en **Service manual**

Wheel loader

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010 Introduction

Contents

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  - Is able to estimate distance, height and gaps.
- The refrigeration technician has completed training that complies with the country-specific laws, standards and guidelines.
- The refrigeration technician has following skills:
  - Is able to assess work correctly.
  - Is able to recognise dangers.
  - Is able to take safety measures.
- Has knowledge and experience of the relevant field of activity.
- Knows the relevant national standards.
- Has the necessary authorisation for maintenance and repair of machine.
- Knows the machine and the hazards.
- Knows all procedures and precautions for maintenance.
- Has knowledge of handling special tools for maintenance and repair.
- Is not under any physical or mental impairment that limits one of the prescribed requirements.
- Is not under the influence of alcohol.
- Is not under the influence of drugs.

010.1.3.7 Slinger

Responsibility

Slinger is responsible for following:
- Wear personal protective equipment.
- Choose correct and undamaged slinging gear.
- Correctly attach slinging gear to load or lifting accessory.
- Correctly remove slinging gear from load or lifting accessory.
- Grant approval for movement or accompaniment.

Requirement

The slinger has following qualification and skills:
- Has completed the legally specified minimum age.
- Physically and mentally capable of slinging loads:
  - Satisfactory eyesight
  - Satisfactory hearing ability
  - Quick reactions
  - Is able to estimate distance, height and gaps.
- The slinger has following skills:
  - Is able to estimate mass distribution and load distribution.
  - Is able to operate radio units.
  - Is able to give clear instructions on radio units.
  - Is able to guide a load.
- Has the necessary authorisation for attaching loads.
- The slinger has the necessary education (theoretical and practical) for the following:
  - Selecting the suitable slinging gear
  - Attaching slinging gear
  - Securing to prevent unintended disengaging of slinging gear
  - Avoiding damage to slinging gear
  - Spotting
  - Applying all necessary signal signs
- Is not under any physical or mental impairment that limits one of the prescribed requirements.
- Is not under the influence of alcohol.
- Is not under the influence of drugs.

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Environmental pollution

– When working in following areas, adhere to laws, regulations and rules applicable at place of use:
  • Areas at risk of water (for example bodies of water)
  • Sound-sensitive areas
  • Emission-sensitive areas

010.1.7 Safe maintenance

010.1.7.1 Spare parts

Danger to life

Incorrect spare parts

– Use original spare parts.
– Make sure that the spare parts meet the technical requirements specified by the manufacturer.
– After replacing parts, tighten loosened screw connections with prescribed tightening torque.
– Find prescribed tightening torque in supplied documentation.
– If the tightening torque is not prescribed by the supplied documentation: Find prescribed tightening torque in Liebherr factory standard.
– If the tightening torque is not prescribed by the Liebherr factory standard: Find tightening torque in valid DIN standard, EN standard or ISO standard.

010.1.7.2 Heavy parts

Danger to life

Incorrect handling

– Exclusively use machine for load-lifting with sufficient loading capacity.
– Exclusively use suitable and functioning lifting accessories with sufficient loading capacity.
– Make sure there are no persons underneath raised loads.
– Exclusively task qualified and experienced persons with the attaching of loads.
– Exclusively task qualified and experienced persons with the directing of operators.
– Make sure that the spotter can be seen by the operator.
– Make sure that spotter and operator are in voice contact if necessary.

Injury

Incorrect protective equipment

– Put on gloves when handling wire ropes.

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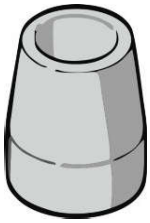
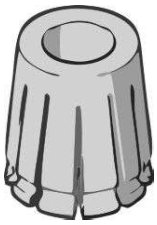
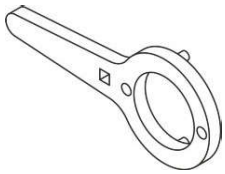
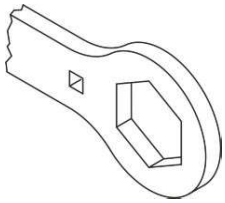
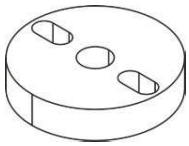
010.2.6 Special tools for tilt cylinders with industrial lift arms

Designation	Item code	Remark	Fig.
Mounting sleeve 150 mm	998622	For fitting the seals	
Expansion sleeve 150 mm	9110410	For fitting the seals	
Piston wrench 100/14 mm	8007366	For fitting the piston	
Piston nut wrench 80/90 mm	9921124	For fitting the piston nut	

Tab. 9: Special tools for tilt cylinders with industrial lift arms

010.2.7 Special tools for steering wheel

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

Tab. 10: Special tools for steering wheel

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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 7	8.8	15.3	13.9*	M 7	8.8	15.0	16.1
	10.9	22.5	20.4*		10.9	22.0	23.6
	12.9	26	23.9*		12.9	26	28
M 8	8.8	19.3	20.6*	M 8	8.8	18.9	23.8
	10.9	28	30*		10.9	28	35
	12.9	33	35*		12.9	32	41
M 8 x 1	8.8	21.0	21.7*	M 8 x 1	8.8	20.5	25
	10.9	31	32*		10.9	30	37
	12.9	36	37*		12.9	35	43
M 9 x 1	8.8	27	31*	M 9 x 1	8.8	27	36
	10.9	40	46*		10.9	39	53
	12.9	47	53*		12.9	46	62
M 10	8.8	31	40	M 10	8.8	30	47
	10.9	45	59		10.9	44	68
	12.9	53	69		12.9	52	80
M 10 x 1	8.8	35	44	M 10 x 1	8.8	34	51
	10.9	51	64		10.9	50	75
	12.9	60	75		12.9	59	88
M 10 x 1.25	8.8	33	42	M 10 x 1.25	8.8	32	49
	10.9	48	62		10.9	47	72
	12.9	56	72		12.9	55	84
M 12	8.8	45	69	M 12	8.8	44	80
	10.9	66	102		10.9	64	118
	12.9	77	119		12.9	75	140
M 12 x 1.25	8.8	50	74	M 12 x 1.25	8.8	49	86
	10.9	73	109		10.9	71	125
	12.9	85	125		12.9	84	150
M 12 x 1.5	8.8	47	72	M 12 x 1.5	8.8	46	83
	10.9	69	105		10.9	68	122
	12.9	81	123		12.9	79	145

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010.5 Preservation guidelines for the SCR system

010.5.1 Putting out of service for longer than 2 months

The SCR system can be put out of service for more than 2 months under the following conditions:
- To prevent urea crystals from accumulating, the SCR system must be checked for leaks and damage.
- Electric or hydraulic connections must not be disconnected.

010.5.2 Starting up after being out of service for longer than 2 months

Before starting up after being out of service for more than 2 months, the following tasks must be carried out:
- Check the SCR system for visible damage.
- Check the electrical and hydraulic lines of the SCR system for damage.
- Check the electrical and hydraulic connections of the SCR system for damage.
- Check the quality of the diesel exhaust fluid (item code for analysis kit: 11698484). If the quality of the diesel exhaust fluid no longer meets the specifications, it must be drained.
- Before operating the diesel exhaust fluid pump, the diesel exhaust fluid tank must be filled to the maximum.

Once the above tasks have been carried out, the function of the SCR system must be tested.

This test is done using the LIDIA engine diagnostic software. The test must be carried out with the engine running.

Test the following functions of the SCR system with the engine running:
- Test the air circuit.
- Test the diesel exhaust fluid circuit.
- Test the blowing out function.

Once these tests have been carried out and no faults have been found, the SCR system can be started up.

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	Designation	Unit	Value		
	Tipping load when fully articulated (ISO 14397-1)	kg	12400	10300	10100
	Operating weight	kg	19500	19700	19750

Tab. 25: Complete machine with loading bucket (industrial lift arms)

A) Industrial lift arms with parallel guidance including quick coupler
B) Earth bucket with short, straight base for quick coupler
C) Welded tooth holder with plug-in teeth
D) High lift
E) In practice, the bucket capacity can be around 10% greater than as calculated using the ISO 7546 standard. The bucket filling level depends on the type of material.

020.1.3 Working attachment: light material bucket

Valid for: L556-1757;

Values stated refer to machine:

- In standard version
- With 23.5R25 L3 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.

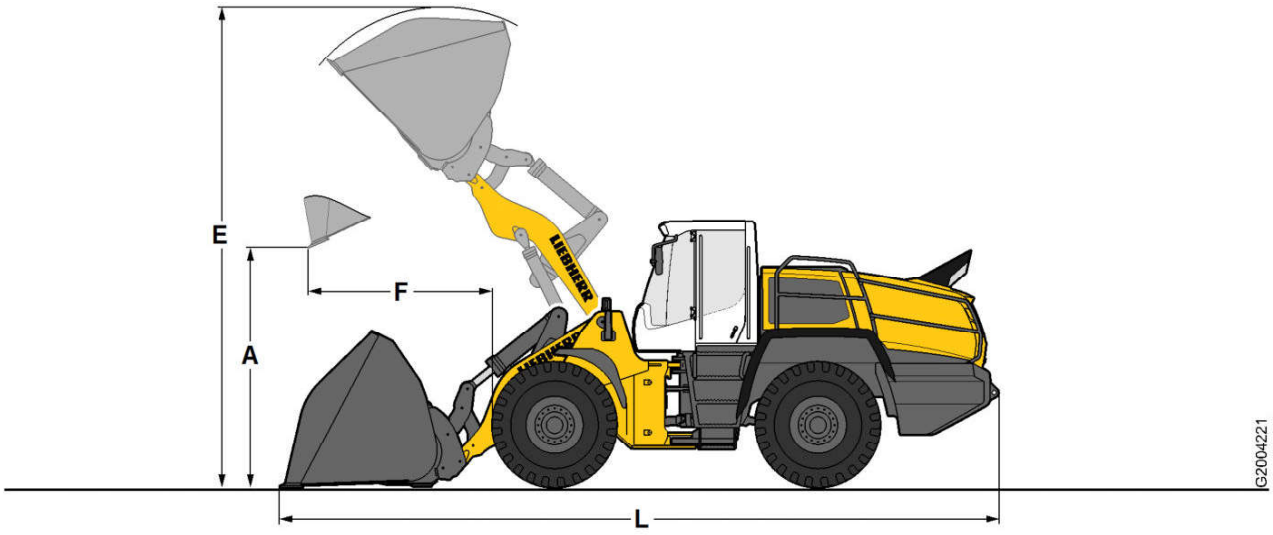

Fig. 79: Working attachment: light material bucket

	Designation	Unit	Value			
	Hydraulic quick coupler		Yes	Yes	Yes	Yes
	Load geometry		A)	A)	A)	A)

020.4 Working hydraulics

020.4.1 Working pump

Valid for: L556-1757;

Description	Unit	Value
Type		Axial piston pump with swash plate variable displacement
Type		A11VO95LRS
Direction of rotation		Anticlockwise
Maximum displacement per turn	cm^3	95
Maximum displacement	l/min	244
Weight	kg	21

020.4.2 Control valve block for Z kinematics

Valid for: L556-1757;

Description	Unit	Value
Type		M6-1477-30/2M6-22 W
Maximum flow rate for lifting function (per outlet)	l/min	280
Maximum flow rate for lowering function (per outlet)	l/min	180
Maximum flow rate for tilt-in function	l/min	200
Maximum flow rate for tilt-out function	l/min	180
Maximum flow rate for 3rd function A3 (optional)	l/min	170
Maximum flow rate for 3rd function B3 (optional)	l/min	300
Maximum flow rate for 4th function A4 (optional)	l/min	170
Maximum flow rate for 4th function B4 (optional)	l/min	300
Weight (excluding supplementary control valve)	kg	59

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020.7.5 Brake accumulator pressure sensor B19

Valid for: L556-1757;

Description	Unit	Value
Measuring range	bar	0 to 600
Signal output	mA	4 to 20
Supply voltage	VDC	8 – 30
Rated temperature range	°C	-25 to +85
Tightening torque	Nm	20

020.7.6 Parking brake hydro accumulator

Valid for: L556-1757;

Description	Unit	Value
Volume	l	0.32
Nitrogen filling pressure at 20 °C	bar	80 $^{+2/-1}$
Weight	kg	1.3

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020.11 Steel parts of the basic machine

020.11.1 Ballast weights

Valid for: L556-1757;

020.11.1.1 Standard (Z kinematics)

Description	Unit	Value
Right ballast weight	kg	550
Left ballast weight	kg	550
Bolt tightening torque	Nm	850
Design:		Steel and concrete

020.11.1.2 Foam-filled tyres or tracks

Description	Unit	Value
Right ballast weight	kg	320
Left ballast weight	kg	320
Bolt tightening torque	Nm	850
Design:		Steel body

020.11.1.3 Industrial lift arms and timber grabber

Description	Unit	Value
Right ballast weight	kg	850
Left ballast weight	kg	850
Bolt tightening torque	Nm	850
Design:		Steel and concrete

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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
					❍	✦		Air filter system: Clean the safety element (after replacing the main element three times, or every year at the latest).		030-75
						✦		Dust protection for alternator (option): clean or replace filter element.		030-76
☐		●	●	❍	❍			Splitter box: Check the oil level.		030-79
				❍	❍			Splitter box: Change the oil.		030-80
			■	❍	❍			Check that the diesel engine intake and exhaust system is in good condition and not loose or leaking.		030-82
		●	●	❍	❍			Check the diesel engine for leaks, contamination and damage.		030-84
☐				❍	❍			Diesel engine: check profile clamps.		030-85
						❍5000 h		Clean the diesel particulate filter module.		030-87
					❍			Change the compressed air dryer.		030-90
					❍			Check the compressed air system.		030-91
Cooling system										
	●	●	●	❍	❍			Cooling system: Check the coolant level.		030-92
					❍	❄		Coolant: checking antifreeze and corrosion protection agent concentration.		030-93
						✦		Clean the cooling system.		030-100
						❍6000 h		Change coolant in cooling system (at least every 4 years).		030-101
Hydraulic components										
☐	●	●	●	❍	❍			Hydraulic tank: Check the oil level.		030-104
				❍	❍			Drain off condensate and sediment from the hydraulic tank.		030-106
				❍	❍			Change the return filter insert in the hydraulic tank.		030-107
					❍			Change the hydraulic tank breather filter.		030-108
						✧		Hydraulic tank: analyse the oil (For more information see: Oil analysis, page 030-23)		030-109
						✧		Change. the oil in the hydraulic tank (For more information see: Oil change, page 030-23)		030-110
Steering system										
☐	●	●	●	❍	❍			Steering: Check the function.		030-114
☐		●	●	❍	❍			Steering cylinders: Lubricate the bearings.		030-114

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Ambient temperature	Designation
From -25 °C to 45 °C	Liebherr Hydraulic Plus

Tab. 49: Recommendation for hydraulic oils

030.3.9.2 Minimum quality requirement

Specification
EMT LH-00-Minimum-HYE

Tab. 50: Minimum quality requirement

When using hydraulic oils from other manufacturers, information on oil change intervals must be obtained from manufacturer or supplier.

030.3.9.3 Oil analysis

	Hydraulic oil	Interval
Normal use (oil analysis optional)	**Mineral oil**	
	Liebherr Hydraulic HVI	First after 1000 h, then every 1000 h, at least once a year
Bio use (oil analysis prescribed)	**Biodegradable**	
	Liebherr Hydraulic Plus	First after 1000 h, then every 1000 h, at least once a year

Tab. 51: Oil analysis

030.3.9.4 Oil change

Hydraulic oil	Without oil analysis	With oil analysis[32)]
Mineral oil		
Liebherr Hydraulic HVI	Every 3000 h	Every 6000 h
Biodegradable		
Liebherr Hydraulic Plus	Every 4000 h	Every 8000 h

Tab. 52: Oil change

31) PAO = polyalphaolefin

32) 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.

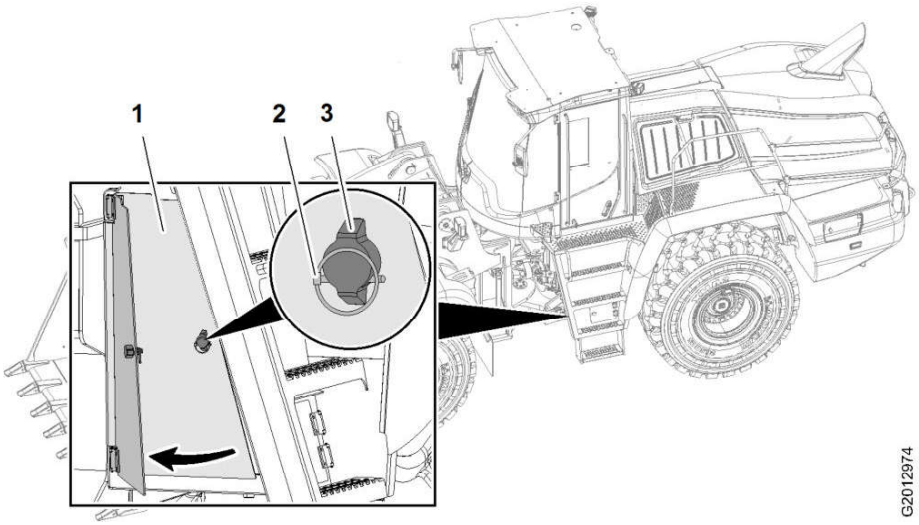

Fig. 91: Service cover in the left of the cab access

1 Service cover
2 Cotter pin
3 Locking mechanism

To open the service cover:

- ▶ Remove cotter pin **2**.
- ▶ Open lock **3**.
- ▶ Open service cover **1**.

NOTICE
Service cover open!
Risk of damage to the machine.

- ▶ Before starting up the machine: Close the service cover and secure it with the cotter pin.

To close the service cover:

- ▶ Close service cover **1**.
- ▶ Close lock **3** and secure it with the cotter pin **2**.

030.4.2.3 Turning off the battery main switch

Valid for: L556-1757;

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

Read the descriptions of the maintenance tasks to find out whether the battery main switch must be turned on or off.

Turn on the battery main switch after completing these maintenance tasks.

Make sure that following requirements are met:
❑ Diesel engine is switched off.

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Quantity	Description	Item code
1	1 m test line	7002437
1	Hand pump with sampling hose	8145666

Tab. 64: Tools required

Oil analysis kits

Liebherr recommends having the oil analyses carried out by Oelcheck.

Oelcheck offers various methods of analysis for a wide range of components and units. Liebherr has chosen two methods analysis that are specially adapted to the particular requirements of our systems and components.

	Green lid: petroleum, coolant	Yellow lid: bio oil
Single analysis kit	8145660	7026 817
6-sample analysis kit	7018 368	7026 088
12-sample analysis kit	7018 369	

Tab. 65: Available analysis kits

The analysis kits with the green lid can be used for hydraulic systems filled with mineral oil, diesel engines, transmission and lubricating grease.

The analysis kits with the yellow lid may only be used for bio hydraulic oils. The difference in the scope of the analysis is that the water content of all bio oils has to be tested using the comparatively expensive Karl Fischer method. However, this test method is essential for a precise diagnosis of bio oils.

If other test laboratories are used, the oil analyses must at least include the following data:

Test methods	Measured items
Atomic emission spectroscopy (AES)	Metal debris, additives, contaminants, iron, chrome, tin, aluminium, nickel, copper, lead, molybdenum, silver, silicon, potassium, magnesium, boron, zinc, phosphorus, barium
Infrared spectroscopy (FT-IR)	Oil condition and pollution, oil oxidation, glycol, water, nitration, fuel, soot
Viscosity	Test at 40 °C and 100 °C, viscosity index, note on lubricity and mixing
Analex PQ index	Magnetic abrasion (information on quantity of magnetisable iron debris in oil > 5 µm)

Tab. 66: Test methods

Sending oil samples

▶ Label the sample container with the barcode (the red laboratory number on the sample information form).
  ▷ This ensures that the form with the sample information is allocated to the correct sample.

▶ Carefully complete sample information form.

Diesel engine: draining oil

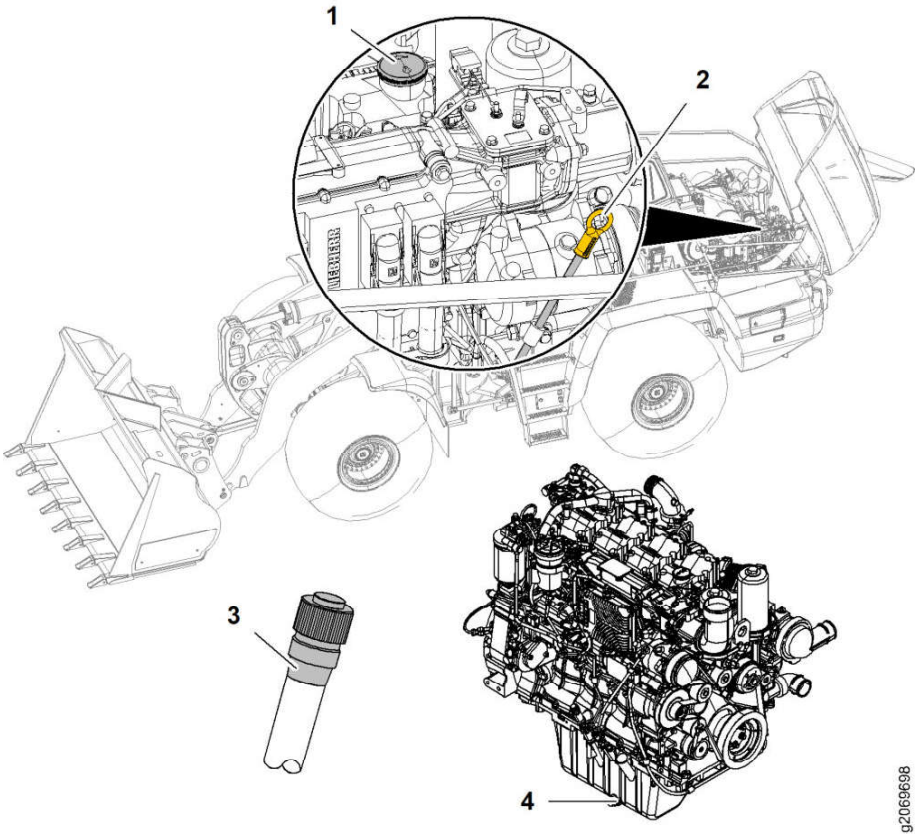

Fig. 107: Changing oil

1	Filler pipe	**3**	Drain hose
2	Dipstick	**4**	Drain valve

CAUTION
Hot fluids!
Burns.

▶ Avoid skin contact with fluids.

▶ Open filler pipe **1**.
▷ Oil drains faster.

▶ Unscrew sealing cap on drain valve **4** on bottom of oil pan.

▶ Screw drain hose **3** onto drain valve.
▷ Oil drains off.

▶ Drain off oil into receptacle.

▶ Unscrew drain hose.

▶ Unscrew cap of drain valve.

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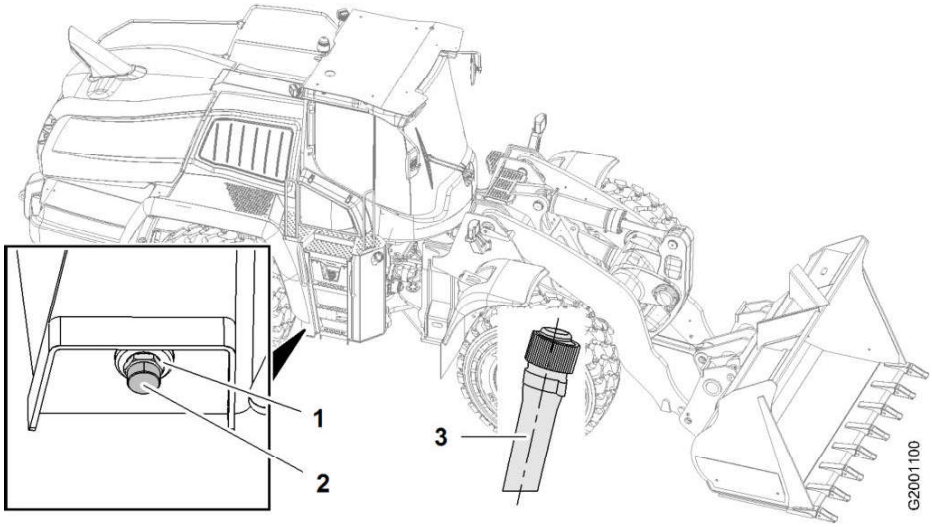

Fig. 117: Fuel tank: Draining off condensate and sediment

1 Drain valve
2 Cap
3 Drain hose

▶ Place a receptacle under the fuel tank.

▶ Unscrew the cap **2** of the drain valve **1**.

▶ Screw the drain hose **3** onto the drain valve **1**.
▷ Condensate and sediment drain off.

▶ Drain the condensation and sediment into a suitable receptacle until clean fuel begins to flow.

▶ Unscrew the drain hose **3**.

▶ Screw the cap **2** onto the drain valve **1** and tighten it.

030.4.4.11 Fuel pre-filter: Draining off condensate

Valid for: L556-1757;

When the water level probe in the fuel pre-filter is activated (the service code is displayed), the water collector tank must be drained.

Make sure that the following requirements are fulfilled:
❑ The machine is in maintenance position 1.
❑ The service access is open.
❑ You have a suitable receptacle ready.
❑ The engine has cooled down.

WARNING
Highly flammable consumables!
Beware of burns.

▶ Avoid naked lights and fire.

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Removing the main element

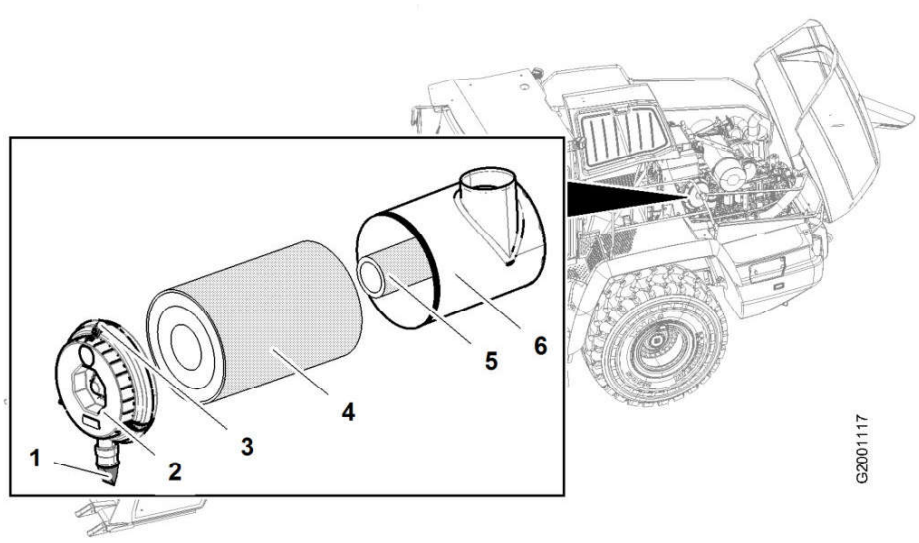

Fig. 126: Removing the main element

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

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

▶ Always replace damaged filter elements.

▶ Release the fixing clips **3** on the service cover **2**.

▶ Take off the service cover **2**.

▶ Remove the main element **4** and check it for damage before cleaning it.

If the main element is damaged:
▶ Change the damaged filter element.

If the main element is not damaged:
▶ Clean the main element.

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Checking the intake system

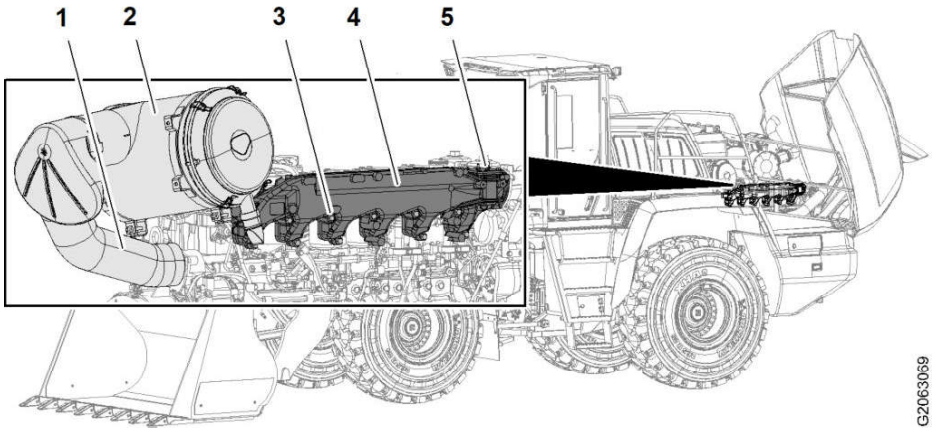

Fig. 139: Checking the intake system

1 Air intake hose
2 Air filter house
3 Screw
4 Air intake pipe
5 Heater flange

- ▶ Check that air intake hose **1** is not damaged and is firmly seated.
- ▶ Check air intake hose **1** for cracks and porosity.
- ▶ Check that fastening clips on air intake hose **1** fit tightly.
- ▶ Check that air filter housing **2** is not damaged and is firmly seated.
- ▶ Check that air intake pipe **4** is not damaged and screws **3** are tight.

If you find any damage:

- ▶ Do not operate diesel engine.
- ▶ Have damaged components replaced by Liebherr customer service.

Checking the exhaust system

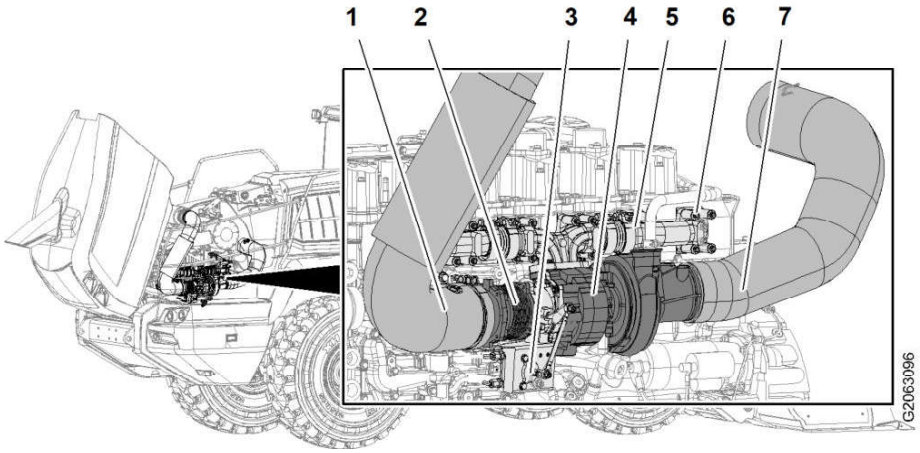

Fig. 140: Checking the exhaust system

1 Exhaust pipe
2 Exhaust port
5 Exhaust manifold
6 Screw

See next page for continuation of the image legend

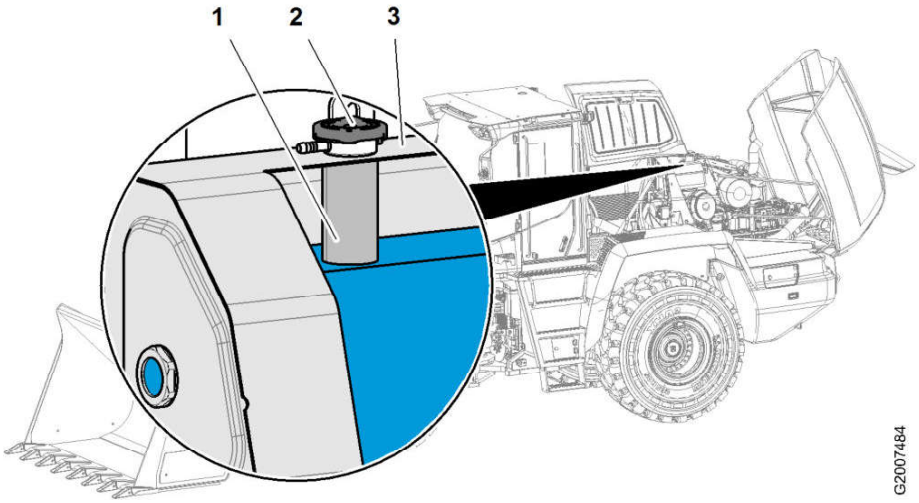

Fig. 148: Checking the coolant level

1 Filler neck
2 Cover
3 Equalising reservoir

CAUTION
Hot. pressurised liquid!
Beware of burns.

▶ Let the engine cool down.

▶ Carefully open the cap **2** of the equalising reservoir **3**.

NOTICE
Non-approved coolant!
Damage to the engine and cooling system.

▶ Only use coolant that meets the Liebherr specifications.

▶ Do not mix coolants with and without silicates.

▶ Top up coolant to the bottom of the filler neck **1**. (For more information see: 030.3.8 Coolant, page 030-22)

▶ Close the cover **2**.

030.4.5.2 Coolant: checking anti-freeze and corrosion protection agent concentration

Valid for: L556-1757;

Checking antifreeze and corrosion inhibitor concentration

The machine is delivered factory-filled with antifreeze and corrosion inhibitor.

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Filling coolant

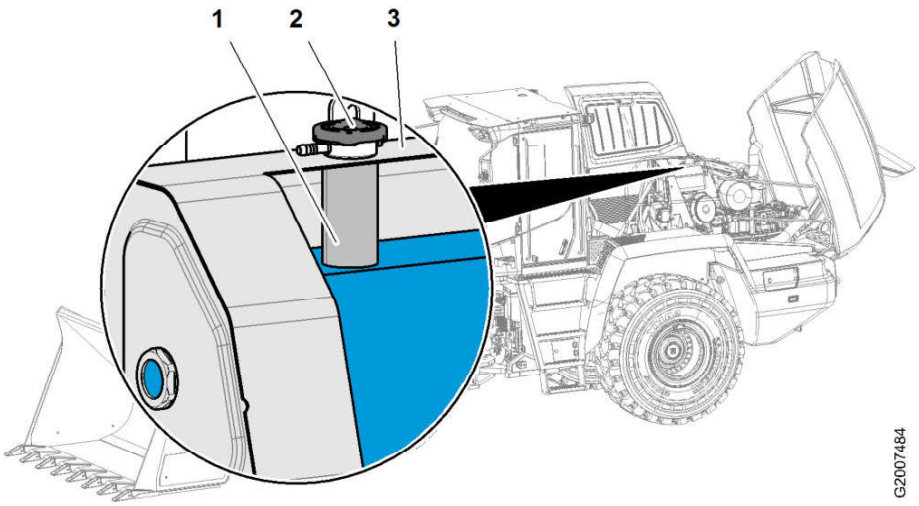

Fig. 156: Filling coolant

1 Filler pipe
2 Cap
3 Coolant equalising reservoir

- ▶ Top up coolant to the bottom of the filler neck **1** in the coolant equalising reservoir **3**.
- ▶ Close the cap **2** of the coolant equalizing reservoir **3**.
- ▶ Start diesel engine.
- ▶ Set heating to maximum temperature and blower speed.
- ▶ Run machine for five minutes at upper diesel engine speed.
  ▷ Coolant is circulated.
- ▶ Turn off diesel engine.
- ▶ Wait until diesel engine has cooled down.

CAUTION
Hot. pressurised liquid!
Beware of burns.

- ▶ Let the engine cool down.

- ▶ Carefully open cap **2** of coolant equalizing reservoir **3**.
- ▶ Check that the coolant level is up to the bottom of the filler pipe **1**.
- ▶ If the coolant level is too low: Top up coolant to the bottom of the filler pipe **1** in the coolant equalising reservoir **3**.
- ▶ Close the cap **2** of the coolant equalizing reservoir **3**.

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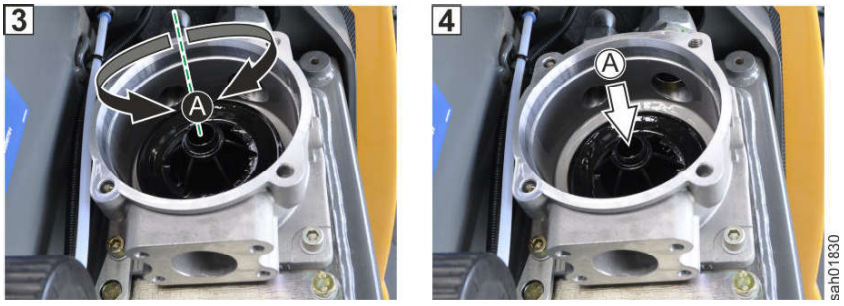

Fig. 167: Putting in the filter insert

NOTICE
No filter effect in the filling position!
Damage to the hydraulic system.

▶ Make sure the filter insert is put in correctly.

▶ Turn the filter insert until it latches.

▶ Put on the compression spring and filter cover.

▶ Tighten the nuts on the filter cover to 25 $^{+5}$ Nm.

▶ Screw in the plug.

▶ Tighten the breather filter.

▶ Pull out the plug and keep it in a safe place.
▷ The breather filter is protected from accidental opening.

▶ Check the oil level.

Checking the oil level

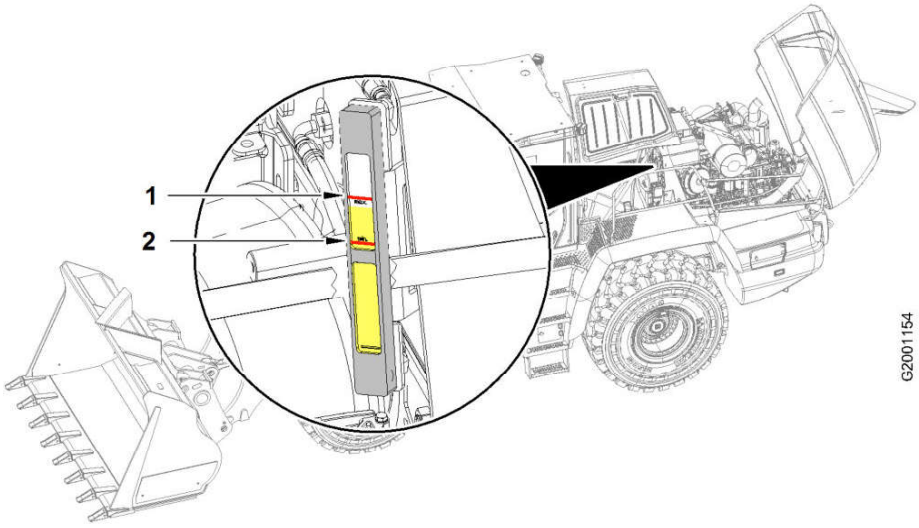

Fig. 168: Checking the oil level

1 Maximum oil level **2** Minimum oil level

▶ Start the engine.

Adjusting the gap

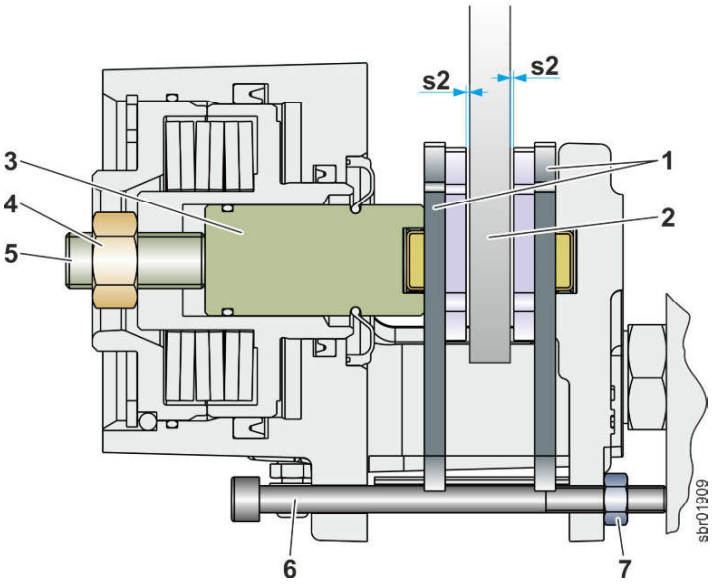

Fig. 178: Adjusting the gap

1	Brake shoe	**5**	Adjusting screw
2	Brake disc	**6**	Adjusting screw
3	Thrust pin	**7**	Lock nut
4	Counter nut	**s2**	Gap

- ▶ Start the diesel engine and let it run for 30 seconds at low idling speed.
  - ▷ The parking brake hydro accumulator is filled.
  - ▷ The parking brake can be operated when the diesel engine is off.
- ▶ Turn off the diesel engine.
- ▶ Switch on the ignition.
- ▶ Connect the Sculi diagnostic software to the machine.
- ▶ In the variables editor, select the ***Brake system*** folder.

WARNING
Beware of machine rolling away!
Accidents.

- ▶ Make sure the machine is parked on level ground.
- ▶ Use chocks to secure the machine against rolling away.

WARNING
Inadvertently engaging the parking brake!
Crushing injuries.

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

- ▶ Force the variable ***QRPBValve*** to the maximum value ***65535***.
  - ▷ The parking brake opens.
- ▶ Unscrew the protective cap.

Troubleshooting
If leakages are detected on the transmission:

▶ Contact Liebherr customer service.

Checking the oil level when the gear oil is at operating temperature

Make sure that the following requirements are fulfilled:
❑ The machine is level.
❑ The gear oil can be seen in the sight glass.

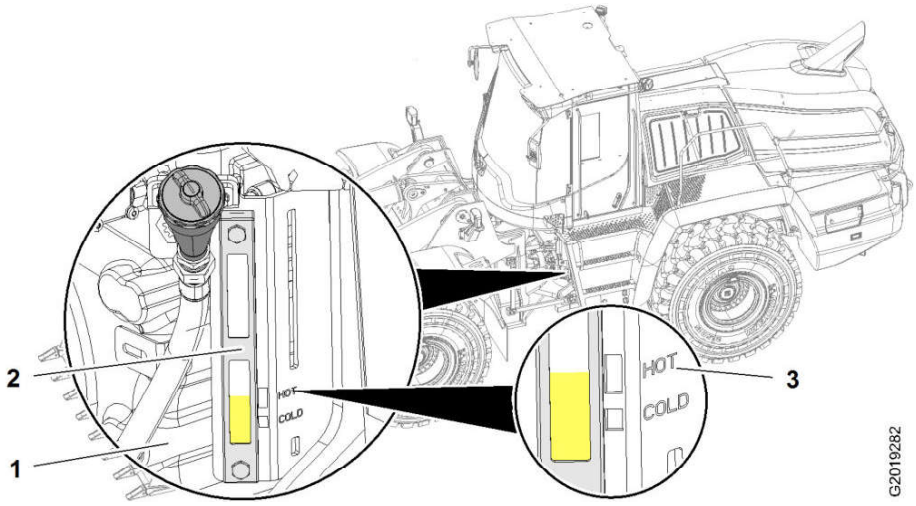

Fig. 188: Checking the oil level when the gear oil is at operating temperature

1 Transmission
2 Oil sight glass
3 HOT range

▶ Put machine into service and operate until the gear oil temperature reaches 60 °C.

▶ Let the machine run at idling speed for 2 minutes.

▶ Engage parking brake.

▶ Engage the articulation lock.

▶ Check the oil level in the oil sight glass **2**.
▷ The oil level must be in the HOT range **3**.

If the oil level is below the HOT range **3**:
▶ Turn off the diesel engine.

▶ Top up the oil. (For more information see: Topping up the oil, page 030-134)

▶ Release the articulation lock.

Troubleshooting
If the oil level is above the HOT range or if leakages are detected on the transmission:

▶ Contact Liebherr customer service.

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Extension: checking articulation play

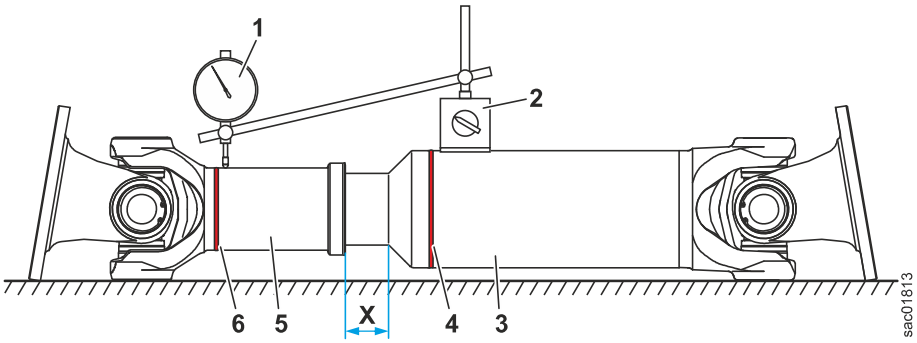

Fig. 197: Extension: checking articulation play

1 Gauge
2 Dial gauge holder
3 Drive shaft tube
4 Weld seam
5 Protective cover
6 Weld seam
X Extension length

▶ Remove drive shaft (for more information, see removal and installation instructions).

▶ Using forks, place drive shaft on a firm, level surface.

▶ Pull drive shaft out to length **X** = 45 mm.

▶ Secure dial gauge holder **2** next to weld seam **4** on drive shaft tube **3**.

▶ Place dial gauge **1** next to weld seam **6** on protective cover **5** and set to 0.

▶ Lift drive shaft at centre of gravity.
▷ Dial gauge **1** shows articulation play.

▶ Check that the articulation play is below the maximum.

Description	Unit	Value
Maximum articulation play	mm	0.17

If required value is not reached:
▶ Replace drive shaft.

030.4.11.3 Checking the tyre pressure

Valid for: L556-1757;

Make sure that following requirements are met:
❑ Machine is in maintenance position 1.
❑ You have the recommended tyre pressures from the manufacturer or dealer at hand.

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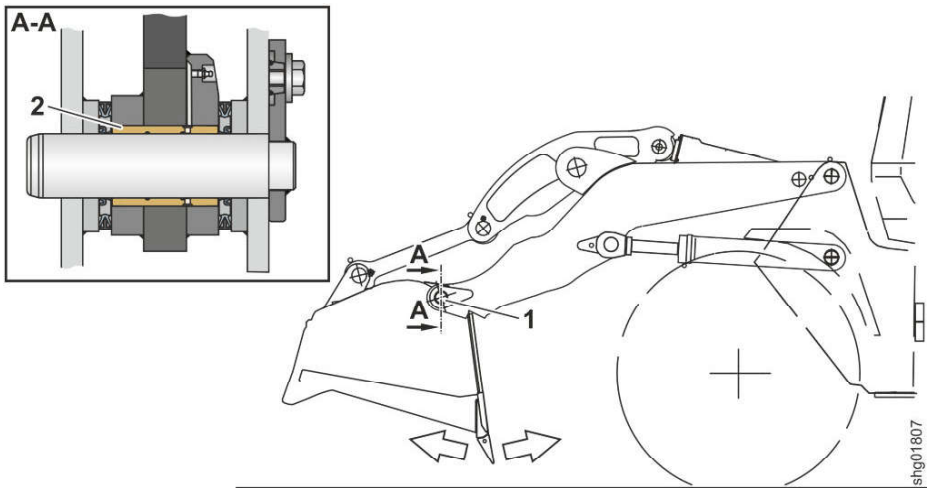

Fig. 209: Lift arms: checking bucket bearing bushings

1 Bucket bearing (2x) **2** Bucket bearing bushing (2x)

- ▶ Deactivate stroke limit damping (option).
- ▶ Raise lift arms so far that bucket can be fully tilted out.
- ▶ Tilt bucket out.
- ▶ Tilt bucket in and out with short, fast movements.
- ▶ When doing so, listen out for noises and play in bucket bearing bushes **2**.

If there are noises or play in bucket bearing bushes **2**:
- ▶ Check lubrication of bucket bearing bushes **2**.
- ▶ Replace bucket bearing bushes **2**.

030.4.13.4 Checking the lift arm bucket stops

Valid for: L556-1757;

Note

This maintenance item is only for Z kinematics.

Make sure that the following requirements are fulfilled:
- ❑ The machine is secured against rolling away.

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▶ Check the condition and function of the driver's safety belt.

▶ Replace damaged parts.

030.4.14.4 Testing the windscreen washer system

Valid for: L556-1757;

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

To check the front windscreen washer system:

▶ Activate windscreen washer system.
▷ Windscreen washer fluid is sprayed onto the front windscreen.
▷ The wiper is switched on.

To check the rear windscreen washer system:

▶ Activate windscreen washer system.
▷ Windscreen washer fluid is sprayed onto the rear window.
▷ The wiper is switched on.

030.4.14.5 Windscreen washer system: filling windscreen washer fluid

Valid for: L556-1757;

The reservoir is fitted below the left cab access.

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

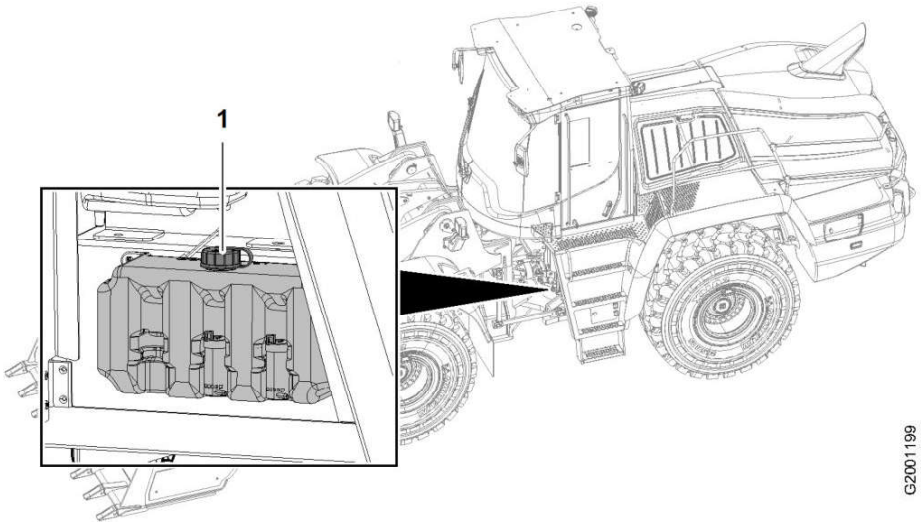


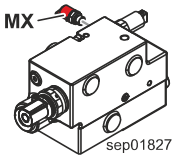
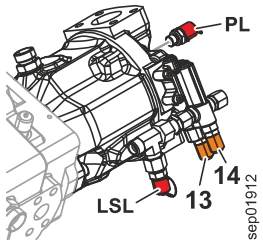
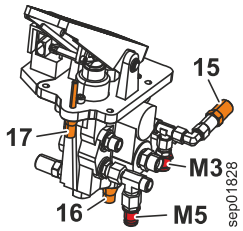
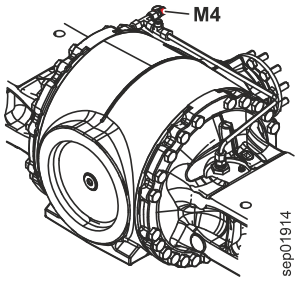
Fig. 220: Windscreen washer system: filling windscreen washer fluid

1 Cover

The filling quantity is approximately 3.5 l.

▶ Open cover **1** on the reservoir.

▶ Top up with standard windscreen washer fluid as necessary.

3. Hydraulic adjustment procedures									
Test / adjustment	**1000 h**	**2000 h**	**Unit**	**Required value**	**Measured**	**Adjusted**	**Adjusting point**	**Test point**	**Figure**
Industrial lift arms control valve block (option): LS-pressure cut-off									
High pressure at full load		○	bar	380±5			12	PA	
Stabilisation module cut-out function									
Cut-out pressure when charging		○	bar	120+60/-10				MX	
Steering system									
Steering pump: LS-pressure cut-off valve									
High pressure at full load		○	bar	210±5			13	PL	
Steering pump: flow regulator (differential pressure)									
Differential pressure ΔP at low idling speed	◊	○	bar	23±1			14	PL/ LSL	
Brake system									
Brake accumulator pressure sensor B19: deviation									
Deviation between pressure gauge and sensor	○	○	bar	<5			15	M3	
Compact brake valve hydro accumulator charging function									
Cut-in pressure	○	○	bar	175±10			16	M3	
Cut-out pressure	○	○	bar	210±10			16	M3	
Service brake pressure									
Brake pressure in 1st brake circuit (front axle)	○	○	bar	95±5			17	M4	
Brake pressure in 2nd brake circuit (rear axle)	○	○	bar	95±5			17	M5	
Service brake hydro accumulator capacity									
Residual pressure in 1st brake circuit (front axle) hydro accumulators after braking 9 times, starting at 165 bar	○	○	bar	>80				M4	
Residual pressure in 2nd brake circuit (rear axle) hydro accumulators after braking 9 times, starting at 165 bar	○	○	bar	>80				M5	

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▶ Select the “Snapshot” function.

Note
The name of the service file contains information that is important for automatic processing of the data.

▶ Do not change the file name.

▶ Save the file.

030.6.4 Cooling system

030.6.4.1 Fan speed proportional solenoid valve

Valid for: L556-1757;

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 mode is activated.
- ❑ Service access is open.

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

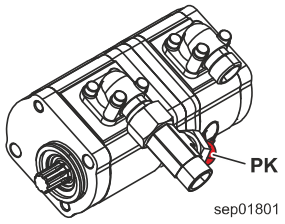

Fig. 232: Fan speed proportional solenoid valve

PK Cooling system high pressure test connection

Preparations

NOTICE
Pressure peak when automatically switching on the reversible fan drive!
Damage to the fan motor.

▶ Make sure the reversible fan drive is deactivated.

Manual calibration of proportional solenoids for 3rd and 4th functions (option)

Note
Calibration of the 3rd and 4th functions is not necessary for normal operation.

▶ Exclusively calibrate 3rd and 4th functions if there are problems actuating the working attachment.

Make sure that the following requirements are fulfilled:
❑ The hydraulic oil is at operating temperature.
❑ The working attachment is attached.
❑ The machine is in the maintenance position for adjustment procedures.

Make sure that the following tools are ready:
❑ Laptop with Sculi diagnostic software

▶ Start the diesel engine.

▶ Connect the Sculi diagnostic software to the machine.

▶ In the variables editor, select the ***Working hydraulics*** folder.

▶ Select the ***Calibrate angle proportional solenoids*** sub-folder.
▷ The variable ***QRCntrlCirc3a*** shows the current at the proportional solenoid for 3rd function A3.
▷ The variable ***QRCntrlCirc3b*** shows the current at the proportional solenoid for 3rd function B3.
▷ The variable ***QRCntrlCirc4a*** shows the current at the proportional solenoid for 4th function A4.
▷ The variable ***QRCntrlCirc4b*** shows the current at the proportional solenoid for 4th function B4.

▶ Make sure that the parking brake is activated.

▶ Raise the lift arms half way.

▶ Tilt the bucket half way in.

▶ Click the variable ***QRCntrlCirc3a*** and press the *space bar*.
▷ The line is coloured pink.
▷ The variable is forced. A gradual approach towards the required value is possible.

Note
To gradually approach the required value:

▶ Cursor *up/down*: last digit of the value +/- 1

▶ Cursor *left/right*: last digit of the value +/- 5

▶ Page *up/down*: last digit of the value +/- 10

▶ Increase the value of the variable ***QRCntrlCirc3a*** until you notice a slight movement of the corresponding working attachment.

▶ When the movement starts, read the variable ***QRCntrlCirc3a***.

▶ Enter the value you read in the variable ***CRCC3aCurrMoveBegin***.

▶ Unforce the variable ***QRCntrlCirc3a***.

▶ Repeat the process for 3rd function B3 with the variable ***QRCntrlCirc3b***. Enter the value you read in the variable ***CRCC3bCurrMoveBegin***.

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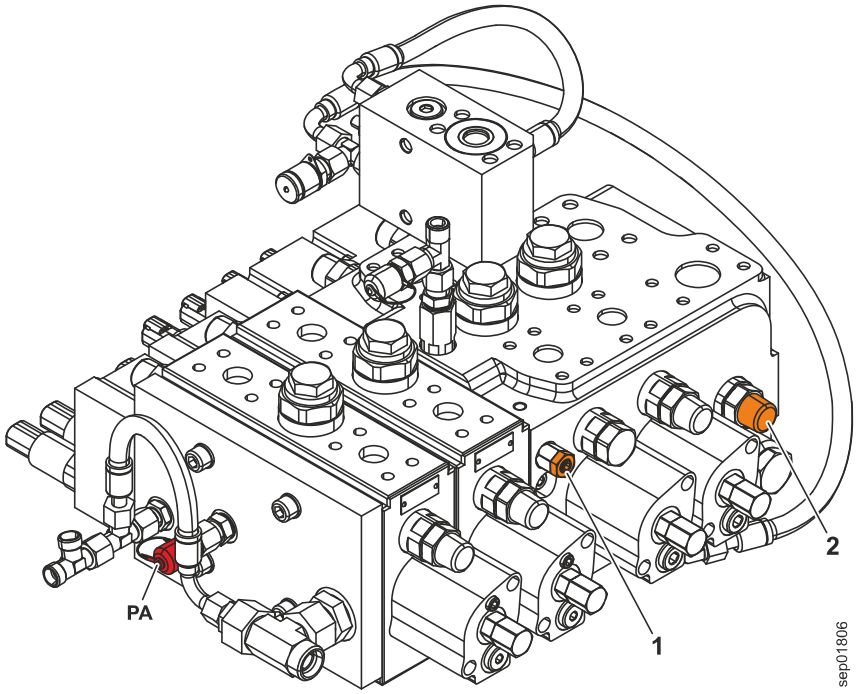

Fig. 241: Z-bar kinematics control valve block: primary pressure relief valve

1 LS-pressure cut-off

2 Primary pressure relief valve

PA Working pump high pressure test connection

Preparations

- ▶ Connect a pressure gauge (600 bar) to high pressure test connection **PA** on control valve block.
- ▶ Turn adjusting screw on LS-pressure cut-off valve **1** by exactly one turn clockwise.
  - ▷ Opening pressure of LS-pressure cut-off valve is above opening pressure of primary pressure relief valve.

Checking and adjusting

- ▶ Starting diesel engine
- ▶ Raise lift arms as far as they will go.
- ▶ Fully activate lifting function at low idling speed.
- ▶ While doing so, check whether high pressure **PA** corresponds to specified value.

Description	Unit	Value
High pressure **PA**	bar	380 $^{\pm 5}$

If required value is not reached:

- ▶ Set bucket down on ground on its teeth or cutting edge.
- ▶ Turn off diesel engine and take out ignition key.
- ▶ Turn adjusting screw of primary pressure relief valve **2**.

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▶ Check and top up nitrogen filling of ride control hydro accumulators **3**. (For more information see: Hydro accumulator: checking and topping up nitrogen filling, page 030-213)

▶ Tighten relief valve **2** with tightening torque 3.5 Nm.

▶ Tighten screw plug **1** to a tightening torque of 7 Nm.

030.6.6 Hydraulic components

030.6.6.1 Hydro accumulator: checking and topping up nitrogen filling

Valid for: L556-1757;

Make sure that following tools are ready:
❑ Testing and filling device for hydro accumulator
❑ Leak spray

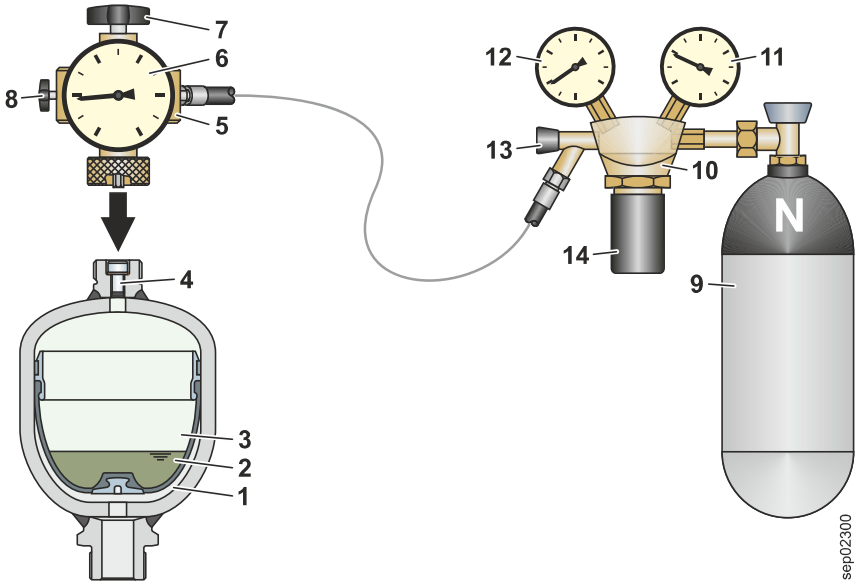

Fig. 248: Hydro accumulator: checking and topping up nitrogen filling

1	Oil side of hydraulic accumulator	**8**	Drain valve
2	Oil filling on nitrogen side (option)	**9**	Nitrogen cylinder
3	Nitrogen side of hydraulic accumulator	**10**	Pressure reducer
4	Screw plug	**11**	Cylinder pressure gauge
5	Testing and filling device	**12**	Outlet pressure gauge
6	Filling pressure gauge	**13**	Pressure reducer outlet valve
7	Handwheel for screw plug	**14**	Pressure control valve

▶ Permanently connect hydro accumulator with hydraulic tank or atmosphere (for example, via relief valve).

If oil side of hydro accumulator cannot be permanently connected with hydraulic tank or atmosphere:

▶ Depressurise and remove hydro accumulator.

▶ Unscrew protective cap of hydro accumulator.

▶ Place hydro accumulator so that screw plug **4** points up.
▷ Oil filling on nitrogen side **2** does not flow out.

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Manual calibration of position sensor of emergency spool valve

Note

Before calibration of position sensor of emergency spool valve, calibrate position sensor of main spool valve!

- ▶ Engage articulation lock (for further information see: operator's manual). If necessary, deactivate service mode and then reactivate it.
- ▶ Fold up left armrest and then fold back down.
  - ▷ Joystick steering is deactivated.
- ▶ Set variable ***MXJSEmergVlvPosAdjStart*** to ***1***.
  - ▷ Calibration function is active for 8 seconds.

WARNING
Accidental steering movements!
Injury.

- ▶ Make sure that articulation lock is engaged.

- ▶ With joystick steering deactivated and within 8 seconds, move **joystick** all the way left and right.
- ▶ Wait until the variable ***MXJSEmergVlvPosAdjStart*** returns to ***0***.
  - ▷ Calibration is completed.
- ▶ Disengage articulation lock (for further information see: operator's manual).

Automatic calibration of proportional solenoids for main spool valve and emergency spool valve

Note

Before calibration of proportional solenoids of emergency spool valve, calibrate position sensor of main spool valve!

- ▶ Make sure that the articulation lock is disengaged.
- ▶ Start diesel engine.
- ▶ Move lift arms into transport position.
- ▶ Fold up left armrest.
  - ▷ Joystick steering is deactivated.

WARNING
Automatic machine movements!
Injury.

- ▶ Make sure there is nobody in danger area around machine.

- ▶ Set variable ***MXJSSteerValveAdjMvBg*** to ***1***.
  - ▷ Calibration takes place automatically.
  - ▷ The machine automatically performs from minimal steering movements.
  - ▷ The calibration can be cancelled by steering with the steering joystick or starting up.
- ▶ Wait until the variable ***MXJSSteerValveAdjMvBg*** returns to ***0***.

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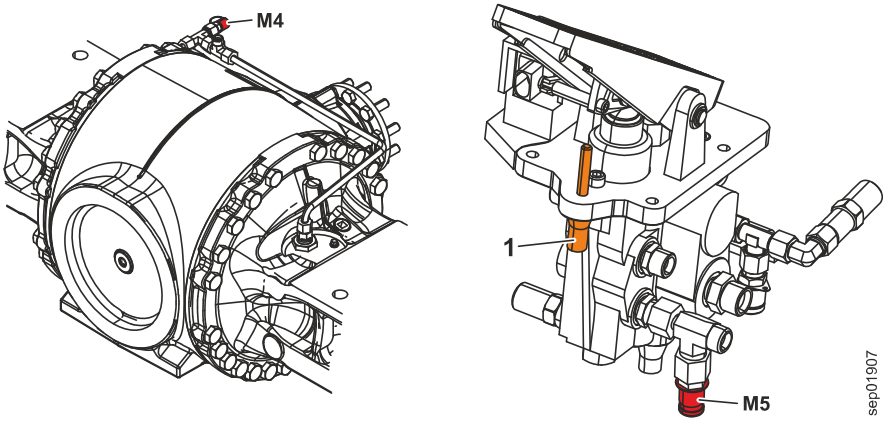

Fig. 263: Service brake pressure

1 Stop bolt

M4 Brake pressure test connection for 1st brake circuit

M5 Brake pressure test connection for 2nd brake circuit

- ▶ Connect a pressure gauge (250 bar) to the 1st brake circuit pressure test connection **M4** on the front axle.
- ▶ Connect a pressure gauge (250 bar) to the 2nd brake circuit pressure test connection **M5** on the compact brake valve.
- ▶ Start the diesel engine.
- ▶ Press the compact brake valve down as far as it will go and hold it there.
- ▶ Check that the brake pressure in both brake circuits has the required value.

Description	Unit	Value
Brake pressure in 1st brake circuit **M4** (front axle)	bar	95 $^{\pm 5}$
Brake pressure in 2nd brake circuit **M5** (rear axle)	bar	95 $^{\pm 5}$

If the required values are not reached:

- ▶ Turn off the diesel engine and take out the ignition key.
- ▶ Adjust the stop screw **1**.
- ▶ Repeat the procedure and adjustment until the required values are attained.

If the required values are reached:

- ▶ Turn off the diesel engine and take out the ignition key.
- ▶ Disconnect the pressure gauge from the 1st brake circuit pressure test connection **M4**.
- ▶ Disconnect the pressure gauge from the 2nd brake circuit pressure test connection **M5**.

030.6.8.4 Service brake hydro accumulator capacity

Valid for: L556-1757;

Make sure that following requirements are met:

- ❑ Hydraulic oil is at operating temperature.
- ❑ Machine is in maintenance position for adjustment procedures.

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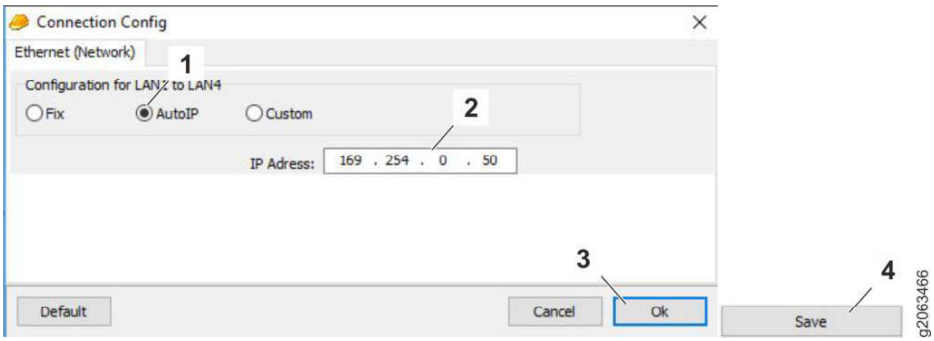

Fig. 278: Connection settings

1 "AutoIP" checkbox
2 IP address
3 "OK" function
4 "Speichern" function

▶ Make sure that "AutoIP" checkbox **1** is selected.

▶ Make sure that IP address **2** is set: 169.254.0.50

▶ Select "OK" function **3**.

▶ Select "Speichern" function **4**.
▷ Connection settings are checked.

Creating "Master 5 Ethernet" address

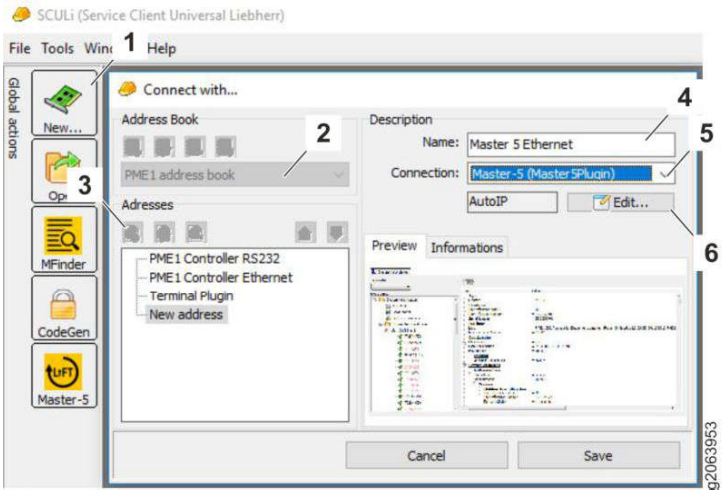

Fig. 279: Creating "Master 5 Ethernet" address

1 "New" function
2 "PME1 address book" address book
3 "New address" function
4 Designation of new address
5 Connection "Master-5 (Master 5Plugin)"
6 "Edit" function

▶ Run Sculi diagnostic software.

▶ Select "New" function **1**.

▶ Select "PME1 address book" address book **2**.

▶ Select "New address" function **3**.

▶ Name new address book: Master5 – Ethernet

▶ Select "Master-5 (Master 5Plugin)" connection **5**.

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Service code	Cause	Remedy
50CA (1st attempt)	The gear oil temperature fell below the minimum during the calibration. The parking brake was opened during the calibration. A function was activated during the calibration. Faulty hydrostat calibration.	Make sure that all requirements are fulfilled: Start calibration again. Do not operate any functions during calibration.
50CA (2nd attempt)	Faulty hydrostat calibration.	Contact technical customer service department.

Tab. 86: Service code table

If no service code appears:

▶ Calibration was successful. Turn off the engine and wait until the central control unit has shut down.
  ▷ Calibration data is sent to the central control unit.

Note

Calibration is not completed until the engine is turned off and the central control unit is completely shut down!

▶ Calibrate the clutch.

Automatic clutch calibration

▶ Start diesel engine.

▶ Set the variable ***MXTCUStartClutchCalibRev*** to ***1***.
  ▷ The calibration is carried out automatically (duration up to 15 minutes).
  ▷ The *calibration active* symbol field **1** in the display lights up.

Note

If the calibration does not start (symbol field *calibration active* is not lit):

▶ Perform basis calibration. (For more information see: Gearbox: basic calibration, page 030-249)

▶ Wait until the variable ***MXTCUStartClutchCalibRev*** returns to ***0***.
  ▷ Calibration is completed.
  ▷ The *calibration completed* symbol field **2** in the display lights up.

If a service code appears:

▶ Calibration has failed. Turn off the engine and wait until the central control unit has shut down.

▶ Proceed as specified in the service code table.

Service code	Cause	Remedy
50D5	Gear oil temperature too low. Parking brake released.	Make sure that all requirements are fulfilled: Start calibration again.

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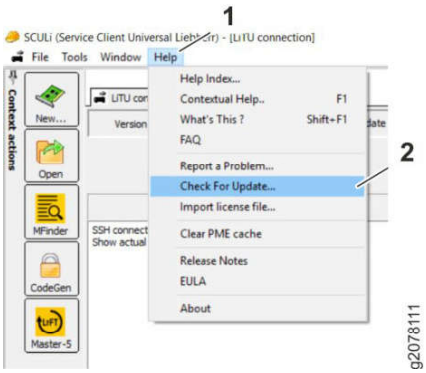

Fig. 295: Checking software version of SCULi diagnostic software

1 "Help" function **2** "Check for update" function

▶ Select "Help" **1** function.

▶ Select "Check for update" function **2** and perform software update of diagnostic software if necessary.

Updating software of LiDAT module

▶ Make sure that the latest software version of the SCULi diagnostic software is installed.

▶ Connect to the LiDAT module. (For more information see: LiDAT: connecting to LiDAT module, page 030-260)

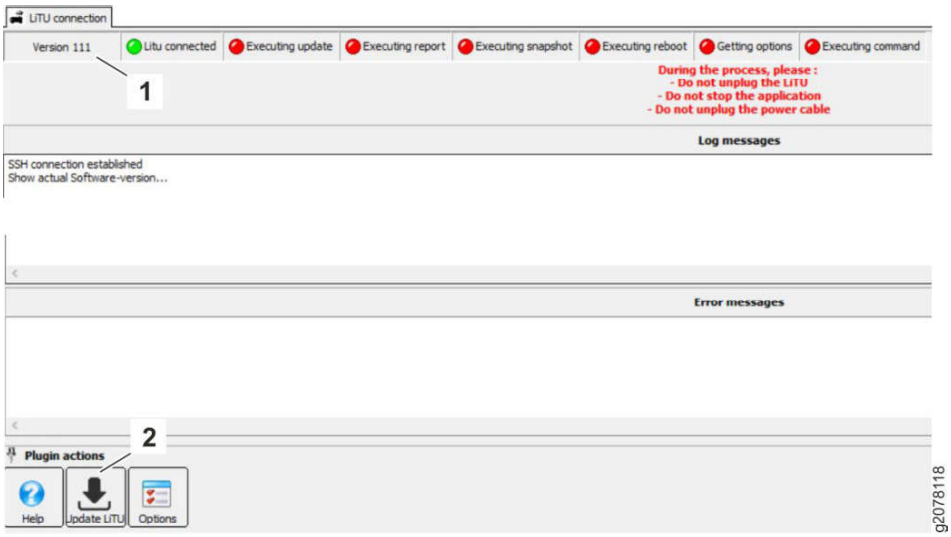

Fig. 296: Software update

1 Current software version **2** "Software update" function

The current software version can be found at the position **1**.

▶ Select "Software update" function **2**.

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- ▶ Select “Load Design” function **3**.
- ▶ Select prepared folder “Designs”.
- ▶ Select and open machine-specific design data.
  - ▷ Design data are loaded.

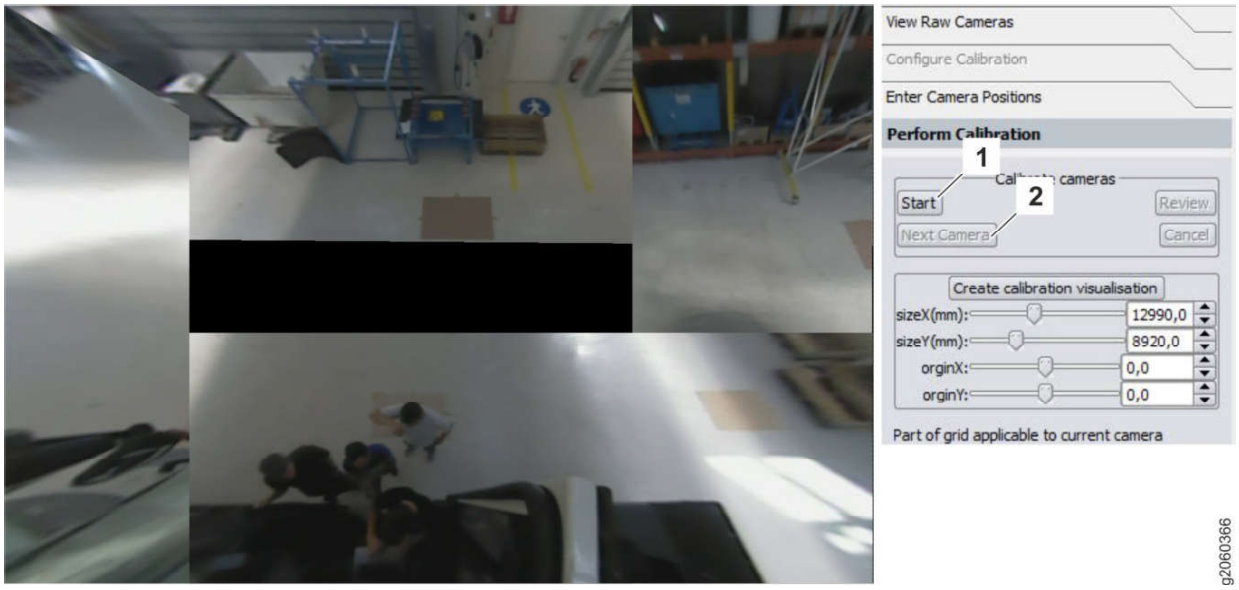

Fig. 312: Starting calibration

1 “Start” function **2** “Next Camera” function

- ▶ Select “Start” function **1**.

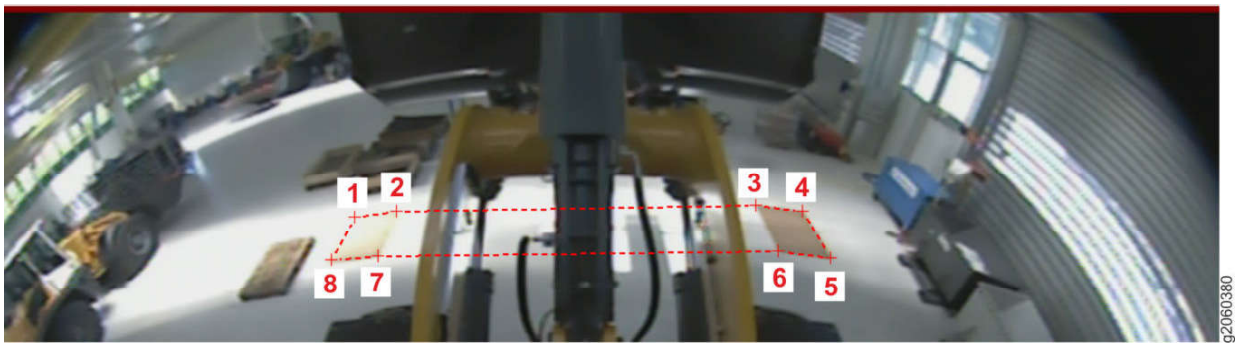

Fig. 313: Front camera

- ▶ Mark corner points of mats.
  - ▷ Observe order according to graphic.
  - ▷ Mark corner points from left to right.
  - ▷ Marks can be moved by clicking again.
  - ▷ Use “ALT” button to enlarge image at position of mouse cursor.
- ▶ Select “Next Camera” function.

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040.1 Engine

040.1.1 Diesel engine overview

Valid for: L556-1757;

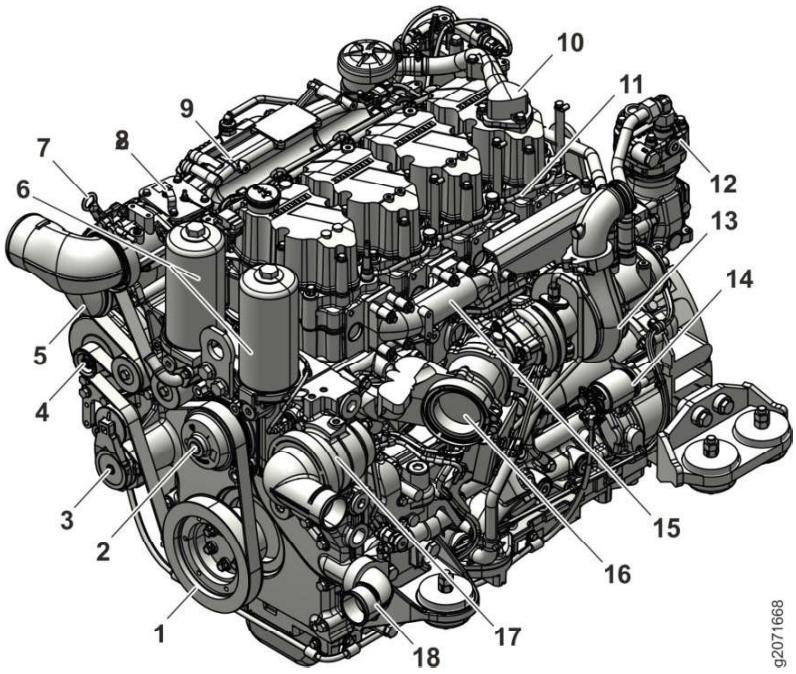

Fig. 324: Diesel engine overview

1	Torsional vibration damper	**10**	Crankcase bleeding line
2	Water pump	**11**	Bleeder line
3	Tensioning device	**12**	Compressor
4	Alternator	**13**	Turbocharger
5	Air conditioning compressor	**14**	Starter
6	Oil filter	**15**	Exhaust pipe
7	Dipstick	**16**	Exhaust port
8	Heating flange	**17**	Thermostat housing
9	Air intake pipe	**18**	Coolant from radiator

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After heatsink **5**, engine oil continues to flow to oil filters.

At low ambient temperatures, the viscosity of the engine oil changes. The engine oil gets thicker. This increases the pressure in the lubrication system. The bypass valve for oil cooler **4** opens starting from a pressure of 3 bar. As a result, the engine oil does not flow through the heatsink **5**. The cooling effect is eliminated, the operating temperature of engine oil is reached faster.

Specifications of bypass valve for oil cooler	
Opening pressure	3 bar

Tab. 95: Specifications of bypass valve for oil cooler

1.3 Cold start valve

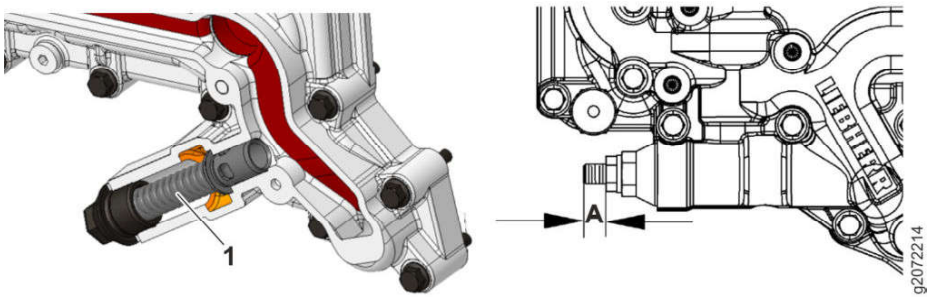

Fig. 335: Cold start valve

1 Cold start valve **A** Adjustment dimension

At low ambient temperatures, the viscosity of the engine oil changes. The engine oil gets thicker. This can cause pressure peaks in the lubrication circuit when the diesel engine starts.

The cold start valve **1** protects the lubrication circuit from excess oil pressure. If the oil pressure exceeds the set value, engine oil will be drained via the cold start valve **1** into the oil pan. The pressure drops.

Specifications for cold start valve	
Opening pressure	9 bar
Adjustment dimension **A**	13 $^{\pm 0.5}$ mm

Tab. 96: Specifications for cold start valve

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040.1.6.2 Vacuum switch

Valid for: L556-1757;

1.1 Layout

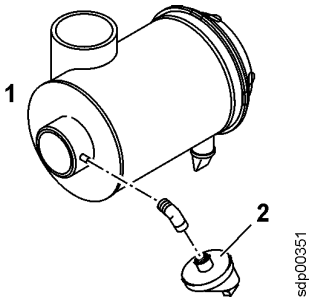

Fig. 345: Layout of vacuum switch

The vacuum switch **2** is fitted on the air filter **1**.

2.1 Function

The vacuum switch **2** monitors the pressure ratio between the turbocharger and air filter **1**.

When the filters are dirty (excessive vacuum detected), the switch triggers the air filter contamination symbol field in the display unit.

When there is neutral pressure, the vacuum switch is closed and opens when the vacuum reaches 50 mbar. If there is already an interruption with the ignition ON, this is recognised as a fault (cable rupture). If the vacuum switch opens during operation or the line is interrupted, this signifies the air filter is contaminated.

040.1.7 Exhaust system

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040.1.7.2 Exhaust gas treatment (stage IV / tier 4f): overview

Valid for: L556-1757;

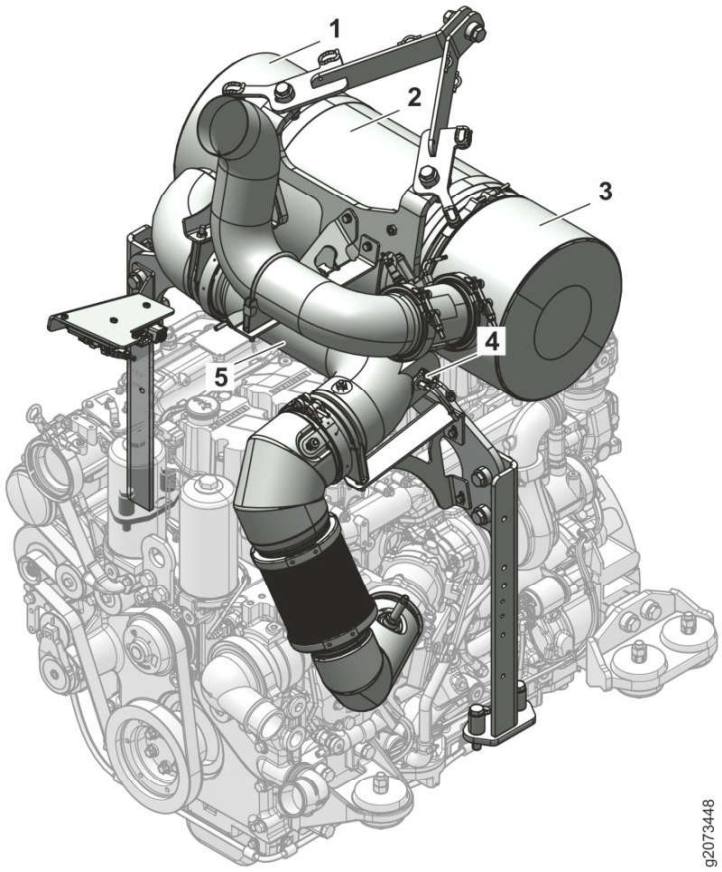

Fig. 353: Overview of exhaust gas treatment system

1 Input module
2 SCR catalytic converter
3 Output module
4 Diesel exhaust fluid nozzle
5 Mixing section

2.1 Basic function

The statutory emissions standards (stage IV, Tier 4f) are fulfilled using a pure SCR strategy.

The engine management system is set so that high combustion temperatures can be reached. This reduces the particulate emissions of the engine. This means that a diesel particulate filter is not required in order to meet the missions standards.

High combustion temperatures have the drawback that NO_x emissions are higher. NO_x are nitrogen oxides, the output of which is regulated by emissions standards.

To reduce NO_x emissions, an SCR system is used.

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1.2 NH_3 sensor

Fig. 365: NH_3 sensor

1 NH_3 sensor **2** NH_3 sensor controller B783

The NH_3 sensor **1** measures the ammonia content in the exhaust at the outlet of the SCR catalytic converter.

If the NH_3 sensor fails, a substitute value of 0 ppm is assumed. A power reduction is activated.

1.3 Differential pressure sensor

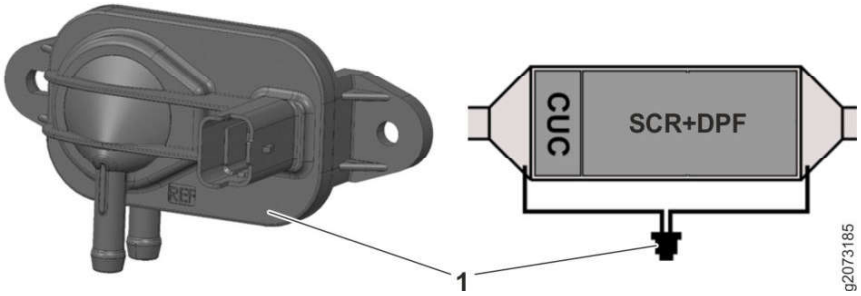

Fig. 366: Differential pressure sensor

1 Differential pressure sensor B722

The differential pressure sensor B722 **1** is only installed in machines with diesel particulate filter (DPF).

The differential pressure sensor is used to calculate the soot load of the diesel particulate filter. The soot load is calculated from the pressure difference between the input of the DPF and the output of the DPF.

The differential pressure sensor outputs a voltage signal between 0.5 V and 4.5 V. This corresponds to a measuring range of 0 bar to 0.3 bar.

040.1.8 Compressed air system

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050 Cooling system

Contents

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4 Secondary piston
5 Throttle
9 Return flow to collector pipe

BMK	Function
Y13	Fan speed proportional solenoid

Tab. 110: Equipment codes

The fan motor drives the fan blade.

2.2 Fan speed proportional solenoid valve

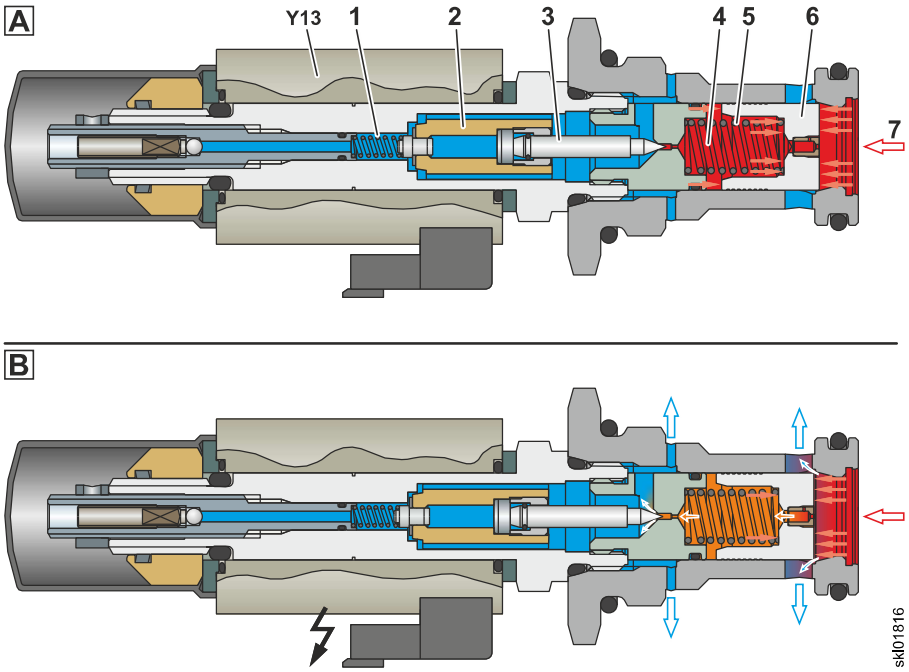

Fig. 384: Fan speed proportional solenoid valve de-energised / fan speed proportional solenoid valve energised

1 Compression spring for secondary piston
2 Stay
3 Secondary piston
4 Pressure chamber
5 Compression spring for primary piston
6 Primary piston
7 Oil supply via fan pump

BMK	Function
Y13	Fan speed proportional solenoid

Tab. 111: Equipment codes

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

Central control unit energises fan speed proportional solenoid **Y13**. Resulting magnetic force pushes stay **2** against spring force of compression spring **1**. This opens secondary piston **3** and allows hydraulic oil to flow out of pressure chamber **4**. Pressure of fan pump **7** can then move primary piston **6** and some of

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050.5.2 Fan reversal valve block

Valid for: L556-1757;

1 Layout

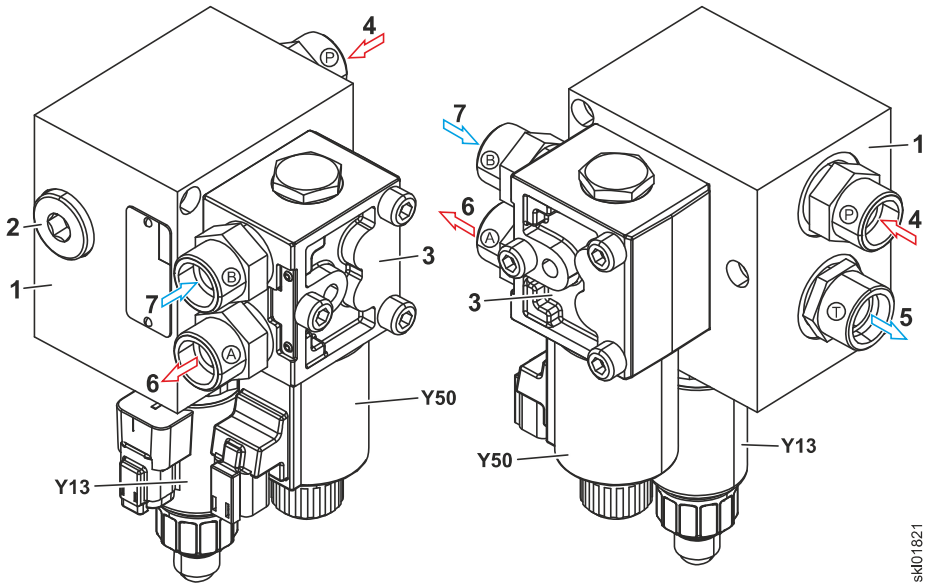

Fig. 390: Fan reversal valve block (from front left and from rear right)

1 Fan reversal valve block
2 Check valve
3 Solenoid valve for fan reversal
4 Oil supply via fan pump
5 Return flow to collector pipe
6 Connection for fan motor (high pressure when fan reversal deactivated)
7 Connection for fan motor (high pressure when fan reversal activated)

BMK	Function	BMK	Function
Y13	Fan speed proportional solenoid	**Y50**	Fan reversal solenoid

Tab. 120: Equipment codes

The fan reversal valve block is mounted on the right-hand side of the vehicle in the rear section below the cooler unit.

2 Function

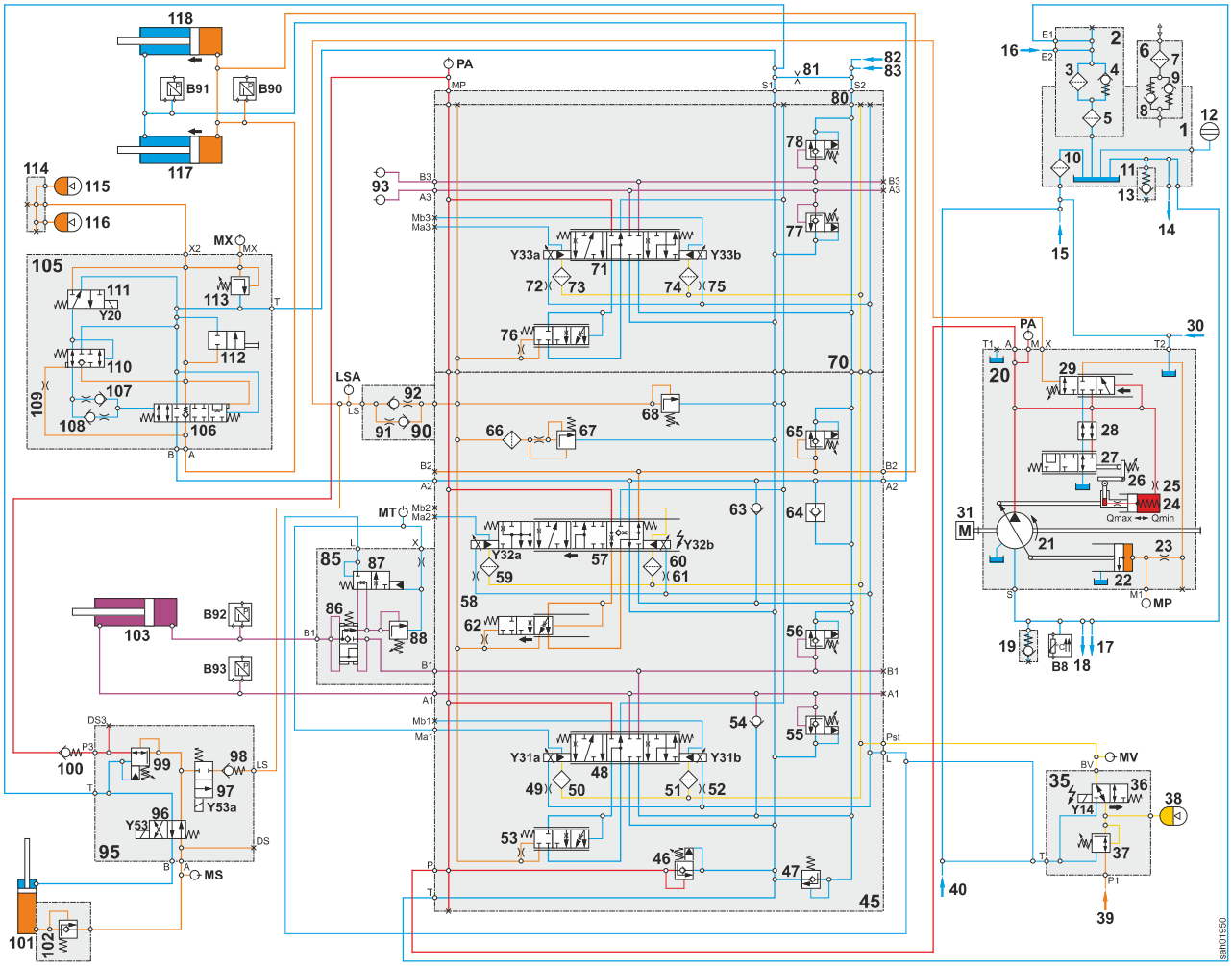

Fig. 395: Diagram of Z-bar kinematics working hydraulics (lift function actuated)

1	**Hydraulic tank**	**39**	Oil supply from hydro accumulator for 1st brake circuit	**80**	End section
2	**Return filter**	**40**	Compact brake valve return flow	**81**	Orifice 1.0 mm
3	Main filter element 10 µm	**45**	**Control block for Z-bar kinematics**	**82**	Return flow from compact brake valve (control valve block housing preheating)
4	Bypass valve 2.5 bar	**46**	Primary pressure relief valve	**83**	Return flow of stroke limit damping pressure relief valves
5	Strainer mesh 100 µm	**47**	Preload valve for 2nd tank duct	**85**	**Anti-drift valve**
6	**Breather filter**	**48**	Tilt cylinder spool valve	**86**	Seat valve
7	Fine filter	**49**	Throttle 1.0 mm	**87**	Release valve
8	Outlet valve 0.65 bar	**50**	Strainer	**88**	Pressure relief valve
9	Inlet valve 0.03 bar	**51**	Strainer	**90**	**Throttle check valve**
10	Leak oil strainer 100 µm	**52**	Throttle 1.0 mm	**91**	Throttle 1.2 mm
11	Steel tank	**53**	Tilt cylinder pressure balance	**92**	Throttle 0.6 mm

See next page for continuation of the image legend

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2 Function

2.1 Basic function

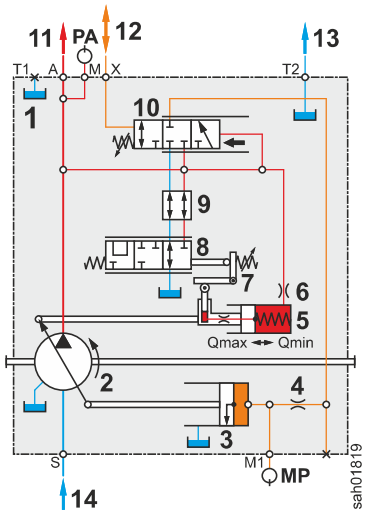

Fig. 400: Hydraulic diagram of the working pump (diesel engine is running)

1	**Working pump**	**8**	Power regulator
2	Axial piston rotary group	**9**	Dummy piston
3	Return piston	**10**	Flow regulator
4	Throttle	**11**	Oil supply for control valve block
5	Positioning piston	**12**	Load sensing signal from control valve block
6	Throttle	**13**	Leak oil to leak oil strainer
7	Regulating lever	**14**	Suction port from hydraulic tank

Name	Test point	Name	Test point
MP	Working pump return pressure	**PA**	Working pump high pressure

Tab. 135: Test points

Working pump draws up oil from hydraulic tank **14** and pumps it to control valve block **11**.

Displacement of working pump depends on engine speed and swivel plate angle. Working pump is regulated via load sensing signal from control valve block **12**.

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1 **Control block**
2 Primary pressure relief valve
3 Preload valve for 2nd tank duct
4 Tilt cylinder spool valve
5 Throttle 1.0 mm
6 Strainer
7 Strainer
8 Throttle 1.0 mm
9 Tilt cylinder pressure balance
10 Replenishing valve for tilting out
11 Secondary pressure relief valve for tilting out
12 Secondary pressure relief valve for tilting in
13 Lift cylinder spool valve
14 Throttle 0.8 mm
15 Strainer
16 Strainer
17 Throttle 0.8 mm
18 Lift cylinder pressure balance
19 Feeder valve for lowering
20 Feeder valve for lowering
21 Secondary pressure relief valve for lifting
22 Strainer
23 Flow regulating valve
24 LS-pressure cut-off
25 **Control valve block section for 3rd function (option)**
26 Spool valve for 3rd function (option)
27 Throttle 1.0 mm
28 Strainer
29 Strainer
30 Throttle 1.0 mm
31 Pressure balance for 3rd function
32 Secondary pressure relief valve for 3rd function A3
33 Secondary pressure relief valve for 3rd function B3
35 **Control valve block section for 4th function (option)**
36 Spool valve for 4th function (option)
37 Throttle 1.0 mm
38 Strainer
39 Strainer
40 Throttle 1.0 mm
41 Pressure balance for 4th function
42 Secondary pressure relief valve for 4th function A4
43 Secondary pressure relief valve for 4th function B4
45 End section
46 Orifice 1.0 mm
50 **Anti-drift valve**
51 Seat valve
52 Release valve
53 Pressure relief valve
55 **Throttle check valve**
56 Throttle 1.2 mm
57 Throttle 0.6 mm
60 Return flow from return filter
61 Oil supply from working pump
62 Connection to ring side of tilt cylinder
63 Connection to piston side of tilt cylinder
64 Connection to stabilisation module (ring side of lift cylinder)
65 Load sensing signal for working pump
66 Connection for 3rd function A3
67 Connection for 3rd function B3
68 Connection for 4th function A4
69 Connection for 4th function B4
70 Return flow from stabilisation module
71 Return flow from compact brake valve (control valve block housing preheating)
72 Return flow of stroke limit damping pressure relief valves
73 Connection to piston side of lift cylinder
74 Connection to ring side of lift cylinder
75 Control oil from pilot control valve block
76 Return flow to pilot control valve block

Name	Test point	Name	Test point
LSA	Load sensing signal for working pump	**PA**	Working pump high pressure
MT	Servo pressure for tilt-out function		

Tab. 139: Test points

BMK	Function	BMK	Function	BMK	Function
Y31a	Proportional solenoid for tilting out	**Y32b**	Proportional solenoid for lifting	**Y34a**	Proportional solenoid for 4th function A4 (option)

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060.6 Pilot control

060.6.1 Pilot control valve block

Valid for: L556-1757;

1 Layout

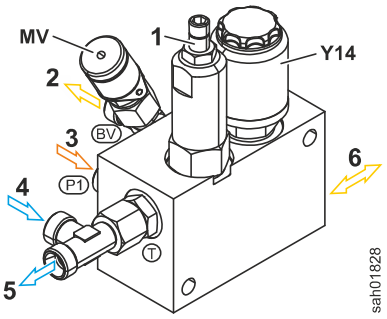

Fig. 411: Pilot control valve block (from front left)

1	Servo pressure relief valve	**4**	Return flow from control valve block
2	Control oil to control valve block	**5**	Return flow to leak oil strainer
3	Oil supply from hydro accumulator for service brake (1st brake circuit)	**6**	Port for pilot control hydro accumulator

Name	Test point
MV	Servo pressure

Tab. 146: Test points

BMK	Function
Y14	Solenoid for servo pressure

Tab. 147: Equipment codes

Pilot control valve block is installed on left side of vehicle, under operator's cab.

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060.8 Electronics of the working hydraulics

060.8.1 Overview of electrical controls the working hydraulics

Valid for: L556-1757;

1 Layout

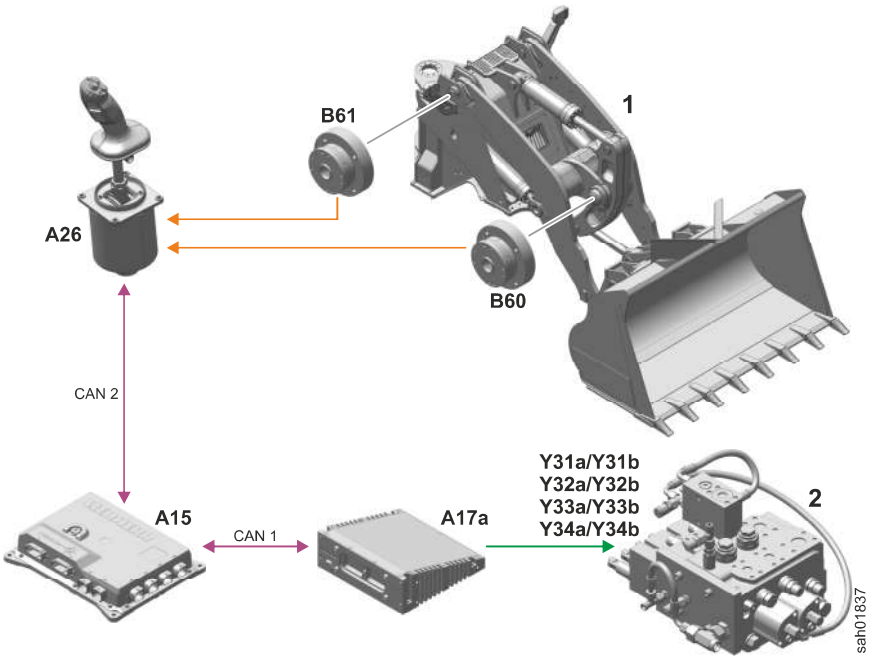

Fig. 418: Overview of electrical controls the working hydraulics

1 Lift arms **2** Control block

BMK	Function	BMK	Function
A15	Central control unit	**Y32a**	Proportional solenoid for lowering
A17a	Output module A17a	**Y32b**	Proportional solenoid for lifting
A26	CAN module for control lever	**Y33a**	Proportional solenoid for 3rd function A3
B60	Angle sensor for bucket position	**Y33b**	Proportional solenoid for 3rd function B3
B61	Angle sensor for lift arm position	**Y34a**	Proportional solenoid for 4th function A4
Y31a	Proportional solenoid for tilting out	**Y34b**	Proportional solenoid for 4th function B3
Y31b	Proportional solenoid for tilting in		

Tab. 160: Equipment codes

Valve block for pipe break protection is mounted directly on hydraulic cylinder to be protected.

2 Function

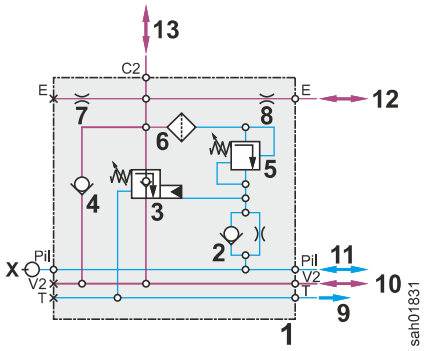

Fig. 426: Valve block for pipe break protection: hydraulic diagram

1	**Valve block for pipe break protection**	**8**	Throttle
2	Throttle check valve	**9**	Return flow to leak oil strainer
3	Pipe break protection valve	**10**	Oil supply through control valve block
4	Check valve	**11**	Servo pressure from control valve block
5	Safety valve	**12**	Connection to other valve block for pipe break protection (lift cylinder only)
6	Fine strainer	**13**	Connection for hydraulic cylinder
7	Throttle		

Name	Test point
X	Venting connection

Tab. 168: Test points

When lifting lift arms or tilting bucket, oil flows from control valve block **10** via pipe break protection valve **3** and check valve **4** to hydraulic cylinder **13**.

When lowering lift arms or tilting out bucket pipe break protection valve **3** is opened with servo pressure **11** of corresponding function.

To guarantee pressure protection, safety valve **5** opens at a pressure of 300 bar at hydraulic cylinder **13** connection. Pipe break protection valve **3** opens and connects hydraulic cylinder **6** to secondary pressure relief valve for corresponding function in control valve block **10**.

060.9.3 Ride control release solenoid valve

Valid for: L556-1757;

1 Layout

Ride control release solenoid valve is installed in front section next to control valve block.

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080.2.3 Return filter

Valid for: L556-1757;

1 Layout

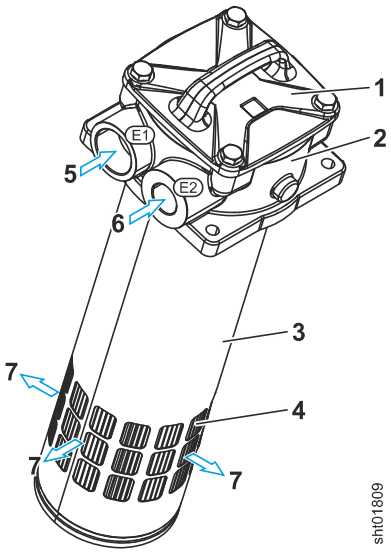

Fig. 433: Return filter

1	Filter cover	**5**	Return flow from control valve block
2	Filter bracket	**6**	Return flow from hydraulic oil cooler
3	Filter housing	**7**	Steel tank
4	Strainer mesh 100 µm		

Return filter is integrated in steel tank.

2 Function

2.1 Basic function

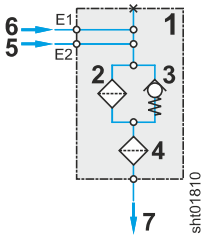

Fig. 434: Return filter: hydraulic diagram

1	**Return filter**	**5**	Return flow from hydraulic oil cooler
2	Main filter element 10 µm	**6**	Return flow from control valve block
3	Bypass valve 2.5 bar	**7**	Steel tank
4	Strainer mesh 100 µm		

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15 Return flow from compact brake valve and pilot control
16 Return flow from control valve block
20 **Steering pump**
21 Axial piston rotary group
22 Return piston
23 Positioning piston
42 Check valve
43 Return line from fan motor
45 **Collector pipe**
46 Preload valve for steering cylinder replenishing function 5 bar
47 Bypass valve for hydraulic oil cooler 1.5 bar
48 Hydraulic oil cooler
67 Left steering cylinder with stroke limit damping
68 Pressure relief valve for stroke limit damping
69 Right steering cylinder with stroke limit damping
70 Pressure relief valve for stroke limit damping
71 Return flow from pressure relief valves to control valve block

Name	Test point	Name	Test point	Name	Test point
LSL	Load sensing signal for steering pump (option)	**PL/**	Steering pump high pressure	**PL1**	High pressure for steering pump or emergency steering pump

Tab. 178: Test points

BMK	Function	BMK	Function
B3	Emergency steering pressure switch	**B8**	Hydraulic oil temperature sensor
B3a	Emergency steering check pressure switch	**M8**	Electric motor for emergency steering pump

Tab. 179: Equipment codes

The steering system is an open circuit. This means that after leaving the consumer, the oil flows to the hydraulic tank rather than directly back to the working pump.

The steering pump **20** draws oil from the hydraulic tank **1** and pumps it through the steering system valve block **40** to the servostat **50**.

The servostat **50** delivers a measured quantity of oil to the steering cylinders with every turn of the steering wheel. The servostat **50** also generates a load sensing signal which is used to regulate the steering pump **20**.

The steering pump has stroke limit damping that prevents hard stops at the limit position. In addition, the steering stabilisation valve block **60** prevents cavitation in the steering cylinders and damps jerky steering movements and external effects when the vehicle is moving.

The oil returning from the steering cylinders flows through the collector pipe **45** and the hydraulic oil cooler **48** back to the hydraulic tank **1**.

The electric emergency steering pump **35** supplies the steering system with oil for a short time if the steering pump **20** fails.

Hydro accumulator for steering damping **63** and **65** with integrated throttle check valve improve steering behaviour.

LBH/12252623/03/211-20200326_151754/en

090.4 Steering cylinder

090.4.1 Steering cylinder

Valid for: L556-1757;

1 Layout

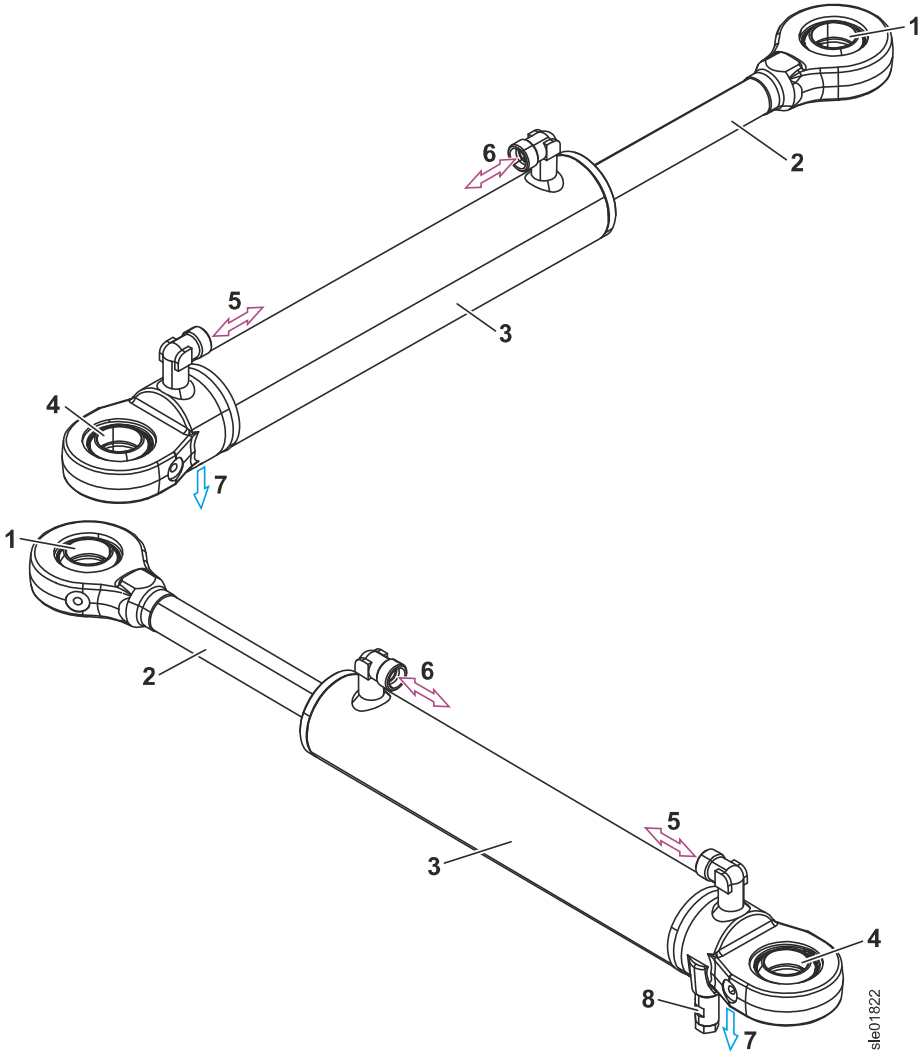

Fig. 456: Steering cylinder (from front left and from front right)

1	Ring-side cylinder bearing	**5**	Cylinder extension port
2	Piston rod	**6**	Cylinder retraction port
3	Piston chamber	**7**	Return flow from pressure relief valve to control valve block
4	Piston-side cylinder bearing	**8**	Pressure relief valve for stroke limit damping

The steering cylinder is equipped with stroke limit damping on the piston side.

LBH/12252623/03/211-20200326_151754/en

090.5.3 Emergency steering electronics

090.5.3.1 Overview of electrical controls of emergency steering system

Valid for: L556-1757;

1.1 Layout

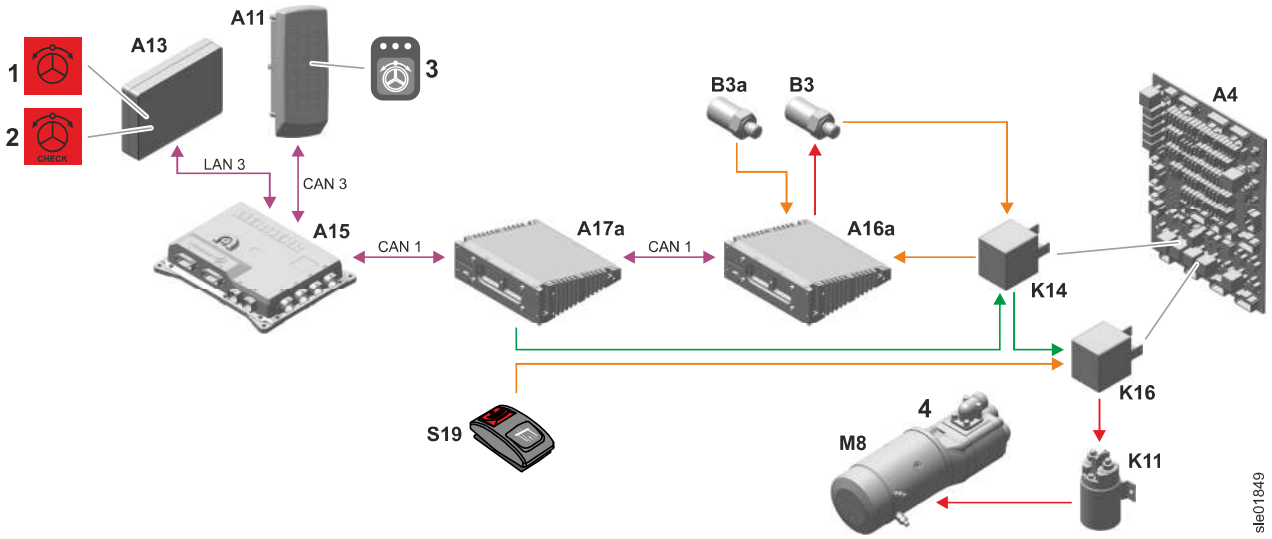

Fig. 469: Overview of electrical controls of emergency steering system

1 *Emergency steering active* symbol field
2 *Emergency steering CHECK failed* symbol field
3 *Emergency steering* key
4 Emergency steering pump

BMK	Function	BMK	Function	BMK	Function
A4	Fuse and relay board	**A17a**	Output module A17a	**K16**	Emergency steering relay
A11	Control unit	**B3**	Emergency steering pressure switch	**M8**	Electric motor for emergency steering pump
A13	Display	**B3a**	Emergency steering check pressure switch	**S19**	*On-road travel* switch
A15	Central control unit	**K11**	Emergency steering pump power relay		
A16a	Input module A16a	**K14**	Emergency steering pump control relay		

Tab. 189: Equipment codes

LBH/12252623/03/211-20200326_151754/en

6	**Breather filter**	**40**	**Valve block for steering system**	**76**	Preload valve for steering cylinder replenishing function 5 bar
7	Fine filter	**41**	Check valve	**77**	Bypass valve for hydraulic oil cooler 1.5 bar
8	Outlet valve 0.65 bar	**42**	Check valve	**78**	Hydraulic oil cooler
9	Inlet valve 0.03 bar	**45**	**Joystick steering control block**	**80**	**Servostat**
10	Leak oil strainer 100 µm	**46**	Servo oil strainer for main spool valve	**81**	Valve spool
11	Steel tank	**47**	Pressure reducing valve for main spool valve	**82**	Metering pump
12	Sight glass for hydraulic oil level	**48**	Servo oil strainer for emergency spool valve	**83**	Secondary pressure relief valve for steering to left
13	Hydraulic tank drain valve	**49**	Pressure reducing valve for emergency spool valve	**84**	Secondary pressure relief valve for steering to right
14	Fan motor leak oil	**50**	Shuttle valve 1	**85**	Feeder valve for steering to left
15	Return flow from compact brake valve and pilot control	**51**	Shuttle valve 2	**86**	Feeder valve for steering to the right
16	Return flow from control valve block	**52**	Check valve	**90**	**Steering stabilisation valve block**
20	**Steering pump**	**53**	Solenoid valve for safety circuit	**91**	Replenishing valve for steering stabilisation 0.5 bar
21	Axial piston rotary group	**54**	Proportional solenoid valve for steering left (main spool valve)	**92**	Replenishing valve for steering stabilisation 0.5 bar
22	Return piston	**55**	Throttle check valve	**93**	**Steering damper hydro accumulator**
23	Positioning piston	**56**	Orifice 0.7 mm	**94**	Throttle check valve 2.0 mm
24	Throttle	**57**	Proportional solenoid valve for steering right (main spool valve)	**95**	**Steering damper hydro accumulator**
25	LS-pressure cut-off	**58**	Throttle check valve	**96**	Throttle check valve 2.0 mm
26	Flow regulator	**59**	Orifice 0.7 mm	**97**	Left steering cylinder with stroke limit damping
27	Throttle	**60**	Main spool valve	**98**	Pressure relief valve for stroke limit damping
28	Fan pump and brake pump suction port	**61**	Cut-off valve for main spool valve	**99**	Right steering cylinder with stroke limit damping
29	Working pump suction port drain valve	**65**	**Control block section for emergency steering function**	**100**	Pressure relief valve for stroke limit damping
30	**Working pump**	**66**	Emergency spool valve	**101**	Return flow to control valve block (housing preheating)

Name	Test point	Name	Test point	Name	Test point
M A1	Servo pressure for steering to left (main spool valve)	**M B2**	Servo pressure for steering to right (emergency spool valve)	**PL1**	High pressure for steering pump or emergency steering pump
M B1	Servo pressure for steering to right (main spool valve)	**LSL**	Load sensing signal for steering pump		

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Name	Test point	Name	Test point
M B1	Servo pressure for steering to the right (main spool valve) A)	**M B2**	Servo pressure for steering to the right (emergency spool valve) A)

Tab. 200: Test points

A) Thread M10x1

BMK	Function	BMK	Function	BMK	Function
B70	Main spool valve position sensor	**Y71**	Proportional solenoid for steering to the left (spool valve for emergency steering function)	**Y74**	Solenoid for safety circuit
B71	Emergency spool valve position sensor	**Y72**	Proportional solenoid for steering to the left (emergency spool valve)		
Y70	Proportional solenoid for steering to the left (main spool valve)	**Y73**	Proportional solenoid for steering to the right (emergency spool valve)		

Tab. 201: Equipment codes

The joystick steering control valve block is supplied with oil by the steering pump **28** and directs that oil to the steering cylinders when the vehicle is steered. The spools are electro-hydraulically actuated.

2.2 Steering in normal mode operation

When joystick steering is activated, the safety circuit solenoid valve **9** is energised. As a result, exclusively the main spool valve **16** is supplied with pilot control oil. That pressure is generated from the steering pump **28** delivery pressure by the main spool valve pressure reducing valve **3**.

When steering to the left or right the relevant proportional solenoid valve is energised. The proportional solenoid valve continues reducing the servo pressure, depending on the current, and directs the servo oil to the main spool valve **16**. As a result, the pilot control fluid pushes the main spool valve **16** against the force of return springs. The ports thus opened by the main spool valve **16** allow the oil to flow from the steering pump **28** to the steering cylinders. In addition, a load-sensing signal **29** is generated that is fed back to the steering pump.

2.3 Steering in emergency steering mode

Joystick steering in emergency mode fundamentally functions in the same way as in normal mode. However, the safety circuit solenoid valve **9** is not energised. As a result, the emergency spool valve **21** is supplied with pilot control oil. At the same time, the main spool valve shut-off valve **17** disconnects the main spool valve **16** from the steering cylinders. That makes sure that emergency steering function still functions even if the main spool valve **16** jams.

The emergency spool valve is supplied with pilot control oil by its own pressure reducing valve **5**.

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090.7 2in1 steering

090.7.1 2in1 steering: total overview

Valid for: L556-1757;

This equipment is optional.

1 Layout

2in1 steering consists of following components:
- Hydraulic tank (For more information see: 080.2.1 Overview of hydraulic tank, page 080-5)
- Steering pump (For more information see: 090.2 Steering pump, page 090-8)
- Servostat for 2in1 steering (For more information see: 090.7.2 Servostat for 2in1 steering, page 090-59)
- Solenoid valve for 2in1 steering
- Steering cylinder (For more information see: 090.4.1 Steering cylinder, page 090-17)
- Steering stabilisation valve block (For more information see: 090.4.2 Steering stabilisation valve block, page 090-20)
- Emergency steering
- Hydraulic oil cooler

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100.2 Service brake and parking brake

100.2.1 Brake pump

Valid for: L556-1757;

1 Layout

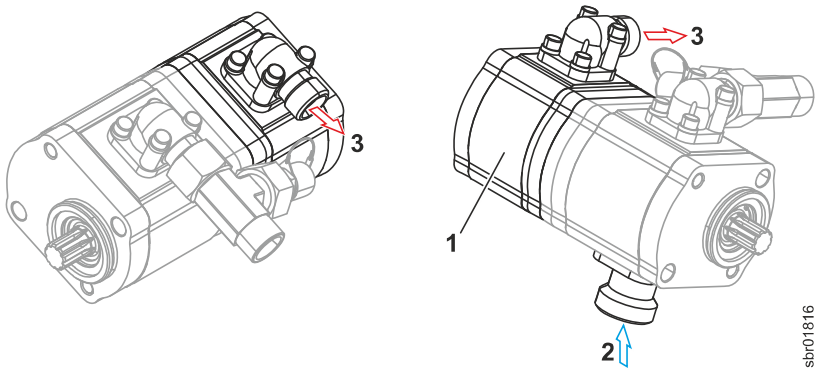

Fig. 492: Brake pump (from front left and from front right)

1 Fan pump
2 Suction port from hydraulic tank
3 Oil supply for compact brake valve

Brake pump is installed together with fan pump on left of vehicle on auxiliary drive of diesel engine.

2 Function

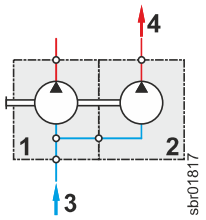

Fig. 493: Hydraulic diagram of brake pump

1 Fan pump
2 Brake pump
3 Suction port from hydraulic tank
4 Oil supply for compact brake valve

Brake pump draws up oil from hydraulic tank through a suction port it shares with fan pump and pumps it to compact brake valve.

Brake pump supplies oil via compact brake valve to following systems:
- Service brake
- Parking brake
- Pilot control (via hydro accumulator for 1st brake circuit)
- Control valve block housing preheating (with surplus oil from brake system)
- Joystick steering control valve block housing preheating (with surplus oil from brake system) (option)

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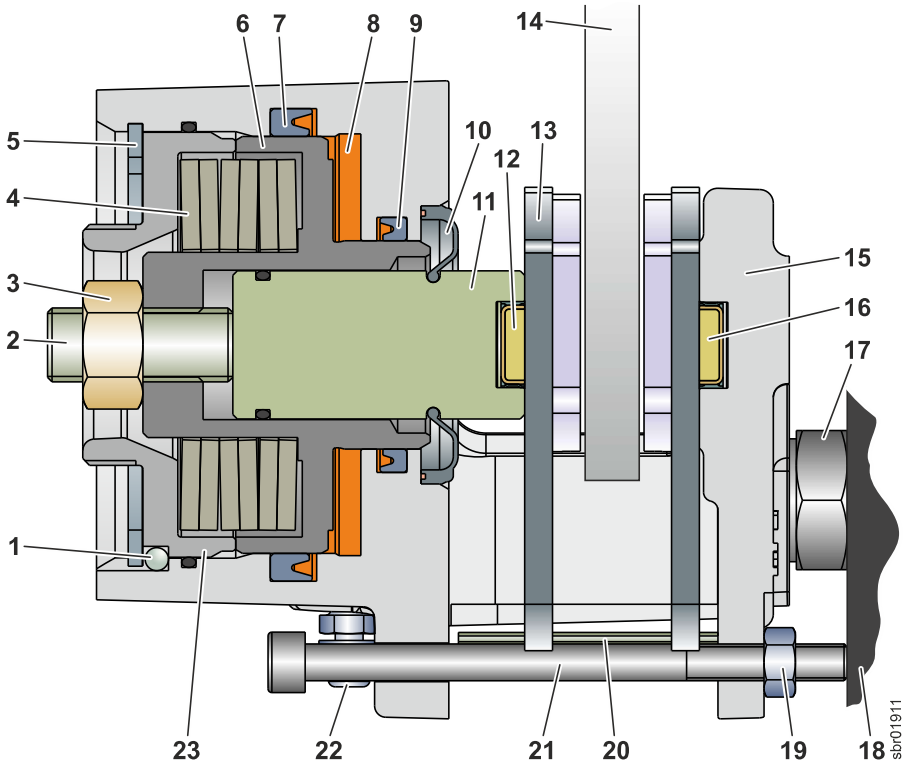

Fig. 501: Sectional view of the parking brake

1	Ball for anti-twist lock	**13**	Brake shoe
2	Adjusting screw	**14**	Brake disc
3	Counter nut	**15**	Brake calliper
4	Cup spring	**16**	Solenoid
5	Snap ring	**17**	Fastening bolt
6	Brake piston	**18**	Transmission housing
7	Seal ring	**19**	Lock nut
8	Pressure chamber	**20**	Lining spring
9	Seal ring	**21**	Adjusting screw
10	Anti-dust membrane	**22**	Bleeder screw
11	Thrust pin	**23**	Cover
12	Solenoid		

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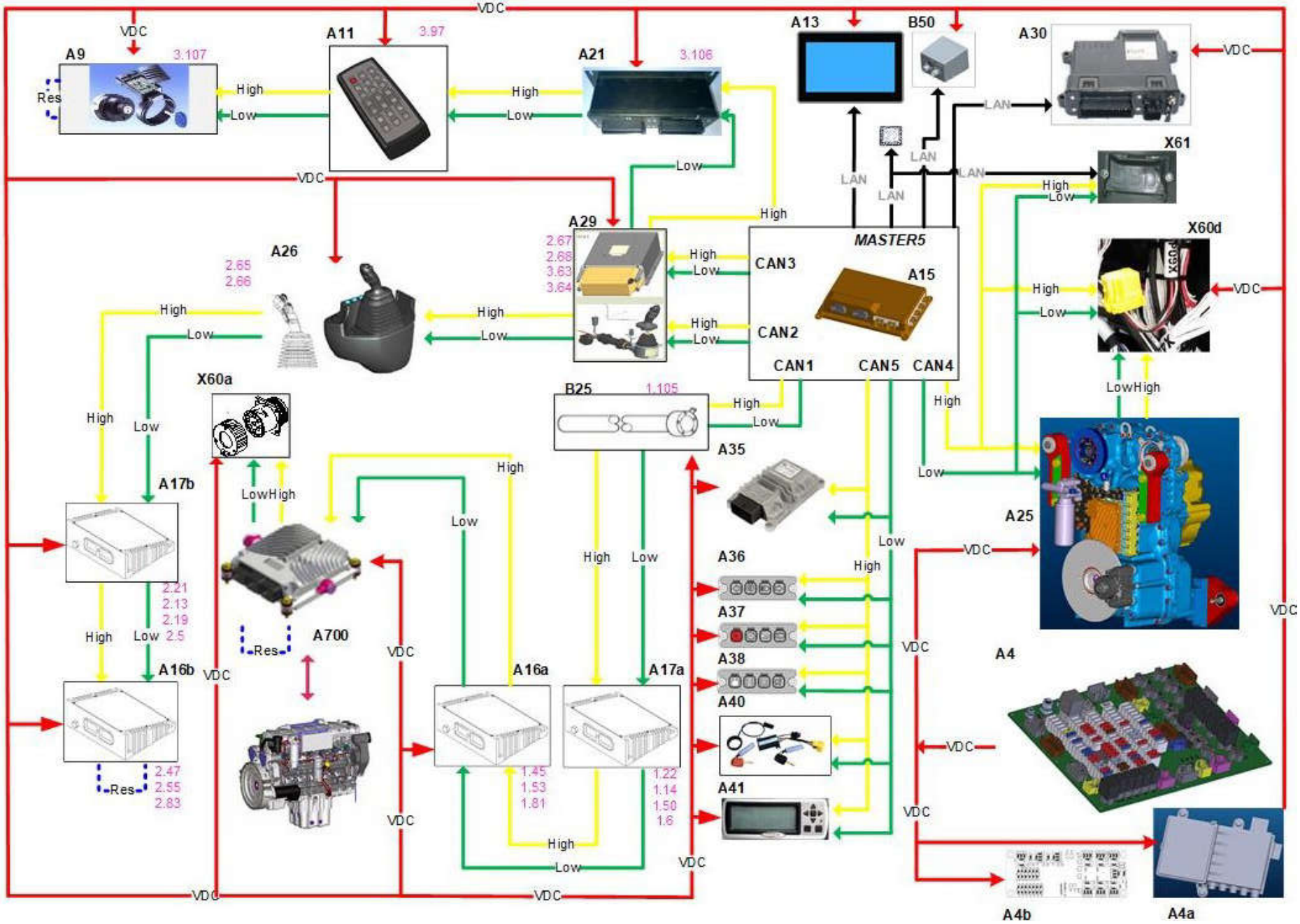


PROJECT GG_4_EVO
DRAWING NUMBER 1333 90100 02 00
ITEM CODE 12466553
DRAWING INDEX 000

MACHINE TYPE	SERIAL NUMBER			
LIDOS Gerät	XXXXX	LIEBHERR FACTORY LBH	CAN OVERVIEW ELECTRICAL SCHEMATIC;	PAGE 1 OF
				CREATION DATE 09.10.2019 15:49

BMK	SYSTEM	LOCATION	FUNCTION	PAGE
-F4	=K	+K	ADDITIONAL CONTROLLER	/124.A2
-F5	=A4a	+B	FUSE SWITCH PARKING BRAKE	/48.F2
-F5	=A4b	+K2	FUSE ADDITIONAL CONTROLLER	/98.A5
-F5	=K	+K	ADDITIONAL CONTROLLER	/124.A4
-F6	=A4	+K2	FUSE ACTIVATION DIESEL PARTICULATE FILTER	/106.A8
-F6	=A4b	+K2	RESERVE FUSE	/95.A5
-F6.	=A4a	+B	RESERVE	/54.A3
-F7	=A4	+K	FUSE SWITCH LIGHTING	/35.A6
-F7	=A4b	+K2	RESERVE FUSE	/95.A7
-F7.	=A4a	+B	FUSE SCR CATALYTIC CONVERTER INLET NOX SENSOR	/54.A5
-F8	=A4	+K	FUSE CONDENSER FAN	/59.C8
-F8	=A4a	+B	FUSE SCR CATALYTIC CONVERTER OUTLET NOX SENSOR	/54.A6
-F9	=A4	+K2	FUSE BUTTON-OPERATED HORN	/33.A2
-F9	=A4b	+K2	FUSE LOGIC UNIT EMERGENCY STEERING CIRCUIT JOYSTICK STEERING	/92.A3
-F9.	=A4a	+B	FUSE NH3 SENSOR	/55.A2
-F01	=A4a	+B1	FUSE T. 30 FUSE BOARD	/24.D6
-F02	=A4a	+B1	FUSE HEATER FLANGE	/24.D7
-F03	=A4a	+B1	FUSE EMERGENCY STEERING PUMP	/24.D6
-F10	=A4	+K2	FUSE ANGLE SENSORS	/41.A4
-F10	=A4b	+K2	FUSE EMERGENCY SPOOL VALVE POSITION SENSOR	/93.A8
-F11	=A4	+K2	FUSE LiDAT MODULE	/62.A1
-F11	=A4b	+K2	FUSE ARTICULATED JOINT ANGLE SENSOR	/93.A1
-F11.	=A4a	+B	FUSE HEATING CIRCUIT WATER VALVE	/51.A1
-F12	=A4	+K	FUSE WINDSCREEN WASHER SYSTEM FRONT, HORN	/33.B4
-F12	=A4b	+K2	FUSE JOYSTICK STEERING	/94.A8
-F12	=B	+B	FUSE EMERGENCY ACTUATION OF PARKING BRAKE	/103.A1
-F13	=A4	+K	FUSE CONDENSER FAN	/59.C2
-F13	=A4b	+K2	FUSE STEERING WHEEL ANGLE SENSOR	/94.A5
-F13	=K	+K2	FUSE DISPLAY 2	/159.A2
-F14	=K	+K2	FUSE KEYPAD 2	/128.A4
-F14.	=A4a	+B	FUSE ENGINE CONTROL UNIT	/49.A1
-F15	=A4	+K	FUSE SWITCH ROAD TRAVEL	/26.F1
-F15.	=A4a	+B1	FUSE REVERSING SIGNAL	/46.A8
-F16	=A4	+K	FUSE ADDITIONAL CONTROLLER INPUT MODULE 1	/88.A3
-F16.	=A4a	+B1	FUSE WORKING HYDRAULICS LOCKOUT; LOWER; 3RD FUNCTION	/46.A5
-F17	=A4	+K	FUSE ADDITIONAL CONTROLLER OUTPUT MODULE 1	/88.A5

BMK	SYSTEM	LOCATION	FUNCTION	PAGE
-F17	=A4a	+B	FUSE CENTRAL LUBRICATION SYSTEM	/64.A2
-F18	=A4	+K2	FUSE SOLENOID VALVES LogHandler	/25.E8
-F18.	=A4a	+B1	FUSE PARKING BRAKE; TILT OUT; TILT IN; LIFT	/46.A2
-F19	=A4	+K	FUSE CENTRAL CONTROL UNIT MASTER5-PREMIUM	/48.A6
-F19	=A4a	+B1	FUSE EMERGENCY STEERING PUMP, FAN DRIVE, REVERSIBLE	/46.A6
-F20	=A4	+K	FUSE REVERSING ALARM	/84.B5
-F20.	=A4a	+B	DIESEL EXHAUST FLUID TANK	/55.A5
-F21	=A4	+K	FUSE BEACON	/83.A4
-F21.	=A4a	+B	FUSE EXHAUST THROTTLE VALVE	/56.A1
-F22	=A4	+K	FUSE ADDITIONAL CONTROLLER OUTPUT MODULE 1	/88.A4
-F22	=A4a	+B	FUSE ENGINE OIL PRESSURE	/56.A3
-F23	=A4	+K	FUSE ADDITIONAL CONTROLLER INPUT MODULE 1	/88.A2
-F23.	=A4a	+B	FUSE HAZARD WARNING SYSTEM	/30.F2
-F24	=A4	+K	FUEL LEVEL SENSOR	/47.A2
-F24.	=A4a	+B1	FUSE TRANSMISSION	/43.A4
-F25	=A4	+K	FUSE HEATING AND AIR CONDITIONING SYSTEM	/58.A4
-F25.	=A4a	+B	DIESEL EXHAUST FLUID LINE PREHEATER	/51.A4
-F26.	=A4a	+B	SOLENOID VALVE, AIR SUPPLY, SCR SYSTEM	/51.A6
-F27	=A4a	+B	FUSE EMERGENCY STEERING CIRCUIT JOYSTICK STEERING T. 15b	/92.F2
-F28	=A4	+K	FUSE ADDITIONAL CONTROLLER OUTPUT MODULE 1	/88.A6
-F28a.W	=K2.RH	+K	FUSE PREPARATION WEIGHING DEVICE	/110.B5
-F28b.W	=K2.R.H	+K	FUSE PREPARATION WEIGHING DEVICE	/110.B6
-F29	=A4	+K	FUSE ADDITIONAL CONTROLLER OUTPUT MODULE 1	/88.A7
-F30	=A4	+K	FUSE ADDITIONAL CONTROLLER OUTPUT MODULE 1	/88.A8
-F31	=A4	+K	FUSE WINDSCREEN WASHER SYSTEM REAR	/34.A1
-F31A	=A4	+K2	FUSE WORKING HEADLIGHT FRONT	/31.B3
-F31B	=A4	+K2	FUSE WORKING HEADLIGHT FRONT	/31.B5
-F32	=A4	+K	FUSE DISPLAY REVERSING CAMERA	/39.A1
-F32A	=A4	+K2	FUSE WORKING HEADLIGHT REAR	/32.B3
-F32B	=A4	+K2	FUSE WORKING HEADLIGHT REAR	/32.B5
-F33	=A4	+K	FUSE BRAKE LIGHT	/29.C2
-F34	=A4	+K	FUSE IMMOBILISER	/39.A5
-F35	=A4	+K	FUSE MULTI-LEVER CONTROL	/135.A1
-F36	=A4	+K	FUSE CONTROL LEVER CAN MODULE	/40.A2
-F37	=A4	+K	FUSE CONTROL UNIT, TRANSMISSION DIAGNOSTIC PLUG	/43.A1
-F38	=A4	+K	FUSE REAR WINDOW HEATER MIRROR HEATER	/35.A5

ITEM CODE 12466553
DRAWING INDEX 000
PROJECT GG_4_EVO
DRAWING NUMBER 1333 90100 02 00

MACHINE TYPE
LIDOS Gerät

SERIAL NUMBER
XXXXX

LIEBHERR
FACTORY LBH

BMK-INDEX
ELECTRICAL SCHEMATIC;

BMK	SYSTEM	LOCATION	FUNCTION	PAGE
-X106.B	=K	+K2	CONNECTOR REVERSING ALARM BUTTON	/84.B1
-X106.S	=K	+K2	CONNECTOR REVERSING ALARM BUTTON	/84.B1
-X111.B	=K	+K	CONNECTOR PREPARATION WEIGHING DEVICE	/110.D5
-X111.S	=K	+K	CONNECTOR PREPARATION WEIGHING DEVICE	/110.E5
-X115.B	=K	+K	CONNECTOR DOOR CONTACT SWITCH	/113.D1
-X115.B.X	=K	+K	CONNECTOR DOOR CONTACT SWITCH	/113.D1
-X117.F	=K	+K	DOOR CONTACT SWITCHRECEIVING UNIT / CONTROL UNIT	/113.E2
-X118.S	=K	+K	CONTACT PINS; RECEIVING UNIT / CONTROL UNIT	/113.E3
-X200.B	=K	+K3	CONNECTOR EXTERIOR MIRROR ADJUSTMENT	/85.B1
-X200.S	=K	+K3	CONNECTOR EXTERIOR MIRROR ADJUSTMENT	/85.B1
-X201.B	=K	+K	INTERFACE CONNECTOR ELECTRIC DOOR OPENING	/113.B1
-X201.S	=K	+K	INTERFACE CONNECTOR ELECTRIC DOOR OPENING	/113.B1
-X213.B	=V	+V	CONNECTOR WORKING BASKET SHUTDOWN	/119.B5
-X213.S	=V	+V	CONNECTOR WORKING BASKET SHUTDOWN	/119.C5
-X214.B	=K	+K	CONNECTOR COMPACT MODULE 1	/118.C2
-X214.S	=K	+K	CONNECTOR COMPACT MODULE 1	/118.B2
-X219.B	=K	+K	CONNECTOR EXTERIOR MIRROR ADJUSTMENT	/85.A5
-X219.S	=K	+K	CONNECTOR EXTERIOR MIRROR ADJUSTMENT	/85.A5
-X255.B	=K	+K	CONNECTOR 24V SOCKET	/86.D8
-X255.S	=K	+K	CONNECTOR 24V SOCKET	/86.D8
-X321a	=V	+V	FRONT SECTION SOCKET RIGHT	/116.D2
-X321b	=V	+V	FRONT SECTION SOCKET	/116.D8
-X325	=K	+K3	CONNECTOR WIRELESS DEVICE	/106.F3
-X326	=K	+K3	RADIO MUTE SWITCH RADIO COMFORT	/36.C6
-X500	=H	+H	SPLICE	/86.F2
-X500.B	=K	+K	CONNECTOR CAB FLOOR	/86.D1
-X500.S	=K	+K	CONNECTOR CAB FLOOR	/86.D2
-X501.B	=K	+K	CONNECTOR CAB FLOOR	/86.D5
-X501.S	=K	+K	CONNECTOR CAB FLOOR	/86.D5
-X502	=K	+K	CONNECTOR LIGHTING CONTROL	/111.C4
-X503	=K	+K	DIAGNOSTIC PLUG, SKYVIEW 360°	/120.C2
-X504	=K	+K	CONTROL ELECTRONICS, SKYVIEW 360°	/120.C4
-X504.a	=K	+K	DIAGNOSTIC PLUG, SKYVIEW 360°	/120.B8
-X615	=K	+K	CONNECTOR PERSONNEL DETECTION	/121.D3
-X616	=H	+H	CONNECTOR PERSONNEL DETECTION	/121.C1
-X710	=M	+M	CONNECTOR ENGINE CONTROL UNIT	/56.D1

BMK	SYSTEM	LOCATION	FUNCTION	PAGE
-X.LAN1	=K	+K2	CONNECTOR ETHERNET MASTER5-PREMIUM	/48.C7
-X.LAN1.X60b	=K	+K2	CONNECTOR ETHERNET MASTER5-PREMIUM	/48.C7
-X.S19b.B	=K	+K	CONNECTOR ROAD TRAVEL	/26.C3
-X.S19b.S	=K	+K	CONNECTOR ROAD TRAVEL	/26.B3
-X.Splice.Can1H	=H	+H	SPLICE	/55.F4
-X.Splice.Can1H1	=H	+H	SPLICE	/55.F3
-X.Splice.Can1H2	=H	+H	SPLICE	/54.F6
-X.Splice.Can1H3	=H	+H	SPLICE	/54.F8
-X.Splice.CAN1L	=H	+H	SPLICE	/55.F4
-X.Splice.CAN1L1	=H	+H	SPLICE	/55.F3
-X.Splice.CAN1L2	=H	+H	SPLICE	/54.F6
-X.Splice.CAN1L3	=H	+H	SPLICE	/54.F8
-X_KI.30	=K	+K2	CONNECTION T. 30	/86.A1
-XC	=F	+F3	CONNECTOR TRANSMISSION	/43.B8
-XC2.B	=H	+H3	CONNECTOR CAN	/87.B5
-XC2.B*	=H	+H	CONNECTOR CAN TERMINATOR	/40.D5
-XC2.B.	=H	+H3	CONNECTOR CAN	/87.E1
-XC2.B..	=H	+H3	CONNECTOR COMPACT MODULE 1	/118.E7
-XC2.S	=H	+H	CONNECTOR CAN	/87.D5
-XC2.S.	=H	+H	CONNECTOR CAN	/87.B2
-XC2.S..	=H	+H3	CONNECTOR COMPACT MODULE 1	/118.B7
-XC2a.	=K	+K	CONNECTOR CAN CONNECTION	/91.B4
-XC2b.	=K	+K	CONNECTOR CAN CONNECTION	/91.E4
-XC.END2	=H	+H	CAN TERMINATOR	/40.D5
-XD	=F	+F3	CONNECTOR TRANSMISSION	/43.D8
-XDW	=K	+K	DIAGNOSTIC PLUG AUXILIARY HEATER	/104.A4
-XMSP1	=H	+H2a	REAR SECTION GROUNDING POINT	/24.E7
-XMSP1	=H	+H2b	REAR SECTION GROUNDING POINT	/29.F8
-XMSP1	=H	+H2c	REAR SECTION GROUNDING POINT	/29.E3
-XMSP1	=H	+H2	REAR SECTION GROUNDING POINT	/24.D2
-XMSP1.ZI1	=H	+H	GROUND INPUT MODULE	/88.F2
-XMSP1.ZO1	=H	+H	GROUND OUTPUT MODULE	/88.F4
-XMSP4	=B	+Bb	GROUNDING POINT	/51.B5
-XMSP4	=B	+Bc	OPERATOR'S CAB GROUNDING POINT	/63.C4
-XMSP4	=B	+B1a	GROUNDING POINT	/45.C4
-XMSP4.1	=H	+H	REAR SECTION GROUNDING POINT	/24.E1

ITEM CODE 12466553 DRAWING INDEX 000

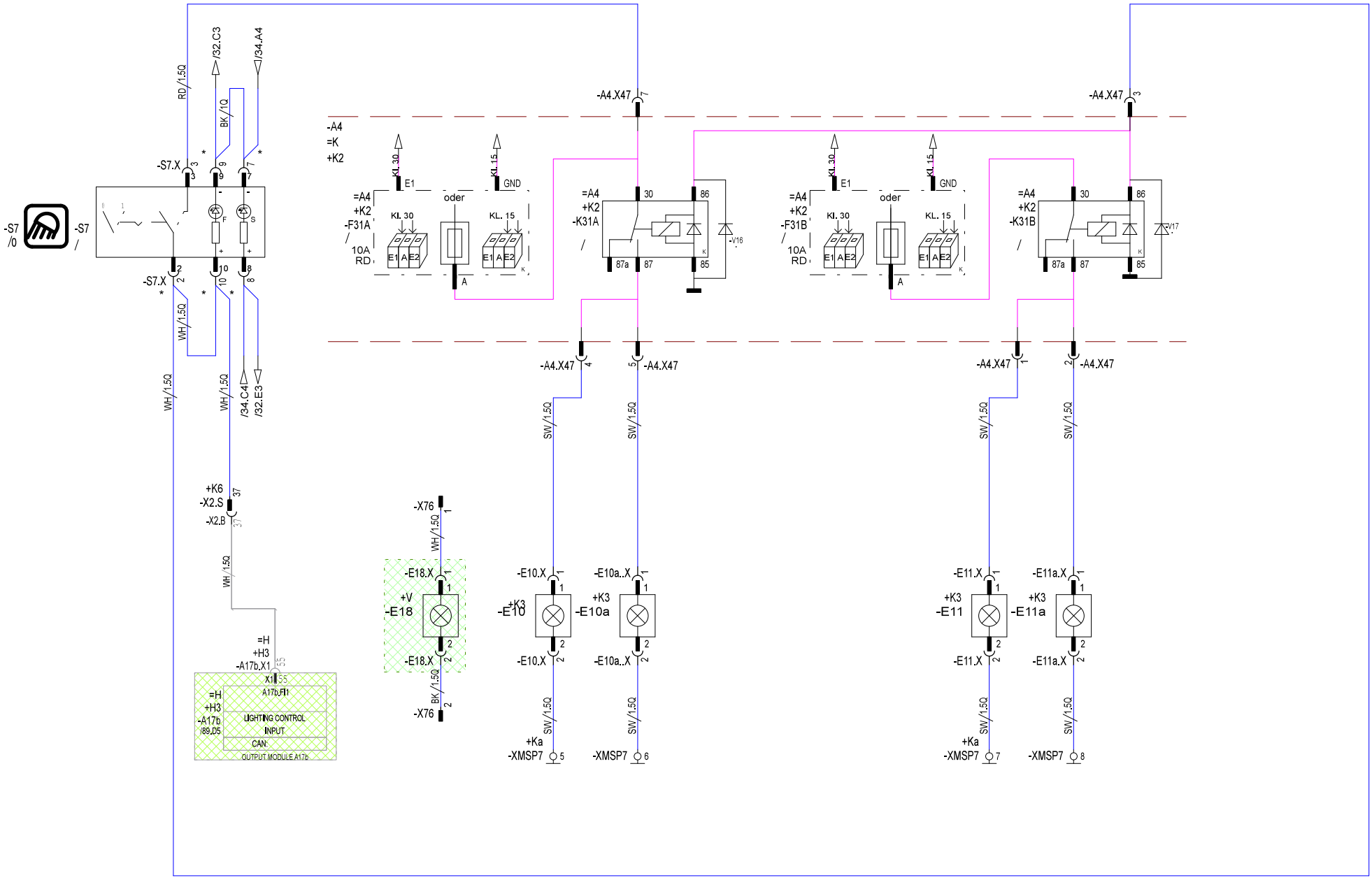
PROJECT GG_4_EVO DRAWING NUMBER 1333 90100 02 00

MACHINE TYPE
LIDOS Gerät

SERIAL NUMBER
XXXXX

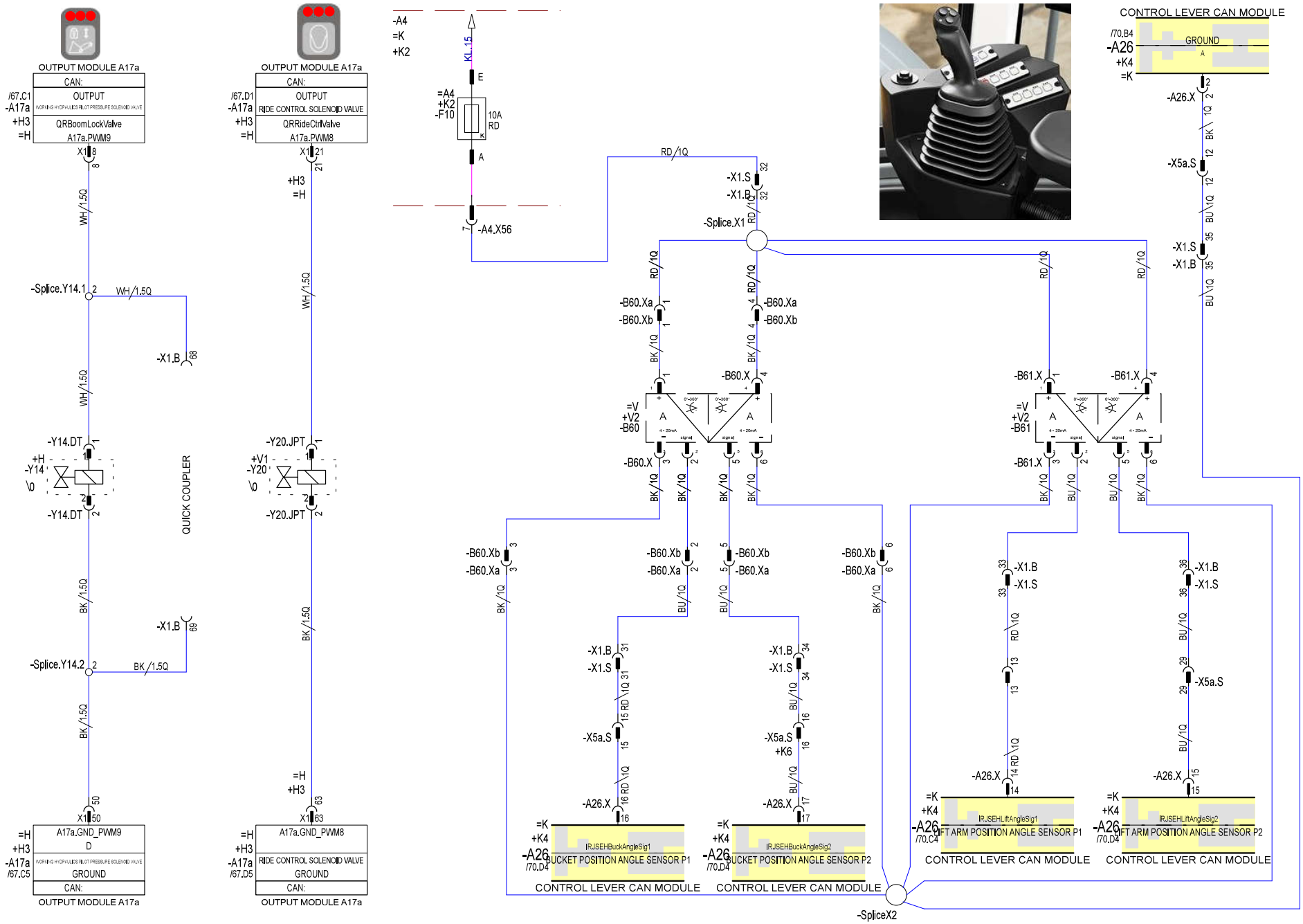
LIEBHERR
FACTORY LBH

BMK-INDEX
ELECTRICAL SCHEMATIC;



PROJECT GG_4_EVO
DRAWING NUMBER 1333 90100 02 00
ITEM CODE 12466553
DRAWING INDEX 000

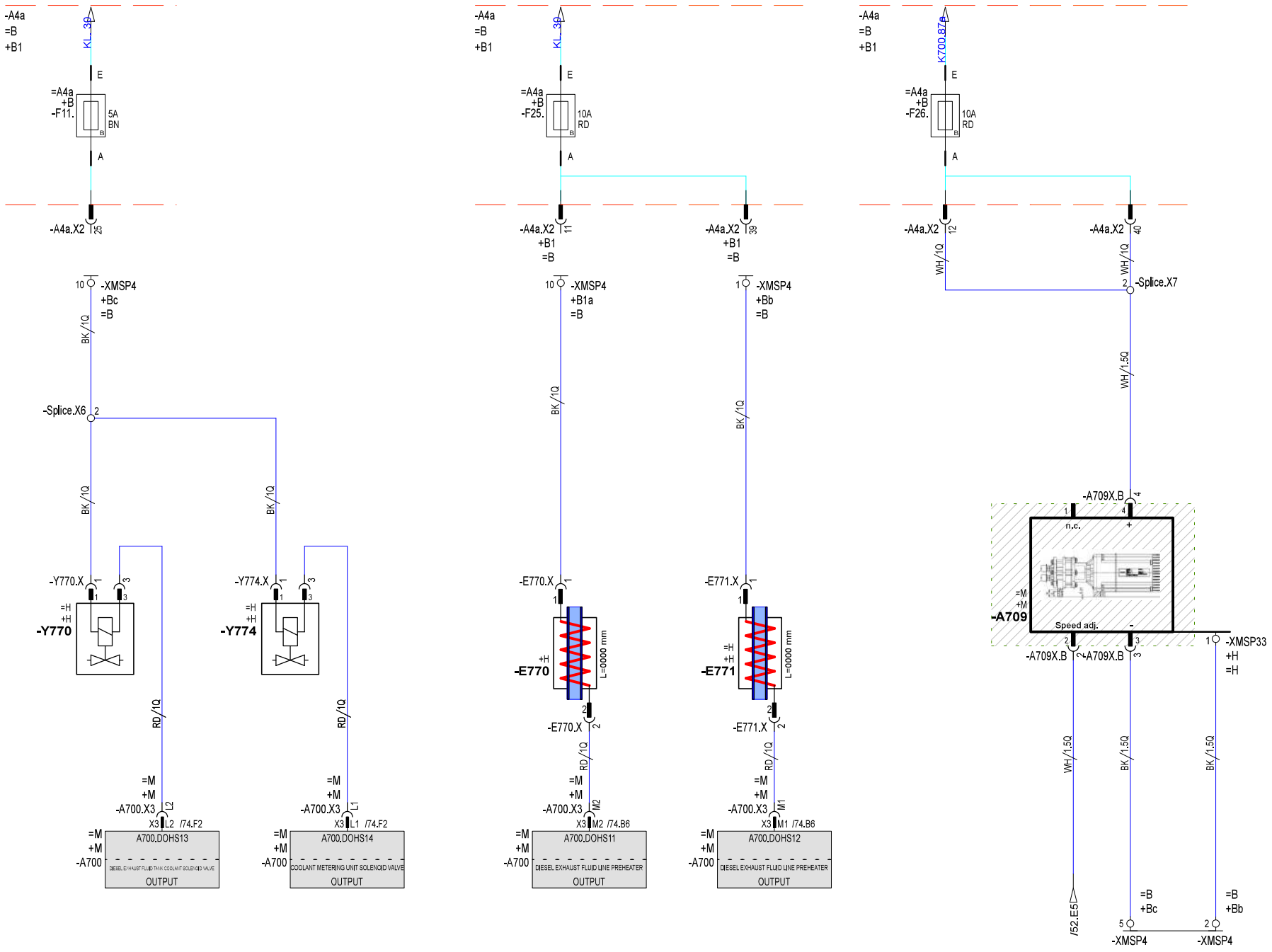
MACHINE TYPE	SERIAL NUMBER			
LIDOS Gerät	XXXXX	LIEBHERR FACTORY LBH	WORKING HEADLIGHT FRONT ELECTRICAL SCHEMATIC;	PAGE 31 OF
				CREATION DATE 09.10.2019 15:49



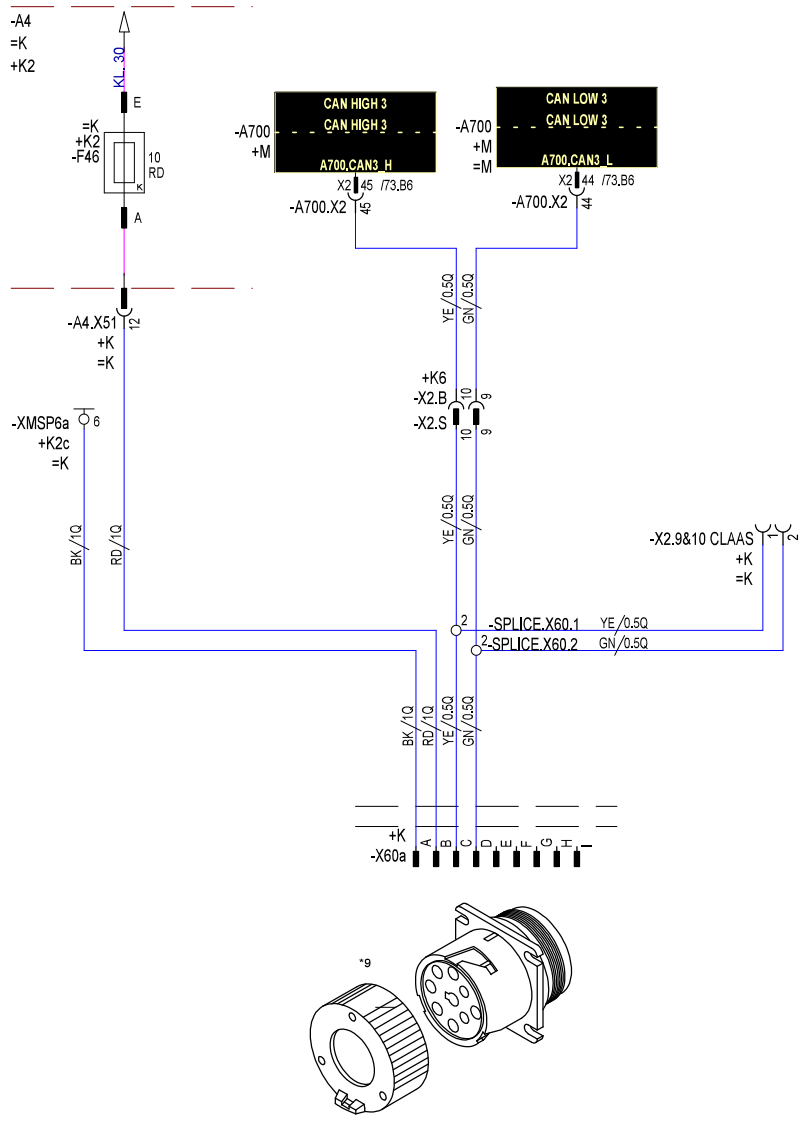
PROJECT	GG_4_EVO
DRAWING NUMBER	1333 90100 02 00
ITEM CODE	12466553
DRAWING INDEX	000

MACHINE TYPE	SERIAL NUMBER		WORKING HYDRAULICS LOCKOUT, RIDE CONTROL, ANGLE SENSORS ELECTRICAL SCHEMATIC;	PAGE 41	OF
LIDOS Gerät	XXXXX	LIEBHERR FACTORY LBH		CREATION DATE	09.10.2019 15:49

ITEM CODE 12466553
DRAWING INDEX 000
PROJECT GG_4_EVO
DRAWING NUMBER 1333 90100 02 00



MACHINE TYPE	SERIAL NUMBER			
LIDOS Gerät	XXXXX	LIEBHERR FACTORY LBH	DIESEL EXHAUST FLUID TANK COOLANT SOLENOID VALVE DIESEL EXHAUST FLUID LINE PREHEATER ELECTRICAL SCHEMATIC;	PAGE 51 OF CREATION DATE 09.10.2019 15:49

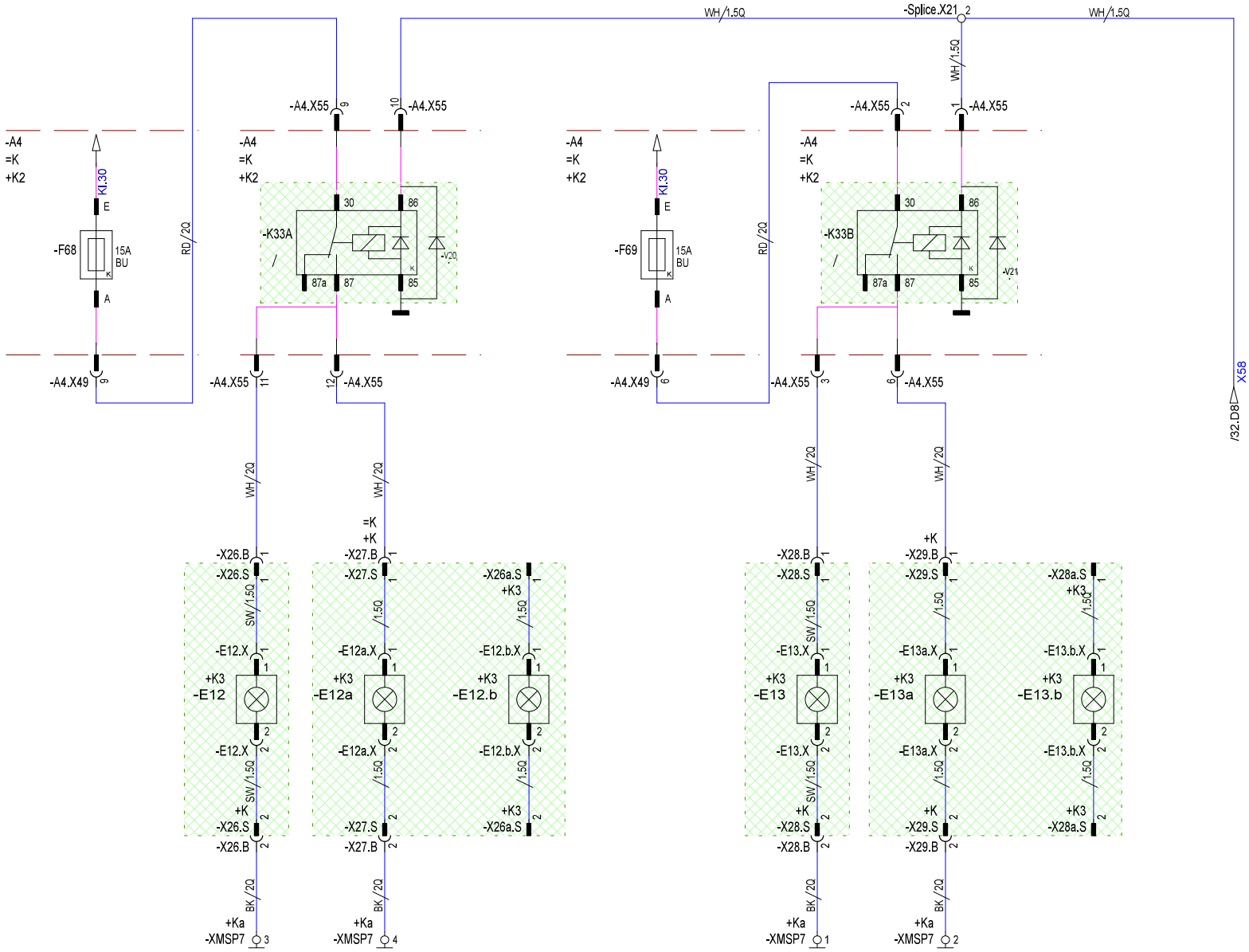


PROJECT GG_4_EVO
DRAWING NUMBER 1333 90100 02 00
ITEM CODE 12466553
DRAWING INDEX 000

MACHINE TYPE	SERIAL NUMBER			
LIDOS Gerät	XXXXX	LIEBHERR FACTORY LBH	DIAGNOSTIC PLUG ENGINE CONTROL UNIT ELECTRICAL SCHEMATIC;	PAGE 61 OF
				CREATION DATE 09.10.2019 15:49

=K -A30 Modul Nr.:
+K2 Modulname: LITU_GRUNDGERÄT

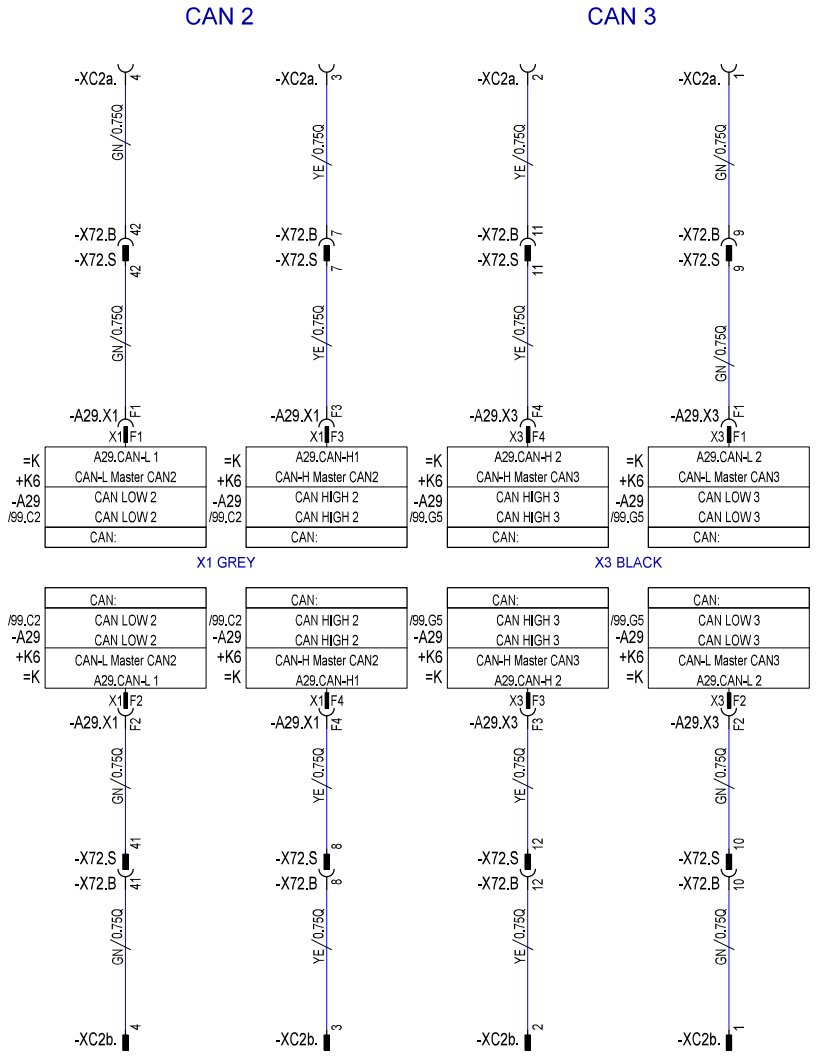
Phys. Adr.	Blatt	EA	Beschreibung	Stecker	Pin	Phys. Adr.	Blatt	EA	Beschreibung	Stecker	Pin
A30.1					1	A30.25					25
A30.2					2	A30.26					26
A30.3					3	A30.27					27
A30.4					4	A30.28	/62.E2		POWER SUPPLY T. 30		28
A30.5	/62.F4		DCD		5	A30.29					29
A30.6	/62.F3		DTR		6	A30.30					30
A30.7					7	A30.31					31
A30.8	/62.F6		GROUND		8	A30.32					32
A30.9					9	A30.33	/62.F5		TXT		33
A30.10					10	A30.34	/62.F7		CTS		34
A30.11					11	A30.35					35
A30.12					12	A30.36					36
A30.13	/62.E1		POWER SUPPLY T. 15		13	A30.37					37
A30.14					14	A30.38					38
A30.15					15	A30.39					39
A30.16					16	A30.40					40
A30.17					17	A30.41					41
A30.18					18	A30.42	/62.E2		GROUND GROUND		42
A30.19	/62.F5		RXD		19						
A30.20	/62.F8		RTS		20						
A30.21					21						
A30.22					22						
A30.23					23						
A30.24					24						



PROJECT GG_4_EVO
DRAWING NUMBER 1333 90100 02 00
ITEM CODE 12466553
DRAWING INDEX 000

MACHINE TYPE	SERIAL NUMBER			
LIDOS Gerät	XXXXX	LIEBHERR FACTORY LBH	OPTION WORKING HEADLIGHT REAR ELECTRICAL SCHEMATIC;	PAGE 81 OF
				CREATION DATE 09.10.2019 15:49

PROJECT GG_4_EVO
DRAWING NUMBER 1333 90100 02 00
ITEM CODE 12466553
DRAWING INDEX 000



MACHINE TYPE
LIDOS Gerät

SERIAL NUMBER
XXXXX

LIEBHERR
FACTORY LBH

OPTION JOYSTICK STEERING CAN MODULE
ELECTRICAL SCHEMATIC;

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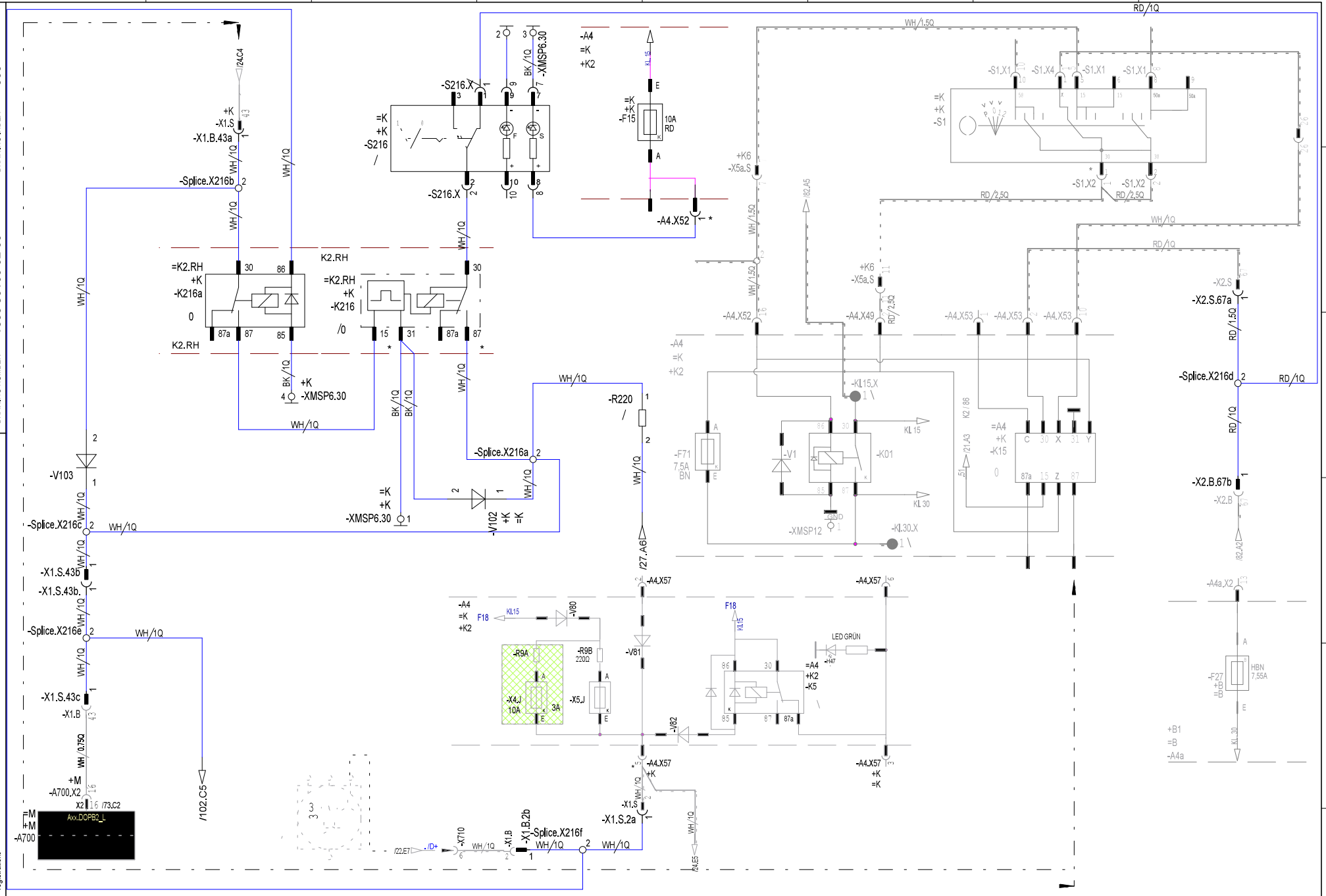
CREATION DATE 09.10.2019 15:49



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PROJECT GG_4_EVO | ITEM CODE 12466553
DRAWING NUMBER 1333 90100 02 00 | DRAWING INDEX 000

MACHINE TYPE	SERIAL NUMBER		
LIDOS Gerät	XXXXX	LIEBHERR FACTORY LBH	OPTION AUTOMATIC DELAYED ENGINE STOP ELECTRICAL SCHEMATIC;

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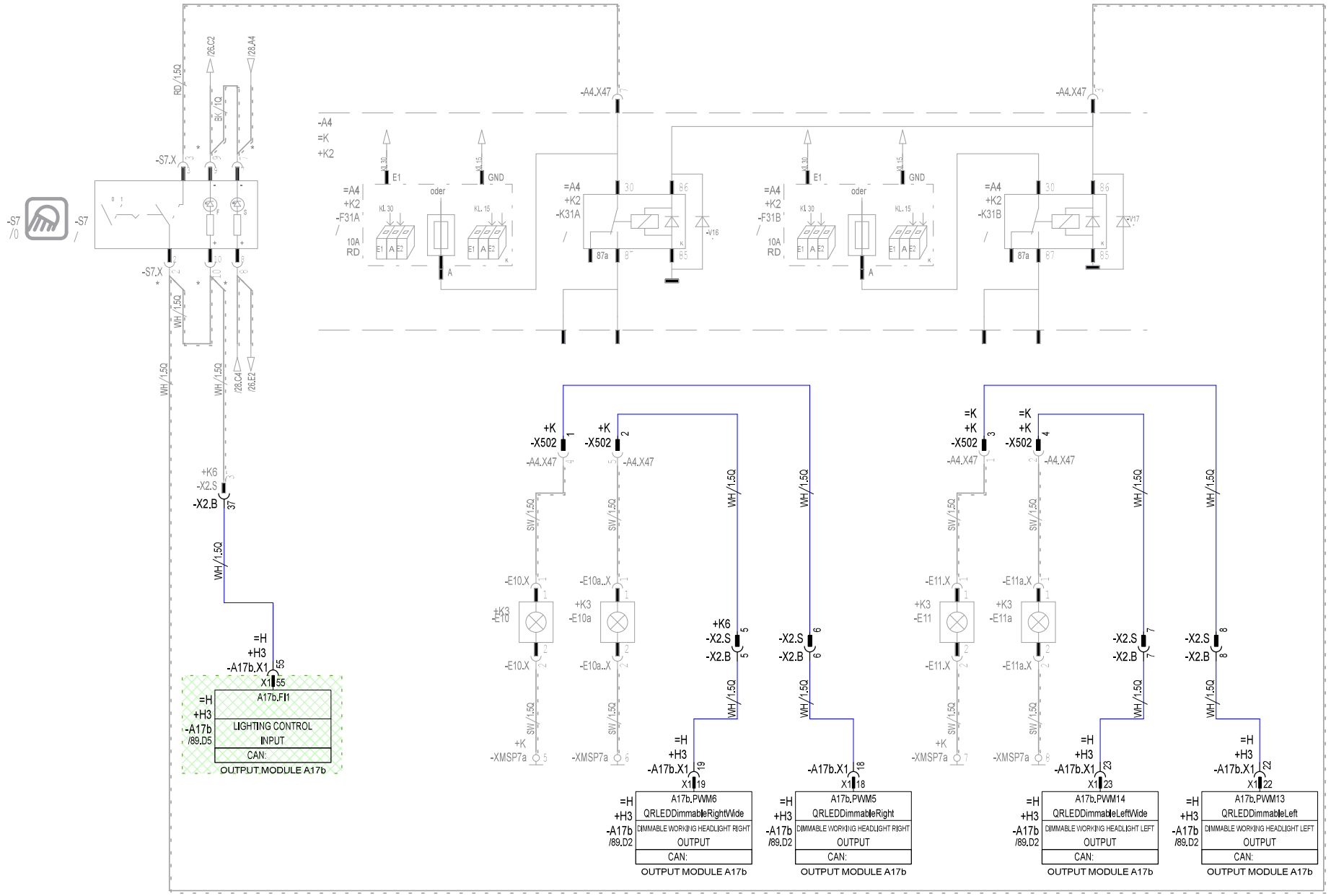
CREATION DATE 09.10.2019 15:49

PROJECT GG_4_EVO
DRAWING NUMBER 1333 90100 02 00
ITEM CODE 12466553
DRAWING INDEX 000



MACHINE TYPE
LIDOS Gerät

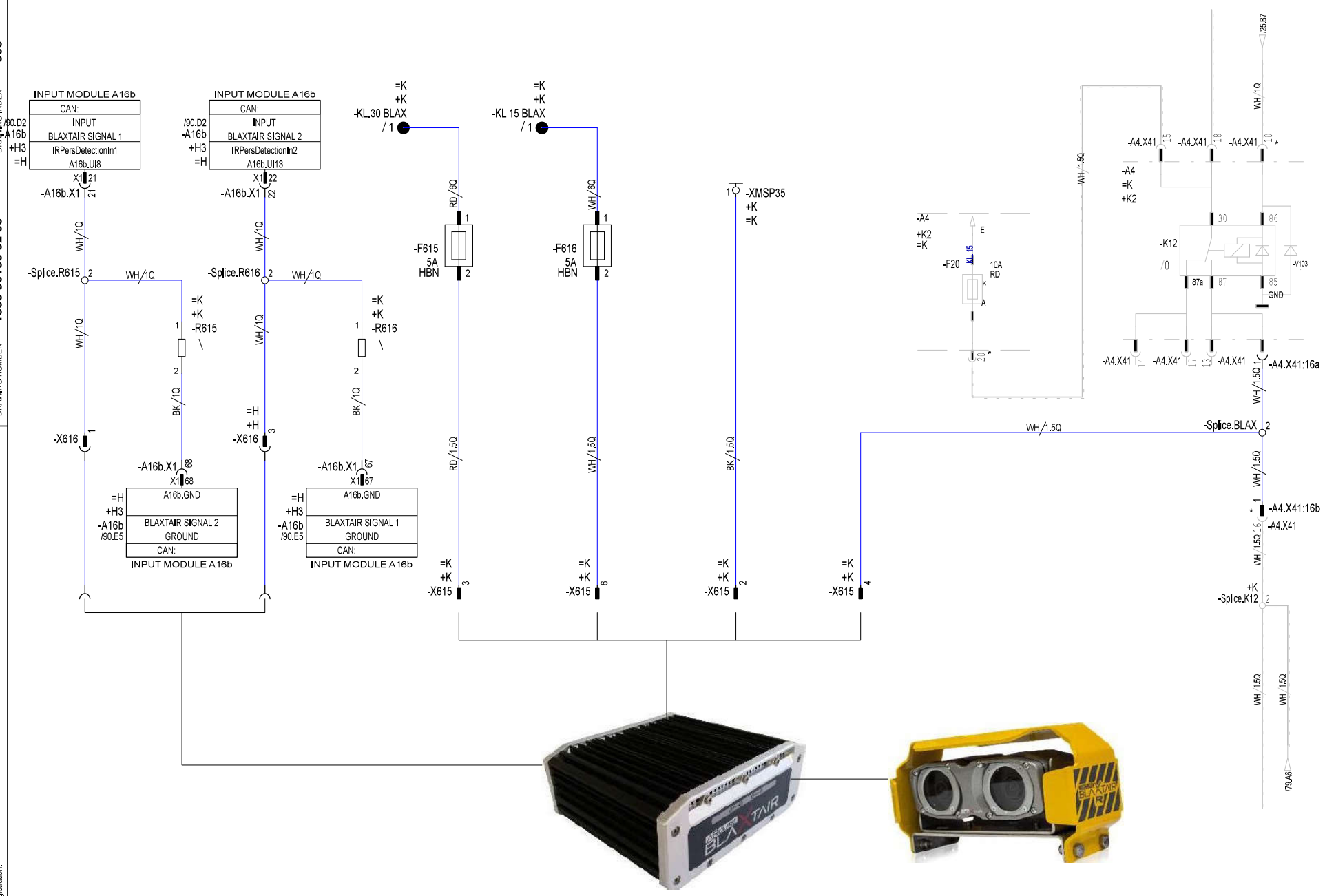
SERIAL NUMBER
XXXXX

LIEBHERR
FACTORY LBH

OPTION LIGHTING CONTROL
ELECTRICAL SCHEMATIC;

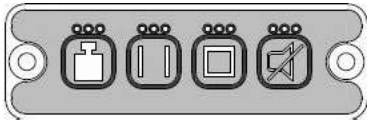
PAGE 111 OF
CREATION DATE 09.10.2019 15:49

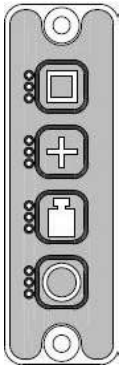
ITEM CODE 12466553
DRAWING INDEX 000
PROJECT GG_4_EVO
DRAWING NUMBER 1333 90100 02 00



MACHINE TYPE	SERIAL NUMBER			PAGE 121 OF
LIDOS Gerät	XXXXX	LIEBHERR FACTORY LBH	OPTION BLAXTAIR REVERSING ALARM ELECTRICAL SCHEMATIC;	CREATION DATE 09.10.2019 15:49

KEYPAD 3

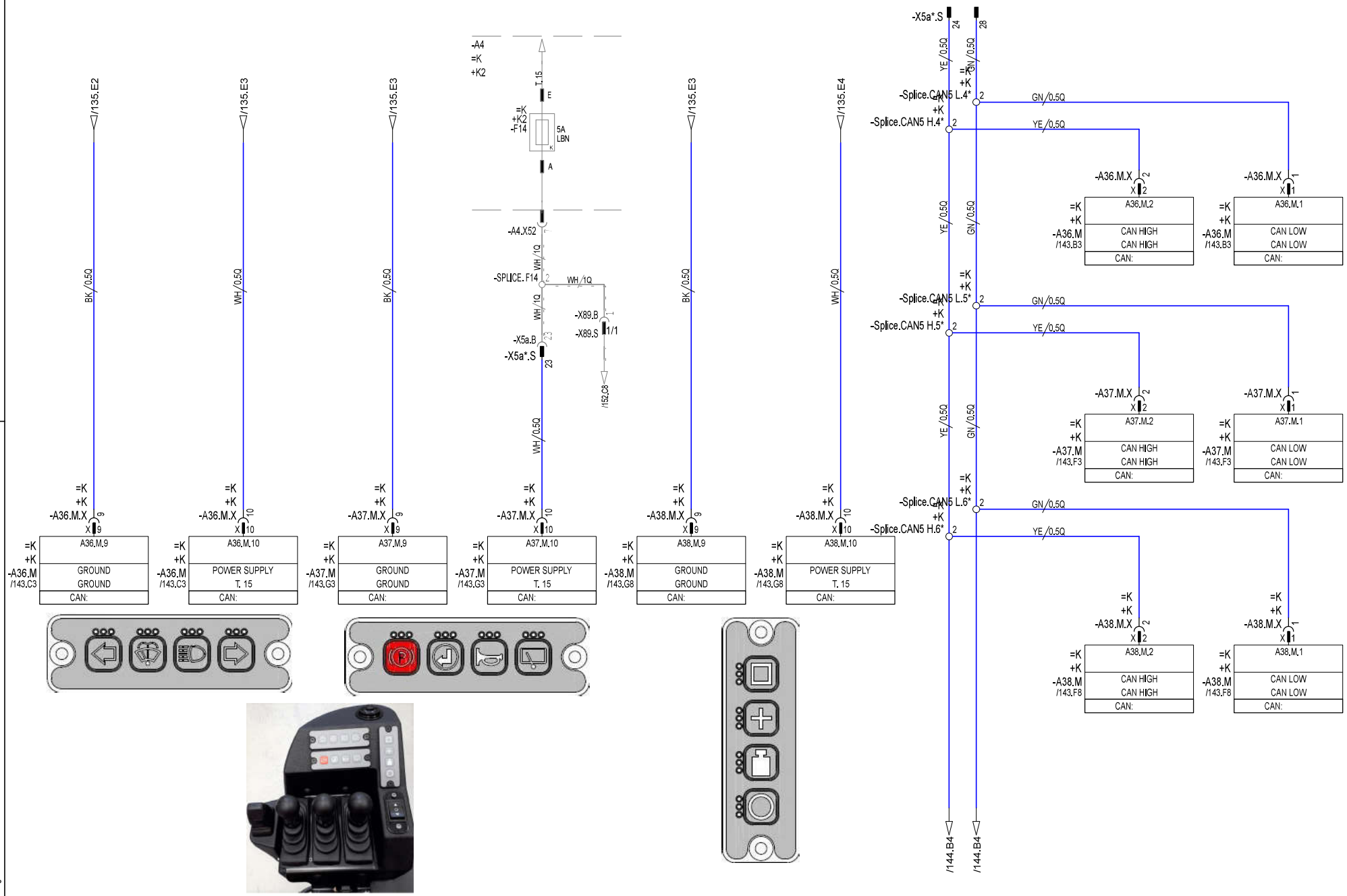




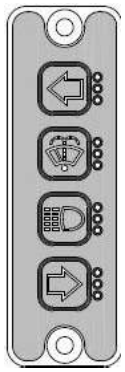
=K
+K4
-A38

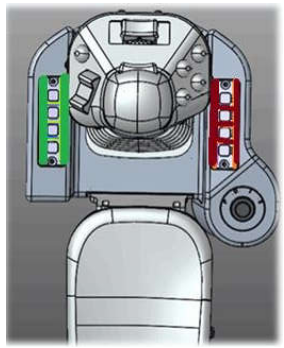
ADDRESS	TYPE	PAGE	DESCRIPTION		CONNECTOR	PIN
A38.1		/128.B8	CAN LOW	CAN LOW	X	1
A38.2		/128.B7	CAN HIGH	CAN HIGH	X	2
A38.3			CAN TERMINATOR	CAN TERMINATOR	X	3
A38.4			GROUND	GROUND	X	4
A38.5		/127.E5	S3_IN	INPUT	X	5
A38.6			S4_IN	INPUT	X	6
A38.7			CAN LOW	CAN LOW	X	7
A38.8			CAN HIGH	CAN HIGH	X	8
A38.9		/128.D5	GROUND	GROUND	X	9
A38.10		/128.D5	POWER SUPPLY	T. 15	X	10
A38.11		/127.E6	S3_OUT	OUTPUT	X	11
A38.12			S4_OUT	OUTPUT	X	12

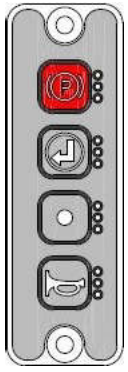
PROJECT GG_4_EVO
DRAWING NUMBER 1333 90100 02 00
ITEM CODE 12466553
DRAWING INDEX 000



MACHINE TYPE	SERIAL NUMBER		VERSION 1 MULTI-LEVER CONTROL KEYPAD 1 2 3	PAGE 141 OF
LIDOS Gerät	XXXXX	LIEBHERR FACTORY LBH	ELECTRICAL SCHEMATIC;	CREATION DATE 09.10.2019 15:49







MACHINE TYPE	SERIAL NUMBER			
LIDOS Gerät	XXXXX	LIEBHERR FACTORY LBH	VERSION 2 LogHandler KEYPAD 1 2 ELECTRICAL SCHEMATIC;	PAGE 151 OF CREATION DATE 09.10.2019 15:49

TYPE MOTOR_SPL

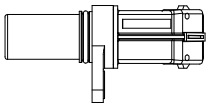
PROJECT: 11392209

TABLE OF CONTENTS

REPLACEMENT FOR	MARKED	lmbbag1	LIEBHERR	A3	DESIGNATION	DESCRIPTION	ARTICLE CODE	SYSTEM	LOCATION
0	DATE	06.02.2018 08:23			ELECTRICAL WIRING DIAGRAM	TABLE OF CONTENTS	11392206	=M	+M
CONFIDENTIAL	CHECKED		FACTORY LMB				DRAWING NUMBER 96 007 9309 90	INDEX 001	SHEET 2 FROM 15
	TECHNICAL REFEREE						ARTICLE CODE 11392206 VERSION 02_0 06.02.2018 08:23		

TYPE MOTOR_SPL

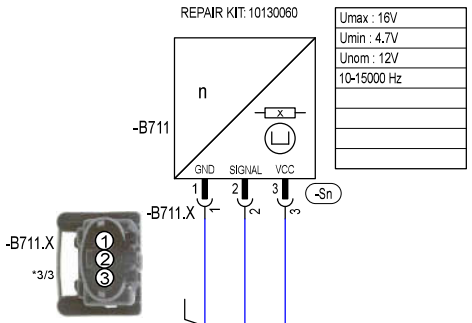
PROJECT: 11392209

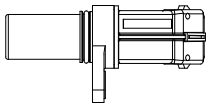


SPEED SENSOR

REPAIR KIT: 10130060

Umax : 16V
Umin : 4.7V
Unom : 12V
10-15000 Hz

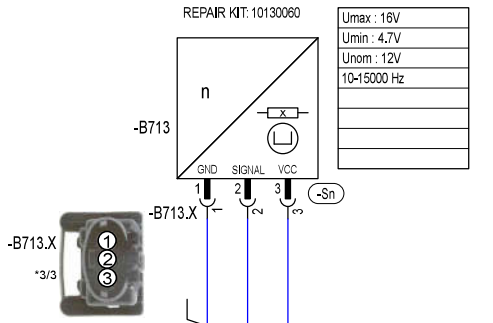




PHASE SENSOR

REPAIR KIT: 10130060

Umax : 16V
Umin : 4.7V
Unom : 12V
10-15000 Hz



REPLACEMENT FOR	MARKED	lmbbag1	LIEBHERR	A3	DESIGNATION	DESCRIPTION	ARTICLE CODE	SYSTEM	LOCATION
0	DATE	06.02.2018 08:23			ELECTRICAL WIRING DIAGRAM	SPEED SENSOR 1, PHASE SENSOR	11392206	=M	+M
CONFIDENTIAL	CHECKED	lmbbua0	FACTORY LMB				DRAWING NUMBER 96 007 9309 90 / INDEX 001	SHEET 12	FROM 15
	TECHNICAL REFEREE								

2 Function

2.1 Basic function

The input modules are part of the control system and are linked to the central control unit via a CAN bus interface. The measurements from sensors are read and evaluated by the input modules. (For more information see: Input modules , page 110-17)

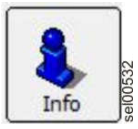
The output modules are part of the control system and are linked to the central control unit via a CAN bus interface. The central control unit can specify the current from the analogue outputs via the CAN bus. The module regulates what currents are required from the outputs. The output module actuates solenoid valves, proportional valves and relays, for example. (For more information see: Output modules , page 110-18)

The tightening torque for the plug connections on the modules is 3 Nm.

2.2 Addresses of the input and output modules

Component	CAN line	Address	Setting when replaced	Status in the system
Input module A16a	1	45 (53, 81)	No	Mandatory
Input module A16b (optional)	2	47 (55, 83)	Yes	Optional
Input module A16L (LogHandler)	2	45 (53, 81)	Yes	Optional
Input module A16M (multi-lever control)	2	48 (56, 84)	Yes	Optional
Output module A17a	1	22 (14, 6, 50)	Yes	Mandatory
Output module A17b (optional)	2	21 (13, 5, 19)	No	Optional

Tab. 232: Module addresses



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

For more information see the section on addressing the compact modules. (For more information see: Addressing CAN module and checking system information, page 030-245)

LBH/12252623/03/211-20200326_151754/en

Connections						Remark
IN				OUT		
X	Y	Z	15	87	87a	
1	0	0	1	1	1	Malfunction. Starting switch defective, external voltage or fuses for terminal 30 defective. Check fuses for terminal 30. Check starting switch. Check external voltage.
1	0	1	1	1	1	Malfunction. Starting switch defective or external voltage. Check starting switch. Check external voltage.
1	1	0	1	1	1	Malfunction. Starting switch defective, external voltage or fuses for terminal 30 defective. Check fuses for terminal 30. Check starting switch. Check external voltage.
1	1	1	1	1	1	Malfunction. Starting switch defective or external voltage. Check starting switch. Check external voltage.

Tab. 238: Diagnosis

1.3 Fuse board A4a

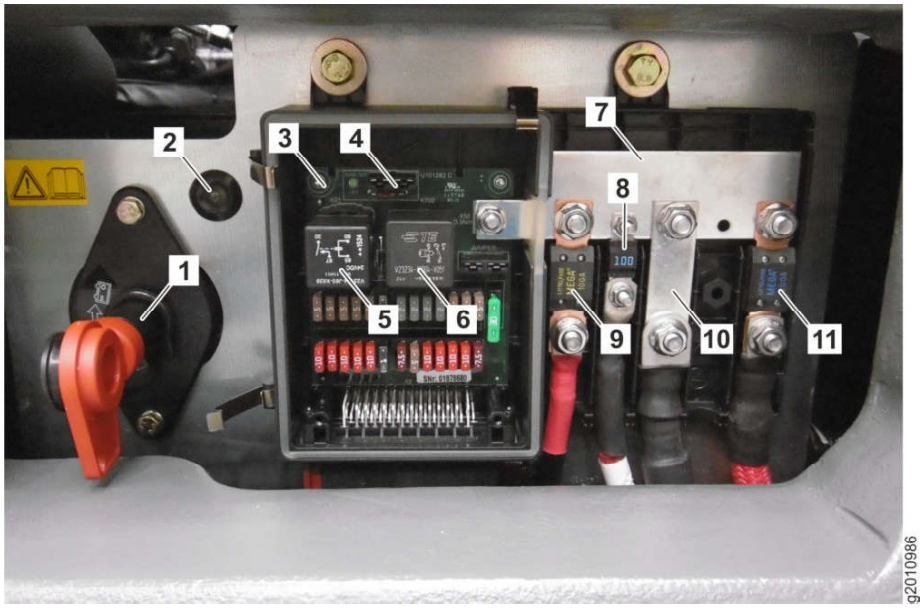


Fig. 524: Fuse board A4a

1 Battery main switch S15
2 *Diesel exhaust fluid line* indicator light E700
3 Fuse board A4a
4 Socket for fuse test
5 Relay K01
6 Relay K700
7 Distributor rail
8 100A fuse for heating flange
9 100A main fuse
10 Power supply from the batteries
11 200A emergency steering pump fuse

2	Temperature valve for gear oil cooler bypass	**8**	Transmission valve block	**14**	Gear oil filter
3	Oil from the gear oil cooler	**9**	Sight glass for gear oil level	**15**	Duct plate
4	Hydrostat module	**10**	Parking brake	**16**	Auxiliary power take-off 1 (not used)
5	Flange for driving diesel engine	**11**	Brake disc for parking brake	**17**	Gear pump
6	Auxiliary power take-off 2 (not used)	**12**	Gear oil filling tube	**18**	Vent valve

Name	Test point	Name	Test point	Name	Test point
MK1	Clutch 1 shift pressure (K1) A)	**MKV**	Clutch shift pressure for forward travel direction (KV) A)	**MSy**	System pressure A)
MK2	Clutch 2 shift pressure (K2) A)	**MO1**	Switching pressure for 1st optional connection B)		
MKR	Clutch shift pressure for reverse travel direction (KR) A)	**MO2**	Switching pressure for 2nd optional connection B)		

Tab. 244: Test points

A) Thread M10x1; tightening torque 6 Nm
B) Thread M12x1.5; tightening torque 35 Nm

BMK	Function	BMK	Function	BMK	Function
A25	Transmission control unit TCU	**Y1**	Proportional solenoid for clutch 2 (K2)	**Y5**	Proportional solenoid for clutch 1 (K1)
B84	Speed sensor for reverse travel direction clutch	**Y2**	Proportional solenoid for forward travel direction clutch (KV)	**Y6**	Proportional solenoid for 2nd optional connection
B85	Filter bypass switch	**Y3**	Proportional solenoid for 1st optional connection		
B86	Gear oil temperature sensor	**Y4**	Proportional solenoid for reverse travel direction clutch (KR)		

Tab. 245: Equipment codes

LBH/12252623/03/211-20200326_151754/en

The planetary gears **ZP1** now rest on the sun gear **ZS1** and transmit the power via the planetary gears **ZP2** to the sun gear **ZS2** and the clutch **K2** to the output.

2.3.5 Machine continuing to accelerate (clutch K2 closed)

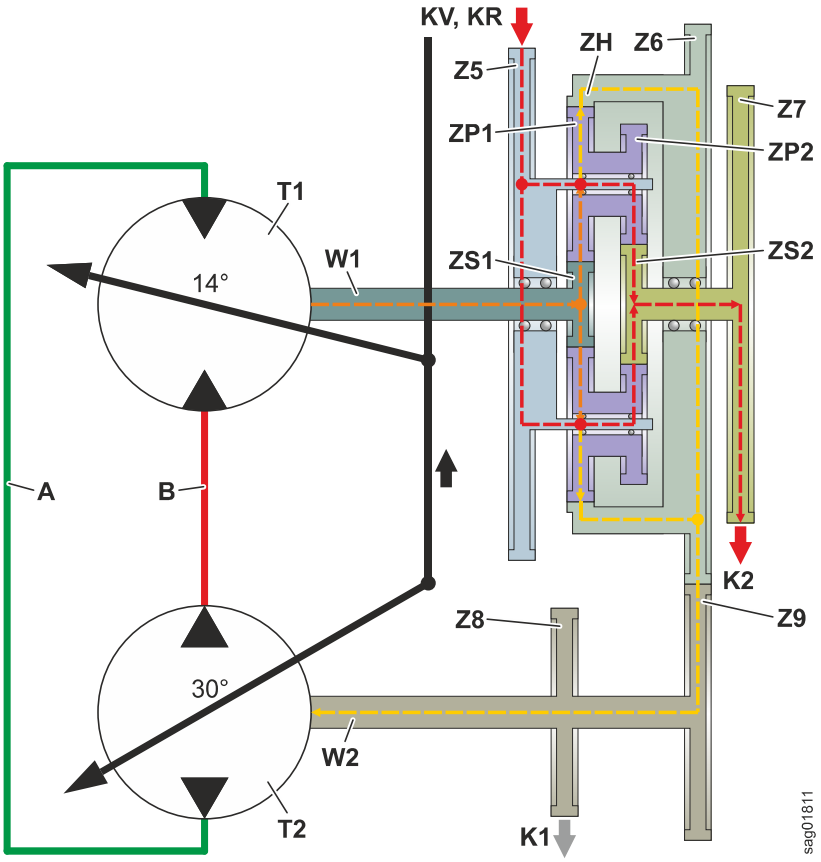


Fig. 539: Machine continuing to accelerate (clutch K2 closed)

Name	Description	Name	Description	Name	Description
A	Duct A	**ZS2**	Sun gear 2	**Z9**	Gearwheel 9
B	Duct B	**ZP1**	Planetary gear 1	**KV**	Forward travel direction clutch
T1	Rotary group 1	**ZP2**	Planetary gear 2	**KR**	Reverse travel direction clutch
T2	Rotary group 2	**ZH**	Ring gear	**K1**	Clutch 1
W1	Shaft 1	**Z6**	Gearwheel 6	**K2**	Clutch 2
W2	Shaft 2	**Z7**	Gearwheel 7		
ZS1	Sun gear 1	**Z8**	Gearwheel 8		

Tab. 255: Key

If the machine continues to accelerate, the double yoke begins to swivel back. As a result, the pump **T2** starts delivering oil to the motor **T1**. The motor **T1** drives the shaft **W1** and thus transmits power hydraulically again as well as mechanically.

120.2.4 Hydrostat module

Valid for: L556-1757;

1 Layout

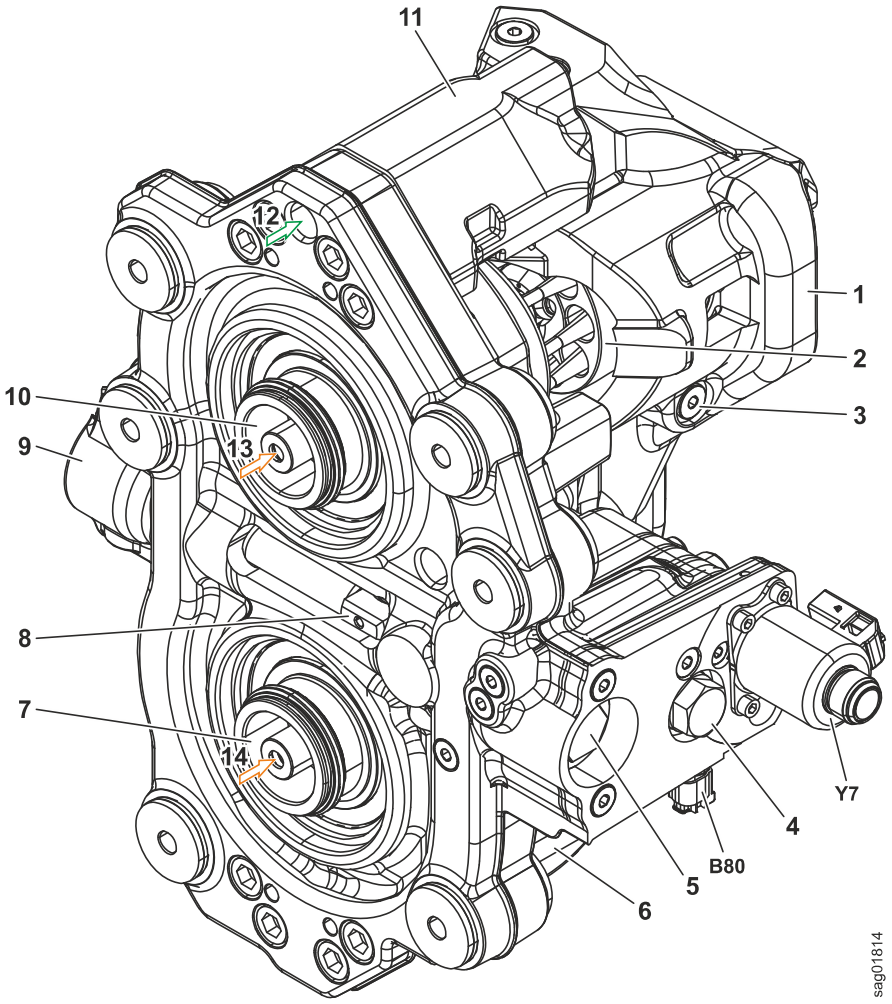


Fig. 545: Hydrostat module (from front left)

1	Double yoke	**8**	Adjusting arm
2	Rotary group 1	**9**	Servo cylinder (extend rotary group 2)
3	Discharge valve with pressure reducing valve 11 bar	**10**	Connection from rotary group 1 to transmission
4	Dummy piston	**11**	Upper swivel bearing for double yoke with rotary bushing
5	Servo cylinder (extend rotary group 1)	**12**	Oil supply from gear pump (via gear oil filter and hydrostat oil filter)
6	Lower swivel bearing for double yoke with rotary bushing	**13**	Rotary group 1 bearing lubrication
7	Connection from rotary group 2 to transmission	**14**	Rotary group 2 bearing lubrication

LBH/122526230/03/211-20200326_151754/en

120.3.6 Temperature sensor

Valid for: L556-1757;

1.1 Layout

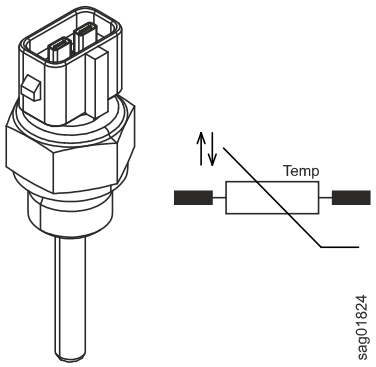


Fig. 555: Temperature sensor

BMK	Function
B86	Gear oil temperature sensor

Tab. 270: Equipment codes

The temperature sensor is screwed into the transmission housing.

2.1 Function

The temperature sensor detects the gear oil temperature.

120.3.7 Proportional solenoid for position control

Valid for: L556-1757;

1.1 Layout

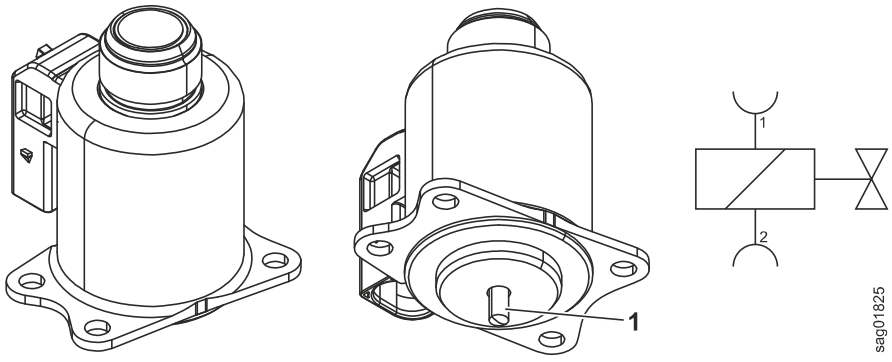


Fig. 556: Proportional solenoid for position control

1 Actuation pin

130.2 Cardan shafts

130.2.1 Drive shaft between diesel engine and transmission

Valid for: L556-1757;

1 Layout

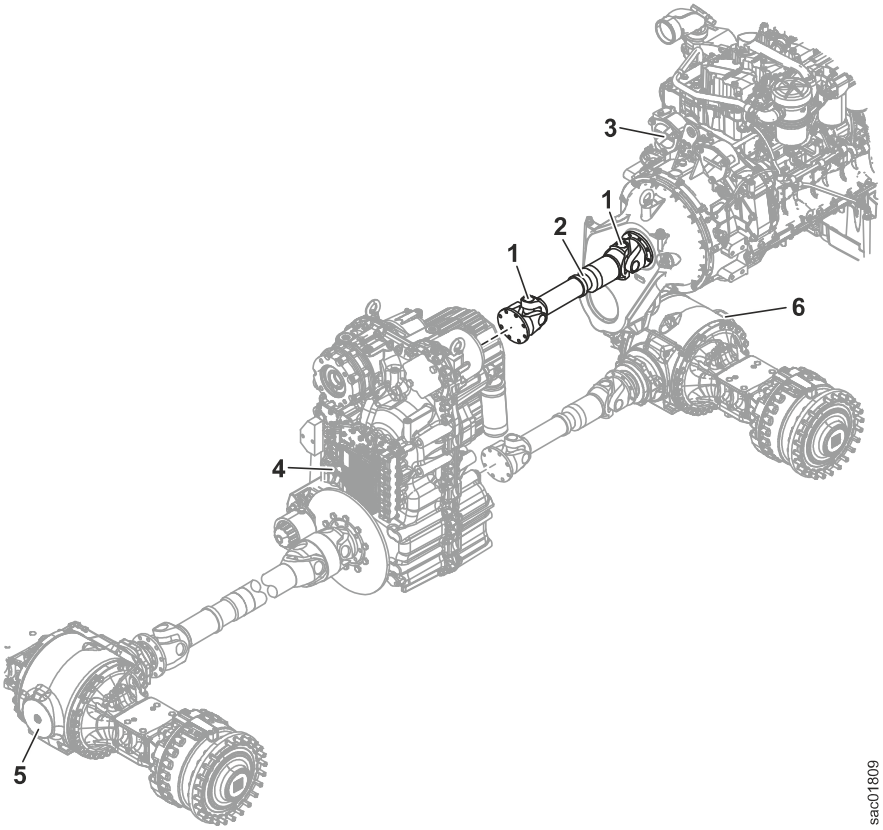


Fig. 563: Drive shaft between diesel engine and transmission

1	Universal joint	**4**	Transmission
2	Extension	**5**	Front axle
3	Diesel engine	**6**	Rear axle

2 Function

The drive shaft connects the output of the diesel engine **3** to the input of the transmission **4**.

2.2 Removal and installation

The drive shaft is balanced. When disassembling the extension, it must therefore be ensured that the two drive shaft halves can be reassembled in the original position. The two drive shaft halves must not be installed twisted with respect to one another.

The universal joints must not be bent to stop position.

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– Manual emergency operation may only be carried out by hand, not with an electric screwdriver. Emergency operation with an electric screwdriver can damage the linear motor. Emergency operation may not be carried out with more than 65 revolutions per minute.

2.4 Linear motor: Troubleshooting

Malfunction	Cause	Remedy
The motor does not make any noise or the piston rod does not move.	No power supply for driving the linear motor.	Check the fuse. Check the power supply. Check the wiring.
	No signal from the *engine hood* bitter.	Check the fuse. Check the power supply. Check the wiring. Check the *engine hood* button .
The linear motor switches off due to overload.	The engine hood is obstructed.	Check the hinge mechanism of the engine hood.
	Damage to the linear motor cylinder.	Check the cylinder of the linear motor. Try extending and retracting the drive with no load.
The electric motor is running but the cylinder does not move.	Damaged gear system or spindle.	Replace the linear motor.
The cylinder extends too slowly. The cylinder extends in jolts.	Too much resistance from the engine hood.	Check the hinge mechanism of the engine hood.
	Insufficient power supply. Voltage drop on the line.	Check the power supply. Check the wiring.

Tab. 274: Linear motor: Troubleshooting

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150.3.2.2 Valve block for quick coupler

Valid for: L556-1757;

1 Layout

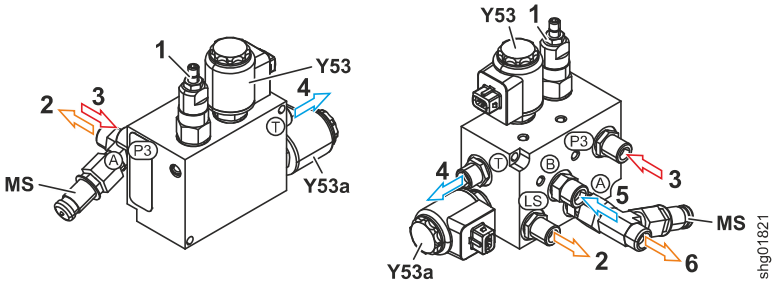

Fig. 577: Valve block for quick coupler (from front left and from rear right)

1 Pressure reducing valve for quick coupler
2 Load sensing signal for working pump (via control valve block)
3 Oil supply from working pump (via control valve block)
4 Return flow to control valve block
5 Connection to hydraulic cylinder ring side
6 Connection to hydraulic cylinder piston side

Name	Test point
MS	Quick coupler closing pressure

Tab. 283: Test points

BMK	Function	BMK	Function
Y53	Solenoid for opening quick coupler	**Y53a**	Quick coupler load sensing signal solenoid

Tab. 284: Equipment codes

Quick coupler valve block is installed in front section to left of control valve block.

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2 Function

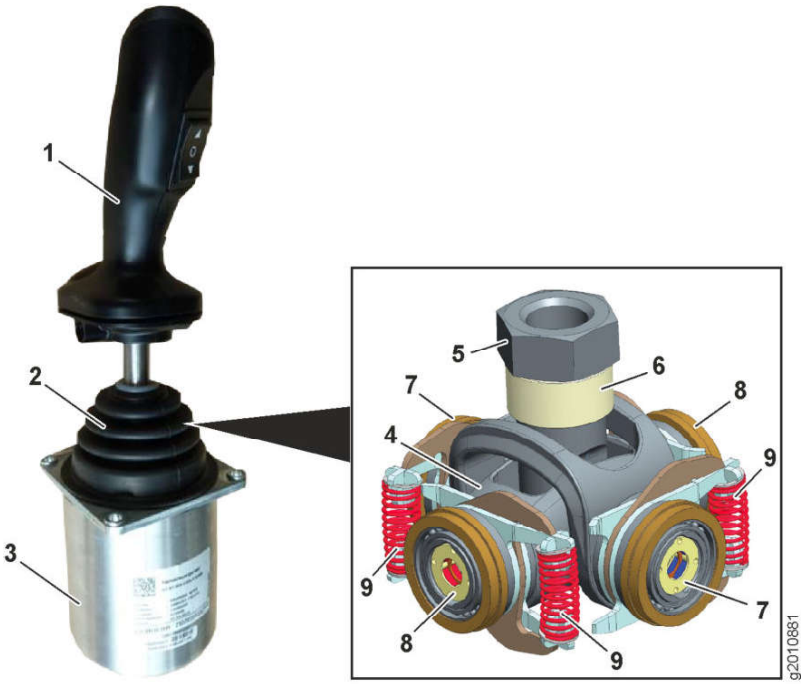

Fig. 584: Function of the control lever

1	Control lever handle	**6**	Stop socket
2	Universal joint	**7**	Angle sensor for the tilt function
3	CAN module for control lever A26	**8**	Angle sensor for the lifting and lowering functions
4	Universal joint	**9**	Return springs
5	Handle holder		

The control lever consists of the handle **1**, the universal joint **4** and the CAN module **3**.

The handle of the control lever contains the travel direction switch and the buttons for additional functions.

The signals from the travel direction switch and the additional function buttons are read by the CAN module of the control lever.

The handle of the control lever is screwed onto the universal joint.

The angle sensors for the tilt function **7** and the angle sensors for the lifting and lowering functions **8** are attached to the axles of the universal joint. These sensors measure the inclination of the control lever.

The universal joint has an action point in all four directions (additional spring force). If this action point is exceeded for more than 0.3 seconds, the kick-out function in that direction is activated.

The control lever CAN module reads and evaluates the signals from the angle sensors, the travel direction switch and the buttons.

This data is sent via a CAN line to the central control unit.

The control lever does not need to be calibrated.

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1 Outside temperature sensor B39
2 Blower
3 Anti-icing sensor B38
4 Evaporator
5 Refrigerant forward flow
6 Condensate trap
7 Expansion valve
8 Refrigerant return flow
9 Heat exchanger
10 Coolant forward flow
11 Coolant return flow
12 Cooling/heating mixer flap
13 Mixer plate
14 Outlet temperature sensor B41
15 Outlet hood
16 Servo motor for head/front level M17
17 Cable harness outlet
18 Servo motor for mixer flap M18
19 Air conditioning controller A21
20 Inside temperature sensor B40
21 Servo motor for recirculated air/ fresh air flap M14

The heating and air conditioning unit is installed on the right on the operator's cab.

2.1 Function

The outside temperature sensor **1** measures the temperature of the fresh air drawn in from outside.

The anti-icing sensor **3** measures the temperature on the evaporator. The evaporator temperature is measured to prevent the evaporator from icing up. If the temperature falls below -1 °C, the compressor coupling is switched off.

The outlet temperature sensor **14** measures the temperature in the mixing chamber. The temperature in the mixing chamber corresponds to the outlet temperature into the operator's cab.

The blower **2** draws in fresh air from outside. The fresh air drawn in is pumped through the condenser and if necessary the heat exchanger via the air pipes into the operator's cab.

The accumulated condensate is collected in the trap **6**. The collected condensate is then discharged via a hose on the bottom of the heating and air conditioning unit.

Refrigerant is evaporated in evaporator **4**. This extracts heat from the surroundings and the evaporator is cooled.

The expansion valve **7** injects refrigerant into the evaporator.

Hot coolant from the diesel engine passes through the heat exchanger **9**. This warms up the heat exchanger. If air is passed through the heat exchanger, it is heated up. The hot air is directed into the operator's cab. This heats the operator's cab.

The cooling/heating mixer flap **12** regulates cooling and heating. In heating mode, the air passes through the heat exchanger. In cooling mode, the path through the heat exchanger is shut off. The air passes directly from the evaporator to the mixing chamber.

The servo motor for the head/front-level flap **16** controls the distribution of air between the head are and the front area.

The servo motor for the mixer flap **18** controls the position of the flap to switch between heating and cooling.

The air conditioning controller **19** processes data from the sensors and controls the servo motors.

The cab air temperature sensor **20** measures the temperature in the operator's cab.

The servo motor for the fresh air flap **21** controls the amount of fresh air in the air drawn in.

160.4.3 Condenser

Valid for: L556-1757;

1 Layout

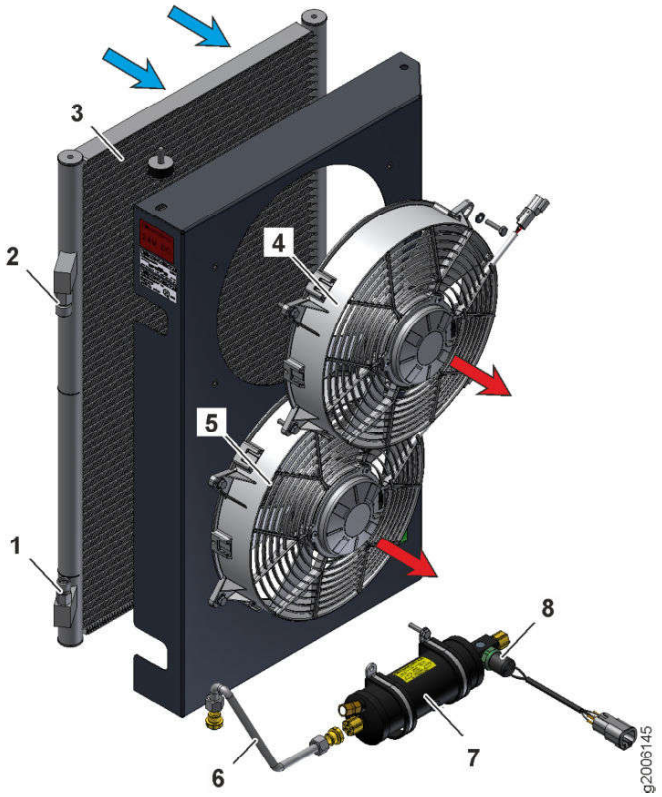

Fig. 600: Condenser unit components

1	Line to dryer	**5**	Condenser fan M13
2	Line from air conditioning compressor	**6**	Connecting line
3	Condenser	**7**	Dryer
4	Condenser fan M13a	**8**	Air conditioning pressure switch B27

The condenser is part of the cooling system.

2 Function

When the air conditioning compressor compresses the refrigerant, the refrigerant is heated up.

The forced-ventilated condenser cools the refrigerant. This turns the gaseous refrigerant into liquid.

The liquid refrigerant passes through the connecting line **6** to the dryer **7**.

Cooling takes place through the air that is drawn in through the condenser by the condenser fans M13 **5** and M13a **4**.

When the air conditioning unit is switched on, both condenser fans run at half speed.

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2.5 Liebherr automatic central lubrication system: industrial lift arms diagram

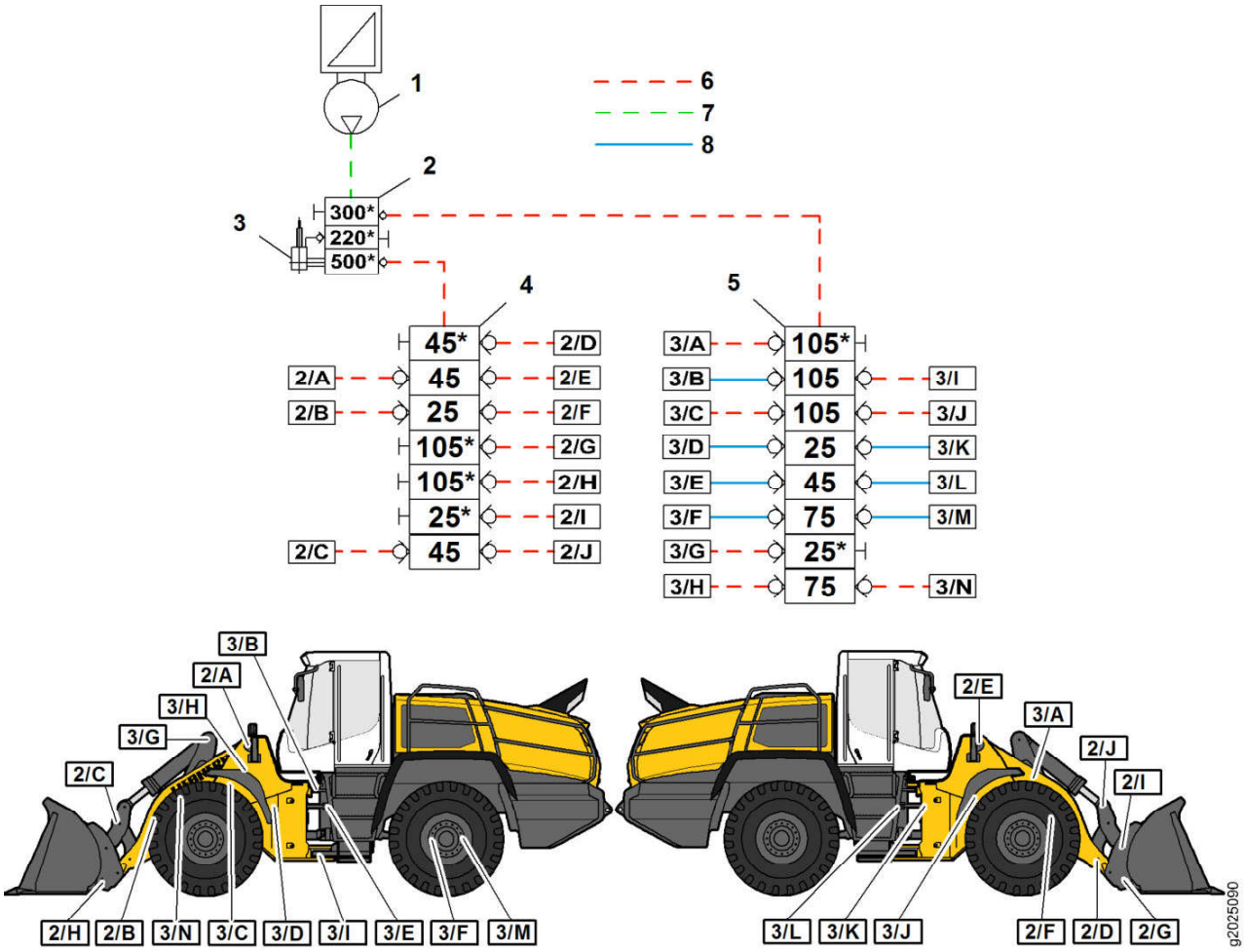

Fig. 608: Diagram of the central lubrication system with overview of lubrication points (Z kinematics)

1	Central lubrication pump	**4**	Secondary progressive distributor 2	**7**	High pressure hose (NW6)
2	Main progressive distributor	**5**	Secondary progressive distributor 3	**8**	Polyamide pipe
3	Pulse generator	**6**	High pressure hose (NW4)		

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The flow rate depends on the piston diameter. Each progressive distributor requires at least three pumping elements to work properly.

The distributors must always be installed in a horizontal position.

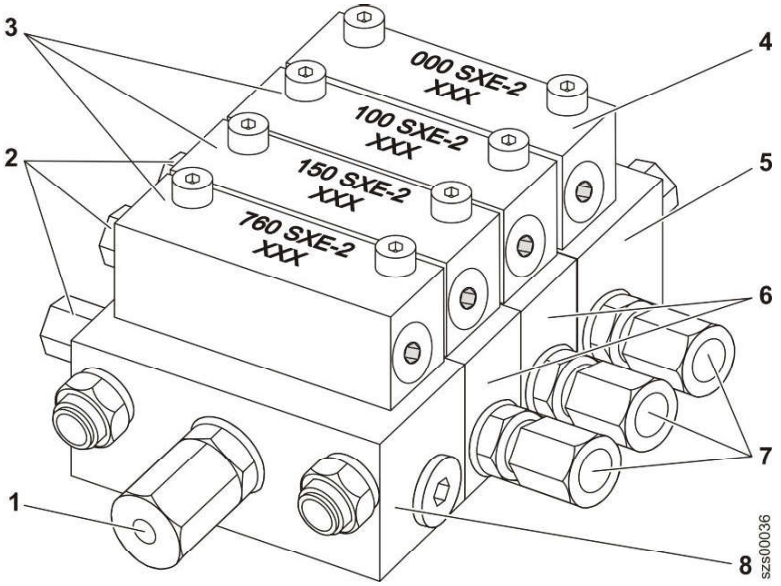

Fig. 620: Progressive distributor

1	Grease intake	**5**	Basic end element
2	Outlets to lubrication points and distributors	**6**	Basic middle element
3	Metering elements	**7**	Outlets to lubrication points and distributors
4	Dummy element	**8**	Basic initial element

The progressive distributor consists of a number of distributor plates connected together by tie rods with washers and nuts. The metering elements are fasten to the basic elements with hex socket screws. The individual elements are sealed with O-rings.

2 Function

2.1 Basic function

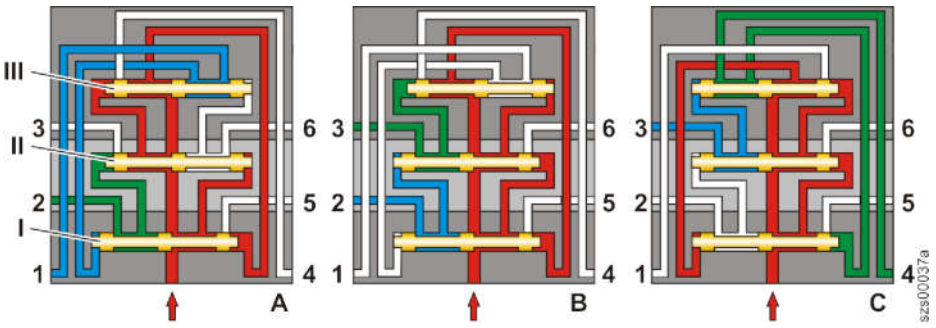

Fig. 621: Piston settings for the progressive distributor SXE-2

A-C	Piston positions	**1-6**	Grease channel outlets
I-III	Piston		

The LiDAT module is equipped with an internal rechargeable battery **1**. The battery is charged using the battery voltage when terminal 30 is activated (battery main switch ON).

The charge status of the battery is monitored internally. If the battery is fully charged or damaged, the charging process is stopped.

1.5 Status display with indicator lamp (LED)

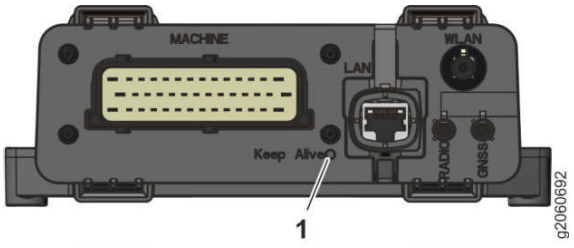

Fig. 629: Status display with indicator lamp (LED)

1 Indicator lamp (LED)

Indicator lamp (LED) **1** signals operating status of LiDAT module.

Colour	Code	Status
Green	Flashes, 1 second on, 1 second off	OK, application runs on terminal 30.
Green	Flashes, 1 second on, 10 second off	OK, application runs on internal rechargeable battery (optional).
Green	Steady light	Starts or shuts down.
White	Steady light	Application is restored or an update is performed.
Yellow	Steady light	There are non-critical errors.
Yellow	Flashes, 1 second on, 1 second off	No W-LAN reception (optional).
Red	Flashes, 1 second on, 1 second off	Critical error
Blue	Flashes, 1 second on, 1 second off	No GNSS reception.
Magenta	Flashes, 1 second on, 1 second off	No GSM reception.

Tab. 299: Status display with indicator lamp (LED)

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2.2 Remote control

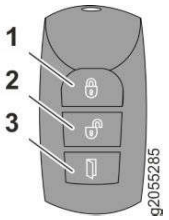

Fig. 647: Remote control

1 *Lock* button
2 *Unlock* button
3 *Unlock and open* button

Remote control sends encrypted signals to receiving unit and control unit.

Remote control is powered by a replaceable button battery inside case.

Remote control and receiving unit and control unit are programmed at factory before delivery. Programming is performed using a programming code. Programming code is enclosed on a label of remote control on delivery.

If a remote control is defective or lost, a new remote control can be requested from factory. Programming is performed using corresponding programming code.

If programming code is lost, a new programming code must be requested. If a new programming code is needed, remote control and receiving unit and control unit must be reprogrammed.

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Silo operation consists of following components:
- Tilt sensor for silo operation
- Angle sensors for bucket position and lift arm position (For more information see: 060.8.2 Working hydraulics angle sensors, page 060-51)
- Pressure sensors for lift cylinder piston side (For more information see: 060.8.3 Pressure sensors for lift cylinders and tilt cylinders, page 060-53)
- Central control unit
- Transmission (For more information see: 120.1 Overview of transmission, page 120-2)
- Diesel engine

2 Function

2.1 Basic function

During silo operation, diesel engine and transmission increase the output torque (power boost). This means more power is available for pushing. To do this, the machine must operate with a certain load uphill in engine braking mode (for example, when moving the silo).

The silo operation reduces the service life of the drive components.

2.2 Activation and deactivation

Silo operation is automatically activated and deactivated by the central control unit. The power boost is gradually adjusted according to the following factors.

Power boost	0% to 100% (linear)	100%
Travel speed	9 km/h to 6 km/h	less than 6 km/h
Pressure on the lifting cylinder piston side	230 bar to 150 bar	less than 150 bar
Angle of inclination around the transverse axis	4° to 8°	8°
Bucket angle starting from saved loading position	25° to 20° tilted in	less than 20° tilted in
Lift cylinder position	60% to 50%	less than 50%

Tab. 307: Parameters for silo operation

The travel speed is sent by the transmission control unit **A25** to the central control unit **A15**.

The pressure on the lifting cylinder piston side is detected by pressure sensor for the lift cylinder piston side **B90**.

The inclination angle is detected by the tilt sensor **B95** and sent via the CAN line **CAN 5** to the central control unit.

The lift arm position is detected by the angle sensors for the bucket position **B60** and lift arm position **B61**.

The central control unit **A15** transmits the appropriate commands to the engine control unit **A700** and transmission control unit **A25**.

2.3 Activation

Install the current transmission software and set the variable ***CXTorqueBoosterOn*** to ***1***.

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