en **Service manual**

Wheel loader

Document ID

Order number: 12234434
Issued: 08-2019
Version: 06
Author: LBH / Technical Documentation Department

Product ID

Manufacturer: Liebherr-Werk Bischofshofen GmbH
Valid for: L 507-1579

Conformity: CE

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010.1.2.5 Disposal

Danger to life

Unapproved disposal of gas containers and pressure vessels

- Before disposal, completely depressurise pressure vessel.
- Before disposal, professionally empty pressure vessel.
- Adhere to safety instructions of pressure vessel manufacturer.

Unapproved disposal of refrigerant

- Have refrigerant disposed of by refrigerant recycling point.
- Adhere to safety data sheet of refrigerant during disposal.

Environmental pollution

Unapproved disposal of machine

- Make sure that the individual elements of the machine are disposed of correctly after the service life.
- Dispose of elements of machine in line with valid country-specific waste disposal guidelines and relevant valid laws.
- Remove fuels, operating fluids and lubricants from all components before disposal.
- Collect and store fuels, operating fluids and lubricants in suitable containers before disposal.
- Adhere to instructions of relevant manufacturer when disposing of fuels, operating fluids and lubricants.
- Have fuels, operating fluids and lubricants disposed of by old oil recycling point.

010.1.3 Description of staff

010.1.3.1 Personal protective equipment

Operators, assistants and maintenance staff are responsible for the following:
- Wearing personal protective equipment
- Regular cleaning and care of protective equipment
- Immediate replacement of damaged parts of protective equipment

The protective equipment consists of following elements:
- Protective helmet
- Safety glasses
- Hearing protection
- Breathing equipment
- Protective gloves
- Warning clothing (reflective, in signal colour)
- Safety boots
- Special protective clothing
  - To prevent burns
  - To prevent freezing
  - To prevent acid burns
  - To prevent stabbing and cutting injuries

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- Use viewing devices if necessary to observe areas around the machine that cannot be seen directly.
- Position working attachment so that sufficient visibility is ensured.
- Work with spotter if visibility is restricted.
- Agree on which hand signs to use.
- If necessary communicate via radio.
- Make sure that spotter is outside danger zone.
- In conditions of poor visibility use illumination in accordance with the applicable regulations.
- Work with extra care and attention in poor visibility and changing weather.
- Only use sun visors if field of vision is not restricted.

Incorrect operation

- Comply with national regulations regarding sufficient visibility in the operator's cab.
- Before operation, check viewing devices for function, cleanliness and correct setting.
- Adjust mirrors so that the best possible all-round visibility is guaranteed.
- Immediately repair defective viewing devices or have them replaced.
- Clean dirty cab windows.
- Avoid covering of visual aids by working attachment.

Damage

Incorrect changes

- Make sure that modifications to the machine do not impair visibility.
- Perform risk analysis again.
- Test machine according to current standards.
- Test machine according to regulations applicable at place of use.
- Depending on the test result, take appropriate measures.
- Inform operator about modifications.

010.1.6.7 Protection against vibration

Injuries

Incorrect working method

- Use machine, working attachment and working tool adapted to the task.
- Check condition of machine (tyre pressure, brakes, steering, mechanical connections, ...).
- Ensure that operator's seat is functional and complies with national regulations.
- Adjust operator's seat to weight and size of operator.
- Adjust shock absorption to weight and size of operator.
- Do not use jerky movements to steer, brake, accelerate and shift gears.
- Do not use jerky movements to move and load working attachment.

Incorrect travel

- Adapt speed to route.
- Travel slowly on rough terrain.
- Travel around obstacles and very rough terrain.
- Travel over longer distances (for example, on public roads) at a suitable (medium) speed.

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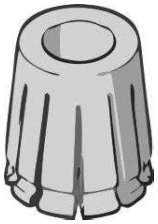
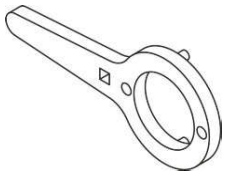
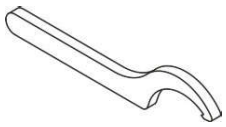
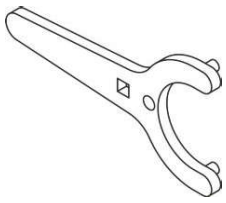
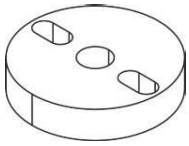
Designation	Item code	Remark	Fig.
Expansion sleeve 80 mm	9227166	For fitting seals	
Piston wrench 52/8 mm	9131359	For fitting piston	
Spanner for piston nut (hook wrench DIN 1810)	8006425	For fitting piston nut	
Piston rod bearing wrench 70/8 mm	9210219	For fitting piston rod bearing	

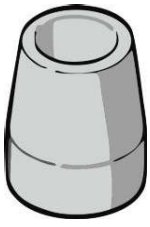
Tab. 7: Special tools for tilt cylinders

010.2.5 Special tools for steering wheel

Designation	Item code	Remark	Fig.
Extractor for steering wheel	10430204	For steering wheel removal	

Tab. 8: Special tools for steering wheel

010.2.6 Special tools for steering cylinders

Designation	Item code	Remark	Fig.
Mounting sleeve 70 mm	9110556	9998626	

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Metric standard threads and fine threads				Metric standard threads and fine threads			
At least one element of the bolted joint (bolts, washers, nuts etc.) with the following surface: flZn = zinc flake coating (LH standard 10021432, LH standard 10215295 flZnnc-480h-L valid ≥M6)				All elements of the bolted joint (bolts, washers, nuts etc.) with the following surface: Black oxide or phosphated Galvanised (LH standard 10215295 Fe// ZnNi(12)5//Cn//T2)			
Minimum total coefficient of friction μ_G= 0.09				Minimum total coefficient of friction μ_G= 0.11			
Thread	Strength class	Assembly prestressing forces F_M in kN	Tightening torques M_A in Nm	Thread	Strength class	Assembly prestressing forces F_M in kN	Tightening torques M_A in Nm
M 22 x 1.5	8.8	180	480	M 22 x 1.5	8.8	180	570
	10.9	270	700		10.9	260	830
	12.9	310	820		12.9	310	970
M 24	8.8	190	570	M 24	8.8	185	660
	10.9	280	840		10.9	270	970
	12.9	320	980		12.9	320	1140
M 24 x 1.5	8.8	220	620	M 24 x 1.5	8.8	215	730
	10.9	320	910		10.9	320	1080
	12.9	380	1070		12.9	370	1250
M 24 x 2	8.8	210	600	M 24 x 2	8.8	205	710
	10.9	310	890		10.9	300	1040
	12.9	360	1040		12.9	350	1220
M 27	8.8	245	830	M 27	8.8	240	970
	10.9	360	1230		10.9	360	1450
	12.9	420	1450		12.9	420	1650
M 27 x 1.5	8.8	280	900	M 27 x 1.5	8.8	280	1060
	10.9	410	1300		10.9	410	1550
	12.9	480	1550		12.9	480	1850
M 27 x 2	8.8	270	880	M 27 x 2	8.8	260	1030
	10.9	400	1300		10.9	390	1500
	12.9	460	1500		12.9	460	1800
M 30	8.8	300	1140	M 30	8.8	290	1300
	10.9	440	1650		10.9	430	1950
	12.9	520	1950		12.9	510	2250
M 30 x 1.5	8.8	350	1240	M 30 x 1.5	8.8	350	1450
	10.9	520	1800		10.9	510	2150
	12.9	610	2150		12.9	590	2500
M 30 x 2	8.8	340	1220	M 30 x 2	8.8	330	1450
	10.9	500	1800		10.9	490	2100
	12.9	580	2100		12.9	570	2450

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020.2.4 Fuel level sensor

Valid for: L507-1579;

Description	Unit	Value
Supply voltage	V	9 - 36
Measuring principle		Capacitive with integrated electronics
Operating temperature		-40 to +85 °C
Measuring error		± 3%
Overall length	mm	590
Start of measuring range (measured from sealing edge)	mm	580
End of measuring range (measured from sealing edge)	mm	15
Compressive strength	bar	5
Protection class		IP69
Signal curve		Geometry adjustment

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020.9 Electrical system

020.9.1 Central control unit (Master 4)

Valid for: L507-1579;

Description	Unit	Value
Protection class (with plug connected)		IP65
Processor speed	MHz	266
Power supply (logic unit)	VDC	9.0 to 60.0
Rated voltage	VDC	24
Operating temperature	°C	-40 to +85
Operation at ambient air pressure	mbar	500 to 1100
Weight	kg	3.5

020.9.2 Compact module

Valid for: L507-1579;

Description	Unit	Value
Protection class (with plug connected)		IP6K9K
Power supply (logic unit)		See sticker on module
Operating temperature	°C	-40 to +85
Weight	kg	1.69

020.9.3 Battery

Valid for: L507-1579;

Description	Unit	Value
Battery voltage	V	12
Battery capacity	Ah	100
Acid density of charged battery	kg/l	1.28
Charging current (recommended)	A	10
Charging voltage (recommended)	VDC	14.0 - 14.4
Cold start current (EN)	A	760
Self-discharging (at 25 °C)		About 7% a month
Electrolyte		Diluted sulphuric acid

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030 Maintenance

Contents

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

Maintenance / inspection after service hours							Tasks to be performed			
On handover	All 8-10 h	All 50 h	All 500 h	All 1000 h	All 2000 h	Other intervals	Additional labelling	**By maintenance staff** ■ Once-only activity ● Repeat interval ✦ If necessary ❄ Annually before the winter **By authorised specialist staff** ☐ Once-only activity ❍ Repeat interval ✧ If necessary **Additional labelling** Assistance required Have this task carried out exclusively by a certified electrician	Confirm tasks	See page
			❍	❍	❍			Check coolant antifreeze and corrosion inhibitor concentration.		030-76
						✦		Clean the cooling system.		030-83
				❍	❍			Replace coolant in cooling system (at least once a year).		030-84
Working hydraulics										
				❍	❍			Clean and lubricate the pilot control unit.		030-87
Hydraulic components										
☐	●	●	❍	❍	❍			Check oil level in hydraulic tank.		030-87
			❍	❍	❍			Drain off condensate and sediment from the hydraulic tank.		030-89
				❍	❍			Change the hydraulic tank return suction filter cartridge.		030-90
					❍			Change the hydraulic tank breather filter.		030-92
						✧		Hydraulic tank: analyse oil.		030-92
						✧		Hydraulic tank: change oil.		030-94
Steering system										
☐	●	●	❍	❍	❍			Steering: Check the function.		030-96
☐		●	❍	❍	❍			Lubricate the steering cylinder bearing.		030-96
Brake system										
			❍	❍	❍			Test service brake and parking brake.		030-97
☐		●	❍	❍	❍			Check the oil level in the brake system.		030-99
				❍	❍			Check the gap and wear on the service brake linings.		030-100
					❍			Check the service brake discs for wear.		030-102
Electrical system										
☐	●	●	❍	❍	❍			Check the function of the lighting and horn.		030-104
			❍	❍	❍			Check the battery fluid levels and terminals.		030-105
				❍	❍			Control lever: Change the travel direction switch rocker and cap.		030-107
Gearbox										
☐			❍	❍	❍			Transmission: check the oil level.		030-109
			☐	❍	❍			Change transmission oil.		030-110
Axles and drive shafts										
☐			❍	❍	❍			Check the axle oil levels.		030-111

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Hydraulic oil	Without oil analysis	With oil analysis[23)]
Liebherr Hydraulic Plus	Every 4000 h	Every 8000 h

Tab. 39: Oil change

030.3.9 Transmission

Valid for: L507-1579;

030.3.9.1 Liebherr recommendation

Ambient temperature	Designation
-40 °C to +50 °C	Liebherr Gear MF 80W

Tab. 40: Liebherr recommendation

030.3.9.2 Minimum quality requirement

Specifications
ZF: TE-ML 05F

Tab. 41: Minimum quality requirement

When using oil from other manufacturers, you must obtain information from the **Liebherr Lubricant Hotline**.

030.3.10 Axle oil

Valid for: L507-1579;

030.3.10.1 Liebherr recommendation

Ambient temperature	Designation
-40 °C to +50 °C	Liebherr Gear MF 80W

Tab. 42: Liebherr recommendation

030.3.10.2 Minimum quality requirement

Specifications
ZF: TE-ML 05F

Tab. 43: Minimum quality requirement

When using oil from other manufacturers, you must obtain information from the **Liebherr Lubricant Hotline**.

[23)] If the result of the oil analysis is positive, the oil can continue being used. If the result of the oil analysis is negative, the oil must be changed.

NOTICE
Incorrect cleaning!
Damage to diesel engine.

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

▶ Clean diesel engine.

After cleaning

▶ Remove all masking and covers over openings and components.

▶ Check all fuel lines, engine oil lines and hydraulic lines (for leaks, loose connections, abrasion and damage).

▶ Repair any defects immediately.

▶ To displace any water that has penetrated: lubricate all bearings and pin connections again.

▶ If necessary, renew the corrosion protection on components and surfaces.

If the diesel engine has been cleaned:

▶ Let the diesel engine warm up at idling speed.
▷ This allows the engine to dry better.

Cleaning the interior of the operator's cab

Note

Only clean the interior equipment of the operator's cab with warm water, without any cleaning additives.

▶ Wipe surfaces with a soft, damp cloth.

Cleaning the rear window of the operator's cab

The rear window only needs to be cleaned after working in very dirty environments.

Make sure the following requirements are met:
❑ The machine is in maintenance position 1.
❑ The cab door is closed.
❑ Suitable climbing aids are available.

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Make sure that following tools are ready:
- ❑ Hand pump
- ❑ Sampling hose
- ❑ Analysis kit

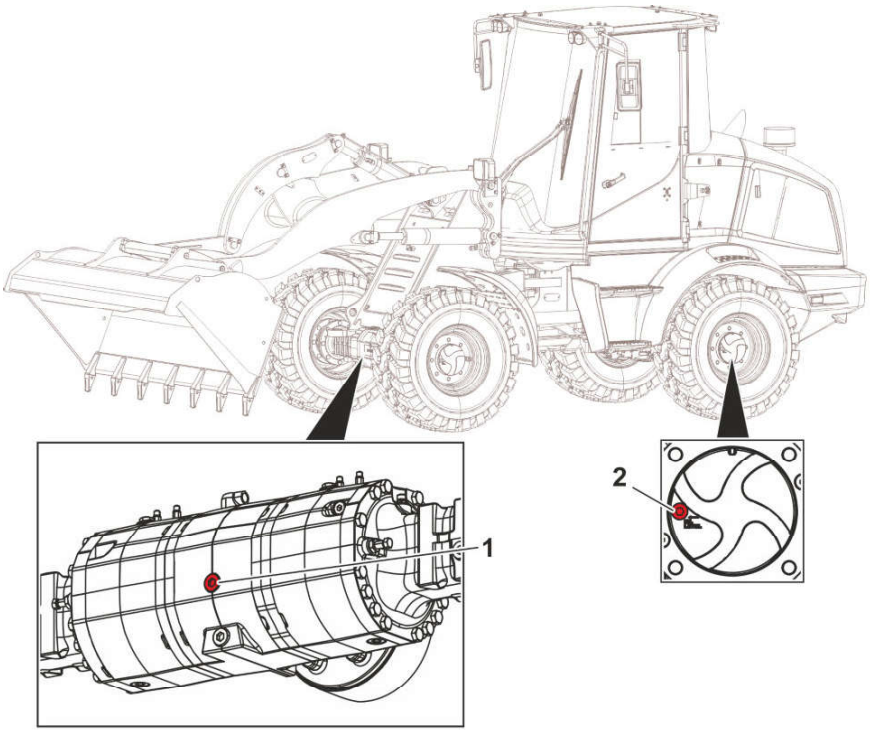

Fig. 84: Sampling point on axles

1 Differential housing filling plug **2** Wheel hub filling plug

▶ Start diesel engine and drive machine for 3 minutes at 15 km/h.
▷ The oil is circulated.

▶ Turn off diesel engine.

▶ Put machine in maintenance position 2.

WARNING
Hot, pressurised fuel and operating fluids!
Beware of burns.

▶ Avoid skin contact with fuel and operating fluids.

▶ Carefully unscrew filling plug.

▶ Carefully unscrew filling plug.

▶ Insert sampling hose to 5 cm below oil level.

▶ Fill the sample container using the hand pump.

▶ Close filling plug again.

Description	Unit	Value
Filling plugs tightening torque	Nm	45 $^{\pm 5}$

- ❑ The diesel engine is cold.
- ❑ Service access is open.

Make sure that following tools are ready:
- ❑ Feeler gauge

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

Exposing valves

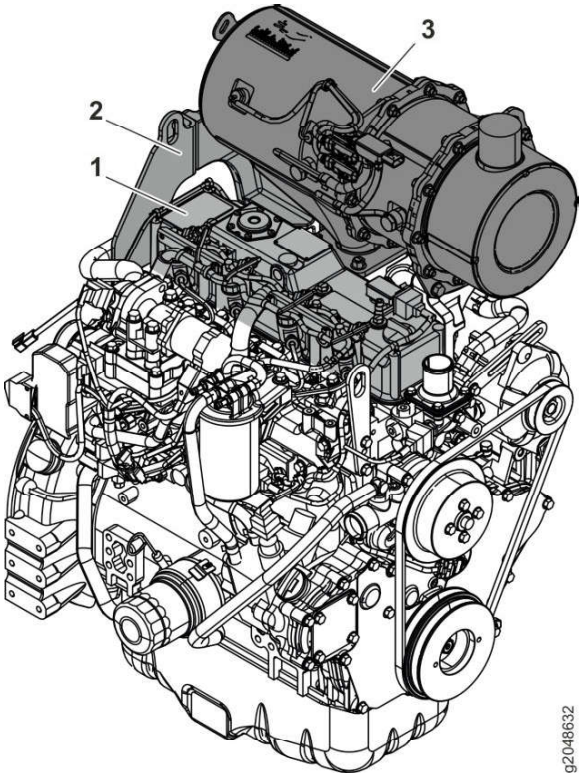

Fig. 95: Exposing valves

1 Valve cover
2 Retaining bracket
3 Diesel particulate filter

The valve cover **1** can only be removed after removal of retaining bracket **2** and diesel particulate filter **3**.

▶ Remove retaining bracket **2**.

▶ Disconnect electrical connections on diesel particulate filter **3**.

▶ Remove diesel particulate filter **3**.

▶ Expose valve cover **1**.

▶ Remove valve cover **1**.

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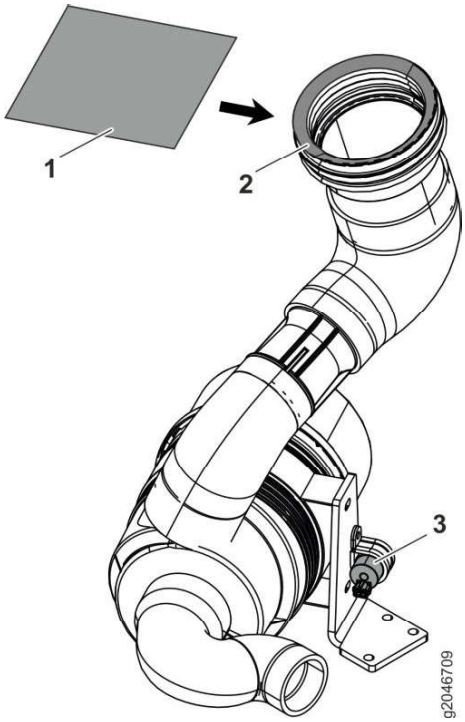

Fig. 105: Testing vacuum switch

1 Cover
2 Air intake opening
3 Vacuum switch for air filter

▶ Start diesel engine.

NOTICE
Sucking in of cover due to high negative pressure at air intake opening!
Damage to diesel engine.

▶ Use stable cover.

▶ Using a stable cover, cover air intake opening **2**.
▷ Negative pressure rises.

▶ Check whether *air filter contamination* warning symbol is shown on display.

If *air filter contamination* warning symbol is not shown:
▶ Check vacuum switch for air filter and renew if necessary. (For more information see: Vacuum switch for air filter, page 040-18)

▶ Check wiring.

▶ Check that air hoses and clips are not leaking and are tight-fitting.

▶ Check air suction system.

030.4.4.13 Cleaning or changing main element of air filter system

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Make sure that following requirements are fulfilled:
❑ Machine is in maintenance position 1.
❑ Service access is open.
❑ Diesel engine has cooled down.
❑ Suitable protective equipment is used.

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▶ Select “SF Exchange” function **1**.
▷ The “SF Exchange” window opens. The window shows the current machine data.

▶ Select “Next” function **2**.
▷ A window for entering the new part number and the new serial number appears.

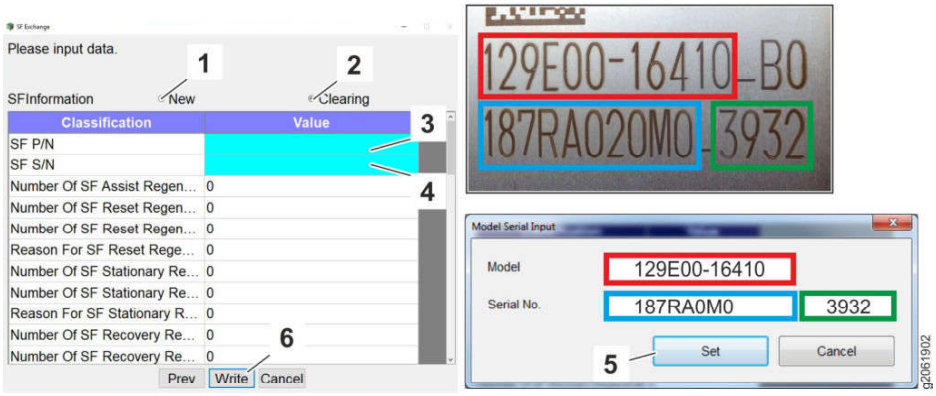

Fig. 116: Entering part number and serial number with example

1	“New” function	**4**	Serial number
2	“Clearing” function	**5**	“Set” function
3	Part number	**6**	“Write” function

If a new diesel particulate filter has been installed:
▶ Select “New” function **1**.

If a cleaned diesel particulate filter has been installed:
▶ Select “Clearing” function **2**.

When entering the part number and serial number, remember that they are case-sensitive.

▶ Enter part number **3**.

▶ Enter serial number **4**.

▶ Select “Set” function **5**.

▶ Select “Write” function **6**.
▷ The “Password authentication” window opens.

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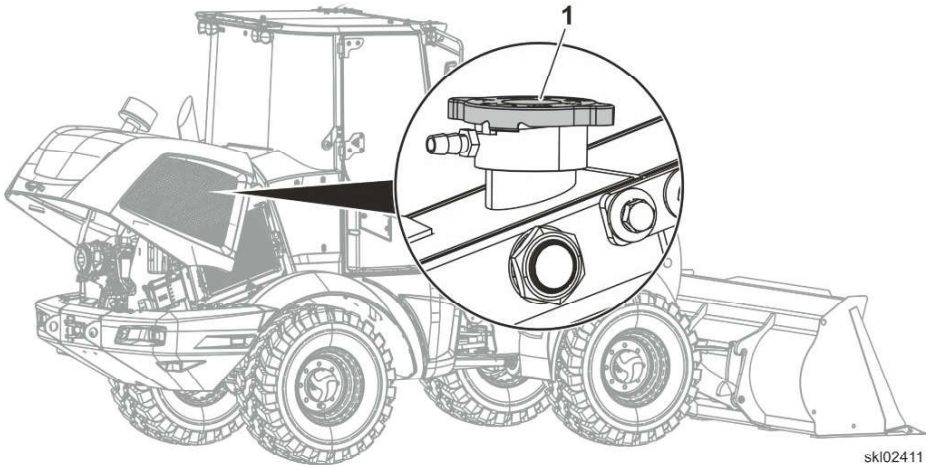

Fig. 126: Checking the corrosion inhibitor concentration

1 Cap of water cooler

CAUTION
Hot. pressurised liquid!
Beware of burns.

▶ Let the engine cool down.

▶ Carefully open cap of water cooler **1**.

Checking the corrosion inhibitor concentration

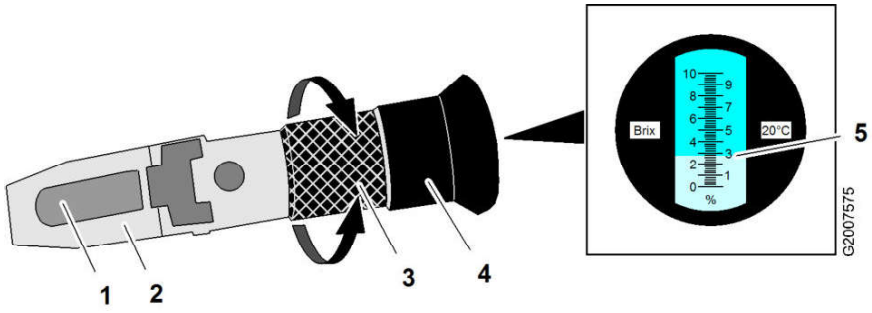

Fig. 127: Checking the corrosion inhibitor concentration

1 Prism
2 Cover
3 Adjusting ring
4 Eyepiece
5 Dividing line

▶ Carefully clean the prism **1** and cover **2** of the refractometer.

▶ Place one or two drops of coolant on the prism **1**.

▶ Close the cover **2**.
▷ The fluid spreads out.

▶ Look through the eyepiece **4** against a light background and focus the scale using the adjusting ring **3**.

▶ Read the Brix value on the dividing line **5**.

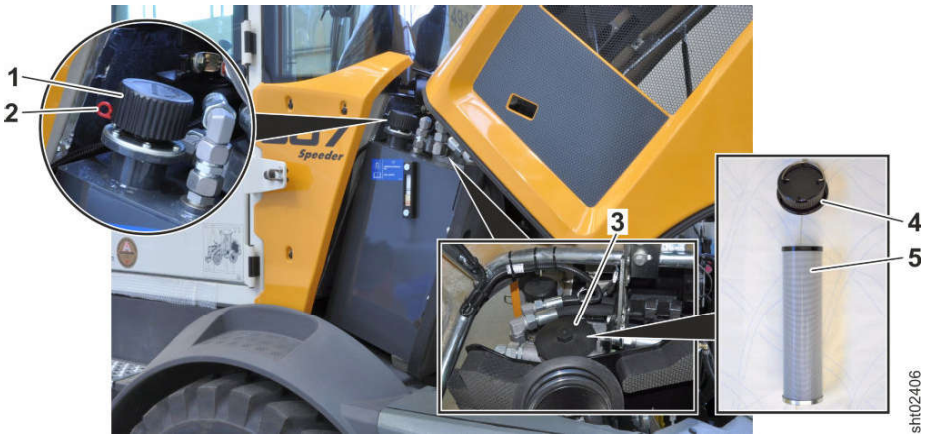

Fig. 137: Changing the hydraulic tank return suction filter cartridge

1 Breather filter
2 Plug
3 Filter cover
4 Filter separator plate
5 Filter cartridge

- ▶ Insert plug **2** in breather filter **1**.
  ▷ The anti-twist device is released.
- ▶ Unscrew the breather filter **1** by two turns.
  ▷ The tank preload pressure is released.
- ▶ Unscrew the filter cover **3** until you can hear air flowing into the filter.
  ▷ The oil level in the filter housing sinks.
- ▶ Unscrew the filter cover **3** and carefully lift it off.
- ▶ Take out the filter separator plate **4**.
- ▶ Take out filter cartridge **5** with filter casing and let it drip dry.
- ▶ If filter cartridge **5** is stuck in filter casing, twist filter cartridge **5** to release it.
- ▶ Pull filter cartridge **5** out of filter casing.
- ▶ Check the filter cartridge **5** for heavy soiling.
- ▶ If the filter cartridge **5** is very dirty, check the hydraulic system for damage.
- ▶ Put in filter casing with a new filter cartridge **5**.

Note
Incorrectly fitted sealing ring on the filter cover!
Leaks.

- ▶ Clean the sealing ring before fitting it.
- ▶ Install the sealing ring when dry.
- ▶ Observe the tightening torque for the filter cover.

- ▶ Clean the sealing ring on the filter cover **3** with a clean cloth.
- ▶ Screw on the filter cover **3** and tighten it to 50 Nm.
- ▶ Tighten breather filter **1**.
- ▶ Pull out the plug **2** and keep it in a safe place.
  ▷ The breather filter is protected from accidental opening.

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Checking the wear on the brake linings

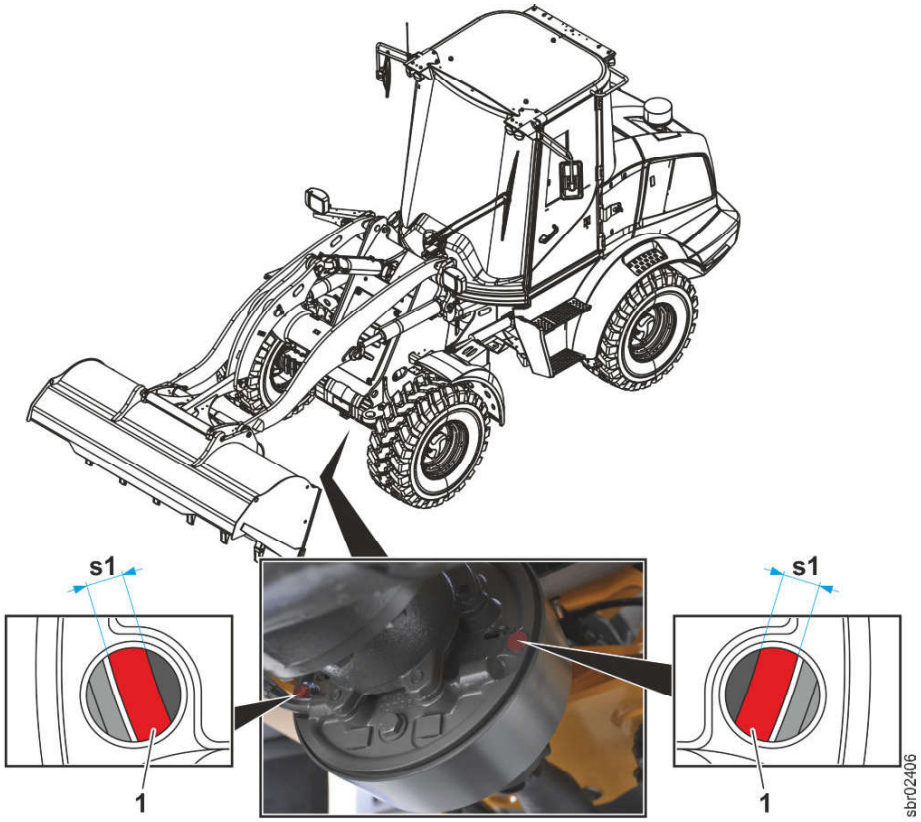

Fig. 148: Checking the wear on the brake linings

1 Brake lining (2x) **s1** Brake lining thickness (2x)

▶ Remove the plugs from the inspection openings.

▶ Check that both brake linings **1** are the required thickness **s1**.

Description	Unit	Value
Minimum thickness **s1** of each brake lining	mm	2.0

If required value is not reached:

▶ Replace brake shoes.

If required value is reached:

▶ Check gap.

Draining oil

WARNING
Hot, pressurised fuel and operating fluids!
Beware of burns.

- ▶ Carefully open filling plug and drain plug.
- ▶ Wear safety glasses.
- ▶ Avoid skin contact with fuel and operating fluids.

- ▶ Carefully unscrew filling plug **1** on transmission housing.
- ▶ Check that oil level is up to bottom of opening.
- ▶ If oil level is too high (oil comes out of opening): check travel motor for defects (oil coming from travel motor into gearbox).
- ▶ If oil level is too low: Check gearbox for leaks.
- ▶ Place a receptacle under the machine.
- ▶ Carefully unscrew drain plug **2** on transmission housing.
  ▷ Oil drains off.
- ▶ Drain off all oil into receptacle.
- ▶ Screw in drain plug **2** and tighten it.
- ▶ Top up oil.

Topping up oil

- ▶ Top up oil through opening of filling plug **1** into transmission until oil level reaches bottom of opening.
- ▶ Screw in filling plug **1** and tighten it.

030.4.12 Axles and drive shafts

030.4.12.1 Checking the axle oil levels

Valid for: L507-1579;

Make sure that following requirements are fulfilled:
❑ Machine is cold.
❑ Machine is in maintenance position 2.

Make sure that following tools are ready:
❑ Torque wrench

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030.4.13.2 Lubricating articulation stops

Valid for: L507-1579;

Make sure the following requirements are met:
❑ The machine is in maintenance position 1.

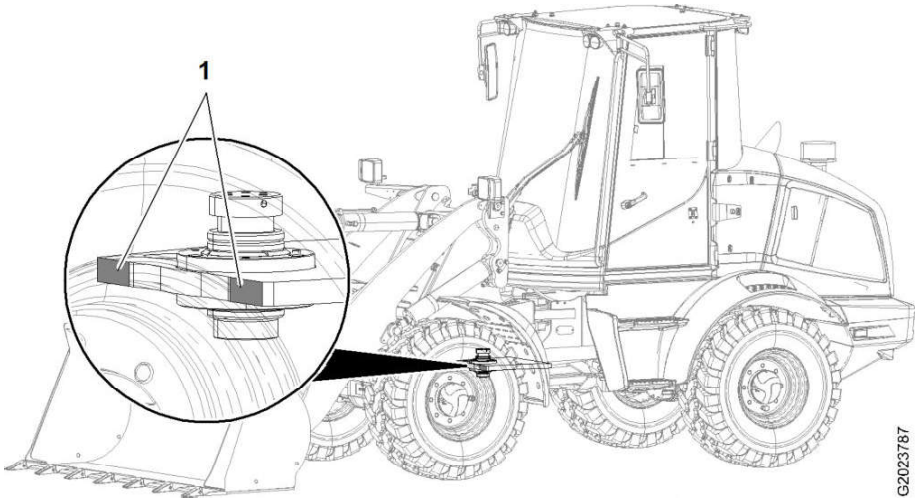

Fig. 169: Lubricating the articulation stops

1 Articulation stops

▶ Lubricate the articulation stops with grease.

030.4.13.3 Lubricating the moving parts of the engine bonnet with penetrating oil

Valid for: L507-1579;

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

Make sure the following lubricants are ready:
❑ Spray Ballistol (item code 10025514)
❑ Liebherr universal grease 9900

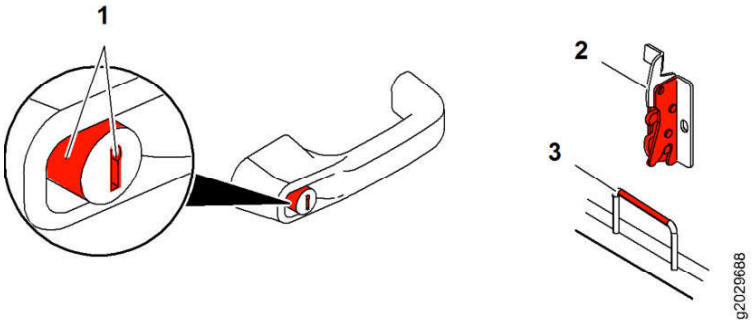

Fig. 170: Lubricating the moving parts of the engine bonnet with penetrating oil

1 Button and locking cylinder
2 Lock
3 Locking mechanism

▶ Lubricate the button and locking cylinder **1** with Spray Ballistol.

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- ▷ Rubber knobs in V-belt base
- ▷ Accumulated dirt or grit
- ▷ Belt profile coming loose from belt base
- ▷ Cracks on V-belt back
- ▷ Cracks in V-belt profile

If V-belt is damaged:

▶ Replace V-belt **2**. (For more information see: Air conditioning: changing V-belt, page 030-132)

Checking V-belt tension

Make sure that following requirements are met:

- ❑ Machine is in maintenance position 1.
- ❑ Diesel engine has cooled down.
- ❑ Service access is open.

Note

V-belt tension is set at factory and must be retightened when belt tension decreases.

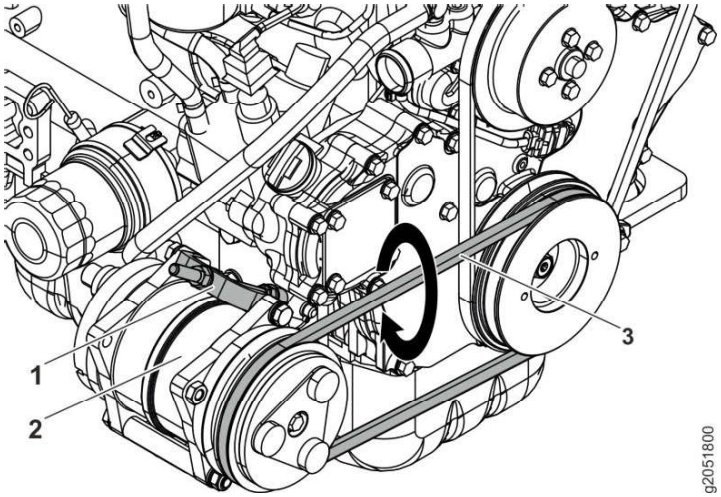

Fig. 182: Checking V-belt tension

1 Tensioning device

2 Air conditioning compressor

3 V-belt of compressor magnetic coupling

V-belt tension is checked in middle of V-belt **3**.

▶ Turn V-belt **3** 90° with thumb, index finger and moderate force.
- ▷ V-belt **3** can be turned about 90°.
- ▷ V-belt tension is correct.

If V-belt **3** can be turned more than 90°:

▶ Set V-belt tension. (For more information see: Setting V-belt tension, page 030-131)

Setting V-belt tension

Make sure that following requirements are met:

- ❑ Machine is in maintenance position 1.

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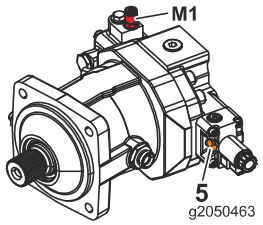
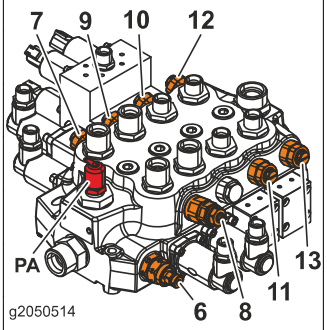
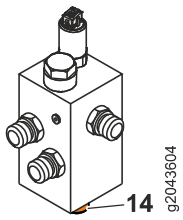
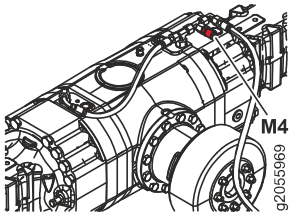
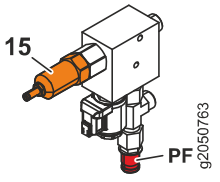
3. Hydraulic adjustment procedure									
Test / adjustment	**1000 h**	**2000 h**	**Unit**	**Required value**	**Measured**	**Adjusted**	**Adjusting point**	**Test point**	**Figure**
⇒**Travel motor: manual calibration (maximum swivel angle)**									
Proportional solenoid current at servo pressure of 185±5 bar	○	○	mA	1200±100			5	M1	
⇒**Travel motor: manual calibration (minimum swivel angle)**									
Proportional solenoid current at servo pressure of 10±5 bar	○	○						M1	
Working hydraulics									
Control valve block: secondary pressure relief valves									
High pressure during tilt in function C)		○	bar	200±5			7	PA	
High pressure during tilt out function C) D)		○	bar	130±5			8	PA	
High pressure during lift function C)		○	bar	200±5			9	PA	
High pressure during 3rd function A3 C)		○	bar	170±5			10	PA	
High pressure during 3rd function B3 C)		○	bar	170±5			11	PA	
High pressure during 4th function A4 (option) C)		○	bar	170±5			12	PA	
High pressure during 4th function B4 (option) C)		○	bar	170±5			13	PA	
Control valve block: primary pressure relief valve									
Opening pressure		○	bar	230±5			6	PA	
Stabilisation module (option), safety valve									
Opening pressure E)	◊	◊	bar	160±10			14	PA	
Service brake									
Service brake: brake pressure in 1st brake circuit									
Brake pressure (inching brake pedal not actuated)	○	○	bar	1.3±0.8				M4	
Brake pressure (inching brake pedal actuated)	○	○	bar	30±4				M4	
Transmission									
Gearbox: external servo pressure reducing valve									
Maximum external servo pressure		○	bar	210±10			15		

Tab. 57: Hydraulic adjustment procedure

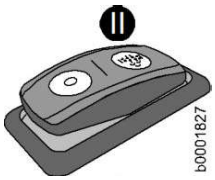


Fig. 196: Service regeneration

NOTICE
Combustible deposits on the exhaust system!
Fire.

- ▶ Clean the machine.
- ▶ Do not leave the operator's cab during manual regeneration.

- ▶ Start diesel engine.
- ▶ Engage parking brake.
- ▶ Press *regenerate diesel particulate filter* switch/button for 30 seconds.
  ▷ Service regeneration is started.

030.6.3.5 Diesel engine: changing engine control unit (ECU)

Valid for: L507-1579;

Perform following activities when changing engine control unit (ECU):
1. If possible: save setting data of existing engine control unit.
2. Download software for new engine control unit.
3. Transfer software to new engine control unit.
4. If possible: transfer setting data of old engine control unit.
5. Confirm update or new installation of engine software via Yanmar-Management-Server.

If, due to damage, it is not possible to establish a connection with existing engine control unit, points 1 and 4 are not performed. In this case, specific data (such as operating hours, current loading of DPF, etc.) is lost.

Note

Software update or new installation on an engine control unit must be confirmed via Yanmar-Management-Server.

As long as updates or new installation of engine software are not confirmed via Yanmar-Management-Server, access to corresponding engine software is blocked for other service technicians.

Saving setting data of existing engine control unit

Make sure that following requirements are fulfilled:
- ❑ Machine is in maintenance position 1.
- ❑ Engine control unit is connected to diesel engine.

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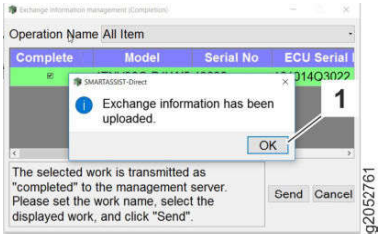

Fig. 213: Sending information completed

▶ Select *OK* function **1**.
▷ Information was sent. Software updates or new installations are complete.

030.6.4 Cooling system

030.6.4.1 Fan motor: fan speed proportional solenoid

Valid for: L507-1579;

Note
Fan speed proportional solenoid valve does not normally need to be adjusted.

▶ Exclusively check and adjust fan speed proportional solenoid valve if performance of cooling system is insufficient, for troubleshooting or if fan motor or parts of it have been replaced.

Make sure that following requirements are met:
❑ Cooling system is cleaned.
❑ Hydraulic oil is at operating temperature.
❑ Machine is in maintenance position for adjustment procedures.
❑ Service access is open.

Make sure that following tools are ready:
❑ Laptop with Sculi diagnostic software
❑ Pressure gauge (250 bar)

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If required value is not reached:
- ▶ Set bucket down with its teeth or cutting edge resting on ground.
- ▶ Turn off diesel engine and take out ignition key.

Note
To adjust the safety valve:
- ▶ Turning adjusting screw clockwise increases pressure.
- ▶ Turning the adjusting screw anticlockwise reduces the pressure.

- ▶ Turn the adjusting screw of the safety valve **1**.
- ▶ Repeat check and adjustment until required value is reached.

If required value is reached:
- ▶ Set bucket down with its teeth or cutting edge resting on ground.
- ▶ Turn off diesel engine and take out ignition key.
- ▶ Turn the safety valve **1** exactly half a turn clockwise.

To make sure opening pressure of safety valve **1** is above that of primary pressure relief valve again:
- ▶ Check primary pressure relief valve. (For more information see: Control valve block: primary pressure relief valve, page 030-166)
- ▶ Disconnect pressure gauge from working hydraulics high pressure test connection **PA**.

030.6.5.5 Ride control hydro accumulator (option): nitrogen filling

Valid for: L507-1579;

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

Make sure that following tools are ready:
- ❑ Vacuum pump
- ❑ Testing and filling device for hydro accumulators with a nitrogen cylinder and pressure reducer
- ❑ Receptacle
- ❑ Torque wrench (20 Nm)

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Thickness of adjusting shim	Approximate change in pressure	Item code
0.5 mm	3.5 bar	4980036
1.0 mm	6.5 bar	7414966

Tab. 62: Adjusting shims

- ▶ Check O-ring **3** for damage.
- ▶ If O-ring **3** is damaged: Replace O-Ring **3**.
- ▶ Screw in replenishing pressure relief valve **1** again and tighten it to a torque of 90 Nm.
- ▶ Remove vacuum pump.
- ▶ Bring hydraulic oil up to operating temperature.
- ▶ Repeat check and adjustment until required value is reached.

If required value is reached:

- ▶ Turn off diesel engine and take out ignition key.
- ▶ Disconnect pressure gauge from replenishing pressure test connection **G**.

030.6.7.3 Travel pump: high pressure relief valves

Valid for: L507-1579;

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

- ▶ Before testing, set the pressure cut-off to a higher value. (For more information see: Preparations, page 030-182)

Make sure that following requirements are fulfilled:

- ❑ Hydraulic oil is at operating temperature.
- ❑ Tractive force adjustment (optional) is deactivated.
- ❑ Machine is in maintenance position for adjustment procedures.
- ❑ Service access is open.

Make sure that following tools are ready:

- ❑ Laptop with Sculi diagnostic software
- ❑ Pressure gauge (600 bar)
- ❑ Vacuum pump
- ❑ Receptacle
- ❑ Torque wrench (250 Nm)

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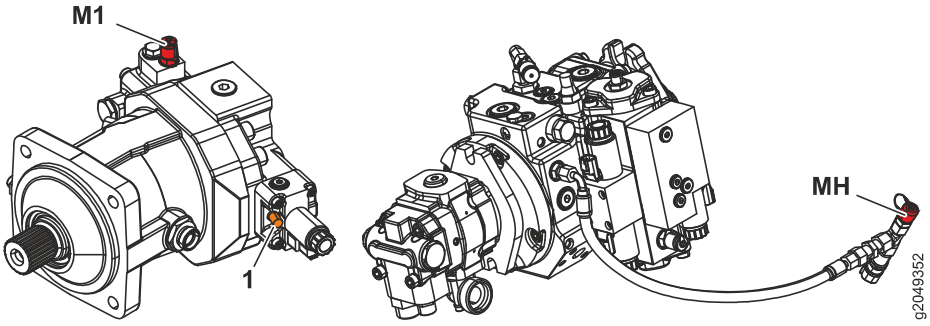

Fig. 233: Travel motor: manual calibration (maximum swivel angle)

1 Travel motor regulation adjusting screw
M1 Travel motor servo pressure test connection
MH Travel pump high pressure test connection

Preparations

- ▶ Connect a pressure gauge (600 bar) to high pressure test connection **MH** on travel pump.
- ▶ Connect a pressure gauge (250 bar) to servo pressure test connection **M1** on travel motor.
- ▶ Start diesel engine.
- ▶ Connect Sculi diagnostic software to machine.
- ▶ In variables editor, select ***Travel motor calibration*** folder.

Manual calibration of servo pressure proportional solenoid

- ▶ Set variable ***MXdrBlockMan*** to ***1***.
  - ▷ Machine is in blocked condition.

Note
Variable ***MXdrBlockMan*** is automatically reset to its original value ***0*** when ignition is switched **OFF**.

- ▶ If necessary, reset value to ***1*** when repeating test.

DANGER
Unintentional movement of the machine!
Fatal injury.

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

- ▶ Select forward travel direction.
- ▶ Increase diesel engine speed until travel pump high pressure **MH** is 200 bar.
- ▶ Set value of variable ***QRDrEPMotor_KG*** to 1000 mA.

While maintaining travel pump high pressure **MH** at 200 bar:
- ▶ Click variable ***QRDrEPMotor_KG*** and press *space bar*.
  - ▷ Line is coloured pink.
  - ▷ A gradual approach towards the required value is possible.

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▶ Select the “machine data” function.

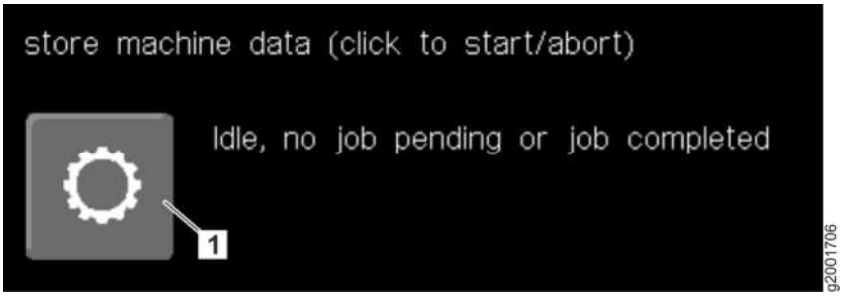

Fig. 246: Starting the download

1 “store machine data” function

▶ Start the “store machine data” function **1**.
  ▷ Start the download.
  ▷ The diagnostic software creates a folder on the memory card in slot CF2. The folder is named with the serial number of the machine. The service file is saved in this folder.
  ▷ A bar shows the progress of the download.
  ▷ When the download is complete, the following text appears: Idle, no job pending or job completed

▶ Switch off the ignition.

▶ Remove the memory card from slot CF2.

▶ Read the service file on the memory card using a memory card reader.

030.6.9.2 Updating the central controller software

Valid for: L507-1579;

The software of central control unit also includes the software for the individual components of electronic system.

When the software of central control unit is updated, the software of following components is updated:
– Central control unit
– Compact modules
– Display
– Air conditioning controller

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

▶ Create a service file before the software update.

Preparing the memory card

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

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

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Note
To adjust the servo pressure:

- ▶ Turn the adjusting screw clockwise to increase the high pressure.
- ▶ Turn the adjusting screw anticlockwise to reduce the high pressure.

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

If required value is reached:

- ▶ Turn off diesel engine and take out ignition key.
- ▶ Disconnect pressure gauge from external servo pressure test connection **PF**.

030.6.10.2 External servo pressure hydro accumulator nitrogen filling

Valid for: L507-1579;

Make sure that following requirements are met:

- ❑ Machine is in maintenance position for adjustment procedures.
- ❑ Service access is open.

Make sure that following tools are ready:

- ❑ Test line
- ❑ For test line with check valve: loose test connection
- ❑ Receptacle
- ❑ Testing and filling device for hydro accumulators with a nitrogen cylinder and pressure reducer

Depressurising oil side of hydro accumulator

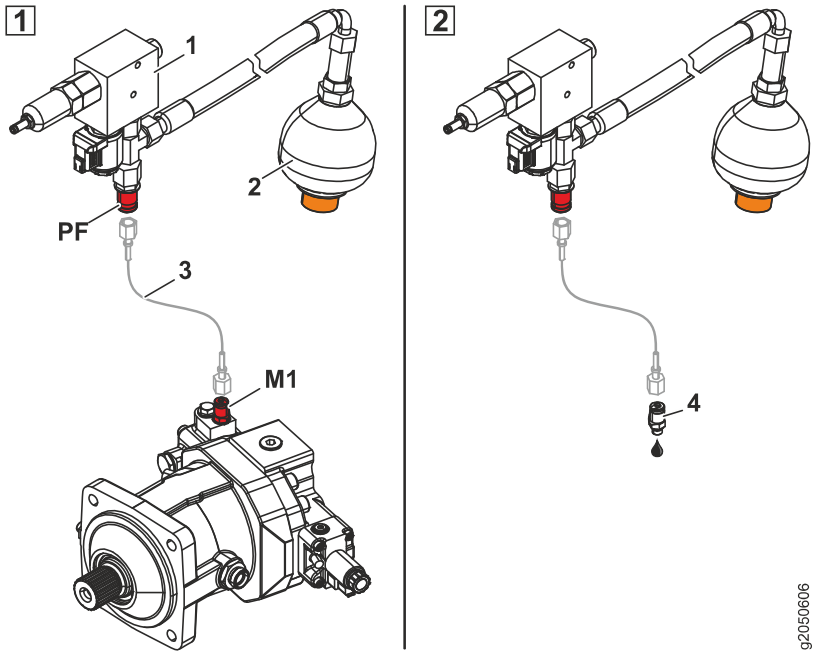

Fig. 256: Depressurising oil side of hydro accumulator

1 Valve block for external servo pressure
2 Hydro accumulator for external servo pressure
4 Loose test connection
PF External servo pressure test connection

See next page for continuation of the image legend

8 Bearing cover
9 Bearing cover bolt
10 Rotor
11 Bearing
12 Bearing cover
13 Thrust washer
14 Thrust washer
15 Nut
23 Holder
24 IC regulator
25 Screw
26 Brush
27 Spring
28 Screw
29 Housing

Alternator is connected to crankshaft pulley via a V-ribbed-belt. When the diesel engine is running, the alternator powers the electrical systems on the diesel engine, as well as the battery.

At low engine speeds, for example when the engine is idling, the alternator generates less power. If the machine requires more power, the difference is taken from the battery. In the reverse situation, the battery is charged. To avoid overcharging the vehicle battery, additional devices restrict the voltage output.

2.4 Starter

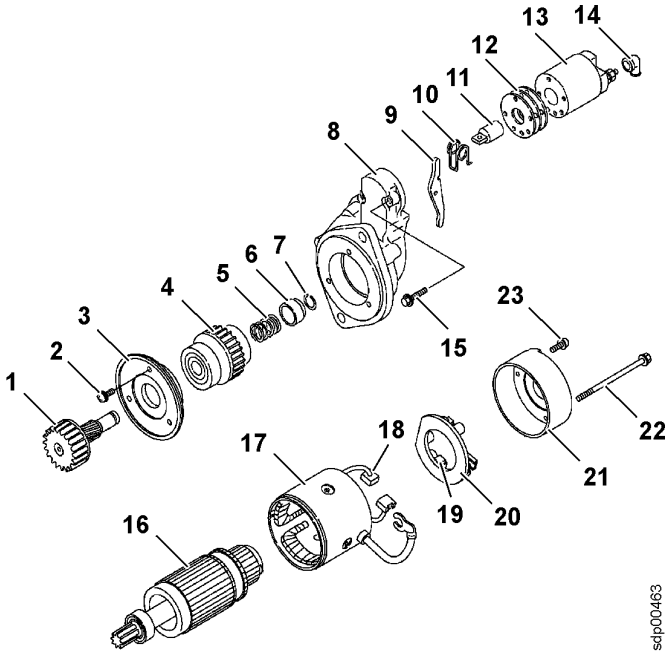

Fig. 262: Starter

1 Pinion shaft
2 Screws
3 Bearing holder
4 Pinion clutch
5 Return spring
6 Pinion stop
7 Snap ring
8 Transmission housing
9 Engagement lever
10 Torsion spring
11 Piston
12 Dust covers
13 Starter relay K61
14 Cover
15 Screws
16 Stay
17 Field coil
18 Positive (+) brushes
19 Negative (-) brushes
20 Brush holder
21 Housing
22 Through-bolts
23 Screw

The starter is powered by the battery via the starter relay **13**. The starter relay is activated by the engine control unit.

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2.2 Bypassing the CAN line

Because the CAN line goes through the fuel level sensor, a critical CAN error can occur in the event of a malfunction of the fuel level sensor. In the event of a critical CAN error, the machine cannot be started.

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

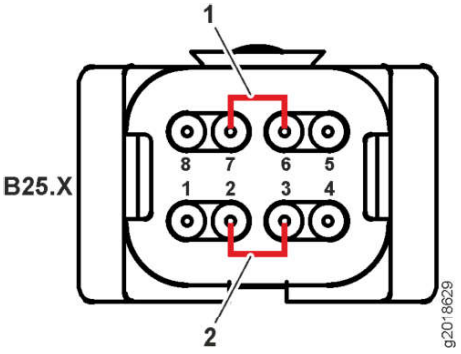

Fig. 272: Connector B25.X

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

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

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

The fuel level sensor is thus bypassed in the CAN line and you can continue operating the machine.

040.1.3.3 Fuel pre-filter

Valid for: L507-1579;

1 Layout

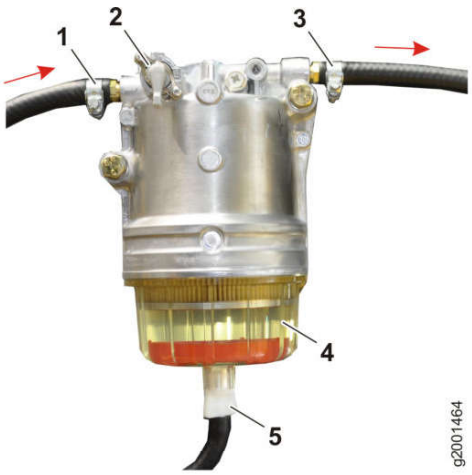

Fig. 273: Fuel pre-filter

1 Fuel from the fuel tank
2 Fuel line shut-off valve
3 Fuel to the fuel pre-delivery pump
4 Filter housing
5 Drain valve

050 Cooling system

Contents

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2.3 Control characteristics when limits are exceeded

If one of temperature readings exceeds a predefined limit, current applied to fan speed proportional solenoid is reduced to minimum current standard setting.

Thresholds			
Threshold	**Temperature**	**Current to proportional solenoid**	**System pressure (at engine speed of 2550 min^{-1})**
Hydraulic oil (***CRFCHydOilTempErr***)	88 °C	Minimum current	L507-1578: 85$^{\pm 10}$ bar L507-1579: 85$^{\pm 10}$ bar L509-1581: 100$^{\pm 10}$ bar L509-1582: 100$^{\pm 10}$ bar
Coolant (***CRFCWaterTempErr***)	105 °C		

Tab. 83: Thresholds

If a limit is exceeded, it has following effects:
- Current applied to proportional solenoid is reduced to minimum level.
- A warning sound goes off.
- A service code is displayed.
- If coolant temperature is too high, performance of diesel engine is reduced.
- If hydraulic oil temperature is too high, output of travel pump is reduced to as low as 40%.

2.4 Sensor failure

If a sensor fails, fan speed proportional solenoid is operated with minimum current.

Description	**Current at proportional solenoid (standard setting)**	**System pressure (at engine speed of 2550 min^{-1})**
Sensor failure	Minimum current	L507-1578: 85$^{\pm 10}$ bar L507-1579: 85$^{\pm 10}$ bar L509-1581: 100$^{\pm 10}$ bar L509-1582: 100$^{\pm 10}$ bar

Tab. 84: Sensor failure

Minimum current can also be adjusted by means of variable ***CRFCFanCurrMin*** in Sculi diagnostic software.

2.5 Behaviour with active compressor magnetic coupling

If magnetic coupling for compressor magnetic coupling Y22 is active, maximum current is limted to 600 mA. Increased cooling capacity during air conditioning operation is thus ensured.

2.6 Behaviour of active regeneration of diesel particulate filter

During an active regeneration of diesel particulate filter, maximum current is reduced to 70% of set value. Increased cooling capacity during active regeneration is thus ensured.

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060 Working hydraulics

Contents

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Working pump **1** draws oil from hydraulic tank **8** and transports it via priority valve **3** to servostat **9** and control block **10**.

2.2 Priority valve

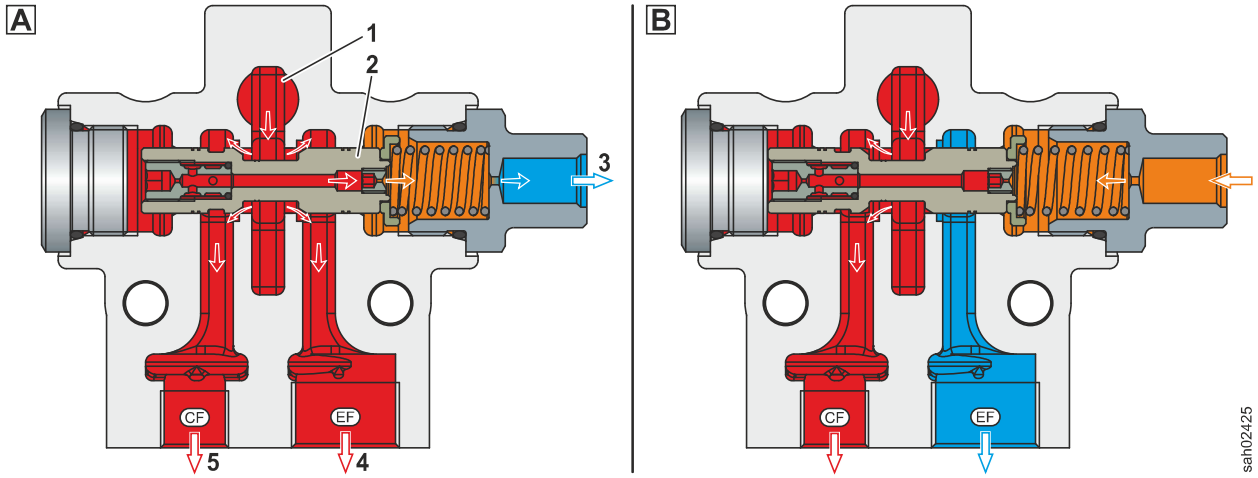

Fig. 314: Priority valve with steering not actuated / priority valve with steering actuated

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

Priority valve **2** distributes oil supplied by gear pump **1** to following systems:
- Steering system
- Working hydraulics

The oil supply for the steering system has priority.

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

When the servostat **5** is actuated, it generates a load sensing signal **3**. This load sensing signal **3** moves priority valve **2** so that pressure in steering system corresponds to that of load sensing signal **3**.

Oil that is not needed by steering system is directed by priority valve **2** to control block **4** and therefore working hydraulics.

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BMK	Function	BMK	Function
Y9	Bucket return-to-dig retaining solenoid (option)	**Y17**	Lift kick-out retaining solenoid (option)
Y14	Solenoid for servo pressure	**Y18**	Float position retaining solenoid

Tab. 107: Equipment codes

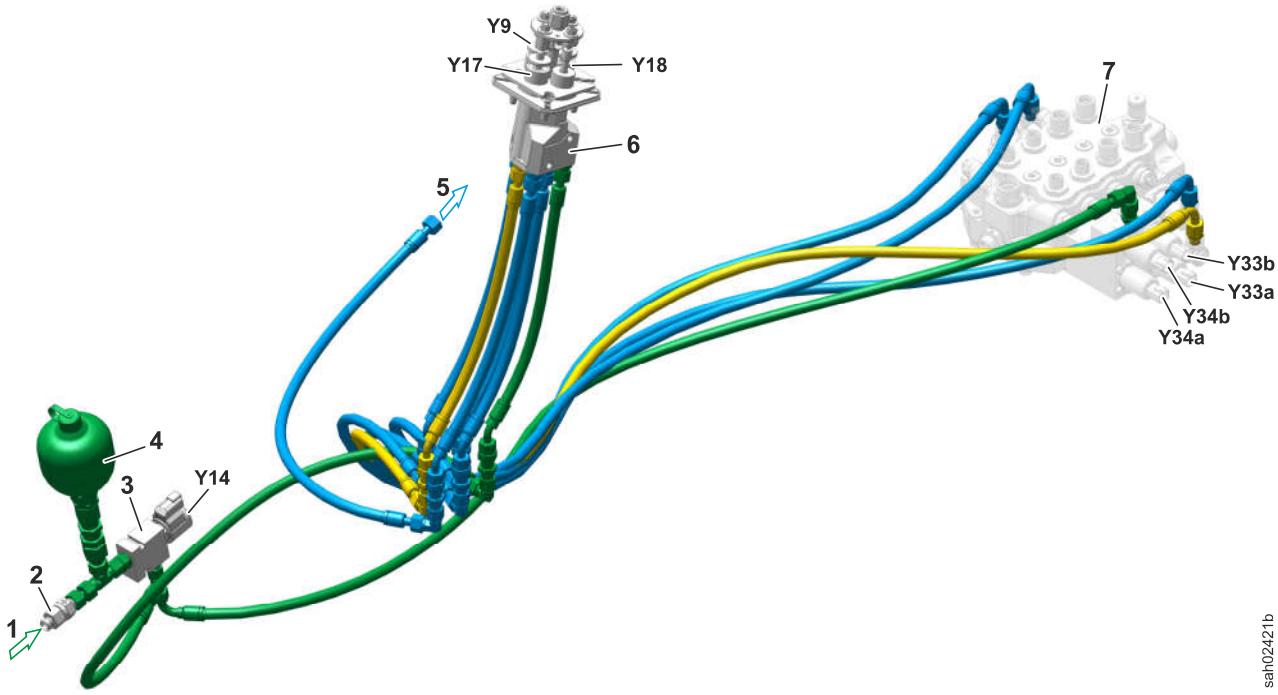

Fig. 323: Pilot control unit (lifting function actuated) (from rear right)

1 Oil supply from replenishing pump
2 Check valve
3 Pilot pressure solenoid valve
4 Pilot control hydro accumulator
5 Return flow to return suction filter
6 Pilot control unit
7 Control block

BMK	Function	BMK	Function	BMK	Function
Y9	Bucket return-to-dig retaining solenoid (option)	**Y18**	Float position retaining solenoid	**Y34a**	Proportional solenoid for 4th function A4
Y14	Solenoid for servo pressure	**Y33a**	Proportional solenoid for 3rd function A3	**Y34b**	Proportional solenoid for 4th function B4
Y17	Lift kick-out retaining solenoid (option)	**Y33b**	Proportional solenoid for 3rd function B3		

Tab. 108: Equipment codes

The pilot control consists of the following components:
– Pilot control unit (For more information see: 060.4.2 Pilot control unit, page 060-24)

Ride control system is a hydraulic spring system for lift arms.

Driving over uneven ground causes machine to vibrate (bouncing and pitching). For ride control, stabilisation module **7** connects ring side of lift cylinder to hydraulic tank **6** so that lift arms can move freely upwards. At same time stabilisation module **7** connects piston side of lift cylinder to ride control hydro accumulator **13**. Nitrogen filling in ride control hydro accumulator **13** cushions shocks.

2.2 Speed-dependent activation

Ride control is activated or deactivated by central control unit depending on travel direction and travel speed (for further information, refer to operator's manual). Travel speeds can be set using Sculi diagnostic software.

Variable	Meaning
CRWERideCtrlSpd-ForwOn	Travel speed for activation during forward travel
CRWERideCtrlSpd-ForwOff	Travel speed for deactivation during forward travel
CRWERideCtrlSpd-BackwOn	Travel speed for activation during reverse travel
CRWERideCtrlSpd-BackwOff	Travel speed for deactivation during reverse travel
CDWERideCtrlDelay4On	Activation delay (applies for forward travel and reverse travel)

Tab. 117: Speed-dependent activation

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060.7 Pipe break protection

060.7.1 Pipe break protection: overview

Valid for: L507-1579;

This equipment is optional.

1 Layout

Pipe break protection consists of following components:
- One valve block for pipe break protection on each hydraulic cylinder of working hydraulics (For more information see: 060.7.2 Valve block for pipe break protection, page 060-43)
- Solenoid valve to release ride control (option) (For more information see: 060.7.3 Solenoid valve for release of the ride control, page 060-44)

LBH/12234434/06/211-20190801_070019/en

2 Function

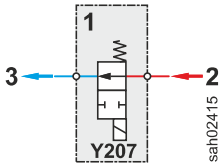

Fig. 351: Solenoid valve for High Flow: hydraulic schematic (diesel engine is running)

1 Solenoid valve for High Flow
2 Oil supply through High Flow pump
3 Return flow to hydraulic oil cooler

BMK	Function
Y207	Magnet for High Flow

Tab. 135: Equipment codes

Solenoid valve for High Flow **1** controls oil flow to control block.

If High Flow function is deactivated, solenoid for High Flow **Y207** is de-energised. As a result, oil of High Flow pump **2** flows to hydraulic oil cooler **3**.

If High Flow function is activated, solenoid for High Flow **Y207** is energised. As a result, oil of High Flow pump flows to control block.

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070.2 Travel pump

Valid for: L507-1579;

1 Layout

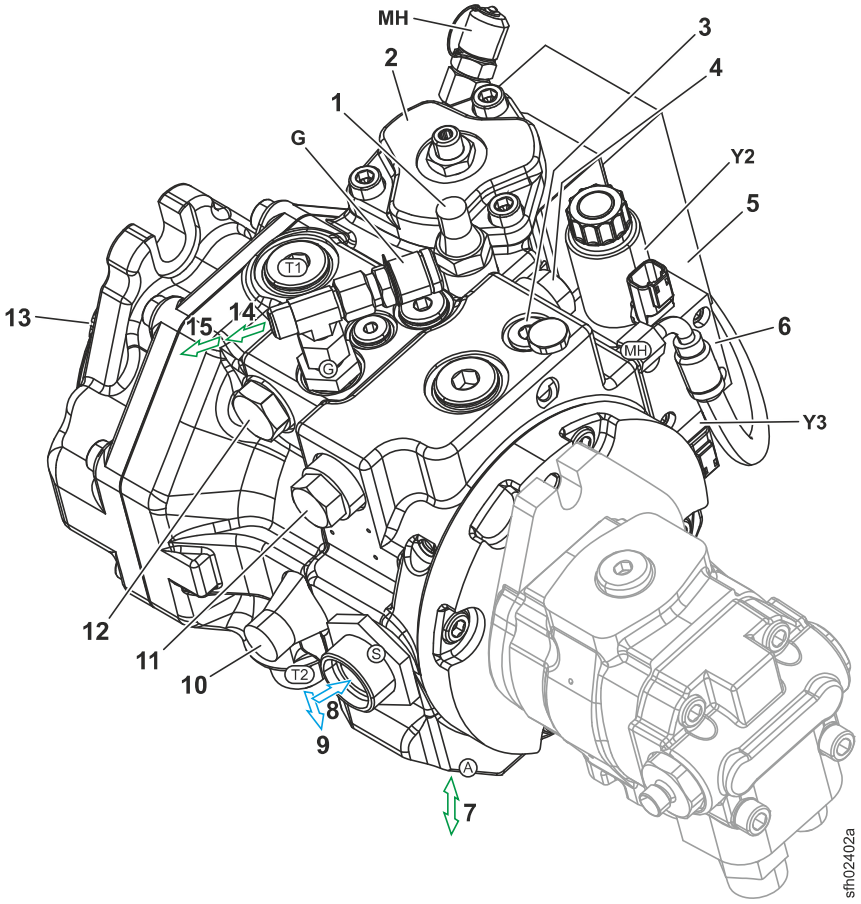

Fig. 355: Travel pump (from front left)

1 Pressure cut-off valve
2 Positioning piston
3 Shuttle valve and bypass for towing
4 Reverse travel direction high pressure relief valve
5 Control pressure valve block
6 Valve block for travel direction
7 Oil supply for travel motor (forward travel direction high pressure)
8 Suction port of replenishing pump of return suction filter
9 Leak oil to hydraulic oil cooler
10 Eccentric adjusting screw
11 Forward travel direction high pressure relief valve
12 Replenishing pressure relief valve
13 Drive shaft
14 Oil supply for parking brake, pilot control and bearing flushing
15 Oil supply for service brake and transmission control unit

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2.4 Variable displacement pump

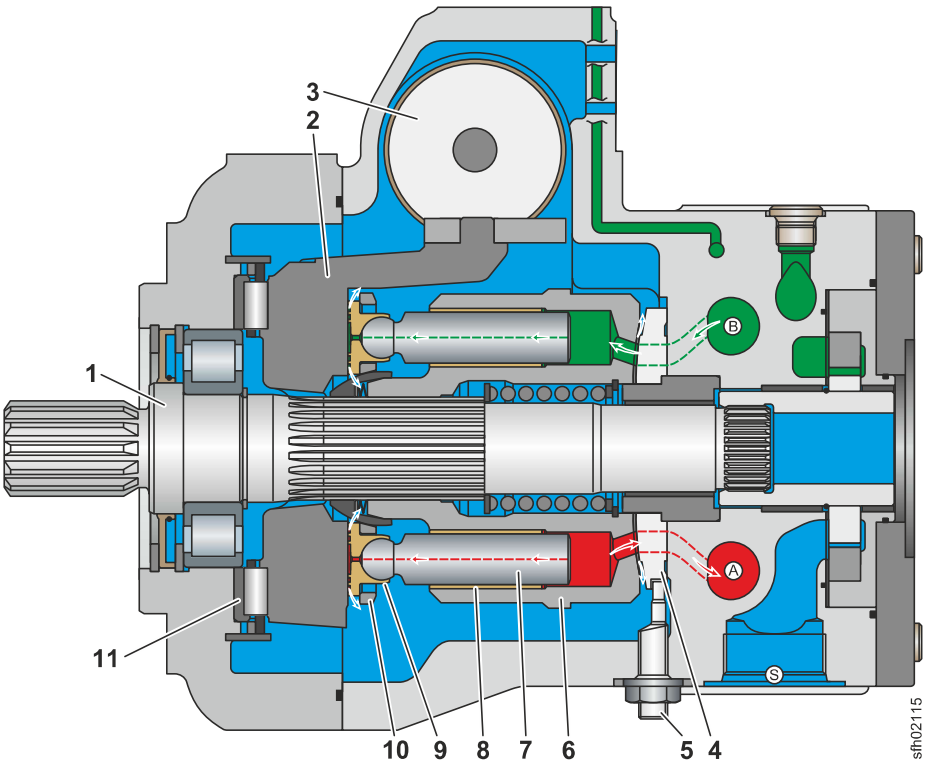

Fig. 364: Variable displacement pump (forward travel direction)

1	Drive shaft	**7**	Piston
2	Swivel plate	**8**	Sliding bushing
3	Positioning piston	**9**	Glide shoe
4	Control plate	**10**	Return plate
5	Eccentric adjusting screw	**11**	Swivel plate bearing
6	Rotary group cylinder (9x)		

2.4.1 Rotary group

Rotary group cylinder **6** is rigidly connected to drive shaft **1** via a gear. The rotary group cylinder **6** contains pistons **7**, which rotate along with rotary group cylinder **6**. The pistons **9** slide up and down in sliding bushings **8** and are guided by glide shoes **9** and return plate **10**.

The swivel plate **2** and control lens **4** do not move.

Oil is pumped through a hole in pistons **7** into glide shoe **9**. This means glide shoe **9** floats on a film of oil and slides over swivel plate **2** without mechanical contact.

The rotary group cylinder **6** also slides on a film of oil. This is produced by leakage between control lens **4** and rotary group cylinder **6**.

2.4.2 Servo piston and swivel plate

The swivel plate **2** lies on swivel plate bearing **10**, and is connected by a lever to positioning piston **3**.

If no travel direction is selected, positioning piston **3** holds swivel plate **2** in zero position. If a travel direction is selected, positioning piston **3** swivels swivel plate **2** up to -20° or +20° (depending on travel direction).

7 Servo pressure valve
8 Positioning piston
9 Discharge valve
10 Orifice
17 Oil from replenishing pump (bearing flushing)
18 Orifice 1.0 mm
19 Connection to travel motor bypass solenoid valve

Name	Test point
M1	Travel motor servo pressure

Tab. 156: Test points

BMK	Function
Y106	Servo pressure proportional solenoid (travel motor)

Tab. 157: Equipment codes

The travel motor is driven with oil from travel pump.

To change direction of rotation, high pressure side and low pressure side are swapped.

2.2 Output speed and output torque

The output speed depends on following factors:
– Oil quantity supplied by travel pump
– Swivel plate angle

The output torque depends on following factors:
– High pressure
– Swivel plate angle

At a small angle, axial piston rotary group **2** has a low displacement. The output speed is high, because exclusively a little oil is required for each revolution. At same time, output torque is low, due to shallow angle of pistons to output shaft.

At a large angle, axial piston rotary group **2** has a high displacement. The output speed is low, because a lot of oil is required for each revolution. At same time, output torque is high, due to large angle of pistons to output shaft.

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– Brake system
– Hydraulics of transmission (Speeder only)

The return-suction filter **7** cleans returning hydraulic oil.

The breather filter **2** compensates pressure fluctuations and maintains a slight preload pressure in the hydraulic tank.

080.2.2 Return suction filter

Valid for: L507-1579;

1 Layout

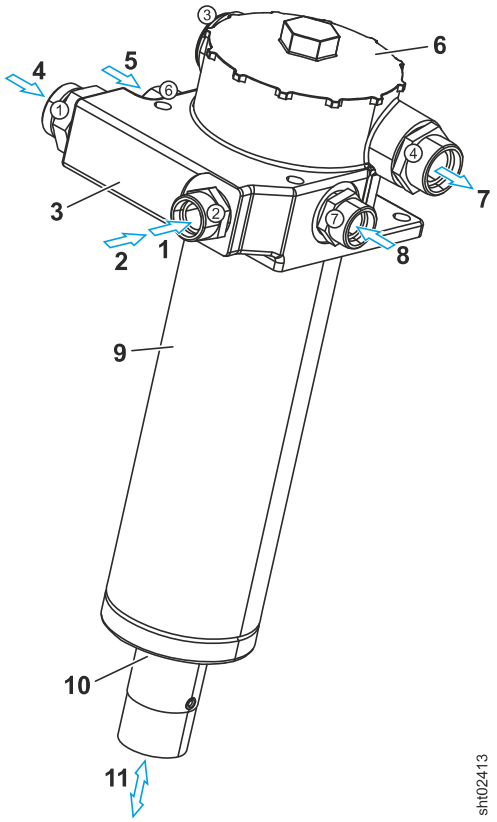

Fig. 379: Return-suction filter (from front left)

1	Return of servostat and pilot control unit	**7**	Replenishing pump suction port
2	Return of inch braking unit and solenoid valve for transmission control unit (Speeder only)	**8**	Return flow from control valve block
3	Filter housing with temperature valve	**9**	Filter casing
4	Return flow from hydraulic oil cooler (uncooled)	**10**	Replenishing valve and preload valve 0.5 bar
5	Return flow from hydraulic oil cooler (cooled)	**11**	Connection to steel tank
6	Filter cover		

The return suction filter is integrated in the steel tank.

090 Steering system

Contents

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100 Brake system

Contents

LBH/12234434/06/211-20190801_070019/en

2	Valve ball	**7**	Equalizing reservoir shut-off valve	**12**	Return flow to return suction filter
3	Pressure control valve	**8**	Equalizing reservoir connection	**13**	Port for 1st brake circuit (wet disc brake)
4	Spacer	**9**	Port for 2nd brake circuit (drum brake)	**14**	Oil supply from replenishing pump
5	Valve piston	**10**	Readjusting spring		

BMK	Function
B12	Brake light pressure switch

Tab. 179: Equipment codes

When inch/brake unit is not actuated, oil from replenishing pump **14** pushes pressure control piston for 1st brake circuit **1** to its initial position. This raises pressure control valve **3** from valve piston **5** and connects 1st brake circuit (wet disc brake) **13** to return suction filter **12**.

At the same time, the return spring **10** pushes the brake piston for the 2nd brake circuit **6** and the valve piston **5** against the spacer **4**. This causes the equalising reservoir shut-off valve **7** to open the connection from the 2nd brake circuit (drum brake) **9** to the equalising reservoir **8**.

2.2.2 Inch/brake unit actuated

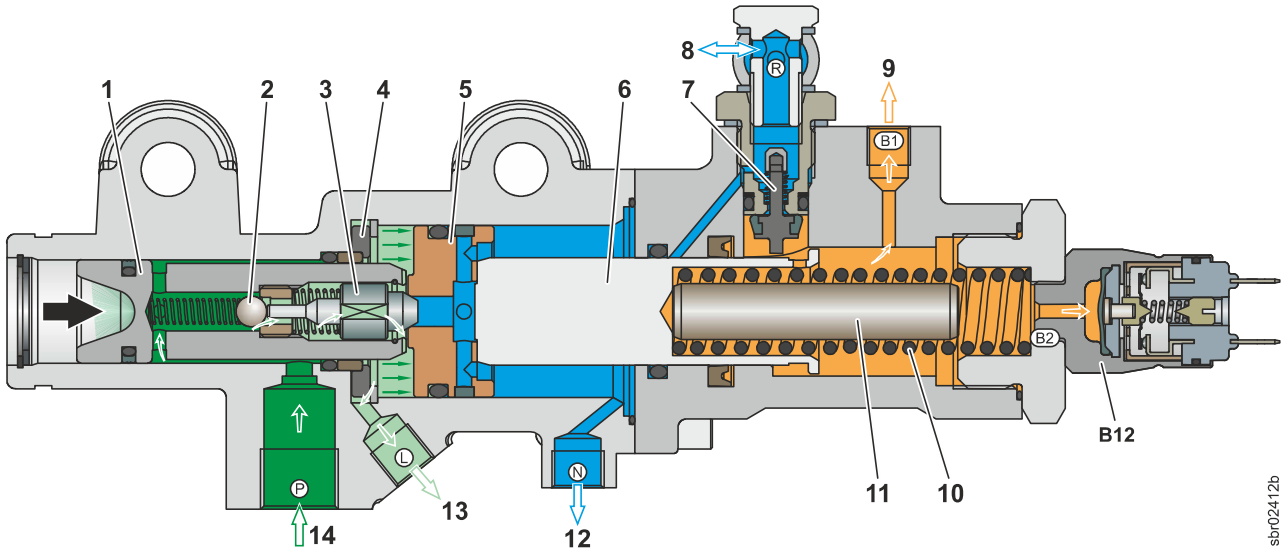

Fig. 404: Service brake pressure control piston and main service brake cylinder; sectional view

1	Pressure regulator piston for 1st brake circuit	**6**	Brake piston for 2nd brake circuit	**11**	Stroke limiting piston
2	Valve ball	**7**	Equalizing reservoir shut-off valve	**12**	Return flow to return suction filter
3	Pressure control valve	**8**	Equalizing reservoir connection	**13**	Port for 1st brake circuit (wet disc brake)
4	Spacer	**9**	Port for 2nd brake circuit (drum brake)	**14**	Oil supply from replenishing pump
5	Valve piston	**10**	Readjusting spring		

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100.3 Parking brake

100.3.1 Valve block for parking brake and differential lockout

Valid for: L507-1579;

1 Layout

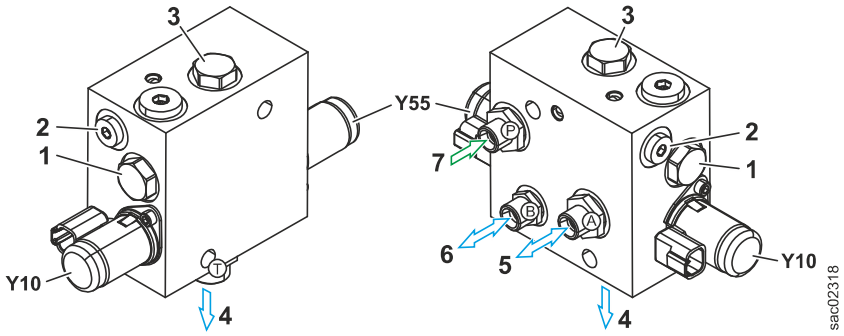

Fig. 417: Valve block for parking brake and differential lockout (from front left and from front right)

1 Check valve 1
2 Flushing throttle 1.5 mm
3 Check valve 2
4 Return flow to hydraulic tank
5 Parking brake connection
6 Differential lockout connection
7 Oil supply from replenishing pump

BMK	Function	BMK	Function
Y10	Parking brake solenoid	**Y55**	Solenoid for differential lockout

Tab. 184: Equipment codes

The valve block for the parking brake and differential lockout is installed in the front section, on the left next to the control valve block.

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110.3 Circuit diagrams

Valid for: L507-1579;

The circuit diagrams for the electrical system show the functional sequences for the entire machine, including optional attachments. Options in the circuit diagrams are shown in green. All components and connectors are correctly labelled and shown with the appropriate symbol so that they can be clearly identified. The key contains an additional list of the components with their designations.

The wiring diagrams can also be called up in the spare parts programme LIDOS under electrical system assemblies. These can be opened in an e3v format via the info button next to assembly circuit diagram.

The circuit diagrams are divided up as follows:
- Overview chart
- Contents
- Key
- BMK list
- Circuit diagrams
- Component overviews

The circuit diagrams contain links that can be activated with a mouse click.

1.1.1 Abbreviations

Abbreviation	Designation
SH	Service hours
EP	Electroproportional
WH	Wiring harness
LED	LED
LFD	Liebherr ride control system
SV	Solenoid valve
PWM	Pulse width modulation (proportional output)
PSV	Proportional solenoid valve
BMK	Equipment code

Tab. 192: Abbreviations

1.1.2 Designation of components with “-”

The designations of the components and connectors are always shown with “-”, e.g.:

Description	Component designation
-A10	Display

Tab. 193: Example of component designation

1.1.3 Location code with “+”

Location codes are always shown with “+”. The location code shows where the component is situated in the machine.

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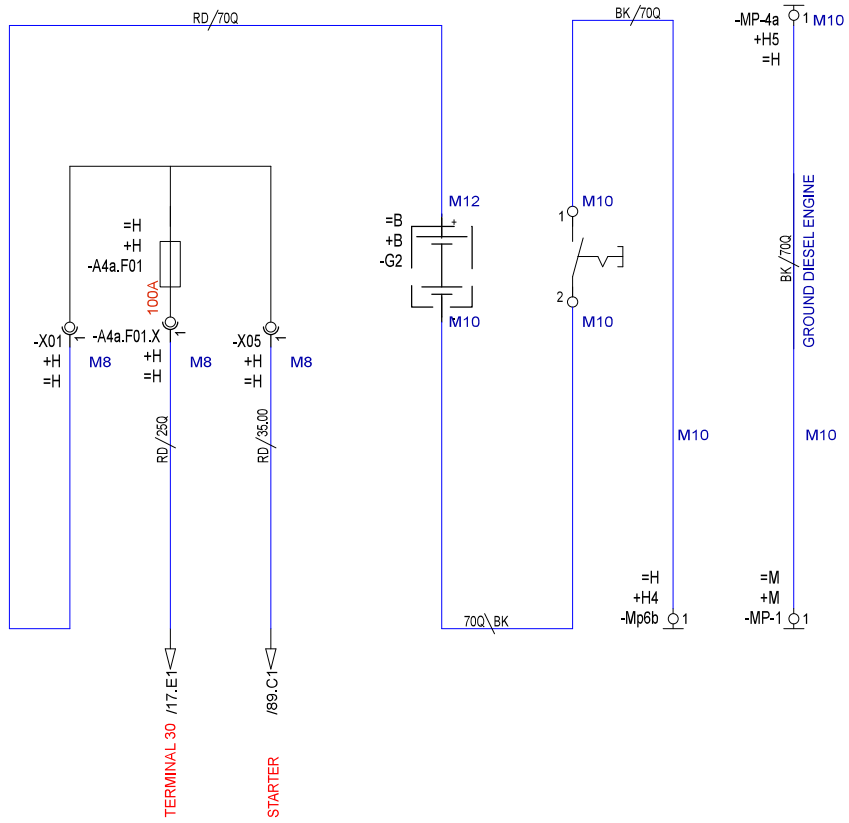
ITEM CODE	12808928
DRAWING INDEX	001
PROJECT	L507-L509
DRAWING NUMBER	1582 00090 01 00

BMK	SYSTEM	LOCATION	FUNCTION	PAGE
-F52	=A4	+K2	FUSE RESERVE T. 30	/79.B3
-F53	=A4	+K2	FUSE DRIVING HEADLIGHT FRONT RIGHT	/40.B6
-F54	=A4	+K2	FUSE HIGH BEAM RIGHT	/40.B7
-F55	=A4	+K2	FUSE MARKER LIGHT LEFT	/40.B5
-F56	=A4	+K2	FUSE MARKER LIGHT RIGHT, LICENCE PLATE LIGHT	/40.B5
-F57	=A4	+K2	FUSE RESERVE T. 30	/78.B3
-F58	=A4	+K2	FUSE RESERVE T. 30	/78.B4
-F59	=A4	+K2	FUSE RESERVE T. 30	/78.B6
-F60	=A4	+K2	FUSE RESERVE T. 30	/79.B4
-F61	=A4	+K2	FUSE RESERVE T. 30	/79.B4
-F62	=A4	+K2	FUSE RESERVE T. 30	/79.B5
-F63	=A4	+K2	FUSE RESERVE T. 30	/79.B6
-F64	=A4	+K2	FUSE RESERVE T. 30	/79.B7
-F65	=A4	+K2	FUSE RADIO T. 15	/48.B6
-F66	=A4	+K2	FUSE DISPLAY T. 30	/56.C8
-F67	=A4	+K2	FUSE RESERVE T. 30	/79.B7
-F68	=A4	+K2	FUSE LiDAT MODULE T. 30	/102.B3
-F69	=A4	+K2	FUSE ADDITIONAL HEADLIGHT REAR	/43.C2
-F70	=A4	+K2	FUSE MARKER LIGHT T. 30	/40.E2
-F71	=A4	+K2	FUSE STARTING SWITCH BYPASS T. 30	/17.C3
-F72	=A4	+K2	FUSE DRIVING HEADLIGHT FRONT LEFT	/40.B6
-F73	=A4	+K2	FUSE HIGH BEAM LEFT	/40.B7
-F74	=A4	+K2	FUSE SEAT COMPRESSOR T. 58	/48.B2
-F75	=A4	+K2	FUSE 12V SOCKET T. 58	/48.B1
-F178	=K	+K4	FUSE REFUELLING PUMP T. 30	/84.C4
-F185	=K	+K4	FUSE AUXILIARY HEATER T. 30	/52.B2
-F185a	=K	+K4	FUSE AUXILIARY HEATER T. 30	/52.B5
-F185b	=K	+K4	FUSE AUXILIARY HEATER T. 30	/53.B2
-F208	=K	+K2	FUSE FUEL PREHEATING T. 15	/74.C5
-G1	=M	+M	ALTERNATOR	/18.E2
-G1.X1	=M	+M	CONNECTOR ALTERNATOR	/18.E2
-G1.X3	=M	+M	CONNECTOR ALTERNATOR	/18.F1
-G2	=B	+B	BATTERY	/19.B7
-H15	=V	+V1	INDICATOR LIGHT FRONT LEFT	/40.E5
-H16	=V	+V1	INDICATOR LIGHT FRONT RIGHT	/40.E6
-H22	=K	+K3	BEACON	/44.C7

BMK	SYSTEM	LOCATION	FUNCTION	PAGE
-H22.X1	=K	+K3	CONNECTOR BEACON +	/44.C7
-H22.X2	=K	+K3	CONNECTOR BEACON -	/44.D7
-H40	=K	+K4	WARNING BUZZER	/43.D5
-H40.X1	=K	+K4	CONNECTOR WARNING BUZZER +	/43.D5
-H40.X2	=K	+K4	CONNECTOR WARNING BUZZER -	/43.D5
-H47	=K	+K2	LED	/18.D7
-H50	=V	+V1	MARKER LIGHT FRONT LEFT	/40.E5
-H51	=V	+V1	MARKER LIGHT FRONT RIGHT	/40.E6
-H54	=V	+V1	LOW BEAM SWITCH LEFT	/40.E5
-H55	=V	+V1	LOW BEAM SWITCH RIGHT	/40.E6
-H56	=V	+V1	HIGH BEAM FRONT LEFT	/40.E5
-H57	=V	+V1	HIGH BEAM FRONT RIGHT	/40.E6
-H207	=K	+K4	INDICATOR LIGHT HIGH FLOW	/29.D8
-H207.X	=K	+K4	CONNECTOR INDICATOR LIGHT HIGH FLOW	/29.C8
-H230	=K	+K4	INDICATOR LIGHT REGULATED FLOW RATE	/30.D5
-H230.X	=K	+K4	CONNECTOR INDICATOR LIGHT REGULATED FLOW RATE	/30.E5
-J.K16	=K	+K2	JUMPER RELAY K16	/81.C1
-K1	=A4	+K2	RELAY INDICATOR LIGHT	/45.C8
-K2	=A4	+K2	RELAY T. 58	/17.C4
-K3	=A4	+K2	RELAY RADIO T. 15	/48.B3
-K4	=A4	+K2	RELAY INDICATOR LIGHT JOHN DEERE	/45.C5
-K5	=A4	+K2	RELAY SIMULATION D+	/18.C6
-K5a	=A4	+K2	RELAY WINDSCREEN WIPER FRONT	/46.D5
-K5a.X	=A4	+K2	CONNECTOR RELAY WINDSCREEN WIPER FRONT	/46.C6
-K6	=A4	+K2	RELAY INDICATOR LIGHT JOHN DEERE	/45.C7
-K7	=A4	+K2	RELAY BUCKET RETURN-TO-DIG	/22.C4
-K8	=A4	+K2	RELAY INTERIOR ILLUMINATION	/48.B8
-K9	=A4	+K2	RELAY MIRROR HEATER, REAR WINDOW HEATER	/49.B3
-K01	=A4	+K2	RELAY STARTING SWITCH BYPASS	/17.C2
-K02	=A4	+K2	RELAY RESERVE	/81.C7
-K10	=A4	+K2	RELAY INDICATOR LIGHT	/45.C3
-K11	=A4	+K2	RELAY RESERVE	/80.C3
-K12	=A4	+K2	RELAY WORKING HYDRAULICS LOCKOUT	/21.C7
-K13	=A4	+K2	RELAY REVERSING SIGNAL	/69.C7
-K14	=A4	+K2	RELAY RESERVE	/81.C3
-K15	=A4	+K2	RELAY RESERVE	/17.C6

MACHINE TYPE	SERIAL NUMBER		EQUIPMENT CODE	PAGE 9 OF
LIDOS Gerät	XXXXX	LIEBHERR FACTORY LBH	ELECTRICAL SCHEMATIC	CREATION DATE 03.09.2018 13:46

FUSE BOX A4a



ITEM CODE	12808928
DRAWING INDEX	001
PROJECT	L507-L509
DRAWING NUMBER	1582 00090 01 00

MACHINE TYPE	SERIAL NUMBER			
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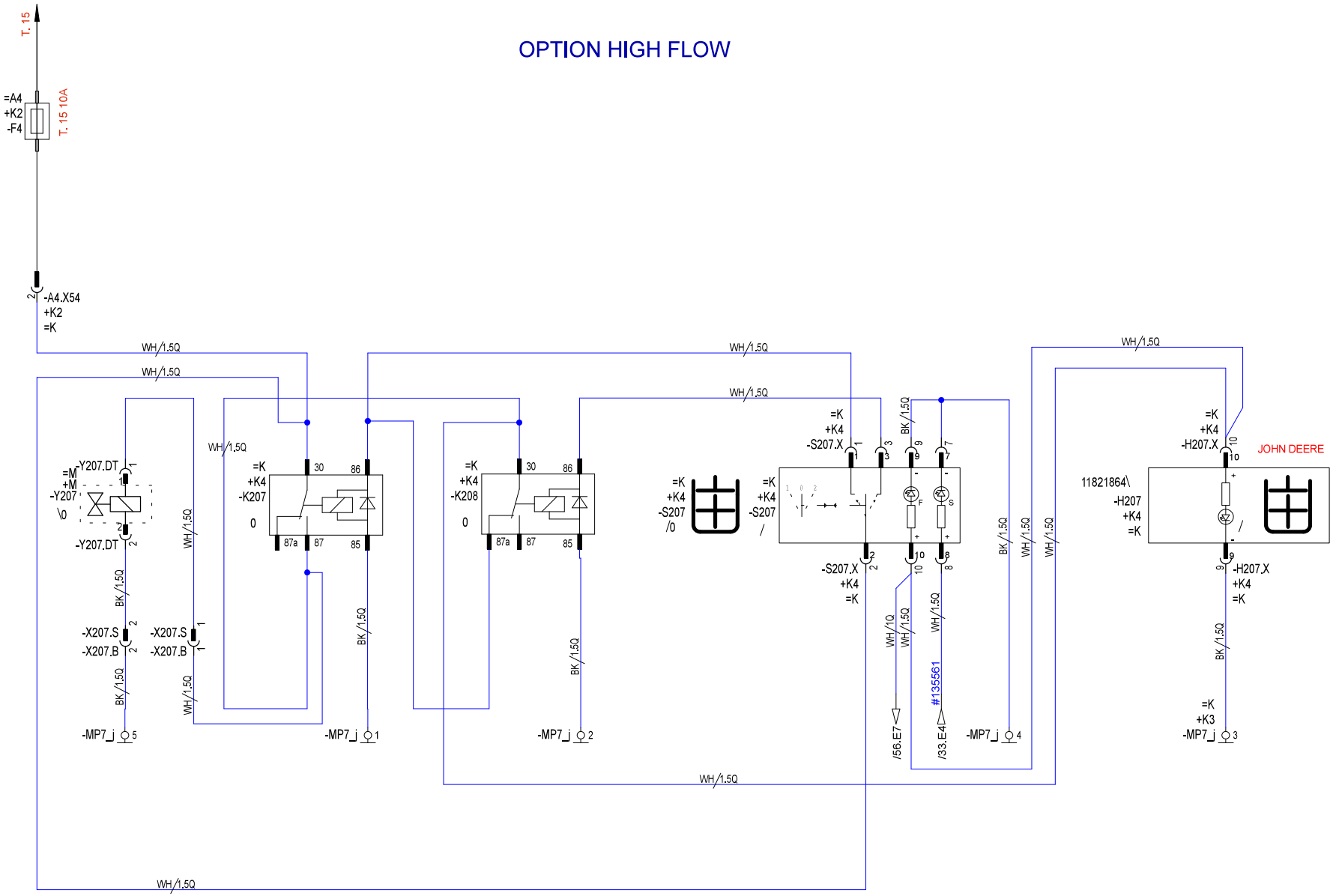
OPTION HIGH FLOW



PROJECT L507-L509
DRAWING NUMBER 1582 00090 01 00
ITEM CODE 12808928
DRAWING INDEX 001

MACHINE TYPE	SERIAL NUMBER			PAGE 29 OF
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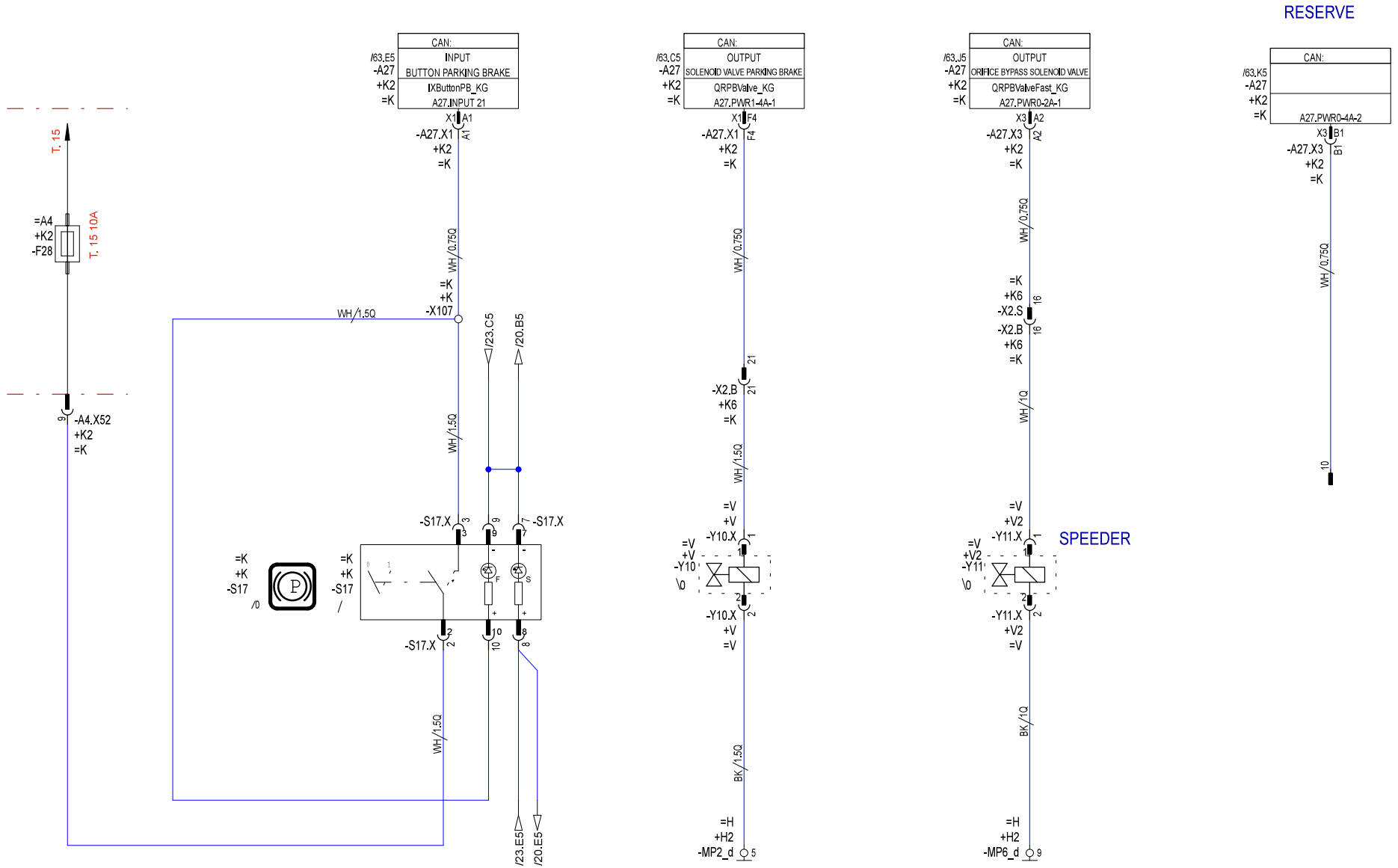
PARKING BRAKE



ITEM CODE	12808928
DRAWING INDEX	001
PROJECT	L507-L509
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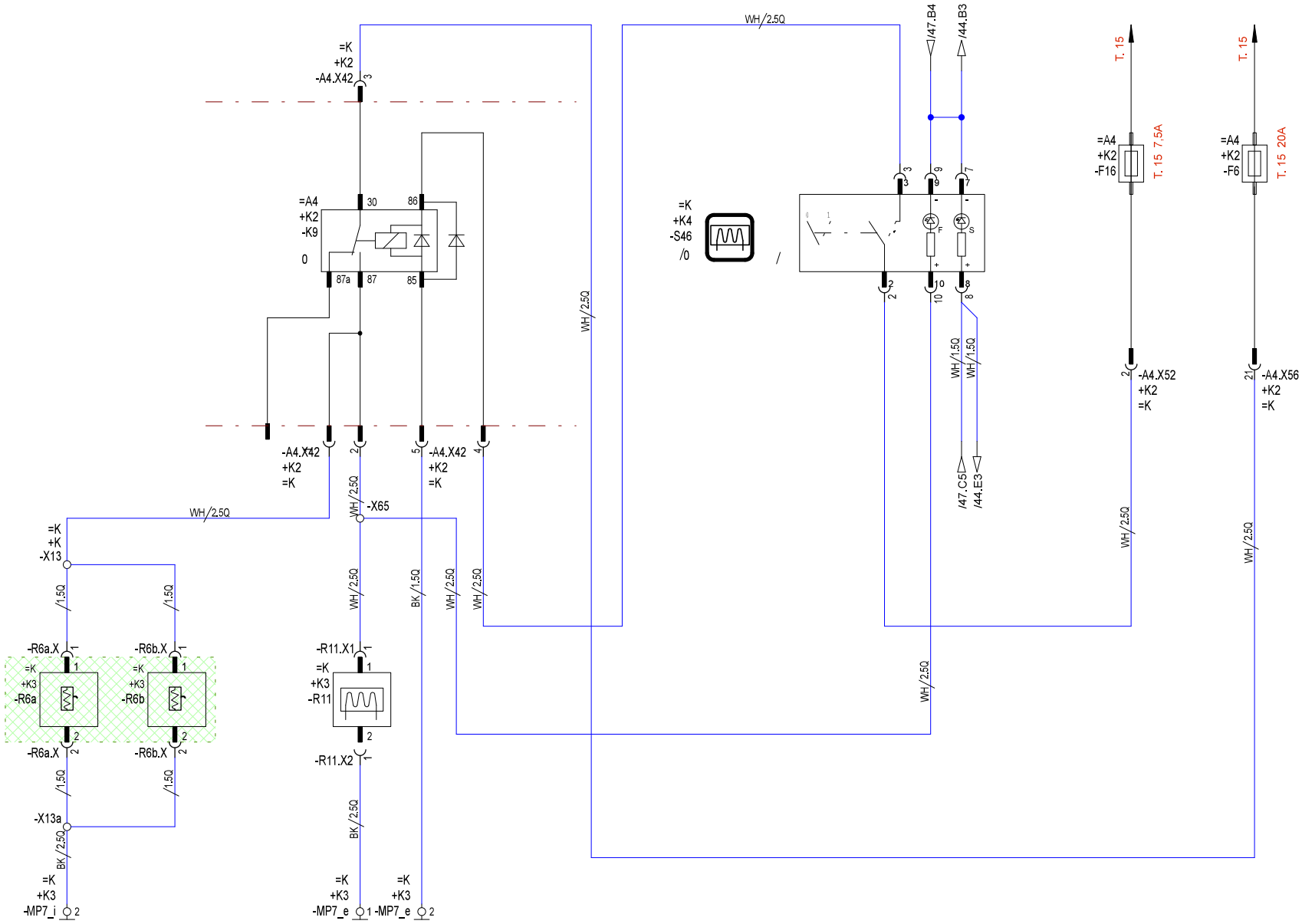
MACHINE TYPE	SERIAL NUMBER		PARKING BRAKE	PAGE 39	OF
LIDOS Gerät	XXXXX	LIEBHERR FACTORY LBH	ELECTRICAL SCHEMATIC	CREATION DATE	03.09.2018 13:46

MIRROR HEATER

REAR WINDOW HEATER



PROJECT	L507-L509
DRAWING NUMBER	1582 00090 01 00
ITEM CODE	12808928
DRAWING INDEX	001

MACHINE TYPE	SERIAL NUMBER			
LIDOS Gerät	XXXXX	LIEBHERR FACTORY LBH	MIRROR HEATER, REAR WINDOW HEATER ELECTRICAL SCHEMATIC	PAGE 49 OF
				CREATION DATE 03.09.2018 13:46

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DRAWING NUMBER 1582 00090 01 00 | DRAWING INDEX 001

JOHN DEERE
KS 12437793

/58.E4 /58.E1 /58.E3 /58.E2

WH/1Q WH/1Q BK/1Q BK/1Q

-X13b1.B +K4 =K

-X400 -X401

WH/1Q BK/1Q

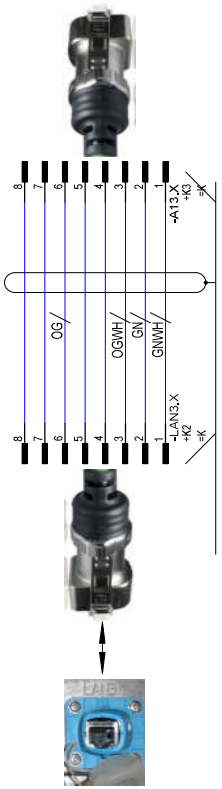
WH/1Q BK/1Q

=K +K4 -X13b1.S

-A13a.X +K3 =K

WH/1.5Q BK/1.5Q

=K +K4 -X13b.S



MASTER4

DISPLAY JOHN DEERE

-X13b.B +K4 =K

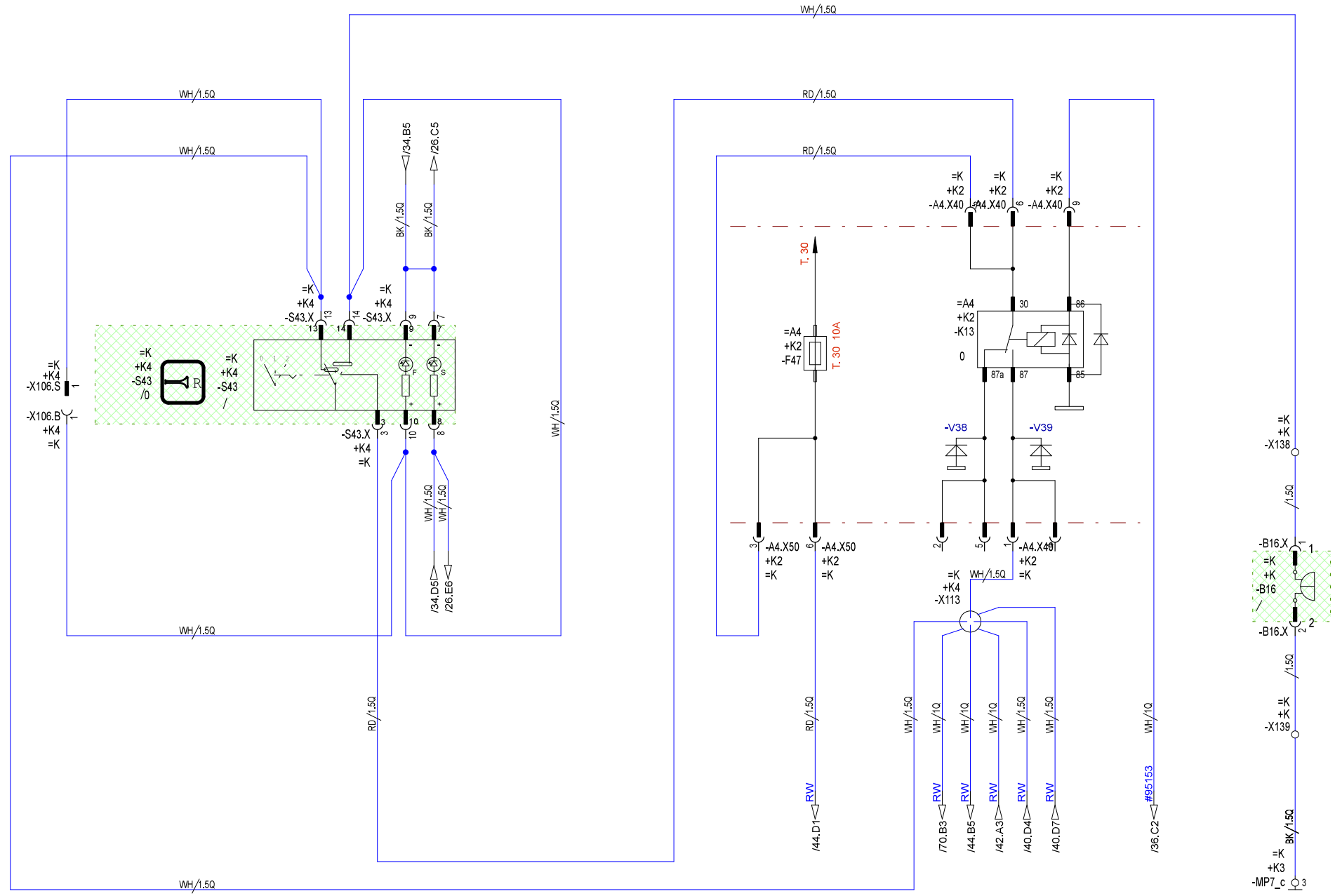
WH/1.5Q BK/1.5Q

/56.E1

=K +K3 6 -MP7_c

MACHINE TYPE	SERIAL NUMBER			PAGE 59 OF
LIDOS Gerät	XXXXX	LIEBHERR FACTORY LBH	DISPLAY JOHN DEERE ELECTRICAL SCHEMATIC	CREATION DATE 03.09.2018 13:46

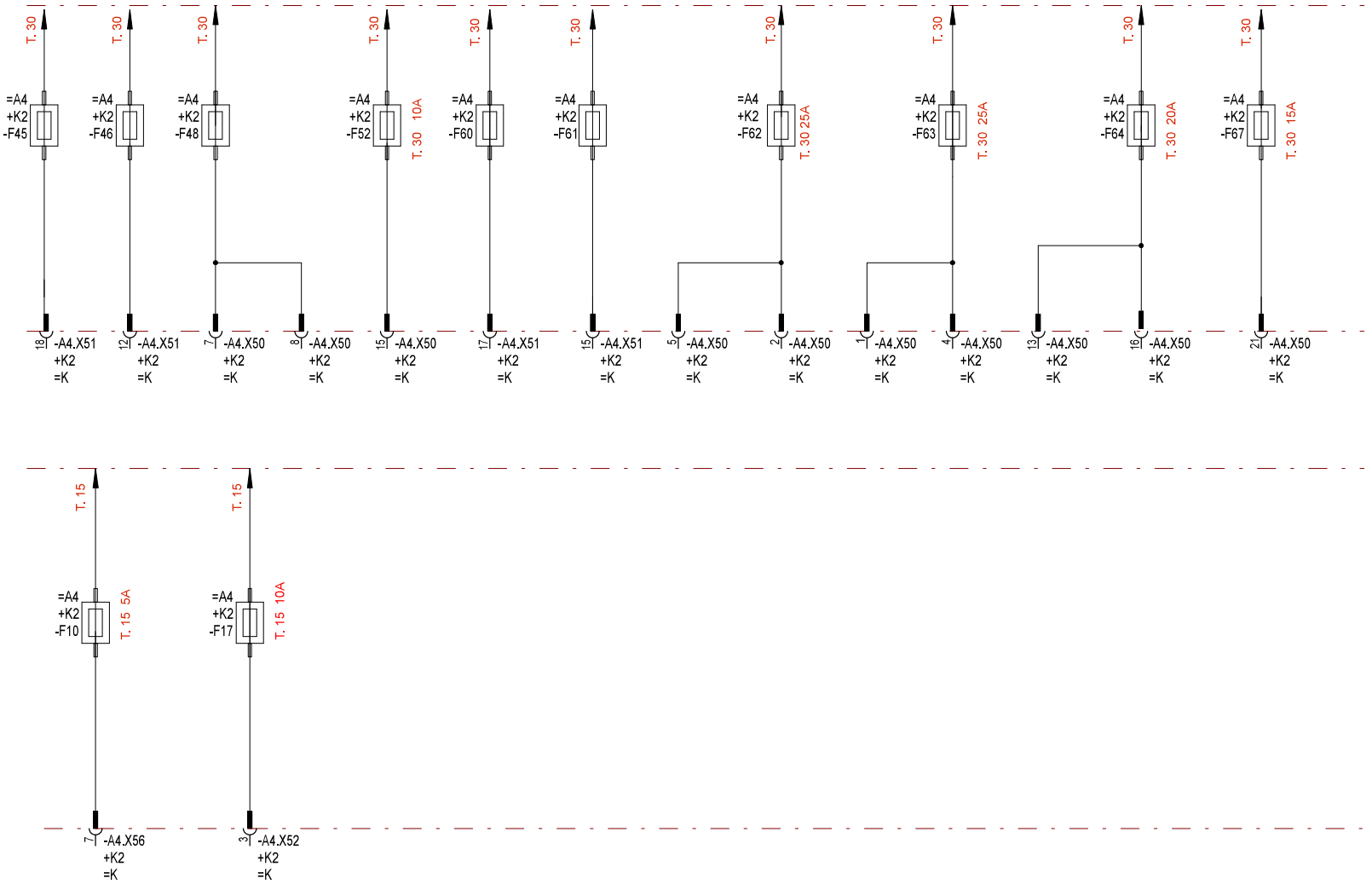
AUDIBLE REVERSING ALARM



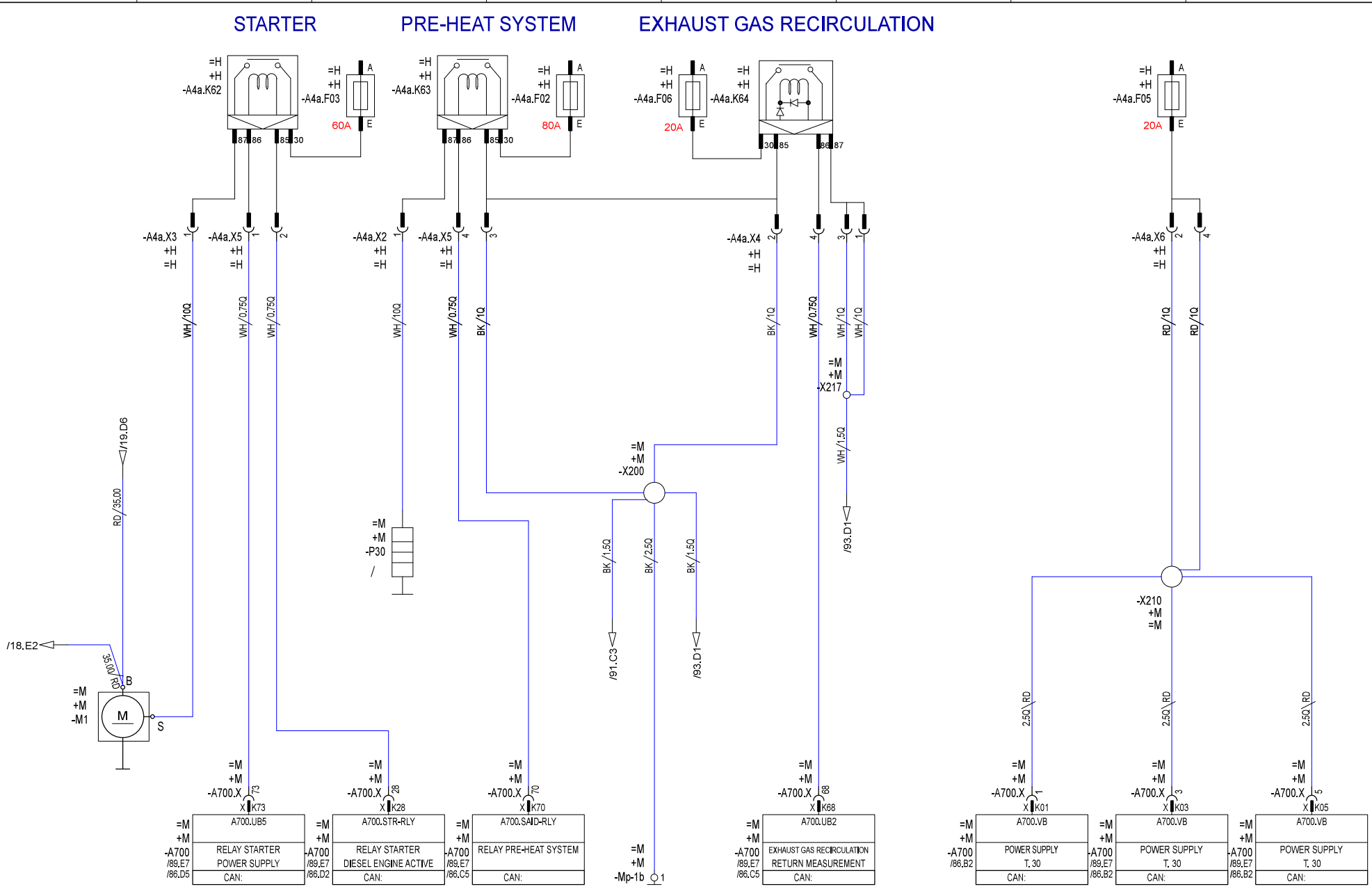
ITEM CODE 12808928
DRAWING INDEX 001
PROJECT L507-L509
DRAWING NUMBER 1582 00090 01 00

MACHINE TYPE	SERIAL NUMBER			PAGE 69 OF
LIDOS Gerät	XXXXX	LIEBHERR FACTORY LBH	AUDIBLE REVERSING ALARM ELECTRICAL SCHEMATIC	CREATION DATE 03.09.2018 13:46

PROJECT L507-L509 | ITEM CODE 12808928
DRAWING NUMBER 1582 00090 01 00 | DRAWING INDEX 001



MACHINE TYPE	SERIAL NUMBER			PAGE 79 OF
LIDOS Gerät	XXXXX	LIEBHERR FACTORY LBH	RESERVE FUSE ELECTRICAL SCHEMATIC	CREATION DATE 03.09.2018 13:46

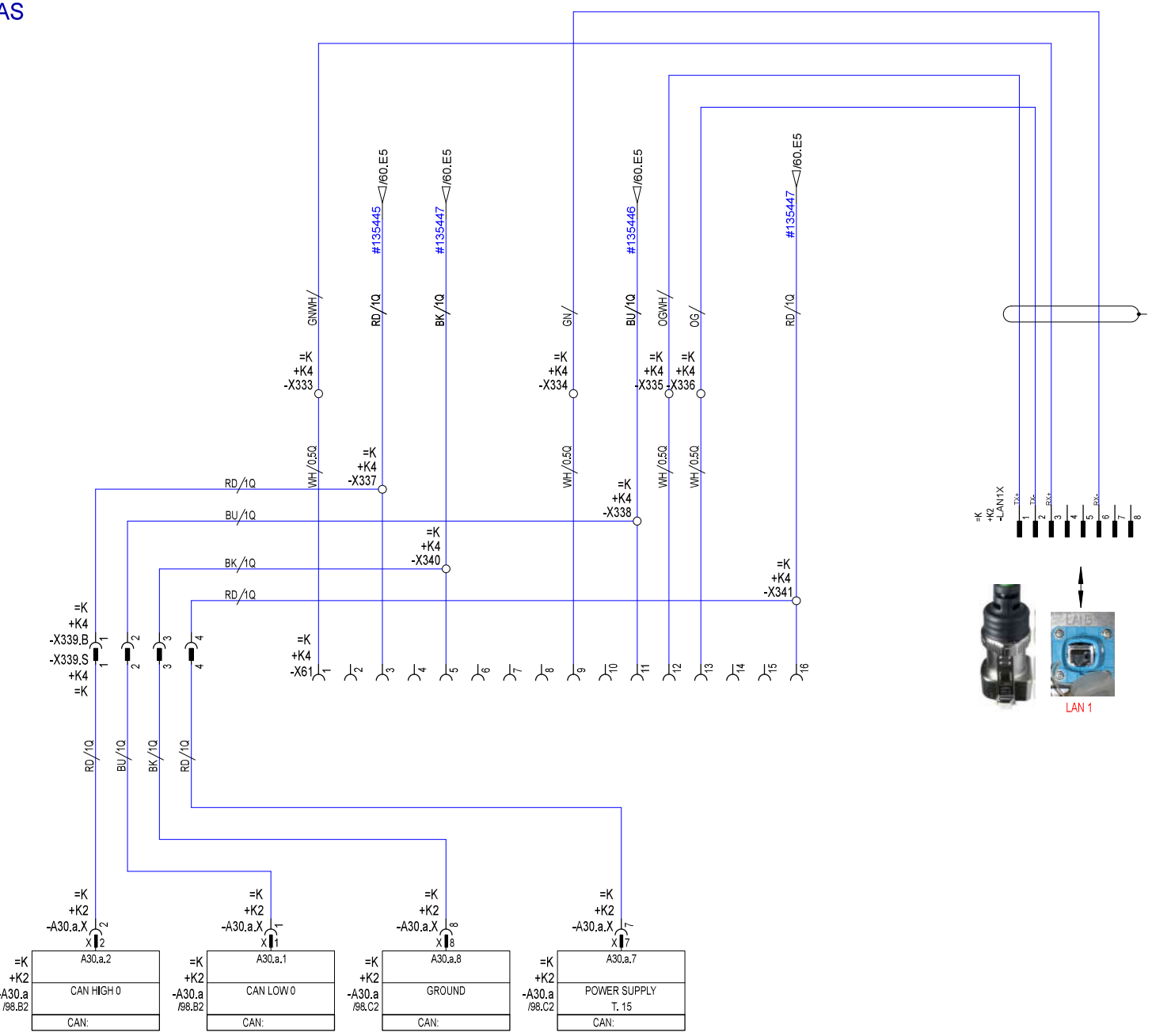


PROJECT L507-L509 ITEM CODE 12808928
DRAWING NUMBER 1582 00090 01 00 DRAWING INDEX 001

MACHINE TYPE	SERIAL NUMBER			
LIDOS Gerät	XXXXX	LIEBHERR FACTORY LBH	STARTER, PRE-HEAT SYSTEM, EXHAUST GAS RECIRCULATION, FUSE HAZARD WARNING SYSTEM, FUSE ENGINE CONTROL UNIT ELECTRICAL SCHEMATIC	PAGE 89 OF CREATION DATE 03.09.2018 13:46

DIAGNOSIS CLAAS

PROJECT L507-L509 | ITEM CODE 12808928
DRAWING NUMBER 1582 00090 01 00 | DRAWING INDEX 001



MACHINE TYPE	SERIAL NUMBER			
LIDOS Gerät	XXXXX	LIEBHERR FACTORY LBH	DIAGNOSIS CLAAS ELECTRICAL SCHEMATIC	PAGE 99 OF
				CREATION DATE 03.09.2018 13:46

The central control unit (Master4) is responsible for the following functions:
- Controlling display
- Controlling CAN bus modules
- Controlling the control units
- Controlling the travel hydraulics
- Controlling the working hydraulics
- Controlling the ride control system
- Controlling the fan system
- Controlling emergency steering pump (if installed)
- Transmission controller
- Brake system controller
- Saving service codes
- Data input and output via diagnostic plug
- Actuating heating and air conditioning controller
- Controlling various options

2.2 Function of the LEDs during operation

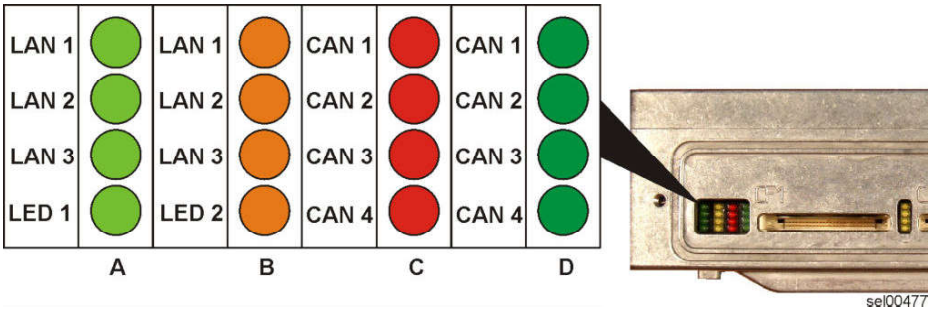


Fig. 435: Function of the LEDs during operation

The LEDs on the central control unit indicate the various transmission statuses.

Transmission mode	LED	Status	Effect
LAN 1 to 3	A	Lights up	Network connected
LAN 1 to 3	B	Flickers	Network traffic
CAN 1 to 4	D	Flickers	Data transfer in progress
CAN 1 to 4	C	Flashes	Transmission error
CAN 1 to 4	C	Lights up	CAN bus stopped

Tab. 196: Function of the LEDs for LAN 1 to 3 and CAN 1 to 4

This operating status of the central control unit is displayed by **LED 1** and **LED 2**.

LED 1	LED 2	Status	Description
On	On	LED test	Directly after the central control unit is switched on, an LED self-test is executed.
Off	Off	Booting	The system is started and waits for all conditions to be met (such as the presence of CAN modules in the system).
Flashes (at 1 s intervals)	Off	Running	The system is running completely (normal operation).

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The fuse board A4 is mounted on the rear wall of the operator's cab.

The fuse board carries and connects the electrical components.

The electrical and electronic components are powered via the fuse board.

1.1.1 Function of the fuse test

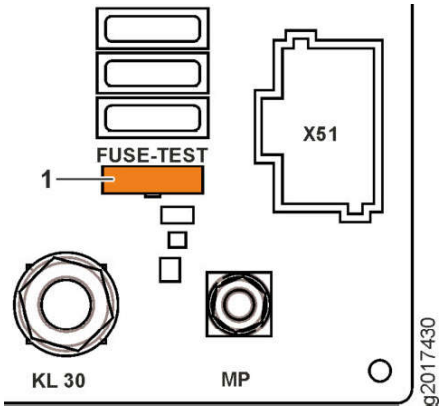

Fig. 446: Function of the fuse test

1 Socket for fuse test

The fuse board A4 has a socket **1** for testing fuses.

To test a fuse, it must be plugged into the socket.

The LED lights up of the fuse is intact.

The fuse test cannot tell whether a fuse has the correct rating. The fuse rating must be checked using the electrical diagram.

1.1.2 Working headlight safety functions

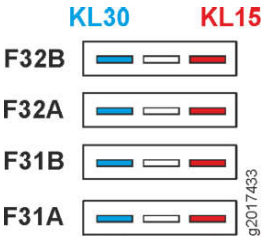

Fig. 447: Working headlight safety functions

Fuse	Function	Fuse	Function
F31A	Front left working headlight	F32A	Rear left working headlight
F31B	Front right working headlight	F32B	Rear right working headlight

Tab. 204: Fuses

The function of the working headlights can be selected by connecting the fuses F31A, F31B, F32A and F32B:

– When the fuses are connected to terminal 30, the working headlights already function when the battery main switch is switched on.

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Name	Description	Name	Description	Name	Description
SD1	Shifting unit with synchro unit	**Z2**	Gearwheel 2 (66 teeth)	**Z4**	Gearwheel 4 (51 teeth)

Tab. 209: Key

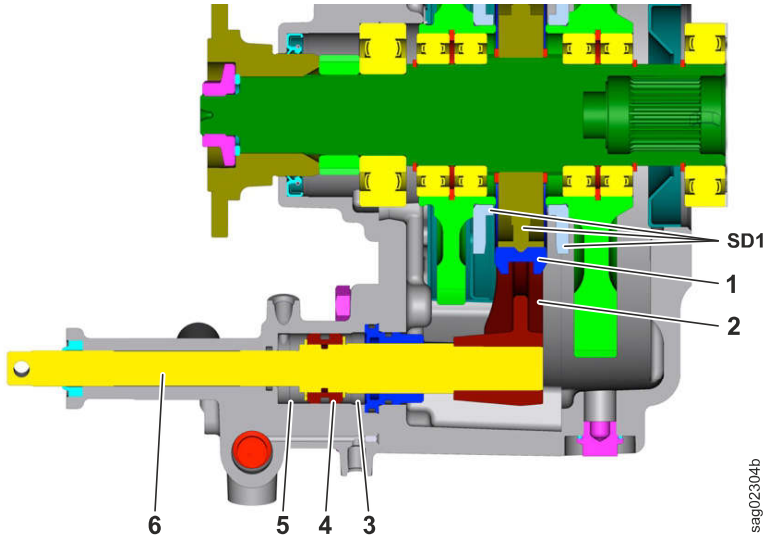

Fig. 454: Gear shifting: sectional view (in neutral position (For more information see: Neutral position, page 120-13))

1 Shift sleeve
2 Shift fork
3 Pressure chamber for 2nd gear
4 Pressure chamber for 1st gear
5 Piston
6 Shift rod

Name	Description
SD1	Shifting unit with synchro unit

Tab. 210: Key

Name	Test point
PF	External servo pressure

Tab. 222: Test points

BMK	Function
Y104	Solenoid for external servo pressure

Tab. 223: Equipment codes

Valve block for external servo pressure is installed in vehicle frame, on right next to travel motor.

2 Function

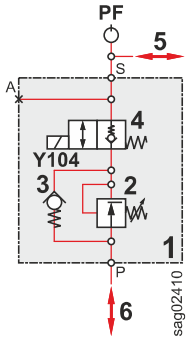

Fig. 463: Valve block for external servo pressure: hydraulic diagram (travel direction is selected)

1 **Valve block for external servo pressure**
2 External servo pressure reducing valve
3 Check valve for external servo pressure
4 Solenoid valve for external servo pressure
5 Connection to hydro accumulator for external servo pressure
6 Connection to travel motor

Name	Test point
PF	External servo pressure

Tab. 224: Test points

BMK	Function
Y104	Solenoid for external servo pressure

Tab. 225: Equipment codes

Pressure reducing valve block **1** is always supplied with high pressure from travel hydraulics via travel motor **6**, regardless of travel direction.

External servo pressure reducing valve **2** reduces high pressure of oil from travel hydraulics to 210 bar and directs it via external servo pressure solenoid valve **4** to external servo pressure hydro accumulator **5**.

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The axle input shaft is fitted with a drum brake which acts as the service brake for the 2nd brake circuit.

2 Function

2.1 Basic function

The axle performs the following functions:
- Transmitting torque and engine speed to the wheels.
- Increasing the output torque by gearing down in the crown wheel and planetary gear.
- Braking the machine using the wet disc brake (service brake).

2.2 Engageable differential lockout

The differential can be 100% locked by pressing a button on the control lever. When the disc clutch locks the differential, it connects the two output sides of the axle to each other. (For more information see: Overview of engageable differential lockout, page 130-6)

2.3 Wet disc brake (service brake for 1st brake circuit and parking brake)

The wet disc brake contains several brake discs arranged in succession. The brake discs have a non-twisting connection alternately with the output and axle housing. The brake discs rotate in axle oil to cool them.

During braking, the service brake piston or the parking brake piston clamps the brake discs. The friction between the discs generates the braking effect.

The force of the service brake piston is generated with oil from the inch/brake unit.

The force of the parking brake piston is generated by cup springs. The parking brake is opened hydraulically.

2.4 Drum brake (service brake for 2nd brake circuit)

(For more information see: 100.2.4 Drum brake, page 100-16)

2.5 Wheel hub

There is a planetary gear in the wheel hub. The planetary gear reduces the speed and increases the torque.

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The bearing is fastened by the bearing covers bolted onto both sides. The bearing pins are held firmly in place in the bearing holes of the rear and front sections by tensioners.

Sealing rings protect the bearing points from dirt.

140.1.2 Articulation lock

Valid for: L507-1579;

1 Layout

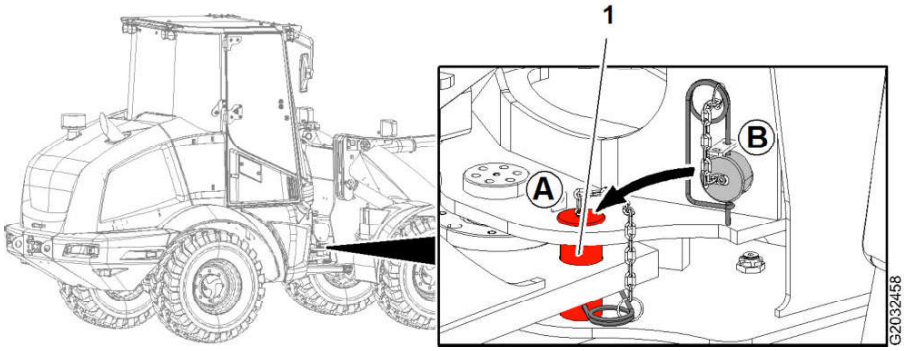

Fig. 478: Releasing articulation lock

1 Retaining pin
A Articulation lock engaged
B Articulation lock open

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

2 Function

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

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

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2 Function

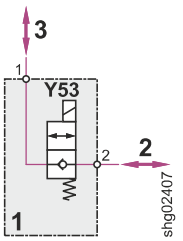

Fig. 484: Quick coupler opening solenoid valve, hydraulic diagram

1 Open solenoid valve for quick coupler
2 Connection for 3rd function B3 (control block)
3 Connection to quick coupler locking hydraulic cylinder

BMK	Function
Y53	Solenoid for opening quick coupler

Tab. 241: Equipment codes

Quick coupler opening solenoid valve **1** connects and disconnects ring side of quick coupler locking hydraulic cylinder **3** from pressure of 3rd function B3 **3**.

Thanks to integrated check valve, oil can also flow out of ring side of hydraulic cylinder for quick coupler lock **3** when quick coupler is locked. This ensures that locking pins are always fully extended during operation.

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4 Dryer-collector unit (option)
5 Air conditioning pressure switch B27 (option)
6 Air-conditioning condenser (option)
10 Coolant supply from diesel engine
11 High pressure line from dryer-collector unit (option)
12 High pressure line from air conditioning compressor (option)

The machine is equipped as standard with hot water heating. Optionally, air conditioning can be also installed.

The expansion valve **2** is attached to the heating and air conditioning unit **3**. The heating and air conditioning unit is installed on the right on the operator's cab.

The compressor magnetic coupling **7** is attached to the diesel engine **1**.

Dryer-collector unit **4** and air conditioning condenser **6** are located in cooler mount.

Air conditioning pressure switch **5** is mounted on dryer-collector unit **4**.

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The expansion valve **11** discharges the liquid, pressurised refrigerant into the evaporator **9**.

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

The evaporator **9** is exposed to hot air from the cab and transfers the heat to the refrigerant. This thermal exchange cools the cab air and heats the refrigerant.

Heated refrigerant evaporates and turns to gas. This change of state requires additional energy from the (warm) evaporator, which further reduces the temperature.

Warmed, gaseous refrigerant is drawn in by air conditioning compressor **1** again.

2.2 Temperature control

The temperature is regulated by the cyclical activation and deactivation of the magnetic coupling **2** of the air conditioning compressor **1** during operation, or by mixing hot air from the heater.

Frequency of switching on and off is controlled by anti-icing sensor **8** and air conditioning temperature switch.

Temperature is also regulated by expansion valve **11**. The pressure and temperature are recorded at the evaporator outlet and the injection quantity is precisely metered.

160.4.2 Compressor magnetic coupling

Valid for: L507-1579;

1 Layout

Fig. 499: Sectional view of air conditioning compressor

1	Pulley	**4**	Magnetic coupling plug connection
2	Magnetic coupling Y22	**5**	Outlet port
3	Adjusting screw	**6**	Intake port

The air conditioning compressor with magnetic coupling **2** is attached to the diesel engine and driven by a V-ribbed-belt.

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– Dirt in the lubrication system
– Defective progressive distributors

2.5 Troubleshooting

Malfunction	Cause	Remedy
Pump not working	Integrated electronic control unit defective	Check the electronic control unit and replace if necessary
	Electrical line interrupted	Check electrical lines
	Pump defective	Check pump and renew if necessary
Pump working but not delivering fluid	Air trapped in pump piston	Bleed the pump
	Filling level below minimum	Fill reservoir
	Pump element defective	Replace pump element
No grease collar on any lubricating points	Pump not working	See “Pump not working”
	Excessive pauses or lubrication time too short	Reduce pause time or increase lubrication time
	System blocked	See “Grease escaping from pressure relief valve”
No grease collar on several lubricating points	Line to auxiliary distributor broken or leaking	Replace line
	Leaky screw connections	Tighten or renew the screw connections
Pump speed decreased	High system pressure	Check bearing points
Grease escaping from pressure relief valve	System pressure too high	Check the system
	Progressive distributor blocked	Renew progressive distributor
	Valve spring defective	Replace pressure relief valve

Tab. 247: Troubleshooting

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2.2 Basic function

The central control unit A15 transmits all machine data to the LiDAT module A30.

The LiDAT module identifies the position of the machine via satellite connections.

The LiDAT module sends the machine data and the position data via a telecommunication connection to the data transfer service provider. The data transfer service provider sends the data via a secure VPN internet connection to the Liebherr LiDAT server.

Depending on their authorisation, customers and Liebherr authorised dealers can access the data on the Liebherr LiDAT server.

A data interface for customer applications allows the machine data to be integrated in internal IT systems.

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

Remote diagnosis and LiDAT teleservice are also possible.

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