en **Operator's manual**

Material handling machine

Document ID

ORIGINAL OPERATOR'S MANUAL

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Manufacturer: Liebherr-Hydraulikbagger GmbH
Type: LH 30 M Litronic
Type no.: 1253 (USA / CAN)
From Serial no.: 89392

Contact

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LHB/12213915/01/2020-08-28/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 rpm	F4HFE413G*B	IV	653.45 g/kWh	640.45 g/kWh
D924 A7-14 SCRT	129 kW	2200 rpm	F4HFE414G*B	IV	678.33 g/kWh	631.52 g/kWh
D934 A7-04	200 kW	1900 rpm	R04LQ7103	IV	682.18 g/kWh	726.85 g/kWh
D934 A7-14	140 kW	1900 rpm	R04LQ7102	IV	683.53 g/kWh	760.17 g/kWh
D934 A7-14	200 kW	1900 rpm	R04LU7101	IV	671.94 g/kWh	709.8 g/kWh
D936 A7-04	320 kW	1900 rpm	R06LQ7101	IV	650.74 g/kWh	694.6 g/kWh
D936 A7-14	320 kW	1900 rpm	R06LU7101	IV	664.06 g/kWh	673.06 g/kWh
D944 A7-04	200 kW	1900 rpm	R04KQ7102	IV	687.26 g/kWh	769.07 g/kWh
D944 A7-04	230 kW	1900 rpm	R04KQ7101	IV	682.36 g/kWh	750.86 g/kWh
D944 A7-14	200 kW	1900 rpm	R04KU7102	IV	686.43 g/kWh	731.46 g/kWh
D944 A7-14	230 kW	1900 rpm	R04KU7101	IV	681.03 g/kWh	713.34 g/kWh
D946 A7-04	330 kW	1900 rpm	R06KQ7102	IV	643.85 g/kWh	684.24 g/kWh
D946 A7-14	330 kW	1900 rpm	R06KU7101	IV	669.65 g/kWh	684.04 g/kWh
D9508 A7-04	455 kW	1900 rpm	V08MQ7102	IV	709.44 g/kWh	761.34 g/kWh
TCD 3.6 L4 DOConly / SCR	95 kW	2000 rpm	CFXI95BU	IV	713.39 g/kWh	730.75 g/kWh

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Reliability

Durability and Sustainability – Quality Down to the Last Detail

Every day Liebherr material handlers show their qualities in a range of industrial applications all over the world. Years of experience, continuous development and the latest technologies provide maximum safety in use. Their robust, compact design and the use of components produced in-house ensure that the LH 30 and LH 35 are designed for a long service life.

Technical Data

Diesel Engine

Rating per SAE J1349/ISO 9249	188 HP (I) (140 kW) at 1,700 rpm
Model	Liebherr D934
Type	4 cylinder in-line
Bore/Stroke	4.8/5.9 in
Displacement	427,17 in³
Engine operation	4-stroke diesel Common-Rail turbo-charged and after-cooled reduced emissions
Air cleaner	dry-type air cleaner with pre-cleaner, primary and safety elements
Engine idling	sensor controlled
Electrical system	
Voltage	24 V
Batteries	2 x 135 Ah/12 V
Alternator	three-phase current 28 V/140 A
Stage Tier 4f	
Harmful emissions values	in accordance with EPA/CARB-40CFR stage Tier 4f
Emission control	Liebherr-SCR technology
Fuel tank	87 gal
Urea tank	12 gal

Cooling System

Diesel engine	water-cooled compact cooling system consisting cooling unit for water, hydraulic oil and charge air with steplessly thermostatically controlled fan

Hydraulic Controls

Power distribution	via control valves with integrated safety valves, simultaneous actuation of chassis and equipment. Swing drive in separate closed circuit
Servo circuit	
Equipment and swing	with hydraulic pilot control and proportional joystick levers
Chassis	
Mobile	electro-proportional via foot pedal
Crawler	with hydraulic proportionally functioning foot pedals or adjusted with plugable levers
Additional functions	via switch or electro-proportional foot pedals
Proportional control	proportionally acting transmitters on the joysticks for additional hydraulic functions

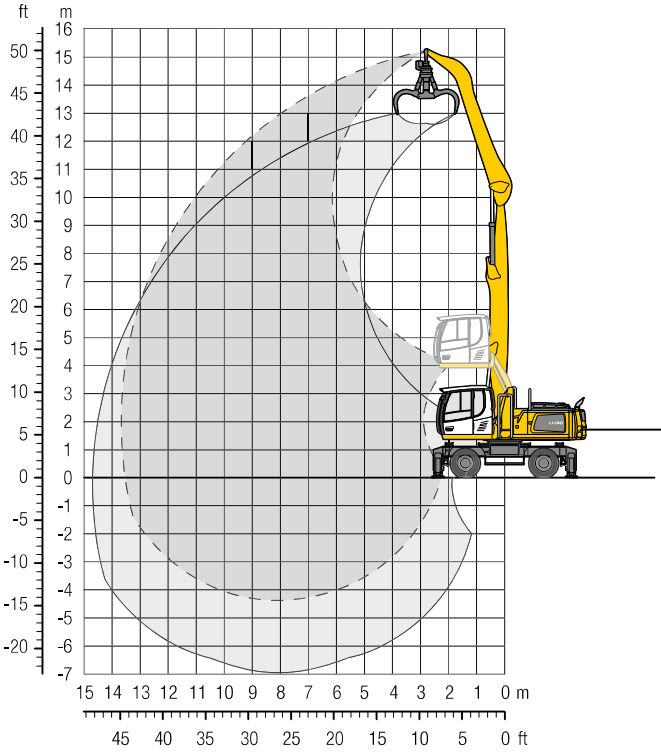
Hydraulic System

Hydraulic pump	
for equipment and travel drive	2 Liebherr axial piston variable displacement pumps (double construction)
Max. flow	2 x 61 gpm
Max. pressure	5,076 psi
for swing drive	reversible axial piston variable displacement pump, closed-loop circuit
Max. flow	37 gpm
Max. pressure	6,092 psi
Hydraulic pump regulation and control	Liebherr-Synchron-Comfort-system (LSC) with electronic engine speed sensing regulation, pressure and flow compensation
Hydraulic tank	46 gal
Hydraulic system	114 gal
Hydraulic oil filter	1 main return filter with integrated partial micro filtration (5 µm)
MODE selection	adjustment of engine and hydraulic performance via a mode pre-selector to match application, e.g. for especially economical and environmentally friendly operation or for maximum material handling and heavy-duty jobs
S (Sensitive)	mode for precision work and lifting through very sensitive movements
E (Eco)	mode for especially economical and environmentally friendly operation
P (Power)	mode for high performance with low fuel consumption
P+ (Power-Plus)	mode for highest performance and for very heavy duty applications, suitable for continuous operation
Engine speed and performance setting	stepless alignment of engine output and hydraulic power via engine speed
Option	Tool Control: 20 preadjustable pump flows and pressures for add-on attachments

Swing Drive

Drive	Liebherr axial piston motor in a closed system, Liebherr planetary reduction gear
Swing ring	Liebherr, sealed race ball bearing swing ring, internal teeth
Swing speed	0 – 9.7 rpm stepless
Swing torque	52,367 lbf ft
Holding brake	wet multi-disc (spring applied, pressure released)
Operation holding brake (Option)	slewing gear brake Comfort

LH 30 M – Equipment GA14

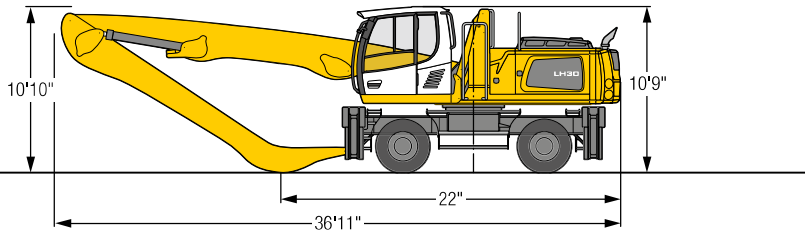


Operating Weight

The operating weight includes the basic machine with 4 point outriggers, hydr. cab elevation, 8 solid tires plus intermediate rings, straight boom 25'7", angled stick 19'8" and multi-tine grab GM 65/0.78 yd³ semi-closed tines.

Weight	63,700 lb

Dimensions

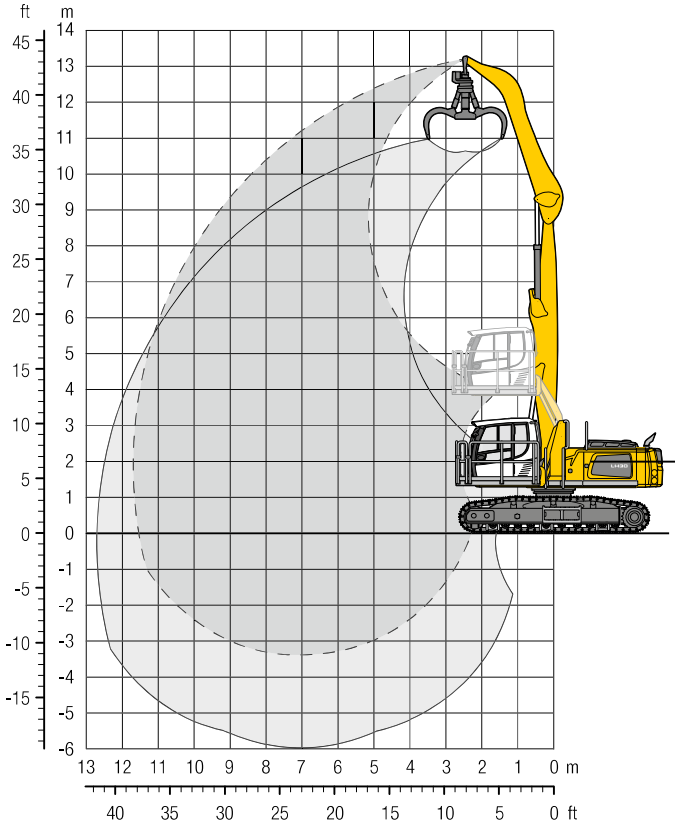


ft	Undercarriage	10 ft		15 ft		20 ft		25 ft		30 ft		35 ft		40 ft		45 ft				ft in
45	Stabilizers raised					12,6	13,6*											10,1	11,2*	22' 7"
	4 pt. outriggers down					13,6*	13,6*											11,2*	11,2*	
40	Stabilizers raised					13,4	15,8*	9,1	12,0									6,4	8,7	29' 7"
	4 pt. outriggers down					15,8*	15,8*	13,5*	13,5*									9,3*	9,3*	
35	Stabilizers raised					13,7	15,9*	9,4	12,3	6,7	8,9							4,8	6,6	34' 7"
	4 pt. outriggers down					15,9*	15,9*	13,8*	13,8*	12,2*	12,2*							8,4*	8,4*	
30	Stabilizers raised							9,4	12,3	6,7	8,9	4,9	6,7					3,9	5,5	38' 2"
	4 pt. outriggers down							13,7*	13,7*	12,1*	12,1*	10,0	10,7*					7,9*	7,9*	
25	Stabilizers raised					13,4	16,2*	9,2	12,1	6,6	8,8	4,9	6,6	3,6	5,0			3,3	4,8	40'11"
	4 pt. outriggers down					16,2*	16,2*	13,9*	13,9*	12,2*	12,2*	10,0	10,7*	7,8	9,2*			7,5	7,6*	
20	Stabilizers raised					12,6	16,7	8,7	11,6	6,3	8,5	4,7	6,5	3,5	5,0			3,0	4,3	42'10"
	4 pt. outriggers down					17,1*	17,1*	14,4*	14,4*	12,4*	12,4*	9,8	10,8*	7,8	9,3*			6,9	7,5*	
15	Stabilizers raised	15,0*	15,0*	18,2	21,8*	11,6	15,6	8,1	10,9	5,9	8,1	4,5	6,2	3,4	4,9			2,7	4,0	44' 1"
	4 pt. outriggers down	15,0*	15,0*	21,8*	21,8*	18,3*	18,3*	15,0*	15,0*	12,3	12,6*	9,6	10,8*	7,7	9,2*			6,4	7,5*	
10	Stabilizers raised	21,3*	21,3*	15,6	21,9	10,3	14,2	7,3	10,1	5,5	7,6	4,2	5,9	3,2	4,7			2,6	3,8	44' 8"
	4 pt. outriggers down	21,3*	21,3*	26,2*	26,2*	19,4*	19,4*	15,5*	15,5*	11,8	12,8*	9,3	10,8*	7,5	9,0*			6,2	7,1*	
5	Stabilizers raised	2,7*	2,7*	13,1	19,1	9,0	12,8	6,6	9,3	5,0	7,2	3,9	5,6	3,1	4,6			2,5	3,8	44'10"
	4 pt. outriggers down	2,7*	2,7*	22,6*	22,6*	19,9*	19,9*	14,8	15,6*	11,3	12,7*	8,9	10,5*	7,3	8,7*			6,1	6,5*	
0	Stabilizers raised	3,6*	3,6*	11,5	12,4*	8,0	11,8	6,0	8,7	4,6	6,7	3,7	5,4	2,9	4,4			2,5	3,8	44' 5"
	4 pt. outriggers down	3,6*	3,6*	12,4*	12,4*	19,3*	19,3*	14,1	15,1*	10,8	12,2*	8,7	10,0*	7,2	8,0*			5,7*	5,7*	
– 5	Stabilizers raised	5,8*	5,8*	10,8	12,1*	7,5	11,1	5,6	8,3	4,4	6,5	3,5	5,2	2,9	4,3			2,6	3,9	43' 1"
	4 pt. outriggers down	5,8*	5,8*	12,1*	12,1*	17,4*	17,4*	13,6	13,9*	10,5	11,2*	8,5	9,0*	6,8*	6,8*			4,9*	4,9*	
–10	Stabilizers raised			10,7	13,7*	7,2	10,9	5,4	8,1	4,2	6,3	3,4	5,1					3,0	4,5	38' 8"
	4 pt. outriggers down			13,7*	13,7*	14,5*	14,5*	11,8*	11,8*	9,5*	9,5*	7,3*	7,3*					5,6*	5,6*	

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

The lift capacities on the stick end without attachment are stated in lb x 1,000 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. Indicated loads based on the ISO 10567 standard and do not exceed 75 % of tipping or 87 % of hydraulic capacity. The lift capacity of the unit is limited by its stability, the lifting capability of the hydraulic elements, or the maximum permissible lifting capacity of the load hook.

LH 30 C EW – Equipment GA12

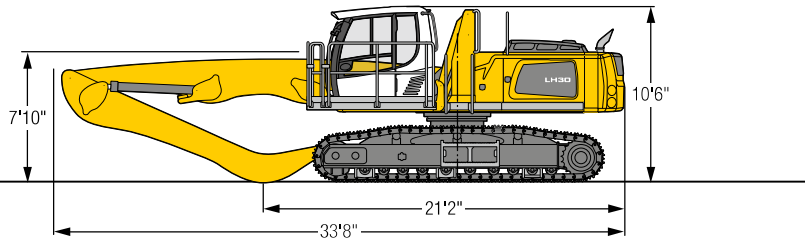


Operating Weight and Ground Pressure

The operating weight includes the basic machine with hydr. cab elevation, straight boom 22'4", angled stick 16'5" and multi-tine grab GM 65/0.78 yd³ semi-closed tines.

Weight	67,500 lb
Pad width	24"
Ground pressure	on request

Dimensions



ft	Undercarriage	10 ft		15 ft		20 ft		25 ft		30 ft		35 ft		40 ft		45 ft				ft in
45	EW																			
40	EW			17,3*	17,3*													14,3*	14,3*	**17' 5"**
35	EW					17,2*	17,2*	11,5*	11,5*									11,4*	11,4*	**25' 1"**
30	EW					17,4*	17,4*	15,2*	15,2*									10,2*	10,2*	**30'**
25	EW					17,5*	17,5*	15,1*	15,1*	13,3*	13,3*							9,6*	9,6*	**33' 5"**
20	EW			21,7*	21,7*	18,1*	18,1*	15,4*	15,4*	13,4*	13,4*	11,0	11,4*					9,3*	9,3*	**35'10"**
15	EW	20,9*	20,9*	24,5*	24,5*	19,3*	19,3*	15,9*	15,9*	13,5*	13,5*	10,9	11,4*					9,3*	9,3*	**37' 5"**
10	EW	42,1*	42,1*	27,3*	27,3*	20,5*	20,5*	16,4*	16,4*	13,5	13,6*	10,7	11,2*					9,4	9,4*	**38' 2"**
5	EW	5,7*	5,7*	28,7*	28,7*	21,0*	21,0*	16,5*	16,5*	13,2	13,3*	10,5	10,7*					8,6*	8,6*	**38' 5"**
0	EW	6,2*	6,2*	21,7*	21,7*	20,3*	20,3*	15,8*	15,8*	12,6*	12,6*	9,7*	9,7*					7,5*	7,5*	**37'11"**
– 5	EW			19,8*	19,8*	18,1*	18,1*	14,2*	14,2*	11,0*	11,0*	7,8*	7,8*					7,0*	7,0*	**36'**
–10	EW					14,3*	14,3*	11,3*	11,3*									8,7*	8,7*	**29' 5"**

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

The lift capacities on the stick end without attachment are stated in lb x 1,000 and can be slewed through 360° on a firm, level supporting surface. Capacities are valid for 24" wide triple grouser pads. Indicated loads based on the ISO 10567 standard and do not exceed 75 % of tipping or 87 % of hydraulic capacity. The lift capacity of the unit is limited by its stability, the lifting capability of the hydraulic elements, or the maximum permissible lifting capacity of the load hook.

9. Diesel oxidation catalyst
10. Fuel additive devices
11. Selective catalytic reduction
12. Diesel exhaust fluid tanks
13. Electronic control, sensors, switching magnets and wire harnesses
14. Information sticker, emission limitation

1.3.7 Exclusions

This warranty provides no cover for:

- Malfunctions in parts that were caused by misuse, incorrect use, modifications, manipulation, shut-off or incorrect or inadequate maintenance.
- Damage caused by fire, accidents, negligence, an act of god or other events that Liebherr cannot influence.
- Consequential damage, for example the loss of the diesel engine or the attachment powered by the diesel engine, towing, machine transports, loss of time, downtimes, inconvenience, costs for telephone, travel and accommodation, and all indirect or direct damage.
- Loss of or damage to personal property, lost profits, commercial losses or other issues that are not specifically included in this warranty.
- Any replacement parts can be used in the performance of maintenance work or repairs. However, the manufacturer accepts no liability for parts that are not original spare parts.
- Any damage resulting from the use of non-original Liebherr spare parts.

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– 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.
– Is physically and mentally capable of attaching 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.

2.3.9 Spotter

Responsibility

The spotter is responsible for the following:
– Wear personal protective equipment.
– Forward signals from slinger to operator.
– If the spotter is the only person for this purpose: Give instructions to operator.

Requirement

The spotter has following qualification and skills:
– Has completed the legally specified minimum age.
– Is physically and mentally capable of directing persons.
  • Satisfactory eyesight
  • Satisfactory hearing ability
  • Quick reactions
  • Is able to estimate distance, height and gaps.
– The spotter has following skills:
  • Is able to operate radio units.
  • Is able to give clear instructions on radio units.
  • Is able to guide a load.
  • Is able to ensure safe movement of load and machine.
– Has the necessary authorisation for giving signal signs.

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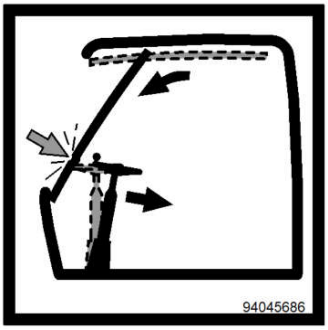
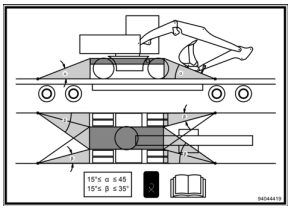
Position	Sign	Description
33		**Diesel exhaust fluid tank** Applies to machines with SCR system. Read notes in operator's manual. Indicates prescribed diesel exhaust fluid.
34		**Closing upper windscreen** Applies to machines with steering wheel. Indicates sequence for closing upper windscreen: Fold back steering wheel. Pull upper windscreen down.
35		**Windscreen washer tank** Indicates filler pipe for windscreen washer fluid.
36		**Transport** Indicates machine-specific requirements for transport.
37		**Emergency exit** Sign contains following information: Indicates location of emergency hammer and emergency exit. In an emergency, break rear screen with emergency hammer.
38		**Tie-down point** Indicates tie-down points.

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– Keep your face towards machine during entry and exit.
– Make sure you always have two hands and a foot or two feet and one hand in contact with the access system.
– After entering the operator's cab, find out about emergency exit.

If the machine has a cab elevation:
– Climb until the door is reached.
– When you reach door handle with your free hand: Open door.
– Continue climbing.

Adhere to safety instructions on entry and exit in operator's manual of complete machine:
– If the uppercarriage is mounted on a support.
– If the machine is part of a system.
– If the uppercarriage is mounted on a pontoon or rail guide system.

2.7.5 Machine danger zone

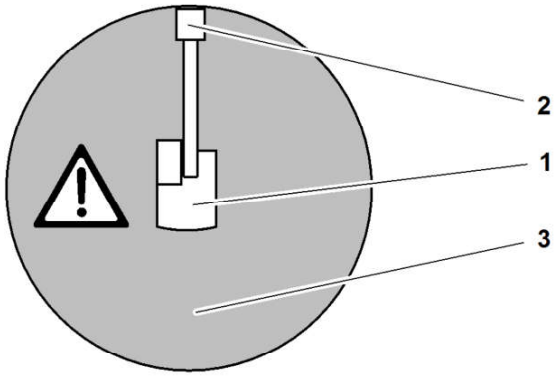

Fig. 78: Machine danger zone (view from above)

1 Machine
2 Reach of working attachment
3 Danger zone

Danger to life

Unapproved presence in danger zone

– Make sure there are no persons in danger zone.

2.7.6 Visibility

Danger to life

Insufficient visibility

– Make sure that persons approach machine from the front and within operator's field of vision.
– Make sure that persons contact the operator before approaching the machine.
– Make sure that no obstacles impair visibility in the working area.
– Use viewing devices to observe environment of machine if necessary.
– Use viewing devices if necessary to observe areas around the machine that cannot be seen directly.

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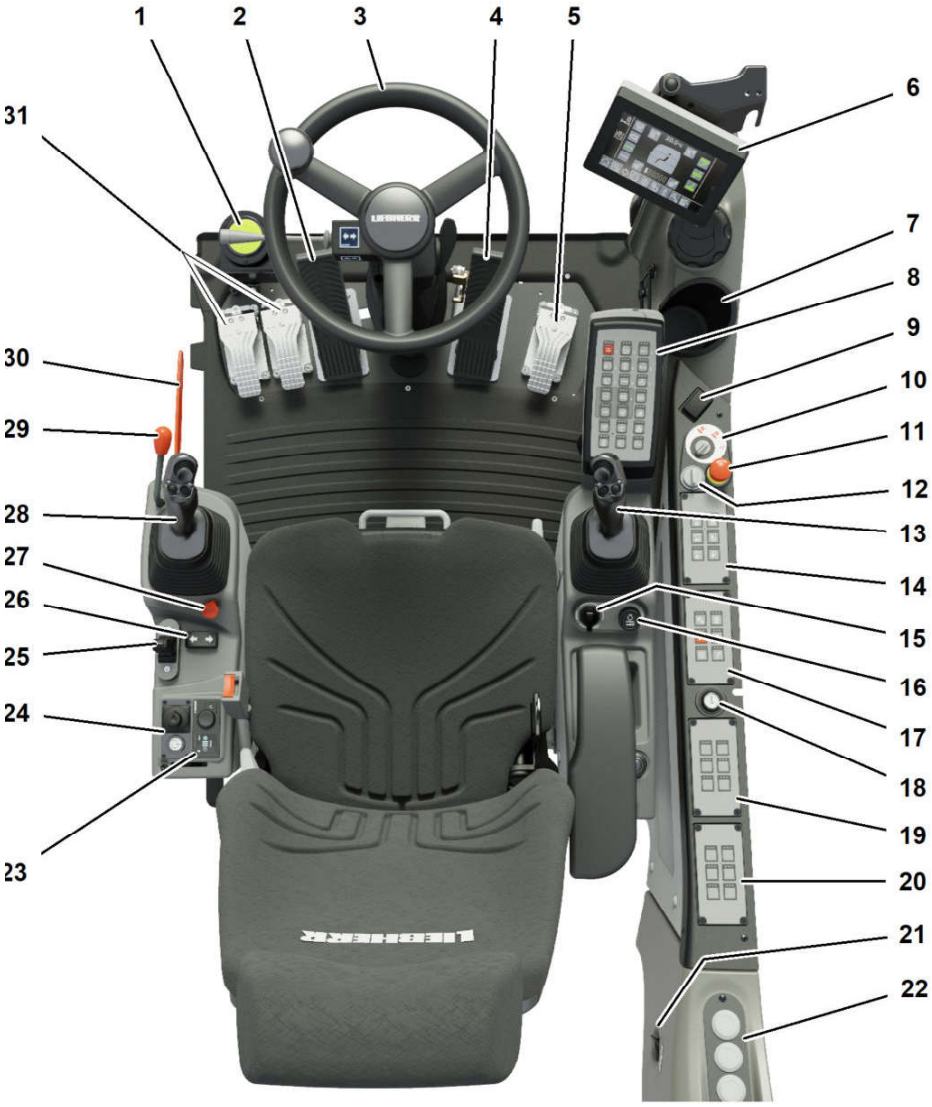

Fig. 79: Overview of operator's platform

1	Circular spirit level[1)]	**17**	Control unit C
2	Slewing brake[1)]	**18**	Confirmation button
3	Steering wheel[1)]	**19**	Control unit D
4	Service brake	**20**	Control unit E
5	Accelerator pedal	**21**	Socket (12 V)
6	Display	**22**	Key switch[1)]
7	Drink holder	**23**	Control unit of auxiliary heater [1)]
8	Control unit A	**24**	Exterior mirror control [1)]
9	Adjusting lever for operator's cab (two-way adjustable cab)[1)]	**25**	Adjustment lever for operator's cab or support[1)]
10	Oscillating axle switch	**26**	Turn signal switch [1)]
11	Emergency cut-off switch or emergency stop button[1)]	**27**	Unlocking button for folding console
12	Control, magnetic crossbeam [1)]	**28**	Left joystick

See next page for continuation of the image legend

[1)] Option

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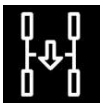
Symbol	Description	Symbol	Description
	Retracting side frames		Travelling right
	Travelling forward		Turning travel gear left on the spot
	Travelling forward and backward		Turning travel gear right on the spot
	Travelling backwards		

Tab. 17: Crawler excavator travel mode

Rail excavator travel mode

Symbol	Description	Symbol	Description
	Travelling forward		Travelling backwards

Tab. 18: Rail excavator travel mode

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Symbol	Meaning
	Backward Stability; shut-off initiated

Tab. 23: Status symbols of slewing gear

Height-adjustable cab

Symbol	Meaning
	Adjusting operator's cab blocked
	Lifting operator's cab blocked
	Lowering operator's cab blocked
	Automatic mode for upper park position
	Automatic mode for lower park position
	Operator's cab; neutral position required
	Boom line break safety open
	Hoist cylinder protection switched off
	Stick cylinder protection switched off
	Inclination cylinder protection switched off
	Adjusting cab inclination blocked

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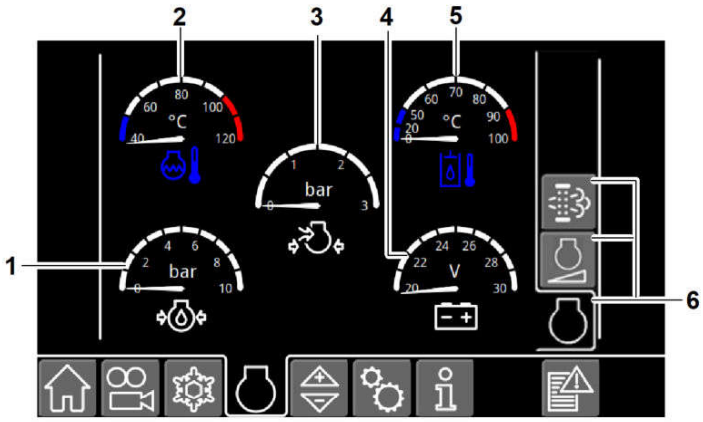

Fig. 402: Operating status menu

1 Engine oil pressure
2 Coolant temperature
3 Charging pressure
4 Battery voltage
5 Hydraulic oil temperature
6 Menu buttons

In normal mode, the symbols are displayed in white, for a warning, they are displayed in red.

Menu button	Designation
	Diesel particulate filter (For more information see: 3.2.7 *Diesel particulate filter* submenu (option), page 96)
	Sensor-controlled low idle automatic and automatic engine stop
	Measurement display

Tab. 32: Menu buttons

3.2.7 *Diesel particulate filter* submenu (option)

Menu call:  > 

The display of this submenu varies depending on machine configuration:

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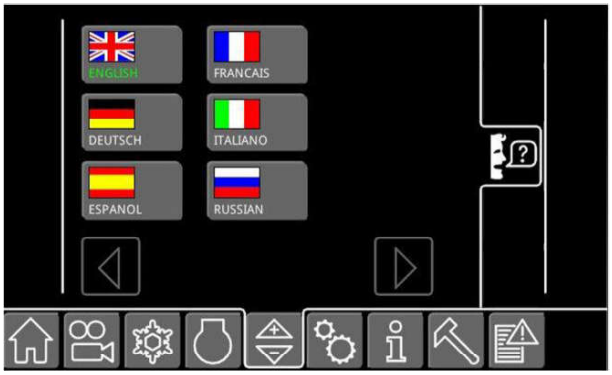

Fig. 435: Language selection submenu

▶ Press button for the desired language.
  ▷ Button of selected language is framed in white.

The change of language only takes effect after the system data are stored.

▶ Set ignition key to **0**.

▶ Wait 40 seconds.

▶ Set ignition key to **1**.
  ▷ Change of language takes effect.

3.2.23 *Electrical outputs* submenu

Menu call:  > >

The display of this submenu varies depending on machine configuration:

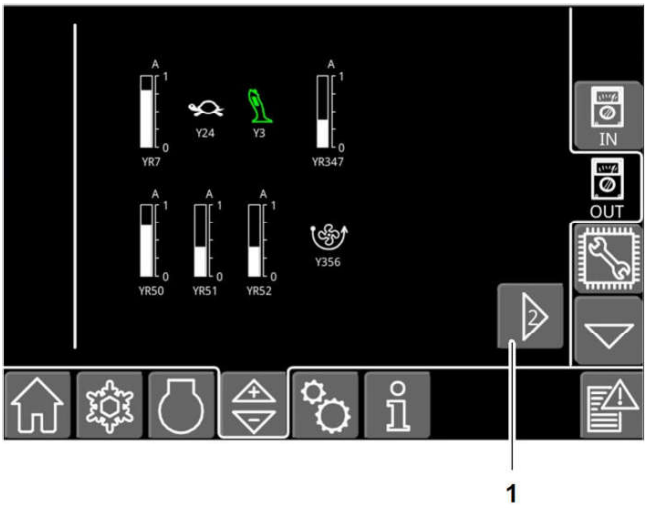

Fig. 436: Electrical outputs submenu

1 *Scroll* button

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

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- ▶ Activate stick cylinder shut-off: (For more information see: 3.5.1 Stick cylinder shut-off (option), page 197)
- ▶ Activate hoist cylinder shut-off: (For more information see: 3.5.2 Hoist cylinder shut-off (option), page 200)

3.2.33 *Stick cylinder speed and hoist cylinder speed* submenu (option)

Menu call:  > 

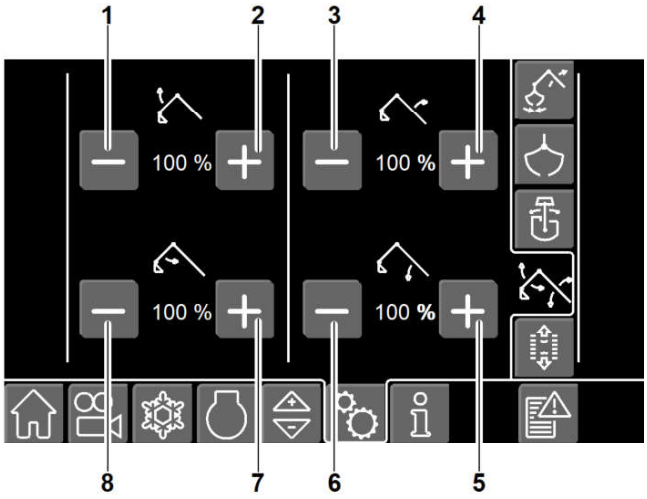

Fig. 474: Setting stick cylinder speed and hoist cylinder speed

1	Reducing stick cylinder extension speed	**5**	Increasing hoist cylinder retraction speed
2	Increasing stick cylinder extension speed	**6**	Reducing hoist cylinder retraction speed
3	Reducing hoist cylinder extension speed	**7**	Increasing stick cylinder retraction speed
4	Increasing hoist cylinder extension speed	**8**	Reducing stick cylinder retraction speed

3.2.34 *Workspace limitation* submenu (option)

Menu call:  > 

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- ▶ Close door.
- ▶ Climb down facing the machine.

3.3.3 Step lighting (option)

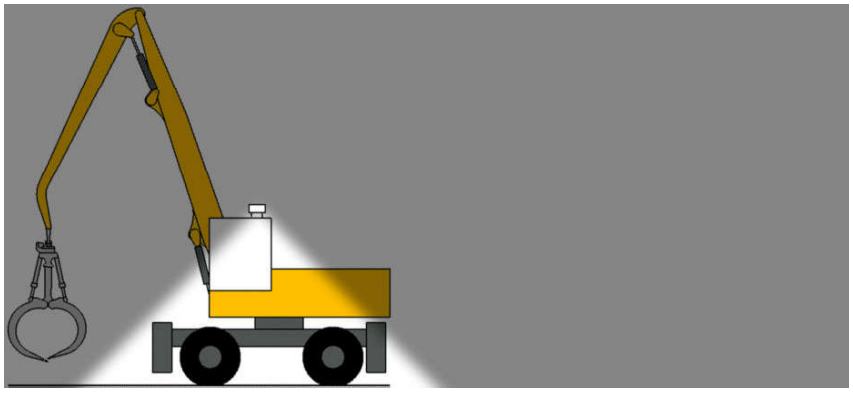

Fig. 499: Step lighting

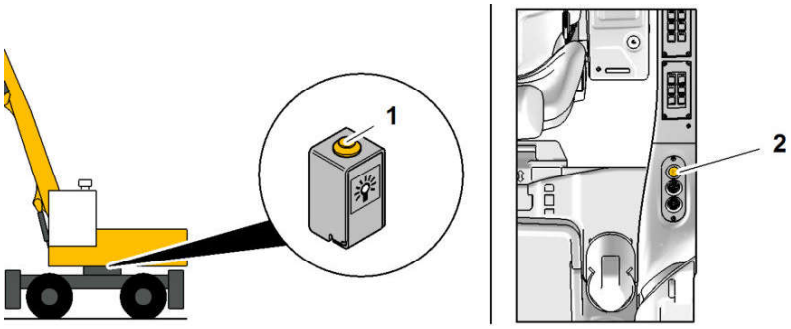

Fig. 500: Step lighting button

1 *Step lighting* button on ladder

2 *Step lighting* button in operator's cab

Note

Headlights of step lighting go out after a preset time.

3.3.4 Emergency exit

Fig. 501: Information sign: emergency exit / emergency hammer

Switching seat heating on and off (option)

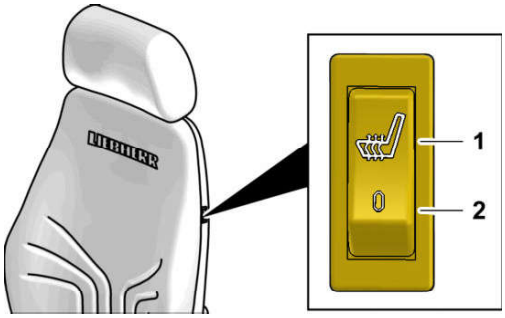

Fig. 521: Seat heating

1 Switch on seat heating
2 Switch off seat seating

Switching seat heating with seat air conditioning on and off (option)

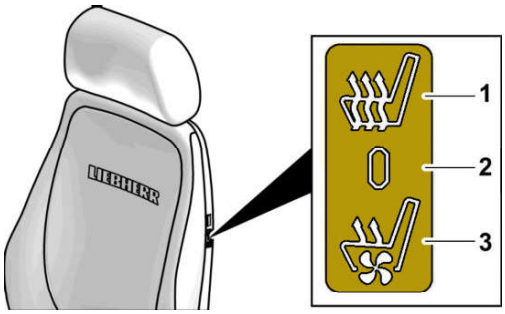

Fig. 522: Seat heating with seat air conditioning

1 Switch on seat heating
2 Switch off seat heating and seat air conditioning
3 Switch on seat air conditioning

3.3.8 Safety belt

The safety belt is an automatic safety belt. It does not need to be adjusted.

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17) Option

Complete windscreen

Opening complete windscreen

- ▶ Open lower windscreen.
- ▶ Open upper windscreen.

Closing complete windscreen

- ▶ Close upper windscreen.
- ▶ Close lower windscreen.

3.3.16 Sun blind

Windscreen sun blind

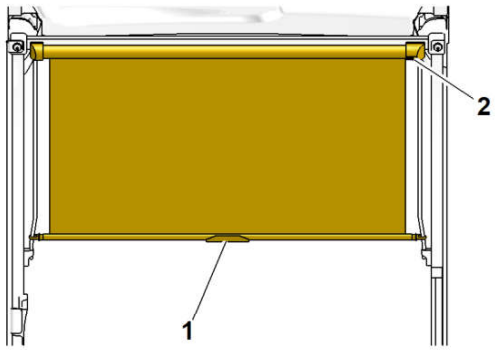

Fig. 547: Windscreen sun blind

1 Tab **2** Roll up button

Roof glass panel sun blind

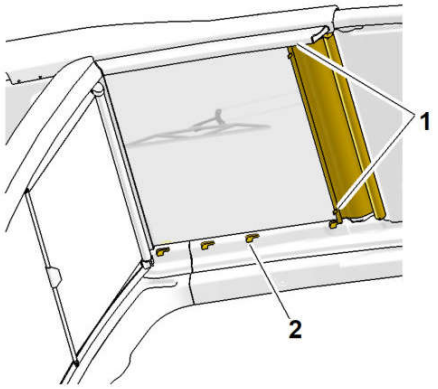

Fig. 548: Roof glass panel sun blind

1 Handle **2** Notch

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DANGER
Explosion of highly flammable fuel!
Danger to life.

- ▶ Avoid naked flames.
- ▶ Do not smoke.

Note
Sulphur content of fuel affects change interval of engine oil and oil filter.

- ▶ Adhere to sulphur content of fuel and change intervals of engine oil. (For more information see: 5.3.4 Engine oils, page 295)

If sulphur content of fuel is not known:
- ▶ Determine sulphur content with oil analysis set.

Make sure the following preconditions are met:
- ❑ Diesel engine is shut off.
- ❑ Auxiliary heater is switched off.

- ▶ Set starting switch to 1.
- ▶ Open tank lid **1**.
- ▶ Move hatch **8** up.
- ▶ Pull off protective cap **7**.
- ▶ Insert suction hose **2** in external fuel tank.
- ▶ Remove remote control **4** if necessary.
- ▶ Open stop cock **6**.

NOTICE
Dry operation of refuelling pump!
Damage to refuelling pump.

- ▶ Make sure that suction hose is immersed in fuel during operation of refuelling pump.
- ▶ Switch off refuelling pump before external fuel tank is completely empty.

Note

Refuelling pump switches off when fuel tank is full.

- ▶ Start refuelling process: Press *switching on refuelling pump* button **5**.

Troubleshooting
Refuelling pump does not aspirate automatically?

- ▶ Press *switching off refuelling pump* button **3**.
- ▶ Raise external fuel tank.
- ▶ Press *switching on refuelling pump* button **5**.

- ▶ End refuelling process: Press *switching off refuelling pump* button **3**.
- ▶ Close stop cock **6**.
- ▶ Remove suction hose **2** from external fuel tank.

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▶ Assume last active operating mode: Press *MODE* key.

or

Select operating mode S, E and P: Press *MODE* key until required operating mode is active.

or

Select operating mode P+: Turn engine speed controller.

3.4.13 After starting

Operating machine

DANGER
Exhaust gases!
Danger to life.

▶ Exclusively run diesel engine in enclosed rooms if there is adequate ventilation.

▶ Ensure sufficient fresh air supply.

DANGER
Sluggish control!
Danger to life.

▶ Before putting load on machine, bring diesel engine and hydraulic oil to operating temperature.

▶ Carefully move machine to open ground.

▶ Before starting work, check all safety relevant functions.

During operation, check following points:
– Oil pressure is constant.
– Output and speed are constant.
– Exhaust gas is colourless.
– Coolant temperature is constant.
– Diesel engine sounds are normal.

▶ Plan a warm-up phase.

▶ Plan work so that the diesel engine can run at operating temperature for as long a period as possible.

▶ Monitor diesel engine during operation.

▶ Adhere to error messages and status symbols on the display.

If malfunctions occur in diesel engine:

▶ Shut off diesel engine immediately.

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Note
Different machine configuration.

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

Depending on the equipment the support is moved with one of the following control elements:
– Left mini-joystick **1**
– *Support* adjusting lever **2**

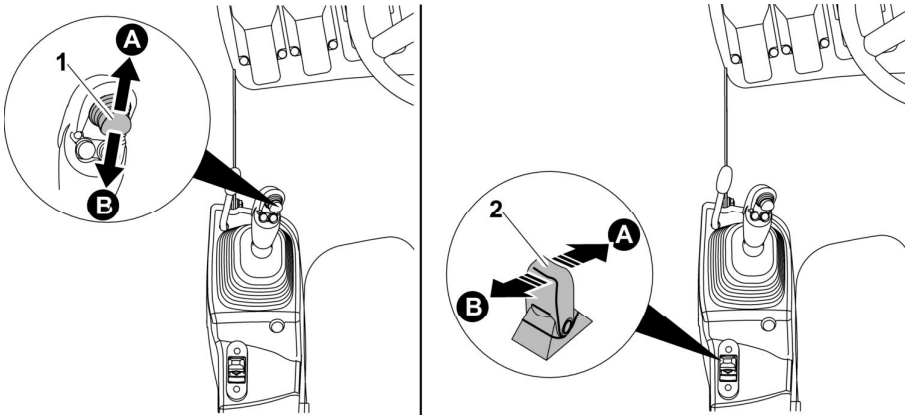

Fig. 654: Control elements

1 Left mini-joystick **2** *Support* adjusting lever

Supporting machine with outrigger support

Key	Status of LEDs	Support
	○ ○ ○	Deactivated: Control not possible
	☀ ☀ ☀	Activated: Control possible

Tab. 57: Outrigger key

In case of individual control[20)] of outriggers the arrangement of keys on the control unit corresponds to the arrangement of outriggers on undercarriage. Example: Left key activates left outrigger.

Symbol	Operating mode	Function or application
	Activated	*Outrigger monitoring system*[20)] symbol is displayed when outrigger support is extended. Machine is not ready to travel.

Tab. 58: Outrigger monitoring system symbol

[20)] Option

3.4.26 Positioning slewing brake

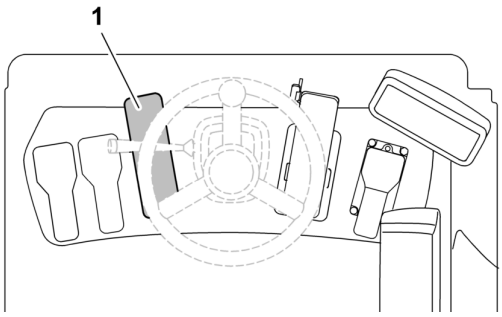

Fig. 686: Positioning slewing brake

1 Brake pedal

NOTICE
Incorrect use!
Wear on brake discs.

▶ Exclusively hold stationary uppercarriage in position.

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

3.4.27 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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Key	Function
	Automatic reversible fan drive is switched on.

Tab. 69: Automatic reversible fan drive button

▶ Make sure that air intake area is free from persistent soiling (For more information see: 5.9.2 Checking cooling system and heat exchanger for contamination and cleaning, page 341) .

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▶ Press *bypass stick cylinder shut-off for heavy working tool* key.
▷ *Confirmation required* symbol appears on the display.

▶ Press confirmation button within 5 seconds.
▷ *Stick cylinder shut-off for heavy working tool active* symbol goes out:

▷ *Stick cylinder shut-off for heavy working tool bypassed* symbol appears:

▷ LEDS in *bypass stick cylinder shut-off for heavy working tool* key light up.
▷ Stick can be retracted without restriction in the approved working area of the stick cylinder shut-off.
▷ Stick can be extended without restriction in the approved working area of the stick cylinder shut-off.

Troubleshooting
Bypass is not activated?
If confirmation button is not pressed within 5 seconds, bypass is not activated.

▶ Activate bypass again.

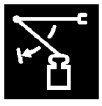
Automatic deactivation of bypass

The stick cylinder shut-off for heavy working tool bypass is deactivated automatically when one of the following actions is performed:
– Shut off diesel engine.
– Activate safety lever.
– Activate quick coupler.

Deactivating bypass

▶ Press *bypass stick cylinder shut-off for heavy working tool* key.
▷ LEDS in *bypass stick cylinder shut-off for heavy working tool* key go out.
▷ *Stick cylinder shut-off for heavy working tool bypassed* symbol goes out:

▷ *Stick cylinder shut-off for heavy working tool active* symbol appears:



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Checking height limitation

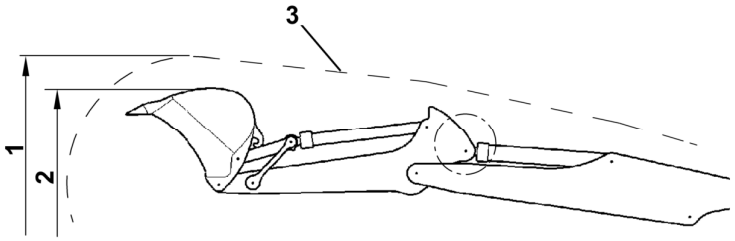

Fig. 798: Checking height limitation

1 Set limit value
2 Working height
3 Moving contour

Make sure the following preconditions are met:
- ❑ Machine is on level and firm ground.
- ❑ Uppercarriage is aligned parallel to undercarriage.
- ❑ Working tool operating mode is selected.
- ❑ Height limitation is switched on.

▶ Make sure that height limitation is not checked under restricting height.

▶ Fully extend working attachment forward.

▶ Retract bucket cylinder until working tool is fully tilted.

▶ Move boom upward until height limitation stops movement.

▶ Measure working height **2**.

▶ Compare measured working height **2** with limit value on the display.

Note
Moving contour stops movement of working attachment!

▶ Make sure that measured working height is smaller than set limit value.

DANGER
Measured working height exceeds set limit value.
Danger to life.

▶ Do not work under restricting heights.

If measured working height exceeds set limit value:
▶ Contact Liebherr customer service.

3.5.6 Overload warning system (option)

Note

The overload warning system warns during work before maximum permitted load is exceeded.

Load-increasing movements do not stop.

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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

NOTICE
Unapproved use of parking brake!
Damage to travel gearbox.

- ▶ During work exclusively use service brake.

Putting machine with wheeled undercarriage with two axles in working position

- ▶ Make sure that travel direction switch is in neutral position.
- ▶ Make sure that parking brake is released.
- ▶ Lock service brake.
- ▶ Lock oscillating axle.
- ▶ Support machine.

Putting machine with wheeled undercarriage with more than two axles in working position

- ▶ Extend folding wings.
- ▶ Support machine.

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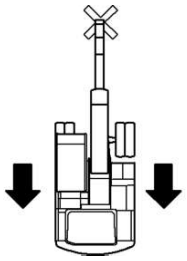
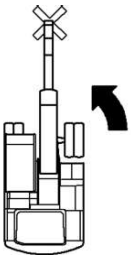
Travelling backward

Hand gesture	Banksman	Machine
Rotate fists in front of body in direction of chain movement.		

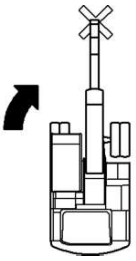
Tab. 89: Travelling backward

Turning left

Hand gesture	Banksman	Machine
Extend forearm upwards in steering direction. Clench fist. Rotate second fist in direction of wheel movement.		

Tab. 90: Turning left

Turning right

Hand gesture	Banksman	Machine
Extend forearm upwards in steering direction. Clench fist. Rotate second fist in direction of wheel movement.		

Tab. 91: Turning right

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▶ Protect exhaust system from water penetration.

▶ Adhere to all permitted dimensions for transport.

If hydraulic hoses exceed permitted total height:

▶ Tie hydraulic hoses to working attachment with belts.

3.9.3 Tying down machine

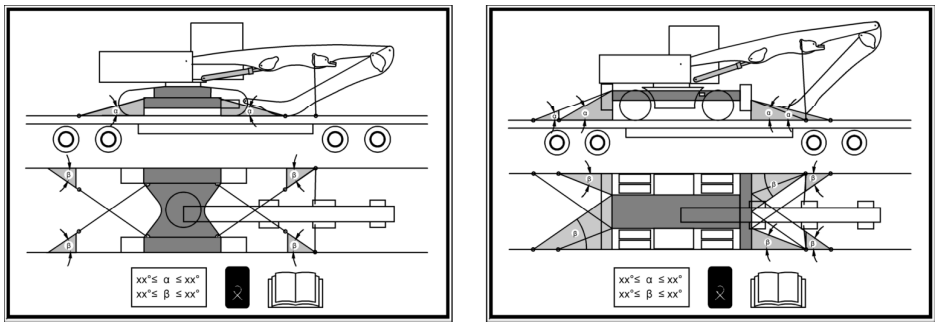

Fig. 866: Signs (example) in operator's cab

Make sure the following preconditions are met:

❑ Slip-resistant mats as per EN 12195-1 with a friction coefficient μ above 0.4 are designed for low-loaders.

❑ Lashing chains ensure lashing force as per EN 12195-3.

Maximum total weight of machine	Lashing force of lashing chain as per EN 12185-3
Up to 44,092 lb	11,240 lb_f
Up to 66,138 lb	17,980 lb_f
Up to 121,252 lb	30,120 lb_f
Up to 176,367 lb	44,960 lb_f
Over 176,367 lb	71,940 lb_f

Tab. 97: Lashing force of lashing chain as per EN 12185-3

DANGER
Machine slipping!
Danger to life.

▶ Secure machine adequately against slipping.

▶ Exclusively use suitable cables and chains.

▶ Determine maximum total weight of machine. (For more information see: 2.4.3 Identification tag (USA), page 49)

▶ Select lashing chains according to maximum total weight of machine.

▶ Attach lashing chains to marked tie-down points of undercarriage.

▶ Arrange lashing chains crosswise.

▶ Attach lashing chains to tie-down points of low-loader.

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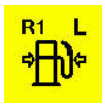
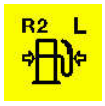
Symbol	Meaning	Effect, characteristic	Remedy
	Fuel level is too low.	Air is entering fuel system. Diesel engine will not start.	Refuel. Bleed fuel system if necessary.
	There is water in the fuel filter. There is water in the fuel tank.	Diesel engine does not reach full speed. Exhaust gas is white. Diesel engine is damaged.	Drain water from fuel filter. Drain water from fuel tank. If symbol is still displayed: Shut off diesel engine and contact Liebherr customer service.
	Prewarning: Fuel pressure is high or low. Fuel filter is contaminated. Fuel filter is defective. Fuel lines are blocked or damaged.	Diesel engine is running unevenly. Diesel engine output is reduced automatically.	Shut off diesel engine. Have fuel filter cleaned or replaced by authorized specialist personnel. If symbol is still displayed: Contact Liebherr customer service.
	Fuel pressure is too high or too low. Fuel filter is contaminated. Fuel filter is defective. Fuel lines are blocked or damaged.		
	Prewarning: Fuel pressure is high. Fuel filter is contaminated. Fuel filter is defective. Fuel lines are blocked or damaged.	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 is still displayed: Contact Liebherr customer service.
	Fuel pressure is too high. Fuel filter is contaminated. Fuel filter is defective. Fuel lines are blocked or damaged.		
	Prewarning: Fuel pressure is low. Fuel filter is contaminated. Fuel filter is defective. Fuel lines are blocked or damaged.	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 is still displayed: Contact Liebherr customer service.
	Fuel pressure is too low. Fuel filter is contaminated. Fuel filter is defective. Fuel lines are blocked or damaged.		
	Prewarning: Fuel pressure in Common Rail system 1 is low.	Diesel engine is running unevenly. Diesel engine output is reduced automatically.	Shut off diesel engine. Contact Liebherr customer service.
	Fuel pressure in Common Rail system 1 is too low.		
	Prewarning: Fuel pressure in Common Rail system 2 is low.	Diesel engine is running unevenly. Diesel engine output is reduced automatically.	Shut off diesel engine. Contact Liebherr customer service.
	Fuel pressure in Common Rail system 2 is too low.		

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4.2.3 Electrical system

Malfunction / error	Cause	Remedy
Charge indicator symbol is displayed after the engine starts.	V-belt is loose.	Tighten v-belt.
	V-belt has torn.	Replace v-belt.
	Alternator is defective.	Contact Liebherr customer service.
Batteries are not charged, or not charged sufficiently.	Batteries are faulty.	Replace batteries.
	Battery connections are loose.	Attach battery connections.
	Battery connections have oxidised.	Clean battery connections.
	Cables are loose.	Connect cables.
	Cables are damaged.	Replace cables.
Malfunction of control elements and display elements has occurred.	Cables are loose or damaged. Control is defective.	Contact Liebherr customer service.
	Fuse is defective.	Replace fuse.
Engine speed cannot be changed.	Sensor-controlled low idle automatic is switched on.	Switch off sensor-controlled low idle automatic or touch joystick.
Sensor controlled low idle automatic is not working. Engine speed does not drop automatically.	Control signal is faulty.	Contact Liebherr customer service.

4.2.4 Heating, ventilation and air conditioning unit

Malfunction / error	Cause	Remedy
Heating does not provide warm air.	Heat supply is interrupted. Control is defective.	Contact Liebherr customer service.
Blower is not working.	No power supply present. Blower motor is defective.	Contact Liebherr customer service.
Blower output is too low.	Filter is contaminated.	Replace filter.
	Air outlets are closed.	Open air outlets.
Air conditioning unit is not cooling.	Air conditioning condenser is contaminated.	Clean air conditioning condenser.
	Temperature sensor, air conditioning compressor or other parts of air conditioning unit are defective.	Contact Liebherr customer service.

4.2.5 Working attachment

Malfunction / error	Cause	Remedy
Hydraulic cylinder yields under load.	Piston seal is defective. Hydraulic line is broken.	Contact Liebherr customer service.
Working attachment has too much bearing play.	Bearings are badly worn.	Contact Liebherr customer service.

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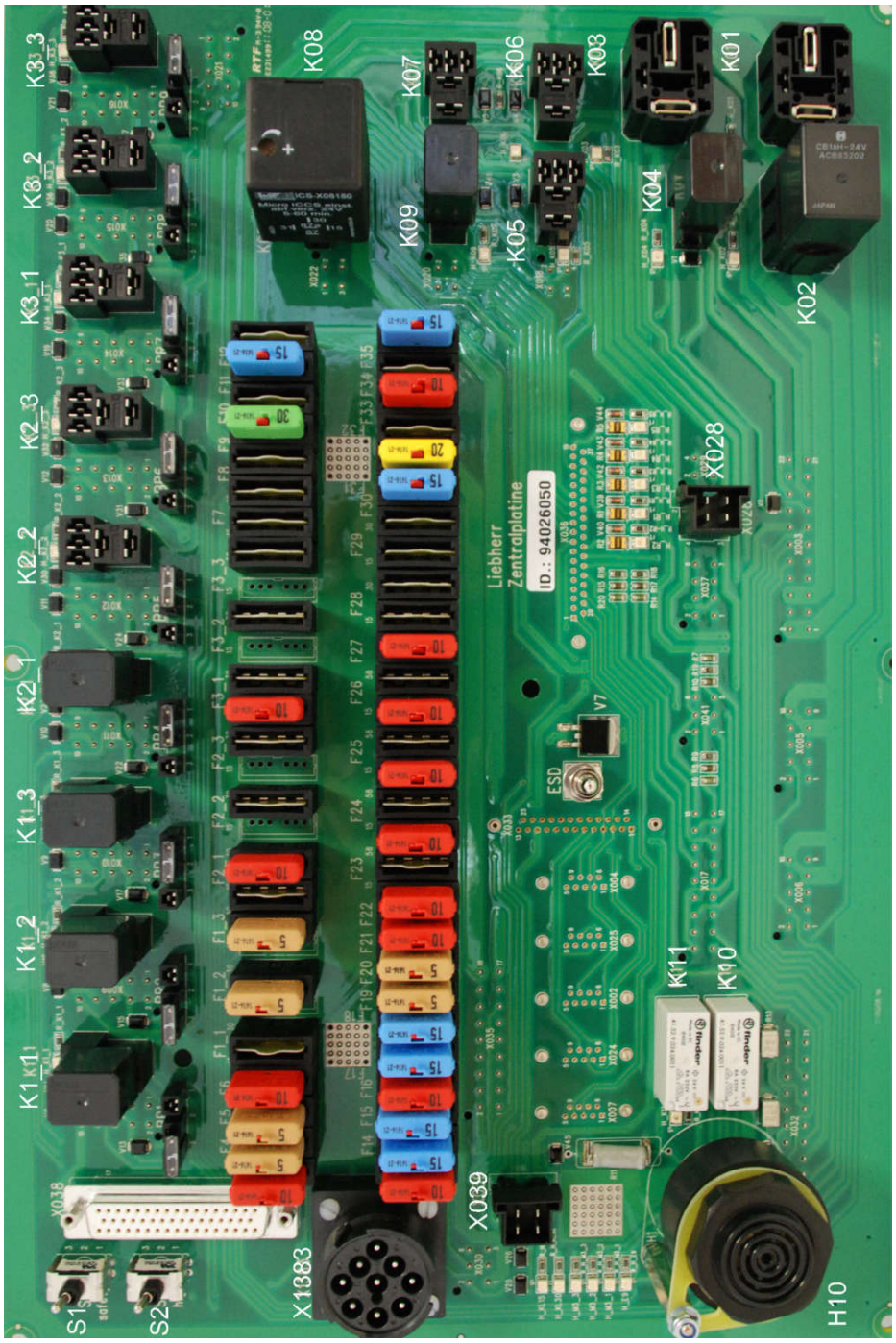

Fig. 951: Main circuit board A161

Fuse	Consumer	Rating [A]
F1_1	Turn indicator	10
F1_2	K1_2, parking light left, reversing light left, licence plate lighting left	5
F1_3	K1_3, parking light right, reversing light right, licence plate lighting right	5

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Inspection and maintenance schedule

Customer:..... Machine type:..... Serial no.:..... Operating hours:..... Date:.....

Maintenance / inspection after service hours								Tasks to be performed		
On handover	All 8-10 h	All 50 h	All 500 h	All 1000 h	All 2000 h	Other intervals	Additional labelling	**By maintenance staff** ■ Once-only activity ● Repeat interval ✦ If necessary ❄ Annually before the winter **By authorised specialist staff** ☐ Once-only activity ❍ Repeat interval ✧ If necessary **Additional labelling** Assistance required Have this task carried out exclusively by a certified electrician	Confirm tasks	See page
				❍	❍	❄		Auxiliary heater (option): Check function.		358
		●				✧		Switch on air conditioning unit.		358
			❍	❍	❍	✧		Clean pre-filter.		
				❍	❍			Replace filter cassette (shorten interval accordingly in dust intensive application).		
		●	❍	❍	❍			Check condenser for contamination and clean if necessary.		359
			❍	❍	❍			Check whether safety belt is available and functioning.		
Lubrication system										
		●	❍	❍	❍	✦		Lubrication system: Fill with grease.		361
		●	❍	❍	❍			Check lubrication of bearings (grease collar).		362
Slewing gearbox and slewing ring										
		●	❍	❍	❍			Slewing gearbox: Check oil level.		363
			☐	❍	❍			Slewing gearbox: Change oil.		
				❍	❍			Slewing gear brake: Check function.		

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Minimum quality requirements

Specification
LH-00–ENG3A
ACEA E4, API CH-4, API CI-4

Tab. 122: Minimum quality requirements

If engine oils from a third party manufacturer are used, information on change intervals must be obtained from respective manufacturer or supplier.

Difficulty factors

Difficulty factors have influence on the change interval of engine oil.

Adapt change interval of engine oil.

Difficulty factors are:
– Frequent cold starts
– Sulphur content in fuel
– Environmental influences
  • Operating temperature
  • Dust
  • High humidity

The sulphur content in the fuel determines the change interval in dependence on the quality of the engine oil.

Sulphur content of fuel	LH-00ENG3A LH-00ENG3A LA[27)]	Liebherr Motoroil 10W-40 Liebherr Motoroil 10W-40 low ash [27)]	Liebherr Motoroil 5W-30 Liebherr Motoroil 5W-30 low ash [27)]
Up to 15 ppm	500 h	1000 h	2000 h
15 ppm to 300 ppm	500 h	1000 h	1000 h
300 ppm to 2000 ppm	250 h	500 h	500 h
2000 ppm to 5000 ppm	125 h	250 h	250 h

Tab. 123: Change interval of engine oil

5.3.5 Refrigerant

The air conditioning contains fluorinated greenhouse gases.

Designation	Air conditioning unit
Refrigerant	R134a
Global warming potential	1430
CO_2 equivalent of 2.20 lb R134a at 77 °F	3,153 lb

Tab. 124: Refrigerant

[27)] For machines with diesel particulate filter use low ash engine oil.

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Locking mechanism of access points

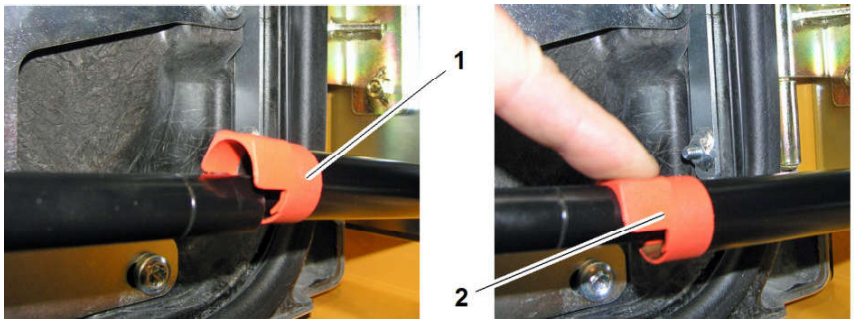

Fig. 963: Locking mechanism of access points

1 Locked position **2** Unlocked position

▶ Completely open access point.
▷ Locking mechanism is in locked position **1**.

▶ Put locking mechanism into unlocked position **2** and close access point.

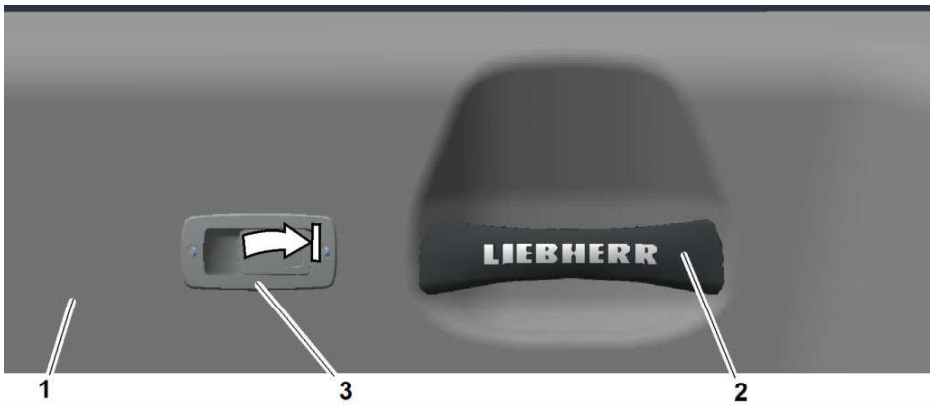

Fig. 964: Locking engine bonnet in place

1 Engine bonnet **3** Remote unlocking
2 Handle

▶ Fully open engine bonnet **1**.
▷ Engine bonnet **1** is locked into place.

▶ Release locking mechanism with remote unlocking **3** and close engine bonnet **1**.

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5.7 Complete machine

5.7.1 Checking machine for proper condition and tightness

NOTICE
Incorrect check!
Damage to machine.

- ▶ Perform visual inspections as per maintenance and inspection schedule.
- ▶ Check machine for proper condition.
- ▶ Check machine for tightness.
- ▶ Check machine for damage.

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

Visual inspection before putting into service

- ▶ Before putting machine into service, always perform inspection tour.
- ▶ Perform maintenance tasks as per maintenance and inspection schedule every 8-10 h and 50 h.

Visual inspection during maintenance tasks

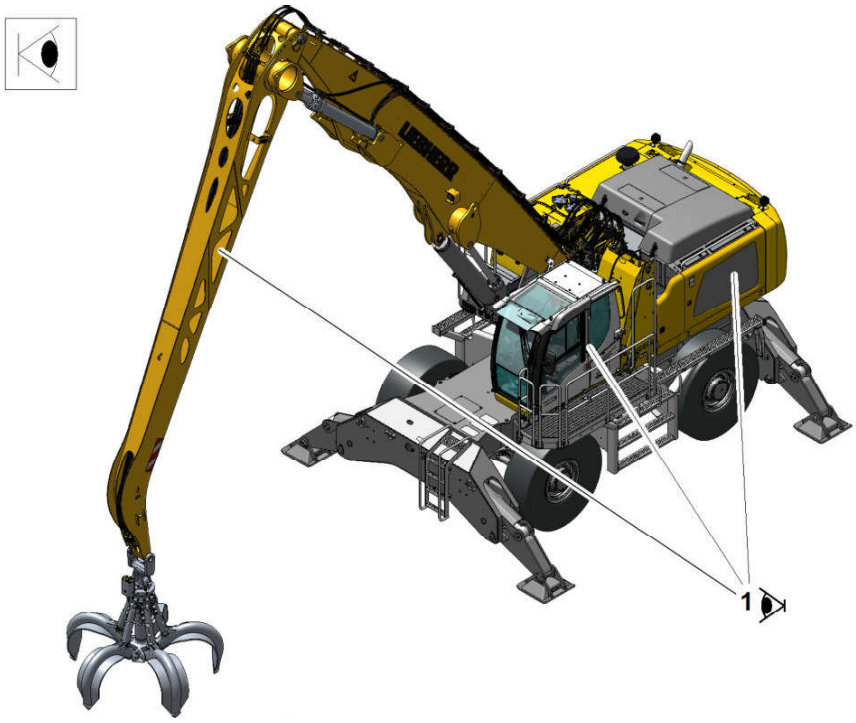

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Fig. 968: Visual inspection of complete machine

DANGER
Explosion of highly flammable fuel!
Danger to life.

- ▶ Avoid naked flames.
- ▶ Do not smoke.

WARNING
Engine hot!
Burns.

- ▶ Let engine cool down.
- ▶ Wear protective gloves.
- ▶ Avoid skin contact with engine when hot.

- ▶ Place suitable receptacle under the fuel pre-filter.
- ▶ Open water drain tap **1**.
  ▷ Condensed water in transparent container flows out.
- ▶ Drain water until pure fuel emerges.
- ▶ Close water drain tap **1**.
- ▶ Dispose of condensed water in an eco-friendly manner.

5.8.4 Fuel tank: Draining water and sediments

NOTICE
Condensed water in tank!
Engine damage.

- ▶ Make sure that fuel tank is filled during idle times.

DANGER
Explosion of highly flammable fuel!
Danger to life.

- ▶ Only work with diesel engine shut off.
- ▶ Avoid naked flames.
- ▶ Do not smoke.

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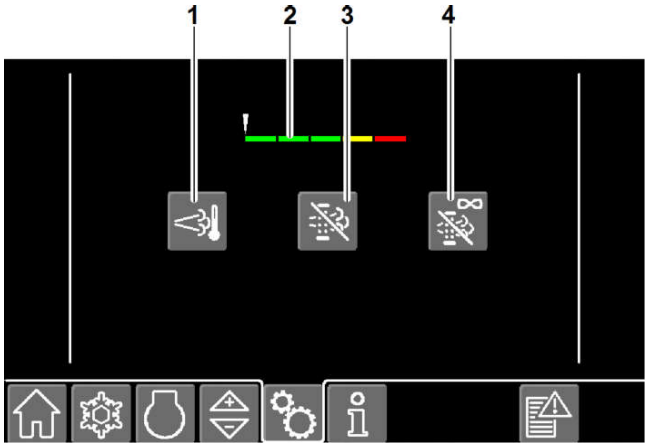

Fig. 995: Activating filter regeneration

1 *Activating filter regeneration* button
2 Contamination level of diesel particulate filter
3 *Temporarily deactivating filter regeneration* button
4 *Permanently deactivating filter regeneration* button

Following factors extend the regeneration time:
– Outside temperature
– Exhaust temperature
– Contamination level of diesel particulate filter

Make sure the following preconditions are met.
❑ Machine is shut down.
❑ Machine is not in an enclosed space.
❑ Machine is in a safe location without fire risk.
❑ Fuel level is sufficient.
❑ Diesel engine is at operating temperature.

▶ Let diesel engine run.

▶ Move folding console up.

▶ Open *diesel particulate filter* menu.

▶ Press *activating filter regeneration* button.
▷ *Filter regeneration in progress* status symbol appears on the display:

▷ *Activating filter regeneration* button is deactivated as button and lights up green:

▷ Filter regeneration starts.
▷ Diesel engine runs at higher speed.
▷ Remaining filter regeneration time is displayed:

▷ Diesel engine drops to idle speed.

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NOTICE
Escaped oil!
Environmental pollution.

- ▶ Collect oil in suitable receptacle.
- ▶ Dispose of discharged oil in eco-friendly manner.

- ▶ Remove existing covers. (For more information see: 5.4.2 Access points under the uppercarriage, page 307)
- ▶ Depressurise hydraulic tank. (For more information see: Depressurising hydraulic tank, page 343)
- ▶ Remove protective cap from suction side drain valve **4**.
- ▶ Place suitable receptacle under suction side drain valve **4**.
- ▶ Place free end of drain hose **3** in receptacle.
- ▶ Screw drain hose **3** onto suction side drain valve **4** until oil is discharged slowly.
- ▶ Monitor hydraulic oil level, work with assistant if necessary.

When required hydraulic oil level is reached:
- ▶ Remove drain hose **3** from suction side drain valve **4**.
- ▶ Dispose of hydraulic oil in eco-friendly manner.
- ▶ Screw protective cap onto suction side drain valve **4**.

5.10.3 Hydraulic tank: Draining water and sediments

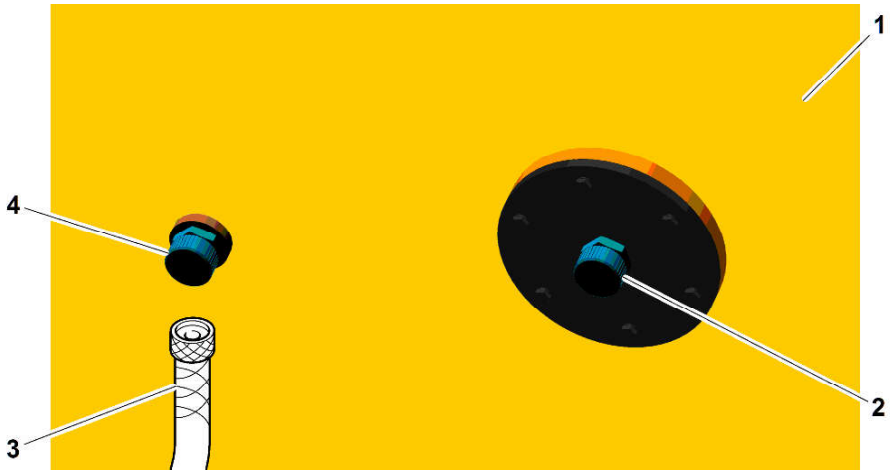

Fig. 1017: Hydraulic tank drain valves

1	Hydraulic tank	**3**	Drain hose
2	Return side drain valve	**4**	Suction side drain valve

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5.14 Operator's cab, heating and air conditioning

5.14.1 Filling with windscreen washer fluid

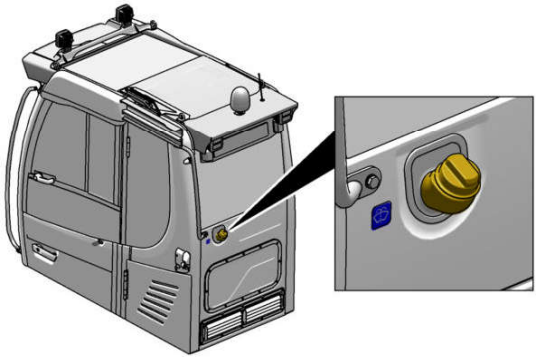

Fig. 1024: Windscreen washer tank

▶ Fill with windscreen washer fluid. (For more information see: 5.3.13 Windscreen washer fluid, page 304)

5.14.2 Heating: Checking function

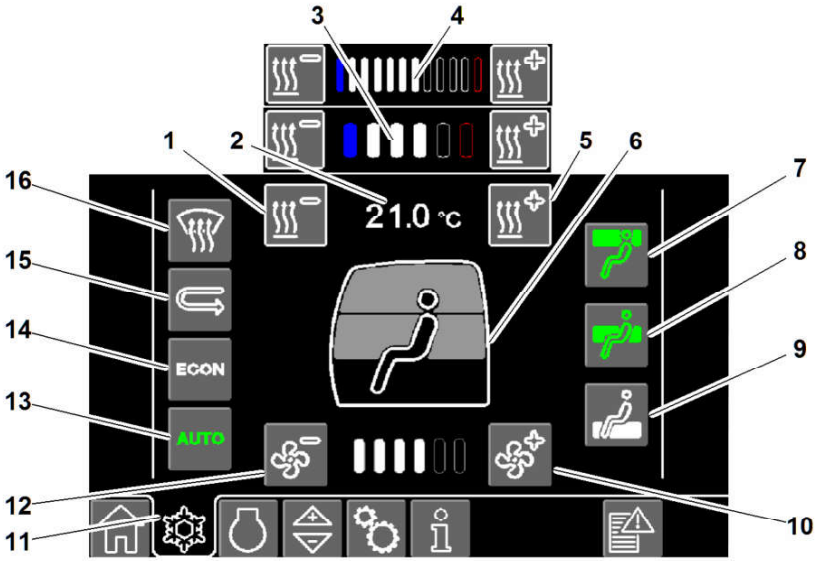

Fig. 1025: Operation via menu

1 *Lower temperature* button
2 *Automatic air conditioning* temperature display
9 *Foot area air outlets* button
10 *Raise blower power* button

See next page for continuation of the image legend

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