en **Service manual**

Wheel loader

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Manufacturer: Liebherr-Werk Bischofshofen GmbH
Valid for: L 508-1853

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LBH/12278874/00/211-20220210_135226/en

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

Tab. 3: Symbols

010.1.2 Intended use

010.1.2.1 Laws, rules, guidelines and safety regulations

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

010.1.2.2 Intended use

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

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

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

Note

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

Incorrect equipment

- Make sure that emergency hammer (option) is present.
- Make sure that position of emergency hammer (option) is known.

010.1.5.2 Fire extinguisher (option)

Danger to life

Incorrect behaviour

- Make sure that all fastening points of fire extinguishers on the machine are known.
- Make sure that everyone is able to operate the fire extinguishers.
- Make sure that everyone knows local fire alarm options.
- Make sure that everyone knows the local fire-fighting possibilities.
- Before starting machine, unlock all locks of hoods and doors of machine.

010.1.6 Safe operation

010.1.6.1 Intoxicants

Danger to life

Physical and mental impairment

- Make sure that no persons working on or with the machine are under the influence of drugs.
- Make sure that no persons working on or with the machine are under the influence of alcohol.
- Make sure that no persons working on or with the machine are under the influence of medication.
- Make sure that no persons working on or with the machine are overtired.
- Make sure that no persons working on or with the machine are exhausted.

010.1.6.2 Dangerous fuels and operating fluids

Injury

Incorrect handling

- Adhere to safety instructions on handling oils, greases and chemical substances.
- In case of hot lubricants and fuels put on personal protective equipment.

Environmental damage

Incorrect disposal

- Dispose of lubricants and fuels safely and in eco-friendly manner.
- Adhere to guidelines applicable to disposal.

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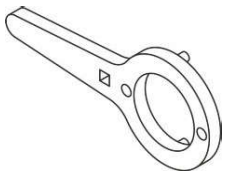
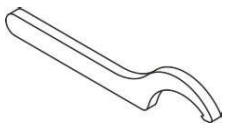
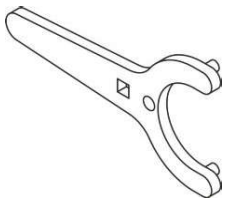
Designation	Item code	Remark	Fig.
Yanmar SMARTASSIST diagnostic software		For diesel engine diagnosis. For more information see Service Information LBH - 04-15-09/14	 g2087594

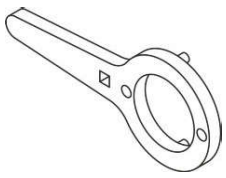
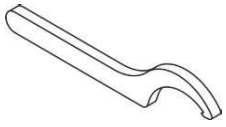
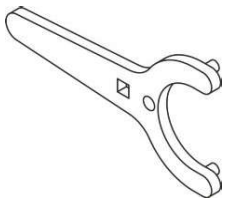
Tab. 4: Special tools for diesel engine

010.2.2 Special tools for lift cylinders

Designation	Item code	Remark	Fig.
Piston wrench 75/12 mm	8007364	For piston assembly	
Piston nut wrench 68/75 mm (hook wrench)	885171501	For piston nut assembly	
Piston rod bearing wrench 92/8 mm	0541063	For piston rod bearing assembly	

Tab. 5: Special tools for lift cylinders

010.2.3 Special tools for tilt cylinders

Designation	Item code	Remark	Fig.
Piston wrench 60/10 mm	9131362	For fitting piston	
Spanner for piston nut (hook wrench DIN 1810)	7900282	For fitting piston nut	
Piston rod bearing wrench 92/8 mm	0541063	For fitting piston rod bearing	

Tab. 6: Special tools for tilt cylinders

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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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020.1 Overall machine

020.1.1 Complete machine with loading bucket

Valid for: L508-1853;

Values stated refer to machine:

- In its standard version
- With 400/70R18 tyres
- Including all lubricants
- With a full fuel tank
- With ROPS/FOPS cab and operator
- On level and stable ground

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

▶ Note information about tyres and working attachment.

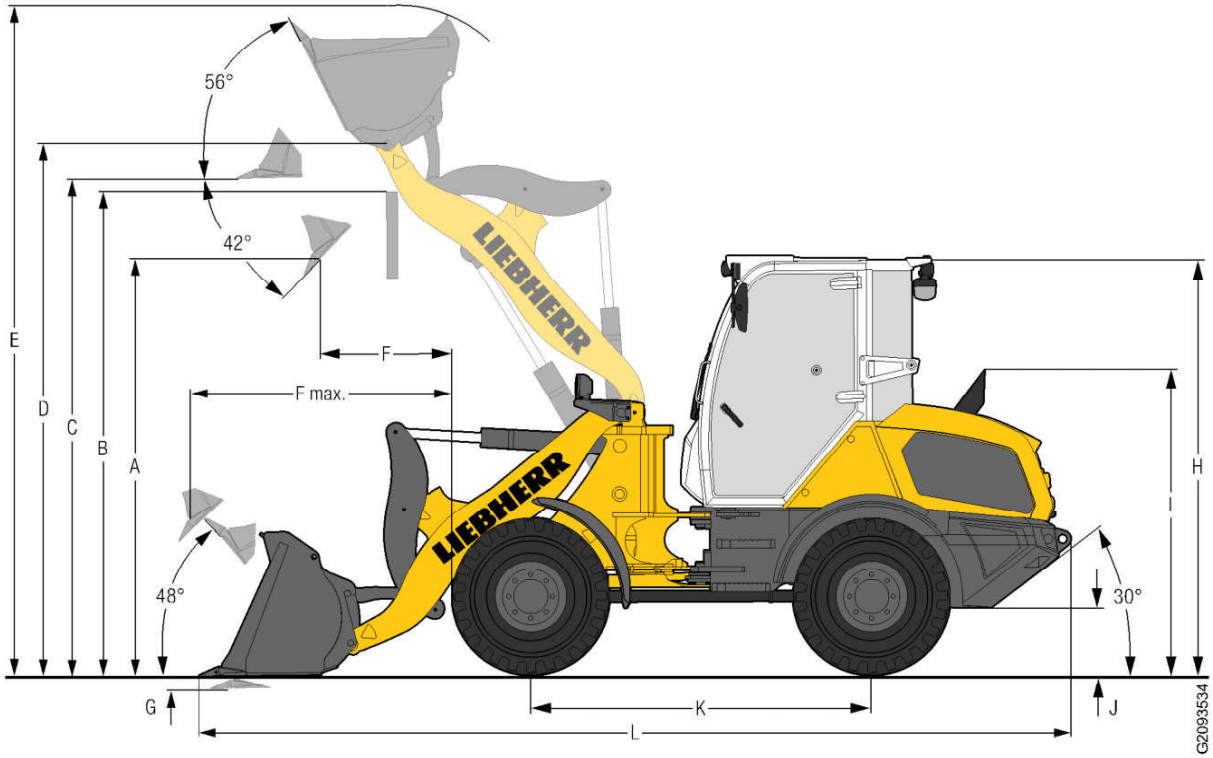

Fig. 26: Complete machine with loading bucket

	Designation	Unit	Value	
	Load geometry		A)	A)
	Cutting tool		B)	B)

Description	Unit	Value
Stroke length	mm	436
Weight	kg	44.8
Tightening torque of piston rod bearing	Nm	800
Tightening torque of piston	Nm	450
Tightening torque of piston nut	Nm	100

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Size and tread code		Change in operating weight	Width across tyres	Change in height	Tyre pressure		
					FA [A]	RA [B]	p - max. [C]
		kg	mm	mm	bar	bar	bar
Mitas 365/80R20 EM-01	L2	8	1920	+34	3.50	3.30	3.75
Mitas 405/70R18 EM-01	L2	12	1960	+7	3.50	3.30	3.75
Mitas 405/70R20 EM-01	L2	+24	1960	+32	3.25	3.10	3.75
Nokian 400/70R20 Hakkapeliitta	L2	+44	1950	+30	3.30	2.80	4.00
Vredestein 340/80R18 Endurion	L3	64	1920	-5	4.00	3.40	4.40
Vredestein 400/70R18 Endurion	L3	0	1960	0	3.50	2.90	4.40
Vredestein 400/70R20 Endurion	L3	+40	1960	+35	3.40	2.75	4.40

Tab. 23: Approved tyres for standard uses

A) Recommended tyre pressures on the front axle (for machine with standard equipment and cold tyres)
B) Recommended tyre pressures on the rear axle (for machine with standard equipment and cold tyres)
C) Maximum tyre pressure

020.9.4.2 Special tyres

Enter the specifications in the tables below as follows:
– **By the machine operator:** If the machine is retrofitted by the machine operator

Size and tread code	Change in operating weight	Width across tyres	Change in height	Tyre pressure		
				FA [A]	RA [B]	p - max. [C]
	kg	mm	mm	bar	bar	bar
...						
...						
...						

Tab. 24: Special tyres

A) Front axle
B) Rear axle
C) Maximum tyre pressure

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
Cooling system										
☐	●	●	❍	❍	❍			Check the coolant level in the cooling system.		030-79
			❍	❍	❍			Coolant: checking anti-freeze and corrosion protection agent concentration.		030-81
						✦		Clean the cooling system.		030-88
					❍			Cooling system: change coolant (at least every 2 years).		030-89
Hydraulic components										
☐	●	●	❍	❍	❍			Hydraulic tank: check oil level.		030-92
			❍	❍	❍			Hydraulic tank: drain off condensate and sediment.		030-93
				❍	❍			Change the return filter in the hydraulic tank.		030-94
					❍			Hydraulic tank: change breather filter.		030-95
						✧		Hydraulic tank: change the oil (For more information see: 030.3.8 Hydraulic oil, page 030-17) .		030-96
Steering system										
☐	●	●	❍	❍	❍			Test steering.		030-99
☐		●	❍	❍	❍			Steering cylinder: lubricate bearing.		030-100
Brake system										
			❍	❍	❍			Test service brake and parking brake.		030-100
☐		●	❍	❍	❍			Check oil level in brake system.		030-102
			❍	❍	❍			Check gap and wear on service brake linings.		030-104
					❍			Service brake for speeder travel drive: check brake plates for wear.		030-106
Electrical system										
☐	●	●	❍	❍	❍			Check the function of the lighting and horn.		030-107
			❍	❍	❍			Checking the batteries.		030-108
				❍	❍			Use the control lever to change the travel direction switch rocker and cap.		030-110
Gearbox										
☐			❍	❍	❍			Transmission: check oil level.		030-112
			☐	❍	❍			Transmission: change oil.		030-112
Axles and drive shafts										
☐			❍	❍	❍			Axle: check oil levels.		030-114

030.3.10.2 Minimum quality requirement

Specifications
ZF: TE-ML 05C

Tab. 45: Minimum quality requirement

Only axle oils with a phosphorus content of at least **1900 mg/kg** may be used for wheel loaders.

In the case of lubricants from other manufacturers, it is possible that the service life may differ from the Liebherr recommendation.

Obtain information on the change intervals from manufacturers or suppliers.

030.3.11 Brake oil

Valid for: L508-1853;

030.3.11.1 Liebherr recommendation

Ambient temperature	Designation
-40 °C to 45 °C	Liebherr Hydraulic HVI

Tab. 46: Liebherr recommendation

Only use hydraulic oil as brake fluid.

Other products such as brake fluids or engine oils will damage the brake system.

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

030.3.12 Lubrication grease

Valid for: L508-1853;

030.3.12.1 Liebherr recommendation

Ambient temperature	Designation
Down to -20 °C	Liebherr universal grease 9900
Down to -55 °C	Liebherr Arctic universal grease

Tab. 47: Liebherr recommendation

030.3.12.2 Minimum quality requirement

Thickener	Shelf life	Specification
Soap-based (lithium complex)	At least 3 years	Pumpability as per KP 2 K (DIN 51502)
		VKA welding force: ≥ 6000 N (DIN 51350, 4 – ASTM D 2596)

Tab. 48: Minimum quality requirement

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Wenn eine Reinigung des Dieselmotors erforderlich ist:

▶ Servicezugang öffnen.

NOTICE
Incorrect cleaning!
Damage to diesel engine.

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

▶ Dieselmotor reinigen.

Nach dem Reinigen

▶ Abdeckungen und Verklebungen von Öffnungen beziehungsweise Bauteile entfernen.

▶ Alle Kraftstoffleitungen, Motorölleitungen und Hydraulikleitungen prüfen (Undichtheiten, gelockerte Verbindungen, Scheuerstellen und Beschädigungen).

▶ Festgestellte Mängel sofort beheben.

▶ Eingedrungenes Wasser verdrängen: Alle Lager, Bolzenverbindungen erneut abschmieren.

▶ Gegebenenfalls Konservierung (den Korrosionsschutz) von Bauteilen oder Oberflächen ausbessern.

Wenn der Dieselmotor gereinigt wurde:

▶ Dieselmotor im Leerlauf warmfahren.
▷ Dieselmotor kann besser trocknen.

Fahrerkabine innen reinigen

Note

Innenausstattung der Fahrerkabine ausschließlich mit warmem Wasser ohne Reinigungsmittelzusätze reinigen.

▶ Oberflächen mit feuchtem, weichem Tuch abwischen.

Fahrerkabine Heckscheibe reinigen

Eine Reinigung der Heckscheibe ist nur nach schmutzintensiven Einsätzen notwendig.

Sicherstellen, dass folgende Voraussetzungen erfüllt sind:
❑ Maschine ist in Wartungsstellung 1.
❑ Kabinentür ist geschlossen.
❑ Geeignete Aufstiegshilfe steht zur Verfügung.

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Sample receipt

▶ Separate sample receipt from sample information form and keep it safe.

030.4.3.6 Fuel and operating fluid analysis: scope of analysis

Valid for: L508-1853;

Note

For description and statement on test methods, see:

www.oelcheck.com

Diesel engine

Engine oils

Cover colour	Appearance	Wear	Additives	Contamination	PQ index	Viscosity 40 °C	Viscosity 100 °C	Viscosity index	Oxidation	Nitration	Sulfation	IR index	Water with IR	Soot	Glycol	Solid foreign matter	Spot test	Fuel content	Base number	Acid number	i-pH
🟢	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x			
🟡	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x
🔵	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

Tab. 56: Scope of analysis of engine oils

Coolant

Cover colour	Appearance	Wear	Additives	Contamination	Nitrite, nitrate	Water hardness	Density	Glycol concentration	Freezing point	pH	Conductivity	Refractive index	Ion chromatography	Chloride and sulfate
🟢	x						x	x	x	x	x	x		
🟡	x	x	x	x		x	x	x	x	x	x	x		
🔵	x	x	x	x	x	x	x	x	x	x	x	x	x	x

Tab. 57: Scope of analysis of coolant

- ▶ Turn off diesel engine.
- ▶ Put the 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 sample container using hand pump.
- ▶ Close filling plug again.

Description	Unit	Value
Filling plugs tightening torque	Nm	50

- ▶ Prepare sample container for shipping. (For more information see: Preparing sample container for shipping, page 030-32)

030.4.4 Drive group

030.4.4.1 Checking diesel engine oil level

Valid for: L508-1853;

Make sure the following preconditions are met:
- ❑ Machine is in maintenance position 1.
- ❑ Service access is open.
- ❑ The diesel engine is level and has been switched off for 10 minutes.
- ❑ Diesel engine has cooled down.

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Exposing valves

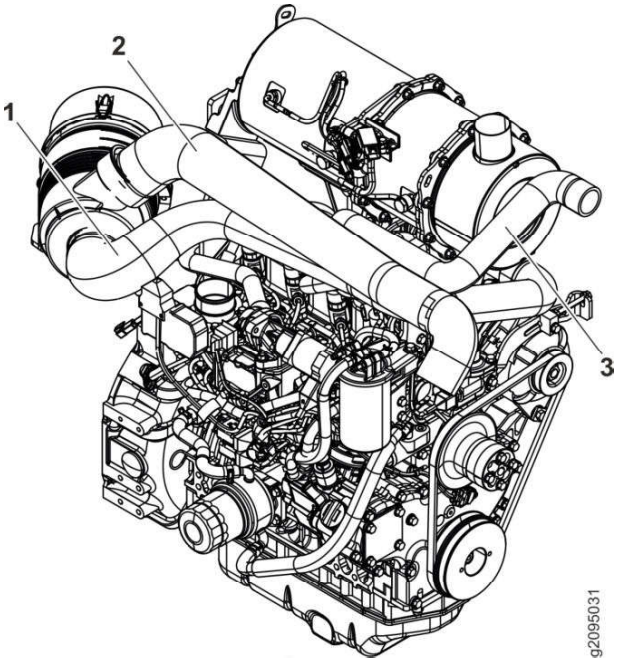

Fig. 115: Removing DPF, exposing valves

1 Clean air intake hose
2 Untreated air intake hose
3 Charge air hose

▶ Remove the clean air intake hose **1**.

▶ Remove untreated air intake hose **2**.

▶ Remove charge air hose **3**.

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- ▶ Switch on ignition.
- ▶ Wait 30 seconds.
  ▷ Fuel system is ventilated.
- ▶ Start the diesel engine and let it run for around 30 seconds.
- ▶ Turn off diesel engine.
- ▶ Check tightness of fuel fine filter **1**.

030.4.4.11 Air filter system: cleaning service cover and dust discharge valve

Valid for: L508-1853;

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

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

Make sure the following preconditions are met:
- ❑ Machine is in maintenance position 1.
- ❑ Service access is open.
- ❑ Diesel engine has cooled down.
- ❑ Suitable protective equipment is used.

Cleaning the service cover

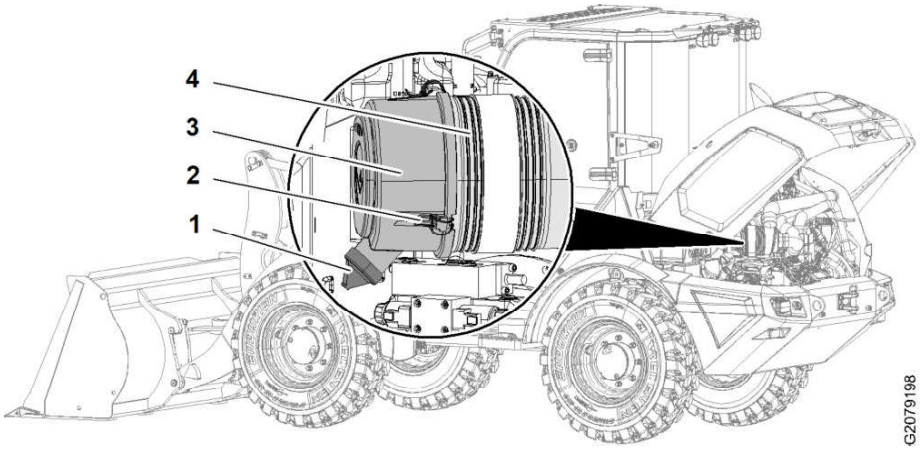

Fig. 126: Clean service cover and dust discharge valve of air filter system.

1	Dust discharge valve	**3**	Service cover
2	Fixing clips	**4**	Filter housing

- ▶ Open the fixing clips **2** and take off the service cover **3**.
- ▶ Clean the service cover **3** and place it back onto the filter housing **4**.
  ▷ The dust discharge valve **1** must face down.
- ▶ Place the service cover **3** fully over the filter housing **4**.
- ▶ Close the fixing clips **2**.

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- ▶ Replace the bolts and nuts around the diesel particulate filter.
- ▶ Screw the new diesel particulate filter on to the diesel oxidation catalyst and the output module again.
- ▶ Install differential pressure line **4** to diesel particulate filter.
- ▶ Start diesel engine.

WARNING
Rotating parts!
Risk of injury.

- ▶ Do not touch rotating parts of the engine.

WARNING
Hot components!
Risk of injury.

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

- ▶ Check that the diesel particulate filter does not leak.
- ▶ Turn off diesel engine.
- ▶ Confirm that the diesel particulate filter has been changed with the Yanmar SMARTASSIST diagnostic software.

030.4.5 Cooling system

030.4.5.1 Cooling system: checking coolant level

Valid for: L508-1853;

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

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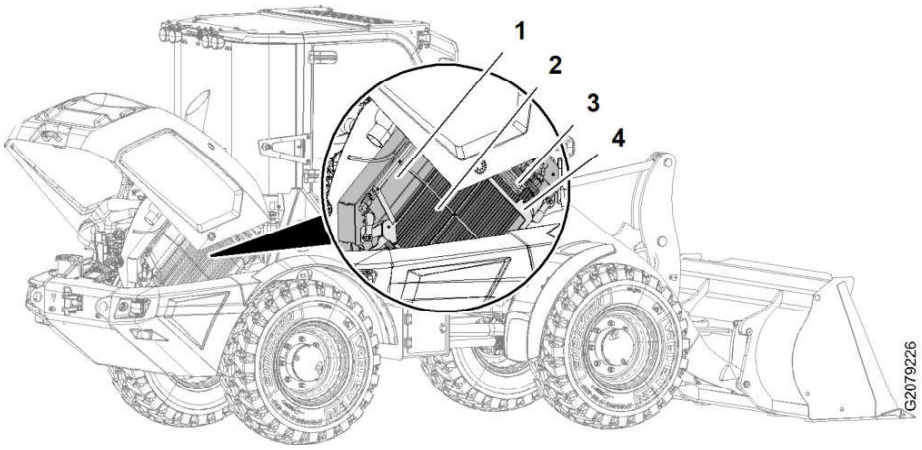

Fig. 146: Cleaning cooling system

1	Cooler unit	**3**	Fuel cooler
2	Condenser unit (option)	**4**	Lint filter (option)

▶ Remove lint filter **4**.

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

▶ Mount lint filter **4**.

030.4.5.4 Cooling system: changing coolant

Valid for: L508-1853;

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

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

Make sure that following consumables are ready:
- ❑ Coolant as specified in table (For more information see: 030.2.2 Fuel and operating fluid filling quantity, page 030-12)

Note
Information on coolant specification:

▶ See “Lubricants and fuels: Diesel engine coolants”. (For more information see: 030.3.7 Coolant, page 030-16)

NOTICE
Incorrectly mixed coolants!
Damage to cooling system.

▶ Do not mix coolants.

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Topping up the oil

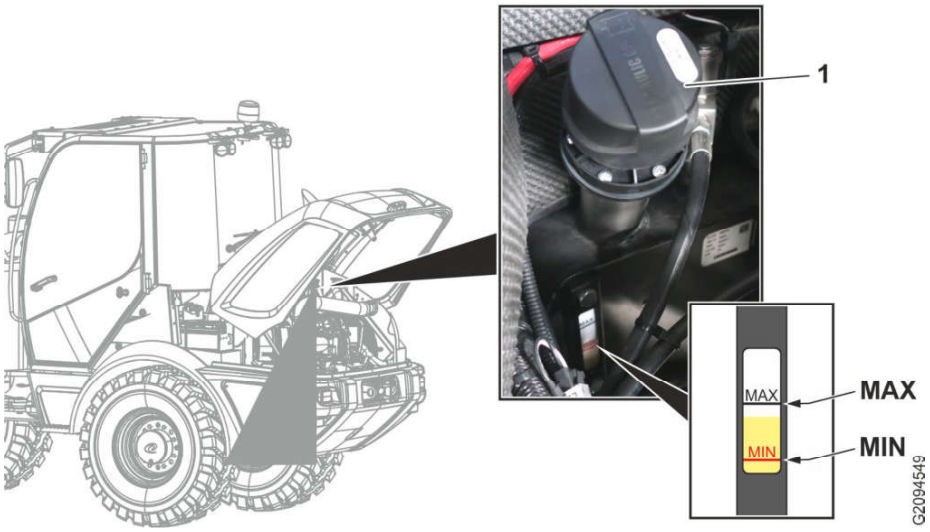

Fig. 156: Topping up the oil

1 Breather filter with filler strainer **MAX** Maximum oil level
MIN Minimum oil level

NOTICE
Contamination in hydraulic oil!
Damage to hydraulics.

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

▶ Fill oil through filler strainer **1** to maximum oil level **MAX** in the hydraulic tank.

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

▶ Start diesel engine.

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

▶ Put the machine in maintenance position 1.

▶ Unscrew breather filter **1**.

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

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

030.4.7 Steering system

030.4.7.1 Test steering

Valid for: L508-1853;

Make sure that following requirements are fulfilled:
❑ Working attachment is in transport position.
❑ Articulation lock is released.
❑ There is enough space to test the steering.

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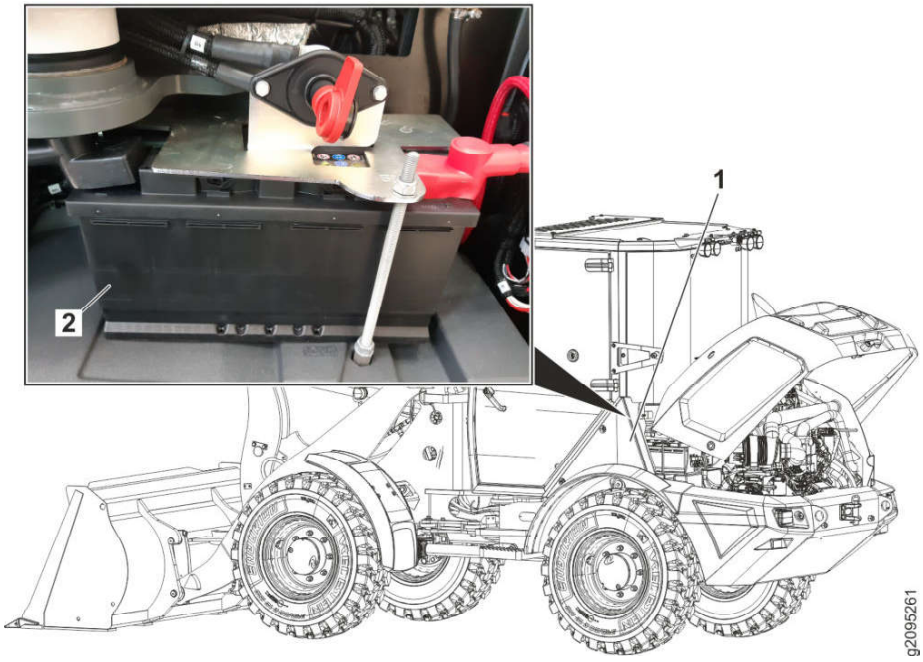

Fig. 168: Battery installation location

1 Cover **2** Battery

▶ Remove cover **1**.

WARNING
Gas forming in the batteries!
Explosion.

▶ Avoid naked lights and fire.

▶ Wear safety glasses and protective gloves.

▶ Use a terminal brush.

▶ Check battery **2** for damage.

▶ Clean battery with a clean cloth.

▶ Clean the terminals and clamps with a special terminal brush.

To ensure a good connection:

▶ Check that the connectors are fastened to the terminals and tighten them if necessary.

▶ Smear the terminals and clamps with acid-proof grease such as Vaseline.

After completing the maintenance tasks:

▶ Install cover **1**.

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Topping up oil in central housing

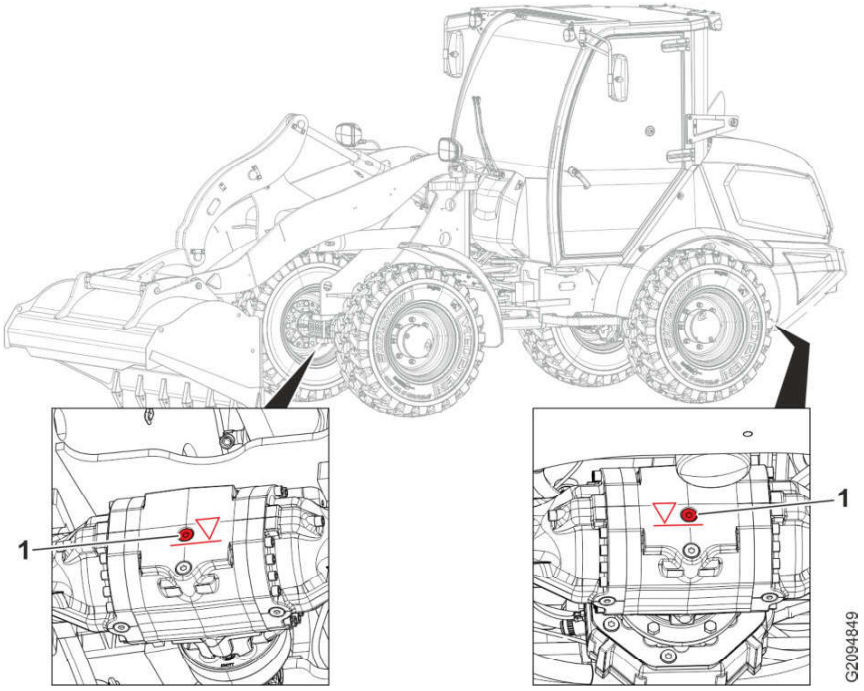

Fig. 178: Topping up oil in central housing

1 Filling plug (2x)

Note
Central housing and wheel hubs are connected to each other.

▶ Fill oil exclusively in central housing.

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

▶ On both axles, screw in filling plug **1** and apply tightening torque of 50 Nm.

▶ Check oil level in wheel hubs (For more information see: Checking oil level in wheel hubs, page 030-120) .

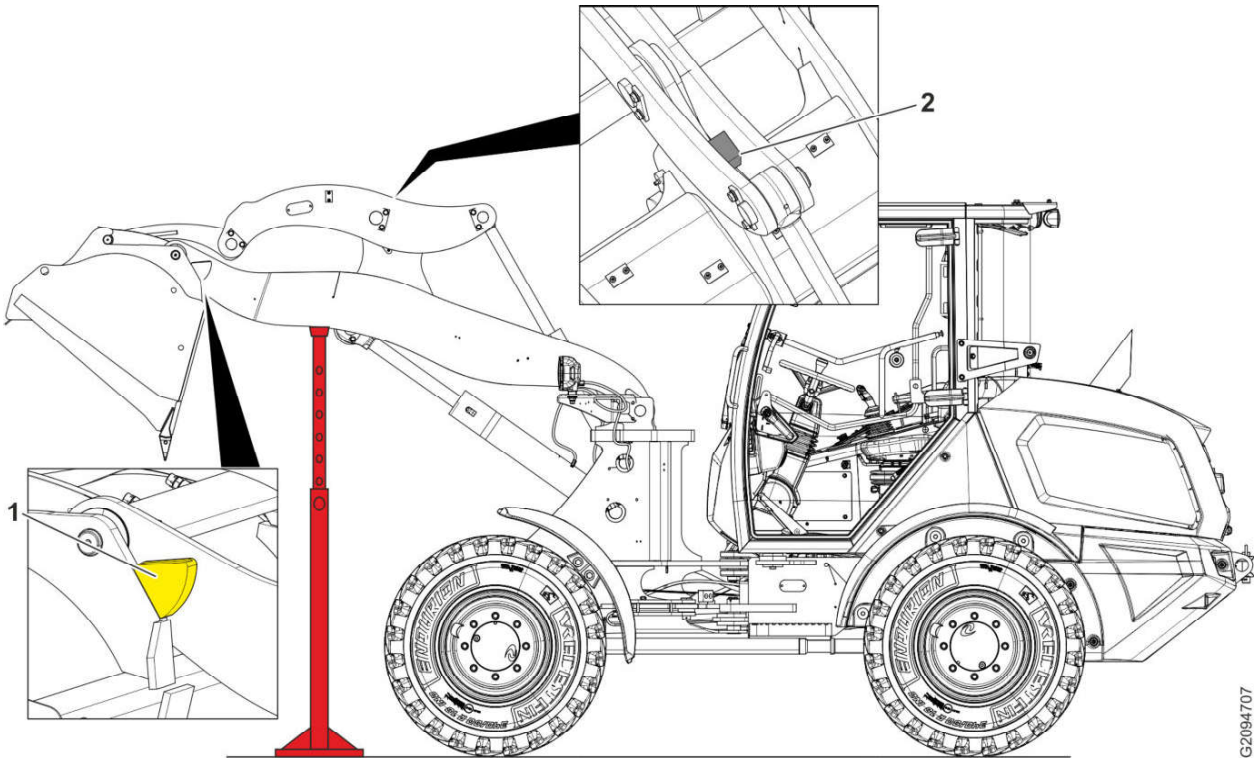

Fig. 190: Lift arms: checking bucket stops

1 Linkage stop

2 Bucket stop (2x)

- ▶ Start diesel engine.
- ▶ Raise lift arms half way and support them.
- ▶ Tilt out bucket, until linkage is at stop.
- ▶ Turn off diesel engine and take out ignition key.
- ▶ Check that gaps at stops correspond to required value.

Description	Unit	Value
Gap at linkage stop **1**	mm	0
Gap at bucket stops **2**	mm	2 $^{\pm 2}$

If required values are not reached:

- ▶ Contact Liebherr customer service.

030.4.13.4 Quick coupler: checking function

Valid for: L508-1853;

Make sure the following preconditions are met:

- ❑ Diesel engine has started.
- ❑ The lift arms have been lowered.
- ❑ The working attachment is tilted in.

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- ▶ Adjust V-belt tension with a tensioning device **1**.
- ▶ Check V-belt tension. Correct if necessary. (For more information see: Checking V-belt tension, page 030-135)
- ▶ Start diesel engine.
- ▶ Set air conditioning to maximum cooling capacity.
  - ▷ Compressor coupling is activated.
  - ▷ V-belt is operated under load.
- ▶ Let diesel engine run for 10 minutes.
- ▶ Turn off diesel engine.
- ▶ Put machine in maintenance position 1.

WARNING
Hot components!
Risk of injury.

- ▶ Do not open the service hatch until the engine has cooled down.

- ▶ Check V-belt tension again. Correct if necessary.

030.4.14.10 Air conditioning unit: draining the condensate

Valid for: L508-1853;

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

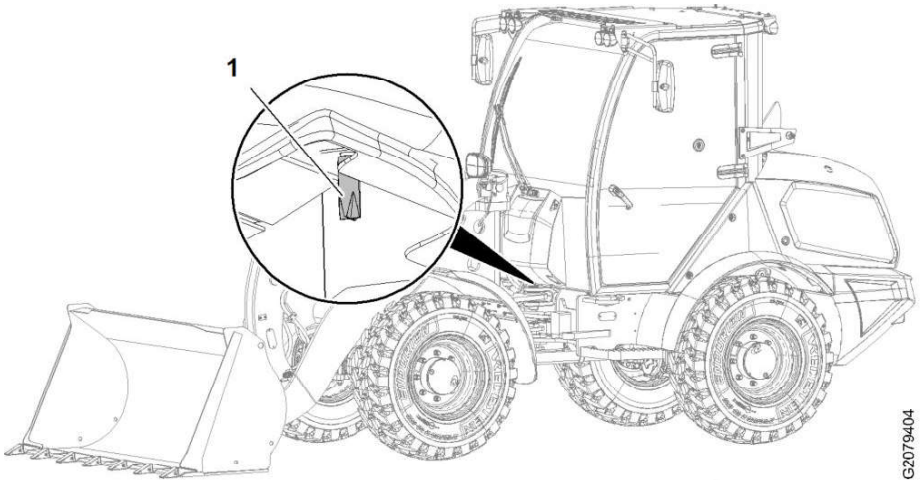

Fig. 202: Air conditioning unit: draining the condensate

1 Water membrane

- ▶ Press the water membrane **1** on the air conditioning unit.
  - ▷ This allows condensate to escape from the air conditioning unit.

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7 Filler strainer
8 Sight glass for hydraulic oil level
9 Hydraulic oil drain valve
10 **Return filter**
11 Filter element 10 µm
12 Bypass valve 1.7 bar
13 Travel pump leak oil
14 Return flow from hydraulic oil cooler
15 Return flow from servostat
16 Return flow of inch/brake unit (for Speeder only)
17 Return flow of solenoid valve for parking brake (for Speeder only)
18 Solenoid valve for relieving pressure on the working pump
19 Orifice 1.8 mm
20 **Working pump**
21 Gear pump
22 Priority valve
23 Filter
24 Throttle 1
32 Replenishing pressure relief valve
33 Oil supply for service brake (for Speeder only)
35 Diesel engine
36 Check valve
37 Pilot control hydro accumulator
40 **Control block**
41 Primary pressure relief valve
42 Load retaining valve for 2nd additional function (option)
43 Spool for 2nd additional function (option)
44 Secondary pressure relief valve for 2nd function A (option)
45 Secondary pressure relief valve for 2nd function B (option)
46 Pressure retaining valve for 1st additional function
47 Spool for 1st additional function
48 Secondary pressure relief valve for 1st function A
49 Secondary pressure relief valve for 1st function B
50 Tilt cylinder load retaining valve
51 Tilt cylinder spool valve
52 Mechanical lock of working hydraulics lockout
59 Mechanical lock of float position
60 Secondary pressure relief valve for lifting
61 Feeder valve for lowering
62 Lift cylinder
65 **Stabilisation module (option)**
66 Ride control valve spool
67 Throttle check valve
68 Ride control solenoid valve
69 Safety valve
70 Hydro accumulator relief valve
71 Ride control hydro accumulator (option)
72 Tilt cylinder
73 Quick coupler for 1st additional function (2x)
74 Open solenoid valve for quick coupler
75 Quick coupler locking hydraulic cylinder
76 Quick coupler for 2nd additional function (2x) (option)
77 Quick coupler for leak oil line (option)

Name	Test point	Name	Test point	Name	Test point
G	Replenishing pressure	**MH**	Travel pump high pressure	**PA**	Working hydraulics high pressure

Tab. 68: Test points

BMK	Function	BMK	Function	BMK	Function
B8	Temperature switch for hydraulic oil	**Y33a**	Proportional solenoid for 1st additional function A	**Y53**	Solenoid for opening quick coupler
B102	Travel pump high pressure sensor	**Y33b**	Proportional solenoid for 1st additional function B	**Y57**	Solenoid for relieving pressure on the working pump
S2a	Retaining magnet for working hydraulics lockout (2x)	**Y34a**	Proportional solenoid for 2nd additional function A (option)		
Y20	Solenoid for ride control	**Y34b**	Proportional solenoid for 2nd additional function B (option)		

Tab. 69: Equipment codes

LBH/12278874/00/211-20220210_135226/en

7 Return filter

8 Solenoid valve for relieving pressure on the working pump

9 Orifice 1.8 mm

10 Working pump

11 Travel pump

12 Valve block for travel direction

19 Inch/brake unit

20 Equalising reservoir

21 Filler strainer

22 Drum brake

23 Rear axle

24 Check valve

31 Quick coupler for 1st additional function (2x)

32 Open solenoid valve for quick coupler

33 Quick coupler locking hydraulic cylinder

34 Quick coupler for 2nd additional function (2x) (option)

35 Quick coupler for leak oil line (option)

Name	Test point	Name	Test point
G	Replenishing pressure	**M4**	Brake pressure in 2nd brake circuit (rear axle)
MH	Travel pump high pressure	**PA**	Working hydraulics high pressure

Tab. 74: Test points

BMK	Function	BMK	Function	BMK	Function
B8	Temperature switch for hydraulic oil	**Y2**	Forward travel direction solenoid	**Y10**	Parking brake solenoid
B12	Brake light pressure switch	**Y3**	Reverse travel direction solenoid	**Y20**	Solenoid for ride control
B101	Output speed sensor	**Y33a**	Proportional solenoid for 1st additional function A	**Y53**	Solenoid for opening quick coupler
B102	Travel pump high pressure sensor	**Y33b**	Proportional solenoid for 1st additional function B	**Y106**	Servo pressure proportional solenoid
R1	Inching function angle sensor	**Y34a**	Proportional solenoid for 2nd additional function A		
S2a	Retaining magnet for working hydraulics lockout (2x)	**Y34b**	Proportional solenoid for 2nd additional function B		

Tab. 75: Equipment codes

LBH/122788774/00/211-20220210_135226/en

100.2 Overview of brake system

Valid for: L508-1853;

For Speeder only.

1 Layout

Brake system consists of service brake and parking brake.

Service brake consists of following components:
- Inch/brake unit
- Drum brake
- Equalising reservoir
- Wet disc brake (rear axle)

Parking brake consists of following components:
- Parking brake solenoid valve
- Wet disc brake (rear axle)

2 Function

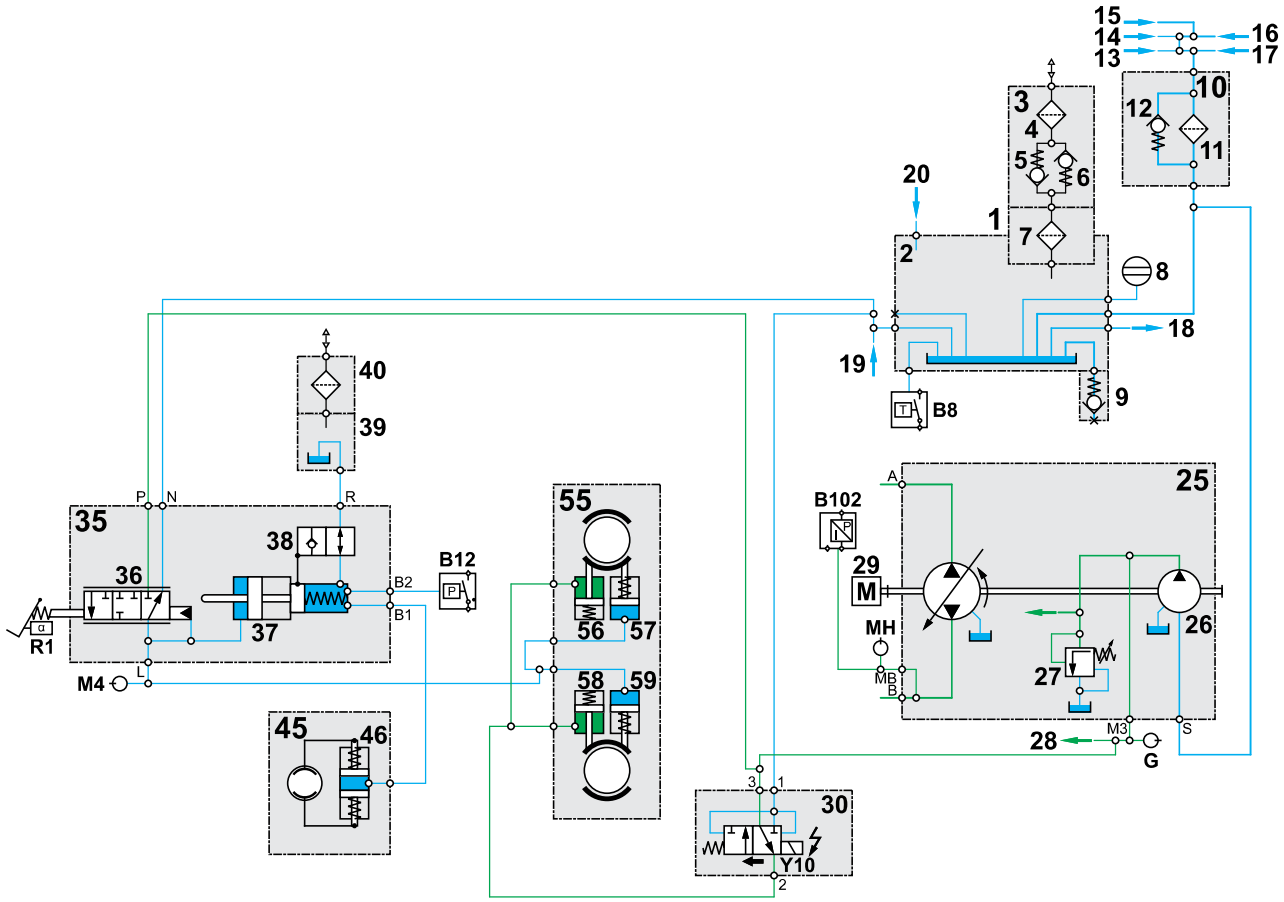

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Fig. 215: Brake system: hydraulic diagram (diesel engine running, travel direction selected)

1	**Hydraulic tank**	**14**	Return flow from hydraulic oil cooler	**35**	**Inch/brake unit**

See next page for continuation of the image legend

ITEM CODE 12892819
DRAWING INDEX 001
PROJECT Serie
DRAWING NUMBER 1853 00090 01 00

BMK	SYSTEM	LOCATION	FUNCTION	PAGE
-B709	=M	+M	COOLANT SENSOR	/48.B3
-B710	=M	+M	CAMSHAFT SPEED SENSOR	/50.B2
-B711	=M	+M	CRANKSHAFT SPEED SENSOR	/50.B3
-B712	=M	+M	DPF REGENERATION SENSOR TEMPERATURE OUTPUT	/50.B4
-B713	=M	+M	FUEL TEMPERATURE SENSOR	/50.B4
-E1	=B	+B1	REVERSING HEADLIGHT RIGHT	/25.E3
-E1.X1	=B	+B1	CONNECTOR REVERSING HEADLIGHT RIGHT	/25.E3
-E1.X2	=B	+B1	CONNECTOR REVERSING HEADLIGHT RIGHT	/25.E3
-E1.X3	=B	+B1	CONNECTOR REVERSING HEADLIGHT RIGHT	/25.E3
-E1.X3.B	=H	+H	CONNECTOR REVERSING HEADLIGHT	/25.F3
-E1.X3.B_a	=H	+H	OPTION FRONT SECTION SOCKET	/55.C3
-E1.X3.S	=H	+H	CONNECTOR REVERSING HEADLIGHT	/25.F3
-E1.X3.S_a	=H	+H	OPTION FRONT SECTION SOCKET	/55.B3
-E1.X4	=B	+B1	CONNECTOR REVERSING HEADLIGHT RIGHT	/25.E3
-E1.X5	=B	+B1	CONNECTOR REVERSING HEADLIGHT RIGHT	/25.E3
-E2	=K	+K3	INTERIOR ILLUMINATION	/23.D8
-E2.X	=K	+K3	CONNECTOR INTERIOR ILLUMINATION	/23.D8
-E3	=V	+V1	DRIVING HEADLIGHT LEFT	/25.E4
-E3.X	=V	+V1	CONNECTOR DRIVING HEADLIGHT LEFT	/25.E4
-E4	=V	+V1	DRIVING HEADLIGHT RIGHT	/25.E5
-E4.X	=V	+V1	CONNECTOR DRIVING HEADLIGHT RIGHT	/25.E5
-E5	=B	+B2	REVERSING HEADLIGHT LEFT	/25.E6
-E5.X1	=B	+B2	CONNECTOR REVERSING HEADLIGHT LEFT	/25.E6
-E5.X2	=B	+B2	CONNECTOR REVERSING HEADLIGHT LEFT	/25.E6
-E5.X3	=B	+B2	CONNECTOR REVERSING HEADLIGHT LEFT	/25.E6
-E5.X3.B_a	=H	+H	OPTION FRONT SECTION SOCKET	/55.D3
-E5.X3.S_a	=H	+H	OPTION FRONT SECTION SOCKET	/55.D3
-E5.X4	=B	+B2	CONNECTOR REVERSING HEADLIGHT LEFT	/25.E6
-E5.X4.B	=H	+H	CONNECTOR REVERSING HEADLIGHT	/25.D6
-E5.X4.S	=H	+H	CONNECTOR REVERSING HEADLIGHT	/25.E6
-E5.X5	=B	+B2	CONNECTOR REVERSING HEADLIGHT LEFT	/25.E6
-E10	=K	+K3	WORKING HEADLIGHT FRONT RIGHT	/24.D1
-E10.X	=K	+K3	CONNECTOR WORKING HEADLIGHT FRONT RIGHT	/24.D1
-E11	=K	+K3	WORKING HEADLIGHT FRONT LEFT	/24.D2
-E11.X	=K	+K3	CONNECTOR WORKING HEADLIGHT FRONT LEFT	/24.D2
-E12	=K	+K3	WORKING HEADLIGHT REAR LEFT	/23.D7

BMK	SYSTEM	LOCATION	FUNCTION	PAGE
-E12.X	=K	+K3	CONNECTOR WORKING HEADLIGHT REAR LEFT	/23.D7
-E13	=K	+K3	WORKING HEADLIGHT FRONT RIGHT	/23.D7
-E13.X	=K	+K3	CONNECTOR WORKING HEADLIGHT REAR RIGHT	/23.D7
-E14	=K	+K3	ADDITIONAL HEADLIGHT LIFT ARMS RIGHT LED	/24.D7
-E14.X	=K	+K3	CONNECTOR ADDITIONAL HEADLIGHT LIFT ARMS RIGHT	/24.D7
-E14l *	=H	+H1	LICENCE PLATE LIGHT RIGHT	/25.E7
-E14l.X *	=H	+H1	CONNECTOR LICENCE PLATE LIGHT RIGHT	/25.E7
-E14r *	=H	+H1	LICENCE PLATE LIGHT LEFT	/25.E7
-E14r.X *	=H	+H1	CONNECTOR LICENCE PLATE LIGHT LEFT	/25.E7
-E15	=K	+K3	ADDITIONAL HEADLIGHT LIFT ARMS LEFT LED	/24.D7
-E15.X	=K	+K3	CONNECTOR ADDITIONAL HEADLIGHT LIFT ARMS LEFT	/24.D7
-F1	=K	+K	FUSE QUICK COUPLER	/33.C8
-F2	=K	+K	FUSE LIGHTING LEFT	/25.B4
-F3	=K	+K	FUSE LIGHTING RIGHT	/25.B5
-F4	=K	+K	FUSE LIGHTING RIGHT	/25.B5
-F5	=K	+K	FUSE LIGHTING LEFT	/25.B4
-F6	=K	+K	FUSE LIGHTING RIGHT	/25.B5
-F7	=K	+K	FUSE LIGHTING LEFT	/25.B4
-F8	=K	+K	FUSE RADIO SEAT COMPRESSOR 12V SOCKET	/29.C2
-F9	=K	+K	FUSE REAR WINDOW HEATER USB CHARGING PORT	/30.C3
-F01	=B	+B2	RESERVE FUSE	/12.E2
-F02	=B	+B2	FUSE TERMINAL 30	/12.E2
-F02.X	=B	+B2	CONNECTOR FUSE TERMINAL 30	/12.E2
-F03	=B	+B2	FUSE STARTER RELAY	/12.E2
-F03.X	=B	+B2	CONNECTOR FUSE STARTER RELAY	/12.E2
-F04	=B	+B2	FUSE RELAY PRE-HEAT SYSTEM	/12.E3
-F04.X	=B	+B1	CONNECTOR FUSE RELAY PRE-HEAT SYSTEM	/12.E3
-F07a	=B	+B2	FUSE HAZARD WARNING SYSTEM	/20.D1
-F10	=K	+K	FUSE PARKING BRAKE	/34.F2
-F11	=K	+K	FUSES REAR WINDOW HEATER	/30.C5
-F12	=K	+K	FUSE ADDITIONAL FUNCTION APPROVAL	/60.D1
-F13	=K	+K	FUSE OPTION FLASHING LIGHT	/56.A8
-F14	=K	+K	FUSE DPF REGENERATION	/35.D1
-F15	=K	+K	FUSE SENSORS/SENSORS	/19.D3
-F15A	=K	+K4	SENSORS	/26.B3
-F16	=K	+K	FUSE RESERVE	/38.D7

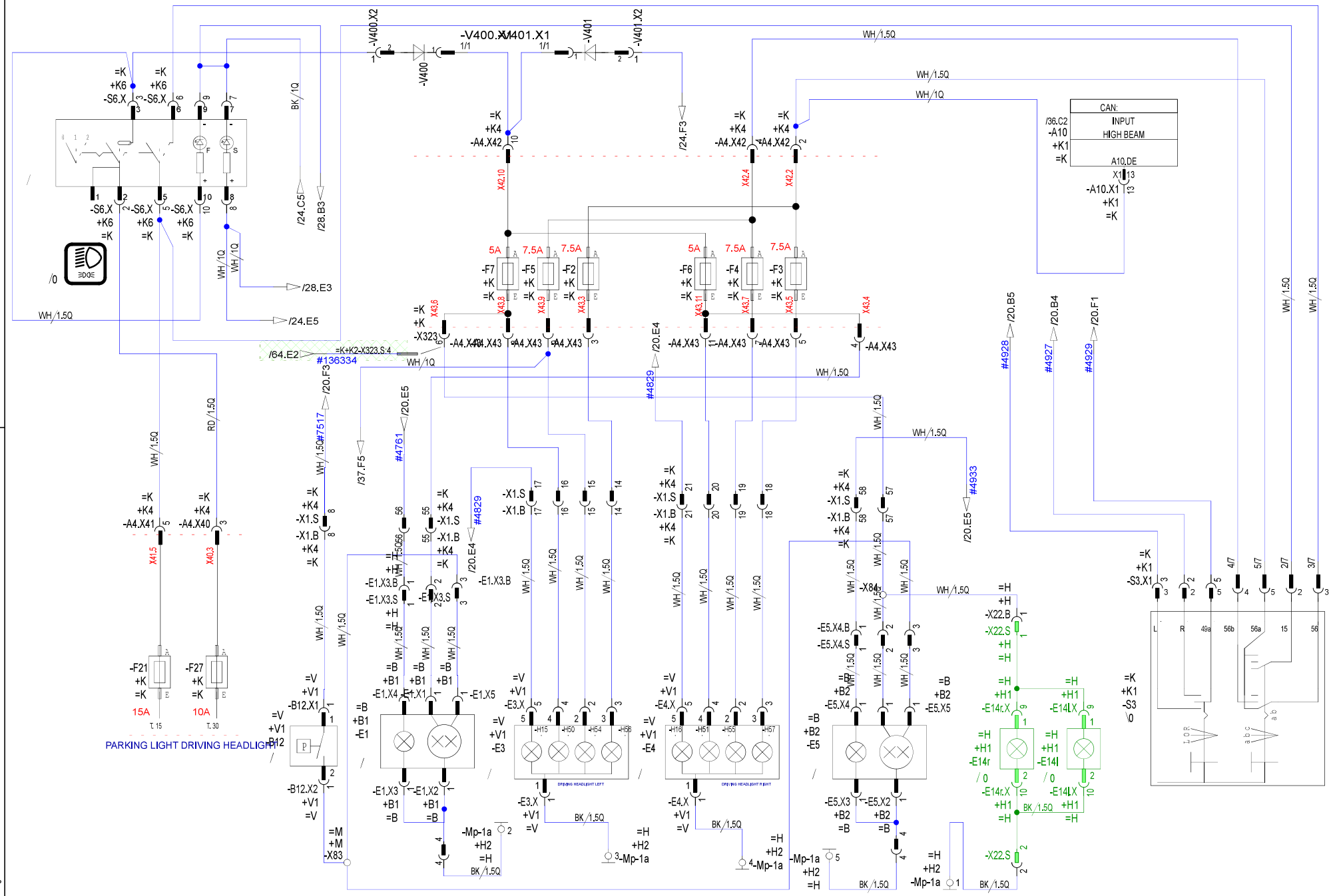
MACHINE TYPE | SERIAL NUMBER | LIEBHERR FACTORY LBH | BMK-INDEX E-SCHEMA | PAGE 5 OF | CREATION DATE 22.10.2021 11:18

ITEM CODE 12892819
DRAWING INDEX 001
PROJECT Serie
DRAWING NUMBER 1853 00090 01 00

CAN: INPUT SWITCH FORWARD TRAVEL DIRECTION /39.D2 -A200 +K4 =K A200.28.DI_32V_PD
CAN: INPUT SWITCH FORWARD TRAVEL DIRECTION /39.D2 -A200 +K4 =K A200.24.DI_32V_PD
CAN: INPUT SWITCH REVERSE TRAVEL DIRECTION /39.C2 -A200 +K4 =K A200.18.DI_32V_PD_w
CAN: INPUT SWITCH REVERSE TRAVEL DIRECTION /39.D2 -A200 +K4 =K A200.26.DI_32V_PD_w
CAN: INPUT BUTTON 1 CONTROL LEVER / &#2 /39.E2 -A200 +K4 =K A200.38.DI_32V_PD_w
CAN: INPUT BUTTON 2 CONTROL LEVER / &#2 /39.E2 -A200 +K4 =K A200.34.DI_32V_PD_w

-A200.X +K4 =K G4 F4 E2 G2 K2 J2
WH/0.75Q
=K +K4 -X202.S -X202.B
-X202.Ba +K4 =K
OPTION MINI-JOYSTICK
-X211.B +K4 =K /63.D5
=K +K4 -X199 #136246 =K+K/14.B6
#19325 /19.B3
#6274 /60.C5
-S2.Xb 1/12 2/12 3/12 4/12 5/12 6/12 7/12 8/12 9/12 10/12 11/12 12/12
=K +K4 -S2.Xa
=K +K4 -S2.X
=K +K4 -S2
=K +K4 -S2b
#94162 /17.B5
RD/1Q BK/1Q
=K +K4 -S2b.X11
=K +K3 -Mp-6d

MACHINE TYPE	SERIAL NUMBER	LIEBHERR FACTORY LBH	CONTROL LEVER E-SCHEMA	PAGE 15 OF
				CREATION DATE 22.10.2021 11:18



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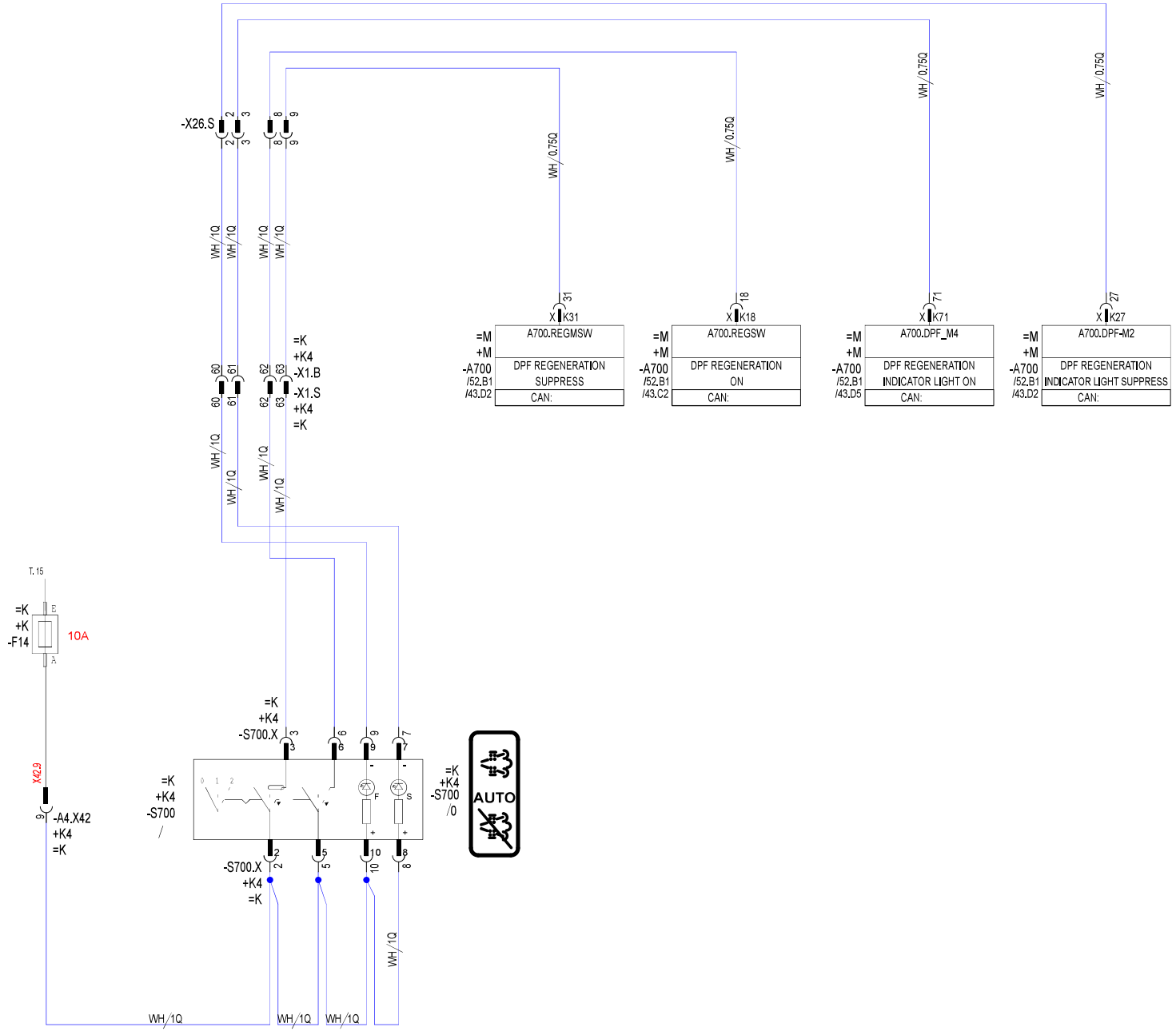
PROJECT
DRAWING NUMBER 1853 00090 01 00
Serie
ITEM CODE 12892819
DRAWING INDEX 001

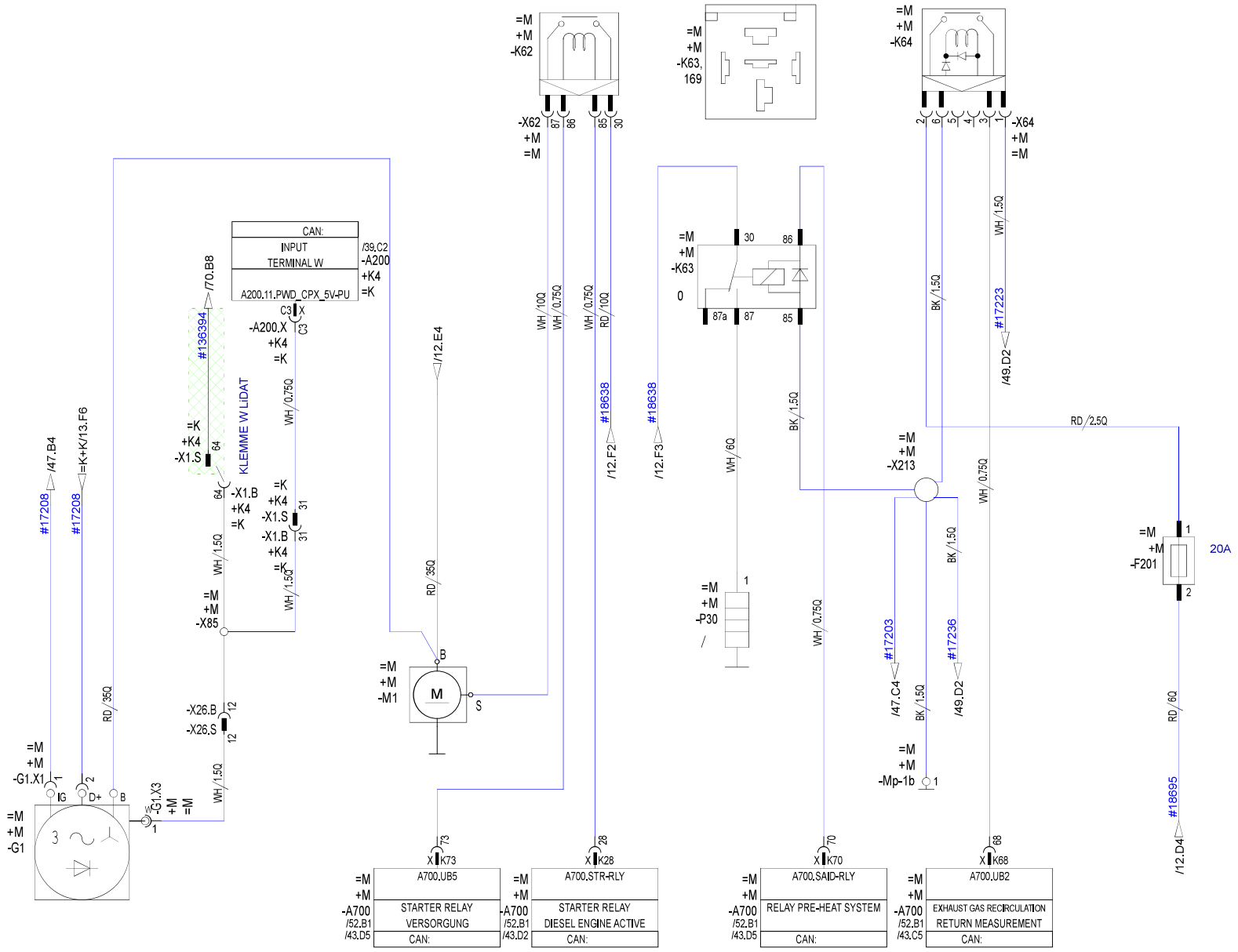
MACHINE TYPE	SERIAL NUMBER	LIEBHERR FACTORY LBH	PARKING LIGHT DRIVING HEADLIGHT STEERING COLUMN SWITCH E-SCHEMA

PAGE 25 OF
CREATION DATE 22.10.2021 11:18

PROJECT Serie
DRAWING NUMBER 1853 00090 01 00
ITEM CODE 12892819
DRAWING INDEX 001

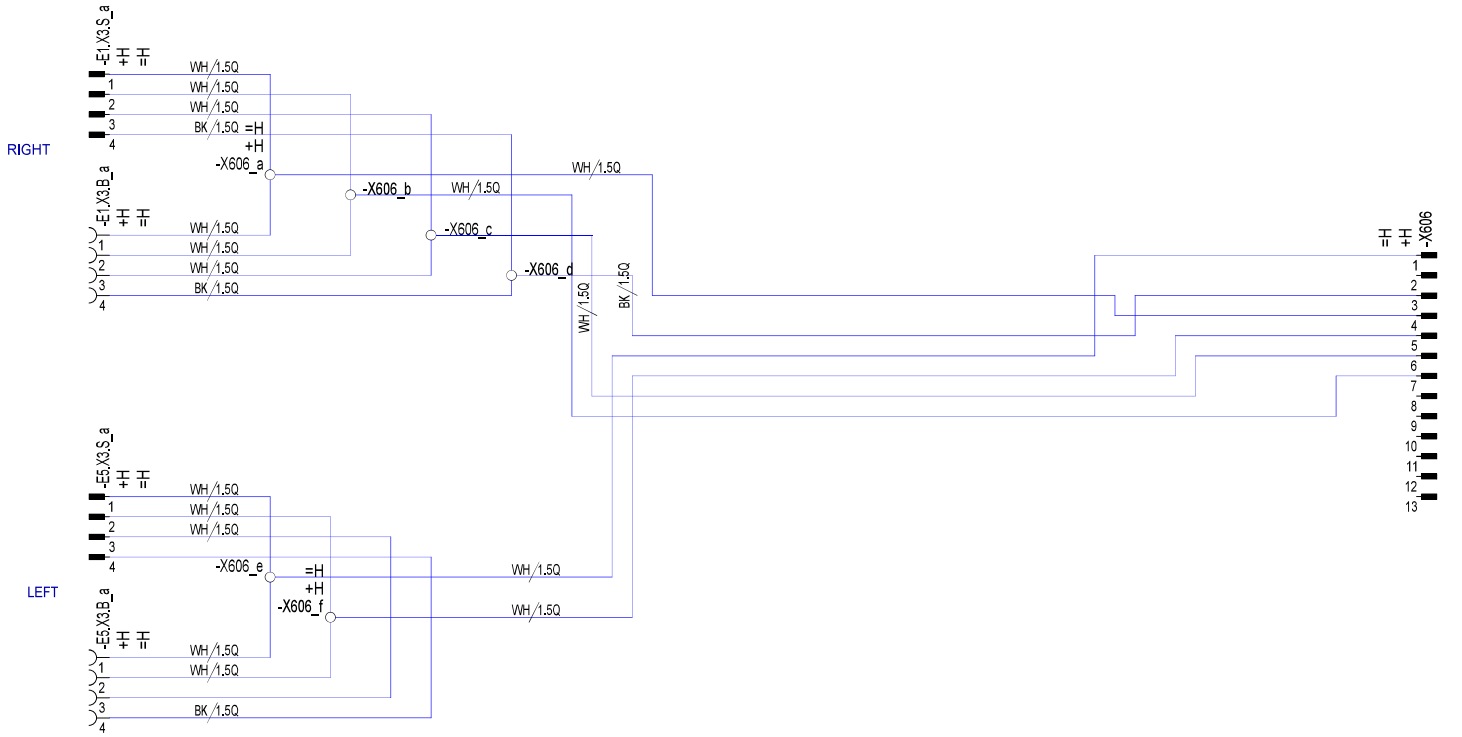


MACHINE TYPE	SERIAL NUMBER	LIEBHERR FACTORY LBH	DPF REGENERATION E-SCHEMA	PAGE 35 OF
				CREATION DATE 22.10.2021 11:18



MACHINE TYPE	SERIAL NUMBER	LIEBHERR FACTORY LBH	STARTER, PRE-HEAT SYSTEM, EXHAUST GAS RECIRCULATION, FUSE HAZARD WARNING SYSTEM, FUSE ENGINE CONTROL UNIT E-SCHEMA	PAGE 45 OF
				CREATION DATE 22.10.2021 11:18

OPTION12V SOCKET



PROJECT Serie
DRAWING NUMBER 1853 00090 01 00
ITEM CODE 12892819
DRAWING INDEX 001

MACHINE TYPE	SERIAL NUMBER	LIEBHERR FACTORY LBH	OPTION 12V SOCKET E-SCHEMA	PAGE 55 OF
				CREATION DATE 22.10.2021 11:18

Bündel 1: S17,S503,S700,S323,S301,S16

Bündel 2: S501,S23,H41,S303,S19,S58a,S45a

SWITCH AND BUTTON ASSIGNMENT

S17	S503	S700	S323	S301	S16	S501 S23	H41	S303	S19	S58a	S45a
LBH ID 11821732	LBH ID 11821772	LBH ID 11821781	LBH ID 11821769	LBH ID 12219328	LBH ID 11821733	LBH ID Hi 12241469 LBH ID 12212120	LBH ID 11821866 LBH ID 12259305 (Option)	LBH ID 12259304	LBH ID 12263831	LBH ID 12220164	LBH ID 11821777
OPTION	OPTION	STANDARD	OPTION	/0 OPTION	OPTION	STANDARD	STANDARD	=K / OPTION	STANDARD	/ OPTION	/ OPTION

Bündel 3: S20,S9,S9a,S6,S7,S8,S8a,S4

Bündel 4:S300,S13,S46,S305,S43,S57

NICHT JD

S20	S9 S9a	S6	S7	S8 S8a	S4	S300	S13	S46	S305	S43	S57
LBH ID 11838259	LBH ID 11821774 LBH ID 11838320	LBH ID 11821738	LBH ID 11821762	LBH ID 11821755 LBH ID 11828232	LBH ID 11821735	LBH ID 11821780	LBH ID 11821745	LBH ID 12207755	LBH ID 12275313	LBH ID 11839397	LBH ID 12257875
STANDARD	OPTION	STANDARD	STANDARD	OPTION	STANDARD	OPTION	STANDARD	STANDARD	/ STANDARD nur EU	/0 OPTION	/ OPTION

PROJECT Serie
DRAWING NUMBER 1853 00090 01 00
ITEM CODE 12892819
DRAWING INDEX 001

MACHINE TYPE	SERIAL NUMBER	LIEBHERR FACTORY LBH	SWITCH AND BUTTON ASSIGNMENT E-SCHEMA	PAGE 65 OF
				CREATION DATE 22.10.2021 11:18