en **Operator's manual**

Wheeled excavator

Document ID

ORIGINAL OPERATOR'S MANUAL

Order number: 12219762
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Product ID

Manufacturer: Liebherr-Hydraulikbagger GmbH
Type: A 924 Heavy Lift Litronic
Type no.: 1206
From Serial no.: 89588

Contact

Liebherr-Hydraulikbagger GmbH
Liebherrstraße 12
D – 88457 Kirchdorf/Iller

LHB/12219762/01/2019-10-16/en

NOTICE
Malfunctions in diesel engine and exhaust treatment system!
High emission values.

- ▶ Adhere to error messages.
- ▶ Rectify malfunctions in diesel engine and exhaust treatment system immediately.

If malfunctions are not rectified:
- ▶ Take machine out of service.

NOTICE
Incorrect operation!
Damage to machine.

- ▶ Make sure that diesel engine and exhaust treatment system are operated and serviced exclusively according to operator's manual.

This CO_2 measurement results from testing over a fixed test cycle under laboratory conditions a(n) (parent) engine representative of the engine type (engine family) and shall not imply or express any guarantee of the performance of a particular engine.

Engine type	Nominal power	High idle rpm	Code	97/68/EC stage	CO_2 emissions during NRSC testing or RMC testing under standard laboratory conditions	CO_2 emissions during NRTC testing with warm start under standard laboratory conditions
D924 A7-04 SCRonly	129 kW	2200 min^{-1}	F4HFE413G*B	IV	653.45 g/kWh	640.45 g/kWh
D924 A7-14 SCRT	129 kW	2200 min^{-1}	F4HFE414G*B	IV	678.33 g/kWh	631.52 g/kWh
D934 A7-04	200 kW	1900 min^{-1}	R04LQ7103	IV	682.18 g/kWh	726.85 g/kWh
D934 A7-14	140 kW	1900 min^{-1}	R04LQ7102	IV	683.53 g/kWh	760.17 g/kWh
D934 A7-14	200 kW	1900 min^{-1}	R04LU7101	IV	671.94 g/kWh	709.80 g/kWh
D936 A7-04	320 kW	1900 min^{-1}	R06LQ7101	IV	650.74 g/kWh	694.60 g/kWh
D936 A7-14	320 kW	1900 min^{-1}	R06LU7101	IV	664.06 g/kWh	673.06 g/kWh
D944 A7-04	200 kW	1900 min^{-1}	R04KQ7102	IV	687.26 g/kWh	769.07 g/kWh
D944 A7-04	230 kW	1900 min^{-1}	R04KQ7101	IV	682.36 g/kWh	750.86 g/kWh
D944 A7-14	200 kW	1900 min^{-1}	R04KU7102	IV	686.43 g/kWh	731.46 g/kWh
D944 A7-14	230 kW	1900 min^{-1}	R04KU7101	IV	681.03 g/kWh	713.34 g/kWh
D946 A7-04	330 kW	1900 min^{-1}	R06KQ7102	IV	643.85 g/kWh	684.24 g/kWh
D946 A7-14	330 kW	1900 min^{-1}	R06KU7101	IV	669.65 g/kWh	684.04 g/kWh
D9508 A7-04	455 kW	1900 min^{-1}	V08MQ7102	IV	709.44 g/kWh	761.34 g/kWh
TCD 3.6 L4 DOConly / SCR	95 kW	2000 min^{-1}	CFXI95BU	IV	713.39 g/kWh	730.75 g/kWh

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Lift Capacities
with Two-Piece Boom 5.80 m HD

Stick 2.25 m

m	Undercarriage stabilized rear	front	3.0 m		4.5 m		6.0 m		7.5 m		9.0 m		m
9.0	–	–			7.4*	7.4*							4.6
	Blade	Outriggers			7.4*	7.4*							
	Outriggers	Outriggers			7.4*	7.4*							
7.5	–	–			8.6*	8.6*	5.9	7.5*					6.4
	Blade	Outriggers			8.6*	8.6*	7.5*	7.5*					
	Outriggers	Outriggers			8.6*	8.6*	7.5*	7.5*					
6.0	–	–			8.9*	8.9*	6.0	8.1	4.0	5.5			7.5
	Blade	Outriggers			8.9*	8.9*	8.4*	8.4*	5.7*	5.7*			
	Outriggers	Outriggers			8.9*	8.9*	8.4*	8.4*	5.7*	5.7*			
4.5	–	–	16.1	16.7*	8.9	11.4*	6.0	7.9	4.1	5.6			8.2
	Blade	Outriggers	16.7*	16.7*	11.4*	11.4*	8.8	9.0*	6.3	7.7*			
	Outriggers	Outriggers	16.7*	16.7*	11.4*	11.4*	9.0*	9.0*	7.7*	7.7*			
3.0	–	–	15.3	16.6*	8.6	11.8	5.9	7.8	4.1	5.6			8.6
	Blade	Outriggers	16.6*	16.6*	13.2	13.3*	8.7	9.8*	6.3	7.9*			
	Outriggers	Outriggers	16.6*	16.6*	13.3*	13.3*	9.8*	9.8*	7.6	7.9*			
1.5	–	–	15.1	16.9*	8.5	11.6	5.9	7.7	3.9	5.4			8.6
	Blade	Outriggers	16.9*	16.9*	13.0	14.2*	8.6	10.3*	6.2	8.1*			
	Outriggers	Outriggers	16.9*	16.9*	14.2*	14.2*	10.3*	10.3*	7.6	8.1*			
0	–	–	15.1	19.9*	8.4	11.6	5.6	7.8	3.8	5.3			8.4
	Blade	Outriggers	19.9*	19.9*	13.0	14.3*	8.7	10.3*	6.0	8.1*			
	Outriggers	Outriggers	19.9*	19.9*	14.3*	14.3*	10.3	10.3*	7.5	8.1*			
−1.5	–	–	14.6	22.9	8.1	11.7	5.3	7.4	3.6	5.1			7.9
	Blade	Outriggers	23.0*	23.0*	13.3	14.4*	8.5	10.5*	5.8	7.6*			
	Outriggers	Outriggers	23.0*	23.0*	14.4*	14.4*	10.5	10.5*	7.3	7.6*			
−3.0	–	–	14.5	23.6	7.8	11.4	5.0	7.1					7.1
	Blade	Outriggers	23.7*	23.7*	13.2	14.9*	8.1	9.7*					
	Outriggers	Outriggers	23.7*	23.7*	14.9*	14.9*	9.7*	9.7*					
−4.5	–	–	14.2	19.3*	7.5	9.8*							5.0
	Blade	Outriggers	19.3*	19.3*	9.8*	9.8*							
	Outriggers	Outriggers	19.3*	19.3*	9.8*	9.8*							

Stick 2.45 m

m	Undercarriage stabilized rear	front	3.0 m		4.5 m		6.0 m		7.5 m		9.0 m		m
9.0	–	–			7.7*	7.7*							4.9
	Blade	Outriggers			7.7*	7.7*							
	Outriggers	Outriggers			7.7*	7.7*							
7.5	–	–					6.0	7.4*					6.7
	Blade	Outriggers					7.4*	7.4*					
	Outriggers	Outriggers					7.4*	7.4*					
6.0	–	–			8.0*	8.0*	6.0	8.1	4.1	5.6			7.8
	Blade	Outriggers			8.0*	8.0*	8.2*	8.2*	6.3	6.3*			
	Outriggers	Outriggers			8.0*	8.0*	8.2*	8.2*	6.3*	6.3*			
4.5	–	–	14.0*	14.0*	8.9	11.0*	5.9	7.9	4.1	5.6			8.4
	Blade	Outriggers	14.0*	14.0*	11.0*	11.0*	8.8*	8.8*	6.4	7.6*			
	Outriggers	Outriggers	14.0*	14.0*	11.0*	11.0*	8.8*	8.8*	7.6*	7.6*			
3.0	–	–	15.3	16.9*	8.6	11.7	5.8	7.8	4.1	5.6			8.8
	Blade	Outriggers	16.9*	16.9*	13.0*	13.0*	8.7	9.6*	6.3	7.8*			
	Outriggers	Outriggers	16.9*	16.9*	13.0*	13.0*	9.6*	9.6*	7.6	7.8*			
1.5	–	–	15.1	16.7*	8.5	11.5	5.8	7.7	4.0	5.5			8.8
	Blade	Outriggers	16.7*	16.7*	13.0	14.1*	8.6	10.2*	6.2	8.0*			
	Outriggers	Outriggers	16.7*	16.7*	14.1*	14.1*	10.2*	10.2*	7.6	8.0*			
0	–	–	15.1	19.4*	8.4	11.6	5.6	7.8	3.8	5.3			8.6
	Blade	Outriggers	19.4*	19.4*	13.0	14.2*	8.6	10.3*	6.0	8.0*			
	Outriggers	Outriggers	19.4*	19.4*	14.2*	14.2*	10.2	10.3*	7.5	8.0*			
−1.5	–	–	14.6	22.7*	8.1	11.7	5.3	7.5	3.6	5.1			8.2
	Blade	Outriggers	22.7*	22.7*	13.2	14.3*	8.5	10.4*	5.8	7.9*			
	Outriggers	Outriggers	22.7*	22.7*	14.3*	14.3*	10.4	10.4*	7.3	7.9*			
−3.0	–	–	14.4	23.4	7.9	11.5	5.0	7.1					7.3
	Blade	Outriggers	23.5*	23.5*	13.2	14.8*	8.1	10.1*					
	Outriggers	Outriggers	23.5*	23.5*	14.8*	14.8*	10.1*	10.1*					
−4.5	–	–	14.2	20.8*	7.5	11.0							5.4
	Blade	Outriggers	20.8*	20.8*	11.1*	11.1*							
	Outriggers	Outriggers	20.8*	20.8*	11.1*	11.1*							

Stick 2.65 m

m	Undercarriage stabilized rear	front	3.0 m		4.5 m		6.0 m		7.5 m		9.0 m		m
9.0	–	–			7.6*	7.6*							5.3
	Blade	Outriggers			7.6*	7.6*							
	Outriggers	Outriggers			7.6*	7.6*							
7.5	–	–					6.0	7.1*					7.0
	Blade	Outriggers					7.1*	7.1*					
	Outriggers	Outriggers					7.1*	7.1*					
6.0	–	–			7.2*	7.2*	6.1	7.7*	4.1	5.6			8.0
	Blade	Outriggers			7.2*	7.2*	7.7*	7.7*	6.3	6.5*			
	Outriggers	Outriggers			7.2*	7.2*	7.7*	7.7*	6.5*	6.5*			
4.5	–	–	9.9*	9.9*	8.9	9.6*	5.9	7.9	4.2	5.7			8.6
	Blade	Outriggers	9.9*	9.9*	9.6*	9.6*	8.6*	8.6*	6.4	7.4*			
	Outriggers	Outriggers	9.9*	9.9*	9.6*	9.6*	8.6*	8.6*	7.4*	7.4*			
3.0	–	–	15.4	17.3*	8.6	11.7	5.8	7.7	4.1	5.6			9.0
	Blade	Outriggers	17.3*	17.3*	12.7*	12.7*	8.6	9.5*	6.3	7.7*			
	Outriggers	Outriggers	17.3*	17.3*	12.7*	12.7*	9.5*	9.5*	7.6	7.7*			
1.5	–	–	15.0	16.6*	8.4	11.5	5.8	7.6	4.0	5.5	2.8	3.9	9.0
	Blade	Outriggers	16.6*	16.6*	12.9	14.0*	8.5	10.1*	6.2	8.0*	4.5	5.2*	
	Outriggers	Outriggers	16.6*	16.6*	14.0*	14.0*	10.1*	10.1*	7.5	8.0*	5.2*	5.2*	
0	–	–	15.0	19.0*	8.4	11.5	5.6	7.7	3.8	5.3			8.8
	Blade	Outriggers	19.0*	19.0*	12.9	14.1*	8.6	10.2*	6.1	8.0*			
	Outriggers	Outriggers	19.0*	19.0*	14.1*	14.1*	10.2	10.2*	7.5	8.0*			
−1.5	–	–	14.6	22.3*	8.1	11.7	5.4	7.5	3.6	5.1			8.4
	Blade	Outriggers	22.3*	22.3*	13.1	14.2*	8.6	10.3*	5.8	8.0*			
	Outriggers	Outriggers	22.3*	22.3*	14.2*	14.2*	10.3	10.3*	7.3	8.0*			
−3.0	–	–	14.3	23.2	7.9	11.5	5.0	7.1	3.5	5.0			7.6
	Blade	Outriggers	23.3*	23.3*	13.3	14.6*	8.2	10.4*	5.5*	5.5*			
	Outriggers	Outriggers	23.3*	23.3*	14.6*	14.6*	10.4*	10.4*	5.5*	5.5*			
−4.5	–	–	14.2	22.1*	7.5	11.0							5.9
	Blade	Outriggers	22.1*	22.1*	12.3*	12.3*							
	Outriggers	Outriggers	22.1*	22.1*	12.3*	12.3*							

Stick 3.05 m

m	Undercarriage stabilized rear	front	3.0 m		4.5 m		6.0 m		7.5 m		9.0 m		m
9.0	–	–											5.9
	Blade	Outriggers											
	Outriggers	Outriggers											
7.5	–	–					6.1	6.4*					7.4
	Blade	Outriggers					6.4*	6.4*					
	Outriggers	Outriggers					6.4*	6.4*					
6.0	–	–					6.1	6.6*	4.2	5.7			8.4
	Blade	Outriggers					6.6*	6.6*	6.1*	6.1*			
	Outriggers	Outriggers					6.6*	6.6*	6.1*	6.1*			
4.5	–	–			7.6*	7.6*	5.9	7.7*	4.3	5.7	2.9	3.9*	9.0
	Blade	Outriggers			7.6*	7.6*	7.7*	7.7*	6.4	7.1*	3.9*	3.9*	
	Outriggers	Outriggers			7.6*	7.6*	7.7*	7.7*	7.1*	7.1*	3.9*	3.9*	
3.0	–	–	15.5	17.9*	8.6	11.8	5.8	7.7	4.2	5.7	2.9	4.0	9.3
	Blade	Outriggers	17.9*	17.9*	12.1*	12.1*	8.6	9.1*	6.3	7.5*	4.6	5.6*	
	Outriggers	Outriggers	17.9*	17.9*	12.1*	12.1*	9.1*	9.1*	7.5*	7.5*	5.6*	5.6*	
1.5	–	–	15.0	16.7*	8.4	11.5	5.7	7.6	4.1	5.6	2.8	3.9	9.4
	Blade	Outriggers	16.7*	16.7*	12.9	13.7*	8.5	9.9*	6.3	7.8*	4.5	6.4*	
	Outriggers	Outriggers	16.7*	16.7*	13.7*	13.7*	9.9*	9.9*	7.5	7.8*	5.6	6.4*	
0	–	–	14.9	18.3*	8.3	11.4	5.7	7.6	3.9	5.4	2.7	3.8	9.2
	Blade	Outriggers	18.3*	18.3*	12.8	14.0*	8.5	10.1*	6.1	7.9*	4.4	6.1*	
	Outriggers	Outriggers	18.3*	18.3*	14.0*	14.0*	10.1	10.1*	7.5	7.9*	5.5	6.1*	
−1.5	–	–	14.6	21.4*	8.1	11.6	5.4	7.6	3.7	5.1			8.8
	Blade	Outriggers	21.4*	21.4*	13.0	14.1*	8.6	10.2*	5.9	8.0*			
	Outriggers	Outriggers	21.4*	21.4*	14.1*	14.1*	10.2	10.2*	7.4	8.0*			
−3.0	–	–	14.3	22.9	7.9	11.5	5.0	7.2	3.5	5.0			8.0
	Blade	Outriggers	23.0*	23.0*	13.2	14.4*	8.2	10.5*	5.7	6.9*			
	Outriggers	Outriggers	23.0*	23.0*	14.4*	14.4*	10.4	10.5*	6.9*	6.9*			
−4.5	–	–	14.3	23.4	7.5	11.0	4.8	6.9					6.6
	Blade	Outriggers	23.5*	23.5*	12.8	13.7*	7.7*	7.7*					
	Outriggers	Outriggers	23.5*	23.5*	13.7*	13.7*	7.7*	7.7*					

Height **Can be slewed through 360°** **In longitudinal position of undercarriage** **Max. reach** *** Limited by hydr. capacity**

With PowerLift 380 bar the lift capacities on the load lift hook of the Liebherr quick coupler SWA 48 without attachment are stated in metric tons (t) and are valid on a firm, level supporting surface with blocked oscillating axle. These capacities can be slewed through 360° with the undercarriage in the transverse position. Capacities in the longitudinal position of the undercarriage (+/– 15°) are specified over the steering axle with the stabilizers raised and over the rigid axle with the stabilizers down. The values apply when the adjusting cylinder is in the optimal position. Indicated loads based on the ISO 10567 standard and do not exceed 75 % of tipping or 87 % of hydraulic capacity, or are limited by the permissible load of the load lift hook on the quick coupler (max. 12 t). Without the quick coupler, lift capacities will increase by up to 226 kg.

In accordance with the harmonised European Standard EN 474-5, hydraulic excavators used for lifting operations must be equipped with pipe fracture safety valves, an overload warning device, a load lift hook and a lift capacity chart.

Wheeled Excavator

A 924 Heavy Lift

Litronic®

Operating Weight:
26,500 – 28,000 kg

Engine:
160 kW / 217 HP

Stage IV

Bucket Capacity:
0.75 – 1.70 m³

LIEBHERR

Attachment

Boom lights, 2 pieces, halogen	•
Boom lights, 2 pieces, LED	+
High pressure circuit incl. unpressurised return line and Tool Control	+
Electronic lift limitation	•
Leak oil line, additional for working tools	+
Liebherr ditch cleaning bucket	+
Liebherr quick coupler, hydraulic or mechanical	+
Liebherr tilt bucket	+
Liebherr tilt rotator	+
Liebherr sorting grab	+
Liebherr backhoe bucket	+
Liebherr tooth system	+
Liebherr clamshell grab	+
Medium pressure circuit incl. lines	+
Pipe fracture safety valves hoist cylinders	•
Pipe fracture safety valve tipping cylinder	+
Pipe fracture safety valve stick cylinder	•
Return line, pressureless (in high pressure circuit option included)	+
Hose quick coupling at end of stick	•
Quick coupling system LIKUFIX	+
Protection for bottom side of stick	+
Tool Control, 10 tool adjustments selectable over the display	+
Overload warning device	•
Two-piece boom, HD version	•

Complete Machine

Lubrication	
Lubrication undercarriage, manually – decentralised (grease points)	•
Central lubrication system for uppercarriage and attachment, automatically (without quick coupler and connecting link)*	•
Central lubrication system, extension for quick coupler	+
Central lubrication system, extension for connecting link	+
Special coating	
Custom painting for tools	+
Special coating, variants	+
Monitoring	
Rear view monitoring with camera	•
Side view monitoring with camera	•

• = Standard, + = Option
* = country-dependent

Options and/or special attachments, supplied by vendors other than Liebherr, are only to be installed with the knowledge and approval of Liebherr in order to retain warranty.

2.3.7 Refrigeration technician

Responsibility

The refrigeration technician is responsible for the following:
- Read operator's manual.
- Read supplied documentation.
  - Operator's manuals for components
  - Operator's manuals from third party manufacturers
  - Additional instructions
- Maintain and repair machine for safe and reliable function.
- Execute all maintenance tasks and repair tasks specified for the refrigeration technician in the maintenance and inspection schedule.
- Isolate battery main switch of power supply system and secure it against switching on again.
- Clearly define and label working position.
- Wear personal protective equipment.
- Use tools suitable for the work deployment.
- Adhere to safety regulations at place of use.
- Report all changes to machine that affect safety to operating company.
- Exclusively perform retrofittings of machine after consultation with manufacturer.
- Use original Liebherr spare parts wherever possible.

Requirement

The refrigeration technician has following qualification and skills:
- Has completed the legally specified minimum age.
- Is physically and mentally capable of maintaining the machine.
  - Satisfactory eyesight
  - Satisfactory hearing ability
  - Quick reactions
  - 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.

2.3.8 Slinger

Responsibility

The slinger is responsible for the following:
- Wear personal protective equipment.
- Choose correct and undamaged slinging gear.

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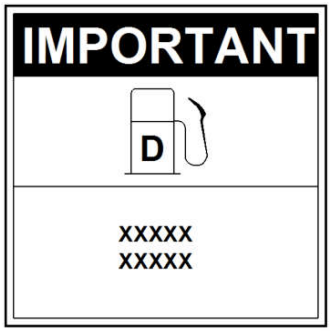
Sign	Description
	**Fuel tank** Read notes in operator's manual. Indicates maximum permitted sulphur content in fuel.
	**Diesel exhaust fluid tank** Applies to machines with SCR system. Read notes in operator's manual. Indicates prescribed diesel exhaust fluid.
	**Step lighting** Indicates step lighting button.

Tab. 9: Information signs

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Burns

Incorrect maintenance

– Shut off engine before any maintenance or repair.

Hot pressurised engine cooling system

– Do not touch coolant and parts carrying coolant.
– Let the cover and parts carrying coolant cool down.

Incorrect heat protection

– Make sure that all holders and protective shields against vibration, chafing and heat build-up have been installed correctly.

Incorrect charging of battery

– Do not smoke.
– Avoid naked flames.
– Wear safety glasses.
– Put on protective gloves.

Incorrect handling of flammable liquids

– Exclusively transport flammable liquids on the machine in the designated tanks.
– Make sure that no oil squirts out of leaks.
– Regularly check lines, hoses and screwed connections for leaks and damage.
– Immediately seal leaks.
– Immediately replace damaged parts.

Incorrect refuelling

– Before refuelling, shut off diesel engine.
– Before refuelling, switch off auxiliary heater (option).
– Do not smoke.
– Avoid naked flames.
– Do not touch fuels with your skin.
– Do not inhale fuel vapours.

Damage to machine

– Before placing machine under heavy load, make sure that machine is at operating temperature.

Environmental pollution

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

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Symbol	Description	Symbol	Description
	Lowering bottom dump shovel		Inserting pipe
	Tilting bucket out		Activating pipe grab
	Tilting bucket in		Opening pipe grab
	Magnet system		Closing pipe grab
	Mowing bucket		Activating pipe-laying tool
	Chainsaw		Turning pipe-laying tool to the left
	Mill		Turning pipe-laying tool to the right
	Turning mulcher		Lifting shear
	Reversing mulcher		Opening shear
	Pneumatic load lift hook		Closing shear
	Tilting bucket		Lowering shear
	Activating tiltrotator		

Tab. 13: Working tools

Symbol	Meaning
	Hoist cylinder shut-off active
	Hoist cylinder shut-off bypassed
	Height limitation bypassed, height limitation switched off
	Height limitation; upper shut-off point reached
	Depth limitation; lower shut-off point reached
	Overload warning, permitted load level reached Load moment limitation; limitation initiated
	Overload warning system not active
	Load moment limitation bypassed; load moment limitation switched off
	Load moment limitation; shut-off initiated
	Backward Stability; shut-off initiated
	Magnet system blocked
	Air compressor
	Undefined sensor; neutral position required
	General hydraulic supplementary circuit; neutral position required

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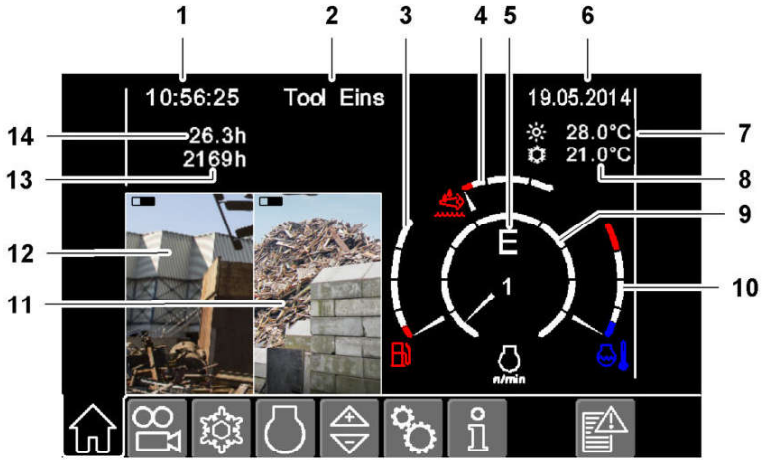

Fig. 371: Start page menu

1	Time	**8**	Selected cab temperature
2	Selected working tool	**9**	Rev counter
3	Fill level in fuel tank	**10**	Coolant temperature
4	Fill level in diesel exhaust fluid tank	**11**	Image of side area camera
5	Operating mode	**12**	Image of rear area camera
6	Date	**13**	Total operating hours
7	Outside temperature	**14**	Daily operating hours

If *servo control* key is switched off, following values appear on the display:
- Daily kilometres instead of daily operating hours **14**
- Total kilometres instead of total operating hours **13**
- Speedometer instead of rev counter **9**

3.2.4 *Camera* menu

Menu call: 

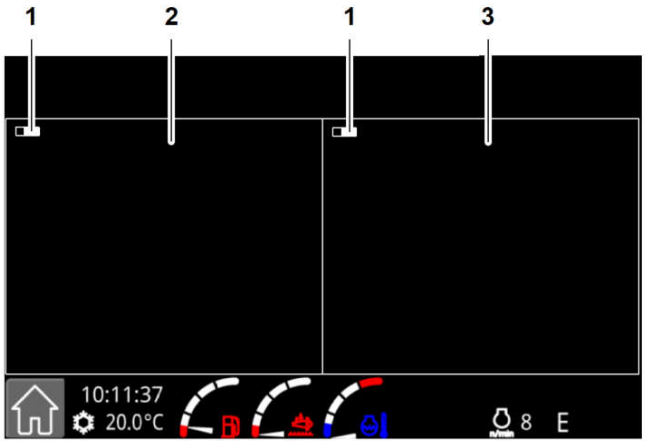

Fig. 373: Camera menu

1	Activity indicator		
2	Image of rear area camera	**3**	Image of side area camera

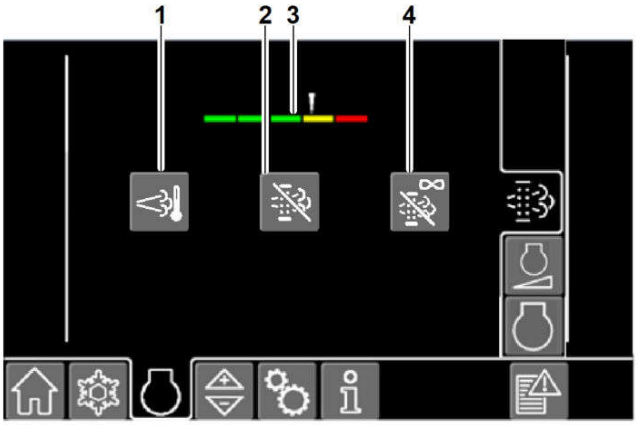

Fig. 402: Diesel particulate filter submenu

1 *Activating regeneration* button
2 *Blocking regeneration* button
3 Contamination level
4 *Blocking regeneration permanently* button

The regeneration can be activated or blocked depending on contamination level of the diesel particulate filter. (For more information see: 5.8.9 Diesel particulate filter: Activating and deactivating regeneration, page 322)

3.2.9 *Sensor-controlled low idle automatic and automatic engine stop* submenu (option)

Menu call: >

The display of this submenu varies depending on machine configuration:

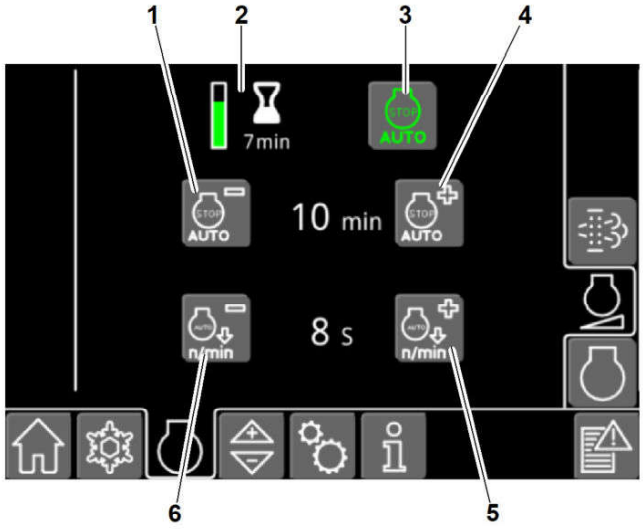

Fig. 403: Sensor-controlled low idle automatic and automatic engine stop submenu

1 *Reducing idling time until automatic engine stop* button
4 *Increasing idling time until automatic engine stop* button

See next page for continuation of the image legend

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3.2.25 *Electrical inputs* submenu

Menu call: > >

The display of this submenu varies depending on machine configuration:

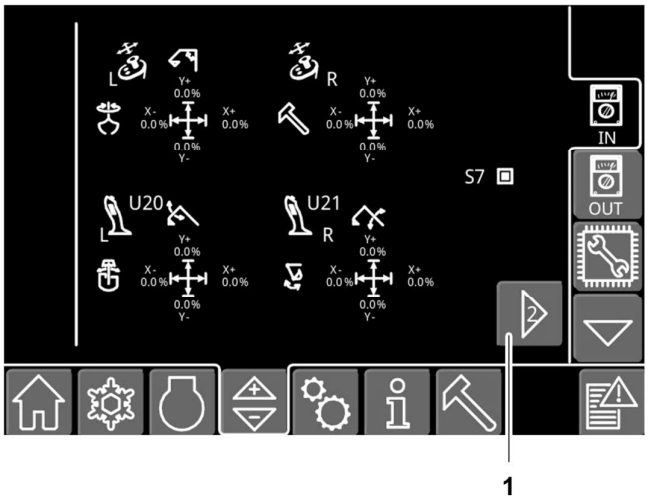


Fig. 433: Electrical inputs submenu

1 *Scroll* button

The *electrical inputs* submenu provides a quick overview for Liebherr customer service. It shows the operating status of the electrical inputs.

3.2.26 *Function settings* menu

Menu call:

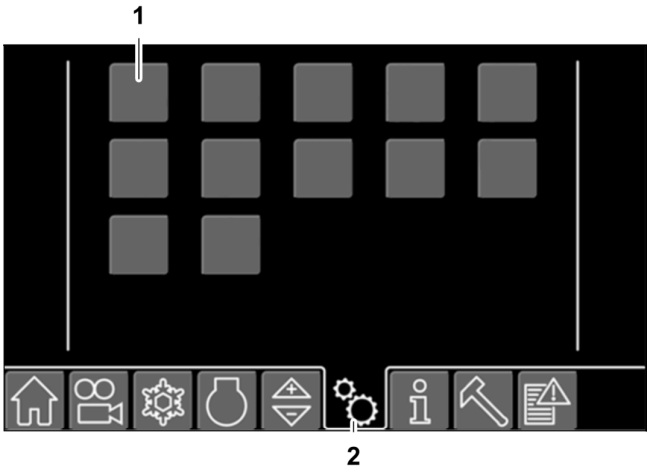


Fig. 434: Function settings menu

1 Menu buttons **2** *Function settings* menu

Quantity of menu buttons on the display depends on machine type and equipment.

3.2.36 *Information* menu

Menu call: 

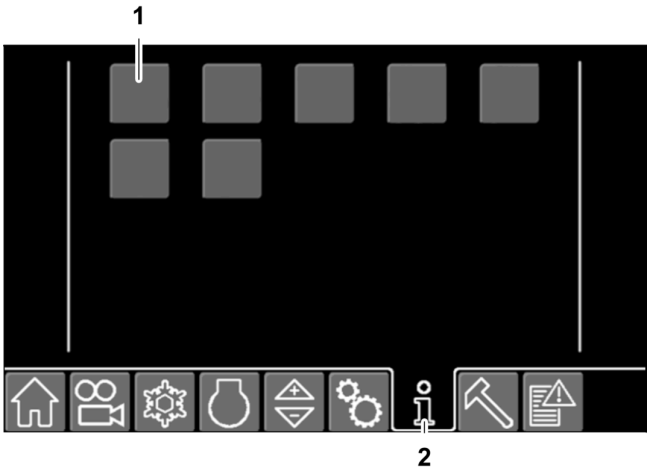
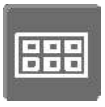


Fig. 472: Information menu

1 Menu buttons **2** *Information* menu

Quantity of menu buttons on the display depends on machine type and equipment.

Menu buttons	Description
	Operating time (For more information see: 3.2.37 *Operating time* submenu, page 114)
	Fuel consumption (For more information see: 3.2.38 *Fuel consumption* submenu, page 114)
	Power consumption
	Key assignment (For more information see: 3.2.39 *Key assignment* submenu, page 115)
	Rail operation odometer
	Road travel position

Tab. 41: Information menu

▶ Move folding console **4** down with console handle **1** until folding console **4** engages audibly.
▷ Safety barrier **2** unfolds.

Deactivating servo control

NOTICE
Incorrect operation!
Damage to folding console.

▶ Exclusively unlock folding console with unlocking button.

DANGER
Defective folding console!
Danger to life.

▶ Contact Liebherr customer service immediately.

▶ Press unlocking button **3**.
▷ Folding console **4** moves upwards.
▷ Safety barrier **2** retracts.

If folding console does not properly fold up after being unlocked:
▶ Contact Liebherr customer service.

3.3.6 Operator's seat

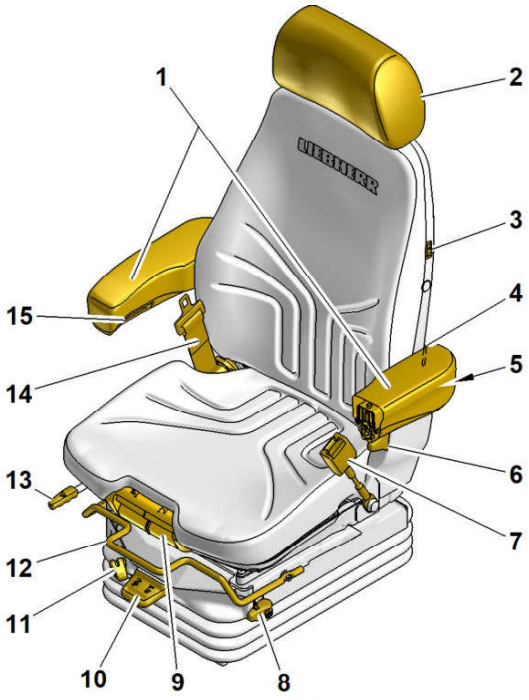


Fig. 498: Operator's seat

1 Armrest
2 Head restraint
9 Adjusting seat cushion
10 Adjusting seat height [17)]

See next page for continuation of the image legend

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3.3.9 Ignition key

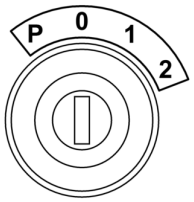

Fig. 517: Ignition key positions

P	Park position	**1**	Start position
0	0 position	**2**	Emergency start

Ignition key positions	Function
Park position	Cab lighting system, radio, socket (12 V)
0 position	-
Start position	Control system autocheck, preglowing, starting diesel engine
Emergency start	Emergency starting of diesel engine

Tab. 44: Ignition key positions

Note
Extended downtimes!
Discharged battery.

▶ Pull out key.

3.3.10 Confirmation button

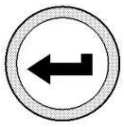

Fig. 518: Confirmation button

Several functions of machine require a confirmation (for example for functions of shut-offs and limitations):
– Activating functions
– Deactivating functions
– Changing the settings of functions

Activating function via key on control unit

▶ Preselect function: Press corresponding key on control unit.
▷ *Confirmation required* status symbol appears on the display:

▷ LEDs in key flash.

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Adjusting side camera

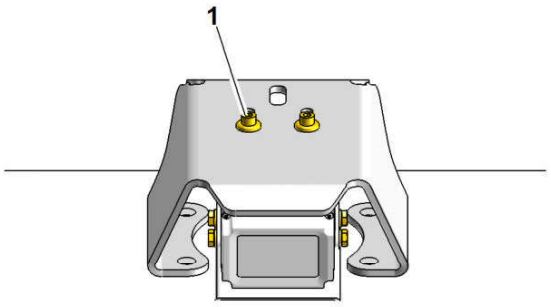

Fig. 545: Adjusting side camera

1 Fixing screw

▶ Adjust camera.

If field of vision is not displayed correctly on the display:
▶ Contact Liebherr customer service.

Adjusting rear area camera

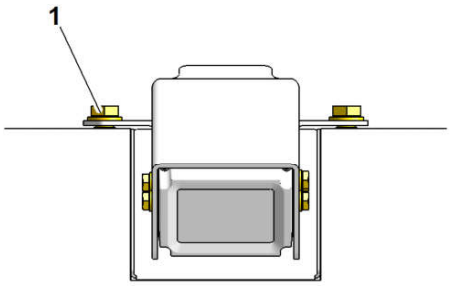

Fig. 546: Adjusting rear area camera

1 Fixing screw

▶ Adjust camera.

If field of vision is not displayed correctly on the display:
▶ Contact Liebherr customer service.

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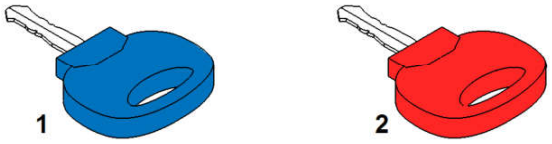


Fig. 581: Blue ignition key and red master key

1 Blue ignition key **2** Red master key

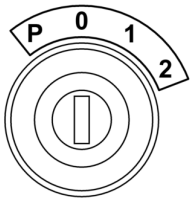
Note
The red master key is used exclusively to teach in or delete blue ignition keys.

- ▶ Keep red master key in safe place (for example with operator).
- ▶ Hand blue ignition keys to operator.

Teaching in ignition keys

A maximum of 10 ignition keys can be taught in.

To create a general key (for example for a fleet), an ignition key can be taught in on multiple immobilisers.



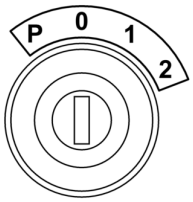
- ▶ Use red master key **2** to set starting switch to 1.
- ▶ Wait 5 seconds.
- ▶ Use red master key **2** to set starting switch to 0.
- ▶ Pull out red master key **2**.
  ▷ Blue ignition keys **1** can be taught in for 20 seconds.
- ▶ Use blue ignition key **1** to set starting switch to 1.
- ▶ Wait 1 second.
  ▷ Blue ignition key **1** is taught in.

Troubleshooting
Blue ignition key is not taught in?
Too many invalid blue ignition keys actuated in starting switch.

- ▶ Wait 15 minutes.
- ▶ Teach in blue ignition key **1** again.

- ▶ Use blue ignition key **1** to set starting switch to 0.
- ▶ Pull out blue ignition key **1**.
- ▶ Teach in additional blue ignition key: Repeat last four steps.

Activating immobiliser



- ▶ Use blue ignition key **1** to set starting switch to 0.
  ▷ Immobiliser is activated.

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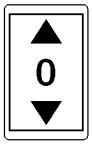
Switch position		Symbol	Travel direction
	Top		Reverse
	0		Neutral
	Bottom		Forward

Tab. 55: Travel direction switch and status symbols

Travelling

WARNING
Steering directions reversed!
Injuries.

▶ Align uppercarriage so that the oscillating axle is in front during forward travel.

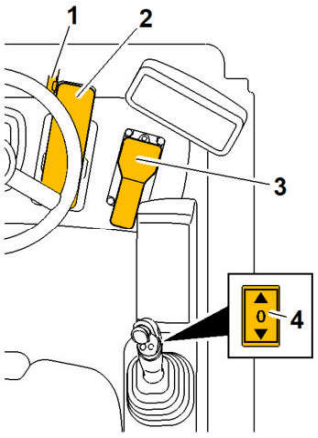


Fig. 621: Control elements

1 Retainer
2 Pedal of service brake
3 Accelerator pedal
4 Travel direction switch

Travelling forward

▶ Turn operator's cab over oscillating axle.

If parking brake is applied:
▶ Press *parking brake* key.

If service brake is locked:
▶ Press retainer **1** downward.

▶ Press accelerator pedal **3** slowly.

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DANGER
Machine tipping over!
Danger to life

When working with the machine:
▶ Unlock oscillating axle in controlled fashion and exclusively temporarily.

Make sure the following preconditions are met:

❑ Oscillating axle switch is in unlocked position.
❑ Uppercarriage is in locked slewing range (> α).

▶ Press and hold switch or button.
▷ Oscillating axle is unlocked.

▶ Release switch or button.
▷ Oscillating axle is locked.

3.4.25 Supporting machine

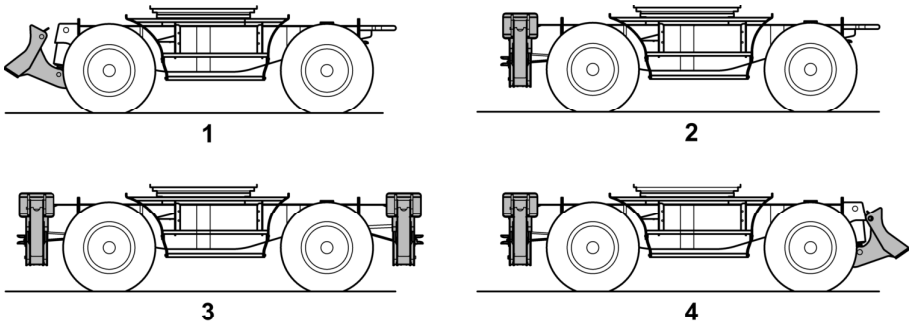

Fig. 661: Support variants

1	Blade support on rigid axle side	**3**	Outrigger support on oscillating axle and rigid axle side
2	Outrigger support on rigid axle side	**4**	Outrigger support and blade support

Note
The way the control elements are assigned depends on the machine equipment.

▶ Adhere to control description sticker in operator's cab.

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3.4.29 Positioning slewing brake

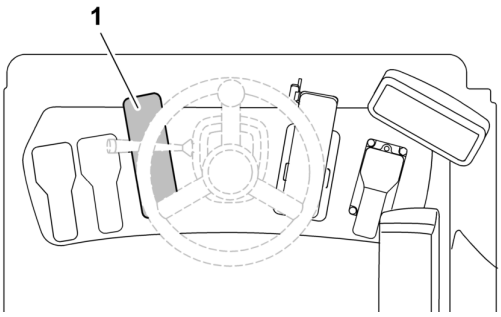

Fig. 689: Positioning slewing brake

1 Brake pedal

NOTICE
Incorrect use!
Wear on brake discs.

- ▶ Exclusively hold stationary uppercarriage in position.

- ▶ Press brake pedal **1**.
  - ▷ Uppercarriage remains in position.

3.4.30 Selecting boom or working tool

NOTICE
Incorrect settings!
Damage to working tool, functional impairment of working tool.

- ▶ Select settings appropriate for technical data of working tool.
- ▶ Observe maximum permitted values for pressure.
- ▶ Observe maximum permitted values for oil quantity.
- ▶ Observe technical data for the working tool.

Note
Boom and working tool (for example grapple, scrap shear, hydraulic hammer) cannot be operated at the same time.

- ▶ Change over control.
- ▶ Adhere to control description sticker in operator's cab.

Changing over control

- ▶ Press *changeover of adjustable boom cylinder to working tool* key.
- ▶ Press confirmation button.
  - ▷ *Changeover of adjustable boom cylinder to working tool* status symbol appears on the display:

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3.5 Shut-off functions

3.5.1 Stick cylinder shut-off (option)

Stick cylinder shut-off prevents collision between the working attachment and the operator's cab and obstacles in front of the machine.

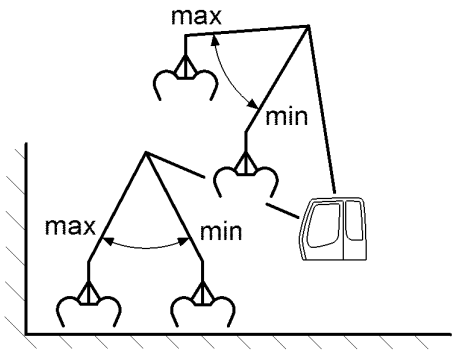

Fig. 721: Shut-off points: Retracting stick (min), extending stick (max)

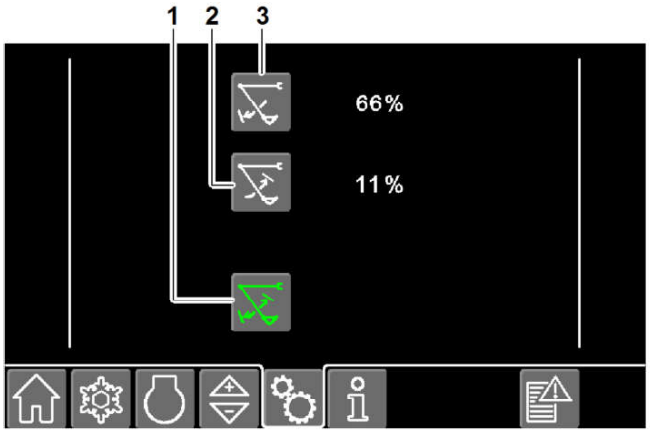

Fig. 722: Stick cylinder shut-off menu

1 *Stick cylinder shut-off* button
2 *Inner shut-off point* button
3 *Outer shut-off point* button

Key	Meaning
	Stick cylinder shut-off is switched on.
	It is possible to move the stick between the shut-off points.
	It is exclusively possible to set new shut-off points within the permitted working range.
	It is possible to bypass the shut-off points for 10 seconds.

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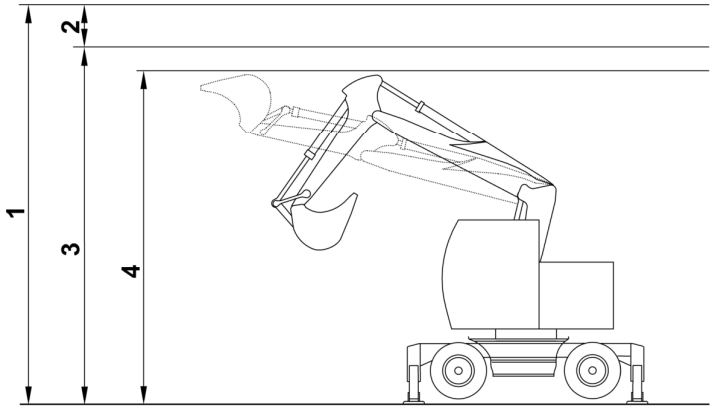

Fig. 770: Height limitation

1 Restricting height
2 Prescribed safe distance
3 Maximum working height
4 Reduced working height (option)

The height limitation calculation is based on the maximum radius of largest Liebherr bucket (1.75 m). If the Tool Management option is activated, the maximum radius of working tool is determined by settings in Tool Management.

Maximum working height

The limit value of maximum working height depends on following factors:
– Position of working attachment
– Machine is working on a slope.
– Machine is working on uneven ground.
– Lowest point of restricting height
– Type of support
– One-sided support

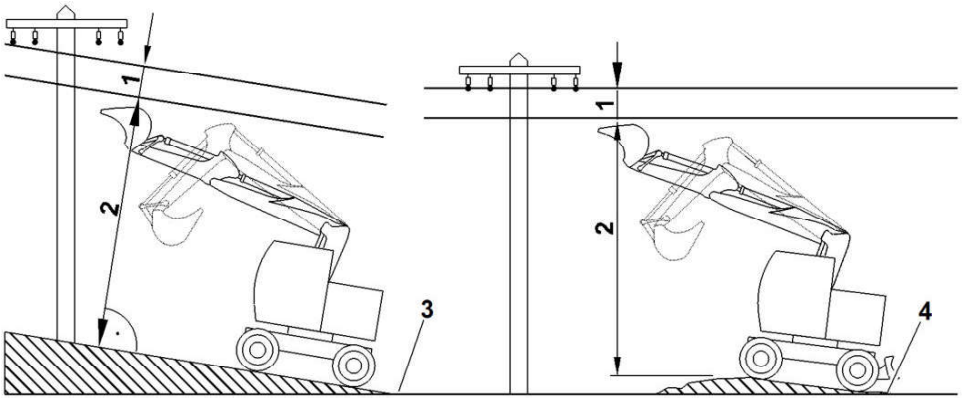

Fig. 771: Example factors for setting maximum working height

1 Safe distance
2 Maximum working height
3 Pitch
4 Uneven ground

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NOTICE
Damage to the machine due to incorrect handling of the tool attachment!
High pressures, torques and stresses can build up in the working attachment when working tools are used. The load is at its greatest when the hydraulic cylinders are completely extended or retracted (limit position) or the attachment is fully extended. Incorrect handling of the working tool can exceed the load limit. Attachment components, hydraulic cylinders and machines can be damaged!

- ▶ Do not move the hydraulic cylinders in or out all the way.
- ▶ Move the hydraulic cylinders carefully and slowly in the area of the limit positions (boundary area).
- ▶ When turning working tools, maintain a distance of at least 10° from the limit position of the bucket cylinder.

NOTICE
Damage to ballcocks!
Ballcocks are not used for controlling fluid flows, but for shutting off pipelines. Ballcocks must always be completely opened or closed. If the lever is in an intermediate position, the seals in the ballcock can be damaged.

- ▶ Always turn the lever of the ballcock all the way to the stop. The ballcock must be completely opened or closed.

3.6.2 Putting machine in working position

Putting machine in working position

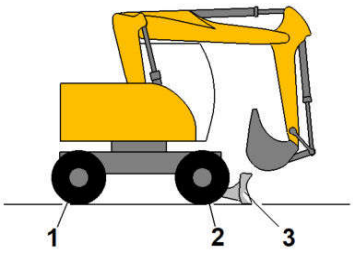

Fig. 790: Working position

1 Oscillating axle
2 Rigid axle
3 Support

NOTICE
Not approved load!
Damage to drive train.

- ▶ Release parking brake.

- ▶ Make sure that parking brake is released.
- ▶ Move travel direction switch to neutral position.
- ▶ Lock oscillating axle.

If machine is not moved during working:
- ▶ Support machine with blade or outriggers.

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Flattening ground with dozer blade (option)

DANGER
Machine tipping over!
Danger to life.

▶ Avoid collision with obstacles.

▶ Lower dozer blade to the ground.

▶ Move machine carefully and at suitable speed.

3.6.8 Working with hydraulic hammer

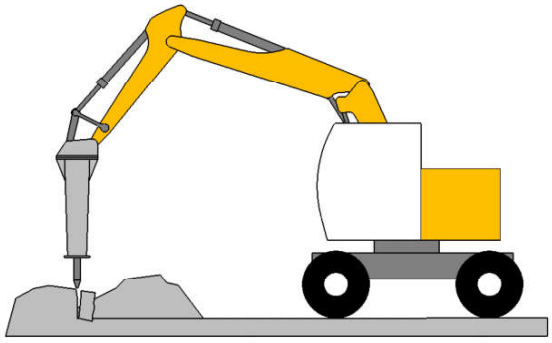

Fig. 804: Working with hydraulic hammer

DANGER
Machine tipping over!
Danger to life.

▶ Work exclusively in approved work area.

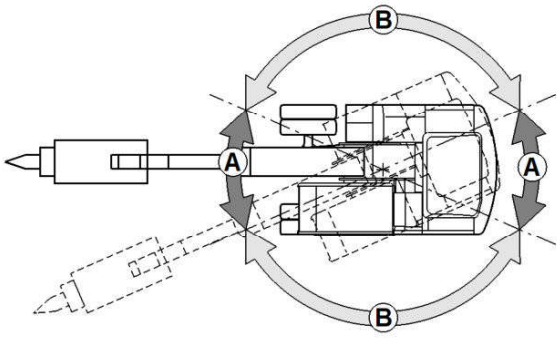

Fig. 805: Work areas

A Approved work area

B Unapproved working area

DANGER
Rockfall!
Danger to life.

▶ Work exclusively with hydraulic hammer in vertical position.

❑ The danger zone of the machine contains no persons.

Lifting machine with two-piece boom attachment

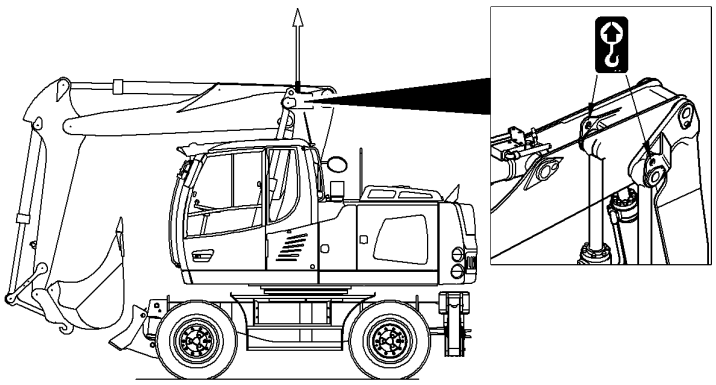

Fig. 814: Lifting machine with two-piece boom attachment

▶ Fasten crane sling to two-piece boom attachment.

▶ Extend hoist cylinders.

▶ Retract adjustable boom cylinder.

▶ Put stick in vertical position.

▶ Press *parking brake* key.
▷ Machine is secured to prevent it rolling.

▶ Shut off diesel engine.

▶ Turn ignition key to position 1.

▶ Depressurise hydraulic lines: Carefully move joysticks and pedals in all directions.

▶ Pull out ignition key.

▶ Move folding console upwards.

▶ Close and lock all doors, covers and hoods on the machine.

▶ Fold in mirrors.

▶ Lift and load machine carefully with crane.

3.9.4 Tying down machine

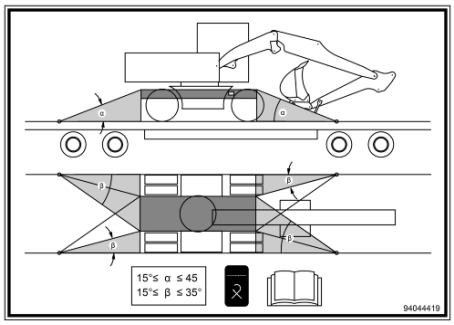

Fig. 816: Sign (example) in the operator's cab

Symbol	Meaning	Effect, characteristic	Remedy
	Prewarning: Fuel pressure in Common Rail system is high or low.	Diesel engine is running unevenly. Diesel engine output is reduced automatically.	Shut off diesel engine. Have fuel filter cleaned by authorized specialist personnel or replaced if necessary; If symbol does not disappear: Contact Liebherr customer service.
	Fuel pressure in Common Rail system is too high or too low.		
	Prewarning: Fuel temperature is high.	Diesel engine output is reduced automatically. Diesel engine is damaged.	Shut off diesel engine. Clean fuel cooler. If symbol is still displayed: Contact Liebherr customer service.
	Fuel temperature is too high.		
	Prewarning: Coolant level is low.	Diesel engine is damaged.	Shut off diesel engine. Fill with coolant. If symbol is still displayed: Contact Liebherr customer service.
	Coolant level is too low.		
	Prewarning: Coolant temperature is high.	Diesel engine output is reduced automatically. Diesel engine is damaged.	Shut off diesel engine. Reduce load. Fill with coolant. Clean engine cooler. If symbol is still displayed: Contact Liebherr customer service.
	Coolant temperature is too high.		
	Prewarning: Air filter is contaminated. Dust collecting tank is full.	Diesel engine output is reduced automatically. Diesel engine is damaged.	Shut off diesel engine. Empty dust collecting tank. Replace air filter.
	Air filter is contaminated. Dust collecting tank is full.		
	Prewarning: Charge air temperature is high.	Diesel engine output is reduced automatically. Diesel engine is damaged.	Shut off diesel engine. Clean intercooling air circuit. If symbol is still displayed: Contact Liebherr customer service.
	Charge air temperature is too high.		
	Prewarning: Diesel engine speed is high.	Diesel engine is damaged.	Shut off diesel engine. Contact Liebherr customer service.
	Diesel engine speed is too high.		

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Malfunction / error	Cause	Remedy
Working attachment cannot be moved.	Limitation of working attachment has been initiated.	Bypass limitation. (For more information see: 3.5 Shut-off functions, page 193)
	Angle sensors of working attachment are defective.	Switch off limitation or shut-off (For more information see: 3.5 Shut-off functions, page 193) . Contact Liebherr customer service.
Working tool cannot be used.	Function is not switched on.	Switch on function.
	Hydraulic lines are not connected.	Connect hydraulic lines.

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Fuse	Consumer	Rating [A]
F2_1	K2_1, travel light left	10
F2_2	K2_2, beacon	10
F2_3	LiDAT, data interface option	5
F3_1	Reversing camera, side camera	10
F3_2	Not used	
F3_3	Door strap system, height adjustable cab	15
F4	Cigarette lighter	10
F5	Interior lighting triggered by door contact	5
F6	Interior lighting, mirror heater	5
F7	Option circuit board power supply	10
F8	Condenser fan	30
F9	K02, front roof light	30
F10	K07, rear window wiper	10
F11	K08, terminal 58	15
F12	K03, rear roof light	15 , 30
F14	Air-sprung operator's seat	10
F15	Terminal 15 air conditioning control	15
F16	Control unit A	15
F17	S7 safety lever or folding console	10
F18	Not used	15
F19	+24V input sensor for input modules FAP, A163, A164, A165	10
F20	Input logic for input modules FAP power supply	5
F21	Display, data interface J1939	5
F22	Terminal 15, master power supply	10
F23	A169, control unit	10
F24	A170, control unit	10
F25	A171, control unit, Tool Management	10
F26	A172, control unit	10
F27	Terminal 30, master power supply	10
F28	Not used	10
F29	Not used	10
F30	Starting switch	10
F31	Terminal 30 air conditioning control	20
F32	K05, roof wiper	10
F33	K04, windscreen wiper top	10
F34	K06, windscreen wiper bottom	10
F35	K09, Tool Management, voltage transformer, radio	15

Tab. 85: Main circuit board A161

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5.2 Filling quantities and lubrication chart

5.2.1 Filling quantities

Lubricants

Description	Quantity [20)]
Diesel engine	31.0 l
Hydraulic system: System capacity	430.0 l
Hydraulic system: Oil change volume	260.0 l
Hydraulic system: Tank capacity	190.0 l
Slewing gearbox	6.0 l
Transmission	3.0 l
Rigid axle	13.0 l
Wheel hubs of rigid axle	each 2.5 l
Rigid axle with extended track	14.0 l
Wheel hubs of rigid axle with extended track	each 2.5 l
Steering axle	9.6 l
Wheel hubs of steering axle	each 2.5 l
Steering axle with extended track	11.0 l
Wheel hubs of steering axle with extended track	each 2.5 l
Pump distributor gear	1.9 l

Tab. 89: Filling quantities, lubricants

Fuels and operating fluids

Description	Quantity [20)]
Fuel tank	480.0 l
Diesel exhaust fluid tank	46.0 l
Cooling system	41.0 l
Air conditioning unit	1.2 kg
Windscreen washer system	8.0 l

Tab. 90: Filling quantities, fuels and operating fluids

[20)] Guidance values

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Minimum quality requirements

Specification
LH-01–COL3A

Tab. 108: Minimum quality requirements

If coolants from other manufacturers are used, information on change intervals must be obtained from respective manufacturer or supplier.

5.3.7 Hydraulic oils

Liebherr recommendation

Ambient temperature	Description
	Liebherr mineral oil
15 to 55 °C	Liebherr Hydraulic Basic 100
10 to 45 °C	Liebherr Hydraulic Basic 68
-20 to 40 °C	Liebherr Hydraulic HVI
	Liebherr-PAO [26] biodegradable
-25 to 45 °C	Liebherr Hydraulic Plus
-40 to 30 °C	Liebherr Hydraulic Plus Arctic

Tab. 109: Liebherr recommendation

Minimum quality requirements

Specification
EMT LH-00-Minimum-HYE

Tab. 110: Minimum quality requirements

If hydraulic oils or filters from other manufacturers are used, information on change and replacement intervals must be obtained from respective manufacturer or supplier.

[26] PAO = poly-alpha-olefin

Objectives of visual inspection

If conducted correctly as per the specifications of the maintenance manual, the visual inspection prevents longer and unplanned outage times through early detection and removal of defects.

Advantages of a correctly performed visual inspection are:
– Conservation of value of machine.
– Quality assurance of maintenance process.
– Preventing subsequent damage
– Safe operation of machine

Make sure that following defects are detected:
– Contamination
– Damage
– Cracks
– Warping
– Leaks
– Loosened connections
– Chafe marks
– Wear
– Incorrect changes to the machine.

Requirements for staff and operating company

– Make sure that the staff is familiar with the design of the complete machine and components.
– Make sure that the staff is familiar with the prescribed inspection technology.
– Make sure that the staff has sufficient visual ability.

Application of visual inspection

Make sure the following preconditions are met:
❑ Complete machine has been cleaned carefully.
❑ Lighting conditions are sufficient.
❑ Accessibility and field of vision of complete machine is present.
❑ Inspection position and suitable distance assumed.

▶ Perform intervals and inspection scope as per maintenance and inspection schedule.

▶ Evaluate visual inspection.

▶ Create defect report if necessary.

5.5.2 Preparing for maintenance

Maintenance instructions

The sequence of maintenance work is based on the maintenance and inspection schedule. The ideal sequence for maintenance work is not allowed for.

▶ Clean machine carefully before starting maintenance work.

▶ Observe maintenance intervals.

Safety instructions

▶ Make sure that no persons are in the danger zone during maintenance and repair work.

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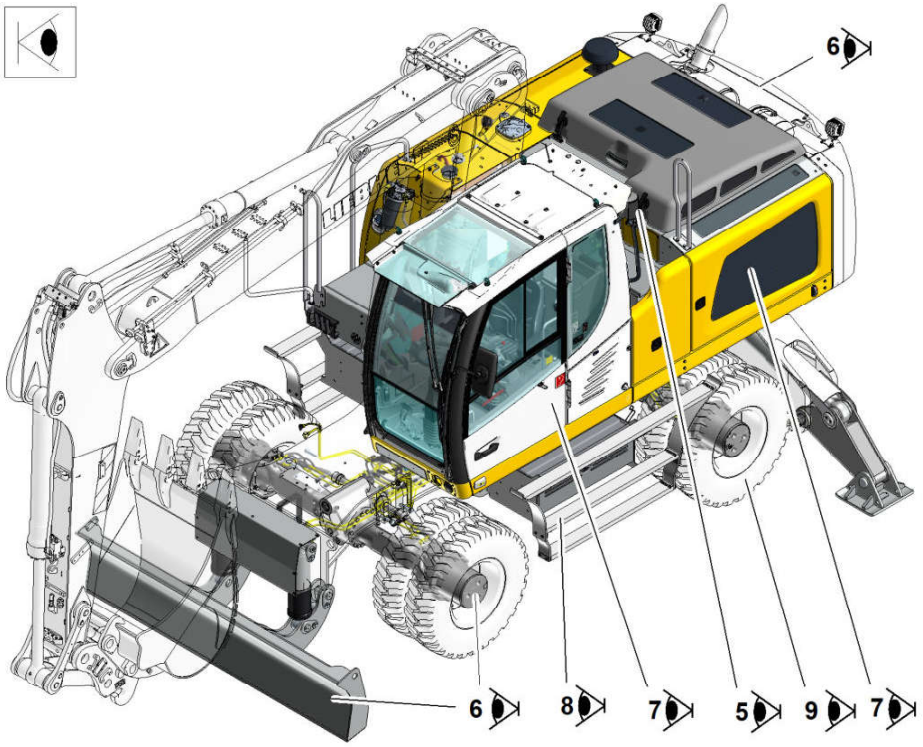

Fig. 917: Visual inspections of components, operator's cab, undercarriage, climbing aids and lubrication system

Position	Assembly	Visual inspection for defects
5	Lubrication system	Check pipes and hoses for damage and tightness.
6	Components and counterweight	Check for proper condition and for missing and loose connections.
7	Operator's cab, trim and folding console	Check for proper condition, damage and cleanliness.
8	Climbing aids, ladders, hand rails, cab accesses, handrails, handles and platforms	Check for presence and damage.
9	Tyres	Check tyre and rim for proper condition, damage, foreign particles and cleanliness.

Tab. 133: Visual inspections

▶ Perform visual inspection. (For more information see: Definition of visual inspection, page 292)

If defects occur in machine:

▶ Record any identified defects.

▶ Inform operating company of defects affecting safety.

▶ Repair identified defects. See service manual for procedure.

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5.8 Drive group

5.8.1 Diesel engine: Bringing into maintenance position

- ▶ Make sure diesel engine is standing horizontally.
- ▶ Shut off diesel engine.
- ▶ Let diesel engine cool down.
- ▶ Switch off battery main switch.
- ▶ Observe diverging instructions in description of the work steps.

5.8.2 Diesel engine: Checking oil level

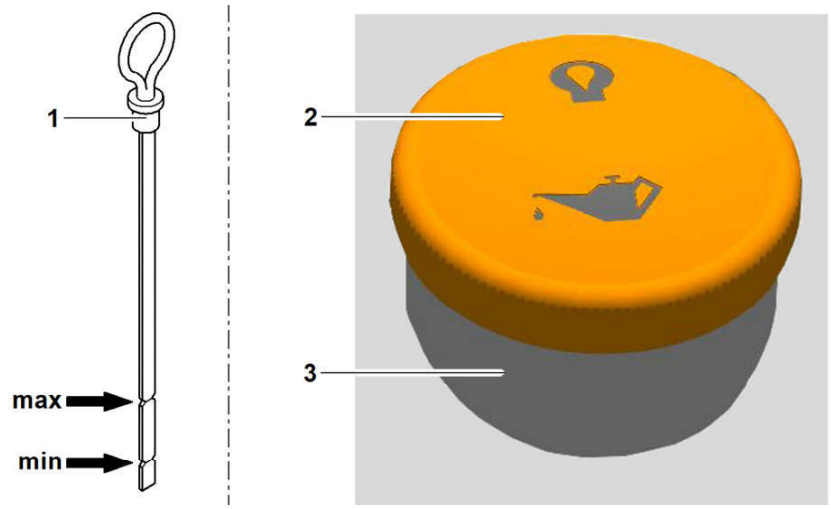

Fig. 927: Diesel engine: Checking oil level

1 Dipstick
2 Oil fill cover
3 Oil fill pipe

WARNING
Hot diesel engine and hot engine oil!
Burns.

- ▶ Let diesel engine cool down.
- ▶ Put on protective gloves.
- ▶ Avoid skin contact with hot diesel engine.
- ▶ Avoid skin contact with hot engine oil.

Make sure the following preconditions are met:
❑ Machine is horizontal.

- ▶ Shut off diesel engine.
- ▶ Wait 1 min until oil has collected in the oil pan.
- ▶ Pull out dipstick **1**.

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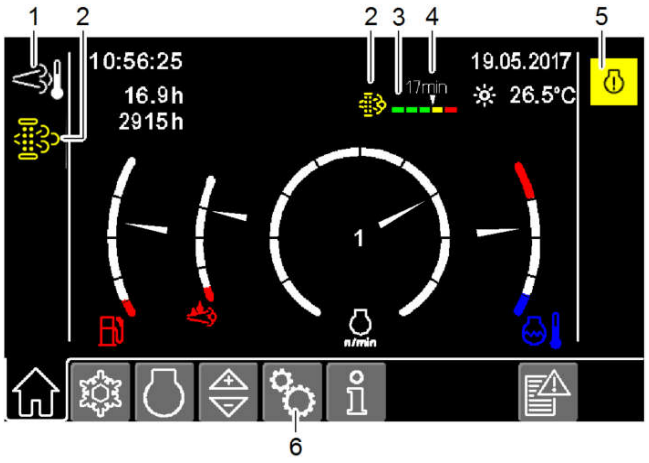

Fig. 934: Start page menu

1 *Increased exhaust temperature* status symbol
2 *Diesel particulate filter contaminated* status symbol
3 Contamination level of diesel particulate filter
4 Remaining filter regeneration time
5 *Prewarning: Control error of diesel engine* warning symbol
6 *Function settings* menu

Contamination level of diesel particulate filter

NOTICE
Contaminated diesel particulate filter!
Damage to diesel engine.

▶ Shut off diesel engine.

▶ Have diesel particulate filter checked by Liebherr customer service.

The bar chart display on the display shows the contamination level of the diesel particulate filter in five stages. The pointer above the bar chart display indicates the degree of contamination of the diesel particulate filter.

	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 5
Stage shown on the display						
Activation of filter regeneration	—	—	—	Manual	Manual	Manually by Liebherr customer service
Deactivating or cancelling filter regeneration	—	—	—	Deacti-vating or cancelling possible	Cancelling possible	Cancelling possible

Tab. 138: Contamination level of diesel particulate filter

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– Diesel engine or electric motor is shut off.

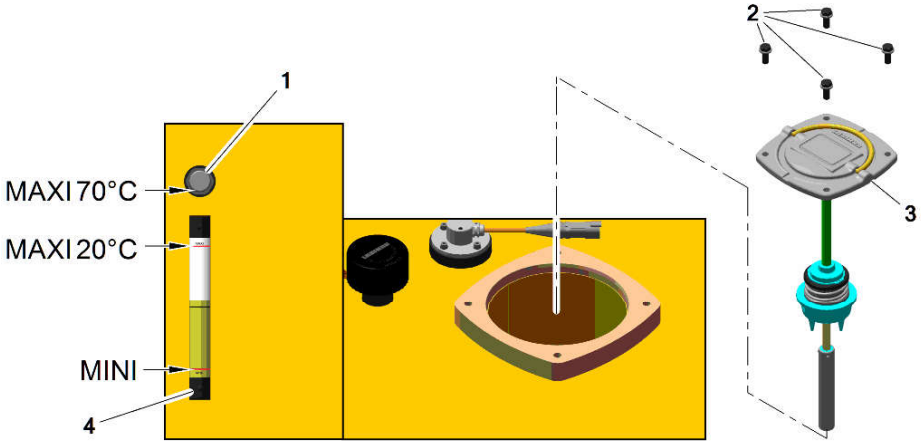

Fig. 966: Hydraulic tank

1	Oil sight glass	**3**	Return filter cover
2	Hex head screw	**4**	Oil sight glass

▶ Check hydraulic oil temperature shown on the display.

▶ Make sure that hydraulic oil temperature is at 20 $^{\pm 5}$ °C.

▶ Extend hoist cylinders, stick cylinders, bucket cylinders, adjustable boom cylinders and support cylinders as far as possible.

▶ Check hydraulic oil level on oil sight glass **4**.

If hydraulic oil level is below **MINI** mark:

▶ Fill with hydraulic oil. (For more information see: Filling with hydraulic oil, page 333)

▶ Retract hoist cylinders, stick cylinders, bucket cylinders, adjustable boom cylinders and support cylinders as far as possible.

▶ Check hydraulic oil level on oil sight glass **4**.

If hydraulic oil level is above **MAXI** mark:

▶ Drain hydraulic oil. (For more information see: Draining hydraulic oil, page 334)

When the machine has reached operating temperature 70 °C:

▶ Retract hoist cylinders, stick cylinders, bucket cylinders, adjustable boom cylinders and support cylinders as far as possible.

▶ Check hydraulic oil level on oil sight glass **1**.

If hydraulic oil level is above bottom edge of oil sight glass **1**:

▶ Drain hydraulic oil. (For more information see: Draining hydraulic oil, page 334)

Filling with hydraulic oil

NOTICE
Incorrect mixture of hydraulic oils!
Damage to hydraulic system.

▶ Do not mix hydraulic oils.

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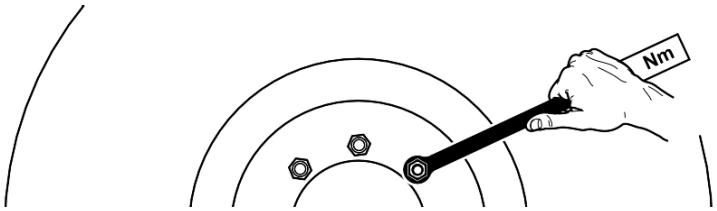

Fig. 974: Tightening wheel nuts

▶ Make sure that all wheel nuts are tightened with 460 Nm.

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NOTICE
Unsuitable gear oil!
Damage to gearbox.

▶ Exclusively use oil in approved quality.

▶ Remove protective cap **1** on oil tank **2**.

▶ Unlock cover with key.

▶ Open cover.

▶ Make sure that oil has prescribed viscosity.

▶ Fill oil tank **2** with prescribed oil until **MAX 3** marking is reached.

▶ Check oil level after 5 minutes.

If oil level is below **MAX 3** mark:
▶ Fill with oil.

If oil level remains unchanged:
▶ Screw cover onto oil tank **2**.

▶ Lock cover with key.

▶ Put protective cap **1** on oil tank **2**.

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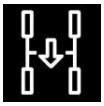
Symbol	Description	Symbol	Description
	Travelling backwards		

Tab. 152: Crawler excavator travel mode

6.1 Rail excavator travel mode

Symbol	Description	Symbol	Description
	Travelling forwards		Travelling backwards

Tab. 153: Rail excavator travel mode

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