en **Service manual**

Wheel loader

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Manufacturer: Liebherr-Werk Bischofshofen GmbH
Valid for: L 566-1484

Contact

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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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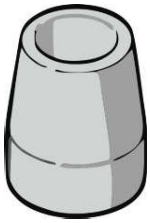
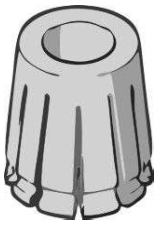
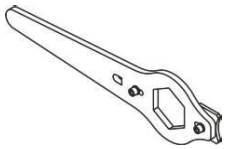
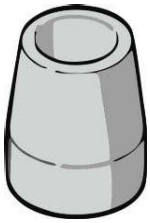
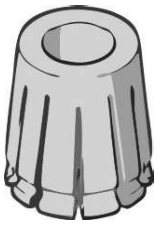
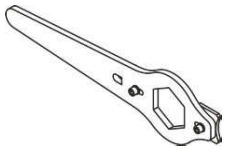
010.2.5 Special tools for lift cylinders with industrial lift arms

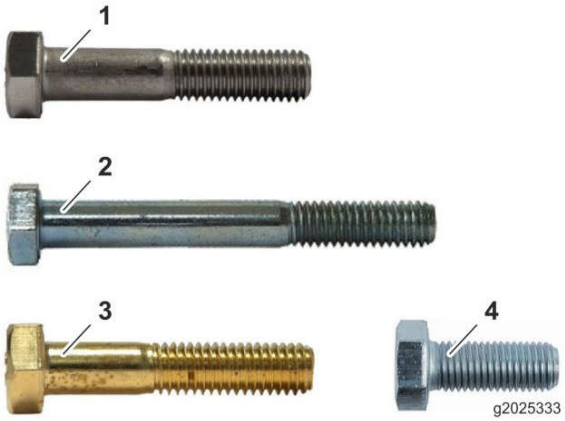
Designation	Item code	Remark	Fig.
Mounting sleeve 150 mm	9998622	For fitting the seals	
Expansion sleeve 150 mm	9110410	For fitting the seals	
Piston wrench 90 mm	9600418	For fitting the piston	

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

010.2.6 Special tools for tilt cylinders with industrial lift arms

Designation	Item code	Remark	Fig.
Mounting sleeve 170 mm	9107931	For fitting the seals	
Expansion sleeve 170 mm	9110412	For fitting the seals	
Piston wrench 110 mm	9600928	For fitting the piston	

Tab. 10: Special tools for tilt cylinders with industrial lift arms

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)**
 **1**: Zinc flake coated	 **1**: Black oxide, phosphated, blued **2**: Thick passivation **3**: Yellow chromate coated **4**: Galvanised Fe//ZnNi(12)5//Cn//T2

Tab. 22: Bolt types

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 4	8.8	4.5	2.9
					10.9	6.6	4.3
					12.9	7.7	5.0
				M 5	8.8	7.3	5.7
					10.9	10.7	8.4
					12.9	12.5	9.8
M 6	8.8	10.6	8.6*	M 6	8.8	10.3	9.9
	10.9	15.5	12.6*		10.9	15.2	14.5
	12.9	18.2	14.7*		12.9	17.7	16.9

010.4.4.2 After being out of service for 12 months

Put the machine into serve as described in the section on recommissioning after 2 months out of service.

The following measures must also be carried out:
- Extract an oil probe from the hydraulic oil and send it in for analysis.
- Carry out planned maintenance and inspection tasks on the machine before putting back into service.
- Mechanically activate the external exhaust return on the diesel engine and the engine brake flap and check for clearance.
- Clean corrosion inhibitor wax from machine and components with steam from a high-pressure cleaner (min. 120 °C) and with 5% cleaning agent (e.g. petroleum). (Careful on walk-on surfaces: there is a danger of slipping on wax remains.)
- Check the diesel engine's V-ripped belt and change if necessary.
- To carry out a test run of the diesel engine: increase the engine speed gradually to up to ¾ of the upper idle speed, until the operating temperature is reached.
- Check oil pressure display immediately after starting the diesel engine.

010.4.4.3 After being out of service for longer than 12 months

Put the machine into serve as described in the section on recommissioning after 12 months out of service.

- **After a machine has been out of service for longer than 12 months, the diesel engine manufacturer’s customer service must be contacted.**
- Remove all covers and seals used for the preservation measures.
- Turn the diesel engine several full turns by hand (use flywheel cranking device – see special tools).
- Start the engine and bring up to operating temperature.
- After the engine has been brought to operating temperature, change all lubrication and operating fluids as well as the filters.
- Check the whole machine for proper functioning and inspect for leaks.

Carry out any additionally required temporary maintenance work.

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	Designation	Unit	Value	
	Turning radius over bucket outer edge	mm	7410	7440
	Breakout force (SAE)	kN	200	185
	Tipping load when straight	kg	17100	16650
	Tipping load when fully articulated (ISO 14397-1)	kg	15000	14550
	Operating weight	kg	24800	24950

Tab. 26: Complete machine with loading bucket (industrial lift arms)

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

020.1.3 Working attachment: light material bucket

Valid for: L566-1484;

Values stated refer to machine:

- In standard version
- With 26.5R25 L3 tyres (For more information see: 020.10.7 Tyres, page 020-37)
- Including all lubricants
- With a full fuel tank
- With ROPS/FOPS cab and operator
- On level and stable ground

Note
Tyres and working attachments affect operating weight and tipping load.

▶ Note the information about the tyres and working attachment.

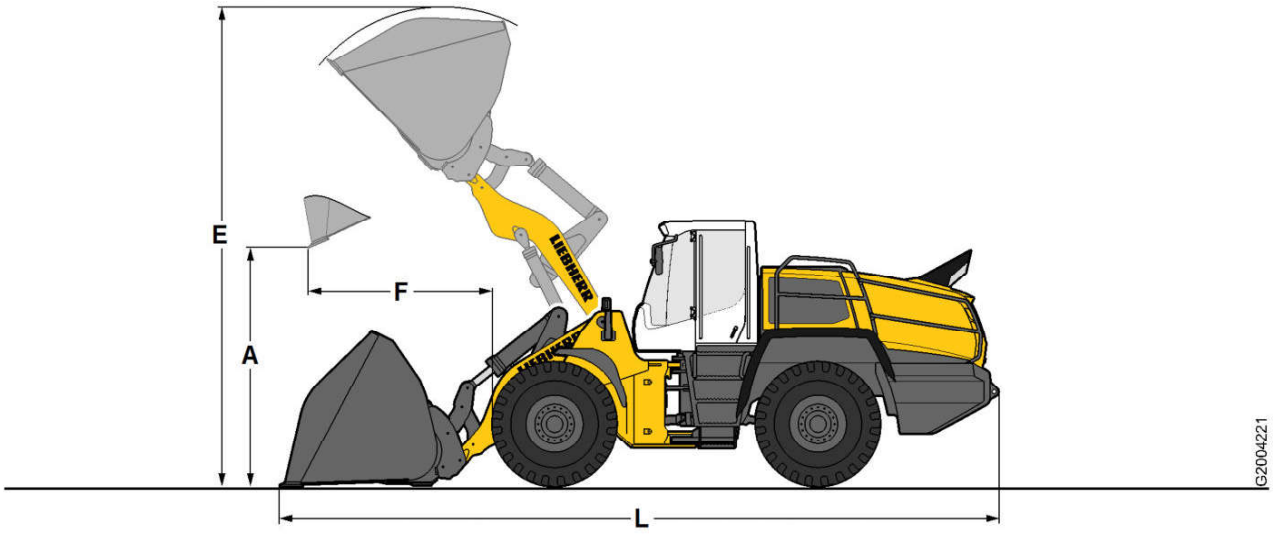

Fig. 81: Working attachment: light material bucket

020.4 Working hydraulics

020.4.1 Working pump

Valid for: L566-1484;

Description	Unit	Value
Type		Axial piston pump with swash plate variable displacement
Type		A11VO130LRS
Direction of rotation		Anticlockwise
Maximum displacement per turn	cm^3	130
Maximum displacement	l/min	300
Weight	kg	75

020.4.2 Control valve block for Z kinematics

Valid for: L566-1484;

Description	Unit	Value
Type		M6-1441-30/2M6-22 W
Maximum flow rate for lifting function (per outlet)	l/min	280
Maximum flow rate for lowering function (per outlet)	l/min	200
Maximum flow rate for tilt-in function	l/min	200
Maximum flow rate for tilt-out function	l/min	180
Maximum flow rate for 3rd function A3 (optional)	l/min	170
Maximum flow rate for 3rd function B3 (optional)	l/min	300
Maximum flow rate for 4th function A4 (optional)	l/min	170
Maximum flow rate for 4th function B4 (optional)	l/min	300
Weight (excluding additional spool valve)	kg	59

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020.7.5 Brake accumulator pressure sensor B19

Valid for: L566-1484;

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

020.7.6 Parking brake hydro accumulator

Valid for: L566-1484;

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

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020.10.7.2 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	4.80	3.50	5.00
Bridgestone 26.5R25 VLTS	L4	+420	2970	+44	4.80	3.20	5.00
Bridgestone 26.5R25 VSDL	L5	+1290	2970	+57	4.80	3.20	6.50
Bridgestone 26.5R25 VSDT	L5	+1038	2970	+50	4.80	3.20	6.50
Bridgestone 26.5R25 VSMS	L5	+1599	2960	+70	4.80	3.50	6.50
Bridgestone 26.5R25 VSNT	L4	+576	2960	+47	4.80	3.20	6.50
Bridgestone 750/65R25 VTS	L3	+194	3070	-39	4.80	3.50	5.00
Continental 26.5R25 EM-Master	L4	+528	2930	+48	5.00	3.80	6.50
Goodyear 26.5R25 GP-4D	L4	+436	2980	+26	4.80	3.50	5.00
Goodyear 26.5R25 RL-4K	L4	+776	2990	+63	4.80	3.50	6.50
Goodyear 26.5R25 RL-5K	L5	+1244	2990	+63	4.80	3.50	6.50
Goodyear 26.5R25 RL-5S	L5	+1460	2990	+63	4.80	3.50	6.50
Goodyear 26.5R25 RT-3B	L3	+324	2980	+26	4.80	3.50	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	3.50	6.50
Goodyear 750/65R25 TL-3A+	L3	+148	3100	-26	4.80	3.50	5.00
Michelin 26.5R25 XHA2	L3	0	2960	0	4.00	2.50	5.50
Michelin 26.5R25 XLD D2A	L5	+696	2970	+38	4.00	2.50	5.50
Michelin 26.5R25 XMINE PRO	L5	+1188	3010	+58	4.20	2.80	7.00
Michelin 26.5R25 XKA	L3	+464	3000	+11	4.00	2.50	6.50
Michelin 26.5R25 XTXL	L4	+488	2970	+23	5.00	3.50	8.00
Michelin 750/65R25 XLD65	L3T	-8	3060	-57	4.20	2.50	5.50

Tab. 32: Tyres for timber work

A) Recommended tyre pressure for cold tyres on the front axle
B) Recommended tyre pressure for cold tyres on the rear axle
C) Maximum tyre pressure

020.10.7.3 Special tyres

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

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030 Maintenance

Contents

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030.1 Maintenance and inspection schedule

General information

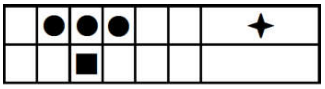
Shorten maintenance intervals depending on conditions of use, for example:
- Dust-intensive use
- Oil quality
- Fuel quality

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.

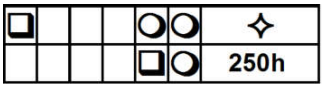
Service packs in spare parts catalogue contain spare parts required for maintenance activities.

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. 34: 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. 35: 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: L566-1484;

030.3.6.1 Liebherr recommendation

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

Tab. 44: Liebherr recommendation

030.3.6.2 Minimum quality requirement

Specification
DIN 70 070
ISO 22241
LH-00-UREA

Tab. 45: Minimum quality requirement

030.3.7 Engine oils

Valid for: L566-1484;

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. 46: 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. 47: 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.

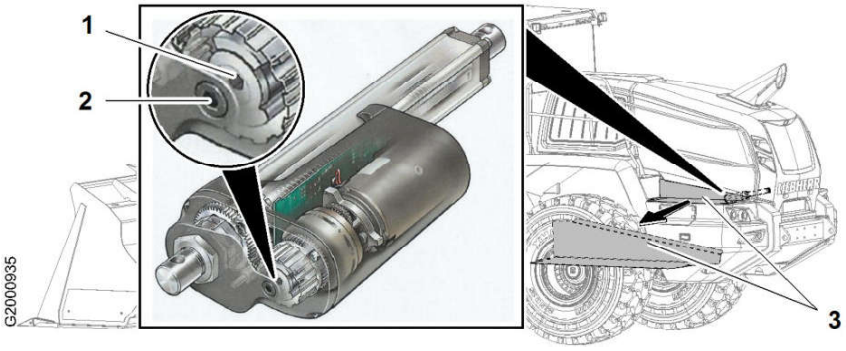

Fig. 95: Manual emergency operation of the engine bonnet

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.

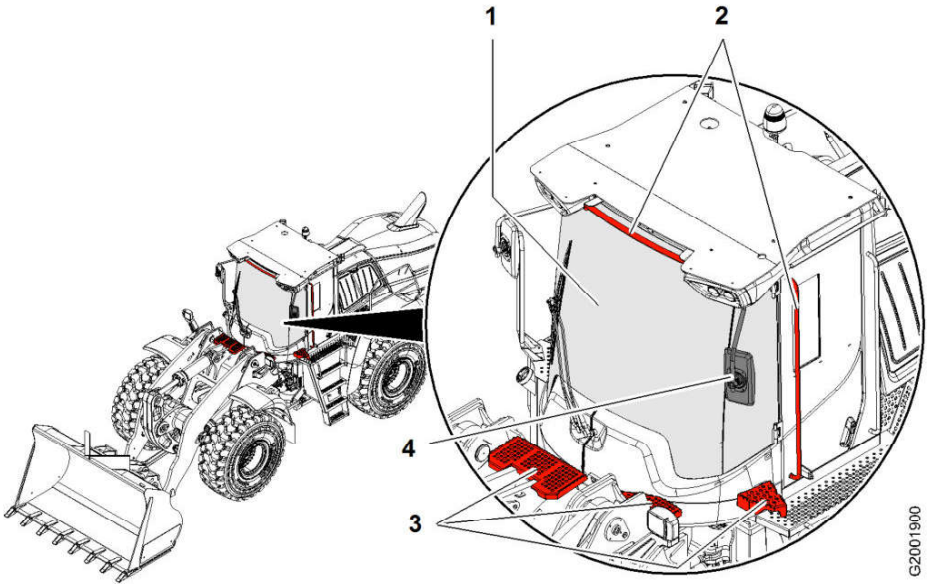

Fig. 102: Cleaning the front windscreen of the cab

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: L566-1484;

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

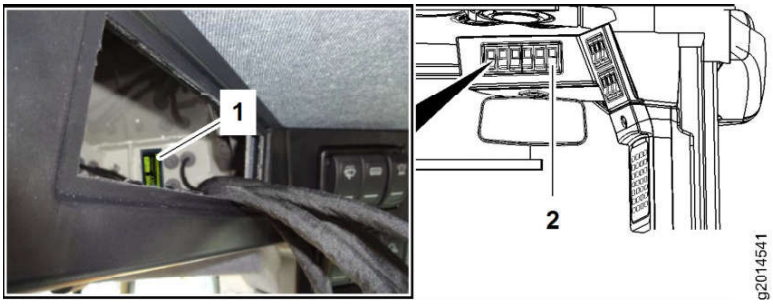

Fig. 103: Changing the VCI-capsule in the back of the switches

1	VCI-capsule	**2**	Switch cover

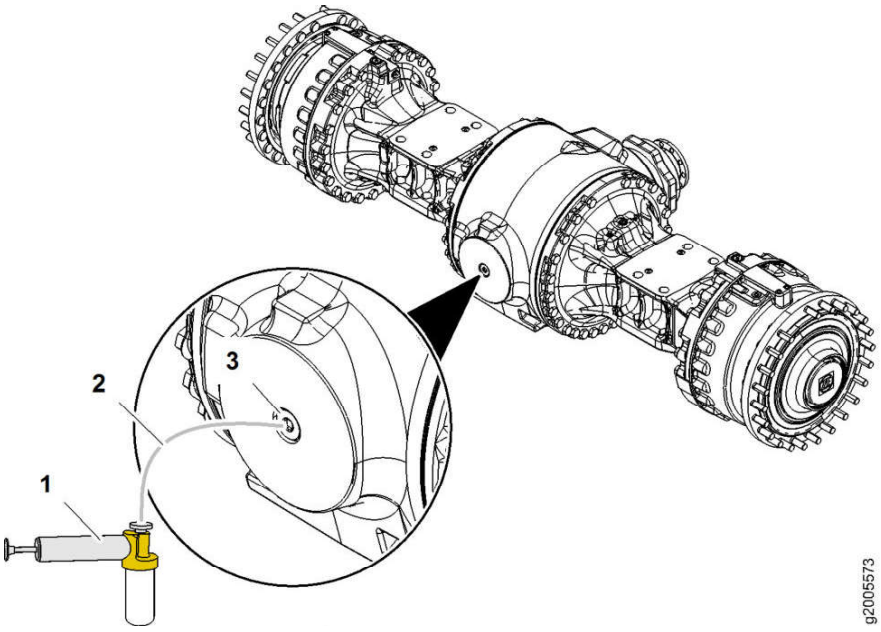

Fig. 111: Sampling point on the axles

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: L566-1484;

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

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: L566-1484;

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

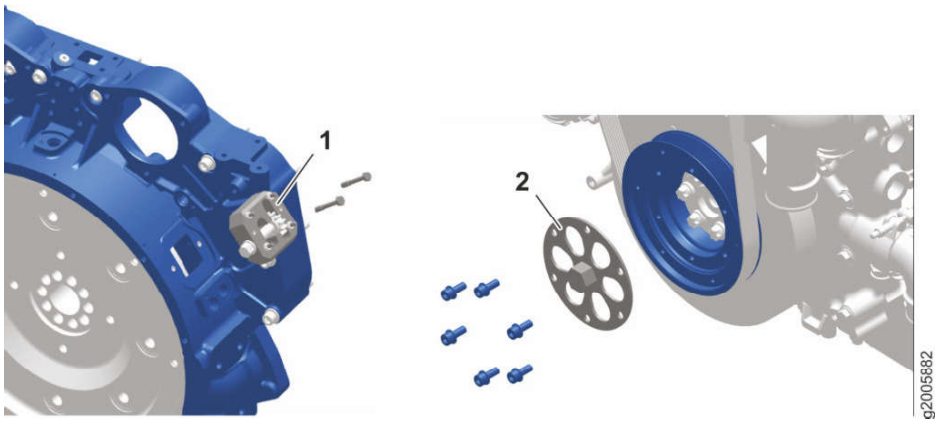

Fig. 121: Attaching engine cranking device

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.

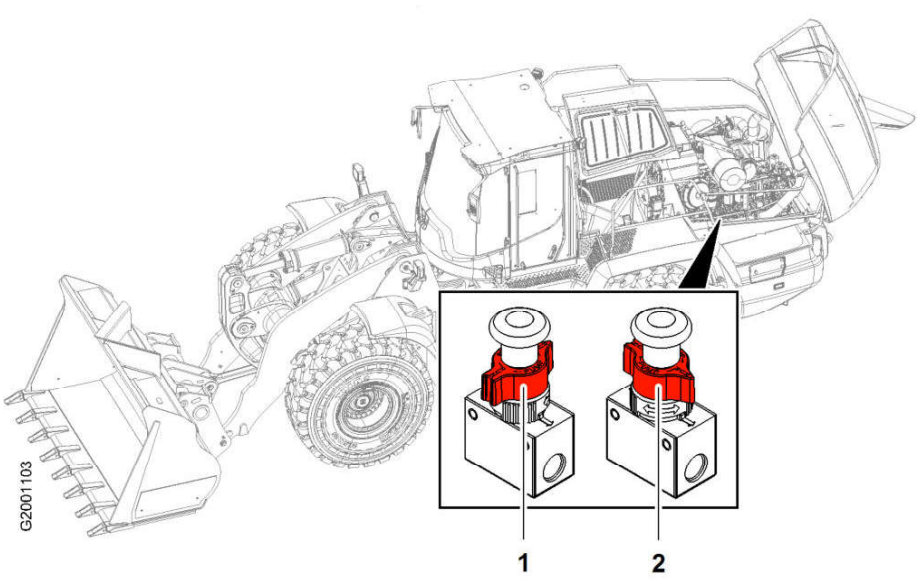

Fig. 130: Bleeding fuel system

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

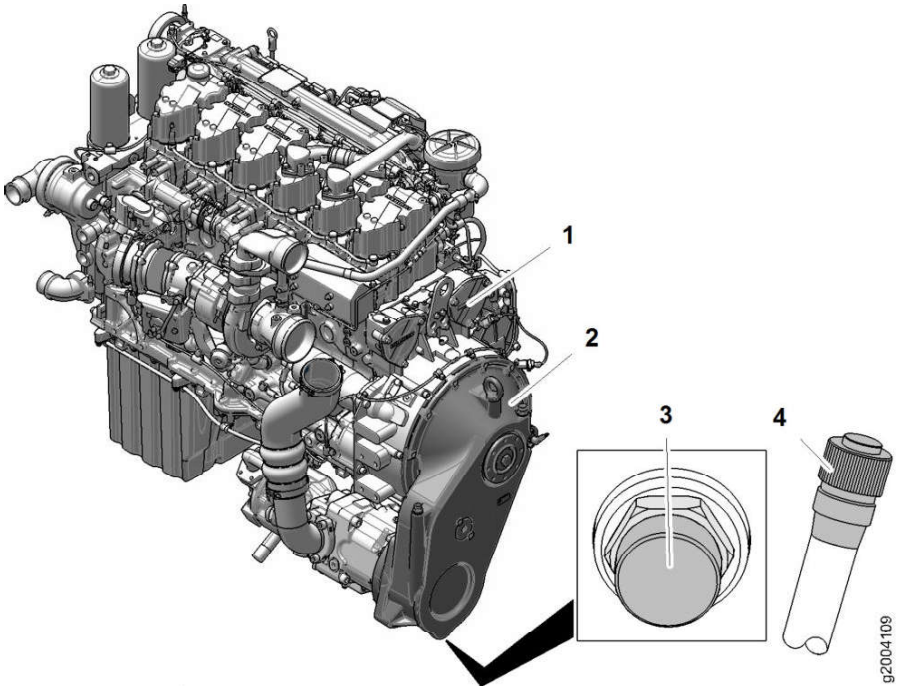

Fig. 141: Splitter box: Draining the oil

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: L566-1484;

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.

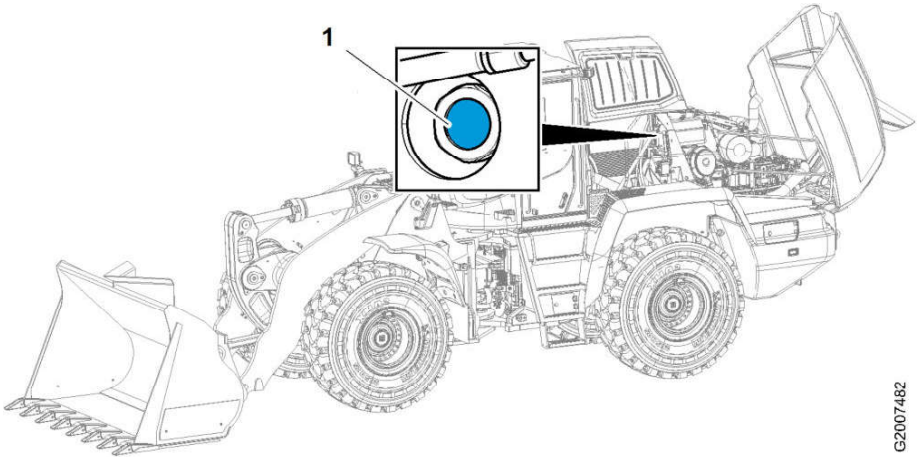

Fig. 150: Checking the coolant level

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.

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Draining coolant

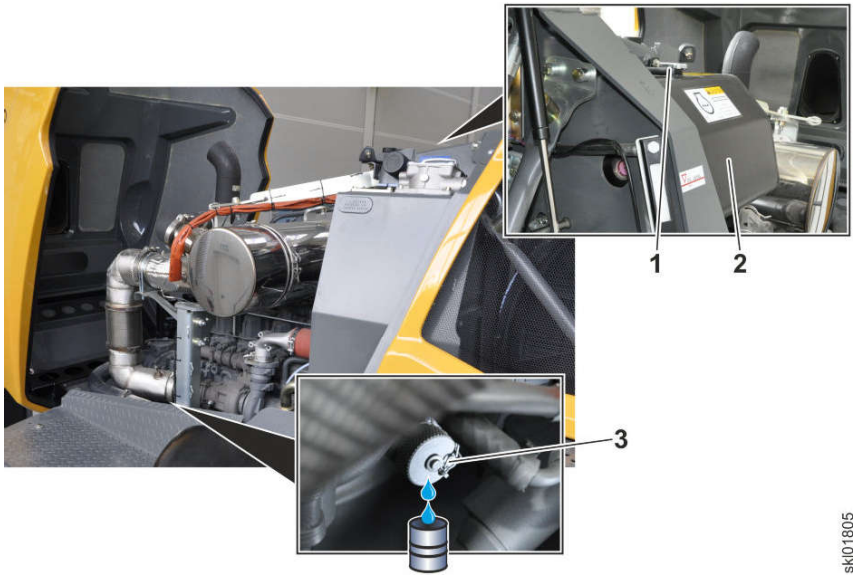

Fig. 158: Draining the coolant

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**.

Fig. 168: 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

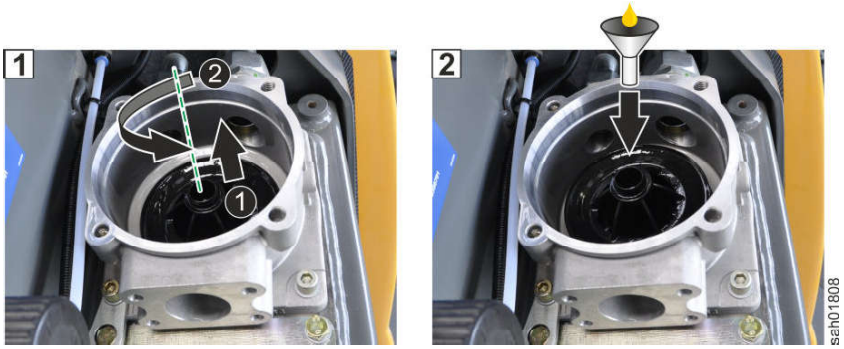

Fig. 169: Topping up the oil

- ▶ 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.

WARNING
Inadvertently engaging the parking brake!
Crushing injuries.

- ▶ Keep people out of the operator's cab.
- ▶ Make sure that the main switch cannot be operated.

- ▶ Force the variable ***QRPBValve*** to the maximum value ***65535***.
  ▷ The parking brake opens.
- ▶ Unscrew the protective cap.
- ▶ Unscrew the counter nut **8**.
- ▶ Loosen the adjusting screw **7** by three to four turns.
- ▶ Push back the thrust pin **6** with a screwdriver.
- ▶ Remove the cotter pin **3** and pull out the guide pin **4**.
- ▶ Remove both brake shoes **1**.
- ▶ Put on the new brake shoes.
- ▶ If the brake shoes do not stick to the solenoids **5**: clean the solenoids **5**.
- ▶ Pit in the guide pin **4** and insert the cotter pin **3**.
- ▶ Adjust the gap. (For more information see: Adjusting the gap, page 030-121)

Adjusting the gap

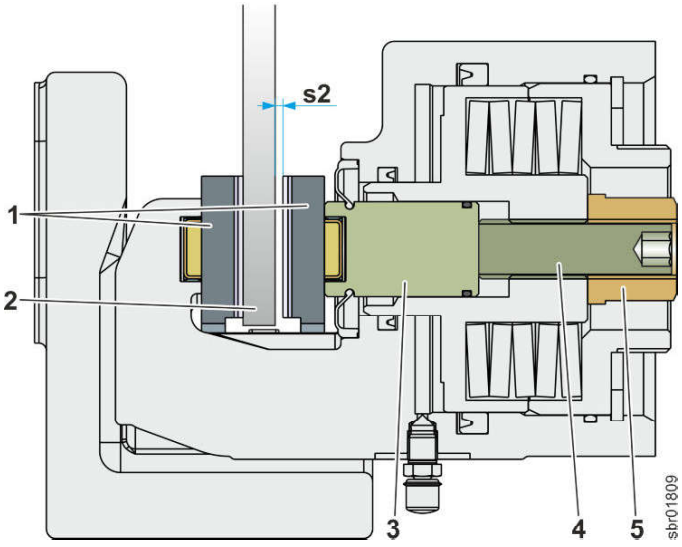

Fig. 181: Adjusting the gap

1	Brake shoe	**4**	Adjusting screw
2	Brake disc	**5**	Counter nut
3	Thrust pin	**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.

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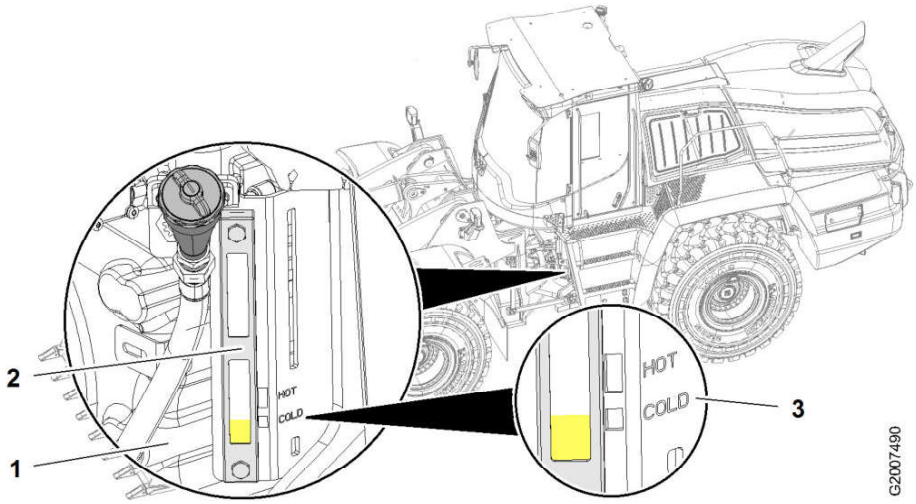

Fig. 190: Checking the oil level when the gear oil is cold

1 Transmission
2 Oil sight glass
3 COLD range

▶ Start the diesel engine and let it run at idling speed.

▶ Wait 3 minutes for the oil to circulate.

▶ Check the oil level in the oil sight glass **2**.
▷ The oil level must be in the COLD range **3** or slightly above it.

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

▶ Top up the oil. (For more information see: Topping up the oil, page 030-132)

Troubleshooting
If leakages are detected on the transmission:

▶ Contact Liebherr customer service.

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

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

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Checking universal joints and extension

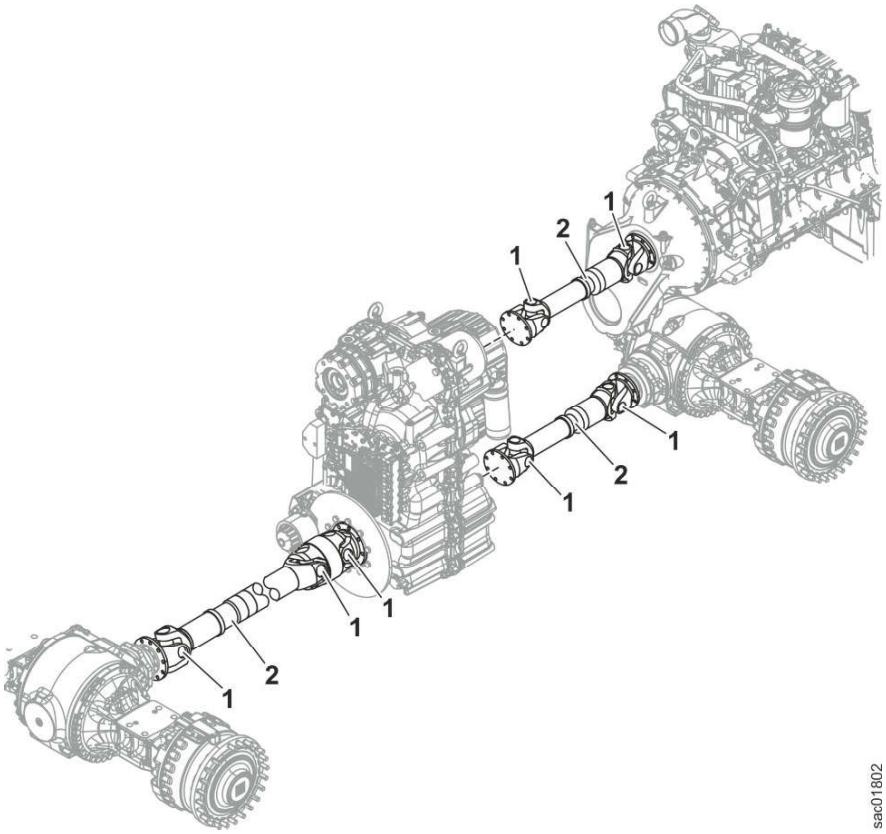


Fig. 199: Checking universal joints and extension

1 Universal joint **2** Extension

▶ Check all three drive shafts for play in the universal joints **1** and the extension **2**.

If there is play in a universal joint **1**:
▶ Replace drive shaft.

If there is play in an extension **2**:
▶ Check articulation play.

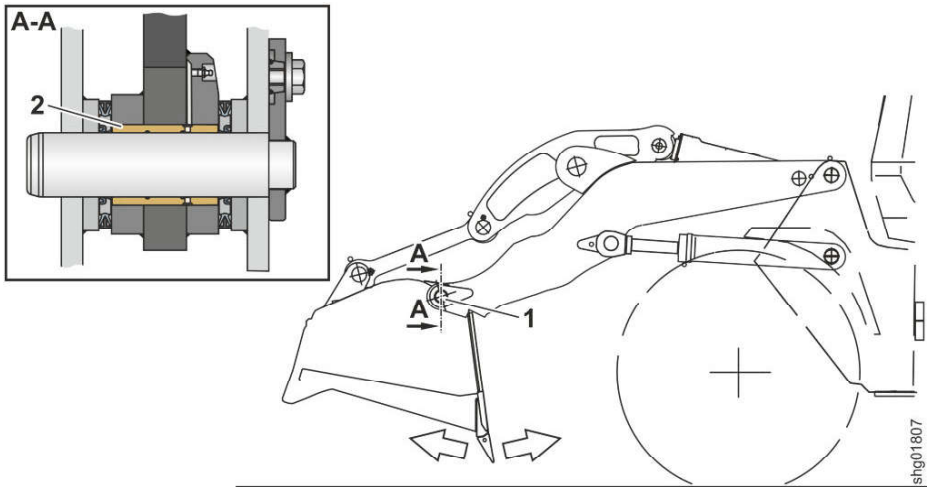


Fig. 211: Checking the lift arm bucket bearing bushings

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

▶ Raise the lift arms so far that the bucket can be fully tilted out.

▶ Tilt the bucket out.

▶ Tilt the bucket in and out with short, fast movements.

▶ When doing so, listen out for noises and play in the bucket bearing bushes **2**.

If there are noises or play in the bucket bearing bushes **2**:

▶ Check the lubrication of the bucket bearing bushes **2**.

▶ Replace the bucket bearing bushes **2**.

030.4.13.4 Checking the lift arm bucket stops

Valid for: L566-1484;

Note

This maintenance item is only for Z kinematics.

Make sure that the following requirements are fulfilled:

❑ The machine is secured against rolling away.

Checking the bucket stops with direct attachment

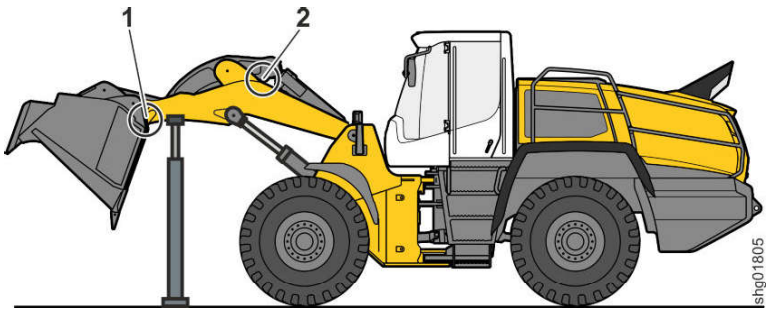


Fig. 212: Checking the bucket stops with direct attachment

1 Bucket stop (2x) **2** Linkage stop

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

▶ Replace damaged parts.

030.4.14.4 Testing the windscreen washer system

Valid for: L566-1484;

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

To check the front windscreen washer system:

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

To check the rear windscreen washer system:

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

030.4.14.5 Windscreen washer system: Topping up windscreen washer fluid

Valid for: L566-1484;

The reservoir is fitted below the left cab access.

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

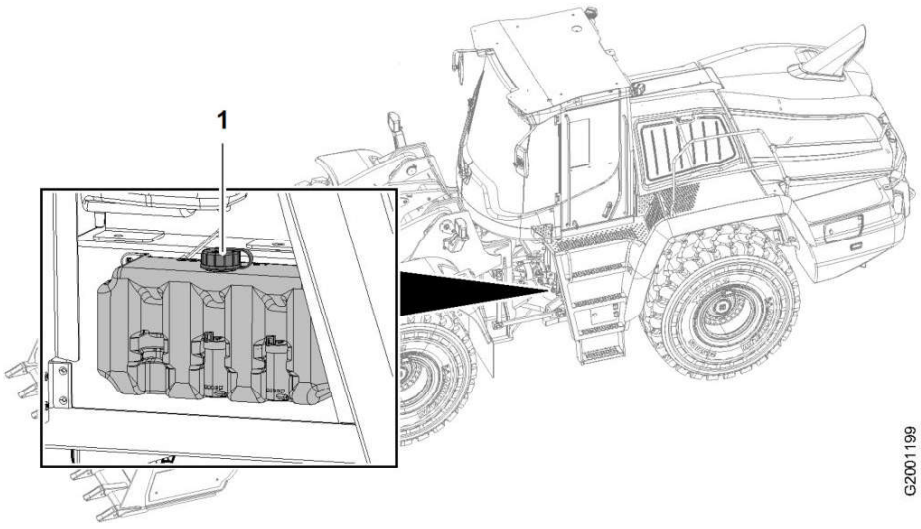


Fig. 222: Windscreen washer system: Topping up windscreen washer fluid

1 Cover

The filling quantity is approximately 3.5 l.

▶ Open cap **1** on the reservoir.

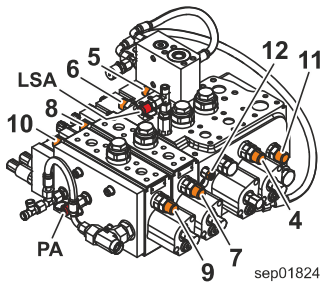
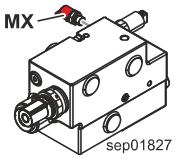
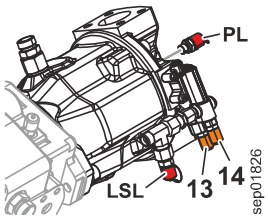
3. Hydraulic adjustment procedures									
Test / adjustment	**1000 h**	**2000 h**	**Unit**	**Required value**	**Measured**	**Adjusted**	**Adjusting point**	**Test point**	**Figure**
Industrial lift arms control valve block (option): secondary pressure relief valves									
Opening pressure for tilting out		○	bar	225±5			4	PA	
Opening pressure for tilting in A)		○	bar	425±5			5	PA	
Opening pressure for lifting A)		○	bar	425±5			6	PA	
Opening pressure for 3rd function A3 (option)		○	bar	255±5			7	PA	
Opening pressure for 3rd function B3 (option)		○	bar	255±5			8	PA	
Opening pressure for 4th function A4 (option)		○	bar	255±5			9	PA	
Opening pressure for 4th function B4 (option)		○	bar	255±5			10	PA	
Industrial lift arms control valve block (option): primary pressure relief valve									
Opening pressure B)		○	bar	390±5			11	PA	
Industrial lift arms control valve block (option): LS-pressure cut-off									
High pressure at full load		○	bar	380±5			12	PA	
Stabilisation module cut-out function									
Cut-out pressure when charging		○	bar	120+60/-10				MX	
Steering system									
Steering pump: LS-pressure cut-off valve									
High pressure at full load		○	bar	210±5			13	PL/	
Steering pump: flow regulator (differential pressure) Up to software version 020: From software version 024:									
Differential pressure ΔP at low idling speed	◊	○	bar	23±1			14	PL/ LSL	
Brake system									
Brake accumulator pressure sensor B19: deviation									
Deviation between pressure gauge and sensor	○	○	bar	<5			15	M3	

Fig. 233: “Snapshot” function

▶ Select the “Snapshot” function.

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

▶ Do not change the file name.

▶ Save the file.

030.6.4 Cooling system

030.6.4.1 Fan speed proportional solenoid valve

Valid for: L566-1484;

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

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

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

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

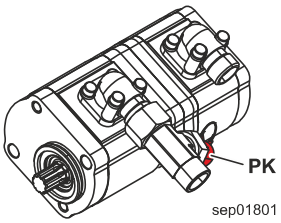


Fig. 234: Fan speed proportional solenoid valve

PK Cooling system high pressure test connection

▶ Unforce the variable ***QREHLiftValveUp***.

▶ Repeat the process for the lowering function with the variable ***QREHLiftValveDn***. Enter the value you read in the variable ***CREHLiftDnCurrMoveBegin***.

▶ Repeat the process for the tilt-in function with the variable ***QREHBucketValveUp***. Enter the value you read in the variable ***CREHBucketUpCurrMoveBegin***.

▶ Repeat the process for the tilt-out function with the variable ***QREHBucketValveDn***. Enter the value you read in the variable ***CREHBucketDnCurrMoveBegin***.

Once all the functions have been calibrated:
▶ Turn off the diesel engine.

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

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

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

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

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

▶ Start the diesel engine.

▶ Connect the Sculi diagnostic software to the machine.

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

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

▶ Make sure that the parking brake is activated.

▶ Raise the lift arms half way.

▶ Tilt the bucket half way in.

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

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If a required value is not reached:

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

Note
To adjust secondary pressure relief valves:

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

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

When all required values are reached:

- ▶ Set bucket down on ground on its teeth or cutting edge.
- ▶ Turn off diesel engine and take out ignition key.
- ▶ Turn adjusting screw on primary pressure relief valve **9** by exactly one turn anti-clockwise.
- ▶ Turn adjusting screw on LS-pressure cut-off valve **8** by exactly one turn anti-clockwise.
- ▶ Check and adjust primary pressure relief valve. (For more information see: Z-bar kinematics control valve block: primary pressure relief valve, page 030-201)
- ▶ Check and adjust the LS pressure cut-off valve. (For more information see: Z-bar kinematics control valve block: LS-pressure cut-off, page 030-203)

030.6.5.9 Z-bar kinematics control valve block: primary pressure relief valve

Valid for: L566-1484;

Note
Opening pressure of primary pressure relief valve is above opening pressure of LS-pressure cut-off.

- ▶ Before testing, set LS-pressure cut-off to a higher value.

Make sure that following requirements are met:

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

Make sure that following tools are ready:

- ❑ Pressure gauge (600 bar)

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Description	Unit	Value
Hydro accumulator charge pressure **MX**	bar	120 $^{+60/-10}$

If the value is not correct:
- ▶ Set the bucket down on the ground on its teeth or cutting edge.
- ▶ Turn off the diesel engine and take out the ignition key.
- ▶ Check the stabilisation module for damage.

If the value is correct:
- ▶ Set the bucket down on the ground on its teeth or cutting edge.
- ▶ Turn off the diesel engine and take out the ignition key.
- ▶ Disconnect the pressure gauge from the hydro accumulator charge pressure test connection **MX**.

030.6.5.15 Ride control hydro accumulator nitrogen filling

Valid for: L566-1484;

Make sure that following requirements are met:
- ❑ Machine is in maintenance position for adjustment procedures.

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

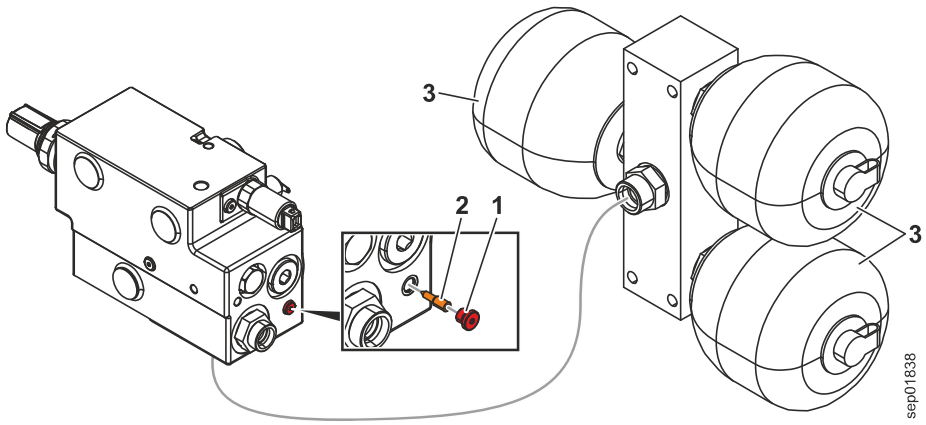

Fig. 249: Ride control hydro accumulator nitrogen filling

1 Screw plug

2 Relief valve

3 Ride control hydro accumulator (3x)

WARNING
Descending lift arms!
Injury.
- ▶ Make sure that the full weight of the lift arms rests on the ground.

- ▶ Unscrew plug **1**.
- ▶ Unscrew relief valve **2** by two turns.
  - ▷ Hydraulic pressure in hydro accumulators **3** is relieved into hydraulic tank.
  - ▷ Hydro accumulators can be checked while installed.

WARNING
Accidental steering movements!
Injury.

▶ Make sure that articulation lock is engaged.

▶ With joystick steering deactivated and within 8 seconds, move **joystick** all the way left and right.

▶ Wait until the variable ***MXJSEmergVlvPosAdjStart*** returns to ***0***.
▷ Calibration is completed.

▶ Turn off diesel engine.

▶ Disengage articulation lock (for further information see: operator's manual).

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

Note

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

▶ Make sure that the articulation lock is disengaged.

▶ Start diesel engine.

▶ Move lift arms into transport position.

▶ Fold up left armrest and then fold back down.
▷ Joystick steering is deactivated.

WARNING
Automatic machine movements!
Injury.

▶ Make sure there is nobody in hazard zone around machine.

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

▶ Wait until the variable ***MXJSSteerValveAdjMvBg*** returns to ***0***.
▷ Calibration is completed.

030.6.7.4 Steering pump: LS pressure cut-off valve

Valid for: L566-1484;

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.
❑ The service access is open.

Make sure that the following tools are ready:
❑ Pressure gauge (600 bar)

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▶ In the variables editor, select the ***Brake system*** folder.
▷ The variable ***PRSIMBrakePressure*** shows the brake accumulator pressure.

▶ Check how far the value of the ***MDdrPmPressHV*** variable deviates from the value displayed by the high pressure gauge **M3**.

Description	Unit	Value
Maximum deviation	bar	5

If the deviation is too great:
▶ Turn off the diesel engine and take out the ignition key.

▶ Inspect the brake accumulator pressure sensor **1** for damage and replace if necessary.

▶ Repeat the test.

If the deviation is within the permitted range:
▶ Turn off the diesel engine and take out the ignition key.

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

030.6.8.2 Compact brake valve hydro accumulator charging function

Valid for: L566-1484;

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:
❑ Pressure gauge (250 bar)

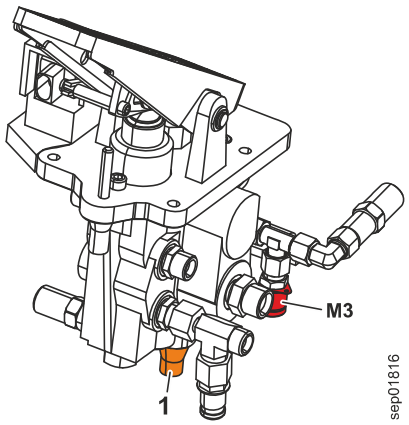

Fig. 265: Compact brake valve hydro accumulator charging function

1 Pilot valve

M3 Service brake accumulator pressure test connection

▶ Connect a pressure gauge (250 bar) to the brake accumulator pressure test connection **M3** on the compact brake valve.

▶ Start the diesel engine.

▶ Wait 10 seconds.
▷ The hydro accumulators for the service brake are full.

Troubleshooting
If the software update is not successfully completed:

- ▶ Switch off ignition and wait until all LEDs go out.
- ▶ Switch on ignition. Software update is started again.

Troubleshooting
If after the software update, the functions do not operate correctly:

- ▶ Create a service file.
- ▶ Set ***MXMDMachineInit*** variable to ***1***.
- ▶ Wait until the value is reset to ***0*** automatically.
- ▶ Switch off ignition and wait until all LEDs go out.
- ▶ Switch on ignition.
- ▶ Recheck functions.

Troubleshooting
If the service code 0x8500A39D is displayed after the software update:

- ▶ Switch off ignition and wait until all LEDs go out.
- ▶ Switch on ignition.

If a service code continues to be displayed even after turning ignition off and then again several times:

- ▶ Create a service file.
- ▶ Contact technical customer service at manufacturer factory.

030.6.9.3 Setting the IP addresses of the central control unit (Master4)

Valid for: L566-1484;

The IP addresses of the Ethernet interface may be lost due to a flat back-up battery or an error in the central control unit (Master4).

If this occurs, the IP addresses must be reset via the Terminal Plugin function with the Sculi diagnostic software.

Establishing the RS-232 connection with the machine

To be able to set the IP addresses, an RS-232 connection needs to be established between the central control unit and the notebook.

On machines with an RS-232 diagnostic plug:

- ▶ Use an RS-232 diagnostic data cable (ID number: 10035410) to connect the notebook with the central control unit.

On machines without an RS-232 diagnostic plug:

- ▶ Use an adapter cable (ID number: 6905860) to connect the notebook via the COM 4 port with the central control unit.

Setting the IP addresses

- ▶ Switch on the ignition.
- ▶ Start the Sculi diagnostic software.

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2	Serial number of connected modules	**6**	Indicates whether the module is used
3	CAN line connecting the module to the central control unit	**7**	Indicates whether the module is active
4	Module identification	**8**	Drop-down window

The serial number **2** indicates the module. The serial number **2** is on the identification plate of the module.

▶ Select module editor “function” **1**.

▶ Select module and open drop-down window **8**.

▶ Select address and confirm with Enter key.

Checking system information of CAN modules

The CAN module addresses are checked using the Sculi diagnostic software.

You can check following settings:
– Address
– ***Active*** status
– ***Timeout*** status
– Serial number of module
– Item code of module

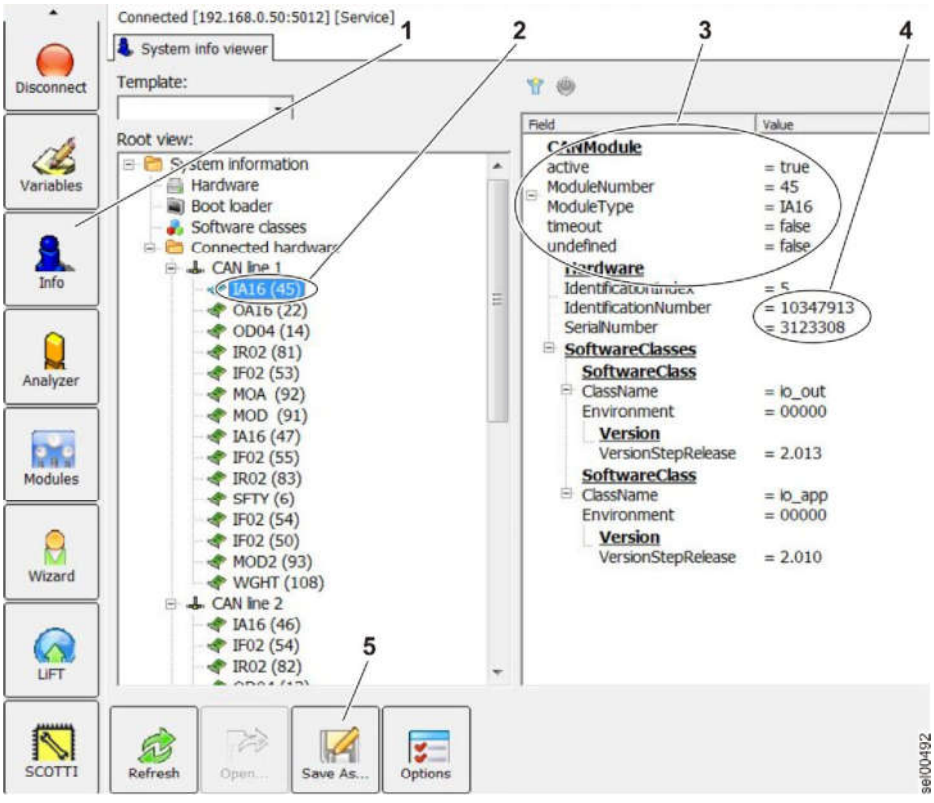

Fig. 287: Checking system information of CAN modules

1	“System information” function	**4**	Serial number and item code
2	Module	**5**	“Save system information” function
3	Module status		

▶ Turn on starting switch.

▶ Start Sculi diagnostic software and connect it to machine.

Reversing test is subdivided into a test with a short shifting delay and a test with a long shifting delay. Both tests must be carried out.

Preparing the memory card

Make sure that following tools are ready:
- ❑ A formatted flash card (item code: 10223095)
- ❑ A flash card reader (item code: 11000491)

The following files must be saved uncompressed on a formatted memory card:
- ❑ The file ***autoexec.frc***
- ❑ The file ***sampleXPower001.smp***
- ❑ The file ***canalyser.SMP***

Files for recording data are provided as a compressed file (***testing_files.exe***) in Liebherr service documentation.

File storage location: Liebherr Service Documentation -> Wheel loader -> Machine software -> XPower_TCU_ID_11837049 -> Diagnosis -> ***testing_files.exe***

- ▶ Unpack file ***testing_files.exe***.
  - ▷ The files for recording the data are then available.
- ▶ Copy the files for recording the data to a formatted memory card.
- ▶ Insert the memory card with the files for recording the data in the memory card slot CF2.

Preparing for the reversing test

Make sure that following requirements are fulfilled:
- ❑ Machine is at operating temperature.
- ❑ Machine is in maintenance position 1.
- ❑ Machine software is correctly configured (type, serial number, etc.).
- ❑ The service calibration has been carried out.
- ❑ Automatic hydrostat calibration has been carried out.
- ❑ Automatic clutch calibration has been carried out.
- ❑ There is a flat, straight stretch of roadway available for the test.

- ▶ Start diesel engine.
- ▶ Connect Sculi diagnostic software to Machine.
- ▶ In the variables editor, select the ***Transmission*** folder.
- ▶ Select the subfolder ***Reversing Diagnosis***.
  - ▷ The variables necessary for the test are displayed.
- ▶ Set the value of the variable ***MXTDTransmRevDiagStart*** to 1.
  - ▷ The machine is in testing mode.
  - ▷ Data is recorded on the memory card in memory card slot CF2.
  - ▷ The diesel engine speed is limited.
  - ▷ The terminal speed is limited to around 8 km/h.

Carrying out the reversing test with short shift delay

In this test, the reversing sequence is initiated as soon as the terminal speed is reached.

During the test, the accelerator pedal is fully depressed the whole time.

- ▶ Select forward travel direction.
- ▶ Accelerate the machine to the terminal speed.

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▷ The display starts up in setting mode.

Fig. 303: Display with Touch Panel button

▶ Press *touch panel* button.

Fig. 304: Display with enter button

▶ Press *enter* button.

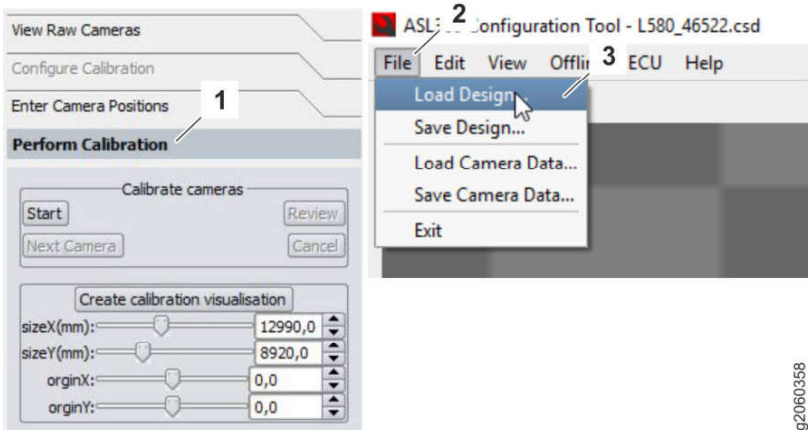

Fig. 320: Loading design data

1 “Perform Calibration” tab

2 “File” tab

3 “Load Design” function

▶ Select “Perform Calibration” tab **1**.

▶ Select “File” tab **2**.

▶ Select “Load Design” function **3**.

▶ Select prepared folder “Designs”.

▶ Select and open machine-specific design data.
▷ Design data are loaded.

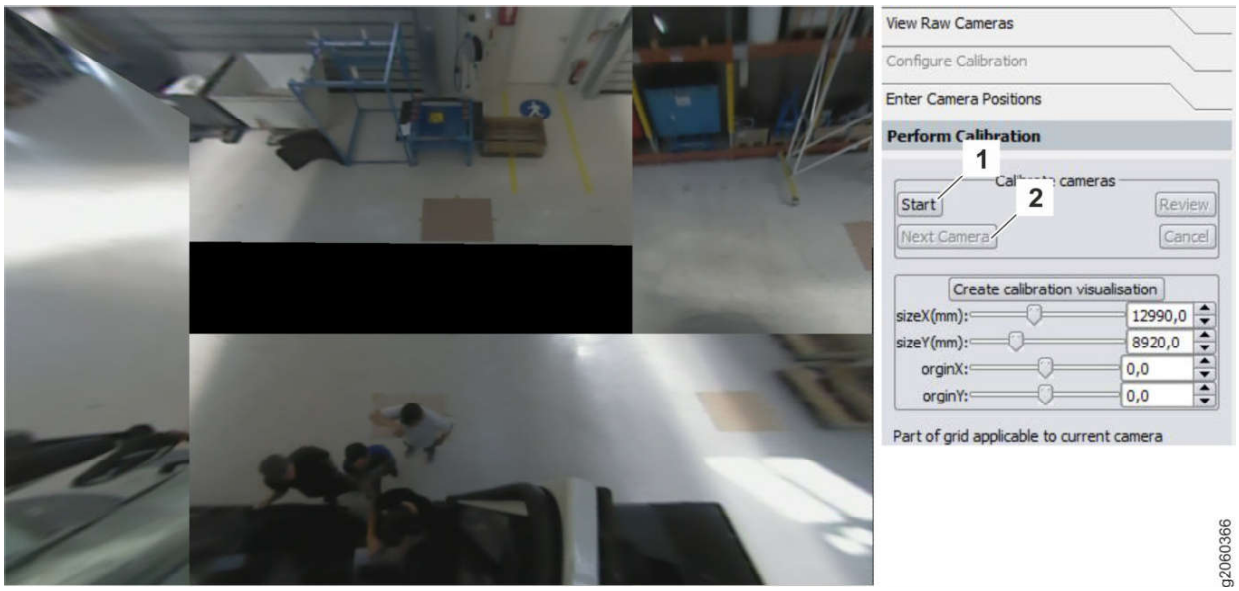

Fig. 321: Starting calibration

1 “Start” function

2 “Next Camera” function

▶ Select “Start” function **1**.

040.1 Engine

Valid for: L566-1484;

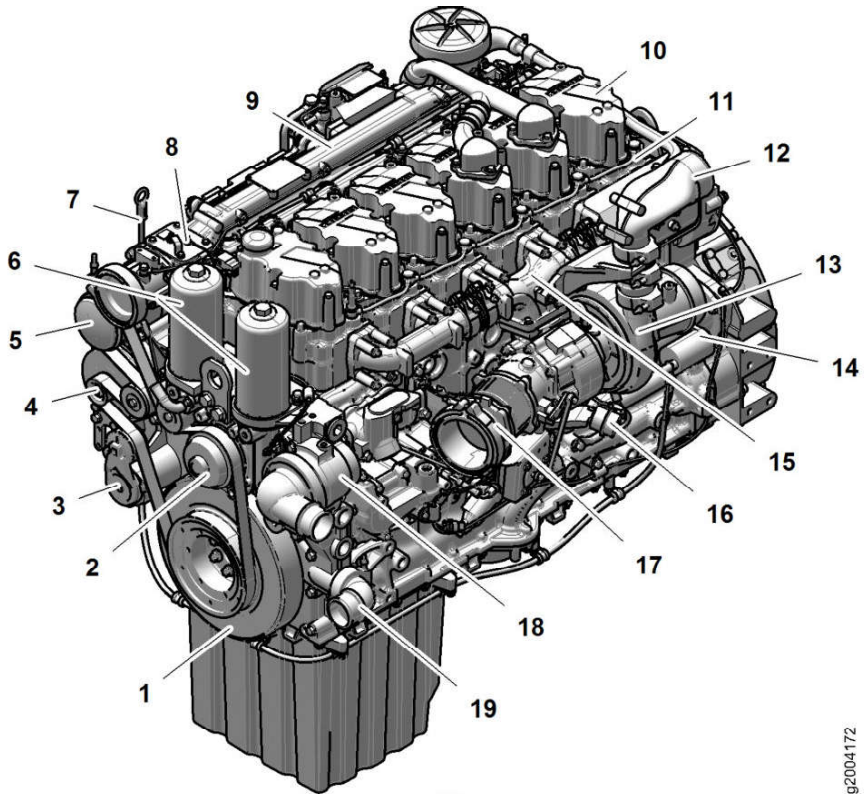

Fig. 333: Diesel engine overview

1	Torsional vibration damper	**11**	Bleeder line
2	Water pump	**12**	Charge air line
3	Tensioning device	**13**	Turbocharger
4	Alternator	**14**	Starter
5	Air conditioning compressor	**15**	Exhaust pipe
6	Oil filter	**16**	Wastegate valve
7	Dipstick	**17**	Exhaust port
8	Heating flange	**18**	Thermostat housing
9	Air intake pipe	**19**	Coolant manifold
10	Valve cover		

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Pin	Function
1	Ground
2	Output signal (0.5 to 4.5 V)
3	Power supply (5 V)

Tab. 116: Plug assignment

Oil pressure	Output voltage
0.0 bar/g	0.5 V
2.5 bar/g	1.5 V
5.0 bar/g	2.5 V
7.5 bar/g	3.5 V
10 bar/g	4.5 V

Tab. 117: Output voltage

1.2.1 Measured values for diagnostics

Supply line diagnostics			
Check	**Preconditions**	**Measurement**	**Required value**
Sensor power supply	Ignition ON Diesel engine OFF Plug connection disconnected	Measure voltage between pins 1 and 3 on line.	$5^{\pm 0.2}$ V
Short circuit between individual lines	Ignition OFF Plug connection disconnected	Measure resistance between pins 1, 2, and 3 on line.	More than 10 kΩ
Lines shorted to earth	Ignition OFF Plug connection disconnected	Measure resistance from pin 2 and pin 3 to earth.	More than 10 kΩ

Tab. 118: Supply line diagnostics

Sensor diagnostics			
Check	**Preconditions**	**Measurement**	**Required value**
Short circuit between individual pins on sensor	Ignition OFF Plug connection disconnected	Measure resistance between pins 1, 2, and 3 on sensor.	More than 10 kΩ
Output signal voltage with ignition ON	Ignition ON Diesel engine OFF	Measure voltage between pins 1 and 2.	$0.5^{\pm 0.2}$ V
Output signal voltage when idling	Ignition ON Diesel engine ON	Measure voltage between pins 1 and 2.	Voltage at lower idling speed: $2^{\pm 0.2}$ V

Tab. 119: Sensor diagnostics

2.2 Characteristic

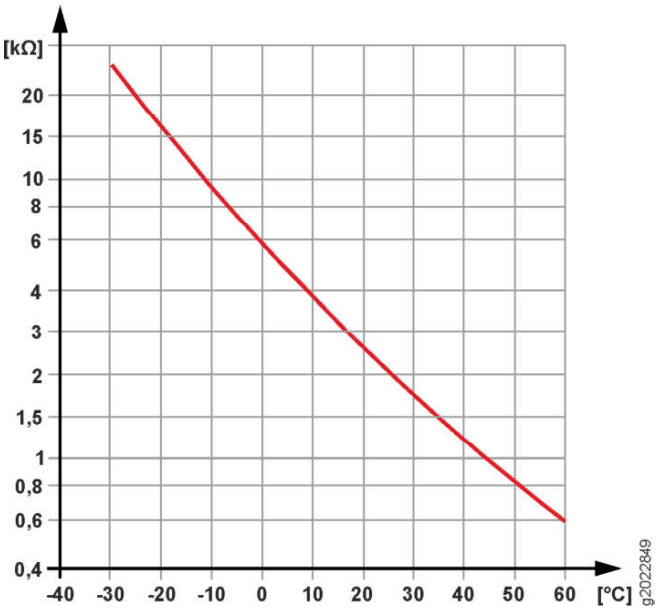

Fig. 348: Characteristic

°C Ambient temperature **kΩ** Sensor resistance

As the temperature increases, the sensor resistance decreases.

Substitute values	
Air humidity	50 %

Tab. 142

040.1.7 Exhaust system

040.1.7.1 Overview of exhaust gas treatment system

Valid for: L566-1484;

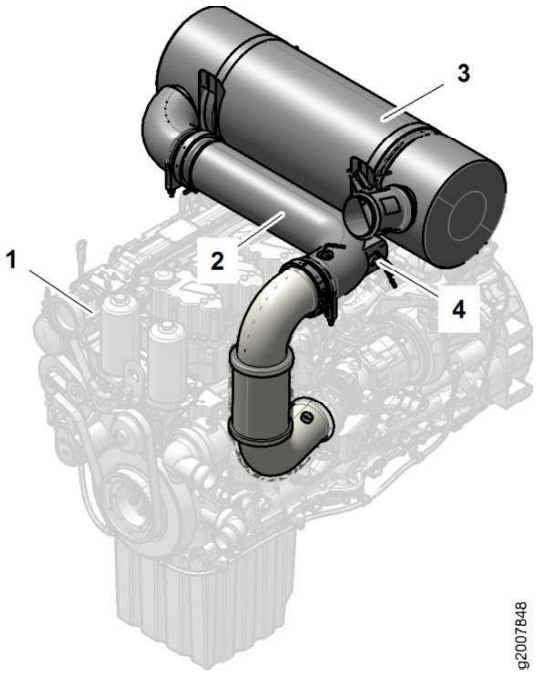

Fig. 358: Overview of exhaust gas treatment system

1 Diesel engine
2 Mixing section
3 SCR catalytic converter
4 Diesel exhaust fluid nozzle

2.1 Basic function

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

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

A diesel particulate filter is only necessary if stipulated by national or regional laws. In this case, the exhaust system comes with an SCR catalytic converter with diesel particulate filter (SCR-F).

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

To reduce NO_x emissions, an SCR system is used.

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1.2 NH_3 sensor

Fig. 370: NH_3 sensor

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

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

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

1.3 Differential pressure sensor

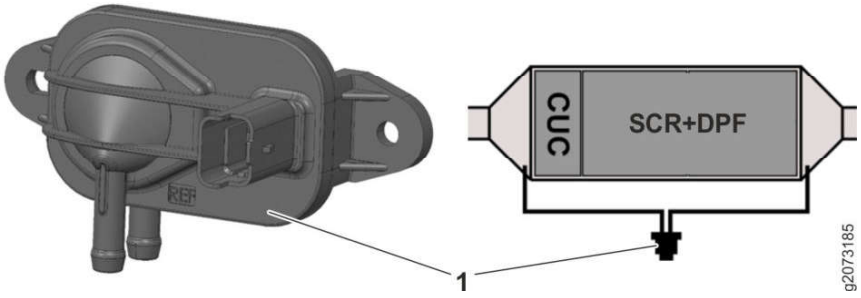

Fig. 371: Differential pressure sensor

1 Differential pressure sensor B722

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

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

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

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040.2 Clutch

Valid for: L566-1484;

The clutch is an elastic torsion absorber and vibration damper installed between the flywheel on the engine and the splitter box.

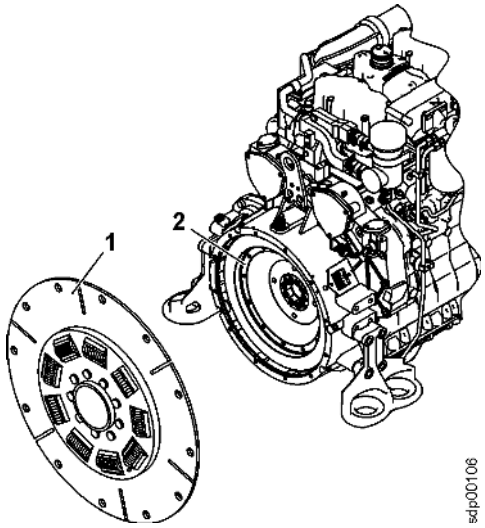

Fig. 382: Position of the clutch

1 Torsion absorber **2** Flywheel

Name	Test point
PK	Cooling system high pressure

Tab. 145: Test points

BMK	Function
Y13	Fan speed proportional solenoid

Tab. 146: Equipment codes

The cooling system hydraulics consist of the following components:
- Hydraulic tank (For more information see: 080.3.1 Overview of hydraulic tank, page 080-8)
- Collector pipe
- Fan pump (For more information see: 050.2.2 Fan pump, page 050-8)
- Fan motor with fan (For more information see: 050.2.3 Fan motor, page 050-9)

2 Function

2.1 Basic function

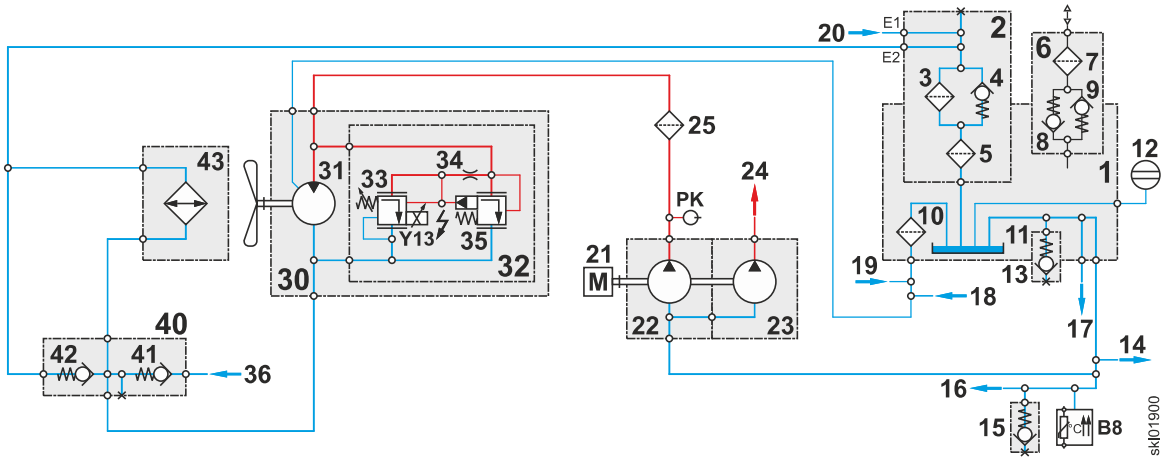

Fig. 388: Diagram of cooling system hydraulics (diesel engine is running)

1	**Hydraulic tank**	13	Hydraulic tank drain valve	25	In-line filter 80 µm
2	**Return filter**	14	Emergency steering pump suction port	30	**Fan motor**
3	Main filter element 10 µm	15	Working pump suction port drain valve	31	Gear motor
4	Bypass valve 2.5 bar	16	Working pump suction port	32	**Fan speed proportional solenoid valve**
5	Strainer mesh 100 µm	17	Steering pump suction port	33	Secondary piston
6	**Breather filter**	18	Return flow from compact brake valve and pilot control	34	Throttle
7	Fine filter	19	Leak oil from steering pump and working pump	35	Primary piston
8	Outlet valve 0.65 bar	20	Return flow from control valve block	36	Return flow from servostat
9	Inlet valve 0.03 bar	21	Diesel engine	40	**Collector pipe**

See next page for continuation of the image legend

2 Function

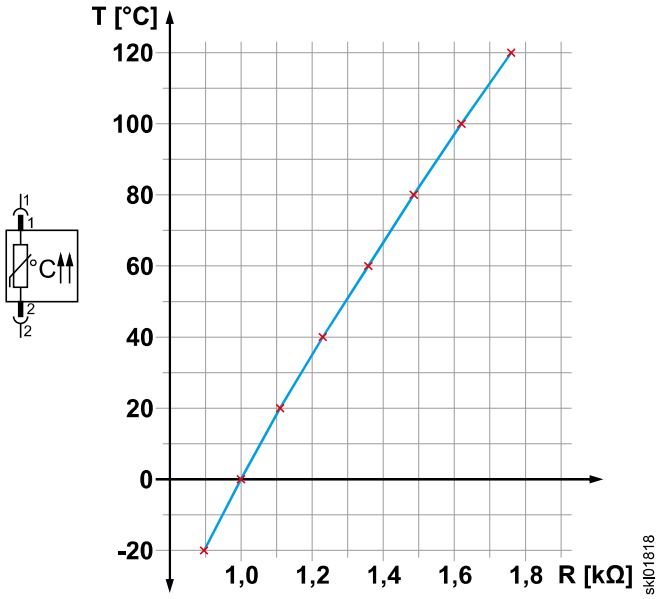

Fig. 397: Hydraulic oil temperature sensor: Wiring diagram and characteristic

T Temperature in °C **R** Resistance in kiloohms

Temperature	Resistance	Temperature	Resistance
-20 °C	895 Ω	60 °C	1355 Ω
0 °C	1000 Ω	80 °C	1485 Ω
20 °C	1110 Ω	100 °C	1620 Ω
40 °C	1230 Ω	120 °C	1760 Ω

Tab. 160: Relationship of temperature to resistance

The central control unit measures the resistance **R** of the hydraulic oil temperature sensor and calculates the hydraulic oil temperature **T** from it.

As the temperature **T** increases, so does the sensor resistance **R** (PTC characteristic). The increase is approximately linear.

Name	Test point	Name	Test point	Name	Test point
MP	Working pump return pressure	**MV**	Servo pressure	**PA** A)	Working pump high pressure

Tab. 167: Test points

A) Test point on control valve block

BMK	Function	BMK	Function	BMK	Function
Y14	Solenoid for servo pressure	**Y31a**	Proportional solenoid for tilting out	**Y32a**	Proportional solenoid for lowering
Y20	Solenoid for ride control	**Y31b**	Proportional solenoid for tilting in	**Y32b**	Proportional solenoid for lifting

Tab. 168: Equipment codes

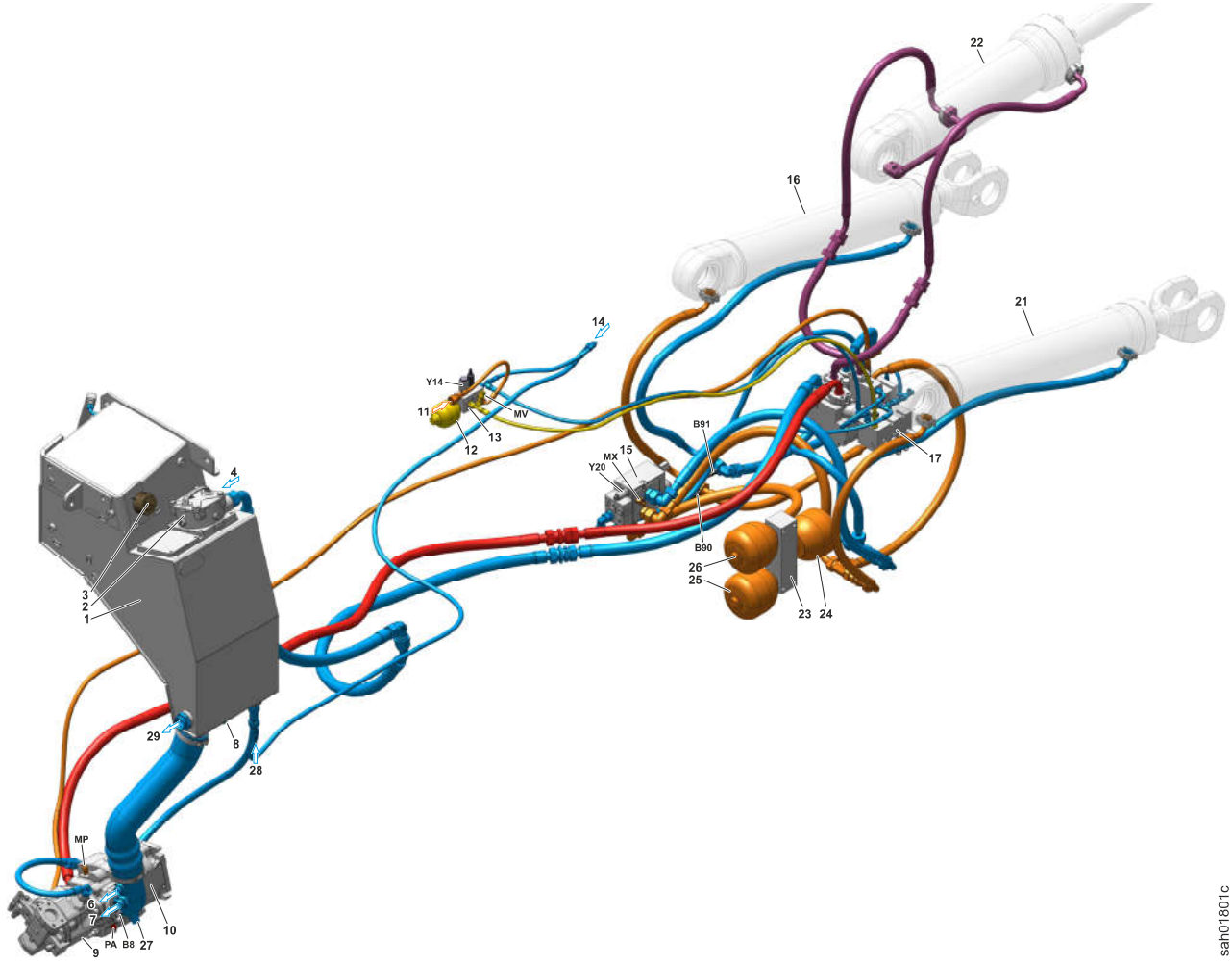

Fig. 404: Working hydraulics for Z-bar kinematics (lifting function actuated) (from rear right)

1 Hydraulic tank

2 Return filter

11 Oil supply from hydro accumulator for 1st brake circuit

12 Pilot control hydro accumulator

23 Hydro accumulator block

24 Ride control hydro accumulator

See next page for continuation of the image legend

3	Oil supply for control valve block	**8**	Adjusting screw for Q_{min}
4	Leak oil to leak oil strainer	**9**	Suction port from hydraulic tank
5	Load sensing signal from control valve block	**10**	Power regulator

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

Tab. 175: Test points

Working pump is attached together with steering pump on splitter box (tandem arrangement).

Working pump is an axial piston variable displacement pump for open circuit.

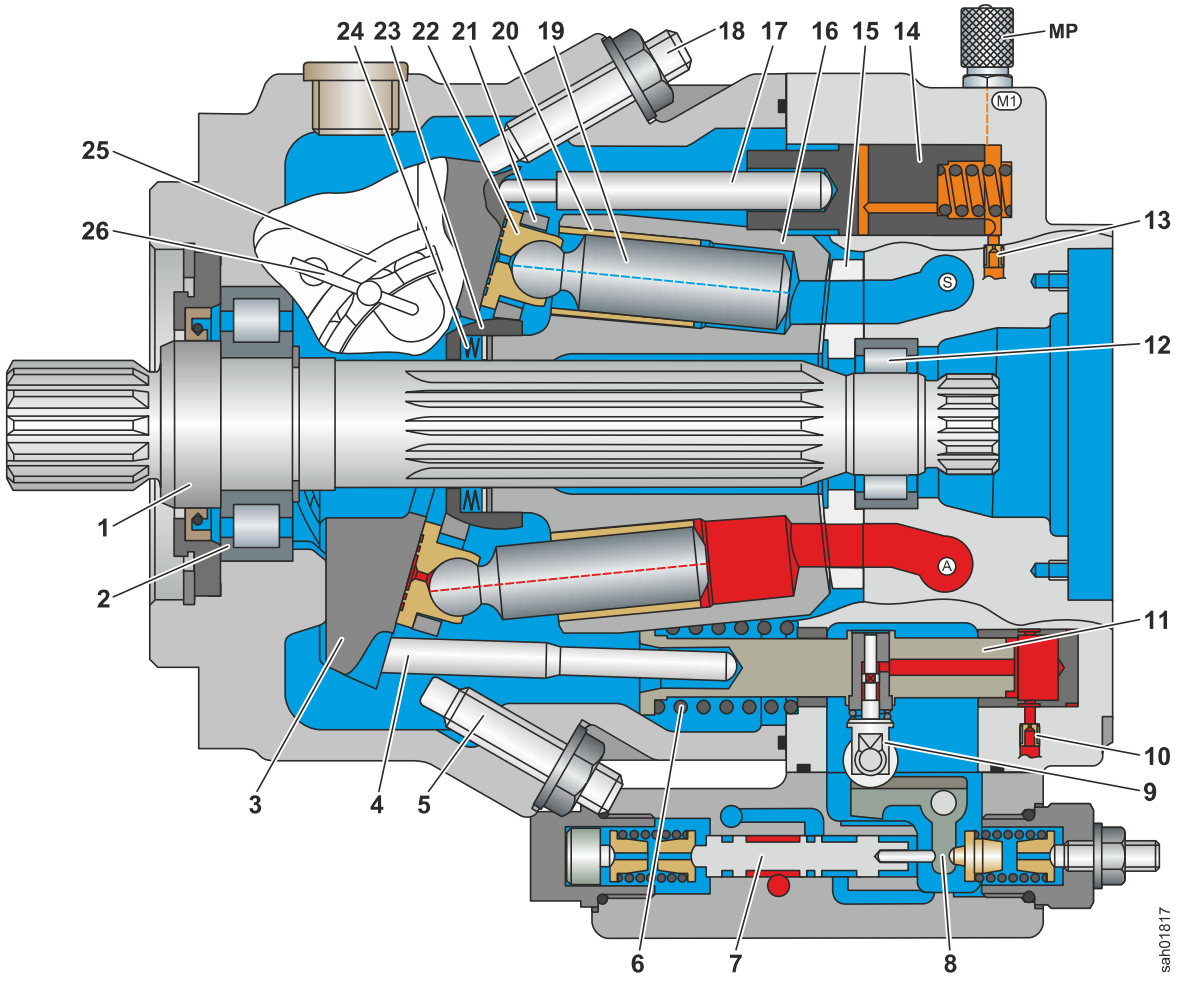

Fig. 408: Sectional view of working pump

1	Drive shaft	**10**	Throttle	**19**	Piston
2	Roller bearing	**11**	Positioning piston	**20**	Sliding bushing
3	Swivel plate	**12**	Roller bearing	**21**	Return plate
4	Adjusting pin	**13**	Throttle	**22**	Glide shoe
5	Adjusting screw for Q_{min}	**14**	Return piston	**23**	Return ball
6	Compression spring	**15**	Control plate	**24**	Cup springs

See next page for continuation of the image legend

10 Control valve block section for 4th function (option)
11 Secondary pressure relief valve for 4th function A4
12 End section
22 Return flow to pilot control valve block
23 Pressure relief valve
24 Release valve
34 Connection of 3rd function B3 (option)
35 Connection of 4th function A4 (option)
36 Connection of 4th function B4 (option)

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. 180: Test points

BMK	Function	BMK	Function	BMK	Function
Y31a	Proportional solenoid for tilting out	**Y32b**	Proportional solenoid for lifting	**Y34a**	Proportional solenoid for 4th function A4 (option)
Y31b	Proportional solenoid for tilting in	**Y33a**	Proportional solenoid for 3rd function A3 (option)	**Y34b**	Proportional solenoid for 4th function B4 (option)
Y32a	Proportional solenoid for lowering	**Y33b**	Proportional solenoid for 3rd function B3 (option)		

Tab. 181: Equipment codes

The control valve block is installed behind the maintenance cover.

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2 Function

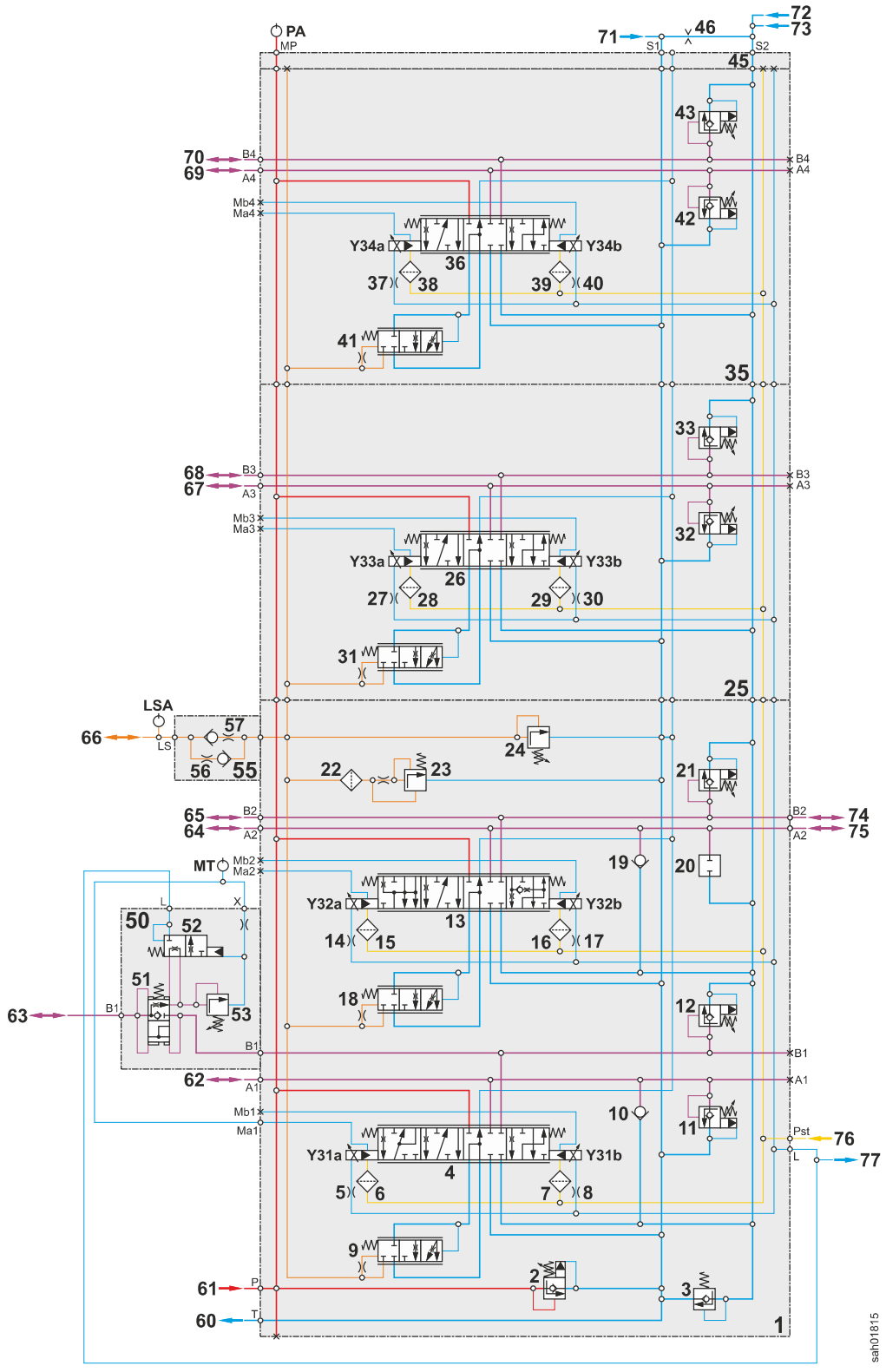

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Fig. 420: Hydraulic diagram of control valve block for industrial lift arms (diesel engine running)

For charging, oil flows from lifting cylinder piston side **11** via non-return valve in ride control valve spool **2** to ride control hydro accumulators **13**. Once maximum charge pressure (shut-off pressure) is reached, pressure in ride control hydro accumulators **13** pushes ride control valve spool **2** against force of return spring, thereby disconnecting lifting cylinder piston side **11** from hydro accumulators **13**.

If maximum charge pressure is exceeded, pressure moves ride control valve spool **2** one position further. This allows oil to flow out of ride control hydro accumulators **13** back to hydraulic tank **12**.

2.3 Ride control activated

To activate ride control, central control unit energises ride control solenoid valve **7**. That pressurises ride control valve spool **2** via release valve **6**.

Pressure pushes ride control valve spool **2** against force of return spring. Ride control valve spool **2** thus connects lifting cylinder piston side **11** to ride control hydro accumulators **13** and lifting cylinder ring side **10** to hydraulic tank **12**.

2.4 Release valve

If pressure in ride control hydro accumulators **13** is higher than on lifting cylinder piston side **11**, there is a perceptible jolt when ride control is activated. Release valve **6** prevents that jolt.

For that purpose, lifting cylinder piston side **11** pressure acts on release valve **6**. If ride control solenoid valve **7** is energised, pressure from ride control accumulators **13** is applied to other side of release valve **6**. If that pressure is higher than pressure on lifting cylinder piston side **11** and spring force, release valve **6** connects ride control hydro accumulators **13** to hydraulic tank **12**.

Only when pressure in ride control hydro accumulators **13** has dropped sufficiently does release valve **6** pass oil through to ride control valve spool **2**.

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12 Preload valve for 2nd tank duct
13 Tilt cylinder spool valve
14 Throttle 1.0 mm
15 Strainer
16 Strainer
17 Throttle 1.0 mm
18 Tilt cylinder pressure balance
19 Replenishing valve for tilting out
20 Secondary pressure relief valve for tilting out
21 Secondary pressure relief valve for tilting in
22 Lift cylinder spool valve
23 Throttle 0.8 mm
24 Strainer
25 Strainer
26 Throttle 0.8 mm
27 Lift cylinder pressure balance
28 Feeder valve for lowering
29 Feeder valve for lowering
45 **Throttle check valve**
46 Throttle 1.2 mm
47 Throttle 0.6 mm
50 **Pipe break protection valve block (tilt cylinder)**
51 Throttle check valve
52 Pipe break protection valve
53 Check valve
54 Safety valve
55 Fine strainer
56 Throttle
57 Throttle
58 Tilt cylinder
59 Ride control release solenoid valve
60 **Pipe-break protection valve block (left lift cylinder)**
61 Throttle check valve
62 Pipe break protection valve
63 Check valve
64 Safety valve
76 Throttle
77 Throttle
78 Right lift cylinder
80 **Stabilization module**
81 Ride control valve spool
82 Throttle 2.0 mm
83 Throttle 0.3 mm
84 Throttle 0.6 mm
85 Release valve
86 Ride control solenoid valve
87 Hydro accumulator relief valve
88 Safety valve
89 Hydro accumulator block
90 Ride control hydro accumulator
91 Ride control hydro accumulator
92 Ride control hydro accumulator

Name	Test point	Name	Test point	Name	Test point
LSA	Load sensing signal for working pump	**MV**	Servo pressure	**PA**	Working pump high pressure
MT	Servo pressure for tilt-out function	**MX**	Ride control hydro accumulator charge pressure	**X**	Venting connection (3x)

Tab. 205: Test points

BMK	Function	BMK	Function	BMK	Function
B90	Pressure sensor for weighing device (piston side) (from serial number 54428)	**Y20**	Solenoid for ride control	**Y32a**	Proportional solenoid for lowering
B91	Pressure sensor for weighing device (ring side) (from serial number 54428)	**Y31a**	Proportional solenoid for tilting out	**Y32b**	Proportional solenoid for lifting
Y14	Solenoid for servo pressure	**Y31b**	Proportional solenoid for tilting in	**Y200**	Solenoid for release of ride control (option)

Tab. 206: Equipment codes

If a pipe breaks, pipe break protection system prevents lift arms from falling and bucket from tipping in an uncontrolled manner. Depending on the hydraulic cylinder and lift arm type, the pipe break protection system disconnects the piston side or the ring side from the control valve block.

Name	Test point	Name	Test point	Name	Test point
MK2	Clutch 2 shift pressure (K2)	**MSy**	System pressure	**PL1**	High pressure for steering pump or emergency steering pump
MKR	Clutch shift pressure for reverse travel direction (KR)	**MT**	Servo pressure for tilt-out function		

Tab. 212: Test points

A) Test point on working pump
B) Test point on control valve block

BMK	Function	BMK	Function	BMK	Function
B3	Emergency steering pressure switch	**M8**	Electric motor for emergency steering pump	**Y14**	Solenoid for servo pressure
B3a	Emergency steering check pressure switch	**R1**	Inching function angle sensor	**Y20**	Solenoid for ride control
B8	Hydraulic oil temperature sensor	**Y1**	Proportional solenoid for clutch 2 (K2)	**Y31a**	Proportional solenoid for tilting out
B12	Brake light pressure switch	**Y2**	Proportional solenoid for forward travel direction clutch (KV)	**Y31b**	Proportional solenoid for tilting in
B19	Brake accumulator pressure sensor	**Y3**	Proportional solenoid for 1st optional connection	**Y32a**	Proportional solenoid for lowering
B80	Pressure sensor for duct AB	**Y4**	Proportional solenoid for reverse travel direction clutch (KR)	**Y32b**	Proportional solenoid for lifting
B81	Pressure sensor for duct A	**Y5**	Proportional solenoid for clutch 1 (K1)	**Y33a**	Proportional solenoid for 3rd function A3
B85	Filter bypass switch	**Y6**	Proportional solenoid for 2nd optional connection	**Y33b**	Proportional solenoid for 3rd function B3
B86	Gear oil temperature sensor	**Y7**	Proportional solenoid for position control	**Y53**	Solenoid for opening quick coupler
B90	Pressure sensor for weighing device (piston side) (from serial number 54428)	**Y10**	Parking brake solenoid	**Y53a**	Quick coupler load sensing signal solenoid
B91	Pressure sensor for weighing device (ring side) (from serial number 54428)	**Y13**	Fan speed proportional solenoid		

Tab. 213: Equipment codes

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090 Steering system

Contents

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2 Function

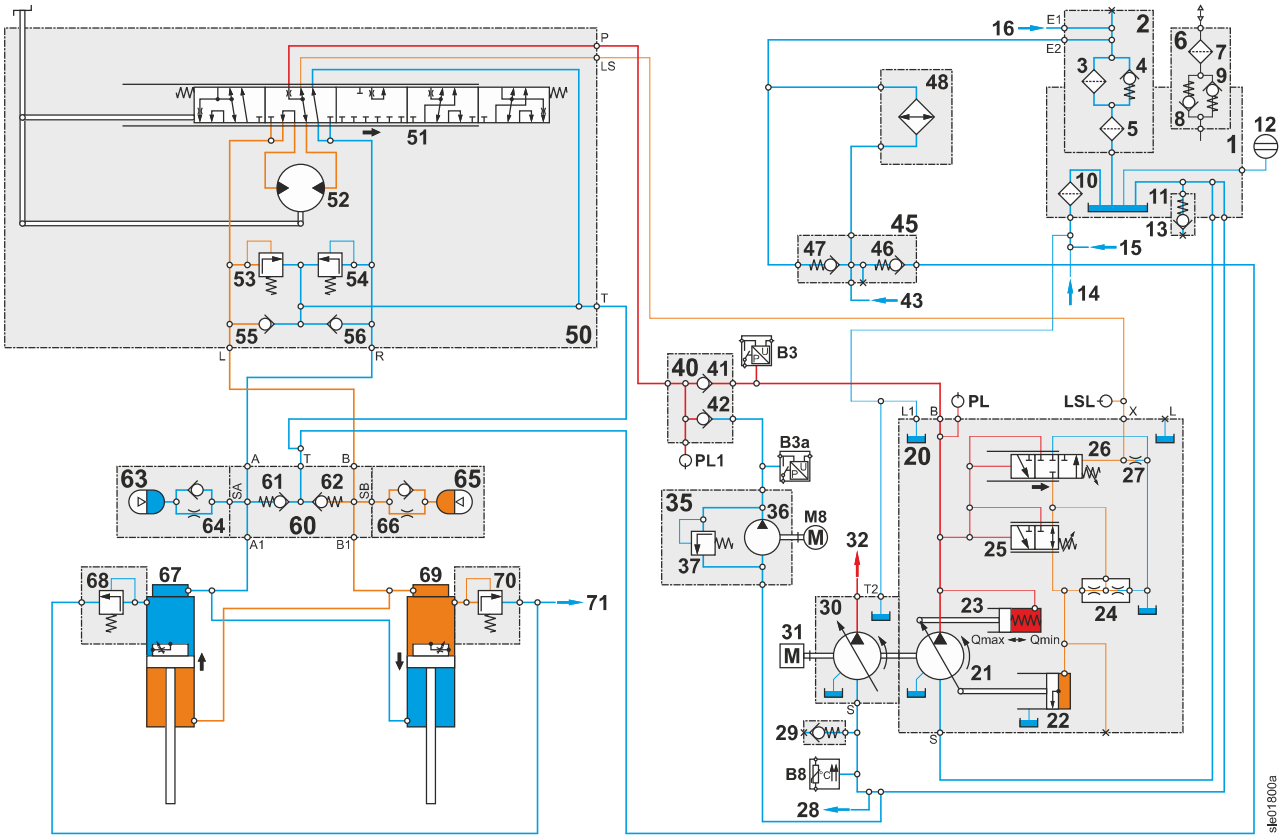

Fig. 455: Hydraulic diagram of the steering system (steering to the left)

1	**Hydraulic tank**	**24**	Throttle	**50**	**Servostat**
2	**Return filter**	**25**	LS-pressure cut-off	**51**	Valve spool
3	Main filter element 10 µm	**26**	Flow regulator	**52**	Metering pump
4	Bypass valve 2.5 bar	**27**	Throttle	**53**	Secondary pressure relief valve for steering to left
5	Strainer mesh 100 µm	**28**	Fan pump and brake pump suction port	**54**	Secondary pressure relief valve for steering to right
6	**Breather filter**	**29**	Working pump suction port drain valve	**55**	Feeder valve for steering to left
7	Fine filter	**30**	**Working pump**	**56**	Feeder valve for steering to the right
8	Outlet valve 0.65 bar	**31**	Diesel engine	**60**	**Steering stabilization valve block**
9	Inlet valve 0.03 bar	**32**	Oil supply for control valve block	**61**	Replenishing valve for steering stabilization 0.5 bar
10	Leak oil strainer 100 µm	**35**	**Emergency steering pump**	**62**	Replenishing valve for steering stabilization 0.5 bar
11	Steel tank	**36**	Gear pump	**63**	**Steering damper hydro accumulator**
12	Sight glass for hydraulic oil level	**37**	Pressure relief valve	**64**	Throttle check valve 2.0 mm
13	Hydraulic tank drain valve	**40**	**Valve block for steering system**	**65**	**Steering damper hydro accumulator**
14	Fan motor leak oil	**41**	Check valve	**66**	Throttle check valve 2.0 mm

See next page for continuation of the image legend

fast the wheel is turned. Metering pump **3** acts like a gear pump and delivers oil to steering cylinders every time steering wheel is turned.

Servostat also generates a load sensing signal **9** which regulates steering pump.

2.2 Secondary pressure relief valves

Secondary pressure relief valves protect steering system from excessive pressure caused by pressure peaks and external force.

2.3 Feeder valves

Replenishing valves protect steering cylinders from cavitation.

2.4 Flow booster

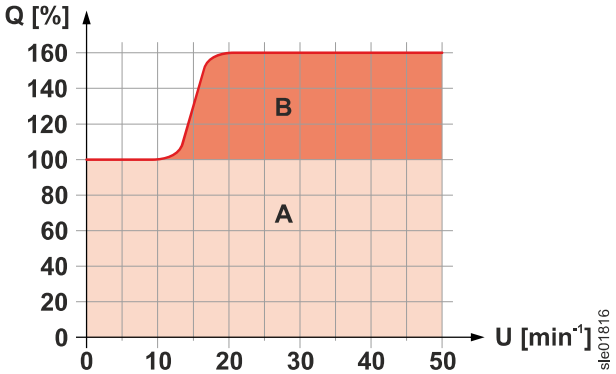

Fig. 468: Servostat: flow amplification

Q	Flow rate in %	**A**	Flow rate via metering pump
U	Turns of steering wheel per minute	**B**	Flow rate directly to steering cylinders

Valve spool consists of a inner spool and an outer spool. Both spools are held in position by centring springs.

At less than ten turns of steering wheel per minute, inner spool and outer spool turn together and deliver oil to metering pump.

At more than ten turns of steering wheel per minute, valve spools shift against each other due to greater resistance. This causes valve spools to release additional openings through which oil flows past metering pump directly to steering cylinders. This boosts flow rate by up to 60%.

2 Function

2.1 Basic function

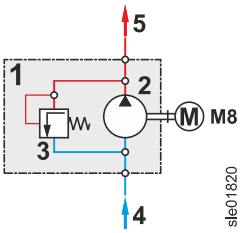

Fig. 480: Hydraulic diagram of emergency steering pump (pump active)

1 **Emergency steering pump**
2 Gear pump
3 Pressure relief valve
4 Suction port from hydraulic tank
5 Oil supply to servostat

BMK	Function
M8	Electric motor for emergency steering pump

Tab. 236: Equipment codes

Emergency steering pump **1** supplies steering system with oil for a short time if steering fails. To do so,, emergency steering pump **1** draws oil from hydraulic tank **4** and pumps it through steering system valve block to servostat **5**.

If no oil is taken while emergency steering pump **1** is in operation, oil circulates via pressure relief valve **3** inside emergency steering pump **1**.

Emergency steering pump **1** is powered by batteries.

2.2 Pump capacity and current consumption

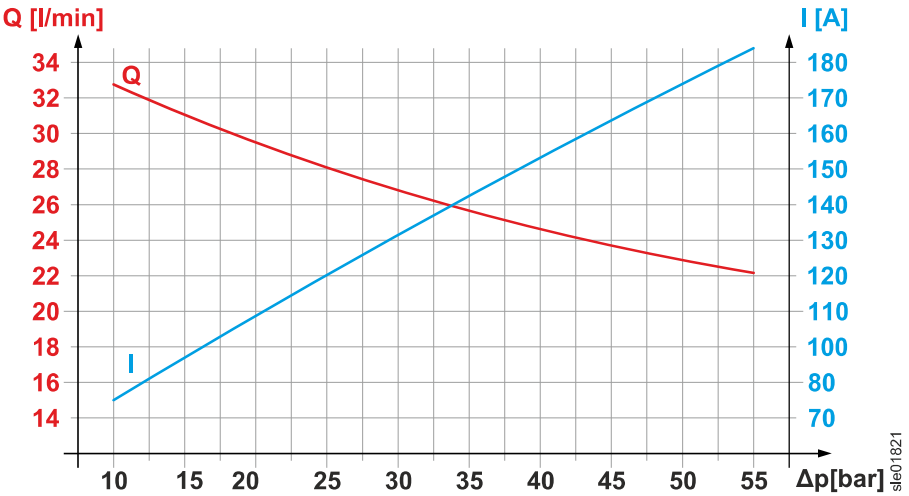

Fig. 481: Emergency steering pump capacity and current consumption

Q Flow rate in litres per minute
I Current consumption in amps
Δp Pump pressure in bar

Pump pressure **Δp** = output pressure **-** input pressure (tank pressure)

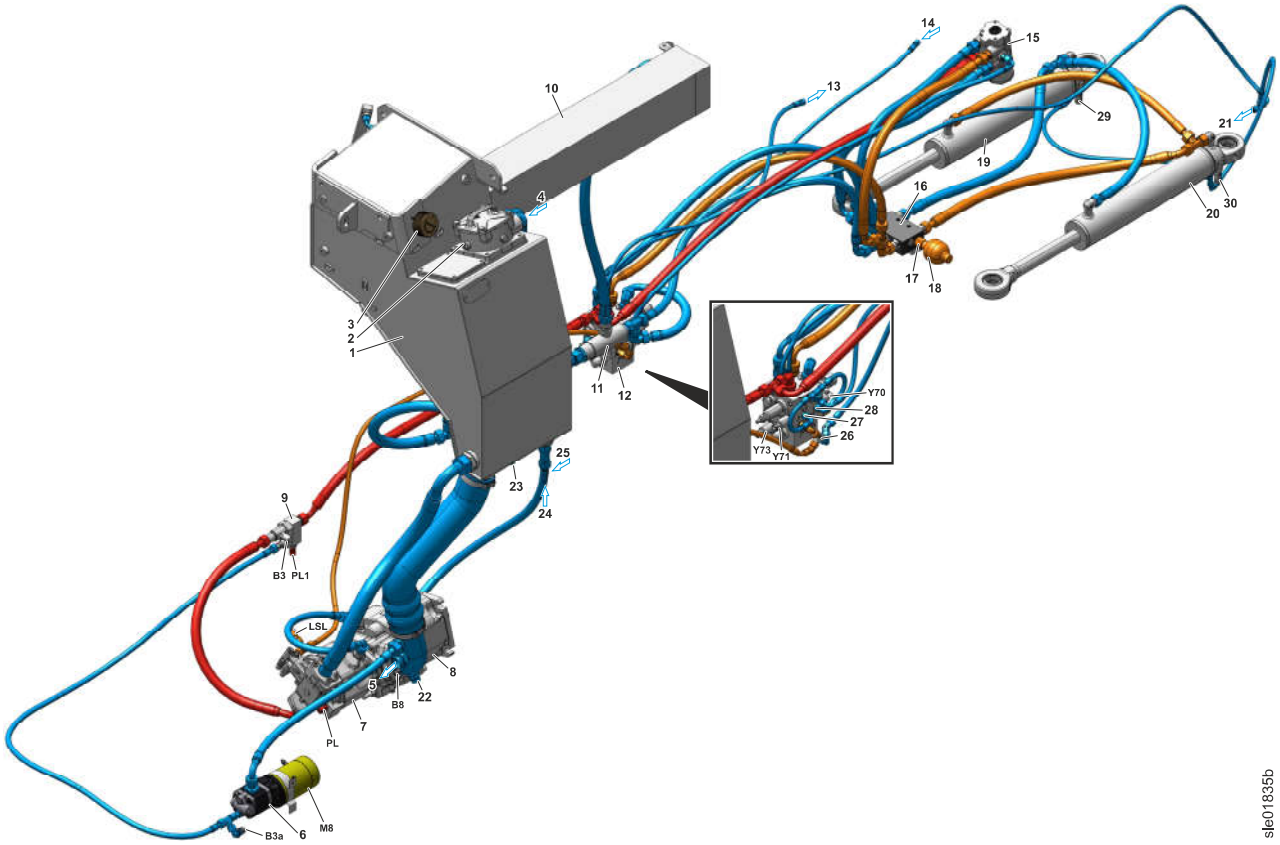

Fig. 490: Joystick steering system (steering to left) (from rear right)

1	Hydraulic tank	**11**	Collector pipe	**21**	Return flow to control valve block (housing preheating)
2	Return filter	**12**	Joystick steering control valve block	**22**	Working pump suction port drain valve
3	Breather filter	**13**	Return flow to leak oil strainer (via pilot control valve block)	**23**	Hydraulic tank drain valve
4	Return flow from control valve block	**14**	Return flow from compact brake valve (housing preheating)	**24**	Fan motor leak oil
5	Fan pump and brake pump suction port	**15**	Servostat	**25**	Return flow from compact brake valve and pilot control
6	Emergency steering pump	**16**	Steering stabilisation valve block	**26**	Shuttle valve
7	Steering pump	**17**	Throttle check valve 2.0 mm (only with joystick steering)	**27**	Orifice 0.8 mm
8	Working pump	**18**	Steering damper hydro accumulator	**28**	Orifice 0.8 mm
9	Valve block for steering system	**19**	Left steering cylinder with stroke limit damping	**29**	Pressure relief valve for stroke limit damping
10	Hydraulic oil cooler	**20**	Right steering cylinder with stroke limit damping	**30**	Pressure relief valve for stroke limit damping

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1 **Hydraulic tank**
2 **Return filter**
3 Main filter element 10 µm
4 Bypass valve 2.5 bar
5 Strainer mesh 100 µm
6 **Breather filter**
7 Fine filter
8 Outlet valve 0.65 bar
9 Inlet valve 0.03 bar
10 Leak oil strainer 100 µm
11 Steel tank
12 Sight glass for hydraulic oil level
13 Hydraulic tank drain valve
14 Fan motor leak oil
15 Return flow from compact brake valve and pilot control
16 Return flow from control valve block
20 **Steering pump**
21 Axial piston rotary group
22 Return piston
23 Positioning piston
24 Throttle
25 LS-pressure cut-off
26 Flow regulator
27 Throttle
28 Fan pump and brake pump suction port
29 Working pump suction port drain valve
30 **Working pump**
31 Diesel engine
32 Oil supply for control valve block
35 **Emergency steering pump**
36 Gear pump
37 Pressure relief valve
40 **Valve block for steering system**
41 Check valve
42 Check valve
45 **Joystick steering control valve block**
46 Shuttle valve
47 Servo oil strainer for main spool valve
48 Servo pressure reducing valve for main spool valve
49 Servo oil strainer for emergency spool valve
50 Servo pressure reducing valve for emergency spool valve
51 Check valve
52 Main spool valve
53 Cut-off valve for main spool valve
54 Solenoid valve for safety circuit
55 **Control block section for emergency steering function**
56 Emergency spool valve
57 Return flow to leak oil strainer (via pilot control valve block)
58 Shuttle valve
59 Orifice 0.8 mm
60 Orifice 0.8 mm
61 Return flow from compact brake valve (housing preheating)
62 Return line from fan motor
65 **Collector pipe**
66 Preload valve for steering cylinder replenishing function 5 bar
67 Bypass valve for hydraulic oil cooler 1.5 bar
68 Hydraulic oil cooler
70 **Servostat**
71 Valve spool
72 Metering pump
73 Secondary pressure relief valve for steering to left
74 Secondary pressure relief valve for steering to right
75 Feeder valve for steering to left
76 Feeder valve for steering to the right
80 **Steering stabilisation valve block**
81 Replenishing valve for steering stabilisation 0.5 bar
82 Replenishing valve for steering stabilisation 0.5 bar
83 **Steering damper hydro accumulator**
84 Throttle check valve 2.0 mm
85 **Steering damper hydro accumulator**
86 Throttle check valve 2.0 mm
87 Left steering cylinder with stroke limit damping
88 Pressure relief valve for stroke limit damping
89 Right steering cylinder with stroke limit damping
90 Pressure relief valve for stroke limit damping
91 Return flow to control valve block (housing preheating)

Name	Test point	Name	Test point	Name	Test point
M A2	Servo pressure for steering to the left (emergency spool valve)	**M DMV1**	Pressure to servo pressure reducing valve for main spool valve	**PL/**	Steering pump high pressure

flow from the steering pump **15** to the steering cylinders. In addition, a load-sensing signal **23** is generated that is fed back to the steering pump.

2.3 Steering in emergency steering mode

Joystick steering in emergency mode fundamentally functions in the same way as in normal mode. However, the safety circuit solenoid valve **10** is not energised. As a result, the emergency spool valve **13** is supplied with pilot control oil. At the same time, the main spool valve shut-off valve **9** disconnects the main spool valve **8** from the steering cylinders. That makes sure that emergency steering function still functions even if the main spool valve **8** jams.

The emergency spool valve is supplied with pilot control oil by its own pressure reducing valve **6**.

2.4 Improved response of the main spool valve

Control oil constantly flows through the external line on the joystick steering control valve block **1** when the main spool valve **8** is activated, and then passed through the orifice **20** or **21** to the hydraulic **16** tank. This improves the response of main spool valve **8**.

2.5 Variable *CXJSValveBlockGen2*

Variable ***CXJSValveBlockGen2*** must be set to ***0***.

090.7.5 Joystick steering control block

Valid for: L566-1484/54743-;

Version: generation 2

LBH/11835199/19/211-20191218_090358/en

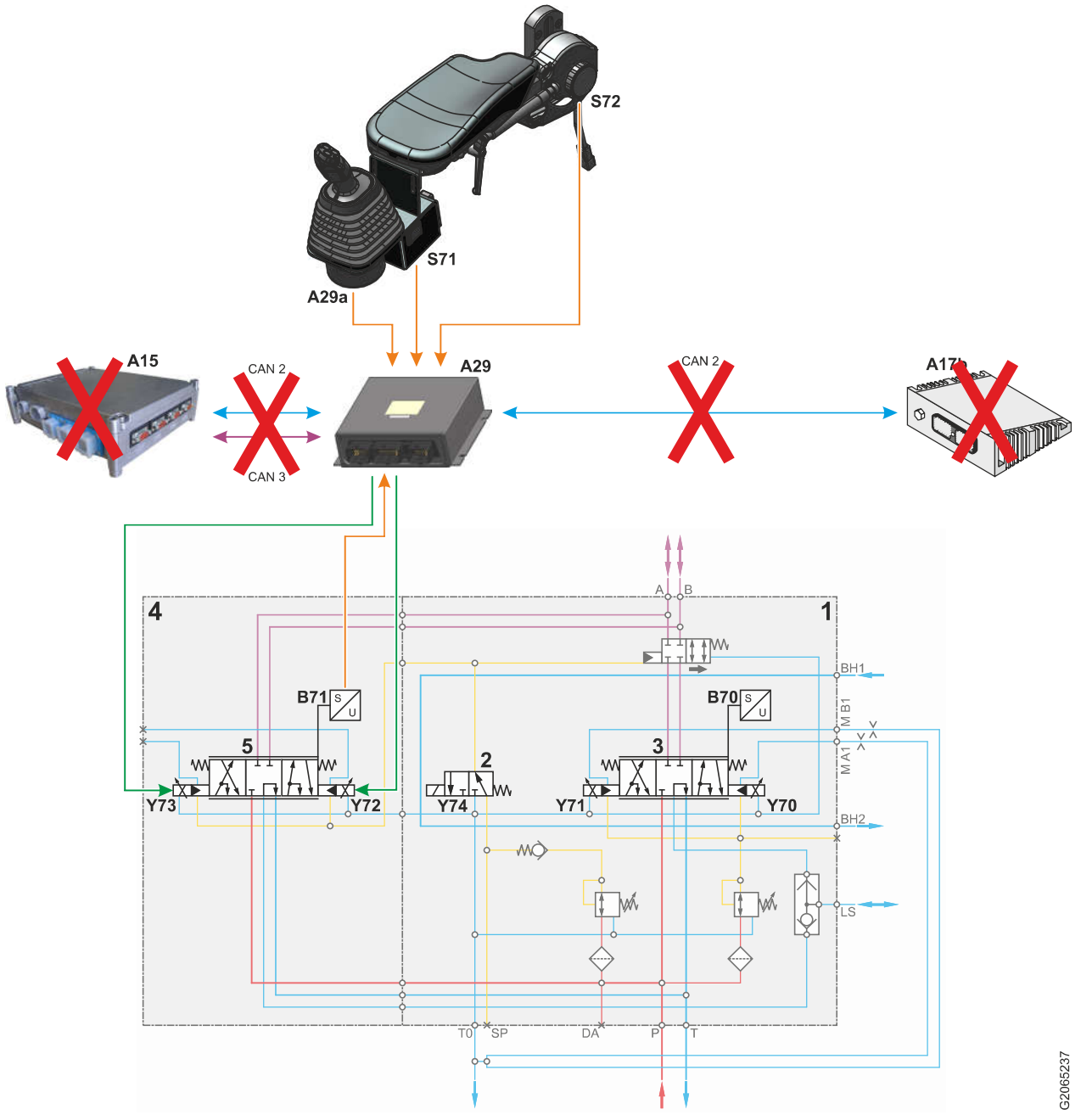

Fig. 504: Joystick steering function in emergency mode

1 **Joystick steering control block**
2 Solenoid valve for safety circuit
3 Main spool valve
4 **Control block section for emergency steering function**
5 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)

1.1 Layout

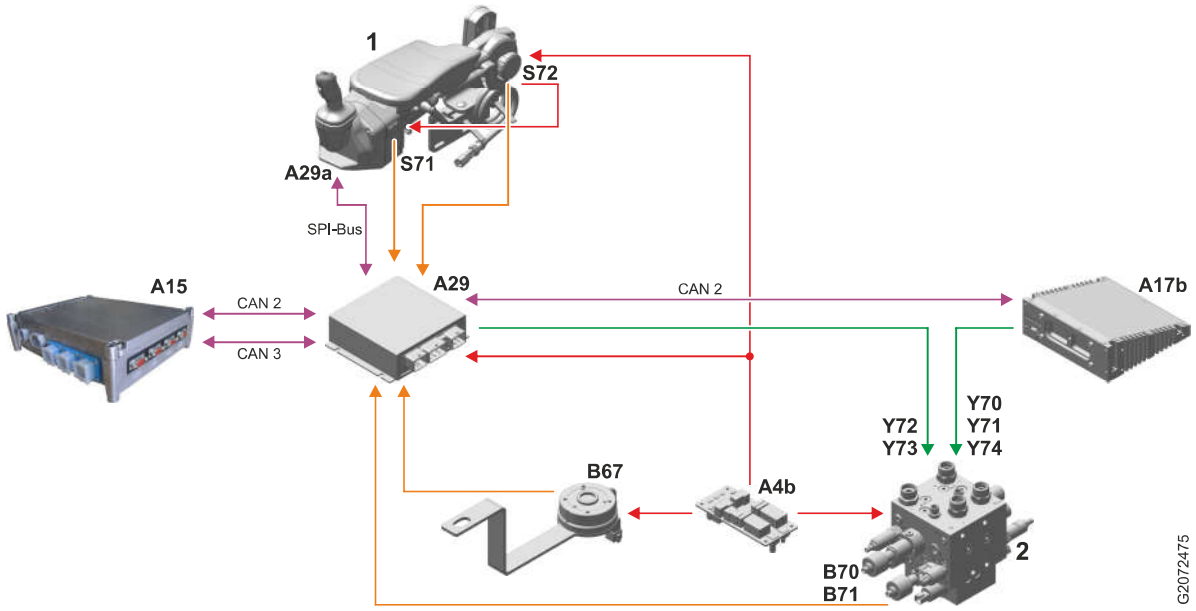

Fig. 510: Electronic control unit for joystick steering

1 Left armrest

1 Joystick steering control valve block

BMK	Function	BMK	Function	BMK	Function
A4b	Joystick steering relay board	**B67**	Articulation angle sensor	**Y70**	Proportional solenoid for steering to left (main spool valve)
A15	Central control unit (Master4)	**B70**	Main spool valve position sensor	**Y71**	Proportional solenoid for steering to left (spool valve for emergency steering function)
A17b	Output module A17b	**B71**	Emergency spool valve position sensor	**Y72**	Proportional solenoid for steering to left (emergency spool valve)
A29	Joystick module	**S71**	Joystick steering switch	**Y73**	Proportional solenoid for steering to right (emergency spool valve)
A29a	Joystick electronics	**S72**	Joystick steering switch (armrest)	**Y74**	Solenoid valve for safety circuit

Tab. 274: Equipment codes

Joystick module **A29** and electronics of joystick **A29a** communicate via an SPI bus.

Joystick module **A29** also receives signals from following components:
- 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**.

2 Function

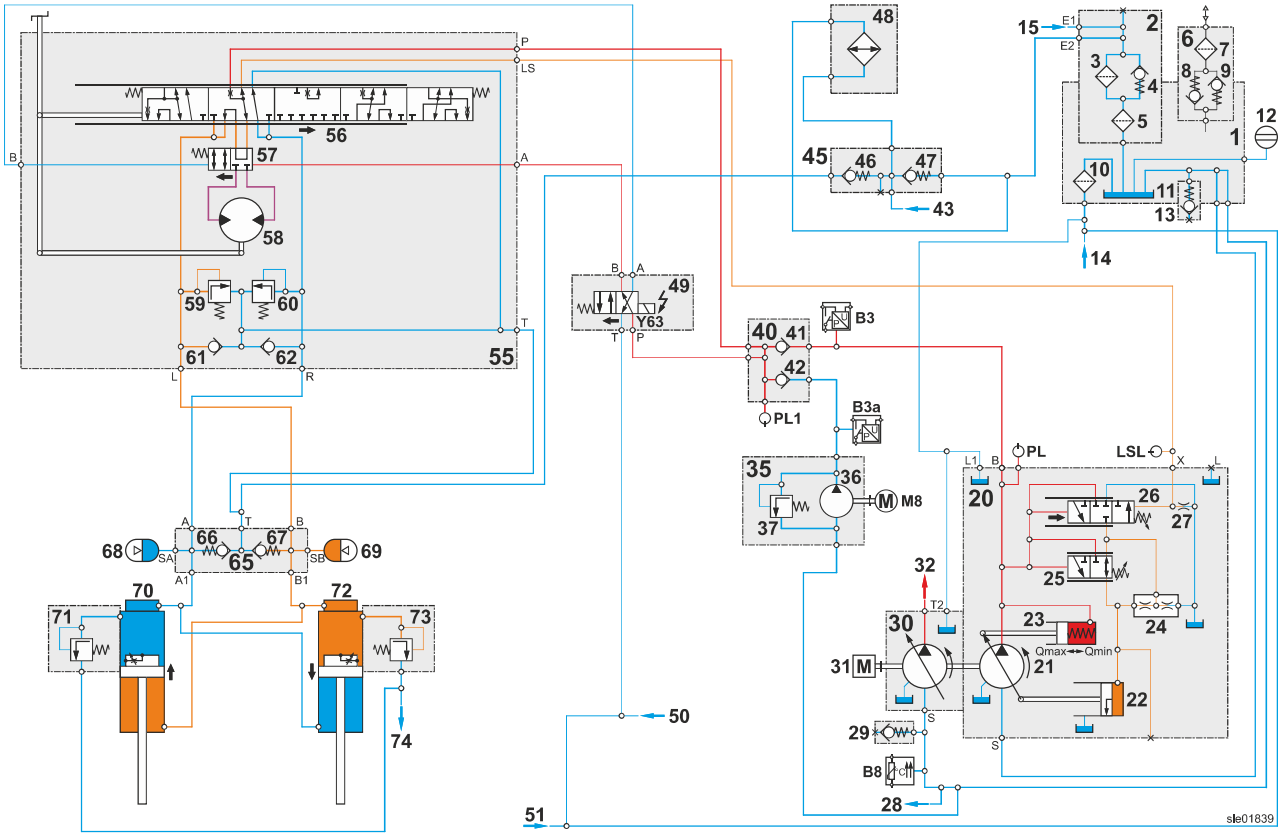

Fig. 516: 2in1 steering: hydraulic diagram (steering left)

1	**Hydraulic tank**	**25**	LS-pressure cut-off	**51**	Compact brake valve return flow
2	**Return filter**	**26**	Flow regulator	**55**	**Servostat for 2in1 steering**
3	Main filter element 10 µm	**27**	Throttle	**56**	Valve spool
4	Bypass valve 2.5 bar	**28**	Fan pump and brake pump suction port	**57**	Cut-off valve for 2in steering
5	Strainer mesh 100 µm	**29**	Working pump suction port drain valve	**58**	Metering pump
6	**Breather filter**	**30**	**Working pump**	**59**	Secondary pressure relief valve for steering to left
7	Fine filter	**31**	Diesel engine	**60**	Secondary pressure relief valve for steering to right
8	Outlet valve 0.65 bar	**32**	Oil supply for control valve block	**61**	Replenishing valve for steering to left
9	Inlet valve 0.03 bar	**35**	**Emergency steering pump**	**62**	Replenishing valve for steering to the right
10	Leak oil strainer 100 µm	**36**	Gear pump	**65**	**Steering stabilisation valve block**
11	Steel tank	**37**	Pressure relief valve	**66**	Replenishing valve for steering stabilisation 0.5 bar
12	Sight glass for hydraulic oil level	**40**	**Valve block for steering system**	**67**	Replenishing valve for steering stabilisation 0.5 bar
13	Hydraulic tank drain valve	**41**	Check valve	**68**	Steering damper hydro accumulator

See next page for continuation of the image legend

2 Function

2.1 Basic function

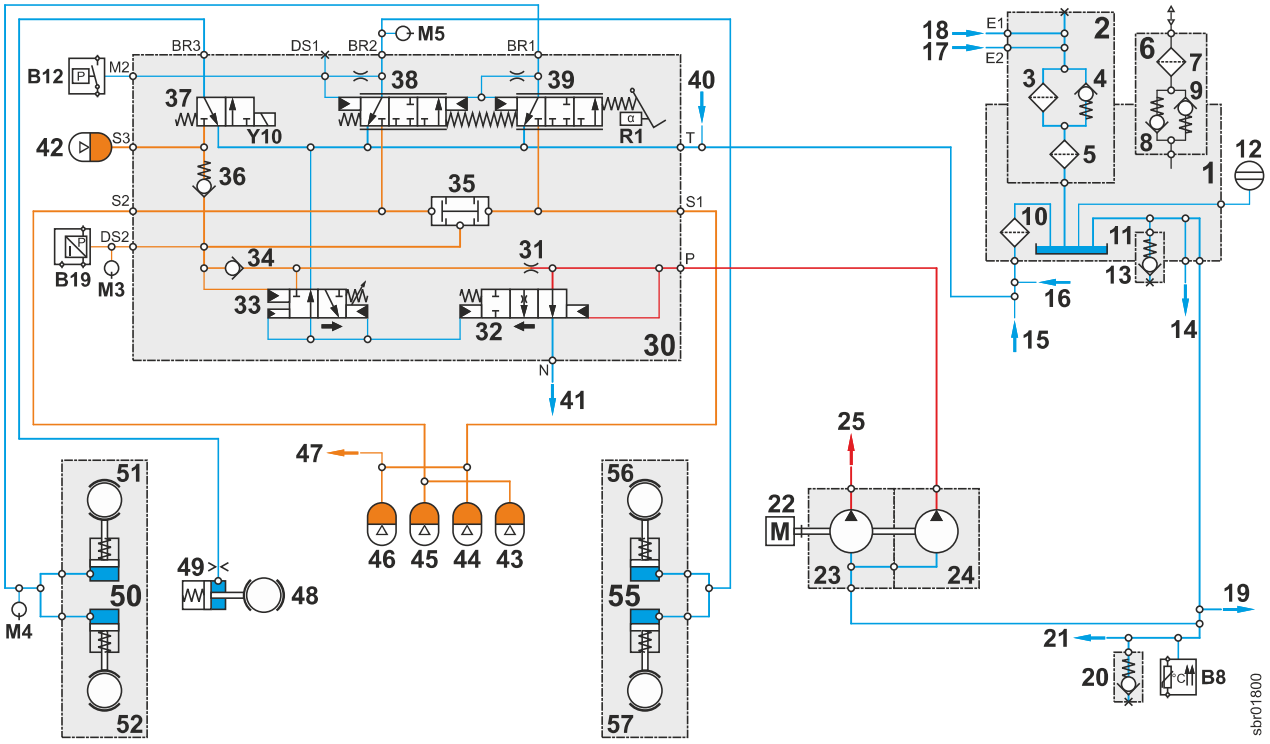

Fig. 521: Hydraulic diagram of brake system (parking brake activated)

1	**Hydraulic tank**	18	Return flow from control valve block	39	Pressure regulator piston for 1st brake circuit
2	**Return filter**	19	Emergency steering pump suction port	40	Return flow from pilot control
3	Main filter element 10 µm	20	Working pump suction port drain valve	41	Return flow to control valve block (housing preheating)
4	Bypass valve 2.5 bar	21	Working pump suction port	42	Parking brake hydro accumulator
5	Strainer mesh 100 µm	22	Diesel engine	43	Hydro accumulator for service brake (2nd brake circuit)
6	**Breather filter**	23	Fan pump	44	Hydro accumulator for service brake (1st brake circuit)
7	Fine filter	25	Brake pump	45	Hydro accumulator for service brake (2nd brake circuit)
8	Outlet valve 0.65 bar	25	Fan motor oil supply	46	Hydro accumulator for service brake (1st brake circuit)
9	Inlet valve 0.03 bar	30	**Compact brake valve**	47	Oil supply for pilot control
10	Leak oil strainer 100 µm	31	Inlet restrictor	48	Parking brake (disc brake)
11	Steel tank	32	Accumulator charge valve	49	Orifice
12	Sight glass for hydraulic oil level	33	Pilot valve	50	**Front axle**
13	Hydraulic tank drain valve	34	Inlet check valve	51	Service brake, 1st brake circuit (wet disc brake)
14	Steering pump suction port	35	Inverted shuttle valve	52	Service brake, 1st brake circuit (wet disc brake)
15	Fan motor leak oil	36	Check valve for parking brake	55	**Rear axle**

See next page for continuation of the image legend

At same time, oil flows through connecting ducts **8** and **12** to readjusting springs. When oil pressure in brake circuits is high enough, oil pressure and return springs push pressure regulating pistons back against pressure regulating spring **14**. Connection to hydro accumulators is interrupted again. This maintains a steady braking pressure in brake circuits as long as pedal position remains unchanged.

If inching brake pedal **1** is pushed down further, oil pressure also increases in brake circuits and higher oil pressure is required to push pressure regulator pistons back against pressure regulator spring **14**.

2.6 Parking brake

When parking brake solenoid valve Y10 is energised, oil flows from parking brake hydro accumulator to disc brake. Parking brake disengages.

2.7 Brake light pressure switch

Pressure switch for brake light B12 in 2nd brake circuit switches on brake light at a brake pressure of $5^{\pm 0.5}$ bar.

2.7.1 Brake accumulator pressure sensor

Brake accumulator pressure sensor B19 measures pressure in hydro accumulator of service brake and sends this to central control unit. If pressure falls below a set value, *brake accumulator pressure too low* symbol appears in display.

In service brake, brake pressure constantly increases up to cut-out pressure and then slowly and steadily falls back to cut-in pressure. If value that central control unit receives from brake accumulator pressure sensor is not plausible or not constant for a certain time, central control unit detects a faulty sensor and generates a service code.

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110.2 Overview of electrical system

Valid for: L566-1484/54428-;

Operating voltage of machine is 24 V. Batteries (2 x 12 V) are connected in series.

Two batteries are installed in left ballast weight.

Following illustrations and tables contain components of electrical system (except for diesel engine).

1 Layout

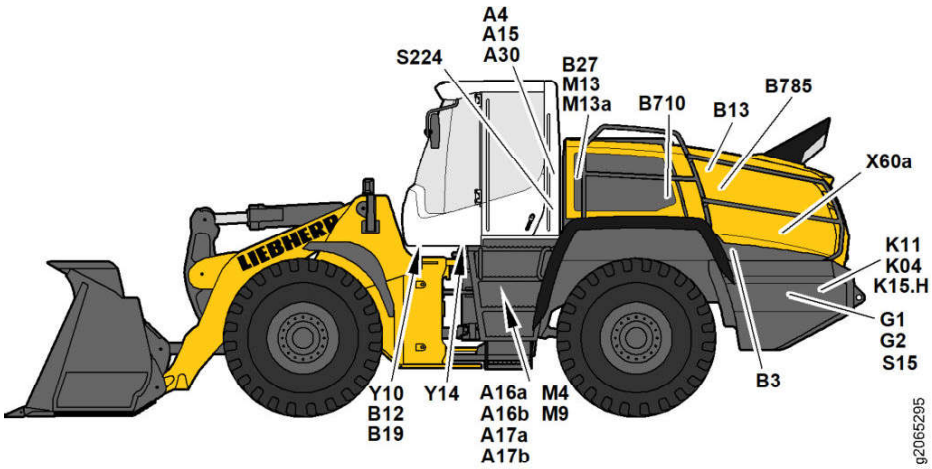


Fig. 537: Machine view from left

Position	Function	Position	Function
A4	Fuse and relay board	G1	Battery
A15	Central control unit	G2	Battery
A30	LiDAT module	K04	Heater flange relay
A16a	Input module A16a	K11	Emergency steering pump relay
A16b	Input module A16b	K15.H	Relay for electric battery main switch
A17a	Output module A17a	M4	Windscreen washer pump
A17b	Output module A17b	M9	Rear screen washer pump
B3	Emergency steering pressure switch	M13	Condenser fan (top)
B12	Brake light pressure switch	M13a	Condenser fan (bottom)
B19	Brake accumulator charge pressure sensor	S15	Battery main switch
B27	Air conditioning pressure switch	S224	*Engine bonnet* button
B710	Water sensor for Separ filter	X60a	Diesel engine diagnostic plug

LBH/11835199/19/211-20191218_090358/en

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

BMK	SYSTEM	LOCATION	FUNCTION	PAGE
-K501	=K	+K2	REFUELLING PUMP	/87.C6
-K700	=A4a	+B	SUPPLY E - ACTUATOR	/55.A2
-KL 15 BLAX	=K	+K	KL. 15 REAR AREA MONITORING	/125.B4
-KL.15	=A4b	+K2	KL. 15a JOYSTICK STEERING	/93.B6
-KL. 15 S	=K	+K	CONNECTOR SEAT BELT	/109.D1
-KL. 15 ZMO2/1	=K	+K	ADDITIONAL MODULE OUTPUT 2	/122.A1
-KL. 15 ZMO2/2	=K	+K	ADDITIONAL MODULE OUTPUT 2	/122.A2
-KL. 15 ZMO2/4	=K	+K	ADDITIONAL MODULE OUTPUT 2	/122.A4
-Kl.15.BEL	=K	+K2	Vcc LIGHTING CONTROL	/117.A5
-Kl.15.SKY	=K	+K	SKY VIEW	/124.A1
-Kl. 15.W	=K	+K	PREPARATION WEIGHING DEVICE	/115.A6
-Kl.15.X	=K	+K2	CONNECTION Kl.15 A4	/24.C2
-Kl. 15.X1c	=K	+K	KL. 15 QUICK-CHANGE DEVICE	/101.A3
-Kl.15.Xha	=K	+K2	LH WEIGHING DEVICE	/111.B7
-KL. 15_A14			DISPLAY 2; GRAB CAMERA	/151.A2
-KL.30	=A4b	+K2	KL. 15b JOYSTICK STEERING	/93.B2
-KL.30 BLAX	=K	+K	KL. 30 REAR AREA MONITORING	/125.B3
-Kl.30.W	=K	+K	PREPARATION WEIGHING DEVICE	/115.A5
-Kl.30.X	=K	+K2	CONNECTION Kl.30 A4	/24.D2
-Kl.30.Xa.	=K	+K2	DIESEL PREHEATING	/62.A6
-Kl.30.Xc	=K	+K	ELECTRICAL SOCKET 24V	/87.A7
-Kl.30.Xg	=K	+K2	RADIO	/108.A3
-KL.RG	=K	+K2	REVERSING OBSTACLE DETECTOR	/84.D4
-KL.Xhb	=K	+K2	LH WEIGHING DEVICE	/111.B7
-LAN2.X	=K	+K	CONNECTOR LAN 2	/38.E4
-LAN3.X	=K	+K	PLUG MASTER	/40.D2
-LÖ.R218.1	=K	+K2:RH	LIGHTING CONTROL	/117.C6
-LÖ.R218.2	=K	+K2:RH	LIGHTING CONTROL	/117.C6
-Lötpunkt.R123	=K	+K	CLAMP R123	/112.C5
-M1	=M	+M	ENGINE START	/24.E6
-M2	=K	+K1	WINDSCREEN WIPER FRONT	/34.D7
-M2.X1	=K	+K1	PLUG WINDSCREEN WIPER FRONT	/34.D7
-M3	=K	+K2	WINDSCREEN WIPER REAR	/35.D6
-M3.X	=K	+K2	PLUG WINDSCREEN WIPER REAR	/35.D5
-M4	=K	+K1	WASHING PUMP FRONT	/34.D8
-M4.X	=K	+K4	PLUG WASHING PUMP FRONT	/34.E8

BMK	SYSTEM	LOCATION	FUNCTION	PAGE
-M5	=K	+K	FAN MOTOR	/61.F6
-M6	=H	+H5	LIEBHERR CENTRAL LUBRICATION SYSTEM	/65.C3
-M6.X	=H	+H5	PLUG LIEBHERR CENTRAL LUBRICATION SYSTEM	/65.D3
-M7	=K	+K2	COMPRESSOR SEAT	/28.D4
-M7.X	=K	+K2	PLUG M7	/28.D4
-M7a.X	=K	+K	CONNECTOR	/110.D4
-M7b.X	=K	+K	CONNECTOR	/110.D6
-M8	=H	+H4	EMERGENCY STEERING PUMP	/26.E1
-M9	=K	+K4	WASHING PUMP REAR AND CAB ROOF	/35.D4
-M9.X	=K	+K4	PLUG WASHING PUMP REAR	/35.D4
-M13	=H	+H	CONDENSER FAN	/60.E3
-M13.X	=H	+H	CONNECTOR M13	/60.D3
-M13a	=H	+H	CONDENSER FAN	/60.E7
-M13a.X	=H	+H	CONDENSER FAN M13a	/60.D7
-M14	=K	+K	SERVOMOTOR FLAP CIRCULATING AIR / FRESH AIR	/61.F6
-M15	=K	+K	SERVOMOTOR FLAP FOOT ZONE	/61.F7
-M16	=K	+K	SERVOMOTOR FLAP MID-LEVEL ZONE	/61.F7
-M17	=K	+K	SERVOMOTOR FLAP HEAD ZONE	/61.F7
-M18	=K	+K	SERVOMOTOR FLAP TEMPERATURE	/61.F7
-M500	=H	+H	REFUELLING PUMP	/87.E5
-M500.X	=H	+H	PLUG REFUELLING PUMP	/87.D5
-MP300	=K	+K2	MASS GROUPING BLOCK	/127.E4
-OLE24	=K	+K2	CONNECTION RELAY BOARD	/108.C4
-OLE 300	=K	+K	CONNECTION Vcc SEAT CONTACT	/127.B3
-OLE 301	=K	+K	CONNECTION SEAT CONTACT	/127.B4
-OLE 302	=K	+K	CONNECTION PARKING BRAKE	/127.B4
-P1	=K	+K4	WORKING HOUR METER	/28.D8
-P1.X1	=K	+K4	PLUG WORKING HOUR METER	/28.D8
-P1.X1.B	=K	+K4	PLUG	/105.E3
-P1.X1.S	=K	+K4	PLUG	/105.E3
-P1.X2	=K	+K4	PLUG WORKING HOUR METER	/28.E8
-R1	=K	+K6	INCH PEDAL	/58.C3
-R1.X	=K	+K6	PLUG R1	/58.C3
-R5	=K	+K6	ANGLE SENSOR SPEED-PEDAL	/58.C7
-R5.X	=K	+K6	CONNECTOR R5	/58.C6
-R9A	=K	+K2	EXCITATIONNOT USED	/28.B6

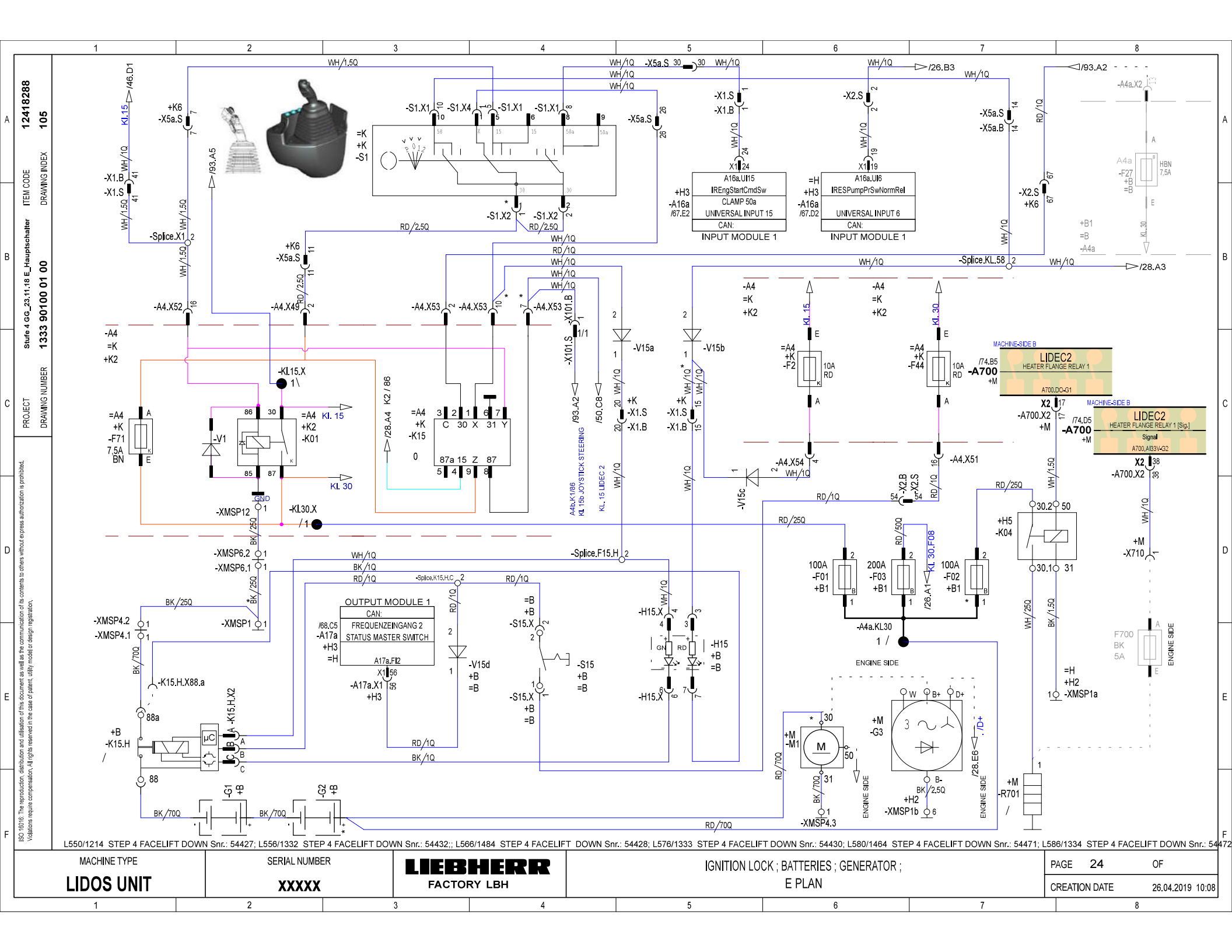
PROJECT Stufe 4 GG_23.11.18 E_Hauptschalter
ITEM CODE 12418288
DRAWING INDEX 105
DRAWING NUMBER 1333 90100 01 00

MACHINE TYPE
LIDOS UNIT

SERIAL NUMBER
XXXXX

LIEBHERR
FACTORY LBH

BMK-INDEX
E PLAN



MACHINE TYPE	SERIAL NUMBER			PAGE 24 OF
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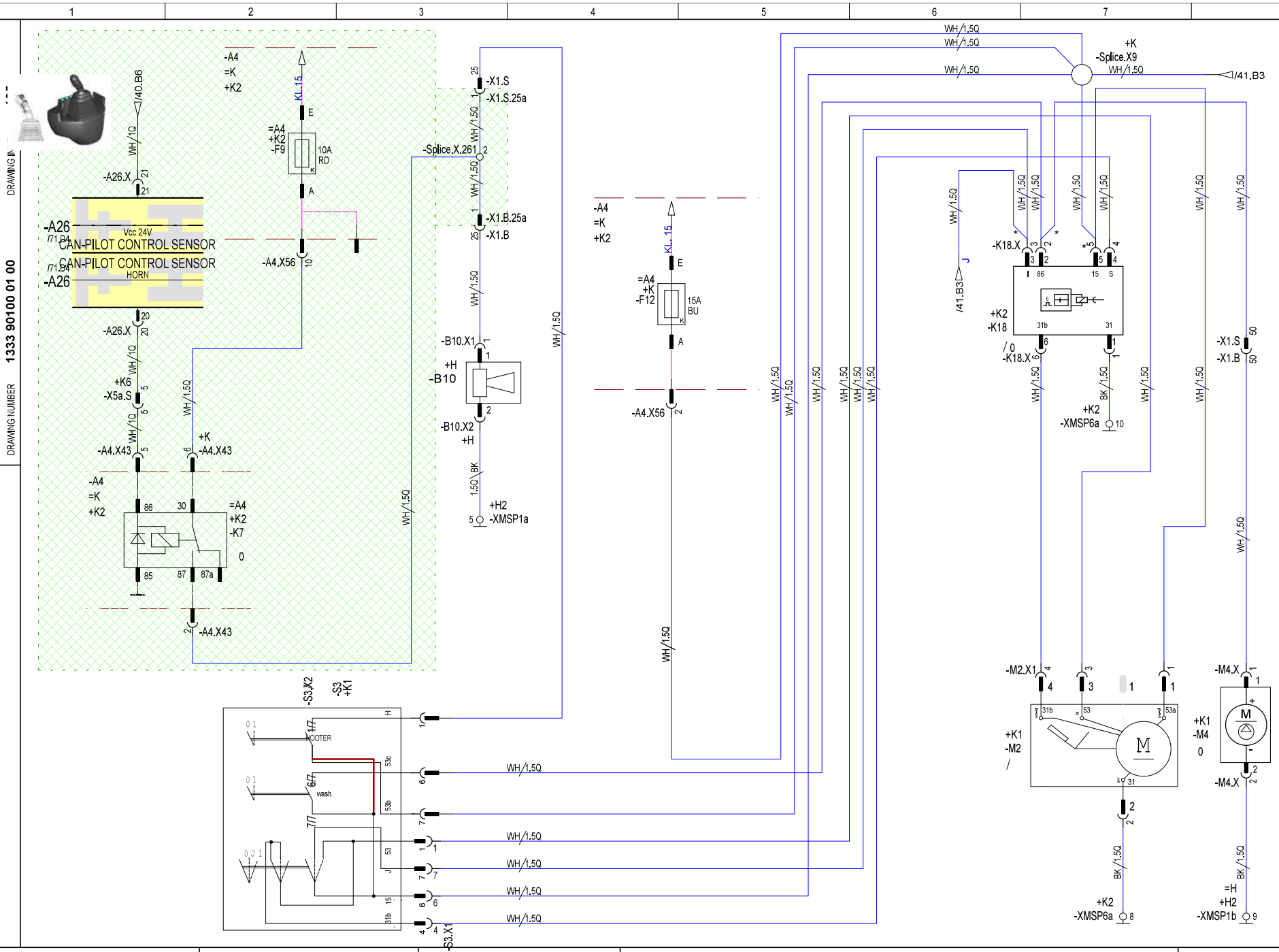


ITEM CODE	12418288
DRAWING IN	
PROJECT	Stufe 4 GG_23.11.18 E_Hauptschalter
DRAWING NUMBER	1333 90100 01 00

MACHINE TYPE	SERIAL NUMBER		WINDSCREEN WASHER FRONT ; HOOTER; HORN OPERATION	PAGE 34 OF
LIDOS UNIT	XXXXX	LIEBHERR FACTORY LBH	E PLAN	CREATION DATE 26.04.2019 10:08

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

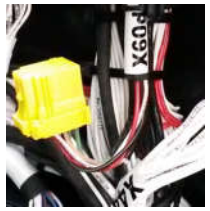
-A4 =K +K2 — KL. 15 — E — =A4 +K -F37 10A RD — K — A

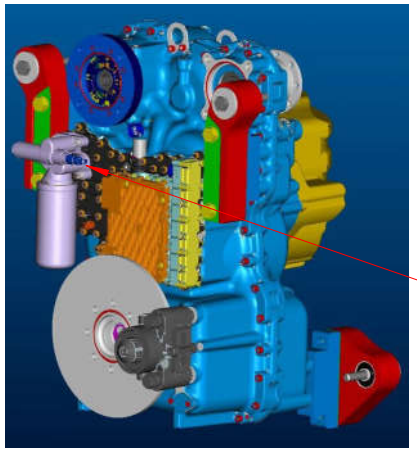
OUTPUT MODULE 1
CAN:
/68.B1 -A17a +H3 PWM-OUTLET 1 (Bank1) PARKING BRAKE QRPBValve A17a.PWM1
X1 4

INPUT MODULE 1
CAN:
/67.C2 -A16a +H3 UNIVERSAL INPUT 4 BRAKE ACCUMULATOR CHARGE PRESSURE IRBrakePressSens A16a.UI4
X1 7

-A4a =B +B1 — KL. 30 — E — =A4a +B1 -F24. 10A RD — B — A

DIAGNOSIS TRANSMISSION





EXTENSION PRESSURE SWITCH

-XC +F3 =F 1/2 2/2

=F +F3 -XD 1 2

-A4.X46 13 *

WH/1Q WH/1Q

-A11.X1 X1 1
=K +K4 -A11 /69.D4 A11.KL15 A +24V SUPPLY CAN:
MAIN-KEY BOARD

MAIN-KEY BOARD
CAN:
/69.D4 -A11 SUPPLY EARTH
+K4 =K SUPPLY EARTH A A11.GND
X1 2
-A11.X1 2

BK/1Q
+K2 -XMSP6b 3

WH/1.5Q
-Y10.JPT 1
+K6 -Y10 \0
2
-Y10.JPT 2

BK/1.5Q
X1 46
+H3 -A17a /68.B5 A17a.GND_PWM1 D GND PARKING BRAKE EARTH
CAN:
OUTPUT MODULE 1

WH/1Q
-B19.X B
+K6 -B19 S +
C A
-B19.X A

WH/1Q
WH/1Q
X1 32
+H3 -A16a /67.E2 A16a.24V Vcc BRAKE ACCUMULATOR SUPPLY 24V
CAN:
INPUT MODULE 1

-A4a.X2 10
RD/1Q
-A25.X1 X1 2
=F +F3 -A25 /73.C2 A25.VPE1 A Vcc KL. 30 SUPPLY KL.30
CAN:
CVT TRANSMISSION

-A4a.X2 38
RD/1Q
-A25.X1 X1 5
=F +F3 -A25 /73.D2 A25.VPE2 A Vcc KL. 30 SUPPLY KL.30
CAN:
CVT TRANSMISSION

CVT TRANSMISSION
CAN:
/73.C2 -A25 +F3 =F SUPPLY Ground Vcc GND A A25.VM1
X1 1
-A25.X1 1
BK/1Q
=B +B -XMSP4c 2

CVT TRANSMISSION
CAN:
/73.C2 -A25 +F3 =F Vcc GND A A25.VM2
X1 4
-A25.X1 4
BK/1Q
=B +B -XMSP4c 3

CVT TRANSMISSION
CAN:
/73.D2 -A25 +F3 =F SUPPLY kL. 15 Vcc kL. 15 A A25.VPI
X1 8
-A25.X1 8
/46.E2

-X60d +K2 — 1 2 3 4 5 6 7 8 9

RD/1Q BK/1Q YE/0.75Q GN/0.75Q YE/0.75Q GN/0.75Q

/64.A4 F51
F51 10A KL. 30

YE/0.75Q GN/0.75Q

=K +K2 -XMSP6a 6
YE/0.75Q GN/0.75Q
-X1.S 44 -X1.B 44
-X1.S 45 -X1.B 45

/39.C7 /39.C7

YE/0.75Q GN/0.75Q
TRANSMISSION CAN2

-A25.X1 X1 20
=F +F3 -A25 /73.E2 A25.CAN2_H A CAN2_H CAN VERB. DIAGNOSSE
CAN:
CVT TRANSMISSION

-A25.X1 X1 17
=F +F3 -A25 /73.E2 A25.CAN2_L A CAN2_L CAN VERB. DIAGNOSSE
CAN:
CVT TRANSMISSION

MASTER CAN BUS 4

RD/1Q BU/1Q

MACHINE TYPE	SERIAL NUMBER			PAGE 44 OF
LIDOS UNIT	XXXXX	LIEBHERR FACTORY LBH	Vcc MAIN KEYPAD; Vcc TRANSMISSION; PARKING BRAKE; E PLAN	CREATION DATE 26.04.2019 10:08

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

MACHINE-SIDE A

/74,C1 -A700 +M =G — LIDEC2 SCR AdBlue PUMP [B] — B — A700,PWM_F-G1-B — X1 29 — -A700.X1 29 +M =G

/74,C1 -A700 +M =G — LIDEC2 SCR AdBlue PUMP [A] — A — A700,PWM_F-G1-A — X1 25 — -A700.X1 25 +M =G

/74,F1 -A700 +M =G — LIDEC2 AIR CHANGE OVER VALVE — A700,PWM_CFB-G3 — X1 62 — -A700.X1 62 +M =G

/74,F1 -A700 +M =G — LIDEC2 AIR CHANGE OVER VALVE [GND] — GND — A700,KL_31_PWR — X1 59 — -A700.X1 59 +M =G

/74,B1 -A700 +M =G — LIDEC2 AIR PRESSURE SENSOR 1 [GND] — GND — A700,KL_31_PWR — X1 7 — -A700.X1 7 +M =G

/74,B1 -A700 +M =G — LIDEC2 AIR PRESSURE SENSOR 1 [Sig.] — Signal — A700,AI5V-G2 — X1 6 — -A700.X1 6 +M =G

/74,A1 -A700 +M =G — LIDEC2 AIR PRESSURE SENSOR 1 [+5V] — 5V — A700,VCC-G1 — X1 5 — -A700.X1 5 +M =G

/74,B1 -A700 +M =G — LIDEC2 DIESEL EXHAUST FLUID PRESSURE AND TEMPERATURE [GND] — GND — A700,KL_31_PWR — X1 11 — -A700.X1 11 +M =G

/74,B1 -A700 +M =G — LIDEC2 DIESEL EXHAUST FLUID PRESSURE AND TEMPERATURE [Sig.] — Signal — A700,AI5V-G3 — X1 10 — -A700.X1 10 +M =G

/74,B1 -A700 +M =G — LIDEC2 DIESEL EXHAUST FLUID PRESSURE AND TEMPERATURE [+5V] — 5V — A700,VCC-G2 — X1 9 — -A700.X1 9 +M =G

/74,F1 -A700 +M =G — LIDEC2 DIESEL EXHAUST FLUID PRESSURE AND TEMPERATURE [Sig.] — Signal — A700,TI-G8 — X1 52 — -A700.X1 52 +M =G

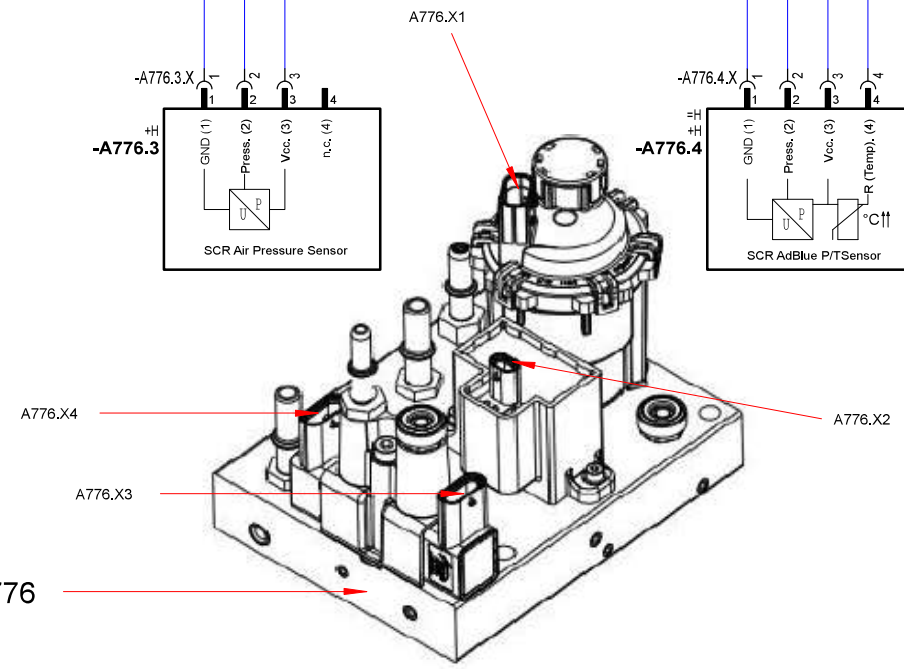
WH/1Q BK/1Q BK/1Q BU/1Q RD/1Q BK/1Q RD/1Q WH/1Q BU/1Q

-A776.1.X — 1 UBatt (1) — 2 n.c. (2) — 3 GND (3)
+H -A776.1 — SCR AdBlue Pump

-A776.2.X — 1 UBatt (1) — 2 GND (2)
+H -A776.2 — SCR Switch over valve

-A776.3.X — 1 GND (1) — 2 Press. (2) — 3 Vcc. (3) — 4 n.c. (4)
+H -A776.3 — SCR Air Pressure Sensor

-A776.4.X — 1 GND (1) — 2 Press. (2) — 3 Vcc. (3) — 4 R (Temp). (4)
=H +H -A776.4 — SCR AdBlue P/TSensor

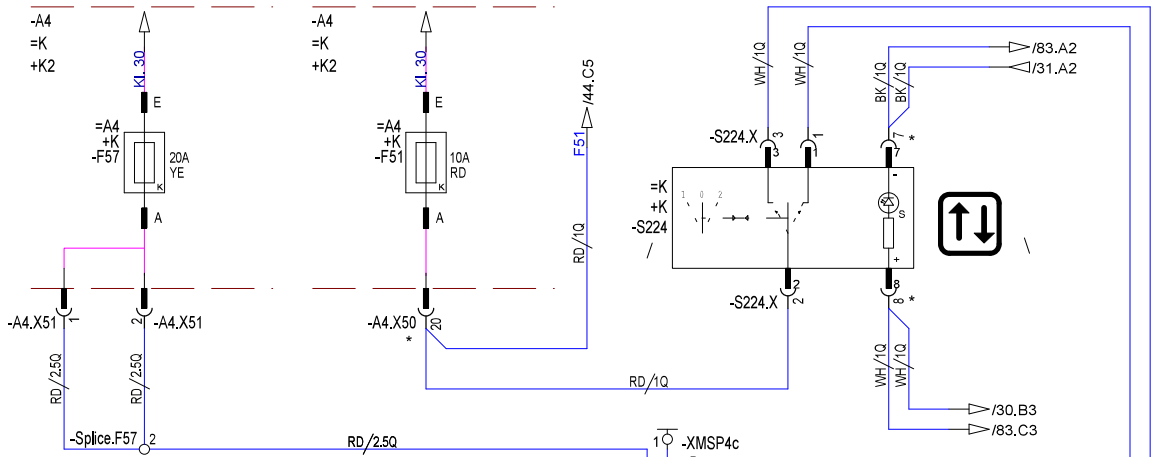


Albonair SCR MODULE

MACHINE TYPE	SERIAL NUMBER			PAGE 54 OF
LIDOS UNIT	XXXXX	LIEBHERR FACTORY LBH	Albonair SCR MODULE E PLAN	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



SWITCH BUMPER AT REAR

MACHINE TYPE	SERIAL NUMBER			
LIDOS UNIT	XXXXX	LIEBHERR FACTORY LBH	ELECTRICAL HOOD OPENING E PLAN	PAGE 64 OF
				CREATION DATE 26.04.2019 10:08

=G
+M
-A700

Modul Nr.:
Modulname:

Ident Nr.: **LH-ECU-LIDEC2**

LIDEC2

ADRESS	SHEET	EA	vom 1	vom 2	PLUG	Pin
A700.VCC-G1	/51.F6	5V	DIFFERENTIAL PRESSURE; [+5V]	MACHINE-SIDE A	X1	1
A700.AI5V-G1	/51.F7	Signal	DIFFERENTIAL PRESSURE [Sig.]	MACHINE-SIDE A	X1	2
A700.KL_31_PWR	/51.A7	GND	DIFFERENTIAL PRESSURE [GND]	MACHINE-SIDE A	X1	3
A700.CAN-G2-L	/56.E7	Low	CAN-BUS-Interface 2 [Low]	MACHINE-SIDE A	X1	4
A700.VCC-G1	/54.A5	5V	AIR PRESSURE SENSOR 1 [+5V]	MACHINE-SIDE A	X1	5
A700.AI5V-G2	/54.A4	Signal	AIR PRESSURE SENSOR 1 [Sig.]	MACHINE-SIDE A	X1	6
A700.KL_31_PWR	/54.A4	GND	AIR PRESSURE SENSOR 1 [GND]	MACHINE-SIDE A	X1	7
A700.CAN-G2-L		Low	CAN-BUS-Interface 2 [Low]	MACHINE-SIDE A	X1	8
A700.VCC-G2	/54.A7	5V	DIESEL EXHAUST FLUID PRESSURE AND TEMPERATURE [+5V]	MACHINE-SIDE A	X1	9
A700.AI5V-G3	/54.A6	Signal	DIESEL EXHAUST FLUID PRESSURE AND TEMPERATURE [Sig.]	MACHINE-SIDE A	X1	10
A700.KL_31_PWR	/54.A6	GND	DIESEL EXHAUST FLUID PRESSURE AND TEMPERATURE [GND]	MACHINE-SIDE A	X1	11
A700.CAN-G2-T		Term.	CAN-BUS-Interface 2 [Term.]	MACHINE-SIDE A	X1	12
A700.VCC-G2		5V	SCRF Differenzialdrucksensor 1 [+5V]	MACHINE-SIDE A	X1	13
A700.AI5V-G4		Signal	SCRF Differenzialdrucksensor 1 [Sig.]	MACHINE-SIDE A	X1	14
A700.KL_31_PWR		GND	SCRF Differenzialdrucksensor 1 [GND]	MACHINE-SIDE A	X1	15
A700.CAN-G2-H	/56.E6	High	CAN-BUS-Interface 2 [High]	MACHINE-SIDE A	X1	16
A700.UBATT-G4		UBATT	AIR FILTER VACUUM SWITCH 1 [UBATT]	MACHINE-SIDE A	X1	17
A700.AI33V-G4		Signal	AIR FILTER VACUUM SWITCH 1 [Sig.]	MACHINE-SIDE A	X1	18
A700.KL_31_PWR		GND	RESERVE (GND) [GND]	MACHINE-SIDE A	X1	19
A700.CAN-G2-H		High	CAN-BUS-Interface 2 [High]	MACHINE-SIDE A	X1	20
A700.KL_31_PWR		GND	RESERVE (GND) [GND]	MACHINE-SIDE A	X1	21
A700.DI-G1		Signal	MASTER/SLAVE REQUEST [Sig.]	MACHINE-SIDE A	X1	22
A700.KL_31_PWR	/51.F4	GND	SCR TEMPERATURE SENSOR 1 [GND]	MACHINE-SIDE A	X1	23
A700.TI-G1	/51.A4	Signal	SCR TEMPERATURE SENSOR 1 [Sig.]	MACHINE-SIDE A	X1	24
A700.PWM_F-G1-A	/54.A1	A	SCR AdBlue PUMP [A]	MACHINE-SIDE A	X1	25
A700.TI-G10		Signal	AdBlue LEVEL (Wema) [S	MACHINE-SIDE A	X1	26
A700.KL_31_PWR	/51.F1	GND	SCR TEMPERATURE SENSOR 2 [GND]	MACHINE-SIDE A	X1	27
A700.TI-G2	/51.A1	Signal	SCR TEMPERATURE SENSOR 2 [Sig.]	MACHINE-SIDE A	X1	28
A700.PWM_F-G1-B	/54.A2	B	SCR AdBlue PUMP [B]	MACHINE-SIDE A	X1	29
A700.KL_31_PWR		GND	AdBlue LEVEL (Wema) [G	MACHINE-SIDE A	X1	30
A700.KL_31_PWR	/51.F2	GND	SCR TEMPERATURE SENSOR 3 [GND]	MACHINE-SIDE A	X1	31
A700.TI-G3	/51.A2	Signal	SCR TEMPERATURE SENSOR 3 [Sig.]	MACHINE-SIDE A	X1	32
A700.KL_31_PWR		GND	RESERVE (GND) [GND]	MACHINE-SIDE A	X1	33
A700.KL_31_PWR		GND	Maintenance [GND]	MACHINE-SIDE A	X1	34
A700.KL_31_PWR		GND	HYDRAULIC OIL TEMPERATURE SENSOR [GND]	MACHINE-SIDE A	X1	35
A700.TI-G4		Signal	HYDRAULIC OIL TEMPERATURE SENSOR [Sig.]	MACHINE-SIDE A	X1	36
A700.DIAG-G1-SUP		Supply	Maintenance [Supply]	MACHINE-SIDE A	X1	37
A700.DIAG-G1-IO		Signal	Maintenance [Sig.]	MACHINE-SIDE A	X1	38
A700.KL_31_PWR	/51.F5	GND	SLEW ANGLE [GND]	MACHINE-SIDE A	X1	39
A700.TI-G5	/51.A5	Signal	SLEW ANGLE [Sig.]	MACHINE-SIDE A	X1	40
A700.DO-G3	/53.A7		HEATING	MACHINE-SIDE A	X1	41
A700.UBATT-G5		UBATT	AIR FILTER VACUUM SWITCH 2 [UBATT]	MACHINE-SIDE A	X1	42
A700.KL_31_PWR	/51.F8	GND	WATER im FUEL SENSOR 1 [GND]	MACHINE-SIDE A	X1	43
A700.TI-G6	/51.A8	Signal	WATER im FUEL SENSOR 1 [Sig.]	MACHINE-SIDE A	X1	44
A700.DO-G4			VENTILATION FLAP	MACHINE-SIDE A	X1	45
A700.AI33V-G5		Signal	AIR FILTER VACUUM SWITCH 2 [Sig.]	MACHINE-SIDE A	X1	46
A700.KL_31_PWR		GND	Batterietemperatursensor [GND]	MACHINE-SIDE A	X1	47
A700.TI-G7		Signal	Batterietemperatursensor [Sig.]	MACHINE-SIDE A	X1	48
A700.KL_31_PWR		GND	RESERVE (GND) [GND]	MACHINE-SIDE A	X1	49
A700.PWM_H-G1H	/53.F4	Plus	SCR Reverting Valve (Bosch) [+]	MACHINE-SIDE A	X1	50
A700.KL_31_PWR		GND	WATER CIRCULATION TEMPERATURE SENSOR [GND]	MACHINE-SIDE A	X1	51
A700.TI-G8	/54.A8	Signal	DIESEL EXHAUST FLUID PRESSURE AND TEMPERATURE [Sig.]	MACHINE-SIDE A	X1	52
A700.KL_31_PWR		GND	RESERVE (GND) [GND]	MACHINE-SIDE A	X1	53
A700.PWM_H-G1L	/53.A4	Minus	SCR Reverting Valve (Bosch) [-]	MACHINE-SIDE A	X1	54
A700.KL_31_PWR		GND	AdBlue TEMPERATURE (Wema) [G	MACHINE-SIDE A	X1	55
A700.TI-G9		Signal	AdBlue TEMPERATURE (Wema) [S	MACHINE-SIDE A	X1	56
A700.KL_31_PWR		GND	Kühlerlüfter-CONTROL 1 [GND]	MACHINE-SIDE A	X1	57
A700.KL_31_PWR		GND	Kühlerlüfter-CONTROL 2 [GND]	MACHINE-SIDE A	X1	58
A700.KL_31_PWR	/54.A3	GND	AIR CHANGE OVER VALVE [GND]	MACHINE-SIDE A	X1	59
A700.PWM_CFB-G1			Kühlerlüfter-CONTROL 1	MACHINE-SIDE A	X1	60
A700.PWM_CFB-G2			Kühlerlüfter-CONTROL 2	MACHINE-SIDE A	X1	61
A700.PWM_CFB-G3	/54.A2		AIR CHANGE OVER VALVE	MACHINE-SIDE A	X1	62

ADRESS	SHEET	EA	vom 1	vom 2	PLUG	Pin
A700.DO_L-G1			Kaltstartlampe	MACHINE-SIDE B	X2	1
A700.DI_KL15	/50.F8	15	CLAMP 15	MACHINE-SIDE B	X2	2
A700.KL_31_PWR	/50.E7	GND	CLAMP 31elektr. (PS2_GND) [GND]	MACHINE-SIDE B	X2	3
A700.KL30_ELEK	/50.F6		CLAMP 30elektr. / PS2	MACHINE-SIDE B	X2	4
A700.DO_L-G2			Fehlerangabe im EMERGENCY OPERATION	MACHINE-SIDE B	X2	5
A700.KL_31_PWR		GND	ACCELERATOR ENCODER 1 [GND]	MACHINE-SIDE B	X2	6
A700.UAI-G1		Signal	ACCELERATOR ENCODER 1 [Sig.]	MACHINE-SIDE B	X2	7
A700.UBATT-G1		UBATT	ACCELERATOR ENCODER 1 [UBATT]	MACHINE-SIDE B	X2	8
A700.DO_L-G3	/52.F1		SCR CONTROL COOLING WATER HEATING	MACHINE-SIDE B	X2	9
A700.KL_31_PWR		GND	ACCELERATOR ENCODER 2 [GND]	MACHINE-SIDE B	X2	10
A700.UAI-G2		Signal	ACCELERATOR ENCODER 2 [Sig.]	MACHINE-SIDE B	X2	11
A700.UBATT-G2		UBATT	ACCELERATOR ENCODER 2 [UBATT]	MACHINE-SIDE B	X2	12
A700.DO_L-G4			SCR Supply MODULE/ENGINE (Bosch)	MACHINE-SIDE B	X2	13
A700.KL_31_PWR		GND	SCR AIR PRESSURE SENSOR (Albonair &#	MACHINE-SIDE B	X2	14
A700.AI5V-G5		Signal	SCR AIR PRESSURE SENSOR (Albonair &#	MACHINE-SIDE B	X2	15
A700.VCC-G3		5V	SCR AIR PRESSURE SENSOR (Albonair &#	MACHINE-SIDE B	X2	16
A700.DO-G1	/24.C7		HEATER FLANGE RELAY 1	MACHINE-SIDE B	X2	17
A700.KL_31_PWR		GND	AdBlue-PRESSURE (Denoxtro	MACHINE-SIDE B	X2	18
A700.AI5V-G6		Signal	AdBlue-PRESSURE (Denoxtro	MACHINE-SIDE B	X2	19
A700.VCC-G3		5V	AdBlue-PRESSURE (Denoxtro	MACHINE-SIDE B	X2	20
A700.DO-G2			HEATER FLANGE RELAY 2	MACHINE-SIDE B	X2	21
A700.DO-G6	/57.A5		RESERVE (DO-G6)	MACHINE-SIDE B	X2	22
A700.DI-G3		Signal	Notdrehzahl REQUEST [Sig.]	MACHINE-SIDE B	X2	23
A700.DI-G2		Signal	STARTING REQUEST (KL50A) [Sig.]	MACHINE-SIDE B	X2	24
A700.DO-G5	/55.F1		RELAY ENGINE Smart Komponente	MACHINE-SIDE B	X2	25
A700.DI-G6		Signal	Not-Halt REQUEST (LWE) [Sig.]	MACHINE-SIDE B	X2	26
A700.DI-G5		Signal	Prüfstandkennung [Sig.]	MACHINE-SIDE B	X2	27
A700.DI-G4		Signal	Erkennung Autarker OPERATION (LWE) [Sig.]	MACHINE-SIDE B	X2	28
A700.KL_31_PWR	/55.F2	GND	RESERVE (GND) [GND]	MACHINE-SIDE B	X2	29
A700.LSB-G1-GND		GND	LSB-Interface [GND]	MACHINE-SIDE B	X2	30
A700.LSB-G1-LSB		LSB	LSB-Interface [LSB]	MACHINE-SIDE B	X2	31
A700.LSB-G1-V			LSB-Interface	MACHINE-SIDE B	X2	32
A700.DO_L-G5	/52.F2		SCR CONTROL ELECTRICAL HEATING 1	MACHINE-SIDE B	X2	33
A700.RS232-G1-GND		GND	RS232-BUS-Interface [GND]	MACHINE-SIDE B	X2	34
A700.RS232-G1-TxD		TxD	RS232-BUS-Interface [TxD]	MACHINE-SIDE B	X2	35
A700.RS232-G1-RxD		RxD	RS232-BUS-Interface [RxD]	MACHINE-SIDE B	X2	36
A700.KL_31_PWR		GND	RESERVE (GND) [GND]	MACHINE-SIDE B	X2	37
A700.AI33V-G2	/24.C8	Signal	HEATER FLANGE RELAY 1 [Sig.]	MACHINE-SIDE B	X2	38
A700.CAN-G1-H	/39.D3	High	CAN-BUS-Interface 1 [High]	MACHINE-SIDE B	X2	39
A700.CAN-G1-H		High	CAN-BUS-Interface 1 [High]	MACHINE-SIDE B	X2	40
A700.DO_L-G6	/52.F4		SCR CONTROL ELECTRICAL HEATING 2	MACHINE-SIDE B	X2	41
A700.AI33V-G3		Signal	HEATER FLANGE RELAY 2 [Sig.]	MACHINE-SIDE B	X2	42
A700.CAN-G1-L	/39.C3	Low	CAN-BUS-Interface 1 [Low]	MACHINE-SIDE B	X2	43
A700.CAN-G1-L	/39.D1	Low	CAN-BUS-Interface 1 [Low]	MACHINE-SIDE B	X2	44
A700.KL_31_PWR		GND	RESERVE (GND) [GND]	MACHINE-SIDE B	X2	45
A700.UBATT-G3	/48.A3	UBATT	COOLANT LEVEL SWITCH [UBATT]	MACHINE-SIDE B	X2	46
A700.CAN-G3-T	/62.B3	Term.	CAN-BUS-Interface 3 [Term.]	MACHINE-SIDE B	X2	47
A700.CAN-G1-T	/39.C1	Term.	CAN-BUS-Interface 1 [Term.]	MACHINE-SIDE B	X2	48
A700.DO_L-G7	/52.F5		SCR CONTROL ELECTRICAL HEATING 3	MACHINE-SIDE B	X2	49
A700.AI33V-G1	/48.F3	Signal	COOLANT LEVEL SWITCH [Sig.]	MACHINE-SIDE B	X2	50
A700.CAN-G3-L	/62.B4	Low	CAN-BUS-Interface 3 [Low]	MACHINE-SIDE B	X2	51
A700.CAN-G3-L	/62.B4	Low	CAN-BUS-Interface 3 [Low]	MACHINE-SIDE B	X2	52
A700.KL_31_PWR		GND	RESERVE (GND) [GND]	MACHINE-SIDE B	X2	53
A700.NC			EMPTY	MACHINE-SIDE B	X2	54
A700.CAN-G3-H	/62.B3	High	CAN-BUS-Interface 3 [High]	MACHINE-SIDE B	X2	55
A700.CAN-G3-H		High	CAN-BUS-Interface 3 [High]	MACHINE-SIDE B	X2	56
A700.KL_31_PWR	/50.E2	GND	CLAMP 31Power (PS1_GND) [GND]	MACHINE-SIDE B	X2	57
A700.KL_31_PWR	/50.E3	GND	CLAMP 31Power (PS1_GND) [GND]	MACHINE-SIDE B	X2	58
A700.KL_31_PWR	/50.E5	GND	CLAMP 31Power (PS1_GND) [GND]	MACHINE-SIDE B	X2	59
A700.KL_31_PWR	/50.F1		CLAMP 30Power / PS1	MACHINE-SIDE B	X2	60
A700.KL_31_PWR	/50.F3		CLAMP 30Power / PS1	MACHINE-SIDE B	X2	61
A700.KL_31_PWR	/50.F4		CLAMP 30Power / PS1	MACHINE-SIDE B	X2	62

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		GENERAL OUTLAY LIDEC 2	PAGE 74 OF
LIDOS UNIT	XXXXX	LIEBHERR FACTORY LBH	E PLAN	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

REVERSE SIGNAL

WH/1.5Q
WH/1.5Q
WH/1.5Q
WH/1.5Q
WH/1.5Q
WH/1.5Q
WH/1.5Q
WH/1.5Q
WH/1.5Q
WH/1.5Q
WH/1.5Q
WH/1.5Q
WH/6Q
WH/1Q
WH/1Q
WH/1Q
WH/1Q
WH/1Q
WH/1Q
WH/1Q
BK/1Q
BK/1Q
BK/1Q
BK/1Q
BK/1Q
BK/1.5Q
BK/1.5Q
RD
SW
OG

/83.A7
/101.A5
/30.B7
/83.C7
/101.B5
/83.A6

=K
+K2
-X106.S 1/1
-X106.B
+K2
=K

=K
+K
-S43
/

-S43.X 13 14 9 7
-S43.X 3 10 8

-A4
=K
+K2
-A4.X56 20
KL 15
E
-F20 10A RD
K
A

-A4
=K
+K2
-A4.X41 15 18 10
-K12
/0
30 86 87a 87 85
GND
-V103
-A4.X41 14 17 13 16
-A4.X41

=K
+K2
-KL.RG
/ 1

-XMSP6.RG 1
+K
=K

=K
+K.RH
-F275
5A
BN
1
2

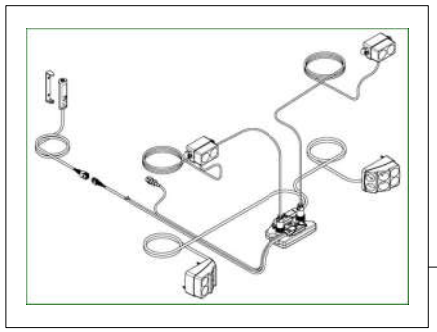
+K
-X78.RG 1 2 3

+K
-Splice.K12 2

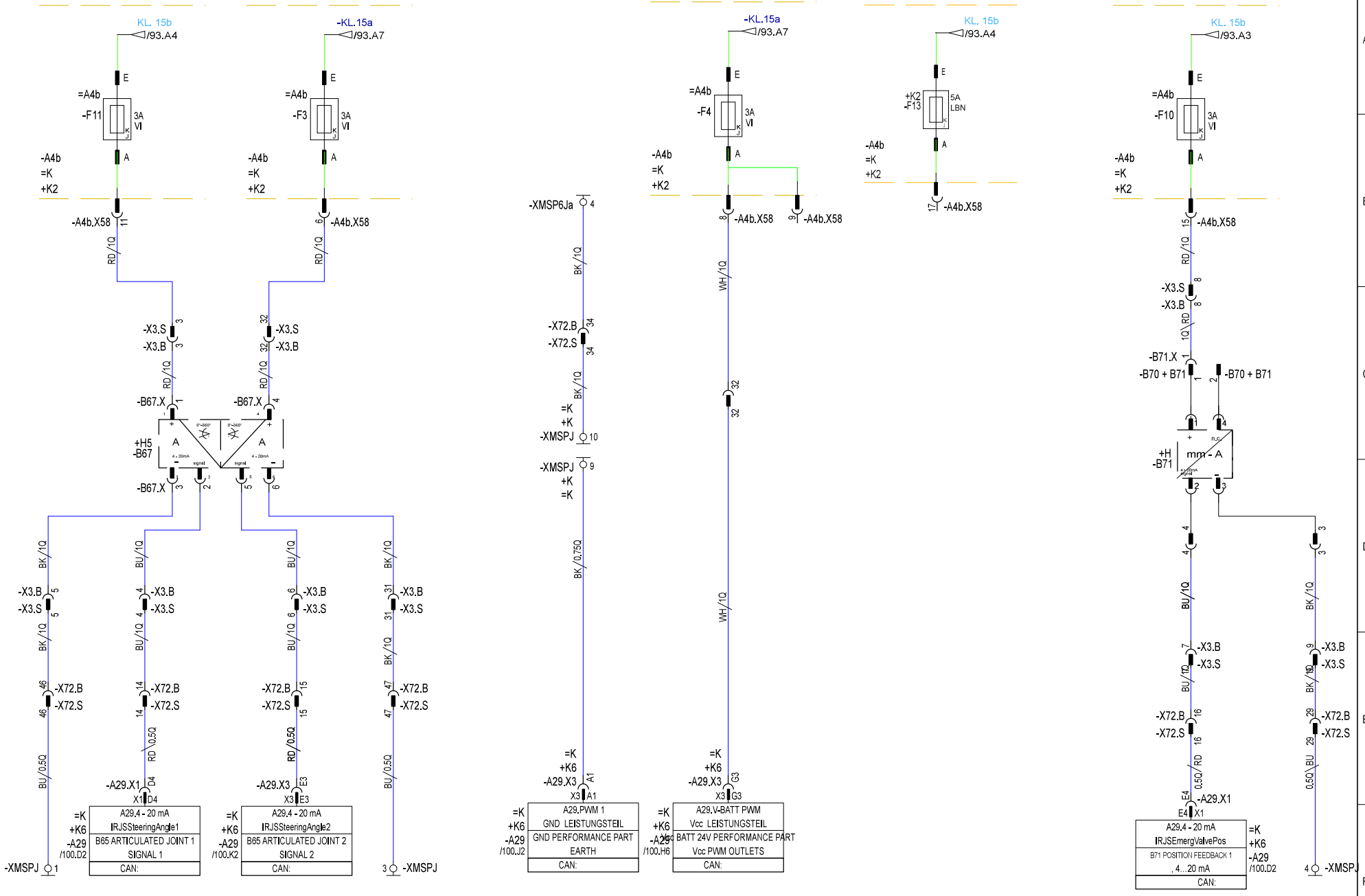
-X1.S 42
-X1.B 42

-B16.X 1
+H5
-B16
2
-B16.X

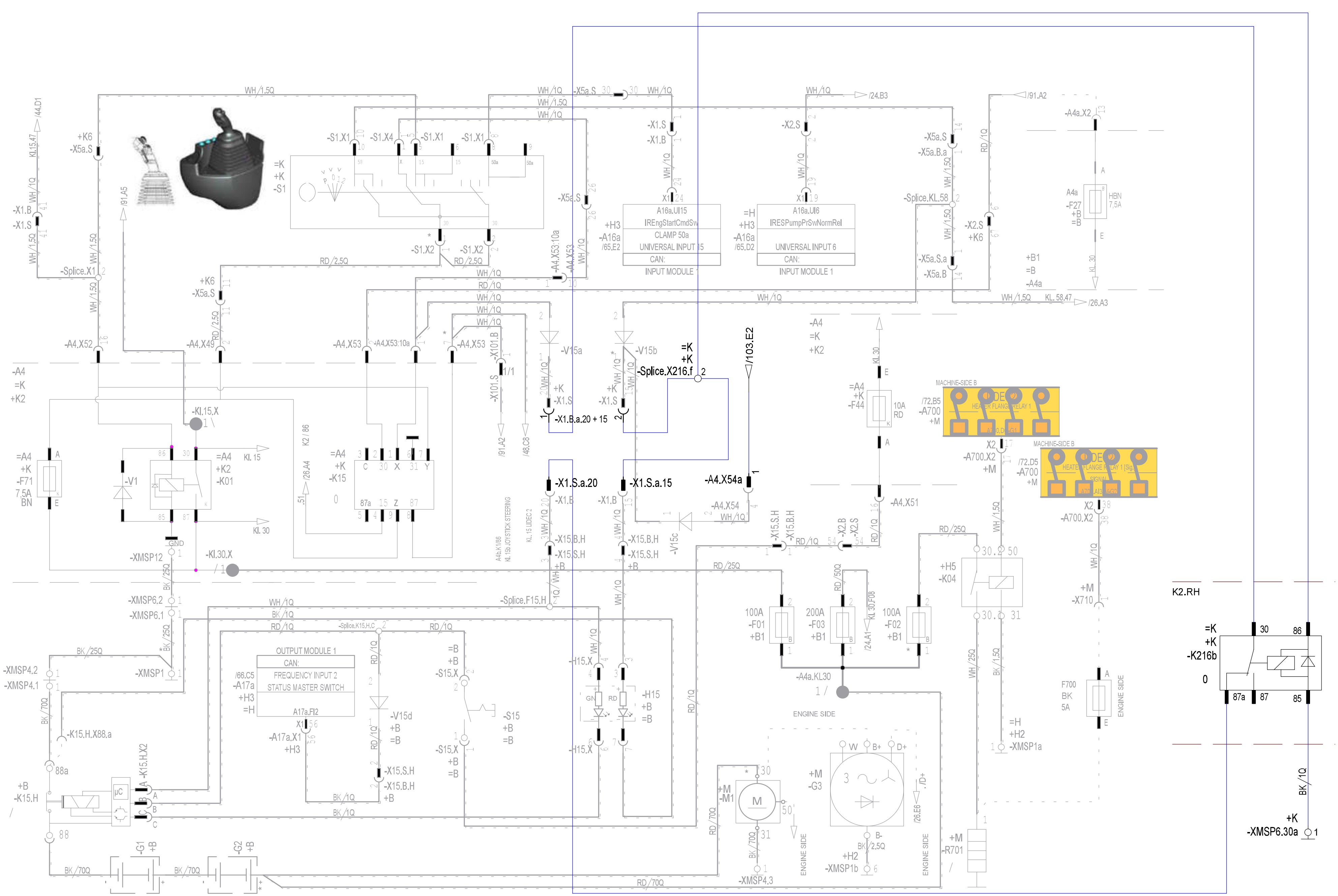
-XMSP1a 4



MACHINE TYPE	SERIAL NUMBER			
LIDOS UNIT	XXXXX	LIEBHERR FACTORY LBH	OPTION BACK-UP ALARM ACOUSTIC E PLAN	PAGE 84 OF
				CREATION DATE 26.04.2019 10:08



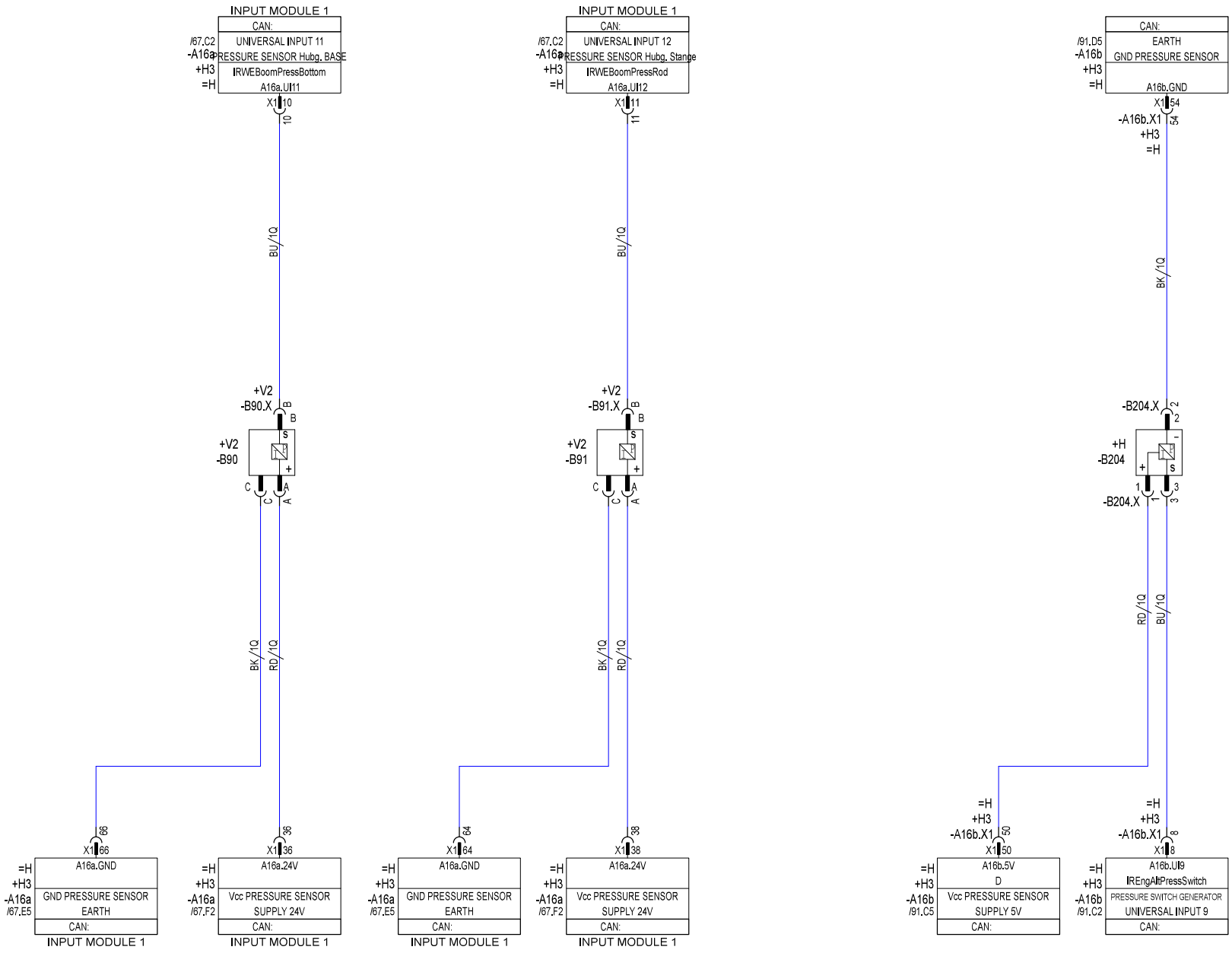
MACHINE TYPE	SERIAL NUMBER			
LIDOS UNIT	XXXXX	LIEBHERR FACTORY LBH	OPTION SENSORS JOYSTICK STEERING E PLAN	PAGE 94 OF
				CREATION DATE 26.04.2019 10:08



L550/1214 STEP 4 FACELIFT DOWN Snr.: 54427; L556/1332 STEP 4 FACELIFT DOWN Snr.: 54432;; L566/1484 STEP 4 FACELIFT DOWN Snr.: 54428; L576/1333 STEP 4 FACELIFT DOWN Snr.: 54430; L580/1464 STEP 4 FACELIFT DOWN Snr.: 54471; L586/1334 STEP 4 FACELIFT DOWN Snr.: 5447

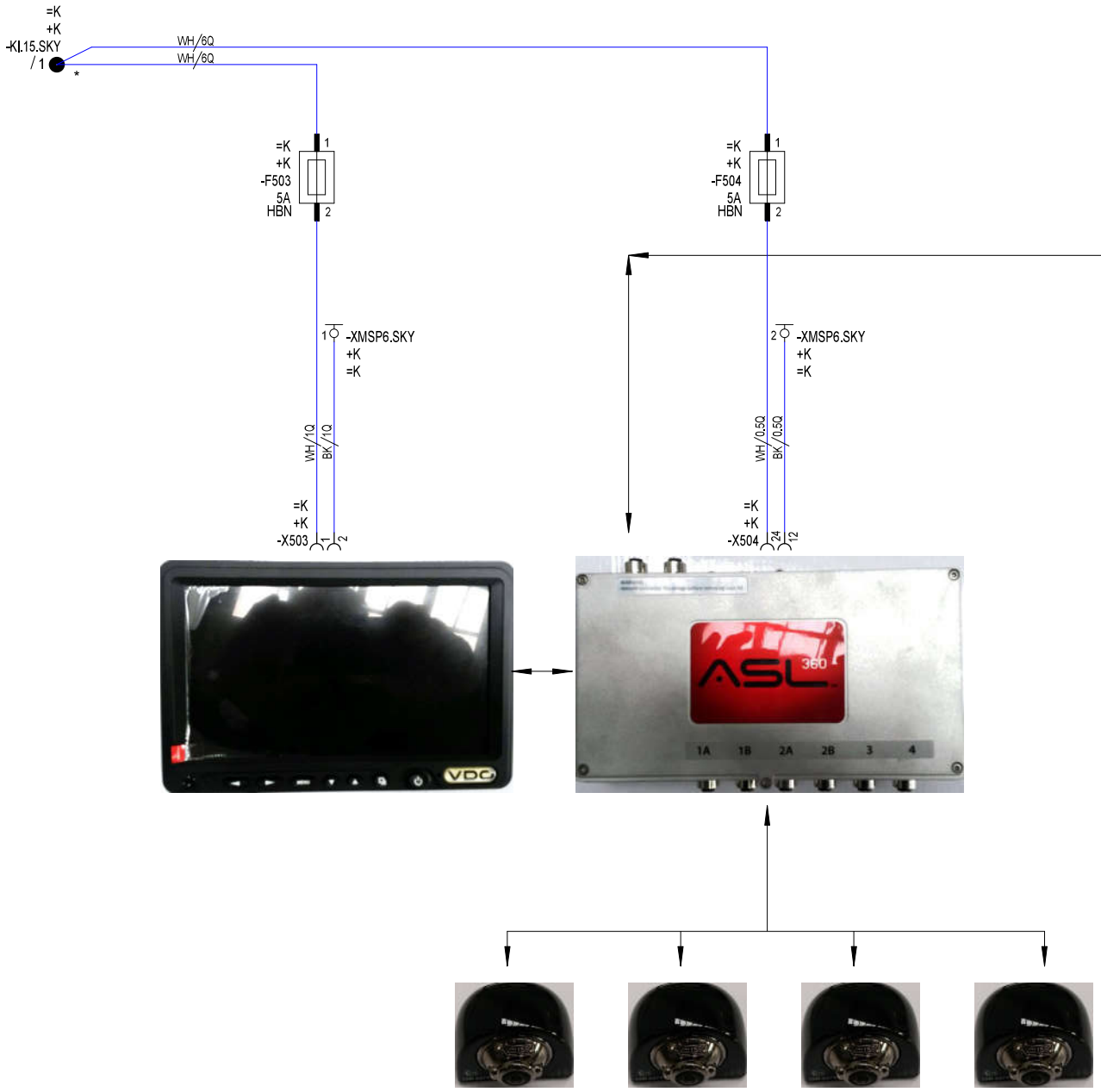
ITEM CODE	12418288
DRAWING INDEX	105
PROJECT	Stufe 4 GG_23.11.18 E_Hauptschalter
DRAWING NUMBER	1333 90100 01 00

MACHINE TYPE	SERIAL NUMBER			
LIDOS UNIT	XXXXX	LIEBHERR FACTORY LBH	OPTION AUTOMATIC RUN-OUT E PLAN	PAGE 104 OF CREATION DATE 26.04.2019 10:08



MACHINE TYPE	SERIAL NUMBER			PAGE 114 OF
LIDOS UNIT	XXXXX	LIEBHERR FACTORY LBH	OPTION LH WEIGHING DEVICE; AIR FILTER VACUUM SWITCH G1 E PLAN	CREATION DATE 26.04.2019 10:08

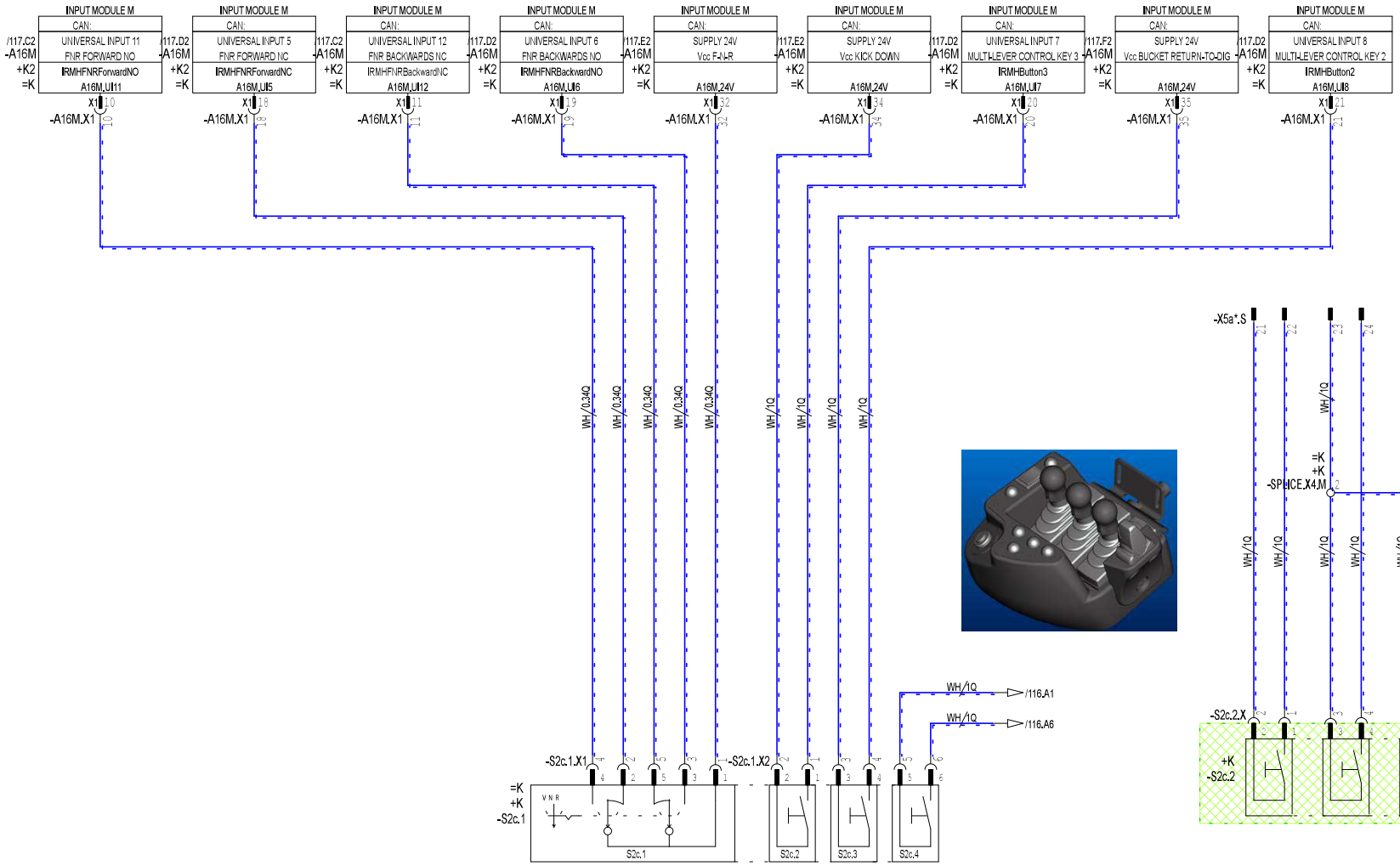
PROJECT 12418288
DRAWING NUMBER 1333 90100 01 00 Stufe 4 GG_23.11.18 E_Hauptschalter ITEM CODE 105 DRAWING INDEX



ETHERNET
DIAGNOSTIC PLUG

MACHINE TYPE	SERIAL NUMBER			PAGE 124 OF
LIDOS UNIT	XXXXX	LIEBHERR FACTORY LBH	OPTION Vcc SKY VIEW 360° E PLAN	CREATION DATE 26.04.2019 10:08

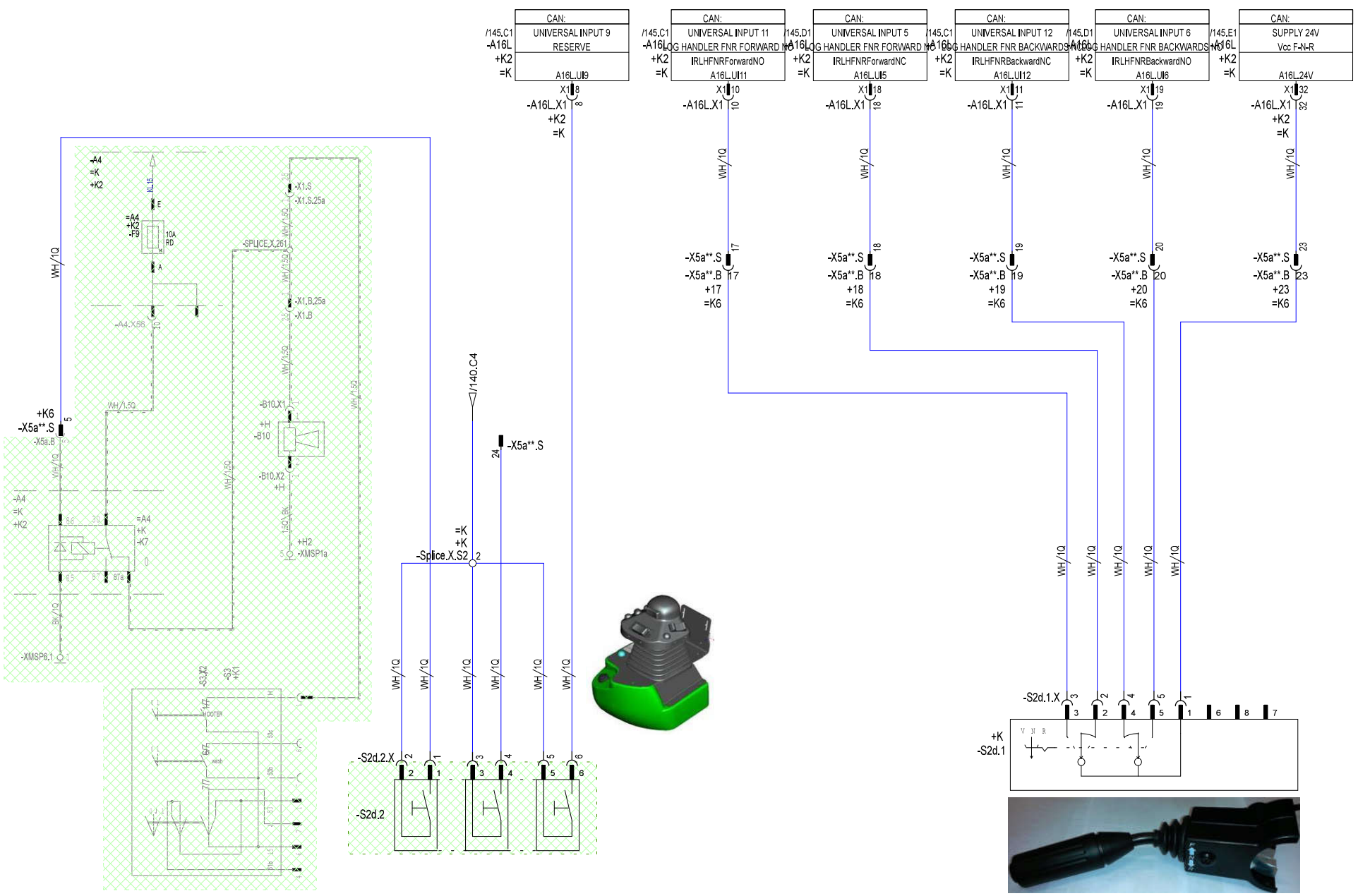
CXMH1Module=0



TO SERIAL NUMBER:.....

MACHINE TYPE LIDOS UNIT	SERIAL NUMBER XXXXX	LIEBHERR FACTORY LBH	VERSION 1 MULTI-LEVER CONTROL F-N-R + 3 PUSH-BUTTON SWITCH E PLAN	PAGE 134 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 2 LOG HANDLER V-N-R + 3 PUSH-BUTTON SWITCH E PLAN	PAGE 144 OF 144
				CREATION DATE 26.04.2019 10:08

TYPE MOTOR_SPL

PROJECT: 10139858

=SYSTEM

=U	UNDERCARRIAGE
=D	TURNTABLE
=A	BOOM
=F	CHASSIS (CRAWLER)
=M	ENGINE
=G	EQUIPMENT

+LOCATION UNDERCARRIAGE

+H	OPERATOR S CAB
+F	TRAVEL VALUE
+S	SWITCH CABINET
+M	ENGINE

+LOCATION TURNTABLE / BOOM

+H	CAB
+D	TURNTABLE
+A	BOOM
+S	SWITCH CABINET
+M	ENGINE

WIRING

*	STAR POINT - WIRING REGISTER
<	CIRCLE WIRING
§	FORCED WIRING

SERVICE FLUID DIN EN61346-1

-A	COMPONENTS, CONTROL DEVICE
-B	FILLER, SENSOR, SENSOR
-C	CONDENSER
-D	SAVE
-E	LIGHTING, HEATING
-F	FUSE
-G	ALTERNATOR, GENERATOR, BATTERY
-H	INDICATOR LIGHTS, REPORTING DEVICES
-K	RELAY, CONTACTORS
-L	INDUCTIVITY
-M	ENGINE
-N	TRANSMITTER, AMPLIFIER
-P	MEASURING EQUIPMENT, TESTING DEVICES
-Q	JUMPER WIRES HIGH VOLTAGE CURRENT
-R	RESISTORS
-S	SWITCH
-T	TRANSFORMERS
-U	TRANSFORMER, CONVERTERS, MODULATORS
-V	DIODES, TRANSISTOR
-W	CABLE STRAND DESIGNATION
-X	CONNECTOR, PLUG, CLAMP
-Y	VALVES
-Z	AUXILIARY PARTS ...

DESIGNATION DIN 72552

15	PLUS SWITCHED AFTER IGNITION SWITCH
30	PLUS BATTERY, DIRECT
31	RETURN LINE BATTERY, MINUS / GROUND DIRECT
50	STARTER, STARTER CONTROL, DIRECT
B, B-	BATTERY, PLUS / MINUS
D, D-	DYNAMO PLUS / MINUS
DF, DF1,2	DYNAMO, FIELD, FIELD1, FIELD2,
AC	GENERATOR CONNEXION
U / V / W	CLAMP GENERATOR

MAKER DESIGNATION

50m	STARTER SYNCHRONISATION
50n	STARTER SYNCHRONISATION
50i	STARTER SYNCHRONISATION
50k	STARTER SYNCHRONISATION
I / L	CHARGE-INDICATOR LAMP
BS	ON-BORD COMPUTER
DFM	UTILIZATION
30b	PLUS BATTERY AFTER MASTER SWITCH

SERVICE FLUID: MAKER, LIEBHERR COMPAGNY

-AF	FUSE MODULE
-WL	CABLE STRAND DESIGNATION
-XMSP	MASS GROUPING BLOCK, GROUND SCREW
-XM	SOLDER POST

FUSES

CURRENT	COLORS	
2	GY	GREY
3	VT	VIOLET
5	LBN	LIGHT BROWN
7,5	BN	BROWN
10	RD	RED
15	LBU	LIGHT BLUE
20	YE	YELLOW
25	LGY	LIGHT GRAY
30	GN	GREY
35	BU	BLUE

WIRE COLORS DIN IEC 757

OLD	NEW	
gr	GY	GREY
vi	VT	VIOLET
rs	PK	PINK
br	BN	BROWN
rt	RD	RED
bl	BU	BLUE
ge	YE	YELLOW
gn	GN	GREEN
sw	BK	BLACK
or	OG	ORANGE
ws	WH	WHITE

EXAMPLE ITEM DESIGNATION (BMK)

=	SYSTEM	+	LOCATION	-	ITEM DESIGNATION	COUNTING NUMBER	:	CONNECTION
=	M	+	M	-	B	702.X	:	1

EXAMPLE SIGNAL CROSS REFERENCE

SIGNAL	.	FUSE	OR	SIGNAL	.	FUSE
30b	.	F390		+24	.	L1

MODIFICATIONS

VERSION	DATE	ADAPTATIONER	CHECKED	SHEET	DESCRIPTION
002	28.06.2016	lmbovs0	lmbbua0	ALL	ELECTRICAL WIRING DIAGRAM ACTUALISATION
003	25.07.2016	lmbovs0	lmbbua0	10-11	FUSE -F700 AND -F705 = 5A
....	....	....	....	....	....
....	....	....	....	....	....
....	....	....	....	....	....
....	....	....	....	....	....
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....	....	....	....	....	....
....	....	....	....	....	....
....	....	....	....	....	....

REPLACEMENT FOR	MARKED	lmbovs0
0	DATE	25.07.2016 12:14
CONFIDENTIAL	CHECKED	lmbbua0
	TECHNICAL REFEREE	

LIEBHERR
FACTORY LMB

A3

DESIGNATION
ELECTRICAL WIRING DIAGRAM

DESCRIPTION
KEY TO SYMBOLS, MODIFICATION SHEET

ARTICLE CODE	SYSTEM	LOCATION
10139857	=M	+M
DRAWING NUMBER: 96 002 9307 90	INDEX: 003	SHEET 3 FROM 19

ARTICLE CODE 10139857 VERSION 03_1 25.07.2016 12:14

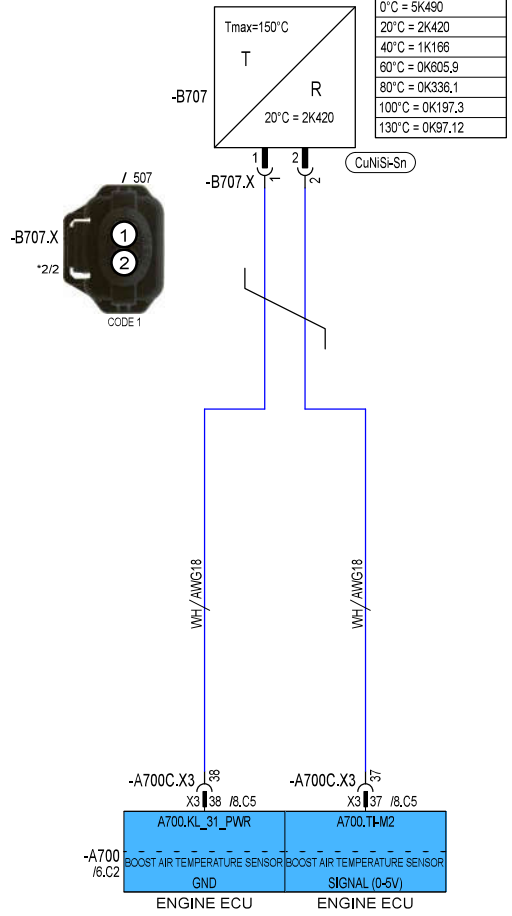
TYPE MOTOR_SPL

PROJECT: 10139858

BOOST AIR TEMPERATURE SENSOR

CONNECTOR REP. KIT: 10139561

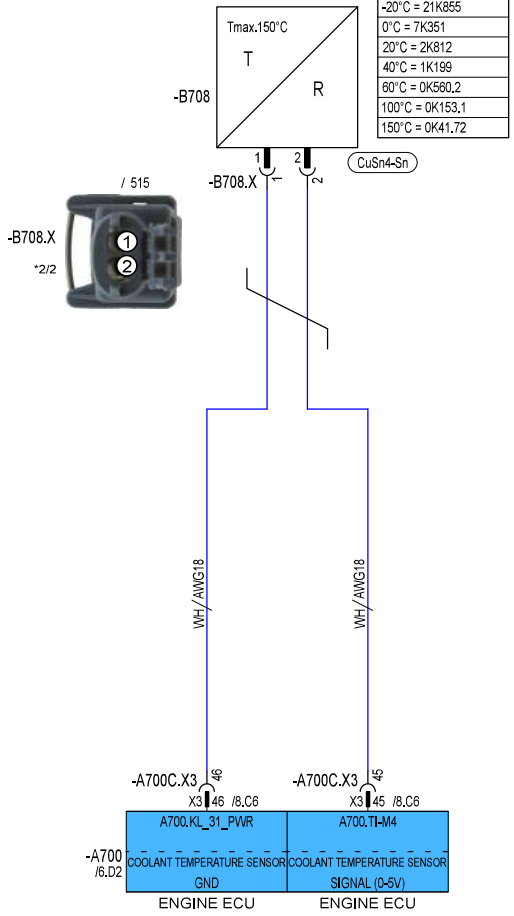
-20°C = 13K846
0°C = 5K490
20°C = 2K420
40°C = 1K166
60°C = 0K605,9
80°C = 0K336,1
100°C = 0K197,3
130°C = 0K97,12



COOLANT TEMPERATURE SENSOR

CONNECTOR REP. KIT: 10130062

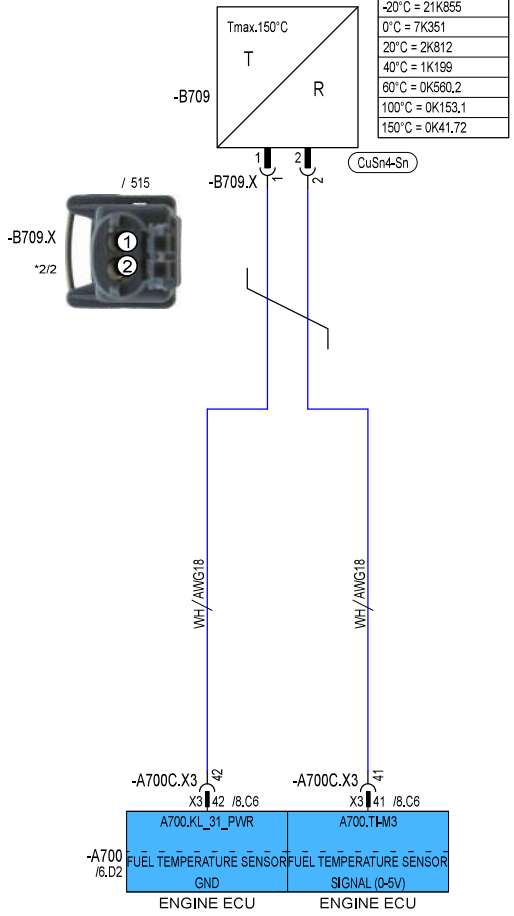
-40°C = 75K762
-20°C = 21K855
0°C = 7K351
20°C = 2K812
40°C = 1K199
60°C = 0K560,2
100°C = 0K153,1
150°C = 0K41,72



FUEL TEMPERATURE SENSOR

CONNECTOR REP. KIT: 10130062

-40°C = 75K762
-20°C = 21K855
0°C = 7K351
20°C = 2K812
40°C = 1K199
60°C = 0K560,2
100°C = 0K153,1
150°C = 0K41,72



REPLACEMENT FOR	MARKED	lmbovs0	LIEBHERR	A3	DESIGNATION	DESCRIPTION	ARTICLE CODE	SYSTEM / LOCATION
0	DATE	25.07.2016 12:14	FACTORY LMB		ELECTRICAL WIRING DIAGRAM	BOOST AIR TEMPERATURE SENSOR, COOLANT TEMPERATURE SENSOR, FUEL TEMPERATURE SENSOR	10139857	=M / +M
CONFIDENTIAL	CHECKED	lmbbua0					DRAWING NUMBER 96 002 9307 90 / INDEX 003	SHEET 13 FROM 19
	TECHNICAL REFEREE							

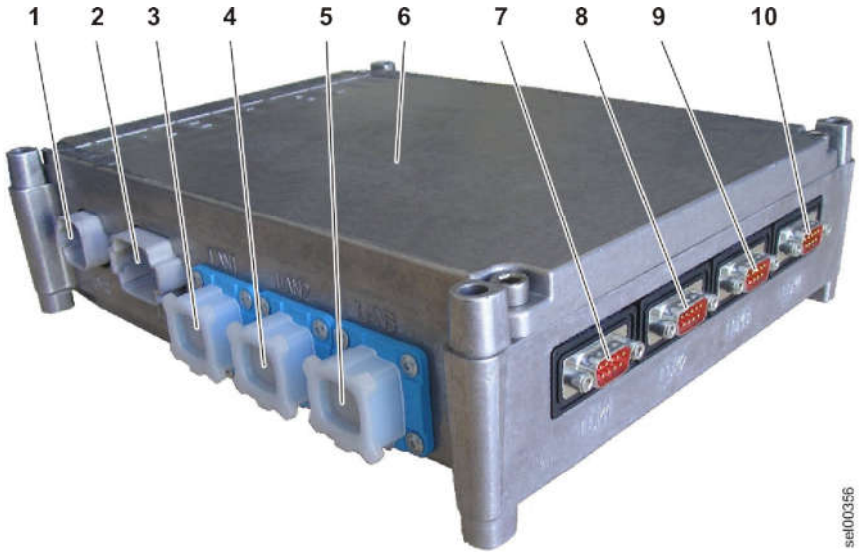


Fig. 545: Plug connections on the central control unit (Master4)

1 PWR.X plug for power supply
2 CAN.X plug for CAN connections
3 LAN 1 plug (diagnostics)
4 LAN 2 connector
5 LAN 3 connector
6 Central control unit housing
7 Connector COM1.X
8 Connector COM2.X
9 Connector COM3.X
10 Plug COM4.X for diagnostics via RS232

Plug assignment

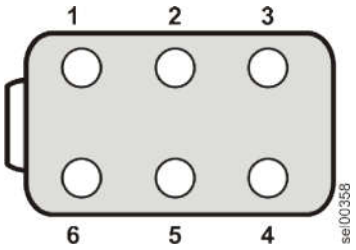


Fig. 546: PWR.X plug

1 Earth (ground)
2 Terminal 15
3 Not assigned
4 Not assigned
5 Housing earth
6 Terminal 30

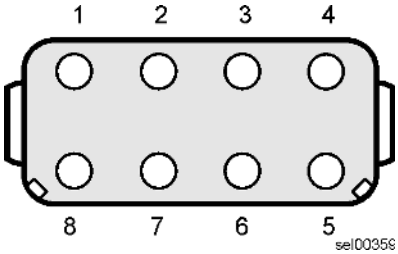


Fig. 547: CAN.X plug

1 CAN 4 low
2 CAN 3 low
3 CAN 2 low
4 CAN 1 low
5 CAN 1 high
6 CAN 2 high
7 CAN 3 high
8 CAN 4 high

2.3 Output module addresses

Module	Address	Function
Output module	SFTY	Safety function
	OD04	Digital outputs
	OA16	Analogue power outputs
	IF02	Frequency measurement inputs

Tab. 311: Output module addresses

The CAN modules are addressed using the Sculi diagnostic software.

LBH/11835199/19/211-20191218_090358/en

The following components are powered directly by the battery:
- Main fuse F01 (100 A)
- Heating flange fuse F02 (100 A)
- Emergency steering pump fuse F03 (200 A)
- Generator G3
- Starter M1

2.2 Batteries

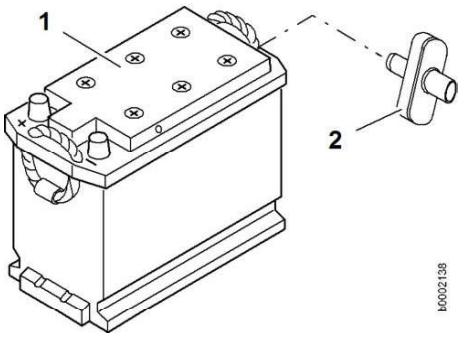


Fig. 568: Battery

1 Battery **2** Anti-ignition cap

The battery consists of six cells, each with 2 volts. These are connected in series and can produce an operating voltage of 12 volts.

The battery **1** has a central gas release and is equipped with a return safety pilot **2**.

The free ducts must be sealed with dummy plugs.

Charge levels				
Acid density at 27 °C	**Charge level**	**Battery voltage**	**Voltage per cell**	**Remark**
1.28 to 1.26	100%	over 12.60	over 2.10	Battery OK
1.25 to 1.24	75%	12.54 to 12.40	2.10 to 2.07	
1.24 to 1.18	50%	12.40 to 12.18	2.07 to 2.03	Charge battery
1.18 >	25%	12.18 >	2.03 >	Battery not OK

Tab. 316: Table of charge levels

If the machine is not started for 4 weeks, there is a risk of sulphate formation and storage deterioration on the battery. During longer standstill periods, the charge level must be regularly checked and the battery must be re-charged if necessary.

If the charge level falls below 50%, there is a risk of permanent damage to the battery.

2.3 Self-discharge of the battery

Even if the battery is not connected to any consumers, after a certain time it will be flat. This phenomenon is called self-discharge and is caused by chemical processes in the battery. The rate of self-discharge depends on the temperature, the acid-to-weight ratio and the battery technology.

LBH/11835199/19/211-20191218_090358/en

5 Auxiliary power take-off 2 (not used)
6 Hydrostat oil filter
7 Transmission valve block
12 Parking brake
13 Duct plate
14 Auxiliary power take-off 1 (not used)
19 Gear oil filter
20 Vent valve

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

Tab. 321: Test points

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

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

Tab. 322: Equipment codes

2.3.4 Change from clutch K1 to clutch K2

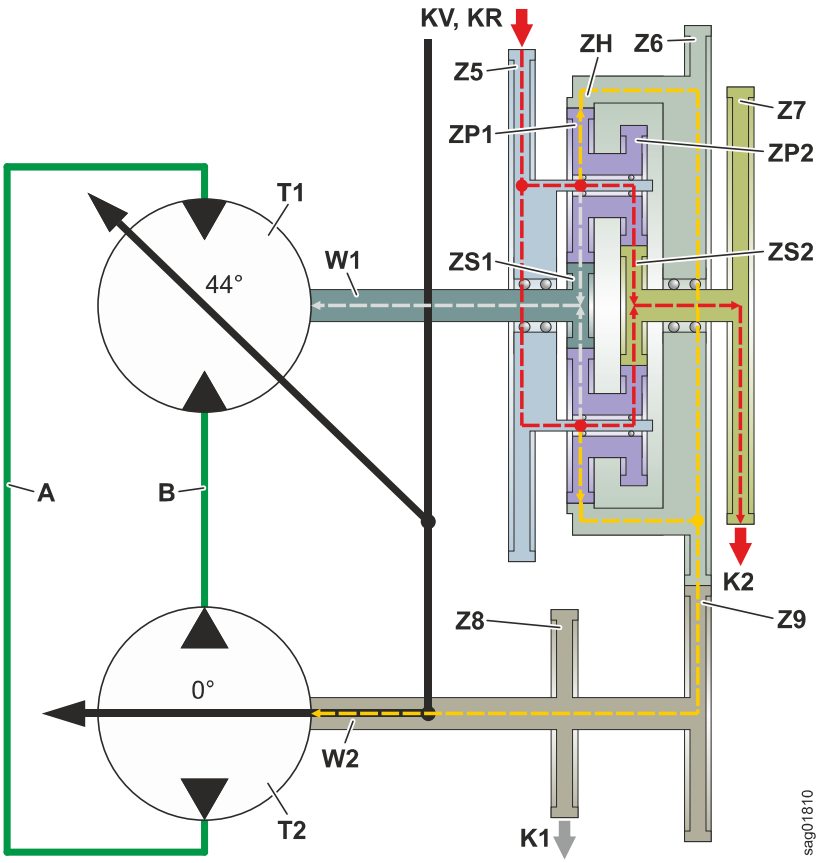


Fig. 581: Change from clutch K1 to clutch K2

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

Tab. 331: Key

At around 10 km/h the double yoke reaches its end position, with the rotary group **T1** (pump) at the maximum angle of 44°. At the same time, the rotary group **T2** (motor) is at the minimum angle of 0°, which means it does not displace any oil and therefore no longer transmits any power. The shaft **W2** is thus driven 100% mechanically. This also drives rotary group **T2** and changes its function from motor to pump. The rotary group **T1** becomes a motor.

At the same time, the clutch **K1** is opened and the clutch **K2** is closed.

6 Secondary spool for forward travel direction clutch (KV)
7 Proportional solenoid valve for 1st optional connection
8 Secondary spool valve for 1st optional connection
9 Proportional solenoid valve for reverse travel direction clutch (KR)
10 Secondary spool for reverse travel direction clutch (KR)
11 Proportional solenoid valve for clutch 1 (K1)
12 Secondary spool for clutch 1 (K1)
13 Proportional solenoid valve for 2nd optional connection
19 Port for forward travel direction clutch (KV)
20 Port for 1st optional connection
21 Port for reverse travel direction clutch (KR)
22 Port for clutch 1 (K1)
23 Port for 2nd optional connection
24 Bearing lubrication for rotary groups, rotary group 2 shaft and planetary gear assembly
25 Return line to transmission housing

BMK	Function	BMK	Function	BMK	Function
Y1	Proportional solenoid for clutch 2 (K2)	**Y3**	Proportional solenoid for 1st optional connection	**Y5**	Proportional solenoid for clutch 1 (K1)
Y2	Proportional solenoid for forward travel direction clutch (KV)	**Y4**	Proportional solenoid for reverse travel direction clutch (KR)	**Y6**	Proportional solenoid for 2nd optional connection

Tab. 336: Equipment codes

Clutches are shifted by means of transmission control valve block.

2.2 Main pressure valve

Main pressure valve **15** regulates oil flow from gear pump **16** to bearing lubrication **25** so that in front of main pressure valve **15**, a pressure of 20 bar accumulates. This pressure shifts clutches.

2.3 Pressure reducing valve

Pressure reducing valve **2** reduces pressure of control oil for secondary spool valve to 9 bar.

2.4 Proportional solenoid valves and secondary spool valve

To shift clutches, transmission control unit energises corresponding proportional solenoid valve. Proportional solenoid valve then directs control oil to secondary spool valve and to a valve and opens it. Secondary spool valve directs oil to clutch and closes it.

LBH/11835199/19/211-20191218_090358/en

120.3.5 Engine speed sensor

Valid for: L566-1484;

1.1 Layout

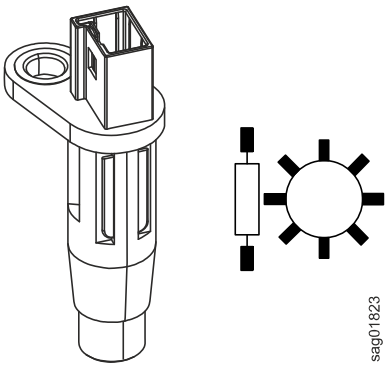


Fig. 597: Speed sensor

BMK	Function
B82	Speed sensor for sun gear 2
B83	Output speed sensor
B84	Speed sensor for reverse travel direction clutch

Tab. 346: Equipment codes

The speed sensors are installed in the transmission housing.

The speed sensors are two-pole Hall sensors.

2.1 Function

NOTICE
Hall element is damaged by resistance measurement!
Damage to speed sensor.

▶ Do not carry out any resistance measurements on the speed sensor.

The speed sensors detect speed and direction of rotation.

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When the brake is released, the oil flows back out of the pressure chamber **2**. The return spring **4** pushes the brake piston **3** back to the initial position and the brake discs **5** separate from each other. The planetary carrier **7** can turn freely again.

2.4 Lubrication

The axle is filled with oil to the bottom of the filling plug. The individual components are lubricated by dipping into the oil with each rotation.

130.1.2 Rear axle

Valid for: L566-1484;

1 Layout

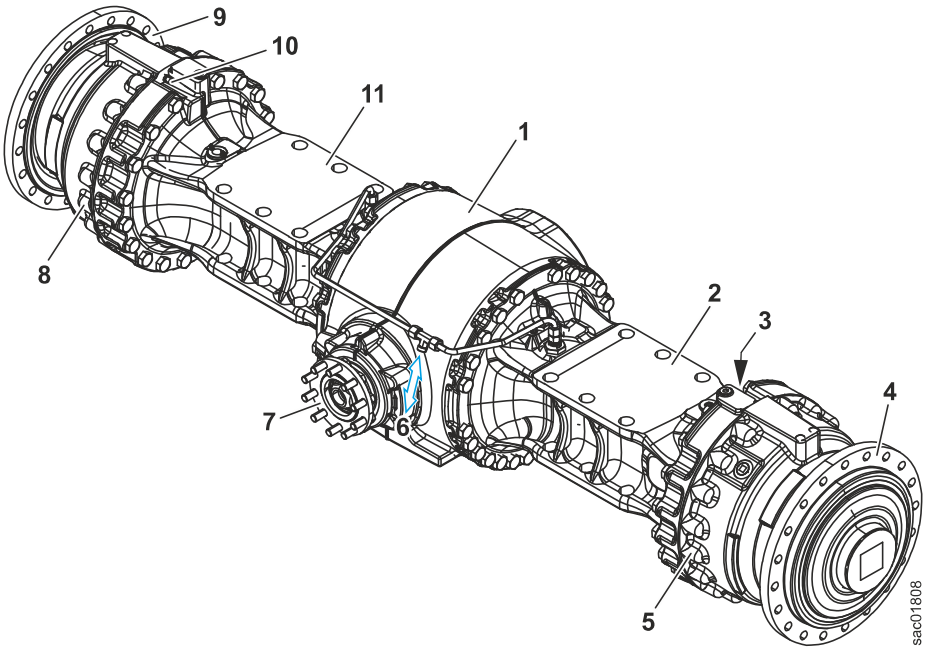

Fig. 605: Rear axle (from front left)

1 Central housing with self-locking differential
2 Left trumpet arm
3 Vent valve
4 Left wheel hub
5 Left wheel hub with planetary gear and wet disc brake (2nd brake circuit)
6 Oil from the compact brake valve (2nd brake circuit)
7 Transmission drive flange
8 Right wheel hub with planetary gear and wet disc brake (2nd brake circuit)
9 Right wheel hub
10 Vent valve
11 Right trumpet arm

The rear axle is bolted to the rear section.

The self-locking differential is integrated in the central housing. The wheel hubs contain the den service brake for the 2nd brake circuit. The service brake is a wet disc brake.

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BMK	Function	BMK	Function
F51	Fuse for controlling the linear motor	S224	*Engine hood* button
F57	Fuse for driving the linear motor	X80	Engine hood connector

Tab. 350: Designations

The linear motor opens and closes the engine hood.

The linear motor is driven by an electric motor. The electric motor uses gears to drive a cylinder that extends and retracts.

The *engine hood* button controls the opening and closing of the engine hood. This is done using a voltage signal and the corresponding input on the linear motor.

When idle, the linear motor is held by a brake. This stops the engine hood from falling shut. This brake opens when the linear motor is energised.

2.2 Safety devices

The linear motor has two internal limit switches. These limit switches prevent it from retracting or extending too far.

The linear motor has an overload detection system. If the engine hood is obstructed when opening or closing, the current consumption of the linear motor increases. The increased current consumption is detected internally. The drive is switched off.

Once an overload has been detected, the linear motor can only retract in the opposite direction.

2.3 Manual emergency operation

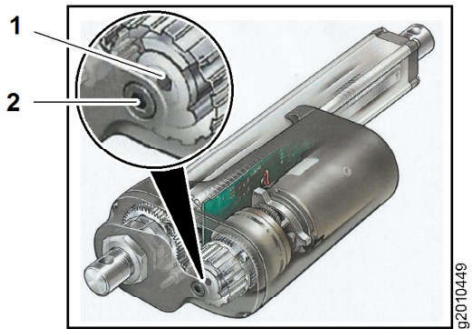

Fig. 613: Manual emergency operation

1 Drive gear **2** Plug

To carry out manual emergency operation: See the operating manual for the machine.

If the power supply fails or if there is a malfunction in the electrical system of the linear motor, the drive can be operated manually.

The drive gear **1** can be turned manually using an Allen key. To do this, the plug **2** must be removed.

For manual emergency operation, note the following:
- The power supply must be switched off during emergency actuation. (Turn off the battery main switch)
- Torque for manual operation: 6 Nm to 8 Nm

2.1.3 Closing the quick coupler

To close the quick coupler, only the quick coupler load sensing signal solenoid valve **4** is energised.

The quick coupler opening solenoid valve **2** applies pressure to the piston side of the quick coupler hydraulic locking cylinder **9**. Also, the quick coupler load sensing signal solenoid valve **3** sends a load sensing signal **8** via the control valve block to the working pump.

150.3.2.2 Overview of quick coupler hydraulics

Valid for: L566-1484/45467-51139;

1 Layout

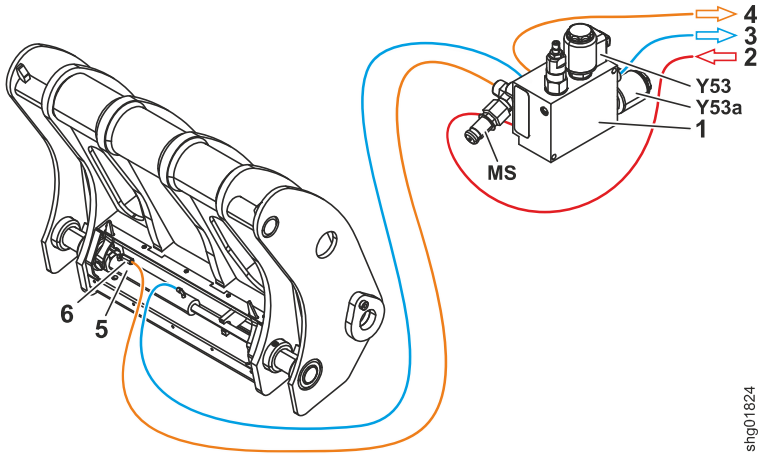

Fig. 619: Overview of the quick coupler hydraulics (from front left)

1 Valve block for quick coupler
2 Oil supply from working pump (via control valve block)
3 Return flow to control valve block
4 Load sensing signal for working pump (via control valve block)
5 Hydraulic cylinder for locking quick coupler
6 Preload valve 15 bar

Name	Test point
MS	Quick coupler closing pressure

Tab. 360: Test points

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

Tab. 361: Equipment codes

The quick coupler hydraulics consist of the following components:
– Valve block for quick coupler (For more information see: Valve block for quick coupler, page 150-13)
– Hydraulic cylinder for locking quick coupler

160 Operator's cab, heating and air conditioning

Contents

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2.2 Function of the angle sensor

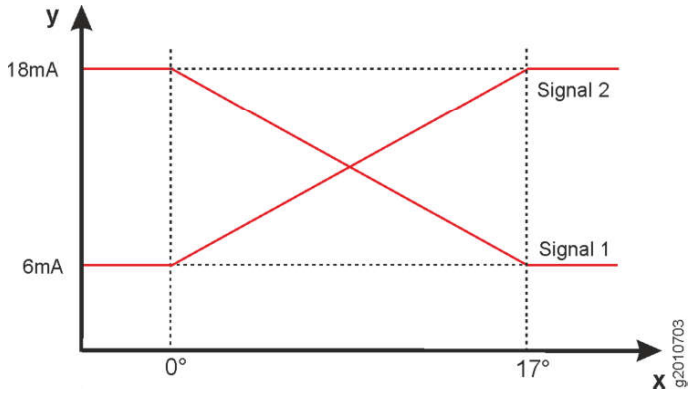

Fig. 635: Current signal characteristics

x Operating area in degrees (angle) **y** Output current in mA

The angle sensor R5 emits two mixed current signals.

When not active, the output for signal 1 is around 18 mA. When not active, the output for signal 2 is around 6 mA. The two signals add up to 24 mA in every position of the accelerator pedal.

For safety reasons, both signals are monitored by the central control unit. This prevents unwanted speed increases caused by a malfunctioning angle sensor.

If the signals deviate or if the angle sensor fails, the engine is reduced to idling speed. At the same time, a service code appears in the display.

If the accelerator pedal is replaced, it has to be calibrated. (For more information see: Pedals: calibration, page 030-178)

2.3 Plug assignment

Pin	Function	Pin	Function
A	Sensor 1 current signal	D	Sensor 2 supply voltage
B	Sensor 1 earth	E	Sensor 2 earth
C	Sensor 1 supply voltage	F	Sensor 2 current signal

Tab. 376: Pin assignment table

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2.4 Characteristic of anti-icing sensor

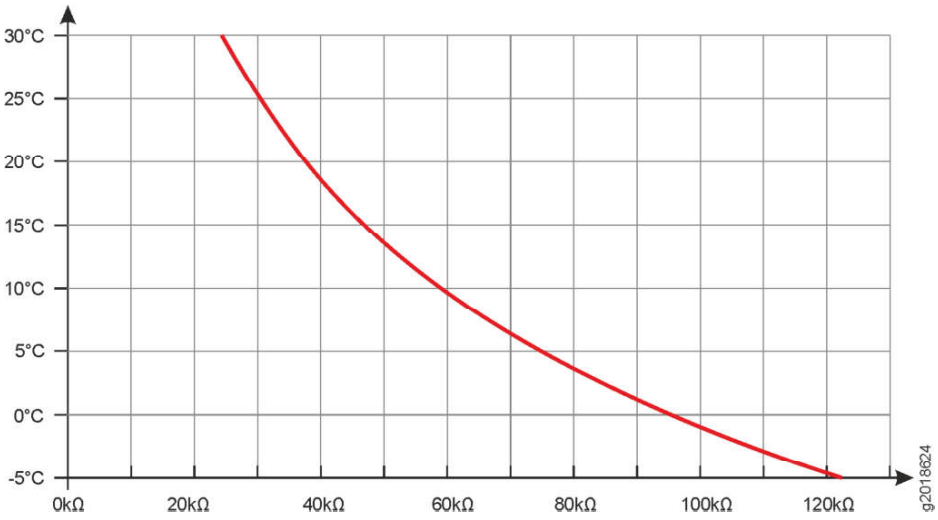

Fig. 643: Characteristic of anti-icing sensor

The anti-icing sensor **B38** is an NTC resistor. As temperature increases, electrical resistance drops.

2.5 Expansion valve

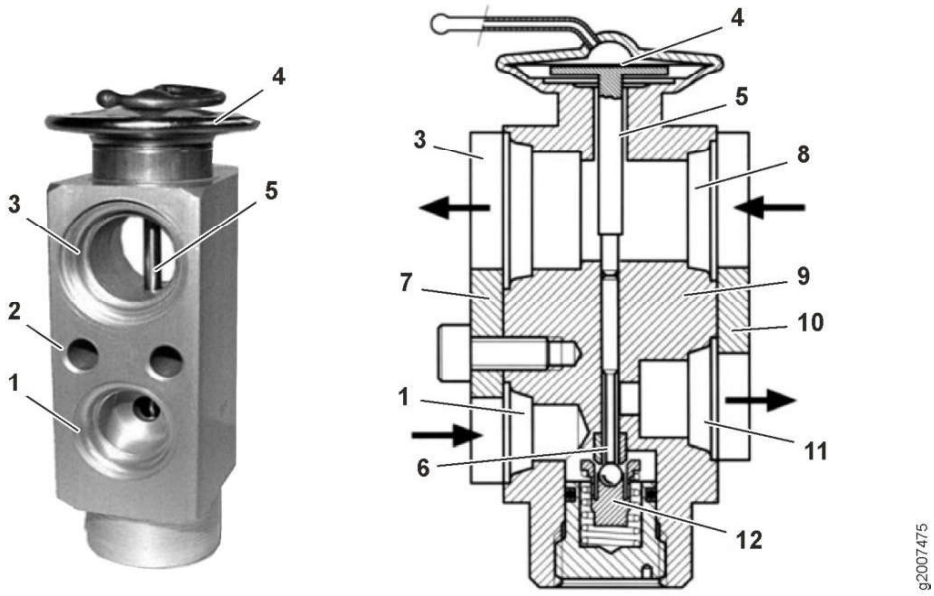

Fig. 644: Expansion valve

1	Refrigerant from dryer	**7**	Flange fastening
2	Housing	**8**	Refrigerant from compressor
3	Refrigerant to air conditioning compressor	**9**	Valve body
4	Membrane	**10**	Flange fastening
5	Thermostatic sensor	**11**	Refrigerant to compressor
6	Restrictor	**12**	Regulator valve