

en

Operating Manual

Wheel Loader
L580 -458 from 12800



LIEBHERR

en

Operating Manual

Wheel Loader
L580 - 458 from 12800

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This operating manual has been written for the **driver** and for the **maintenance personnel** of the machine.

It describes:

- Chapter 1 - Product description
- Chapter 2 - Safety regulations
- Chapter 3 - Operation and handling
- Chapter 4 - Malfunctions
- Chapter 5 - Maintenance

This operating manual must be carefully read before initial operation and should be read and used later at regular intervals by anyone responsible for working on the machine.

Working with or on the machine includes:

- **Operation**, including equipping, troubleshooting during operation, removing production debris, maintenance, removing operating and auxiliary materials.
- **Servicing**, including maintenance, inspection and repairs.
- **Transport** or loading the machine.

This manual helps the driver to become acquainted with the machine and prevents malfunctions due to improper operation.

Observation of the operating manual by maintenance staff:

- Increases reliability during operation
- Extends the service life of your machine
- Reduces repair costs and downtime

This manual must be kept with the machine. Place a copy within easy reach in the glove compartment in the driver's cab.

In addition to the operating manual follow the instructions based on existing national accident prevention and environmental protection regulations.

In addition to the operating manual and applicable national and local legal accident prevention rules, observe the recognised technical regulations for safe and proper operation.

This operating manual contains all the information you need to operate and service your machine.

If you should, however, require more detailed explanations or information, our technical information and customer services departments will be happy to provide assistance.

You will understand that we cannot accept warranty claims for damage due to improper use, insufficient maintenance, use of non-approved consumables or failure to follow the safety instructions.

LIEBHERR will cancel without prior notice all obligations such as warranty agreements and service contracts entered into by **LIEBHERR** and/or its agents if spare parts other than genuine **LIEBHERR** parts or those purchased from **LIEBHERR** are used for maintenance and repairs.

In extreme conditions, maintenance may be required more often than stated in the inspection schedule.

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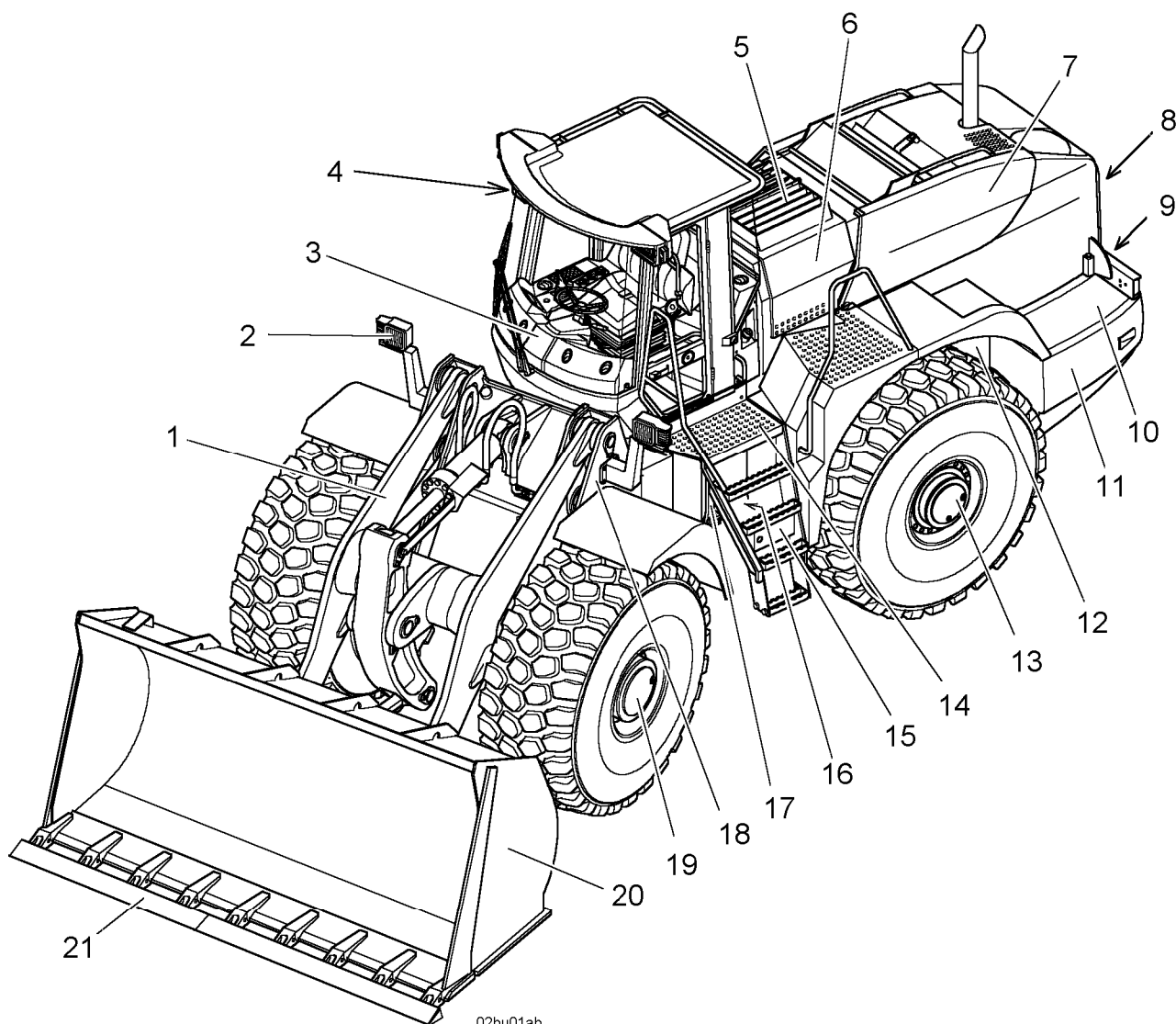
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1 Product description

Equipment layout

Standard version

This section contains an overview of the machine and the names of the components shown.



02bu01ab

Left view of machine

- | | | |
|---------------------------|------------------------------|----------------------|
| 1 Lift arm | 8 Engine compartment door | 15 Tool box |
| 2 Lighting | 9 Towing device | 16 Steering cylinder |
| 3 Driver's cab | 10 Battery compartment cover | 17 Articulation lock |
| 4 Working floodlight | 11 Ballast weights | 18 Front section |
| 5 Cooling system | 12 Rear section | 19 Front axle |
| 6 Cooling system hood | 13 Rear axle | 20 Bucket |
| 7 Engine compartment hood | 14 Cab access | 21 Tooth guard |

1.1 Technical data

1.1.1 Complete machine with bucket



The values stated refer to the machine:

- In its standard version
- With Z lift arms (3050 mm)
- Without a hydraulic quick-change device
- With 26.5R25 Michelin XHA tyres
- With rock bucket²⁾ and Michelin XLD-D2 26.5R25 tyres
- Including all lubricants
- With a full tank
- With ROPS/FOPS cab and driver

Tyre sizes and additional attachments affect the operating weight and tipping load.



Bucket versions

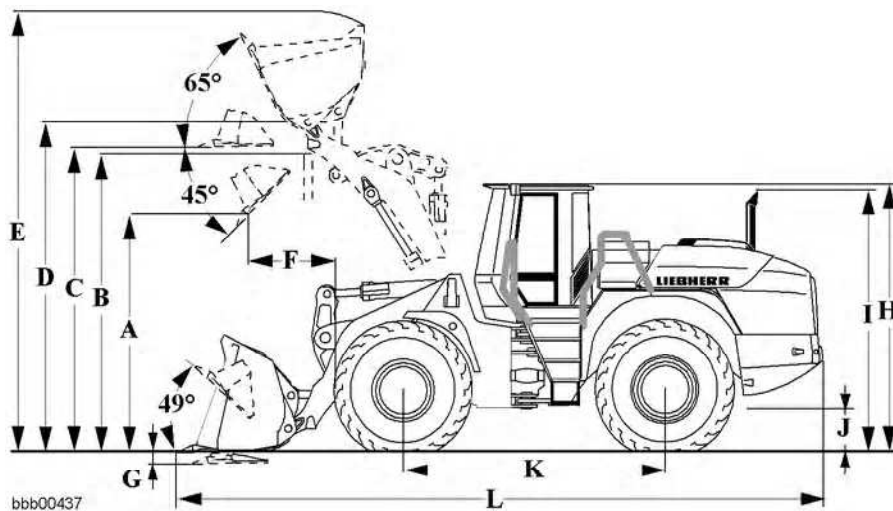
Key to the table:

Z = Welded tooth holder with plug-in teeth

U = Four-section, reversible undercut blade

¹⁾Rear loading bucket with angled base

²⁾Rock bucket with delta blade and overflow grille.



Dimensions

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	Description	Unit	Value				
			Z ¹⁾	U ¹⁾	Z ¹⁾	U ¹⁾	DZ ²⁾
	Cutting tool		Z ¹⁾	U ¹⁾	Z ¹⁾	U ¹⁾	DZ ²⁾
	Bucket capacity as per ISO 7546	m ³	5,0	5.0	5,5	5.5	4.0
	Bucket width	mm	3300	3300	3300	3300	3200
	Specific material weight	t/m ³	1,8	1.8	1,6	1.6	2.1
A	Dump height at maximum lifting height and 45° tilt-out angle	mm	3300	3300	3230	3230	3250
B	Dump height	mm	4100	4100	4100	4100	4100
C	Maximum bucket base height	mm	4250	4250	4250	4250	4250
D	Maximum bucket pivot point height	mm	4560	4560	4560	4560	4560
E	Maximum bucket top height	mm	6320	6320	6420	6420	6160
F	Reach at maximum lifting height and 45° tilt-out angle	mm	1150	1150	1225	1225	1180
G	Digging depth	mm	110	110	110	110	110
H	Height above the cab	mm	3540	3540	3540	3540	3590
I	Height above exhaust	mm	3450	3450	3450	3450	3500
J	Ground clearance	mm	550	550	550	550	600
K	Wheel base	mm	3570	3570	3570	3570	3570
L	Overall length	mm	9000	8820	9100	8930	9130
	Turning radius over bucket outer edge	mm	7250	7230	7300	7280	7250
	Lifting force (SAE)	kN	250	250	250	250	250
	Breakout force (SAE)	kN	175	175	160	160	170
	Tipping load when straight	kg	20260	19995	20040	19735	20030
	Tipping load articulated at 37°	kg	18180	17940	18000	17730	17995
	Tipping load articulated at 40°	kg	17850	17640	17680	17410	17660
	Operating weight	kg	24740	24940	24850	25090	25930
	Tractive force	kN	173,3	173.3	173,3	173.3	173.3

1.1.2 Engine



Type: 6-cylinder in-line engine, water-cooled with turbocharger and charge air cooling.

Air filter system: Dry air filter with safety element, separator, LCD service display

The exhaust emissions are below the threshold levels in EU directive 97/68/EC – Stage II.

Name	Value	Units
Diesel engine	D 926 TI-E A2	
Number of cylinders	6	Pc.
Rated power according to ISO 9249 at 2000 min ⁻¹	195 / 265	kW / PS
Maximum torque at 1200 min ⁻¹	1285	Nm
Cylinder capacity	9.96	Litres
Lower idle speed	750 ±50	min ⁻¹
Upper idle speed	2100 +80	min ⁻¹
Longitudinal / traverse inclinability	45 / 45	°

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1.1.3 Electrical system

bpik0028



Protected by:

- Main fuse
- Fuses for preglow system, starter, emergency steering pump
- Fuses on the main electronics

Batteries:

- Connected in series
- Fitted in the left and right ballast weights

Battery main switch: Rear left of engine compartment

Name	Value	Units
Battery voltage	12	V
Battery capacity	2 x 143 / 12	Ah / V
Number of batteries	2	Pc.
Operating voltage	24	V
Three-phase current alternator	28 / 55	V / A
Starter	24 / 5.4	V / kW

Battery fastening

When fitting or changing the battery:

Name	Value	Units
Tightening torque	10	Nm

1.1.4 Travel drive

bpik0029



Continuously variable hydrostatic travel drive

Type: 2plus2:

- Swash plate variable displacement pump and two axial piston motors in a closed circuit
With a transfer gear
- Forward and reverse travel by switching the flow direction of the variable displacement pump.

Travel drive control:

- By gas pedal and tractive force control pedal (inch pedal).
- The tractive force control pedal facilitates continuous adjustment of tractive or thrust force at full engine speed.
- Forward and reverse travel are selected using the Liebherr control lever
- The travel ranges are selected using the buttons on the control unit.

Speed data:

- For forward and reverse travel
- With standard tyres

Name	Value	Units
Travel range 1	0–10.0	km/h
Travel range 2	0–20,0	km/h
Travel range A1–2 (automatic)	0–20.0	km/h
Travel range A1-3 (automatic)	0–40,0	km/h
Travel range A2–3 (automatic)	0–40.0	km/h

1.1.5 Axles



Automatically acting self-locking differential in both axles.

Front axle Rigidly mounted planetary axle

Name	Value	Units
Width	2230	mm
Differential lock	45	%

Rear axle Oscillating planetary axle

Name	Value	Units
Width	2230	mm
Differential lock	45	%
Angle of articulation to each side	13	°
Height of obstacles which can be driven over	560	mm

1.1.6 Braking



The braking system complies with the roadworthiness certification regulations.

Service brake Self-arrest of hydrostatic travel drive, acting on all four wheels. Additional pump accumulator brake system with wet disc brakes in the wheel hubs (two separate brake circuits).

Parking brake Electrohydraulic spring accumulator brake system on the gearbox.

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1.1.7 Ballast weight

The factory supplies the machine with the type of ballast stated in the order.



Installing or changing the working attachment or tyres.
! See the section on attachments and accessories in chapter 2.

Key:

LR = Air tyres

LR+RA = Air tyres with foam

LR+K = Air tyres with chains

x = Required ballast

Description		LR	LR+RA	LR+K
Ballast weight –	Standard ballast	x	--	--
	Special ballast	--	x	x
	Road ballast	x	--	--

Selection table

1.1.8 Tyres



The driving performance of the machine depends, among other things, on the tyres.

The same tyre size must be used for all four wheels.

When changing the tyres or if there is increasing wear on the tyres, make sure that the difference in diameter between the tyres on the front and rear axles is no more than 3 %.

Otherwise the axles may be damaged.

The correct tyre pressure is a decisive factor for the proper performance of the machine and for a long tyre lifetime.

You will find the following specifications in the table below:

- Recommended tyre sizes
- Tyre tread
- Tyre pressure

Abbreviations:

- **p – Max.** = maximum permissible air pressure
- **VA** = front axle
- **HA** = rear axle

The air pressure specifications refer to:

- Basic air pressure recommendations - as set when delivered from the factory
- Cold tyres
- Machine ready for operation - basic machine with standard equipment and permissible load



For special uses such as industrial timber handling or other uses where heavier loads may be expected, a higher tyre pressure is recommended, depending on the specific load. However, the tyre pressure may not be greater than the maximum permitted by the tyre manufacturer's specifications.

! Check and adjust the tyre pressure, see the maintenance tasks in chapter 5.

Michelin tyres

Air pressure table 1 for the standard machine

Air pressure table 2 for machines used for industrial timber handling

Tyre size	Tyre tread	Air pressure (bar)		
		VA	HA	p – Max.
26.5 R25EM	XHA * L3	4.30	2.50	5.50
26.5 R25EM	XLD D1A * L4	4.30	2.50	5.50
26.5 R25EM	XLD D2A * L5	4.30	2.50	5.50
26.5 R25EM	XMine D2 * L5	4.30	2.50	5.50

Air pressure table 1

Tyre size	Tyre tread	Air pressure (bar)		
		VA	HA	p – Max.
26.5 R25EM	XLD D1A * L4	5.00	3.30	5.50

Air pressure table 2

Goodyear tyres

Air pressure table 1 for the standard machine

Air pressure table 2 for machines used for industrial timber handling

Tyre size	Tyre tread	Air pressure (bar)		
		VA	HA	p – Max.
26.5 R25EM	GP-2B * L2	4.30	2.50	5.00
26.5 R25EM	RT-3B * L3	4.30	2.50	5.00
26.5 R25EM	TL-3A * + L3	4.30	2.50	5.00
26.5 R25EM	GP-4D * L4	4.30	2.50	5.00
26.5 R25EM	RL 5K * L5	4.30	2.50	5.00

Air pressure table 1

Tyre size	Tyre tread	Air pressure (bar)		
		VA	HA	p – Max.
26.5 R25EM	GP-4D ** 4S	6,00	3,00	6,50

Air pressure table 2

Bridgestone tyres

Air pressure table for the standard machine

Tyre size	Tyre tread	Air pressure (bar)		
		VA	HA	p – Max.
26.5 R25EM	VMT * L3	4.50	3.50	5.00
26.5 R25EM	VSDT * L5	5.00	3.50	5.00
26.5 R25EM	VSDL * L5	5,00	3,50	5,00

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Special tyres Air pressure table for machines with special tyres:

Tyre size	Tyre tread	Air pressure (bar)		
		VA	HA	p – Max.
1)				
2)				
2)				

The specifications should be entered in the tables as follows:

- 1) By the manufacturer, if the machine is delivered ex-works with special tyres.
- 2) By the machine operator, if the machine is retrofitted by the machine operator.

Tyres for machines with optional accessories

Table 1 is for the type of optional accessory

Air pressure table 2 is for machines with optional accessories

Specifications	Type of optional accessory
1)	
2)	
2)	

Table 1

Tyre size	Tyre tread	Air pressure (bar)		
		VA	HA	p – Max.
1)				
2)				
2)				

Air pressure table 2

The specifications should be entered in the tables as follows:

- 1) By the manufacturer, if the machine is delivered ex-works with optional accessories.
- 2) By the machine operator, if the machine is retrofitted by the machine operator.

1.1.9 Snow chains or guard chains



This equipment is optional.

When snow chains or guard chains are used, they must be attached to all four wheels.



Failure to do this can damage the drive system.
! See the section on attachments and accessories in chapter 2.

Valid for L554, L574, L580:

If you attach snow chains or guard chains, you must adjust the ballast weight.

See the section on the ballast weight in chapter 1.



Installing or changing the working attachment or tyres.
! See the section on attachments and accessories in chapter 2.

1.1.10 Tyres with foam

This equipment is optional.

When tyres with foam are used, they must be attached to all four wheels.

Valid for L554, L574, L580:

If you fill the tyres with foam, you must adjust the ballast weight.

See the section on the ballast weight in chapter 1.



Installing or changing the working attachment or tyres.
! See the section on attachments and accessories in chapter 2.

1.1.11 Steering



Type:

- Load sensing axial piston displacement pump with pressure flow controller.
- Central articulated joint with two dual-action steering cylinders with shock absorbers.

Emergency steering: Electrohydraulic emergency steering system

Name	Value	Units
Angle of articulation to each side	40	°
Angle of articulation to each side	13	°
Maximum operating pressure	210	bar

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1.1.12 Working hydraulics

bpik0034



Type:

Load sensing axial piston displacement with power controller and pressure cut-off.

Cooling:

Hydraulic oil cooling with thermostatically controlled fan and oil cooler

Filtration:

Return filter in the hydraulic tank.

Control:

Single-lever control, hydraulic servo system.

Lifting cycle:

- Lifting, neutral, lowering
- Float position using lockable Liebherr control lever.
- Automatic lift kick-out.

Tilting cycle:

- Tilt out, neutral, tilt in
- Automatic bucket return-to-dig function.

Name	Value	Units
Maximum flow	290	l/min
Maximum operating pressure	350	bar

1.1.13 Working attachment

bpik0035

**Lift arm**

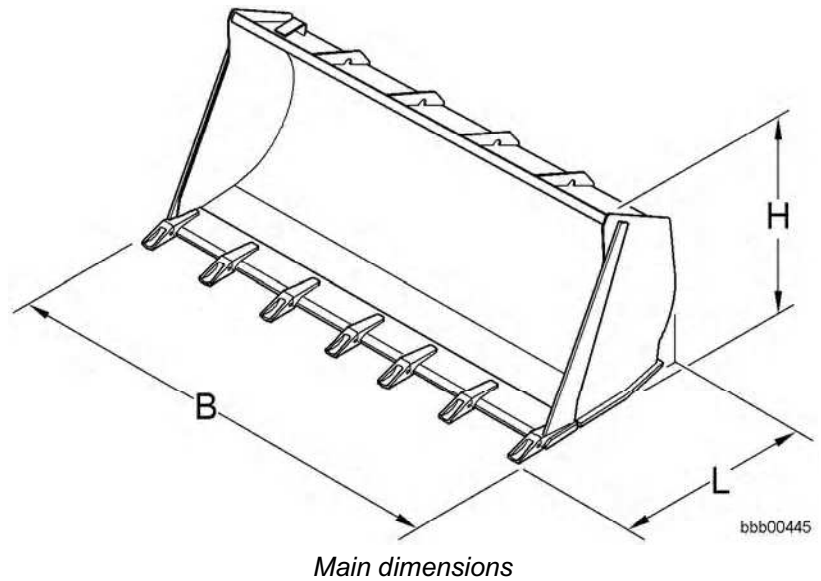
Z kinematics with one tilt cylinder.

Sealed bearing points.

Working cycle time at rated load:

Name	Value	Units
Lifting	5,6	sec
Tilting out	2,0	sec
Lowering (empty)	3,5	sec

Bucket



Rear loading bucket:

- With angled base
- For lift arms without hydraulic quick-change device.

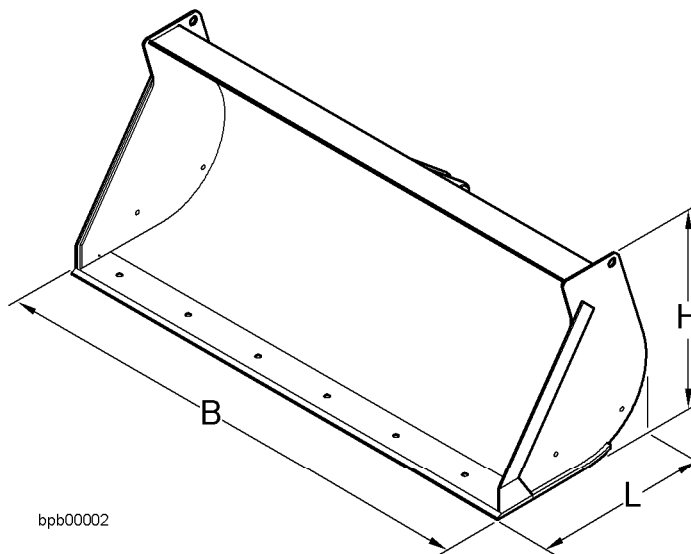
Name	Value	Units
Bucket capacity as per ISO 7546	5.0	m ³
Specific material weight	1.8	t/m ³
B – bucket width	3300	mm
H – height	1675	mm
L - length	1900	mm
Weight	2340	kg

Name	Value	Units
Bucket capacity as per ISO 7546	5.5	m ³
Specific material weight	1.6	t/m ³
B – bucket width	3300	mm
H – height	1760	mm
L - length	2000	mm
Weight	2500	kg

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Rear loading bucket:

- Version with undercut blade.
- With angled base
- For lift arms without hydraulic quick-change device.



Main dimensions

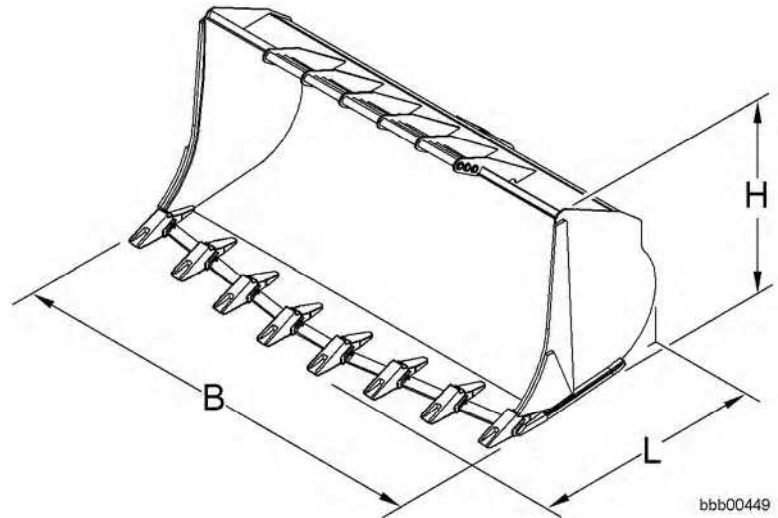
Name	Value	Units
Bucket capacity as per ISO 7546	5.0	m ³
Specific material weight	1.8	t/m ³
B – bucket width	3300	mm
H – height	1710	mm
L - length	1725	mm
Weight	2500	kg

Name	Value	Units
Bucket capacity as per ISO 7546	5.5	m ³
Specific material weight	1.6	t/m ³
B – bucket width	3300	mm
H – height	1800	mm
L - length	1825	mm
Weight	2700	kg

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Rock bucket:

- With delta blade and overflow grille.
- For lift arms without hydraulic quick-change device.



Name	Value	Units
Bucket capacity as per ISO 7546	4.0	m ³
Specific material weight	2.1	t/m ³
B – bucket width	3200	mm
H – height	1555	mm
L - length	1900	mm
Weight	2815	kg

Hydraulic quick-change device

This equipment is optional.

Alternative versions:

- Hydraulic quick-change device for Z lift arms.
- Combined electrohydraulic quick-change device for Z lift arms.
- Combined electrohydraulic quick-change device with comfort control for Z lift arms.

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1.1.14 Driver's cab



On elastic bearing on rear section, soundproof ROPS/FOPS cab.

Design:

- Detachable left door with sliding window.
- The right door is the emergency exit.
- Tinted windows made of hardened single-glazed safety glass
- Adjustable steering column.
- ROPS rollover protection in accordance with DIN/ISO 3471/ EN 474-3.
- FOPS stone impact protection in accordance with DIN/ISO 3449/ EN 474-1.

Driver's seat

Alternative versions:

- Driver's seat with gas-filled spring suspension.
 - Driver's seat with pneumatic suspension.
- This equipment is optional.

1.1.15 Sound emission



Sound pressure

Name	Value	Units
ISO 6396 – LpA (in driver's cab)	69	dB (A)

Sound output

Name	Value	Units
2000/14/EG – LwA (outside)	106	dB (A)

1.1.16 Towing device



The towing device is attached to the back of the machine.

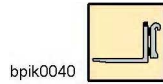
Purpose:

- For towing the machine out of a danger area
See the section on emergency operation in chapter 3.
- For lifting the machine by crane
See the section on transporting the machine in chapter 3.

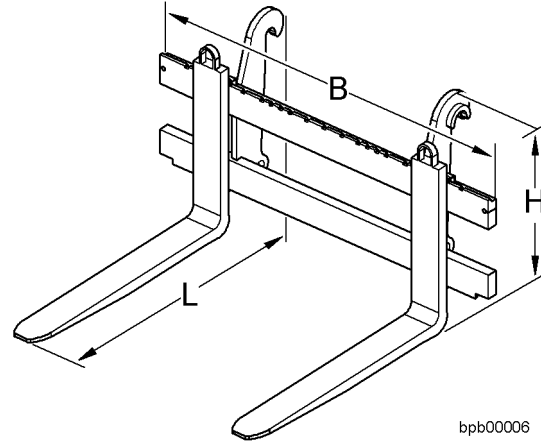


It may not be used for attaching a trailer. The manufacturer/supplier will not be held liable for damage resulting from this.
 ! See the instructions on proper use and safely towing the machine in chapter 2.

1.1.17 Forklift



This equipment is optional.



Dimensions

bbp00006

Name	Value	Units
Fork carrier prong size	FEM IV	
Prong length	1800	mm
L – Length (fork carrier + prongs)	2220	mm
K – Fork carrier width	2050	mm
H – Height (fork carrier + prongs)	1270	mm
Weight (fork carrier + prongs)	1160	kg

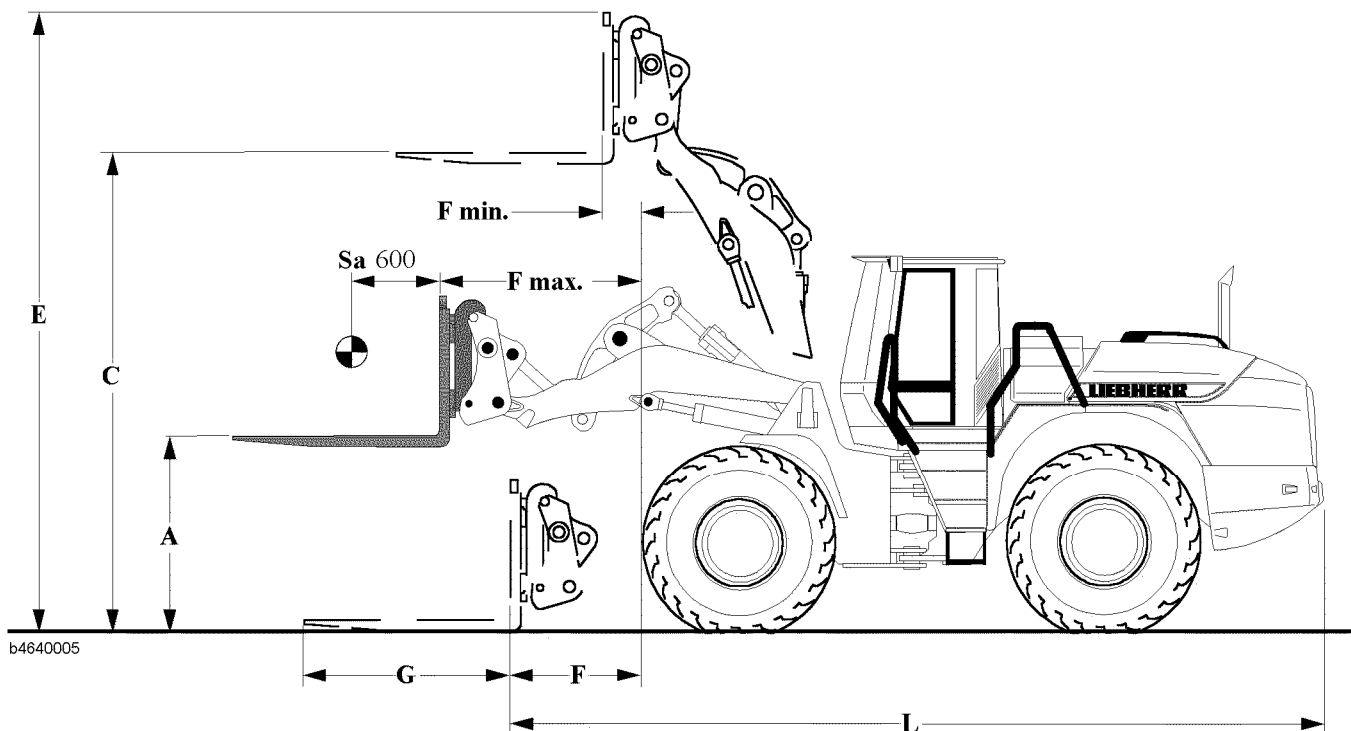
LBH/01/003801/0003/5.05/en

Complete machine with forks

The values stated refer to the machine:

- With lift arms (3,050 mm)
- With hydraulic quick-change device
- With a FEM IV fork
- With specified tyres
(See footnote)
- Including all lubricants
- With a full tank
- With ROPS/FOPS cab and driver
- In accordance with EN 474-3 and ISO 8313.

Tyre sizes and additional attachments affect the operating weight and tipping load.



Dimensions of machine with Z lift arms and fork

Load geometry		Z kinematics		Z kinematics	
Fork attachment for quick-change device		FEM IV 1,800 mm fork		FEM IV 1,800 mm fork	
Description		Value	Unit	Value	Unit
A	Lifting height at maximum reach	1985	mm	1985	mm
C	Maximum lifting height	4340	mm	4340	mm
E	Maximum height above fork carrier	5530	mm	5530	mm
F	Reach in loading position	1300	mm	1300	mm
F max.	Maximum reach	1970	mm	1970	mm
F min.	Reach at maximum lifting height	860	mm	860	mm
G	Fork prong length	1800	mm	1800	mm
L	Overall length of basic machine	7800	mm	7800	mm
	Tipping load when straight	14280 ¹⁾	kg	14490 ²⁾	kg
	Articulated tipping load	12500 ¹⁾	kg	12750 ²⁾	kg
	Operating weight	24650 ¹⁾	kg	25340 ²⁾	kg

¹⁾With 26.5 R25 Michelin XHA tyres

²⁾With Michelin XLD-D2 26.5R25 tyres

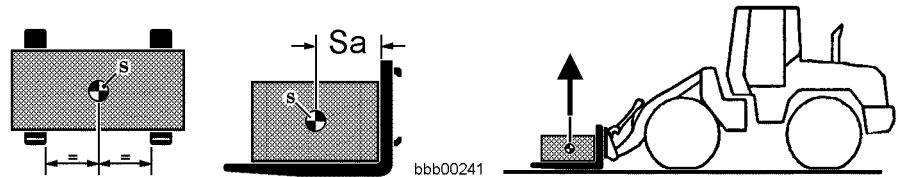
Load bearing tables for forklift operation

The loads (rated payloads) are calculated according to the EN 474-3 safety norm.

The permissible load is stated as a percentage of the tipping load as per ISO 8313 with the fork prongs in the horizontal position.

The following values may not be exceeded:

- On even and firm terrain – 80% of the tipping load with forklift.
- On uneven terrain – 60% of the tipping load with forklift.



The following tables specify the permitted loads on various types of terrain and at various distances to the centre of gravity **Sa**.

All calculated values refer to the original LIEBHERR equipment (fork carrier and prongs).

Lift arms with Z kinematics

Maximum permissible load for lift arms with SW-quick change device.

Even and firm terrain Load = 80% of the tipping load		Loads in kg with different distances to the centre of gravity - Sa in mm							
Tyres	Tyre filling	500	600	700	800	900	1000	1100	1200
26.5R25 Michelin XHA ²⁾	--	9670 ¹⁾	8840 ¹⁾	8150 ¹⁾	7550 ¹⁾	7040 ¹⁾	6590 ¹⁾	6200 ¹⁾	5850 ¹⁾
26.5R25 Michelin XHA	1,500 kg	9670 ¹⁾	8840 ¹⁾	8150 ¹⁾	7550 ¹⁾	7040 ¹⁾	6590 ¹⁾	6200 ¹⁾	5850 ¹⁾
26.5R25 Michelin XLD-D2	--	9670 ¹⁾	8840 ¹⁾	8150 ¹⁾	7550 ¹⁾	7040 ¹⁾	6590 ¹⁾	6200 ¹⁾	5850 ¹⁾
26.5R25 Michelin X-Mine	--	9670 ¹⁾	8840 ¹⁾	8150 ¹⁾	7550 ¹⁾	7040 ¹⁾	6590 ¹⁾	6200 ¹⁾	5850 ¹⁾
26.5R25 Goodyear GP-4B	--	9670 ¹⁾	8840 ¹⁾	8150 ¹⁾	7550 ¹⁾	7040 ¹⁾	6590 ¹⁾	6200 ¹⁾	5850 ¹⁾
26.5R25 Goodyear RL-5K	--	9670 ¹⁾	8840 ¹⁾	8150 ¹⁾	7550 ¹⁾	7040 ¹⁾	6590 ¹⁾	6200 ¹⁾	5850 ¹⁾

¹⁾Payload restricted by tilt cylinders of Z-kinematics.

²⁾Standard tyres

Uneven terrain Load = 60% of the tipping load		Loads in kg with different distances to the centre of gravity - Sa in mm							
Tyres	Tyre filling	500	600	700	800	900	1000	1100	1200
26.5R25 Michelin XHA ²⁾	--	7724	7500	7288	7088	6899	6590 ¹⁾	6200 ¹⁾	5850 ¹⁾
26.5R25 Michelin XHA	1,500 kg	8571	8322	8088	7550 ¹⁾	7040 ¹⁾	6590 ¹⁾	6200 ¹⁾	5850 ¹⁾
26.5R25 Michelin XLD-D2	--	7918	7688	7472	7267	7040 ¹⁾	6590 ¹⁾	6200 ¹⁾	5850 ¹⁾

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Technical data

Uneven terrain Load = 60% of the tipping load		Loads in kg with different distances to the centre of gravity - Sa in mm							
Tyres	Tyre fill- ing	500	600	700	800	900	1000	1100	1200
26.5R25 Michelin X-Mine	--	8039	7806	7586	7377	7040 ¹⁾	6590 ¹⁾	6200 ¹⁾	5850 ¹⁾
26.5R25 Goodyear GP-4B	--	7792	7566	7352	7150	6959	6590 ¹⁾	6200 ¹⁾	5850 ¹⁾
26.5R25 Goodyear RL-5K	--	8015	7783	7563	7356	7040 ¹⁾	6590 ¹⁾	6200 ¹⁾	5850 ¹⁾

¹⁾Payload restricted by tilt cylinders of Z-kinematics.

²⁾Standard tyres

1.1.18 Timber grabber



bpik0047

This equipment is optional.

Complete machine for timber handling

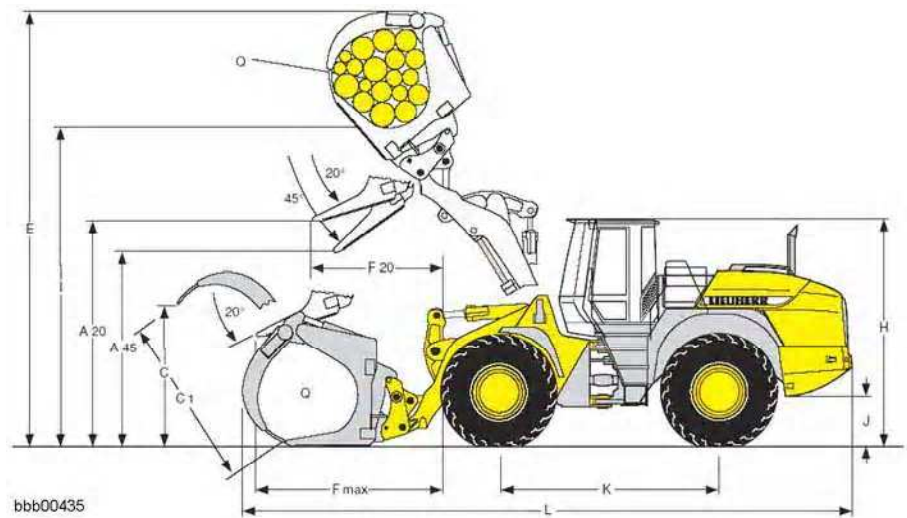
- The values stated refer to the machine:
- With Z lift arms (3050 mm)
 - With tilt cylinder support (Holzknecht)
 - With hydraulic quick-change device
 - With 26.5R25 Goodyear GP4B tyres
 - Including all lubricants
 - With a full tank
 - With ROPS/FOPS cab and driver

Tyre sizes and additional attachments affect the operating weight and tipping load.

Key to the table:

ZKK = Z kinematics with tilt cylinder support and hydraulic quick-change device (Holzknecht)

¹⁾Data includes water-filled rear tyres.



Dimensions

Name	Value	Units
Load geometry	ZKK	
A20 Unloading height at 20°	3630	mm
A45 Unloading height at 45°	2880	mm
C Maximum grabber opening in loading position	3370	mm
C1 Maximum grabber opening	3650	mm
E Maximum height	7800	mm
F20 Reach at maximum lifting height and 20° tilt-out angle	2230	mm
F45 Reach at maximum lifting height and 45° tilt-out angle	1660	mm
Fmax. Maximum reach	3340	mm
H Height above cab	3540	mm
I Manipulation height	5400	mm
J Ground clearance	550	mm
K Wheel base	3570	mm
L Overall length	9980	mm

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Name	Value	Units
Machine width under tyres	2930	mm
Q Grabber cross section	3.5	m ²
Grabber width	1850	mm
Payload	8800 ¹⁾	kg
Operating weight	27300 ¹⁾	kg

2 Safety regulations

Working on the machine poses safety risks to the operator, driver or maintenance engineers. You can prevent risks and accidents by regularly reading and observing the various safety instructions.

This is especially important for personnel who only occasionally work on the machine, for example, carrying out rigging or maintenance work.

The safety regulations listed below, if conscientiously followed, will ensure your own safety and that of others, and will prevent the machine from being damaged.

Whenever tasks which could cause danger to personnel or damage to the machine are described, the necessary safety precautions are explained in this manual.

These are indicated by the headings **Danger**, **Warning** or **Caution**.

2.1 Introduction

1. The symbols below have the following meanings:



Danger

Warning that without appropriate precautions, certain operational procedures could result in fatal accidents.



Warning

Warning that without appropriate precautions, certain operational procedures could result in severe physical injuries.



Caution

Warning that without appropriate precautions, certain operational procedures could result in minor physical injuries or damage to the machine.

2. **Observance of these instructions does not exempt you from following any additional rules and guidelines that may apply**

The following should also be observed:

- The safety rules in force at the operating site
- Legally enforceable road traffic regulations
- Guidelines issued by trade associations

2.2 General safety regulations

1. Familiarise yourself with the **operating manual** before starting up the machine.

Make sure that you are in possession of and have read and understood additional instructions applicable to any special equipment installed on your machine.

2. Only expressly authorised personnel may operate, service or repair the machine.

Observe the legal minimum ages.

3. Only trained or instructed personnel may operate the machine. Clearly assign responsibility for operation, rigging, maintenance and repair work.

4. Clearly establish the driver's responsibilities (also with respect to traffic regulations) and authorise him to refuse to carry out unsafe instructions from third parties.
5. Personnel undergoing training, instruction or who are not yet fully qualified may only be allowed to work on the machine under constant supervision by an experienced person.
6. Now and again check that your personnel are working safely and are aware of possible dangers in observance of the **operating manual**.
7. Wear safe working clothes when working on the machine.
Do not wear rings, wristwatches, ties, scarves, unbuttoned jackets, loose clothing or similar garments, as they can become caught in the machinery and cause injury.
Certain tasks require safety goggles, safety boots, hard hats, gloves, reflective vests, ear protection etc.
8. Ask the site manager about any special safety regulations in force on the site.
9. Do not hold onto the steering column, the control panel or the control levers when getting on or off the machine.
You might inadvertently trigger movements which could lead to accidents.
10. Never jump down from the machine. Use the steps, ladders and platforms provided for getting on and off.
11. Familiarise yourself with the emergency exit through the right cab door and/or the rear window.
12. Unless there are other instructions, perform maintenance and repair work as follows:
Procedure:
 - Park the machine on firm, level ground and lower the working attachment to the ground.
 - Move all control levers to neutral.
 - Shut down the engine and take out the ignition key.
13. Before starting any work on the hydraulic circuit, you must also press the working hydraulics lockout button and actuate all pilot control units (joystick and pedals) in both directions in order to reduce the control pressure and accumulated pressure in the operating circuits. You must then reduce the internal tank pressure.
14. Lock the working hydraulics to prevent accidental actuation before leaving the driver's cab.
Lock the working hydraulics in accordance with the instructions in the **operating manual**.
15. Secure all loose parts of the machine.
16. Never start up a machine without first making a thorough tour of inspection and checking if any warning signs are missing or illegible.
17. Observe all signs with warnings or safety instructions.
18. Special safety apparatus must be fitted to the machine for certain applications. If this is the case, only work with this apparatus fitted and in working order.
19. Do not make any modifications, extensions or conversions to the machine with possible safety implications without the approval of the supplier. This also applies to installing and adjusting safety apparatus and valves, as well as to welding load-bearing components.

2.3 Proper use

1. When fitted with the standard bucket, forklift or grabber equipment, the wheel loader is solely to be used for loosening, picking up, transferring, loading and dumping earth, stone, rock fragments or other materials and loading it onto trucks, ships, conveyor belts or crushers.
2. Any other use, such as breaking rock, hammering in posts, transporting people or towing is deemed improper.
The manufacturer/supplier will not be held liable for damage resulting from this.
The operator bears sole liability.
3. Vehicles used for lifting purposes are subject to special conditions and must also be equipped with the prescribed safety equipment.
4. Proper use also includes observance of the **operating manual** and adherence to the inspection and maintenance conditions.

2.4 Decals on the machine

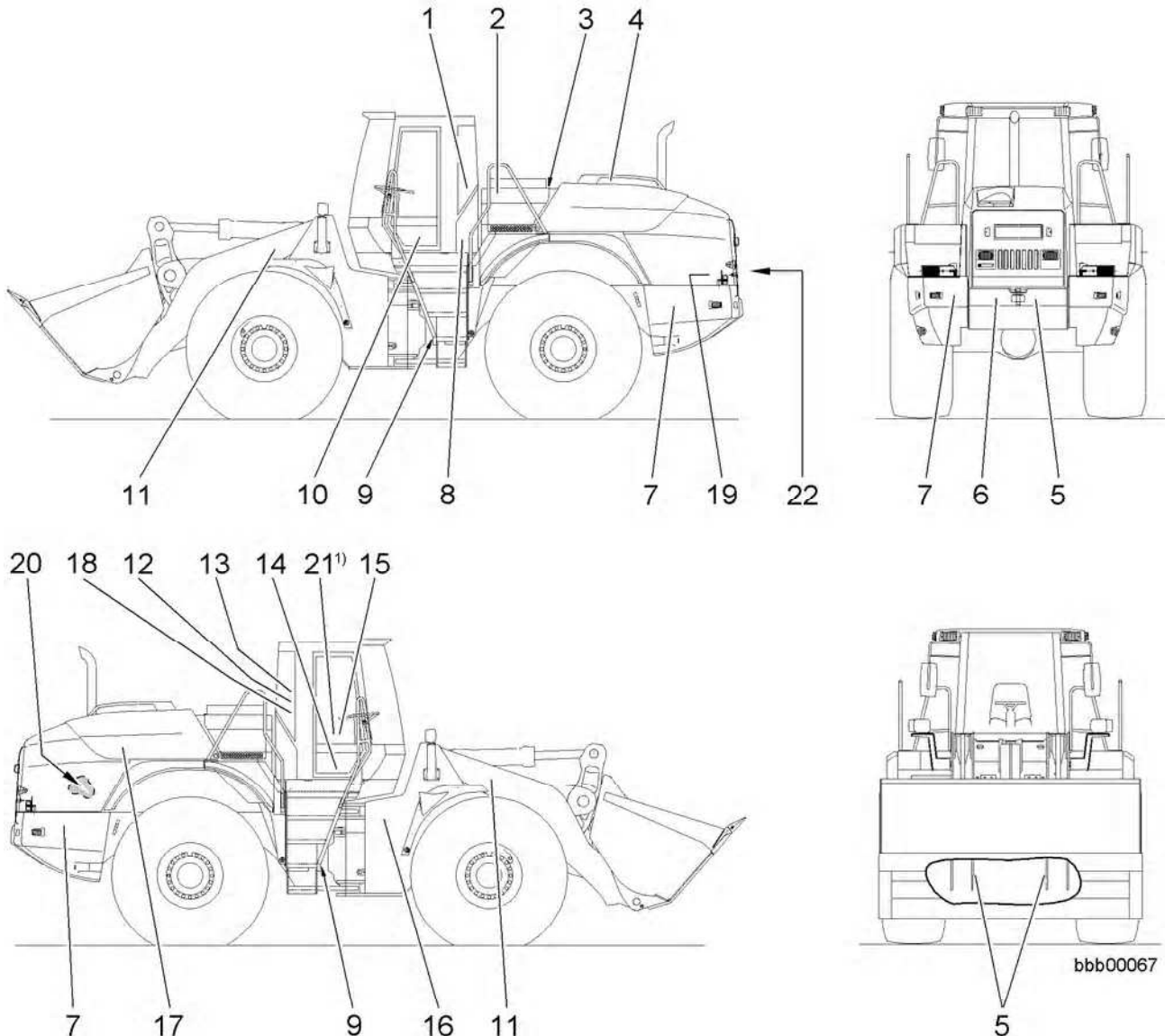
1. There are several types of decal attached to the machine.

Decal types:

- Safety decals
- Information decals
- Type plates

The order numbers can be found in the spare parts list.

2.4.1 Location of decals



Location of decals

- | | | |
|--|-----------------------------------|---|
| 1 Noise output decal – L _{WA} | 9 Articulation area warning decal | 16 Machine type plate |
| 2 Cooler decal | 10 Lubrication chart | 17 Oil level decal |
| 3 Minimum level decal | 11 Keep clear decal | 18 Wheel lugs decal |
| 4 Engine standstill decal | 12 Accident prevention decal | 19 Jump start decal |
| 5 Slinging and lifting point decal | 13 Steering decal | 20 Tightening torque decal |
| 6 Lashing point decal | 14 ROPS decal | 21 Bearing load table decal ¹⁾ |
| 7 40 km/h speed limit decal | 15 Working hydraulics decal | 22 Voltage decal |
| 8 Windscreen water decal | | ¹⁾ This equipment is optional |

2.4.2 Safety decals

1. The section on the location of decals describes where they are attached. Failure to obey the safety decals can lead to severe or even fatal injuries. The safety decals should be continuously checked for completeness and legibility. Replace any missing or illegible safety decals immediately.



03sc04ab

Engine standstill decal

Warns of the risk of accidents, possibly resulting in severe injuries.

Meaning: **Only open when the engine is shut down**



bsich007

Articulation area decal

Warns of the risk of accidents, possibly resulting in severe or even fatal injuries.

Meaning: **Keep out of the articulation area when it is not locked**

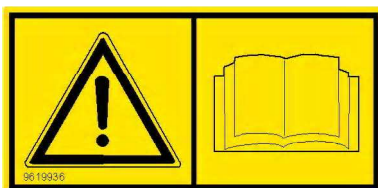


03sc01ab

Keep clear decal

Warns of the risk of accidents, possibly resulting in severe or even fatal injuries.

Meaning: **Keep out of the danger area**



03sc03ab

Accident prevention decal

Refers to instructions in the operating manual for preventing accidents.

Meaning: **Strictly observe the accident prevention instructions in the operating manual when operating the machine**



03sc05ab

Steering decal

Warns of the risk of accidents, possibly resulting in severe or even fatal injuries.

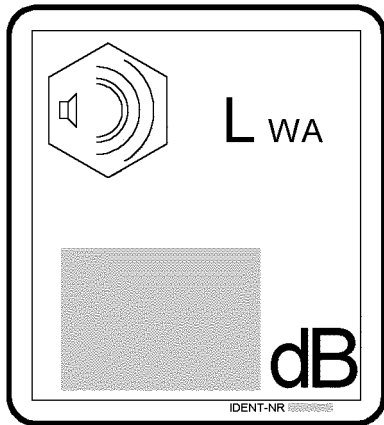
Meaning: **The steering is only operational when the engine is running**

2.4.3 Information decals

1. The section on the location of decals describes where they are attached. The information decals indicate information on operating, servicing and properties of the machine.

Noise output decal – L_{WA}

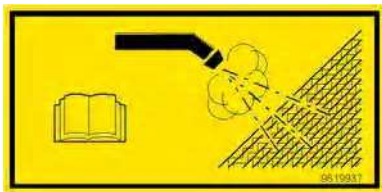
States the noise output level (L_{WA}) of the machine in decibels.
You can read the level on the decal on the machine.



03sc24ab

Cooler decal

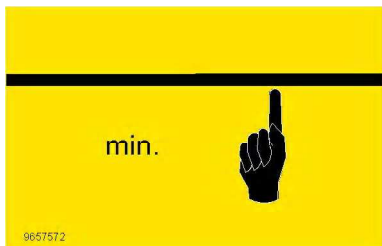
Refers to cleaning the cooling system.



03sc07ab

Minimum level decal

Indicates the coolant level in the coolant reservoir.



03sc12ab

Slings and lifting point decal

Refers to the slinging and lifting points on the machine.



03sc17ab

Lashing point decal

Refers to the lashing points on the machine.



03sc16ab

40 km/h decal

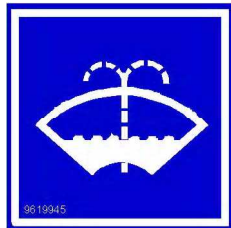
Refers to the permitted speed limit for the machine.



03sc08ab

Windscreen water decal

Indicates the reservoir for the windscreen washer fluid.

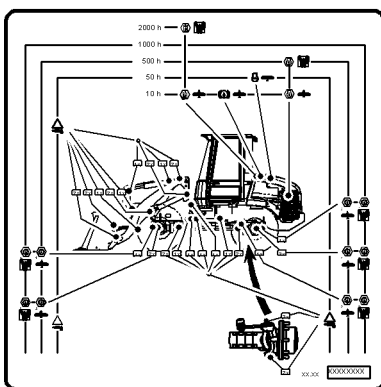


9619945

03sc13ab

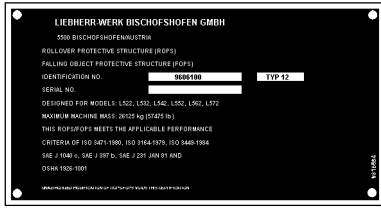
Lubrication chart decal

Indicates the maintenance points and intervals in relation to lubricants and consumables for the machine.



bsich002

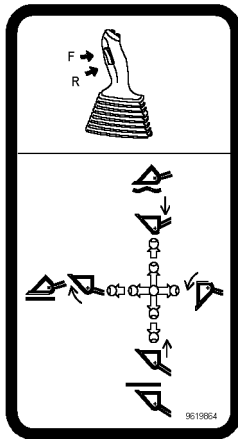
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03sc09ab

ROPS decal

States the maximum load of the roll-over protection system.



03sc06at

Working hydraulics decal

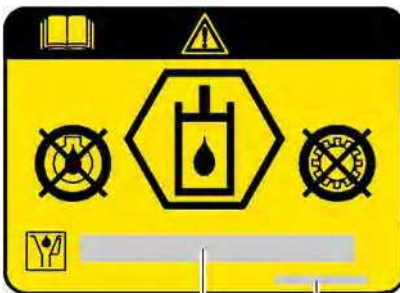
Indicates the directions in which the LH control lever can be moved.



03sc11ab

Oil level decal

It indicates the oil level in the hydraulic tank.



Bio oil decal

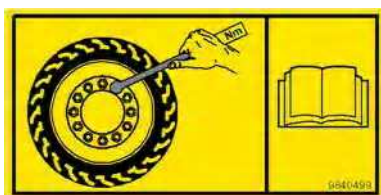
This equipment is optional.

- 1 Bio oil type
- 2 ID number

Indicates that the hydraulic system is filled with bio oil.

States that bio oil cannot be used for lubricating the engine and gearbox.

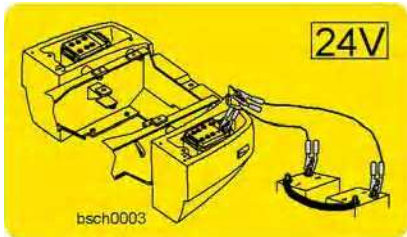
The field 1 contains the exact designation of the bio oil in the hydraulic system.



bsch0001

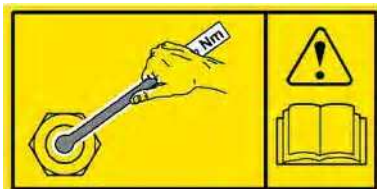
Wheel lugs decal

Refers to the service interval for checking the tightness of the wheel lugs specified in the operating manual.



Jump start decal

Shows the right way to connect jump leads.



Tightening torque decal

Refers to tightening torque of the battery fastening.

	L644	L664	L664	L674	L674S	L690
	5800kg	6500kg	7845kg	8940kg	8840kg	8840kg
	4550kg	4875kg	5885kg	6630kg	6960kg	7500kg

ISO 8313 3967129

Bearing load table decal

This equipment is optional.
Indicates the maximum permissible load in forklift operation.



Voltage decal

Refers to the battery main switch.

Meaning: **The electrical system is energised when the battery main switch is turned on.**

2.4.4 Type plates

1. The section on the location of decals describes where they are attached. The machine and all its components, such as the engine, gearbox and axles, have type plates affixed to them.

LBH/01/003801/0003/5.05/en

Machine type plate

Information on the type plate:

- Type
- Vehicle ID No.
- Maximum total weight
- Year of construction
- Maximum front axle load
- Maximum rear axle load
- Engine power
- Maximum speed
- Homolog. no. ¹⁾
- Maximum trailer weight ¹⁾

¹⁾ Italian version only



typ00001

Type plate



typit001

Italian version of machine type plate

2.5 Instructions on preventing crushing injuries and burns

1. Do not work under the attachment if it is not resting on the ground or supported.
2. Do not use any ropes or chains which are damaged or which have insufficient load bearing capacity.
Wear protective gloves when handling wire ropes.
3. When working with the attachment, never align the boreholes with your fingers, instead, use a suitable mandrel for this purpose.
4. Make sure no objects come into contact with the fan when the engine is running.
Objects which fall or project into the fan will be thrown back out or destroyed and could damage the fan.
5. When the machine is near operating temperature, the engine cooler system is hot and pressurised.
Do not touch parts carrying cooling water.
This can lead to burns.
6. Only check the coolant level once the cap on the expansion tank has cooled down enough to touch.
Carefully open the cap to let out excess pressure.
7. When running at or near the operating temperature, the engine oil and hydraulic oil are hot.
Avoid touching hot oil or parts which carry oil.
8. Wear goggles and safety gloves when working on the battery.
Avoid sparks and naked lights.
9. Never let anyone move the bucket or other working attachments into position by hand.

LBH1/01/003801/0003/05.05/en

10. Any time you open the engine compartment, prevent the compartment doors from falling shut using the struts provided.
11. Before starting up the machine, close and lock the engine compartment doors and the battery compartment cover.
12. Never lie under the machine when it is raised using the working attachment, unless the undercarriage is securely supported using wooden beams.

2.6 Instructions on preventing fires and explosions

1. When refuelling, the engine must be turned off. Switch off the auxiliary heater, if installed.
2. Do not smoke. Avoid naked flames when refuelling or where batteries are being recharged.
3. Always follow the instructions in the **operating manual** when starting the engine.
4. Check the electrical system.
Immediately eliminate all faults such as loose connections, worn cables or burnt out fuses and bulbs.
5. Do not carry combustible fluids on the machine outside the tanks provided.
6. Regularly check all lines, hoses and bolted connections for leaks and damage.
7. Repair the leaks immediately and replace the damaged components.
Oil escaping from leaks can easily cause fires.
8. Make sure that all brackets and protective plates are properly installed to prevent vibrations, abrasion and heat build-up.
9. Starting agent (ether) is a particularly dangerous fire hazard.
Never use ether starting agent near head sources, naked lights (such as cigarettes) or in poorly ventilated spaces.
10. Do not use starting agents containing ethers to start diesel engines with preglow or flame glow systems.
Otherwise there is a risk of **explosions**.
11. Familiarise yourself with the location and use of fire extinguishers and find out about fire alarm and firefighting facilities on site.

2.7 Safety instructions for start-up

1. Each time you start up the machine, make a thorough tour of inspection.
2. Check the machine for loose bolts, cracks, wear, leaks and deliberate damage.
3. Never start up a damaged machine.
4. Make sure the damage is rectified immediately.
5. Ensure that all hoods and covers are closed and locked. Check that all the warning and instruction decals are in place.
6. Clean the windows and interior and exterior mirrors, and secure the doors and windows against inadvertent movement.
7. Make sure no-one is working on or underneath the machine. Warn any bystanders before you start up the machine.

8. After getting into the driver's cab, adjust the seat, the inside and outside mirrors, the control lever and the seat belt so that you can work comfortably.
9. Sound insulation equipment on the machine must be in place during operation.

2.8 Safety precautions during start-up

1. Before starting, check that all control lamps and instruments are working properly.
Move all control levers to neutral.
2. Before starting the engine, briefly sound the horn to warn anyone else in the vicinity of the machine.
3. Only start the machine when sitting in the driver's seat.
4. Unless otherwise instructed, start the engine in accordance with the instructions in the **operating manual**.
5. Start the engine and then check all display and monitoring equipment.
6. Only run the engine in enclosed spaces when there is sufficient ventilation. If necessary, open the windows and doors to ensure adequate fresh air.
7. Run the engine until both it and the hydraulic oil are at operating temperature. Low oil temperatures lead to sluggish performance.
8. Check that the attachment controls are working properly.
9. Carefully drive the machine to open ground and check the service brake, the steering, the signals and lighting.

2.9 Instructions for safe working

1. Before starting work, familiarise yourself with the features of the site, as well as any special regulations and warning signals.
The working environment includes obstacles in the working area and on access roads, the firmness of the terrain and any protective barriers to prevent the public from entering the site.
2. Always keep a safe distance from overhangs, drops, slopes and unsafe terrain.
3. Be especially careful with variable terrain conditions, poor visibility and changeable weather.
4. Find out where the supply pipes to the site are, and be especially careful when working near them. If necessary, notify the relevant authorities.
5. Keep a safe distance away from overhead power lines.
When working near overhead power lines, keep the attachment well away from them.
 - There is a risk of **fatal injury**.
 - Find out about the safety clearances to be observed.

If the machine comes into contact with live power lines:

- Do not get out of the machine.
 - If possible, move the machine to a safe distance away from the danger area.
 - Warn any bystanders not to approach or touch the machine.
 - Arrange for the power to be switched off.
 - Only get out of the machine when you are sure that the power line you have touched or damaged has been switched off.
6. Before driving or working with the machine, check that the accessories are safely stowed away.
 7. When driving on public roads, paths and spaces, observe the traffic regulations, and make sure the machine is in a fit condition to use public roads if this is not already the case.
 8. Always switch on the lights in darkness and poor visibility.
 9. Do not take passengers on the machine.
 10. Only work seated and wearing a safety belt.
 11. Report any malfunctions and make sure that any necessary repairs are carried out immediately.
 12. Take personal care to ensure that no-one is endangered when the machine starts moving.
 13. Before starting work, check the brake system as instructed in the **operating manual**.
 14. Never get out of the driver's seat when the machine is still in motion.
 15. Never leave the machine unattended with the engine running.
 16. When driving the machine, lower the working attachment to the transport position and carry the load as close as possible to the ground.
 17. Avoid movements which could cause the machine to tip over.
If the machine does start to tip over or slide sideways, put down the attachment immediately and point the machine downhill.
Wherever possible, work up or downhill and not sideways to the slope.
 18. Drive carefully on rocky or slippery terrain and on slopes.
 19. Only drive downhill within the permitted speed limit, otherwise you could lose control over the machine.
The engine must be running at the rated speed and you should only reduce the travel speed using the pedals.
Shift down to a lower gear before reaching the slope. Do not wait until you are actually on it.
 20. When loading a truck, insist on the driver getting out of his cab, even if it is protected against stone impact.
 21. When performing work such as demolition work, clearance and crane operation, always use the protective equipment provided for these specific tasks.
 22. Have someone direct you when vision is restricted and whenever else it is necessary.
Only let one person give you signals.
 23. Only allow experienced personnel to sling loads and direct crane drivers.
The person giving directions must remain in sight of the operator or at least be in spoken contact with him.

2.10 Safety instructions for driving on slopes

1. On downward slopes, always drive carefully and never at top speed, as you could otherwise lose control over the machine.

Travel speeds:

- Never exceed the speed limits specified in the **operating manual**.
 - Exceeding the maximum speed causes the permitted limits to be exceeded for all rotating parts, including the drive motor, the drive shaft, all gears including axles and ultimately the diesel engine itself.
2. Before driving onto a slope, therefore select a travel range (gear) in which you can safely negotiate the whole slope without endangering yourself, the machine and other people.
 3. Also, take your foot off the gas pedal when driving onto a slope.

2.11 Parking safely

1. When possible, always park the machine on flat, firm ground.
If you have to park on a slope, use wheel wedges to prevent the machine from moving.
2. If the machine has articulated steering, engage the articulation lock.
This only applies to wheel loaders with articulated steering.
3. Lower the digging attachment so that it is lightly anchored in the ground.
4. Move all control levers to the neutral position and engage the parking brake.
5. Shut down the engine in accordance with the instructions in the **operating manual**.
6. Lock the working hydraulics before leaving the driver's cab.
Lock the working hydraulics in accordance with the instructions in the **operating manual**.
7. Lock up the machine, take out all keys and secure it against unauthorised use and vandalism.

2.12 Transporting the machine safely

1. Only use suitable transport equipment and lifting gear with sufficient load capacity.
2. Park the machine on flat ground and use wedges to secure the tracks or wheels.
3. If necessary, dismantle the working attachment for the duration of transport.
4. The ramp for driving onto the low-bed truck should not be more than 30° steep, and should be covered with wooden boards to prevent slipping.
5. Clean the machine tracks or wheels of snow, ice and mud before driving onto the ramp.
6. Before driving on, secure the upper carriage to the undercarriage with the locking pin.
Procedure: does not apply to wheel loaders.
7. Align the machine precisely with the loading ramp.

8. Attach the hand lever to the pedals for sensitive driving.
Procedure: does not apply to wheel loaders.
9. Have someone give signals to direct the driver.
Drive carefully onto the ramp and then on to the transport vehicle itself.
10. Have wedges ready to prevent the machine from rolling back when driving on.
11. Tilt the attachment in and drive onto the ramp.
Keep the attachment close to the loading area.
12. After driving on, lower the working attachment onto the loading area.
Apply the articulation lock (this only applies to wheel loaders with articulated steering).
13. Secure the machine and the remaining individual components against slipping using chains and wedges.
14. Relieve the pressure lines, take out the ignition key, lock the cab door and side panels, and get out of the machine.
15. Acquaint yourself with the route before transport, especially as regards the width, height and weight limits you will encounter.
16. Make a special note of any overhead power lines, bridges and tunnels along the route.
17. Apply the same care when driving off.
Procedure:
 - Remove all chains and wedges.
 - Start the engine in accordance with the instructions in the **operating manual**.
 - Carefully drive off the loading area using a ramp.
 - Keep the attachment close to the ground.
 - Have someone give you directions.

2.13 Towing the machine safely

1. Always observe the correct procedure as described in the **operating manual**. See the section on towing the machine in chapter 3.
2. The machine may only be towed in exceptional circumstances, for example to move it away from a dangerously exposed position for repairs.
3. Before pulling or towing the machine, check that all attachments and towing equipment are safe and secure.
4. The rope or bar used for towing must have sufficient tensile strength and be fastened to the holes provided on the front section.
In no event are damage or accidents resulting from towing covered by the manufacturer's guarantee.
Instructions on towing by rope:
 - Make sure no-one is near the taut rope when towing.
 - Keep the rope taut and avoid kinks.
 - Carefully pull the rope taut.
 - Sudden jerks can cause a slack rope to tear.
5. When towing, keep to the prescribed transport position, speed limit and route.
6. When starting the machine up again, follow the instructions in the **operating manual**.

2.14 Measures for ensuring safe maintenance

1. Never attempt maintenance and repair work unless you are qualified to do so.
2. Observe the prescribed periods for regular checks and inspections or those specified in the **operating manual**.
A suitably equipped workshop is absolutely necessary in order to perform repair work.
3. The table at the end of this **operating manual** states exactly who may carry out each job.
The jobs listed under **daily / weekly** in the maintenance schedule can be carried out by the driver or by service personnel.
The other jobs may only be carried out by suitably qualified specialist staff.
4. Spare parts must meet the technical requirements specified by the manufacturer. This is guaranteed if you use genuine spares.
5. Wear safety overalls for maintenance work. Certain jobs not only require a hard hat and safety boots, but also goggles and safety gloves.
6. Keep unauthorised persons away from the machine during maintenance.
7. Set up an extended cordon around the maintenance area as necessary.
8. Notify the operating personnel before starting repairs or other special jobs. Nominate a supervisor.
9. Unless otherwise specified in the **operating manual** carry out all maintenance work on the machine on firm, level ground with the engine off.
10. Afterwards always re-tighten any bolts loosened during maintenance and repair work.
11. If safety equipment has to be dismantled for rigging, maintenance and repair work, it must be re-installed and checked as soon as the job is finished.
12. When undertaking maintenance jobs, especially under the machine, attach a warning sign marked **DO NOT SWITCH ON** to the ignition where it is clearly visible. Take out the ignition key.
13. Before starting maintenance or repairs, clean any oil, fuel or service fluids from the machine, especially connections and bolted joints. Do not use abrasive cleaning agents. Use fibre-free cloths.
14. Before welding, burning and sanding, clean any dust from the machine and the area around it, and ensure adequate ventilation.
Otherwise there is a risk of **explosions**.
15. Before cleaning the machine with water, steam jet (high-pressure cleaner) or other cleaning agents, cover or tape up all openings where water, steam and cleaning agent may not penetrate for safety reasons.
Electric motors, control cabinets and battery compartments are at particular risk.
Further procedure:
 - Make sure that during cleaning work on the machine housings, the temperature sensors for the fire alarm and extinguisher systems do not come into contact with hot cleaning agent. Otherwise the fire extinguishing system could be activated.
 - After cleaning, completely remove the covers and tape.
 - After cleaning, check all fuel, engine oil and hydraulic oil lines for leaks, loose connections, abrasion and damage.
 - Repair any defects immediately.
16. Follow the safety instructions for the product in question when handling oil, grease and other chemical substances.

17. Dispose of spare parts and consumables in a safe, environmentally sound manner.
18. Take care when handling hot operating and auxiliary materials (danger of burns and scalding).
19. Only operate combustion engines and fuel-powered heaters in sufficiently ventilated rooms. Before starting the engine inside a building, make sure the room is well ventilated. Follow the local regulations in force at the site.
20. Only carry out welding, burning and grinding work when it is expressly allowed, as otherwise you may cause fires or explosions.
21. Do not try to lift heavy parts. Only use suitable equipment with sufficient load capacity.

Procedure:

- When replacing individual parts and larger assemblies, carefully fasten and secure them to the lifting gear so that no danger can arise.
- Only use suitable lifting gear in perfect order, and slinging equipment with sufficient load capacity.

Keep out from under suspended loads.

22. Do not use ropes which are damaged or of insufficient load bearing capacity. Wear protective gloves when handling wire ropes.
23. Only allow experienced personnel to sling loads and direct crane drivers. The person giving directions must remain in sight of the operator or at least be in spoken contact with him.
24. When carrying out fitting work above head height, use the safety climbing aids and working platforms provided or equivalent. Do not use parts of the machine for climbing. Wear a safety harness when working at height. Keep all handles, steps, rails, gangways, platforms and ladders free from dirt, snow and ice.
25. When working on the attachment (for example replacing teeth), make sure it is properly supported. Avoid direct metal-to-metal contact.
26. Never lie under the machine when it is raised using the working attachment, unless the undercarriage is securely supported using wooden beams.
27. Always support the machine on blocks, so that it cannot become unbalanced by any shift in weight. Avoid metal-to-metal contact.
28. Only trained specialist staff may perform work on the chassis, brake and steering systems.
29. If you have to repair the machine on a slope, secure the wheels with wedges. Move the working attachment to the maintenance position and engage the articulation lock.
30. Only personnel with the requisite skills and experience may work on hydraulic equipment.
31. Wear protective gloves when looking for leaks. Under pressure, a thin jet of liquid can pierce the skin.
32. Never release hydraulic lines or bolts before setting down the working attachment and shutting down the engine.
Before starting any work on the hydraulic circuit, you must also press the working hydraulics lockout button and actuate all pilot control units (joystick and pedals) in both directions in order to reduce the control pressure and accumulated pressure in the operating circuits. You must then reduce the internal tank pressure.
33. Regularly check all hydraulic oil lines, hoses and bolted connections for leaks and visible damage. Repair all damage immediately. Oil escaping under pressure can cause injury and fires.
34. Before beginning repair work, depressurise the system sections and pressurised lines (hydraulics, compressed air) which are to be opened, as instructed in the assembly descriptions.

35. Lay and fit hydraulic and compressed air lines in the proper manner. Do not switch the connections. Fittings, as well as the length and quality of the hose lines, must match the manufacturer's requirements.
Only use LIEBHERR spare parts.
36. Replace hydraulic hose lines at appropriate intervals, even if there are no apparent defects which may impair safety.
37. Work on the machine's electrical equipment may only be carried out by a qualified electrician or by instructed persons under the direction and supervision of a qualified electrician, in accordance with the recognised electrical engineering rules.
38. Only use original fuses with the stated current ratings. If there are malfunctions in the electrical power supply, switch off the machine immediately.
39. Inspect and test the machine's electrical equipment regularly. Immediately rectify all faults, such as loose connections, scorched or worn cables or burnt out fuses and bulbs.
40. If you have to carry out work on live components, have a second person assist you, who can throw the emergency stop or main switch in an emergency. Cordon off the working area with a red and white safety chain and a warning sign. Only use insulated tools.
41. When working on high-voltage assemblies after they have been isolated from the power supply, short the supply cable and the components, such as capacitors, with an earthing rod.
42. First, check that the isolated parts are not live, connect them to earth and then short them. Isolate any neighbouring live parts.

2.15 Safety instructions for maintenance work on machines with hydro accumulators

1. Only qualified staff may carry out work on the hydraulic and pneumatic connections of the membrane accumulator.
Serious accidents could result from inexpert fitting and operation.
The hydraulic system must be depressurised before work can be carried out on it.
Do not carry out any welding or soldering work on the membrane accumulator.
There is a risk of explosion during welding or soldering work.
The accumulator may burst during machining, resulting in the loss of the operating permit.
Hydro accumulators may only be filled with nitrogen, not with oxygen or air - otherwise there is a **risk of explosion**.
The accumulator can heat up, causing burns.
Do not use membrane accumulators which have been damaged during transportation.
New membrane accumulators must be filled with nitrogen before they are used. Remove the sealing caps on the fluid side.
The minimum and maximum operating data are permanently marked on the membrane accumulator. The marking must remain visible.

2.16 Safety instructions for welding work on the machine

1. Main components for power transmission (such as the vehicle frame and attachment components) . . may only be welded by the manufacturer or an authorised workshop.

Disconnect the battery when working on the electrical system or when carrying out arc welding on the machine.

Always disconnect the negative terminal first and reconnect it last.

On machines with electronic gearbox control units:

- Also disconnect the multi-pin plug on the electronic gearbox control unit before starting any welding work on the machine.

The earth cable of the welding device should be attached as close as possible to the actual welding location, so that it is not possible for the welding current to flow through components or sealing elements such as the slewing ring, joints, bearings, bushes, rubber components . . and seals.

2.17 Instructions for working safely on the working attachment

1. Do not work under the attachment if it is not resting on the ground or supported.
2. When replacing attachment components (decals, cutting edge, teeth), . . do not let metal rest on metal.
3. Do not try to lift heavy parts. Only use suitable equipment with sufficient load capacity.
4. Always wear gloves when working with wire ropes.
5. Never release hydraulic lines or bolts before setting down the working attachment and shutting down the engine.

Before starting any work on the hydraulic circuit, you must also press the working hydraulics lockout button and actuate all pilot control units (joystick and pedals) in both directions in order to reduce the control pressure and accumulated pressure in the operating circuits. You must then reduce the internal tank pressure.

6. Ensure that all lines and threaded couplings are reconnected and re-tightened on completion of the job.
7. Be especially careful when removing or inserting bolts and pins made of hardened steel, as they can splinter, causing serious injury.

Wear safety gloves and goggles.

Whenever possible use special tools (such as mandrels, extractors, . . etc.)

2.18 Safety instructions for transporting the machine by crane

1. Lower the working attachment and tilt back the loading equipment to its limit.
2. Apply the articulation lock (this only applies to wheel loaders with articulated steering).

3. Move all control levers to the neutral position and engage the parking brake.
4. Shut down the engine in accordance with the instructions in the **operating manual**.
5. Lock the working hydraulics before leaving the driver's cab.
Lock the working hydraulics in accordance with the instructions in the **operating manual**.
6. Lock all doors, covers and hoods on the machine.
7. Only allow experienced personnel to sling loads and direct crane drivers. The person giving directions must remain in sight of the operator or at least be in spoken contact with him.
8. Attach the lifting tackle to the lugs and bore holes provided on the machine.
9. Make sure the lifting tackle is long enough.
10. Carefully lift the machine.
11. **CAUTION! Keep out from under the machine when it is raised.**
12. When restarting the machine, proceed strictly according to the **operating manual**.

2.19 Safe maintenance of hydraulic hoses and hose lines

1. Never attempt to repair hydraulic lines and hydraulic hoses.
2. All hoses, hose lines and threaded couplings must be checked regularly, at the very least once a year, for leaks and visible signs of damage.
Replace damaged parts immediately. Oil escaping under pressure can cause injury and fires.
3. Even when properly stored and subjected to normal load, hoses and hose lines are subject to natural ageing. This limits their service life.
4. Improper storage, mechanical damage and excess strain are the main causes of damage.
5. Hose lines should not be used for longer than six years, including storage of no longer than two years (note the date of manufacture on the hoses).
6. Using the hoses close to their maximum strain can shorten their service life (e.g. high temperatures, frequent movement, extremely high impulse frequencies and multiple shift operation).
7. Hoses and hose lines must be replaced when inspections reveal the following.

Criteria:

- Damage to the outer layer penetrating to the inner layer (e.g. abrasion, cuts and cracks)
- Embrittlement of the outer layer (cracks in the hose material)
- Deformation of the natural shape of the hose or the hose line, both when pressurised and depressurised, or at bends, e.g. layer separation, blistering
- Leaks
- Failure to observe installation requirements
- Damage or deformation of the hose fittings, which reduces the strength of the fittings or the connection between the fitting and the hose
- Slippage of the hose out of the fitting
- Corrosion of the fitting, impairing its function and strength
- Exceeded storage time or service life

8. Only use genuine spare parts to replace hoses and hose lines.
9. Lay and fit hoses and hose lines in the proper manner. Do not switch the connections.

2.20 Attachments and accessories

1. Attachments and accessories produced by third-party manufacturers or those which have not been generally approved by LIEBHERR for installation or for external fitting may not be installed or fitted on the machine without prior written consent from LIEBHERR.
2. The appropriate technical documentation should be made available to LIEBHERR for this purpose.
3. When adding or converting equipment or tyres, the stability of the machine must be tested and ensured in accordance with **EN 474**.
See also the technical data section in chapter 1.

2.21 Protection against vibrations

1. The vibrations to which mobile construction machines are subjected are mainly due to the way they are used.

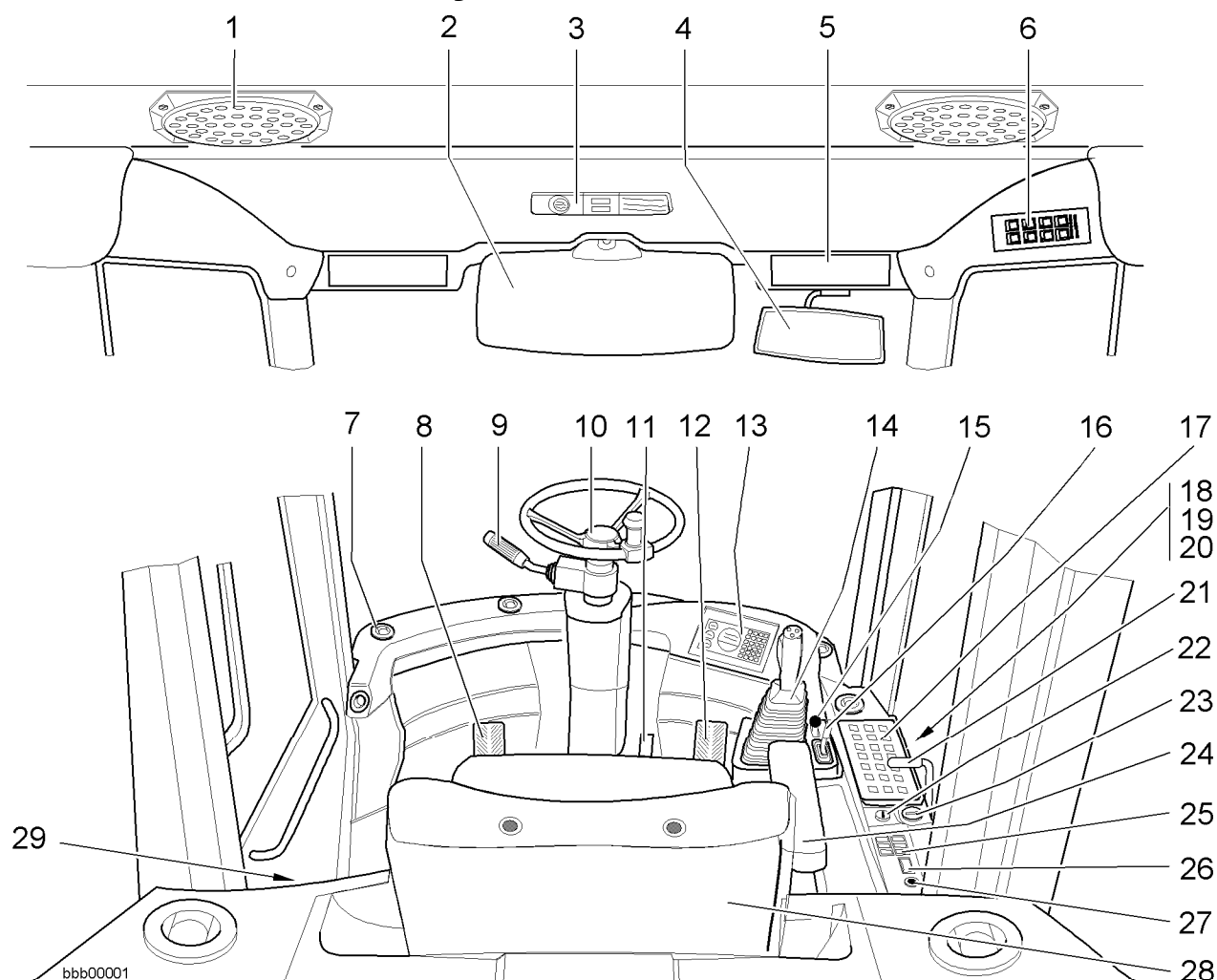
The following parameters in particular have a great effect:
 - Terrain conditions: bumps and potholes.
 - Operating methods: speed, steering, braking, use of the controls while driving and while working.
2. The amount of vibration depends to a large extent on the machine operator, because he determines the speed, gear ratio, working methods and distance covered.
This results in a wide range of different vibrations for the same type of machine.
3. The machine operator can reduce overall vibration by following these recommendations:

- Select a suitable machine, equipment and accessories for the job.
- Use a machine equipped with a suitable seat (i.e. for earthworking machines, a seat which complies with EN ISO 7096).
- Keep the seat in good condition and adjust it as follows:
 - Adjust the seat and its suspension according to the height and weight of the driver.
 - Regularly check the suspension and adjustment mechanisms of the seat and make sure the seat is kept in the condition specified by the manufacturer.
- Check the service condition of the machine, especially the tyre pressure, brakes, steering, mechanical connections etc.
- Do not steer, brake, accelerate, shift gears or load the working attachment of the machine suddenly.
- Adjust the speed of the machine to the distance to be driven in order to reduce vibrations.
 - Slow down when driving over difficult terrain.
 - Drive around obstacles and avoid difficult terrain.
- Keep the area on which the machine is operated in a tidy condition.
 - Remove any large rocks and obstacles.
 - Fill in any trenches or holes.
 - Have machines available to maintain good terrain and plan sufficient time to do so.
- Travel over longer distances (e.g. public roads) at a suitable (medium) speed.
- For machines which are often driven on open roads, use a special additional system (if available) to reduce vibrations during this type of use.

If such systems are not available, control your speed to stop the machine from shaking.

3 Operation, Handling

3.1 Layout of control elements



Inside view of the driver's cab

- | | | |
|--|---|--|
| 1 Radio speaker | 11 Steering column adjustment lever | 21 Emergency exit door handle (right-hand door) |
| 2 Sun visor | 12 Gas pedal | 22 Ignition switch |
| 3 Interior lights with switch | 13 Instrument panel display unit | 23 Mechanical hour meter |
| 4 Interior mirror | 14 LIEBHERR control lever | 24 Adjustable arm rest |
| 5 Radio compartment | 15 Panel adjustment lever | 25 Switch fitting for optional working functions |
| 6 Heater/ventilation/air conditioning control unit | 16 Control lever fitting for optional working functions | 26 Ashtray |
| 7 Heater/ventilation/air-conditioning outlet nozzles | 17 Control unit | 27 Cigarette lighter socket |
| 8 Inch/brake pedal | 18 Fuses | 28 Driver's seat |
| 9 Steering column switch | 19 Control electronics | 29 Glove compartment |
| 10 Adjustable steering column with steering wheel | 20 Control relay | |

3.2 Operation

3.2.1 Battery main switch

You must turn on the battery main switch before you can operate the machine.

Turning on the battery main switch

Before entering the driver's cab:

- Make sure that the battery main switch is on.
The battery main switch is located in the engine compartment.
Refer to the section on the daily start-up routine under handling.



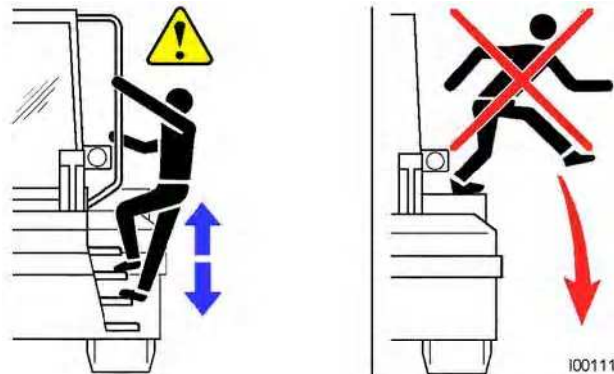
3.2.2 Cab access


Only get on and off the machine using the access aids provided.


Normally, the driver's cab must be entered and exited through the left-hand driver's cab door.

The right-hand driver's cab door is provided as an emergency exit and therefore should only be used in this event.

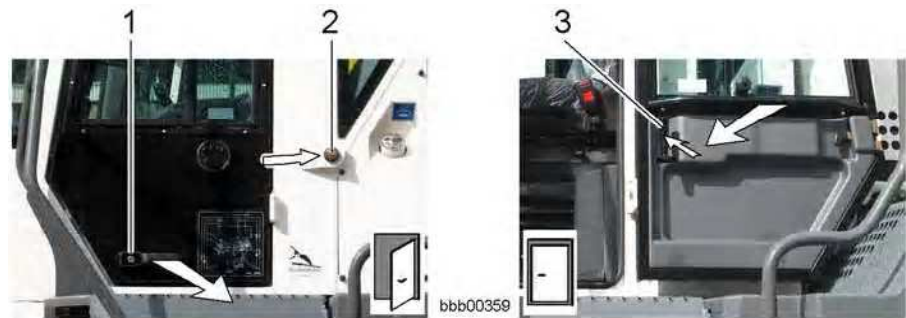
Familiarise yourself with the emergency exit through the right cab door. See the section on the emergency exit.



Warning  You risk injury if you jump or fall off the machine.
! Use the steps, ladders and handles provided for getting on and off.
! Never jump down from the machine.

Warning  You could be injured if the machine suddenly moves.
! Do not hold onto the steering column, the control panel or the control levers when getting on or off.

Entering the driver's cab

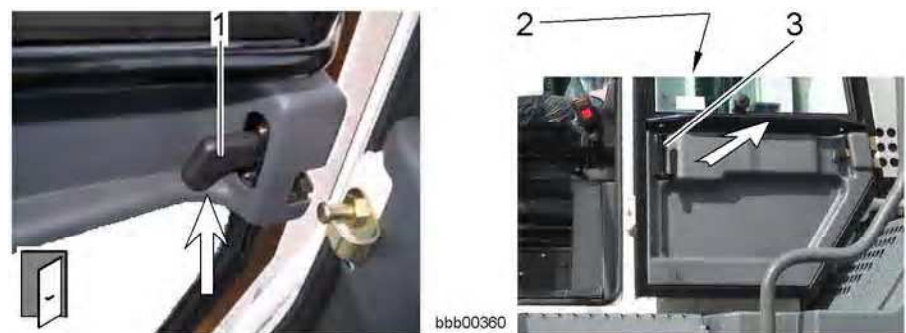


Entering the cab

- 1 Handle with lock
- 2 Door holder
- 3 Door holder lever

- Open the lock of the cab door with the ignition key.
- Open the cab door with the door handle 1 until it latches in the door holder 2.
- Enter the cab.
- Use the door holder lever 3 to lock and unlock the cab door.

Leaving the driver's cab



Leaving the cab

- 1 Door opener lever
- 2 Door holder
- 3 Door holder lever

- Open the cab door with the door opener lever 1 until it latches in the door holder 2.
- Leave the cab.
- Use the door holder lever 3 to lock and unlock the cab door.
- Lock the cab door with the ignition key.

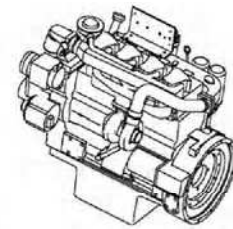
3.2.3 Emergency exit



The right-hand driver's cab door is provided as an emergency exit and therefore should only be used in this event.

Before starting up the machine, check that you can exit the cab through the right-hand door from inside without any hindrance.

Leaving the driver's cab through the emergency exit



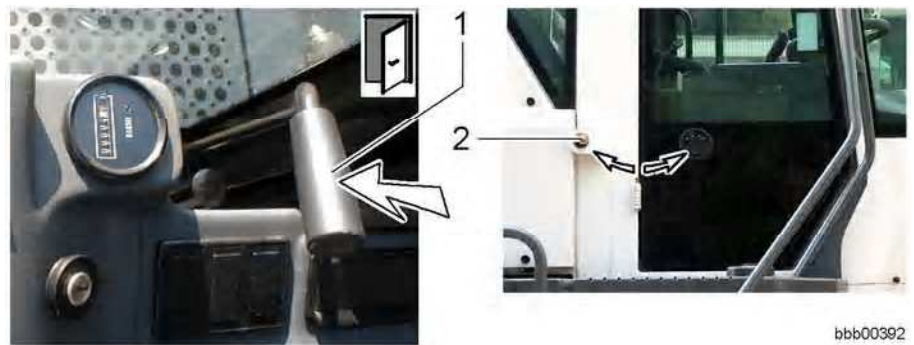
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Switching off the engine



There is a risk of accidents if you leave the engine running. If you leave the cab by the emergency exit with the engine running, it increases the risk of accidents for the driver and any auxiliary staff. **!** Deactivate the driving and working functions.

- Turn off the engine. All functions are switched off.



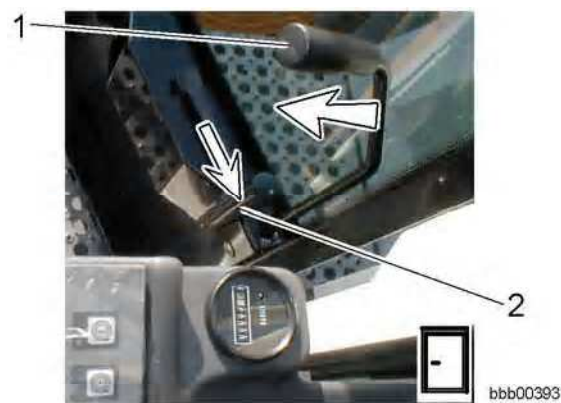
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Emergency exit

1 Door opener lever

2 Door holder

- Open the right cab door with the door opener lever 1 until it latches in the door holder 2.



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Emergency exit

1 Door opener lever

2 Door closer lever

- To close the right cab door: Use the door closer lever 2 to unlock the cab door.

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3.2.4 Driver's seat with mechanical suspension

The ergonomically designed driver's seat offers a high degree of comfort. The adjustable seat surface, back rest, suspension and arm rest mean that the driver can adjust the seat for maximum individual comfort.

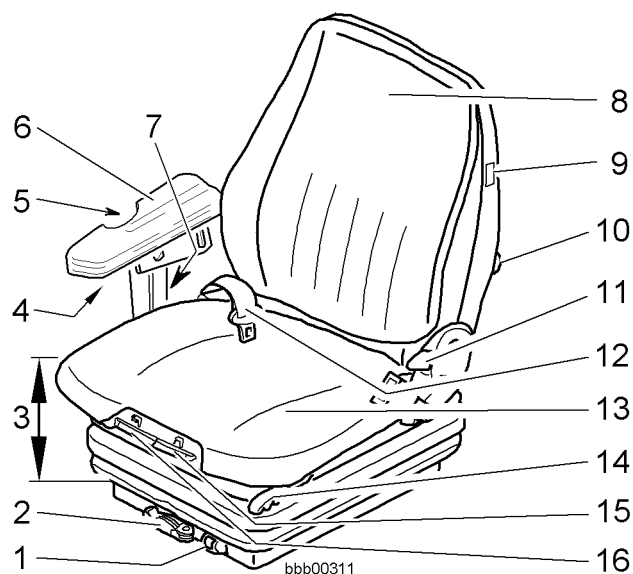
Vibration damping:

The seat installed in the machine complies with ISO 7096.

When the machine is used correctly, the vibrations transmitted by the driver's seat are less than or equal to the vibrations simulated in test conditions for the corresponding machine class in accordance with ISO 7096 class EM3.

The vibration acceleration values (a_{zw}), measured in accordance with ISO 2631, Part 1, thus meet the standards for protection against overall body vibrations in EN 474-1.

Layout



Main components and adjustable elements of the driver's seat

- | | |
|---|--|
| 1 Weight display | 9 Seat heating switch (optional) |
| 2 Weight adjustment | 10 Lumbar support knob |
| 3 Height adjustment | 11 Back rest adjustment lever |
| 4 Locking screw for arm rest horizontal adjustment | 12 Seat belt |
| 5 Locking screw for arm rest inclination adjustment | 13 Seat surface |
| 6 Arm rest | 14 Driver's seat horizontal adjustment lever |
| 7 Locking screw for arm rest height adjustment | 15 Seat surface inclination adjustment lever |
| 8 Back rest | 16 Seat surface horizontal adjustment lever |

Adjusting the driver's seat

The seat can be adjusted to the driver's individual requirements to provide the highest possible degree of comfort.

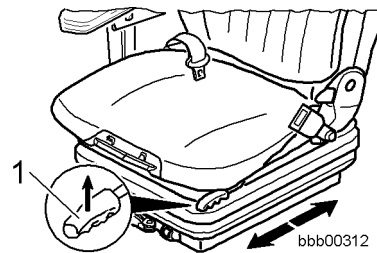
Adjusting the driver's seat for driving on roads



There is a risk of injuries if the driver's seat is not properly adjusted.
! When driving on public roads, the driver's seat may only be adjusted when the machine is at a standstill.

- Adjust the driver's seat before starting the machine.

Adjusting the driver's seat horizontally

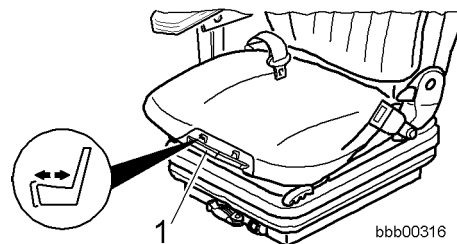


Horizontal adjustment of the driver's seat

The seat can be moved backward or forward using the lever 1.

- Pull the lever 1 in the direction of the arrow.
- Adjust the driver's seat horizontally and release the lever.

Adjusting the driver's seat horizontally

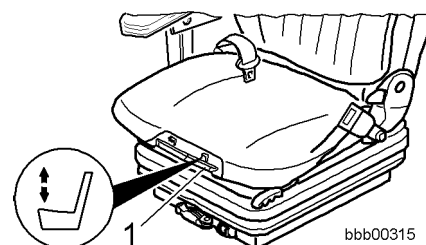


Horizontal adjustment of the driver's seat surface

The seat can be moved backward or forward using the lever 1.

- Push up the lever 1.
- Adjust the surface of the driver's seat horizontally and release the lever.

Adjusting the inclination of the seat surface

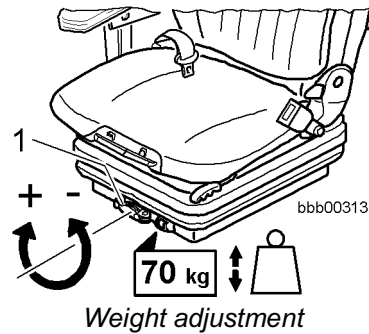


Adjusting the inclination of the driver's seat surface

The seat can be moved up or down using the lever 1.

- Push up the lever 1.
- Adjust the surface of the driver's seat vertically and release the lever.

Adjusting the seat suspension

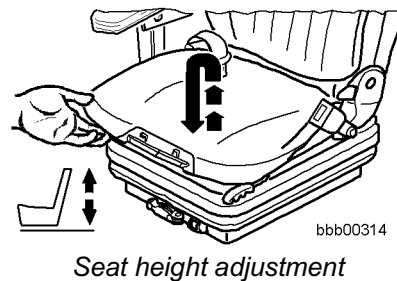


The seat suspension can be adjusted to the driver's individual body weight.

- Set the correct body weight using the knob 1.

The display to the right of the knob shows the set body weight.

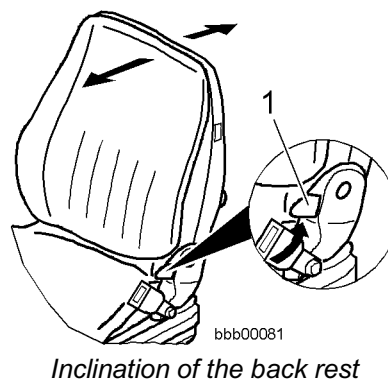
Adjusting the seat height



Adjust the seat height by lifting up the seat with your hand. The height can be adjusted to several levels.

- Lift up the seat as necessary until you hear it catch. If you lift the seat to the last level (as far as it will go), it sinks to the lowest position.

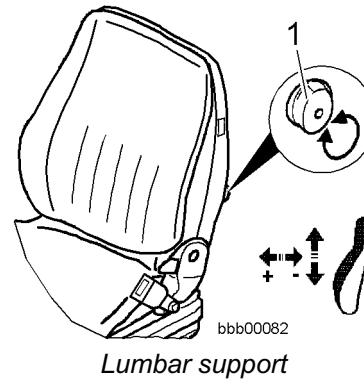
Adjusting the back rest



Adjust the inclination of the back rest using the lever 1 on the left of the driver's seat.

- Raise the lever 1.
- Move the seat to the required inclination and release the lever.

Adjusting the lumbar support

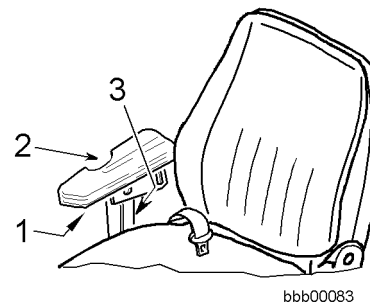


Lumbar support

The lumbar support increases the comfort of the driver.

- Turning the hand wheel **1** to the left or right enables you to individually adapt both the height and the curve of the back upholstery.

Adjusting the arm rest



Arm rest adjustment

The height, inclination and horizontal position of the arm rests can be adjusted separately.

- Height adjustment: release the clamp screw **3**, adjust the height and lock it in place.
- Inclination adjustment: loosen the clamp screw **2**, adjust the inclination and lock it in place.
- Horizontal adjustment: loosen the clamp screw **1**, adjust the arm rest horizontally and lock it in place.

3.2.5 Driver's seat with pneumatic suspension

This equipment is optional.

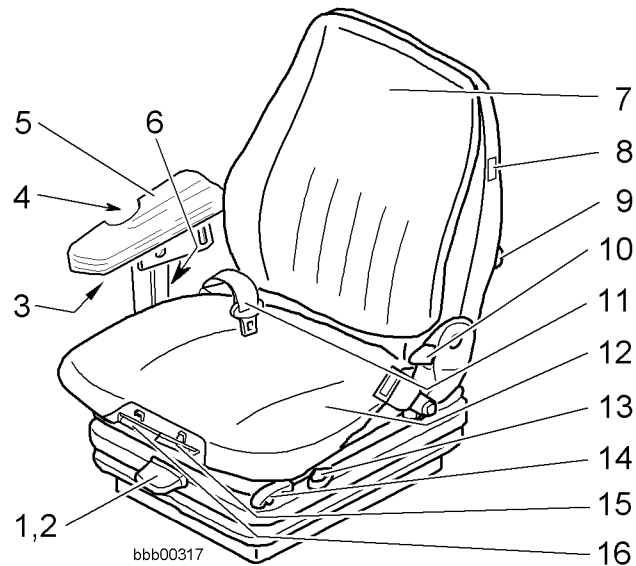
The ergonomically designed driver's seat offers a high degree of comfort. The adjustable seat surface, back rest, suspension and arm rest mean that the driver can adjust the seat for maximum individual comfort.

Vibration damping:

The seat installed in the machine complies with ISO 7096.

When the machine is used correctly, the vibrations transmitted by the driver's seat are less than or equal to the vibrations simulated in test conditions for the corresponding machine class in accordance with ISO 7096 class EM3.

The vibration acceleration values (a_{ZW}), measured in accordance with ISO 2631, Part 1, thus meet the standards for protection against overall body vibrations in EN 474-1.

Layout

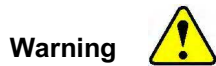
Main components and adjustable elements of the driver's seat

- | | |
|---|--|
| 1 Weight adjustment | 10 Back rest adjustment lever |
| 2 Height adjustment | 11 Seat belt |
| 3 Locking screw for arm rest horizontal adjustment | 12 Seat surface |
| 4 Locking screw for arm rest inclination adjustment | 13 Lever for horizontal suspension |
| 5 Arm rest | 14 Lever for horizontal adjustment |
| 6 Locking screw for arm rest height adjustment | 15 Seat surface inclination adjustment lever |
| 7 Back rest | 16 Seat surface horizontal adjustment lever |
| 8 Seat heating switch (optional) | |
| 9 Lumbar support knob | |

Adjusting the driver's seat

The seat can be adjusted to the driver's individual requirements to provide the highest possible degree of comfort.

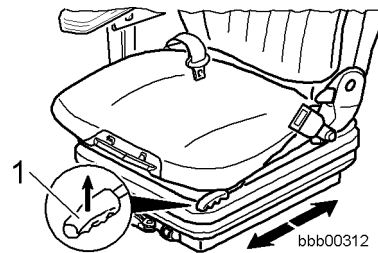
Adjusting the driver's seat for driving on roads



There is a risk of injuries if the driver's seat is not properly adjusted.
 ! When driving on public roads, the driver's seat may only be adjusted when the machine is at a standstill.

- Adjust the driver's seat before starting the machine.

Adjusting the driver's seat horizontally

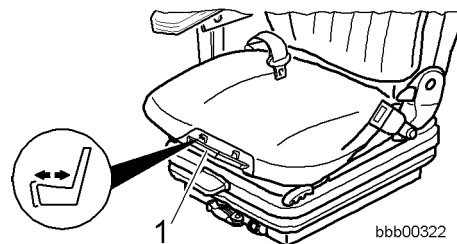


Horizontal adjustment of the driver's seat

The seat can be moved backward or forward using the lever 1.

- Pull the lever 1 in the direction of the arrow.
- Adjust the driver's seat horizontally and release the lever.

Adjusting the driver's seat horizontally

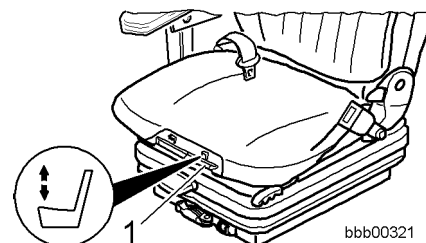


Horizontal adjustment of the driver's seat surface

The seat can be moved backward or forward using the lever 1.

- Push up the lever 1.
- Adjust the surface of the driver's seat horizontally and release the lever.

Adjusting the inclination of the seat surface



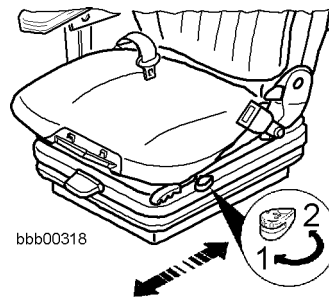
Adjusting the inclination of the driver's seat surface

The seat can be moved up or down using the lever 1.

- Push up the lever 1.
- Adjust the surface of the driver's seat vertically and release the lever.

LBH/01/003801/0003/5.05/en

Activating and deactivating horizontal suspension on the driver's seat

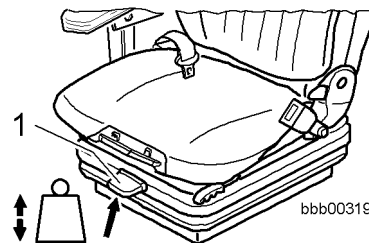


Horizontal suspension

Under certain conditions you can increase comfort by activating the horizontal suspension. This enables the driver's seat to better absorb shocks in the direction of travel.

- Position 1 = horizontal suspension on
- Position 2 = horizontal suspension off

Adjusting the seat suspension



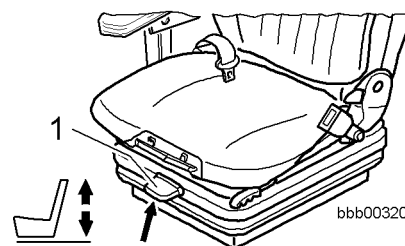
Weight adjustment

The seat suspension can be adjusted to the driver's individual body weight.

- Set the correct body weight by briefly pulling the lever 1.

The driver must be in the normal seated position when making this adjustment.

Adjusting the seat height



Seat height adjustment

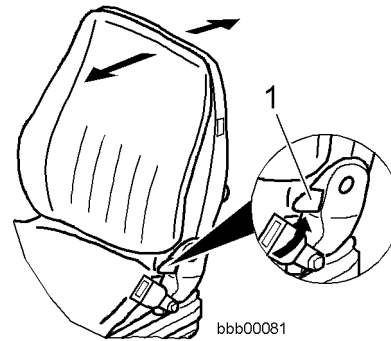
The seat height can be adjusted progressively using an air suspension system.

- Alter the seat height by pulling or pushing the lever 1 all the way in or out.

If you reach the upper or lower limit position, the height is adjusted automatically to ensure at least the minimum suspension.

To prevent damage, actuate the compressor for no more than a minute.

Adjusting the back rest

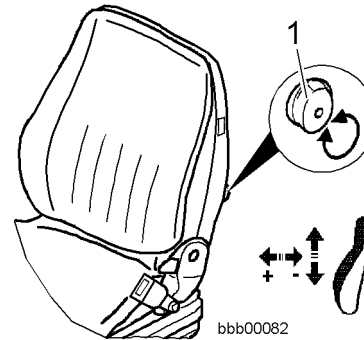


Inclination of the back rest

Adjust the inclination of the back rest using the lever **1** on the left of the driver's seat.

- Raise the lever **1**.
- Move the seat to the required inclination and release the lever.

Adjusting the lumbar support

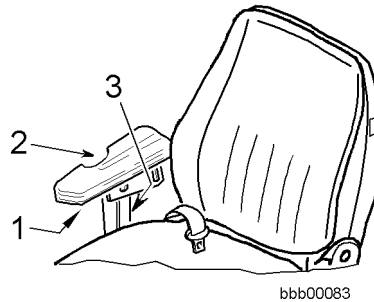


Lumbar support

The lumbar support increases the comfort of the driver.

- Turning the hand wheel **1** to the left or right enables you to individually adapt both the height and the curve of the back upholstery.

Adjusting the arm rest



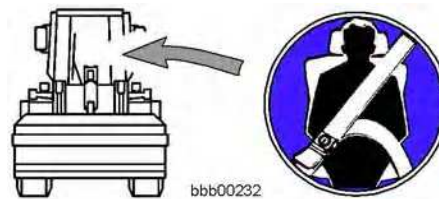
Arm rest adjustment

The height, inclination and horizontal position of the arm rests can be adjusted separately.

- Height adjustment: release the clamp screw **3**, adjust the height and lock it in place.
- Inclination adjustment: loosen the clamp screw **2**, adjust the inclination and lock it in place.
- Horizontal adjustment: loosen the clamp screw **1**, adjust the arm rest horizontally and lock it in place.

3.2.6 Seat belt

Safety aspects of the seat belt



Always wear a seat belt

The driver's cab is equipped with roll-over protection (**ROPS**).

The ROPS roll-over protection system can only protect the driver if the seat belt has been fastened.

This section describes the safety considerations for wearing the seat belt.

Warning



There is a risk of injuries if the seat belt is not fastened.

If the machine is braked or stops abruptly, the driver may suffer severe injuries if he is not wearing a seat belt.

! It is essential that you fasten your seat belt before starting up the machine.

Danger



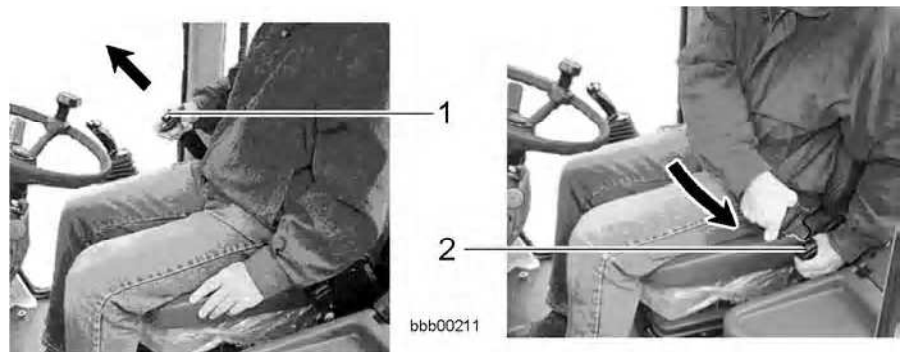
There is a risk of injuries if the seat belt is not fastened. If the machine tips or rolls over, the driver could suffer fatal injuries if he is not wearing a seat belt.

! It is essential that you fasten your seat belt before starting up the machine.

- To guarantee your safety, regularly check the condition, function and fastening of the seat belt.
- Immediately replace damaged parts.
- The seat belt may not be twisted when in use.

Fastening the seat belt

The seat belt is an automatic belt. You do not need to adjust the belt length.



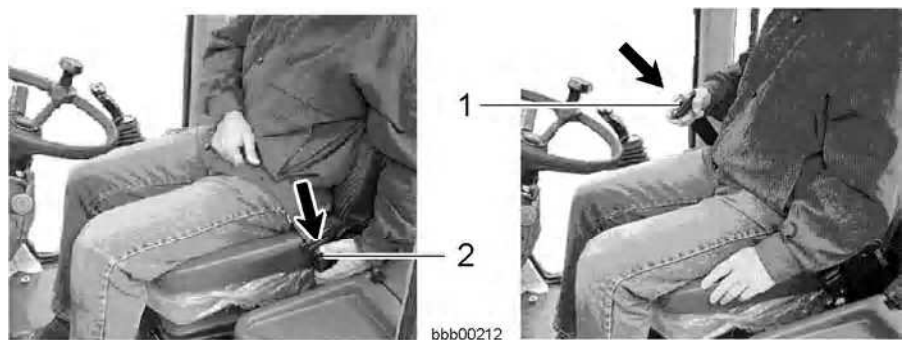
Fastening the seat belt

- Pull the belt buckle 1 over your body at hip level and plug it into the snap lock 2.

NOTE: The roller may lock if you pull out the belt suddenly.

- Check that the snap lock is engaged by pulling the clasps.

Releasing the seat belt



Releasing the seat belt

- Push down the lock button on the snap lock 2.
- Let the belt buckle 1 slowly wind up the roller.

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3.2.7 Steering column and steering wheel

Layout

The steering column with the steering wheel and steering column switch is integrated in the steering console.

Adjusting the steering column

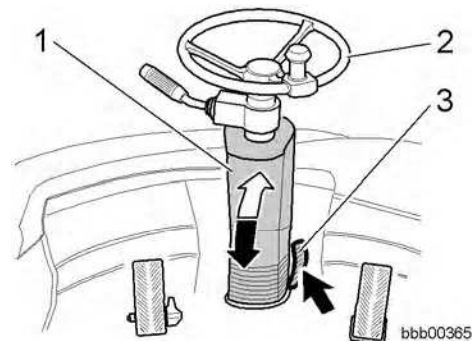
The steering wheel can be adjusted to suit the driver by adjusting the steering column.

The steering wheel can be adjusted progressively.



There is a risk of injuries if the steering column is not properly adjusted.

! When driving on public roads, the steering column may only be adjusted when the machine is at a standstill.



Adjusting the steering column

1 Steering column
2 Steering wheel

3 Lever

- Press down the lever **3** with your foot in the direction of the arrow.
- Pull or push the steering wheel **2** to adjust the steering column **1** as required.
- Release the lever **3** to lock the steering column **1** in the selected position.

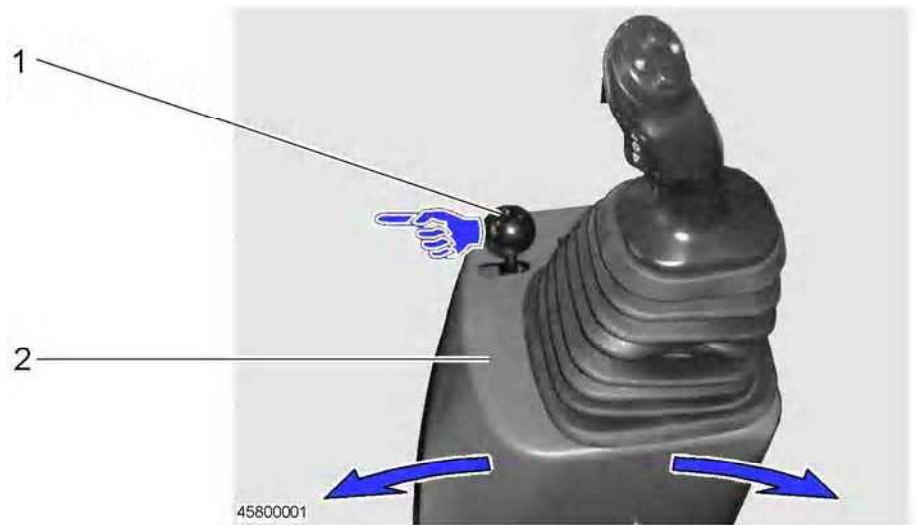
3.2.8 Control panel

The control panel is mounted on the cab floor to the right of the driver's seat.

The control panel can be adjusted to suit the seat position and arm length of the driver.

Adjusting the position of the control panel provides maximum comfort - and therefore safety - for the driver.

Adjusting the control panel to the seat position and arm length of the driver



Control panel

1 Locking lever

2 Control panel

Warning



The working attachment can cause accidents if it is accidentally actuated.
 ! Set down the attachment flat on the ground.

- Push the locking lever 1.
The control panel moves back.
- Adjust the control panel 2.
- Release the locking lever 1.
The control panel is fixed.

3.2.9 Ignition switch



Ignition switch position

1 Ignition switch

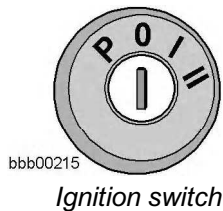
The ignition switch is equipped with a repeat start lock.
 The ignition key can be removed when it is in the 0 position with the engine switched off.

LBH/01/003801/0003/5.05/en

When the ignition key is in the 0 position or parking position, the following units on the instrument panel can be switched on:

- Hazard warning system
- Interior lighting
- With the ignition key in the parking position
- Working floodlight
- Flashing beacon (optional)
- Radio (optional)

Layout



Switch positions:

P – Parking position

0 – 0 position / engine off

I – Contact, operating and preglow position

II – Starting position

Switching the electrical system on and off

Make sure that the battery main switch is on.

- Switch the electrical system on or off with the ignition key.



3.2.10 Steering column switch

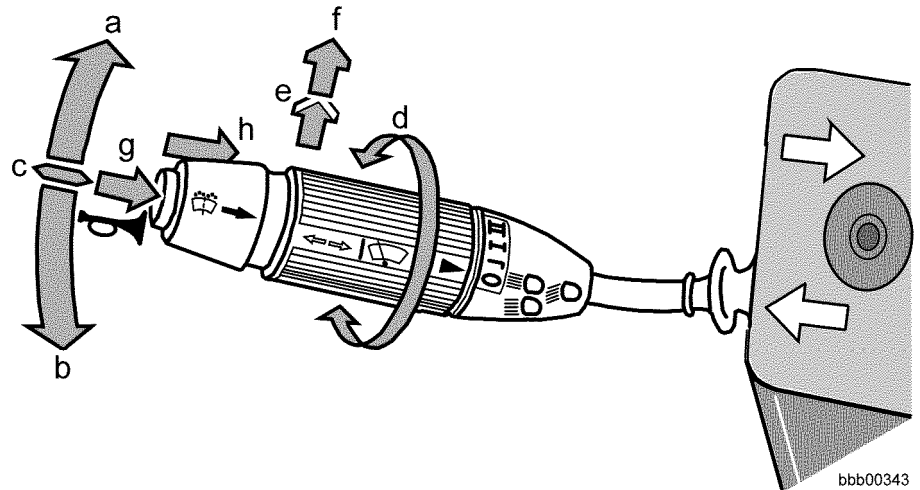
The steering column switch is mounted on the steering column.

Layout

The steering columns switch consists of the following controls:

- Travel direction indicators
- High beam
- Horn and headlight flasher
- Front windscreen wiper
- Front windshield wiper and washer system

Function description



Steering column switch

Functions of the steering column switch when activated in each direction:

- a** – Direction display: right indicators
- b** – Direction display: left indicators
- c** – Centre position: neutral position
- d** – Windshield wiper: front windshield
 - **0** – Level 0
 - **J** – Interval
 - **I** – Level I
 - **II** – Level II
- e** – Visual warning indicator: headlight flasher
- f** – High beam: driving light
- g** – Audible warning indicator: horn
- h** – Windshield wiper / washer system: front windshield

3.2.11 Lighting

Make sure that the electrical system is switched on.

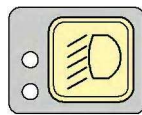


bbb00214

Switching off the parking light / driving light

- Press the button once.
The parking light lights up.
- Press the button again.
The driving light lights up.
- To switch off the parking light and driving light, press the button a third time.

All functions are switched off.



04ta13ab

LBH/01/003801/0003/5.05/en

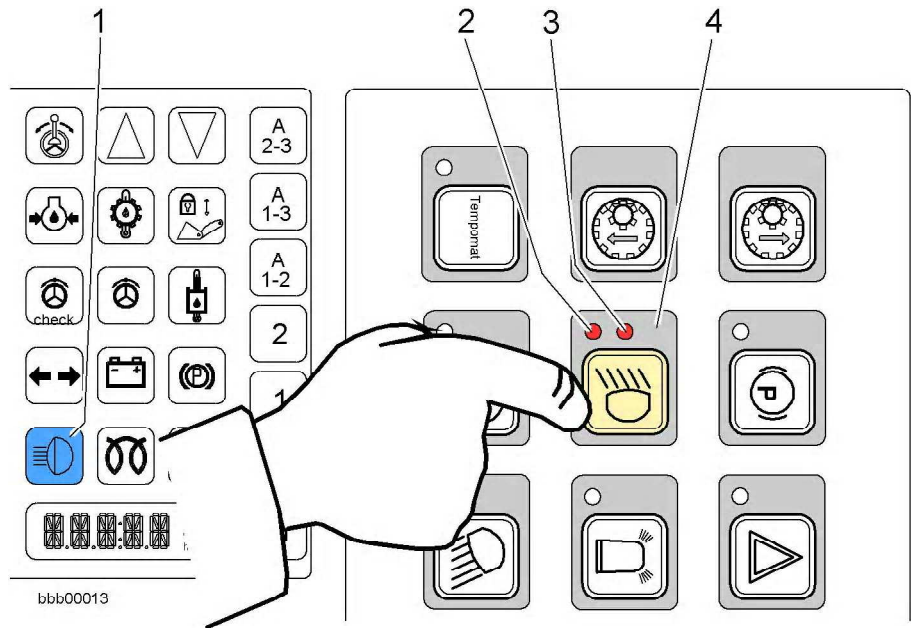
Caution 

Risk of damage to the battery
 If the battery is in a discharged condition over a long period of time (e.g. longer than one month), the battery can no longer be recharged.
 ! Avoid discharging the battery accidentally.

- When you leave the driver's cab:
 Make sure that you have not left the parking / driving light on.

Switching on high beam

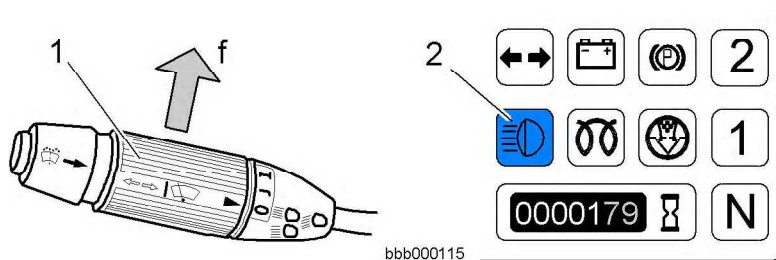
Make sure that the driving light is switched on.



Control unit

- 1 High beam symbol field
- 2 Parking light LED
- 3 Driving light LED
- 4 Parking light/driving light button

- Press the button 4 for the parking light/driving light twice.
 The LEDs 2 and 3 light up.

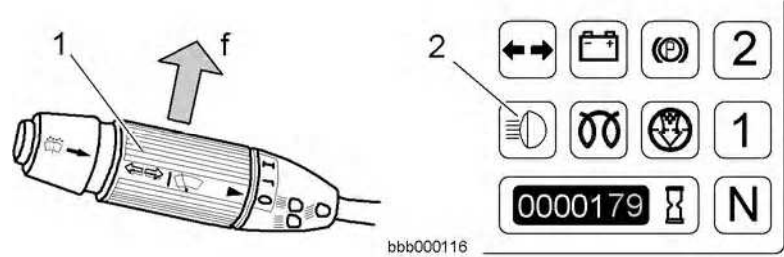


Steering column switch and display unit

- 1 Steering column switch
- 2 High beam symbol field

- Push the steering column switch 1 in direction f.
 The symbol field 2 for high beam lights up.
 High beam is activated.

Switching off high beam



Steering column switch and display unit

1 Steering column switch

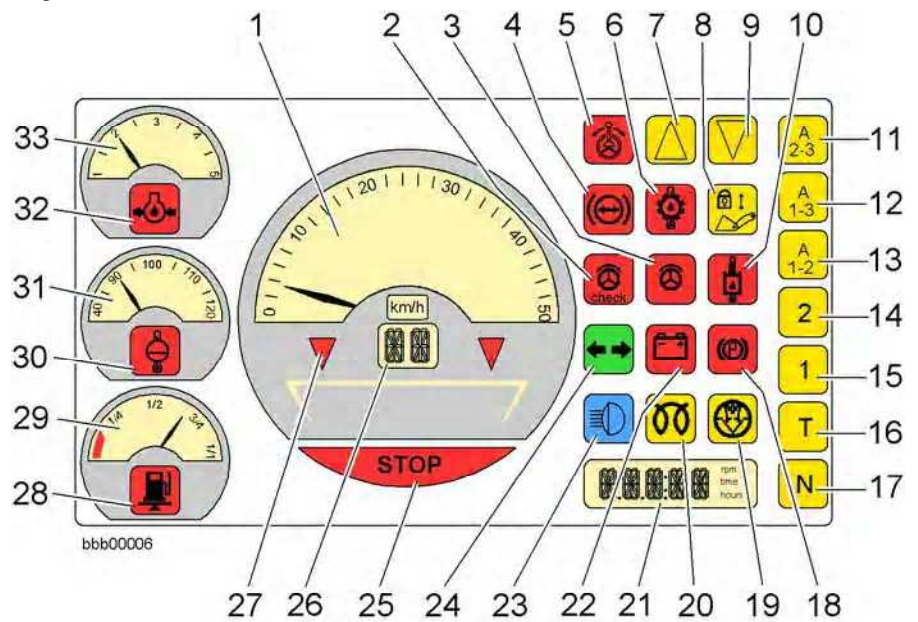
2 High beam symbol field

- To switch back to low beam, push the steering column switch **1** in direction **f**.
The symbol field **2** for high beam goes out.
The driving light lights up.

3.2.12 Display unit

The layout and function of the display unit are described in this section.

Layout



Display unit

- | | |
|--|--|
| 1 Travel speed display | 7 Forward travel direction symbol field |
| 2 Emergency steering check symbol field | 8 Working hydraulics lockout symbol field |
| 3 Emergency steering symbol field | 9 Reverse travel direction symbol field |
| 4 Brake system accumulator pressure symbol field | 10 Hydraulic oil overheating symbol field |
| 5 Joystick steering symbol field | 11 Automatic travel range 2-3 symbol field |
| 6 Gear oil overheating symbol field | |

LBH/01/003801/0003/5.05/en

- 12 Automatic travel range 1-3 symbol field
- 13 Automatic travel range 1-2 symbol field
- 14 Fixed gear 2 symbol field
- 15 Fixed gear 1 symbol field
- 16 Tempomat T symbol field
- 17 Neutral position N symbol field
- 18 Parking brake symbol field
- 19 Air filter contamination symbol field
- 20 Preglow monitor symbol field
- 21 Segment display for engine speed, time, operating hours segment and service codes
- 22 Battery charge (charge control) symbol field
- 23 High beam symbol field
- 24 Direction indicator system symbol field
- 25 Stop symbol field
- 26 Selected gear and tractive force control display
- 27 Overspeed protection display
- 28 Fuel supply symbol field
- 29 Fuel supply display
- 30 Engine overheating and coolant level symbol field
- 31 Coolant temperature display
- 32 Engine oil pressure symbol field
- 33 Engine oil pressure display

The display unit is mounted on the right at the front of the instrument panel.

It consists of the display (symbol LCD) and the backlighting. Each symbol field is either red, yellow, green or blue.

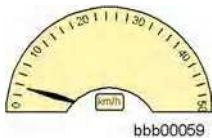
Function description

Travel speed display

Travel speed display

Display function:

- Shows the machine's travel speed.



bbb00059
Segment display

Emergency steering check indicator

Emergency steering check symbol field

Symbol field colour – red

Lights up briefly after the engine is started.

The symbol field goes out once the check has successfully taken place.



04ml13ab

Emergency steering indicator

Emergency steering symbol field

Symbol field colour – red

Warning functions:

- Lights up: if the engine shuts down or if the steering pump fails when the machine is moving.

The emergency steering pump is activated for approximately 50 seconds.

See also the sections on the control unit and emergency operation.



04ml14ab



bpik0012

Audible warning:

- When the emergency steering function (emergency steering pump) is switched on, an interval tone sounds.

Tone sequence: 2 second tone followed by 3 seconds pause.



bbb00015

Brake system accumulator pressure indicator

Brake system accumulator pressure symbol field

Symbol field colour – red

Lights up when the brake accumulator pressure is too low.

Warning sequence:

- When a warning is received, the symbol field lights up.
- The warning function of the symbol field is accompanied after 2 minutes by a continuous tone.



bbb00020

Joystick steering indicator

Joystick steering symbol field

Symbol field colour – red

Lights up during operation of the machine with optional joystick steering.



04ml18ab

Gear oil overheating indicator

Gear oil overheating symbol field

Symbol field colour – red

Lights up when the gear oil temperature is too high.

Warning sequence:

- When a warning is issued, the symbol field flashes first.



bbb00017

Forward travel direction indicator

Forward travel direction symbol field

Symbol field colour – yellow

Displays that the selected travel direction of the machine is forwards.

Flashes when the ignition key is in position **I** or **II**:
If the travel direction switch is set to forward.

Flashes when the ignition key is in position **II**:
When the parking brake button has been pressed.



bbb00010

Working hydraulics lockout indicator

Working hydraulics lockout symbol field

Symbol field colour – yellow

Lights up when the working hydraulics lockout is activated.



bbb00018

Reverse travel direction indicator

Reverse travel direction symbol field

Symbol field colour – yellow

Displays that the selected travel direction of the machine is reverse.

Flashes when the ignition key is in position **I** or **II**:
If the travel direction switch is already or is still set to reverse.

Flashes when the ignition key is in position **II**:
When the parking brake button has been pressed.



04ml11ab

Hydraulic oil overheating indicator

Hydraulic oil overheating symbol field

Symbol field colour – red

Lights up when the hydraulic oil temperature is too high.

Warning sequence:

- The symbol field flashes lights up if the hydraulic oil temperature exceeds 95 °C.
Above 95 °C the service code E92 appears in the display unit.
- The warning function of the symbol field is accompanied by a tone sounding at intervals.



bpik0012

Audible warning:

- When the hydraulic oil temperature exceeds 95 °C
Tone sequence: 1 second tone followed by 10 seconds pause.



bbb00021

Travel range 2-3 indicator

Travel range 2-3 symbol field

Symbol field colour – yellow

Displays that the selected travel range is 2-3.



bbb00022

Travel range 1-3 indicator

Travel range 1-3 symbol field

Symbol field colour – yellow

Displays that the selected travel range is 1-3.



bbb00023

Travel range 1-2 indicator

Travel range 1-2 symbol field

Symbol field colour – yellow

Displays that the selected travel range is 1-2.



bbb00024

Fixed gear 2 indicator

Travel range 2 symbol field

Symbol field colour – yellow

Displays that the selected travel range of the machine is 2.



bbb00025

Fixed gear 1 indicator

Travel range 1 symbol field

Symbol field colour – yellow

Displays that the selected travel range of the machine is 1.



bbb00026

Tempomat T indicator

Tempomat T symbol field

Symbol field colour – yellow

The machine keeps to the travel speed at the time the function is activated.



bb600027

Neutral position N indicator

Neutral position N symbol field

Symbol field colour – yellow

The travel drive is switched to neutral.

Flashes when the ignition key is in position **I** or **II**:

If the travel direction switch is set to forward or reverse.

Flashes when the ignition key is in position **II**:

When the parking brake button has been pressed.



04ml10ab

Parking brake activation indicator

Parking brake symbol field

Symbol field colour – red

Warning functions:

- Lights up when the ignition key is turned to contact, operating and preglow position **I**.

- Lights up when the parking brake is engaged.

The symbol field goes out when the parking brake is released.



04ml06ab

Air filter contamination indicator

Air filter contamination symbol field

Symbol field colour – yellow

Lights up when the air filter is heavily contaminated.



04ml05ab

Preglow monitoring

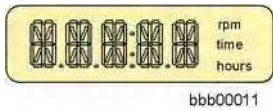
Preglow monitor symbol field

Symbol field colour – yellow

Lights up when the ignition key is turned to the ignition, operation and preglow position - **I** and in the starting position **II**.

The symbol field goes out at the end of the preglow period and when the engine is started.

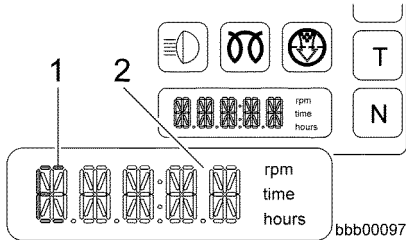
Engine speed, time, operating hours and service code indicator



Segment display for engine speed, real time, operating hours segment or service codes

Field colour – grey

Requirement: the required function must be selected on the control unit.



Display functions:

- Displays the time.
- Displays the engine speed.
- Shows how many hours the machine has been in operation. The service hours are used as the basis for the maintenance intervals.
- Displays the service code in the event of malfunction.

Service code structure:

Field 1 = E plus Field 2 = service code number.

The service code display is accompanied by a beep.

Tone sequence: immediately after the service code is displayed, 1 second long, once only.

When a service code is displayed which means the machine has to be stopped, the STOP symbol field also lights up.

The segment display goes out when the ignition is switched off. If necessary, first note the service code which is displayed.



Battery charge control indicator



Battery charge (charge control) symbol field

Symbol field colour – red

Warning functions:

- Lights up when the ignition key is in the ignition position I. The symbol field goes out when the engine is started.
- It lights up, for instance, if the V-ribbed drive belt of the alternator tears.

High beam activation indicator



High beam symbol field

Symbol field colour – blue

Lights up when the high beam is activated.

Direction indicator system activation indicator

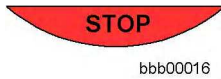


Direction indicator system symbol field

Symbol field colour – green

Warning functions:

- Flashes when the steering column switch is actuated to display the travel direction.
- Flashes when the hazard warning system is activated.



bbb00016

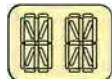
Machine stop indicator

Stop symbol field

Symbol field colour – red

Lights up:

- If there is a service code message which means that the machine must be shut down.
- If the engine overheats.
- If the engine oil pressure is too low.
- If the coolant temperature is too high.
- If the coolant level is too low.



bbb00019

Segment display

Travel range or tractive force control indicator

Segment display for gear and tractive force control

Field colour – yellow

Display functions:

- Shows the selected gear – **G1, G2, G3**.
- Shows the selected tractive force between 25% and 100% in 5% increments.
- Shows the adjustable time interval of 5 to 95 minutes for the optional reversing of the fan drive..



bbb00080

Overspeed protection indicator

Overspeed protection segment display

Overspeed protection field 1

Symbol field colour – red

Warning message:

- Flashes if the machine is operated at too high a speed.
- Also, the service code E91 appears in the display unit.
- The warning function of the symbol field is accompanied by a single beep.



04ml23ab

Low fuel supply indicator

Fuel supply symbol field

Symbol field colour – red

Flashes when the diesel fuel is down to reserve level.



bbb00007

Fuel supply tank content indicator

Fuel supply display

Field colour – grey (limit range with reserve – red)

Shows the content of the diesel fuel tank.

LBH/01/003801/0003/5.05/en

Engine overheating and coolant level indicator



04ml24ab

Engine overheating and coolant level symbol field

Symbol field colour – red

Warning functions:

- Flashes when the coolant temperature exceeds 102 °C.
- Lights up when the coolant level is too low.

Warning message when the coolant temperature exceeds 102 °C:

- When a warning is issued, the symbol field flashes first.
- The stop symbol field lights up.
See the section on the machine stop indicator.
- The warning function of the symbol field is accompanied by a continuous tone.



bbb00016

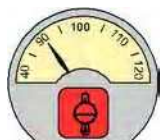


bpik0006

Warning message when the coolant level is too low:

- When a warning is received, the symbol field lights up.
- The stop symbol field lights up.
See the section on the machine stop indicator.
- The warning function of the symbol field is accompanied by a continuous tone.

Coolant temperature indicator



bbb00008

Coolant temperature display

Field colour – grey

Shows the coolant temperature in °C.

Engine oil pressure indicator



04ml25ab

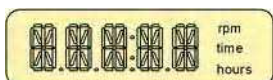
Engine oil pressure symbol field

Symbol field colour – red

Warning functions:

- Lights up when the ignition key is in the ignition position I.
The symbol field goes out when the engine is started.
- Flashes when the engine oil pressure drops.

Requirement: the diesel engine must be running.



bbb00011

Warning sequence:

- When a warning is received, the symbol field lights up.
Also, the service code E27 appears in the display unit.
- The warning function of the symbol field is accompanied after 10 seconds by a continuous tone.



bpik0006



bbb00016

The stop symbol field lights up.

See the section on the machine stop indicator.

Engine oil pressure display



bbb00009

Engine oil pressure display

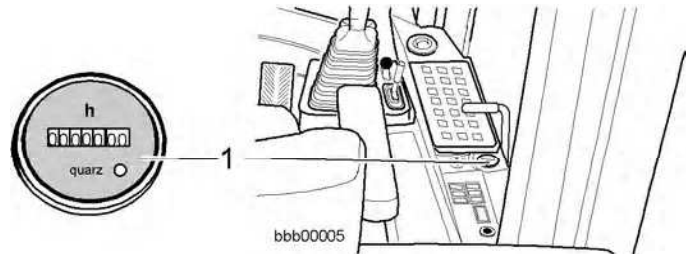
Field colour – grey

Shows engine oil pressure in bar.

3.2.13 Mechanical service hours counter

The machine is equipped with an additional mechanical service hours counter.

Layout



Service hours counter

1 Service hours counter

The mechanical service hours counter **1** is in the instrument panel to the right of the driver's seat.

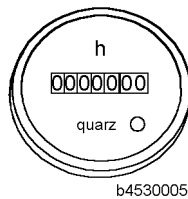
Function description

Machine service hours indicator

Mechanical service hours counter

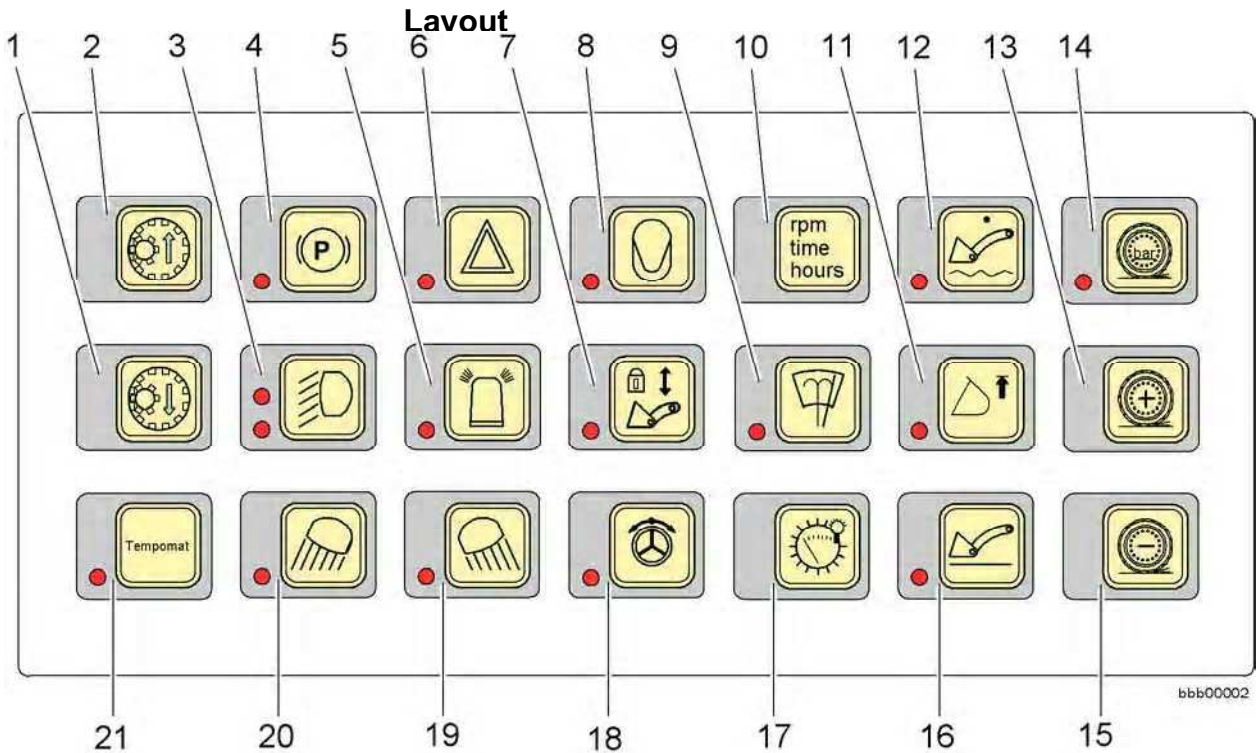
Shows how many hours the machine has been in operation.

The service hours are used as the basis for the maintenance intervals.



3.2.14 Control unit

The design and function of the control unit are described in this section.



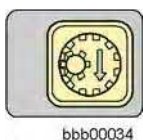
Control unit (view rotated by 90°)

- | | | |
|--------------------------------------|--|---|
| 1 Travel range down button | 9 Rear windshield wiper and washer system button | 17 Display unit brightness control button |
| 2 Travel range up button | 10 Engine speed, clock and service hours button | 18 Emergency steering button |
| 3 Parking light/driving light button | 11 Lift kick-out button | 19 Rear working floodlights button |
| 4 Parking brake button | 12 Float position button | 20 Front working floodlights button |
| 5 Flashing beacon button | 13 Increase tractive force button | 21 Tempomat button |
| 6 Hazard warning system button | 14 Tractive force adjustment button | |
| 7 Working hydraulics lockout button | 15 Reduce tractive force button | |
| 8 Ride control (LFD system) button | 16 Bucket return-to-dig button | |

The control unit is in the instrument panel to the right of the driver's seat. All On/Off buttons on the control unit are equipped with LEDs. When the button is on, the LED lights up red. When the button is off, the LED lights goes out.

Function description

Selecting a lower travel range



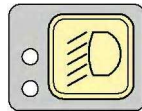
Travel range down button
Selects a lower travel range.
The selected travel range is indicated on the display unit.

Selecting a higher travel range



Travel range up button
Selects a higher travel range.
The selected travel range is indicated on the display unit.

LBH/01/003801/0003/05.05/en



04ta13ab

Parking light / driving light

Parking light/driving light button

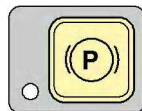
Function for parking light:

- Switches the parking light on or off.
Press the button once to activate the parking light.

Function for driving light:

- Switches the driving light on or off.
Press the button twice to switch on the driving light.

Press the button three times to switch off all functions.



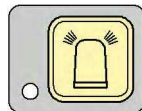
04ta02ab

Parking brake

Parking brake button

Engages or releases the parking brake.

Press the switch to engage or release the parking brake.



04ta14ab

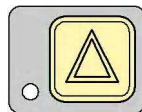
Flashing beacon

This equipment is optional.

Flashing beacon button

Switches the flashing beacon on and off.

The button is also functional when the ignition key is in the 0 position or parking position.



04ta01ab

Hazard warning system

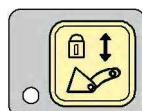
Hazard warning system button

Switches the hazard warning system on or off.

When you press the button:

- If the hazard warning system symbol field is flashing, all four flashing lights on the machine are on.
- If the hazard warning system symbol field goes out, all four flashing lights on the machine go out.

The button is also functional when the ignition key is in the 0 position or parking position.



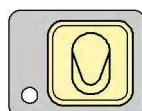
bbb00028

Working hydraulics lockout

Working hydraulics lockout button

Disables and enables the working hydraulics functions.

Press the switch to activate or deactivate the working hydraulics lockout.



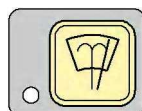
04ta04ab

Switching ride control (LFD system) on or off

Ride control (LFD system) button

Switches the ride control system on or off.

The function is memorised after the ignition is switched off, and is thus still active when the ignition is switched on again.



04ta10ab

Rear windshield wiper and washer system

Rear windshield wiper and washer system button

Switches the windshield wiper and washer system for the rear window on or off.

LBH/01/003801/0003/5.05/en

Switching between the engine speed, clock and service hours

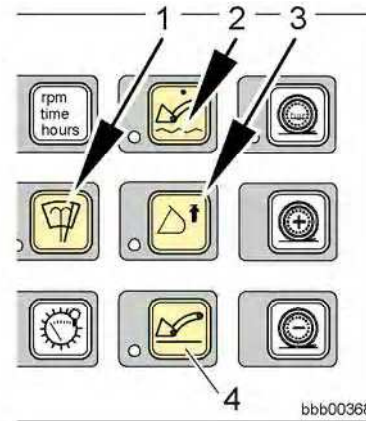
Engine speed, clock and service hours button

Switches the display between the engine speed, clock and service hours.



bbb00032

Setting the clock



bbb00368

Control unit

1 Rear windshield wiper and washer system button

2 Float position button
3 Lift kick-out button

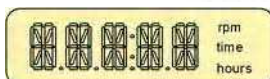
Setting the clock:

- Press the buttons **1**, **2** and **3** at the same time and switch on the electrical system using the ignition key.
- Press the button **2** to switch from years, months, days, hours or minutes.
- Press the button **3** to increase the preset values.
- Press the button **4** to decrease the preset values.
- To save the settings: switch off the electrical system with the ignition key.

Service hours indicator



bbb00032



bbb00011

Activating the segment display:

- Switch on the electrical system using the ignition key.
- Press the engine speed, clock and service hours button.

The number of hours the machine has been in operation is displayed. The service hours are used as the basis for the maintenance intervals.

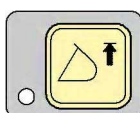
Lift kick-out

Lift kick-out button

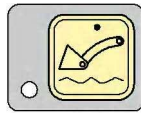
Switches the lift kick-out function on and off.

When the button is pressed, a solenoid on the pilot control device is activated.

The LIEBHERR control lever is held in the raised lift arm position by magnetic force.



04ta12ab



04ta06ab

Float position

Float position button

Switches the float position function on or off.

When the button is pressed, a solenoid on the pilot control device is activated.

After the LIEBHERR control lever is actuated, it is held in the lower lift arm position by magnetic force.

The function is memorised after the ignition is switched off, and is thus still active when the ignition is switched on again.



bbb00029

Increasing the tractive force

Increase tractive force button

Increases the tractive force of the machine.

The tractive force is shown as a percentage (between 25 % and 100 %) on the display unit.



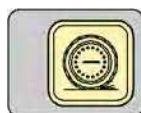
04ta03ab

Tractive force adjustment

Tractive force adjustment button

Prepares the tractive force adjustment function.

The function is memorised after the ignition is switched off, and is thus still active when the ignition is switched on again.



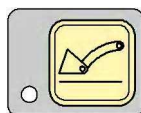
bbb00030

Reducing the tractive force

Reduce tractive force button

Reduces the tractive force of the machine.

The tractive force is shown as a percentage (between 25 % and 100 %) on the display unit.



04ta17ab

Bucket return-to-dig

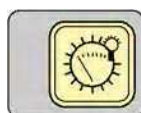
Bucket return-to-dig button

Switches the automatic bucket return-to-dig function on or off.

When the button is pressed, a solenoid on the pilot control device is activated.

The LIEBHERR control lever is held in the bucket tilt-in position by magnetic force.

The function is memorised after the ignition is switched off, and is thus still active when the ignition is switched on again.



bbb00035

Display unit brightness control

Display unit brightness control button

Adjusts the brightness of the display unit.



04ta16ab

Emergency steering

Emergency steering button

Repeat starts the emergency control pump for emergency steering functions.

When the ignition is switched on, press and hold the button to start the emergency steering pump again.

Refer to the section on towing the machine when the steering system has broken down.

LBH10/1003801/0003/5.05/en



04ta08ab

Rear working floodlights

Rear working floodlights button

Switches the rear working floodlights on or off.

Press the button to switch the rear working floodlights on and off.

The button is also functional when the ignition key is in the 0 position or parking position.



04ta07ab

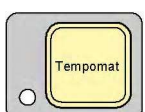
Front working floodlights

Front working floodlights button

Switches the front working floodlights on or off.

Press the button to switch the front working floodlights on or off.

The button is also functional when the ignition key is in the 0 position or parking position.



bbb00031

Tempomat

Tempomat button

This function is only available when travelling forward in fixed gears 1 and 2.

Activation:

- When the machine is moving:
The machine keeps to the travel speed at the time the function is activated.
The speed thus set is the maximum speed.
- When the machine is stationary:
The machine travels at the minimum speed of the selected gear.
Gear level 1: 4 km/h
Gear level 2: 10 km/h

The function is deactivated in the following conditions:

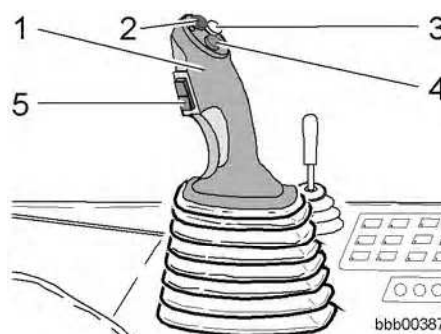
- If you press the reverse travel direction switch.
The control electronics switch to automatic travel range **A1-3**.

Deactivate the function by pressing the tempomat button again or changing the travel range.

3.2.15 LIEBHERR control lever

This section describes the design and function of the LIEBHERR control lever.

Layout



bbb00387

LH control lever

LBH/01/003801/0003/5.05/en

- 1 LH control lever
- 2 Kick-down button
- 3 Additional equipment button ¹⁾
- 4 Comfort control switch ²⁾
- 5 Travel direction switch

Integrated controls:

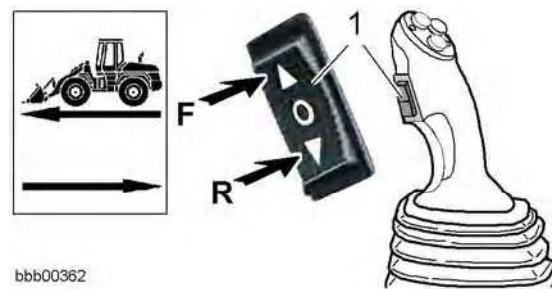
- Lever with pilot control unit for controlling the working attachment
- Button for kick-down shifting
- Button for controlling an additional hydraulic function
¹⁾e.g. optional additional equipment (high dump bucket)
- Comfort control button
²⁾e.g. optional hydraulic quick-change device
- Switch for changing travel direction between forward and reverse.

Function description

Use the LIEBHERR control lever (LH control lever) to control the travel direction and movements of the working attachment.

Switching the travel direction

The travel direction cannot be selected while the parking brake is engaged. You can change the travel direction using switch 1 on the LH control lever. See the section on driving in chapter 3.



LH control lever

- 1 Travel direction switch
- 0 = Neutral travel direction
- F = Forward travel direction
- R = Reverse travel direction

- Selecting the travel direction:
 Press the switch 1 according to the direction you want to travel in. Symbol fields are used to show the selected travel direction on the instrument panel in the display unit. See the section on the display unit in chapter 3.

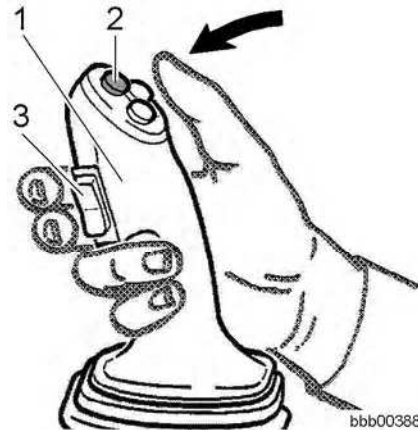
LBH/01/003801/0003/5.05/en

Using the kick-down function

When the electrical system is switched on, the default settings are the automatic travel range **A1-3** and the travel drive is set to neutral **N**. Both are shown in the display unit.

The kick-down function can only be selected when the machine is moving. Kick-down shifting is possible while moving forwards or reversing in the following travel ranges: **2**, **A1-2**, **A1-3**, **A2-3** and at every travel speed.

Use: See the section on kick-down shifting in the driving section.



LH control lever

1 LH control lever
2 Kick-down button

3 Travel direction switch

Selection procedures for kick-down shifting:

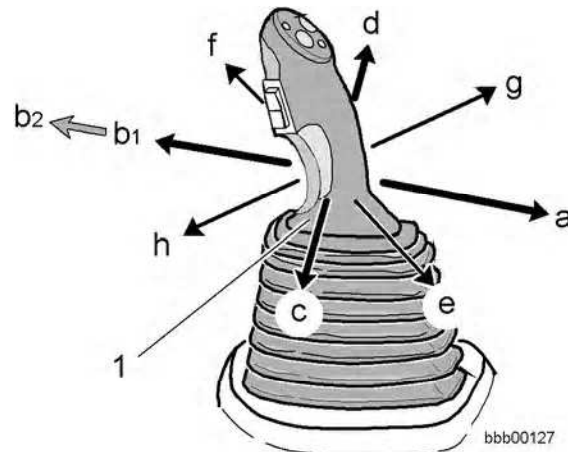
- When you press the button **2** the machine is automatically hydrostatically braked.
The gearbox automatically shifts to first gear.
This means that the gear is automatically shifted from 3 to 2 and then from 2 to 1.
- When you drive without resistance, first gear is active for 10 seconds from the time the button **2** is pressed.
The machine then automatically shifts to second gear when the speed increases again.
- When driving into the pile, first gear remains selected as long as there is resistance.

As long as the kick-down function is activated, you cannot drive faster than 8 km/h in first gear.

- To deactivate the kick-down function:
Press the switch **3** according to the direction you want to travel in.

Controlling the working attachment

The grip of the LH control lever is mechanically linked to the pilot control device directly underneath it.



Directions of movement of the LH control lever

- a Back
- b1 Forward to action point
- b2 Forward to limit
- c Left
- d Right
- e-h Diagonal

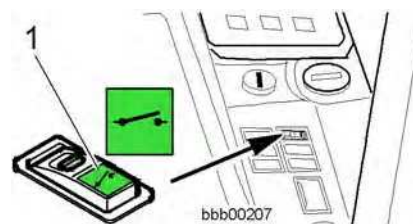
- Control the working attachment by moving the LH control lever 1.

Movements of the LH control lever and associated functions:

- a – Raises the lift arm
- b1 – Normal lowering function – the lift arm is lowered slowly
- b2 – Fast lowering function – the lift arm is lowered quickly
- c – Tilts the bucket in
- d – Tilts the bucket out
- e – Raises the lift arm while tilting the bucket in
- f – Lowers the lift arm while tilting the bucket out
- g – Raises the lift arm while tilting the bucket out
- h – Lowers the lift arm while tilting the bucket in

Comfort control

This equipment is optional.



Comfort control

- 1 Comfort control switch

Functions:

- It controls an additional hydraulic function, such as the high dump bucket.

Operation:

- Using a button and the tilt-in and tilt-out function of the LH control lever.

Advantage:

- You can keep your hand on the LH control lever.
Very good fine control is possible.

Warning

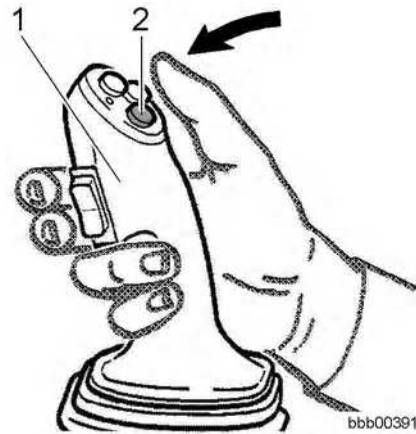


Incorrect operation can lead to injuries.

! The tilt-in and tilt-out function (tilt cylinder) cannot be used at the same time as comfort control.

Activate the comfort control function using the comfort control switch **1**.

See the section on using the hydraulic quick-change device (electrohydraulically with comfort control) in the operation section.



LH control lever

1 LH control lever

2 Comfort control button

- Press and hold down the comfort control button **2**.
- Use the LH control lever **1** to move the working attachment via the additional control circuit (accessory kit).

An example of this is tilting the high dump bucket in or out using the bucket cylinder.

- When you release the comfort control button **2**, the additional hydraulic control function is interrupted.

The working attachment is thus moved via the control circuit of the working hydraulics.

An example of this is tilting the attachment in or out using the tilt cylinder.

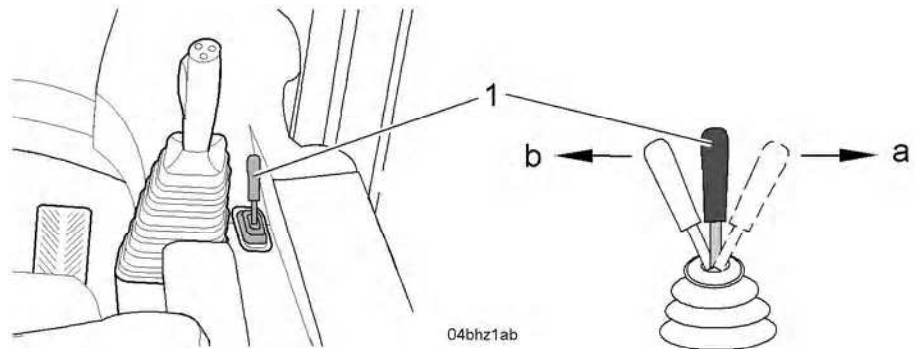
3.2.16 Control lever for additional working functions

This equipment is optional.

The control lever for additional working functions (additional control lever) is installed to the right of the LH control lever in the instrument panel.

Controlling the optional attachment

If an optional attachment with an independent control circuit is attached to the lift arm, it is controlled by the additional control lever.



Directions of movement of the additional control lever

a – Back

b – Forward

- You can control the optional attachment using the additional control lever 1.

Movements of the additional control lever and associated functions:

a– (function depends on the type of optional equipment attached)

b– (function depends on the type of optional equipment attached)

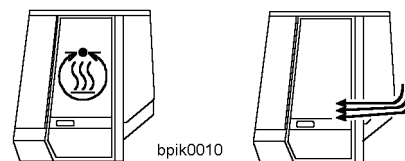
- **Make sure you are familiar with the operation of the optional attachment installed.**

Refer to the section on operation or to the operating manual for additional equipment.

3.2.17 Heating and ventilation

The driver's cab is equipped with a warm water heating system.

The controls are located in the top right of the cab.



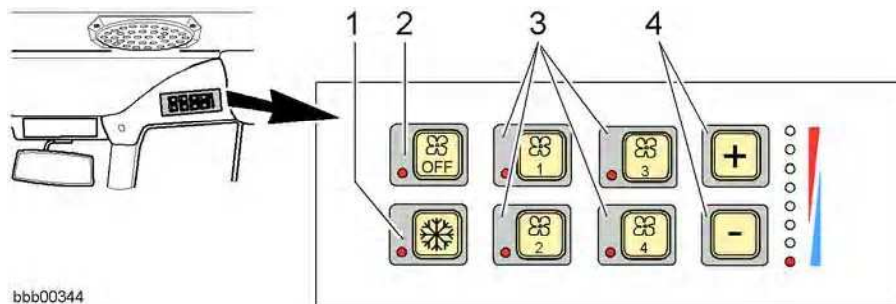
The intake air is filtered through two serviceable dry filter cartridges and directed to the adjustable air flow nozzles in the cab through the heating/air-conditioning unit.

Make sure that:

- The shut-off valves on the thermostat housing of the diesel engine are open.
- The machine's electrical system is switched on.
- The nozzles for the air flow are open.

For example towards the driver, front windshield or rear window.

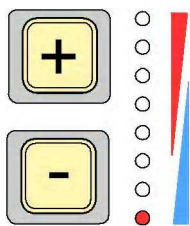
Regulating the temperature



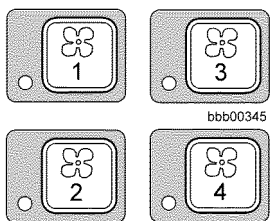
bbb00344

Heater, blower and air-conditioning control panel

- 1 Air-conditioning system button
- 2 Blower OFF button
- 3 Blower level button
- 4 Heater button



bbb00037



bbb00345

- **To regulate the temperature:**
Press the heater button 4 with the plus or minus sign.
 - **To speed up the warming process:**
Press the heater button 4 with the plus sign to the highest level.
 - Press the blower button 3 to level 4.
- LEDs indicate the set temperature range.

Adjusting the blower

The filters of the heating/air-conditioning unit must be regularly serviced in order to ensure good ventilation.

The air flow is impaired if the filter is dirty.

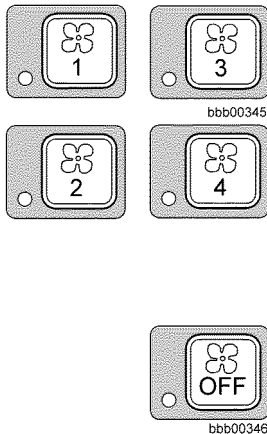
See the section on maintenance tasks in chapter 3.

The air outlet nozzles in the cab must also be open.

Caution 

The evaporator may be damaged if the recirculated air filter is not present. If there is no recirculated air filter or fresh air filter, the closely meshed, deep evaporator fins will quickly become dirty. It is then necessary to replace the evaporator as cleaning is no longer possible.

! Never operate the heater/air-conditioning unit without filters.



• **To switch on the blower:**

Press one of the blower level buttons **3, 1– 4**.

Fresh air and circulating air is automatically blown into the cab.

• Press the blower level buttons **3, 1 – 4** to adjust the air flow.

Blower speeds:

- Level 1 – weak air flow
- Level 2 or 3 – medium air flow
- Level 4 – strong air flow

• **To switch off the blower:**

Press the blower OFF button **2**.

3.2.18 Air-conditioning system



bsym0029

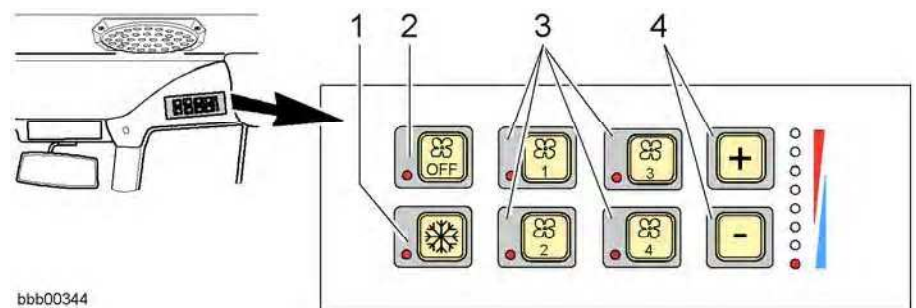
All driver's cabs are fitted with air-conditioning units.

The intake air is filtered through two serviceable dry filter cartridges and directed into the cab via the evaporator, heat exchanger and adjustable outlet nozzles.

Using the air-conditioning system

In order to ensure that the air-conditioning system remains in good working order, it is advisable to switch it on every 14 days.

When the air-conditioning system is in use, the shaft seal ring in the air-conditioning compressor is lubricated. This prevents coolant escaping from the air-conditioning compressor.



Heater, blower and air-conditioning control panel

- | | |
|----------------------------------|-----------------------|
| 1 Air-conditioning system button | 3 Blower level button |
| 2 Blower OFF button | 4 Heater button |

In order to switch on the air-conditioning system:

- The engine must be running.
- The blower button **3** must be set to at least level **1**.



04ta15ab

Air-conditioning system button

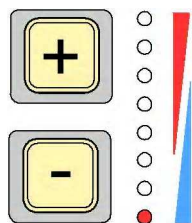
Switching on the air-conditioning system

- To switch on the air-conditioning system, press the air-conditioning system button.

An LED on the button indicates that the function is active.

Regulating the temperature

The cab temperature is regulated by mixing in hot air supplied by the heater.



bbb00037

- Set the cab temperature using the heater button 4:

Plus button = warmer

Minus button = cooler

Cooling the air in the cab

- If heat has built up in the cab, first air the cab thoroughly.

To achieve maximum cooling in the cab, take the following steps:

- Set the highest blower speed.
- Press the heater button 4 with the minus sign to the lowest level.
- Close the cab doors and windows.
- Direct the outlet nozzles away from the windows.

Re-heat mode

On cold, damp days, you can use the air-conditioning system to dehumidify out the cab air.

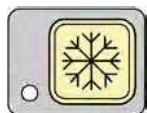
- To dehumidify the cab air, switch on the air-conditioning system in addition to the heater.

The windows are prevented from steaming up by the moisture in the air condensing on the cool evaporator and then running out into the drip tray in the form of water.

Switching off the air-conditioning system

- To switch off the air-conditioning system, press the air-conditioning system button.

When the function is switched off, the LED in the button goes out.



04ta15ab

Air-conditioning system button

3.2.19 Interior cab lighting

The interior lighting is mounted centrally in the top of the cab.

Switching the interior lighting on and off



Interior lighting

1 Interior lighting
2 Reading lamp

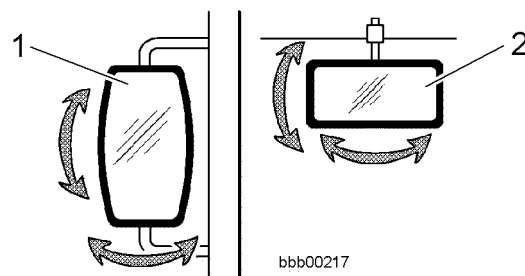
3 Interior lighting switch
4 Reading lamp switch

- To switch the interior lighting 1 on or off, press the switch 3.
- To switch the reading lamp 2 on or off, press the switch 4.
- Set the beam of the reading lamp 2 as required by turning the reading lamp.

3.2.20 Interior and exterior mirrors

The driver's cab is equipped with one interior and two exterior mirrors.

Adjusting the mirrors



Adjusting the mirrors

1 Exterior mirror

2 Interior mirror

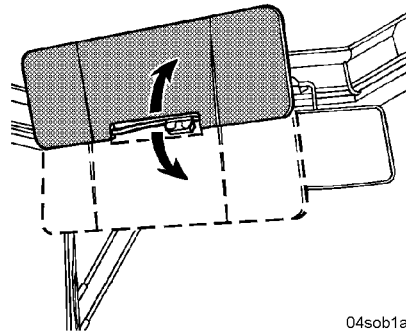
- All mirrors can be adjusted individually.

3.2.21 Sun visor

The driver's cab is equipped with a sun visor.

LBH/01/003801/0003/5.05/en

Adjusting the sun visor



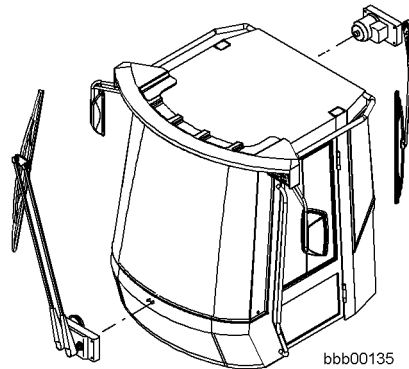
04sob1ab

Adjusting the sun visor

- Adjust the sun visor according to your individual requirements by pulling it up or down.

3.2.22 Windshield wiper and washer system

Layout



bbb00135

The machine has an electric windshield washer and wiper system for the front and rear windshields.

Essentially it consists of the controls, the windshield wipers, the reservoir and pumps, and the outlet nozzles for the washing fluid.

The wiper and washer systems for the front and rear windshield use a shared washer fluid reservoir.

Non-return valves are fitted in the washing fluid hoses to the outlet nozzles.

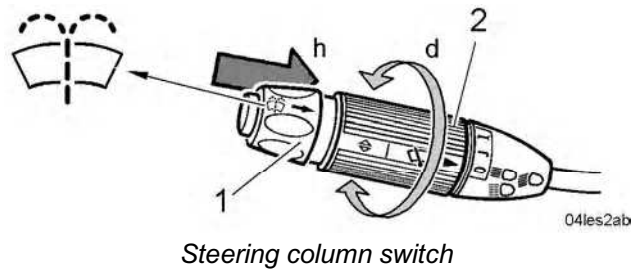
The switches for the front washer and wiper system are on the steering column switch.

The switches for the rear washer and wiper system are in the right-hand side console. There is a spring-action button for activating the washer fluid pump.

Activating the windshield wiper and washer system

Make sure that the electrical system is switched on before using the wiper and washer system.

Using the front windshield wiper and washer system



Steering column switch

1 Button
2 Handle

d Windshield wiper activation

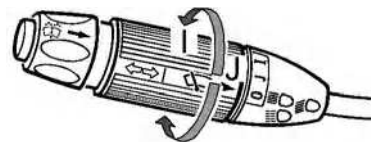
h Windshield wiper and washer system activation

- To wipe the window, Turn the handle **2** to the required position **J – I – II**.
- To wash the window, press the button **1** on the steering column switch.

Washer fluid is sprayed onto the front windscreen through the outlet nozzles.

Adjusting the wiper interval

The wiper interval can be adjusted.



bbb00188

- **To adjust the wiper interval:**
Turn the handle to **J**.
- Turn the handle to **I**.
- Wait for the required wiper interval (use a stopwatch or count).

- Turn the handle back to **J**.

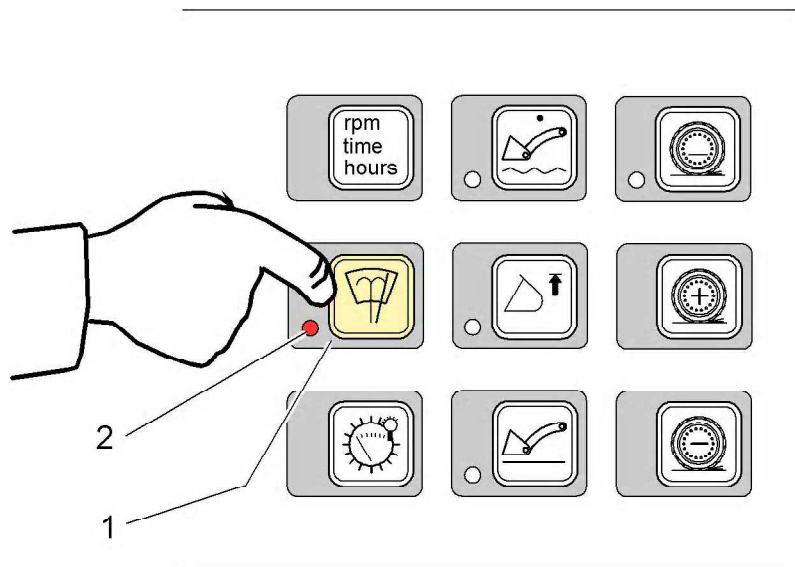
The wiper now wipes at the set interval.

- Repeat the process to correct it.
- When the ignition is off, the setting is lost.

The default interval is restored.

Using the rear windshield wiper and washer system

Switch on the windshield wiper and washer system by pressing the button **1** .



bbb00039

Control unit

1 Rear windshield wiper and washer system button

2 LED

- To wipe the window, press the button **1** once.
The LED **2** on the button indicates that the function is active.
- Top wipe and wash the window, press the button **1** again and hold it down.

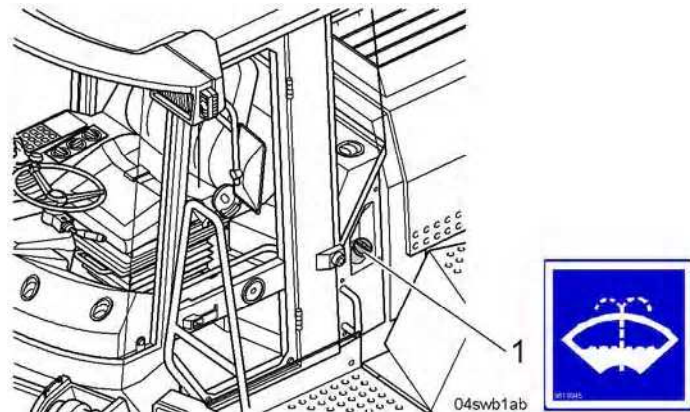
Washer fluid is sprayed onto the rear windscreen through an outlet nozzle.

- To switch off the windshield wiper and washer system, press the button **1** a third time.

The LED **2** on the button goes out.

3.2.23 Windshield washer fluid reservoir

Layout



Windshield washer fluid reservoir

1 Reservoir filling inlet

The reservoir is located on the left-hand side of the driver's cab. The filling inlet 1 is mounted outside on the left-hand side of the driver's cab.

Topping up washer fluid

The filling quantity is 3.5 litres.

- Unlock the cap on the reservoir and take it off.
- Top up with standard windshield washer fluid as necessary.

Caution



Ice can damage the windshield wiper and washer system. Icing up can damage the windscreen wiper and washer system and cause it to fail. A dirty front or rear windscreen is a safety hazard.

- ! Scrape snow and ice from the windshield before driving.
- ! You must protect the windshield wiper and washer system using anti-freeze.



04sy02ab

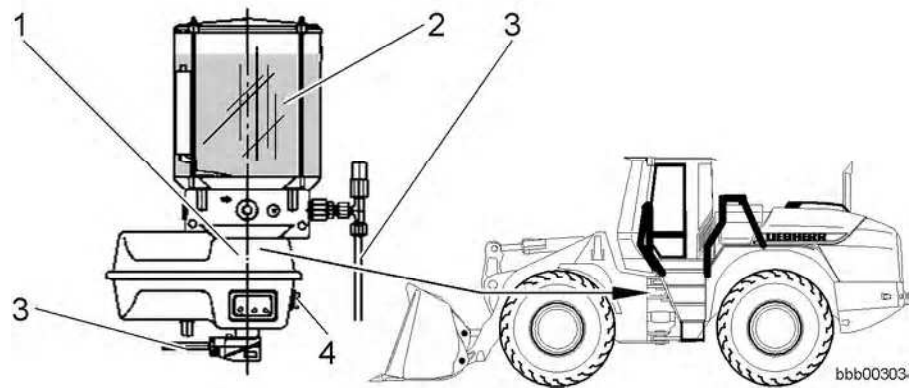
- Use commercially available windscreen antifreeze.
- Top up with an appropriate quantity of antifreeze before the winter starts.

3.2.24 LIEBHERR automatic lubrication system

This equipment is optional.

Layout

The central lubrication pump with its transparent reservoir and integrated electronic control unit is installed on the left-hand side of the machine. The operating switches and function lamps are in the right-hand control panel.



Automatic central lubrication system

- | | |
|----------------------------|--------------------------|
| 1 Central lubrication pump | 3 Lubricant supply lines |
| 2 Transparent container | 4 Button |

The automatic central lubrication system consists of:

- The central lubrication pump with a transparent container and an integrated control unit
- The operating elements and indicator lamps
- A main and several secondary progressive distributors
- The electric button and the lubricant supply lines

Function description

Basic function

The LIEBHERR automatic central lubrication system is a progressive system.

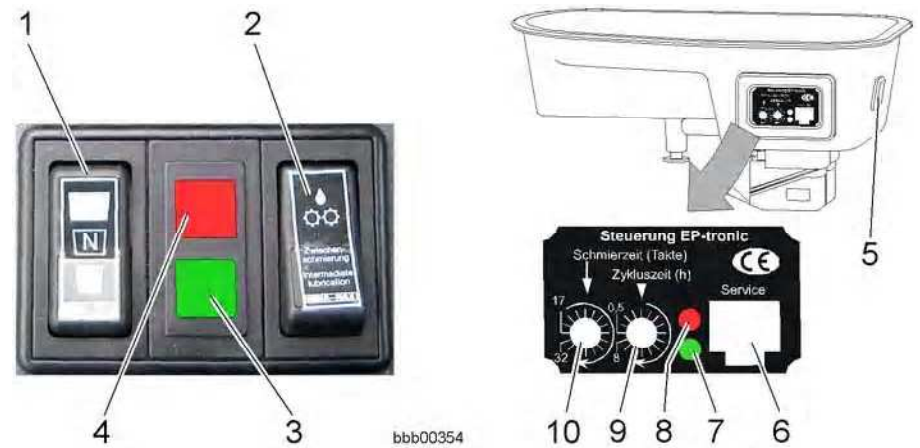
It lubricates progressively, i.e. all lubricating points in succession.

The central grease pump pumps the lubricant through all the supply lines and through one main and several secondary distributors to the lubrication points.

A pressure relief valve monitors the lubrication of all points.

Lubrication and cycle times

The integrated control unit electronically controls the central lubrication system.



Control unit

- 1 Lubrication intensity switch
75%, 100%, 125%
- 2 Non-scheduled lubrication button
- 3 Green signal lamp
- 4 Red signal lamp
- 5 Non-scheduled pump lubrication button
- 6 Data cable plug
- 7 Green fault indicator LED
- 8 Red function indicator LED
- 9 Cycle time adjustment switch
- 10 Cycle number adjustment switch

The green signal lamp **3** and the green LED **7** light up for 1.5 seconds after the ignition is switched on, indicating that the system is ready for operation.

The pump can also be switched on manually by pressing the button **2** or **5**.

The pump motor switches off after the set number of cycles **10** and the set cycle time **9** begins.

All further lubrication cycles follow automatically in a pattern determined by the set cycle time.

If the ignition is switched off or the parking brake applied during lubrication, the control device stops the lubrication, the remaining cycles are stored, and then continued again from that point after the ignition is turned on again or the parking brake released.

Description	Value	Unit
Default lubrication time	28	Cycles
Default cycle time	0,5	h
Adjustable lubrication time	min. 1 max. 48	Cycles Cycles
Adjustable cycle time	min. 0.5 max. 8.0	h h

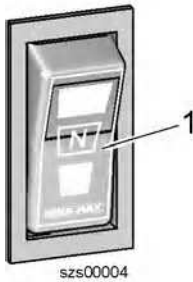
Lubrication and cycle time

Operating the central lubrication system

Using the button **2** or **5** on the engine housing, you can perform non-scheduled lubrication at any time.

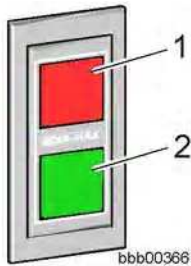
The default settings can be found in the section on lubrication and cycle times.

LBH101/003801/0003/5.05/en



Lubrication intensity

Using the button **1** you can adjust the lubrication to the conditions of use. Starting from 100%, the lubrication can be extended or shortened by 25%.



Ready indicator

- 1 Red signal lamp
- 2 Green signal lamp

Indication of readiness for operation:

The green signal lamp **2** lights up when the ignition is switched on. The green signal lamp lights up for 1.5 seconds.

Lubrication active

The green signal lamp **2** lights up for the entire lubrication time.

Test lubrication (non-scheduled lubrication)

If non-scheduled lubrication is started, the green and red signal lamps **2** and **1** light up alternately for one second at a time.

Cycle error

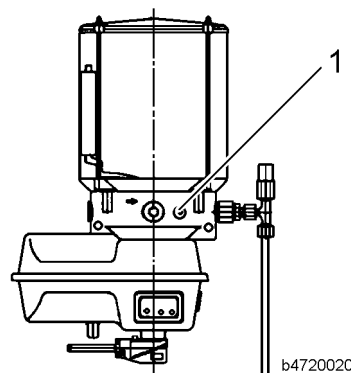
(Lubrication point, lubricant supply line or distributor blocked). If the specified cycles cannot be executed in the given time, the green and red signal lamps **2** and **1** light up in one-second cycles.

Grease level in reservoir too low

The red signal lamp **1** lights up if the grease supply in the reservoir falls too low.

The red signal lamp **1** stays on until the grease is topped up.

Filling the reservoir



The grease fitting **1** is used to fill the reservoir.

Grease specifications: See the lubricants and fuels listed in chapter 5.

LBH/01/003801/0003/5.05/en

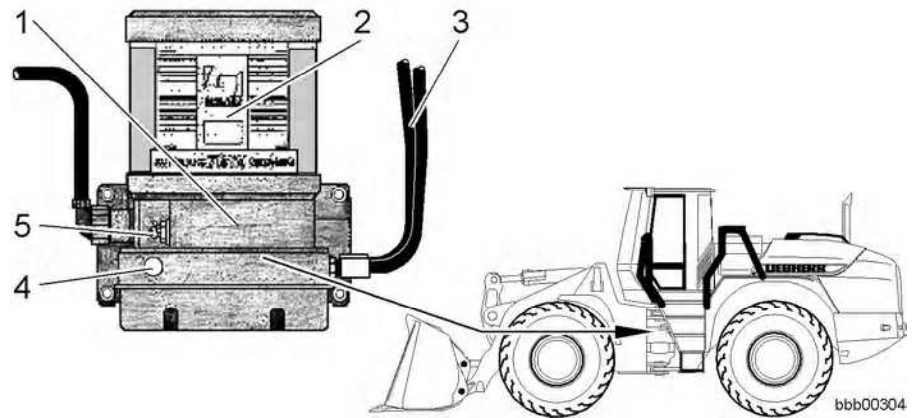
3.2.25 TWIN automatic lubricating system

This equipment is optional.

Layout

The central lubrication pump is fitted on the left side of the machine, in the articulation zone behind the cab access.

The control element is mounted on the right side of the driver's cab on the instrument panel.



Automatic central lubrication system

- | | |
|----------------------------|--|
| 1 Central lubrication pump | 4 Test switch |
| 2 Transparent container | 5 Filling coupling with protective cover |
| 3 Lubricant supply lines | |



Central lubrication pump

- | | |
|----------------------------|--|
| 1 Central lubrication pump | 3 Retaining solenoid for transparent container |
| 2 Transparent container | |

LBH/01/003801/0003/5.05/en

The automatic central lubrication system consists of:

- The central lubrication pump with a transparent container and an integrated control unit
- The control panel with switches, display and LED control lamps
- Distributor blocks with measuring valves
- The electric pressure switch and the lubricant supply lines

Function description

How the system works

The TWIN automatic central lubrication system is a progressive system. The system carries out all functions automatically. After the ignition has been switched on, the pump delivers the grease to the lubrication points in set intervals using the measuring valves. The set interval time between lubrication appears immediately in the display after the ignition has been switched on.



Central lubrication pump

- | | |
|----------------------------|--|
| 1 Central lubrication pump | 4 Filling coupling with protective cover |
| 2 Transparent container | |
| 3 Test switch | |

The electrically driven central lubrication pump 1 with an integrated controller delivers the grease (lubricant) to the distributor blocks and measuring valves.

The grease is delivered to the individual lubrication points using the measuring valves.

The built-in electronic control device controls the lubrication and dead time of the piston pump.

Description	Value	Unit
Dead time for heavy-duty use	10	min

LBH/01/003801/0003/5.05/en

Description	Value	Unit
Dead time for normal use	20	min
Dead time for light use	30	min

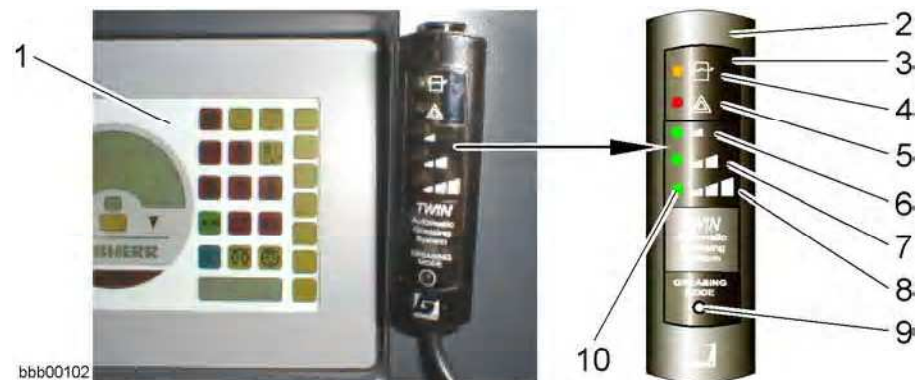
Dead time

An electric pressure switch monitors the system pressure in the main supply line.

Setting the lubrication mode

The lubricating mode is set using the mode switch 9. Make sure that the electrical system is switched on.

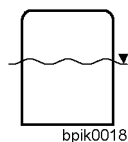
Setting the desired lubricating mode



Automatic lubrication system control panel

- | | |
|--|------------------------|
| 1 Instrument panel display unit (machine) | 5 Error code display |
| 2 Automatic lubrication system control panel | 6 Light use |
| 3 Display | 7 Normal use |
| 4 Filling level indicator | 8 Heavy use |
| | 9 Mode switch |
| | 10 LED control lamp(s) |

The symbols on the display 3 mean:



bplk0018

Filling level too low – the transparent reservoir must be topped up.
LED control lamp (orange)



bsym0043

Error – the system is out of action. The transparent reservoir is empty or there is some other malfunction.
LED control lamp (red)

After topping up the reservoir or after repairs, use the test switch on the pump to put the electronic control unit of the system back into operation.



bsym0044

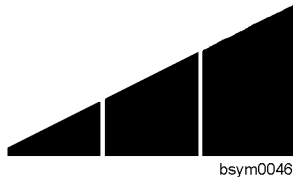
Lubrication for light use – long dead time.
LED control lamp (green)



bsym0045

Lubrication for normal use – normal dead time.
LED control lamp (green)

LBH/01/003801/0003/5.05/en



bsym0046

Lubrication for heavy use – short dead time.
LED control lamp (green)

- Setting the desired lubricating mode:
Press the mode switch **9** repeatedly.

The corresponding LED (control lamp) lights up to indicate the selected function.

Filling the transparent reservoir

If the indicator lights flash at the start of each lubricating cycle for two minutes (0.5 seconds on / 0.5 seconds off), the grease level in the reservoir has reached the minimum.

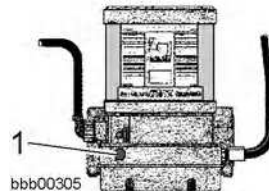
In this case, the reservoir must be refilled as quickly as possible.

- Remove the protective cap from the filling coupling.
- Thoroughly clean the filling coupling and the coupling on the filling hose.
- Secure the filling hose to the filling coupling.
- Fill the reservoir to the maximum level (see the markings on the reservoir).
- Release the filling hose and replace the protective covers.

Test lubrication (non-scheduled lubrication)

Make sure that the electrical system is switched on.

To test the system, you can carry out a single lubricating sequence manually.



bbb00305

- Press the test switch **1** on the pump for 3 to 5 seconds.

The system will now carry out a single lubrication cycle.

During this lubricating sequence, the indicator lamps flash (2 seconds on / 2 seconds off).

Non-stop lubrication

Make sure that the electrical system is switched on.

To deliver additional grease to all lubricating points (for example, after cleaning the machine) or to bleed air from the system, you can carry out lubricating sequences without intervals.

- Press the test switch on the pump for more than 6 seconds.

The system will now carry out lubricating sequences without intervals.

During this sequence, the indicator lamps flash (0.2 seconds on / 0.2 seconds off).

The non-stop sequence ends when the ignition is switched off.

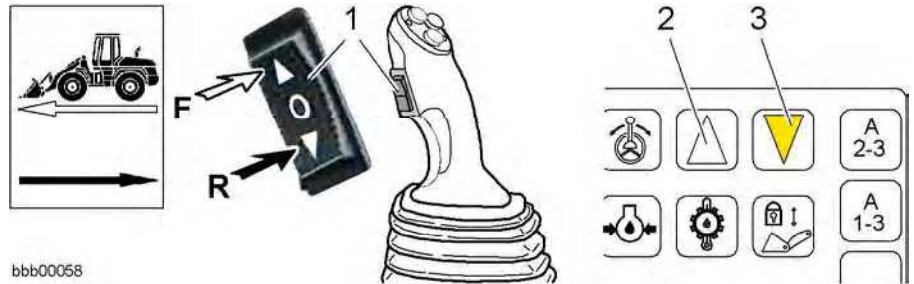
3.2.26 Audible reverse warning device

This equipment is optional.

This equipment comes as standard with the tunnel version of the machine. In the driver's cab there is an additional warning shield with information to be observed regarding the reverse warning device.

The audible reverse warning system warns anyone standing behind the machine while it is reversing.

Activating the reverse warning device



bbb00058

LH control lever and display unit

The reverse warning system is electrically actuated when the travel direction switch is in the reversing position.

An alarm sounds when you move the switch 1 to the R position for reversing.

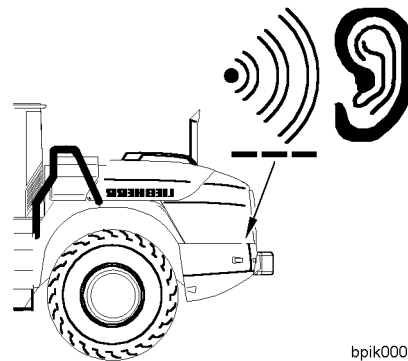


Danger

There is a risk of accidents when reversing the machine. Obstructed vision when reversing can cause accidents resulting in serious injury or death as well as damage to property.

! When reversing, make sure you have a clear view and observe the safety regulations.

- Press the switch 1 for R = REVERSE travel direction.



bpik0005

The reverse warning device, which is mounted at the back of the machine, on the left side in the engine compartment, emits an alarm tone of around 60 pulses per minute.

The alarm tone is roughly 5 decibels louder than the ambient noise.

3.2.27 Visible reverse warning device

This equipment is optional.

The machine can also be equipped with a visual reverse warning device, in addition to the audible one.

Two red warning lights are fitted on the rear of the machine.

The visual reverse warning system warns anyone standing behind the machine while it is reversing.

Activating the reverse warning device

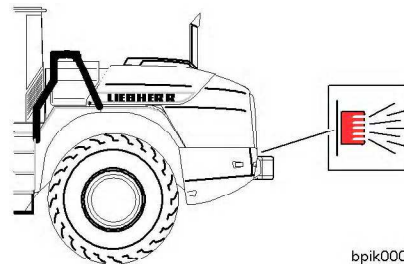
The warning lamps are electrically actuated when the travel direction switch is in the reversing position.



bbb00058

LH control lever and display unit

- Press the switch 1 for R = REVERSE travel direction.



bpik0004

The two warning lights flash.

3.2.28 Reversible fan drive

This equipment is optional.

The fan can be reversed to clean the cooler.

The interval for reversing the fan drive is adjustable because the need for cleaning depends on the conditions of use.

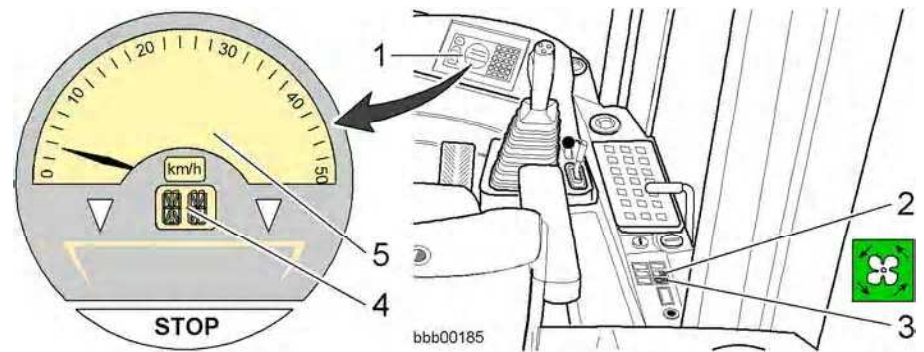
Setting the reversible fan mode

The interval for reversing the fan drive can be adjusted according to the conditions of use and need for cleaning.

The fan rotates in the opposite direction for a period of 20 seconds.

The set time is counted at engine speeds above 950 min⁻¹.

Make sure that the electrical system is switched on before reversing the fan direction.



- 1 Display unit
- 2 Control lamp
- 3 Button
- 4 Selected gear and tractive force control display
- 5 Travel speed display

The interval for reversing the fan can be set between 5 and 95 minutes.

- To adjust the interval:
Press the fan reversal button **3**.

The control lamp **2** lights up as long as the fan reversal function is activated.

The set interval is displayed in 5, 10 or 15 minute intervals on the display unit **1**. See the selected gear and tractive force control display **4**

The display remains for 3 to 5 seconds after you release the button.

The fan reversal function is deactivated when you switch off the electrical system.

When you switch the electrical system on again, the fan reversal function remains deactivated until you press the button **3**.

- Press the fan reversal button **3**.

The fan reversal function is activated with the interval you set previously.

3.3 Handling

3.3.1 Daily start-up

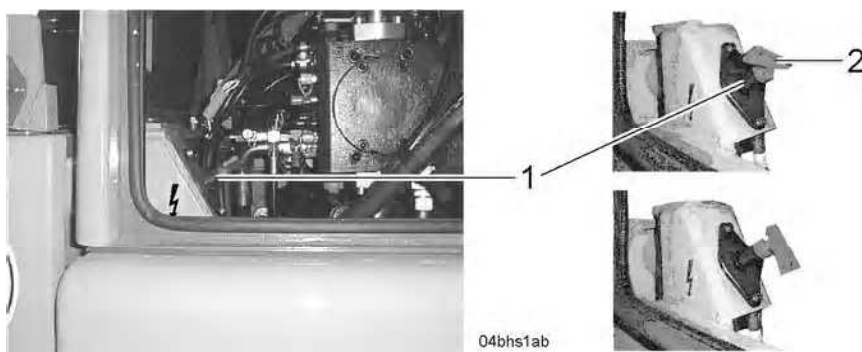
Make sure that:

- The maintenance tasks to be carried out daily or every 10 service hours have been performed. See the maintenance and inspection schedule in chapter 5.
- Enough diesel fuel is available for the daily workload. See the section on refuelling with diesel fuel.

Operating position

This is how to put the machine into the operating position.

Turning on the battery main switch



Battery main switch


1 Battery main switch

2 Main switch key

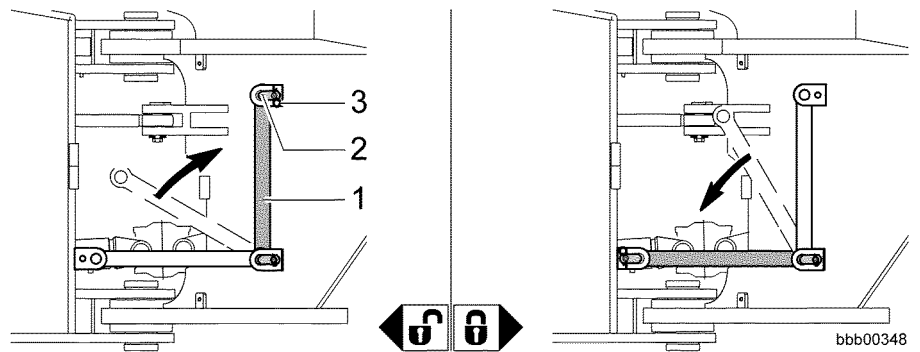
- Switch on the battery main switch.
- Close all service doors, hatches and hoods, and lock them if possible.

Closing the service doors, hatches and hoods

Releasing the articulation lock

Warning 

There is a risk of accidents if the steering is locked.
 When the articulation lock is engaged, no steering functions are possible.
 ! Release the articulation lock.



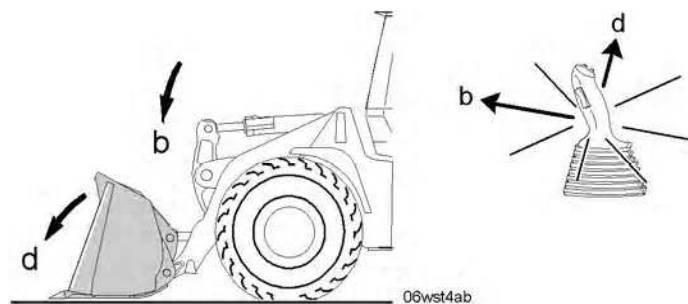
Articulation lock open / closed

1 Locking bar
 2 Pin

3 Spring clip

- Pin the locking bar **1** in the top position.
- Secure the pin **2** from falling out using the spring clip **3**.

Putting the machine in the starting position

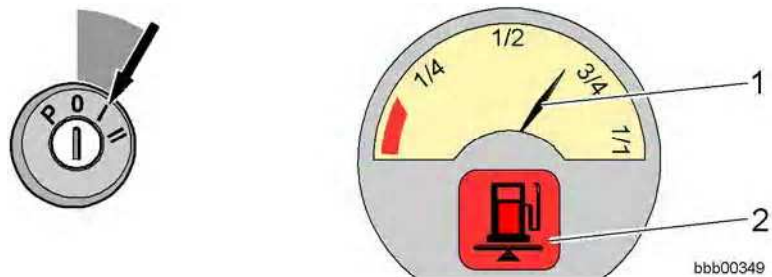


Starting position

- Set the bucket down flat on the ground.

Refuelling with diesel fuel

Make sure that the electrical system is switched on.



Display unit

1 Fuel supply display

2 Fuel supply symbol field

- Look at the fuel supply segment field **1** to see if there is sufficient diesel in the tank.

LBH10/1003801/0003/15.05/en

If there is too little fuel, the fuel supply symbol field 2 flashes.
See also the section on the display unit.
In this case, there are 35 litres left in the tank.



Safety while refuelling

Danger 

There is a risk of fires and explosions.
! Do not smoke. Make sure there are no naked lights when refuelling.
! Only refuel with the engine switched off.



Fuel tank

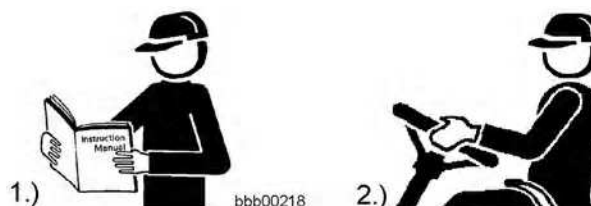
1 Tank cap

2 Cap

- It is essential to observe the safety regulations for refuelling. See also the safety regulations in chapter 2.
- Only use clean diesel fuel. See the section on diesel fuels in chapter 5.
- Carefully clean around the tank cap before taking it off.
- Refuel with diesel fuel as necessary.
- If possible, refuel at the end of the working day to prevent condensation from accumulating in the tank.

The machine is ready for operation.

3.3.2 Starting the diesel engine



Operating manual

- 1.) Make sure you have read and understood the operator's manual
- 2.) Then you are ready to use the machine

Only ever operate the machine once you have read and understood the operating manual.

Information about the machine's travel drive system:

- The machine is equipped with a hydrostatic travel drive.
- You cannot start the engine by bump-starting it or towing it.

Starting precautions

The following precautions must be taken before starting the machine. First make sure that the machine is in its operating position. See the section on the operating position.

Starting procedure

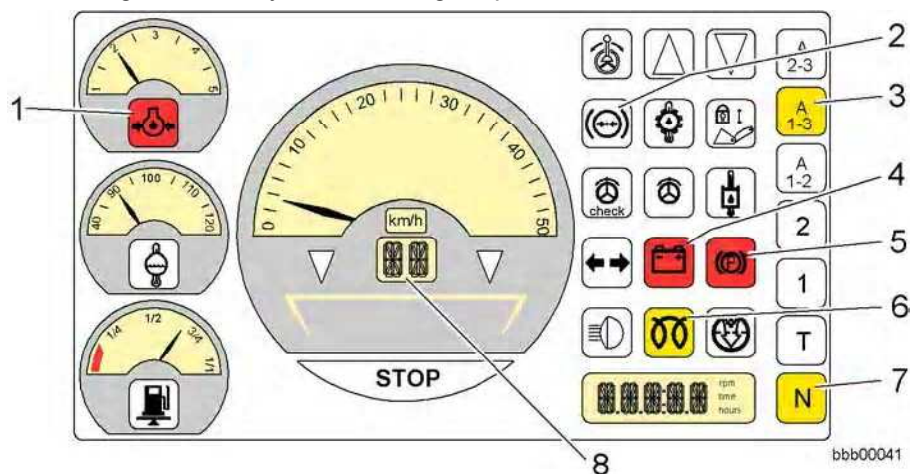
Lamp check



During the lamp check, the control electronics test all the segment and symbol fields.

- Switch on the electrical system by turning the ignition key to position I.

All the segment and symbol fields light up for 3 seconds as a check.



Display unit

- | | |
|--|--|
| 1 Engine oil pressure symbol field | 4 Battery charge (charge control) symbol field |
| 2 Brake system accumulator pressure symbol field | 5 Parking brake symbol field |
| 3 Automatic travel range 1-3 symbol field | 6 Preglow monitor symbol field * |
| | 7 Neutral position N symbol field |
| | 8 Selected gear and tractive force control display |

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After the check is completed, the following symbol fields must still flash or light up with the key in position I:

1 Engine oil pressure (red) flashes

2 Brake system accumulator (red):

Lights up when the brake accumulator pressure is too low.

3 Automatic travel range 1–3 (yellow) lights up

4 Battery charge (red) lights up

5 Parking brake (red) lights up

7 Neutral N (yellow) lights up

8 Selected gear and tractive force control

G1 indicates that gear 1 is selected.

* The symbol field 6 for the preglow monitor only lights up at temperatures below +5 °C.

Preglowing the engine

The preglow time depends on the outside temperature and the electrical starting conditions.

Preglowing does not take place at temperatures above +5 °C.

The preglow time can be as long as 120 seconds if the temperature is extremely cold.



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Starting the engine

- At temperatures below +5 °C:

Wait until the symbol field 6 for the preglow monitor goes out.

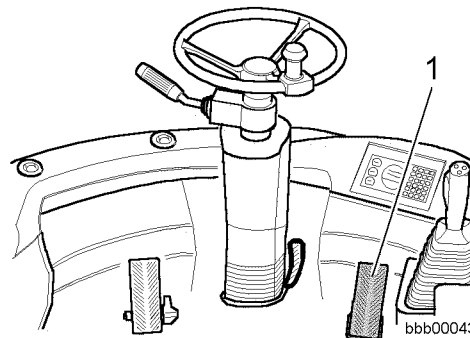
The preglow time is over when the symbol field goes out.



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The preglow relay controls the preglow time (below +5 °C) until the engine is ready, which can take anything from 30 seconds to 2 minutes, depending on the temperature.

The engine is ready to start.

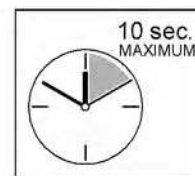


Gas pedal

- Press the gas pedal 1 to adjust the engine speed.



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Ignition switch starting position

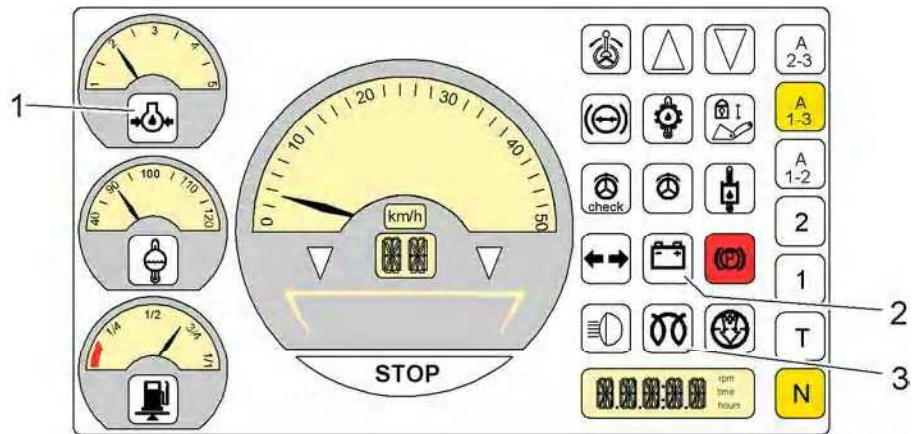
- Turn the ignition key to the starting position II and keep it in there until the engine starts.
- **Do not hold the key in the starting position for more than 10 seconds at a time.**
- If the engine does not start:
Turn the ignition key back to the 0 position.

Troubleshooting

The engine will not start.

- Wait two minutes and try to start the engine again.
- If the motor does not start after two attempts, find the cause and rectify it.
See the service code tables in chapter 4.

- Let go of the ignition key as soon as the engine starts running.
The ignition key automatically returns to the operating position.



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Display unit

- 1 Engine oil pressure symbol field
- 2 Battery charge (charge control) symbol field
- 3 Preglow monitor symbol field

When the engine starts, the following symbol fields must go out:

- 1 Engine oil pressure (red)
- 2 Battery charge (red)
- 3 Preglow monitor (yellow)

Note: when the engine is being preheated, the symbol field 3 goes out when the preglow time has elapsed, i.e. when the engine is ready.

The preglow time can be as long as 120 seconds if the temperature is extremely cold.

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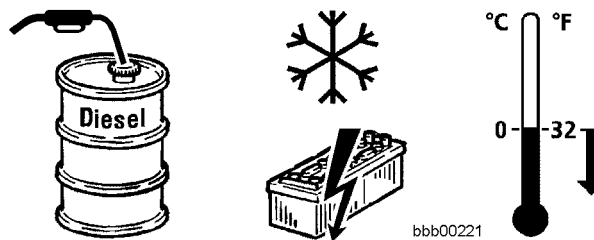
Troubleshooting

The symbol fields **1, 2 and 3** do not go out.

- Switch off the engine and rectify the problem as described in the section on malfunctions.

- Once the engine has started, decrease the speed immediately to a medium speed.
- Briefly let the engine warm up by actuating the working attachments at medium load.
- Then gradually increase to full load.

Starting precautions at cold temperatures



Winter operation

The following precautions help you start the engine at cold temperatures.

Precautions:

- Check the battery charge
If necessary, recharge the battery.
- Use winter-grade fuel
See the section on diesel fuels in chapter 5.
- Use an auxiliary engine preheating system heating (cooling water):
If required, the machine can be equipped with an auxiliary engine prewarming system (cooling water).
The auxiliary engine prewarming system is optionally available from your LIEBHERR dealer.

Warning



There is a risk of explosion with the diesel engine.
There is a risk of explosions when using volatile fluids for starting diesel engines with preglow systems.
! Do not use starting agents containing ethers.

- Carry out the precautions listed for starting at temperatures below freezing.

3.3.3 Driving

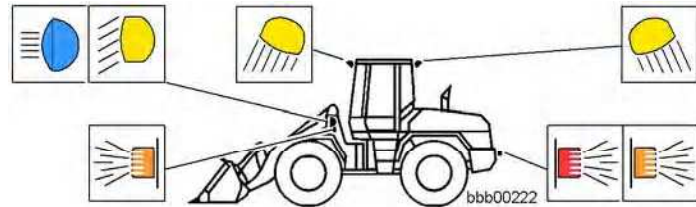


- This is the situation after the electrical system is switched on:
- After the electrical system has been turned on, automatic travel range **A1-3** is automatically selected.
The segment display in the display unit indicates gear level **1**.
 - The parking brake is automatically activated.
 - When the parking brake is engaged, the travel lockout is active.
 - The travel direction cannot be preselected.

Preparing for driving

Carry out the preparations for driving in the following order. First make sure that the machine is in its operating position. See the section on the operating position.

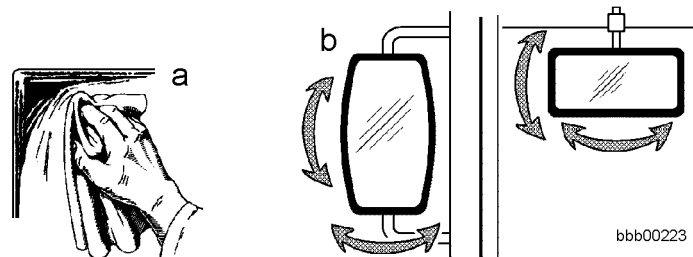
Checking the lights



Headlamp adjustment

- Check the lights.
- Adjust the headlights if necessary.

Checking the interior and exterior mirrors



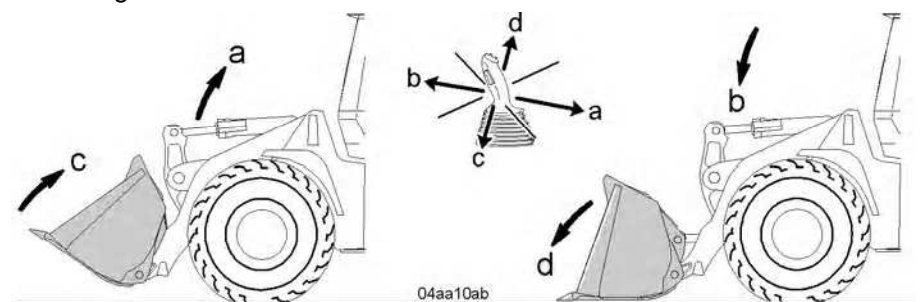
Interior and exterior mirrors

- Clean the interior and exterior mirrors.
- Adjust the interior and exterior mirrors.
- Turn the ignition key to the starting position II and keep it in there until the engine starts.
See also the starting procedure in the section on starting the diesel engine.

Starting the machine

Putting the working attachment into position

For detailed information, see the sections on the LIEBHERR control lever and using the lift arms.



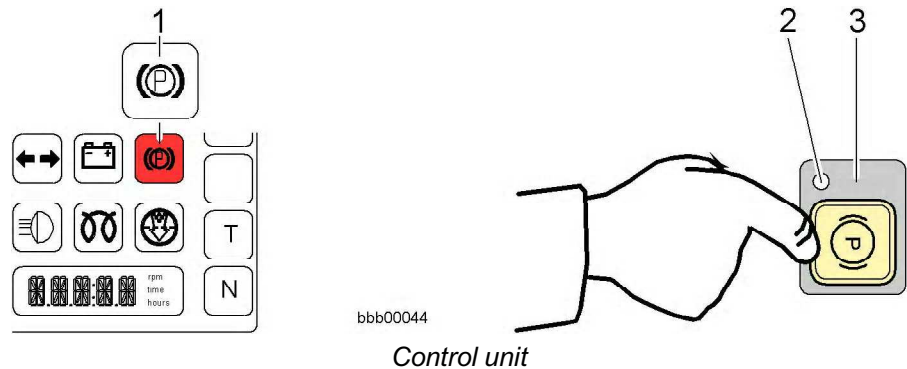
Bucket position

- Raise or lower the lift arm to the starting position.
- Move the bucket into position.

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Releasing the parking brake

When the parking brake is engaged, the travel lockout is active. The travel direction cannot be preselected.



1 Parking brake symbol field
2 LED
3 Parking brake button

- Press the button **3** to release the parking brake. The LED **2** on the button **3** goes out. The symbol field **1** for the parking brake goes out.

Selecting the travel direction

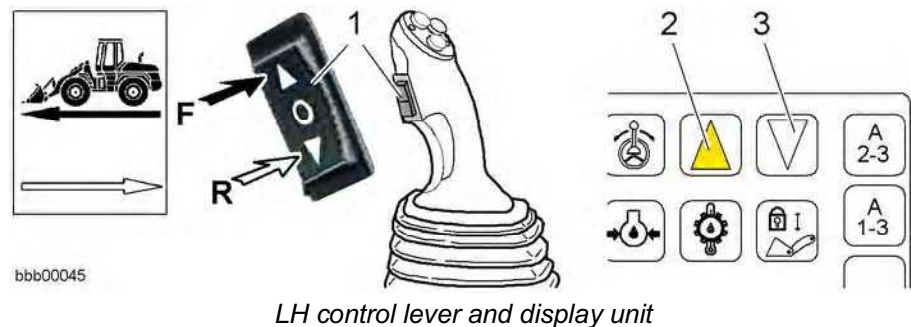
This might be the situation after the electrical system is switched on.

The forward or reverse travel direction symbol field flashes:

- When the ignition key is in position **I** or **II**. If the travel direction switch is set to forward or reverse.
- When the ignition key is in position **II**. When the parking brake button has been pressed.

- If this is the situation: Move the travel direction switch to the middle, neutral position.

You can now preselect forward or reverse travel again by pushing the travel direction switch.



1 Travel direction switch
2 Forward travel direction symbol field
3 Reverse travel direction symbol field

- Press the switch **1** for **F = FORWARD** travel direction.

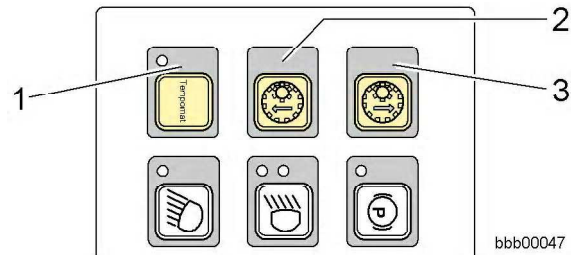
or

- Press the switch **1** for **R = REVERSE** travel direction. Depending on the switch position, the symbol field for forward travel **2** or for reverse travel **3** lights up.

Selecting travel ranges

When the electrical system is switched on, the automatic travel range **A1-3** is selected and the travel drive is set to neutral **N**.

These are both indicated by symbol fields on the display unit.



You can select the travel ranges using the buttons 1, 2 and 3 on the control unit.

The gear level associated with the travel range is shown in the segment display on the display unit.

You can shift to another travel range at any speed.

If you shift down at too high a speed, the machine is first hydrostatically braked. The travel range is then automatically shifted down.



You can select the following travel ranges:

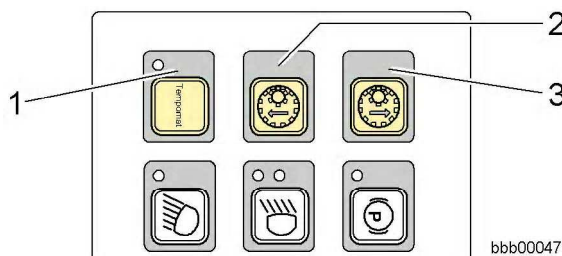
- Fixed gear **1** for slow driving (on steep slopes).
This shifts the gears to gear level **1**.
The segment display shows gear level **1**.
- Fixed gear **2** for normal working operation.
This shifts the gears to gear level **2**.
The segment display shows gear level **2**.
- Automatic travel range **A1-2** for normal working operation.
This shifts the gears to gear level **1** or **2**.
If the gears are shifted when the machine is stationary, the segment display shows gear **1**.
If the gears are shifted when the machine is moving, the segment display shows the gear level depending on the travel speed.
- Automatic travel range **A1-3** for driving on public roads or for transport.
This shifts the gears to gear level **1**, **2** or **3**.
If the gears are shifted when the machine is stationary, the segment display shows gear **1**.
If the gears are shifted when the machine is moving, the segment display shows the gear level depending on the travel speed.
- Automatic travel range **A2-3** for driving on public roads or for transport.
This shifts the gears to gear level **2** or **3**.
If the gears are shifted when the machine is stationary, the segment display shows gear **2**.
If the gears are shifted when the machine is moving, the segment display shows the gear level depending on the travel speed.
- Tempomat **T** when slow travel is required.
The machine keeps to the travel speed at the time the function is activated.
The segment display shows gear **1** or **2** depending on the selected fixed gear.
- Neutral position **N** for shifting the travel direction to neutral.
The travel drive is switched to neutral.
The segment display shows gear level **1**.

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Shifting gear in automatic travel ranges:

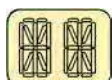
- Gear levels **1**, **2** and **3** are automatically shifted according to the the gas pedal position, the travel speed and the rate of acceleration or deceleration.

Travel speeds: see the technical data section.



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- Depending on the type of use, press the button **1**, **2** or **3** to select the travel range.



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Segment display

The gear level associated with the travel range is shown on the display unit.

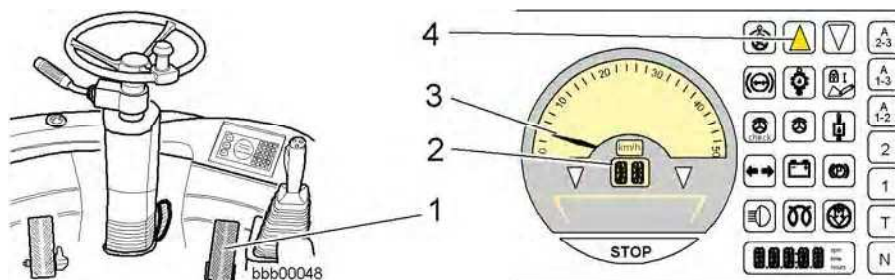
Setting off

After the electrical system has been turned on, automatic travel range **A1-3** is automatically selected.

The segment display in the display unit indicates gear level **1**.

Make sure that you have carried out all the preparations for driving.

See also the section on preparing for driving.



Gas pedal and travel speed display

- 1 Gas pedal
- 2 Gear level LCD
- 3 Travel speed display
- 4 Travel direction symbol field

- Push down the gas pedal **1**.

The machine starts moving.

- Control the travel speed using the gas pedal.

The gear selected when setting off is displayed in the LCD field **2**.

The driving speed is shown in the travel speed display **3**.

Driving

You will find descriptions of work operations, driving, transport and transferring bulk material in the section on general working methods.

Just after you set off, check that the steering and brakes are working properly.

See the section on maintenance tasks in chapter 5.

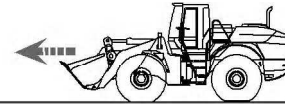
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Overspeed protection The diesel engine and variable displacement motors can overspeed when driving down a steep slope.

The machine has an overspeed protection system to prevent injury and damage.

However, the overspeed protection system does not provide protection against deliberately reckless driving down steep slopes.

Driving on even terrain



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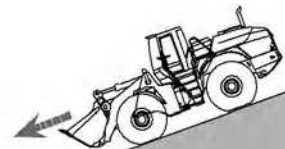
When a certain speed is reached in each travel range (forward and reverse), the pump flow of the working hydraulics pump is reduced.

This speed is slightly above the stated maximum speed in each travel range.

This prevents the machine from exceeding the maximum permitted speed on even terrain.

The overspeed protection system is not activated.

Driving on a steep downhill slope



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When a certain speed is reached in each travel range (forward and reverse), the pump flow of the working hydraulics pump is reduced.

The machine is braked hydrostatically.

If the steep slope causes the machine to greatly exceed the stated maximum speed in each travel range (forwards and reverse), the overspeed protection system is activated.

Overspeed protection functions:

With service code **E 91**

Protects against excessive output speed

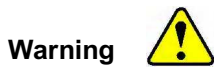
Protects the diesel engine from overspeed

Activates the rear axle brake

Protects from rolling downhill

Overspeed causes the following actions:

- The automatic rear axle brake is activated.
- The warning buzzer sounds for one second.
- The service code **E 91** appears in the display.
- Additionally after 3 seconds of overspeed protection being active, the service code **E 96** appears in the display.
- The service codes are stored in the data memory of the electronics.



Danger can be caused by deliberately reckless driving down steep slopes. When driving down a steep slope without due care, the diesel engine and the variable displacement motors can overspeed.
! Do not drive recklessly down steep slopes.

Deliberately reckless driving down slopes means:

- The driver drives downhill too fast
- The automatic rear axle brake (overspeed) is active for more than 3 seconds due to excess engine speed or travel speed.
- The service codes **E 91** and **E 96** are shown alternately on the display.
- The service codes are stored in the data memory of the electronics.

NOTE

If the service code **E 96** is found several times in the data memory, the manufacturer's warranty for any parts damaged or destroyed as a result of overspeed is invalidated.

• **If driving on a long, steep downhill slope:**

First activate kick-down mode (see the section on driving with kick-down shifting).

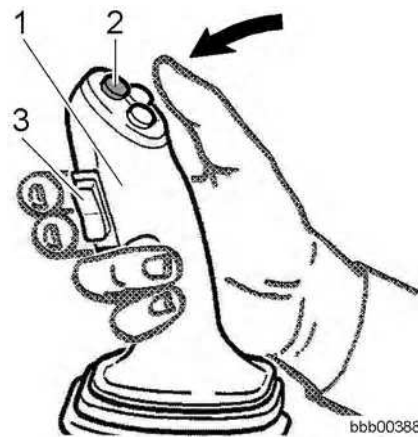
The machine is automatically hydrostatically braked and the microcontroller switches to first gear (travel range I).

The machine remains in first gear until you press the gas pedal.

- If the speed continues to increase due to the steepness of the downhill slope:
Operate the brake pedal.

Driving with kick-down shifting

The kick-down function allows temporary manual shifting to first gear.

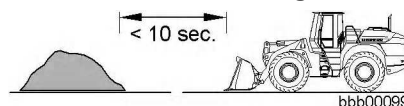


LH control lever

- 1 LH control lever
- 2 Kick-down button

- 3 Travel direction switch

Kick-down shifting is used in the following situations:



a) When approaching the pile

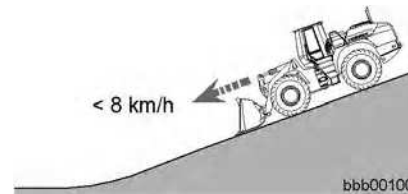
This allows you to work on the pile in first gear.

The kick-down function hydrostatically brakes the machine, and it switches down to first gear.

While pushing into the pile, first gear remains selected as long as the resistance is high.

Kick-down mode is deactivated when you change travel direction.

- If you want to use kick-down shifting:
Press the kick-down button **2** on the LH control lever **1**.

**b) Driving onto a steep downhill slope**

Before driving onto a steep slope, you can also use the kick-down function to shift to travel range I (first gear).

The machine remains in first gear until you press the gas pedal.

In kick-down mode, the maximum travel speed is 8 km/h.

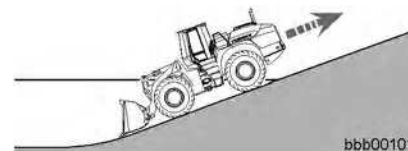
- If driving on a long, steep downhill slope:
First activate kick-down mode.

The machine is automatically hydrostatically braked and the microcontroller switches to first gear.

At high travel speeds, the machine automatically shifts from third to second gear, and then to first gear.

The machine remains in first gear until you press the gas pedal.

When you press the gas pedal, the microcontroller automatically switches to second and third gear.

**c) Driving backwards up a steep slope**

When you select the travel direction, the machine drives off in second gear.

If steep terrain prevents this, the microcontroller automatically switches to first gear after 0.8 seconds.

- If you cannot wait 0.8 seconds:
You can switch to first gear immediately using the kick-down function.
- If you want to use kick-down shifting:
Set the travel direction switch **3** to reverse and at the same time press the kick-down button **2** on the LH control lever **1**.

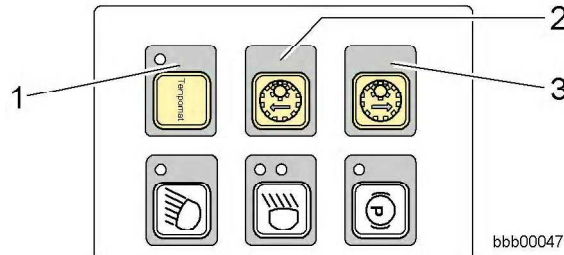
Driving with the Tempomat function

When slow driving is necessary, the Tempomat function can be activated.

This function is only available when travelling forward in fixed gears 1 and 2.

Activation:

- When the machine is moving:
The machine keeps to the travel speed at the time the function is activated.
The speed thus set is the maximum speed.
- When the machine is stationary:
The machine travels at the minimum speed of the selected gear.
Gear level 1: 4 km/h
Gear level 2: 10 km/h



- **To drive off at the desired speed:**
Select fixed gear 1 or 2 by pressing button 2 or 3.
The selected gear and the travel speed are shown in the display unit.
- Press the Tempomat button 1 and put your foot right down on the gas pedal to reach the required speed.

The function is deactivated in the following conditions:

- If you press the reverse travel direction switch.
The control electronics switch to automatic travel range **A1-3**.

- **Switching off the Tempomat:**
Press the button 1 again.

or

- Select a different travel range.

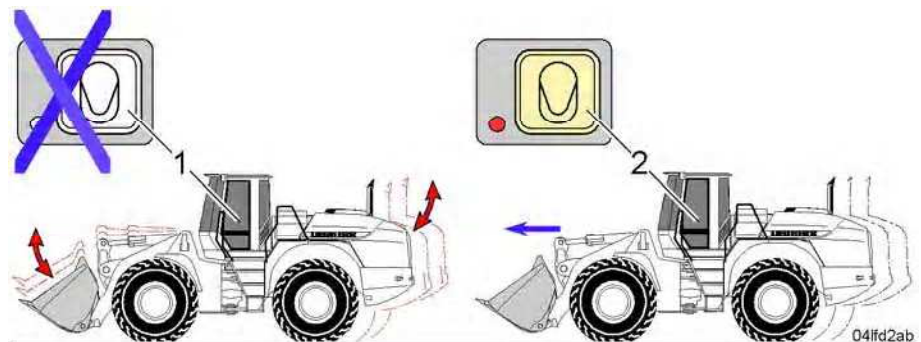
Driving without LFD

The LFD system is the Liebherr ride control system. If you travel long distances without LFD you may experience vibrations while driving.

Therefore, the LFD system should be activated for all applications which require significant distances to be covered.

- Improve driving comfort by activating the LFD system.

Driving with LFD



Driving with or without LFD

1 Driving without LFD

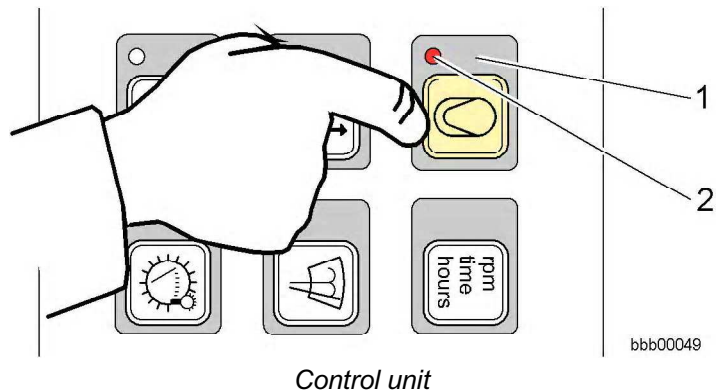
2 Driving with LFD

The LFD system improves driver comfort in nearly all situations by reducing vibrations.

Therefore, the LFD system should be activated for all applications which require significant distances to be covered.

Activating the LFD system

If you have activated the LFD system, it is automatically switched on when the machine reaches a certain speed.



1 Ride control button 2 LED

Press the button 1 for ride control (LFD system) to prepare the function.

- Press the button 1 for ride control (LFD system).

The LED 2 on the button indicates that the function is active.

The LFD system is now activated.

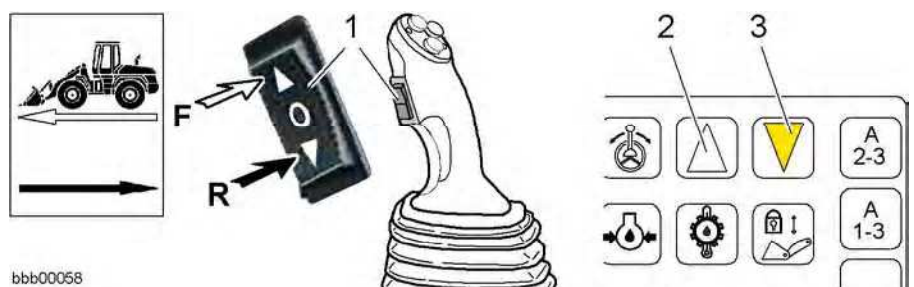
The LFD system automatically switches on when the machine speed is more than 10 km/h.

Reversing

The machine can be reversed in either travel direction and at any travel speed.

Shifting process when reversing

- When reversing in travel ranges **A1-2** (automatic), **A1-3** (automatic) or **A2-3** (automatic) the machine does not shift back automatically to gear level 1.
- The system only shifts to gear level 1 when it is not possible to drive off in gear level 2.

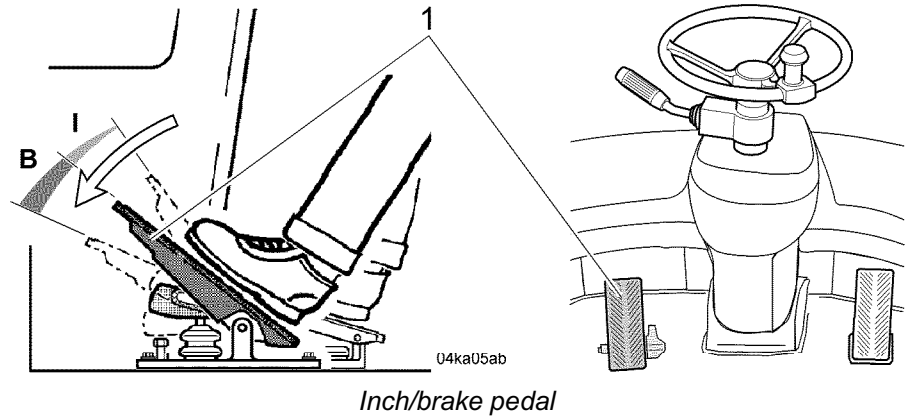


Travel direction switch and display unit

1 Travel direction switch 3 Reverse travel direction symbol field
 2 Forward travel direction symbol field

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- To change the travel direction, press the switch 1. Depending on the switch position, the symbol field for forward travel 2 or for reverse travel 3 lights up.



Inch/brake pedal

- **If a gentle reverse action is required:**
Support the reversing procedure by easing off the gas pedal or by gently pressing the inch/brake pedal.

This results in smooth reversing action.

Tractive force adjustment

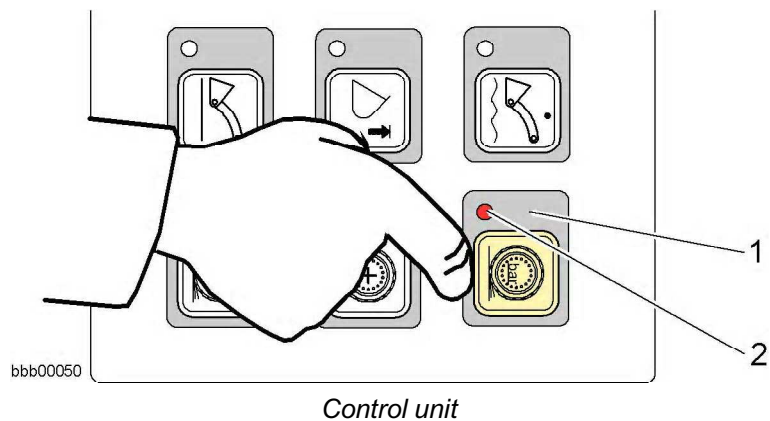


You can adjust the maximum tractive force of the machine for special working conditions such as on loose sand. This prevents the wheels from spinning on sandy ground.

See also the section on the control unit.

The tractive force is adjusted:

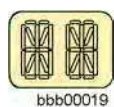
- When the button for tractive force adjustment has been pressed.
- Only in the forward travel direction.
- When the travel speed of the machine is under 4 km/h.
- Only in gear 1.



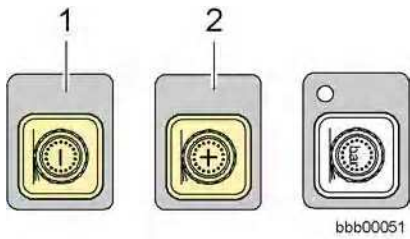
Control unit

- 1 Tractive force adjustment button
- 2 LED

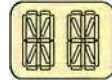
- Press the button 1 for tractive force adjustment. The LED 2 on the button indicates that the function is active. The tractive force adjustment function is now activated. The value set previously for the tractive force is shown for one and a half seconds on the display unit.



Segment display



Tractive force adjustment button



Segment display



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- Adjust the tractive force by selecting the required level using the button.

- 1 Lower tractive force
- 2 Higher tractive force

The new value for the tractive force is shown on the display unit.

- **When you no longer need tractive force adjustment: Switch off the tractive force adjustment function again.**

Otherwise you cannot reach the maximum tractive force.

Driving on public roads

Before driving on public roads, find out about the route (roads, bridges, tunnels, underpasses, bottlenecks etc.) as regards the weight limit, bridge load, width and height restrictions.

Wheel loaders which are limited by design to a maximum speed of 20 km/h and have no official registration number must be labelled on both sides with the operating company's address and require an operational liability insurance certificate.

The wheel loader may only be driven on public roads when unloaded.

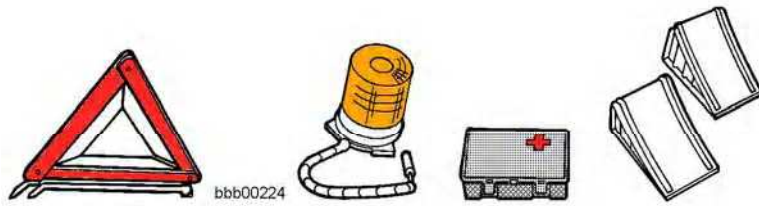
Before driving on public roads, find out the following:

- Ask the vehicle owner whether the necessary conditions for permission to drive on public roads have been met.
 - “Operating permit”
 - “Special license”
- The appropriate safety regulations.
- See the following sections in chapter 2:
 - “Safety instructions for driving on slopes”
 - “Instructions for safe working”

Make sure that you have carried out all the preparations for driving.

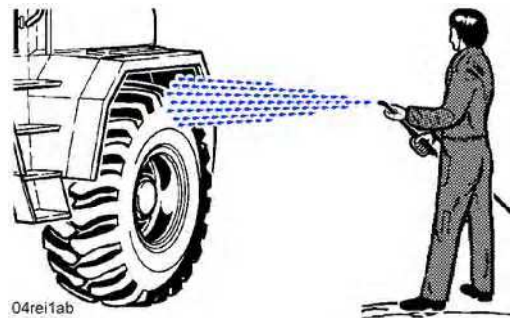
Preparing for driving on roads

Make sure that the safety devices listed below are all stowed on board, in accordance with the provisions of the **Roadworthiness Certification**.



- Warning triangle
- Flashing beacon
- First aid kit
- Wheel wedges

Also make sure that you have carried out all the tasks listed below.

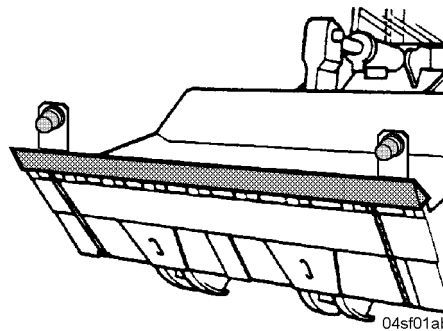


Washing

- Remove coarse dirt from the machine and clean the tyre treads.

See the section on cleaning the machine in chapter 5.

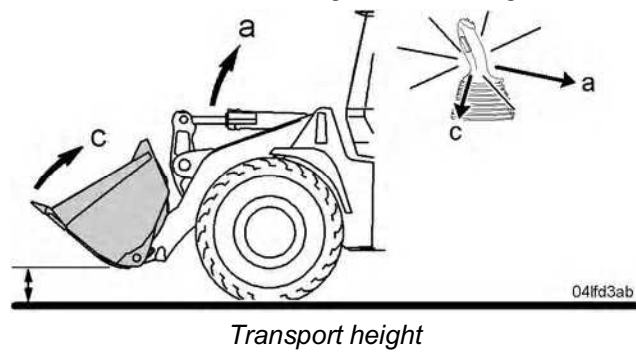
- Close all service doors, hatches, covers and hoods and where possible lock them.



Bucket tooth guard and side lamps

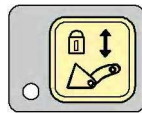
- Attach the tooth guard to the bucket.
- Attach the side lamps.
- Plug in the cables for the side lights.

Driving You will find descriptions of work operations, driving, transport and transferring bulk material in the section on general working methods.



Make sure that:

- The bucket is in the transport position when driving.
The transport position means that the bucket pivot point is about 40 cm above the ground.
- The bucket is tipped up as far as it will go.



Make sure that the working hydraulics are locked so that the working attachment cannot be moved inadvertently.

See also the section on locking the working hydraulics.

- Always drive with due care.
- Observe the highway code.

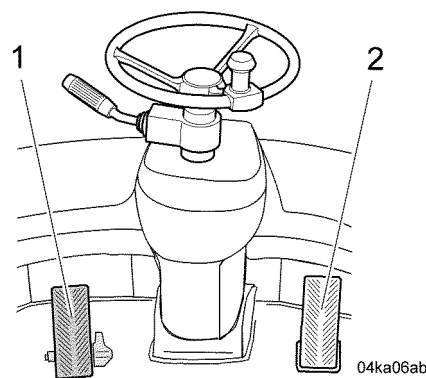
Braking

There are two ways to brake the machine:

- With the hydrostatic circuit only.
- With the hydrostatic circuit and the disc brake.

Hydrostatic braking

You can brake the machine hydrostatically by reducing the engine speed. The hydrostatic travel drive system of the machine also acts as a service brake in the deceleration phase.



Inch/brake pedal and gas pedal

1 Inch/brake pedal

2 Gas pedal

- Reduce the speed of the diesel engine with the gas pedal 2.

Service brake

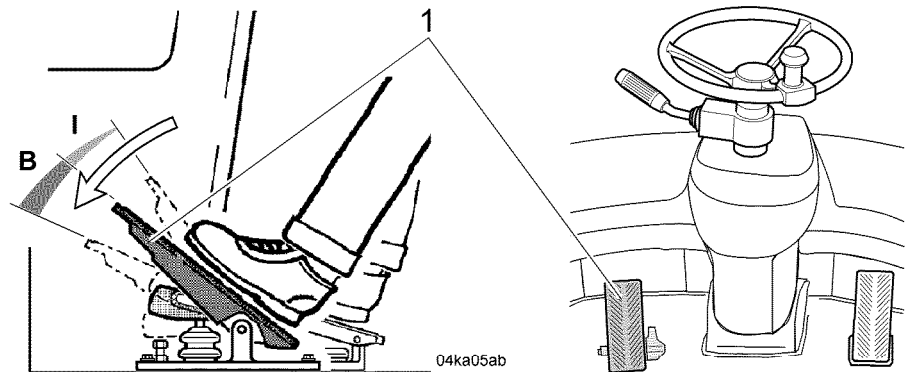
If hydrostatic braking is not sufficient, you must brake the machine using the inch/brake pedal 1.

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Braking with the inch/brake pedal

During braking, there are two actuation ranges for the inch/brake pedal:

- Range **I** for hydrostatic braking only.
- Range **B** for braking with the hydrostatic circuit and with the wet disc brakes in the wheel hubs.



Inch/brake pedal

1 Inch/brake pedal
I Inching range

B Braking range

Warning



There is a risk of accidents when braking without due care. If you brake the machine without due care, you may suffer severe injuries if your seat belt is not properly fastened.

! It is essential that you fasten your seat belt before starting up the machine.

- Braking with the hydrostatic circuit only: Press the inch/brake pedal **1** in range **I**.

or

- Braking with the hydrostatic circuit and the disc brake: Press the inch/brake pedal **1** in range **B**. The machine is braked accordingly.
-

Troubleshooting

Little or no braking effect.

- Shut down the machine immediately.
 - Contact LIEBHERR CUSTOMER SERVICE.
-

Braking in emergencies

Danger



Inappropriate braking in emergencies can cause accidents.

! For full braking in emergencies, push the inch/brake pedal all the way down.

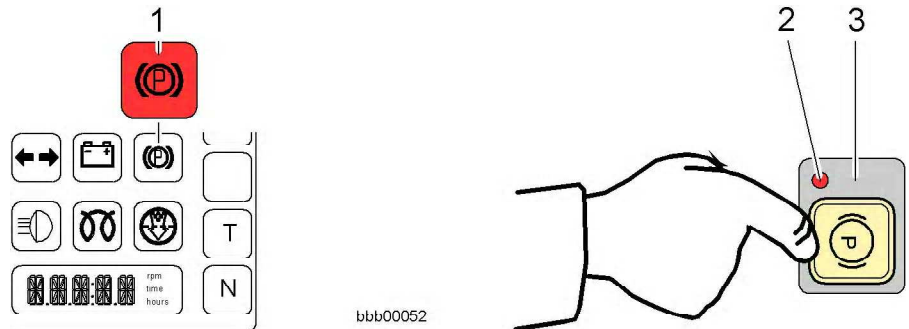
- Press the inch/brake pedal **1** in range **B** as far as it will go. This brakes the machine suddenly.

After the machine stops If you leave the machine with the engine running, take the following precautions.

Engaging the parking brake.

When you engage the parking brake the travel direction is automatically switched to neutral.

Do not engage the parking brake until the machine has come to a full standstill.



Control unit

- 1 Parking brake symbol field
- 2 LED
- 3 Parking brake button

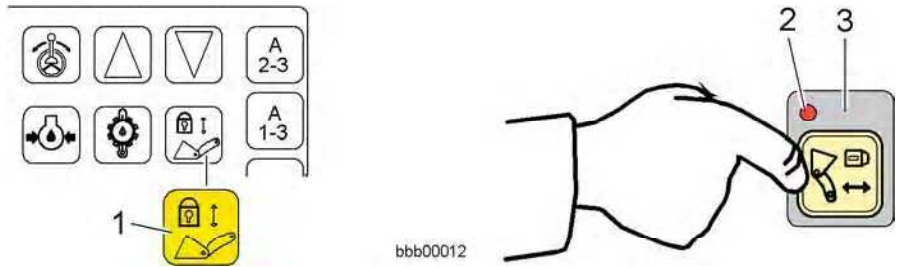
- Activate the parking brake with the button 3.

The LED 2 on the button indicates that the function is active.

The symbol field 1 for the parking brake lights up.

The parking brake is engaged and the travel direction is switched to neutral.

Locking the working hydraulics



Control unit

- 1 Working hydraulics lockout symbol field
- 2 LED
- 3 Working hydraulics lockout button

- Press the button 3 for the working hydraulics lockout to prevent inadvertent activation of the working attachment.

The LED 2 on the button indicates that the function is active.

The symbol field 1 for the working hydraulics lockout lights up.

The working hydraulics are no longer operational.

Securing the machine

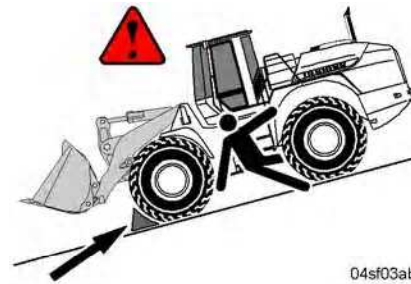
The following precautions should be taken when the machine is to be parked for a prolonged period on a slope.

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There is a risk of accidents if the machine rolls away.
! Secure the machine against rolling away.

- Take the wedges out of their holders.



Downhill slope

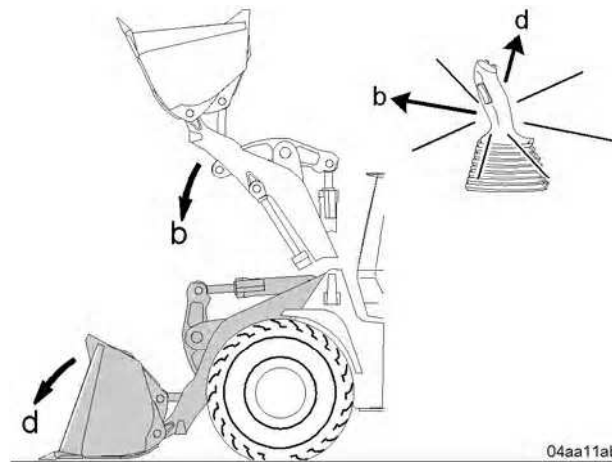
- Use the wedges to secure the machine against rolling away.

3.3.4 Shutting down the machine

Take the following precautions before you switch off the engine and leave the machine.

Lowering the working attachment

Make sure that the bucket is empty.



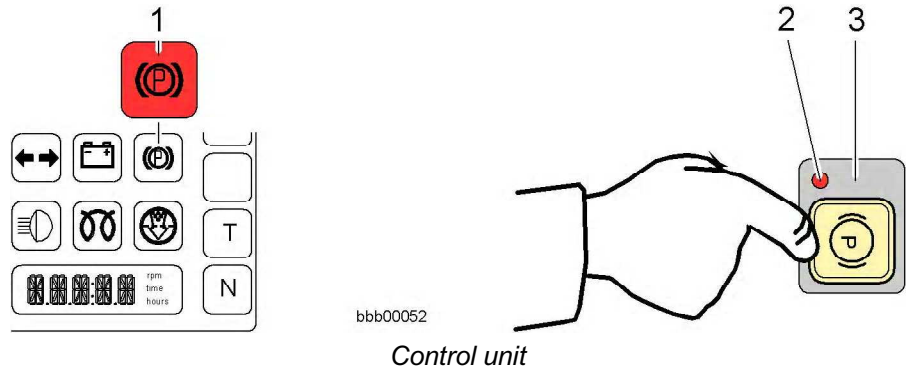
Bucket arm movement

- Lower the lift arms by moving the control lever in direction **b**.
- Set down the bucket flat on the ground by moving the control lever in direction **d**.

Engaging the parking brake

The parking brake is automatically engaged when you switch off the ignition.

This is how to engage the parking brake before switching off the ignition:



1 Parking brake symbol field
2 LED

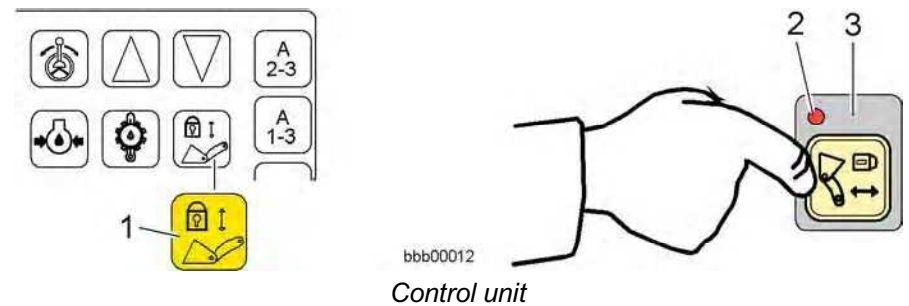
3 Parking brake button

- **If necessary**, engage the parking brake by pressing the button 3. The LED 2 on the button indicates that the function is active. The symbol field 1 for the parking brake lights up.

Locking the working hydraulics

The working hydraulics lockout is activated automatically when you switch off the ignition.

This is how to activate the working hydraulics lockout before switching off the ignition.



1 Working hydraulics lockout symbol field
2 LED

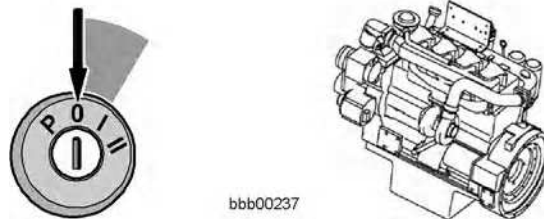
3 Working hydraulics lockout button

- **If necessary**, press the button 3 for the working hydraulics lockout to prevent inadvertent activation of the working attachment. The LED 2 on the button indicates that the function is active. The symbol field 1 for the working hydraulics lockout lights up. The working hydraulics are no longer operational.

Switching off the engine

Do not switch off the engine suddenly when it is running at full speed. This is especially important with turbo engines.

If you suddenly switch off the motor, the turbocharger continues running for a while with no oil supply.



Switching off the engine

- Reduce the engine speed to idle running speed by taking your foot off the gas pedal.
- Let the engine continue idling briefly - for 10 to 15 seconds.
- Turn the ignition key to the **0** position and pull it out.

All the symbol fields go out.

Turning off the battery main switch

The battery main switch is located at the rear left of the engine compartment.

See the section on turning off the battery main switch in chapter 5.

If you are leaving the machine unattended, you must turn off the battery main switch.



- Turn off the battery main switch.

Securing the machine

The following precautions should be taken when the machine is to be parked for a prolonged period on a slope.

Danger

There is a risk of accidents if the machine rolls away.

! Secure the machine against rolling away.

- Take the wedges out of their holders.



Downhill slope

- Use the wedges to secure the machine against rolling away.



Ignition switch parking position

Parking position

The ignition key cannot be pulled out in the parking position **P**.

- Turn the ignition key to the parking position **P**.
- You can keep the battery main switch turned on when parking the machine on public roads.

The consumer units listed below are ready for operation:

- Interior lighting
- Hazard warning system
- Socket/cigarette lighter
- Working floodlight

The following optional accessories are also ready for operation, if fitted.

- Flashing beacon
- Radio

Danger



If unauthorised people are on the machine it can put the maintenance personnel in extreme danger.

! Secure the machine against access by unauthorised persons.

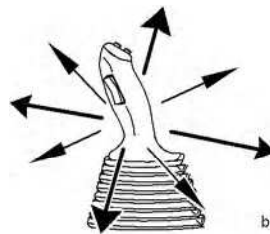
- When leaving the machine:

Turn the ignition key to the **0** position and pull it out.

Any power consumers which are still required can be switched on at the instrument panel.

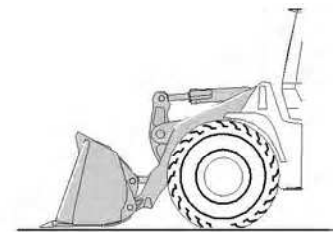
See the section on the ignition switch.

3.3.5 Operating the lift arms



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LH control lever



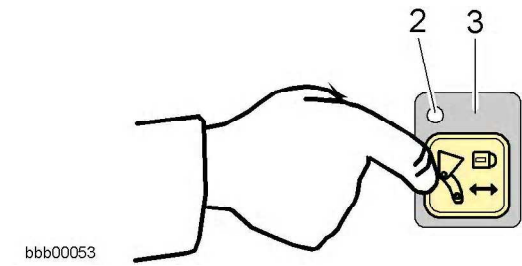
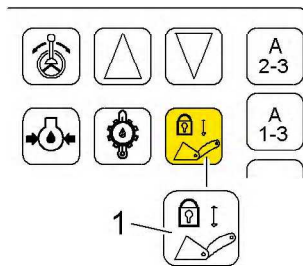
The movements of the lift arms and the working attachment (bucket) are controlled by the LH control lever.

See also the section on the LIEBHERR control lever.

Releasing the working hydraulics

The working hydraulics are automatically ready for operation when you switch on the ignition.

- **If you have previously engaged the working hydraulics lockout:**
Release the working hydraulics for operation.



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Control unit

- 1 Working hydraulics lockout symbol field
- 2 LED

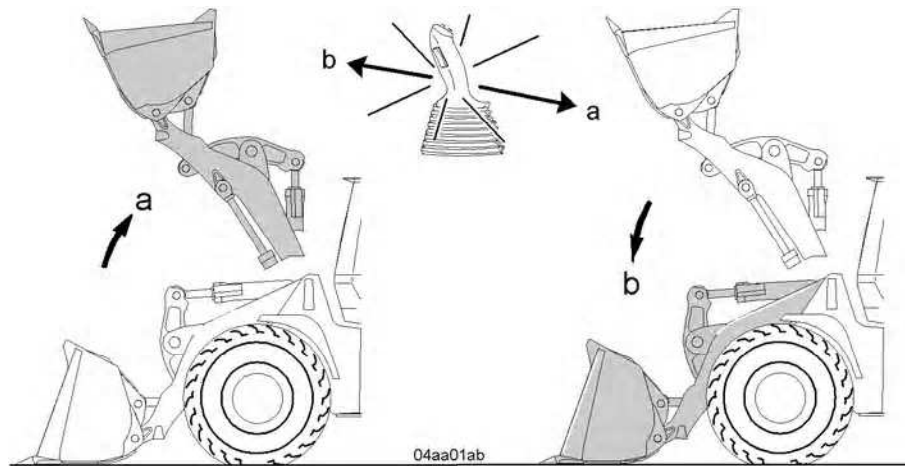
- 3 Working hydraulics lockout button

- Deactivate the working hydraulics lockout by pressing the button **3**.
The LED **2** on the button goes out.
The symbol field **1** for the working hydraulics lockout goes out.
The working hydraulics are now operational.
You can operate the working attachment.

Operating the lift cylinders

The lift cylinders raise and lower the lift arms.

Raising or lowering the lift arms

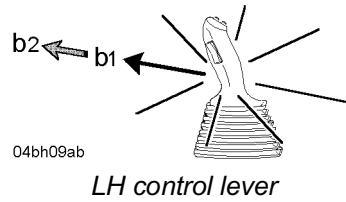


Raising or lowering the lift arms

- Move the LH control lever in direction **a**.
The lift arms are raised.

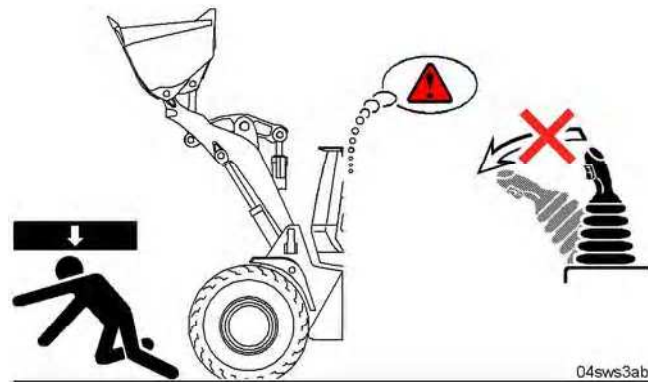
There are two ways to lower the lift arms:

- Slowly, using the normal lowering functions
- Quickly, using the quick drop function



- To actuate the normal lowering function, move the LH control lever in the direction **b1** up to the action point.

The lift arms are slowly lowered.



Danger

Danger



There is a risk of accidents when the working attachment is lowered quickly.

The raised working attachment is lowered quickly when you actuate the quick drop function.

Anyone standing under the working attachment will be crushed.

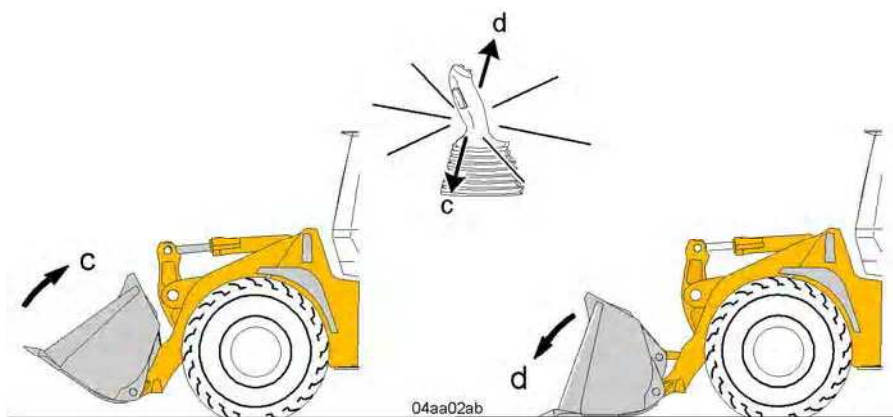
! Keep out of the danger area.

- To actuate the quick drop function, move the LH control lever in direction **b2** through the action point to its limit.

The lift arms are quickly lowered.

Operating the tilt cylinders

The tilt cylinder tilts the bucket in and out.



Tilting the bucket in and out

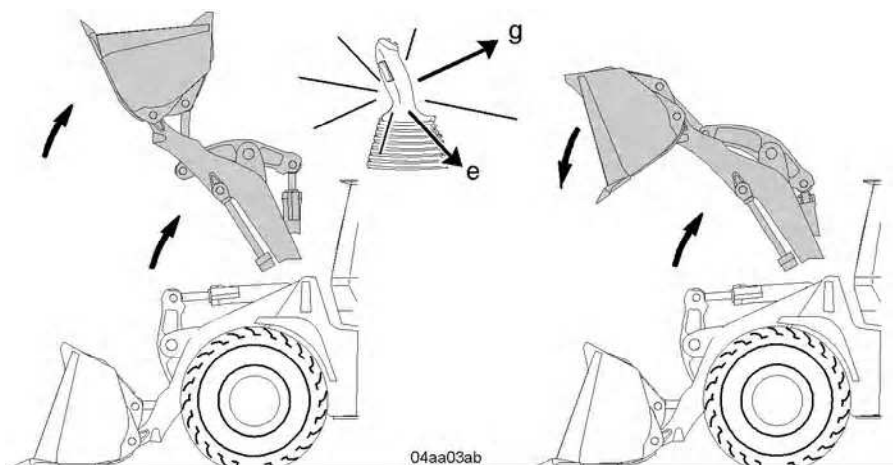
Tilting the bucket in or out

- Move the LH control lever in direction **c**.
The bucket is tilted in.
- Move the LH control lever in direction **d**.
The bucket is tilted out.

Operating the lift and tilt cylinders simultaneously

You can extend or retract the lift and tilt cylinders simultaneously by moving the LH control lever diagonally.

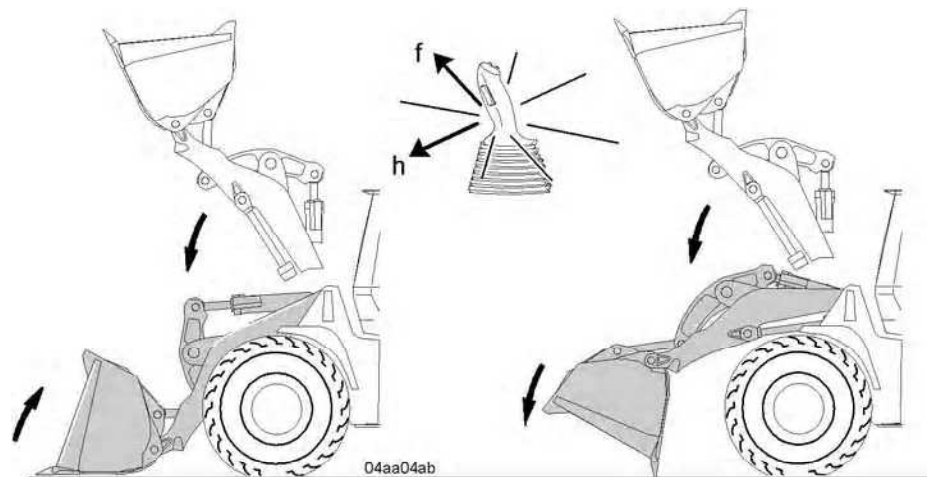
Raising the lift arms while tilting the bucket in or out



Working movements

- Move the LH control lever in direction **e**.
The lift arms are raised while the bucket is tilted in.
- Move the LH control lever in direction **g**.
The lift arms are raised while the bucket is tilted out.

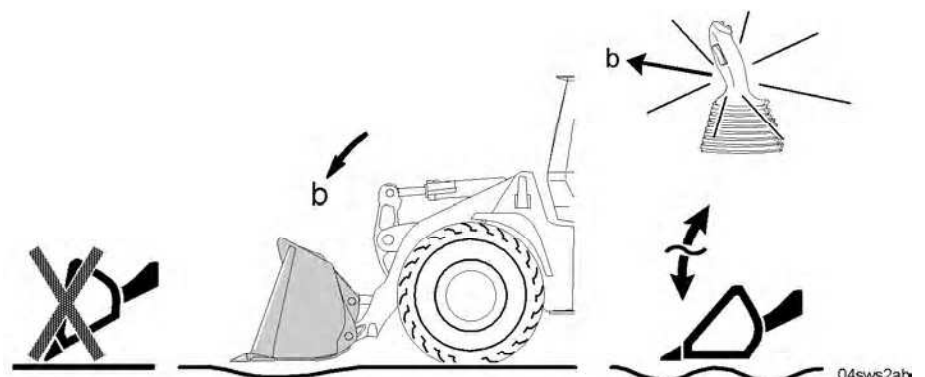
Lowering the lift arms while tilting the bucket in or out



Working movements

- Move the LH control lever in direction **h**.
The lift arms are lowered while the bucket is tilted in.
- Move the LH control lever in direction **f**.
The lift arms are lowered while the bucket is tilted out.

Float position



Bucket in float position

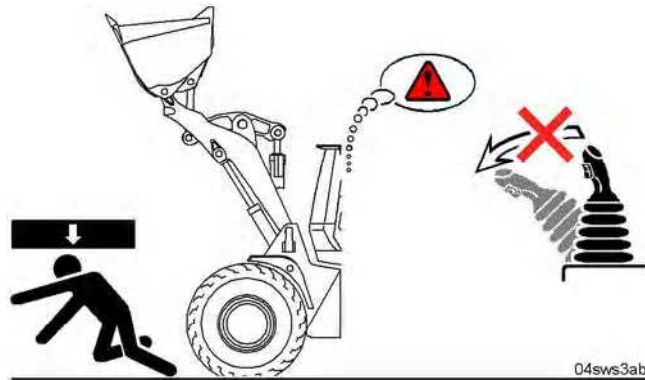
The float position allows the bucket to lie on the ground under its own weight and to move freely on uneven ground.

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Activating float position

This is how to activate the float position.

Make sure the lift arms are lowered and the bucket is lying flat on the ground.



Danger

Danger



There is a risk of accidents when the working attachment is lowered quickly.

The working attachment is lowered quickly when the float position is activated.

Anyone standing under the working attachment will be crushed.

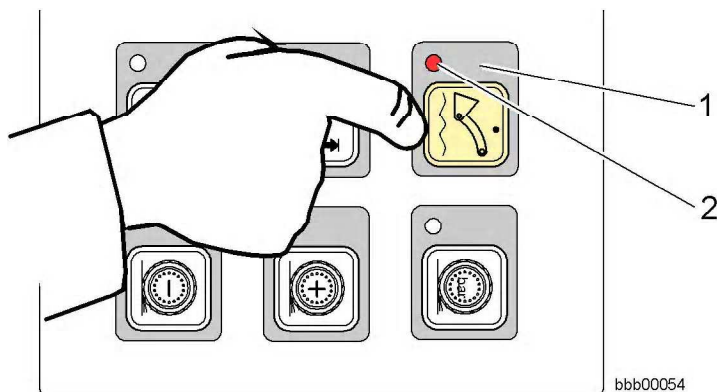
! Keep out of the danger area.

- Do not activate the float position function when the working attachment is raised.



Bucket position

- Lower the lift arm and lay the bucket down flat on the ground.



Control unit

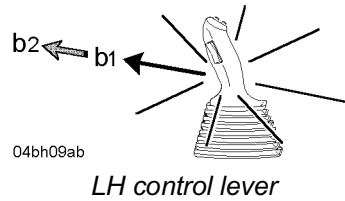
1 Float position button

2 LED

Press the float position button **1** to enable the function.

- Press the float position button **1**.

The LED **2** on the button indicates that the function is active.



- Move the LH control lever in direction **b2** through the action point as far as it will go and then release it.

The LH control lever is held in this position by magnetic force.

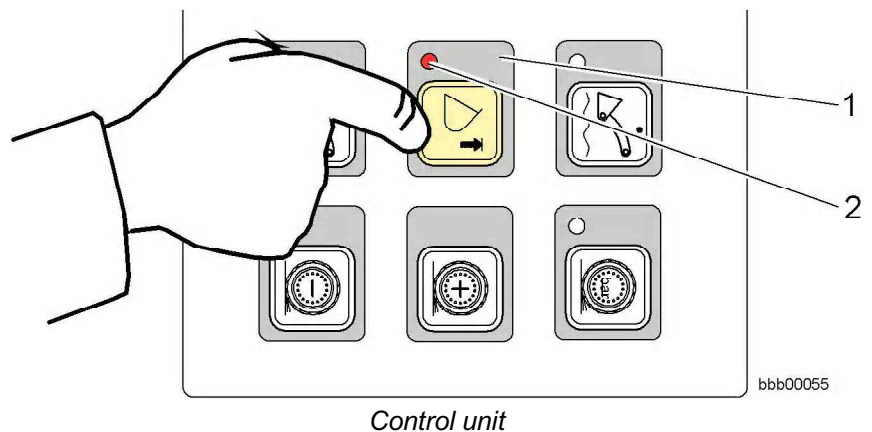
The float position function is now active.

Using the automatic lift kick-out function

The automatic lift kick-out function prevents the lift arm coming to an abrupt halt at the upper lift limit. This protects both the machine and the driver from unnecessary jolting.

Activating the automatic lift kick-out function

The procedure for activating the automatic lift kick-out is as follows:



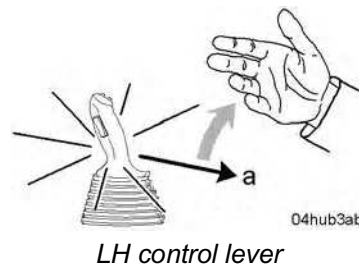
1 Lift kick-out button

2 LED

- Press the button **1** for lift kick-out.

The LED **2** on the button indicates that the function is active.

The lift kick-out function is now active.



- Move the LH control lever in direction **a** through the action point as far as it will go and then release it.

The LH control lever is held in this position by magnetic force.

This means that the lift arm is only raised as far as the switching point for the lift kick-out.

The lifting procedure is automatically stopped at this point.

Lift kick-out for reduced dumping height

You can also use the proximity switch to set a reduced dumping height.

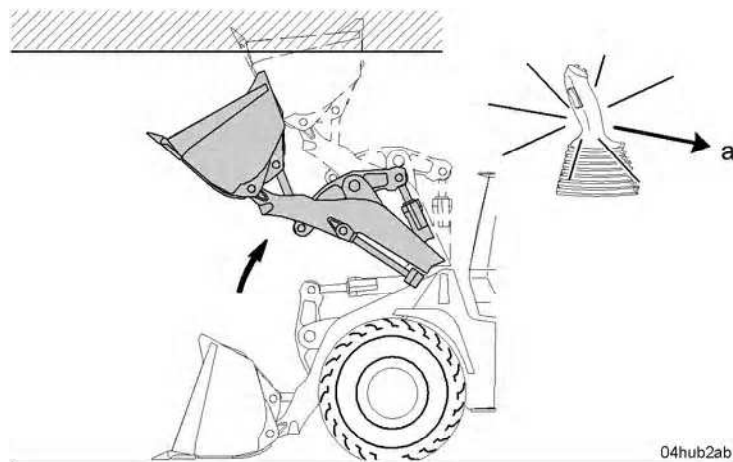


There is a risk of accidents when working close to a height limit. When working close to a height limit, there is a risk of accidents if the lift kick-out is overrun.

! When working near to a height limit, proceed with extreme caution.

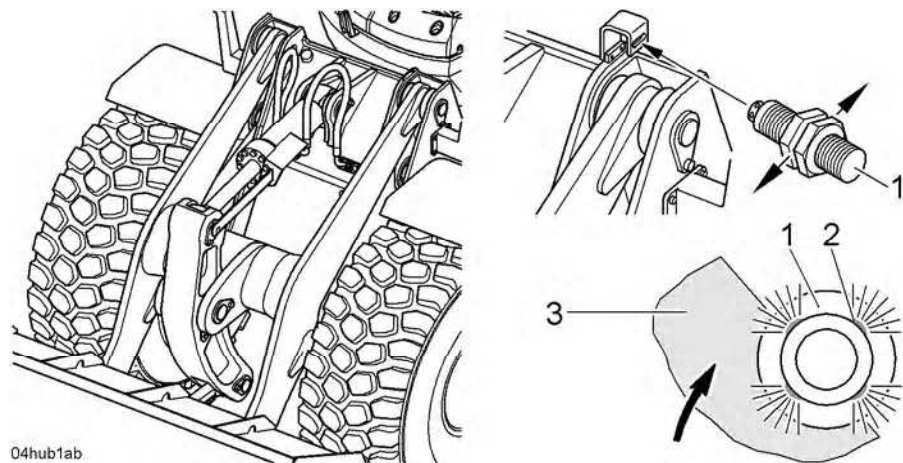
Setting the lift kick-out for reduced dumping height

- Set the lift kick-out for a reduced dumping height.
- The proximity switch for the automatic lift kick-out is set at the factory. If necessary, the proximity switch can be re-adjusted. The procedure for re-adjusting the proximity switch is as follows.



Reduced dumping height

- Raise the lift arms to the required dumping height.



Proximity switch

- | | |
|--|--------------|
| 1 Proximity switch for automatic lift kick-out | 2 LED |
| | 3 Bucket arm |

- Release the fixing nuts of the proximity switch. Horizontally adjust the proximity switch 1 until the bucket arm 3 covers up to half the contact surface of the proximity switch. When the bucket arm enters the actuation range of the proximity switch, the four LEDs 2 on the proximity switch light up.

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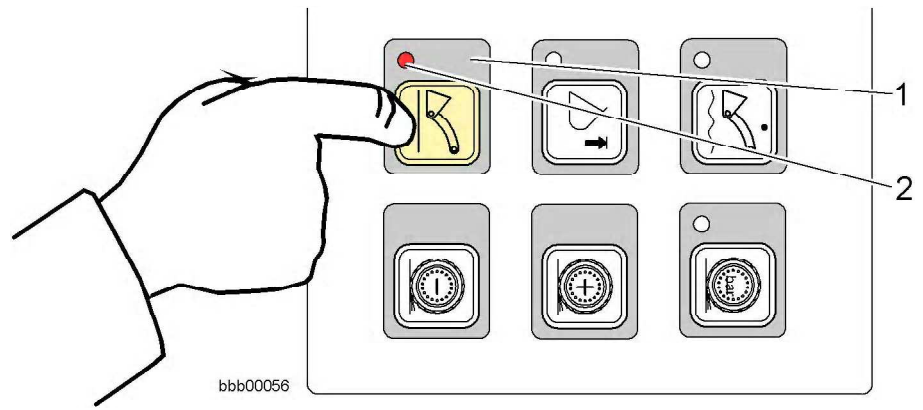
- Tighten the fixing nuts on the proximity switch again.
The proximity switch has been reset and the automatic lift kick-out is once more ready for operation.
- Test the setting and re-adjust it if necessary.

Automatic bucket return-to-dig function

You can use the automatic bucket return-to-dig function for loading jobs which require a certain digging position.

Activating the automatic bucket return-to-dig function

The procedure for activating the automatic bucket return-to-dig function is as follows:



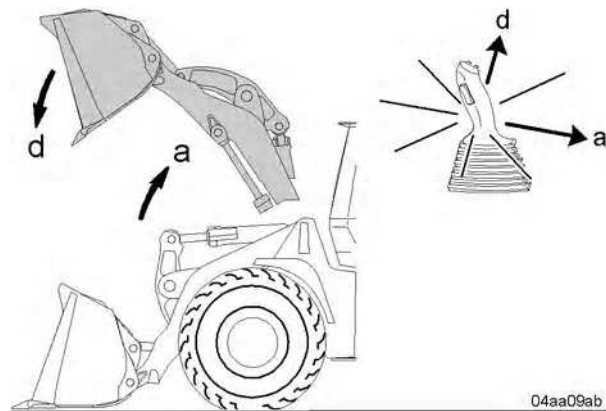
Control unit

- 1 Bucket return-to-dig button
- 2 LED

- Press the bucket return-to-dig button 1.
The LED 2 on the button indicates that the function is active.
The automatic bucket return-to-dig function is now activated.

Using the automatic bucket return-to-dig function

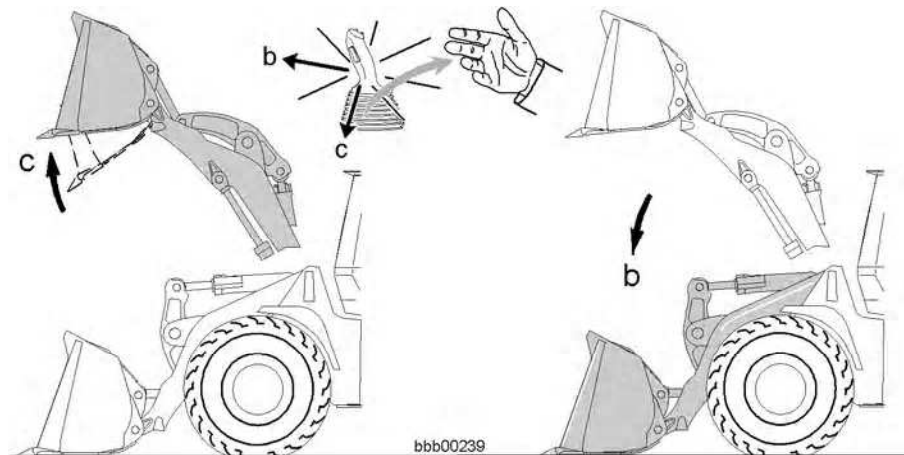
Make sure the automatic bucket return-to-dig function is activated.



Working movements

LBH/01/003801/0003/5.05/en

- Raise the lift arm by moving the LH control lever in direction **a**.
- Tilt the bucket out in the raised position by moving the LH control lever in direction **d**.



Working movements

- Tilt in the loading bucket in the raised position by moving the LH control lever in direction **c** through the action point as far as it will go and releasing it.

The LH control lever is held in this position by magnetic force.

This moves the bucket into the preliminary position for the digging position.

As soon as the bucket reaches the preliminary position, the solenoid releases the LH control lever.

- Lower the lift arms by moving the LH control lever in direction **b**.

This moves the loading bucket into the digging position on the ground.

Setting the digging position

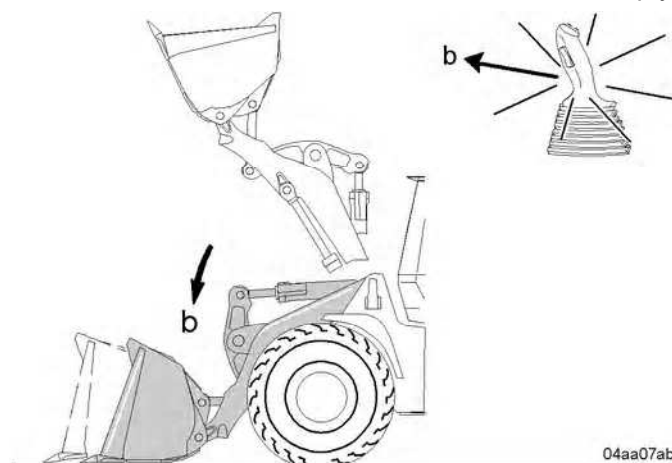
The proximity switch for the automatic bucket return-to-dig function is set at the factory.

If necessary, the proximity switch can be re-adjusted.

The procedure for re-adjusting the proximity switch is as follows.

Rough adjustment

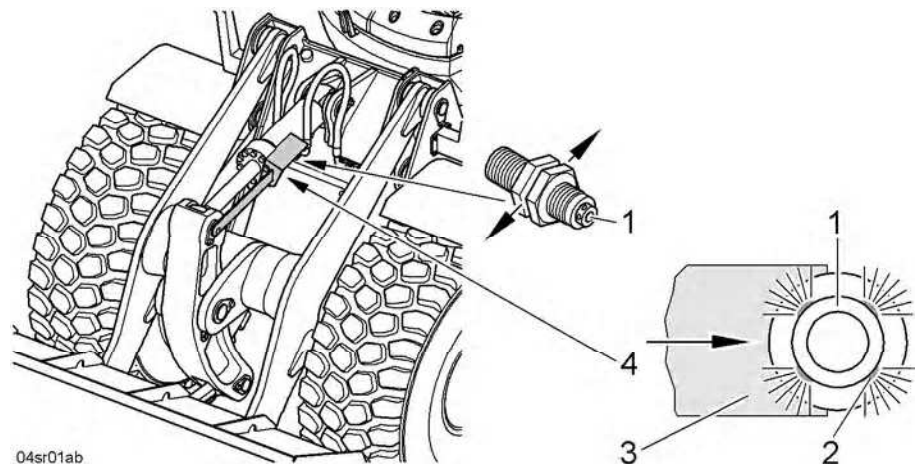
Make sure that the lift arms are lowered and the bucket is empty.



Rough digging position

LBH/01/003801/0003/5.05/en

- Using the LH control lever, move the loading bucket to the required digging position.



04sr01ab

Setting up bucket return-to-dig

- | | |
|---|-------------------------------|
| 1 Proximity switch for automatic bucket return-to-dig | 3 Positioning curve |
| 2 LED | 4 LFD system proximity switch |

- Release the fixing nuts of the proximity switch 1. Horizontally adjust the proximity switch 1 until the positioning curve 3 covers up to half the contact surface of the proximity switch. When the positioning curve enters the contact area of the proximity switch, the four LEDs 2 on the proximity switch light up.
- Tighten the fixing nuts on the proximity switch 1 again. The rough adjustment of the required digging position is now complete.
- Test the rough adjustment: The procedure is described in the section on using the automatic bucket return-to-dig function.
- If required, carry out a fine adjustment.

Fine adjustment

Carry out several tests to perform the fine adjustment.

- Using the LH control lever, move the loading bucket to the exact digging position.
- Re-adjust the proximity switch as detailed in the section on rough adjustment.
- Test the fine adjustment The procedure is described in the section on using the automatic bucket return-to-dig function.

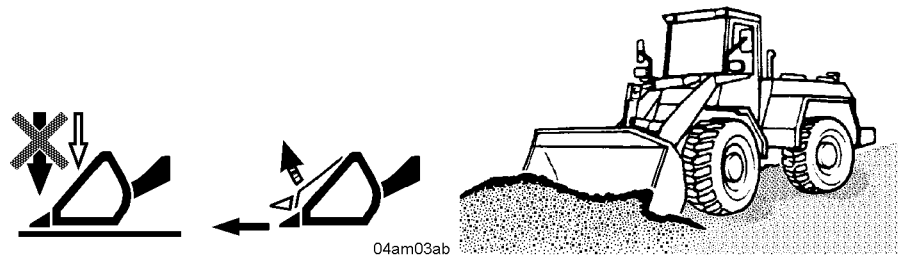
3.3.6 Working methods

This section describes the routine working methods.

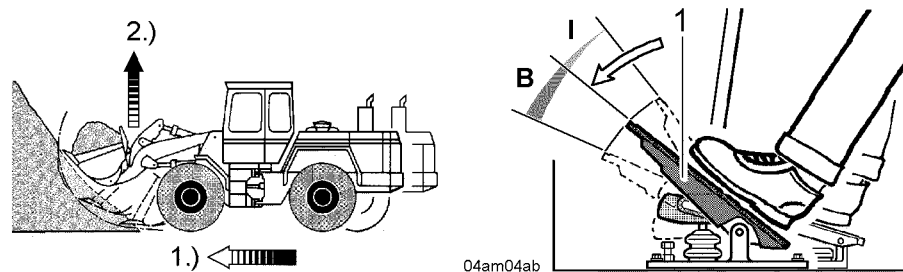
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Picking up and moving material

The following procedure is recommended to avoid any possible loss of traction.



- Do not work with a strong downwards pressure on the bucket.
 - If the flow of the bulk material into the bucket needs to be assisted when driving into the material, gently tip the bucket up and down.
- Pressing the inch/brake pedal reduces tractive force, which makes loading easier.



Power distribution by inching

1 Inch/brake pedal
I Inching range

B Braking range

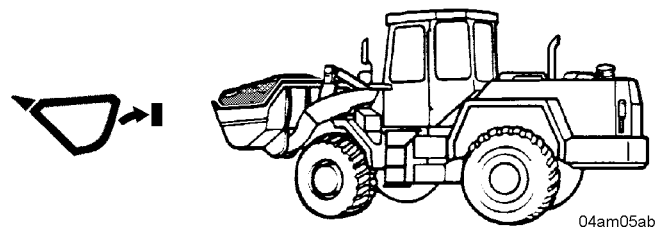
- Also press down the inch/brake pedal 1 in range I with the required force.

The power is adjusted:

- 1.) The power of the travel hydraulics is reduced.
- 2.) The power of the working attachment is reduced.

Power adjustment has the following advantages:

- The wheels no longer spin
- The fuel consumption is reduced.



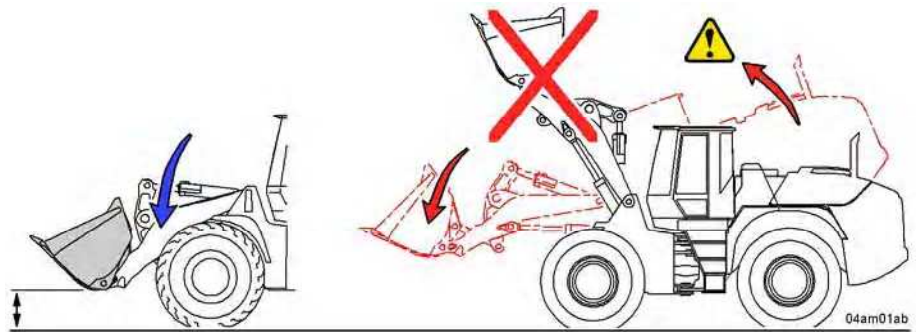
- Tilt in the loaded bucket as far as it will go and raise the lift arms.

Transporting and moving material


The bucket should be moved into the transport position to improve the machine's stability and to ensure good viewing conditions when transporting and transferring bulk materials.

The transport position means that the bucket pivot point is roughly 40 cm above the ground.

Transport position



Bucket position

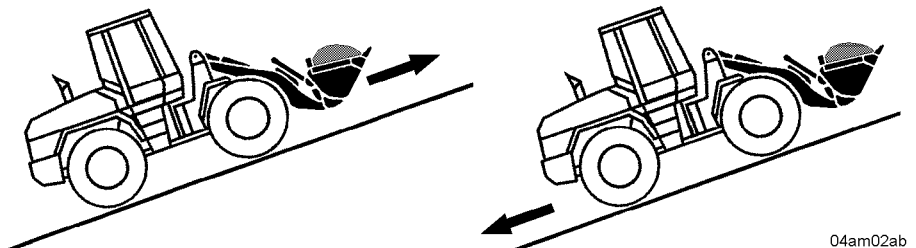
Warning 

There is a risk of the machine tipping over. The machine might tip over when the lift arms are raised due to the shift in the centre of gravity.

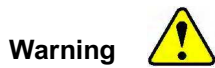
! Observe the maximum permitted bulk material weight and the specified tipping loads.

- Move the loaded bucket to the transport position.

Transporting the load on a slope



Direction of travel during transport



There is a risk of the machine tipping over.

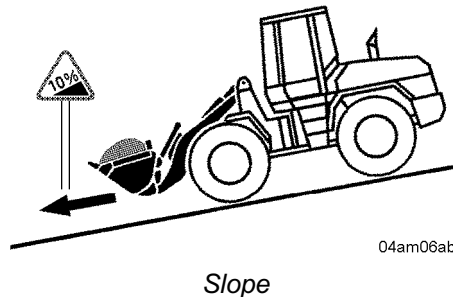
! Hold the loaded bucket low when transporting a load on steep terrain.



- Do not turn the machine on steep slopes.
- Drive forwards up the slope.
- Drive backwards down the slope.
- Do not drive on slopes with the working attachment raised.

Driving on slopes

You must observe the safety instructions when driving on slopes. See the safety instructions for driving on slopes in chapter 2.



There is a risk of the machine tipping over.

The machine can tip over more easily when driving on sloping ground.

! Always keep the loaded bucket low during transport.

! Do not suddenly change direction or brake abruptly.

- Ease off the gas pedal before driving onto the slope.
- Drive downhill carefully.
- If necessary, apply the service brake.

or

If driving on a long, steep downhill slope:

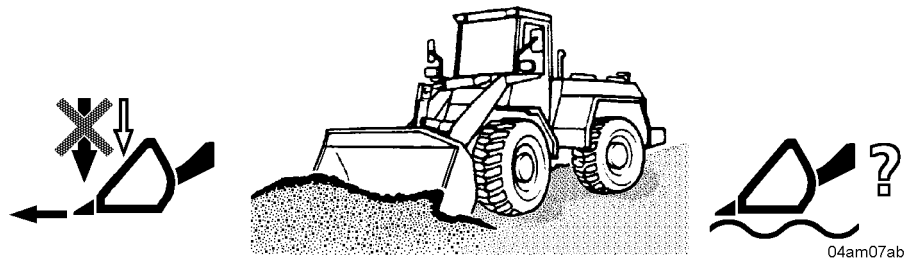
- First switch to travel range I. See also in the information on changing travel ranges in the driving mode section.

Grading work

Keep the bucket base horizontal when grading.

Grading

The following procedure is recommended to avoid any possible loss of traction.

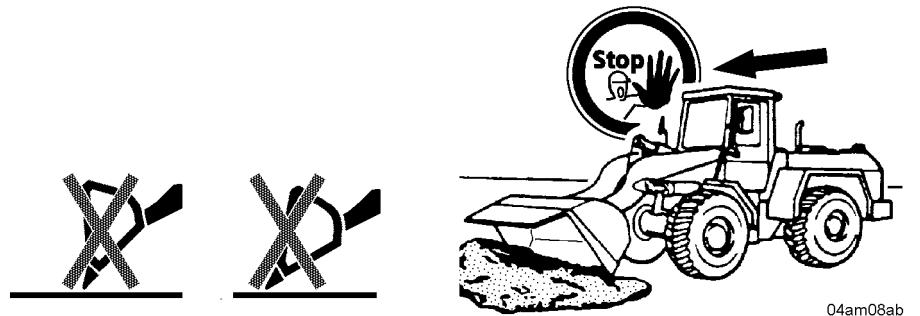


Procedure for grading

- Do not work with a strong downwards pressure on the bucket.

or

- Use the float position function, See also the sections on operating the lift arms and the float position function.



Impermissible bucket positions

Caution

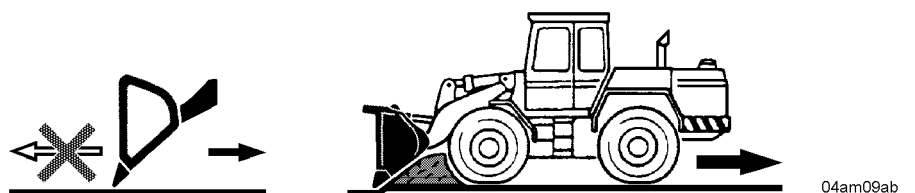
There is a risk of damage to the machine.
The machine may be damaged during grading work if the bucket hits a hard object when it is tipped down while the machine is moving forward.
! Do not grade in the forward travel direction with the bucket tipped down.

- Keep the base of the bucket parallel to the ground.

or

- Gently set the bucket base down.

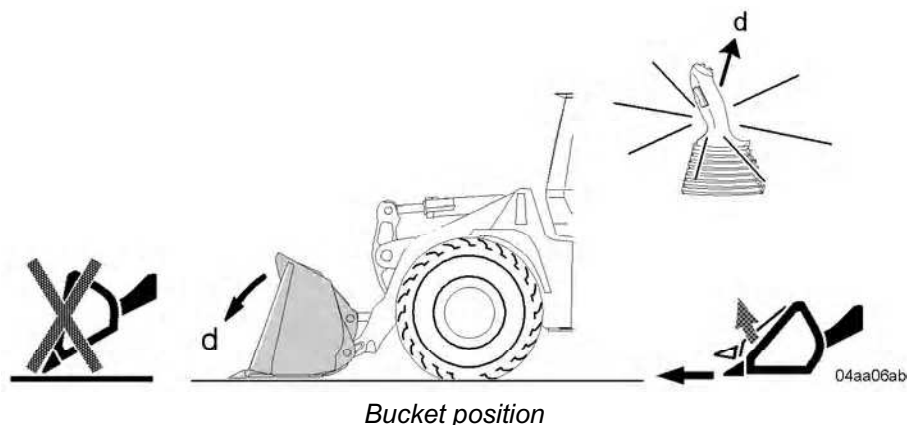
Scraping off material



- Tilt the bucket down and drive backwards.

Loading a heap

Picking up material



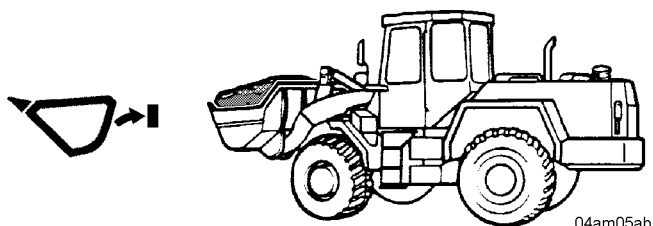
Caution

There is a risk of damage to the machine.

The lift arms may be damaged if you hit a hard obstacle at speed when clearing away bulk material in the forward travel direction with the bucket tipped down.

! When clearing away bulk material, do not drive into the pile with the bucket tipped down.

- Lower the bucket horizontally to the ground.
- Drive into the material, slightly tipping the bucket in the process.
- If the flow of the bulk material into the bucket needs to be assisted gently tip the bucket up and down when driving into the material.
- Also press down the inch/brake pedal See the section on picking up and moving material.

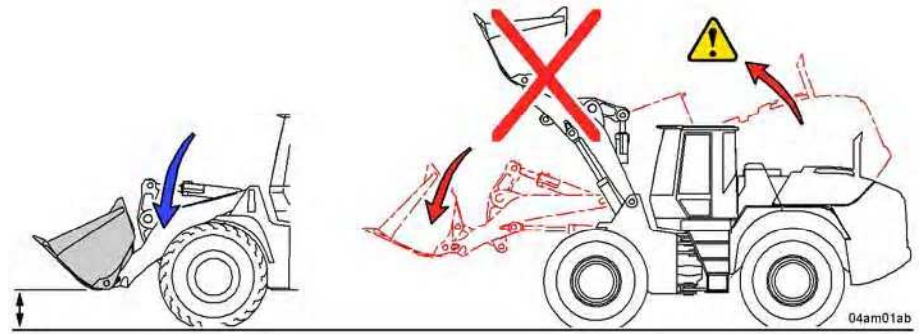


Bucket position

- Tilt in the loaded bucket as far as it will go and raise the lift arms.

Transporting material

Keep the loaded bucket low during transport in order to improve the machine's stability and to ensure good viewing conditions.

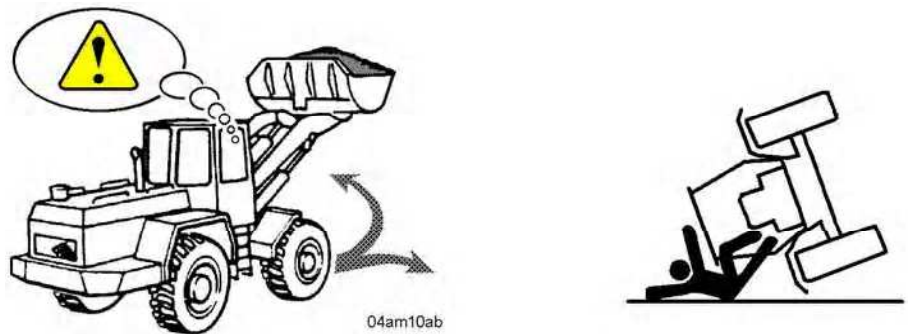


Bucket position

Make sure that the bucket is in the transport position.

The transport position means that the bucket pivot point is roughly 40 cm above the ground.

- Move the bucket to the transport position.



The machine may tip over

Warning



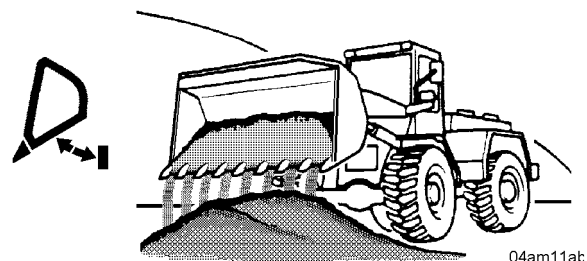
There is a risk of the machine tipping over.

The machine might tip over when the lift arms are raised due to the shift in the centre of gravity.

! Do not suddenly change direction or brake abruptly when the bucket is raised.

- Do not raise the lift arm until just before reaching the unloading point.

Dumping



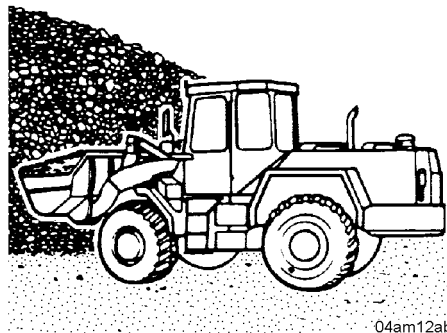
Dumping

- Tip out the bucket.
- To loosen material adhering to the bucket, quickly tilt the bucket in and out, briefly jolting against the bucket arm stops.

Removing material from a slope or wall

Removing material from a slope

This is how to remove normal material such as sand or gravel.



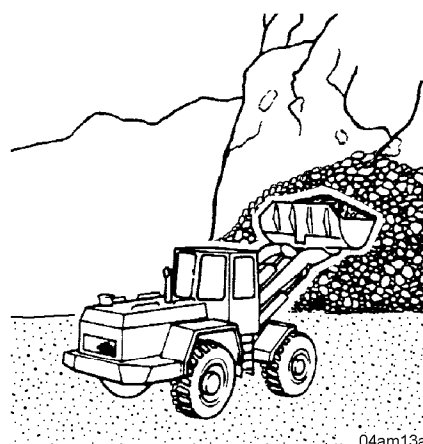
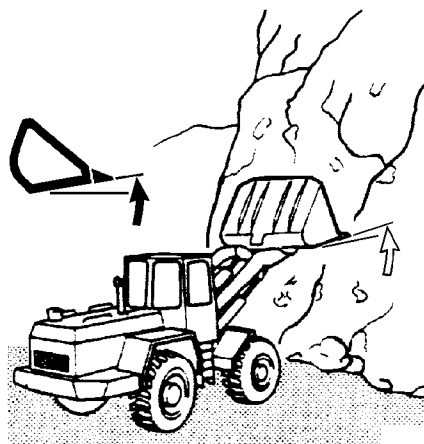
04am12ab

Removing bulk material 1

- Start at the foot of the slope and work upwards.

Removing material from a wall

This is how to remove unusually hard material such as rock.



04am13ab

Removing bulk material 2

- Slightly tilt up the bucket base.
- Start removing material at the top and work downwards.

Warning

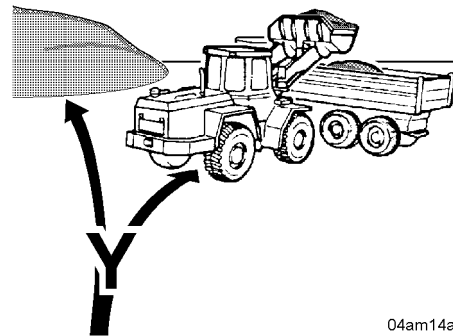


There is a risk of accidents due to falling material.
 ! Do not work under overhangs.

- Remove overhangs first and then look out for slippage.

Loading a transport vehicle

Transport routes



04am14ab

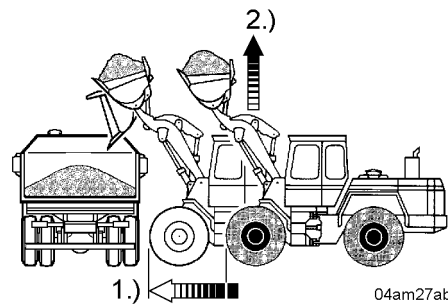
Y-movement

The vehicle to be loaded should be parked so that the transport distance for the machine is as short as possible.

If possible make a **Y movement**. See also in the information on reversing in the driving mode section.

Loading procedure

In order to speed up the loading procedure, brake the machine in front of the truck with the inch/brake pedal.



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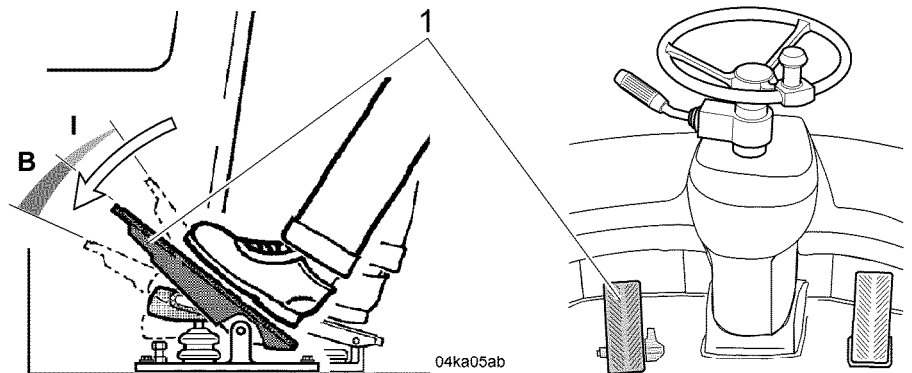
Unloading point

This achieves the following:

- 1.) Sensitive speed adjustment
- 2.) Optimum power adjustment for the working attachment

See the section on picking up and moving material.

- Put the machine in the unloading position. Do not raise the lift arms until just before reaching the unloading point.



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Inch/brake pedal

1 Inch/brake pedal
I Inching range

B Braking range

LBH/01/003801/0003/5.05/en

- Brake the machine by pushing down the inch/brake pedal **1** in range **I** with the required force.

Warning



There is a risk of accidents due to falling material.

! The driver may only swing the working attachments over occupied driver cabs, operating and working stations of other machines if they are protected by reinforced roofs (FOPS).

! If the driver's cab is not equipped to provide the necessary degree of protection, then the driver of the machine in question must leave his cab during overhead operations.

- Load the truck so that the material falls into the middle of the skip.
- Load long transport vehicles from front to back.

When working near overhead power lines:

Danger



There is a risk of accidents through contact with overhead power lines. There is a risk of **fatal injury**.

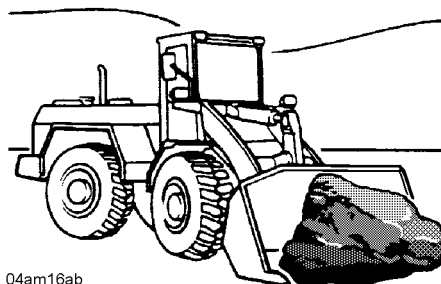
! Obtain information about the safety clearances to be observed.



- Keep the machine a sufficient distance away.
- Do not go near power lines with the attachment.
- Also read the instructions for safe working in the chapter on safety regulations.

Loading large rocks

Make sure that the loading surface of the transport vehicle can withstand the impact of large rocks.



Loading the bucket

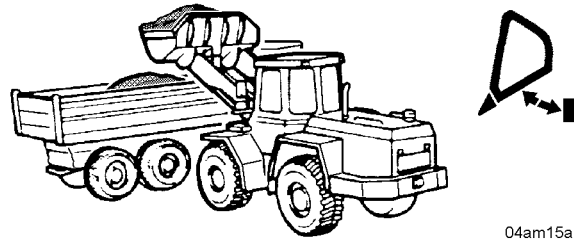
- First put a bucket load of smaller rocks in the transport vehicle.
- Carry on loading the transport vehicle.

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Loading sticky material

You can use the automatic bucket return-to-dig function for loading jobs which require a certain digging position.

See also the sections on operating the lift arms and the automatic float position function.



Dumping

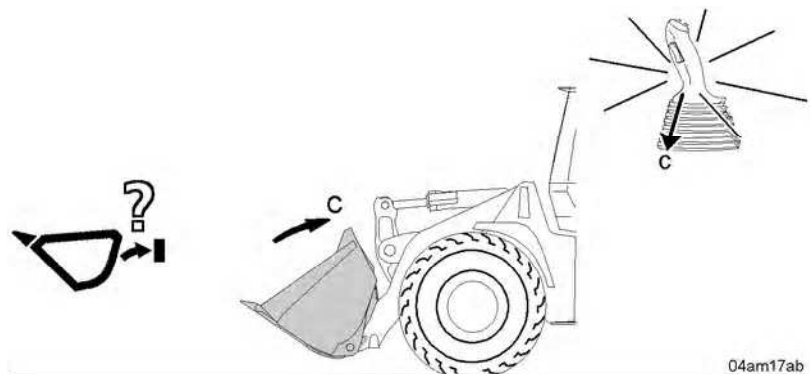
- Tip out the bucket.

Caution 

There is a risk of damage to the machine. Unnecessary jolting when tipping up and down against the bucket arm stops can increase wear on the bolts and bushes on the kinematics. ! Avoid unnecessary jolting.

- To loosen material adhering to the bucket, quickly tilt the bucket in and out, briefly jolting against the bucket arm stops.

Moving the machine back



Bucket position

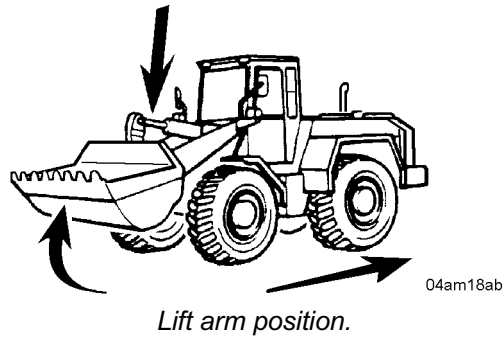
LBH/01/003801/0003/5.05/en



Caution

There is a risk of damage to the machine. Unnecessary jolting when tipping up and down against the bucket arm stops can increase wear on the bolts and bushes on the kinematics.
 ! Avoid unnecessary jolting.

- Tilt the bucket in.

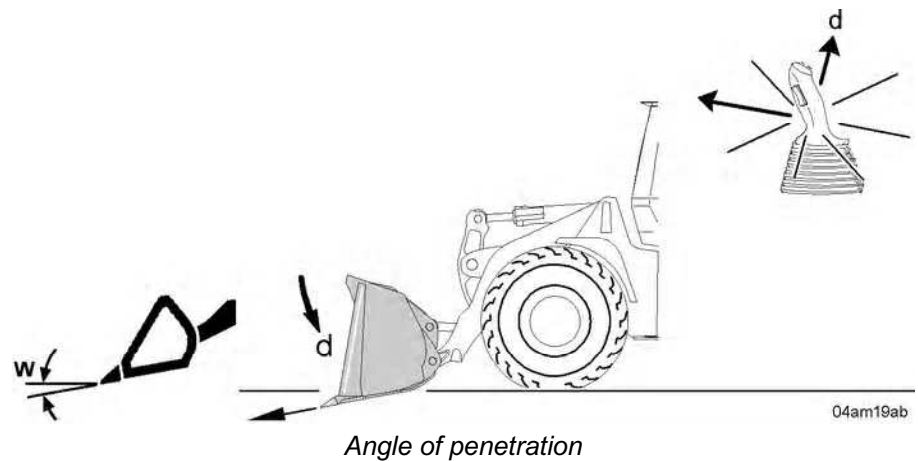


- Lower the lift arm when driving back.

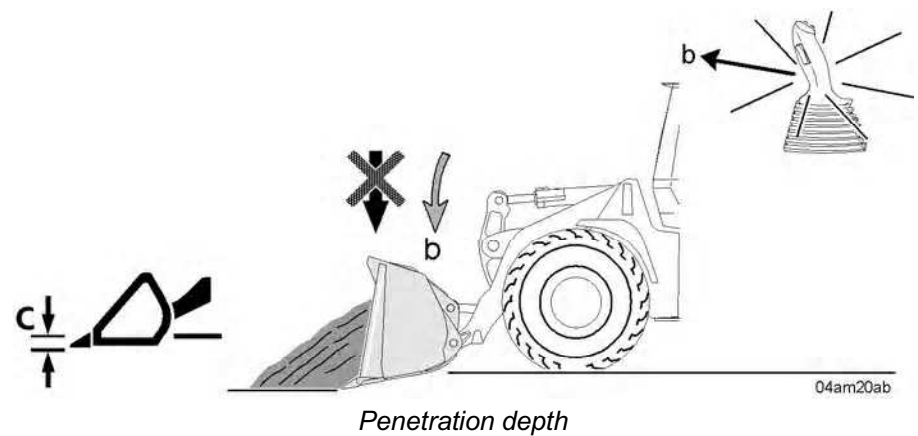
Excavation

Lifting out soft material

This is how to excavate soft material.

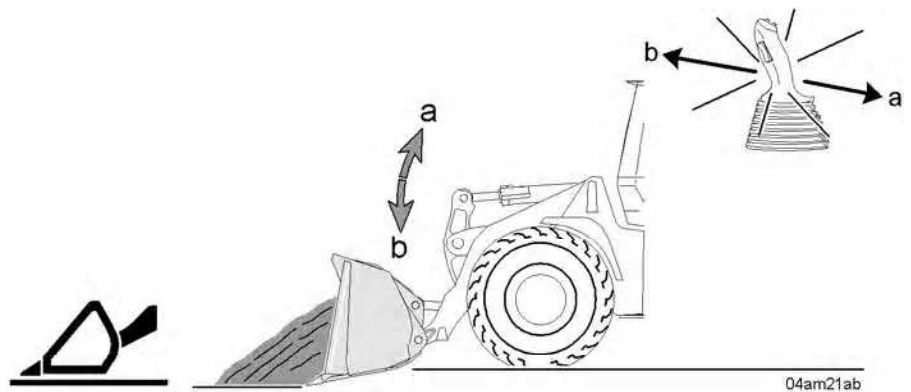


- Lower the bucket to the ground.
- Set a small cutting angle **w** of no more than 10°.



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- When approaching with the machine, simultaneously press the lift arms down, until a sufficient penetration depth **C** is reached.
- The following procedure is recommended to avoid any possible loss of traction. Do not work with a strong downwards pressure on the bucket.

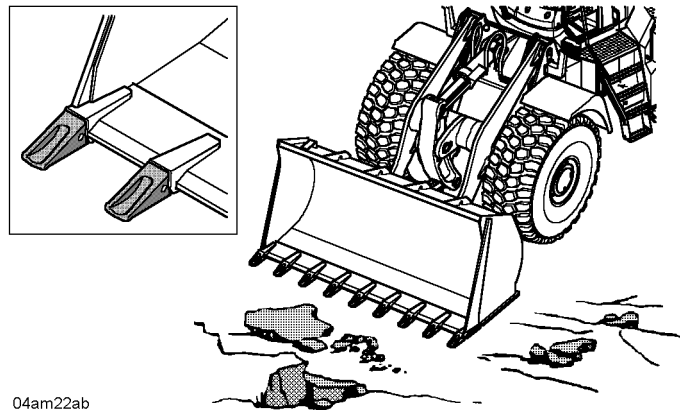


Lift arm movement

- Make horizontal cuts when driving forward.
- Raise and lower the lift arms to make the work easier.

Lifting out hard material

Use a bucket with teeth for excavating hard material.



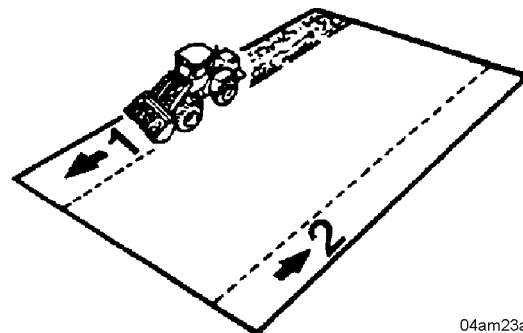
04am22ab

Working attachment

- For the subsequent procedure See the section on lifting out soft material.

Example of foundation excavation

This is how to excavate foundations.

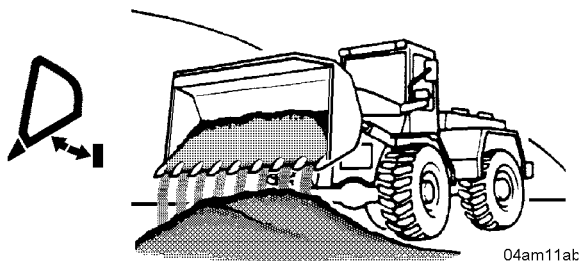


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Lengthways cuts

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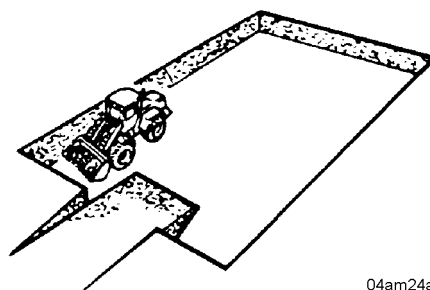
- Use the bucket to make a first trench along the side of the pit.
- When the first trench is down to a depth of 1 metre, start a second trench along the opposite side.
- Excavate the area between to the same depth as the two side trenches.



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Heaping material

- Heap the material in one corner, leaving the sides of the foundations clear.



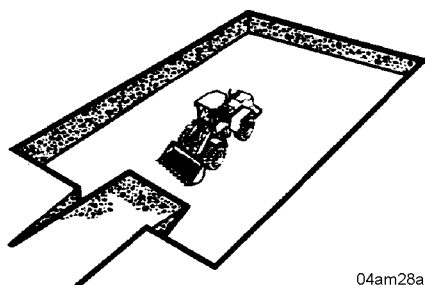
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Pit corner

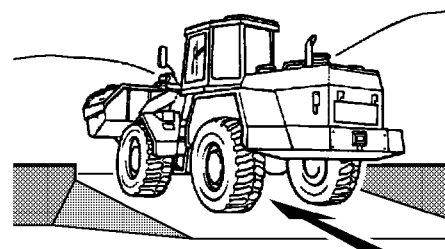
- When the foundations have been excavated to the required depth, dig out the corners and transport the material out of the pit.

Driving out of the pit

You must make a ramp so that you can drive the machine out of the pit.



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Exit ramp and transport direction

- To make an exit for the machine dig out the centre of the ramp.
- Keep the loaded bucket low during transport.
- Drive forwards out of the pit.

3.3.7 Soot particle filter

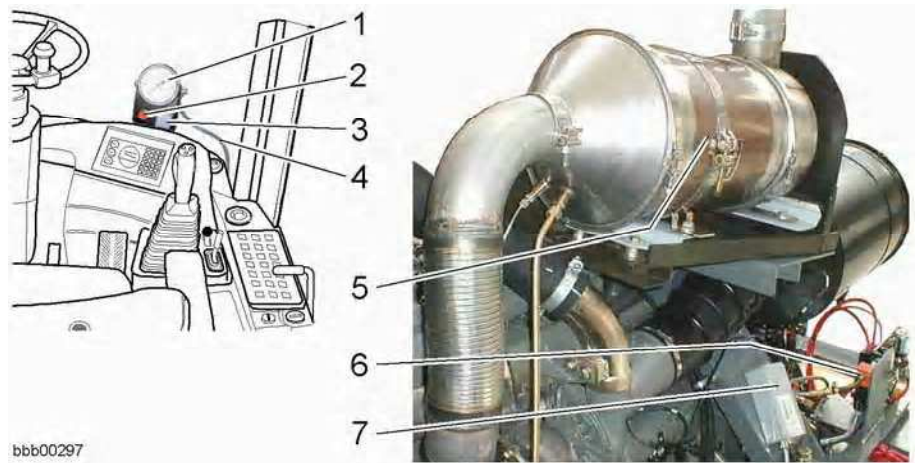
This equipment is optional.

Description	Value	Unit
Filter medium	Ceramic block made from cordierite with catalytic coating	–
Maximum exhaust gas counterpressure	0,2	bar

Tasks of the soot particle filter:

- It reduces the emission of soot particles.
- It eliminates most of the carbon monoxide (CO) and hydrocarbons (HC) from the exhaust.
- It regenerates itself during normal operation.

Daily machine start-up with the particle filter system



Soot particle filter system

- | | |
|---------------------------------------|------------------------|
| 1 Exhaust gas counterpressure display | 4 Pressure line |
| 2 Visual counterpressure monitor | 5 Soot particle filter |
| 3 Audible counterpressure monitor | 6 Filter/drain unit |
| | 7 Data logger |

Other components not shown:

- Counterpressure line
- Data logger line

Task of the exhaust gas counterpressure display:

- To display the contamination status of the particle filter system.

Task of the electronic limit value monitor:

- To give an audible and visible warning to the operator when the maximum counterpressure is exceeded.
The data measured by the counterpressure monitor is saved electronically.

With turbo engines, the counter-pressure may not exceed 0.2 bar.

Visual and audible counterpressure monitor

Counterpressure warning sequence:

- If the counterpressure exceeds 0.15 bar for longer than 60 seconds
The counterpressure monitor **2** lights up.
- If the counterpressure exceeds 0.2 bar for longer than 60 seconds
The audible counterpressure monitor **3** is also activated.

NOTE:

After the counterpressure monitor is activated, you must take action to reduce the counterpressure.

If excess exhaust counterpressure is indicated:

- Excess exhaust counterpressure can also be caused by a blocked counterpressure line.
- If the display indicates excess counterpressure, in addition to cleaning the filter, inspect and service the counterpressure line.
- The counterpressure monitor must be inspected and serviced every **500 service hours**.

See the section on the soot particle filter in the maintenance and inspection schedule in chapter 5.

- Contact LIEBHERR CUSTOMER SERVICE.

Caution

There is a risk of damage to the soot particle filter and the diesel engine. If the machine idles for prolonged periods or is run in the lower load range, the maximum counterpressure may be exceeded.

! Avoid letting the machine idle for prolonged periods or run in the lower load range.

- If the counterpressure is too high:
Take action to reduce it.

NOTE:

The data measured by the counterpressure monitor is saved electronically.

- If the evaluation of the measured data shows that no action was taken to reduce the counterpressure:
The manufacturer's warranty becomes invalid for any component damaged or destroyed by excess counterpressure.

Lowering the counterpressure**Action to reduce the counterpressure:**

- If the counterpressure is above 0.15 bar:
Run the diesel engine at high speed.
- **This means:** drive at full load for approximately 5 minutes.
e.g. working against a wall.

or

Lower and raise the lift arms with a fully loaded bucket at full throttle

- until the counterpressure is clearly lower than 0.15 bar.

Troubleshooting

If the counterpressure cannot be reduced using these measures:



- Shut down the machine immediately.
- Clean the filter.

IMPORTANT

The soot particle filter must be cleaned once a year, or at least once every 1000 service hours.

- The cleaning must be done using suitable equipment, so that the ash can be collected for disposal.

NOTE

- When refitting the filter module after cleaning, make sure the filter module is fitted with the exhaust in the right direction.
- Do not fit the filter module in the opposite direction.
- For additional information:
Contact LIEBHERR CUSTOMER SERVICE.

Exhaust gas tests

For operation in Switzerland:

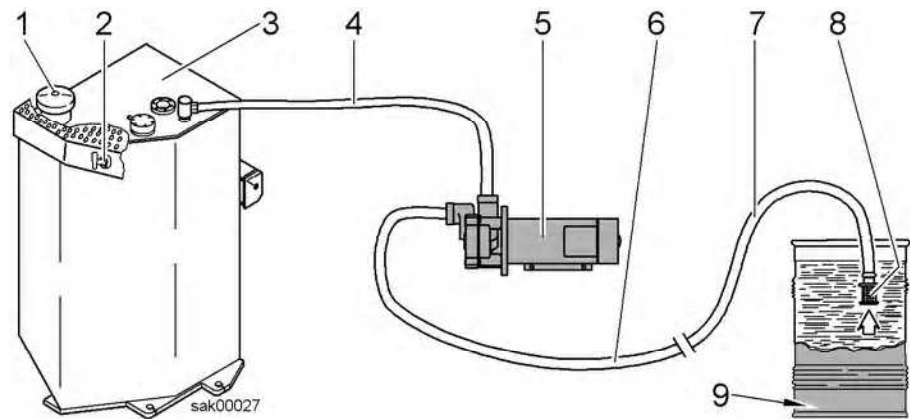
- The machine is marked with the VERT filter label and test label. BUWAL and BauRLL prescribe test measurements to be logged in the exhaust maintenance document at least every 24 months.
- The exhaust maintenance document is created by the main importer and provided with the machine.

For operation in the EU:

- TRGS 554 prescribes test measurements for vehicles in industrial use. These must be carried out and documented annually or every 1500 service hours. For vehicles used underground the intervals are 6 months or every 600 service hours.

3.3.8 Filling the tank using the filling pump

This equipment is optional.



Make sure that:

- The machine is in maintenance position 1.
- The suction line extension 7 (with suction strainer) is connected to the suction line 6 behind the engine compartment door.
The suction strainer 8 is not damaged, otherwise the refuelling pump 5 is not protected against foreign particles.
- The suction line extension 7 with the suction strainer 8 reaches to the bottom of the tank 9 (so that the tank can be completely drained).
- The battery main switch is turned on.
- The key for the refuelling pump switch 2 (next to the tank filler cap) is inserted.

Starting up the filling pump

Description	Value	Unit
Flow rate	50	l/min
Max. duty cycle	15	min
Max. suction height	4	m



Fuel tank

1 Tank cap

2 Cap

- Open the tank cap 1 on the filler neck.

Warning 

There is a risk of burns and explosions.

! Never allow naked flames or lighted cigarettes in the vicinity during the refuelling procedure.



Fuel tank

- Turn the key in the switch **2** to the ON position. Refuelling begins.

Caution 

There is a danger due to the fuel overflowing from the filler neck.

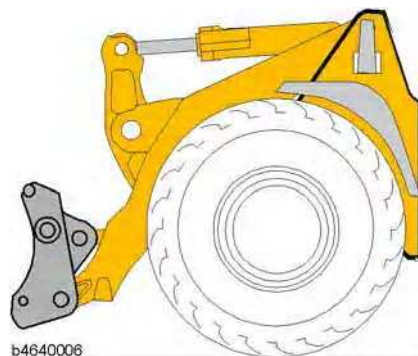
The refuelling pump does not switch off automatically, which means fuel can overflow from the filler neck.

! Watch the filling process via the fuel tank filler neck **1**.

- After finishing refuelling, turn the key in the switch **2** to the OFF position and take out the key.
- Close the fuel tank cap **1**.
- Disconnect the suction line extension **7** (with suction strainer) from the suction line **6** and seal the lines with dummy plugs.

3.3.9 Operating the hydraulic quick-change device for Z lift arms

This equipment is optional.



Quick-change device

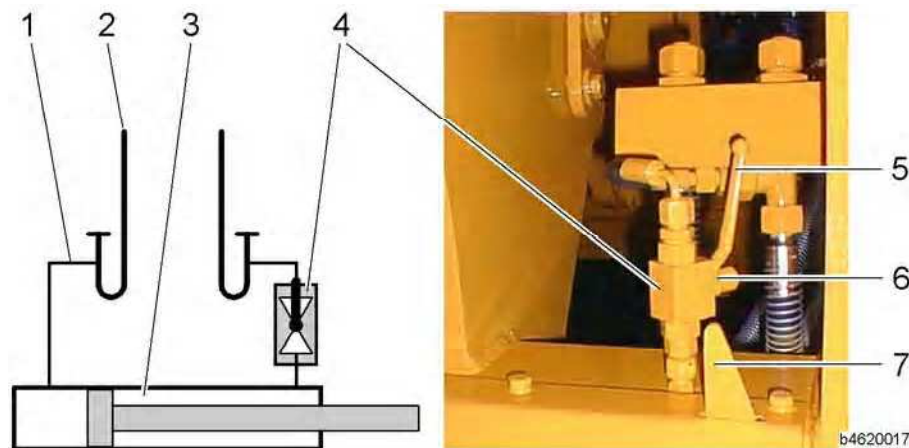
Quick-change device version:

- Hydraulic activation and deactivation using changeover valve. Hydraulic operation using the additional control lever.
- Mechanical locking indicator of the quick-change device.

Information on attachments and accessories:

- **Attachments and accessories produced by third-party manufacturers or those which have not been generally approved by LIEBHERR for installation or for external fitting may not be installed or fitted on the machine without prior written consent from LIEBHERR.**
- **The appropriate technical documentation should be made available to LIEBHERR for this purpose.**

Activating the quick-change device



Hydraulic quick-change device

- | | |
|---------------------------------------|------------------------|
| 1 Supply line for quick-change device | 4 Changeover valve |
| 2 Supply line for accessory kit | 5 Switch lever |
| 3 Hydraulic cylinder | 6 Anti-twist lock |
| | 7 Mechanical indicator |

The hydraulic quick-change device is activated (enabled) or deactivated (blocked) using the changeover valve 4.

The switch lever 5 is secured with an anti-twist lock 6 to prevent actuation by mistake.

This is how to activate the quick-change device.

LBH/01/003801/0003/5.05/en

Make sure that:

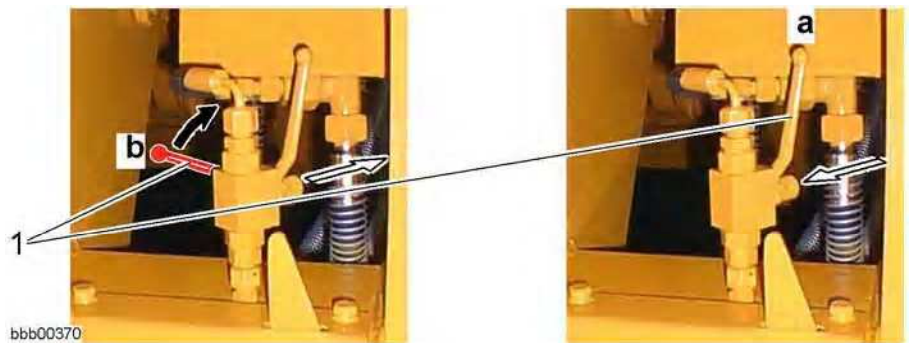
- The lift arm is lowered to just above the ground.
- Where a working attachment with an independent hydraulic supply is mounted, all cylinders, valves etc. are in the initial position or closed.
- Where a working attachment is fitted, make sure that it is tilted in.



Danger 

There is a risk of accidents if the working attachment drops.

! Do not activate the quick-change device when the working attachment is raised.



Changeover valve

The picture shows two lever positions (open/closed).

Activate (release) the hydraulic quick-change device with the changeover valve.

- If you want to activate the quick-change device:
Move the switch lever **1** to position **a** and engage the anti-twist lock.

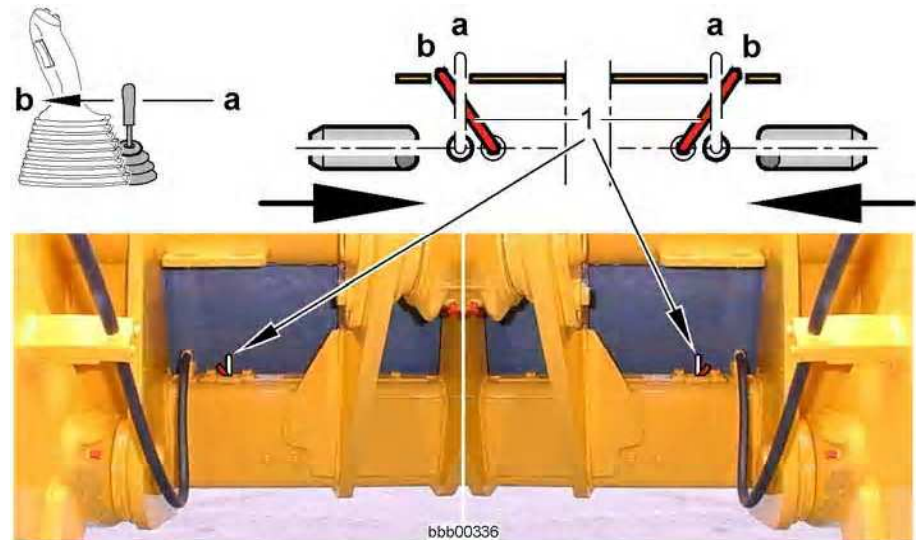
This opens the changeover valve.

The position of the lever shows the direction in which the hydraulic oil flows.

The function for unlocking the quick-change device is thus enabled.

Unlocking the quick-change device

The procedure for unlocking the quick-change device is as follows. Make sure the quick-change device has been activated (enabled) by means of the changeover valve 4.




Quick-change device as seen from the driver's cab

- 1 Mechanical indicator
- a Locked position
- b Unlocked position

- Completely retract the locking pins by moving the LH control lever in direction **b** to the stop and holding it in this position. The locking pins for the quick-change device are retracted. The position (retracted) of the locking pins is indicated mechanically by the display **1**.

Disconnecting the working attachment

This is the procedure for detaching the working attachment. If the working attachment has an independent hydraulic circuit, make sure the hydraulic supply lines have been disconnected.

Warning 

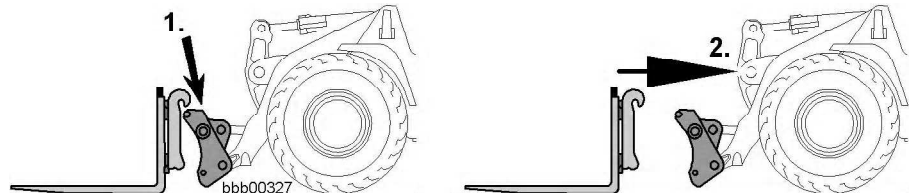
There is a risk of accidents if the working attachment is incorrectly set down.

! Never set down the working attachment in unsecured areas (roadways etc.).

- Set down the working attachment flat on firm, even ground.

If the working attachment has an independent hydraulic supply, set down the working attachment in such a way that the hydraulic lines are not subjected to any strain.

- Secure the working attachment against tipping over.



- Carefully remove the quick-change device from the adapter holder at the top of the working attachment.

The working attachment is now disconnected.

Disconnecting hydraulic lines

If the working attachment has an independent hydraulic circuit, the hydraulic supply lines must be disconnected.

The procedure for disconnecting the hydraulic lines is as follows.

Depressurising the operating circuits**Warning** 

There is a risk of accidents from hydraulic lines under pressure.

! Depressurise the hydraulic circuits before connecting or disconnecting hydraulic lines and couplings.

- Shut down the diesel engine.
- Switch on the electrical system using the ignition key.
- Operate all pilot control devices in both directions using the control lever.

Disconnecting hydraulic lines

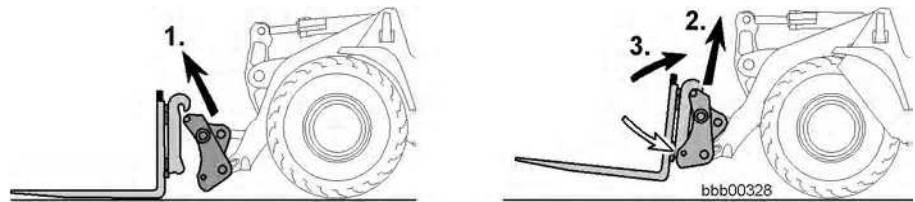
- Release the hydraulic lines and quick-release couplings from the machine.
- Make sure that no hydraulic oil leaks onto the ground.

Take any contaminated soil for disposal, because hydraulic oil can pollute rivers and groundwater.

- Seal the line couplings with a cap.
- Place the hydraulic lines in the hose retainer.

Picking up and connecting the working attachment

This is the procedure for attaching and connecting the working attachment. Make sure that the quick-change device is completely unlocked.



- Carefully put the quick-change device in the adapter holder at the top of the working attachment.
- Slightly raise and tilt in the working attachment.

The working attachment must be fully engaged in the quick-change device.

Locking the quick-change device

The procedure for locking the quick-change device is as follows.

Make sure that:

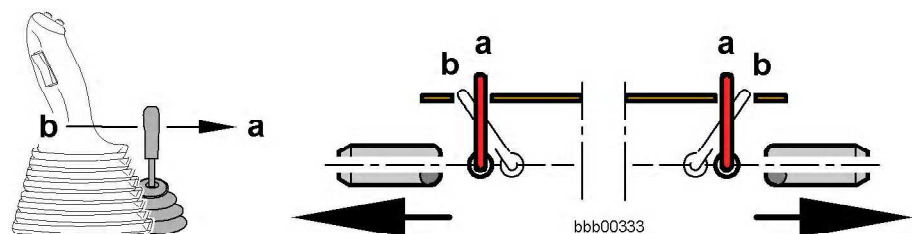
- The working attachment is completely engaged in the quick-change device, so that the working attachment can be locked in place with the locking pins.
- The quick-change device has been activated by means of the changeover valve 4.

Danger



There is a risk of accidents if the working attachment drops.

! Check whether the working attachment is fully engaged in the quick-change device.



- Completely extend the locking pins by moving the LH control lever in direction a to the stop and holding it in this position.

The locking pins for the quick-change device are extended.

The working attachment is now connected.

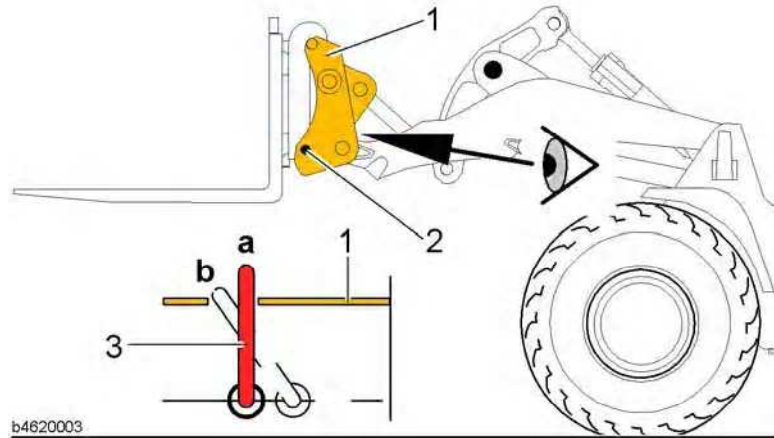
Checking that the working attachment is locked

This is how to check after locking.

Make sure that the quick-change device is in a suitable position for inspection.

Danger 

There is a risk of accidents if the working attachment drops.
 ! Do not carry out any working movements of the attachment before checking whether it is locked.
 ! Check whether the working attachment is securely locked to the quick-change device.



Visual inspection of quick-change device

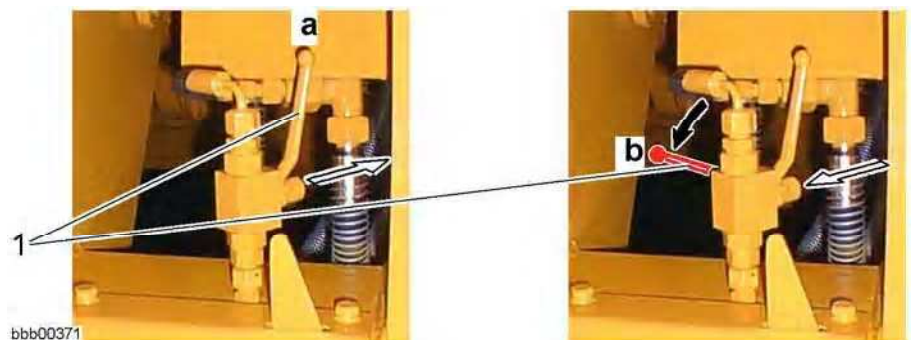
- 1 Quick-change device
- 2 Locking pin
- 3 Mechanical indicator
- a Locked position
- b Unlocked position

- Move the lift arm up until it is possible to see the display 3.
- Get out of the machine and visually check that the locking pins 2 have actually locked the working attachment.
- Carry out the inspection on both sides of the machine.

You can see that it is properly locked when the indicator 3 is upright. In addition, the locking pins 2 must have been inserted all the way to the outer borehole of the quick-change device 1.

Danger 

There is a risk of accidents if the working attachment drops.
 If the quick-change device is unintentionally unlocked, both personnel and the working attachment will be endangered.
 ! It is essential that the changeover valve is locked again after the locking procedure is finished.



Changeover valve

LBH/01/003801/0003/5.05/en

The picture shows two lever positions (open/closed).

Deactivate (block) the quick-change device with the changeover valve.

- Close the changeover valve by taking the switch lever **1** out of the anti-twist lock and setting it to the position **b**.

This closes the changeover valve.

The function for unlocking the hydraulic quick-change device is thus blocked.

- Do not carry out any movements with the working attachment until you have inspected and deactivated the quick-change device.
- For operating a working attachment with its own control circuit, see the description in chapter 3 on the control lever for additional working functions and working with optional equipment (e.g. Using the high dump bucket).

Connecting the hydraulic lines

If the working attachment has an independent hydraulic circuit, the hydraulic supply lines must be connected.

Warning



There is a risk of accidents from hydraulic lines under pressure.

! Depressurise the hydraulic circuits before connecting or disconnecting hydraulic lines and couplings.

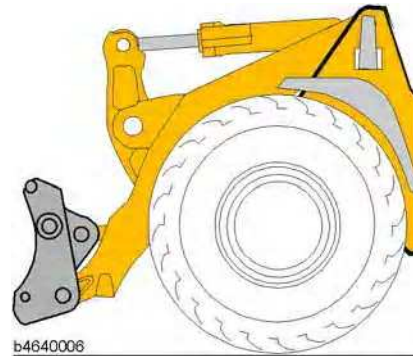
- Take the caps off the line couplings.
- Connect the hydraulic lines according to their function.

Note the following points when connecting:

- Clean the line couplings before connecting.
 - Do not connect the wrong ends of the hydraulic lines.
 - Lay the hydraulic lines so that they cannot become caught in the working attachment during operation.
 - Use any hose retainers provided when laying the lines.
- Check the hydraulic lines for leaks after connecting them.

3.3.10 Operating the combined electrohydraulic quick-change device for Z lift arms

This equipment is optional.



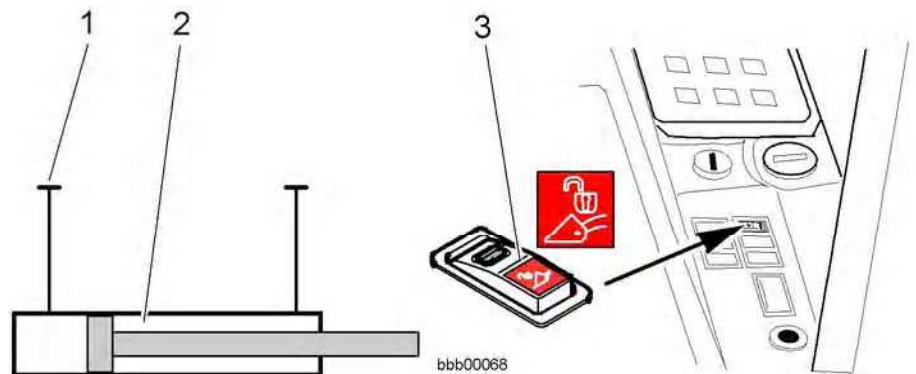
Quick-change device version:

- Combined electrohydraulic version.
Electric activation and deactivation using switch.
Hydraulic operation using the additional control lever.
- Mechanical locking indicator of the quick-change device.

Information on attachments and accessories:

- **Attachments and accessories produced by third-party manufacturers or those which have not been generally approved by LIEBHERR for installation or for external fitting may not be installed or fitted on the machine without prior written consent from LIEBHERR.**
- **The appropriate technical documentation should be made available to LIEBHERR for this purpose.**

Activating the quick-change device



Hydraulic quick-change device

- | | |
|--|--|
| <p>1 Supply line for quick-change device</p> <p>2 Hydraulic cylinder</p> | <p>3 Switch for hydraulic quick-change device (optional)</p> |
|--|--|



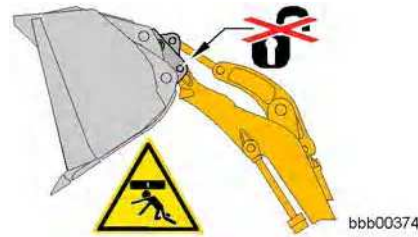
The combined, electro-hydraulically operated quick-change device is activated and deactivated using the switch 3 for the hydraulic quick-change device.

This is how to activate the quick-change device.

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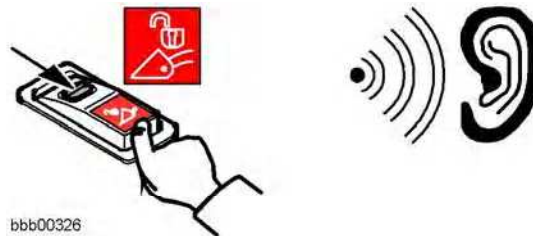
Make sure that:

- The lift arm is lowered to just above the ground.
- Where a working attachment with an independent hydraulic supply is mounted, all cylinders, valves etc. are in the initial position or closed.
- Where a working attachment is fitted, make sure that it is tilted in.



Danger 

There is a risk of accidents if the working attachment drops.
 ! Do not activate the lockable switch when the working attachment is raised.



- Loosen the activation lock in the direction of the arrow and simultaneously push the switch forwards.

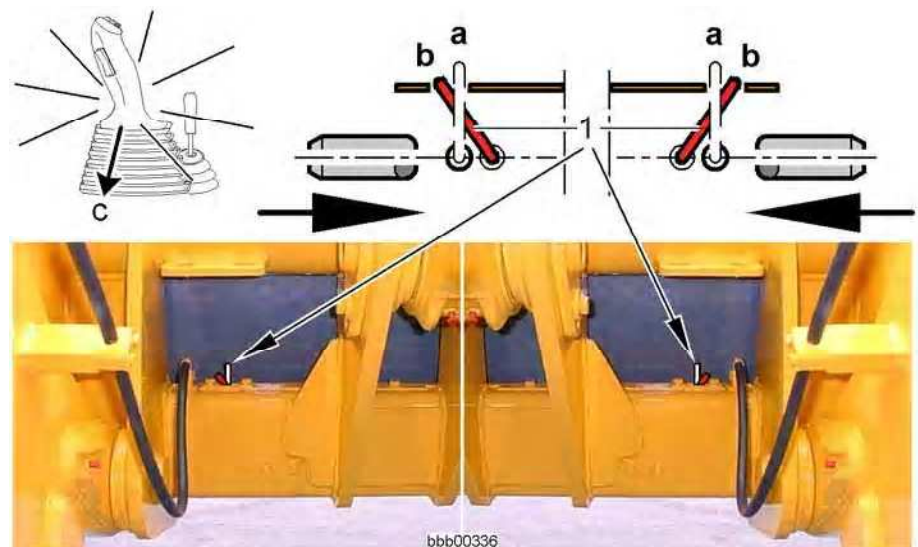
When you press the switch you will hear a warning signal from the instrument panel.

The function for unlocking the quick-change device is thus enabled.

Unlocking the quick-change device

The procedure for unlocking the quick-change device is as follows.

Make sure that the switch for the hydraulic quick-change device has been pressed.



Quick-change device as seen from the driver's cab

1 Mechanical indicator

a Locked position

LBH/01/003801/0003/15.05/en

b Unlocked position

- Completely retract the locking pins by moving the LH control lever in direction **c** (to tilt in the working attachment) to the stop and holding it in this position.

The locking pins for the quick-change device are retracted.

The position (retracted) of the locking pins is indicated mechanically by the display **1**.

Disconnecting the working attachment

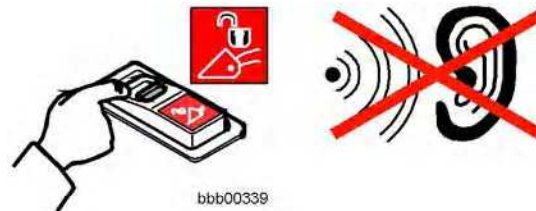
This is the procedure for detaching the working attachment.

If the working attachment has an independent hydraulic circuit, make sure the hydraulic supply lines have been disconnected.



There is a risk of accidents if the working attachment is incorrectly set down.

! Never set down the working attachment in unsecured areas (roadways etc.).



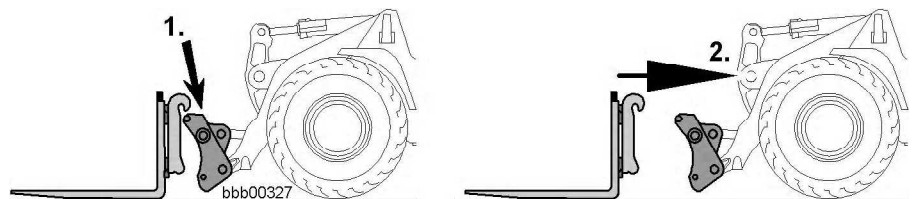
- Deactivate the quick-change device by pushing back the hydraulic quick-change device switch.

When you press the switch the warning signal from the instrument panel stops.

- Set down the working attachment flat on firm, even ground.

If the working attachment has an independent hydraulic supply, set down the working attachment in such a way that the hydraulic lines are not subjected to any strain.

- Secure the working attachment against tipping over.



- Carefully remove the quick-change device from the adapter holder at the top of the working attachment.

The working attachment is now disconnected.

Disconnecting hydraulic lines

Procedure: as described in the section on operating the hydraulic quick-change device for a Z-lift arm.

Picking up and connecting the working attachment

Procedure: as described in the section on operating the hydraulic quick-change device for a Z-lift arm.

LBH/01/003801/0003/15.05/en

Locking the quick-change device

The procedure for locking the quick-change device is as follows.

Make sure that:

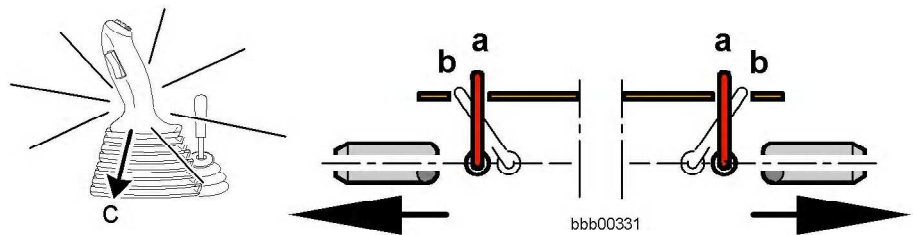
- The working attachment is completely engaged in the quick-change device, so that the working attachment can be locked in place with the locking pins.
- The switch for the hydraulic quick-change device is turned off.



Danger

There is a risk of accidents if the working attachment drops.

! Check whether the working attachment is fully engaged in the quick-change device.



- Completely extend the locking pins by moving the LH control lever in direction c (to tilt in the working attachment) to the stop and holding it in this position.

The locking pins for the quick-change device are extended.

The working attachment is now connected.

Checking that the working attachment is locked

This is how to check after locking.

Make sure that the quick-change device is in a suitable position for inspection.

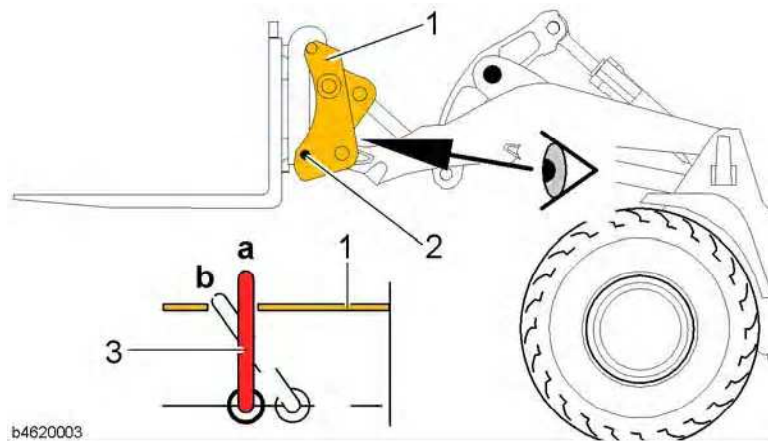


Danger

There is a risk of accidents if the working attachment drops.

! Do not carry out any working movements of the attachment before checking whether it is locked.

! Check whether the working attachment is securely locked to the quick-change device.



Visual inspection of quick-change device

1 Quick-change device

2 Locking pin

3 Mechanical indicator
a Locked position

b Unlocked position

- Move the lift arm up until it is possible to see the display **3**.
- Get out of the machine and visually check that the locking pins **2** have actually locked the working attachment.
- Carry out the inspection on both sides of the machine.

You can see that it is properly locked when the indicator 3 is upright. In addition, the locking pins 2 must have been inserted all the way to the outer borehole of the quick-change device 1.

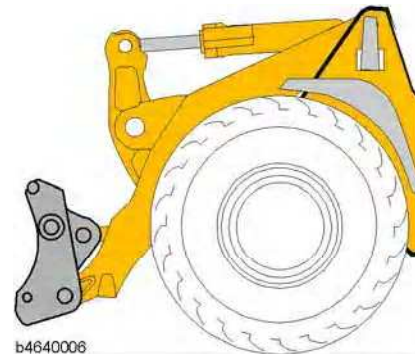
- Do not carry out any working movements of the attachment before performing the check.
- For operating a working attachment with its own control circuit, see the description in chapter 3 on the control lever for additional working functions and working with optional equipment (e.g. Using the high dump bucket).

Connecting the hydraulic lines

Procedure: as described in the section on operating the hydraulic quick-change device for a Z-lift arm.

3.3.11 Operating the combined electrohydraulic quick-change device with comfort control for Z lift arms.

This equipment is optional.



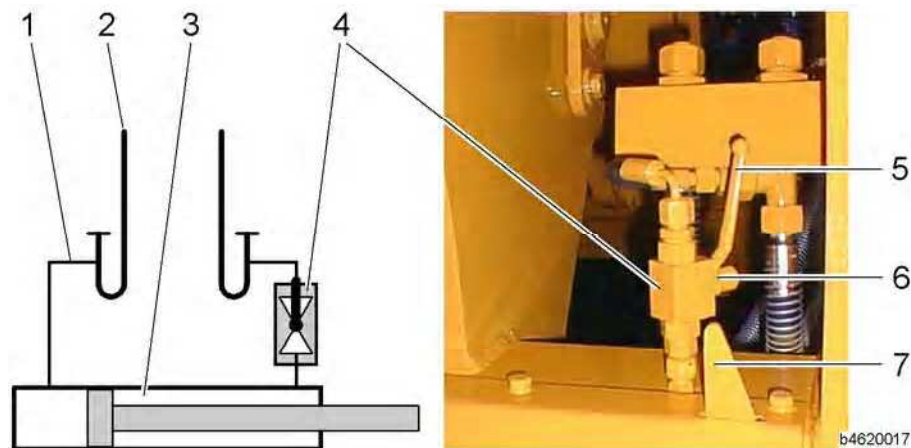
Quick-change device version:

- Combined electrohydraulic version with comfort control.
Electrical activation and deactivation using changeover valve and switch.
Hydraulic operation using the LH control lever.
- Mechanical locking indicator of the quick-change device.

Information on attachments and accessories:

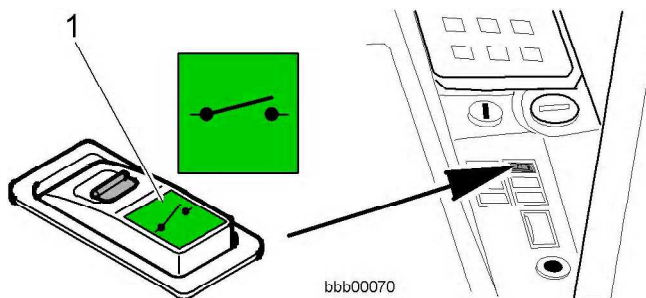
- **Attachments and accessories produced by third-party manufacturers or those which have not been generally approved by LIEBHERR for installation or for external fitting may not be installed or fitted on the machine without prior written consent from LIEBHERR.**
- **The appropriate technical documentation should be made available to LIEBHERR for this purpose.**

Activating the quick-change device



Hydraulic quick-change device

- | | |
|---------------------------------------|------------------------|
| 1 Supply line for quick-change device | 4 Changeover valve |
| 2 Supply line for accessory kit | 5 Switch lever |
| 3 Hydraulic cylinder | 6 Anti-twist lock |
| | 7 Mechanical indicator |



Comfort control

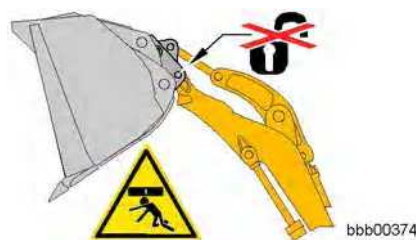
- 1 Comfort control switch

The combined, electro-hydraulically operated quick-change device with comfort control is activated and deactivated using the switch 1. This is how to activate the quick-change device.

Make sure that:

- The lift arm is lowered to just above the ground.
- Where a working attachment with an independent hydraulic supply is mounted, all cylinders, valves etc. are in the initial position or closed.
- Where a working attachment is fitted, make sure that it is tilted in.
- The changeover valve 4 is open.

See the description of activating the quick-change device in the section on operating the hydraulic quick-change device for Z lift arms (version 1).

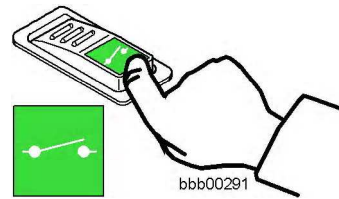


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Danger



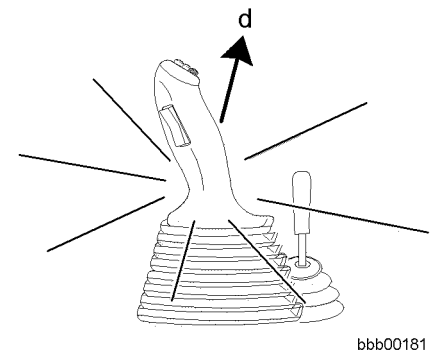
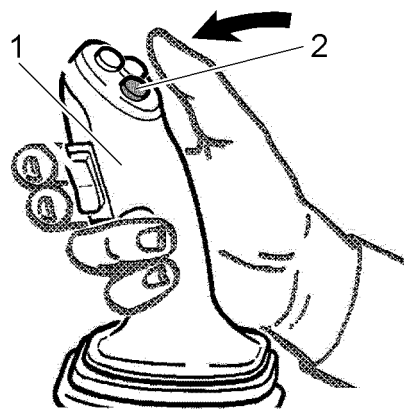
There is a risk of accidents if the working attachment drops.
 ! Do not actuate switch when the working attachment is raised.



- Press the switch forwards.
 The function for unlocking the quick-change device is thus enabled.

Unlocking the quick-change device

The procedure for unlocking the quick-change device is as follows.
 Make sure that the quick-change device has been activated using the comfort control switch 1.



LH control lever

- 1 LH control lever
- 2 Comfort control button

d Direction of movement

- Press the button 2 and hold it down.
 Press the button 2 to disable the function for operating the lift and tilt cylinders.
- Completely retract the locking pins by moving the LH control lever 1 in direction d (to tilt out the working attachment) to the stop and keep it in this position.

The locking pins for the quick-change device are retracted.

- When the locking pins are completely retracted:
 Release the button 2 and the LH control lever 1 again.
 Release the button 2 to enable the function for operating the lift and tilt cylinders again.

Disconnecting the working attachment

Procedure: as described in the section on operating the hydraulic quick-change device for Z lift arms.

Disconnecting hydraulic lines

Procedure: as described in the section on operating the hydraulic quick-change device for Z lift arms.

LBH101/003801/0003/5.05/en

Picking up and connecting the working attachment

Procedure: as described in the section on operating the hydraulic quick-change device for Z lift arms.

Locking the quick-change device

The procedure for locking the quick-change device is as follows.

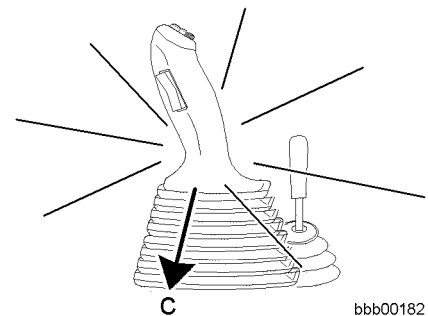
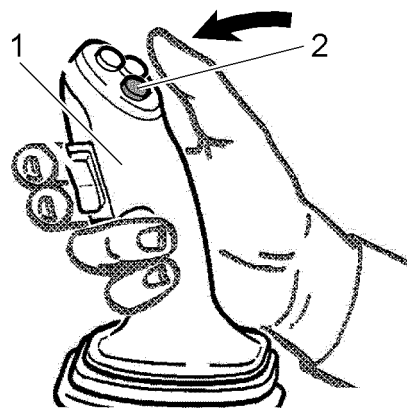
Make sure that:

- The working attachment is completely engaged in the quick-change device, so that the working attachment can be locked in place with the locking pins.
- The quick-change device is activated using the comfort control switch 1.



There is a risk of accidents if the working attachment drops.

! Check whether the working attachment is fully engaged in the quick-change device.



LH control lever

- 1 LH control lever
- 2 Comfort control button

c Direction of movement

- Press the button 2 and hold it down.

Press the button 2 to disable the function for operating the lift and tilt cylinders.

- Completely extend the locking pins. Move the LH control lever 1 in direction c (to tilt in working attachment) to the stop and keep it in this position.

The locking pins for the quick-change device are extended.

- When the locking pins are completely extended:
Release the button 2 and the LH control lever 1 again.

Release the button 2 to enable the function for operating the lift and tilt cylinders again.

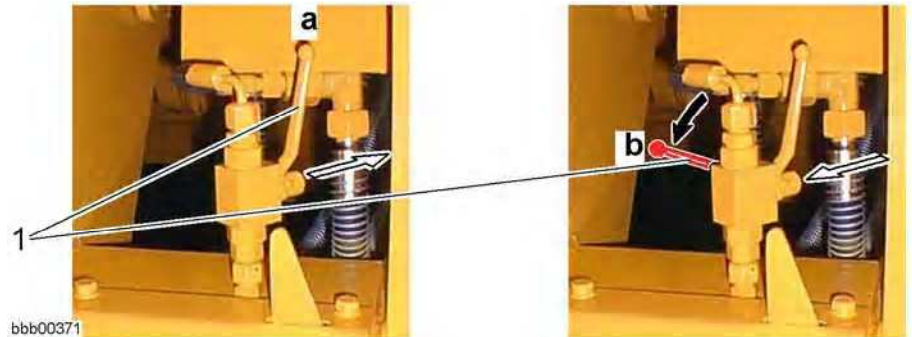
The working attachment is now connected.

Danger

There is a risk of accidents if the working attachment drops.

If the quick-change device is unintentionally unlocked, both personnel and the working attachment will be endangered.

! It is essential that the changeover valve is locked again after the locking procedure is finished.



Changeover valve

- After the locking procedure:
Deactivate (block) the quick-change device with the changeover valve.

Checking that the working attachment is locked

Procedure: as described in the section on operating the hydraulic quick-change device for Z lift arms.

Connecting the hydraulic lines

Procedure: as described in the section on operating the hydraulic quick-change device for Z lift arms.

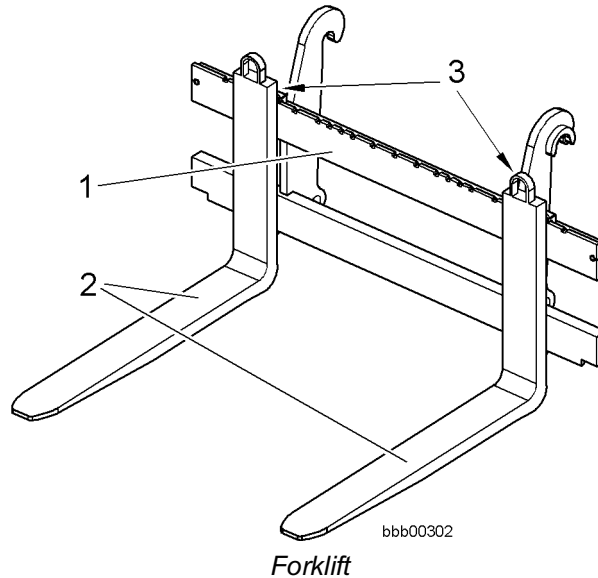
3.3.12 Forklift

This equipment is optional.

The forklift consists of the fork carrier and adjustable fork prongs.

The forklift is mounted using the quick-change device.

Use the forklift for picking up, transporting and transferring pallets, and for stacking.



1 Fork carrier
2 Fork prongs

3 Fork lock

For forklift operation with a P-kinematics lift arm:

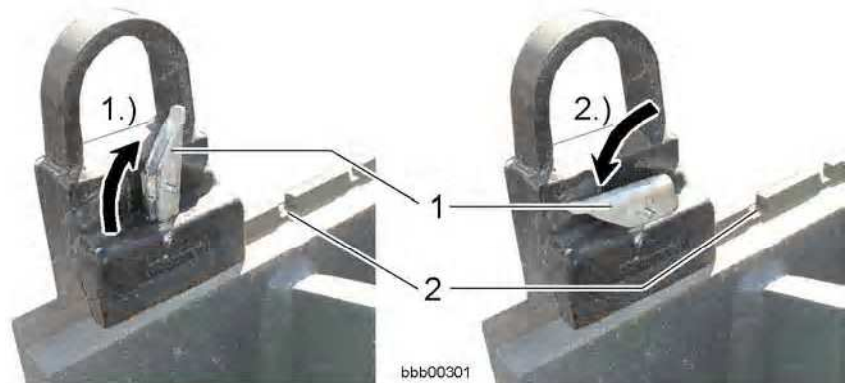
- This only applies for machines with a P-lift arm attached.
The parallel kinematics permit parallel guidance of the load over the entire lifting range during lifting or lowering.

For forklift operation with lift arms with Z-kinematics:

- No parallel movement is possible with a lift arm with Z-kinematics.
This means that the attachment tilts in during the lift movement up to 2/3 of the maximum lift height and then tilts out again, but does not tilt down forwards.
- The less favourable lever ratio of the Z-kinematics in the topmost lifting range means that the load bearing capacity may be restricted.
See the load tables for forklift operation in chapter 1.

Adjusting the prongs on the fork carrier

The fork prongs are attached to the fork carrier and are secured against slipping with the fork lock on the upper fork hook. This is how to adjust the prongs on the fork carrier:



1 Fork lock
2 Groove

1.) Opening the fork lock
2.) Closing the fork lock

- Open the fork lock 1.
 - Push the prongs to the correct position.
 - When closing the fork lock 1 let it latch in the groove 2.
- The prongs are held tight.

Jobs for the forks

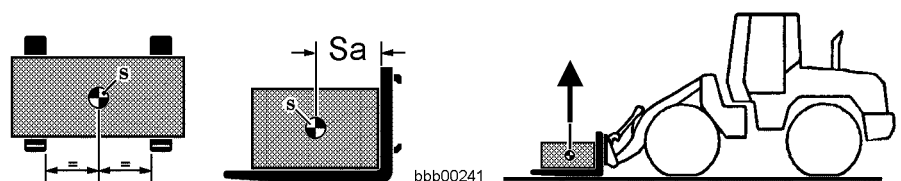


There is a risk of accidents if the forklift tilts out forward. If the forklift is not parallel to the ground (0°) in its starting position, it may tilt out forward.
! Avoid incorrect operation during forklift operation.

When lifting in forklift mode, the load is not parallel to the ground. This means when the forks are initially parallel (0° to the ground), when they are lifted two thirds of the full height:

- the attachment tilts in
- if lifted further, they tilt back out, but not forward.



The lever ratio of the kinematics in the topmost lifting range means that the load bearing capacity may be restricted. See the load tables for forklift operation in chapter 1. This is how to work in forklift mode.
Make sure that the working attachment and the quick-change device are safely locked. See the description in the sections on operating the quick-change device and checking that the working attachment is locked.



S Centre of gravity

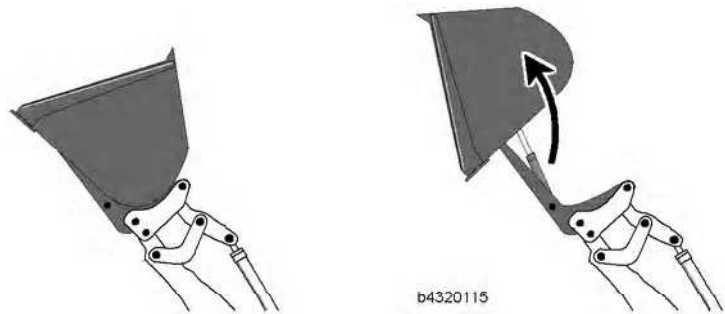
Sa Distance from centre of gravity

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- Caution**  There is a risk of damage to the load and the machine.
During forklift operation, only use forks with prongs of suitable length and make sure that these do not project beyond the load. Otherwise goods or pallets lying in front of the forks could be damaged.
! Avoid incorrect operation during forklift operation.
-
- When you pick up the load, make sure that the load is resting as close as possible to the vertical limb of the fork prong.
Pick up the load. Make sure that the centre of gravity **Sa** of the load is correctly positioned.
- Warning**  There is a risk of the machine tipping over.
! Avoid incorrect operation during forklift operation.
-
- Raise the lift arms to the transport position (30–40 cm above the ground).
 - When driving unloaded, tilt the forklift slightly in and carry it low.
 - When driving with a load, tilt the forklift slightly in and carry the load low.
 - When driving on slopes, always keep the load uphill.
 - Never drive across slopes.
 - Never turn on slopes.
 - If a high unloading position is required:
Do not raise the lift arms until just before reaching the unloading point.
 - If a low unloading position is required:
Do not lower the lift arms until just before reaching the unloading point.

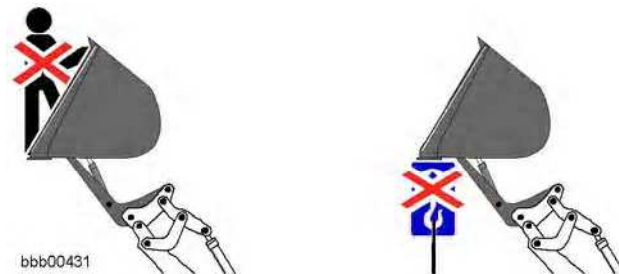
3.3.13 Using the high dump bucket

The high dump bucket is equipped with its own hydraulic circuit for the high dumping function.



This high dumping function means that the buckets are especially suitable for work requiring a great dump height, such as loading high-sided wagons.

It can be used for light materials such as wood shavings, sawdust and cereals.



The high dump bucket may not be used:

- To lift or transport persons.
- To carry lifting equipment (in other words, you may not attach crane hooks or similar items).
- For handling material heavier than the specific material weight.
See the technical data section in chapter 1.
- For breaking up rocks.
- For hammering in posts.
- Underground.

The manufacturer will not be held liable for damage caused by improper use (such as, for example, breaking off rocks, hammering in posts or attaching lifting gear).

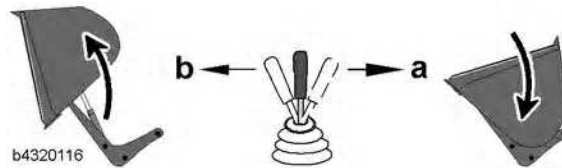
Function test

Before starting work:

- Carry out a function test without any load.
- Familiarise yourself with the operation of the high dump bucket.

Caution 

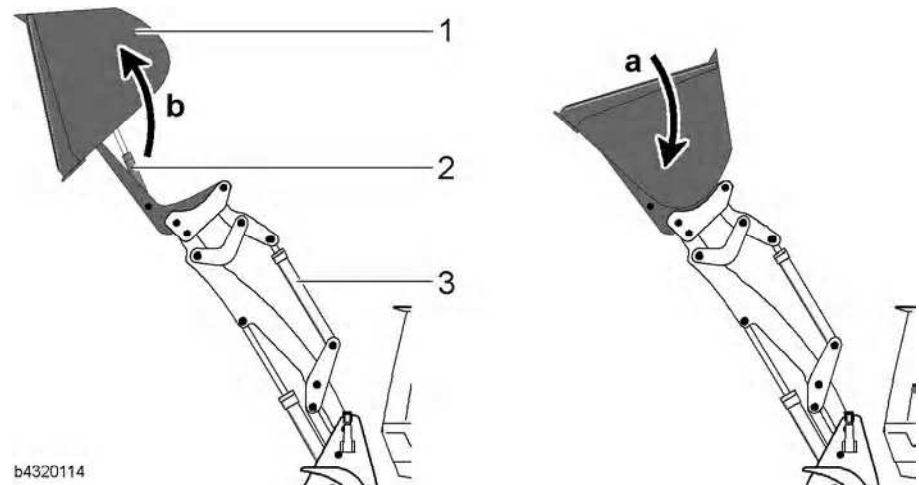
There is a risk of accidents if the hydraulic circuit is incorrectly connected.
! Check to see that bucket tilts in and out properly.



- Actuate the high dump bucket with the additional control lever to check if the hydraulic circuit of the high dump bucket is correctly connected.

Tilting the high dump bucket in and out

The high dump bucket is controlled using the additional control lever. See also the section on the control lever for additional working functions.



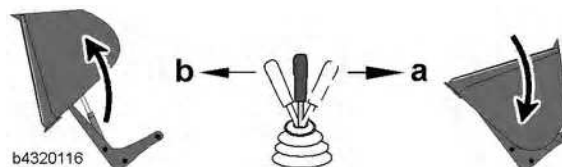
High dump bucket

- 1 Bucket body
- 2 Hydraulic cylinder for high dump bucket
- 3 Tilt cylinder for lift arm

Caution 

There is a risk of damage to the machine and the vehicle to be loaded. If the high dump bucket is not properly used, the side of the lorry, for example, may be damaged.

! When loading lorries or similar vehicles, only tip out the material using the hydraulic circuit of the high dump bucket.



- **Tilting out the high dump bucket:**
Move the additional control lever in direction **b**. The high dump bucket is tilted out.
- **Tilting in the high dump bucket:**
Move the additional control lever in direction **a**. The high dump bucket is tilted in.

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Loading using the high dump bucket

For high dump bucket operations such as loading light material, see the section on working methods.

3.3.14 Transferring timber

An optional attachment is available for transferring timber.



Tilt cylinder support

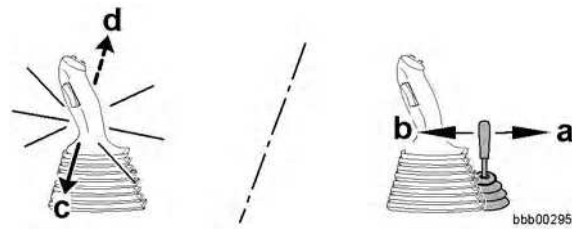
- | | |
|--------------------|--------------------|
| 1 Z-bar linkage | 4 Support fork |
| 2 Tilt cylinder | 5 Lubricating line |
| 3 Support cylinder | |

The support fork and the two support cylinders provide the necessary torque in the unloading position when carrying heavy equipment and loads. For the maximum payload, see the technical data section in chapter 1. This is how to transfer timber.

Make sure that the working attachment and the quick-change device are safely locked.

See the description in the sections on operating the quick-change device and checking after locking.

Using the timber grabber



The operation of the timber grabber can vary according to its design.

Versions:

- Operation using the additional control lever
 - Operation using the comfort control switch and LH control lever
- See also the section on the LIEBHERR control lever.

- **Before starting work:**

Carry out a function test without any load.

- Familiarise yourself with the operation of the attachment.
- For details on the function, operation and maintenance of the attachment:
See the manufacturer's operating manual.

Caution



There is a risk of accidents if the hydraulic circuit is incorrectly connected.
! Test the function of the attachment.

- Operate the attachment to check if the hydraulic circuit of the timber grabber is correctly connected.

Transferring timber

- **When you pick up the load:**

Make sure that the centre of gravity of the load is correctly positioned.



Warning

There is a risk of the machine tipping over.

! Avoid incorrect operation when transferring timber.

- Raise the lift arms to the transport position (30–40 cm above the ground).
- When driving unloaded, tilt the attachment slightly in and carry it low.
- When driving with a load, tilt the attachment slightly in and carry the load low.
- When driving on slopes, always keep the load uphill.
- Never drive across slopes.
- Never turn on slopes.

See also the section on working methods.

- If a high unloading position is required:
Do not raise the lift arms until just before reaching the unloading point.
- If a low unloading position is required:
Do not lower the lift arms until just before reaching the unloading point.

3.3.15 Transporting the machine

Lifting the machine by crane

It is essential to observe the accident prevention regulations when lifting the machine by crane.

See section on safety regulations when lifting the machine by crane in chapter 2.

Take the following precautions before lifting the machine by crane.

Precautions:

- Lower the working attachment and tilt back the loading equipment to its limit.
- Engage the articulation lock.
- Move all control levers to neutral.
- Engage the parking brake.
- Lock the working hydraulics.
- Shut down the engine.
- Close and lock all doors, hatches and hoods on the machine.

For detailed descriptions, see the section on operation and handling.

Find out about:

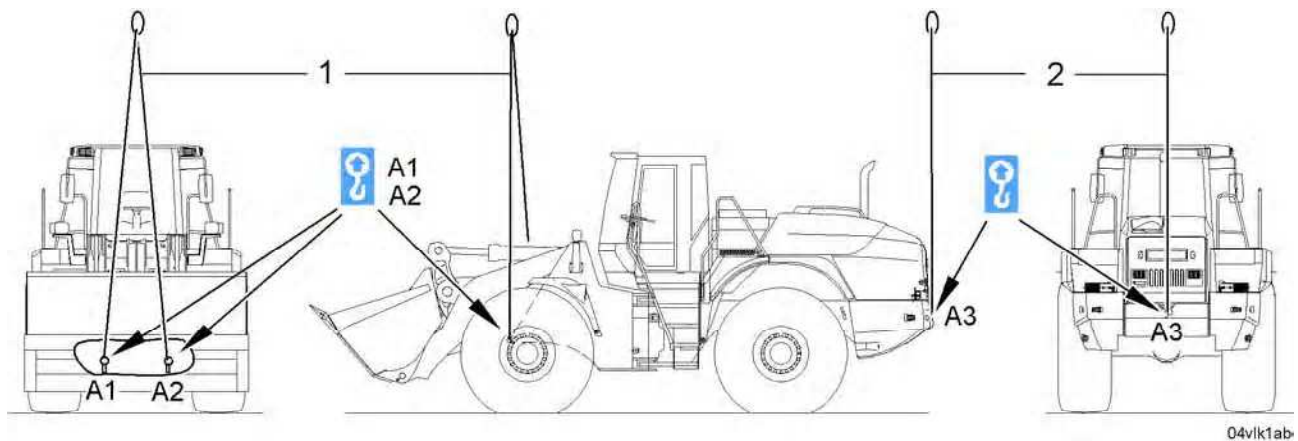
- The weight and collision masses of the machine: See the technical data section in chapter 1.
- The required load bearing capacity and lengths of the lifting tackle.

Loading for lorry or rail transport

This is carried out when the machine has to be loaded by crane.

Necessary equipment:

- Lifting tackle **1**: minimum rope length 5.0 m
- Lifting tackle **2**: Minimum rope length 4.5 m



Loading diagram 1

- 1 Lifting tackle – 2-strand rope
- 2 Lifting tackle – 1-strand rope

A1 Front right slinging and lifting point

A2 Front left slinging and lifting point

A3 Rear slinging and lifting point



There is risk of accidents if the suspended load falls.
 ! Never stand under the machine when it is suspended.

- Attach the lifting tackle to the slinging and lifting points **A1**, **A2**, **A3** provided on the machine.
- Carefully lift the machine and load it.



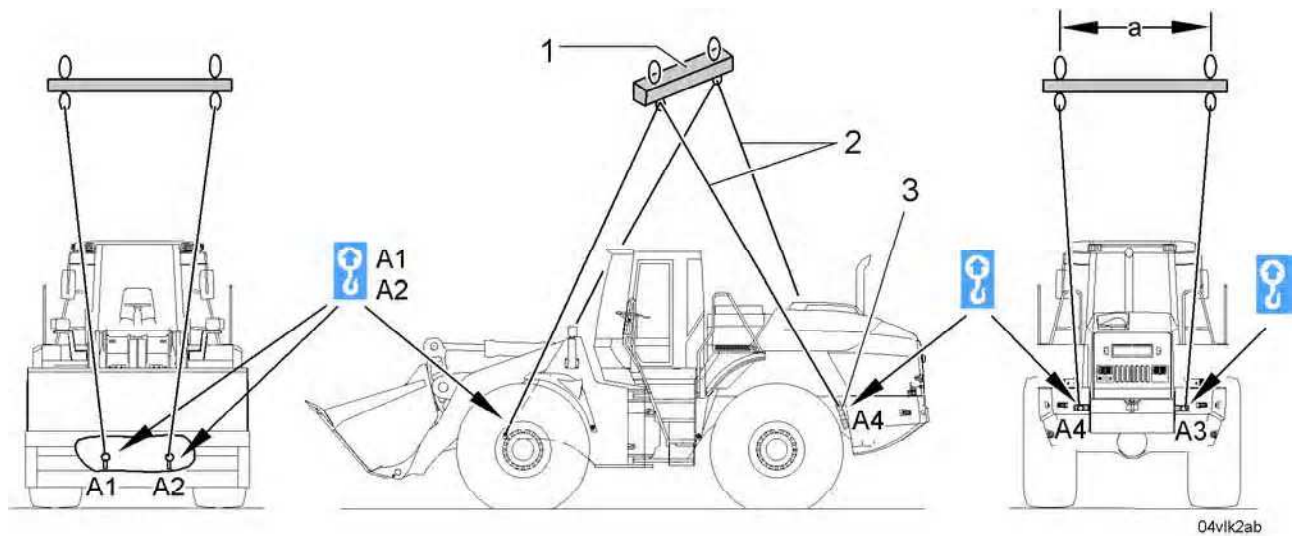
- Do not allow anyone under the raised machine.

Loading for sea transport

This is carried out when the machine has to be loaded by crane.

Necessary equipment:

- Slinging lug **3**: available as optional equipment – LIEBHERR order no. 9840127
- Slinging attachment or yoke **1** of the shipping company: minimum size **a** = 2.5 m
- Lifting tackle **2**: minimum rope length 5-6 m



Loading diagram 2

- 1 Towing device/yoke
- 2 Lifting tackle – 2-strand rope
- 3 Slings lug

- A1 Front right slinging and lifting point
- A2 Front left slinging and lifting point

- A3 Rear right slinging and lifting point
- A4 Rear left slinging and lifting point



There is risk of accidents if the suspended load falls.
 ! Never stand under the machine when it is suspended.

- Remove the left and right mudguards on the rear of the machine.
- Attach the slinging lug 3 to the rear left and right-hand side of the machine.
- Attach the lifting tackle to the slinging and lifting points A1, A2, A3, A4 provided on the machine.
- Carefully lift the machine and load it.

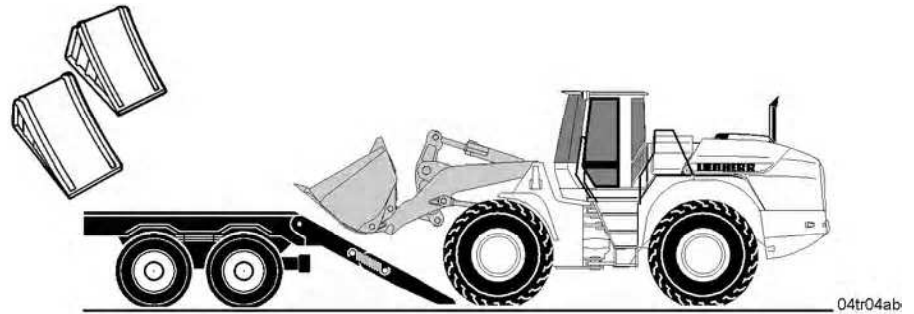


- Do not allow anyone under the raised machine.

Transporting the machine by lorry or rail

Before driving onto the loading area

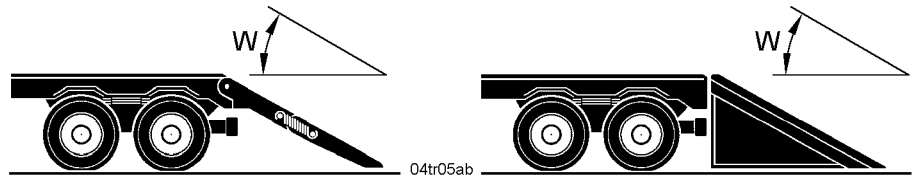
The following precautions must be taken before driving onto the loading area.



Loading the machine

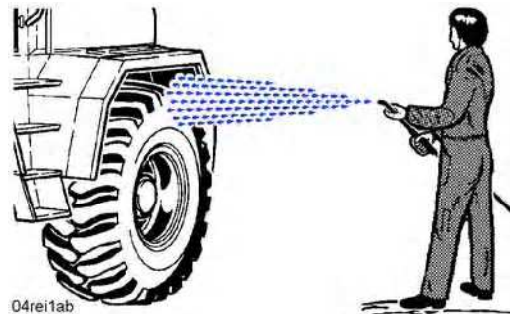
Precautions:

- Have wheel wedges ready.
- Have suitable tensioning ropes or chains ready to lash the machine down.



Ramp inclination

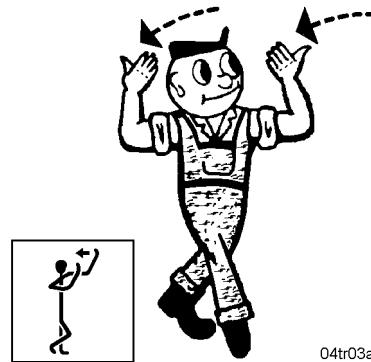
A ramp should be provided for driving the machine onto the loading area. The inclination of the ramp **W** may not exceed 30°.



Washing

Clean the tyres of snow, ice and mud before driving up the ramp.

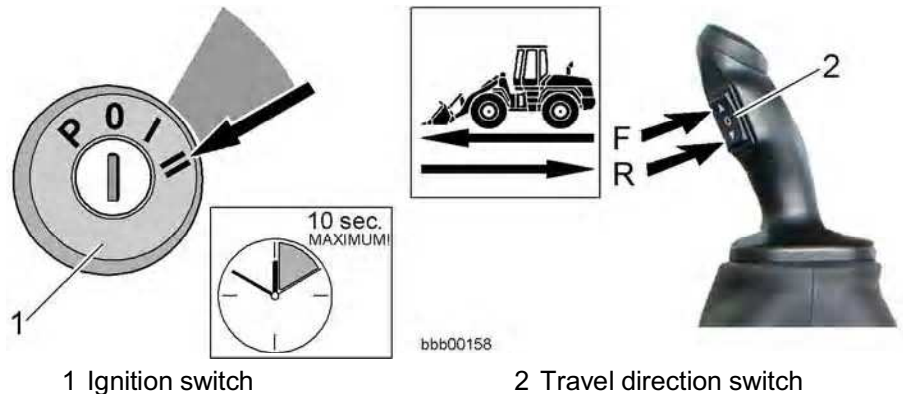
Driving onto the loading area For detailed descriptions, see the section on operation and handling.



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When driving onto the loading area have someone direct you. Make sure there is someone to give the driver the necessary signals. **Persons giving directions must always take up a position to one side of the machine.**

This is the procedure for driving onto the loading area:



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1 Ignition switch

2 Travel direction switch

- Start the engine.

This is the situation after the machine has been started:

- The default settings are the automatic travel range **A1-3** and the travel drive set to neutral **N**. These are both indicated by the symbol field on the display unit.
- The parking brake is automatically activated.

See also the sections on starting the diesel engine and driving mode.

- Release the parking brake.
- Select the travel direction.

Warning



There is a risk of accidents if the machine is driven without due care. Reckless driving can endanger those loading, directing and driving the machine.

! Always drive with due care when loading the machine.

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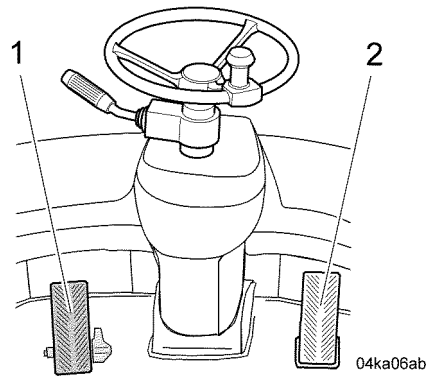
Caution 

There is a risk of damage if the machine is not driven with due care. Reckless driving can damage the transport vehicle and the machine.
! Always drive with due care when loading the machine.

- Push down the gas pedal carefully.
- Carefully drive the machine to the loading area and stop.

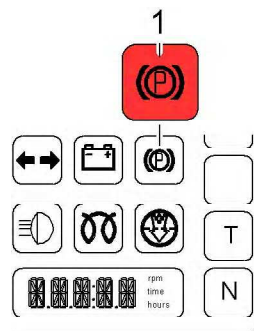
After driving onto the loading area

For detailed descriptions, see the section on operation and handling. Make sure that the air stream produced during transport cannot enter the exhaust pipe opening. This is especially important for rail transport, since the direction of travel cannot be known in advance.

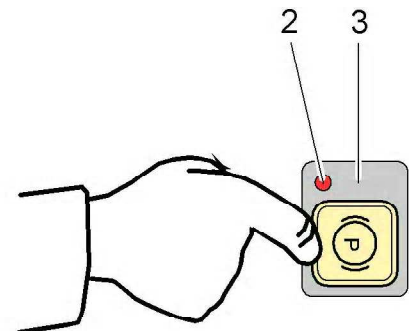


Inch/brake pedal and gas pedal

- Stop the machine.

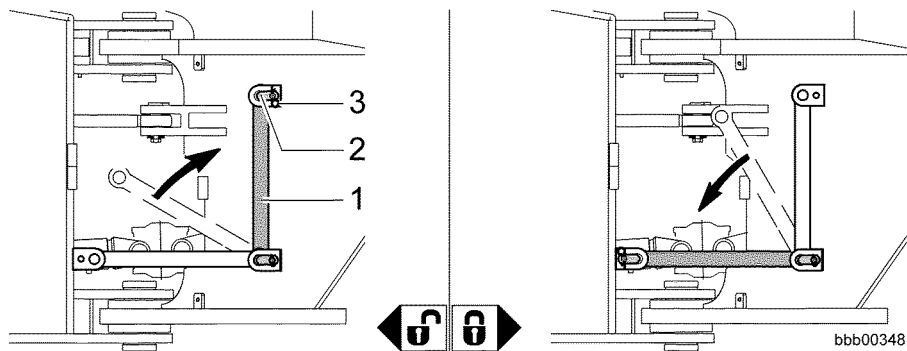


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Parking brake

- Engage the parking brake.

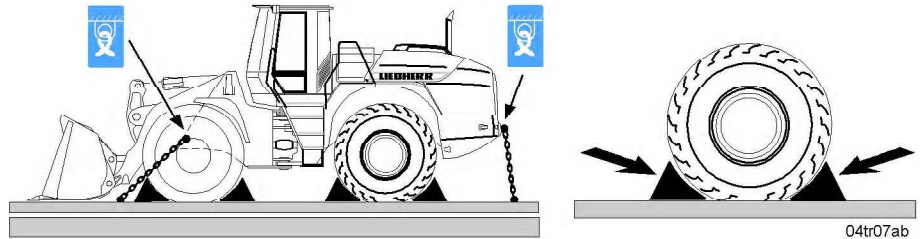


Articulation lock open / closed

- Engage the articulation lock.
- Bolt the locking bar 1 in the bottom position.

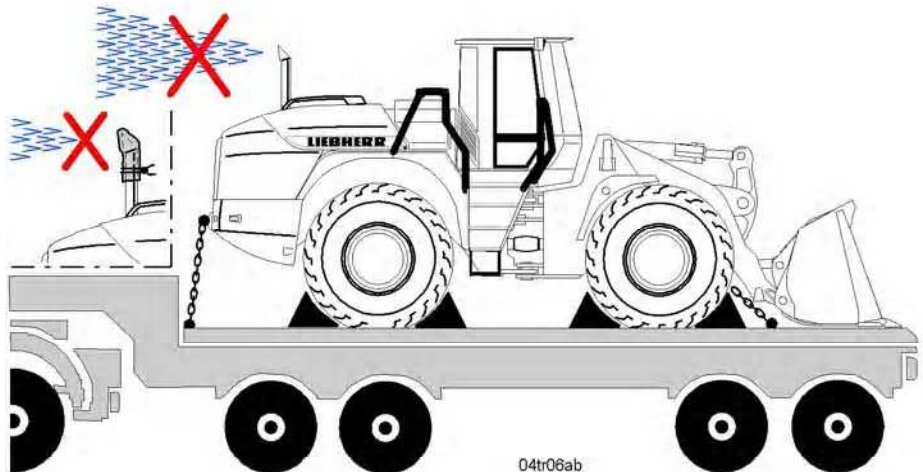
LBH/01/003801/0003/5.05/en

- Secure the pin **2** from falling out using the spring clip **3**.
- Lower the lift arms and lay the bucket down flat on the loading area.
- Turn off the engine.
- Close and lock all doors and hoods on the machine.



Lashing points

- Secure the machine against sliding using wheel wedges and tensioning ropes or chains.
- Fasten the ropes and chains securely to the indicated lashing points.



Exhaust pipe covering

If the machine is being transported facing backwards, air can blow into the exhaust pipe opening.

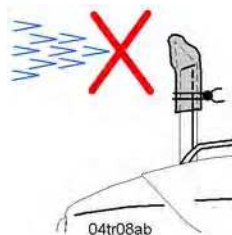
Take the following precaution to prevent damage during transport.

Caution 

There is a risk of damage to the turbocharger.
 If air blows into the exhaust pipe opening, it causes the turbocharger of the diesel engine to rotate.
 The turbocharger is not lubricated when the engine is not running.
 The turbocharger can be damaged if it is not lubricated.
 ! Prevent the air stream produced during transport from entering the exhaust.

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- To block off the exhaust pipe opening, climb onto the machine via the cab access, making sure that you have secure footing.



Blocking off the exhaust pipe opening

- Block off the exhaust pipe opening using airtight material which cannot slip.

3.4 Emergency operation

This section describes the emergency operations of the machine.

Emergency operations:

- Towing the machine
- Jump starting

3.4.1 Towing the machine

If the machine breaks down, you may have to tow it away from a hazardous area.

The following towing instructions only apply to exceptional situations where a machine incapable of independent movement has to be taken to a place where it can be repaired or transported.

Towing speed and towing distance:

- Maximum towing speed 2 km/h
- Only short distances are permitted, in order to move the machine away from a danger area.

Safety instructions for towing

Towing the machine can be difficult and is therefore entirely the responsibility of the operator.

In no event can damage or accidents resulting from towing be covered by the manufacturer's guarantee.

See the section on safely towing the machine in chapter 2.



Danger



Incorrect towing can cause accidents.

When a machine incapable of independent movement is not properly towed, the result could be severe or even fatal injuries.

! Always secure the machine against rolling away before releasing the brakes for towing.

- Follow all specified safety regulations and the following instructions when towing.

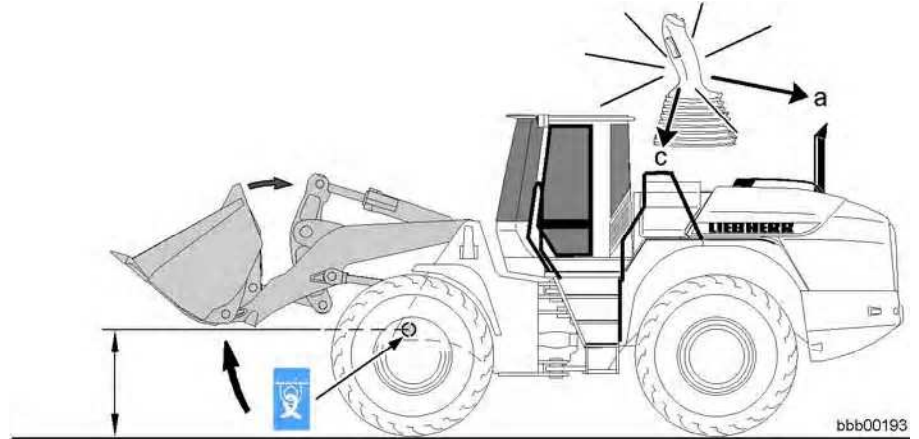
Towing with the engine running

The following precautions must be taken before towing the machine.

Precautions:

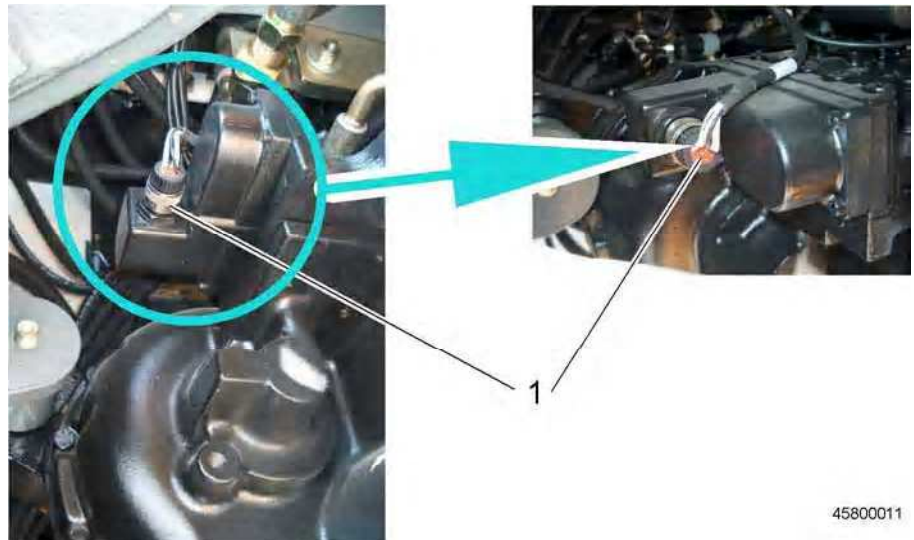
- Put the machine in the towing position.
- Deactivate all travel functions
- Release the parking brake.

This is how to tow the machine with the engine running.



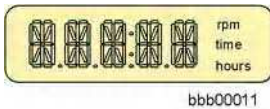
Towing position

- **Put the machine in the towing position.**
Raise the lifting gear above the towing drill hole.
- If the working attachment can be hydraulically operated, tilt in the bucket as far as it will go.



- Put all travel functions out of operation by removing the plug **1** from the transfer gear.

This disconnects the solenoid valve on the gearbox from the electronics.

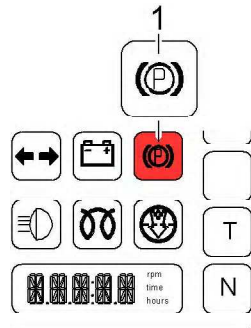


Segment display for service codes

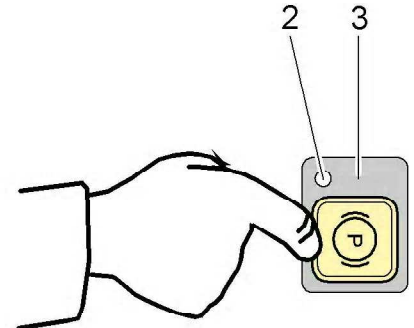
Error message:

- Service codes **E 75** and **E 76** are displayed in the segment field on the display unit.
- See the sections on the display unit and service codes on the display.

The machine's travel functions are now out of operation.



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Control unit

1 Parking brake symbol field
2 LED

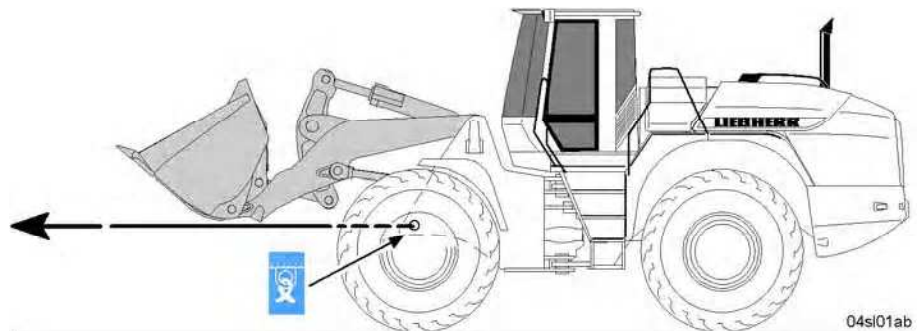
3 Parking brake button

- Press the button **3** to release the parking brake.

The LED **2** on the button **3** goes out.

The symbol field **1** for the parking brake goes out.

The parking brake is released and the machine can now be towed.



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Towing

- Feed the two towing ropes through the bore holes in the front section and secure them.
- Tow the machine out of the danger area.
- **When towing has been completed:**
Reattach the plug **1** to the transfer gear.

This connects the solenoid valve on the gearbox to the electronics.

The machine's travel functions are operational again.

Towing with the engine not running

If the machine has suffered a serious breakdown such as engine failure, the braking and steering functions will be impaired.

Since the brake accumulator is not filled when the diesel engine is not running, the service brake becomes ineffective after it is used a few times.

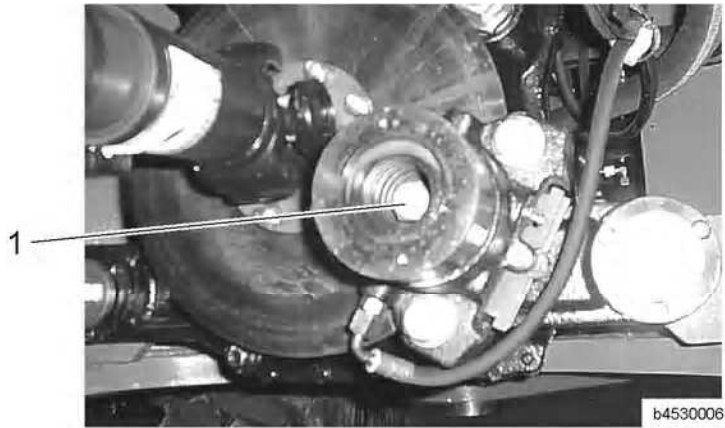
Make sure that the parking brake has been mechanically released before towing the machine away.

This is how to tow the machine without the engine running.



There is a risk of accidents if the machine suddenly rolls away.
! Secure the machine against rolling away.

- Release the parking brake mechanically.
- Take off the cover.



Parking brake

- Loosen the counter nut.
- Loosen the adjusting screw 1 until the brake pad no longer touches the brake disc.

This releases the parking brake.



There is a risk of accidents when the machine is in tow.
Since the steering function is restricted, there is a risk of accidents when the machine is being towed.

! When towing the machine, use the emergency steering function.

- See the section on towing the machine when the steering system has failed.
- Only tow the machine using the tow bar.
- **When towing has been completed:**
Correctly reset the parking brake.

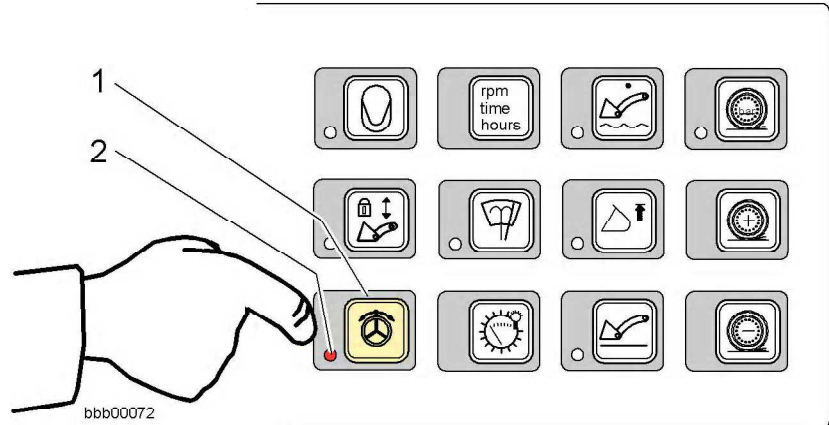
Towing the machine when the steering system has failed

If the ignition is on, you can steer using the emergency steering pump repeat start function.

Make sure that the electrical system is switched on.



How to operate the emergency steering pump repeat start function.



Control unit

- 1 Emergency steering button
- 2 LED

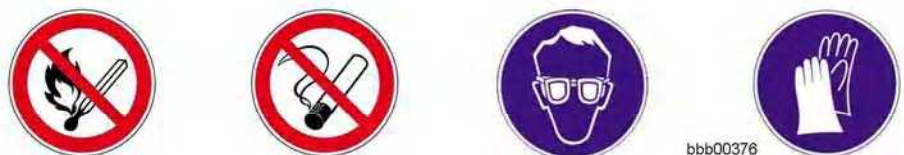
- If you need to turn the steering wheel while towing:
Press and hold down the emergency steering button **1**.
The LED **2** on the button indicates that the function is active.
The emergency steering symbol field lights up when the emergency steering function is activated. See also the description of the display unit in the section on operation.
A thermostat in the emergency steering pump protects it from overheating. When a set temperature is exceeded, the electric motor switches off. Only when it cools down can the emergency steering pump be started again.

3.4.2 Jump starting

If you have problems starting because the batteries are flat, the machine can be jump started with external batteries. Make sure you have taken all the following safety precautions.

Connecting an external battery

How to jump start the machine.

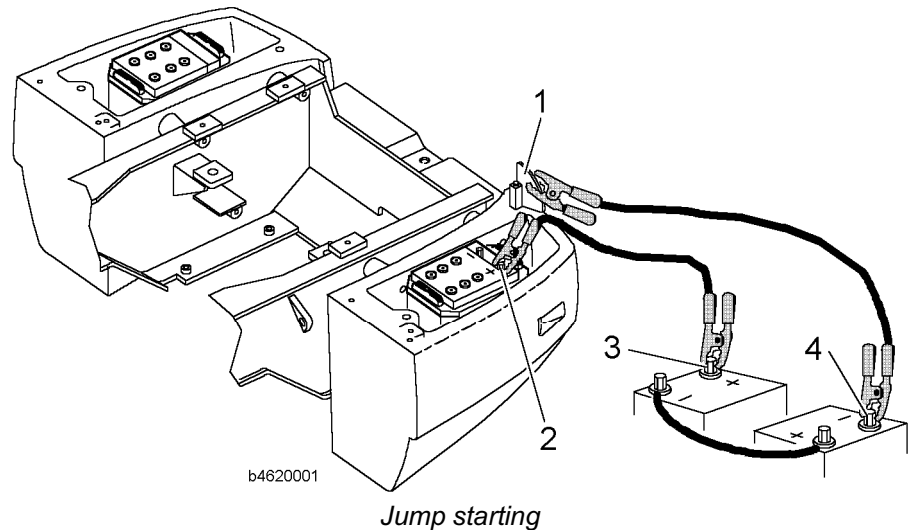


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Danger

There is a risk of accidents due to incorrect or careless jump starting. Excess gas can form when you connect an external battery to old batteries. There is a risk of explosions.
! Therefore avoid naked flames and sparks near the batteries.
! Wear protective gloves and goggles when jump starting.
! Only use sufficiently thick jump leads.
! Make sure you connect and disconnect the jump leads in the right order.

LBH/01/003801/0003/15.05/en



1 Earth point on machine frame
2 Positive terminal of the flat battery

3 Positive terminal of the external battery
4 Earth point of the external battery

- First connect one jump lead to the positive terminal of the flat battery **2** and then to the positive terminal of the external battery **3**.
- Connect the second jump lead to the earth point of the external battery **4** and then to the earth point on the vehicle frame **1**.
- Start up the engine. See the section on starting the engine.

Disconnecting the external battery

Before removing the jump leads, you must shift the engine to low idling speed.

Excess voltage can be avoided by switching on major consumers such as floodlights.

- First disconnect the jump lead from the earth point on the vehicle frame **1** and then from the earth point on the external battery **4**.
- Then remove the second jump lead from the positive terminal of the external battery **3** and then from the positive terminal of the flat battery **2**.

4 Malfunctions

Warning and error messages

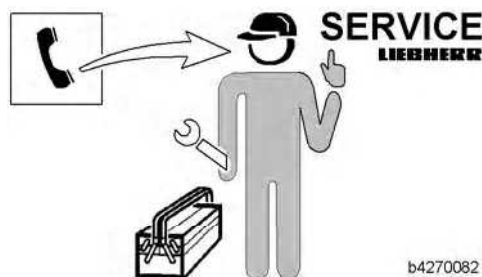
- Various faults are indicated by the corresponding symbol fields (visually) or by display instruments on the instrument panel.
See the section on the display unit in chapter 3.
- Some warning functions are accompanied by audible warning signals.

Finding and eliminating errors and malfunctions

- Faults can often be traced back to incorrect operation or servicing of the machine.

Therefore, carefully read the appropriate section of the operating manual each time a fault occurs.

- **Analyse the cause of the fault and correct it immediately.**
- Describe the fault and all related circumstances as accurately as possible if you contact **LIEBHERR CUSTOMER SERVICE**.
Precise information helps to locate and eliminate the cause of the fault. This means that the exact type and serial number of the machine need to be stated.
- Never perform any work for which you have not been trained or instructed.



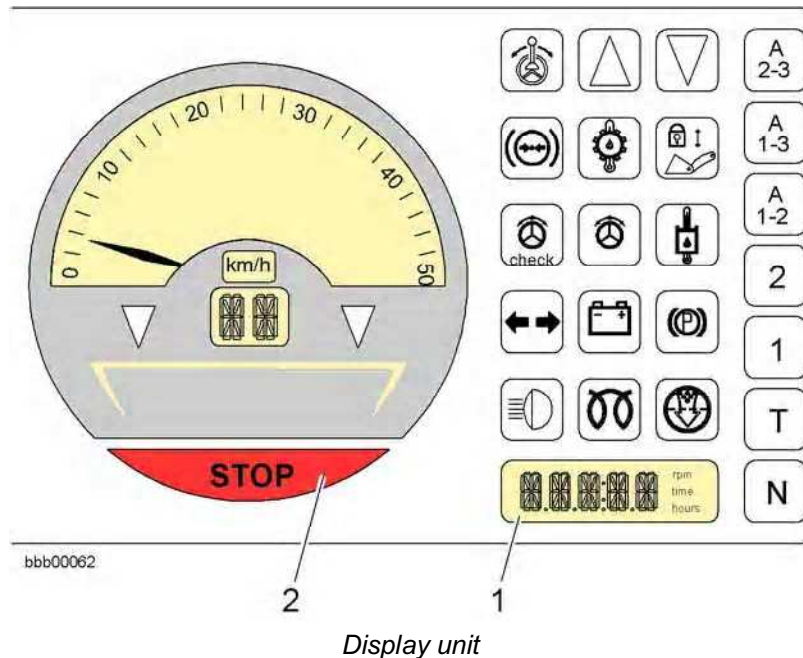
If you cannot identify the cause of the fault with the service code tables, or are not able to remedy the fault, contact LIEBHERR CUSTOMER SERVICE.

4.1 Service Code Table

4.1.1 Service code indication on the display

The MC6 microcontroller monitors many of the machine's functions. It monitors for short circuits, cable rupture, external voltage and incorrect input and output signals.

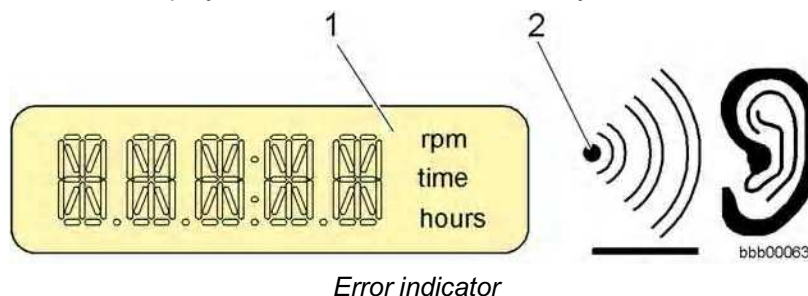
In addition, the microcontroller continuously checks the program sequence and communication with the display unit.



1 Service code display

2 STOP display

If a fault occurs while you are setting up or operating the machine, it is shown on the display unit and stored in the memory.



Error indicator

The following must be taken into account:

- The service code is displayed in the segment field 1.
- Service codes 11 to 31 are not indicated by the display unit.
- All service codes are stored in the service code memory and can be read using the BODEM software.
- All service codes are accompanied by a single beep.

Malfunctions and their effects

Every malfunction has a defined effect. This is specified in the "Effect" column of the service code table. Restricted driving is usually still possible.

If malfunctions occur which can damage the machine:

- The machine is shut down.
- Neutral travel direction is automatically selected and the machine coasts to a halt.
- This is indicated by the STOP display 2 on the display unit.

Make a note of the service code, as it disappears from the segment field of the display unit when the ignition is switched off.

Have LIEBHERR CUSTOMER SERVICE rectify the fault.

Service-Code	Symptom	Cause	Solution
E 11	Service hours display defective	Incorrect RAM information for service hours (error in the main electronics)	Contact LIEBHERR CUSTOMER SERVICE
E 18	Fan rotating at high speed and tractive force adjustment active	Cable rupture or short circuit in hydraulic oil temperature sensor B8	Contact LIEBHERR CUSTOMER SERVICE
E 19	Fan rotating at high speed and tractive force adjustment active	Cable rupture or short circuit in cooling water temperature sensor B21	Contact LIEBHERR CUSTOMER SERVICE
E 20	Coolant temperature symbol field H13 flashes, warning buzzer sounds continuously	Cable rupture or short circuit in cooling water temperature sensor B20	Contact LIEBHERR CUSTOMER SERVICE
E 21	Engine oil pressure symbol field lights up	Engine oil pressure too low or sensor defective	Check engine oil level
E 22	Engine overheating and coolant level symbol field H13 lights up	Coolant level too low	Check coolant level, check level switch B13
E 24	Brake accumulator pressure symbol field lights up	Brake accumulator pressure too low or defective pressure switch (B19)	Contact LIEBHERR CUSTOMER SERVICE
E 25	No display or display frozen	MC-6 not sending data to the control electronics A1 (CPU)	Contact LIEBHERR CUSTOMER SERVICE
E 26	Engine overheating and coolant level symbol field H13 flashes	Coolant temperature too high (B20)	Check cooler for dirt, contact LIEBHERR CUSTOMER SERVICE
E 27	Engine oil pressure symbol field lights up	Engine oil pressure too low or switch (B7) defective	Check engine oil level, contact LIEBHERR CUSTOMER SERVICE

Service-Code	Symptom	Cause	Solution
E 30	No effect	Diesel engine speed too low (< 500 min ⁻¹)	Contact LIEBHERR CUSTOMER SERVICE
E 31	No display or display frozen	Communication problem between the display unit A13 and the control electronics A1 (CPU)	Contact LIEBHERR CUSTOMER SERVICE
E 60	Outputs remain de-energised	Starting condition not fulfilled (output speed below 1 km/h)	Contact LIEBHERR CUSTOMER SERVICE
E 61	STOP, the machine is shut down	Communication problem between the MC6 master board and the control electronics A1 (CPU)	Contact LIEBHERR CUSTOMER SERVICE
E 62	STOP, the machine is shut down	Communication problem between the MC6 master board and the slave board	Contact LIEBHERR CUSTOMER SERVICE
E 65	No effect	Battery voltage below 17V	Check the battery and charge
E 66	No effect	Battery voltage below 17V	Check the battery and charge
E 67	No inching function	No signal from the angle sensor or the inching parameter is set to 255	Contact LIEBHERR CUSTOMER SERVICE
E 68	Pump does not reduce flow	Current min Vmax parameter at 800 mA	Contact LIEBHERR CUSTOMER SERVICE
E 69	Reduced tractive force	Inch pedal does not return to 0 position, pedal is dirty	Clean pedal, contact LIEBHERR CUSTOMER SERVICE
E 70	STOP, the machine is shut down	Faulty current at the control pressure proportional valve Y15	Contact LIEBHERR CUSTOMER SERVICE
E 71	Only reverse travel possible	When the forward travel solenoid valve Y2 is activated, current is below 150 mA, or there is no voltage at the digital output	Contact LIEBHERR CUSTOMER SERVICE
E 72	Only forward travel possible	When the solenoid valve Y3 is activated, current is below 150 mA, or there is no voltage at the digital output	Contact LIEBHERR CUSTOMER SERVICE
E 73	Fixed gear 2 engaged, kick-down not possible	Faulty current at proportional solenoid Y27 on variable displacement motor 1	Contact LIEBHERR CUSTOMER SERVICE

Service-Code	Symptom	Cause	Solution
E 74	Fixed gear 1 is engaged and variable displacement motor 1 is set to a wide angle to prevent overspeed	Faulty current at the proportional solenoid Y28 on variable displacement motor 2	Contact LIEBHERR CUSTOMER SERVICE
E 75	Travel range 2-3 is selected, kick-down is not possible	Faulty current at gear solenoid 1 Y6.1	Contact LIEBHERR CUSTOMER SERVICE
E 76	Fixed gear 1 is engaged and variable displacement motor 1 is set to a wide angle to prevent overspeed	Faulty current at the gear solenoid 2 Y6.2	Contact LIEBHERR CUSTOMER SERVICE
E 77	Fixed gear 2 is engaged	Faulty current at the gear solenoid 3 Y6.3	Contact LIEBHERR CUSTOMER SERVICE
E 78	Automatic rear axle brake not working	Faulty current at the rear axle brake solenoid Y 16	Contact LIEBHERR CUSTOMER SERVICE
E 80	Fixed gear 1 engaged, travel only via diesel speed	Gas potentiometer voltage 0.3 V outside set limits	Contact LIEBHERR CUSTOMER SERVICE
E 81	Inching function switched off over a 20 second ramp	Inching potentiometer voltage 0.3 V outside set limits	Contact LIEBHERR CUSTOMER SERVICE
E 83	STOP, the machine is shut down	Implausible input combination from the travel direction switch	Contact LIEBHERR CUSTOMER SERVICE
E 84	Kick-down function is not active	The kick-down button has been active longer than 2 minutes after starting	Contact LIEBHERR CUSTOMER SERVICE
E 85	Driving only possible in 1st gear with the motors at the maximum swivel angle	The diesel engine speed is 0 after having been over 800 rpm ⁻¹ .	Contact LIEBHERR CUSTOMER SERVICE
E 87	Driving only possible in 1st gear with the motors at the maximum swivel angle	The speed of motor 1 does not match the output speed and the speed of motor 2	Contact LIEBHERR CUSTOMER SERVICE
E 88	Driving only possible in 1st gear with the motors at the maximum swivel angle	The speed of motor 2 does not match the output speed and the speed of motor 1	Contact LIEBHERR CUSTOMER SERVICE

Service-Code	Symptom	Cause	Solution
E 89	Driving only possible in 1st gear with the motors at the maximum swivel angle	The variable displacement motor speed is greater than the output speed	Contact LIEBHERR CUSTOMER SERVICE
E 90	STOP, the machine is shut down	Excessive speed difference between the output and variable displacement motors	Contact LIEBHERR CUSTOMER SERVICE
E 91	The machine switches to neutral. The driver can select the travel direction after the speed drops	The speed of one or both variable displacement motors is too high	In future brake and drive at a lower speed when going downhill
E 92	Travel pump power reduced, 1 second long beep every 10 seconds	Current at control pressure proportional valve limited due to excess hydraulic oil temperature	Contact LIEBHERR CUSTOMER SERVICE
E 94	Initially no effect, later overspeed service code 91	Variable displacement motor 1 turns with open coupling 1 and 3	Contact LIEBHERR CUSTOMER SERVICE
E 95	Initially no effect, later overspeed service code 91	Variable displacement motor 2 turns with open coupling 2	Contact LIEBHERR CUSTOMER SERVICE
E 96	The machine switches to neutral. The driver can select the travel direction after the speed drops	Automatic braking due to excess diesel engine or variable displacement motor speed for more than 3 seconds / driver has driven too fast downhill	In future brake and drive at a lower speed when going downhill or contact LIEBHERR CUSTOMER SERVICE
E 97	The output of the travel pump is reduced. 1 second long beep every 10 seconds.	Current at control pressure proportional valve limited due to excess coolant temperature	Contact LIEBHERR CUSTOMER SERVICE
E 98	Shift to neutral, after the engine speed drops the travel direction can be engaged again	Engine speed too high / driver has driven downhill too fast	In future brake and drive at a lower speed when going downhill
E 99	Continued driving is only possible in fixed gear 1 or 2	Gear oil temperature over 120 °C	Clean gear oil cooler, contact LIEBHERR CUSTOMER SERVICE
E A1	Type L564 is selected by default	MC6 has no device type in the EPROM	Enter using Bodem

Service-Code	Symptom	Cause	Solution
E A2	Machine stopped, continued driving only possible with joystick OFF	Joystick steering potentiometer voltage outside the set range	Check wiring harness, correct using Bodem
E A3	Machine stopped, continued driving only possible with joystick OFF	Conflicting redundant signals at joystick potentiometer	Contact LIEBHERR CUSTOMER SERVICE
E A4	Machine stopped, continued driving only possible with joystick OFF	Faulty current via the right joystick proportional solenoid	Contact LIEBHERR CUSTOMER SERVICE
E A5	Machine stopped, continued driving only possible with joystick OFF	Faulty current via the left joystick proportional solenoid	Contact LIEBHERR CUSTOMER SERVICE
E A6	Joystick steering is deactivated	Failed deactivation test. (The main electronics cannot switch off the proportional valve current)	Contact LIEBHERR CUSTOMER SERVICE
E B0	Couplings are open. Driving is not possible, no hydrostatic brake effect	Engine current comparison mode	Contact LIEBHERR CUSTOMER SERVICE

4.1.2 Visible and audible warning signals



The following table contains the warning signals which have an additional audible tone or which are only displayed visually, along with their causes and remedies.

There are four different audible warning signals:

- Continuous tone
- Interval tone (1 second tone followed by 10 second pause)
- Interval tone (2 second tone followed by 3 second pause)
- Single 1 second beep

LBH/01/003801/0003/5.05/en

Warning signal	Cause	Remedy
Coolant temperature symbol field (H13) flashes and STOP symbol field lights up, continuous warning buzzer	Coolant temperature above 102 °C (B20)	Clean the cooling system Check the fan speed
	Error in the cooling or electrical system	Check the temperature sensor B20 Compare the temperature between B20 and B21. If the temperature at B21 is too low, check the diesel engine thermostat
Coolant temperature symbol field (H13) and STOP symbol field light up, continuous warning buzzer	Coolant level too low (B13)	Check the coolant level
	Error in the electrical system	Check the coolant level transmitter B13
Service code E 92 Hydraulic oil overheating symbol field (H23) lights up Warning buzzer with interval tone Tone sequence: 1 second tone followed by 10 seconds pause The output of the travel pump is reduced	Hydraulic oil temperature above 95 °C (B8)	Clean the cooling system Check the fan speed
	Fault in the cooling / hydraulic / electrical system	Check the temperature sensor B8 Check the wiring to the main electronics Check the working hydraulics pressure relief valves (control valve block) Check the travel hydraulics pressure relief valves (variable adjustment pump)
Service code E 97 Warning buzzer with interval tone Tone sequence: 1 second tone followed by 10 seconds pause The output of the travel pump is reduced	Coolant temperature above 97 °C (B21)	Clean the cooling system Check the fan speed
	Error in the electrical system	Check the temperature sensor B21 Check the wiring to the main electronics
Emergency steering check symbol field (H24) lights up	Emergency steering pump check not successfully completed (B3a)	Check the emergency steering pump
	Error in the electrical / hydraulic system	Check the pressure switch B3a Check the wiring to the main electronics Check the emergency steering pump pressure
Emergency steering symbol field (H8) lights up, warning buzzer with interval tone Tone sequence: 2 second tone followed by 3 seconds pause, after 1 minute: Stop symbol field (H36) lights up, travel direction fails	Emergency steering function activated due to failure of steering pump (B3)	Check the steering pump
	Error in the electrical / hydraulic system	Check the pressure switch B3 Check the steering pump standby pressure
Engine oil pressure symbol field (H4) flashes Stop symbol field (H36) lights up After 10 seconds continual warning buzzer	Insufficient engine oil pressure (B7)	Check the oil level
	Error in the diesel engine lubricating oil supply	Check the pressure relief valve
	Error in the electrical system	Check the pressure switch B7 Check the wiring to the main electronics

Warning signal	Cause	Remedy
Service code E 99 Gear oil overheating symbol field (H14) lights up Driving only possible in 1st or 2nd gear	Gear oil temperature over 120°C (B14)	Clean the gear oil cooler
	Oil level too high	Correct the oil level
	Error in the electrical system	Check the thermo switch B14 Check the wiring to the gear electronics A2
Accumulator pressure symbol field (H19) lights up No travel direction can be selected, after 2 minutes continual warning buzzer	Brake accumulator pressure too low (B19)	Start the engine: the brake accumulators are filled while the engine runs
	Error in the electrical / hydraulic system	Check the pressure switch B19 Check the wiring to the main electronics Check the accumulator charge valve Check the gear pump
Battery charge symbol field (H6) lights up The parking brake cannot be released	Torn V-belt	Fit a new V-belt
	Defective alternator	Repair the alternator Check the wiring to the main electronics
Service code segment display (P7) shows the service code, single 1-second beep		Refer to the service code tables

4.1.3 Troubleshooting the LIEBHERR automatic central lubrication system

This equipment is optional.

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Malfunction	Cause	Remedy
Green indicator light displays a 1.5 second flashing code immediately after the ignition is turned on.	LIEBHERR automatic central lubrication system is active.	
Green indicator light does not display a 1.5 second flashing code immediately after the ignition is turned on.	LIEBHERR automatic central lubrication system is not energized. No voltage from terminal 15 to terminal 5. No earth connection with the control device or the indicator light. Indicator lamp is defective. Wiring between the power source and the control device or between the control device and the indicator light interrupted.	Immediate action is required. Check fuse F9 and change if necessary. Check earth connection and re-establish if necessary. Replace indicator lamp. Check wiring and repair if necessary. Contact LIEBHERR CUSTOMER SERVICE
Green test lamp lights up for a longer period.	LIEBHERR automatic central lubrication system is active and a lubrication cycle is currently being performed.	
Green and red indicator lamps flash (1 sec. on / 1 sec. off). Grease is emerging from the pressure relief valve.	The cycles set could not be performed in the time specified.	One or more lubrication points blocked. One or more distributors blocked.
Red indicator lamp lights up constantly.	Minimum grease level reached in the container.	Refill the container (malfunction message is automatically reset).
Red indicator lamp flashes (0.5 sec. on / 1 sec. off).	Memory error.	Contact LIEBHERR CUSTOMER SERVICE
All points to be lubricated are dry and no error is indicated (indicator light is not defective).	Set cycle time (pause) is too long for the application.	Set a shorter cycle time (pause) using the selection switch. Contact LIEBHERR CUSTOMER SERVICE
All lubrication points are excessively greasy.	Set cycle time (pause) is too short for the application.	Set a longer cycle time (pause) using the selection switch. Contact LIEBHERR CUSTOMER SERVICE
One or more lubrication points is/are dry, whereas the others are sufficiently lubricated.	Kinked or broken secondary line. Distributor with insufficient flow selected.	Check the secondary line and replace if necessary. Install a distributor with greater flow.
One or more lubrication points is/are excessively greasy, whereas the others are sufficiently lubricated.	Distributor with a flow which is too high has been selected or too many distributors have been connected together.	Adjust the flow of the distributors for the lubricating points.

4.1.4 Flashing codes of the TWIN automatic central lubrication system indicator lamp

This equipment is optional.

Malfunction/flashing code	Cause	Remedy
Indicator lamp does not display a flashing code immediately after the ignition is turned on.	<p>TWIN system is not energized.</p> <p>No voltage from terminal 15 to terminal 3.</p> <p>No earth connection with the control device or the indicator light.</p> <p>Indicator lamp is defective.</p> <p>Wiring between the power source and the control device or between the control device and the indicator lamp interrupted.</p>	<p>Immediate action is required.</p> <p>Check fuse F5 and change if necessary.</p> <p>Check earth connection and re-establish if necessary.</p> <p>Replace indicator lamp.</p> <p>Check wiring and repair if necessary.</p> <p>Contact LIEBHERR CUSTOMER SERVICE</p>
Indicator lamp flashes (0.5 sec. on / 0.5 sec. off) for two minutes at the start of every cycle.	<p>Minimum grease level reached in the container.</p>	<p>Refill the container (malfunction message is automatically reset).</p>
Indicator lamp lights up constantly for 2 minutes at the end of the pumping phase.	<p>Main supply line is defective (pump does not build up pressure).</p> <p>Air in the system. This means that there is insufficient pressure within the highest permissible pump time.</p> <p>Grease pressure switch defective.</p> <p>O-ring damaged or not put in place when the dosing unit was replaced. This causes grease to flow from one channel into the other.</p> <p>5/2 shuttle valve defective. No pressure is built up.</p> <p>Other cause.</p>	<p>Repair the line and bleed the system.</p> <p>Bleed the system (both main supply line channels) and conduct a test with one single cycle.</p> <p>Check the switch and replace if necessary.</p> <p>Check the dosing unit and insert a new O-ring if necessary.</p> <p>Check the valve and replace if necessary.</p> <p>Contact LIEBHERR CUSTOMER SERVICE</p>
The indicator light glows constantly.	<p>The same malfunction message five times in a row (or 5 malfunction messages in a row in the same main supply line channel). Control of the pump and shuttle valve by the control device has been interrupted (to prevent damage).</p> <p>Only if level switch (separate accessory) is installed:</p> <p>Minimum level message and failure to reach the pressure within the highest permissible pump time.</p>	<p>Find the cause of the malfunction and rectify it. Press the test switch (on the pump) for at least 1 second to reset the message.</p> <p>Refill the container and press the test switch (on the pump) for at least 1 second to reset the message. Afterwards conduct a system test and bleed the system if necessary.</p>

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Service Code Table

Malfunction/flash code	Cause	Remedy
All points to be lubricated are dry and no error is indicated (indicator light is not defective).	Set cycle time (pause) is too long for the application.	Set a shorter cycle time (pause) using the selection switch or adjust the set cycle time using GINA. Contact LIEBHERR CUSTOMER SERVICE
All lubrication points are excessively greasy.	Set cycle time (pause) is too short for the application.	Set a longer cycle time (pause) using the selection switch (if present) or adjust the set cycle time using GINA. Contact LIEBHERR CUSTOMER SERVICE
One or more lubrication points is/are dry, whereas the others are sufficiently lubricated.	Kinked or broken secondary line. Dosing unit with insufficient flow selected. Non-functioning dosing unit.	Check the secondary line and replace if necessary. Install a dosing unit with greater flow. Remove the dosing unit and clean it or install a new dosing unit.
One or more lubrication points is/are excessively greasy, whereas the others are sufficiently lubricated.	Dosing unit with excessive flow selected. Dosing unit with internal leakage.	Install a dosing unit with a smaller flow. Remove the dosing unit and install a new one.
Red indicator lamp flashes (0.2 sec. on / 0.2 sec. off) for a complete cycle.	Test with a single cycle is currently running.	Lamp goes out after test cycle. This is at the end of the current cycle or after the ignition has been switched off.
The indicator lamp flashes (0.2 sec. on / 0.2 sec. off) during a complete cycle.	Test with an uninterrupted cycle is currently running.	Lamp goes out after test cycle. This is after the ignition has been switched off.

4.2 Eliminating malfunctions

4.2.1 Replacing fuses



There is a risk of damaging the electrical system.

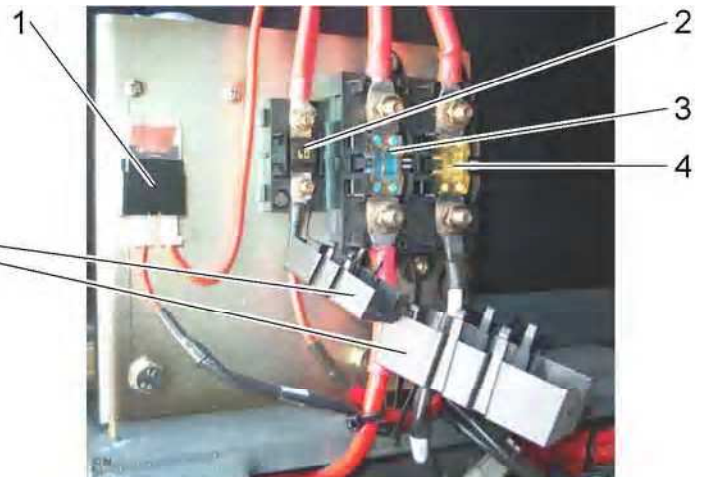
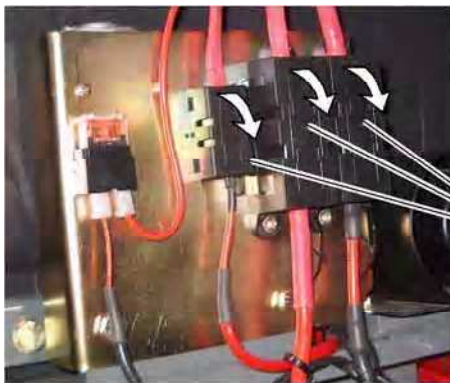
! In order to prevent damage to the electrical system, only use fuses with the correct rating.

Make sure that:

- The electrical circuit has been checked before changing the fuse.
- For safety reasons, after checking the circuit, that the machine's electrical system has been switched off.

Mega fuses

- If you need to access the fuses:
Open the rear hatch.
- Remove the cover of the fuse boxes **5**.



45800010

Main fuse

1 Fuse F07
2 Fuse F06

3 Fuse F08
4 Main fuse F00

5 Fuse box cover (removed)

Fuse	Value	Unit	Designation/function	Location
F00	100	A	Main fuse	Rear left of engine compartment
F06	60	A	Preglow	Rear left of engine compartment
F07	10	A	Hazard warning system	Rear left of engine compartment
F08	200	A	Emergency steering pump	Rear left of engine compartment

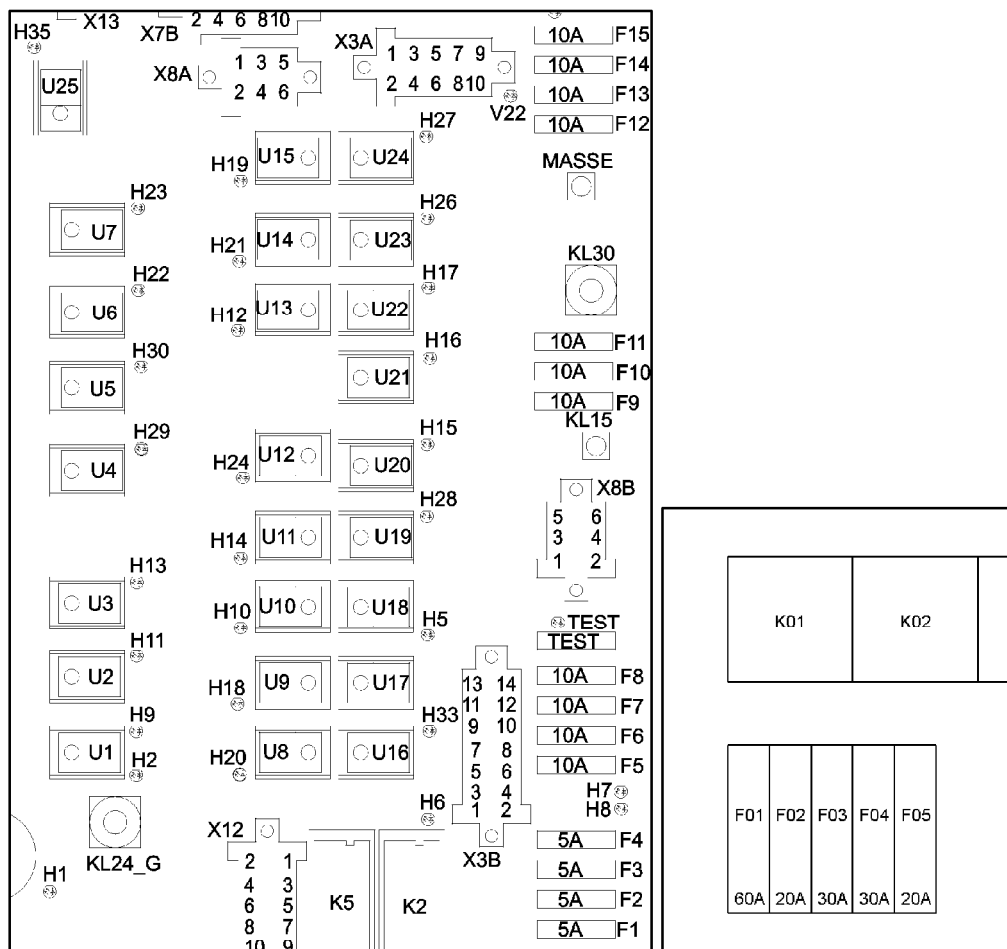
Mega fuses

- **If the main fuse 4** must be replaced:
Use the table above to identify the defective fuse.
- Unscrew the defective fuse and replace it with a new one with the same rating.

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Plug-in fuses in the main electronics

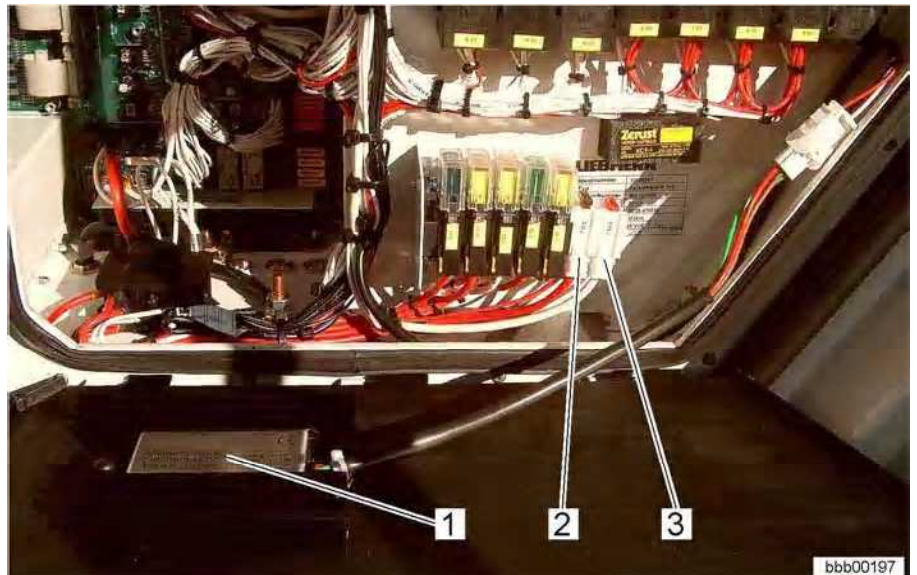
The control board, electronics, relays, main fuse and plug-in fuses are located behind the right door and the console cover.



bbb00066

Main electronics with plug-in fuses F01-F15

- F01 – 60A 24V terminal connected
- F02 – 20A Starter terminal 50 starting excess fuel
- F03 – 30A Engine stop solenoid
- F04 – 30A Main fuse terminal 15 (pin)
- F05 – 20A Heater motor blower
- F1 – 5A Right driving headlight (high beam)
- F2 – 5A Left driving headlight (high beam)
- F3 – 5A Right driving headlight (low beam)
- F4 – 5A Left driving headlight (low beam)
- F5 – 10A Rear wiper / central lubrication / B15, B17
- F6 – 10A Headlight flasher
- F7 – 10A Spare terminal 30 (cab roof)
- F8 – 10A Spare terminal 30 (cab roof)
- F9 – 10A Spare terminal 15 (cab roof)
- F10 – 10A Spare terminal 15 (cab roof)
- F11 – 10A Front wiper motor
- F12 – 10A Radio / interior lighting / terminal block terminal 58
- F13 – 10A Cigarette lighter / driver's seat compressor
- F14 – 10A Ignition switch terminal 30
- F15 – 10A Supply MC6



Main electronics

- 1 Voltage transformer A20
- 2 Fuse F09 ¹⁾
- 3 Fuse F222 ¹⁾

Fuse	Value	Unit	Designation/function	Location
--	--	--	A20 – optional voltage converter for radio	On the back of the main electronics cover
F09 ¹⁾	7,5	A	Optional voltage converter for radio	Main electronics
F222 ¹⁾	10	A	Optional pneumatic driver's seat	Main electronics

Fuses for optional equipment

¹⁾This equipment is optional.

- Open the right cab door.
- Unscrew the side console cover.

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5 Maintenance

5.1 Maintenance and inspection schedule

The following abbreviations are used in this section:

- h = service hours

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

	●	●				✦
		■				

bsym0039

The symbols have the following meanings:

Table with solid circle, box or star

- Responsibility for carrying out the maintenance work lies with the machine operator or his maintenance personnel.
This affects the maintenance intervals every 10 and 50 service hours (h) and non-scheduled intervals.

□		○	○	○	✦
		□	○	○	250h

bsym0040

The symbols have the following meanings:

Table with empty circle, box or star, or service hours (h)

- The maintenance and inspection work must be performed or supervised by authorised engineers from LIEBHERR or its authorised dealers.
This affects the maintenance intervals on delivery, every 500, 1000, 2000 service hours (h), and at unscheduled times.

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

Customer: Machine type: Serial No.: Oper. hours: Date :

Maintenance/inspection according to operating hours							TASKS TO BE PERFORMED	
On delivery	Every 10	Every 50	Every 500	Every 1000	Every 2000	Special intervals	By maintenance personnel ■ One-off activity ● Repetition interval † If necessary ❄ Annually at the start of the cold season	By authorised qualified personnel □ One-off activity ○ Repetition interval † If necessary
Complete machine								
<input type="checkbox"/>								Have the driver lubricate the machine in accordance with the lubrication chart and instruct him on proper maintenance
<input type="checkbox"/>								Instruct the driver in the operation of all functions
<input type="checkbox"/>	●	●	○	○	○			Check the machine for external damage
							†	Make sure the bolted connections are tight
<input type="checkbox"/>							†	Seal any leaks
			<input type="checkbox"/>	○	○			Check the hydraulic pressure according to the testing and adjustment plan - see the service manual
Diesel engine and pump distributor gear								
<input type="checkbox"/>	●	●	○	○	○			Check the engine oil level
			○	○	○			Change the engine oil (note: the operating hours stated here only apply to the appropriate engine oil quality / for complicating factors see the lubricants and fuels section)
			○	○	○			Replace the oil filters
			○	○	○			Check and replace the V-ribbed belt
			○	○				Check valve play
				○				Lightly grease the ring gear on the flywheel
					○		❄	Check the flame glow system
					3000h			Replace the oil separator (or every 2 years)
<input type="checkbox"/>	●	○	○	○				Drain off water and sediment from the fuel tank
				○	○		†	Change the fuel fine filter
		■	○	○	○		†	Drain off condensate from the fuel separator
					○		†	Replace the filter insert in the fuel separator
	●	○	○	○			†	Clean the service cap and dust extraction valve on the air filter
			○	○			†	Clean or replace the air filter main element (replace the safety element after having replaced the main element 3 times)
			○	○	○			Check the air suction hoses for leaks and tight fitting
			○	○	○			Check the exhaust lines for leaks and tight fitting
<input type="checkbox"/>	●	○	○	○				Check the oil level in the pump distributor gear
			<input type="checkbox"/>	○	○			Change the gear oil in the pump distributor gear
Soot particle filter (optional)								
			○	○	○			Check the pipe and hose line of the counterpressure monitoring unit for leakage or blockage
			○	○	○			Check the electronic counterpressure monitor

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Customer: Machine type: Serial No.: Oper. hours: Date :

Maintenance/inspection according to operating hours							TASKS TO BE PERFORMED	
On delivery	Every 10	Every 50	Every 500	Every 1000	Every 2000	Special intervals	By maintenance personnel ■ One-off activity ● Repetition interval † If necessary * Annually at the start of the cold season	By authorised qualified personnel □ One-off activity ○ Repetition interval † If necessary
			○	○	○	†		Check and service the condensate separator (drainage filter)
				○	○			Replace the condensate separator (drainage filter)
				○	○	†		Clean the soot particle filter
Cooling system								
□		●	○	○	○			Check the coolant level
			○	○	○			Replace the coolant filter
				○	○	*		Check the anti-freeze and DCA-4 concentration in the coolant
						†		Clean the cooling system
						3000h		Replace the coolant with anti-freeze and DCA-4 (at least every 2 years)
Working hydraulics								
				○	○			Lubricate the pilot control unit, clean the magnets and lubricate the universal joints
□	●	●	○	○	○			Check the oil level in the hydraulic tank
			○	○	○			Drain water and sediment from the hydraulic tank
					○			Change the hydraulic oil and check the return strainer
□		■	○	○	○	250h		Check and clean the magnetic rod on the hydraulic tank
			○	○	○			Change the return suction filter
				○	○			Replace the bleeder filter on the hydraulic tank
Steering system								
□	●	●	○	○	○			Check that the steering is working
□		●	○	○	○			Lubricate the bearing points on the steering cylinders
Brake system								
□	●	●	○	○	○			Check the service brake and parking brake
				○	○	†		Check the gap and wear on the parking brake
Electrical system								
□	●	●	○	○	○			Check the indicator lamps and lighting
			○	○	○			Check the batteries, fluid level and terminals
Transfer gear								
□		●	○	○	○			Checking the transfer gear oil level
			□	○	○			Change the gear oil in the transfer gear
			□	○	○			Change the gear oil filter
Axles and tyres								
□		■	○	○	○			Check the tightness of the wheels (once after 50, 100 and 250 h)

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Customer: Machine type: Serial No.: Oper. hours: Date :

Maintenance/inspection according to operating hours							TASKS TO BE PERFORMED	
On delivery	Every 10	Every 50	Every 500	Every 1000	Every 2000	Special intervals	By maintenance personnel ■ One-off activity ● Repetition interval † If necessary * Annually at the start of the cold season	By authorised qualified personnel □ One-off activity ○ Repetition interval † If necessary
<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		Check the axle oil levels	
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		Change the axle gear oil	
<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>	†	Lubricate the bevel gear seal on the front and rear axles (if necessary, for example, if used in water every day).	
<input type="checkbox"/>		●	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		Check and lubricate the front drive shaft	
<input type="checkbox"/>		●	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		Check and lubricate the rear drive shaft	
<input type="checkbox"/>						†	Check and adjust the tyre pressure	
Machine frame and ballast weight								
<input type="checkbox"/>		●	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		Grease the oscillating axle frame and articulation lock	
Central lubrication system								
<input type="checkbox"/>		●	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		Check whether metered quantities are adequate at the bearing points (grease collars) of the central lubrication system	
<input type="checkbox"/>		●	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		Check the hose lines of the central lubrication system (lubrication points, detached hoses, leaks)	
Cab, heating and air-conditioning								
						†	Lubricate the door hinges	
						†	Clean or replace the fresh air and recirculated air filter	
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		Check the indicator beads in the dryer-collector unit	
Lift arms and quick-change device								
<input type="checkbox"/>		●	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		Lubricate the lift arms and attachment	
				<input type="checkbox"/>	<input type="checkbox"/>	†	Check the bucket bearing seals and the bearing bushings on the lift arms	
				<input type="checkbox"/>	<input type="checkbox"/>		Check the lift arms and bucket stops	
<input type="checkbox"/>		●	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		Check that the quick-change device is working	

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5.2 Lubricant chart, filling quantities









5.2.1 Table of filling quantities

Specifications in the medium column:

- The standard lubricants and fuels required for central European climate conditions are stated here.
- **Before you change or top up the oil in the hydraulic system (hydraulic tank), always check if it is filled with petroleum or bio oil.**
- For more detailed information about the required lubricants and service fuels, see the section on lubricants and fuels.

Specifications in the dosage column:

- The values stated for the filling quantities in the table are only guidelines.
- The dipstick and level markings are always mandatory.
- Each time the oil is replaced or topped up, check the level in the unit in question.

	Name	Medium	Dosage	Units
 06sy05ab	Diesel engine (with filter change)	Engine oil SAE 10W -40	23,5	l
 06sy08ab	Pump distributor gear	Gear oil SAE 90 LS	2,5	l
 06sy04ab	Diesel engine cooling system total capacity	Coolant	38	l
 06sy03ab	Hydraulic system total capacity	Engine oil SAE 20W -20	240	l
 06sy03ab	Hydraulic tank	Engine oil SAE 20W -20	120	l
 1 06sy14ab	Transfer gear	ATF oil	11,5	l
 3 06sy16ab	Front axle	Gear oil SAE 90 LS	58	l
 5 06sy18ab	Rear axle	Gear oil SAE 90 LS	50	l

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bsym0057



bsym0029

Name	Medium	Dosage	Units
Fuel tank	Diesel	330	l
Air-conditioning system	Refrigerant R 134a	1800	g

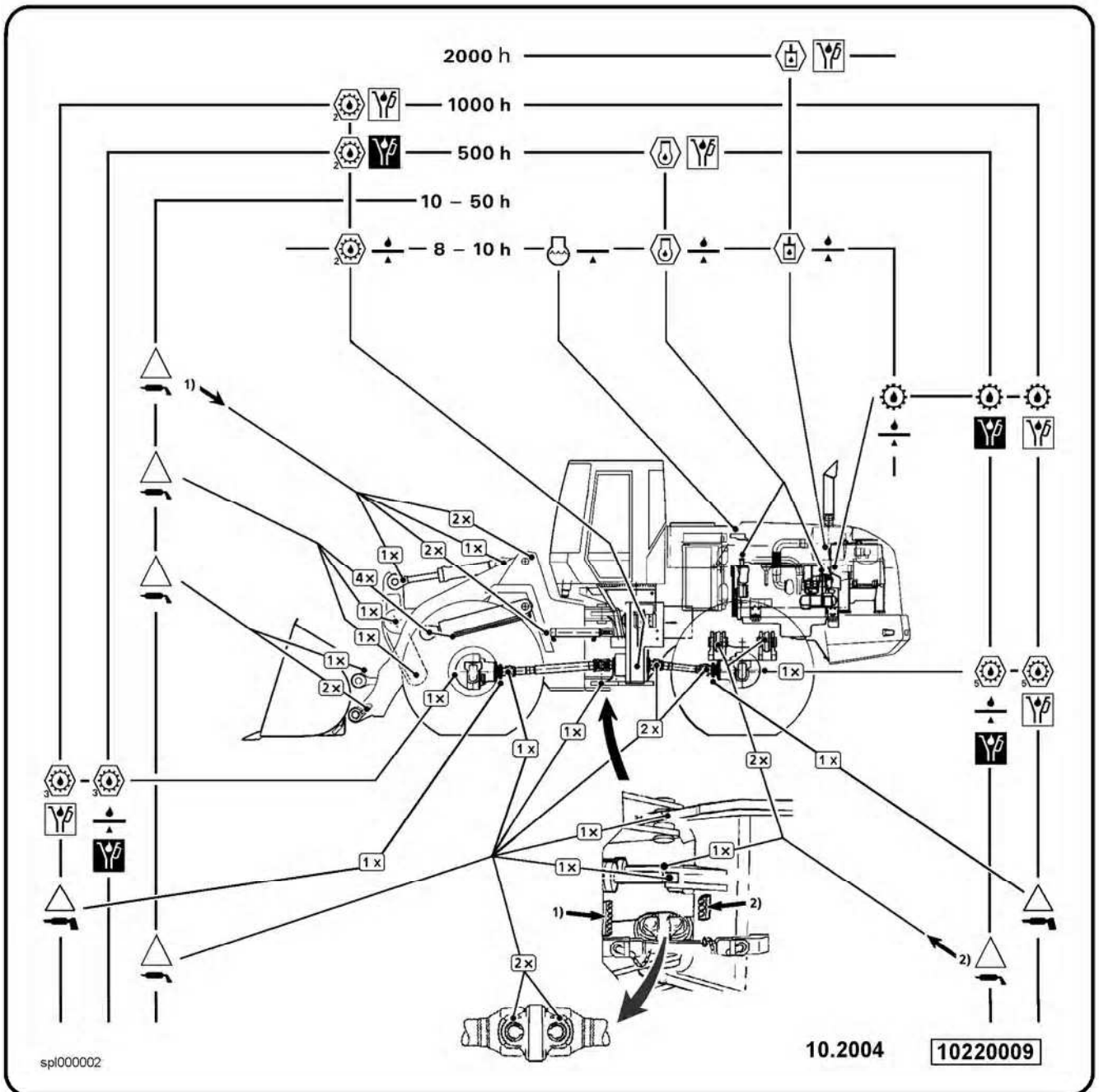
5.2.2 Lubricant chart







The lubrication chart provides an overview of the location of the maintenance points on the machine and of the maintenance intervals.

You will find detailed information in the maintenance and inspection schedule, as well as in the individual descriptions in the section on maintenance tasks.

For more detailed information about the required lubricants and service fuels, see the section on lubricants and fuels.

For information about the required filling quantities, see the tables of filling quantities.



Symbol	Name	Symbol	Name
 06sy09ab	General lubrication points	 06sy01ab	Lubrication
 06sy13ab	Check the oil level	 06sy21ab	Check the coolant level
 06sy11ab	Oil change	 06sy12ab	First oil change

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5.3 Maintenance tasks

On completion of servicing, the machine should be returned to the operating position.

See the section on the operating position in chapter 3.

5.3.1 Preparatory tasks for maintenance

Before performing the various maintenance tasks, move the machine to maintenance position unless otherwise explicitly specified in the description.

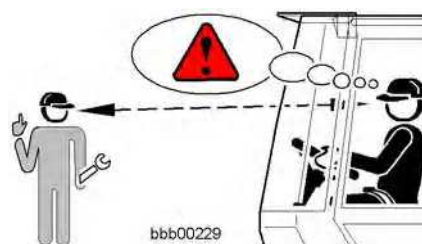
The various maintenance tasks include:

- Lubricating the lift arms
- Checking the oil level or changing the oil in the engine, gears, axles, hydraulic tank, etc.
- Replacing filters as well as adjustment and repair work on the hydraulic system

Safety precautions for maintenance

Always observe the accident prevention regulations during maintenance work.

See the measures to ensure safe maintenance on chapter 2.



Visual contact

Make sure that visual contact between the operator in the cab and maintenance personnel is always maintained.

Danger

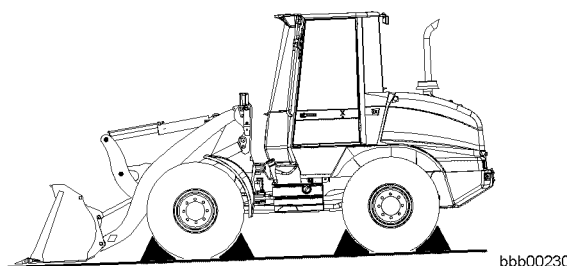


There is a risk of accidents for maintenance personnel.

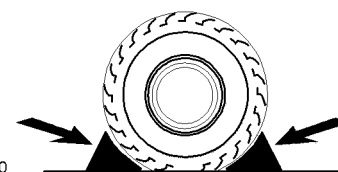
The presence of unauthorised persons on the machine can place the maintenance personnel in extreme danger.

! Never enter a dangerous area of the machine without making your presence known.

- Make sure you can be clearly seen before entering one of the machine's danger areas.



Wheel wedges



- Secure the machine against rolling away with wheel wedges.

Maintenance positions

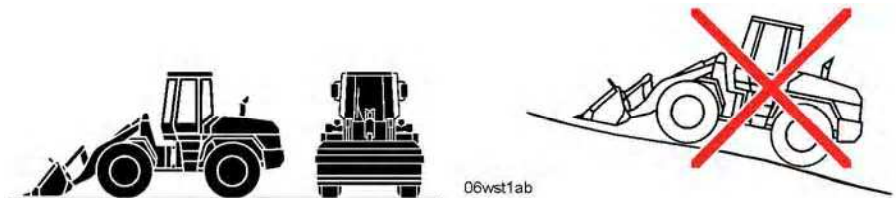
The maintenance position depends on the maintenance task to be performed.

The two basic maintenance positions 1 and 2 are described below. They enable you to access the individual maintenance points.

Maintenance position 1

To move the machine into maintenance position 1 proceed as follows.

For a detailed description of the individual procedures, see the section on operation in chapter 3.



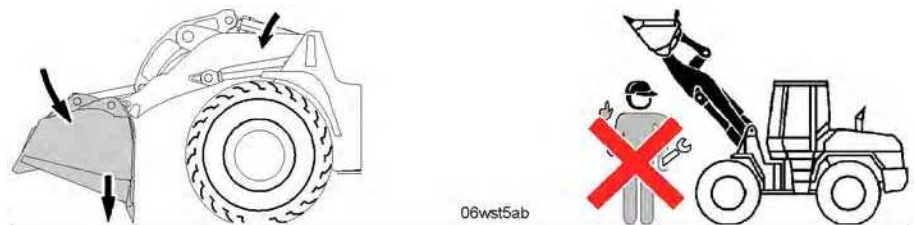
Maintenance position 1

- Park the machine on level ground.
- Lower the lift arms.
- Set the bucket down flat on the ground.
- Engage the parking brake
- Turn off the diesel engine.
- Take out the ignition key.

Maintenance position 2

To move the machine into maintenance position 2 proceed as follows.

For a detailed description of the individual procedures, see the section on operation in chapter 3.



Maintenance position 2

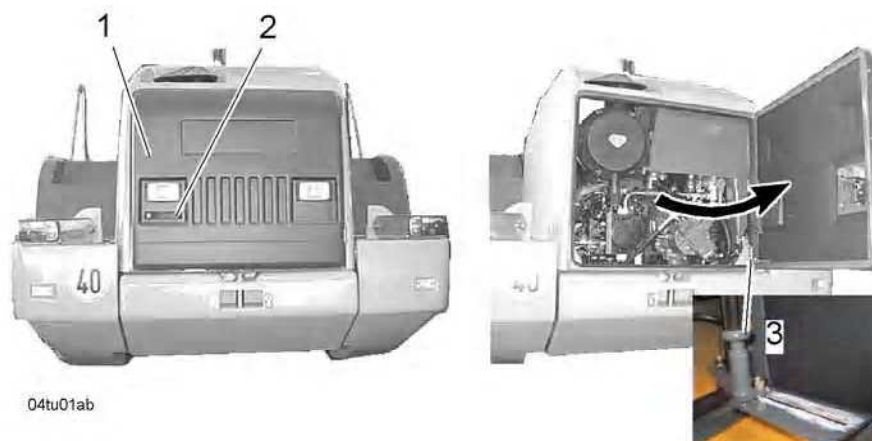
- Park the machine on level ground.
- Engage the articulation lock.
- Lower the lift arms.
- Tilt the bucket out and set it down on the ground on its teeth or cutting edge.
- Engage the parking brake
- Turn off the diesel engine.
- Take out the ignition key.

Opening the service doors and hoods

Opening the engine compartment door

Open the door if you need to access the following units or components:

- Hydraulic pumps
- Hydraulic tank
- Hydraulic tank shut-off valve
- Air filter
- Battery main switch



04tu01ab

Engine compartment door

1 Engine compartment door
2 Handle with lock

3 Spring lock



There is a risk of injury if the engine compartment door falls shut.

! Check that the door is secured in the fully open position by the spring lock.

- Open the lock with the ignition key.
- Completely open the door 1 with the handle 2.

The spring lock 3 latches into place.

Closing the engine compartment door



- Pull up the spring lock 3.
- Lock the engine compartment door if necessary.

Opening the engine compartment hood

When the hood is open, you can access the following units:

- Diesel engine
- Cooling system
- Pump distributor gear



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Engine compartment door and hood cable

- Open the engine compartment door.

Warning

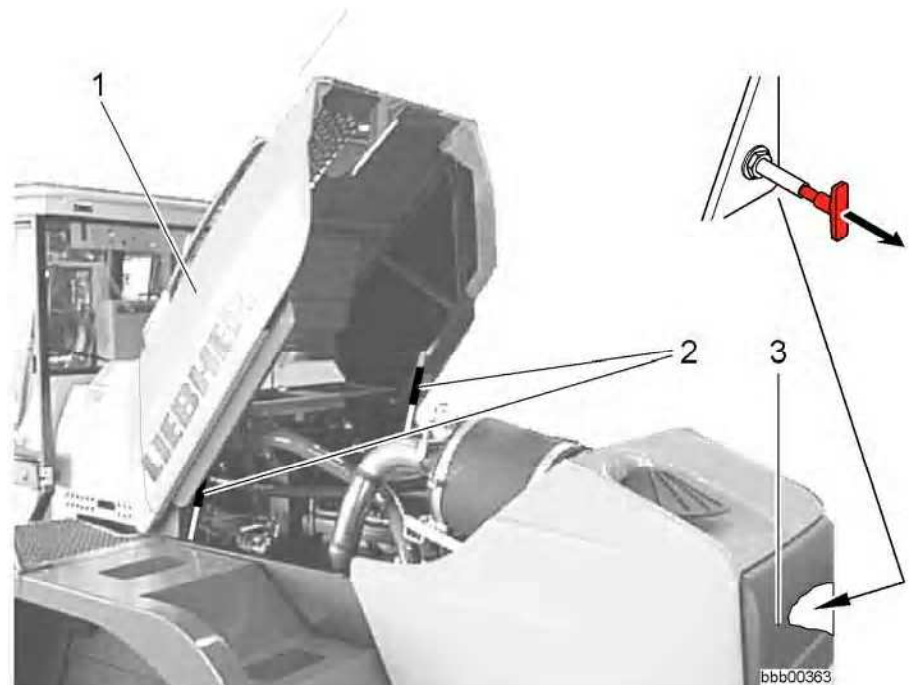
Engine parts which are in motion can cause injury.

Rotating or moving engine parts, such as the fan blades or V-belts, can cause injury.

! Only open the engine compartment hood when the engine is shut down.

- Pull the cable 1 for unlocking the engine compartment hood until the lock is open.

The lock releases the engine compartment hood 1.



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Engine compartment hood

1 Engine compartment hood
2 Gas-filled springs

3 Engine compartment door

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The hood is automatically opened and held in position by two gas-filled springs **2**.

Warning

There is a risk of injuries if the hood falls shut.

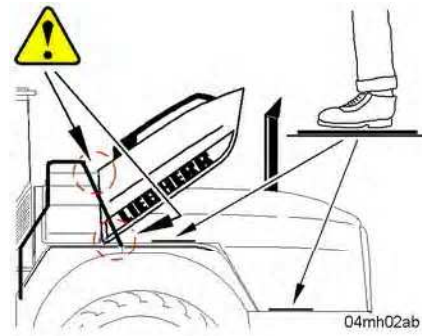
! Check that the gas-filled springs securely hold the hood fully open.

- Check the function.

Troubleshooting

If not, rectify the problem immediately.

- Contact LIEBHERR CUSTOMER SERVICE.



Foot plate

To close the hood, climb onto the machine via the cab access, making sure that you have secure footing.

Caution

There is a risk of accidents when opening or closing the hood. You can injure your feet when opening and closing the hood.

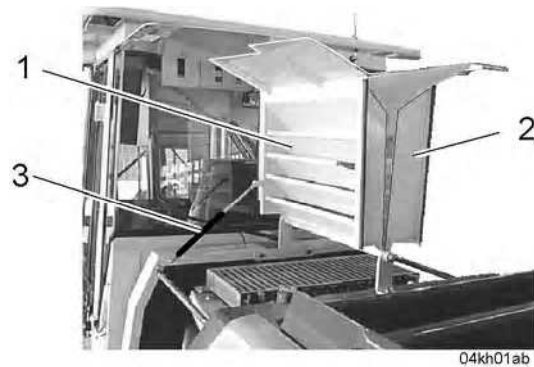
! Make sure your feet are in a safe place when opening or closing the hood.

- Stand to one side of the hood with both feet on the foot plates provided.
- If the hood needs to be closed again:
Push down the hood handle until the hood engages in the lock.

Opening the cooling system hood

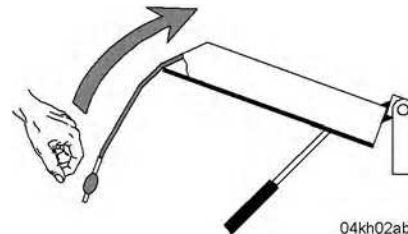
When the hood is open, you can access the cooling system. Make sure that the left or right cab door is closed as necessary.

- When opening or closing the hood, climb onto the machine via the cab access, making sure that you have secure footing.



Cooling system hood

- 1 Left cooling system hood
- 2 Right cooling system hood
- 3 Gas-filled springs



Cooling system hood

- Completely open the hood **1** by pulling up the handle. The hood is held in this position by the gas-filled spring **3**.

Warning

There is a risk of injuries if the hood falls shut.
 ! Check that gas-filled spring holds it completely open.

- If not, rectify the problem immediately.

Troubleshooting

The function is not assured

- Contact LIEBHERR CUSTOMER SERVICE.
-

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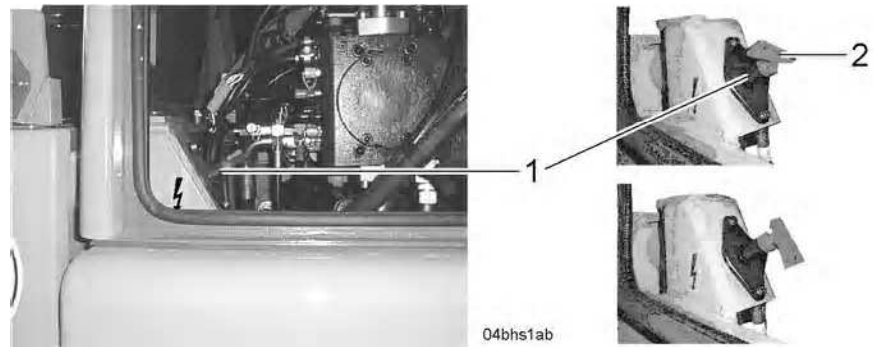
Turning off the battery main switch

The battery main switch is located at the rear left of the engine compartment.

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

Find out from the descriptions of the relevant maintenance tasks whether the battery main switch must be turned on or off. See the section on maintenance tasks.

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



Battery main switch

1 Battery main switch

2 Main switch key

Danger



There is a risk of accidents for maintenance personnel.

If unauthorised people are on the machine it can put the maintenance personnel in extreme danger.

! For safety reasons, it is essential that the battery main switch is turned off.

! Pull out the key for safety reasons.

- Turn off the battery main switch **1** by turning the key **2** to the **0** position.

5.3.2 Checking the machine for external damage

Make sure that the machine is in maintenance position 1.

Procedure

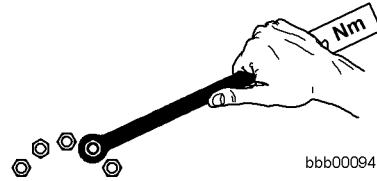
- Before starting up the machine, check for external damage which might impair safe operation.
- Repair any damage with safety implications immediately.



5.3.3 Making sure the bolted connections are tight

Make sure that:

- The machine is in maintenance position 2.
- The appropriate service doors, hatches and hoods are open.

Procedure

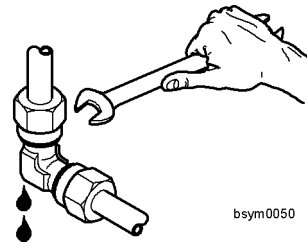
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- Check that all bolts and screws are tight.
- Tighten any loose screws or bolts with the required tightening torque.

5.3.4 Sealing leaks

Make sure that:

- The machine is in maintenance position 2.
- The appropriate service doors, hatches and hoods are open.

Procedure

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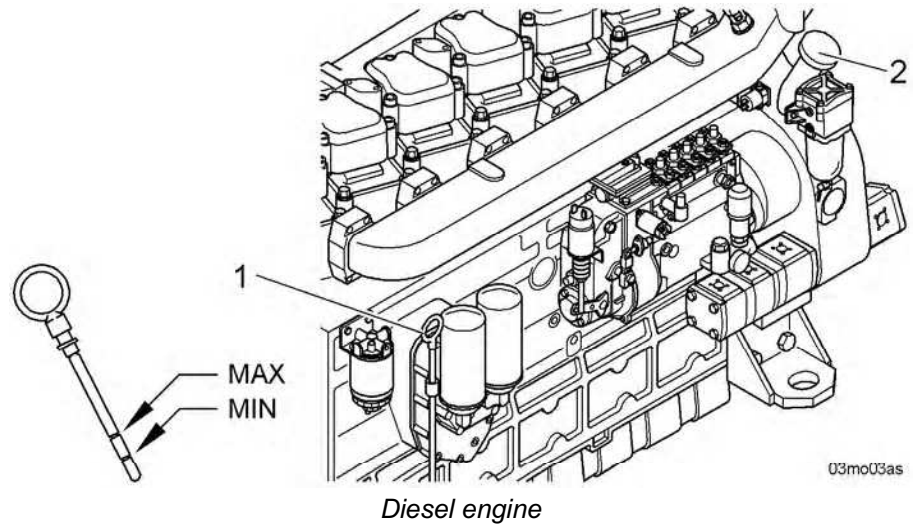
- Check the entire hydraulic system for leaks.
- Replace any damaged hydraulic seals.
- Tighten any loose hydraulic couplings.
- See also the section on safe maintenance of hydraulic hoses and hose lines in chapter 2.

5.3.5 Checking the engine oil level

Make sure that:

- The machine is in maintenance position 1.
- The engine compartment hood is open.
- The engine is level and has not been running for 2 - 3 minutes.

Procedure



- Pull out the dipstick **1**, wipe it clean, and re-insert it.
- Pull out the dipstick once again and read off the oil level.

The oil level must be between the MIN and MAX markings.

- If the oil level is too low:
Remove the sealing cap from the filler neck **2** and top up with oil. For information on the required oil quality see the section on lubricants and fuels.



Oil may escape due to excess pressure.

The sealing cap of the oil filling pipe of the pump distributor gear is equipped with a ventilation and bleeder filter. The sealing cap for the diesel engine, however, does not have such a filter.

If the caps are swapped, excess pressure can result in oil leakage in the pump distributor gear.

! Make sure that you do not mix up the sealing caps.

- Top up with oil via the oil filler neck **2**.
- Clean the sealing cap, place it on the filler neck **2** and tighten it.

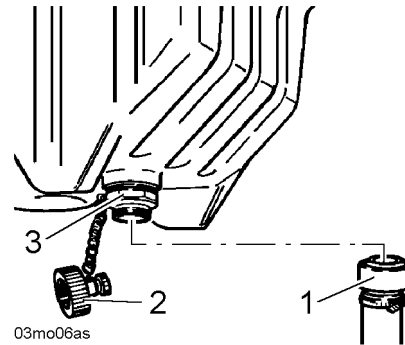
5.3.6 Changing the engine oil

Make sure that:

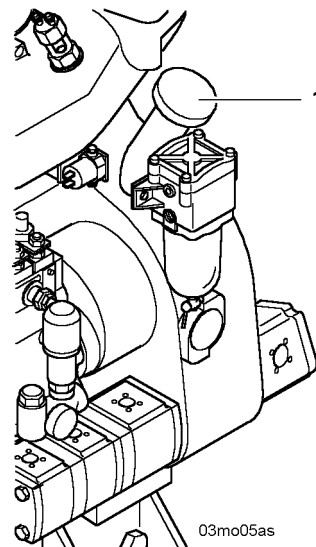
- The machine is in maintenance position 1.
- The engine compartment hood is open.
- The engine is warm.
- A suitable receptacle, an oil drain hose and the specified engine oil are at hand.

See the table of filling quantities for the required capacity of the receptacle.

Procedure



- Unscrew the oil drain hose and screw the sealing cap onto the drain valve.
- Screw the oil drain hose to the oil drain valve.
- Drain off the oil into the receptacle.
- Unscrew the oil drain hose.
- Screw the cap onto the oil drain valve.
- **When changing the engine oil and the oil filter:**
Change the filter as described in the section on changing the oil filter.



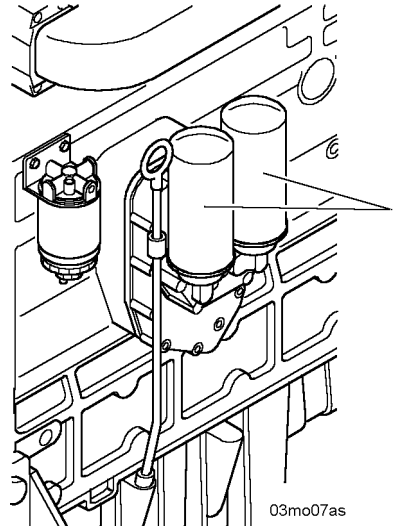
- Pour the new oil into the filler neck 1 up to the MAX marking on the dipstick.
- Clean the filler cap, place it on the oil filler neck 1 and tighten it.
- Start the engine and check the oil pressure.
- Turn off the engine and after 1 or 2 minutes, check the oil level on the dipstick.
- Top up with oil if necessary.

5.3.7 Replacing the oil filter

Make sure that:

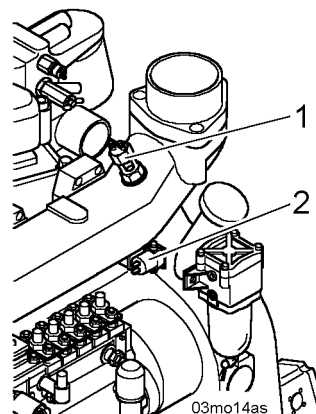
- The machine is in maintenance position 1.
- The engine compartment hood is open.
- The engine oil has been drained off.
- Only use genuine LIEBHERR spare parts.
(2 oil filter cartridges)

Procedure



- Release the filter cartridges **1** with a strap wrench and unscrew them.
- Clean the seals on the filter bracket.
- Lightly coat the rubber gaskets on the new oil filter cartridges with engine oil.
- Screw the new filter cartridges onto the filter bracket and tighten them by hand.
- Start up the engine and check the oil pressure on the engine oil pressure segment field in the display unit.
- Turn off the engine. Check the seals on the oil filters and the oil level.
- Top up with oil if necessary.

5.3.8 Checking the flame glow system



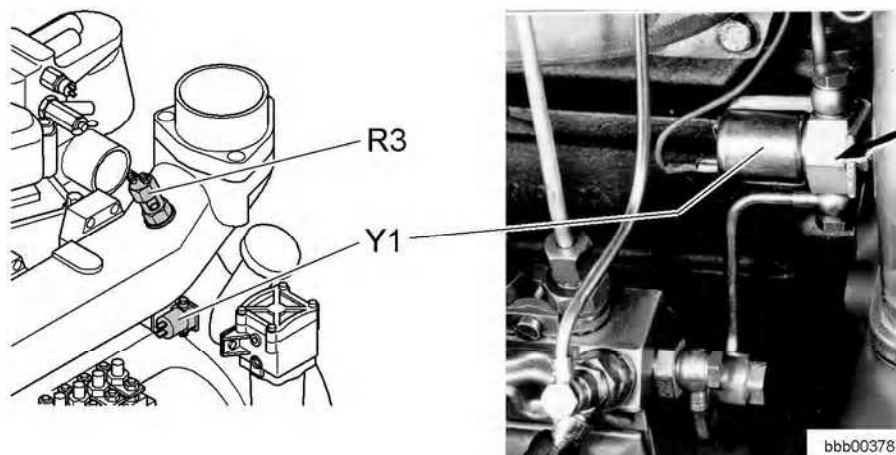
The test is restricted to the proper functioning of the solenoid valve **2** and the flame glow plug **1**.

The preglow relay controls the preglow time until the engine is ready, which can take anything from 0.5 to 2.0 minutes, depending on temperature.

Make sure that:

- The machine is in maintenance position 1.
- The engine compartment hood is open.

Checking the solenoid valve



- Unscrew the fuel line on the flame glow plug **R3**.
- Move the switch handle on the injection pump to the stop position (remove fuse F6 for the engine stop solenoid).
- Turn over the engine with the starter. Fuel should flow from the fuel line to the flame glow plug.

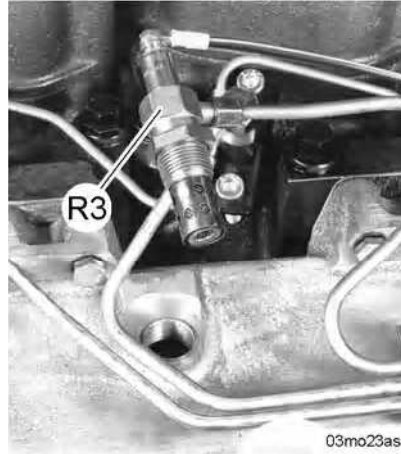
After the F6 fuse is changed and the engine started, the fuel from the fuel line to the flame glow plug should stop flowing.

Troubleshooting

If no fuel flows when the engine is cranked, or if the fuel flow will not stop flowing when the motor is running:

- Replace the solenoid valve **Y1**.
When installing it, note the flow direction indicated by the arrow.

Checking the flame glow plug



- Remove the flame glow plug **R3**.
- Re-attach the fuel line and the electrical lead to the flame glow plug **R3**.
- Move the switch handle on the injection pump to the stop position (remove the F03 mega fuse).
- Set the starter switch S1 to the preglow position (position 1).

The heating coil in the flame glow plug **R3** should glow red when the preglow process has finished.

- Turn over the engine with the starter.

The fuel delivered to the glowing heating coil in the flame glow plug **R3** should evaporate.

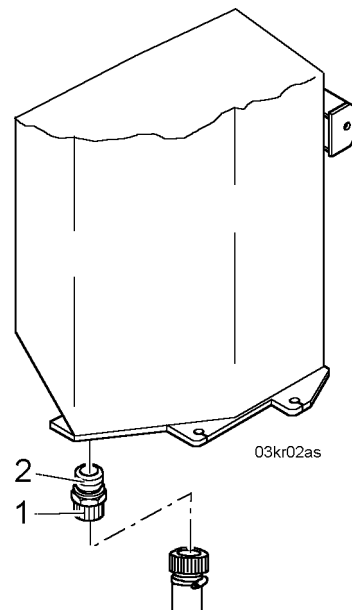
Troubleshooting

If the heating coil in the flame glow plug **R3** does not start glowing, or if no fuel is delivered to the heating coil when the engine is turning over:

- Replace the flame glow plug **R3**.
-

5.3.9 Draining off water and sediment from the fuel tank

Make sure that the machine is in maintenance position 1.

Procedure

- Unscrew the sealing cap **1** on the drain valve **2** on the bottom of the diesel tank.
- Screw the drain hose onto the drain valve **2**.
- Drain the condensation and sediment into a suitable receptacle until clean fuel begins to flow.
- Unscrew the drain hose.
- Screw the cap **1** onto the drain valve **2** and tighten it.

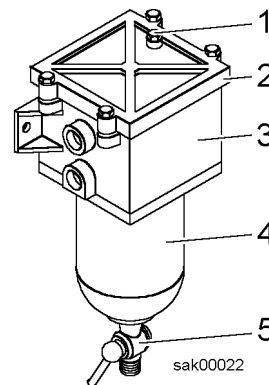
5.3.10 Changing the fuel fine filter

Make sure that:

- The machine is in maintenance position 1.
- The engine compartment hood is open.

Procedure

- Unscrew the fine fuel filter **1** (using a suitable filter strap) and dispose of it.
- Lightly oil the rubber seal on the new filter cartridge.
- Screw on the filter cartridge and tighten it by hand.
- Bleed air from fuel system.

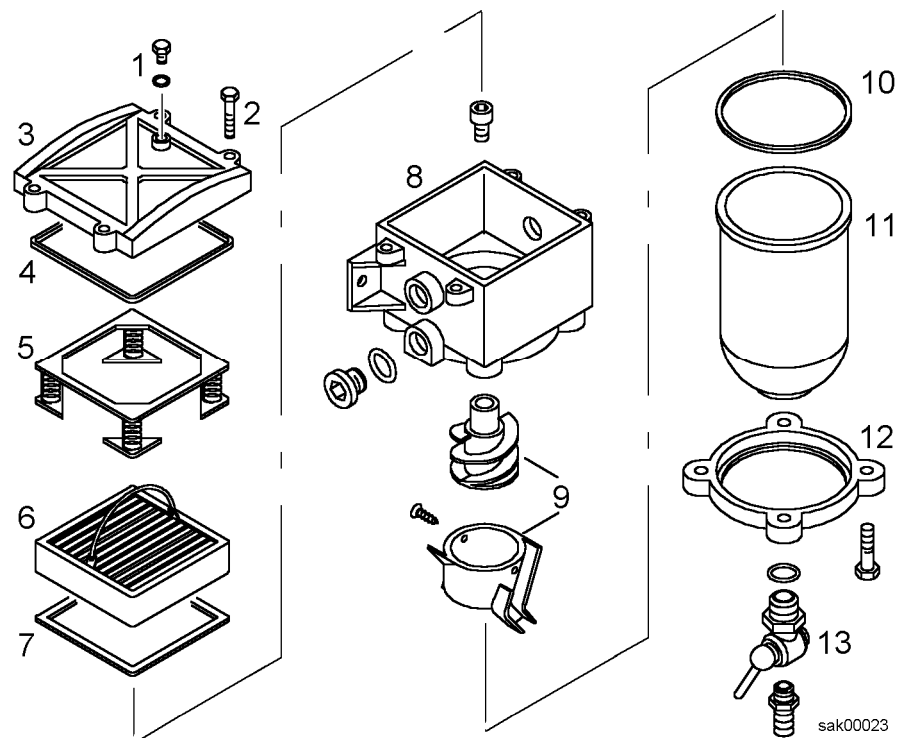
5.3.11 Draining off condensate from the fuel separator**Procedure**

- Open the bleeder screw **1**.
- Open the drain cock **5** and let the condensate drain off into a suitable receptacle until clean fuel starts to flow.

Make sure no diesel fuel flows into the engine bearing below.

- Close the drain cock **5** and the bleeder screw **1** again.

5.3.12 Replacing the filter insert in the fuel separator



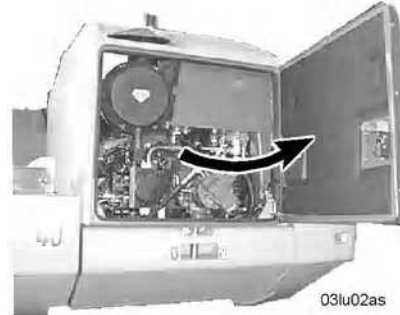
The filter insert **6** should be changed after 2000 operating hours, or when the suction resistance is too high and the diesel engine loses power. The filter insert **6** flushes and cleans itself from top to bottom each time the condensate is drained.

Procedure

- Release the screws **2** and take off the cover **3**.
- Remove the holding clamp **5** and the filter insert **6**.
- Check the seals **4** and **7** for proper installation or damage. Replace any damaged seals.
- Insert the new filter insert **6** and the holding clamp **5**.
- Replace the cover **3** and tighten the screws **2**.

5.3.13 Cleaning the service cap and dust extraction valve on the air filter

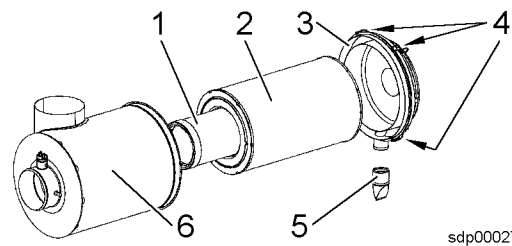
Important: A defective or hardened dust extraction valve **4** impairs the function of the service cap **3**. This in turn shortens the service life of the filter elements. The valve must also be closed whenever the diesel engine speed exceeds 1/3 of the maximum speed.



Make sure that:

- The machine is in maintenance position 1.
- The engine compartment door is open.
- The battery main switch is switched off and the main switch key is taken out.

Cleaning the dust extraction valve



- Press the rubber seal on the dust extraction valve **5** several times to remove the dust from the service cap **3**.
- When working in dusty conditions, check and empty the dust extraction valve **5** more often.
- If the dust extraction valve is damaged or stays open:
Replace the dust extraction valve.

Cleaning the service cap

- Open the fixing clips **4** on the service cap **3** and take the cap off.
- Clean the service cap **3**.
- Put the service cap **3** back on the filter housing **6**.

The dust extraction valve **5** must face down.

- Make sure the cap is placed properly on the filter housing **6**.
Only then can you close the fixing clips **4** without excessive force.
- Close the fixing clips **4**.

5.3.14 Cleaning or replacing the air filter main element

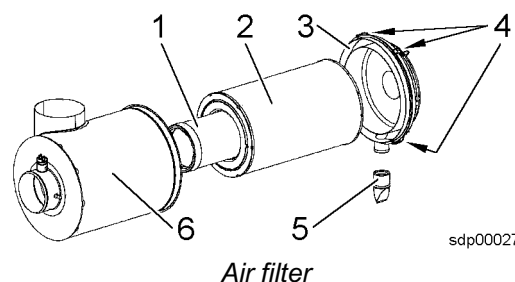
The main element **2** should be cleaned or replaced when the air filter contamination symbol field on the display unit lights up or at least every 1000 service hours.

If the air filter contamination symbol field remains lit after the main element **2** has been serviced then the safety element **1** must also be replaced.

Make sure that:

- The machine is in maintenance position 1.
- The engine compartment door is open.
- The battery main switch is switched off and the main switch key is taken out.

Procedure



- | | |
|------------------|-------------------------|
| 1 Safety element | 4 Fixing clips |
| 2 Main element | 5 Dust extraction valve |
| 3 Service cap | 6 Air filter housing |

- Open the fixing clips **4** on the service cap **3** and take the cap off.
- Remove the main element **2** and the safety element **1**.
To loosen the seal: pull or twist the elements slightly up, down or sideways.



There is a risk of damage to the filter.
Tapping the filter to clean it will damage it.
! Do not tap out the filter.



- Blow the main element **2** from inside outwards with dry air.
- Ensure that all dirt is removed from the filter housing before inserting a new or cleaned filter element.
- The safety element **1** should be replaced every third time the main filter element **2** is replaced.

- Lightly oil the seal surfaces before installing the filter elements (for the main element **2** this is on the inside, for the safety element **1** on the outside).
- Re-insert filter elements 1 and 2 and make sure that they are correctly fitted.
- Clean the service cap **3** and put it on the filter housing with the dust extraction valve **5** facing down.
- Only when the lid completely covers the filter housing can you close the fixing clips without excessive force.
Close the fixing clips **4**.

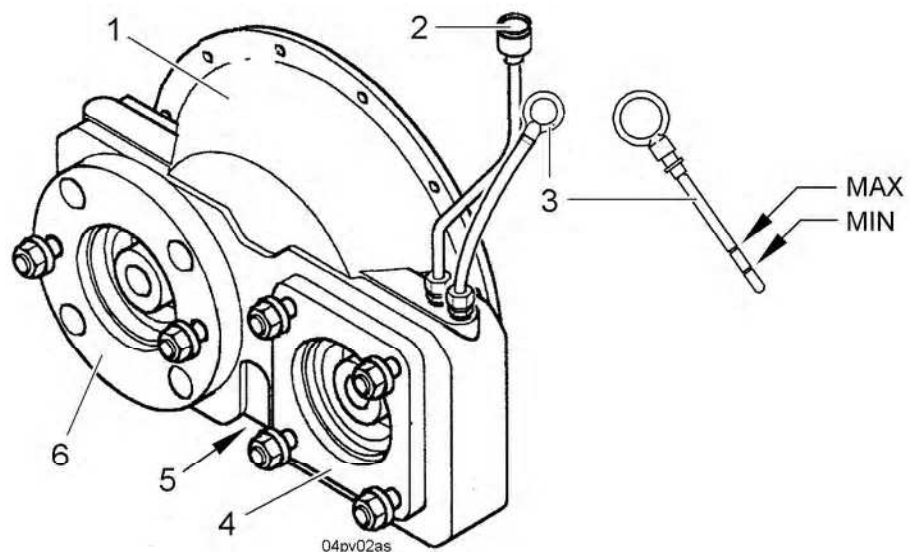
5.3.15 Checking the oil level in the pump distributor gear

The dipstick **3** and the oil inlet pipe **2** are located in the engine compartment directly beside the hydraulic tank. Access is from above the engine on the right-hand side.

Make sure that:

- The machine is in maintenance position 1.
- The engine compartment hood is open.

Procedure



Pump distributor gear

- Pull out the dipstick **3**, wipe it clean, and re-insert it.
- Pull out the dipstick **3** once again and read off the oil level. The oil level must be between the MIN and MAX markings.
- If the oil level is too low:
Remove the sealing cap from the oil filling tube **2** and top up with oil. For the oil quality, see the gear lubricants listed in chapter 5.



Oil may escape due to excess pressure.

The sealing cap of the oil filling pipe of the pump distributor gear is equipped with a ventilation and bleeder filter. The sealing cap for the diesel engine, however, does not have such a filter.

If the caps are swapped, excess pressure can result in oil leakage in the pump distributor gear.

! Make sure that you do not mix up the sealing caps.

- Clean the sealing cap for the oil filling tube **2**, put it on the oil filling tube **2** on the pump distributor gear, and then tighten it up.

5.3.16 Checking and servicing the condensate separator (drain filter)

This equipment is optional.

The condensate separator is part of the soot particle filter system.

The filter/drain unit 1 is mounted to on the front, right-hand side under the cab.



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Main components

- | | |
|------------------------|--|
| 1 Filter/drain unit | 5 Exhaust gas counterpressure display line |
| 2 Counterpressure line | 6 Data logger line |
| 3 Condensate container | |
| 4 Drain plug | |

- **At regular intervals (daily or as required):**
Check the filling level of the filter/drain unit.
- **If the condensate container is over half full with condensation water:**
Drain off the accumulated condensation water.
 - To do this, unscrew the drain plug **4** from the condensate container **3**.
 - Pour out the condensation water.
 - Screw the drain plug **4** back onto the condensate container **3**.
- Check the filter insert (visible in the sight glass) of the filter/drain unit **1** for dirt.
- **If the filter insert is too dirty:**
The filter insert must be replaced.

NOTE The condensate separator should be completely replaced after 1000 operating hours.

This must be done when cleaning the filter (every 1000 operating hours as prescribed).

- Contact LIEBHERR CUSTOMER SERVICE.

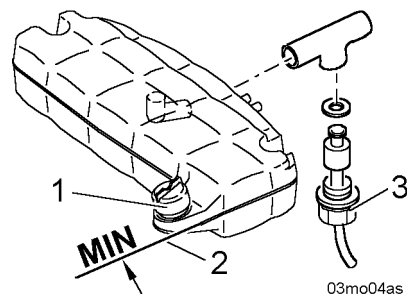
5.3.17 Checking the coolant level

The coolant equalising reservoir and filler neck is located on the top of the cooling unit. The equalising reservoir can be accessed once the engine hood has been opened. The filler neck can be accessed after the left-hand cooler hood has been opened.

Make sure that:

- The machine is in maintenance position 1.
- The engine compartment hood is open.

Procedure



The coolant level can be seen on the coolant equalising reservoir from outside. The proper level for a cold engine is slightly below the middle of the equalising reservoir MIN marking. If the level is too far below the MIN marking, coolant must be added. If the coolant level is too low, this is indicated by the coolant level probe 3 and displayed on the engine overheating and coolant level symbol field, along with a simultaneous audible warning.

- Check the coolant level in the equalising reservoir.
- The MIN marking 2 on the equalizing reservoir indicates the required coolant level.
- If the coolant level is below the MIN marking 2:
Top up the coolant in the equalizing reservoir via the filler neck 1 (as described below).

The coolant to be added must contain the appropriate concentrations of anti-freeze and DCA-4. See the detailed description in the section on checking the anti-freeze and DCA-4 concentrations in the coolant.





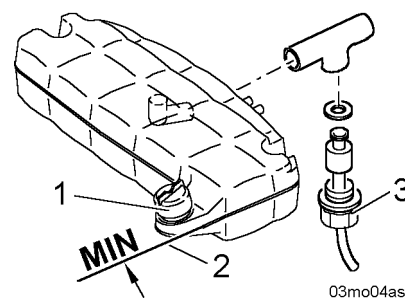
There is a danger of scalding due to coolant escaping under pressure.

! Only open the sealing cap on the filler neck **1** when the engine has cooled down - the coolant temperature indicator in the display unit should be in the lower third of the segment field.

! Never top up the cooling system when the engine is still hot.

- Turn the sealing cap on the filler neck **1** slightly anti-clockwise, allowing excess pressure to escape, then open it fully.
- Fill with coolant up to the MIN marking **2** on the equalizing reservoir.
- Place the sealing cap on the filler neck **1** and tighten it up.

5.3.18 Checking the anti-freeze and DCA-4 concentration in the coolant

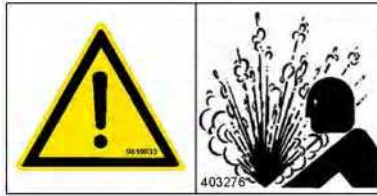


The coolant must contain at least 50% by volume antifreeze and corrosion protection agent. This protects against freezing down to around -37 °C. Furthermore, the coolant must contain between 0.3 and 0.8 units of DCA-4 per litre.

Make sure that:

- The machine is in maintenance position 1.
- The left-hand cooling system hood is open.
- The Fleetguard CC 2602 M test kit for the DCA-4 and anti-freeze concentration is ready.

Procedure for checking the antifreeze and DCA-4 concentration in the coolant



There is a danger of scalding due to coolant escaping under pressure.

! Only open the sealing cap on the filler neck when the engine has cooled down - the coolant temperature indicator in the indicator unit should be in the lower third of the segment field.

- Carefully open the sealing cap on the filler neck **1**.
- Test the anti-freeze and DCA-4 concentrations with the Fleetguard CC 2602 M test kit.
- If the concentrations are not correct:
Top up with anti-freeze and DCA-4 to the correct levels.

Procedure for correcting the antifreeze and DCA-4 concentration

- If the antifreeze concentration is too low:
Drain off the coolant and top up with pure antifreeze according to the following diagram.
- Along with the calculated amount of pure antifreeze to be topped up, add around 5 units (5%) of DCA4.

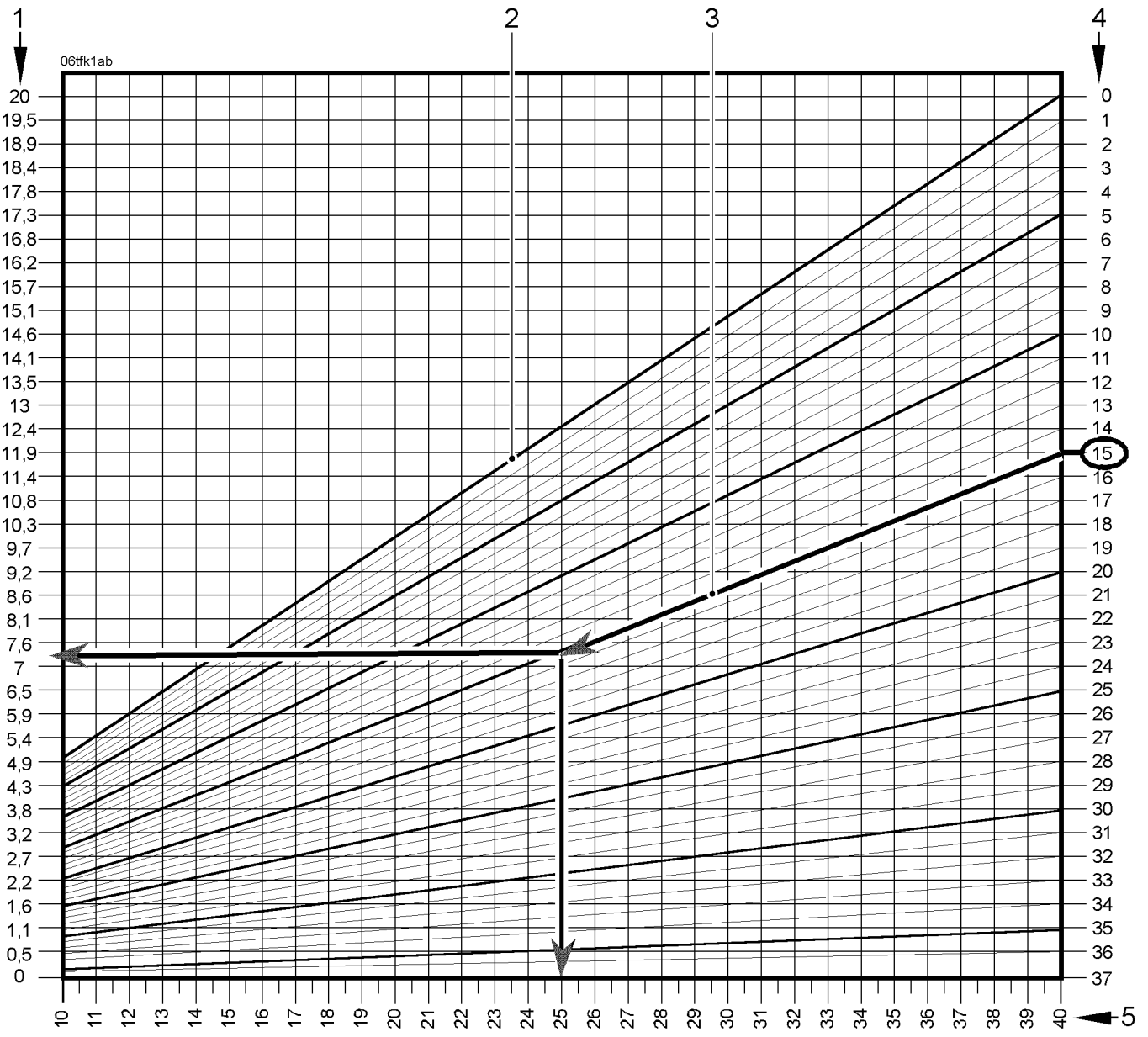


Caution

There is a risk of damage to the diesel engine.

Too much antifreeze and corrosion protection agent impairs the cooling effect. This eventually causes damage to the diesel engine.

! Never use more than 60% antifreeze and corrosion protection agent.



Selection for antifreeze concentration

1 Topping up quantity of pure antifreeze and corrosion protection agent in litres and around 5 units of DCA4

2 Guidelines
3 Example -15 °C
4 Measured coolant freezing point in °C

5 Capacity of cooling system in litres

Procedure for the example -15 °C:

- If a temperature of -15 °C is measured in the cooling system:
Follow the guideline 3 (starting from the measured temperature) to the left down to the vertical line indicating the filling quantity for the cooling system 5 and from this point horizontally to the left edge.

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This gives you the topping up quantity of pure antifreeze and corrosion protection agent 1 to be added in order to achieve protection down to -37°C .

- To restore the correct mixing ratio, you must drain off at least the previously calculated quantity from the cooling system.
- Top up with the correct quantity of pure antifreeze and corrosion protection agent and DCA4.
- The coolant previously drained off can be used if necessary to restore the required coolant level.

5.3.19 Cleaning the cooling system



Cooling system hood

Clean the cooler whenever necessary in order to ensure proper cooling. In dusty environments, check the cooler every day and clean it if necessary. Dirty cooler units result in overheating. The consequence is an audible and visual warning with simultaneous power reduction of the travel drive. Dust and other contaminants can be removed from the cooling fins with water jets, steam or compressed air. Compressed air is preferable.

Make sure that:

- The machine is in maintenance position 1.
- The left and right cooling system hoods are open.

Procedure

- Clean the cooler units with compressed air, steam or water.

Caution



Risk of damage to the cooling system

Careless handling can damage the cooler fins.

! Do not use hard objects or excessive water pressure for cleaning.

- Close the hoods **1** and **2** again, having first closed the cab doors.

5.3.20 Replacing the coolant with anti-freeze and DCA-4

Use clean, fresh water with a Ph value between 6.5 and 8.5 and a low sulphate / chlorine content for preparing the coolant.

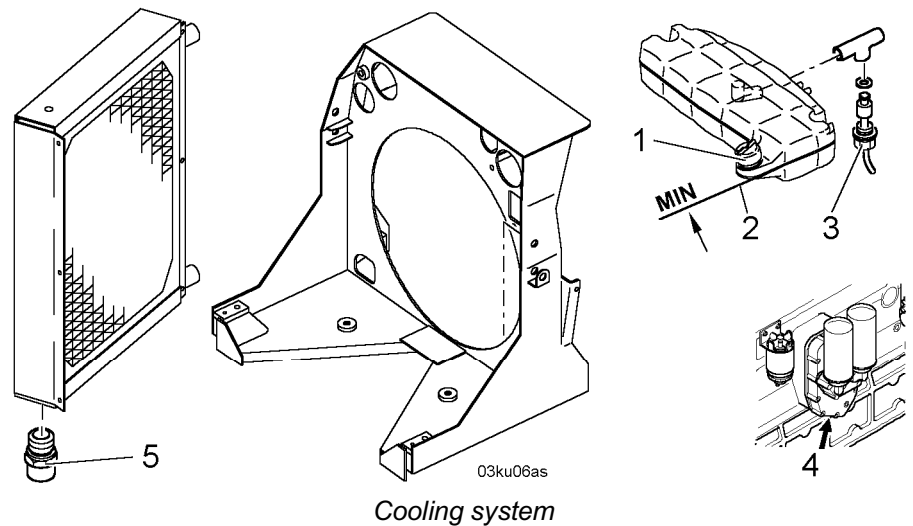
The coolant must be prepared outside the cooling system.

Always dispose of any coolant which you have drained off but no longer need according to the applicable regulations.

Make sure that:

- The machine is in maintenance position 1.
- The left-hand cooling system hood is open.
- The engine compartment hood is open.
- A receptacle with a minimum capacity of 25 litres is available for the used coolant, along with a drain hose.
- The mixing ratio of the coolant to be added corresponds to the correct value. See the section on checking the anti-freeze and DCA-4 concentration of the coolant.

Procedure



- | | |
|--|-----------------------|
| 1 Coolant equalising reservoir filling inlet | 3 Coolant level probe |
| 2 MIN marking | 4 Engine drain plug |
| | 5 Drain valve |





There is a danger of scalding due to coolant escaping under pressure.

! Only open the sealing cap on the filler neck when the engine has cooled down - the coolant temperature indicator in the indicator unit should be in the lower third of the segment field.

- Open the sealing cap on the filler neck **1**.
- Unscrew the sealing cap on the cooler drain valve **5** and unscrew the drain hose. Drain the coolant into the receptacle.
- Take off the drain hose, screw the sealing cap onto the cooler drain valve **5** and tighten it.

Also drain the coolant from the diesel engine:

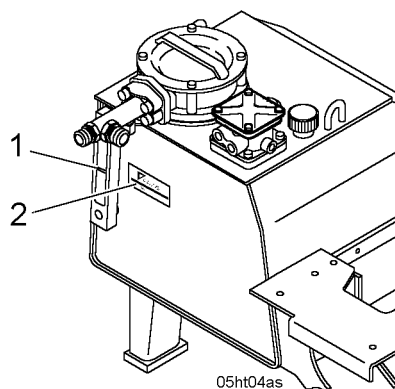
- Open the drain plug **4** and let the coolant flow into the receptacle.
- Screw the drain plug **4** back in and tighten it.
- Top up with coolant to the MIN marking **2** on the equalizing reservoir.
- Starting the diesel engine
- Allow the diesel engine to run at lower idling speed.
- Correct the coolant level.
Top up with coolant until it reaches the MIN marking **2**.
- Screw the sealing cap onto the equalizing reservoir filler neck **1**.

5.3.21 Checking the oil level in the hydraulic tank

Make sure that:

- The machine is cold.
- The machine is in maintenance position 1.
- The engine compartment hood is open.

Checking the hydraulic oil level



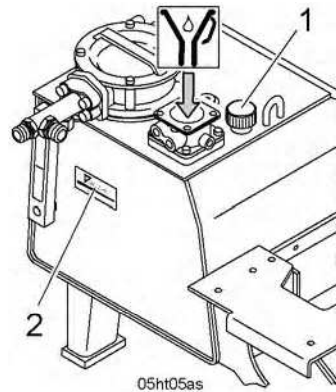
1 Sight glass

2 Maximum oil level marking

The red maximum oil level marking shows the correct oil level.

- Check the oil level in the sight glass **1**.
- If the oil level is too low:
Top up with hydraulic oil.

Topping up with hydraulic oil



- Release the tank pre-pressure by unscrewing the bleeder filter **1** on the hydraulic tank.

The hydraulic oil may only be poured in through the return strainer.

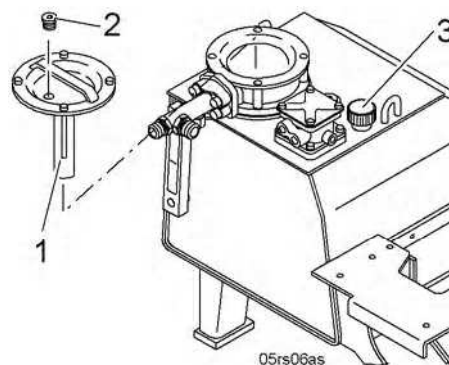
- Open the cover of the return strainer.
- Top up with hydraulic oil up to the oil level marking **2**.
- Put the cover on the housing with the spring and tighten it up.
- Screw on the bleeder filter.

5.3.22 Checking and cleaning the magnetic rod on the hydraulic tank

Make sure that:

- The machine is in maintenance position **1**.
- The engine compartment hood is open.

Procedure



- Release the tank pre-pressure:
Unscrew the bleeder filter **3** on the hydraulic tank by two turns.

- Unscrew the plug **2**.

The oil level sinks.

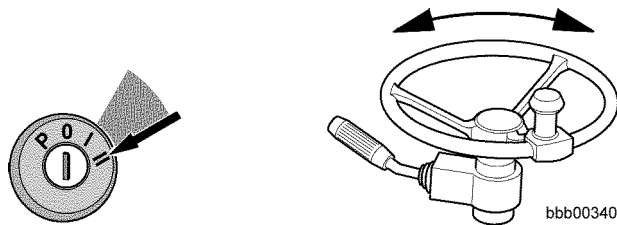
- Release the bolts on the lid and slowly lift the lid with the magnetic rod **1**.

Troubleshooting

Serious contamination or large metal fragments on the magnetic rod may indicate damage to the hydraulic system.

- In this event, locate the problem and rectify it.

- Carefully clean the magnetic rod.
- **After cleaning:**
Place the O-ring and cover with the magnetic rod on the housing.
- Tighten the screws on the cover.
- Screw in the plug 2.
- Tighten the bleeder filter 3.

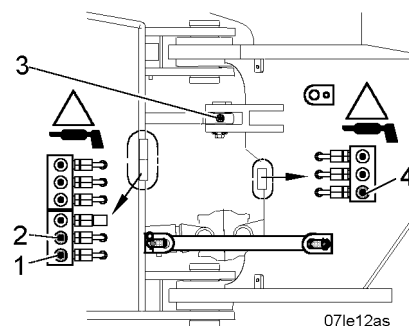
5.3.23 Checking that the steering is working**Procedure**

- Start the diesel engine.
- Without moving the machine, turn the steering in both directions and check that it is functioning properly.

5.3.24 Lubricating the bearing points on the steering cylinders

Make sure that:

- The machine is in maintenance position 1.
- The articulation lock is engaged if possible.

Procedure

Steering cylinder lubrication points

- | | |
|--|---|
| <p>1 Lubrication point at base of right-hand steering cylinder</p> <p>2 Lubrication point at base of left-hand steering cylinder</p> | <p>3 Lubrication point on the piston rod end of left-hand steering cylinder</p> |
|--|---|

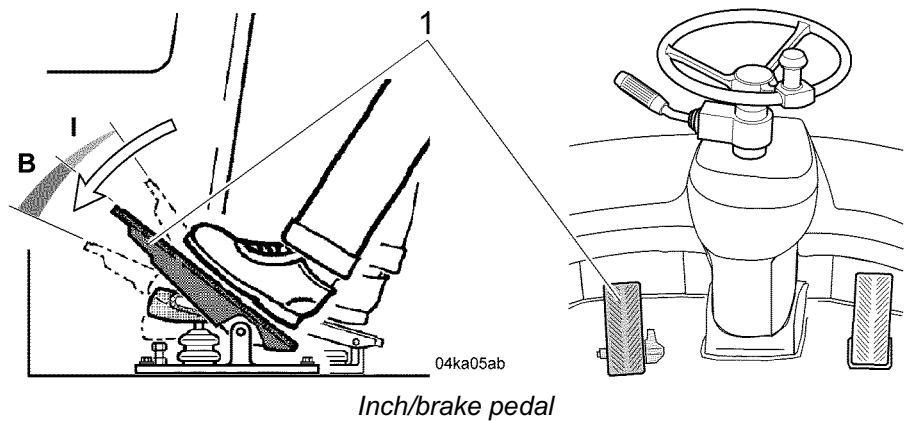
4 Lubrication point on the piston rod end of right-hand steering cylinder

- Lubricate the bearing points on the steering cylinders.

5.3.25 Checking the service brake and parking brake

Make sure that there is enough room to check the service brake and parking brake.

Checking the service brake



1 Inch/brake pedal
I Inching range

B Braking range

Warning



There is a danger of driving into bystanders or obstacles.

! Do not allow anyone into the danger area while these tests are being conducted.

! Perform the test on level ground with no obstacles.

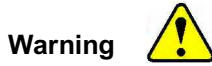
- Start the machine, and drive it forwards at around 8 km/h.
- Push the inch/brake pedal all the way down. The machine must come to an **abrupt** stop.

Troubleshooting

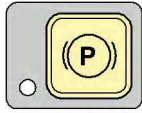
If the braking effect is too slight or entirely absent:

- Contact LIEBHERR CUSTOMER SERVICE.
-

Checking the parking brake



There is a danger of driving into bystanders or obstacles.
 ! Do not allow anyone into the danger area while these tests are being conducted.
 ! Perform the test on level ground with no obstacles.



04ta02ab

- Start the machine, and drive it forwards at around 5 km/h.
- Press the parking brake button while travelling.

The machine must come to an abrupt halt.

Troubleshooting

If the braking effect is too slight or entirely absent:

- Contact LIEBHERR CUSTOMER SERVICE.

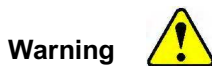
5.3.26 Checking the gap and wear on the parking brake

Friction can change the gap X1 and X2 and the thickness of the brake lining.

Make sure that:

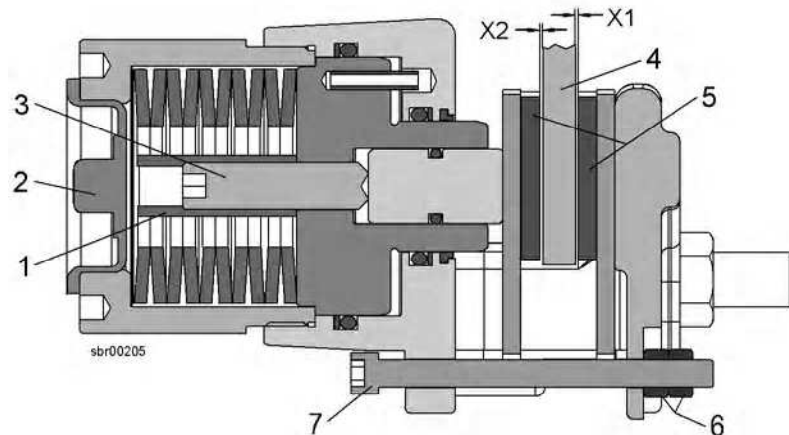
- The machine is in maintenance position 2.

Procedure



There is a risk of injuries due to machine rolling away.
 ! Make sure that the machine is secured against rolling away when carrying out work on the parking brake.

- Secure the machine against rolling away with wheel wedges.



Disc brake (shown in open position)

1 Lock nut

2 Sealing cap

LBH/01/003801/0003/5.05/en

3 Adjusting screw
4 Brake disc
5 Brake lining
6 Counter nut

7 Socket-head screw
X1 Gap
X2 Gap

- Start the diesel engine and press the button to release the parking brake.
- Test the brake lining thickness.
- If the brake lining is thinner than 1.0 mm:
Replace the brake linings **5**.
- Check the gap **X1** and X2.
- If the gap X1 + X2 is more than 1.5 mm:
Adjust the gap.
- Loosen the counter nut **6** and adjust the gap X1 to 0.3 mm using an allen key **7**.
- Tighten the counter nut **6**.
- Unscrew the sealing cap **2** and loosen the lock nut **1**.
- Use the adjusting screw **3** to set the gap X2 to 0.3 mm.
- Tighten the lock nut **1**.
- Engage the parking brake several times and test it again.
- Screw on the sealing cap **2** and tighten it.

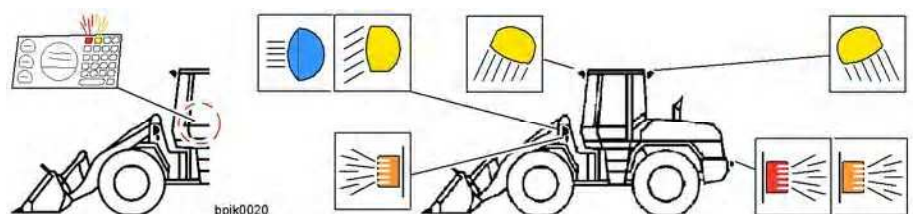
5.3.27 Checking the indicator lamps and lighting

Make sure that:

- The machine is in maintenance position 1.
- The machine's electrical system is switched on.

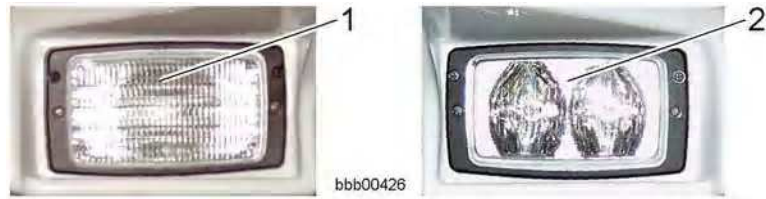
Checking the indicator lamps and lighting

- When you switch on the ignition, the lamps on the display unit are tested.
- All symbol fields light up for three seconds.
See the section on starting the engine in chapter 3.



- Switch on the ignition.
- Check that the symbol fields on the display unit light up.
- Check that all lights are working.

Adjusting the working floodlights



Versions:

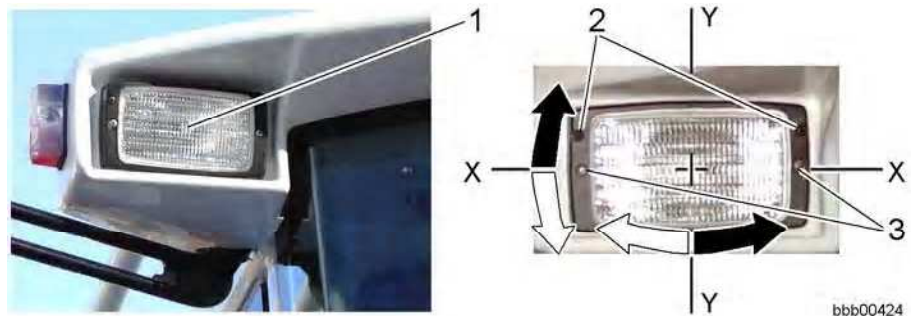
- 1 Single-chamber floodlight
 - 2 Double-chamber floodlight
- This equipment is optional.

Adjust the working floodlights as required:

- Either for close range lighting
- or for long range lighting.

Adjusting the front working floodlight

The optional double-chamber front working floodlight cannot be adjusted.



Front working floodlight

- 1 Floodlight
- 2 Adjusting screws

- 3 Fixing screws

Horizontal Y axis adjustment:

- Only limited adjustment is possible.
- To adjust:
 - Tighten or loosen the left or right adjusting screw **2** as required.

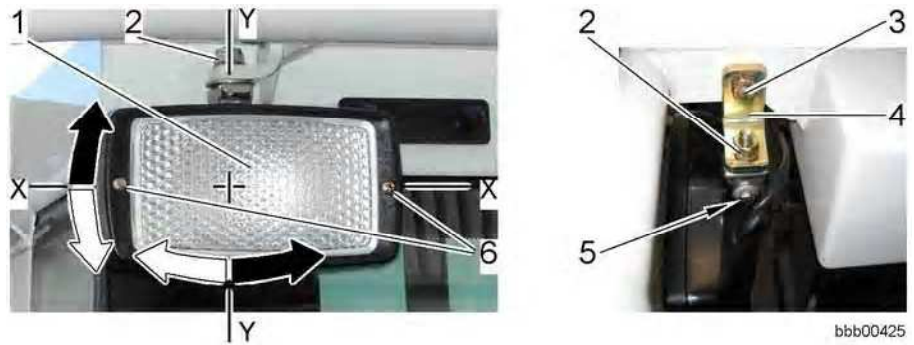
Vertical X axis adjustment:

- The effective (visible) lighting range can be adjusted from 20 m to 40 m.
- To adjust:
 - Tighten or loosen the left and right adjusting screws **2** as required.

Adjusting the rear working floodlight

This equipment is optional.

This description also applies to double-chamber rear working floodlights.



Rear working floodlights

- | | |
|-----------------|-------------------|
| 1 Floodlight | 4 Bracket |
| 2 Fixing screw | 5 Adjusting screw |
| 3 Fixing screws | 6 Fixing screws |

Horizontal Y axis adjustment:

- Loosen the screw 2.
- Move the left and right floodlights as required.
- Tighten the screw again.

Vertical X axis adjustment:

- Loosen the appropriate screws 3 or 5.
- Move the left and right floodlights as required.
- Tighten the screws again.

5.3.28 Checking the transfer gear oil level

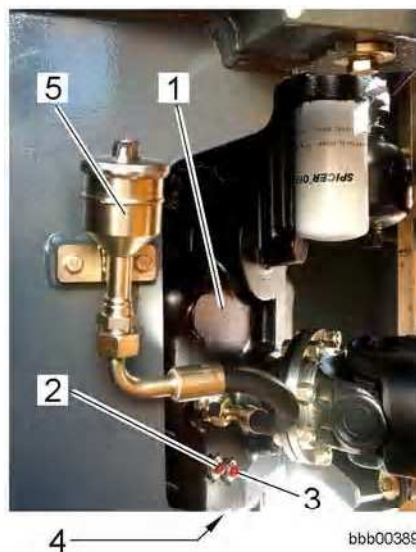
Make sure that:

- The machine is in maintenance position 1.
- The articulation lock is engaged.

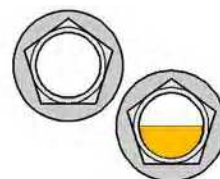
LBH/01/003801/0003/5.05/en

Procedure

- Start the diesel engine and let it run at low idling speed.
Check the oil level with the engine running and at a gear oil temperature of $20 \pm 10^\circ\text{C}$.

*Transfer gear*

- | | |
|----------------------|----------------|
| 1 Transfer gear | 4 Drain plug |
| 2 Top sight glass | 5 Filling tube |
| 3 Bottom sight glass | |



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- Check the oil level in the sight glasses **2, 3**.
The oil level must be within the bottom sight glass **3**.

Troubleshooting

If the oil level is too low:

- Switch off the engine and top up with the required amount of gear oil.
For the oil quality, see the section gear lubricants in the lubricants and fuels section.

- Repeat the check.

Troubleshooting

If the oil level is too high:

- Contact LIEBHERR CUSTOMER SERVICE.

5.3.29 Checking the tightness of the wheels (once after 50, 100 and 250 h)

Make sure that:

- The machine is in maintenance position 1.
- A torque wrench with a measuring range of over 750 Nm is available.

Procedure



Check the tightness of the wheels according to the specified intervals.
 ! This one-off maintenance tasks scheduled for 50, 100 and 250 service hours must be performed every time the wheels are changed.



Installing or changing the working attachment or tyres.
 ! See the section on attachments and accessories in chapter 2.

- Check that the nuts and bolts on all four wheels have been tightened with the required torque.

Description	Value	Unit
Wheel lug tightening torque	750	Nm
Wheel lug spanner size	32	mm

Wheel lug tightening torque and spanner size

5.3.30 Lubricating the bevel gear seals of the front and rear axles

The bevel gear seals should be lubricated as necessary, and when operating the machine in water, every day.

Make sure that the machine is in maintenance position 1.

Procedure



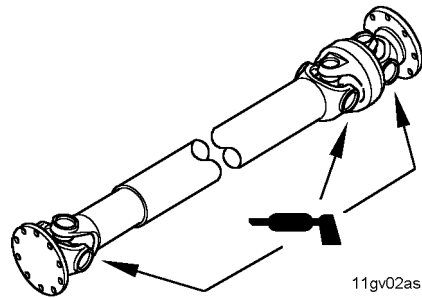
- Grease the bevel gear seals of the front and rear axles.
 Grease specifications: See the lubricants and fuels listed in chapter 5.

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5.3.31 Checking and lubricating the front drive shaft

Make sure that the machine is in maintenance position 1.

Procedure

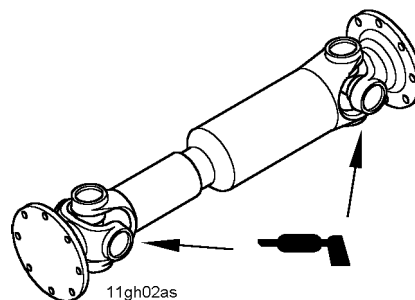


- Lubricate the drive shaft at both universal joints.
- Check the play of the drive shaft in the bearings.
- Check the rubber sleeve for leaks and damage.

5.3.32 Checking and lubricating the rear drive shaft

Make sure that the machine is in maintenance position 1.

Procedure



- Lubricate the drive shaft at both universal joints.
- Check the play of the drive shaft in the bearings.

5.3.33 Checking and adjusting the tyre pressure

The air pressure in the tyres has a significant influence on the overall operating performance of the machine.

The tyre pressure depends on the following factors:

- The tyres used
- The purpose the machine is used for
- The attachment installed

For special uses where heavier loads may be expected, a higher tyre pressure is recommended.

However, the tyre pressure **may not be greater than the maximum permitted** by the tyre manufacturer's specifications.

Make sure that:

- The machine is in maintenance position 1.
- The correct tyre pressures are available.
See the section on tyres in chapter 1.

The tyre pressures stated refer to cold tyres.

Procedure



Checking and adjusting the tyre pressure

Warning 

Exploding tyres can cause serious injury.

If the tyre inflation equipment is incorrectly or carelessly used or if the tyre pressure is too high, the tyres may burst or the rims may come off, causing severe, or possibly even fatal injuries.

To check and adjust the tyre pressure:

- ! Use a sufficiently long hose with a self-locking adapter for filling the tyres.
- ! Do not stand in the danger zone.

- Check the air pressure in all the tyres and adjust if necessary.

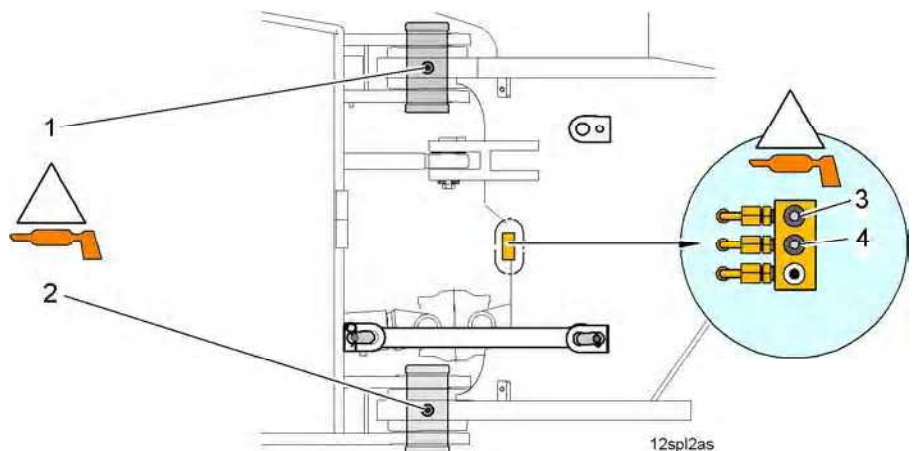
5.3.34 Greasing the oscillating axle frame and articulation lock

Make sure that:

- The machine is in maintenance position 1.
- The articulation lock is engaged.

Procedure

Grease the lubricating points for the oscillating axle frame and articulation lock.



Lubrication points on the right-hand side of the central lubricating rail

- | | |
|-------------------------------|--------------------------------|
| 1 Top articulation bearing | 3 Front oscillating axle mount |
| 2 Bottom articulation bearing | 4 Rear oscillating axle mount |

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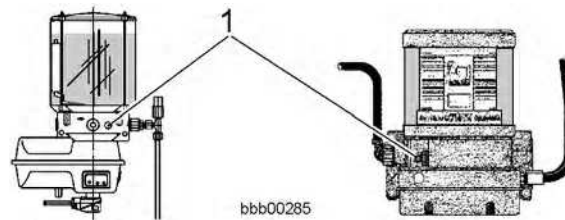
- Grease the lubricating point for the oscillating axle frame and articulation lock.

5.3.35 Checking whether metered quantities are adequate at the bearing points (grease collars) of the central lubrication system



bsym0049

- Visually examine whether metered quantities are adequate at the bearing points.
- If the bearing points are not sufficiently lubricated, locate the problem and rectify it.



Regularly check the grease quantity in the reservoir.

Stay within the minimum and maximum lubricant levels.

The reservoir has a sight glass where the rubber stripper on the agitator can be seen. You can check how much grease is left here.

Depending on the version of the central lubrication system:

- If necessary, fill the reservoir via the grease fitting or the filling coupling 1.

For lubricant specifications, see the section on lubricants and fuels.

5.3.36 Checking the hose lines of the central lubrication system (lubrication points, detached hoses, leaks)



bsym0049

- Visually examine the hose lines for defects.
- In case of any defects, locate and rectify the problem.

5.3.37 Lubricating the door hinges

Make sure that the machine is in maintenance position 1.

Procedure

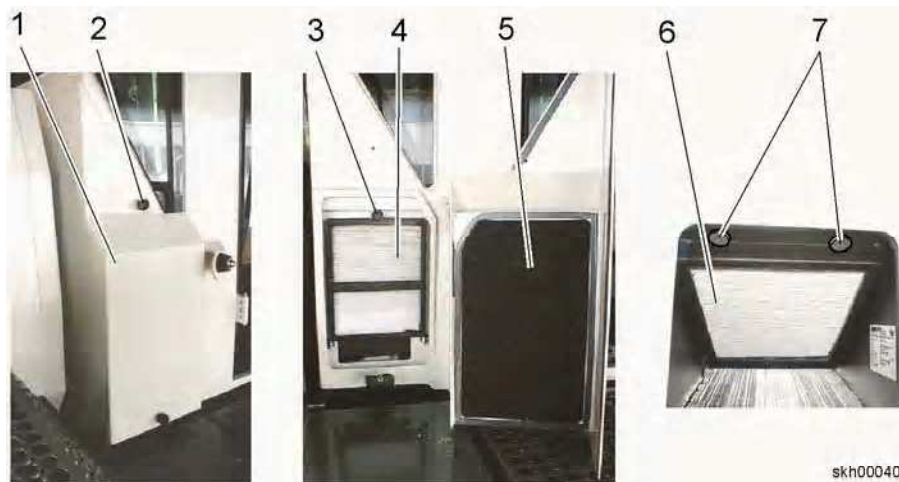
- Lubricate the door hinges with a grease gun.
For lubricant specifications, see the section on lubricants and fuels.



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5.3.38 Cleaning and changing the fresh air filter

Make sure that the machine is in maintenance position 1.

Procedure

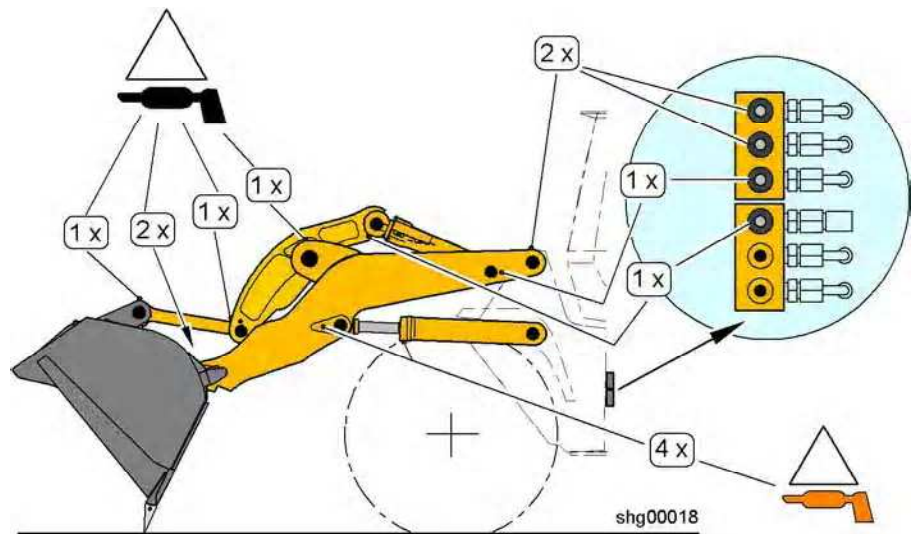
- Unscrew the cover **1**.
- Gently press down the fresh air filter **5** on the upper end and pull it out.
- Unscrew the fixing frame **3** and take out the fine fresh air filter **4**.
- Unscrew the fixing frame **7** and take out the recirculated air filter **6**.
- Clean (blow or wash out) the filter **5**, or replace if necessary.
- Clean (blow out) the filters **4** and **6**, or replace them if necessary.
- Insert the cleaned or new filters, making sure they are correctly fitted (the arrows moulded on the filter frame point towards the air taken in).
- Screw the cover **1** back on.

5.3.39 Lubricating the lift arms and attachment

Make sure that the machine is in maintenance position 2.

Lubricating standard lift arms and attachment

Procedure



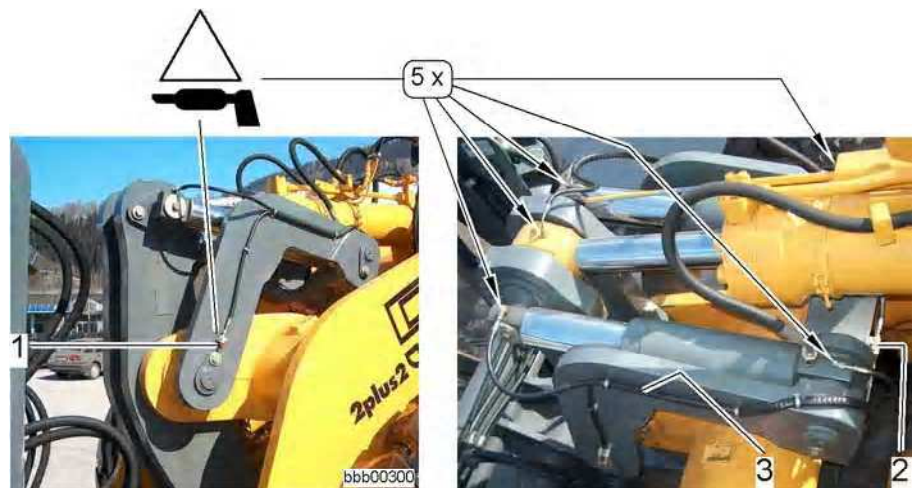
Bearing and lubrication points on the lift arms

- Move the lift arms and the bucket to the position shown.
- Secure the machine against rolling away with wheel wedges.
- Grease all the bearing and lubrication points on the lift arms.
- If fitted, lubricate the optional quick-change device.
- If fitted, grease the lubrication points on the attachment.
- The lower bucket bearings should be lubricated daily if necessary.

Lubricating the tilt cylinder support for timber transfer

This equipment is optional.

Procedure



Tilt cylinder support

- 1 Grease fitting
- 2 Distributor block

- 3 Lubricating line

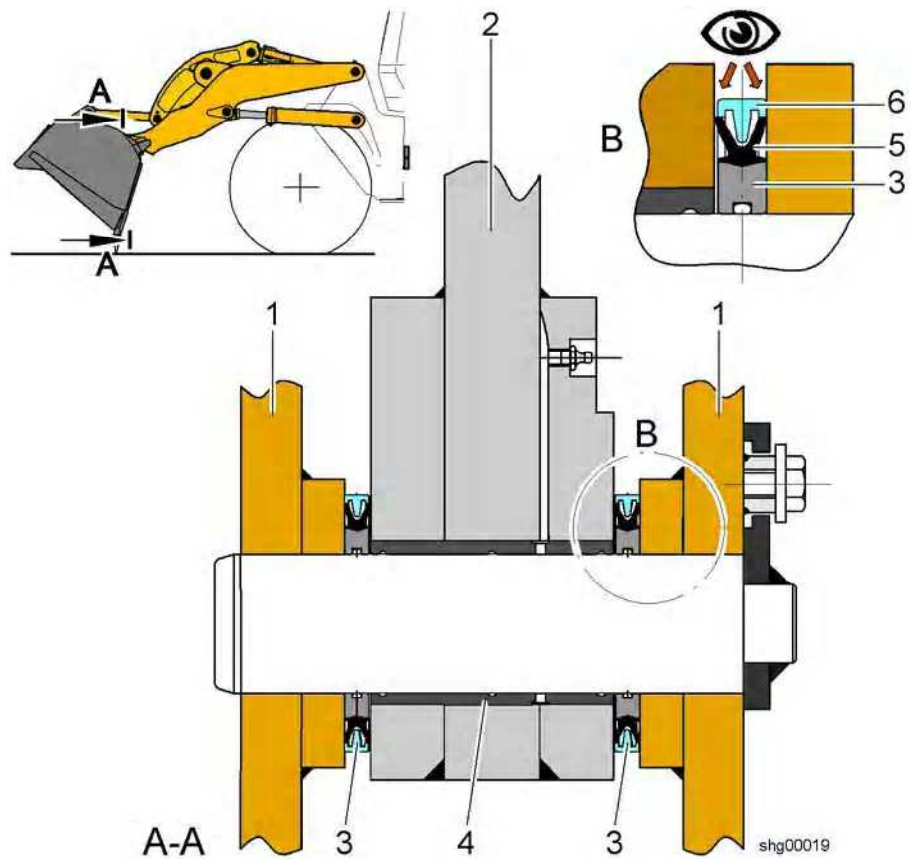
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- Grease the lubrication points via the grease fitting **1**.
The lubricant is pumped via the distributor block **2** and the lubricating lines **3** to the lubricating points.
- If fitted, grease the lubrication points on the timber grabber.
For detailed information on maintenance for the attachment, see the manufacturer's instructions.

5.3.40 Checking the bucket bearing seals and the bearing bushings on the lift arms

The bucket bearing seal **3** prevents dirt from entering the bearing, thus increasing the lifetime of the bearing bushings. Depending on the type of application, wear occurs on the sealing lips **5** and on the dirt guard **6**. If the bucket bearing seal **3** is in any way damaged or worn, it must be replaced.

Procedure for checking the bucket bearing seal



Bucket bearing seal

- | | |
|------------------------|-------------------|
| 1 Bucket bearing plate | 4 Bearing bushing |
| 2 Bucket arm | 5 Sealing lips |
| 3 Bucket bearing seal | 6 Dirt guard |

- Move the lift arms and the bucket to the position shown.
- Clean the bucket bearing seal **3** using a steam jet.

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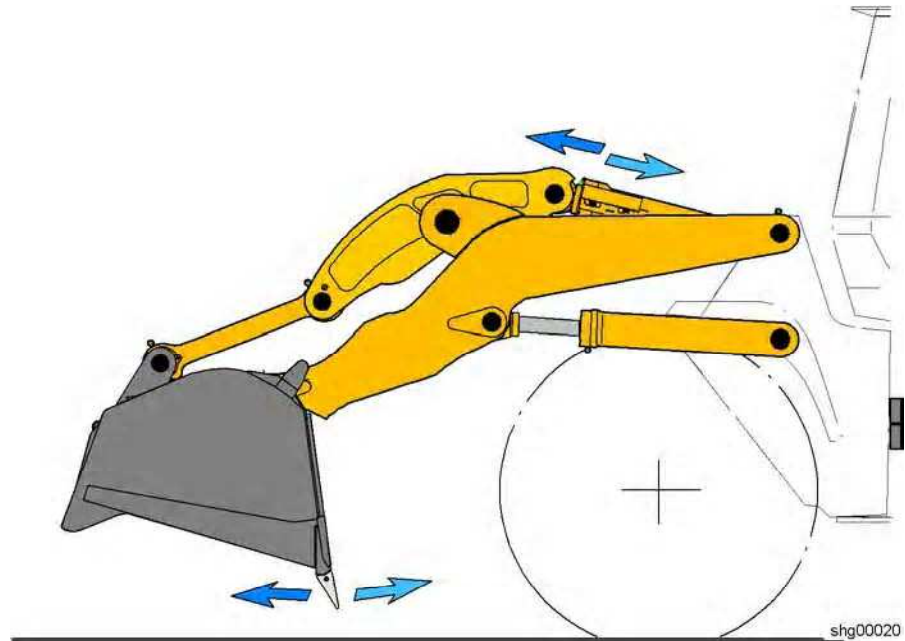
- Visually check whether the sealing lips **5** touch the sides of the lift arms and the bucket.
- If there is a gap between the sealing lips **5** and the bucket arm **2** or the bucket bearing plate **1**, or if the bucket bearing seal is damaged:
Replace the bucket bearing seal as described in section 17 of the service manual.

Procedure for checking the bearing bushings for wear

Dirt or insufficient lubrication can cause wear on the bearing bushings.

The increased play between the pin and bearing bushing causes noises.

Replace the bearing bushings in good time to prevent damage to the material of the bucket arm.



Lift arm bearing bushings

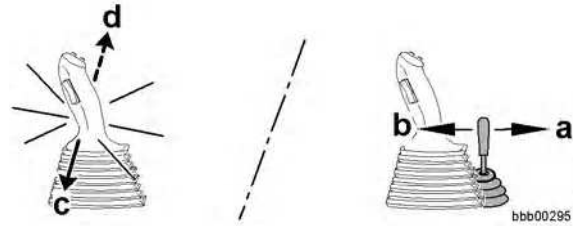
- Move the lift arms and the bucket to the position shown.
- Gently and rapidly tilt the bucket in and out, and check the bearing points for noise and play.
- If there is significant play at the bearing points or loud noise:
Replace the bearing bushings. Contact LIEBHERR CUSTOMER SERVICE.

5.3.41 Checking that the quick-change device is working

Make sure that:

- The engine has been started.
- The lift arms have been lowered.
- The working attachment is tilted in.

Procedure



The operation of the quick-change device can vary according to the version or the type of machine.



Danger

Failure to use the quick-change device properly can cause accidents.

! See the section on operation in chapter 3 for how to use the quick-change device.

! Follow the safety instructions.

- To check that it is working properly:

Unlock the quick-change device and lock it again.

This prevents the locking pins from jamming and preventing the quick-change device from being released.

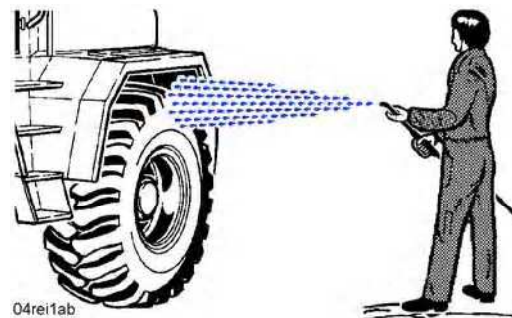
- To make sure, check:

That the quick-change device is properly locked again.

5.3.42 Cleaning the machine

Washing the machine

Cleaning the machine




Washing

Electrical devices such as the emergency steering pump, refuelling pump, sensors and electric components in the cab are not watertight.


Be careful when cleaning the machine with a high-pressure cleaner.

Every time you clean the machine with a high-pressure cleaner, regrease all lubrication points on the machine.


Caution  Freshly painted surfaces may be damaged. Cleaning with high-pressure [more than 1379 kPa (13.8 bar)] can damage freshly painted surfaces.

! When a new machine is delivered, let the paint dry in the air for at least 30 days before you wash it or parts of it with a high-pressure cleaner.

! Until this 30 day period has passed, only use a low-pressure cleaner for washing.

Caution  Risk of damaging the soundproofing mats. The soundproofing mats can be damaged if you clean them with high pressure. Damaged soundproofing mats increase the sound output level above that guaranteed by the manufacturer.

! Do not expose soundproofing mats to water or steam jets.

Caution  There is a risk of damaging electrical devices. When using a high-pressure cleaner, you may damage electrical devices such as the emergency steering pump, refuelling pump, sensors and electrical components in the cab.


! Do not expose electrical devices to water or steam jets.

- Wash the machine.
- Regrease all lubrication points on the machine.

Cleaning the diesel engine

When washing the engine using water or steam jet, take care not to expose electronic devices such as the starter, alternator, sensors and oil pressure switches directly to the jet.

After cleaning, start up the engine to allow it to dry out.

Caution  There is a risk of damaging the engine and its electric components. Moisture penetration can cause corrosion and electrical malfunctions.

! Do not expose devices such as the starter, alternator, sensors and oil pressure switches to water or steam jets.

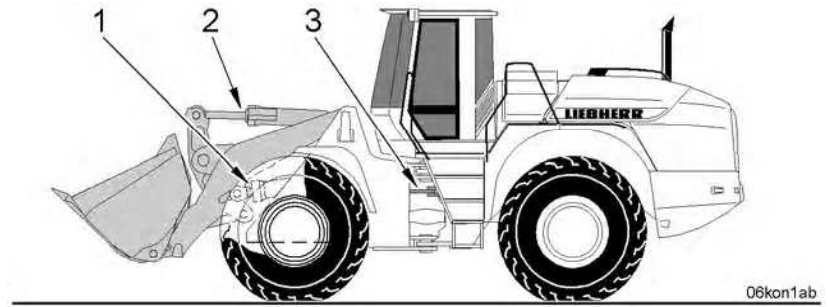
- Carefully clean the engine.

5.3.43 Corrosion protection

If the machine is not used for more than 4 weeks, especially on sea journeys, the following measures must be taken.

Protecting the piston rods from corrosion

Use a non-acidic corrosion protection grease to protect against corrosion.



1 Lift cylinder
2 Tilt cylinder

3 Steering cylinder

- Shut down the machine so that all piston rods are retracted as far as possible in their cylinders.
- Smear all exposed piston rods with a thick layer of oxygen-free anti-corrosion grease.
- If the cylinder piston rods are not coated with hydraulic oil for a prolonged period:
The piston rods must be coated with non-acidic corrosion protection grease.

When moving a machine thus protected for loading or transport, the scraper removes the grease from the piston rods in the cylinders.

- If the machine is transported:
Check the corrosion protection on the piston rods once again after loading.

Protecting the fuel tank from corrosion

If the machine is not used for a long time, condensation can collect in the tank.

Condensation in the tank leads to rust.

- If the machine is not used for more than 2 months:
Fill up the fuel tank with diesel.

5.4 Lubricants and fuels

Conscientious observance of the regulations for handling lubricants and fuels will increase the reliability and service life of the machine.

It is especially important that the specified lubricant qualities are observed.

You can find the various specifications about the prescribed intervals in the maintenance and inspection schedule and the lubrication chart.

You can find details on lubrication, checking the oil level and changing operating fluids in the maintenance section under maintenance tasks.

Follow the rules on handling lubricants and fuels, especially the environmental regulations.

Filling quantities and specifications:

- The filling quantities listed in the tables are only guidelines. The dipstick and level markings are always mandatory.
- Each time the lubricant or fuel is replaced or topped up, check the level in the unit in question.
- For more detailed information about the required lubricants, fuels and filling quantities, see the filling quantities in the lubrication chart and the section on lubricants and fuels.

Environmental protection

- Always implement and observe environmental protection measures.
- Observe national regulations.
- Ensure that liquids can be properly disposed of before draining them.

Disposing of used materials

This applies to the following types of used materials and hazardous waste:

- Oils, lubricants, brake fluids, etc.
- Coolant
- Fuels
- Filters, oil cartridges etc.
- Rubber, tyres, insulating materials etc.
- Batteries

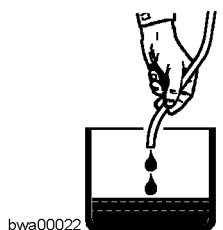
Procedure



Environmental and health hazard

! Observe the local regulations for protecting the environment when disposing of used materials.

- Always collect and store used materials separately in suitable containers.
- Dispose of used materials properly at the official collection points.



Disposal

Converting the hydraulic system from petroleum to environmentally compatible hydraulic fluids

For the operation of LIEBHERR earth moving machines with environmentally compatible hydraulic fluids we recommend **PANOLIN HLP SYNTH 46**. **Machines filled at factory with environmentally compatible hydraulic fluids have an appropriate sign (CAUTION) attached to the driver's cab and hydraulic tank.**

Procedure for conversion:



Beware of damaging the machine's hydraulic system. Mixing environmentally harmless hydraulic fluids with mineral oils produces a vigorous reaction that can damage the hydraulic system.

! Avoid mixing environmentally harmless hydraulic fluids with mineral oils.

- If you intend to convert the machine to environmentally-compatible hydraulic fluid, you **must** first consult LIEBHERR CUSTOMER SERVICE.
- It is essential that you order the **INSTRUCTION SHEET** and the **CONVERSION GUIDELINES** from LIEBHERR and that you observe them.

5.4.1 Lubricating oils for diesel engines



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Lubricating oil quality

Only high-alloy lubricating oils are used in modern diesel engines. They consist of basic oils blended with additives. The lubricating oil regulation for LIEBHERR diesel engines is based on the following specifications and regulations.

Description	Specifications
API classification (American Petroleum Institute)	CF-4, CG-4, CH-4, CI-4
ACEA classification (Association des Constructeurs Européens de l'Automobile)	E2, E3, E4, E5

Specifications and regulations for diesel engine lubricating oils

Lubricating oil viscosity

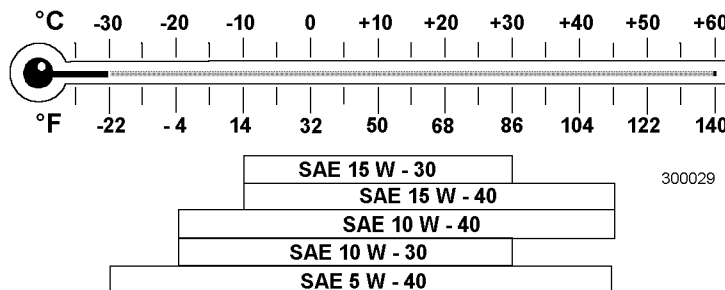
The lubricating oil viscosity is selected according to the SAE (Society of Automotive Engineers) classification. The decisive factor for the selection of the correct SAE class is the ambient temperature.

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The selection of the SAE classification does not affect the quality of a lubricant oil.

If the viscosity is too high, starting can be difficult. If it is too low, lubricant efficiency may be impaired.

The temperature ranges detailed in the following diagram are guidelines - short-term deviations are permissible.



Selection of the SAE class according to temperature

Lubricant oil changing intervals

Changing intervals:

- Change the oil according to climate zone, sulphur content in the fuel and oil quality as shown in the following table.

Even if the specified number of service hours (h) is not reached in a given year, the engine oil and filter should be replaced at least once a year.

Complicating factors

Various complicating factors or harsh operating conditions can affect the maintenance intervals.

Complicating factors or harsh operating conditions include:

- Frequent cold starts
- A sulphur content above 0.5% in the fuel
- Outside operating temperatures below -10 °C

If working under difficult conditions, the oil change intervals defined in the maintenance and inspection schedule must be reduced by half, as shown in the table below.

Complicating factor		Oil quality	
		E2 CF-4, CG-4 CH-4, CI-4	E3, E4, E5
Outside temperature	Sulphur content in fuel	Interval	
Normal climate, down to -10 °C	Below 0.5%	250 h	500 h
	Above 0.5%	125 h	250 h
Below - 10 °C	Below 0.5%	125 h	250 h
	Above 0.5%	-	125 h

Oil change intervals in service hours (h)

LBH/01/003801/0003/5.05/en

5.4.2 Diesel fuels



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Specifications

The diesel fuels must meet the minimum requirements in the fuel specifications listed below.

Authorised fuel specifications:

- DIN EN 590
- ASTM D 975-89a - 1D and 2D

The sulphur content should not exceed 0.5% by weight. Higher sulphur content affects the oil change intervals and the engine lifetime.

Lubricity

The reduction of the sulphur content in diesel fuels has raised the problem of lubricity. It has been found that diesel fuels which comply with the European limit of 0.05 % sulphur by weight can cause wear in injection systems, especially distributor injection pumps.

Branded fuels (in Germany) contain these lubricant additives as part of their additives package. The fuel lubricity must be <400µm according to the HFRR (60°) test.

The additives should be added by the supplier in his capacity as agent responsible for fuel quality. Addition of secondary lubricity additives by the customer is not recommended.

Diesel fuel at very low temperatures

When outside temperatures fall below 0°C, the flow performance of summer diesel fuel may be insufficient as a result of paraffin separation. The same problem arises with winter diesel fuels below -15 C.

Diesel fuel containing additives for operating temperatures down to -20 °C is also often available.

To avoid breakdowns, the diesel fuel must be mixed with two star petrol or paraffin at low temperatures. Blending in two star petrol must be viewed as an emergency remedy and it may not exceed 30% by volume.

Four star petrol may not be used for blending.

The engine power can drop in relation to the additive mixture used for cold conditions. Blending in additives should therefore be kept to a minimum, taking into account the outside temperatures.

For safety reasons, the fuel may only be mixed in a fuel container. When refuelling, pour in the fuel additive with lower specific gravity before the diesel fuel. The engine should then be run until the fuel mixture is circulating throughout the entire fuel system.

Diesel fuel mixing ratio (% vol.)

Outside temperature °C	Summer diesel fuel %	Additive %
0 to -10	70	30
-10 to -15	50	50 *

Mixing ratio for summer diesel fuel

* If an additive of 50% is necessary, only paraffin may be used (not two-star petrol).

Outside temperature °C	Winter diesel fuel %		Additive %	
	-15 °C	-20 °C	-15 °C	-20 °C
0 to -10	100	100	--	--
-10 to -15	100	100	--	--

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Outside temperature °C	Winter diesel fuel %		Additive %	
	-15 °C	-20 °C	-15 °C	-20 °C
-15 to -20	70	100	30	- -
-20 to -25	50	70	50 *	30

Mixing ratio for winter diesel fuel

* If an additive of 50% is necessary, only paraffin may be used (not two-star petrol).

Additives for diesel fuel (flow improvers)

Flow improvers available on the market will also improve the cold weather performance of the diesel fuel. Their use requires the observance of quantity and application recommendations stipulated by the manufacturer.

5.4.3 Coolants for diesel engines

General recommendations

The cooling system only functions reliably when it is working in a pre-pressurised condition. Therefore it is essential that it is kept clean and leakproof, that the cooling plug and operating valves function properly and that the necessary coolant level is maintained.

The antifreeze and corrosion protection agents approved by us ensure sufficient protection against cold, corrosion and cavitation, do not corrode seals and hoses and do not foam.

Coolants which contain unsuitable antifreeze and corrosion protection or which have been insufficiently or incorrectly prepared can cause units or components in the coolant circuit to malfunction as a result of cavitation or corrosion damage.

Also, heat-insulating deposits can occur on heat-conducting components which can result in overheating and cause the engine to break down.

Fresh water regulations

Drinking tap water is suitable with the following restrictions.

Appearance: colourless, clear, free of visible impurities.

Sea water, brackish water, salt water and industrial waste water are not suitable.

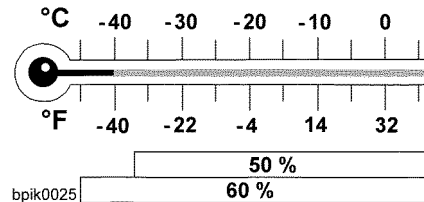
Fresh water quality	
Description	Value and unit
Water hardness	0.6 to 2.7 mmol/l (3 to 15° d)
pH value at 20 °C	6.5 to 8.0
Chloride ion content	max. 80 mg/l
Sulphate ion content	max. 80 mg/l

Coolant with DCA 4

DCA 4 stands for diesel coolant additive, and is manufactured by Fleet-guard

The cooling system must contain at least 50% by volume antifreeze and corrosion protection agent all year round. This protects against freezing down to around -37 °C.

When coolant loss occurs, make sure that the proportion of antifreeze has not dropped below the 50% by volume limit.



Proportion in % of antifreeze and corrosion protection agent



Caution

There is a risk of damage to the diesel engine.

If the proportion of antifreeze and corrosion protection agent is too high, the cooling effect is reduced, causing damage to the engine.

! Do not use more than 60 % antifreeze and corrosion protection agent.

When carrying out maintenance work, check the concentration of antifreeze and anti-corrosion agent and correct it if necessary.

The DCA 4 concentration must be between 0.3 and 0.8 units per litre.

The Fleetguard CC2602 M test kit is recommended for testing the DCA 4 concentration.

The prescribed interval for changing the coolant is 2 years.

Filling the cooling system for the first time

When the cooling system is filled for the first time or re-filled following repairs, additional fluid DCA 4 must be added to the DCA 4 concentration in the coolant filters for antifreeze and corrosion protection.

Machine type	Filling	Water	Antifreeze/corrosion protection agent	Fluid DCA 4
L538	30.5 l	14.5 l	14.5 l	1.5 l
L544, L554	32.5 l	15.5 l	15.5 l	1.5 l
L564, L574, L580	38.0 l	18.0 l	18.0 l	2.0 l

Approved antifreeze and corrosion protection agents

Approved antifreeze and corrosion protection agent for diesel engine cooling systems (concentrate/un-diluted)		
Product designation	Manufacturer	
A	Agip Antifreeze Plus	Agip
	Agip Langzeit-Frostschutz	Agip
	Antigel DB 486	Sotragal
	Aral Kühler-Frostschutz A	Aral
	AVIA Frostschutz APN (G48-00)	AVIA
B	BP anti frost X 2270 A	BP
	BP Nappel C 2270/1	BP
C	Caltex Engine Coolant DB	Caltex
	Caltex Extended Life Coolant	Caltex
	Castrol Anti-Freeze O	Castrol
	Century F.L. Antifreeze	Century
	Chevron DEX-COOL Extended Life Anti-Freeze/Coolant	Chevron Texaco
D	DEUTZ Kühlschutzmittel 0101 1490	DEUTZ
E	Esso Kühlerfrostschutz	Esso

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Approved antifreeze and corrosion protection agent for diesel engine cooling systems (concentrate/undiluted)

Product designation		Manufacturer
F	Fricofin	Fuchs
	Frostschutz Motorex (G 48-00)	Bucher + Cie
	Frostschutz 500	Mobil
G	Glacelf Auto Supra	Total
	Glycoshell AF 405	Shell
	Glycoshell N	Shell
	Glysantin (G48-00)	BASF
H	Havoline XLC	ARTECO
	Havoline DEX-COOL Extended Life Anti-Freeze/Coolant	Chevron Texaco
I	Igol Antigel Type DB	Igol
L	Labo FP 100	Labo
M	Motul Anti-Freeze	Motul
O	OMV-Frostschutzmittel	OMV
	Organifreeze	Total
	OZO Frostschutz S	Total
T	Total Antigel S-MB 486	Total
	Total Frostfrei	Total
V	Veedol Antifreeze O	Veedol
W	Wintershall Kühlerschutz	Wintershall

Approved antifreeze and corrosion protection agents (50:50 premix)

Product designation		Manufacturer
C	Caltex Extended Life Coolant Pre-Mixed 50/50 (ready-to-use-version)	Caltex
	Chevron DEX-COOL Extended Life Prediluted 50/50 Antifreeze coolant	Chevron Texaco
H	Havoline XLC, 50/50	ARTECO
	Havoline DEX-COOL Extended Life Prediluted 50/50 Antifreeze coolant	Chevron Texaco
L	Liebherr Anti-Freeze APN Mix Id.Nr. 8611045 – 20 l drum	LIEBHERR
O	Organicool 50/50	Total

Using coolant without antifreeze**Using DCA 4 without antifreeze and corrosion protection agent**

In exceptional cases and when outside temperatures never fall below freezing, such as tropical zones, where it is demonstrable that no approved antifreeze and corrosion protection agent is available, the coolant may be composed solely of water and DCA 4.

In order to protect the cooling system from corrosion in this case:

- About twice as much DCA 4 must be used in relation to the mixing ratio of antifreeze and corrosion protection agent and DCA 4.
- The DCA 4 concentration must be between 0.6 -1.06 units per litre.
- The coolant must be replaced once a year.

The Fleetguard CC 2602 M test kit is recommended for testing.

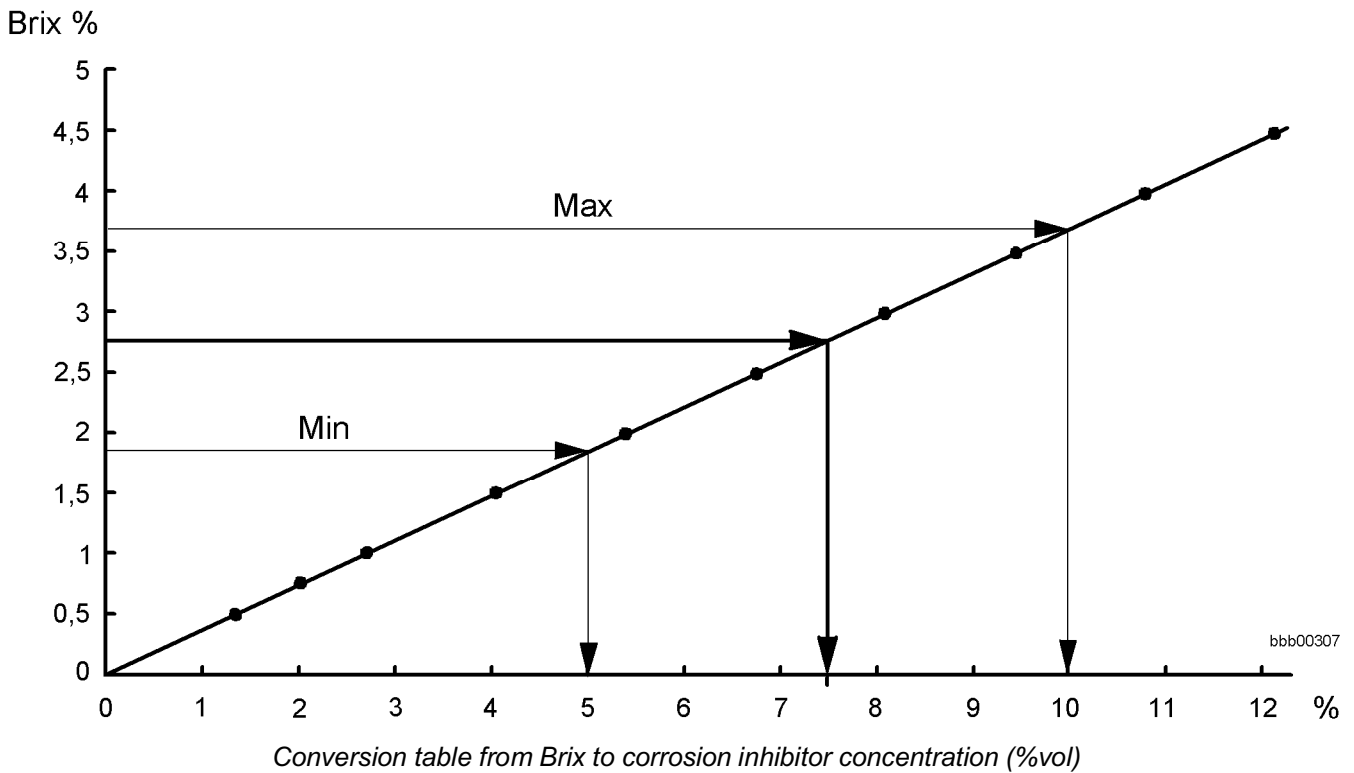
Using anti-corrosion agent without antifreeze

In exceptional cases and when outside temperatures never fall below freezing, such as tropical zones, where it is demonstrable that no approved antifreeze and corrosion protection agent is available, corrosion inhibitors may be used.

The coolant must be replaced once a year.

The mixing ratio must consist of 7.5 % corrosion inhibitor and 92.5 % water.

The Gefo 2710 refractometer is recommended for testing.



Approved water-soluble corrosion protection agent (concentrate)	
Product designation	Manufacturer
Caltex CL Corrosion Inhibitor Concentrate	Caltex
Chevron Texaco Heavy Duty Extended Life Corrosion Inhibitor Nitrite Free	Chevron Texaco
Havoline Extended Life Corrosion Inhibitor (XLI)	ARTECO
Total WT Supra	Total

5.4.4 Hydraulic oils



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Specifications

Only engine oils (mineral oils) meeting the following specifications and regulations are permitted.

Description	Specifications
API classification (American Petroleum Institute)	CF-4, CG-4, CH-4
ACEA classification (Association des Constructeurs Européens de l'Automobile)	E2 , E3 , E4

Specifications and regulations for hydraulic oil

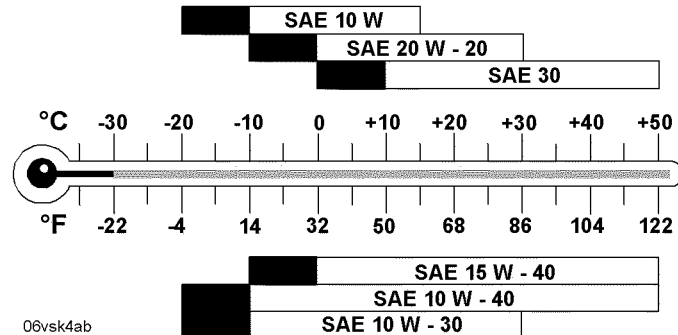
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Viscosity The viscosity is selected according to the SAE (Society of Automotive Engineers) classification.

The decisive factor for the selection of the correct SAE class is the ambient temperature.

The selection of the SAE classification has no bearing on the quality of a hydraulic oil.

The temperature ranges presented in the diagram are merely guidelines.



Selection of the SAE class according to temperature

Warming up

For temperatures up to 10 °C below the specified limit:

- Adjust the diesel engine to roughly half speed after starting.
- Activate the hydraulic cylinders and engines and briefly move the cylinders to their stops.
- Warming up takes roughly 10 minutes.

At even lower temperatures:

- Before starting the engine, prewarm the oil tank.

Environmentally compatible hydraulic fluids

When operating LIEBHERR earth moving machines with environmentally compatible hydraulic fluids, we recommend **PANOLIN HLP SYNTH 46** with the viscosity specified by LIEBHERR.

Conversion of the hydraulic system to an environmentally compatible hydraulic fluid:

- See the section on conversion from mineral oils to environmentally harmless hydraulic fluids.

NOTE:

- Environmentally-compatible hydraulic fluids must be checked every 500 operating hours at regular intervals.
- LIEBHERR recommends that oil analysis is carried out by WEAR-CHECK.
- Oil change:
 - Not at the interval stated in the maintenance and inspection schedule.
 - At the interval specified by WEAR-CHECK.
- Do not mix environmentally-compatible hydraulic fluid from different manufacturers or with mineral oils. See also the customer service information.

Monitoring hydraulic oil - changing according to oil samples - analysis and laboratory report:



Oil change intervals according to sample analysis and laboratory report

- 1 Service hours
- 2 First oil sample
- 3 Second oil sample
- 4 Further oil samples every 500 operating hours

5.4.5 Lubricating oils for the transmission



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Pump distributor gear and axles

Gear oils must comply with the API GL-5 and MIL-L 2105 B, C or D specifications and the viscosity class SAE 90 LS *.

* = Gear oil with limited slip additives for disc brakes and self-locking differentials.



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LS = limited slip additive:

- Not required for pump distributor gears
- Required for axles

For the viscosity class SAE 90 LS, an oil of the viscosity class SAE 80 W 90 LS can also be used.

Transfer gear

An ATF oil compliant with the DEXTRON II D specification should be used as lubrication oil for the axle transfer gear.

Factory filling:

ATF 86 AVIA-FLUID DEXRON II D



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Description	ID no.	Quantity
ATF 86 AVIA-FLUID DEXRON II D	861012601	210 l
ATF 86 AVIA-FLUID DEXRON II D	10009964	20 l

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5.4.6 Grease for general lubrication points



This grease must meet the **KP2k** specification – consistency 2 of the NL GI class according to DIN 51818 and DIN 51825 or EP 2 according to NF-T-60 132.

The grease must be made of a lithium complex with a four ball tester (VKA) value of at least 2300 N according to DIN 51350 or ASTM D 2596.

Application:

- Grease for all lubrication points (according to the lubrication schedule)
- Lubricant grease for bolt fitting
- Lubricant grease for automatic central lubrication systems

Approved lubricants

LIEBHERR 9610 special grease is a milling-resistant, ageing-resistant lithium grease, providing protection against corrosion with excellent lubricity over a wide temperature range.

Its molecular composition yields high degrees of shearing and milling stability and good flow properties in long pipes.

Description	ID no.	Quantity
LH 9610 special grease	8613 02908	400 g (cartridge)
LH 9610 special grease	8613 01308	10 kg (drum)
LH 9610 special grease	8613 04508	25 kg (drum)

Lubricant grease for automatic central lubrication systems

Greases with high-pressure additives (EP greases) are recommended. Only use greases with the same type of saponification.



Note:

Greases with solid lubricant particles such as graphite may not be used.

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