en

Service manual

Wheel loader

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Manufacturer: Liebherr-Werk Bischofshofen GmbH
Valid for: L 576-1333

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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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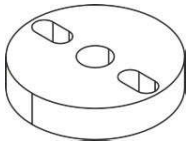
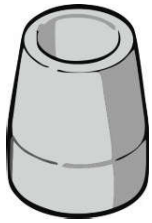
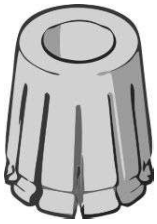
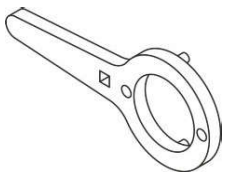
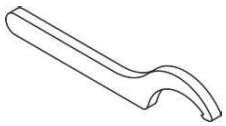
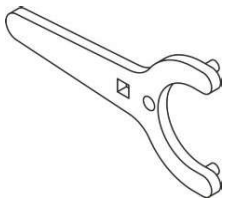
010.2.5 Special tools for steering wheel

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

Tab. 9: Special tools for steering wheel

010.2.6 Special tools for steering cylinders

Designation	Item code	Remark	Fig.
Mounting sleeve 90 mm	9227161	For fitting the seals	
Expansion sleeve 90 mm	9227162	For fitting the seals	
Piston wrench 60/10 mm	9131362	For fitting the piston	
Spanner for piston nut (hook wrench DIN 1810)	12211049	For fitting the piston nut	
Piston rod bearing wrench 76/9 mm	0541665	For fitting the piston rod bearing	

Tab. 10: Special tools for steering cylinders

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

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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020.2.5 Compressed air system

Valid for: L576-1333;

Description	Unit	Value
Compressed air accumulator volume	l	20
Compressed air accumulator charge pressure	bar	10
Regeneration accumulator volume	l	0.6
SCR system operating pressure	bar	2.2

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020.7 Brake system

020.7.1 Brake pump

Valid for: L576-1333;

Description	Unit	Value
Type		External gear pump
Displacement per turn	cm^3	4
Direction of rotation		Anticlockwise

020.7.2 Compact brake valve

Valid for: L576-1333;

Description	Unit	Value
Type		LT17M4X
Weight	kg	13.4

020.7.3 Service brake hydro accumulator

Valid for: L576-1333;

Description	Unit	Value
Volume	l	1.4
Nitrogen filling pressure at 20 °C	bar	95 $^{+2/-1}$
Weight	kg	5.4

020.7.4 Brake light pressure switch B12

Valid for: L576-1333;

Description	Unit	Value
Type		Normally open
Switch point, rising	bar	5 $^{\pm 0.5}$
Connecting thread	mm	M12x1.5

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Size and tread code		Change in operating weight	Width across tyres	Change in height	Tyre pressure		
					FA [A]	RA [B]	p - max. [C]
		kg	mm	mm	bar	bar	bar
Bridgestone 26.5R25 VSNT	L4	+576	2960	+47	4.50	3.20	6.50
Bridgestone 750/65R25 VTS	L3	+86	3070	-39	4.70	3.50	5.00
Continental 26.5R25 EM-Master	L4	+528	2930	+48	4.75	3.75	6.50
Ecomega 26.5R25 M5DT	L5	+1180	2910	+63	5.00	4.50	6.50
Goodyear 26.5R25 GP-4D	L4	+436	2980	+26	4.80	3.20	5.00
Goodyear 26.5R25 RL-4K	L4	+776	2990	+63	4.80	3.00	6.50
Goodyear 26.5R25 RL-5K	L5	+1244	2990	+63	4.80	3.00	6.50
Goodyear 26.5R25 RL-5S	L5	+1460	2990	+63	4.80	3.00	6.50
Goodyear 26.5R25 RT-3B	L3	+324	2980	+26	4.80	3.20	6.50
Goodyear 26.5R25 RT-5D	L5	+1008	2990	+63	4.80	3.50	6.50
Goodyear 26.5R25 TL-3A+	L3	+348	2980	+30	4.80	3.00	5.00
Goodyear 750/65R25 TL-3A+	L3	+40	3100	-26	4.70	3.00	5.00
Michelin 26.5R25 XHA2	L3	0	2960	0	3.70	2.70	5.50
Michelin 26.5R25 XLD D2A	L5	+696	2970	+38	3.70	2.70	5.50
Michelin 26.5R25 XMINE PRO	L5	+1188	3010	+58	3.70	2.70	7.00
Michelin 26.5R25 XKA	L3	+464	3000	+11	3.70	2.70	6.50
Michelin 26.5R25 XTXL	L4	+488	2970	+23	4.50	3.00	8.00
Michelin 750/65R25 XLD65	L3T	-116	3060	-57	4.00	3.00	5.50

Tab. 25: Approved tyres for standard uses

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

020.10.6.2 Tyres for timber work

Size and tread code		Change in operating weight	Width across tyres	Change in height	Tyre pressure		
					FA [A]	RA [B]	p - max. [C]
		kg	mm	mm	bar	bar	bar
Bridgestone 26.5R25 VJT	L3	+160	2970	+14	5.00	3.50	5.00
Bridgestone 26.5R25 VLTS	L4	+420	2970	+44	5.00	3.50	5.00
Bridgestone 26.5R25 VSDL	L5	+1290	2970	+57	5.00	3.50	6.50
Bridgestone 26.5R25 VSDT	L5	+1038	2970	+50	5.00	3.50	6.50
Bridgestone 26.5R25 VSMS	L5	+1599	2960	+70	5.00	3.50	6.50
Bridgestone 26.5R25 VSNT	L4	+576	2960	+47	5.00	3.50	6.50
Bridgestone 750/65R25 VTS	L3	+86	3070	-39	5.00	3.70	5.00

030 Maintenance

Contents

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030.1 Maintenance and inspection schedule

General information

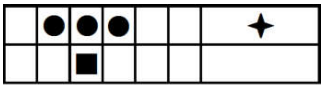
Shorten maintenance intervals depending on conditions of use, for example:
- Dust-intensive use
- Oil quality
- Fuel quality

Ensure that lubricants, liquids and replaced parts are disposed of safely and in an environmentally friendly manner. Comply with applicable country-specific guidelines and applicable laws in country of use.

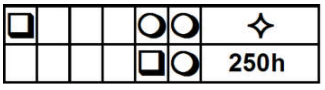
Service packs in spare parts catalogue contain spare parts required for maintenance activities.

The following abbreviations are used in this section:
- h = operating hours

Various symbols (solid or empty circles, boxes and stars) are used to indicate the maintenance tasks, which fall into two main types.

 G2010460	**The symbols have the following meanings:** Table with solid circle, box or star Responsibility for carrying out the maintenance work lies with the machine operator or his maintenance staff. Maintenance interval: every 10, 50 and 500 service hours (h), and at unscheduled times.

Tab. 28: Machine operator

 G2010467	**The symbols have the following meanings:** Table with empty circle, box or star, or service hours (h) The maintenance and inspection work must be performed or supervised by authorised engineers from Liebherr or its authorised dealers. Maintenance interval: on delivery and every 1000, 2000, 3000 service hours (h), and at unscheduled times.

Tab. 29: Authorised specialist staff

You will find a list of the spare parts needed for maintenance and inspection work in the service package of the spare parts list.

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030.3.6 Diesel exhaust fluid

Valid for: L576-1333;

030.3.6.1 Liebherr recommendation

Designation
AdBlue® in Europe
DEF (Diesel exhaust fluid) in the USA
AUS 32 (aqueous urea solution)

Tab. 38: Liebherr recommendation

030.3.6.2 Minimum quality requirement

Specification
DIN 70 070
ISO 22241
LH-00-UREA

Tab. 39: Minimum quality requirement

030.3.7 Engine oils

Valid for: L576-1333;

030.3.7.1 Liebherr recommendation

Ambient temperature	Designation
-30 °C to 35 °C	Liebherr engine oil 5W-30
-30 °C to 35 °C	Liebherr engine oil 5W-30 low ash

Tab. 40: Recommendation for engine oils

For machines with a diesel particulate filter, the low ash engine oil must be used.

030.3.7.2 Other approved engine oils

Ambient temperature	Designation
-20 °C to 45 °C	Liebherr engine oil 10W-40
-20 °C to 45 °C	Liebherr engine oil 10W-40 low ash

Tab. 41: Other approved engine oils

For machines with a diesel particulate filter, the low ash engine oil must be used.

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▶ Push the button **1** to position **A** and hold it.
▷ The engine bonnet **2** opens.
▷ The mechanism holds the engine bonnet in position.

Troubleshooting
If the mechanism does not hold the engine bonnet in position:

▶ Contact Liebherr customer service.

To close the engine bonnet:

▶ Push the button **1** to position **B** and hold it.
▷ The engine bonnet **2** closes.

Note
The engine bonnet encounters an obstruction when opening or closing and is stopped due to overload.
The engine bonnet can only be opened or closed in the opposite direction to the overload.

▶ Press button **1**.

▶ Remove obstruction.

Manual emergency operation of the engine bonnet

NOTICE
Overload!
Damage to the drive system.

▶ Turn off the battery main switch.

▶ Only carry out emergency actuation manually.

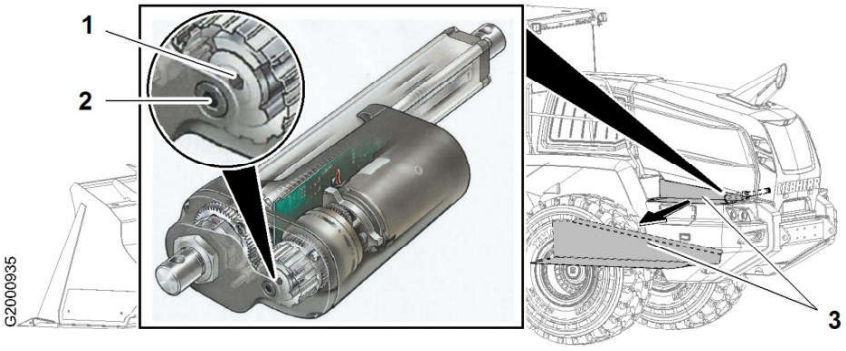

Fig. 90: Manual emergency operation of the engine bonnet

1 Drive gear
2 Screw plug
3 Battery compartment cover

▶ Remove the battery compartment cover **3**.
▷ The provides access to the emergency actuation mechanism.

▶ Unscrew the screw plug **2**.

▶ Turn the drive gear **1** by hand with an Allen key.
▷ The engine bonnet opens.

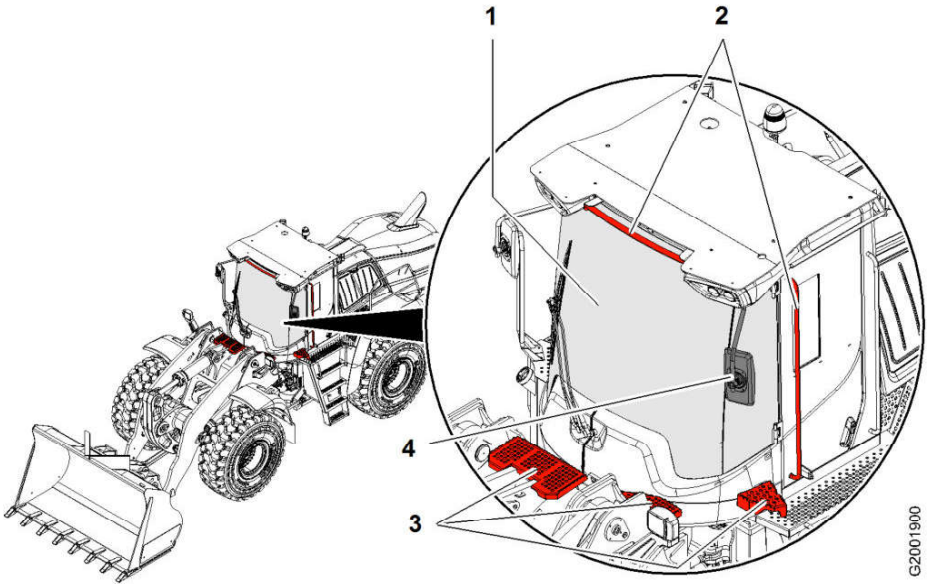

Fig. 97: Cleaning the front windscreen of the cab

1	Front windscreen	**3**	Footplate
2	Handrail	**4**	Exterior mirror

▶ Fold in the exterior mirror **4** towards the cab door.

▶ Access to the windscreen: use the footplate **3** and handrail **2**.

▶ Use commercial glass cleaner.

▶ Use lint-free cleaning cloths.

030.4.3.4 Changing the VCI-capsules

Valid for: L576-1333;

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

Make sure following material is ready:
❑ 5 VCI-capsules of type VC1-1 (item code: 8145869).
❑ A sticker for noting that they have been changed (enclosed with the VCI-capsules).

Changing the VCI-capsule in the back of the switches

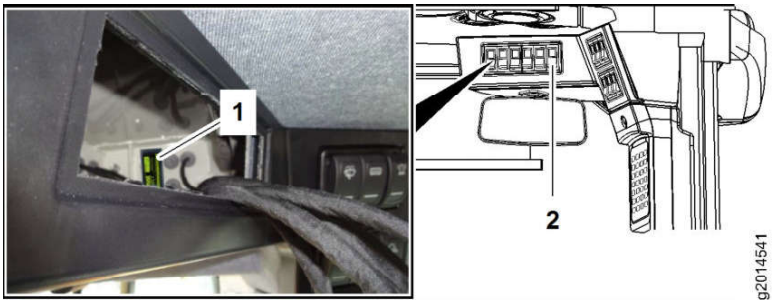

Fig. 98: Changing the VCI-capsule in the back of the switches

1	VCI-capsule	**2**	Switch cover

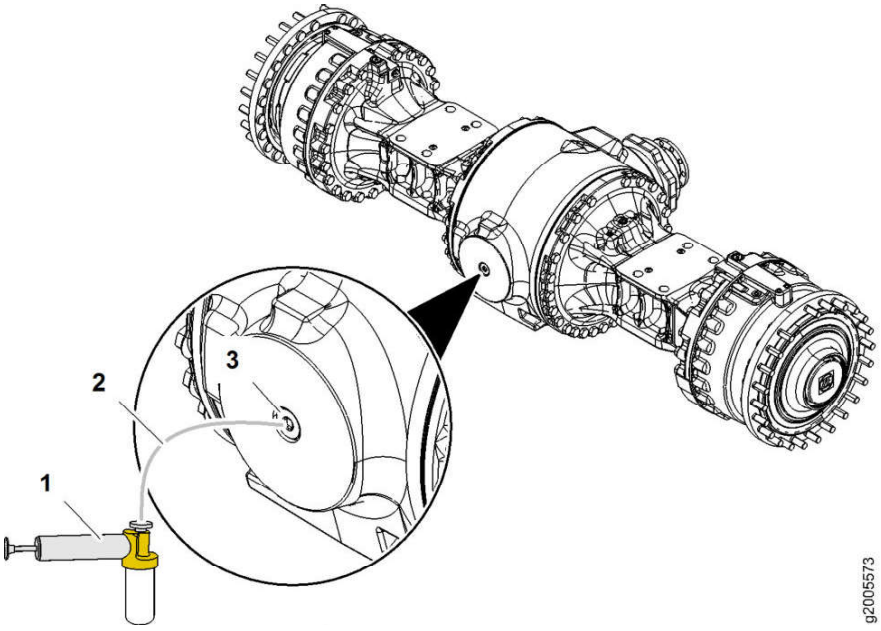

Fig. 106: Sampling point on the axles

1 Hand pump
2 Sampling hose
3 Filling plug

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

▶ Put machine in maintenance position 2.

CAUTION
Hot, pressurised fluid!
Injury.

▶ Carefully unscrew filling plug.

▶ Carefully unscrew filling plug **3**.

▶ Insert the sampling hose **2** to 5 cm below the oil level.

▶ Fill the sample container using the hand pump **1**.

▶ Close the filling plug again.

Hydraulic system

Take oil sample from hydraulic system: (For more information see: Hydraulic tank: analysing the oil, page 030-108)

030.4.4 Drive group

030.4.4.1 Checking diesel engine oil level

Valid for: L576-1333;

There are two ways to check the oil level:
– Checking the oil level on the display
– Checking the oil level on the dipstick

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Troubleshooting
If you find any damage to the electrical system of the engine:

▶ Do not start the engine.

▶ Repair the damage or replace the parts.

030.4.4.7 Checking diesel engine valve clearance

Valid for: L576-1333;

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

Make sure that one of following tools is ready:
❑ Engine cranking device (item code: 10116805) (recommended)
❑ Engine cranking device (item code: 0524045)

Attaching engine cranking device

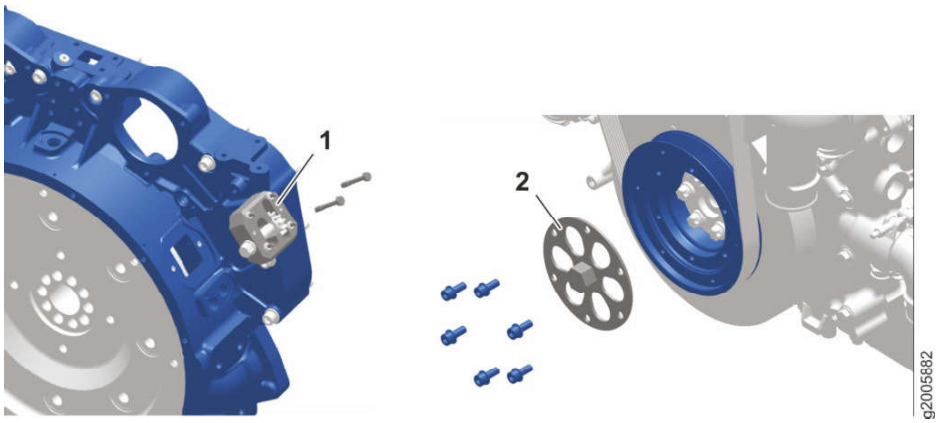

Fig. 116: Attaching engine cranking device

1	Engine cranking device (item code: 0524045)	**2**	Engine cranking device (item code: 10116805)

Note

The engine cranking device (item code: 10116805) is recommended because the torsional vibration damper is easier to access than the flywheel housing.

▶ Attach a cranking device to the diesel engine.

Checking and adjusting the valve clearance

Cylinder numbering and crankshaft direction of rotation:
– Cylinder 1 is on the flywheel side.
– The diesel engine turns anticlockwise as seen towards the flywheel.
– The outlet valves of the cylinder are on the flywheel end.

▶ Remove valve cover.

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❑ Service access is open.
❑ Diesel engine has cooled down.

Make sure that following tool is ready.
❑ Receptacle

WARNING
Highly flammable consumables!
Beware of burns.

▶ Avoid naked lights and fire.

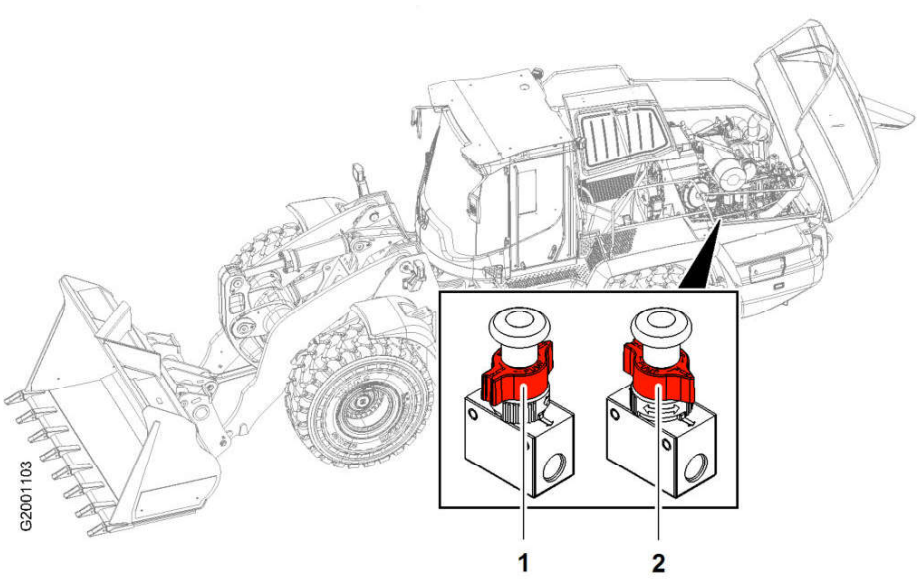

Fig. 125: Bleeding fuel system

1 Hand pump in *PUMP* position **2** Hand pump in *RUN* position

CAUTION
Pressurised fluids that are irritants to the skin!
Risk of injury.

▶ Wear safety gloves and goggles.

▶ Put hand pump in *PUMP* position **1**.

▶ Operate hand pump until you feel strong resistance.

▶ Put hand pump in *RUN* position **2**.

▶ Start diesel engine.

Troubleshooting
If machine will not start after approx. 20 sec.:

▶ Wait one minute and repeat starting process.

Once you have repeated this three times:
▶ Repeat bleeding process.

Splitter box: Draining the oil

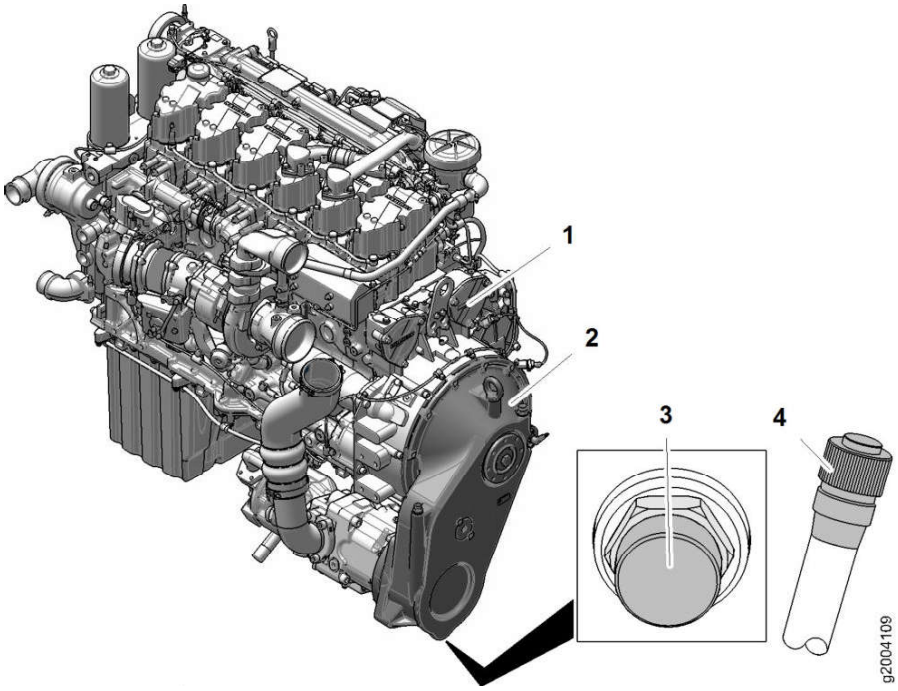

Fig. 136: Splitter box: Draining the oil

1	Engine	**3**	Drain valve
2	Splitter box	**4**	Drain hose

▶ Pull the dipstick out of the splitter box **2**.
▷ This allows the oil to flow out more easily.

The drain valve **3** is on the underside of the splitter box.

▶ Unscrew the cap from the drain valve.

▶ Screw the drain hose **4** onto the drain valve.

▶ Drain off the oil into the receptacle.

▶ Unscrew the drain hose.

▶ Unscrew the cap of the drain valve.

▶ Put in the dipstick.

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030.4.5 Cooling system

030.4.5.1 Cooling system: Checking the coolant level

Valid for: L576-1333;

Checking the coolant level

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

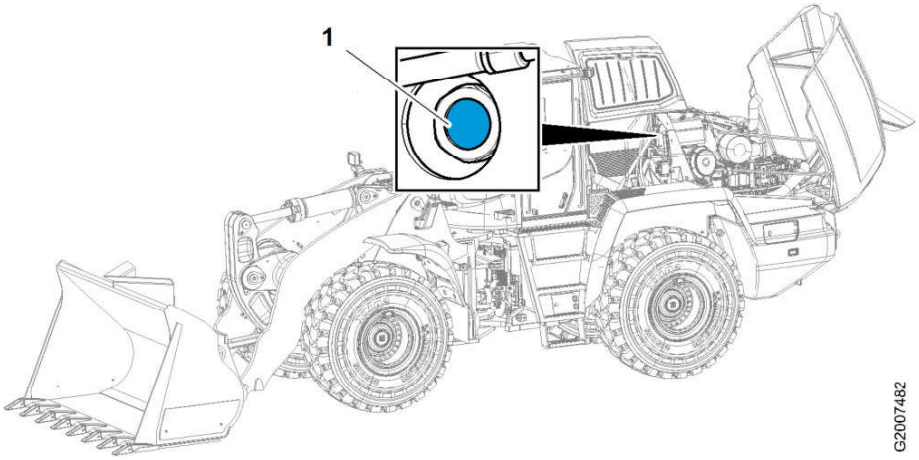

Fig. 145: Checking the coolant level

1 Equalising reservoir sight glass

▶ Check the coolant level in the equalizing reservoir through the sight glass **1**.

If the sight glass **1** is not completely filled with coolant:
▶ Top up the coolant. (For more information see: Filling coolant, page 030-91)

Filling coolant

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

LBH/11835200/20/211-20191218_090725/en

Draining coolant

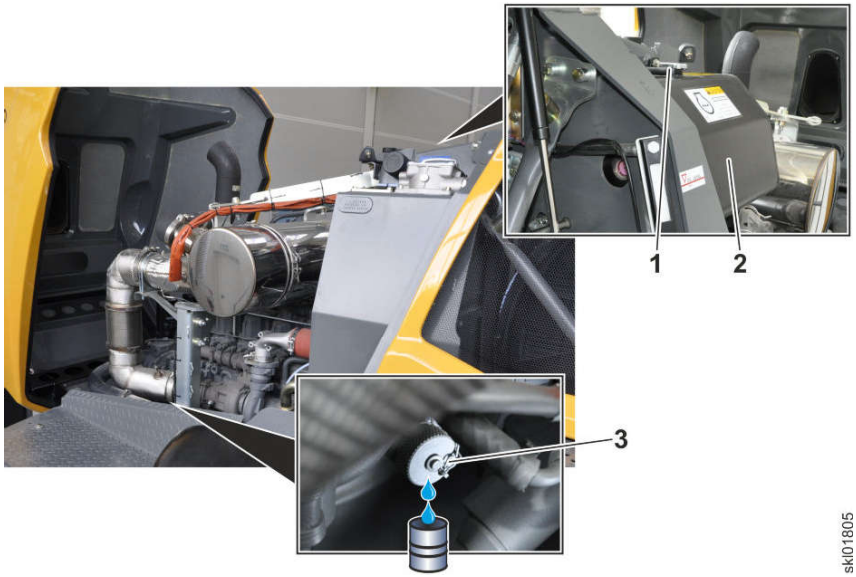

Fig. 153: Draining the coolant

1 Cap
2 Coolant equalising reservoir
3 Drain valve

▶ Carefully open the cap **1** of the coolant equalizing reservoir **2**.

▶ Place a receptacle under machine.

▶ Unscrew the cap from the drain valve **3**.

▶ Screw the drain hose onto the drain valve **3**.
▷ Coolant flows out.

▶ Completely drain the coolant into the receptacle.

▶ Unscrew the drain hose from the drain valve **3**.

▶ Screw the cap onto the drain valve **3**.

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Fig. 163: Draining oil from the hydraulic tank

6 Hydraulic tank drain valve

- ▶ Unscrew the cap of the hydraulic tank drain valve **6**.
- ▶ Screw the drain hose onto the hydraulic tank drain valve **6**.
  ▷ Oil drains off.
- ▶ Drain off all the oil into the receptacle.
- ▶ Unscrew the drain hose from the hydraulic tank drain valve **6**.
- ▶ Screw the cap onto the hydraulic tank drain valve **6**.
- ▶ Top up the oil.

Topping up the oil

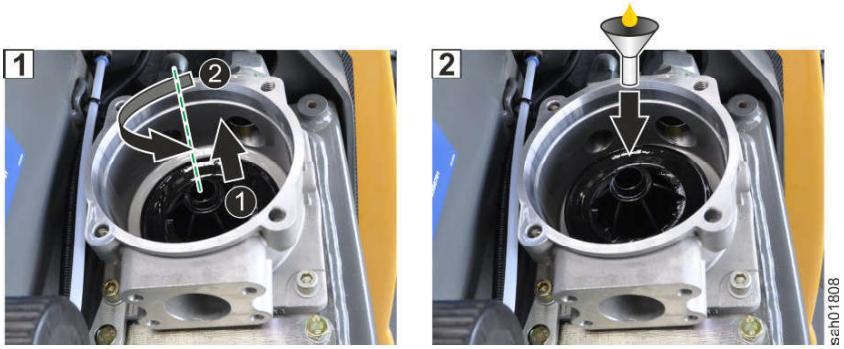

Fig. 164: Topping up the oil

- ▶ Lift out the filter insert and turn it by 90°.
- ▶ Put down the filter insert.
  ▷ The return filter is in the filling position.

Note

When filling using the filling position, the oil flows through the 100 µm strainer fabric.

- ▶ Fill the oil through the return filter until the oil level is between the minimum and maximum.

If the value is correct:

▶ Check the gap. (For more information see: Check the gap, page 030-121)

If the value is not correct:

▶ Replace both brake shoes. (For more information see: Replace the brake shoes, page 030-122)

Check the gap

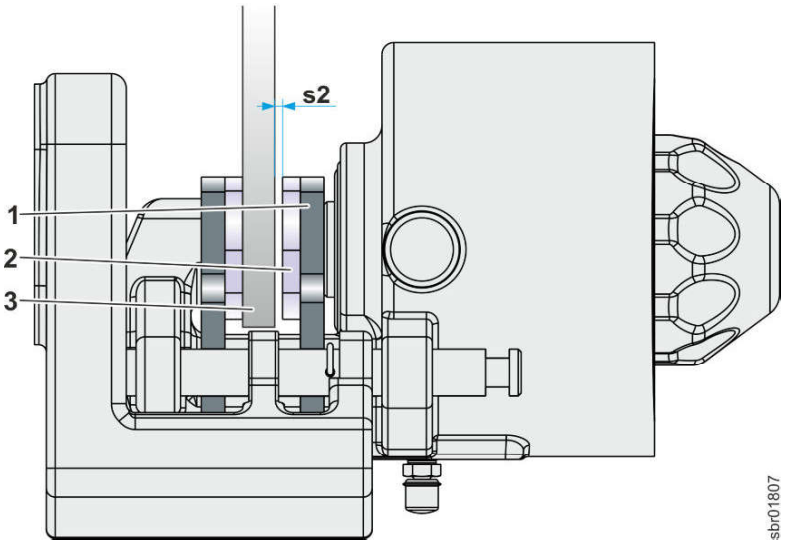

Fig. 177: Check the gap

1	Brake shoe	**3**	Brake disc
2	Brake lining	**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 wheel wedges 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***.

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Fig. 185: Button cover and buttons

1 Button cover
2 Screws
3 Buttons

▶ Loosen the screws **2**.

Note

▶ To remove the button cover **1** more easily, push together the two grips of the control lever.

▶ Note that the buttons **3** are different sizes.

▶ Take off the button cover **1**.

Fig. 186: Fitting the button cover

4 Anti-twist lock

▶ Fit the buttons **3** in the new cover **1**.

▶ Fit the button cover on the control lever. Pay attention to the anti-twist lock **4**.

Note

To stop the buttons **3** from falling out of the cover **4** during assembly:

▶ Gently press the three buttons from outside to hold them in place.

▶ Tighten the screws **2** to 0.5 Nm.

NOTICE
Incorrectly mixed axle oils!
Damage to the axles.

▶ No not mix axle oils.

Draining the oil

WARNING
Hot. pressurised liquid!
Beware of burns.

▶ Carefully unscrew the filling plug.

▶ Wear safety glasses.

▶ Avoid skin contact with fluids.

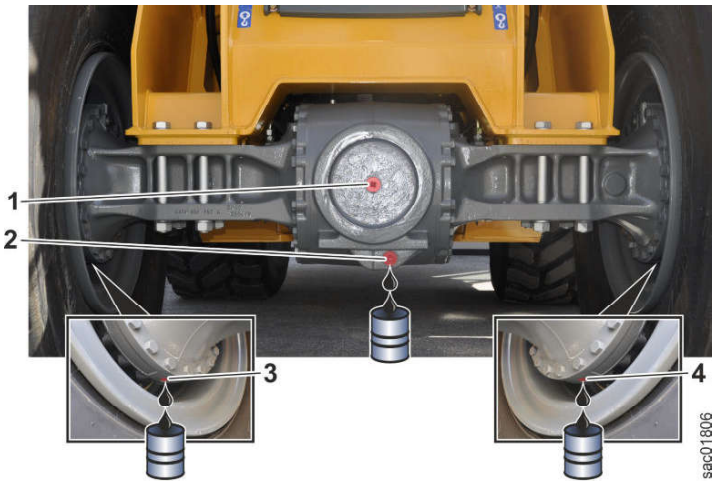

Fig. 195: Draining the oil

1	Filling plug	**3**	Right wheel hub drain plug
2	Main housing drain plug	**4**	Left wheel hub drain plug

Note
Filling plugs and drain plugs with 1/2" square socket!

▶ Unscrew the filling plugs and drain plugs using a 1/2" ratchet without a socket attached.

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

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

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

▶ If the oil level is too high (oil comes out of the opening): Check the axle for brake defects (oil coming from the brake system in the axle).

▶ Place a receptacle under the front axle.

▶ Carefully unscrew the drain plugs on the main housing **2** and on the wheel hubs **3** and **4** of the front axle.
▷ Oil drains off.

Lubricating the industrial lift arms

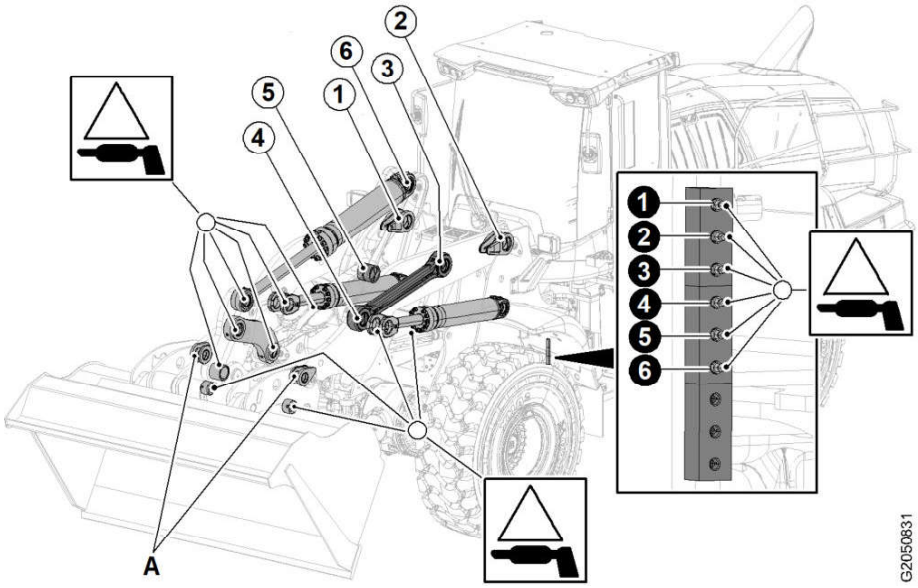

Fig. 207: Lubricating the industrial lift arms

A Lower bucket bearing

- ▶ Take the cap off the grease fitting.
- ▶ Grease the lift arm bearings at the lubrication points.
- ▶ The lower bucket bearings **A** should be lubricated daily in accordance with requirements.
- ▶ Put the cap on the grease fitting.

Lubricating the attachment

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

Note
Lubricate the attachment.

- ▶ Ensure that the lubricating points are easy to access. Disconnect the attachment if necessary.
- ▶ For detailed information on the maintenance of non-Liebherr attachments, see the operator's manual from the manufacturer.

030.4.13.2 Lift arms: Checking the bucket bearing seals

Valid for: L576-1333;

The bucket bearing seals prevent dirt from entering the bearing, thus extending the service life of the bearing bushings. Sealing lips and dirt guards are wear parts and must be renewed immediately if damaged.

Make sure that the following requirements are fulfilled:
- ❑ The machine is in maintenance position 2.

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Changing the fresh air filter

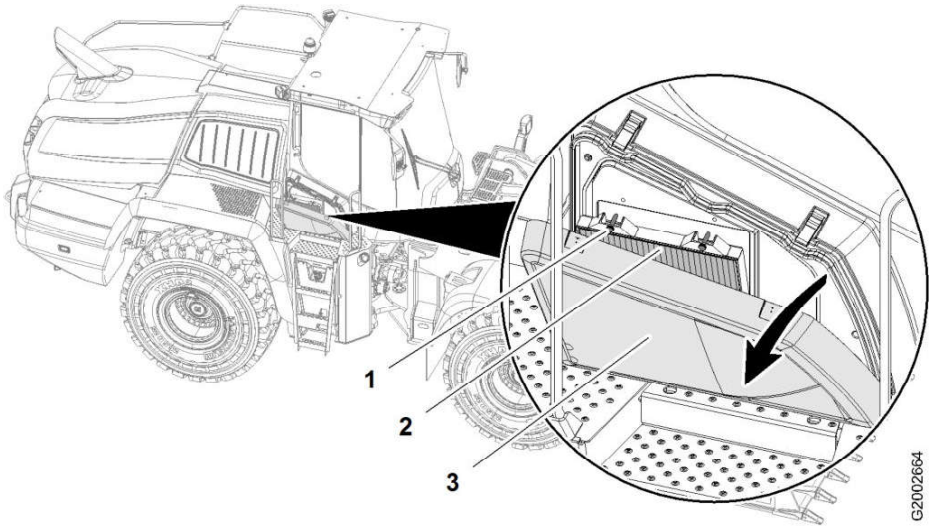

Fig. 217: Cleaning the fresh air filter

1 Knurled screw (2x)
2 Fresh air filter
3 Cover

- ▶ Open the cover **3**.
- ▶ Unscrew the knurled screws **1**.
- ▶ Take out the fresh air filter **2** and dispose of it.
- ▶ Put in the new fresh air filter **2**.
- ▶ Screw in the knurled screws **1**.
- ▶ Close the cover **3**.

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2. Calibrations									
Test / adjustment	**1000 h**	**2000 h**	**Unit**	**Required value**	**Measured**	**Adjusted**	**Adjusting point**	**Test point**	**Figure**
Working hydraulics									
Multi-lever control (option): calibration									
Manual lever calibration		○							
Calibrating working hydraulics angle sensors									
Manual calibration of lift arm position angle sensor		○							
Manual calibration of bucket position angle sensor		○							
Proportional solenoids in control valve block: calibration									
Automatic calibration of proportional solenoids for lifting and tilting		○							
Manual calibration of proportional solenoids for 3rd function (option)	◊	◊							
Manual calibration of proportional solenoids for 4th function (option)	◊	◊							
Steering system									
Joystick for joystick steering (option): calibration (from serial number: 55878)									
Automatic calibration of joystick		○							
Angle sensor for articulation angle (option): calibration									
Manual calibration of articulation angle sensor (using steering wheel)		○							
Control block for joystick steering (option): calibration									
Automatic calibration of position sensor of main spool valve		○							
Manual calibration of position sensor of emergency spool valve (using steering joystick)		○							
Automatic calibration of proportional solenoids for main spool valve and emergency spool valve		○							
Drive group									
Pedals: calibration									
Manual calibration of accelerator pedal		○							
Manual calibration of inching function		○							

Tab. 75: Calibrations

If the required values are reached:
▶ Calibration was successful. Switch off ignition.

030.6.3.2 Reading the diesel engine service files

Valid for: L576-1333;

Service files are data that is required for diagnosing diesel engine problems and for handling warranty claims.

The service file of the Liebherr diesel engine is saved in HTML format. The file name must not be changed.

After replacing an diesel engine component, the diesel engine service file must be sent to the following e-mail address:
lbh.maschinenfeedback@liebherr.com

Only the serial number of the machine must be included in the subject line of the e-mail.

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

Make sure that the following tools are ready:
❑ Diagnostic cable (CAN-Fox) (item code: 11482727)
❑ LiDIA USB dongle (item code: 11494535)

▶ Connect the LiDIA diagnostics software with the diesel engine.

Fig. 229: “Diagnosis” function

▶ Select “Diagnosis” function.
▷ The diagnostics software looks for an ECU to connect to.

Fig. 230: Engine control unit

▶ Select the engine control unit.

▶ The diagnostics software connects to the engine control unit.

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▶ Contact the technical customer service department.

If no service code appears:
▶ Calibration was successful. Turn off the diesel engine.

Manual calibration of the proportional solenoids for lifting and tilting

Note
Manual calibration for lifting and tilting is not necessary when the machine is working properly.

▶ Only carry out manual calibration for lifting and tilting if automatic calibration fails.

Make sure that the following requirements are fulfilled:
❑ The hydraulic oil is at operating temperature.
❑ 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 ***QREHLiftValveUp*** shows the current at the proportional solenoid for lifting.
  ▷ The variable ***QREHLiftValveDn*** shows the current at the proportional solenoid for lowering.
  ▷ The variable ***QREHLiftBucketValveUp*** shows the current at the proportional solenoid for tilting in.
  ▷ The variable ***QREHLiftBucketValveDn*** shows the current at the proportional solenoid for tilting out.

▶ Make sure that the parking brake is activated.

▶ Raise the lift arms half way.

▶ Tilt the bucket half way in.

▶ Click the variable ***QREHLiftValveUp*** 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 ***QREHLiftValveUp*** until you notice a slight movement of the lifting function.

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

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

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3 Secondary pressure relief valve for lifting
4 Secondary pressure relief valve for 3rd function A3 (option)
5 Secondary pressure relief valve for 3rd function B3 (option)
8 LS-pressure cut-off
9 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 primary pressure relief valve **9** by exactly one turn clockwise.
  - ▷ Opening pressure of primary pressure relief valve is higher than that of secondary pressure relief valves.
- ▶ Turn adjusting screw on LS-pressure cut-off valve **8** by exactly one turn clockwise.
  - ▷ Opening pressure of LS-pressure cut-off valve is above opening pressure of secondary pressure relief valves.
- ▶ Make sure that critical functions are deactivated. (For more information see: Deactivate critical functions, page 030-176)

Checking and adjusting

- ▶ Start diesel engine.

NOTICE
There is no secondary pressure relief valve for lowering function.
Irreparable damage to working pump.

- ▶ Do not activate lowering function as far as it will go.

- ▶ At low idling speed, activate in succession lifting, tilting out and tilting in functions, as well as optional additional functions, as far as they will go and then operate fully.
- ▶ While doing so, check whether high pressure **PA** corresponds to specified value.

Description	Unit	Value
High pressure **PA** during tilt out **1** function	bar	405 $^{\pm 5}$
High pressure **PA** during tilt in **2** function	bar	405 $^{\pm 5}$
High pressure **PA** during lift **3** function	bar	425 $^{\pm 5}$
High pressure **PA** during 3rd function A3 (option) **4**	bar	255 $^{\pm 5}$
High pressure **PA** during 3rd function B3 (option) **5**	bar	255 $^{\pm 5}$
High pressure **PA** during 4th function A4 (option) **6**	bar	255 $^{\pm 5}$
High pressure **PA** during 4th function B4 (option) **7**	bar	255 $^{\pm 5}$

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Fig. 247: Moist surfaces, no visible oil leak

▶ Document the damage and observe whether the condition deteriorates.

If the condition deteriorates:
▶ Replace the hydraulic lines.

Medium damage to the hydraulic lines

Cracks or cuts up to the steel fabric or steel fabric exposed due to damage to the outer jacket

The damage to the outer jacket (such as cracks, cuts or abrasions) through which the steel fabric is exposed is classified as medium damage if the steel fabric is undamaged. Damage to the steel fabric is classified as severe damage.

Fig. 248: Cracks or cuts up to the steel fabric or steel fabric exposed due to damage to the outer jacket

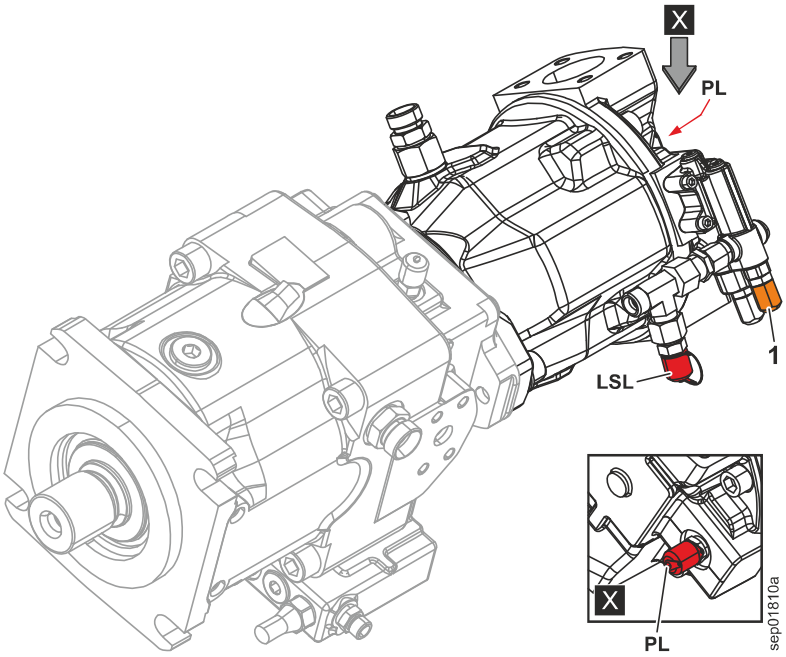

Fig. 255: Steering pump: flow regulator (differential pressure)

1 Flow regulator

LSL Steering pump load sensing signal test connection

PL Steering pump high pressure test connection

NOTICE
Increase in pressure due to the automatic checks after starting the diesel engine!
Irreparable damage to the pressure gauges.

▶ Wait at least 20 seconds after starting the diesel engine before connecting pressure gauges.

NOTICE
High pressure of steering pump above maximum pressure of pressure gauges!
Irreparable damage to pressure gauges.

▶ Do not operate steering.

▶ Start diesel engine.

▶ Make sure that parking brake is activated.

▶ Wait 20 seconds.
  ▷ Emergency steering pump check is carried out.
  ▷ Joystick steering (option) check is carried out.
  ▷ Brief increase in pressure to over 200 bar.

DANGER
Unintended movement of the machine!
Fatal injury.

▶ Make sure no-one can enter the operator's cab.

- ▶ Install vacuum pump. (For more information, see Liebherr service documentation on removal and installation of components)
- ▶ Place a receptacle under the machine.
- ▶ Remove the relevant hydraulic accumulator and test with testing and filling device for hydro accumulators. (For more information see: Hydro accumulator: checking and topping up nitrogen filling, page 030-207)

If required values are reached:

- ▶ Disconnect the pressure gauge from the brake accumulator pressure test connection **M3**.
- ▶ 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**.

030.6.9 Electrical system

030.6.9.1 Central control unit (Master4) Creating a Servicefile

Valid for: L576-1333;

The service file is a folder where files relevant to the servicing of the machine are kept.

On machines with a touch screen display, the service file is generated on the screen using the “SCOTTI” function.

On machines without a touch screen display or where the touch screen display is not working, the service file is generated using the “SCOTTI” function in the Sculi diagnostic software.

After replacing an electrical or electronic component, a complete service file must be sent to the following e-mail address:
lbh.maschinenfeedback@liebherr.com

Note
Liebherr will only accept service files if the following conditions are met:

- ▶ The file name may not be changed.
- ▶ The service file is only complete is the entire contents of the folder are available. Individual files are not acceptable.

Note
Folders cannot be added to e-mails as attachments.

- ▶ Send folders as a Zip-File.

Files in the service file	Description
today.mde	Files with the extension **.mde** contain machine data and recordings of machine operation.
service.cor	This file contains information on adjustment data and enabled functions on the machine.

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For the reset to function and prevent machine data from being lost, the memory card with the machine software must be inserted in slot CF-1.

Connecting the two pins **2** together and switching on the ignition performs a reset.

▶ Connect the pins **2** with an electrical line **3**.

▶ Switch on the ignition.

▶ Remove the connection between the two pins after ten seconds.
  ▷ Resetting the central control unit is started.
  ▷ The machine software is installed again.
  ▷ This process can take several minutes.

Resetting and installing the machine software have been successful if a connection can be made to the central control unit using the Sculi diagnostic software.

▶ Check the connection to the central control unit using the Sculi diagnostic software.

When resetting and installing the machine software have been successfully completed:

NOTICE
Beware of damage to the central control unit.

▶ Pay attention to the seal when screwing on the cover.

▶ Screw the cover back onto the central control unit (tightening torque 10 Nm).

It may be necessary to install the latest machine software.

▶ Install the latest machine software.

030.6.9.5 Testing the CAN line

Valid for: L576-1333;

The CAN line can be tested by measuring the resistance or by measuring the voltage.

The following tools are required to test the CAN line:
❑ Multimeter (resistance metering, voltage metering)
❑ Metering leads (ID number 11006220 and 11006221)
❑ Metering points (ID number 884191214 and 884191114)

Resistance measurements on the CAN line

The following faults can be detected by resistance measurements on the CAN line:
– A break in the CAN line.
– The function of both 120 Ω resistors.
– Short circuit to earth.
– Short circuit to machine voltage.
– Short circuit between CAN HIGH and CAN LOW.

Note
Do not take resistance measurements while the circuit is live!
The resistance measurements of live components can be incorrect, because the measured value is distorted by the connected voltage.

▶ Turn off the battery main switch.

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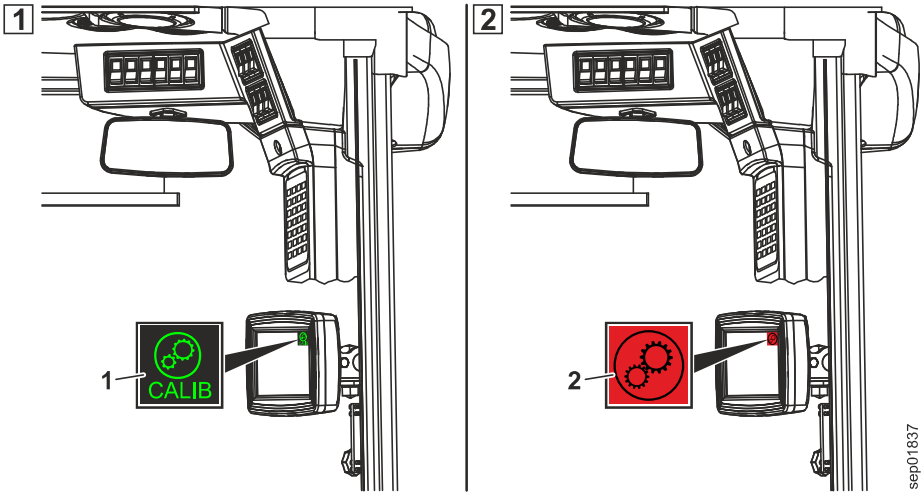

Fig. 284: Symbol fields during calibration

1 *Calibration active* symbol field **2** *Calibration completed* symbol field

Preparations

- ▶ Start diesel engine.
- ▶ Connect Sculi diagnostic software to the machine.
- ▶ In the variables editor, select the ***Service calibration*** folder.
- ▶ Make sure that the parking brake is activated.

Automatic hydrostat calibration

- ▶ Set the variable ***MXTCUStartHydroCalib*** to ***1***.
  - ▷ Calibration takes place automatically.
  - ▷ 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 030-248)

- ▶ Wait until the variable ***MXTCUStartHydroCalib*** 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
50D6	Gear oil temperature too low. Parking brake released.	Make sure that all requirements are fulfilled: Start calibration again.

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▶ Perform a calibration of the transmission in accordance with the adjustment checklist.

▶ Test drive the machine.

Troubleshooting
If you experience problems with the transmission during the test drive (insufficient power, reversing problems), carry out the following tests according to the service manual (adjustment procedure):

▶ Travel gearbox: Check power output (For more information see: Travel gearbox: Check power output, page 030-253)

▶ Transmission: Reversing test (For more information see: Transmission: Reversing test, page 030-256)

030.6.11 Axles and drive shafts

030.6.11.1 Tyres: setting radius

Valid for: L576-1333;

Note
The central control unit needs the tyre radius in order to calculate various parameters such as the travel speed.

▶ Set the correct tyre radius when tyres with a different external diameter are mounted.

Make sure that the following requirements are fulfilled:
❑ The diesel engine is switched off.

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

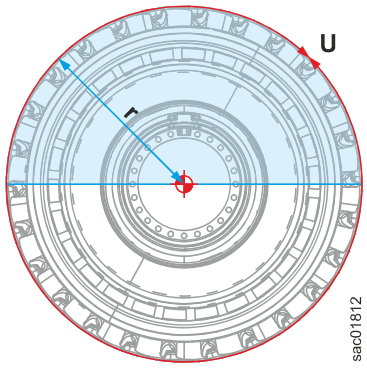


Fig. 293: Tyres: setting radius

r Radius **U** Circumference

Note
Tyre deformation due to weight of machine!
Incorrect measurement when measuring the radius.

▶ Measure the circumference if possible.

▶ When measuring the radius directly, only measure in the highlighted area.

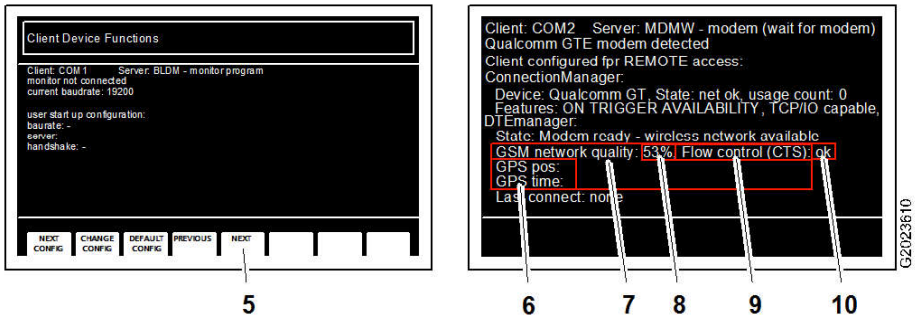


Fig. 306: Checking connection status

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

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

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

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

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

030.6.14.2 LiDAT: activating data transmission manually

Valid for: L576-1333;

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

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

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

Creating a GSM connection

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

▶ Switch on the ignition.

▶ Check connection status.

Activating data transmission manually

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

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

Fig. 324: LiPDS_ConfigTool

▶ Start LiPDS_ConfigTool software.

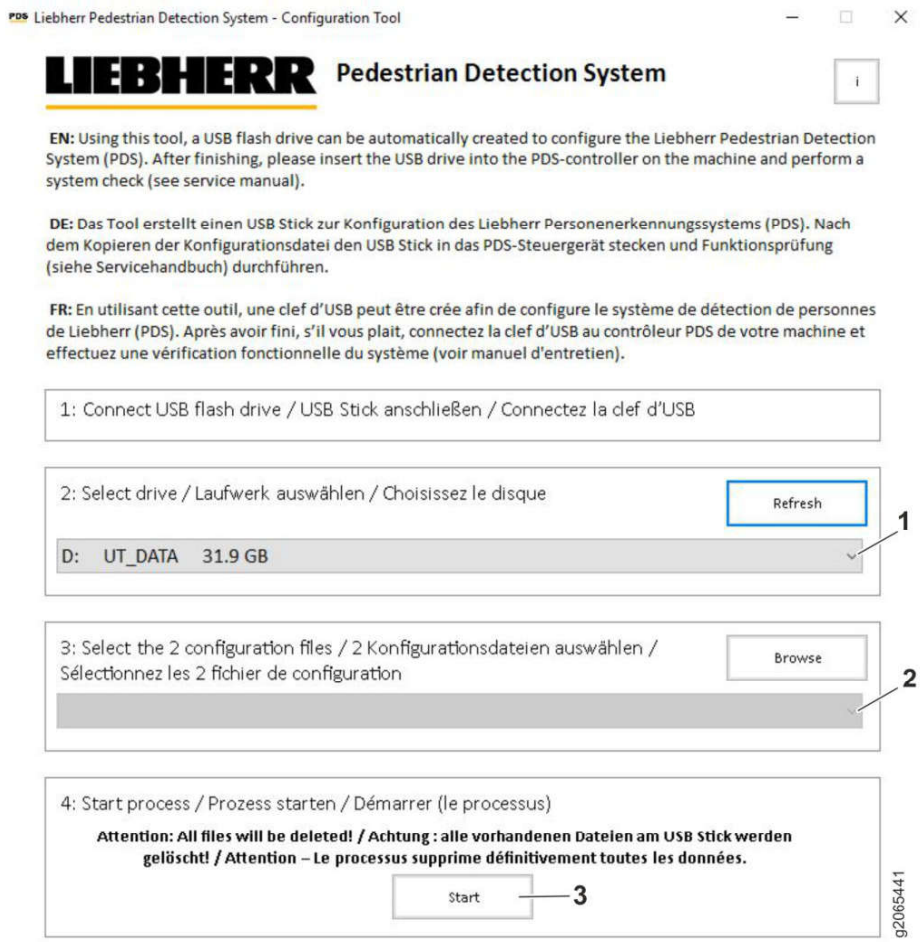


Fig. 325: LiPDS_ConfigTool software

1 USB drive
2 Configuration files
3 "Start" function

▶ Connect standard USB stick to laptop.

▶ Select USB drive **1**.

▶ Select both configuration files **2**.

▶ Select "Start" function **3**.
▷ USB stick is formatted.
▷ USB stick is named correctly.
▷ Configuration files are transmitted to USB stick.

▶ Remove USB stick from laptop.

2.9.2 Power reduction according to charge air temperature

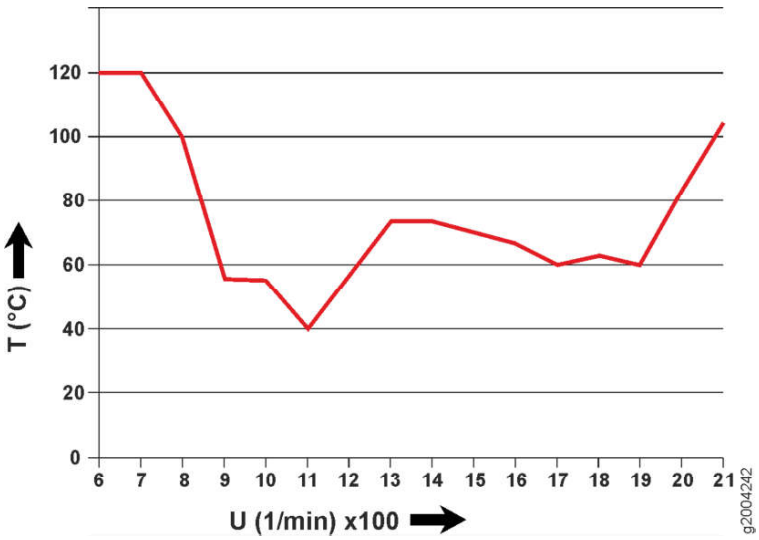


Fig. 331: Power reduction according to charge air temperature

T Charge air temperature in degrees Celsius **U** Engine speed

The charge air temperature threshold depends on the engine speed.

If the characteristic is exceeded, the engine control unit reduces the injection quantity. The charge air temperature decreases.

The injection quantity is reduced until the temperature falls back below the threshold.

At a charge air of 80 °C the service code P1011 (Charge air - overtemperature warning) is generated.

At a charge air of 100 °C the service code P1012 (Charge air - critical overtemperature) is generated.

2.9.3 Engine brake function

The diesel engine is equipped with an exhaust throttle valve M715. The exhaust throttle valve acts as an engine brake on steep gradients.

The exhaust throttle valve acts as an engine brake under the following conditions:
- When the machine is in engine braking mode (negative torque).
- When the diesel engine exceeds a defined speed threshold.

040.1.2 Electrical components of diesel engine

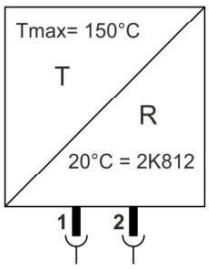
Valid for: L576-1333;

1 Layout

Note

The BMK codes used refer to the electrical diagram of the diesel engine.

1.5 Cooling water temperature sensor B708



g2005702

Fig. 339: Cooling water temperature sensor

Cooling water temperature sensor **B708** is mounted under oil filters, in cooling circuit.

Cooling water temperature is measured using an NTC resistor.

if sensor fails, a substitute value of -100 °C is displayed. If sensor fails, engine control unit uses a computational model to continue running diesel engine.

Pin	Function
1	Ground
2	Output signal (0 to 76 kΩ)

Tab. 122: Plug assignment

Cooling water temperature	Resistance
-40 °C	75.762 kΩ
-20 °C	21.855 kΩ
0 °C	7.351 kΩ
20 °C	2.812 kΩ
40 °C	1.199 kΩ
60 °C	0.560 kΩ
100 °C	0.153 kΩ
150 °C	0.041 kΩ

Tab. 123: Output voltage

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pressure relief valve (which opens at approximately 500 bar when idling) protects the fuel high pressure pump from excess pressure.

2.3.1 High pressure control

The engine control unit regulates the high pressure using a characteristic map.

The signal value of the rail pressure sensor controls the metering valve (VCV) using a PWM signal (0 to 1.3 A). Pressure builds up. The high pressure control valve (PCV) is fully energised.

To make pressure reduction more dynamic, the high pressure control valve (PCV) is briefly de-energised. This means the pressure can be reduced more quickly.

2.3.2 Emergency mode

If the rail pressure sensor of the high pressure control valve (PCV) or the metering valve (VCV) fails, the common rail system goes into emergency mode.

In emergency mode, the high pressure control valve (PCV) and the metering valve (VCV) are no longer energised.

The metering valve (VCV) is completely opened and allows the entire flow to go to the high pressure section. The high pressure control valve (PCV) opens at its mechanical opening pressure.

depending on the speed and load, the rail pressure is dynamically limited at 700 bar to 1200 bar.

If the rail pressure sensor fails, the rail pressure is determined using a characteristic map.

2.4 Discharge port

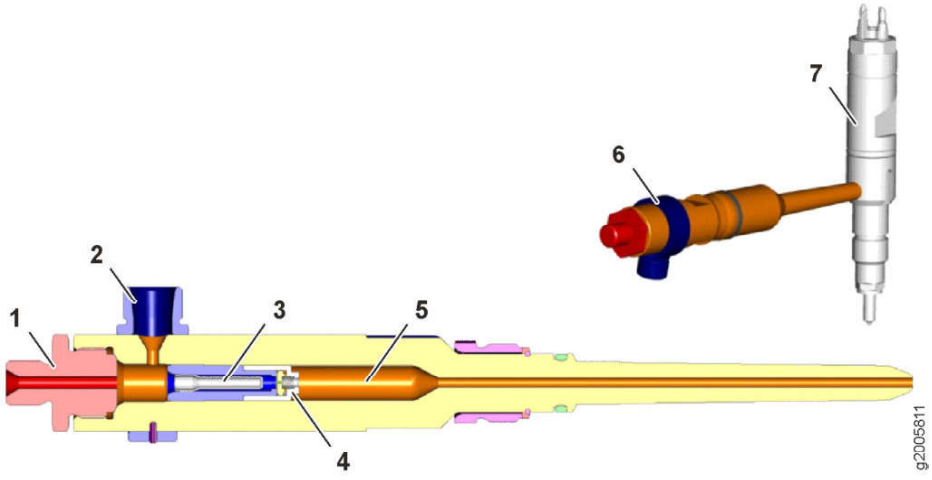

Fig. 347: Discharge port

1	Fuel inlet	**5**	Accumulator
2	Connection to next cylinder	**6**	Discharge port
3	Filter	**7**	Injector
4	Check valve		

The pressure port **6** holds the pressurised fuel for the injector **7**. The fuel is stored in the accumulator **5**.

The filter **3** protects the discharge port and the downstream injector from dirt. The filter is a perforated filter.

2.5 Diesel exhaust fluid injection

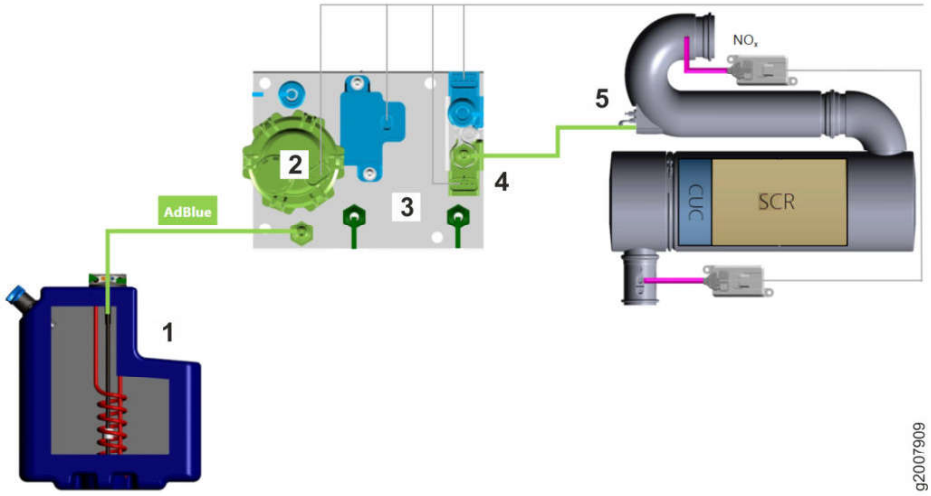

Fig. 357: Diesel exhaust fluid injection

1	Diesel exhaust fluid tank	**4**	Diesel exhaust fluid pressure and temperature sensor A776.4
2	Diesel exhaust fluid pump	**5**	Diesel exhaust fluid nozzle
3	Metering unit		

The diesel exhaust fluid pump **2** draws up diesel exhaust fluid from the diesel exhaust fluid tank **1**.

The diesel exhaust fluid is directed via the metering unit **3** to the diesel exhaust fluid nozzle **5**.

The diesel exhaust fluid temperature sensor **4** measures the pressure and the temperature of the fluid in the metering unit.

In the nozzle, the diesel exhaust fluid is mixed with compressed air. This makes the spray finer and distributes it more evenly through the mixing section.

2.6 Exhaust throttle valve

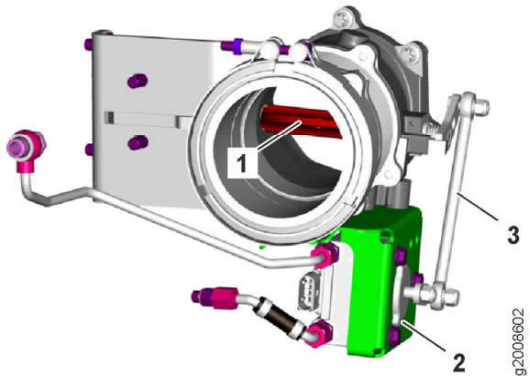

Fig. 358: Exhaust throttle valve

1	Exhaust throttle valve	**3**	Linkage
2	Servo motor M715		

The exhaust throttle valve is mainly used for thermal management of the diesel engine.

The load due to soot particles is determined by a calculation model (fuel consumption, etc.) and the values of differential pressure sensor. The load is given in grams per litre (g/L).

If the load of soot particles exceeds 5.7 g/L, the yellow symbol field *Regenerate diesel particulate filter* prompt is displayed.

If the load of soot particles exceeds 6.5 g/L, the yellow symbol field *Regenerate diesel particulate filter* prompt is displayed. In addition, the power of diesel engine is reduced by 25%. A service code is displayed.

If the load of soot particles exceeds 7 g/L, the red symbol field *Regenerate diesel particulate filter* prompt is displayed. In addition, the power of diesel engine is reduced by 50%. A service code is displayed.

When the automatic regeneration mode is activated, an active regeneration is initiated for a load of more than 5 g/L. The regeneration ends at a load of less than 3.8 g/L.

In manual regeneration mode, an active regeneration can be started between a load of 3.8 g/L and 6.9 g/L. The regeneration ends successfully at a load of less than 3.8 g/L.

From a load above 7 g/L, only one more service generation can be started with the diagnostic software LIDIA. A service code is displayed.

2.2.2 Load condition (time since last manual regeneration)

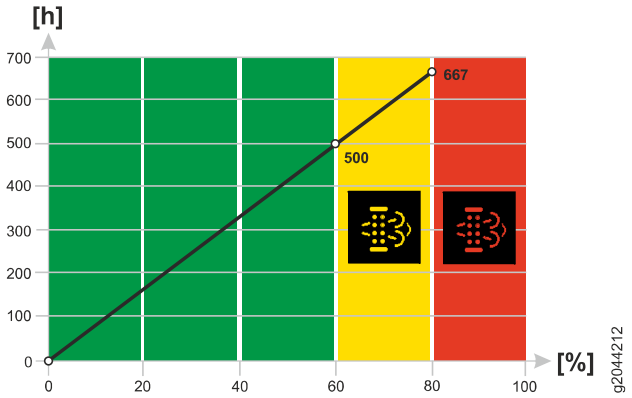

Fig. 371: Display of time since last manual regeneration

h Time since last manual regeneration in operating hours

% Load condition in per cent

Every 500 hours of operation, a manual regeneration must be carried out. The longer since the last manual regeneration, the higher the load condition shown.

At 500 operating hours, the yellow symbol field *Regenerate diesel particulate filter* prompt is displayed.

If no manual regeneration is carried out for up to 667 operating hours, the red symbol field *Regenerate diesel particulate filter* prompt is displayed. In addition, the power of diesel engine is reduced by 25%. A service code is displayed.

The time since the last manual regeneration is reset to 0 after each successful manual regeneration.

040.1.8 Compressed air system

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. 147: Equipment codes

The fan motor drives the fan blade.

2.2 Fan speed proportional solenoid valve

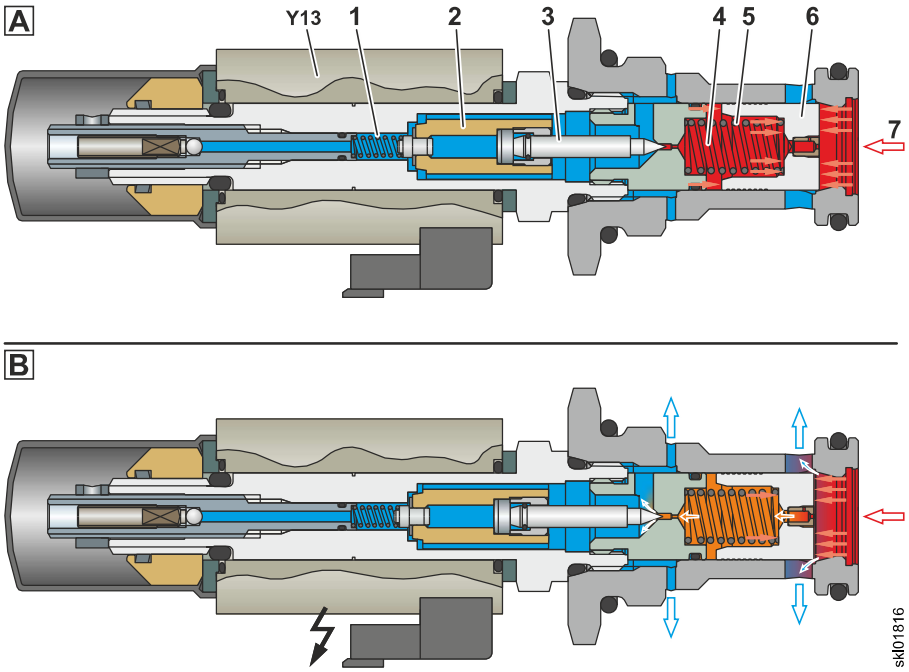

Fig. 389: Fan speed proportional solenoid valve de-energised / fan speed proportional solenoid valve energised

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. 148: 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

050.5.2 Fan reversal valve block

Valid for: L576-1333;

1 Layout

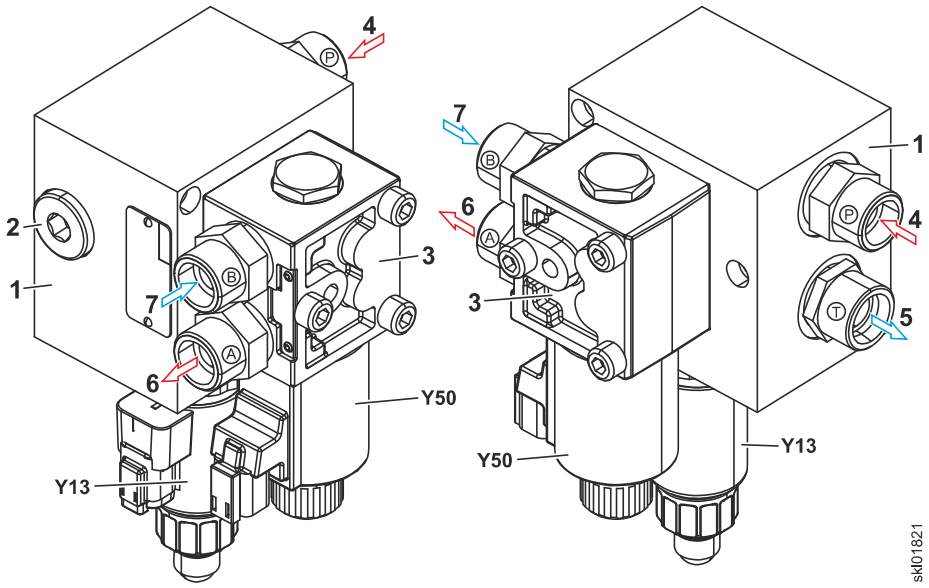

Fig. 395: Fan reversal valve block (from front left and from rear right)

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. 157: 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.

BMK	Function	BMK	Function	BMK	Function
B8	Hydraulic oil temperature sensor	**Y31a**	Proportional solenoid for tilting out	**Y33b**	Proportional solenoid for 3rd function B3 (option)
B90	Pressure sensor for weighing device (piston side) (from serial number 54428)	**Y31b**	Proportional solenoid for tilting in	**Y53**	Solenoid for opening quick coupler (option)
B91	Pressure sensor for weighing device (ring side) (from serial number 54428)	**Y32a**	Proportional solenoid for lowering	**Y53a**	Quick coupler load sensing signal solenoid (option)
Y14	Solenoid for servo pressure	**Y32b**	Proportional solenoid for lifting		
Y20	Solenoid for ride control	**Y33a**	Proportional solenoid for 3rd function A3 (option)		

Tab. 166: Equipment codes

Working hydraulics is an open circuit. This means that after leaving consumer, oil flows to hydraulic tank rather than directly back to working pump.

Working pump **20** draws up oil from hydraulic tank **1** and pumps it to control valve block **45**. Control valve block **45** directs oil via spools to consumers.

Spool valves are electro-hydraulically actuated. To do this, oil is diverted from service brake hydro accumulators **39**. Pilot control pressure reducing valve **37** reduces pressure of this oil to servo pressure.

When working attachment is actuated, proportional solenoid valves for individual functions are energised. Proportional solenoid valves reduce servo pressure once more, depending on current, and direct servo oil to spool valves. Servo oil pushes spool valves against force of return springs. Oil flows from working pump **20** to consumers via openings that spools have accordingly released.

Pressure balances generate a load sensing signal which regulates working pump **20**.

Tilt function has an anti-drift valve **85**. Anti-drift valve separates tilt cylinder piston side from control valve block **45** when tilt function is not actuated. This prevents bucket from being tilted out accidentally due to leakage in spools **48**.

Ride control function absorbs vibrations that occur when driving with a loaded working attachment. Stabilization module **110** connects lift cylinder ring side to hydraulic tank **1** and lift cylinder piston side to ride control hydro accumulators.

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6 Preload valve for 2nd tank duct
7 Spool lift limitation for tilting in
8 Spool lift limitation for lifting
9 LS-pressure cut-off
10 Flow control valve with strainer
11 Replenishing valve for tilting out
12 Feeder valve for lowering
13 Spool lift limitation for 3rd function B3
14 Secondary pressure relief valve for 3rd function A3
15 Spool lift limitation for 4th function B4
21 Return flow of stroke limit damping pressure relief valves
22 Pressure balance for 4th function
23 Secondary pressure relief valve for 4th function B4
24 Control valve block section for 4th function (option)
25 Secondary pressure relief valve for 3rd function B3
26 Pressure balance for 3rd function
27 Control valve block section for 3rd function (option)
28 Secondary pressure relief valve for lifting
29 Secondary pressure relief valve for tilting in
30 Anti-drift valve
36 Connection to piston side of tilt cylinder
37 Connection to ring side of lift cylinder (left lift cylinder)
38 Connection to ring side of right lift cylinder and stabilization module
39 Connection to piston side of right lift cylinder and stabilization module
40 Connection to piston side of lift cylinder (left lift cylinder)
41 Connection of 3rd function A3 (option)
42 Connection of 3rd function B3 (option)
43 Connection of 4th function A4 (option)
44 Connection of 4th function B4 (option)
45 Load sensing signal for working pump

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. 171: Test points

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060.5 Ride control

060.5.1 Overview of ride control system

Valid for: L576-1333;

1 Layout

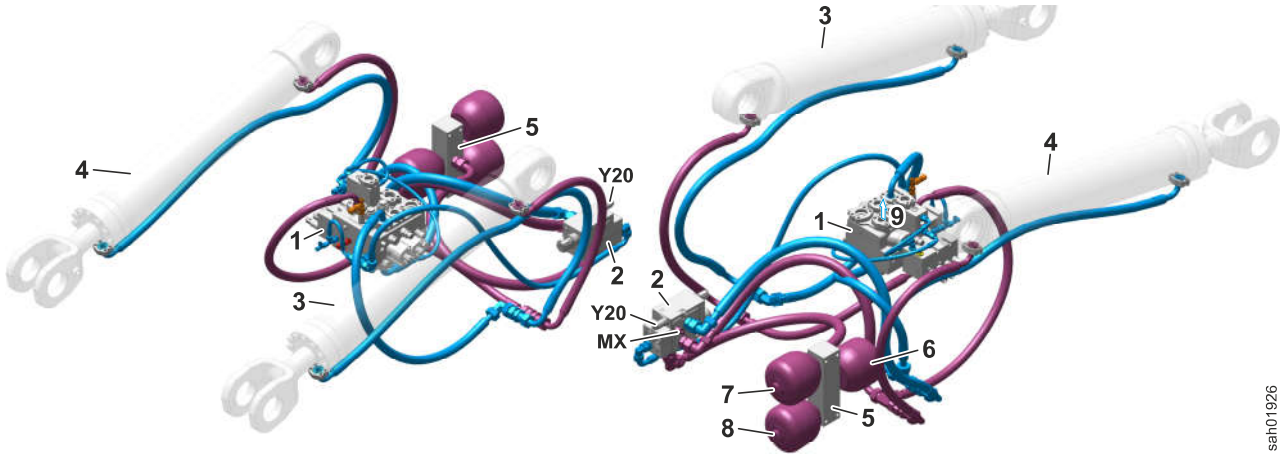

Fig. 414: Ride control system (ride control active) (from front left and from rear right)

1	Control block	**4**	Right lift cylinder	**7**	Ride control hydro accumulator
2	Stabilization module	**5**	Hydro accumulator block	**8**	Ride control hydro accumulator
3	Left lift cylinder	**6**	Ride control hydro accumulator	**9**	Return flow from return filter

Name	Test point
MX	Ride control hydro accumulator charge pressure

Tab. 180: Test points

BMK	Function
Y20	Solenoid for ride control

Tab. 181: Equipment codes

Ride control system consists of following components:
- Stabilization module (For more information see: 060.5.2 Stabilisation module, page 060-32)
- Ride control hydro accumulator
- Lift cylinder

060.6.2 Working hydraulics angle sensors

Valid for: L576-1333;

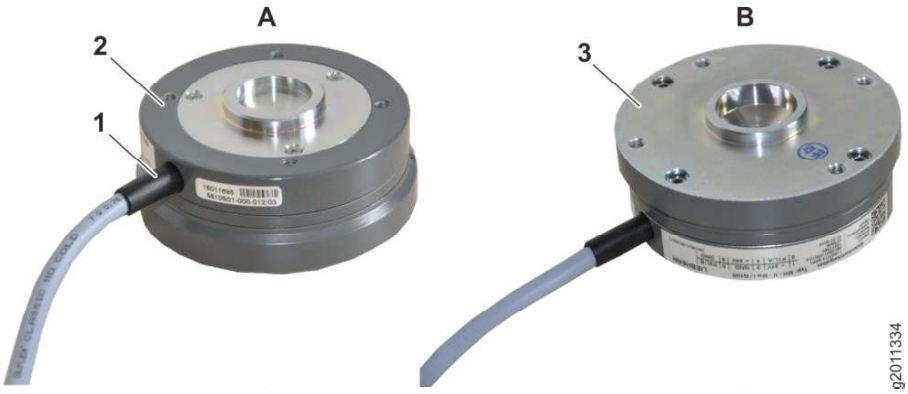

Fig. 420: Working hydraulics angle sensors

1	Connecting cable	**A**	View of housing with integrated electronics
2	Housing with integrated electronics	**B**	View of connecting housing
3	Connecting plate		

The angles sensors of working hydraulics are mounted on the lift arms (lift arm position angle sensor B61) and on the rocker arm (bucket position angle sensor B60).

Both angle sensors are the same type and can be swapped with each other.

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080 Hydraulic components

Contents

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2 Function

2.1 Basic function

The steel tank stores the hydraulic oil. The hydraulic pumps draw the oil directly from the steel tank.

Before the oil returns to the steel tank, it is filtered by the filter unit and the leak oil strainer.

2.2 Condensate and sediment

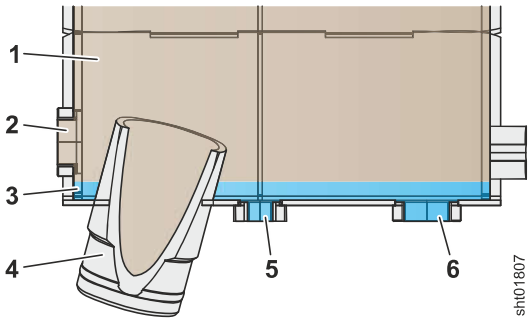

Fig. 433: Suction ports: Sectional view

1	Hydraulic oil	**4**	Suction port for working pump, emergency steering pump, fan pump and brake pump
2	Steering pump suction port	**5**	Port for drain valve
3	Condensate and sediment	**6**	Port for leak oil strainer

The suction ports for the hydraulic pumps are located above the bottom of the steel tank. This allows condensate and sediment **3** to settle without being drawn in when the machine is started. Condensate and sediment **3** can be removed from the steel tank via the drain valve **5**.

8 Working pump

9 Valve block for steering system

17 Left steering cylinder with stroke limit damping

18 Right steering cylinder with stroke limit damping

25 Pressure relief valve for stroke limit damping

26 Pressure relief valve for stroke limit damping

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. 205: 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. 206: Equipment codes

The steering system consists of the following components:
- Hydraulic tank (For more information see: 080.3.1 Overview of hydraulic tank, page 080-8)
- Steering pump (For more information see: 090.3 Steering pump, page 090-13)
- Servostat (For more information see: 090.4 Servostat, page 090-19)
- Steering cylinder (For more information see: 090.5.1 Steering cylinder, page 090-22)
- Steering stabilisation valve block (For more information see: 090.5.2 Steering stabilisation valve block, page 090-25)
- Emergency steering (For more information see: 090.6.1 Emergency steering overview, page 090-28)
- Hydraulic oil cooler

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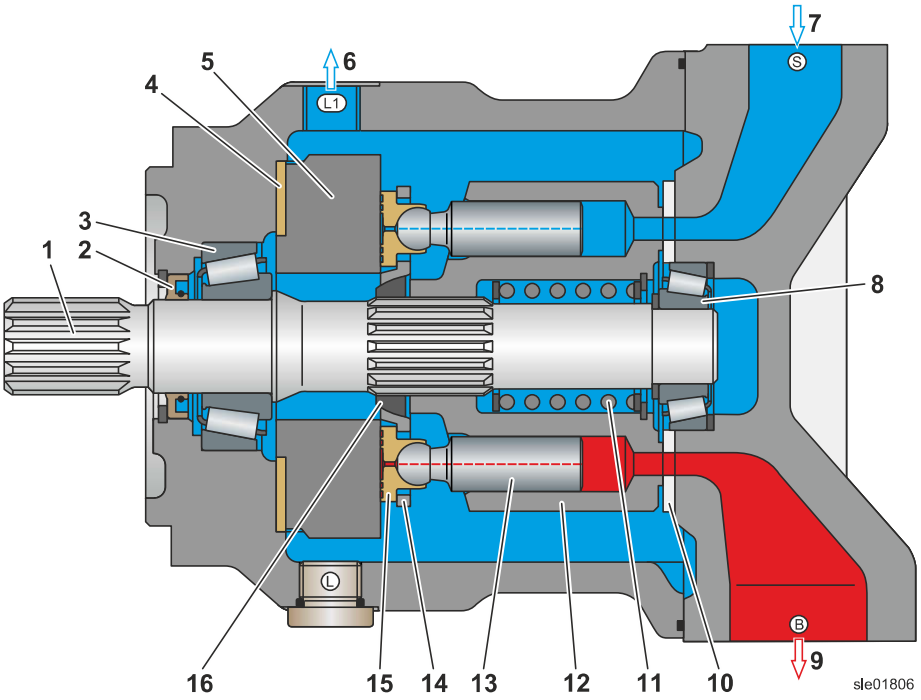

Fig. 449: Sectional view of steering pump (vertical)

1	Drive shaft	**9**	Oil supply to servostat
2	Shaft seal ring	**10**	Control plate
3	Tapered roller bearing	**11**	Compression spring
4	Bearing shell	**12**	Rotary group cylinder
5	Swivel plate	**13**	Piston
6	Leak oil to leak oil strainer	**14**	Return plate
7	Suction port from hydraulic tank	**15**	Glide shoe
8	Tapered roller bearing	**16**	Return ball

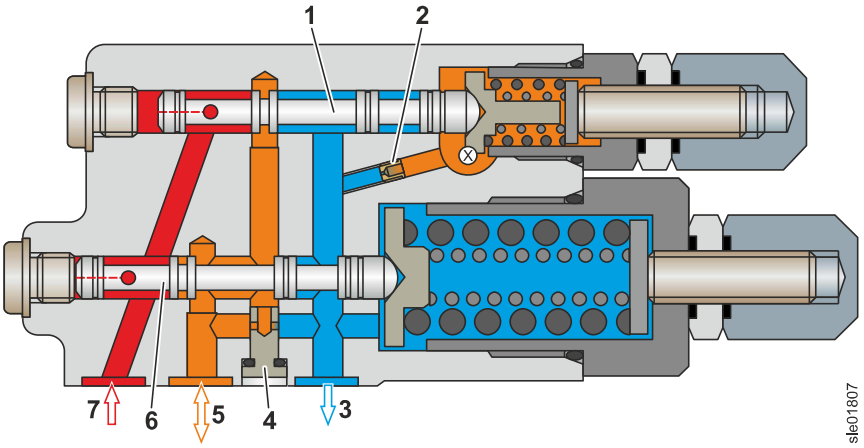

Fig. 450: Sectional view of steering pump

1	Flow regulator	**5**	Connection to return piston
2	Throttle	**6**	LS-pressure cut-off
3	Connection to pump housing	**7**	Connection to operating pressure
4	Throttle		

090.5.2 Steering stabilisation valve block

Valid for: L576-1333/0-50692;

1 Layout

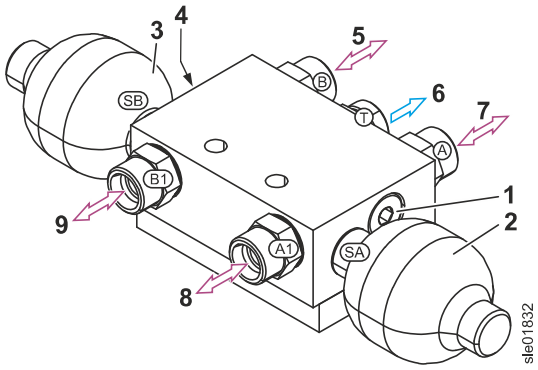

Fig. 464: Steering stabilisation valve block (from front left)

1	Replenishing valve for steering stabilisation 0.5 bar	**6**	Return flow to collector pipe
2	Steering damper hydro accumulator	**7**	Servostat port
3	Replenishing valve for steering stabilisation 0.5 bar	**8**	Port for piston side of left steering cylinder
4	Steering damper hydro accumulator	**9**	Port for piston side of right steering cylinder
5	Servostat port		

The steering stabilisation valve block is mounted on the rear section near the articulated joint.

2 Function

2.1 Basic function

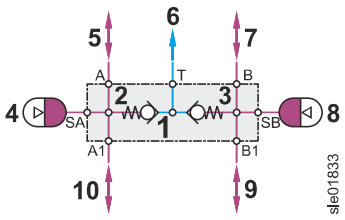

Fig. 465: Hydraulic diagram of the steering stabilisation valve block

1	**Steering stabilisation valve block**	**6**	Return flow to collector pipe
2	Replenishing valve for steering stabilisation 0.5 bar	**7**	Servostat connection for steering to the left
3	Replenishing valve for steering stabilisation 0.5 bar	**8**	Steering damper hydro accumulator
4	Steering damper hydro accumulator	**9**	Port for piston side of right steering cylinder
5	Servostat connection for steering to the right	**10**	Port for piston side of left steering cylinder

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Pin	Input / output	Function
1	X	Switching signal input from emergency steering pressure switch B3
2	30	Power supply via terminal 30
3	C	Diagnostic output for input module A16a
4	15	Power supply via terminal 15
5	87a	Power supply for switching contact of relay K16
6	31	Ground
7	Y	Input signal from output module A17a
8	87	Switching signal to relay K16
9	Z	D+ signal from diesel engine

Tab. 226: Emergency steering control relay pin assignment

The emergency steering control relay K14 is used to control the emergency steering function.

The switching signal from the pressure switch B3 is read at the input **X**. If the pressure in the steering system drops, the switching signal from the pressure switch B3 drops off. This activates the emergency steering pump via the outputs **87** and **87a**.

The relay is powered via the input **30** with voltage from terminal 30.

Via the output **C**, the central control unit A15 tests the relays K14 and the switching state of the pressure switch B3 using a timing signal. If the voltage at this output drops, either the relay K14 is defective, or the pressure switch B3 has opened due to a pressure drop in the steering system. In both cases, a service code appears. The emergency steering pump is activated.

The relay is powered via the input **15** with voltage from terminal 15.

Switching contact of relay K16 is supplied with voltage via the output **87a**. This output is active when the pressure switch B3 opens **or** the command to activate the emergency steering pump comes from the central control unit A15.

The relay is earthed via the output **31**.

The input **Y** receives the signal from the central control unit A15 to activate the emergency steering pump.

The relay K16 is switched via the output **87**. This output is active when the command to activate the emergency steering pump comes from the central control unit A15.

The input **Z** receives the signal from the diesel engine D+. This tells the relay K14 whether or not the diesel engine is running. This is necessary in order not to activate the emergency steering pump immediately the ignition is on.

2.3 Function of the on-road travel switch S19

When driving on roads, the safety regulations are more stringent. This means that the emergency steering system must work even if the central control unit fails.

In normal mode, the emergency sting relay K16 is activated by the output **87**. The output **87** is activated when the central control unit emits a signal to the input **Y** am on the relay K14 to activate the emergency steering pump.

To ensure the emergency steering function if the central control unit fails, the *on-road travel* switch S19 must be active.

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

Tab. 231: Test points

BMK	Function	BMK	Function	BMK	Function
B3	Emergency steering pressure switch	**B71**	Emergency spool valve position sensor	**Y72**	Proportional solenoid for steering to the left (emergency spool valve)
B3a	Emergency steering check pressure switch	**M8**	Electric motor for emergency steering pump	**Y73**	Proportional solenoid for steering to the right (emergency spool valve)
B8	Hydraulic oil temperature sensor	**Y70**	Proportional solenoid for steering to the left (main spool valve)	**Y74**	Solenoid for safety circuit
B70	Main spool valve position sensor	**Y71**	Proportional solenoid for steering to the left (spool valve for emergency steering function)		

Tab. 232: Equipment codes

The steering pump **20** draws oil from the hydraulic tank **1** and pumps it through the steering system valve block **40** to the joystick steering control valve block **45** and to the servostat **70**. Joystick steering control valve block **45** directs oil to steering cylinders by means of spool valve **52**.

Spool valve **52** is electro-hydraulically actuated. For that purpose the pressure reducing valve **48** reduces the delivery pressure of the steering pump **20** to the servo pressure.

When steering to the left or right the relevant proportional solenoid valve is energised. Proportional solenoid valve reduces servo pressure once more, depending on current, and directs servo oil to spool valve **52**. Servo oil thus pushes spool valve **52** against spring force of return springs. Via the openings that the spool valve **52** releases, the oil flows from the steering pump **20** to the steering cylinders.

For the emergency steering function, the system is provided with redundant backup hydraulics. Circuit for emergency steering function has its own pressure reducing valve **50** and its own spool valve **56**.

2.2 Load sensing signal

Depending on the operating status, the steering pump is regulated by a load sensing signal from one of the three systems:
- Load sensing signal from the servostat **70**
- Load sensing signal from the main spool valve **52**
- Load sensing signal from the emergency spool valve **56**

Two shuttle valves ensure that the steering pump is always supplied with the load sensing signal of the relevant active system.

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Name	Test point	Name	Test point	Name	Test point
M A2	Servo pressure for steering to left (emergency spool valve)	**PL/**	Steering pump high pressure		

Tab. 239: Test points

BMK	Function	BMK	Function	BMK	Function
B3	Emergency steering pressure switch	**B71**	Emergency spool valve position sensor	**Y72**	Proportional solenoid for steering to left (emergency spool valve)
B3a	Emergency steering check pressure switch	**M8**	Electric motor for emergency steering pump	**Y73**	Proportional solenoid for steering to right (emergency spool valve)
B8	Hydraulic oil temperature sensor	**Y70**	Proportional solenoid for steering to left (main spool valve)	**Y74**	Solenoid for safety circuit
B70	Main spool valve position sensor	**Y71**	Proportional solenoid for steering to left (spool valve for emergency steering function)		

Tab. 240: Equipment codes

Steering pump **20** draws oil from hydraulic tank **1** and pumps it through steering system valve block **40** to joystick steering control valve block **45** and to servostat **80**. Joystick steering control valve block **45** directs oil to steering cylinders by means of main spool valve **60**.

Main spool valve **60** is electro-hydraulically actuated. For that purpose pressure reducing valve **47** reduces delivery pressure of steering pump **20** to servo pressure.

When steering to left or right relevant proportional solenoid valve is energised. Proportional solenoid valve continues reducing servo pressure, depending on current, and directs servo oil to main spool valve **60**. As a result, pilot control fluid pushes main spool valve **60** against force of return springs. Ports thus opened by main spool valve **60** allow oil to flow from steering pump **20** to steering cylinders.

For emergency steering function, system is provided with redundant backup hydraulics. Circuit for emergency steering function has its own pressure reducing valve **49** and its own emergency spool valve **66**.

2.2 Load sensing signal

Depending on operating status, steering pump is regulated by a load sensing signal from one of three systems:
- Load sensing signal from servostat **80**
- Load sensing signal from main spool valve **60**
- Load sensing signal from emergency spool valve **66**

Three shuttle valves ensure that steering pump is always supplied with load sensing signal of relevant active system.

LBH/11835200/20/211-20191218_090725/en

2 Function

2.1 Basic function

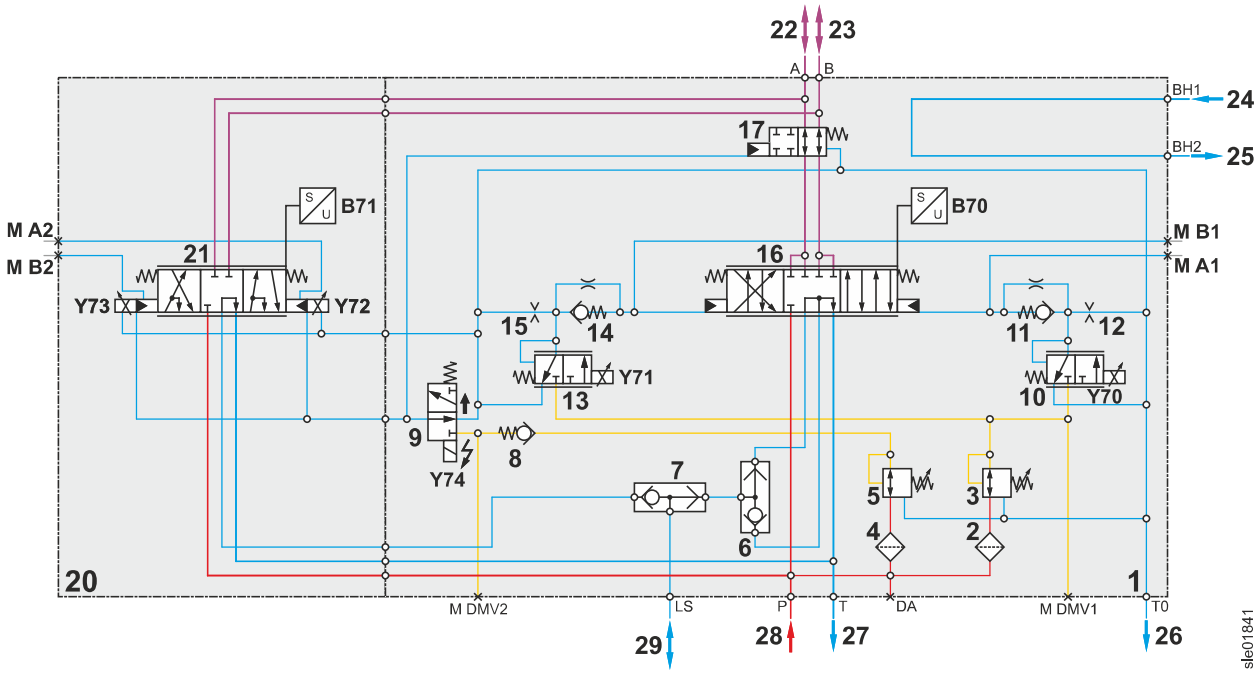

Fig. 492: Hydraulic diagram of joystick steering control valve block (joystick steering activated)

1	**Joystick steering control block**	**10**	Proportional solenoid valve for steering left (main spool valve)	**21**	Emergency spool valve
2	Servo oil strainer for main spool valve	**11**	Throttle check valve	**22**	Connection for steering to left
3	Pressure reducing valve for main spool valve	**12**	Orifice 0.7 mm	**23**	Connection for steering to the right
4	Servo oil strainer for emergency spool valve	**13**	Proportional solenoid valve for steering right (main spool valve)	**24**	Return flow from compact brake valve (housing preheating)
5	Pressure reducing valve for emergency spool valve	**14**	Throttle check valve	**25**	Return flow to control valve block (housing preheating)
6	Shuttle valve 2	**15**	Orifice 0.7 mm	**26**	Return flow to leak oil strainer (via pilot control valve block)
7	Shuttle valve 1	**16**	Main spool valve	**27**	Return flow to collector pipe
8	Check valve	**17**	Cut-off valve for main spool valve	**28**	Oil supply from steering pump
9	Solenoid valve for safety circuit	**20**	**Control block section for emergency steering function**	**29**	Load sensing signal to working hydraulics pump

Name	Test point	Name	Test point
M A1	Servo pressure for steering to the left (main spool valve) A)	**M A2**	Servo pressure for steering to the left (emergency spool valve) A)

Joystick module **A29** receives signals from following components:
- Joystick electronics **A29a**
- Joystick steering switch **S71**
- Joystick steering switch (armrest) **S72**
- Articulation angle sensor **B67**

Joystick module **A29** forwards these signals via CAN lines 2 and 3 to central control unit **A15**.

Central control unit **A15** uses output module **A17b** to control proportional solenoid for steering to right (main spool valve) **Y71** and proportional solenoid for steering to left (main spool valve) **Y70** on joystick steering control valve block **1**.

Joystick module **A29** controls proportional solenoid for steering to right (emergency spool valve) **Y73** and proportional solenoid for steering to left (emergency spool valve) **Y72** on joystick steering control valve block **1**.

Data of position sensor of main spool valve **B70** and of position sensor of emergency spool valve **B71** are read from joystick module **A29**.

Safety circuit solenoid valve **Y74** is activated by central control unit **A15** via output module **A17b**. In normal node, solenoid valve is energised. In emergency mode, solenoid valve is not energised.

Electric components of joystick steering are powered via joystick steering relay board **A4b**.

Articulation angle sensor **B67** measures steering deflection using position of articulated joint.

Joystick steering control valve block **1** controls oil flow to steering cylinders.

Note

When driving on roads, joystick steering is deactivated using *on-road travel* switch S19.

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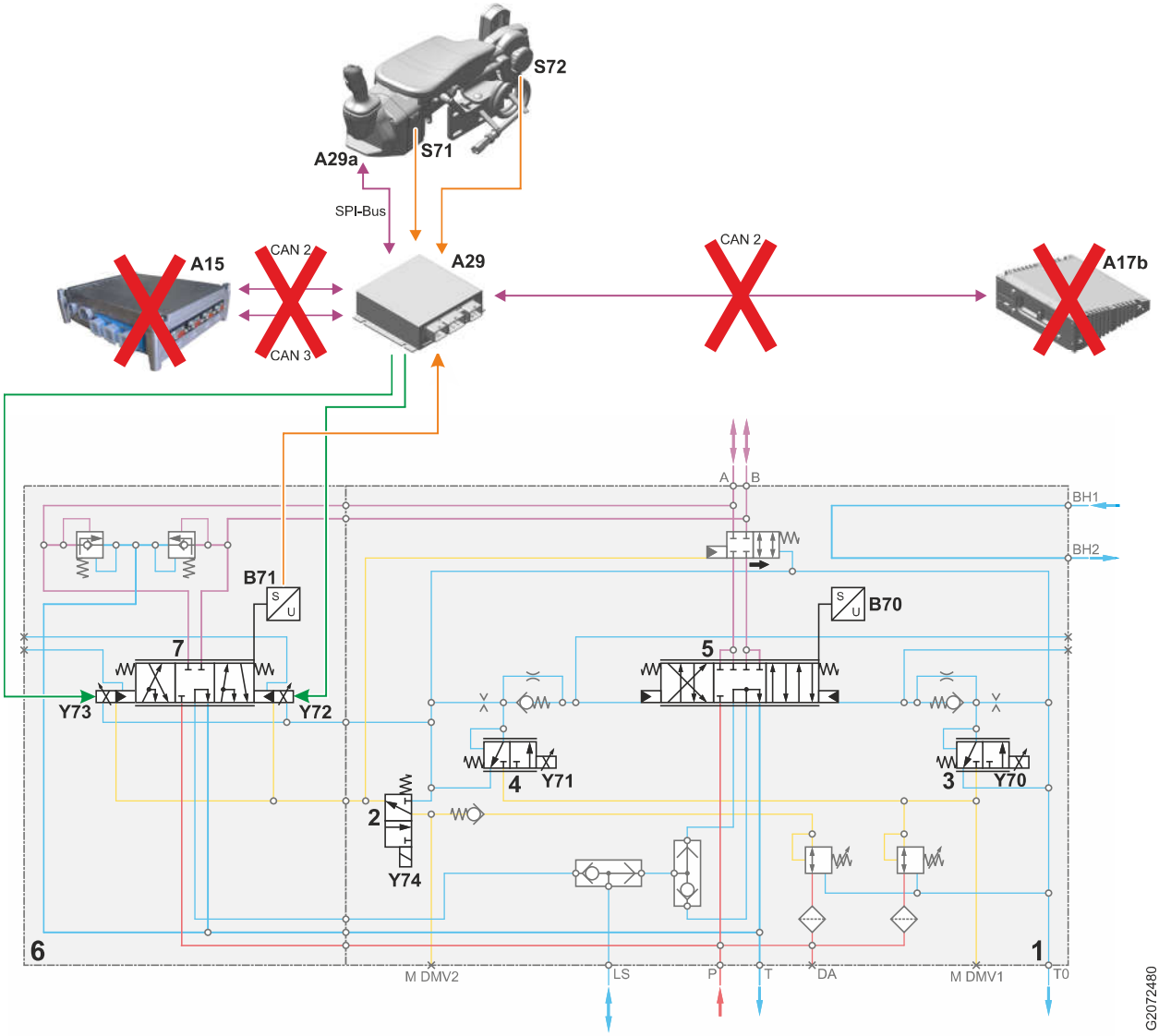

Fig. 503: Joystick steering function in emergency mode

1 **Joystick steering control block**
2 Solenoid valve for safety circuit
3 Proportional solenoid valve for steering left (main spool valve)
4 Proportional solenoid valve for steering right (main spool valve)
5 Main spool valve
6 **Control block section for emergency steering function**
7 Emergency spool valve

BMK	Function	BMK	Function	BMK	Function
A15	Central control unit (Master4)	**B71**	Emergency spool valve position sensor	**Y72**	Proportional solenoid for steering to left (emergency spool valve)
A17b	Output module A17b	**S71**	Joystick steering switch	**Y73**	Proportional solenoid for steering to right (emergency spool valve)

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2 Function

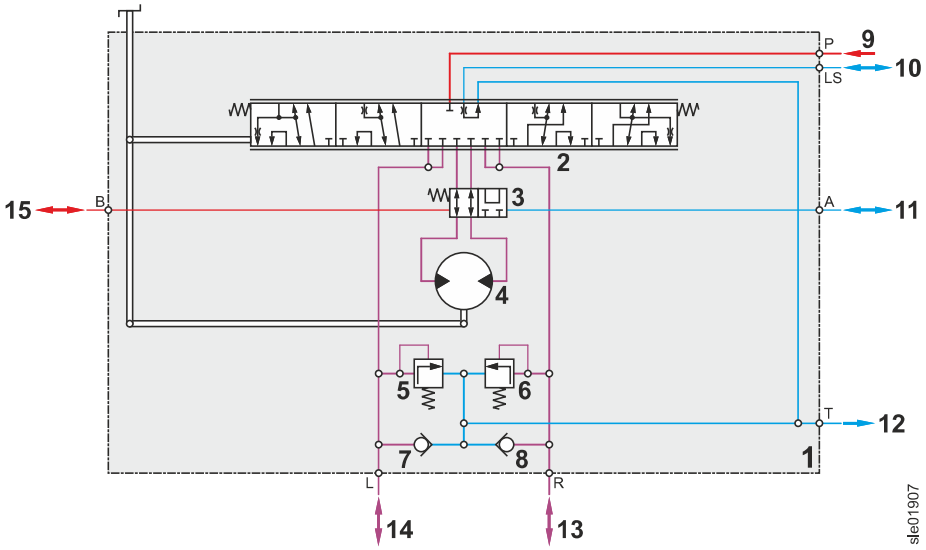

Fig. 509: Servostat for 2in1 steering: hydraulic diagram (diesel engine is running)

1	**Servostat for 2in1 steering**	**9**	Oil supply from steering pump
2	Valve spool	**10**	Load sensing signal to working hydraulics pump
3	Cut-off valve for 2in1 steering	**11**	Connection for activating 2in1 steering
4	Metering pump	**12**	Return flow to collector pipe
5	Secondary pressure relief valve for steering to left	**13**	Connection for steering to left
6	Secondary pressure relief valve for steering to right	**14**	Connection for steering to the right
7	Feeder valve for steering to left	**15**	Connection for deactivating 2in1 steering
8	Feeder valve for steering to left		

If servostat for 2in1 steering **1** is installed, in addition to conventional steering mode, machine can also be steered in direct steering mode.

In conventional steering mode, metering pump **4** delivers a defined quantity of oil to steering cylinder **13** and **14** back with each turn of steering wheel. In direct steering mode, oil flows past metering pump **4** directly to steering cylinders, as long as servostat is actuated. Quantity of oil is no longer metered per turn of steering wheel. As a result, large steering movements can be made with small turn of steering wheel.

To activate direct steering mode, oil **3** is applied to cut-off valve for 2in1 steering **11**. As a result, cut-off valve for 2in1 steering **3** guides oil past metering pump **4**.

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BMK	Function	BMK	Function
B19	Brake accumulator pressure sensor	Y10	Parking brake solenoid

Tab. 278: Equipment codes

Compact brake valve is screw-connected to floor of operator's cab.

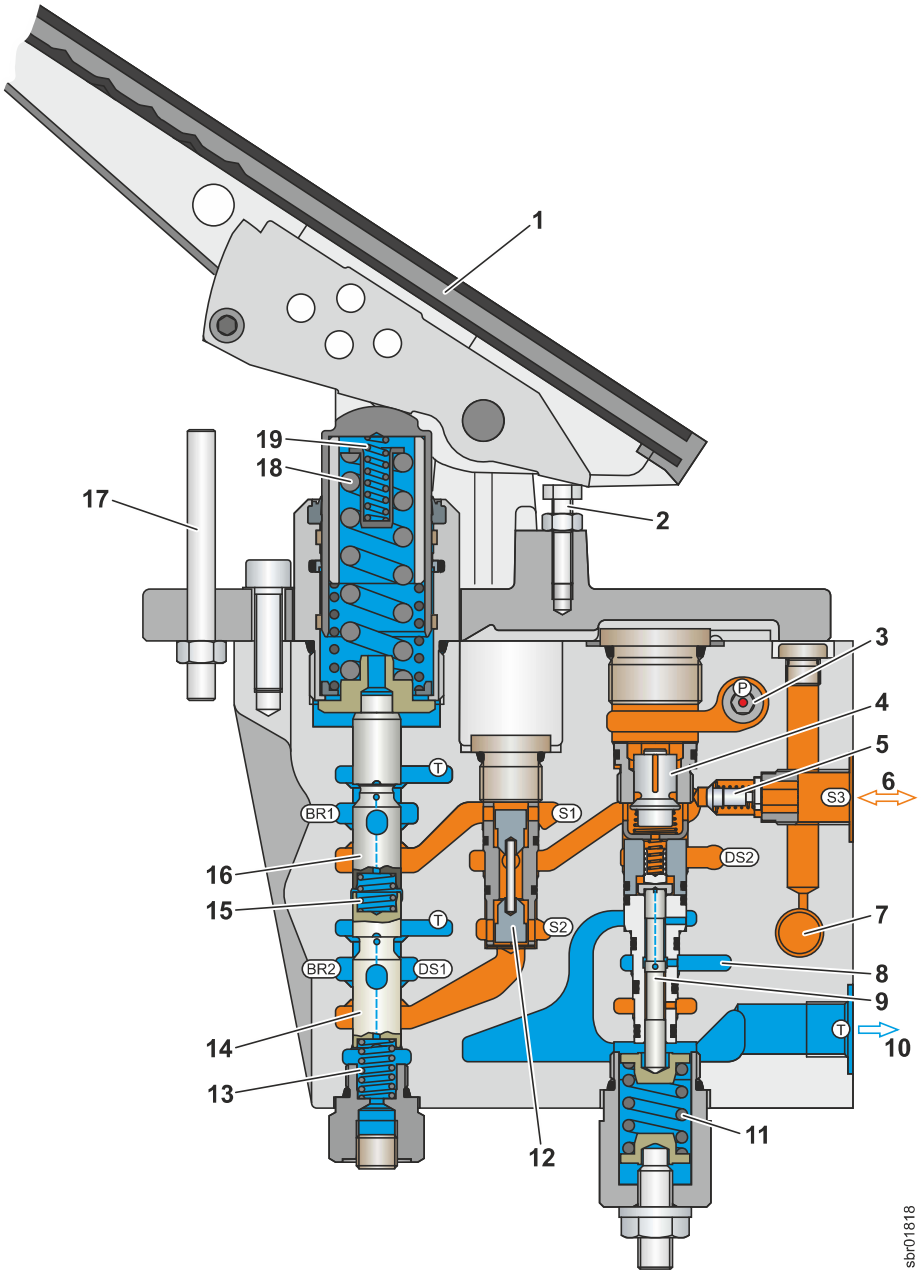


Fig. 516: Sectional view of compact brake valve

1 Inching brake pedal
2 Zero position stop screw
3 Inlet restrictor
11 Regulating spring for pilot valve
12 Inverted shuttle valve
13 Return spring for pressure regulation piston

See next page for continuation of the image legend

110 Electrical system

Contents

LBH/11835200/20/211-20191218_090725/en

110.3 Lighting

Valid for: L576-1333;

1 Layout

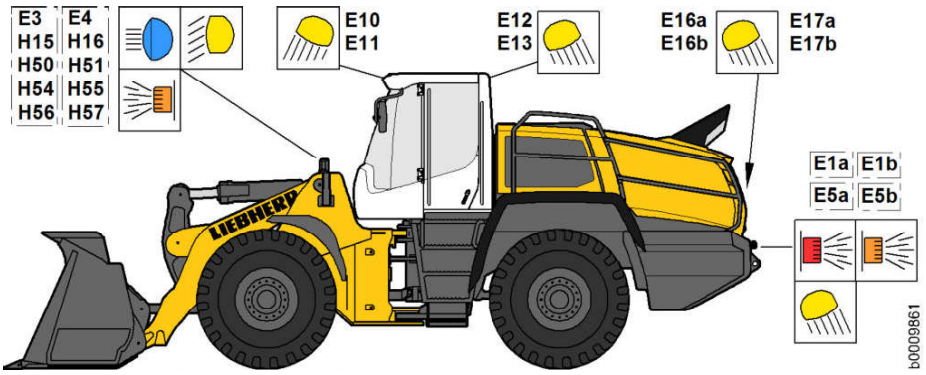


Fig. 532: Overview of lighting

BMK	Function	BMK	Function
E1a	Left tail light	E16b	Left engine bonnet working head-light
E1b	Left reversing light	E17a	Right engine bonnet working headlight
E3	Left driving headlight	E17b	Right engine bonnet working headlight
E4	Right driving headlight	H15	Front left direction indicator
E5a	Right tail light	H16	Front right direction indicator
E5b	Right reversing light	H50	Front left parking light
E10	Front right working headlight	H51	Front right parking light
E11	Front left working headlight	H54	Left low beam
E12	Rear left working headlight	H55	Right low beam
E13	Rear right working headlight	H56	Left high beam
E16a	Left engine bonnet working headlight	H57	Right high beam

Tab. 287: Component designations

2.1 Basic function

The machine lighting is controlled by switches in the operator's cab and the steering column switch S3.

The left brake light and the right brake light are controlled by the brake light pressure switch B12.

BMK	SYSTEM	LOCATION	FUNCTION	PAGE
-B50	=H	+H1	REAR CAMERA	/38.B4
-B50.X	=H	+H	CONNECTOR REAR CAMERA	/38.B4
-B50.X2	=H	+H1	CONNECTOR REAR CAMERA	/38.B5
-B51 *	=V	+V	PROXIMITY SWITCH WEIGHING DEVICE	/112.C2
-B52	=V	+V2	GRAB CAMERA	/151.B7
-B52 *	=V	+V	PROXIMITY SWITCH WEIGHING DEVICE	/112.C3
-B52.F	=K	+K	FRONT CAMERA	/38.B7
-B52.F.X1	=K	+K	CONNECTOR B52.F.X1	/38.B7
-B52.X1	=V	+V	CONNECTOR GRAB CAMERA	/151.B7
-B60	=V	+V2	TILT	/42.C5
-B60.L	=V	+V	ANGLE SENSOR LOG HANDLER BOOM POSITION	/141.C5
-B60.X	=V	+V2	CONNECTOR B60	/42.C5
-B60.Xa	=V	+V	CONNECTOR LIFT ARM	/42.B5
-B60.XaL	=V	+V	CONNECTOR LOG HANDLER ANGLE SENSOR	/141.C5
-B60.Xb	=V	+V	CONNECTOR LIFT ARM	/42.C5
-B61	=V	+V2	HOISTING	/42.C7
-B61.X	=V	+V2	CONNECTOR B61	/42.C7
-B62	=K	+K	HOISTING	/130.C1
-B62.X	=K	+K	CONNECTOR B62	/130.C2
-B63	=K	+K	TILT	/130.C4
-B63.X	=K	+K	CONNECTOR B63	/130.C5
-B64	=K	+K	OPTIONAL EQUIPMENT	/130.C7
-B64.X	=K	+K	CONNECTOR B64	/130.C7
-B65	=K	+K	OPTIONAL EQUIPMENT	/131.C7
-B65.X	=K	+K	CONNECTOR B65	/131.C7
-B66	=V	+V	PRESSURE GRAB	/147.C3
-B66.X	=V	+V	CONNECTOR B66	/147.C3
-B67	=H	+H5	SENSOR ARTICULATED JOINT	/94.C2
-B67.X	=H	+H5	CONNECTOR B67	/94.C2
-B67a	=H	+H	LIGHTING CONTROL ARTICULATED JOINT	/117.C4
-B67a.X	=H	+H	LIGHTING CONTROL ARTICULATED JOINT	/117.C3
-B70	=H	+H	POSITION FEEDBACK 2	/96.C2
-B70	=K	+K	DOOR CONTACT SWITCH	/28.C2
-B70 + B71	=H	+H	ADAPTOR WIRING	/94.C8
-B70.X	=H	+H	PLUG B70	/96.C2
-B70.X	=K	+K	CONNECTOR DOOR CONTACT SWITCH	/28.C2

BMK	SYSTEM	LOCATION	FUNCTION	PAGE
-B70a	=K	+K	DOOR CONTACT SENSOR RETROFIT KIT	/126.B7
-B70a.X	=K	+K	CONNECTOR DOOR CONTACT SWITCH RETROFIT KIT	/126.B7
-B70S.X	=H	+H	ADAPTOR WIRING	/96.C2
-B71	=H	+H	POSITION FEEDBACK 1	/94.C8
-B71.X	=H	+H	CONNECTOR B71	/94.C8
-B80	=H	+H	PRESSURE SENSOR FOR CHANNEL DOWN	/45.F5
-B81	=H	+H	PRESSURE SENSOR FOR CHANNEL A	/45.F6
-B82	=H	+H	PRESSURE SENSOR FOR SUN GEAR 2	/45.F6
-B83	=H	+H	SPEED SENSOR FOR OUTPUT	/45.F6
-B84	=H	+H	SPEED SENSOR FOR CLUTCH TRAVELLING DIRECTION BACKWARDS	/45.F6
-B85	=H	+H	FILTER BYPASS SWITCH	/45.F7
-B86	=H	+H	TEMPERATURE SENSOR FOR GEAR OIL	/45.F7
-B90	=V	+V2	PRESSURE LH WEIGHING DEVICE	/114.C3
-B90.X	=V	+V2	PLUG B90	/114.C3
-B91	=V	+V2	PRESSURE LH WEIGHING DEVICE	/114.C5
-B91.X	=V	+V2	PLUG B91	/114.C5
-B204	=H	+H	AIR FILTER VACUUM SWITCH	/114.C7
-B204.X	=H	+H	PLUG B204	/114.C7
-B581	=B	+B	SCR AIR DRIER	/53.D8
-B581.X	=B	+B	CONNECTOR B581	/53.D8
-B710	=M	+M	WATER SENSOR	/51.D8
-B710.X	=M	+M	PLUG WATER SENSOR	/51.C8
-B722	=M	+M	SCR-F DIFFERENTIAL PRESSURE SENSOR	/51.C7
-B722.X	=M	+M	B722 CONNECTOR	/51.C7
-B723	=M	+M	DieselOxydCatalysator - TEMPERATURE 1 Upstream	/51.C4
-B723.X	=M	+M	PLUG DPF TEMPERATURE 1	/51.C4
-B726	=H	+H	O2 / NOX SENSOR1 UP	/55.D5
-B726.X	=H	+H	CONNECTOR B726	/55.D5
-B727	=H	+H	O2 / NOX SENSOR1 DOWN	/55.D6
-B727.X	=H	+H	PLUG B727	/55.D6
-B737	=K	+K	AMBIENT TEMPERATURE SENSOR 1	/51.C5
-B737.X	=K	+K	PLUG UT	/51.C5
-B771	=M	+M	TEMPERATURE SENSOR SCR 1 Upstream	/51.C1
-B771.SCR-F	=H	+H	DieselOxydCatalysator - TEMPERATURE 1 Downstream	/51.C3
-B771.SCR-F.X	=H	+H	CONNECTOR B782	/51.C3
-B771.X	=M	+M	PLUG DPF TEMPERATURE 2	/51.C1

PROJECT: Stufe 4 GG_23.11.18 E_Hauptschalter
ITEM CODE: 12418288
DRAWING INDEX: 105
DRAWING NUMBER: 1333 90100 01 00

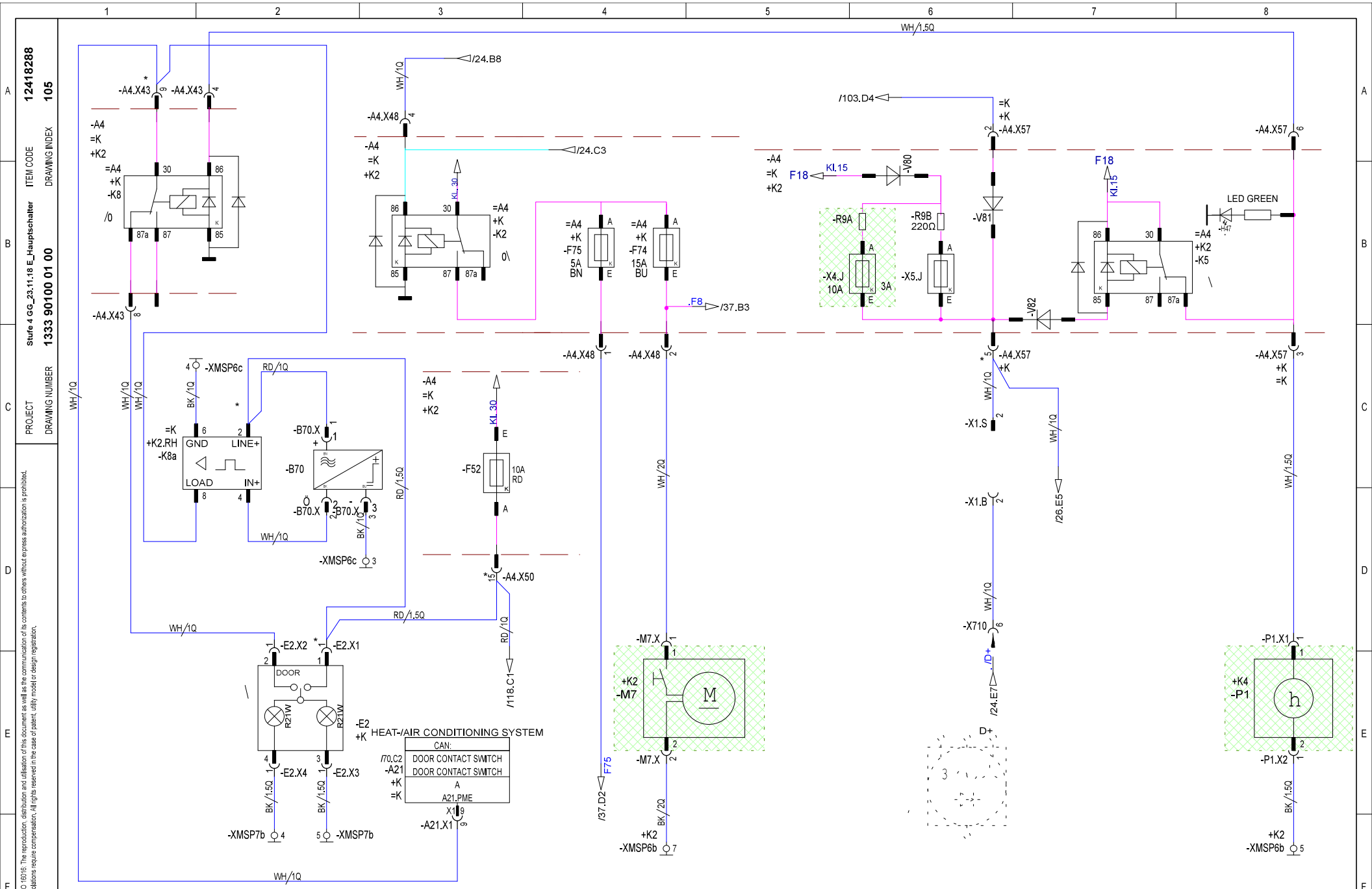
MACHINE TYPE: LIDOS UNIT
SERIAL NUMBER: XXXXX
LIEBHERR FACTORY LBH
BMK-INDEX E PLAN

BMK	SYSTEM	LOCATION	FUNCTION	PAGE
-T3.X	=K	+K2	PLUG T3	/37.D2
-V1	=A4b	+K2	BLOCKING DIODE AUTOMATIC LOCK	/95.D2
-V1	=K	+K2	FREE-WHEELING DIODE K01	/24.C2
-V2	=A4b	+K2	BLOCKING DIODE AUTOMATIC LOCK	/95.E3
-V3	=A4b	+K2	BLOCKING DIODE AUTOMATIC LOCK	/95.B3
-V3	=K	+K2	FREE-WHEELING DIODE K12	/37.B4
-V13.B	=H	+H	DIODE CONDENSER FAN	/60.E3
-V13.B.	=H	+H	CONNECTOR DIODE CONDENSER FAN	/60.E7
-V13.KL	=H	+H	DIODE CONDENSER FAN	/60.E3
-V13.KL.	=H	+H	DIODE CONDENSER FAN	/60.E7
-V13.S	=H	+H	CONNECTOR DIODE CONDENSER FAN	/60.D3
-V13.S.	=H	+H	CONNECTOR DIODE CONDENSER FAN	/60.D7
-V15a	=K	+K	DIODE MASTER SWITCH CIRCLE	/24.C5
-V15b	=K	+K	DIODE MASTER SWITCH CIRCLE	/24.C5
-V15c	=K	+K	DIODE MASTER SWITCH CIRCLE	/24.D5
-V15d	=B	+B	DIODE MASTER SWITCH CIRCLE	/24.E3
-V16	=K	+K2	FREE-WHEELING DIODE K31A	/32.B5
-V17	=K	+K2	FREE-WHEELING DIODE K31B	/32.B7
-V18	=K	+K2	FREE-WHEELING DIODE K32A	/33.B5
-V19	=K	+K2	FREE-WHEELING DIODE K32B	/33.B7
-V20	=K	+K2	FREE-WHEELING DIODE K33A	/81.B4
-V21	=K	+K2	FREE-WHEELING DIODE K33B	/81.B7
-V27E.	=K	+K	AUXILIARY HEATER	/105.B4
-V27E..X1	=K	+K	CONNECTOR V27E	/105.B4
-V27E..X2	=K	+K	CONNECTOR V27E	/105.B4
-V32C	=K	+K2	BLOCKING DIODE	/33.B7
-V49	=K	+K2	FREE-WHEELING DIODE K245	/60.B7
-V50	=K	+K2	FREE-WHEELING DIODE K244	/60.B4
-V57	=K	+K2	FREE-WHEELING DIODE K10	/36.D6
-V80	=A4	+K2	BLOCKING DIODE	/28.B6
-V81	=A4	+K2	BLOCKING DIODE	/28.B6
-V82	=A4	+K2	BLOCKING DIODE	/28.B7
-V83	=K	+K2	BLOCKING DIODE	/31.D4
-V84	=K	+K2	BLOCKING DIODE	/31.D4
-V87	=K	+K2	BLOCKING DIODE	/31.D6
-V88	=K	+K2	BLOCKING DIODE	/31.D7

BMK	SYSTEM	LOCATION	FUNCTION	PAGE
-V89	=K	+K2	BLOCKING DIODE	/31.C7
-V102	=K	+K	AUTOMATIC RUN-OUT	/103.D4
-V103	=K	+K	AUTOMATIC RUN-OUT	/103.D1
-V103	=K	+K2	FREE-WHEELING DIODE K245	/84.C7
-V104	=K	+K2	FREE-WHEELING DIODE K244	/60.B5
-V200	=A4	+K	QUICK-CHANGE DEVICE	/101.C5
-V201	=A4	+K	QUICK-CHANGE DEVICE	/101.C5
-V202	=A4	+K	QUICK-CHANGE DEVICE	/101.C6
-V203	=A4	+K	QUICK-CHANGE DEVICE	/101.D8
-VUI10	=K	+K	DIODE	/119.A6
-VUI10.	=K	+K	DIODE	/30.A6
-VUI10.X1	=K	+K	CONNECTOR	/119.A6
-VUI10.X2	=K	+K	CONNECTOR	/119.A6
-W1	=K	+K3	ANTENNA	/37.D8
-X-E29.B	=K	+K	CONNECTOR V27E	/105.C5
-X-E29.S	=K	+K	AUXILIARY HEATER	/105.C5
-X1.B	=K	+K	PLUG CAB FLOOR	/33.D4
-X1.B.25a	=K	+K	LIFT END OPERATION VIA PUSH-BUTTON SWITCH	/34.B3
-X1.B.25a.	=K	+K2	LIFT END OPERATION VIA PUSH-BUTTON SWITCH	/85.B4
-X1.B.2b	=K	+K	CONNECTOR	/103.F4
-X1.B.43a	=K	+K	CONNECTOR	/103.B2
-X1.B.a.20 + 15	=K	+K	CONNECTOR	/104.C4
-X1.B.S.43	=K	+K	PARKING BRAKE EMERGENCY OPERATION	/106.E2
-X1.J	=A4	+K2	JUMPER	/31.C4
-X1.S	=K	+K	PLUG CAB FLOOR	/33.C4
-X1.S.25a	=K	+K2	LIFT END OPERATION VIA PUSH-BUTTON SWITCH	/85.A4
-X1.S.25a	=K	+K	LIFT END OPERATION VIA PUSH-BUTTON SWITCH	/34.A3
-X1.S.2a	=K	+K	CONNECTOR	/103.F4
-X1.S.43.	=K	+K	PARKING BRAKE EMERGENCY OPERATION	/106.C3
-X1.S.43b	=K	+K	CONNECTOR	/103.D1
-X1.S.43b.	=K	+K	CONNECTOR	/103.D1
-X1.S.43c	=K	+K	CONNECTOR	/103.E1
-X1.S.a.15	=K	+K	CONNECTOR	/104.C4
-X1.S.a.20	=K	+K	CONNECTOR	/104.C4
-X2.9&10 CLAAS	=K	+K	CONNECTOR	/62.C5
-X2.B	=K	+K6	PLUG CAB FLOOR	/59.C6

PROJECT: Stufe 4 GG_23.11.18 E_Hauptschalter
DRAWING NUMBER: 1333 90100 01 00
ITEM CODE: 12418288
DRAWING INDEX: 105

MACHINE TYPE: LIDOS UNIT
SERIAL NUMBER: XXXXX
LIEBHERR FACTORY LBH
BMK-INDEX E PLAN

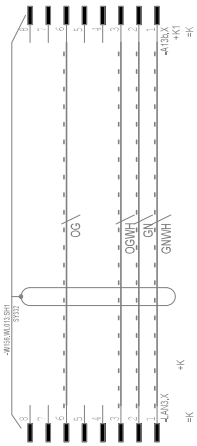


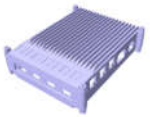
PROJECT
DRAWING NUMBER 1333 90100 01 00
Stufe 4 GG_23.11.18 E_Hauptschalter
ITEM CODE 12418288
DRAWING INDEX 105

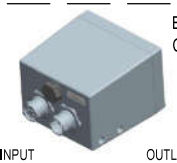
MACHINE TYPE	SERIAL NUMBER			
LIDOS UNIT	XXXXX	LIEBHERR FACTORY LBH	INDOOR LIGHTING; COMPRESSOR SEAT; DOOR CONTACT SWITCH E PLAN	PAGE 28 OF CREATION DATE 26.04.2019 10:08

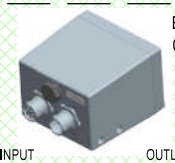
PROJECT Stufe 4 GG_23.11.18 E_Hauptschalter ITEM CODE 12418288

DRAWING NUMBER 1333 90100 01 00 DRAWING INDEX 105

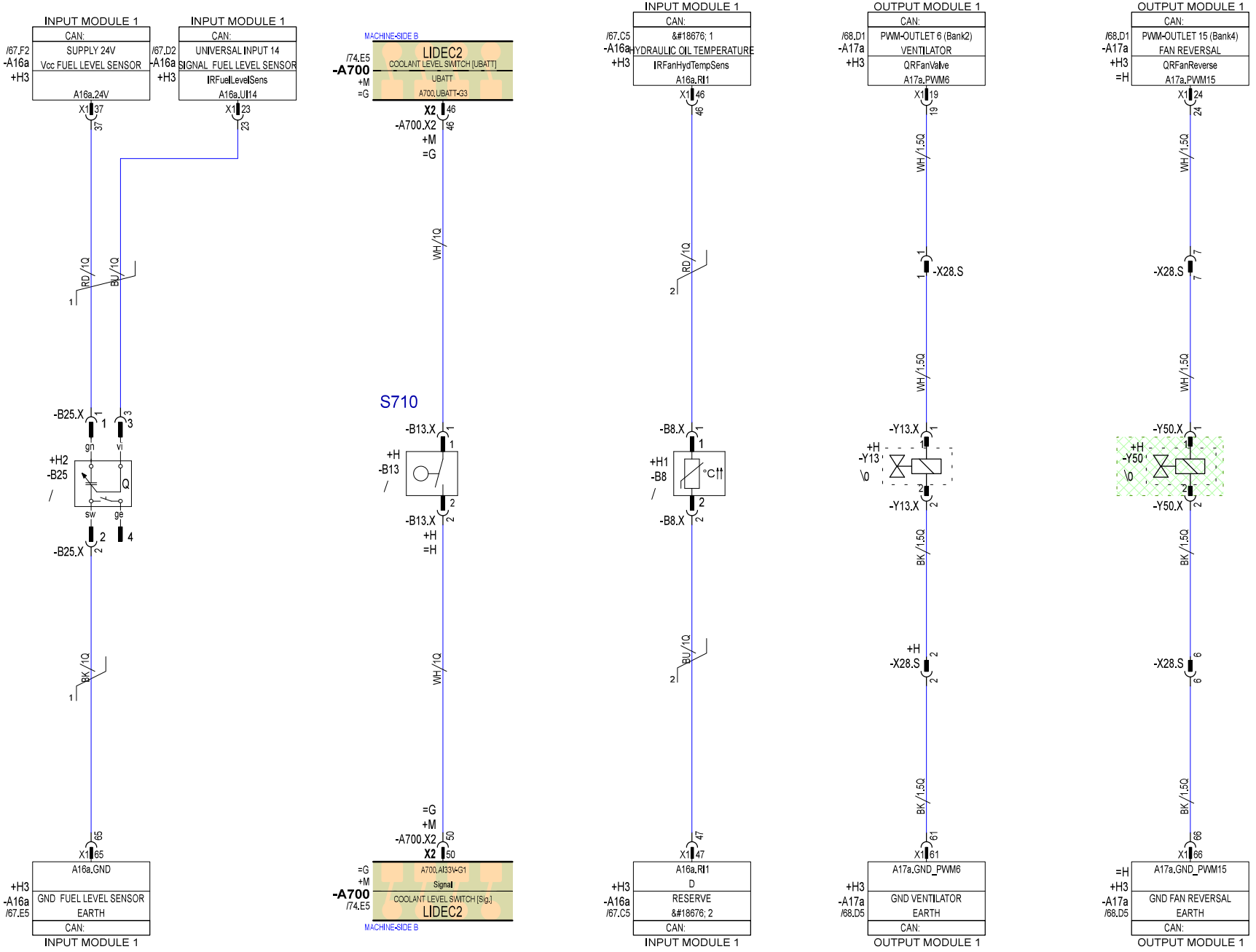






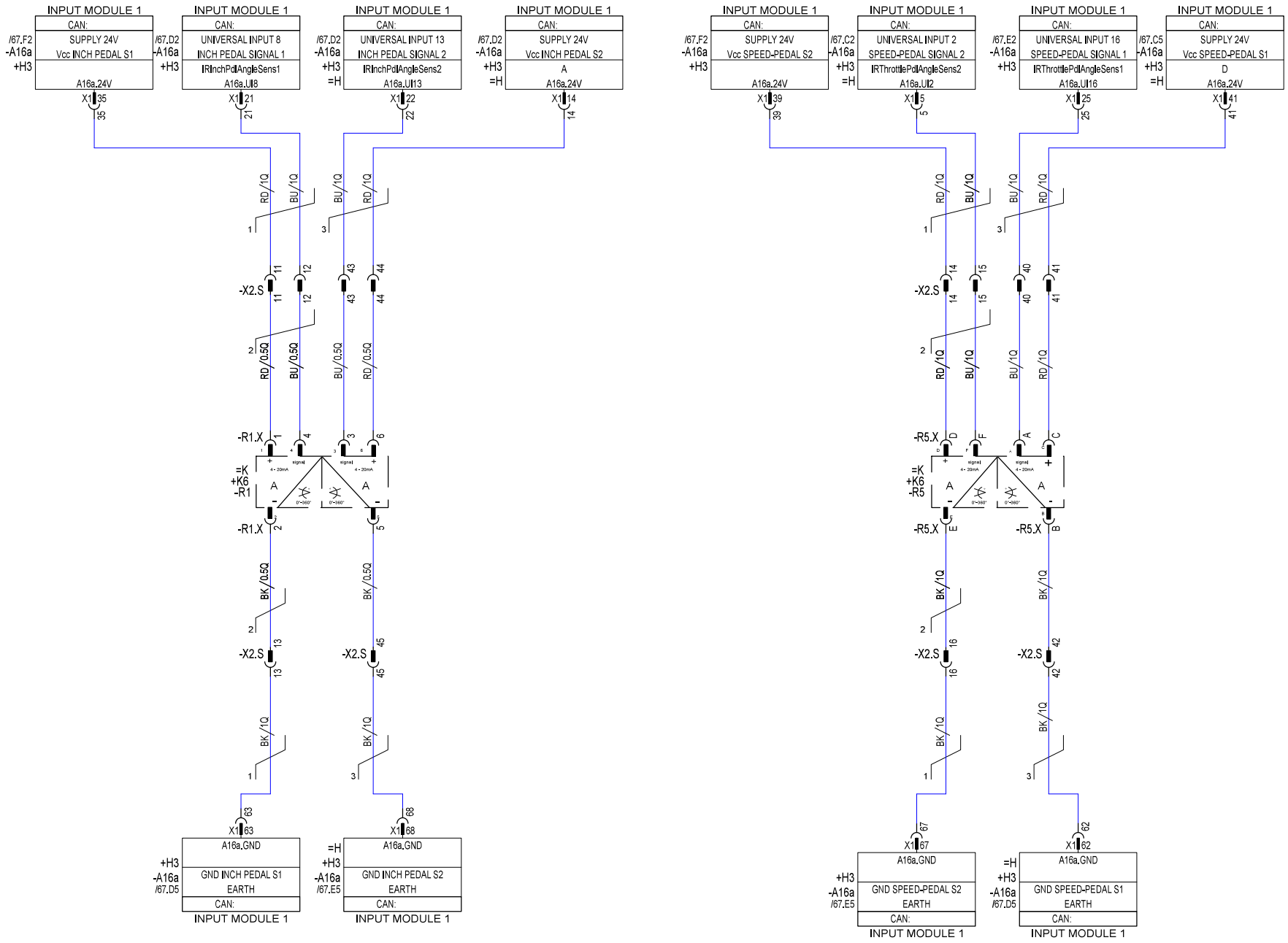


MACHINE TYPE	SERIAL NUMBER			PAGE 38 OF
LIDOS UNIT	XXXXX	LIEBHERR FACTORY LBH	CAMERA E PLAN	CREATION DATE 26.04.2019 10:08



PROJECT 12418288
DRAWING NUMBER 1333 90100 01 00
Stufe 4 GG_23.11.18 E_Hauptschalter
ITEM CODE 105
DRAWING INDEX

MACHINE TYPE	SERIAL NUMBER			
LIDOS UNIT	XXXXX	LIEBHERR FACTORY LBH	FUEL LEVEL SENSOR; HYDRAULIC OIL TEMPERATURE ; E PLAN	PAGE 48 OF
				CREATION DATE 26.04.2019 10:08



PROJECT
DRAWING NUMBER 1333 90100 01 00 Stufe 4 GG_23.11.18 E_Hauptschalter
ITEM CODE 12418288
DRAWING INDEX 105

MACHINE TYPE	SERIAL NUMBER			
LIDOS UNIT	XXXXX	LIEBHERR FACTORY LBH	ANGLE SENSOR INCH-/SPEED-PEDAL E PLAN	PAGE 58 OF
				CREATION DATE 26.04.2019 10:08

OUTPUT MODULE 1 ON- / OUTLETS

-A17a Modul Nr.:
+H3 Modulname: PME1_AUSGANGSMODUL

Phys. Adr.	Blatt	EA	Beschreibung	Stecker	Pin	Phys. Adr.	Blatt	EA	Beschreibung	Stecker	Pin
A17a.24V_B1	/47.E1		V-Batt 24V BK 1	0	1	A17a.24V			RESERVE	0	41
A17a.24V_logic	/46.F7		V-Batt 24V LOGIC	0	2	A17a.24V			RESERVE	0	42
A17a.GND	/47.E1		SUPPLY EARTH	0	3	A17a.CAN_Low	/39.D4		CAN LOW > CAN RESERVE	0	43
A17a.PWM1	/44.A2		PARKING BRAKE	0	4	A17a.CAN_Low	/39.C4		CAN LOW	0	44
A17a.PWM2	/43.A1		TILT OUT	0	5	A17a.GND_DO2			GND BACK UP ALARM	0	45
A17a.PWM3	/43.A2		TILT IN	0	6	A17a.GND_PWM1	/44.F2		GND PARKING BRAKE	0	46
A17a.PWM4	/43.A4		HOISTING	0	7	A17a.GND_PWM2	/43.F1		GND TILT OUT	0	47
A17a.PWM9	/42.A1		WORKING HYDRAULICS LOCKOUT	0	8	A17a.GND_PWM3	/43.F2		GND TILT IN	0	48
A17a.PWM10	/43.A3		LOWERING	0	9	A17a.GND_PWM4	/43.F4		GND HOISTING	0	49
A17a.PWM11	/43.A5		3. CONTROL CIRCUIT A	0	10	A17a.GND_PWM9	/42.F1		GND WORKING HYDRAULICS LOCKOUT	0	50
A17a.PWM12	/43.A6		3. CONTROL CIRCUIT B	0	11	A17a.GND_PWM10	/43.F3		GND LOWERING	0	51
A17a.GND	/47.E5		SUPPLY EARTH	0	12	A17a.GND_PWM11	/43.F5		GND ADDITIONAL EQUIPMENT 1	0	52
A17a.24V_logic			RESERVE	0	13	A17a.GND_PWM12	/43.F6		GND ADDITIONAL EQUIPMENT 2	0	53
A17a.24V_B3	/47.E5		V-Batt 24V Bk 3	0	14	A17a.GND_DO4				0	54
A17a.24V_B2	/47.D3		SUPPLY 24V BK 2	0	15	A17a.FI1	/27.A2		ON-ROAD TRAVEL SWITCH	0	55
A17a.GND_logic	/46.F7		EARTH LOGICAL PART	0	16	A17a.FI2	/24.D3		STATUS MASTER SWITCH	0	56
A17a.GND	/47.D3		SUPPLY EARTH	0	17	A17a.CAN_High	/39.D5		CAN HIGH > CAN RESERVE	0	57
A17a.PWM5			RESERVE	0	18	A17a.CAN_High	/39.C5		CAN HIGH	0	58
A17a.PWM6	/48.A6		VENTILATOR	0	19	A17a.GND			RESERVE	0	59
A17a.PWM7	/49.A3		BUZZER	0	20	A17a.GND_PWM5			GND FLOAT POSITION	0	60
A17a.PWM8	/42.A2		LFD	0	21	A17a.GND_PWM6	/48.F6		GND VENTILATOR	0	61
A17a.PWM13			RESERVE	0	22	A17a.GND_PWM7	/49.F3		GND BUZZER	0	62
A17a.PWM14	/26.A5		EMERGENCY STEERING PUMP	0	23	A17a.GND_PWM8	/42.F2		GND LFD	0	63
A17a.PWM15	/48.A7		FAN REVERSAL	0	24	A17a.GND_PWM13			RESERVE	0	64
A17a.PWM16			RESERVE	0	25	A17a.GND_PWM14	/26.F1		GND EMERGENCY STEERING PUMP	0	65
A17a.GND	/47.D6		SUPPLY EARTH	0	26	A17a.GND_PWM15	/48.F7		GND FAN REVERSAL	0	66
A17a.GND_logic			RESERVE	0	27	A17a.GNDPWM16			RESERVE	0	67
A17a.24V_B4	/47.D6		V-Batt 24V Bk 4	0	28	A17a.GND			RESERVE	0	68
A17a.CAN_Res			CAN-END>PIN 43	0	29	A17a.GND_FI1			RESERVE	0	69
A17a.24V			RESERVE	0	30	A17a.GND_FI2			RESERVE	0	70
A17a.GND_DO1			RESERVE	0	31						
A17a.V_DO1	/47.D8		SUPPLY DO1	0	32						
A17a.DO1	/30.C8		REVERSE SIGNAL	0	33						
A17a.V_DO2	/47.C5		SUPPLY DO2	0	34						
A17a.DO2	/47.D5		Vcc BANK 3	0	35						
A17a.V_DO3	/65.D1		SUPPLY DO3	0	36						
A17a.DO3	/65.D1		Vcc CENTRAL GREASING	0	37						
A17a.V_DO4	/47.C1		Vcc DIGTAL OUTPUT 4	0	38						
A17a.DO4	/47.D1		Vcc BANK 1	0	39						
A17a.GND_DO3	/65.F4		GND CENTRAL GREASING	0	40						

PROJECT Stufe 4 GG_23.11.18 E_Hauptschalter ITEM CODE 12418288
DRAWING NUMBER 1333 90100 01 00 DRAWING INDEX 105

MACHINE TYPE	SERIAL NUMBER			PAGE 68 OF
LIDOS UNIT	XXXXX	LIEBHERR FACTORY LBH	GENERAL OUTLAY OUTPUT MODULE 1 E PLAN	CREATION DATE 26.04.2019 10:08

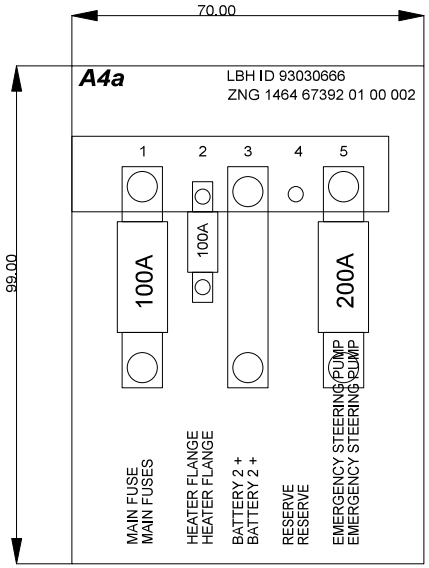
PROJECT Stufe 4 GG_23.11.18 E_Hauptschalter
DRAWING NUMBER 1333 90100 01 00
ITEM CODE 12418288
DRAWING INDEX 105

TEXT: BLACK RAL 9005
BASE: WHITE RAL 9002

MATERIAL: ADHESIVE FOIL nach DELIVERY INSTRUCTION

DELIVERY INSTRUCTION 10020148

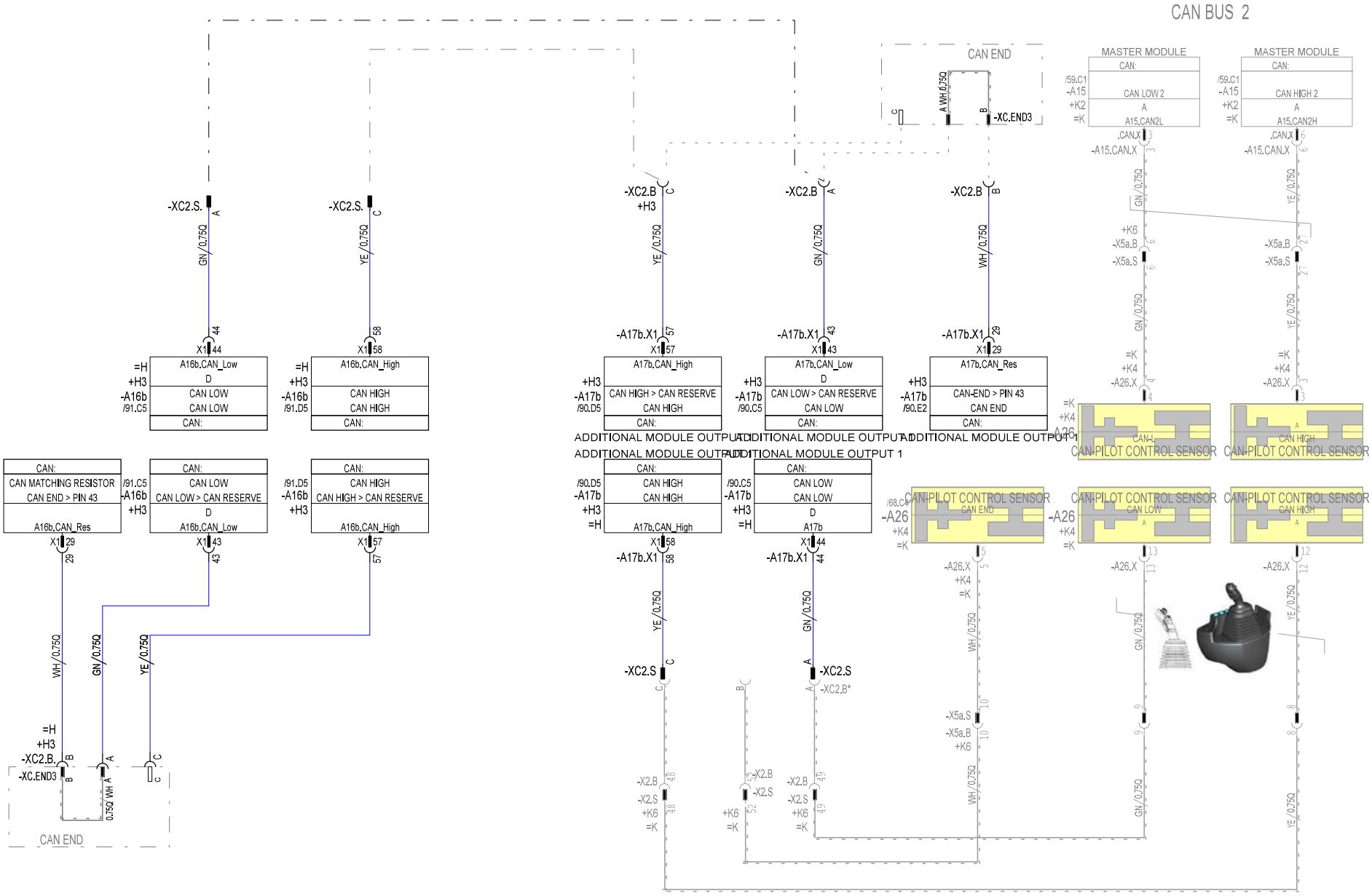
DIMENSIONS: 99mm mal 70mm



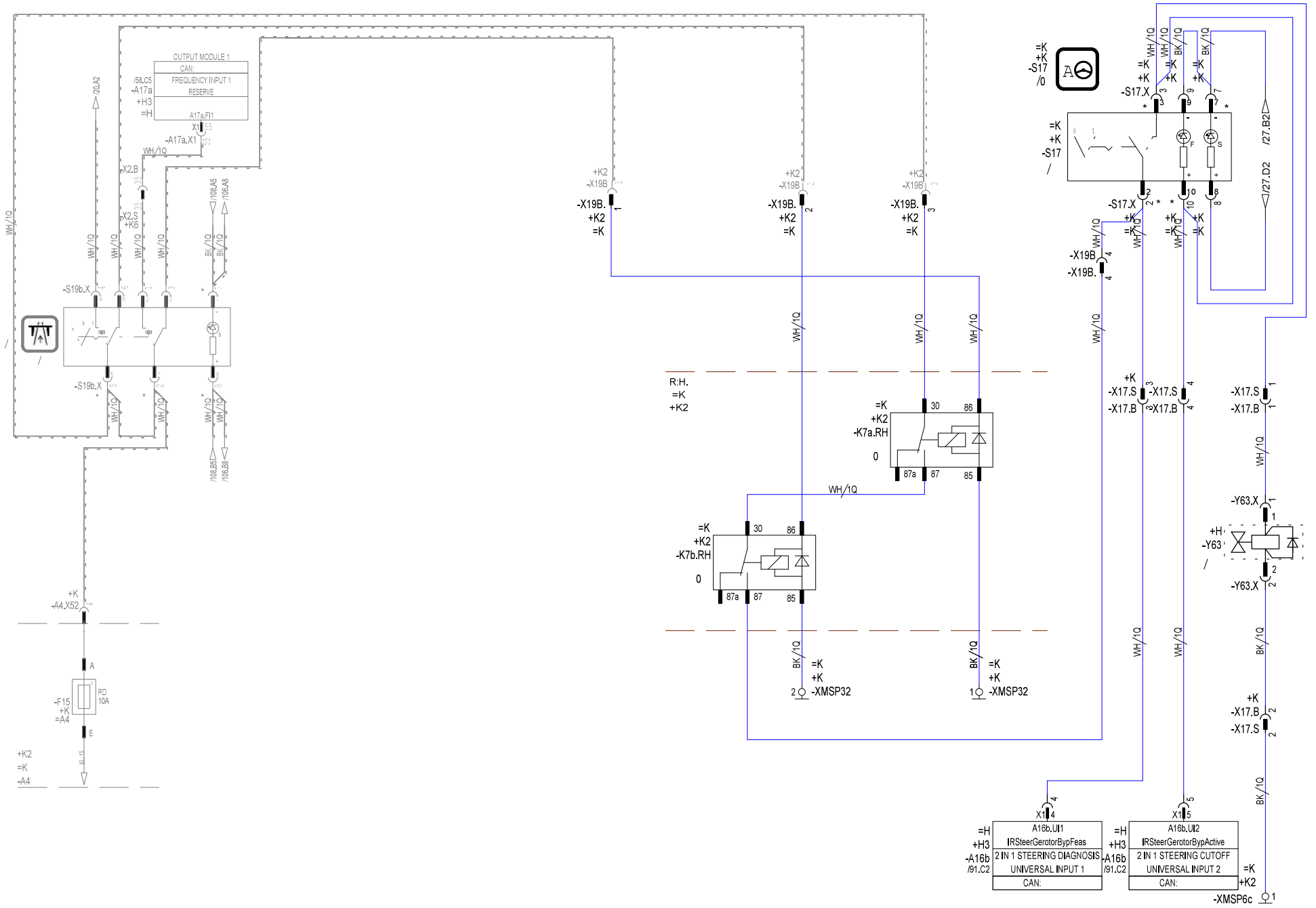
ARTICEL CODE
ID 93030666
ZNG 1464 67392 01 00 002

MACHINE TYPE	SERIAL NUMBER		PROTECTIVE FOIL / GENERAL OUTLAY A4a PART 2	PAGE 78 OF
LIDOS UNIT	XXXXX	LIEBHERR FACTORY LBH	E PLAN	CREATION DATE 26.04.2019 10:08

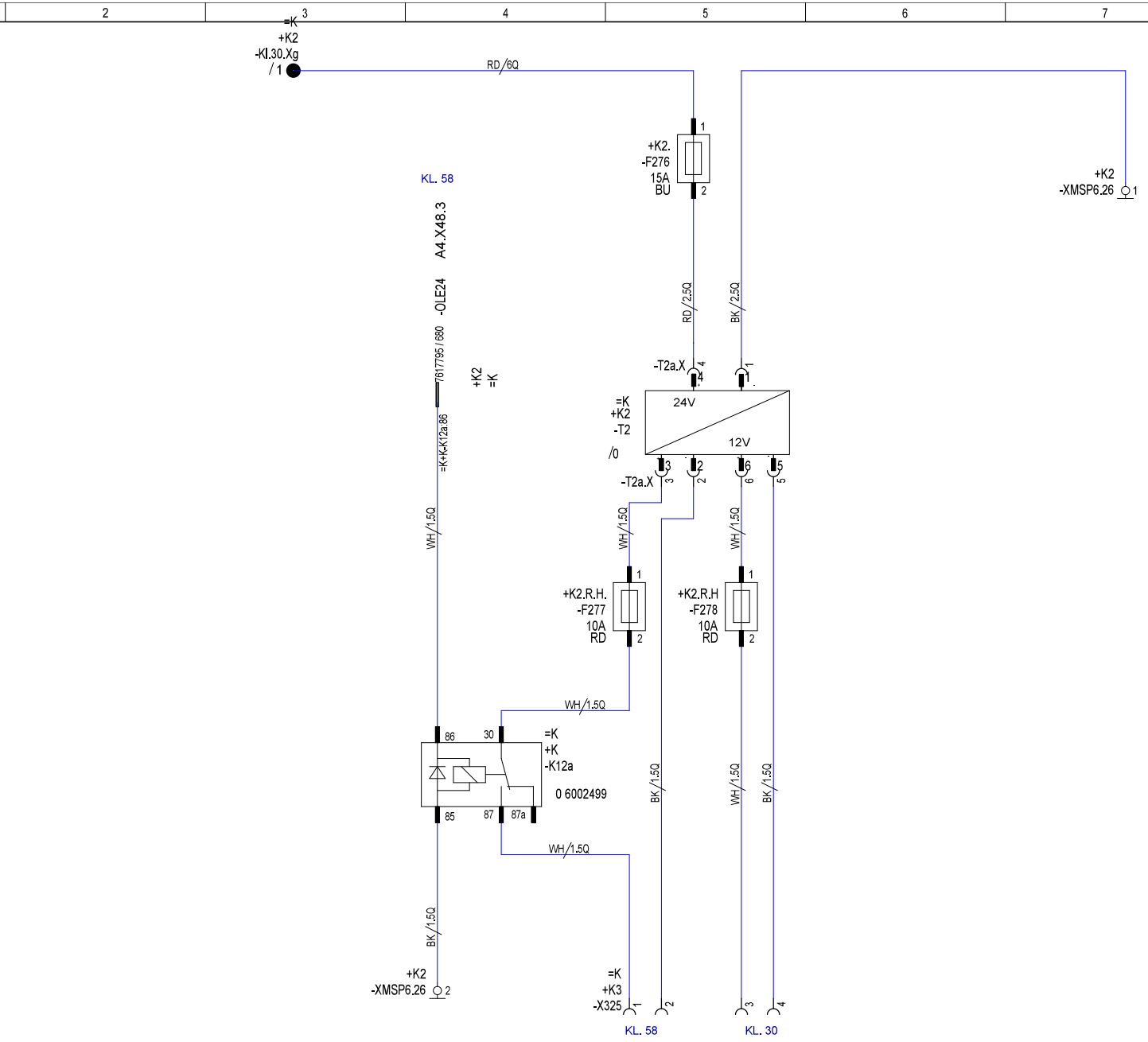
PROJECT 12418288
ITEM CODE 105
DRAWING INDEX
Stufe 4 GG_23.11.18 E_Hauptschalter
DRAWING NUMBER 1333 90100 01 00



MACHINE TYPE	SERIAL NUMBER			
LIDOS UNIT	XXXXX	LIEBHERR FACTORY LBH	OPTION CAN BUS 2 ADDITIONAL MODULE E PLAN	PAGE 88 OF CREATION DATE 26.04.2019 10:08



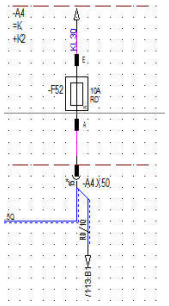
MACHINE TYPE	SERIAL NUMBER			
LIDOS UNIT	XXXXX	LIEBHERR FACTORY LBH	OPTION GEROTOR STEERING E PLAN	PAGE 98 OF
				CREATION DATE 26.04.2019 10:08

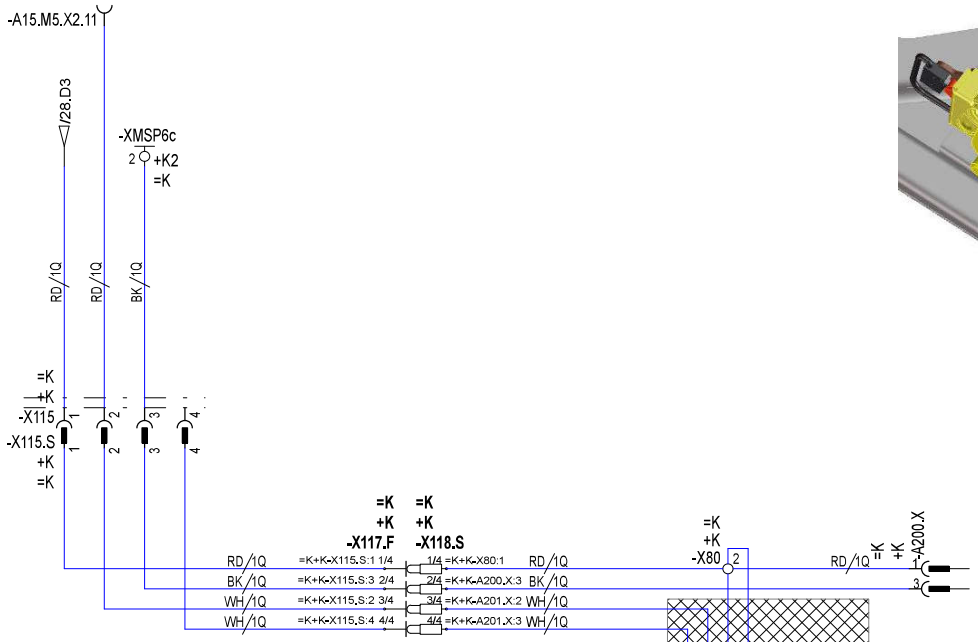


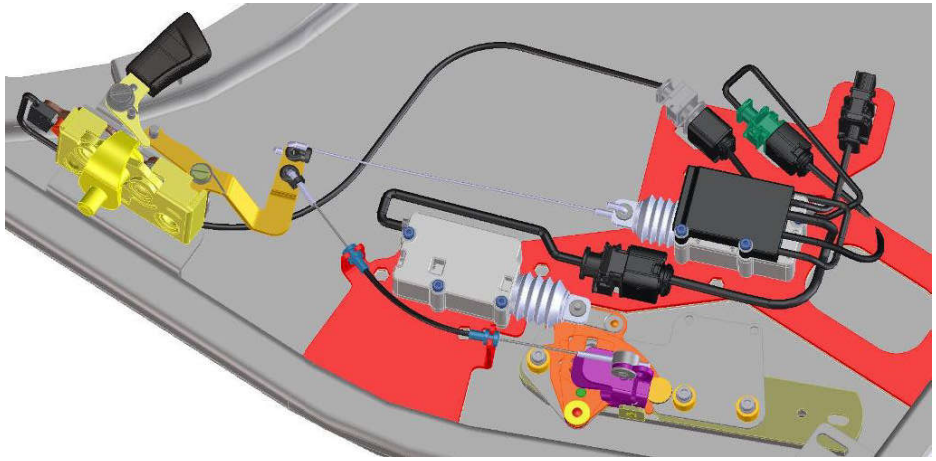
PROJECT: Stufe 4 GG_23.11.18 E_Hauptschalter
ITEM CODE: 12418288
DRAWING NUMBER: 1333 90100 01 00
DRAWING INDEX: 105

MACHINE TYPE	SERIAL NUMBER			PAGE 108 OF
LIDOS UNIT	XXXXX	LIEBHERR FACTORY LBH	OPTION RADIO PREPARATION LIEBHERR WHEEL LOADER E PLAN	CREATION DATE 26.04.2019 10:08

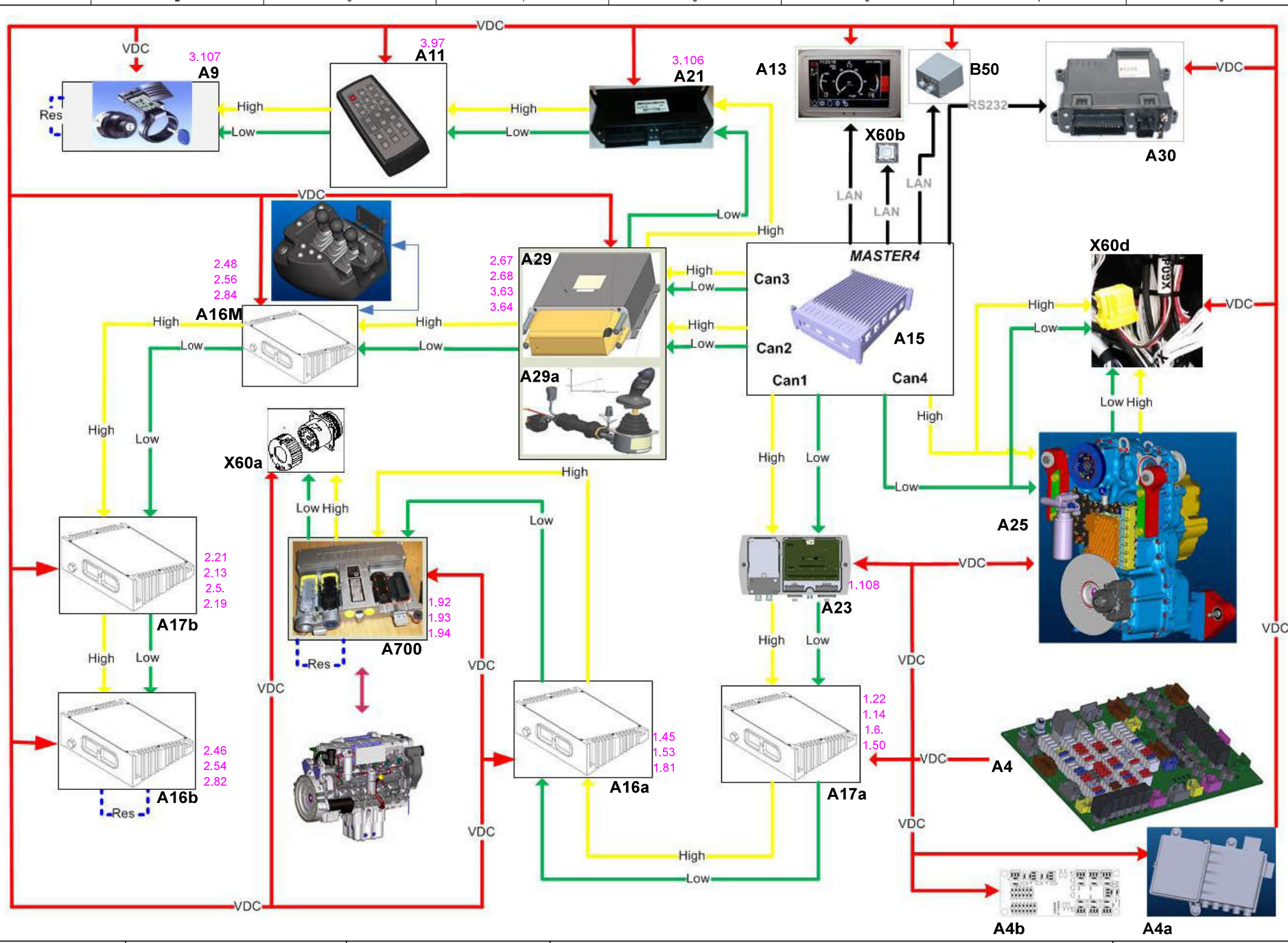
PROJECT 12418288
ITEM CODE Stufe 4 GG_23.11.18 E_Hauptschalter
DRAWING INDEX 105
DRAWING NUMBER 1333 90100 01 00







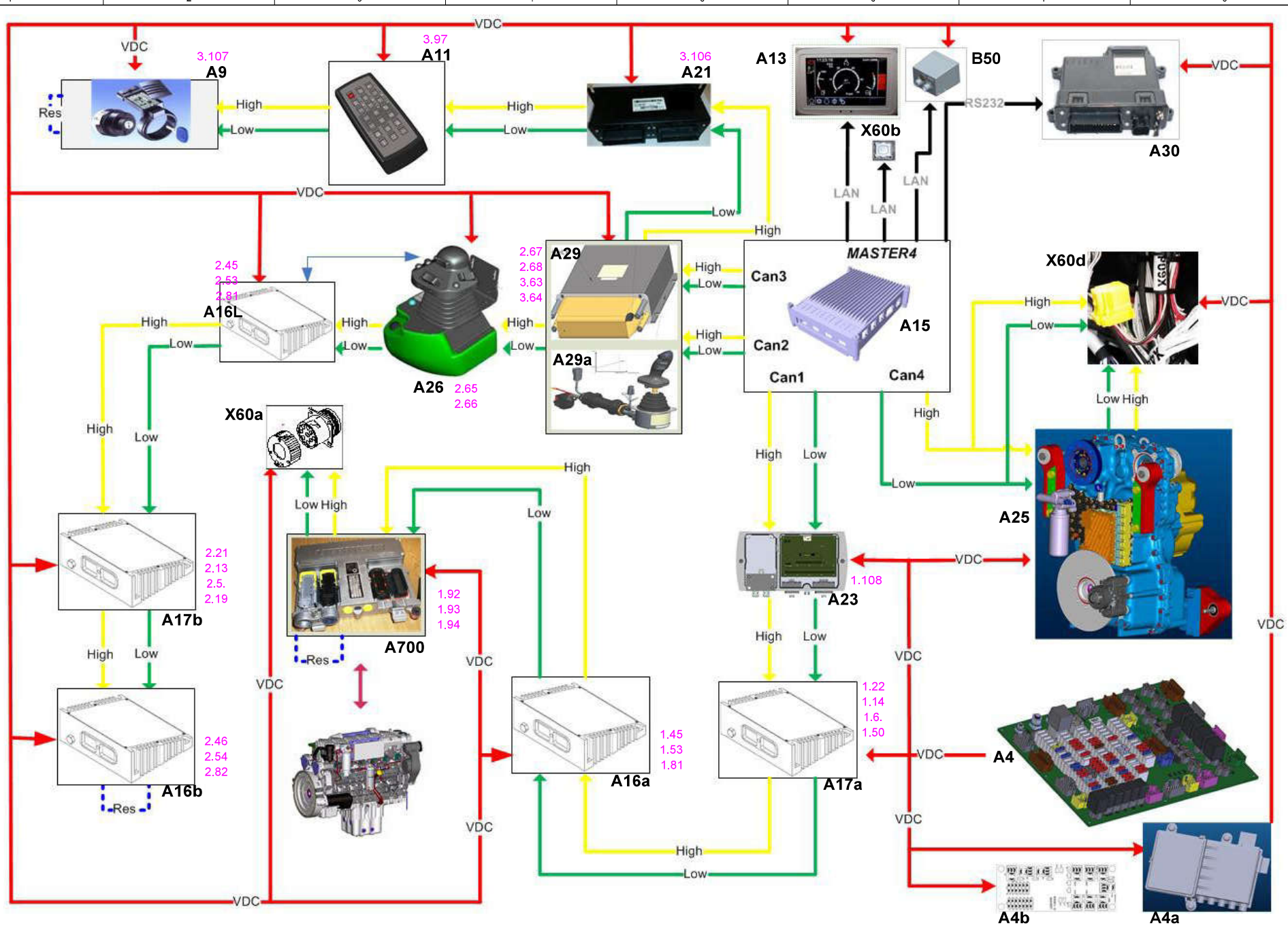
MACHINE TYPE	SERIAL NUMBER			
LIDOS UNIT	XXXXX	LIEBHERR FACTORY LBH	OPTION REMOTE KEY E PLAN	PAGE 118 OF
				CREATION DATE 26.04.2019 10:08



PROJECT: Stufe 4 GG_23.11.18 E_Hauptschalter
DRAWING NUMBER: 1333 90100 01 00
ITEM CODE: 12418288
DRAWING INDEX: 105

MACHINE TYPE	SERIAL NUMBER			
LIDOS UNIT	XXXXX	LIEBHERR FACTORY LBH	VERSION 1 MULTI-LEVER CONTROL CAN GENERAL OUTLAY E PLAN	PAGE 128 OF
				CREATION DATE 26.04.2019 10:08

PROJECT 12418288
DRAWING NUMBER 1333 90100 01 00 Stufe 4 GG_23.11.18 E_Hauptschalter
ITEM CODE 105
DRAWING INDEX

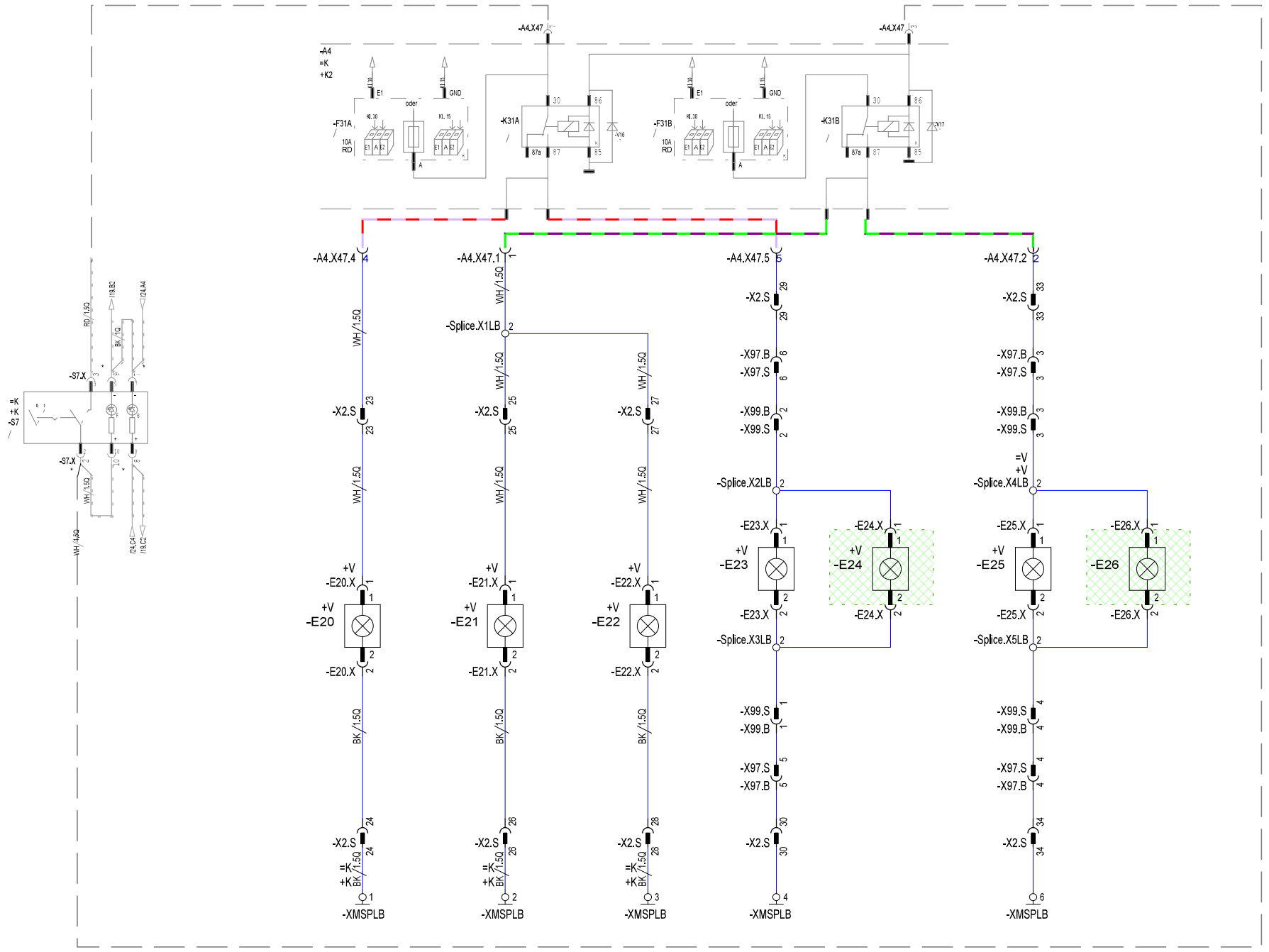


MACHINE TYPE LIDOS UNIT	SERIAL NUMBER XXXXX	LIEBHERR FACTORY LBH	VERSION 2 LOG HANDLER CAN GENERAL OUTLAY E PLAN	PAGE 138 OF CREATION DATE 26.04.2019 10:08

PROJECT 12418288 ITEM CODE

Stufe 4 GG_23.11.18 E_Hauptschalter 105 DRAWING INDEX

DRAWING NUMBER 1333 90100 01 00



MACHINE TYPE	SERIAL NUMBER			PAGE 148 OF
LIDOS UNIT	XXXXX	LIEBHERR FACTORY LBH	VERSION 2 LOG HANDLER LIGHTING E PLAN	CREATION DATE 26.04.2019 10:08

TYPE MOTOR_SPL

PROJECT: 10139858

ENGINE CONTROL UNIT

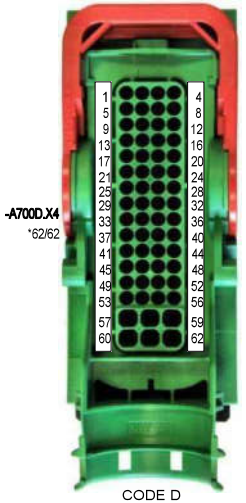
-A700

LSB:
ADR:
CAN:

Phys. Addr.	TYPE	SHEET	DESCRIPTION		CONNECTOR	PIN
A700.VCC-M7			NC	NC	X4	44
A700.AI5V-M7			NC	NC	X4	40
A700.KL_31_PWR			NC	NC	X4	36
A700.VCC-M4			RESERVE	NC	X4	41
A700.KS-M4-B			NC	NC	X4	39
A700.KS-M4-A			NC	NC	X4	33
A700.VCC-M5			RESERVE	NC	X4	42
A700.KL_31_PWR			RESERVE	NC	X4	34
A700.VCC-M6			RESERVE	NC	X4	43
A700.KL_31_PWR		/15.E2	OIL LEVEL SENSOR & TEMPERATURE	GND	X4	35
A700.AI5V-M8		/15.E3	OIL TEMPERATURE SENSOR	SIGNAL (0-5V)	X4	38
A700.AI5V-M9		/15.E1	OIL LEVEL SENSOR	SIGNAL (0-5V)	X4	37
A700.TI-M5			NC	NC	X4	45
A700.KL_31_PWR			NC	NC	X4	46
A700.TI-M6			NC	NC	X4	49
A700.KL_31_PWR			NC	NC	X4	50
A700.TI-M7		/14.E5	PVG TEMPERATURE SENSOR	SIGNAL (0-5V)	X4	53
A700.KL_31_PWR		/14.E4	PVG TEMPERATURE SENSOR	GND	X4	54
A700.VDD_M1		/15.E5	SPEED SENSOR	SUPPLY (12V)	X4	56
A700.FI_H-M1		/15.E4	SPEED SENSOR	SIGNAL (0-5V)	X4	52
A700.KL_31_PWR		/15.E4	SPEED SENSOR	GND	X4	48
A700.VDD-M2		/15.E7	PHASE SENSOR	SUPPLY (12V)	X4	55
A700.FI_H-M2		/15.E7	PHASE SENSOR	SIGNAL (0-5V)	X4	51
A700.KL_31_PWR		/15.E6	PHASE SENSOR	GND	X4	47
A700.PWM_H-M3H			NC	NC	X4	58
A700.PWM_H-M3L			NC	NC	X4	61
A700.PWM_H-M4H			NC	NC	X4	57
A700.PWM_H-M4L			NC	NC	X4	60
A700.AI33V-M4			NC	NC	X4	59
A700.DO_P-M1		/10.E5	STARTER KL50	ACTIVATION	X4	62
A700.DO_CR-M1L		/17.E2	INJECTION NOZZLE 1 (BANK 1)	PWM (GND)	X4	29
A700.DO_CR-M12H		/17.E2	INJECTION NOZZLE 1 (BANK 1)	PWM (+)	X4	32
A700.DO_CR-M2L		/18.E7	INJECTION NOZZLE 6 (BANK 1)	PWM (GND)	X4	25
A700.DO_CR-M12H		/18.E6	INJECTION NOZZLE 6 (BANK 1)	PWM (+)	X4	28
A700.DO_CR-M3L		/18.E5	INJECTION NOZZLE 5 (BANK 2)	PWM (GND)	X4	21
A700.DO_CR-M34H		/18.E4	INJECTION NOZZLE 5 (BANK 2)	PWM (+)	X4	24
A700.DO_CR-M4L		/17.E5	INJECTION NOZZLE 2 (BANK 2)	PWM (GND)	X4	17
A700.DO_CR-M34H		/17.E4	INJECTION NOZZLE 2 (BANK 2)	PWM (+)	X4	20
A700.DO_CR-M5L		/17.E7	INJECTION NOZZLE 3 (BANK 3)	PWM (GND)	X4	13
A700.DO_CR-M56H		/17.E6	INJECTION NOZZLE 3 (BANK 3)	PWM (+)	X4	16
A700.DO_CR-M6L		/18.E2	INJECTION NOZZLE 4 (BANK 3)	PWM (GND)	X4	9
A700.DO_CR-M56H		/18.E2	INJECTION NOZZLE 4 (BANK 3)	PWM (+)	X4	12

Phys. Addr.	TYPE	SHEET	DESCRIPTION		CONNECTOR	PIN
A700.DO_CR-M7L			RESERVE	NC	X4	5
A700.DO_CR-M78H			RESERVE	NC	X4	8
A700.DO_CR-M8L			RESERVE	NC	X4	1
A700.DO_CR-M78H			RESERVE	NC	X4	4
A700.KL_31_PWR			RESERVE	NC	X4	2
A700.KL_31_PWR			RESERVE	NC	X4	3
A700.KL_31_PWR			RESERVE	NC	X4	6
A700.KL_31_PWR			RESERVE	NC	X4	7
A700.KL_31_PWR			RESERVE	NC	X4	10
A700.KL_31_PWR			RESERVE	NC	X4	11
A700.KL_31_PWR			RESERVE	NC	X4	14
A700.KL_31_PWR			RESERVE	NC	X4	15
A700.KL_31_PWR			RESERVE	NC	X4	18
A700.KL_31_PWR			RESERVE	NC	X4	19
A700.KL_31_PWR			RESERVE	NC	X4	22
A700.KL_31_PWR			RESERVE	NC	X4	23
A700.KL_31_PWR			RESERVE	NC	X4	26
A700.KL_31_PWR			RESERVE	NC	X4	27
A700.KL_31_PWR			RESERVE	NC	X4	30
A700.KL_31_PWR			RESERVE	NC	X4	31

/ 505
CONNECTOR REP. KIT: 10136379



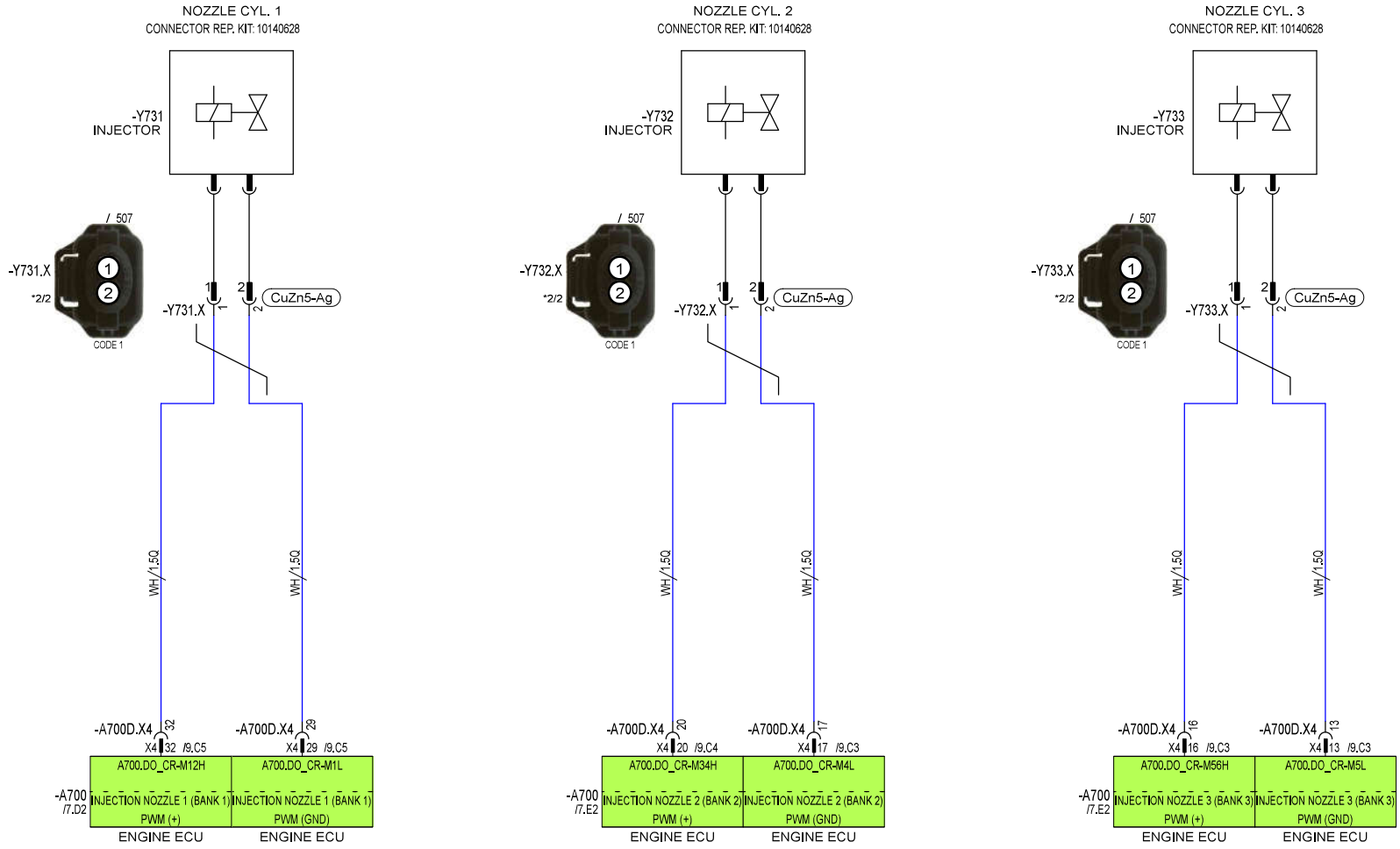
CODE D

REPLACEMENT FOR	MARKED	lmbovs0	LIEBHERR FACTORY LMB	A3	DESIGNATION: ELECTRICAL WIRING DIAGRAM	DESCRIPTION: ENGINE CONTROL UNIT ECU2 D-CODING	ARTICLE CODE: 10139857
0	DATE	25.07.2016 12:14					DRAWING NUMBER: 96 002 9307 90
CONFIDENTIAL	CHECKED	lmbbua0					INDEX: 003
	TECHNICAL REFEREE						SYSTEM: =M
							LOCATION: +M
							SHEET 7 FROM 19

ARTICLE CODE 10139857 VERSION 03.1 25.07.2016 12:14

TYPE MOTOR_SPL

PROJECT: 10139858



REPLACEMENT FOR	MARKED	lmbovs0	LIEBHERR FACTORY LMB	A3	DESIGNATION ELECTRICAL WIRING DIAGRAM	DESCRIPTION NOZZLE CYL. 1-3	ARTICLE CODE 10139857	SYSTEM =M	LOCATION +M
0	DATE	25.07.2016 12:14					DRAWING NUMBER 96 002 9307 90	INDEX 003	SHEET 17 FROM 19
CONFIDENTIAL	CHECKED	lmbbua0							
	TECHNICAL REFEREE								

ARTICLE CODE 10139857 VERSION 03_1 25.07.2016 12:14

110.5.3.1 Overview of the input and output modules

Valid for: L576-1333;

1 Layout

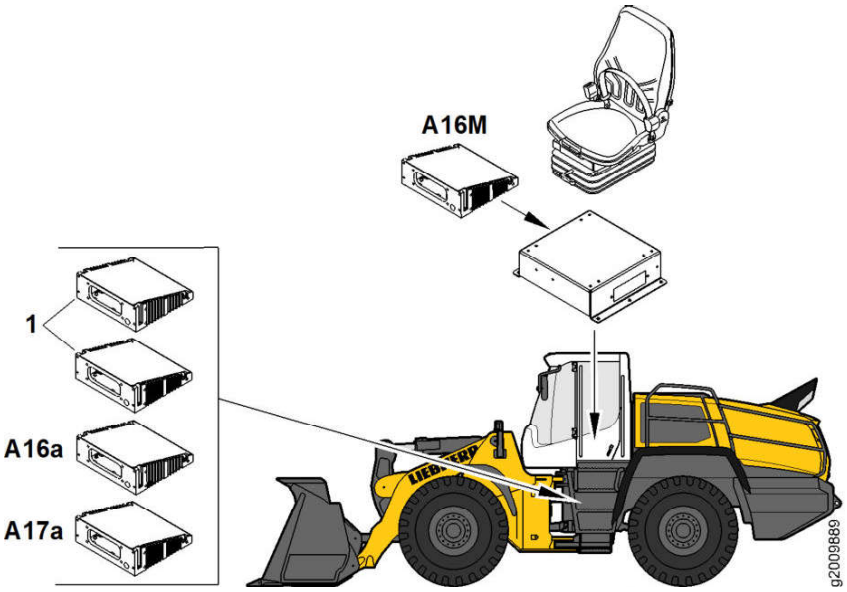


Fig. 543: Position of the input and output modules

BMK	Description
A16a	Input module A16a
A17a	Output module A17a
A16M	Input module A16M (multi-lever control, optional)
1	Space for optional modules

Tab. 294: Module designations

The input and output modules are on the left under the cab access.

If multi-lever control is installed, the input module for this is fitted under the operator's seat.

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 the sensors m are read and evaluated by the input modules. (For more information see: Input modules , page 110-23)

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 110-25)

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1.2 Function of relay K15 (safety function)

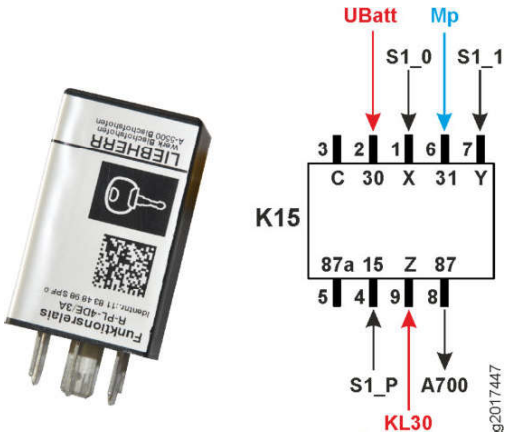

Fig. 554: Relay K15 with symbol

Pin	Connection	Description
1	X	Signal for switch S1 ignition “OFF”
2	30	Power supply from the batteries
3	C	Not assigned (earthing switching)
4	15	Signal for switch S1 park position
5	87a	Not assigned
6	31	Ground
7	Y	Signal for switch S1 ignition “ON”
8	87	Terminal 15 output signal (safety function)
9	Z	Terminal 30

Tab. 300: Designations

Relay K15 (safety function) is installed for reasons of safety.

Relay K15 supplies the engine control unit and the joystick steering (option) with an additional terminal 15 signal. This ensures that if terminal 15 fails, the machine can be safely shut down via relay K01.

If the terminal 15 signal via relay K01 fails (cable rupture, defective relay etc.), the engine control unit A700 is still powered via relay K15. The diesel engine remains on. This maintains the steering pressure and the machine can be safely parked.

If terminal 15 signal via relay K15 (safety function) fails (cable rupture, defective relay etc.), emergency steering pump is automatically activated via relay K14.

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2.2 Relay for electric battery main switch

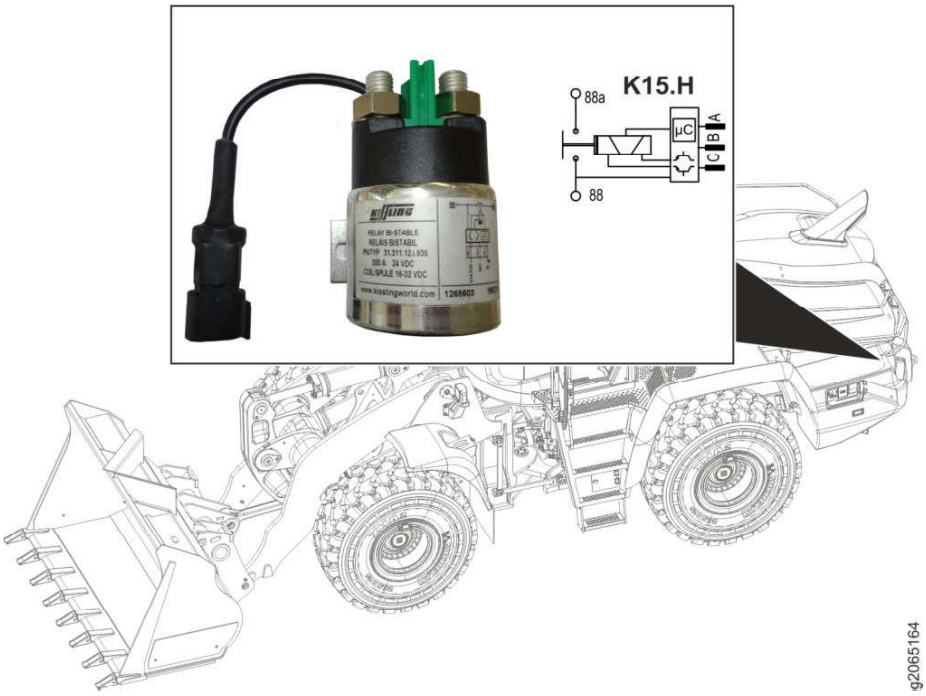

Fig. 562: Relay for electric battery main switch

Relay for electric battery main switch **K15.H** is fitted in left ballast weight.

Relay has drop-in coil and drop-out coil with permanent-magnetic retention. A pulse on respective coil causes relay to drop in or drop out. End positions are maintained with permanent magnetics without using energy.

Power supply takes place via pin **A**. An internal bridge is used as ground supply.

Relay has an electric switch-off delay of five minutes.

Plug assignment		
Pin	**Function**	**Description**
A	Power supply	Power supply of terminal 30 via connection **X** on starting switch.
B	Control input	Control signal from battery main switch **S15**.
C	Control output	Control output (ground switching) to activate green LEDs for battery main switch. Activation can take place as continuous signal or flashing signal.

Tab. 306: Plug assignment

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2 Function

2.1 Basic function

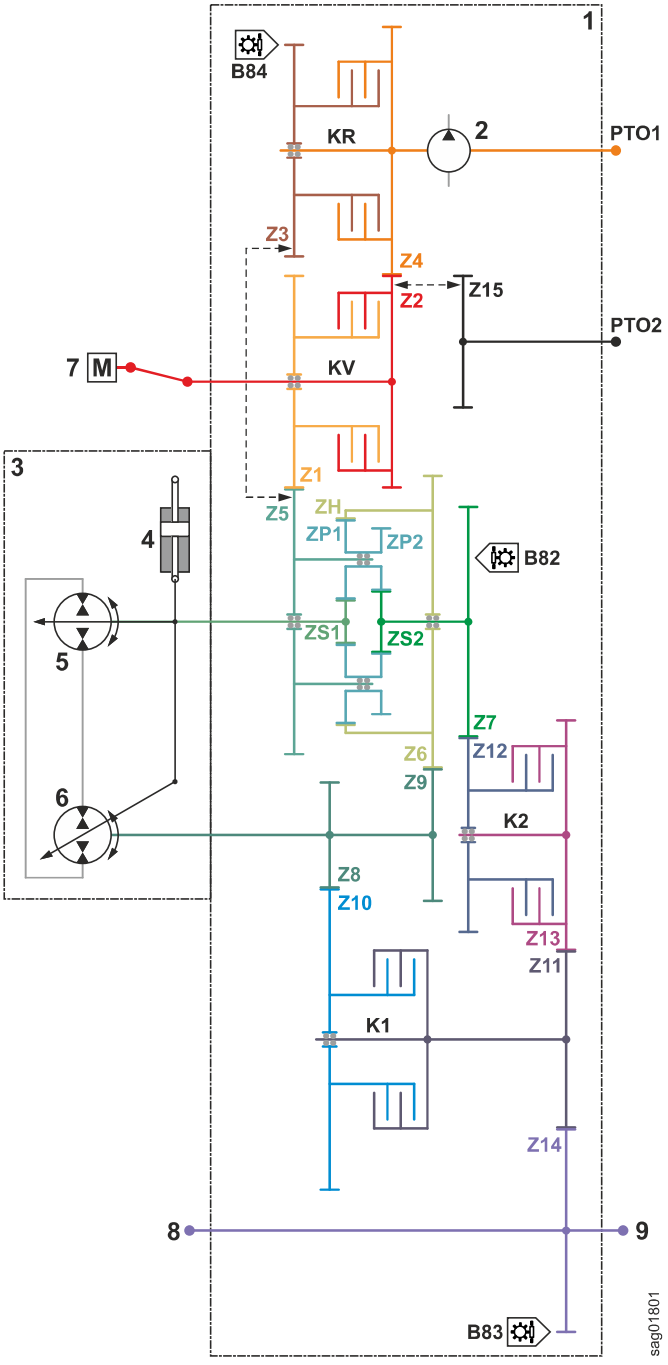

Fig. 568: Transmission diagram

1	Transmission housing	**6**	Rotary group 2
2	Gear pump	**7**	Diesel engine
3	Hydrostat module	**8**	Drive shaft to rear axle
4	Servo cylinder	**9**	Drive shaft to front axle
5	Rotary group 1		

2 Function

2.1 Basic function

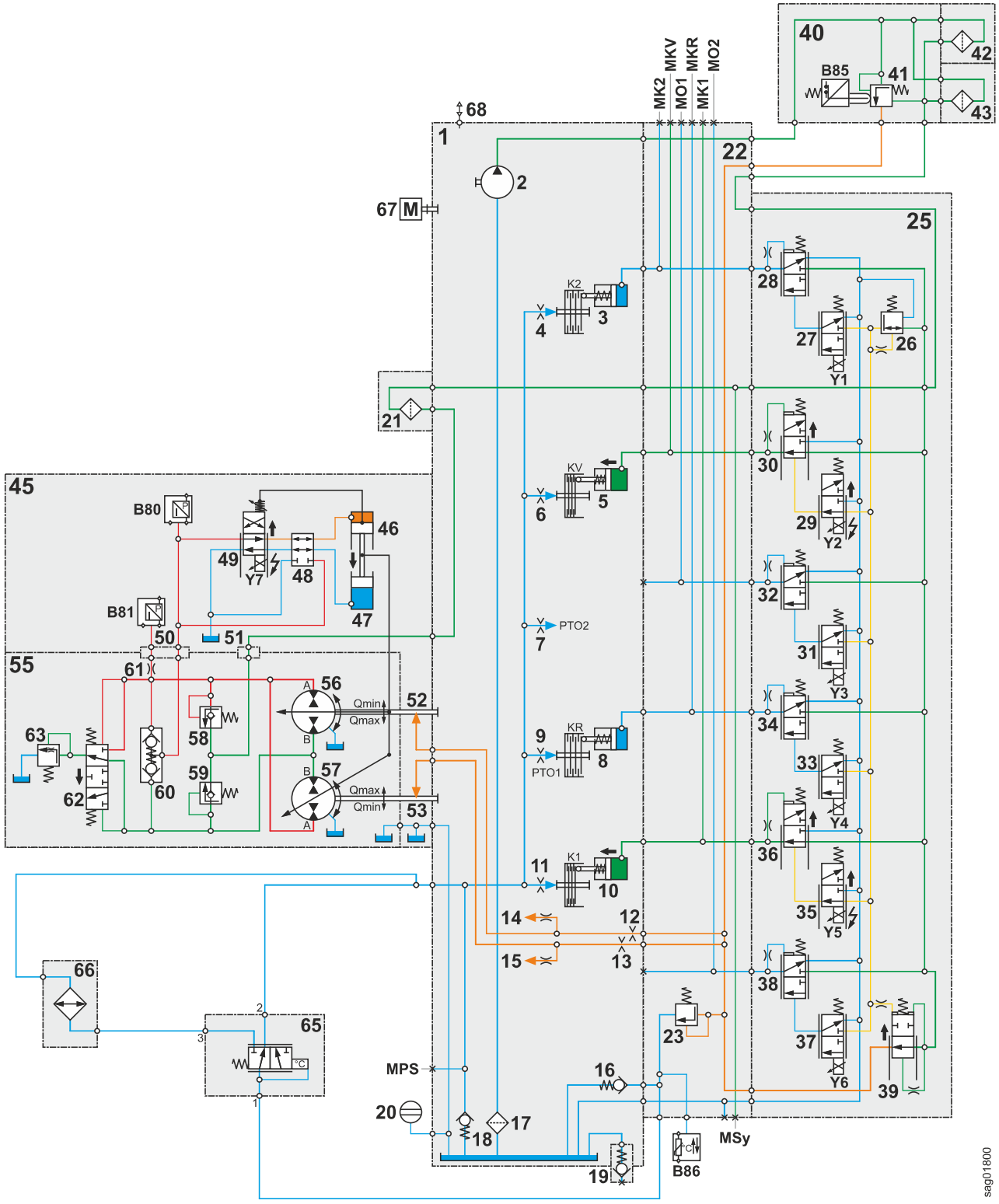

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Fig. 574: Diagram of transmission hydraulics (forward travel direction, clutch K1 closed)

Hydrostat module consists of two hydraulic rotary groups, rigidly connected to each other by double yoke. If rotary group 1 is at an angle of 0°, rotary group 2 is at an angle of 44° and vice versa.

2 Function

2.1 Basic function

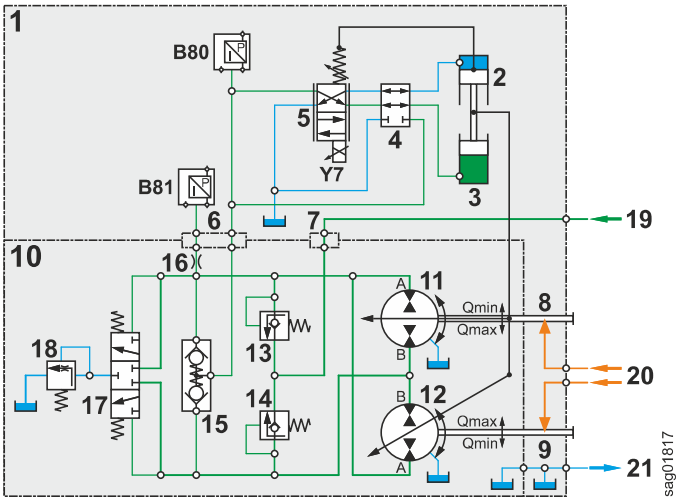

Fig. 582: Hydraulic diagram of hydrostat module (diesel engine is running)

1 **Hydrostat module**
2 Servo cylinder (extend rotary group 1)
3 Servo cylinder (extend rotary group 2)
4 Dummy piston
5 Position control valve
6 Lower rotary bushing
7 Upper rotary bushing
8 Rotary group 1 bearing lubrication
9 Rotary group 2 bearing lubrication
10 **Double yoke**
11 Rotary group 1
12 Rotary group 2
13 High pressure relief valve for duct A with replenishing function
14 High pressure relief valve for duct B with replenishing function
15 Shuttle valve
16 Throttle piston
17 Discharge valve
18 Pressure reducing valve 11 bar
19 Oil supply from gear pump (via gear oil filter and hydrostat oil filter)
20 Oil supply for bearing lubrication
21 Return line to transmission housing

BMK	Function	BMK	Function
B80	Pressure sensor for duct AB	**Y7**	Proportional solenoid for position control
B81	Pressure sensor for duct A		

Tab. 327: Equipment codes

Hydrostat module transmits some of power of diesel engine to wheels hydrostatically. Hydrostatically transmitted portion of total power transmitted decreases as travel speed increases.

130 Axles and drive shafts

Contents

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130.2.3 Drive shaft between transmission and rear axle

Valid for: L576-1333;

1 Layout

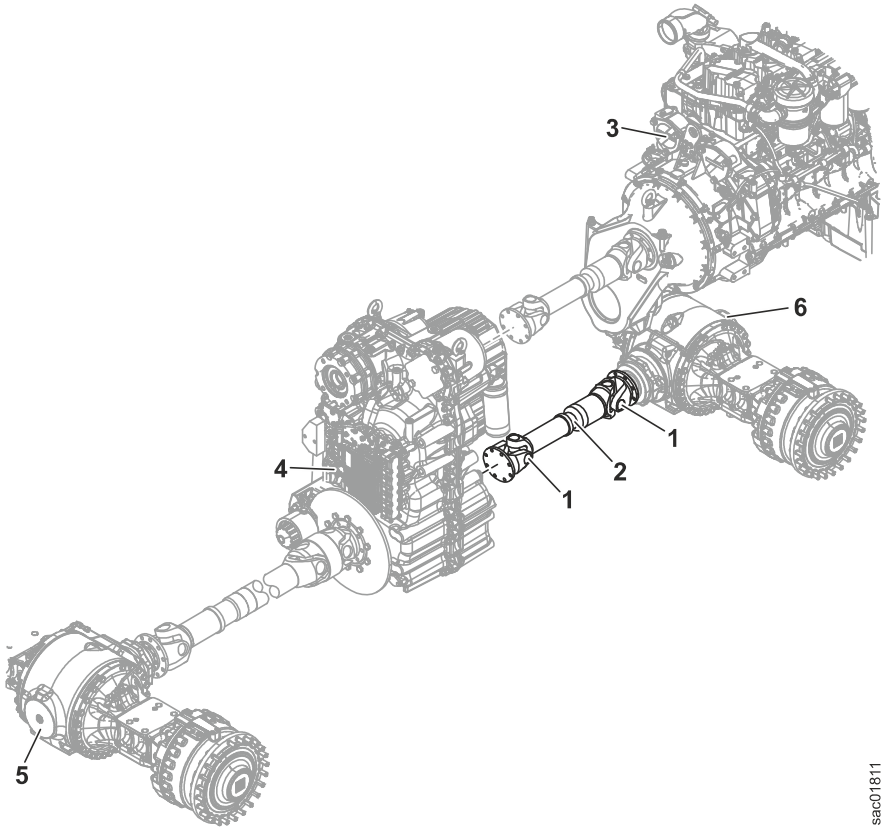

Fig. 599: Drive shaft between transmission and rear axle

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 transmission **4** to the input of the rear axle **6**.

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.

For additional information, see: removal and installation of components.

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BMK	Function	BMK	Function
B60	Angle sensor for bucket position	**B61**	Angle sensor for lift arm position

Tab. 339: Equipment codes

The moving parts of the lift rams are connected to each other with lubricated sliding bearings.

The bucket bearing **4** is also sealed against dirt.

2 Function

Advantages of Z kinematics:
- Very high torque in the loading position, therefore very high breakout force.
- Tilted-out bucket goes into loading position when lowered.
- Fewer moving parts, so requires less maintenance.
- Low weight, therefore high tipping load.

Drawbacks of Z kinematics:
- Low torque at upper lift arm position. Heavy working attachments (such as a timber grabber) can pull out the tilt cylinder or prevent the equipment from being tilted in again.
- No parallel movement. The bucket tilts out slightly when lifting.

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2.3.1 Opening solenoid valve for quick coupler

Solenoid valve for quick coupler **2** determines which side of hydraulic cylinder for quick coupler locking is pressurised. In order to open quick coupler, solenoid valve for quick coupler **2** is energized.

150.2.3 Quick coupler electrics

150.2.3.1 Quick coupler electric control unit

Valid for: L576-1333;

1 Basic function

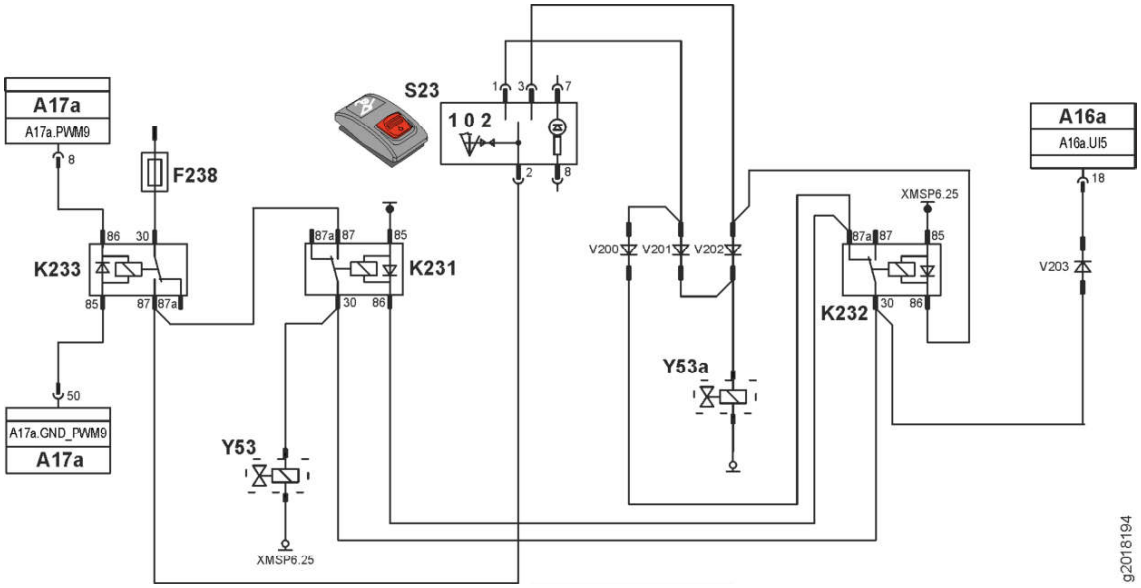

Fig. 615: Quick coupler electric control unit

Position	Description	Position	Description
A16a	Input module A16a	K233	Safety shutdown relay
A17a	Output module A17a	S23	*Quick coupler* button
F238	Quick coupler fuse	Y53	Quick coupler solenoid valve
K231	Quick coupler unlocking relay	Y53a	Quick coupler load sensing signal solenoid valve
K232	Latching function relay		

Tab. 358: Items

The quick coupler is unlocked and locked using the *quick coupler* button **S23**.

The electronic control unit is powered via the quick coupler fuse **F238**.

The quick coupler solenoid valve **Y53** is controlled by the quick coupler unlocking relay **K231**.

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2.2 Function test

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

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

2.3 Plug assignment

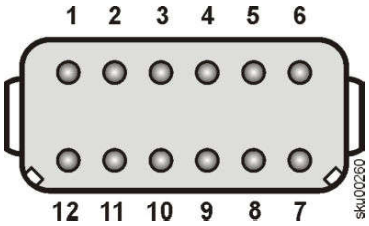

Fig. 620: Plug A11/X1

1	Supply voltage +24 V	**7**	CAN bus CAN High 2
2	Earth	**8**	CAN bus CAN Low 2
3	CAN bus CAN High 1	**9**	Terminating resistor
4	CAN bus CAN Low 1	**10**	Unassigned
5	Unassigned	**11**	Unassigned
6	Unassigned	**12**	Unassigned

160.2.2 Touch screen display

Valid for: L576-1333;

1 Layout

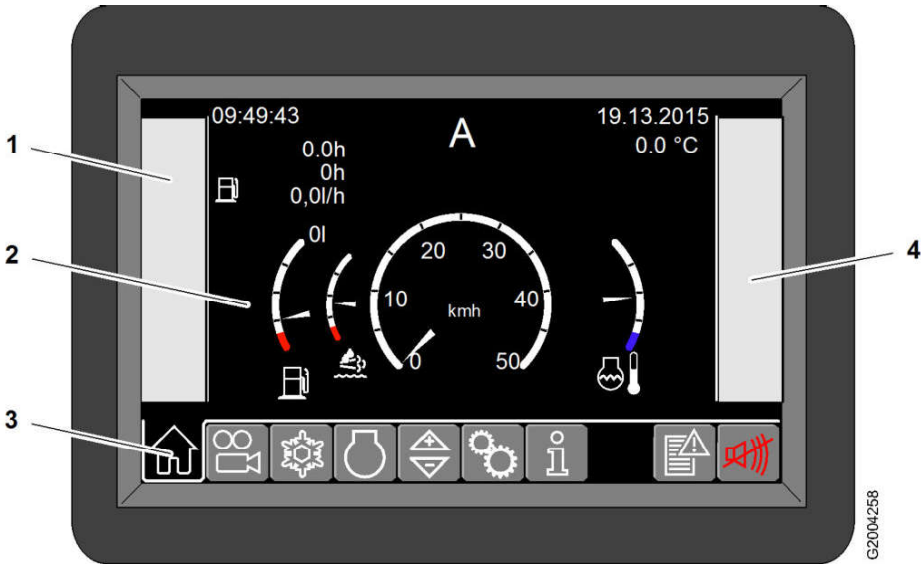

Fig. 621: Display

1	Status bar	**3**	Menu bar
2	Menu	**4**	Warning bar

The display A13a (touch screen monitor) is mounted in the front right of the cab.

Malfunction	Cause	Remedy
Not enough cooling	Not enough refrigerant in the air conditioning circuit	Correct the refrigerant level
	Air in the air conditioning circuit	Evacuate and refill the air conditioning unit
	Expansion valve blocked	Check the expansion valve
	Condenser blocked	Check the condenser
	Valve plates in the air conditioning compressor are defective	Check the valve plates

Tab. 363: Air conditioning: Troubleshooting

160.3.2 Heating and air conditioning unit

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

The evaporator **10** is exposed to hot air from the cab and transfers the heat to the refrigerant. This thermal exchange cools the cab air and heats the refrigerant.

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

The warmed, gaseous refrigerant is drawn in by the air conditioning compressor **1** again.

160.4.2 Air conditioning compressor

Valid for: L576-1333;

1 Layout

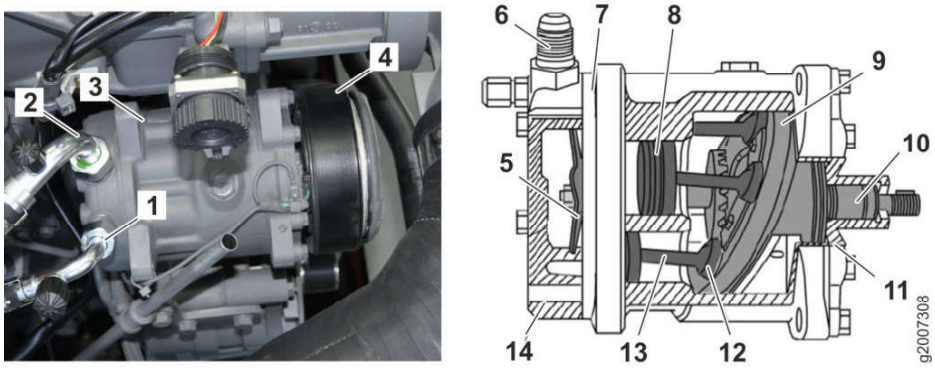

Fig. 638: Sectional view of air conditioning compressor

1	Outlet port	**8**	Piston
2	Intake port	**9**	Swash plate
3	Housing	**10**	Shaft with axial face seal
4	Compressor coupling Y22 with pulley	**11**	Cover with guide hub
5	Intake and discharge valve	**12**	Bearing
6	Screw connection	**13**	Connecting rod
7	Valve plate		

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

2 Function

The air conditioning compressor acts as a pump, drawing in refrigerant in a gaseous condition from the evaporator, compressing it and delivering it to the condenser.

Note

To prevent the axial face seal of the shaft **10** from drying out, the air conditioning compressor should be started up once a month, even when it is cold outside.

2.1 Overall system

The electrically powered central lubrication pump delivers the grease to the main progressive distributor and distributes it to the secondary progressive distributors. Each secondary progressive distributor delivers the grease to its lubrication points. The central control unit (Master4) controls the set lubrication and pause times of the central lubrication pump.

2.2 Progressive lubrication

The automatic central lubrication system is a progressive system. It lubricates progressively. This means the lubrication points are lubricated in succession.

2.3 Liebherr automatic central lubrication system: Z kinematics diagram

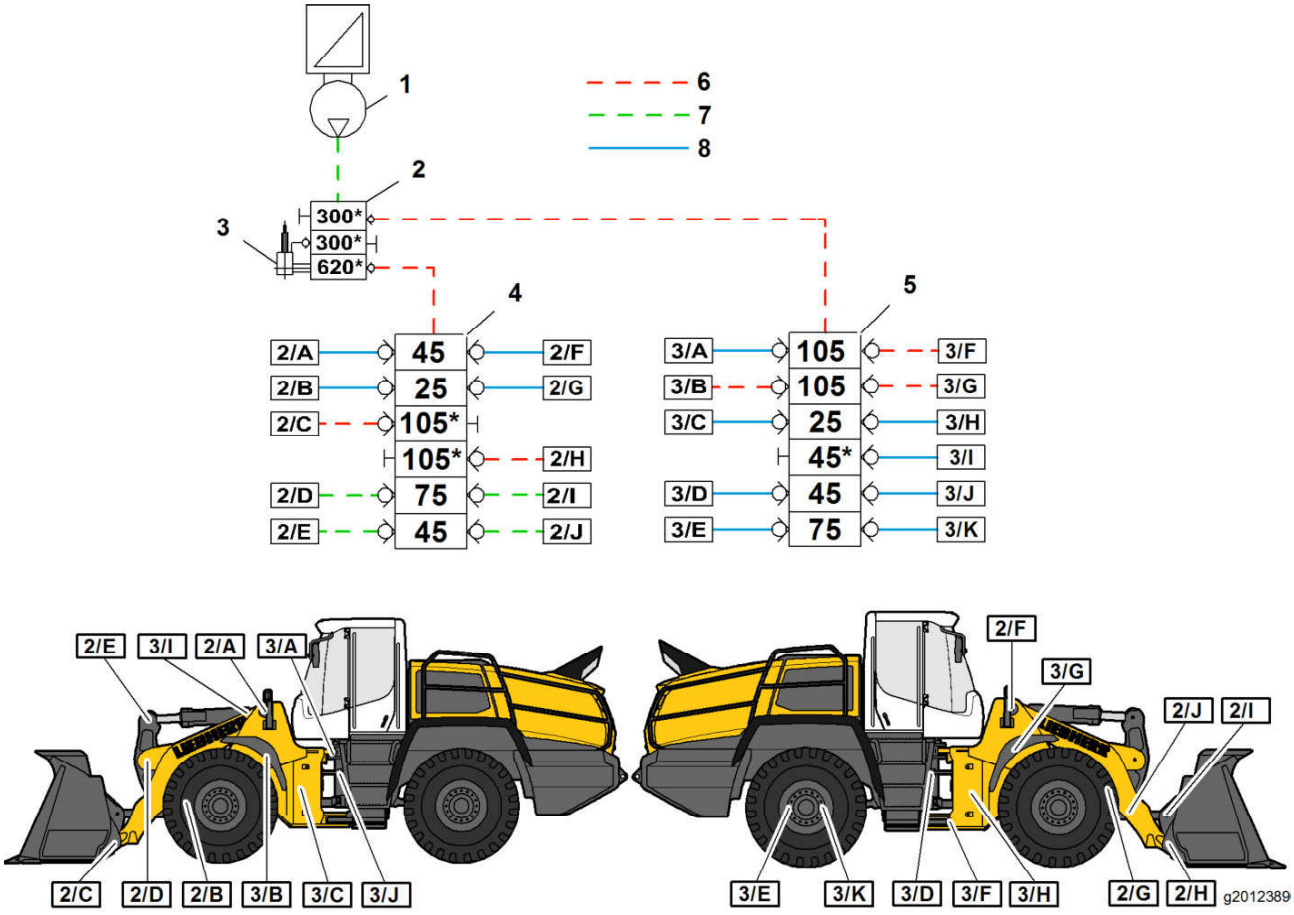

Fig. 645: Diagram of the central lubrication system with overview of lubrication points (Z kinematics)

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.

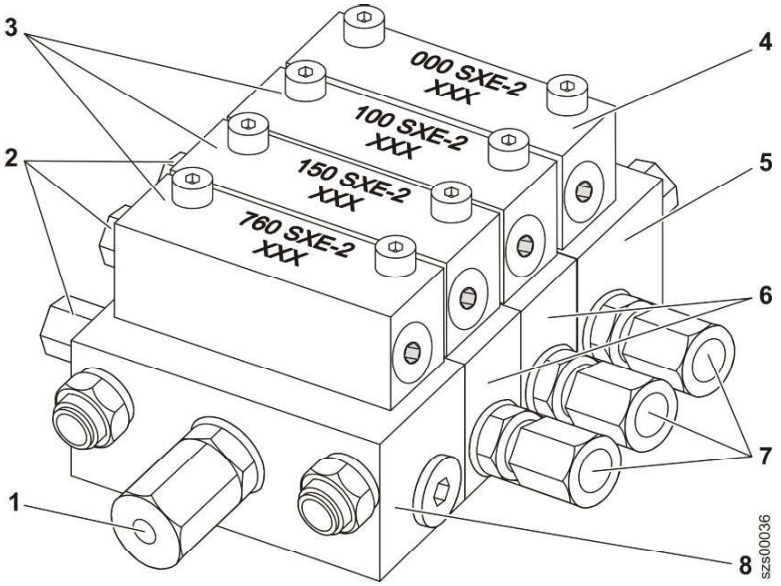

Fig. 657: Progressive distributor

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

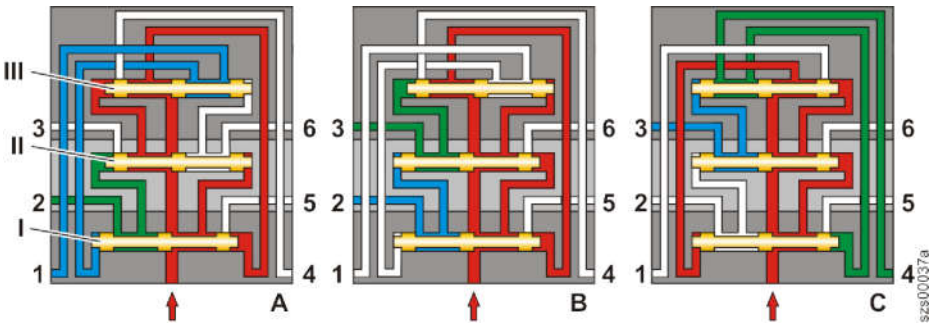

Fig. 658: Piston settings for the progressive distributor SXE-2

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