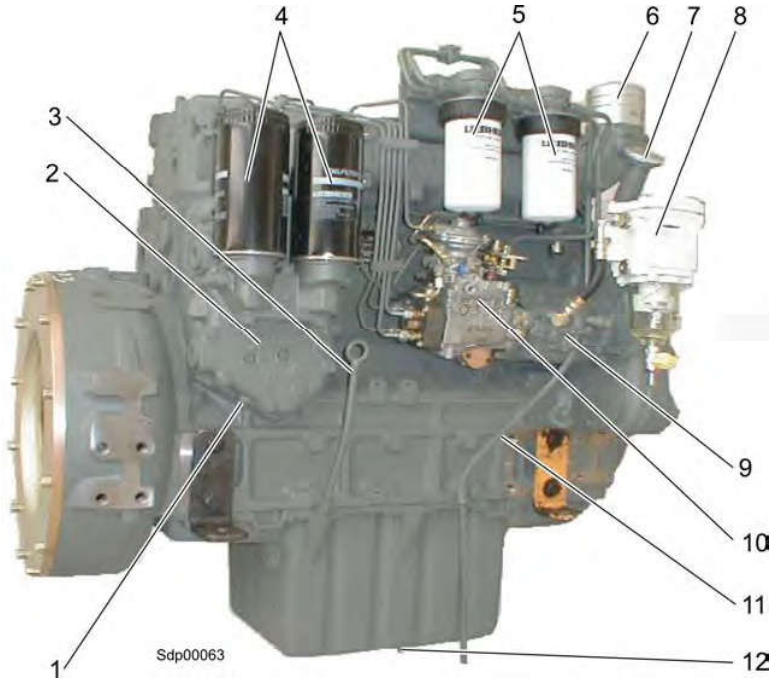
1 Engine oil drain valve
2 Flywheel-end flange for travel and working hydraulic pump
3 Dipstick
4 Starter
5 Auxiliary PTO gear pump
6 Fuel water separator
7 Fuel fine filter
8 Filter bleeder screw
9 Crankcase bleeder
10 Fuel pump
11 Intake manifold
12 Air preheater
13 3-phase alternator
14 V-belt tensioner
15 Heat exchanger intake
16 Water pump
17 Coolant drain valve
18 Water pump intake side
19 Engine oil cooler
20 Engine oil filter
21 Oil pan

Valid for: ***L538*** *- 432 / from 8508*

The diesel engine is a water-cooled, four-stroke in-line engine with direct injection, turbocharger and charge air cooling.

The engine is fitted transversely in the rear section and elastically supported on rubber elements. The flywheel end faces left.

Cylinder 1 is at the flywheel end and cylinder 4 is at the water pump end.



Diesel engine components / right view (front)

1 Coolant oil drain plug
2 Engine oil filter and cooler housing
3 Dipstick
4 Engine oil filter
5 Fuel fine filter
6 Air intake port
7 Oil filler neck
8 Fuel pre-filter (Separ filter)
9 Fuel pump
10 Mechanically controlled distributor injection pump
11 Fuel pump bleeder hose
12 Oil drain valve

The diagram shows the voltages from the fuel level sensor 1 with reference to the contents of the tank.

The lower the fuel level 6 the higher the voltage 5 and thus the level shown on the fuel level segment field 2.

The first bar in the fuel level segment display 2 on the left shows that the fuel is a reserve level.

4.3.3 Fuel pre-filter (in-line filter) L524, L534

(ID 7090480)

The fuel filter is an in-line filter between the fuel tank and the fuel pump. It must be replaced with each service.

Design

Fuel pre-filter installation

The fuel pre-filter is an in-line filter in a transparent housing.

The filter is clipped to the fuel feeder hose. A short section of hose connects the outlet to the fuel pump.

The filter flow can be controlled in both directions. With this installation, the 90° port faces the pump.

Function description

The fuel pump sucks the fuel through the fuel pre-filter. Any foreign particles are caught in the filter mesh. These can be seen through the transparent housing, indicating the degree of contamination.

You can also observe the fuel flow. This is an advantage when servicing the fuel system, for example when it needs bleeding.

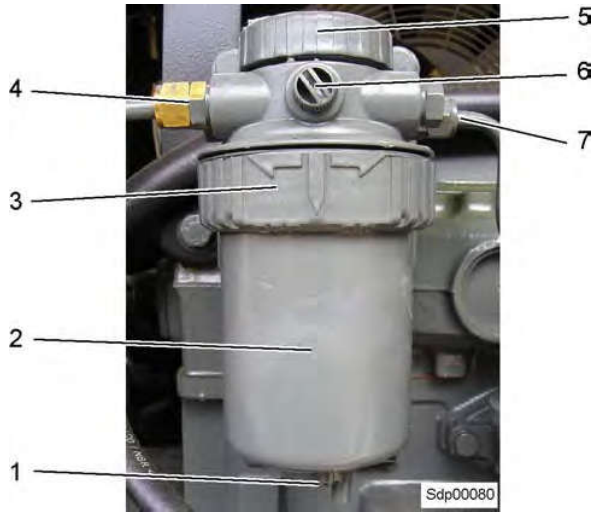
Technical data

4.4.4 Fuel fine filter L524, L534

(ID 7090528)

The filter has a snap fitting and can be serviced without any tools. The filter can be removed and replaced by hand during a service.

Design



Fuel fine filter installation

1 Water drain valve
2 Filter insert
3 Filter fixing ring
4 Filter outlet
5 For special functions
6 Bleeder screw
7 Filter intake

The fuel fine filter is fitted between the fuel pump and the injection pump.

The filter element is a cartridge fixed to the filter head with a ring. This is a disposable filter cartridge which must be replaced each time it is serviced.

Function description

The fuel fine filter protects the fuel system from contamination.

The diesel fuel is pumped under pressure from the fuel pump through the filter intake into the filter insert.

The pressure of the fuel pump forces the fuel through the filter membrane.

The filtered fuel then flows through the outlet in the filter head via the fuel line to the injection pump.

Technical data

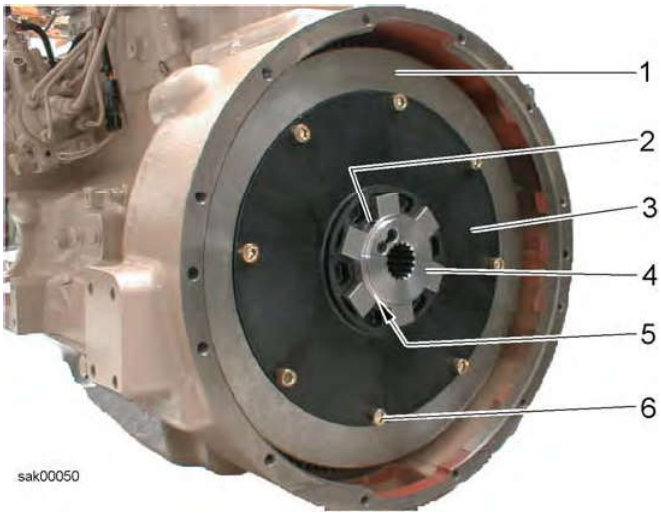
4.7 Coupling

4.7.1 Coupling L524, L534

(ID 5717325, 10010559)

Design

The coupling connects the flywheel on the diesel engine to the tandem pump.



Position of the coupling

1 Flywheel
2 Fixing screw
3 Elastic element
4 Hub star
5 Hub star shoulder
6 Fixing screws
7 Elastic element

Installation position and instructions:

– The elastic element 3 is fitted with its ribs facing the flywheel. The smooth side can be seen from the outside.
– The hub star 4 is fitted with its shoulder 5 facing the travel hydraulics pump.
– All screws are glued with LOCTITE 241.

Function description

The coupling is an elastic connection between the diesel engine and the tandem pump.

Power transmission

The following components transmit the engine torque to the tandem pump:

– Flywheel 1
– Fixing screws 6
– Elastic element 3
– Hub star 4
– Hub

Technical data

Valid for: ***L524*** *- 438 / 0101 -8795;* ***L534*** *- 434 / 0101 -8961;* ***L538*** *- 432 / 0101 -8507*

Fan control at upper engine speed	System pressure	Current	Fan speed
Hydraulic oil up to 31 °C Coolant up to 78 °C	20 ±10 bar	1350 mA	430 ±50 min -1
Hydraulic oil 31 - 55 °C Coolant up to 78 °C	65 ±10 bar	880 mA	1200 ±50 min -1
Hydraulic oil 55 - 73 °C Coolant 78 - 84 °C	65-125 ±10 bar	880 - 550 mA	1200-1740 min-1
Hydraulic oil above 73 °C Coolant above 84 °C	125 ±10 bar	550 mA	1740 ±50 min -1
Hydraulic oil above 106 °C Coolant above 100 °C (L538) Coolant above 103 °C (L524, L534)	Warning lamp + buzzer + 1st gear		
Adjusting the pressure relief valve: Proportional solenoid deenergised or one of the two temperature sensors unplugged	175 ±5 bar	0 mA	2130 ±50 min -1

Table of values for fan control

Valid for: ***L524*** *- 438 / 8796-;* ***L534*** *- 434 / 8962-;* ***L538*** *- 432 / 8508-;*

Fan control at upper engine speed	System pressure	Current	Fan speed
Hydraulic oil up to 30 °C Coolant up to 70 °C	20 ±10 bar	1350 mA	430 ±50 min -1
Hydraulic oil 31 - 64 °C Coolant 70 - 81.5°C	65 ±10 bar	880 mA	1200 ±50 min -1
Hydraulic oil 65 -73 °C Coolant 81.5 - 84 °C	65-125 ±10 bar	880 -550 mA	1200-1740 min-1
Hydraulic oil 73 - 90 °C Coolant 84 - 97 °C (L538) Coolant 84 - 100 °C (L524, L534)	125 ±10 bar	550 mA	1740 ±50 min -1
Hydraulic oil above 90 °C Coolant above 97 °C (L538) Coolant above 100 °C (L524, L534)	175 ±10 bar	0 mA	2130 ±50 min -1
Hydraulic oil above 95 °C Coolant above 100 °C (L538) Coolant above 103 °C (L524, L534)	Warning lamp + buzzer + 1st gear		
Adjusting the pressure relief valve: Proportional solenoid deenergised or one of the two temperature sensors unplugged	175 ±5 bar	0 mA	2130 ±50 min -1

Table of values for fan control

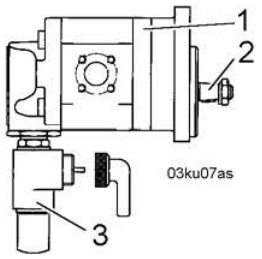
5.2 Gear motor

(ID 5717099)

The gear motor 1 is attached to the fan grille. The motor 1 drives the fan blades via the fan drive shaft 2.

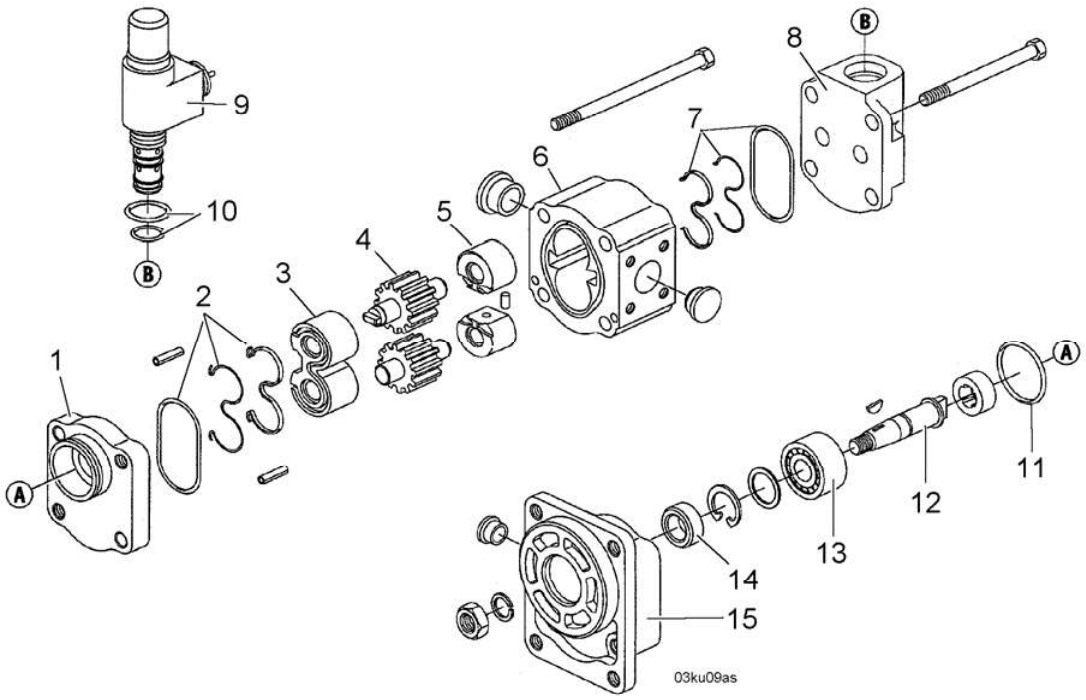
The proportional pressure relief valve 3 attached to the gear motor 1 controls the fan speed.

Design



Gear motor with proportional pressure relief valve

1 Gear motor
2 Fan drive shaft
3 Proportional pressure relief valve



Gear motor with proportional pressure relief valve

1 Bearing cover
2 Seal set
3 Bearing bushings
4 Gears
5 Bearing bushings
6 Motor housing
7 Seal set
8 Proportional pressure relief valve connecting housing
9 Proportional pressure relief valve
10 O-ring
11 O-ring
12 Shaft
13 Roller bearing
14 Shaft seal ring
15 Bearing cover

Hydraulic plan of the travel hydraulics

1 Hydraulic tank
2 Return strainer
3 Bleeder filter
4 Return suction filter
5 Replenishing valve with strainer
6 Pressure retension valve
7 Bypass valve
8 Return oil from working hydraulics
9 Bypass valve 2.5 bar
10 Temperature valve
11 Inch/brake pedal
12 Inching valve
13 Tank connection
14 Hydro accumulator connection
15 Flow dividing valve
16 Temperature sensor
17 Connection for emergency steering pump
18 Gear pump for fan / brake system
19 Suction pump for variable displacement motors
20 Variable displacement pump, complete
21 Variable displacement pump
22 Travel direction valve
23 Swivel restrictor
24 Servo cylinder
25 Pressure relief and replenishing valve A
26 Pressure relief and replenishing valve B
27 Pressure cut-off
28 Restrictor ø 1.8 mm
29 Restrictor ø 1.5 mm
30 Replenishing pump
31 Replenishing pressure relief valve
32 Orifice
33 Control valve
34 Fan motor, complete
35 Main piston
36 Restrictor
37 Pressure relief and proportional valve
38 Gear motor
39 Oil cooler, complete
40 Variable displacement motor 1, complete
41 Variable displacement motor
42 Check valve
43 Travel direction valve
44 Control piston
45 Servo piston
46 Swivel restrictor
47 Discharge valve
48 Orifice
49 Pressure relief valve
50 Variable displacement motor 2, complete
51 Variable displacement motor
52 Control valve (DA-control)
53 Control valve (pressure control)
54 Swivel restrictor
55 Servo piston
56 Restrictor ø 1.5 mm
57 Transfer gear
58 Restrictor ø 1.5 mm
60 Solenoid valve block
61 Solenoid valve - inch kick-out
62 Special function solenoid valve
63 Travel range -1 solenoid valve
64 Pilot control solenoid valve
65 Check valve
66 Pilot control hydro accumulator
67 Connection for pilot control unit
MA High pressure test connection (forwards)
MB High pressure test connection (reverse)
G Replenishing pressure test connection
PST Control pressure test connection
M1 Servo pressure / variable displacement motor test connection 1
M2 Servo pressure / variable displacement motor test connection 2
P High pressure / fan test connection

The hydrostatic travel drive operates as a closed circuit. The variable displacement pump 20 pumps oil directly to the variable displacement motors 40 and 50. The oil returning from the variable displacement motors is pumped back to the intake side of the variable displacement pump.

The pump swivelling action depends on the diesel engine speed and the load. As the engine speed increases, the displacement pump swivels out and the machine begins to move. The travel direction valve 22 determines the direction in which the displacement pump operates and hence the travel direction of the machine.

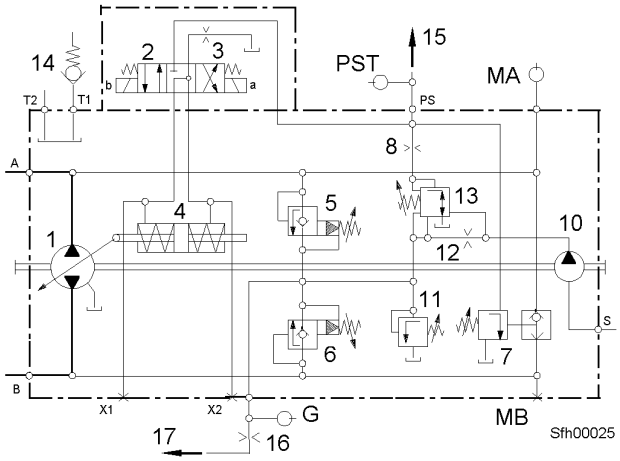
The variable displacement motor 50 can be swivelled to the zero position. At high speeds the variable displacement motor swivels to 0°. In this position, the oil only flows to the variable displacement motor 40. This means a high speed can be achieved.

At low speeds or high traction loads the two variable displacement motors swivels to a wider angle. This leads to a low output speed and a high torgue at the variable displacement motors.

When the inch/brake pedal 11 is pressed, the control pressure of the variable displacement pump 20 is continuously reduced. This means the speed and tractive force of the machine can be continuously reduced.

Function description

Basic function



Hydraulic plan of the variable displacement pump

1 Variable displacement pump
2 Travel direction valve
3 Swivel restrictor
4 Servo cylinder
5 Pressure relief and replenishing valve A
6 Pressure relief and replenishing valve B
7 Pressure cut-off
8 Restrictor
10 Replenishing pump
11 Replenishing pressure relief valve
12 Orifice
13 Control valve
14 Check valve
15 Control oil to the inching valve
16 Restrictor
17 Variable displacement motor bearing lubrication

The variable displacement pump is designed for hydrostatic drives in the closed circuit.

The pump delivers directly to the variable displacement motors. The oil flowing back from the variable displacement motors is fed back to the suction side of the pump.

The pump swivelling action depends on the diesel engine speed and the load.

When the diesel engine is idling, the swivel angle of the variable displacement pump is 0° (the pump output is zero). The variable displacement pump swivels out with increasing control pressure (speed increase) and increases its flow.

The travel direction valve determines the direction in which the displacement pump operates and the travel direction of the machine.

The pressure cut-off limits the maximum operating pressure within the closed circuit.

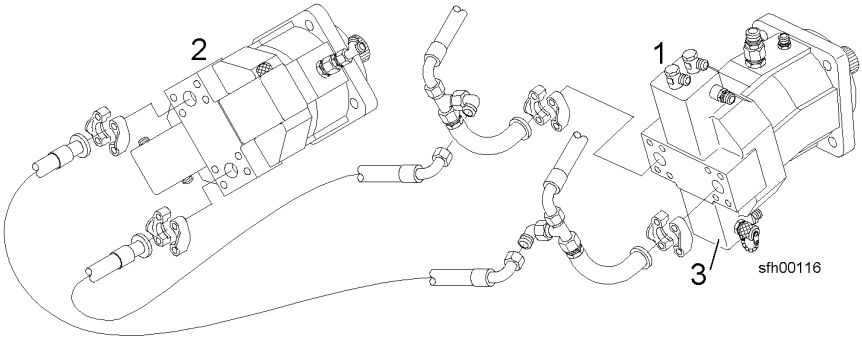
Servo piston and swash plate

The servo piston 3 turns the swash plate 2 on its roller bearing and thus controls the pump flow.

6.2 Variable displacement motor

Function description

The variable displacement motors drive the transfer gear. A high or low torque is transmitted to the gears depending on the swivel abgle and the high pressure. The large control range of the two variable displacement motors means that the speed range of the machine is also large.



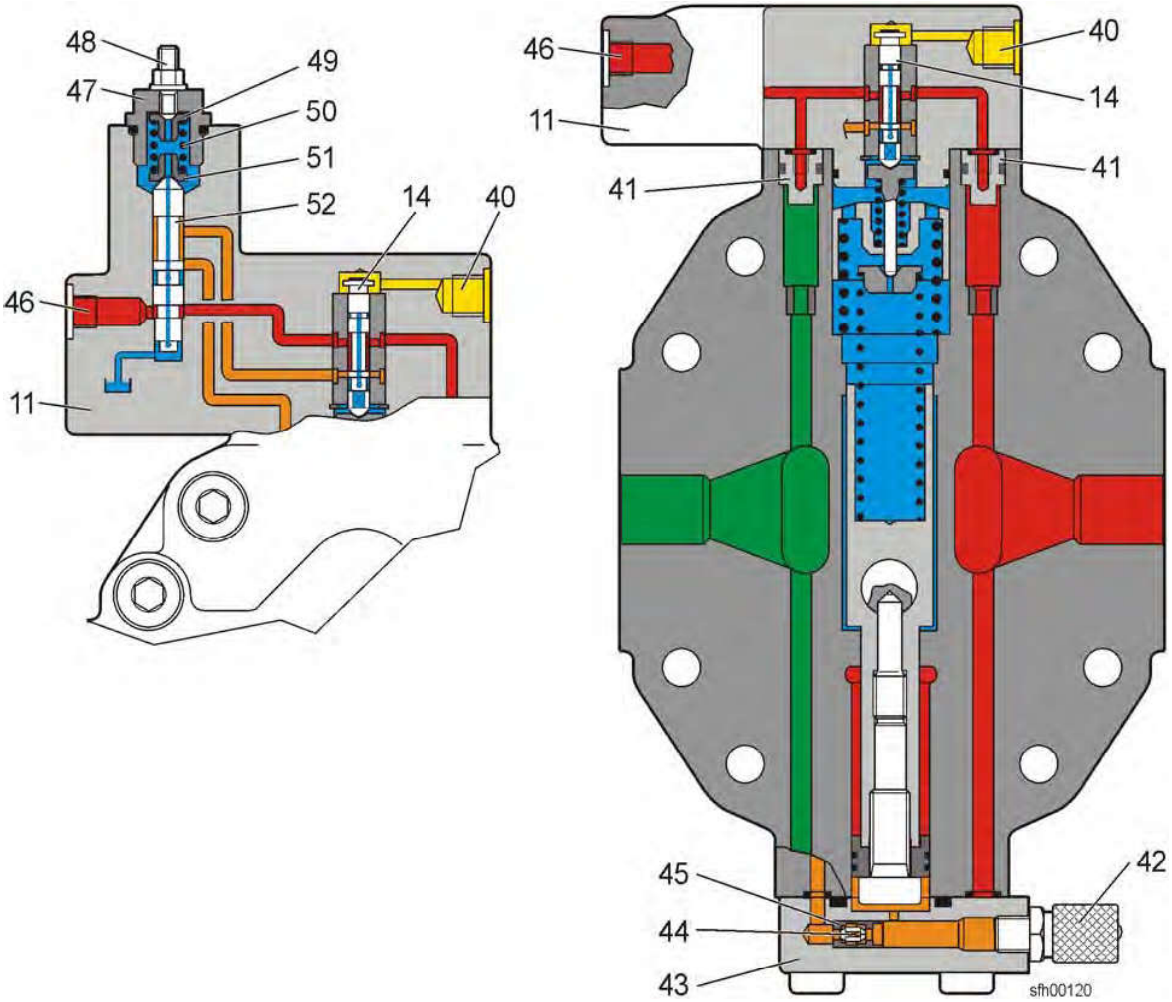
The flow from the displacement pump reaches the variable displacement motors via pressure connection A or B. In the process, the regulating pistons which move along the cylinder of the variable displacement motors are subjected to pressure. The resulting force turns the drive shaft and generates a certain torque.

The highest speed is reached when the two variable displacement motors are at a narrow swivel angle. In this case, the variable displacement motor 2 is at an angle of 0° and the variable displacement motor 1 at a narrow angle (approx. 10°).

At the maximum traction requirement, both variable displacement motors are at a swivel angle 25° to produce a large torque.

See the detailed description in the “Variable displacement motor 1” and “Variable displacement motor 2” chapters.

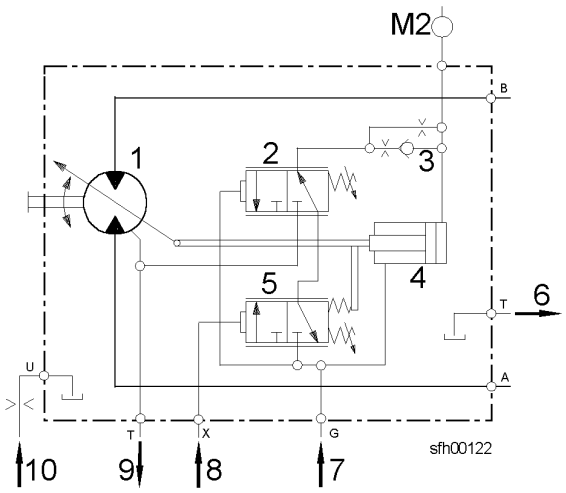
LBH/01///12.01/en/Version: 10.2001



Components of the variable displacement motor

Function description

Basic function



Hydraulic plan of the variable displacement motor

6.3 Inching function

Function description

Basic function

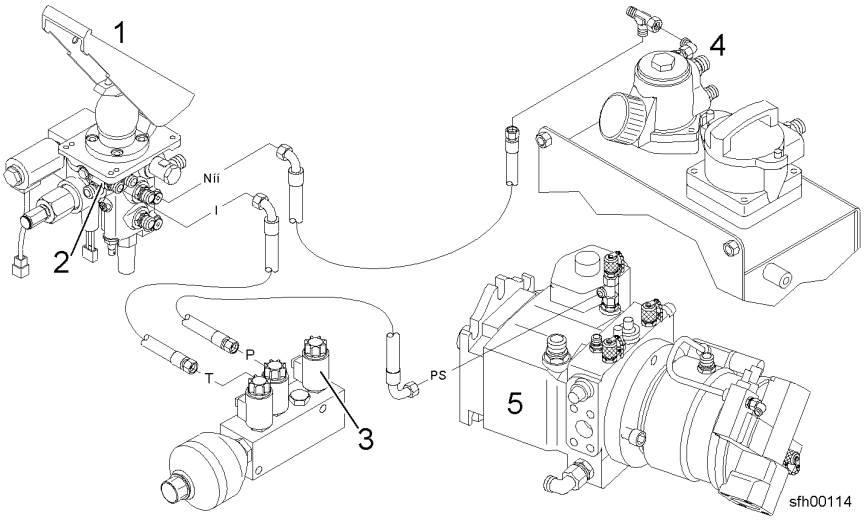
The tractive force or speed is controlled by means of the gas pedal and the combined inch/brake pedal.

The inch/brake pedal is actuated in the following situations:

– When, at the same time, a high performance is required from the working hydraulics, the tractive force or speed can be regulated by using the inch- brake pedal.
– When lifting up material in order to regulate the pushing power of the machine
– In order to regulate speed to the truck when loading material

Inching function

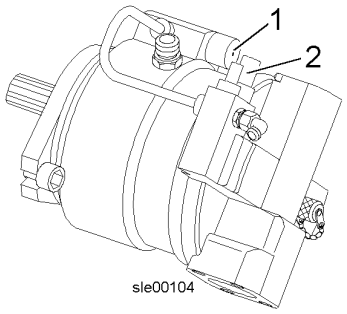
The inching function allows smooth control of the tractive force and speed of the machine. During the inching function, the control pressure of the variable displacement pump 5 is continuously reduced. The variable displacement swivels towards a smaller flow quantity.



The inching valve 1 is integrated in the brake compact block.

When the inch/brake pedal 1 is actuated the inching valve 2 opens. Control oil flows from the variable displacement pump 5 via the inching deactivation solenoid valve 3 and the inching valve 2 to the return strainer 4 of the hydraulic tank.

The inching deactivation solenoid valve 3 automatically swicthes off the inching function when travelling downhill. The function is only possible if the gas pedal is not pressed. The inching deactivation function prevents the diesel engine from speeding up.



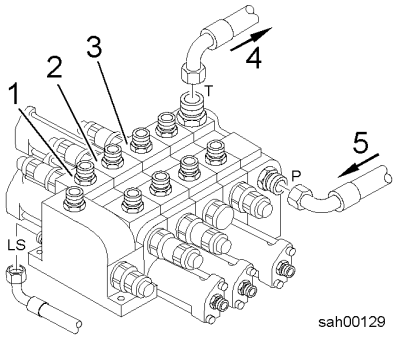
Working hydraulics pump

The working hydraulics pump provides the working hydraulics and the steering system with oil.

The pump draws oil from the hydraulic tank and delivers it to the control valve block.

The flow demand control 2 (load sensing) of the working hydraulics pump ensures that the pump only supplies the oil quantity from the hydraulic tank which is currently required. The power regulator 1 on the working hydrulics pump prevents excessive power consumption by the diesel engine.

See the detailed description in the “Working hydraulics pump” chapter.



Control valve block

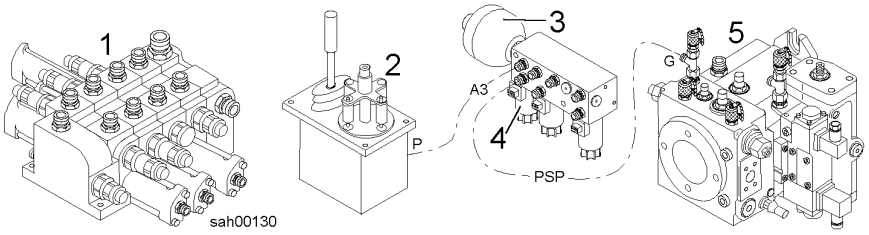
The working hydraulics pump provides the control valve block with oil via the connection 5. The returning oil is pumped through the connection 4 back to the hydraulic tank.

The spool valves for the lift cylinder 3, tilt cylinder 2 and additional function 1 are integrated in the control valve block. The spool valves in the control valve block are hydraulically controlled by the pilot control unit.

The secondary pressure relief valves protect the hydraulic system from pressure peaks from the consumer units. The LS pressure relief valve for the working hydraulics and steering system protects the working hydraulics pump from excess pressure.

See the detailed description in the “Control valve block” chapter.

Pilot control



Components of the pilot control

The working hydraulics are actuated by an independent control circuit. The spool valves are hydraulically actuated in the control valve block 1 by the pilot control unit 2. The required servo oil is obtained from the variable adjustment pump 5 (replenishing pump) of the travel hydraulics and directed via the pilot control solenoid valve 4 to the pilot control unit 2.

The pilot control hydro accumulator 3 also enables the control valve block 1 to be activated when the diesel engine is not running.

See the detailed description in the “Pilot control” chapter.

LBH/01///12.01/en/Version: 10.2001

Name	Value	Units
RPM at rated engine speed	2400	min $^{-1}$
Power output	40	kW
Flow controller (Delta p)	28 $^{\pm 1}$	bar
Power controller at regulation begin	215 $^{\pm 5}$	bar
Weight	29	kg

Technical data

Valid for: *L534-434/0101-, Id. 5717277*

Name	Value	Units
Control type	DFLR	
Max. displacement	60	cm³
Flow at rated engine speed	141	l/min
RPM at rated engine speed	2400	min $^{-1}$
Power output	57	kW
Flow controller (Delta p)	25 $^{\pm 1}$	bar
Power controller at regulation begin	215 $^{\pm 5}$	bar
Weight	33	kg

Technical data

Valid for: *L538-432/0101-, Id. 5717177*

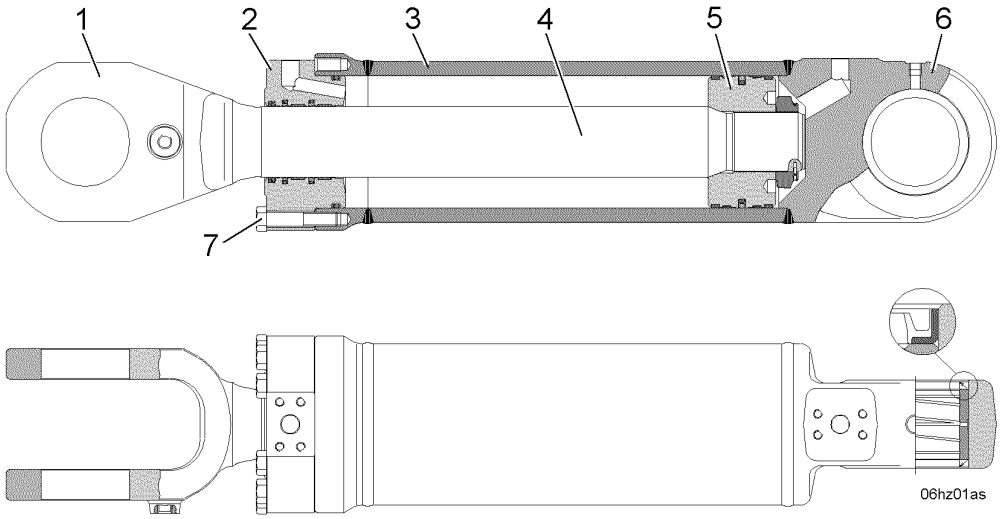
Name	Value	Units
Control type	DFLR	
Max. displacement	71	cm³
Flow at rated engine speed	137	l/min
RPM at rated engine speed	2000	min $^{-1}$
Power output	57	kW
Flow controller (Delta p)	25 $^{\pm 1}$	bar
Power controller at regulation begin	215 $^{\pm 5}$	bar
Weight	33	kg

7.3 Pilot control

7.4 Lift cylinder and tilt cylinder

7.4.1 Lift cylinder
(Id. 9609285, 9655214)

Layout



1 Rod-side cylinder bearing
2 Piston rod bearing
3 Cylinder tube
4 Piston rod
5 Piston
6 Bottom cylinder bearing
7 Hex screw

The cylinder base is welded to the cylinder tube 3.
The rod-end cylinder bearing 1 is shaped like a fork.
The bottom cylinder bearing 6 is in the form of a bracket with a bearing bushing.
The piston rod bearing 2 is plugged and screwed to the cylinder tube 3.
The piston 5 and piston rod bearing 2 are fitted with O-rings and glydseal, rimseal and stepseal sealing rings.
The O-rings are fitted with support rings.

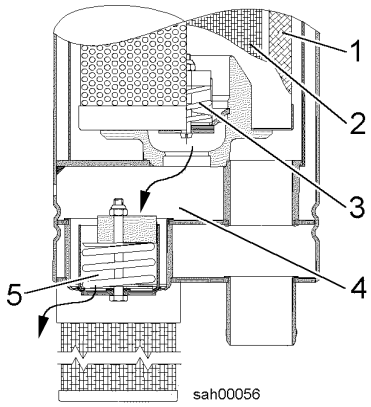
Function description

Extending and retracting

The hydraulic cylinder is a double-action cylinder with a piston rod at one end.
The maximum forces in the cylinder depend on the maximum operating pressure and the active surfaces.
When extending, the piston face is active; when retracting, the smaller ring face is active.
This means the force when extending is greater than when retracting.
The piston speed is inversely proportional to the force. The speed is higher when retracting than when extending.

Piston rod guide

The piston rod is guided by the guide rings on the piston and in the piston rod bearing.



Pressure relief by the bypass valve

The bypass valve 3 prevents excess pressure in the return flow system.

If a certain excess pressure is reached, the bypass valve opens. The oil now flows through the safety strainer 2, the bypass valve 3 and the pre-tension valve 5 into the hydraulic tank.

The safety strainer 2 catches dirt particles in the filter. This prevents contamination of the hydraulic tank.

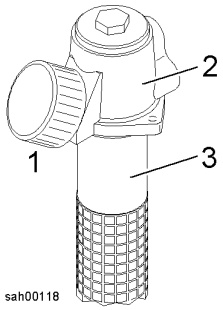
Excess pressure can arise if the filter element 1 is dirty or the viscosity of the oil is low.

Technical data

Name	Value	Units
Filtration grade	10	µm
Pre-tension valve	0.5	bar
Replenishing valve	0.04	bar
Replenishing strainer	160	µm
Bypass valve	2.5	bar

7.5.2 Return strainer
(Id. 7622829)

Layout

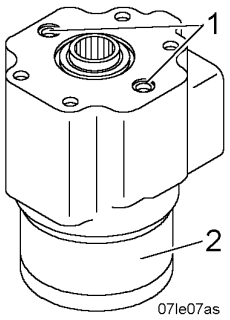


Components of the return strainer

1 Bleeder filter
2 Housing
3 Strainer insert

The return strainer is integrated in the hydraulic tank.

Servostat

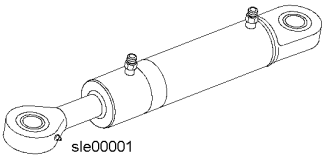


The servostat is connected to the steering column. The metering pump 2 and the spool in the servostat are actuated and the steering movement initiated via the steering wheel.

The pressure relief valves 1 protect the steering cylinder and the servostat from excessive pressure peaks.

See the detailed description in the “Servostat” chapter.

Steering cylinder



The steering cylinder is connected to the front and rear sections. The steering cylinder pushes the front and rear section together via the articulated joint.

When steering, the steering cylinder is actuated by oil from the servostat. When steering to the right, pressure is applied to the the bottom side of the steering cylinder, and to the rod end when steering to the left. The different piston surfaces of the steering cylinder mean that the steering speed is slightly different to the left and right.

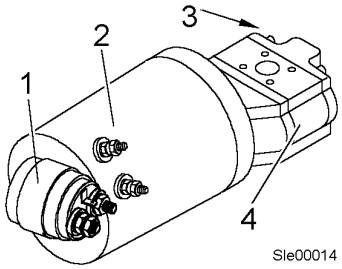
See the detailed description in the “Steering cylinder” chapter.

Emergency steering function

The emergency steering function enables the steering to be operated if the diesel engine or working hydraulics pump fail. The emergency steering pump is activated by the control electronics.

See the detailed description in the “Emergency steering” chapter.

Emergency steering pump



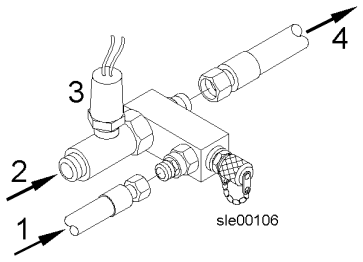
The gear pump 4 of the emergency steering pump is driven by the electric motor 2. The electric motor is switched on via the relay 1.

For emergency steering, the emergency steering pump draws oil from the hydraulic tank and delivers it via a check valve to the servostat.

The pressure relief valve 3 protects the pump from excess pressure.

See the detailed description in the “Emergency steering pump” chapter.

Valve block



The valve block connects the oil flow from the control valve block (connection 2) or from the emergency steering pump (connection 1) to the servostat (connection 4).

The emergency steering pressure switch 3 monitors the pressure of the working hydraulics pump. If the pressure at the presure switch is too low, the emergency steering pump is automatically activated. This can occur when the diesel engine has stalled or when the working hydraulics pump breaks down.

The check valve in the valve block prevents oil flowing back to the control valve block or the emergency steering pump.

See the detailed description in the “Valve block” chapter.

For slow steering movements, the entire flow is directed via the metering pump 3. Oil flow to the steering cylinder is thus dependent on the size of the metering pump and the steering wheel revolutions. This enables a very sensitive steering response, e.g., for on-road travel.

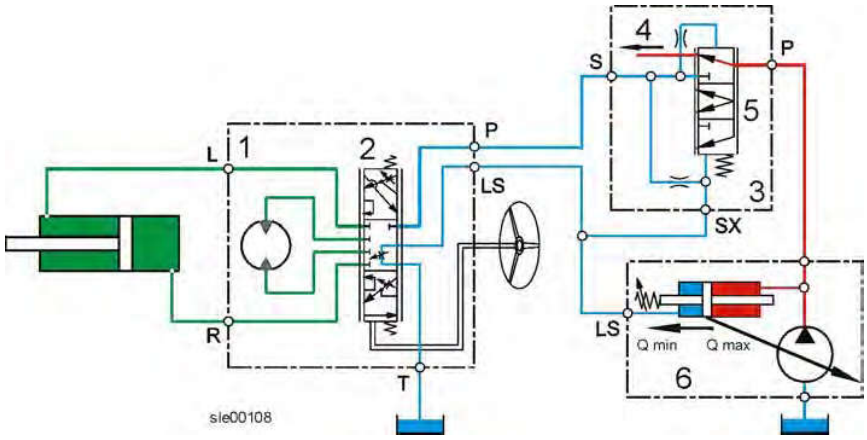
At higher steering speeds, above approx. 10 steering wheel revolutions per minute, additional boreholes open in the rotary valve spool. Some of the oil flows via the metering pump 3 and additional oil flows via the proportion via the rotary valve spool 4 directly to the cylinders. The ratio of oil volume flowing via the metering pump to oil flowing directly via the rotary valve spool is 1: 1,6. This enables a very rapid steering response for off road driving, for example.

Flow demand control (load sensing)

The flow demand control (load sensing) system ensures that the priority valve in the control valve block only supplies the oil quantity currently required to the steering. The servostat relays the oil requirement via the LS connection to the control valve block.

Steering in inactive condition

When the steering is not activated, the connection P in the servostat is blocked. The connection LS for controlling the priority valve 5 and the working hydraulics pump 6 is relieved by the spool 2 to the tank connection T. This pushes the priority valve 5 downand all the oil from the working hydraulics pump 6 is provided to the working hydraulics via the connection 4.



Steering in inactive condition

1 Servostat
2 Spool
3 Control valve block
4 Working hydraulics oil supply
5 Priority valve
6 Working hydraulics pump
P Connection
LS Connection
T Tank connection

Steering in active condition

When the steering is actuated, the spool 2 in the servostat 1 is moved. The connection P is connected to the connection LS and to the steering cylinder. The increased pressure at the connection LS pushes the priority valve 5 far enough upwards to allow sufficient oil to flow through the connection P to the servostat.

At the same time, the LS signal activates the flow regulator in the working hydraulics pump 6. This caused the working hydraulics pump 6 to adjust to the required flow and provide the servostat with oil.

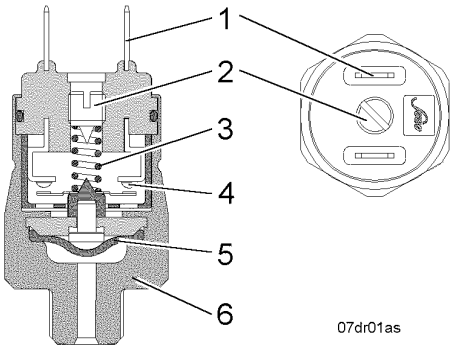
The temperature sensor 7 monitors the temperature of the electric motor 6 directly in the winding. The high current input causes the electric motor 6 to heat up after it has been running for just a few minutes. If a certain temperature is reached, the temperature sensor 7 interrupts the negative signal to the ground connection 4. This switches off the relay 1 and the emergency steering pump comes to a standstill. The emergency steering pump can only be restarted once the electric motor has cooled down again.

Technical data

Name	Value	Units
Displacement	11	cm³
Pressure relief valve	55 $^{\pm 5}$	bar
Max. current consumption	150	A
Weight	10	kg

8.4.2 Emergency steering pressure switch
(Id. 9605534)

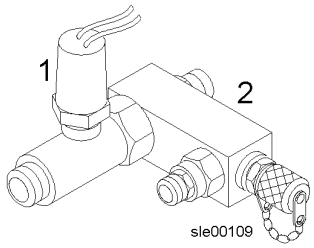
Layout



Components of the pressure switch

1 Connection contact
2 Adusting screw
3 Pressure spring
4 Switch contact
5 Membranes
6 Housing

The emergency steering pressure switch 1 is mounted on the valve block 2.



The service brake is a hydraulic double-circuit system. It acts on the wet disc brakes of the front and rear axles.

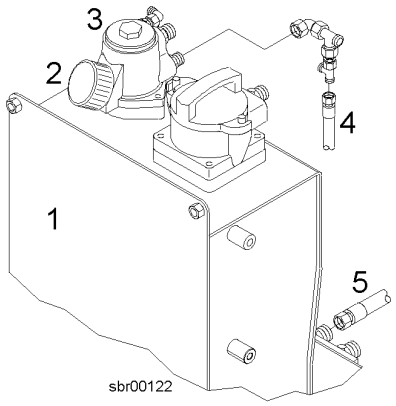
The brake fan gear pump 6 draws oil from the hydraulic tank 1 and pumps it to the compact brake valve 10. The compact brake valve 10 contains a priority valve 18 which divides the oil flowing from the pump to the brake system and the fan drive. Most of the oil flows to the brake system.

When the inch/brake pedal 21 is pressed down to less than half its full extent, the machine is hydrostatically braked by the inching valve 13.

If the pedal is pressed down further, the service brake is activated. Brake pressure is applied to the wet disc brakes in the axles.

The parking brake 9 is an accumulator brake. The parking brake is opened by oil pressure and closed by spring force. When the parking brake opens, oil flows under pressure through the parking brake solenoid valve 19 to the brake caliper 9.

Hydraulic tank

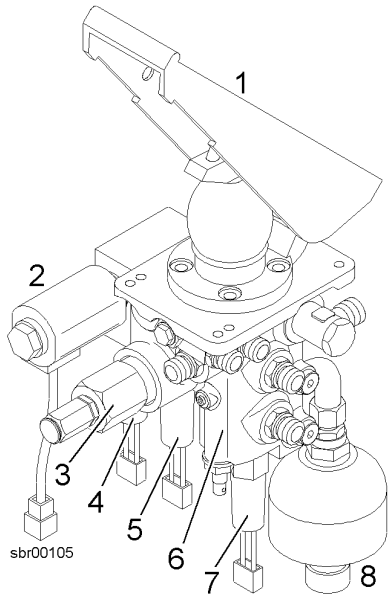


The hydraulic tank 1 provides filtered oil for the braking system. The gear pump draws up oil from the hydraulic tank via the connection 5. The returning oil is pumped through the connection 4 and the return strainer 3 back to the hydraulic tank.

The bleeder filter 2 compensates for pressure differences inside the hydraulic tank by providing appropriate ventilation.

See the detailed description in the “Hydraulic tank” chapter.

Compact brake valve



The compact brake valve performs the following tasks:

- Supplying the brake system and the fan motor with oil via a priority valve
- Charging the hydro accumulator
- Inching function when the inch/brake pedal is pressed down slightly
- Inching and braking function when the inch/brake pedal is pressed down fully
- Actuating the parking brake via the parking brake solenoid valve

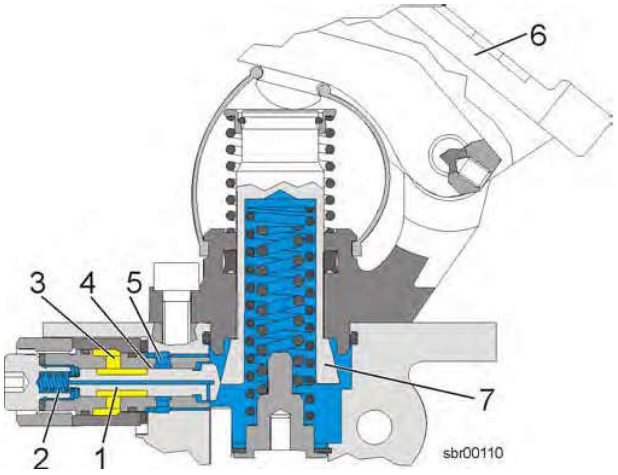
The built-in priority valve divides the quantity of oil in the gear pump to the brake system and the fan motor Oil is mainly delivered to the brake system.

The accummulator charge valve 3 fills the parking brake hydro accummulator to a set oil pressure. The accumulator charge pressure switch 4 monitors the pressure in the hydro accumulators.

When the inch/brake pedal is pressed down, oil flows from the service brake hydro accumulators to the wet disc brake. This causes the contact in the brake light pressure switch 7 to close, and the brake lights light up.

The parking brake solenoid valve 2 opens when the parking brake is actuated.

See the detailed description in the “Compact brake valve” chapter.

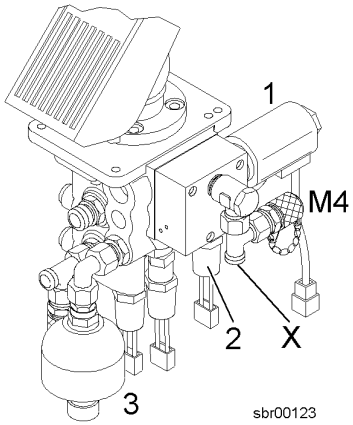


Compact brake valve with integrated inching valve

The inching valve is actuated by the inch/brake pedal.

When the inch/brake pedal 6 is pressed the actuating piston 7 is pushed down. The spring 2 pushes the inching control piston 1 to the right and the control edge 4 opens. The control pressure 3 is connected to the tank channel 5. This continually reduces the control pressure 3 and the variable displacement pump is turned so that it delivers a smaller volume.

Parking brake solenoid valve



The parking brake solenoid valve 1 is mounted on the compact brake valve. The parking brake is supplied with oil by the parking brake hydro accumulator 3.

When the parking brake switch is pressed, the parking brake solenoid valve 1 is energised. Oil pressure acts via the connection X on the piston in the brake caliper and opens the brake.

The parking brake pressure switch 2 enables the travel direction to be pre-selected with the parking brake released. When the parking brake is engaged, the parking brake pressure switch 2 cannot be pressed and the travel direction cannot be selected.

Technical data

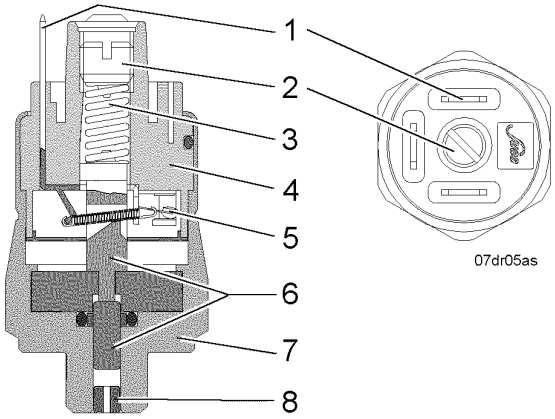
Name	Value	Units
Accumulator charge valve cut-in pressure	145 ±5	bar
Accumulator charge valve cut-off pressure	175 ±5	bar
Max. service brake pressure	65 ±5	bar
Parking brake solenoid valve current consumption	1.0	A
Parking brake solenoid valve resistance	23	Ohm

Technical data

Name	Value	Units
Hydro accumulator volume	160	cm³
Preload pressure (nitrogen filling)	30	bar

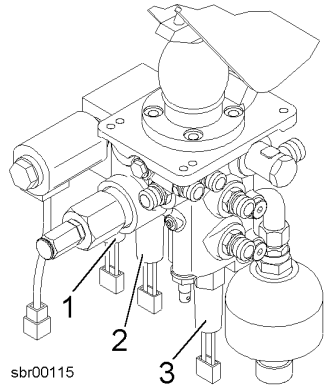
9.2.3 Parking brake pressure switch
(Id. 6905531)

Layout



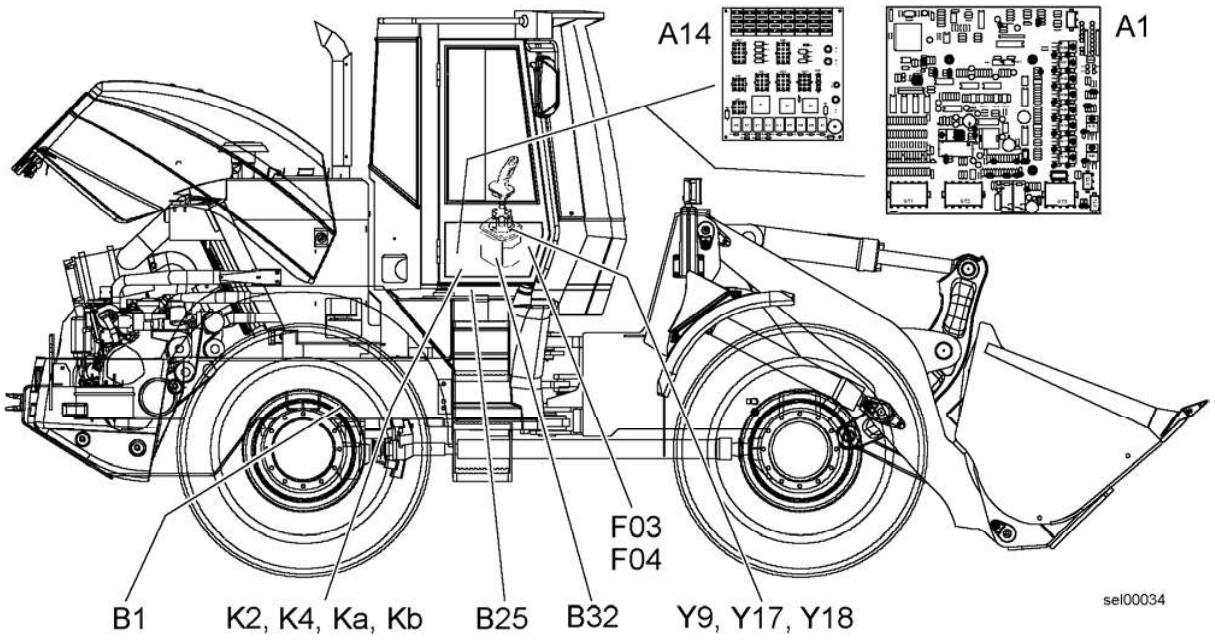
Components of the pressure switch

1 Connection contact
2 Adusting screw
3 Pressure spring
4 Top housing section
5 Switch contact
6 Actuator piston
7 Housing
8 Nozzle

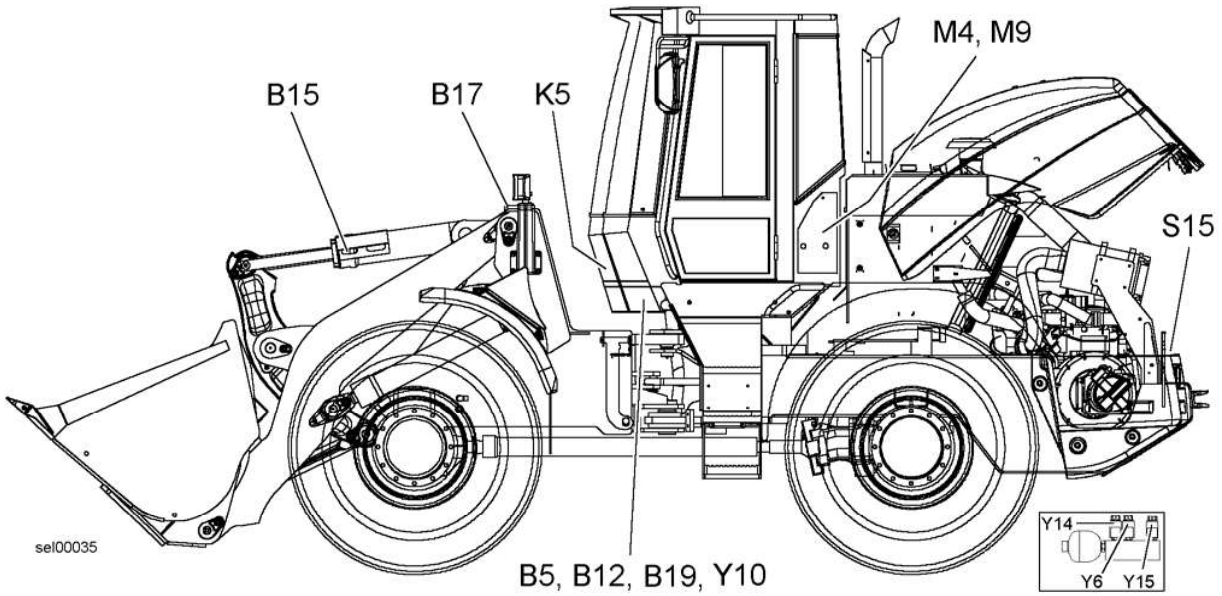


Location of the pressure switch

1 Parking brake pressure switch
2 Brake light pressure switch
3 Accumulator charge pressure switch



Machine view 1 (right)



Machine view 2 (left)

Code	Description	Step
A1	Electronic controller	4/A
A4	Fuse and relay board	4
B5	Parking brake pressure switch	4/E
B16	Back-up alarm	4/H
CN12	MATE-N-LOK connector, 12-pin, white	4/B
CN13	MATE-N-LOK connector, 12-pin, red	4/B
CN14	MATE-N-LOK connector, 15-pin, purple	4/E
D11	Diode 1N4007	4/F
D24	Diode 1N4007	4/F
E1	Left reversing light 24 V - 21 W	4/H
E5	Left reversing light 24 V - 21 W	4/H
F7B	7.5A fuse for parking brake, control lever power supply	4/A
Ka	Reverse travel direction relay	4/D
Kb	Forward travel direction relay	4/D
K22	Parking brake relay	4/E-F
S2	Forward/reverse travel direction button	4/E-F
S17	Parking brake switch	4/D
ST2	Connector, 9-pin /A1	4/A
ST3	Connector, 15-pin /A1	4/A
ST4	Connector, 2-pin /A1	4/A
X2	Connector, 70-pin / main WH	4
X7	Connector, 6-pin Deutsch (rear left lighting)	4/H
X8	Connector, 6-pin Deutsch (rear right lighting)	4/H
X9	Connector, 2-pin Deutsch (parking brake SV Y10)	4/H
X13	Connector, 4-pin XLR (travel direction SV Y26)	4/H
X14	Connector, 4-pin XLR (reverse SV Y3)	4/H
X15	Connector, 4-pin XLR (forward SV Y2)	4/H
X18	Connector, 2-pin Deutsch (backup alarm)	4/H
X50	Connector, 2-pin Junior Timer (travel range 1 SV)	4/H
X56	Connector, 10-pin MATE-N-LOK (control panel)	4/C-D
X57	Connector, 10-pin MATE-N-LOK (control panel)	4/C-D
X64	Connector, 3-pin Deutsch (pressure switch B5)	4/E
Y2	Forward travel direction solenoid valve	4/H
Y3	Reverse travel direction solenoid valve	4/H
Y6	Travel range 1 solenoid valve	4/H
Y10	Parking brake solenoid valve	4/H
Y26	Coupling solenoid valve (absent)	4/H

Electric travel hydraulics circuit

The travel hydraulics are controlled via the LH control lever S2, the relay Ka/Kb and the electronic controller A1.

When the ignition is on there must always be voltage from the fuse F7B via the two relays Ka, Kb connection 87a to the electronic controller ST2 pin 7 and 8 (safety circuit).

The travel range can be preselected when the ignition is on.

The travel range can only be activated with the motor running and the parking brake off.

Safety circuit

If the travel direction is preselected and the voltage signal between the relays Ka, Kb and the electronic controller ST2 pin 7 and 8 is interrupted, the machine will not move. This is indicated by the red LED H12 on the control board A1 lighting up.

Travelling forwards

When the parking brake is engaged, the pressure switch B5 closes and sends a voltage signal to the electronic controller A1 ST2 pin 7.

When you select forward travel direction with the switch S2 the relay Kb is activated. As long as the switch is pressed, the voltage signal from the relay

Code	Description	Step
A4	Fuse and relay board	6
B10	Klaxon	6/A
CN1	MATE-N-LOK connector, 9-pin, green	6
CN5	MATE-N-LOK connector, 15-pin, green	6
CN12	MATE-N-LOK connector, 12-pin, white	6
CN14	MATE-N-LOK connector, 15-pin, purple	6
D3	Diode 1N4007	6/D-E
D17	Diode 1N4007	6/E
D18	Diode P600	6/C
D20	Diode 1N4007	6/E
D21	Diode P600	6/C
D89	Diode P600	6/E
D99	Diode P600	6/E
E3	Left headlight 24 V - 70/75 W	6/G
E4	Right headlight 24 V - 70/75 W	6/G
E6	Left tail light 24 V - 10 W	6/G
E7	Right tail light 24 V - 10 W	6/G
E8	Right profile light 24 V - 4 W	6/G
E9	Left profile light 24 V - 4 W	6/G
E14	Left/right number plate light 24 V - 10/10 W	6/G
F2B	15A fuse for front wiper, horn	6/A
F2C	7.5A fuse for right driving light	6/E
F3A	10A fuse for hazard warning system, working attachment, flashing beacon (optional)	6/A
F4A	7.5A fuse for right high beam	6/E
F4B	3A fuse for left parking light, registration lighting	6/E
F5A	3A fuse for right parking light, monitor background lighting	6/E
F5C	7.5A fuse for left driving light	6/E
F7A	7.5A fuse for left high beam	6/E
H15	Front left indicator light 24 V - 21 W	6/G
H16	Front right indicator light 24 V - 21 W	6/G
H17	Rear left indicator light 24 V - 21 W	6/G
H18	Rear right indicator light 24 V - 21 W	6/G
K1	Direction indicator relay	6/C
K25	Right indicator relay	6/D-E
K26	Left indicator relay	6/D-E
S3	Steering column switch	6/A-B-C
S4	Hazard warning system switch	6/D
S6	Parking/driving light switch	6/D
X2	Connector, 70-pin / main WH	6
X5	Connector, 6-pin Deutsch (front section)	6/G-H
X6	Connector, 6-pin Deutsch (front section)	6/G-H
X7	Connector, 6-pin Deutsch (rear left lighting)	6
X8	Connector, 6-pin Deutsch (rear right lighting)	6
X22	Connector, 12-pin MATE-N-LOK (cab)	6
X24	Connector, 7-pin (steering column switch)	6/A-B
X25	Connector, 7-pin (steering column switch)	6/B-C
X27	Connector, 2-pin Deutsch (number plate lighting)	6/G-H

LBH/Version 02/07.2005/en/lbhlor0/22.05.2006

Code	Description	Step	Maschine view
F3C	15A fuse for rear working floodlight (optional)	8/A	--
F4A	7.5A fuse for right high beam	6/E	--
F4B	3A fuse for left parking light, registration lighting	6/E	--
F4C	7.5A fuse for rear wiper	7/A	--
F5A	3A fuse for right parking light, monitor background lighting	6/E	--
F5B	7.5A fuse for ride control system (optional)	5/A	--
F5C	7.5A fuse for left driving light	6/E	--
F6A	7.5A fuse for power supply A1, emergency steering button, pressure switch B3a	10/A	--
F6B	25A fuse (optional)	5/A	--
F6C	15A fuse for heater fan, air conditioning (optional)	7/A	--
F7A	7.5A fuse for left high beam	6/E	--
F7B	7.5A fuse for parking brake, control lever power supply	4/A	--
F7C	3A fuse for monitor supply (battery +30)	3/A	--
F8A	5A fuse for monitor (ignition +15)	2/A	--
F8B	10A fuse for engine stop	2/C	--
F8C	3A fuse for monitor supply (battery +15), preglow, engine stop	2/A	--
G1	Three-phase alternator with regulator	1/F	3
G2	Batteries (2x12 V)	1/G-H	3
H2	Preglow signal lamp	3/B-C	--
H3	Forward travel direction	3/A	--
H4	Engine oil pressure signal lamp	3/A	--
H5	Working hydraulics lockout signal lamp	3/B	--
H6	Battery charge indicator lamp	3/A	--
H7	Air filter contamination signal lamp	3/B	--
H8	Emergency steering signal lamp	3/B	--
H9	Reverse travel direction	3/A	--
H10	Direction indicator system signal lamp	3/B-C	--
H11	Parking brake signal lamp	3/A	--
H12	High beam signal lamp	3/B-C	--
H13	Engine overheating signal lamp	3/B-C	--
H15	Front left indicator light 24 V - 21 W	6/G	3
H16	Front right indicator light 24 V - 21 W	6/G	3
H17	Rear left indicator light 24 V - 21 W	6/G	3
H18	Rear right indicator light 24 V - 21 W	6/G	3
H19	Brake accumulator pressure signal lamp	3/B	--
H20	Left brake light 24V - 21W	8/G-H	3
H21	Right brake light 24V - 21W	8/G-H	3
H22	Flashing beacon 24V - 70W (optional)	8/G-H	--
H23	Hydraulic oil overheating signal lamp	3/A	--
H24	Emergency steering check signal lamp	10/E	--
H25	Travel range 1 signal lamp	3/B-C	--
H26	Travel range 2 signal lamp	3/B-C	--
H27	Safety belt signal lamp	3/B-C	--
H28	Special function signal lamp	3/B-C	--
K1	Direction indicator relay	6/C	--
K2	Engine start relay	1/C-D	1
K3	Engine stop relay	2/E	--
K4	Preglow relay	2/E, 12/E	1, 3
K5	Wiper washer interval relay	7/C	2
K8	Ignition on supply relay (+15)	2/A-B	--
K11	Ride control relay	5/E	--
K14	Relay for air conditioning coupling (optional)	7/F	--
K17	Lift kick-out relay	5/F	--
K18	Bucket return-to-dig relay	5/F	--
K22	Parking brake relay	4/E-F	--
K25	Right indicator relay	6/D-E	--

If the parking brake is engaged, the pressure switch B5 is depressurised and the voltage supply from the fuse (F7B - ST2 pin 6) is interrupted. When ST2 pin 6 is not energised, the preselected travel direction is deactivated.

Selecting reverse travel direction: As long as the switch SW1 is pressed, the signal at A1 on the plug ST2 changes from pin 8 to pin 9 and reverse travel direction is activated.

If the parking brake is engaged, the pressure switch B5 is depressurised and the voltage supply from the fuse (F7B - ST2 pin 6) is interrupted. When ST2 pin 6 is not energised, the preselected travel direction is deactivated.

Switching between travel ranges 1, 2 and neutral

After the engine is started, travel range 2 is always activated.

The **travel range** can only be changed if the parking brake is released.

If you select **travel range 1** (tortoise) on the switch S100, a voltage signal is sent to the electronic controller A1 ST2 pin 11.

The electronic controller A1 sends a voltage signal on ST3 pin 2 to the travel range 1 solenoid valve Y6.

When the travel range 1 solenoid valve Y6 is energised, the travel motor M2 is held at the maximum angle.

If you select **travel range 2** (hare) on the switch S100, a voltage signal is sent to the electronic controller A1 ST2 pin 10.

The output on the electronic controller A1 (ST3 pin 2 to the travel range 1 solenoid valve Y6) is de-energised, and so therefore is the travel range 1 solenoid valve Y6 on the cut-in block.

When the travel range 1 solenoid valve Y6 is de-energised, the travel motor M2 returns to the minimum angle.

To select neutral travel direction, hold the switch S100 on **travel range 1** for 3 seconds.

Hydraulic oil temperature protection

If the hydraulic oil overheats (more than 106°C measured by the temperature sensor B8), the machine automatically switches down to travel range 1 after a minute.

In this condition the following warning signals are activated:

– Warning buzzer 3 seconds on, 10 seconds off etc.
– The travel range 1 and 2 indicators H25 and H26 flash alternately every 500ms.
– Hydraulic oil overheating signal lamp H23 lights up continuously.
– The red LED H13 on the electronic controller A1 lights up.

The warning signals and travel range 1 remain active until the hydraulic oil temperature falls back below 106 °C.

Coolant temperature protection

If the coolant overheats (more than 100°C (L538) or 103°C (L534, L534) measured by the temperature sensor B21), the machine automatically switches down to travel range 1 after a minute.

In this condition the following warning signals are activated:

– Warning buzzer 3 seconds on, 10 seconds off etc.
– The travel range 1 and 2 indicators H25 and H26 flash alternately every 500ms.
– Hydraulic oil overheating signal lamp H23 flashes.
– The red LED H14 on the electronic controller A1 lights up.

The warning signals and travel range 1 remain active until the coolant temperature falls back below 103°C.

Reversing block

The reversing block is activated at above 16 km/h.

Code	Description	Step
A4	Fuse and relay board	6
B10	Klaxon	6/A
CN1	MATE-N-LOK connector, 9-pin, green	6
CN5	MATE-N-LOK connector, 15-pin, green	6
CN12	MATE-N-LOK connector, 12-pin, white	6
CN14	MATE-N-LOK connector, 15-pin, purple	6
D3	Diode 1N4007	6/D-E
D17	Diode 1N4007	6/E
D18	Diode P600	6/C
D20	Diode 1N4007	6/E
D21	Diode P600	6/C
D89	Diode P600	6/E
D99	Diode P600	6/E
E3	Left headlight 24 V - 70/75 W	6/G
E4	Right headlight 24 V - 70/75 W	6/G
E6	Left tail light 24 V - 10 W	6/G
E7	Right tail light 24 V - 10 W	6/G
E8	Right profile light 24 V - 4 W	6/G
E9	Left profile light 24 V - 4 W	6/G
E14	Left/right number plate light 24 V - 10/10 W	6/G
F2B	15A fuse for front wiper, horn	6/A
F2C	7.5A fuse for right driving light	6/E
F3A	10A fuse for hazard warning system, working attachment, flashing beacon (optional)	6/A
F4A	7.5A fuse for right high beam	6/E
F4B	3A fuse for left parking light, registration lighting	6/E
F5A	3A fuse for right parking light, monitor background lighting	6/E
F5C	7.5A fuse for left driving light	6/E
F7A	7.5A fuse for left high beam	6/E
H15	Front left indicator light 24 V - 21 W	6/G
H16	Front right indicator light 24 V - 21 W	6/G
H17	Rear left indicator light 24 V - 21 W	6/G
H18	Rear right indicator light 24 V - 21 W	6/G
K1	Direction indicator relay	6/C
K25	Right indicator relay	6/D-E
K26	Left indicator relay	6/D-E
S3	Steering column switch	6/A-B-C
S4	Hazard warning system switch	6/D
S6	Parking/driving light switch	6/D
X2	Connector, 70-pin / main WH	6
X5	Connector, 6-pin Deutsch (front section)	6/G-H
X6	Connector, 6-pin Deutsch (front section)	6/G-H
X7	Connector, 6-pin Deutsch (rear left lighting)	6
X8	Connector, 6-pin Deutsch (rear right lighting)	6
X22	Connector, 12-pin MATE-N-LOK (cab)	6
X24	Connector, 7-pin (steering column switch)	6/A-B
X25	Connector, 7-pin (steering column switch)	6/B-C
X27	Connector, 2-pin Deutsch (number plate lighting)	6/G-H

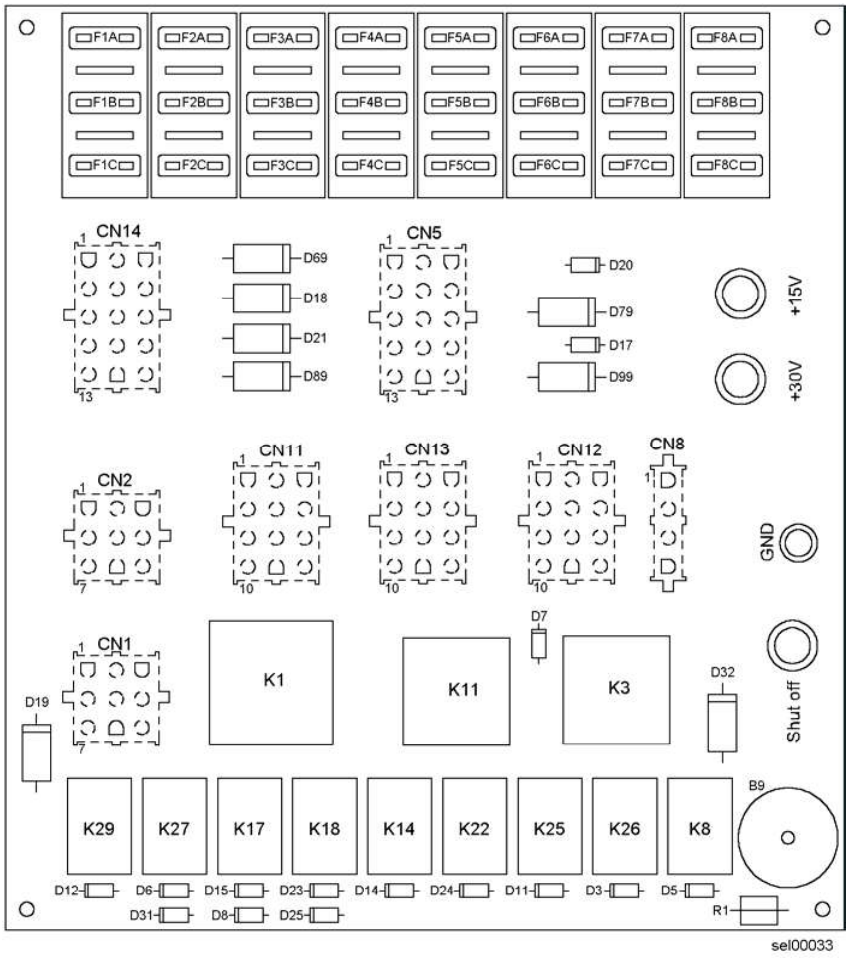
LBH/Version 02/07.2005/en/lbhlor0/22.05.2006

10.1 Fuse and relay board A4

The fuse and relay board A4 is fitted inside the right control panel at the rear.

Design

The fuse and relay board A4 contains relays, fuses, diodes, the electronic indicator, plug connectors, the warning buzzer B9 and screw connections for the power supply.



Fuse and relay board A4

F1A	7.5A Brake light
F2A	15A Lighting, switch lighting
F3A	10A Hazard warning system, working attachment, flashing beacon
F4A	7.5A Right high beam
F5A	3A Right parking light, monitor background lighting
F6A	7.5A Power supply A1, emergency steering button, pressure switch B3a
F7A	7.5A Left high beam
F8A	5A Monitor (ignition +15)
F1B	10A Interior lighting, socket, radio (optional), compressor
D12	1N4007 extinguishing diode K29
D14	1N4007 extinguishing diode K14
D15	1N4007 extinguishing diode K7
D17	1N4007 high beam blocking diode
D18	P600 indicator blocking diode
D19	P600 working attachment blocking diode
D20	1N4007 high beam blocking diode
D21	P600 indicator blocking diode
D23	1N4007 extinguishing diode

H1 Green transformer power supply LED
H2 Green controller power supply LED
H3 Red output N20 error LED
H4 Red output N21 error LED
H5 Red output N22 status LED
H6 Red LED (no function)
H7 Red output N24 status LED
H8 Red output N18 status LED
H9 Red output N17 status LED
H10 Red output N16 status LED
H12 Red safety logic LED
H13 Red hydraulic oil overheating LED
H14 Red coolant overheating LED
H15 Green output N20 active LED
H16 Green output N21 active LED
H17 Green output N22 LED
H18 Green LED (no function)
H19 Green output N24 active LED
H20 Green output N17 active LED
H21 Green output N16 active LED
H22 Red output N15 status LED
H23 Green output N15 active LED
H24 Red output N31 status LED
H25 Green output N31 active LED
N15 Additional function 1 output stage
N16 Pump forward output stage
N17 Pump reverse output stage
N18 Fan proportional valve output stage
N20 Emergency steering pump output
N21 Ride control output stage
N22 Zero throttle output stage
N23 Coupling output stage (no function)
N24 Slow travel range output stage 1
N31 Additional function 2 output stage
S1.1 Fan control coding switch NORMAL / TROPICS
S1.2 Coding switch for temperature adjustment L524, L534 / L538
S2.1 Joystick coding switch – latch/push direction button
S2.2 Coding switch with no function
ST1 Connector 15-pin female
ST2 Connector 15-pin male
ST3 Connector 12-pin female
ST4 Connector 2-pin female
ST5 Connector 2-pin male

Plug assignment

ST1 connector (15-pin female)

3 Hydraulic oil temperature sensor B8 supply (earth)
4 Unassigned
5 Coolant temperature sensor B21 input (analogue signal)
6 Hydraulic oil temperature sensor B8 supply (earth)
7 Overheating warning output H23 (earth-switching)
8 Hydraulic oil temperature sensor B8 input (analogue signal)
9 Power take-off sensor B1 supply (earth)
10 Power take-off sensor shield B1
11 Power take-off speed input B1 (frequency)
12 Unassigned
13 Unassigned
14 Engine speed input TW G1 (frequency)
15 Emergency steering pump manual activation input S10 (positive switching)
16 Emergency steering pressure switch input B3 (earth switching)
17 Emergency steering check pressure switch input B3a (positive switching)

ST2 connector (15-pin male)

1 Power supply - F6A 24V (+)
2 Power supply - earth (-)
3 Charge control input T61 G1 (positive switching)
4 Travel range 2 lamp output H26 (positive switching)
5 Travel range 1 lamp output H25 (positive switching)
6 Parking brake input B5 (positive switching)
7 Forward selection input, N/C (positive switching)
8 Reverse selection input, N/C (positive switching)
9 C signal input (positive switching)
10 Upshift S100 input (positive switching)

Lowering the engine output at excess temperature

If the intake air, coolant or fuel is too hot, the electronic controller A14 reduces the engine output proportionately.

The following temperatures cause a reduction in engine output:

Item	Temperature	Power reduction
Intake air temperature	> 150°C	20%
Coolant temperature	> 108°C > 113°C > 118°C*	5% 40% 60%
Fuel temperature	> 120°C	20%

*If the coolant temperature exceeds 118°C, in addition after 30 seconds the electronic controller switches off the engine.

Storing service codes when tolerances are exceeded

If preset tolerances are not maintained, the electronic controller A14 stores a service code.

For a detailed description see section 19

Issuing service codes on the display S41

If preset tolerances are not maintained, one of the following warnings is issued on the button S41 for the duration:

– The lamp flashes

– The lamp lights up

You can also press the button to read the service code in the form of a flashing signal.

For a detailed description see section 19

Reading service codes with the MURPHY GAGE diagnostic tool

The following information can be obtained by connecting the MURPHY GAGE to the diagnostic connector:

– **Units** – either metric or imperial units
– **Eng. Conf.** – engine configurations (see the list in the engine manual)
– **Throttle** – value from angle sensor R5 0 – 100%
– **Load RPM –** engine suppression
– **Eng. Torq** – engine torque
– **Eng. RPM** – engine speed from the speed and position sensor B37
– **Eng. Hrs** – service hours
– **Fuel Used** – total fuel consumption
– **Cool Temp**. – coolant temperature from sensor B20a
– **Fuel Temp**. – fuel temperature from sensor B35
– **Oil Press** – oil pressure not connected
– **Fuel Rate** – hourly fuel consumption
– **Mani Temp**. – intake air temperature from sensor B36
– **Batt. Volt** – battery voltage
– **Service Code** – active service codes
– **Stor Code** – stored service codes

12 Axles, tyres

Chapter contents

LBH/01///12.01/en/Version: 10.2001

Pressure oil is supplied to the brake pistons 14 (three units), which force the retainer plate 12 towards the outer discs and inner discs, which are supported in the axle casing 9.
When the brake is not activated, the return springs 5 push the retainer plate 12 and the brake piston 14 back to the initial position. In the process, the brake discs break contact and the drag torque is reduced to a minimum.
Der parking brake is fitted on the axle input. See the detailed description in the “Brake system” chapter.

Wheel attachment

The wheels are fixed to the wheel flange of the wheel hubs by wheel nuts. The wheels are centered by the spherical collar nuts.

Axle lubrication

The differential and the wheel hubs each have their own oil system. Oil filler and drain plugs are attached to the wheel hubs and the differential housing.

Technical data

Valid for: *L524-438/0101-, Id. 5717173*

Name	Value	Units
Locking value of the self-locking differential	45	%
Angle of swing (to each side)	6	°
Wheel base	1900	mm
Differential ratio	3.1	
Wheel hub ratio	6.23	
Total gear ratio	19.3	
Wheel lug tightening torque	650	Nm
Wheel lug spanner size	30	mm
Weight	600	kg

Technical data

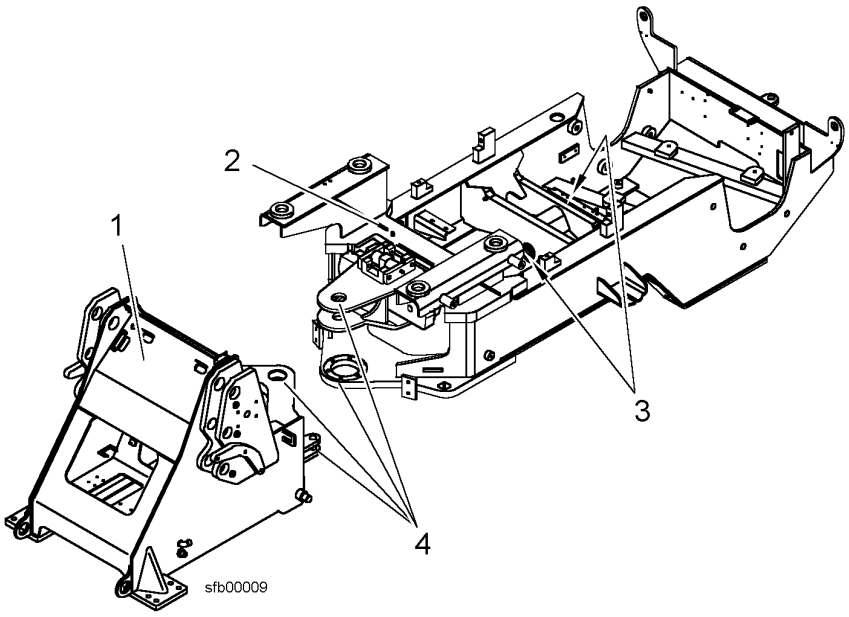
Valid for: *L534-434/0101-, Id. 5716875; L538-432/0101-, Id. 5716875*

Name	Value	Units
Locking value of the self-locking differential	45	%
Angle of swing (to each side)	6	°
Wheel base	1900	mm
Differential ratio	3.67	
Wheel hub ratio	6.23	
Total gear ratio	22.85	
Wheel lug tightening torque	650	Nm
Wheel lug spanner size	30	mm
Weight	680	kg

13.1 Vehicle frame

Layout

The machine frame consists of a front section and a rear section. These are linked by the oscillating angle mount.



Main components of the machine frame

1 Front section
2 Rear section
3 Oscillating axle mount
4 Articulation bearing

Function description

The oscillating angle mount allows the machine to be steered and to oscillate between the front and rear sections around the longitudinal axle of the vehicle.

In order to steer, the machine frame is pivoted to the left or right via the oscillating angle mount.

The machine frame transmits the forces from the lift arm to the axles. The vehicle frame bears all the key components of the machine such as the diesel engine, driver's cab, transfer gear, etc.

14 Central lubrication system

Chapter contents

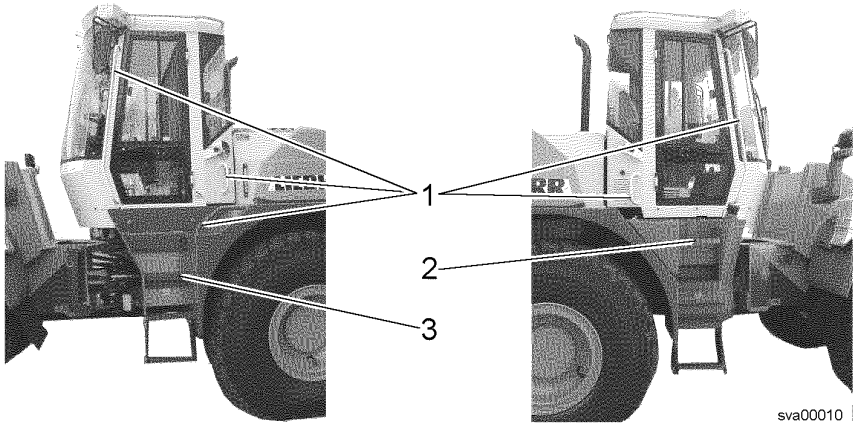
LBH/01///12.01/en/Version: 10.2001

15.2 Cab access

(Id. 9609274, 9658670)

Personnel should only get on and off the machine using the access aids provided.

Layout



Driver's cab access

1 Handles
2 Right cab access
3 Left cab access

The cab access 3 is fixed to the rear section with two bolts. The lowest step is linked to the cab access by two rubber supports.
The cab access 2 is fixed to the rear section with five bolts. The lowest step is linked to the cab access by two rubber supports.

Function description

The left cab access is for entering and leaving the driver's cab and access to certain maintenance points.
The left cab access is for emergency exit and access to certain maintenance points.

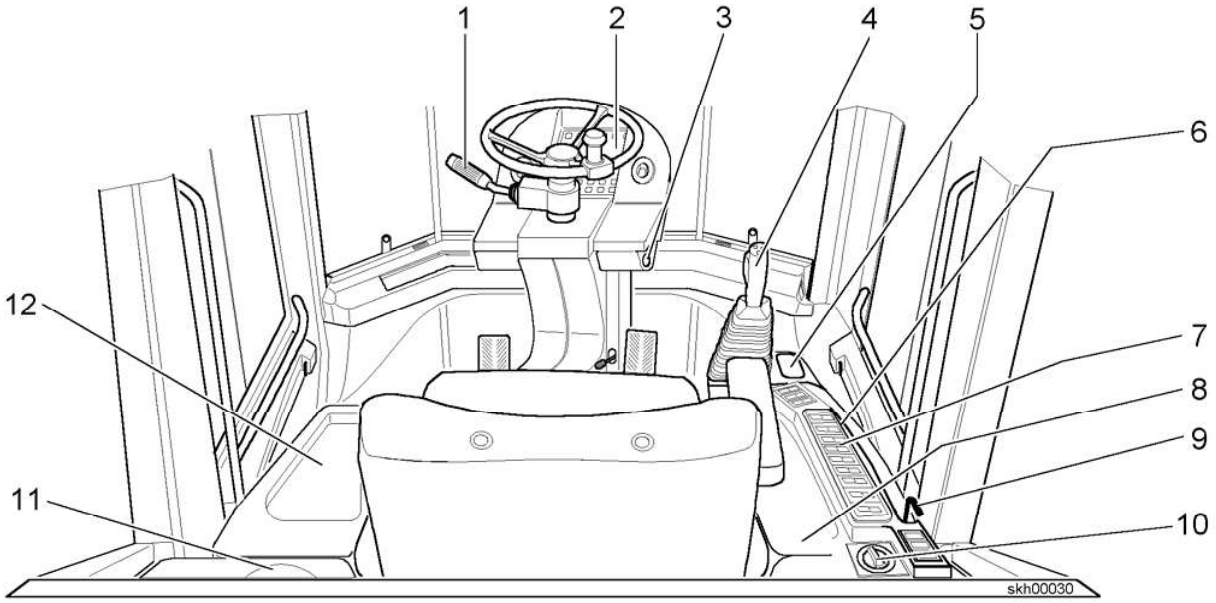
16.1 Instrument panel

Important operating, display and control elements are arranged on the instrument panel. Their locations are determined by ergonomic factors.

Ergonomic design means that health and safety aspects are taken into account.

Features such as the adjustable steering column and seat provide maximum comfort for the driver.

Design



Instrument panel

1 Steering column switch
2 Display unit on the instrument panel
3 Ignition switch
4 LIEBHERR control lever
5 Position for additional control lever
6 Electronic controller A1
7 Switches on the side console
8 Fuse and relay box
9 Air flap adjustment lever
10 Heater control panel
11 Round compartment
12 Glove compartment

Adjustable steering column with steering wheel and steering column switch

The display unit 2 on the instrument panel, the switches for the driving lights and floodlights and the switches for the parking brake and hazard lights are built into the steering console.

The ignition switch 3 is on the right side of the steering console.

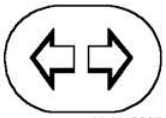
Right-side console (control panel)

The LIEBHERR control lever 4 is in the side cover on the right. To the right of this, an (optional) additional control lever 5 may be installed.

Other controls in the side cover 7 include switches and lamps for the equipment, emergency steering, wipers and mode switch.

The electronic controller A1 6 is under the side cover.

The top part of the side cover can be opened.


bsym0020

Flashing indicator

The lamp (H10) is directly activated by a positive signal from the indicator relay (K1).

Operating mode	Value	Input signal
Lamp test	None	None
Ignition ON	None	None
Indicator switch ON	Flashes	(+) Positive from K1 to X4 pin 14


bsym0021

Air filter contamination indicator

This indicator lights up when the air filter is very dirty. The air filter must be serviced.

The vacuum switch (B4) on the intake pipe between the engine and the air filter earths the display unit when the vacuum reaches a set level (meaning the filter is very dirty).

Operating mode	Value	Input signal
Lamp test	Lights up	Internal
Ignition ON	None	None
Malfunction: dirty air filter	Flashes	(-) negative (earth) from B4 to X4 pin 16

16.1.2 Switches on the instrument panel

The switches for operating the machine and ensuring safety are integrated in the steering console.

These are on/off switches for the lights and hazard warning system, as well as a spring button with OFF, ON and 0 positions for the parking brake.

The travel range and neutral selection on the LH control lever has been integrated in the left switch group on the instrument panel (buttons) since serial number 6871.

LBH/Version 02/07.2005/en/lbhlor0/22.05.2006

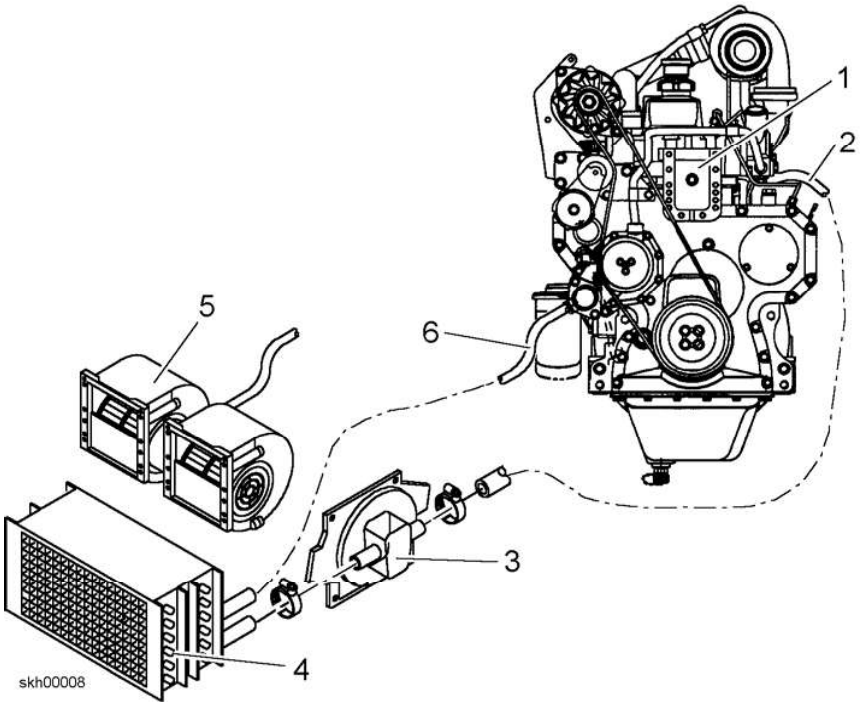
16.2 Heating and ventilation

(ID 9840506)

The driver's cab is equipped with a warm water heating system.

The heating circuit is part of the engine cooling circuit.

Design



Heating circuit

1 Diesel engine
2 Hot water supply
3 Water valve
4 Heat exchanger
5 Blower
6 Return

The hot water supply 2 is on the thermostat housing of the engine and is connected by flexible hoses to the heat exchanger 4 in the cab.

The supply line contains the water valve 3, which is operated via a bowden cable. This means the heating power can be continuously adjusted.

The return line 6 of the heating circuit ends in the lower coolant line.

The heater, with the radial blower and the heat exchanger 4, is located under the driver's seat.

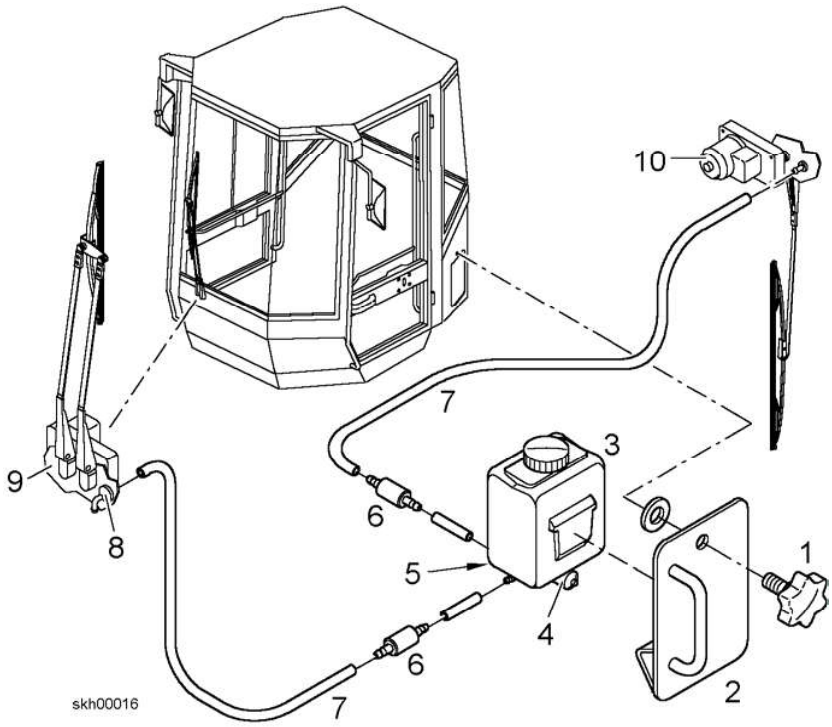
A flap in the blower intake duct allows fresh air and circulated air to be selected and mixed as required.

The controls are located on the left behind the driver's seat (blower knob and heater slider). The lever for the fresh/circulated air flap is on the right beside the side cover.

There is a serviceable air filter between the fresh/recirculated air flap and the heater blower. This fastened with a clip and pushed onto the seal surface.

16.4 Windscreen wiper and washer system

Design



Windscreen wiper and washer system

1 Star grip screw
2 Cover
3 Washer fluid reservoir
4 Front washer pump
5 Rear washer pump
6 Check valve
7 Washer hose
8 Outlet nozzle
9 Front wiper motor
10 Rear wiper motor

The machine has an electric washer and wiper system for the front and rear windscreens.

Essentially it consists of the wipers and nozzles, the wiper motor and gear, the reservoir and pumps, and the controls.

The front and rear wiper and washer systems have a common washer fluid reservoir.

Non-return valves are fitted in the washer hoses to the outlet nozzles.

The switches for the front washer and wiper system are on the steering column switch.

The switch for the rear washer and wiper system is in the right-hand side console. There is a spring-action button for activating the washer pump.

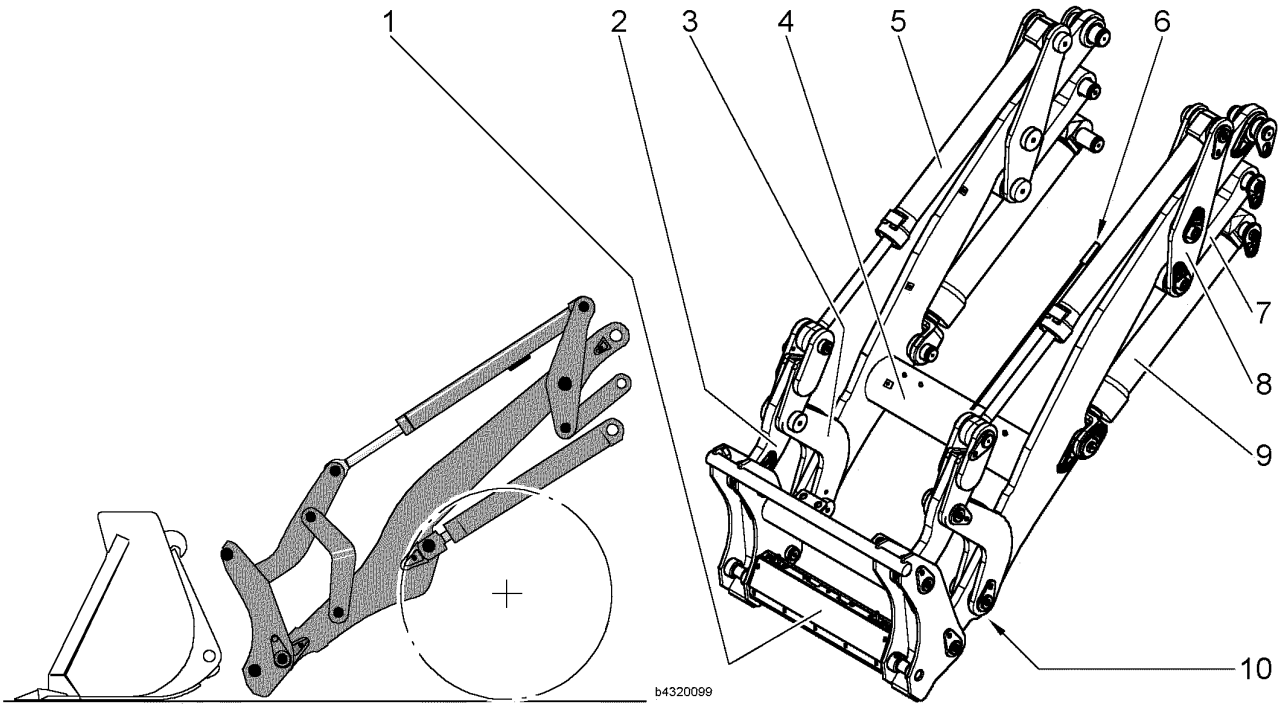
Front and rear washer system

The two washer pumps are fastened to the floor of the shared washer fluid reservoir. This is built into the rear of the cab on the left and can be accessed from outside.

LBH/Version 02/07.2005/en/lbhlor0/22.05.2006

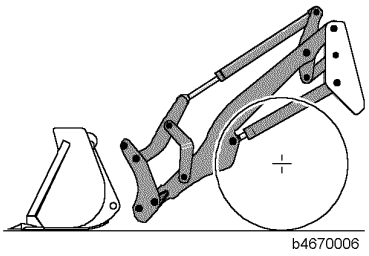
17.2 P-bar kinematics lift arm

Layout



Main components of the P-bar lift arm

1 Hydraulic quick-change device
2 Front linkage
3 Front connecting link
4 Bucket arm
5 Tilt cylinder
6 Automatic bucket return-to-dig
7 Connecting link
8 Rear linkage
9 Lift cylinder
10 Bucket stops



P-bar kinematics

The lift arm is attached to the front section of the machine.

The P-lift arms have a parallel kinematic design. This means that the arrangement of the tilt cylinder, reversing levers at the back and front, connecting strap and bucket arm form a parallelogram.

The parallel kinematics enable the load to be kept parallel to the ground, e.g. with a forklift, over the entire lifting range.

The P-lift arms are equipped with a hydraulic quick-change device. The hydraulic quick-change device is fitted as standard equipment.

Two lift cylinders and two tilt cylinders are attached to the lift arms.

The lift arms are bolted to the front section via the bucket arm bearings and via the cylinder bearings at the cylinder base.

The bearing points on the lift arm are sealed and protected against wear caused by dirt and corrosion.

The lift cylinders are mounted at the piston rod-end on the bucket arm and at the cylinder bottom-end on the front section.

The lift cylinders are mounted at the piston rod-end on the front linkage and at the cylinder bottom end on the rear linkage.

The automatic bucket return-to-dig device is mounted on the left tilt cylinder.

18 Attachments, accessories

Chapter contents

LBH/01///12.01/en/Version: 10.2001

Name	Value	Units
Bucket capacity as per ISO 7546	3,0	m³
Weight	1340	kg
Max. permissible operating pressure of attachment hydraulics	250	bar