en

Operating Manual

Wheel Loader

L524 -438 from 13100

LIEBHERR

en

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L524 - 438 from 13100

Document identification

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Address

Address: LIEBHERR-WERK BISCHOFSHOFEN GMBH
Dr. Hans Liebherr – Straße 4

A – 5500 BISCHOFSHOFEN

Manufacturer

Address: LIEBHERR-WERK BISCHOFSHOFEN GMBH

Machine data:

Please enter the following details on receipt of your vehicle: *You will find these details on the vehicle type plate. They will be useful when ordering spare parts.

*** Serial no.**

VATZ . . . . ZZB . . . . . .

*** Year of manufacture**

. . . .

Initial start-up date

. . / . . / . .

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Foreword

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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- We reserve the right to alter the technical details of the machine regardless of the specifications and illustrations in these documents.
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1 Product description

Equipment layout

Alternative versions

This section contains an overview of the alternative versions of the machine.

Alternative versions of the machine

1 Z lift arms

2 P lift arms

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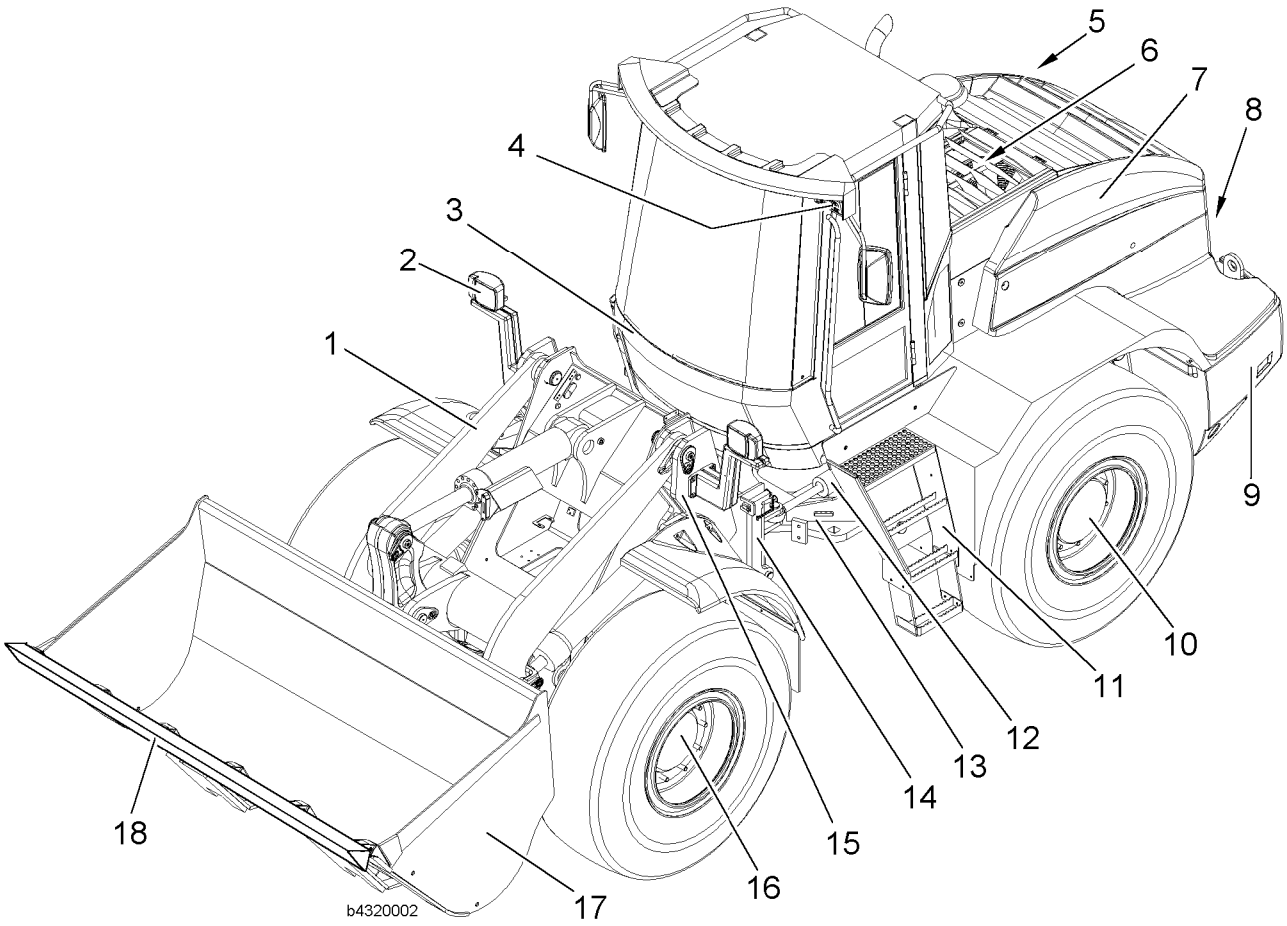
Version with Z lift arms

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



Left view of machine

1 Lift arms with Z kinematics
2 Lighting
3 Driver's cab
4 Working floodlight
5 Battery compartment
6 Cooler flap
7 Engine compartment hood
8 Towing device
9 Ballast weights
10 Rear axle
11 Cab access
12 Steering cylinder
13 Rear section
14 Articulation lock
15 Front section
16 Front axle
17 Bucket
18 Tooth guard

Version with P lift arms

The lift arms are the only difference with the machine with P lift arms shown here.

Lift arms with P kinematics

The names of all the components are the same as for the version with Z lift arms.

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1.1 Technical data

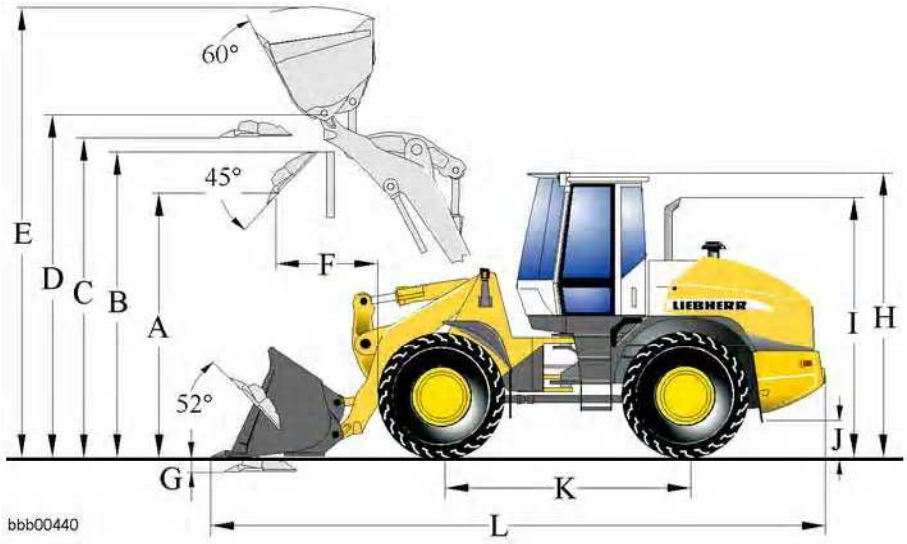
1.1.1 Complete machine - Z kinematics with loading bucket


bpik0039

The values stated refer to the machine:
- In its standard version
- With Z lift arms (2,400 mm)
- Without a hydraulic quick-change device
- With 17.5R25 Goodyear GP-2B 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:
ZK = Z kinematics
Z = Welded tooth holder with plug-in teeth.



Dimensions

Name	Value	Units
Load geometry	ZK	
Cutting tool	Z	
Bucket capacity as per ISO 7546	2.0	m³
Bucket width	2500	mm
Specific material weight	1.8	t/m³
A Dump height at maximum lifting height and 45° tilt-out angle	2850	mm
B Dumping height	3335	mm
C Maximum bucket base height	3510	mm
D Maximum bucket pivot height	3760	mm

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Name	Value	Units
E Maximum bucket top edge height	4840	mm
F Reach at maximum lifting height and 45° tilt-out angle	870	mm
G Digging depth	80	mm
H Height above cab	3150	mm
I Height above exhaust	3090	mm
J Ground clearance	520	mm
K Wheel base	2700	mm
L Overall length	6835	mm
Turning radius over bucket outer edge	5500	mm
Lifting force (SAE)	98	kN
Breakout force (SAE)	92	kN
Tipping load when straight	8030	kg
Tipping load articulated at 40°	7005	kg
Operating weight	10100	kg
Tractive force	76.2	kN

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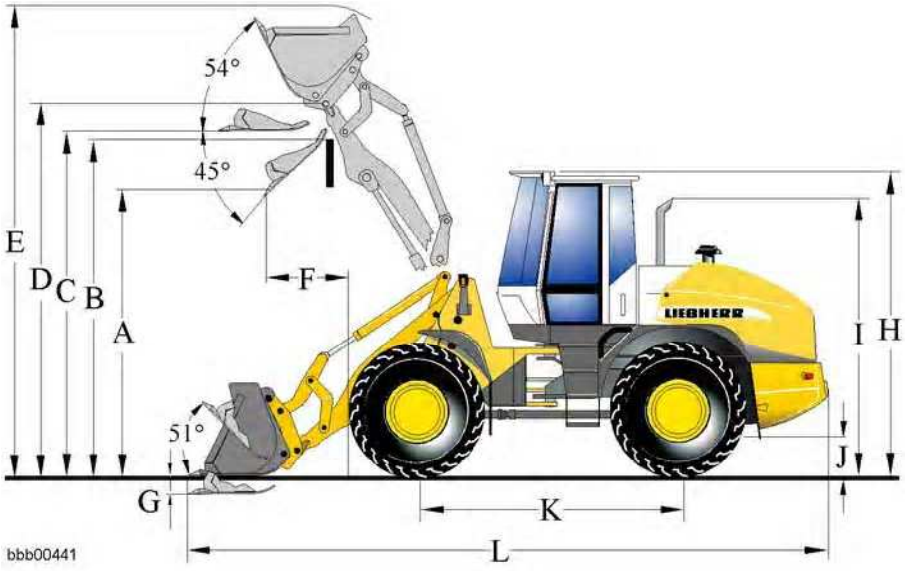
1.1.2 Complete machine - P kinematics with loading bucket

This equipment is optional.

The values stated refer to the machine:
– With parallel kinematics – lift arms (2400 mm)
– With hydraulic quick-change device
– With 17.5R25 Goodyear GP-2B 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:
PK = P kinematics
Z = Welded tooth holder with plug-in teeth.



Dimensions

Name	Value	Units
Load geometry	PK	
Cutting tool	Z	
Bucket capacity as per ISO 7546	1.7	m³
Bucket width	2500	mm
Specific material weight	1.8	t/m³
A Dump height at maximum lifting height and 45° tilt-out angle	2815	mm
B Dumping height	3380	mm
C Maximum bucket base height	3500	mm
D Maximum bucket pivot height	3750	mm
E Maximum bucket top edge height	4895	mm
F Reach at maximum lifting height and 45° tilt-out angle	1030	mm
G Digging depth	55	mm

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Name	Value	Units
H Height above cab	3150	mm
I Height above exhaust	3090	mm
J Ground clearance	520	mm
K Wheel base	2700	mm
L Overall length	6890	mm
Turning radius over bucket outer edge	5530	mm
Lifting force (SAE)	89	kN
Breakout force (SAE)	80	kN
Tipping load when straight	7100	kg
Tipping load articulated at 40°	6250	kg
Operating weight	10200	kg
Tractive force	76.2	kN

1.1.3 Engine


bpik0027

Type: 4-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 504 TI	
Number of cylinders	4	Pc.
Rated power acording to ISO 9249 at 2400 min $^{-1}$	81 / 110	kW / PS
Maximum torque at 1400 min^{-1}	424	Nm
Cylinder capacity	4.5	Litres
Lower idle speed	850 $^{\pm 50}$	min^{-1}
Upper idle speed	2550 $^{+80}$	min^{-1}
Longitudinal / traverse inclinability	30 / 30	°

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1.1.4 Electrical system

bpik0028 

Protected by:
– Main fuse
– Fuses for preglow system, starter, emergency steering pump
– Fuses on the control unit

Batteries:
– Connected in series
– Installed in the right ballast weight

Battery main switch: Rear right of engine compartment

Name	Value	Units
Battery voltage	12	V
Battery capacity	2 x 100 / 12	Ah / V
Number of batteries	2	Pc.
Operating voltage	24	V
Three-phase current alternator	24 / 55	V/ A
Starter	24 / 7	V / kW

Battery fastening

When fitting or changing the battery:

Name	Value	Units
Tightening torque	10	Nm

1.1.5 Travel drive

bpik0029 

Continuously variable hydrostatic travel drive

Type:
– Swash plate variable displacement pump and two axial piston motors in a closed circuit.
– 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, as well as travel ranges, are selected using the Liebherr control lever

Speed data:
– For forward and reverse travel
– With standard tyres

Name	Value	Units
Travel range I	8.0	km/h
Travel range II	33.0	km/h

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1.1.6 Axles

Automatically acting self-locking differential in both axles.

Front axle Rigidly mounted planetary axle

Name	Value	Units
Width	1960	mm
Differential lock	45	%

Rear axle Oscillating planetary axle

Name	Value	Units
Width	1960	mm
Differential lock	45	%
Angle of articulation to each side	6	°
Height of obstacles which can be driven over	470	mm

1.1.7 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 differential housing (two separate brake circuits).

Parking brake Electrohydraulically activated spring accumulator disc brake on the front axle.

1.1.8 Steering

Type: Central articulation joint with absorbers.

Name	Value	Units
Angle of articulation to each side	40	°
Angle of articulation to each side	6	°
Maximum operating pressure	210	bar

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1.1.9 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	105	l/min
Maximum operating pressure	300	bar

1.1.10 Working attachment

bpik0035 

Key:
– ZK = Z kinematics
– PK = parallel kinematics

Lift arm

Sealed bearing points.

Kinematics variations:
– Z kinematics with one tilt cylinder – standard.
  Hydraulic quick-change device – optional
– Parallel kinematics with two tilt cylinders – optional
  Hydraulic quick-change device – standard

Working cycle time at rated load:

Name	Value	Units
ZK – lifting	6.5	sec
PK – lifting	7.0	sec
ZK – tilting out	2.0	sec
PK – tilting out	4.0	sec
ZK – lowering (empty)	5.0	sec

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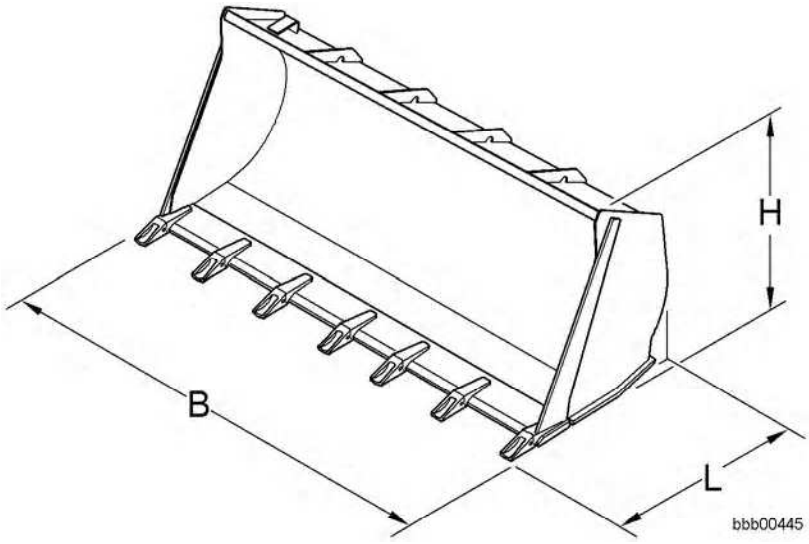
Name	Value	Units
PK – lowering (empty)	5.0	sec

Bucket



Main dimensions

Standard bucket for lift arms with Z kinematics.

Name	Value	Units
Bucket capacity as per ISO 7546	2.0	m³
Specific material weight	1.8	t/m³
B – bucket width	2500	mm
H – height	1145	mm
L - length	1315	mm
Weight	750	kg

Standard bucket for lift arms with P kinematics.

Name	Value	Units
Bucket capacity as per ISO 7546	1.7	m³
Specific material weight	1.8	t/m³
B – bucket width	2500	mm
H – height	1115	mm
L - length	1170	mm
Weight	675	kg

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Hydraulic quick-change device

The quick-change device is optional on machines with Z kinematics.
Variations for Z kinematics:
– 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.

The quick-change device is standard on machines with P kinematics.

Version for P kinematics:
– Combined electrohydraulic quick-change device for P lift arms.

1.1.11 Driver's cab

bpik0036 

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

Design:
– 2 detachable doors
– The right door is the emergency exit.
– Left door with sliding window
– 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.

1.1.12 Heating and ventilation

bpik0043 

Driver's cab with defroster, fresh air filter, circulated air system and cooling water heating.

Name	Value	Units
Blower speeds	3	
Heating power	4.8	kW

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1.1.13 Air conditioning system

This equipment is optional.

An air conditioning system can be installed for the driver's cab.

Name	Value	Units
Type	Heater/air condition-er	
Cooling power	4.8	kW

1.1.14 Sound emission

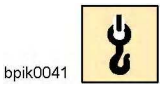
Sound pressure

Name	Value	Units
ISO 6396 – LpA (in driver's cab)	71	dB (A)

Sound output

Name	Value	Units
2000/14/EG – LwA (outside)	103	dB (A)

1.1.15 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.

Note

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.

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1.1.16 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

Note

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 for the standard machine

Tyre size	Tyre tread	Air pressure (bar)		
		VA	HA	p – Max.
17.5 R25EM	XTLA * L3	3.00	2.00	4.50
17.5 R25EM	XHA * L3	3.00	2.00	4.50
17.5 R25EM	XLD D2A * L5	3.00	2.00	4.50
17.5 R25EM	XMine D2 * L5	3.00	2.00	4.50
550/65 R25EM	XLD L3T * L3	2.80	2.00	4.50
500/70 R24EM	XM 37	3.20	2.00	3.50

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Goodyear tyres

Air pressure table for the standard machine

Tyre size	Tyre tread	Air pressure (bar)		
		VA	HA	p – Max.
17.5 R25EM	GP-2B * L2	3.30	2.00	5.00
17.5 R25EM	RT-3B * L3	3.30	2.00	5.00
550/65 R25EM	GP-3D * L3	3.00	2.00	5.00

Bridgestone tyres

Air pressure table for the standard machine

Tyre size	Tyre tread	Air pressure (bar)		
		VA	HA	p – Max.
17.5 R25EM	VMT * L3	4.00	3.50	5.00
17.5 R25EM	VSDL * L5	5.00	3.50	5.00

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

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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.

1.1.17 Snow chains or guard chains

bpik0044 

This equipment is optional.

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

Note

Failure to do this can damage the drive system.

! See the section on attachments and accessories in chapter 2.

1.1.18 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.

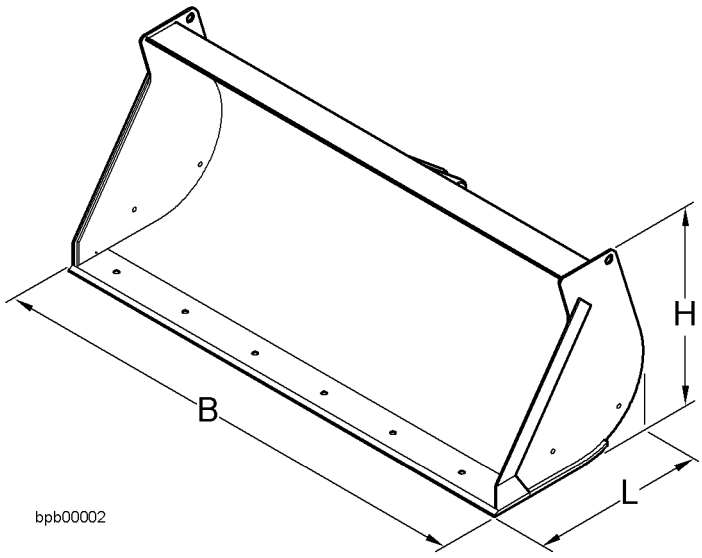
Note

Installing or changing the working attachment or tyres.

! See the section on attachments and accessories in chapter 2.

1.1.19 Light material bucket

This equipment is optional.
Version with undercut blade.



Main dimensions

Light material bucket for Z kinematics

Name	Value	Units
Bucket capacity as per ISO 7546	3.0	m³
Specific material weight	1.0	t/m³
B – bucket width	2700	mm
H – height	1365	mm
L - length	1360	mm
Weight	1015	kg

Light material bucket for P kinematics

Name	Value	Units
Bucket capacity as per ISO 7546	3.0	m³
Specific material weight	0.9	t/m³
B – bucket width	2700	mm
H – height	1365	mm
L - length	1360	mm
Weight	1015	kg

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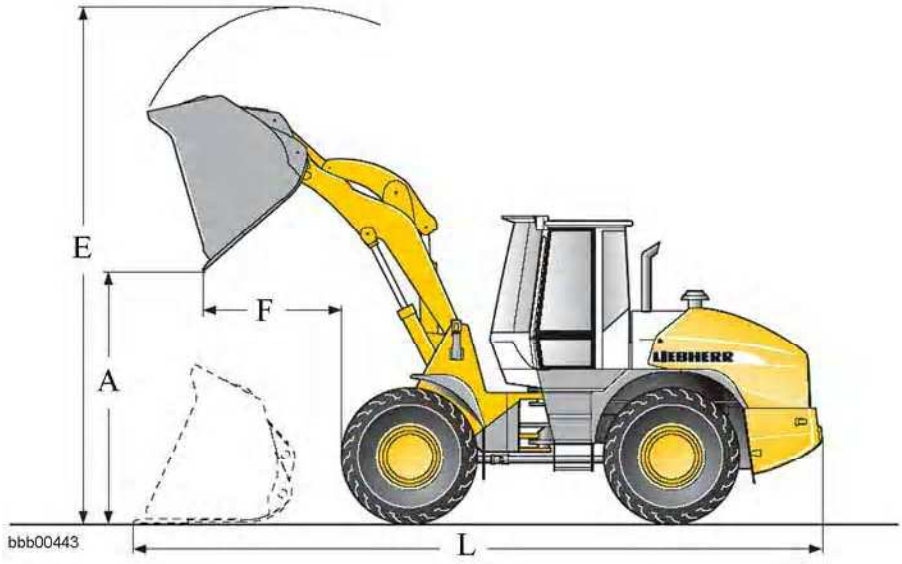
Complete machine with light material bucket

The values stated refer to the machine:
– Depending on kinematics version
  with lift arms (ZK = 2400 mm / PK = 2400 mm)
– With hydraulic quick-change device
– With 17.5R25 Goodyear GP-2B 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:
ZK = Z kinematics
PK = parallel kinematics



Dimensions

Name	Value	Units
Load geometry	ZK / PK	
Bucket capacity as per ISO 7546	3.0 / 3.0	m³
Bucket width	2700 / 2700	mm
Specific material weight	1.0 / 0.9	t/m³
A Dump height at maximum lifting height	2485 / 2570	mm
E Maximum height at bucket top edge	5215 / 5200	mm
F Reach at maximum lifting height	1150 / 1290	mm
L Overall length	7155 / 7150	mm
Tipping load when straight	7000 / 6600	kg
Articulated tipping load	6150 / 5800	kg
Operating weight	10800 / 10510	kg

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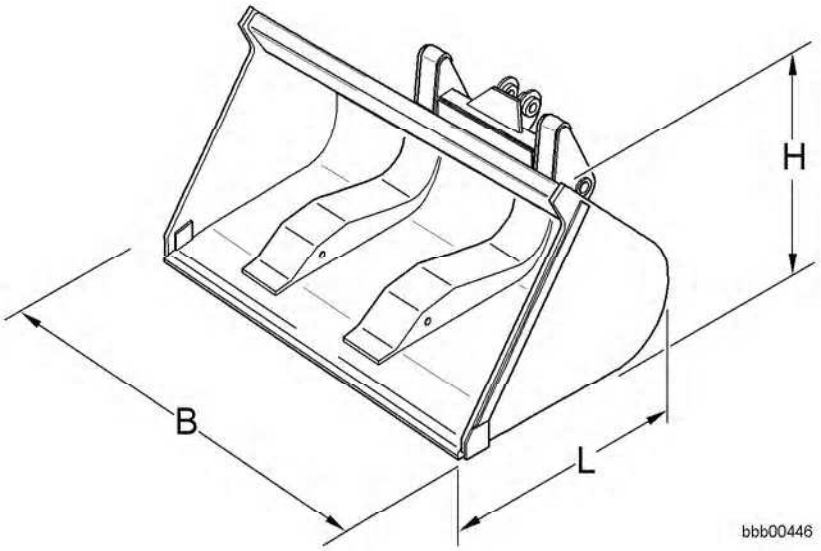
1.1.20 High dump bucket

This equipment is optional.



Main dimensions

Name	Value	Units
Bucket capacity as per ISO 7546	3.0	m³
Specific material weight	0.8	t/m³
B – bucket width	2700	mm
H – height	1435	mm
L – length with blade	1480	mm
Weight	1340	kg
Maximum operating pressure for attachment hydraulics	250	bar

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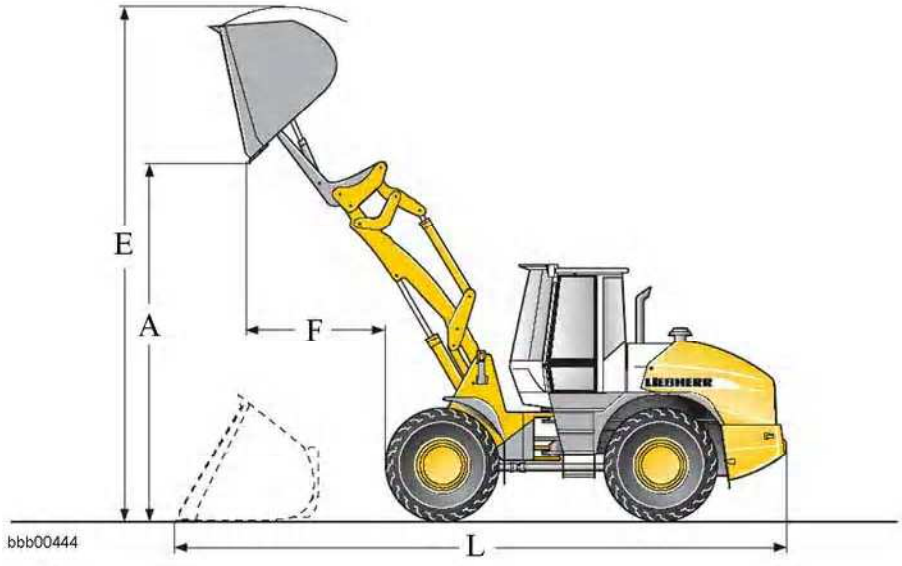
Complete machine with high dump bucket

The values stated refer to the machine:
– With parallel kinematics – lift arms (2400 mm)
– With hydraulic quick-change device
– With 17.5R25 Goodyear GP-2B 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:
PK = parallel kinematics



Dimensions

Name	Value	Units
Load geometry	PK	
Bucket capacity as per ISO 7546	3.0	m³
Bucket width	2700	mm
Specific material weight	0.8	t/m³
A Dump height at maximum lifting height	4260	mm
E Maximum height at bucket top edge	5950	mm
F Reach at maximum lifting height	1510	mm
L Overall length	7296	mm
Tipping load when straight	6200	kg
Articulated tipping load	5450	kg
Operating weight	10850	kg

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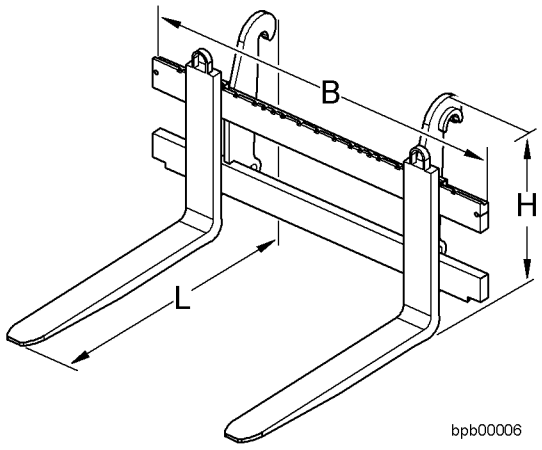
1.1.21 Forklift

bpik0040 

This equipment is optional.



Dimensions

Name	Value	Units
Fork carrier prong size	FEM III	
Prong length	1200	mm
L – Length (fork carrier + prongs)	1572	mm
K – Fork carrier width	1778	mm
H – Height (fork carrier + prongs)	974	mm
Weight (fork carrier + prongs)	453	kg

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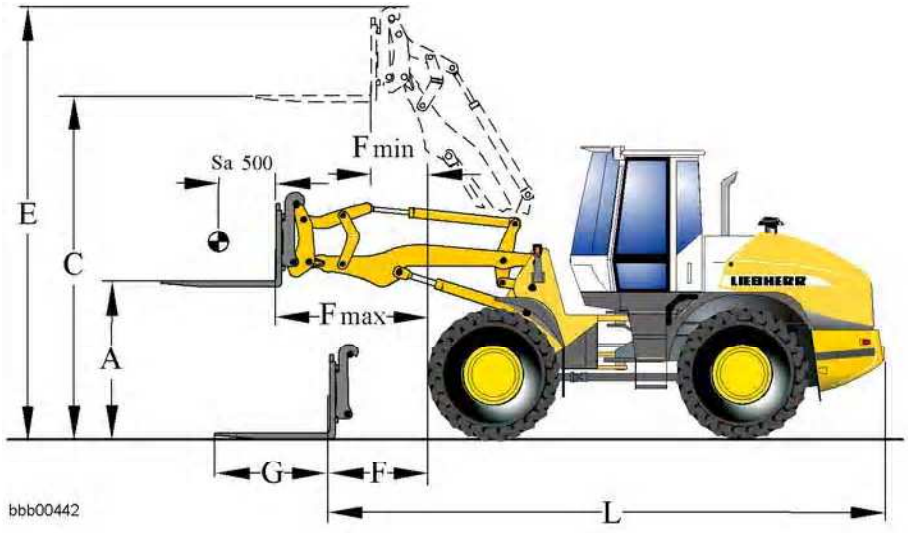
Complete machine with forks

The values stated refer to the machine:
- Depending on kinematics version
  with lift arms (ZK = 2400 mm / PK = 2400 mm)
- With hydraulic quick-change device
- With 17.5R25 Goodyear GP-2B tyres
- 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.

Key to the table:
ZK = Z kinematics
PK = parallel kinematics



Dimensions

Name	Value	Units
Load geometry	ZK / PK	
A Lifting height at maximum reach	1690 / 1690	mm
C Maximum lifting height	3570 / 3560	mm
E Maximum height above fork carrier	4490 / 4480	mm
F Reach in loading position	990 / 990	mm
F max. Maximum reach	1635 / 1635	mm
F min. Reach at maximum lifting height	725 / 735	mm
G Fork prong length	1200 / 1200	mm
L Overall length of basic machine	6040 / 6040	mm
Tipping load when straight	5735 / 5650	kg
Articulated tipping load	5050 / 4970	kg
Operating weight	10040 / 9950	kg

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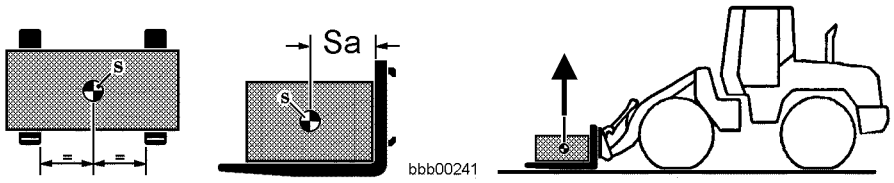
Load bearing tables for forklift operation

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 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	**500**	**600**	**700**	**800**	**900**	**1000**	**1100**	**1200**
17.5R25 L2 [2]or L3	3800 [1]	3400 [1]	3100 [1]	2850 [1]	2630 [1]	2450 [1]	2290 [1]	2150 [1]
17.5R25 L4 or L5	3800 [1]	3400 [1]	3100 [1]	2850 [1]	2630 [1]	2450 [1]	2290 [1]	2150 [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	**500**	**600**	**700**	**800**	**900**	**1000**	**1100**	**1200**
17.5R25 L2 [2]or L3	3031	2927	2829	2738	2630 [1]	2450 [1]	2290 [1]	2150 [1]
17.5R25 L4 or L5	3131	3023	2923	2828	2630 [1]	2450 [1]	2290 [1]	2150 [1]

[1]Payload restricted by tilt cylinders of Z-kinematics.
[2]Standard tyres

Lift arms with P kinematics

Maximum permissible load for lift arms with quick change device.

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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	**500**	**600**	**700**	**800**	**900**	**1000**	**1100**	**1200**
17.5R25 L2 [1]or L3	3979	3842	3714	3594	3482	3377	3278	3184
17.5R25 L4 or L5	4112	3970	3838	3715	3599	3490	3387	3291

[1]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	**500**	**600**	**700**	**800**	**900**	**1000**	**1100**	**1200**
17.5R25 L2 [1]or L3	2984	2881	2785	2696	2611	2532	2458	2388
17.5R25 L4 or L5	3084	2978	2879	2786	2699	2617	2540	2468

[1]Standard tyres

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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.

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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.

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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.

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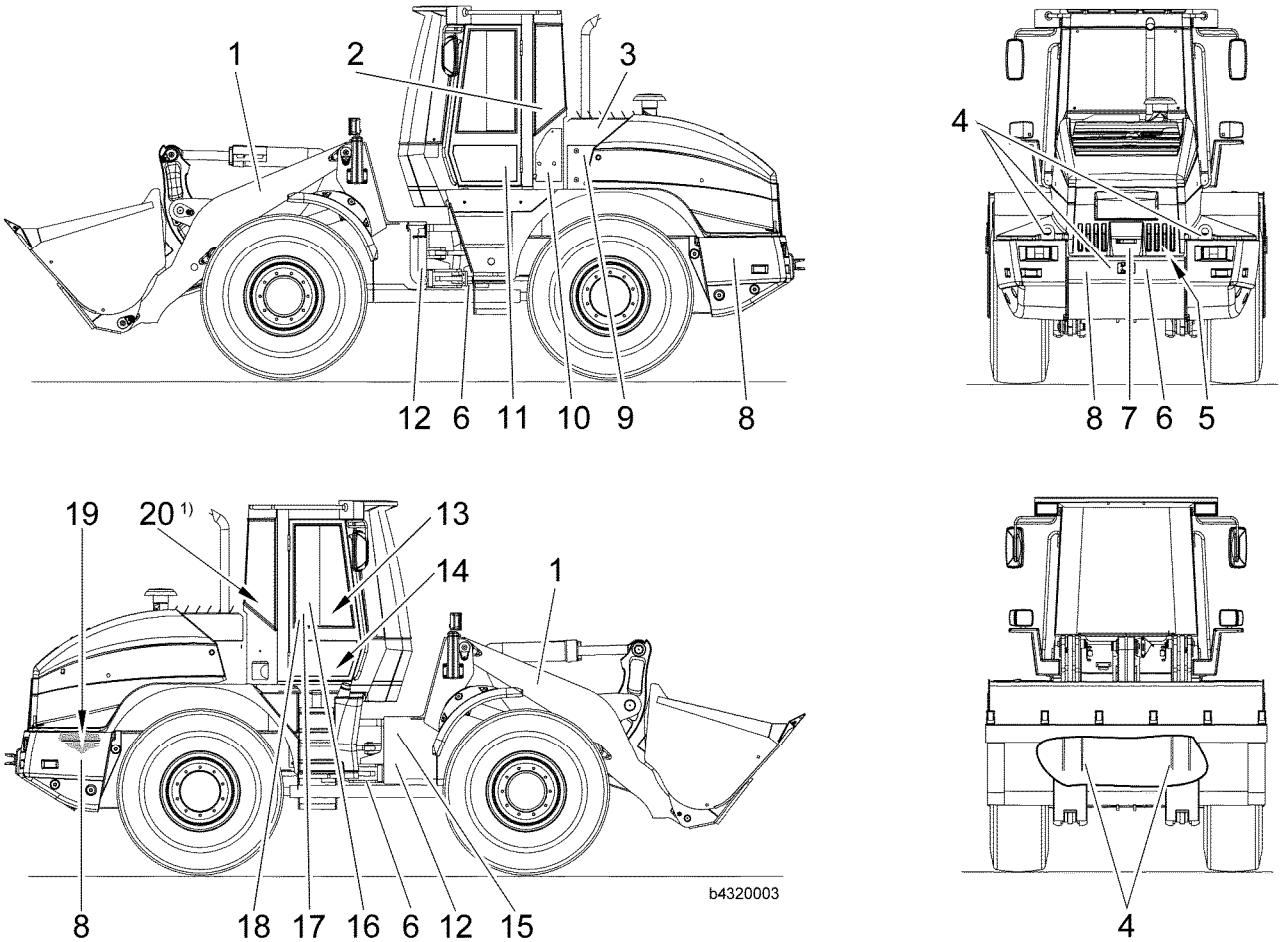
2.4.1 Location of decals



Location of decals

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

2.4.2 Safety decals

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.

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Keep clear decal

03sc01ab

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

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

Engine standstill decal

03sc04ab

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

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

Articulation area decal

bsich007

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**

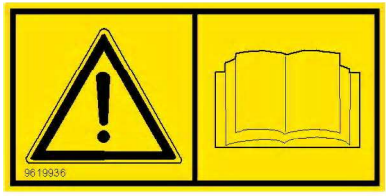
Steering decal

03sc05ab

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**

Accident prevention decal



03sc03ab

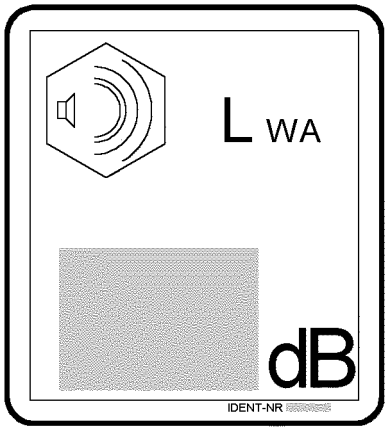
Refers to instructions in the operating manual for preventing accidents.

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

2.4.3 Information decals

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.



03sc24ab

Noise output decal – L_{WA}

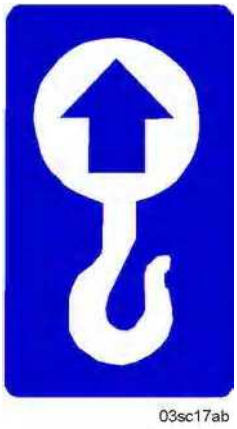
States the noise output level (L_{WA}) of the machine in decibels.

You can read the level on the decal on the machine.


03sc07ab

Cooler decal

Refers to cleaning the cooling system.


03sc17ab

Slinging and lifting point decal

Refers to the slinging and lifting points on the machine.


bsich005

Voltage decal

Refers to the battery main switch.

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

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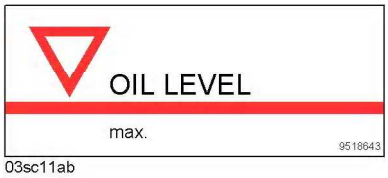
Lashing point decal

Refers to the lashing points on the machine.

40 km/h decal

Refers to the permitted speed limit for the machine.

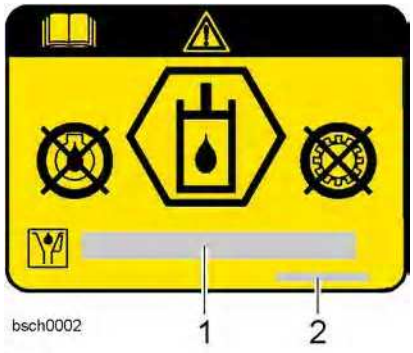
Oil level decal



It indicates the oil level in the hydraulic tank.

Bio oil decal

This equipment is optional.



1 Bio oil type

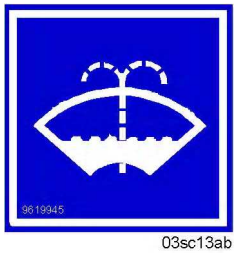
2 ID number

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.

Windscreen water decal



Indicates the reservoir for the windscreen washer fluid.

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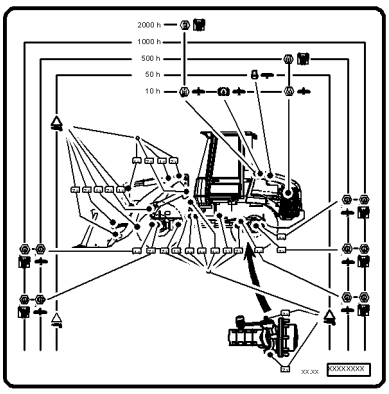
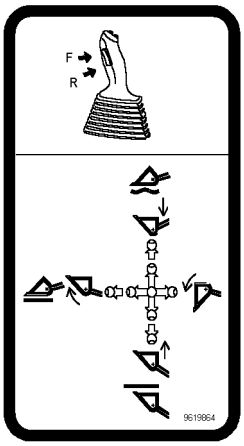
Lubrication chart decal



bsich002

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

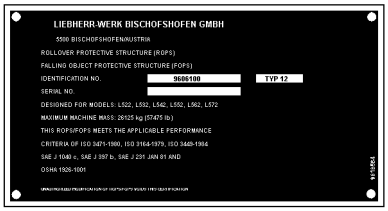
Working hydraulics decal



03sc06at

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

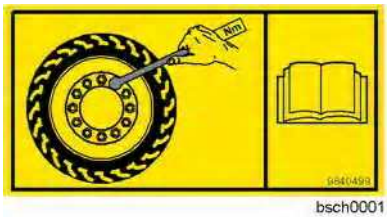
ROPS decal



03sc09ab

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

Wheel lugs decal



bsch0001

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

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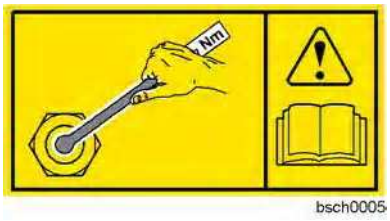


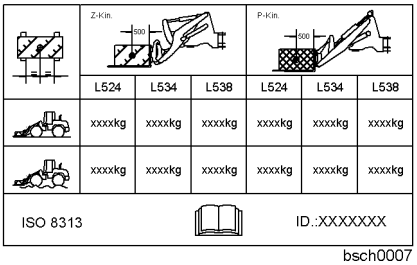
bsch0005

Tightening torque decal

Refers to tightening torque of the battery fastening.

Bearing load table decal

This equipment is optional.
Indicates the maximum permissible load in forklift operation.
The loads stated on the decal refer to machines with standard tyres.

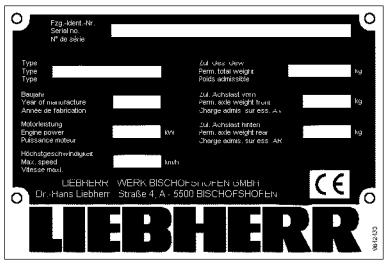


bsch0007

2.4.4 Type plates

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.

Machine type plate



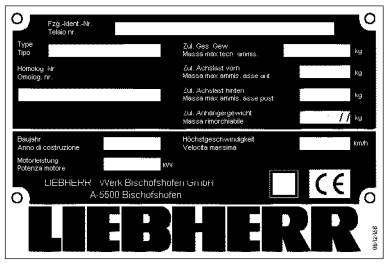
typ00001

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

The total weight and axle loads stated refer to operation of the machine on roads.



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.
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.

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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.

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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.

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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.

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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.

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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**.

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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 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.

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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.

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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.

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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).

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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:

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– 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.

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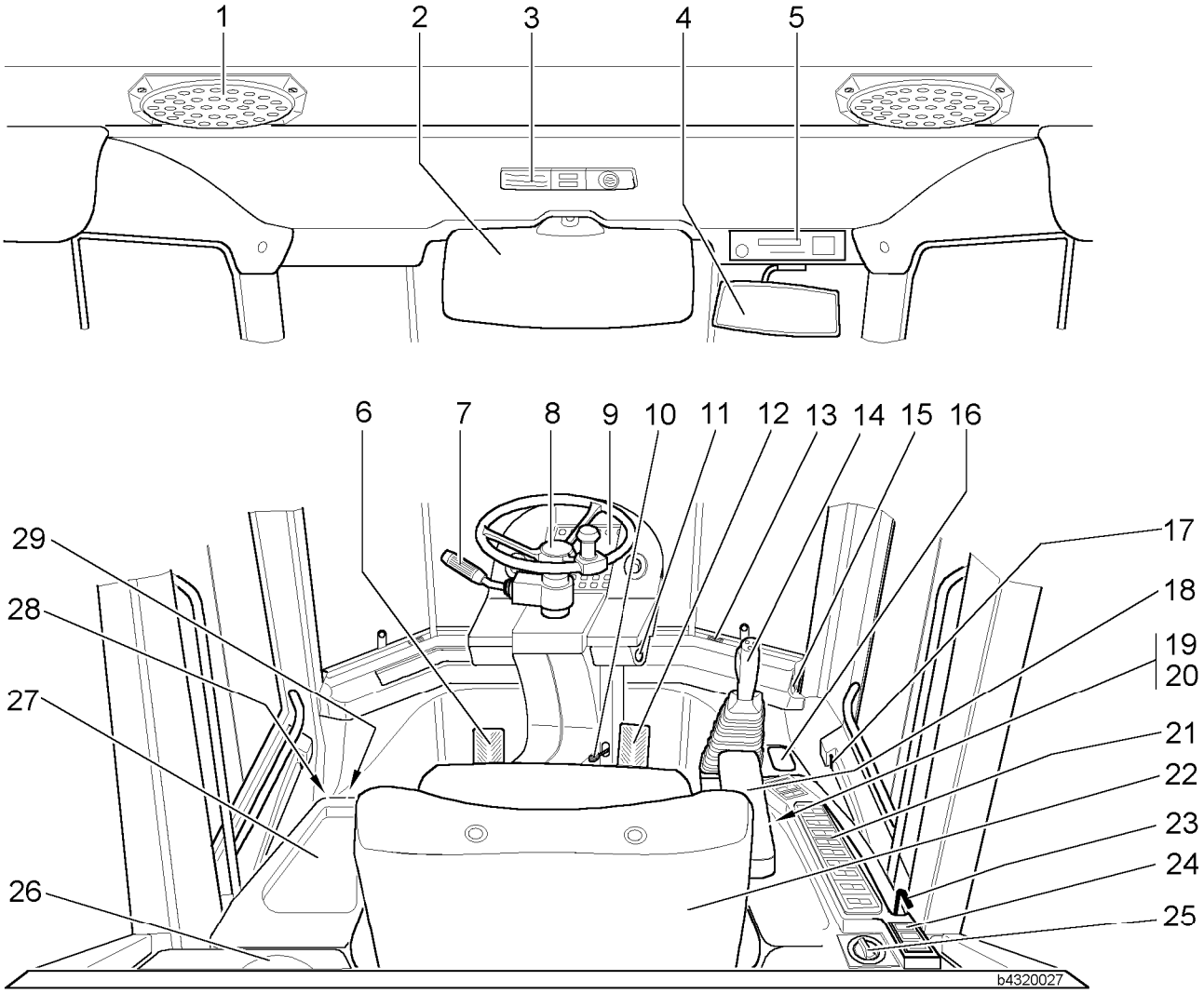
3 Operation, Handling

3.1 Layout of control elements



Inside view of the driver's cab

1 Radio speaker
2 Sun visor
3 Interior lights with switch
4 Interior mirror
5 Radio compartment (optional)
6 Inch/brake pedal
7 Steering column switch
8 Adjustable steering column with steering wheel
9 Instrument panel with display unit
10 Steering column adjustment lever
11 Ignition switch
12 Gas pedal
13 Heater/ventilation/air-conditioning outlet nozzles (8 in total)
14 LIEBHERR control lever
15 Ashtray
16 Control lever fitting for optional working functions
17 Emergency exit door handle (right-hand door)
18 Adjustable arm rest
19 Fuse box
20 Electronic controller and relay box
21 Switches on the side console (control panel)
22 Driver's seat
23 Air flap adjustment lever
24 Ventilation control
25 Heater control
26 Round compartment
27 Glove compartment
28 Socket
29 Compartment with lockable lid

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3.2 Operation

3.2.1 Battery main switch

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

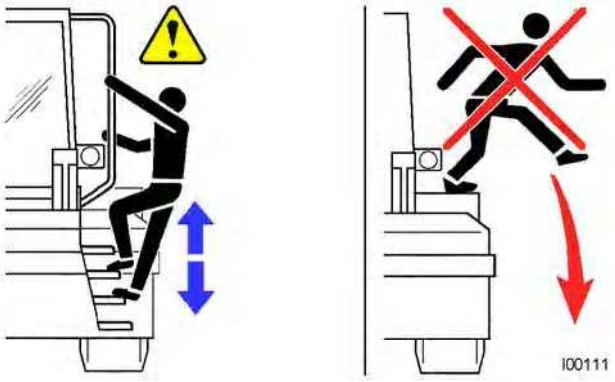
Turning on the battery main switch

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.

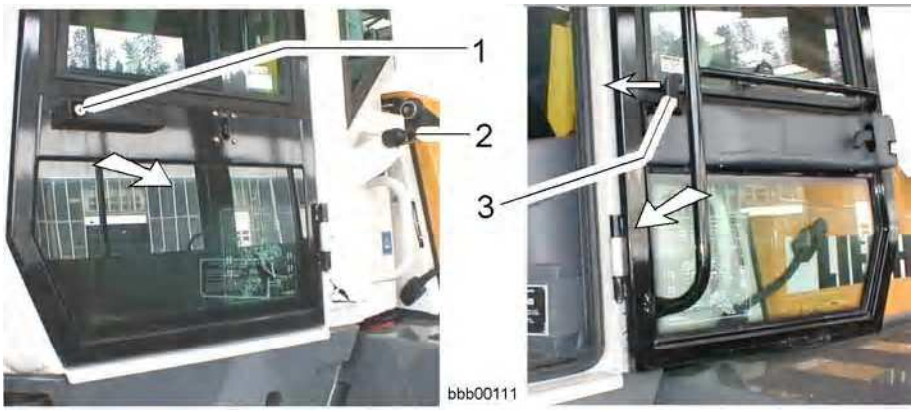
! Never jump down from the machine.

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

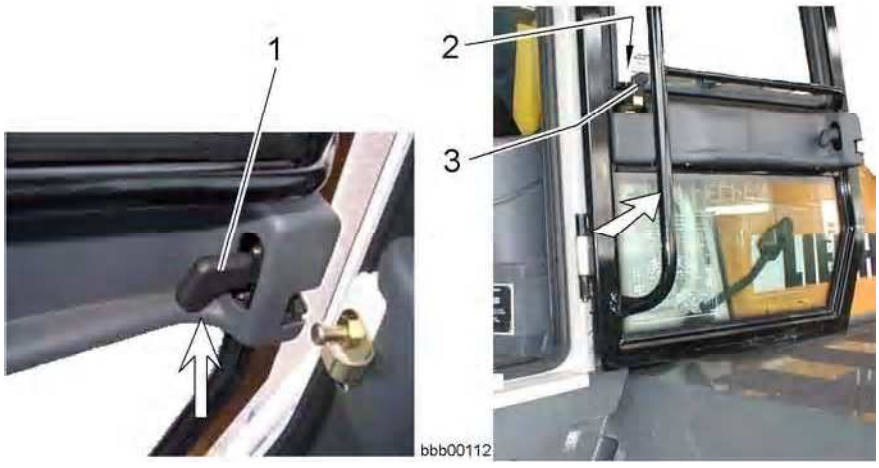


Entering the cab

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.

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3.2.3 Emergency exit


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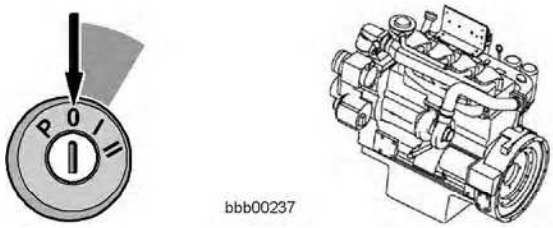
The right-hand driver's cab door is provided as an emergency exit and therefore should only be used in this event.

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



Switching off the engine

Warning

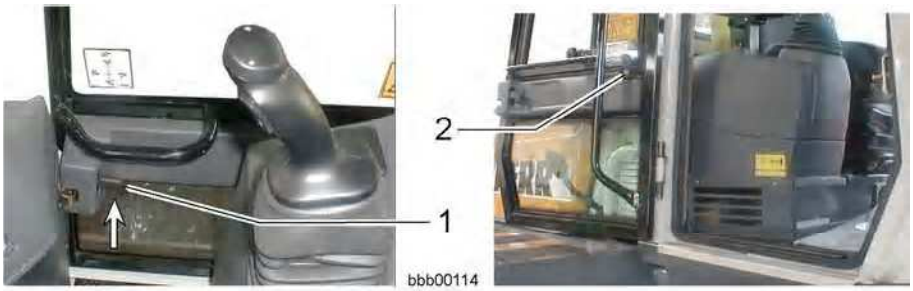
There is a risk of accidents if you leave the engine running.

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.

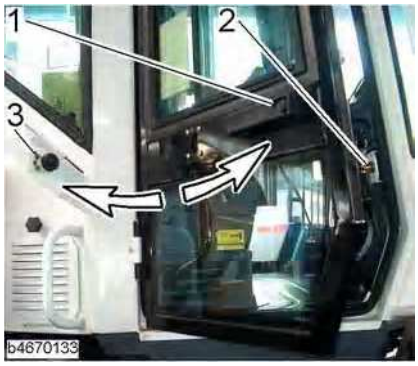


Opening the emergency exit

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**.
- Leave the cab.

Opening the emergency exit from outside



Opening the emergency exit

1 Handle with lock 2 Door holder

- Open the right cab door with the door handle **1** until it latches in the door holder **2**.

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.

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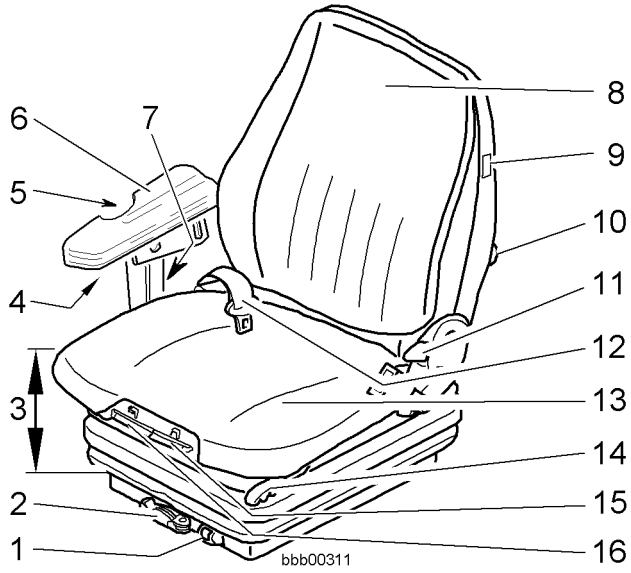
Layout



Main components and adjustable elements of the driver' seat

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

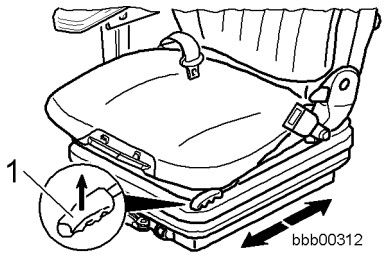
Warning

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

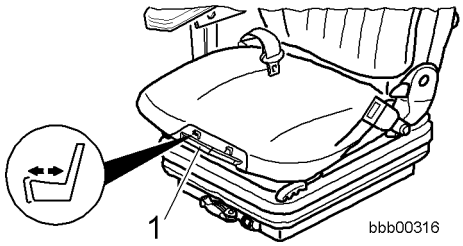


Horizontal adjustment of the driver's seat

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

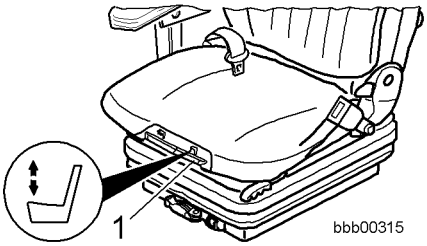


Horizontal adjustment of the driver's seat surface

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.

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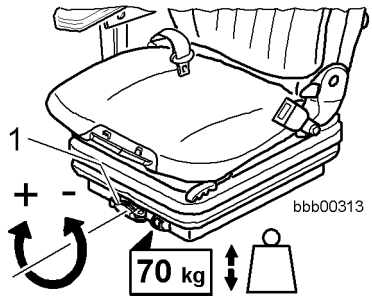
Adjusting the seat suspension



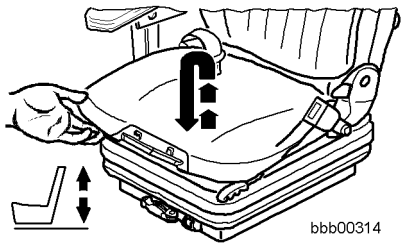
Weight adjustment

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

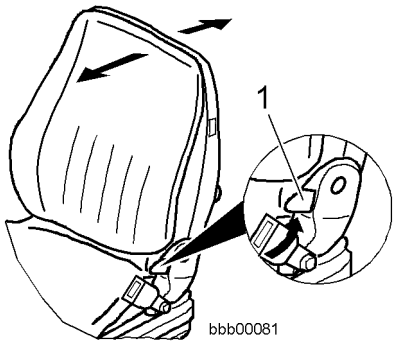


Seat height adjustment

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



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.

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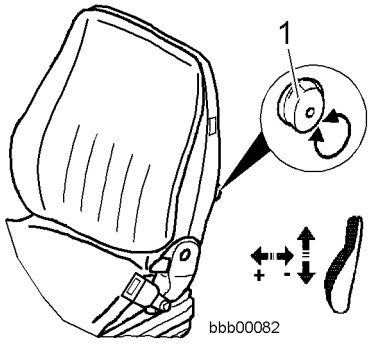
Adjusting the lumbar support

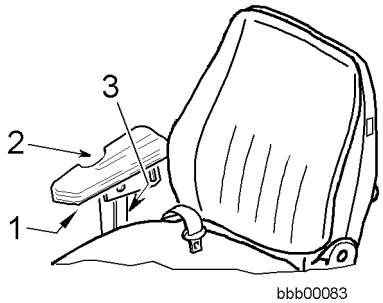


Lumbar support

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.

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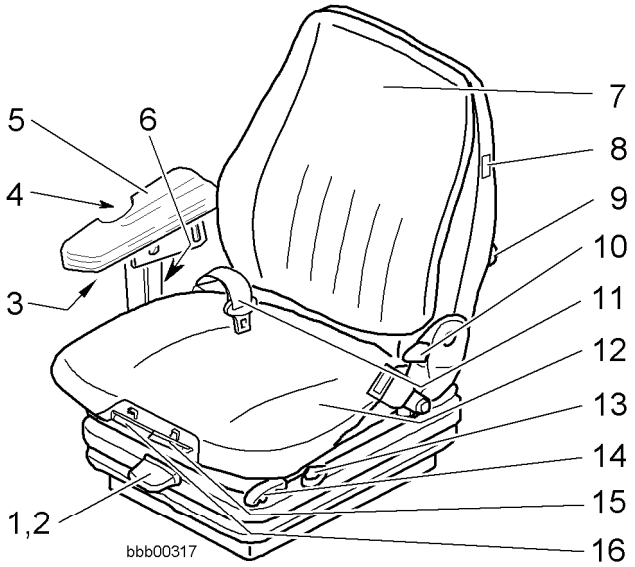
Vibration damping:
The seat installed in the machine complies with ISO 7096.
When the machine is used correctly, the vibrations transmitted by the driver's seat are less than or equal to the vibrations simulated in test conditions for the corresponding machine class in accordance with ISO 7096 class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

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

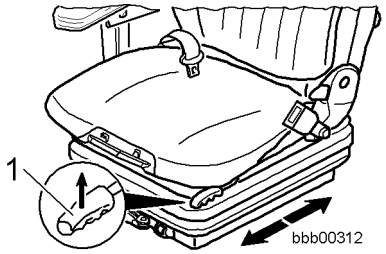
Warning

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

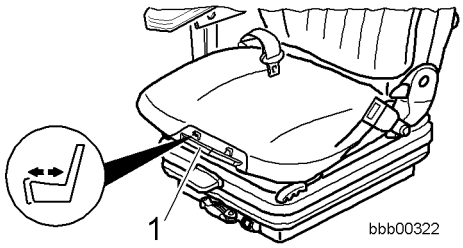


Horizontal adjustment of the driver's seat

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

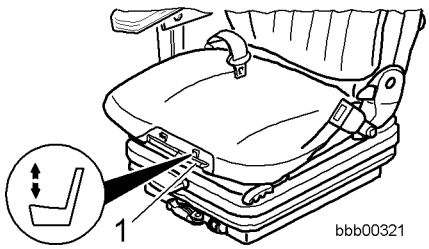


Horizontal adjustment of the driver's seat surface

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.

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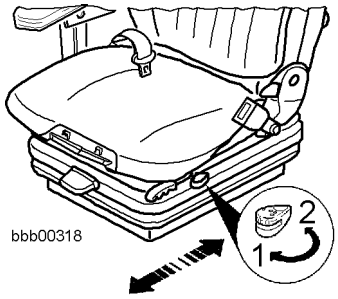
Activating and deactivating horizontal suspension on the driver's seat

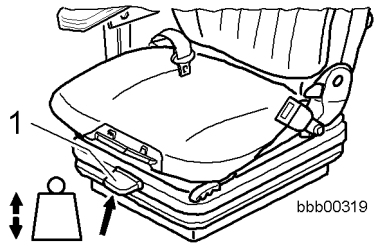


Horizontal suspension

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



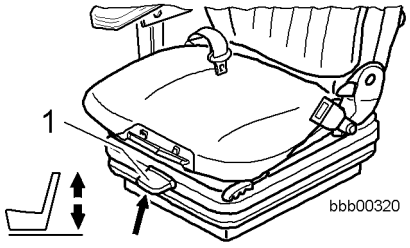
Weight adjustment

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.

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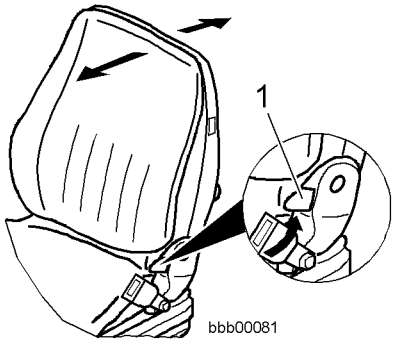
Adjusting the back rest

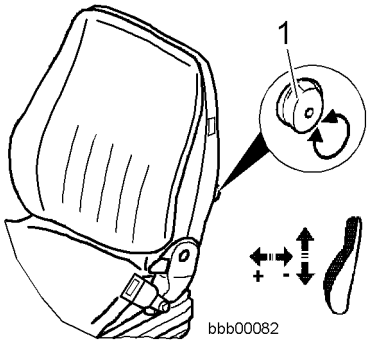


Inclination of the back rest

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



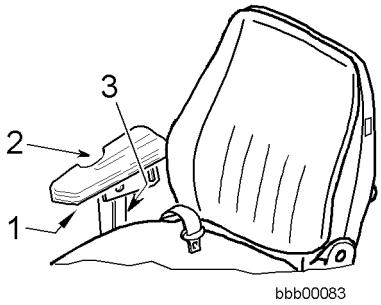
Lumbar support

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.

LBH/02/003801/0003/7.05/en

Adjusting the arm rest



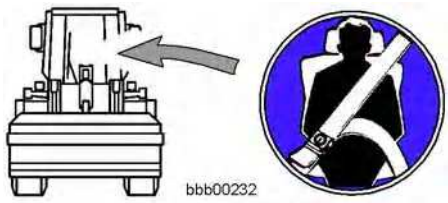
Arm rest adjustment

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

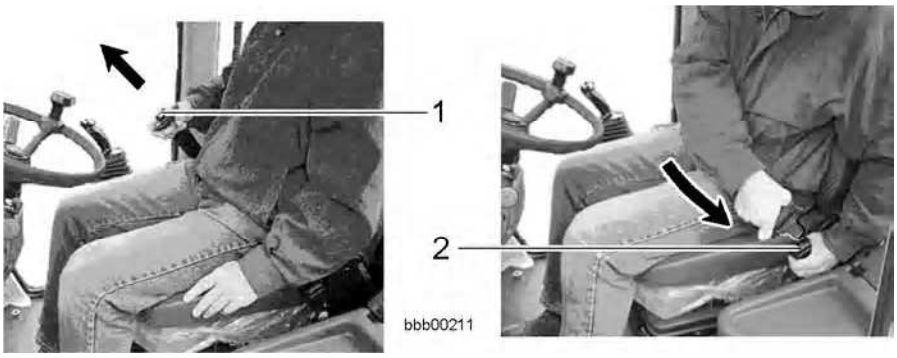
There is a risk of injuries if the seat belt is not fastened.
If the machine tips or rolls over, the driver could suffer fatal injuries if he is not wearing a seat belt.

! 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.



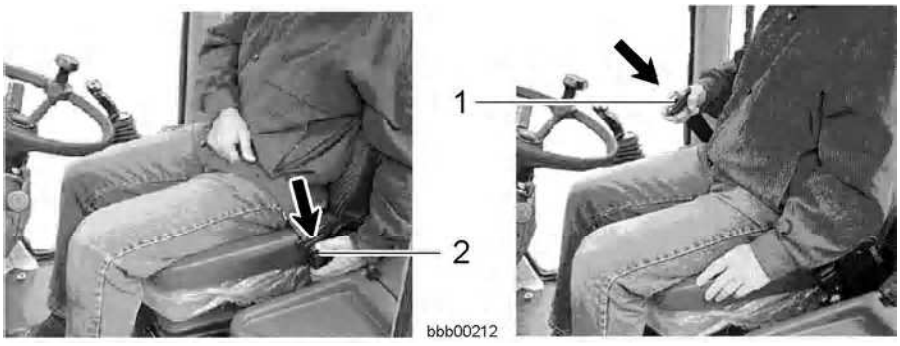
Fastening the seat belt

- 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.

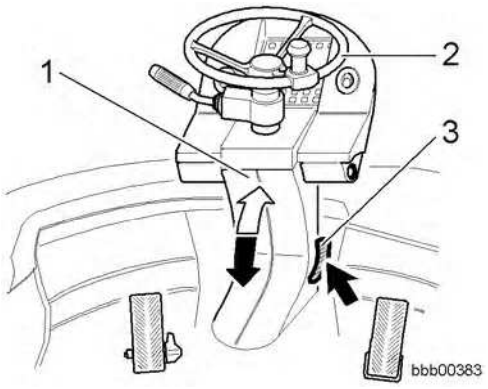
Adjusting the steering column

The steering wheel can be adjusted to suit the driver by adjusting the steering column.
It can be set in four positions.

Warning

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 Ignition switch

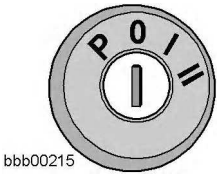
Ignition switch position

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.

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)
  With the ignition key in the parking position

Layout



Ignition switch

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.

3.2.9 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

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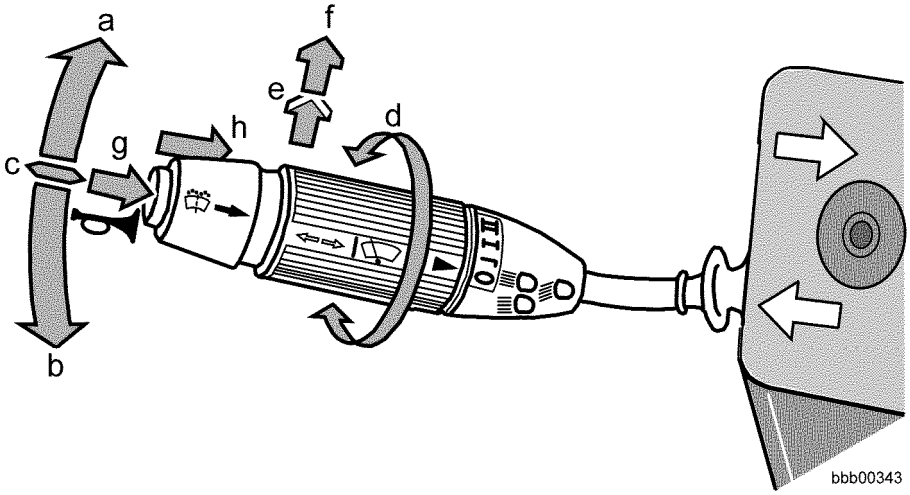
Function description



Steering column switch

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

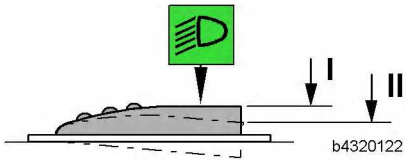
a – Direction display: right indicators
b – Direction display: left indicators
c – Centre position: neutral position
d – Windshield wiper: front windshield
- **0** – Level 0
- **J** – Interval
- **I** – Level I
- **II** – Level II

e – Visual warning indicator: headlight flasher
f – High beam: driving light
g – Audible warning indicator: horn
h – Windshield wiper / washer system: front windshield

3.2.10 Lighting

Make sure that the electrical system is switched on.

Switching off the parking light / driving light

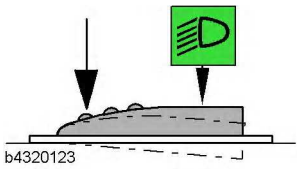


- Turn the parking / driving light switch to position **I**.

The parking light lights up.

- Turn the parking / driving light switch to position **II**.

The driving light lights up.



- To switch off the parking light and driving light, press the switch at the rear all the way down.

All functions are switched off.

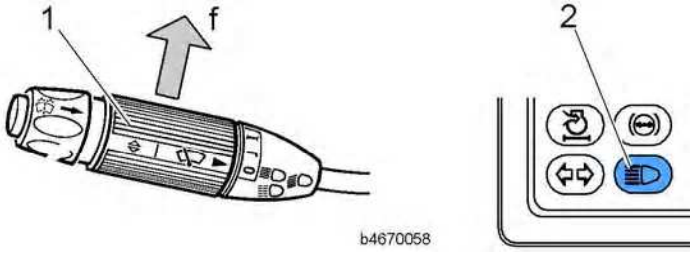
Caution

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.



Steering column switch and display unit

1 Steering column switch 2 High beam symbol field

- Push the steering column switch in direction **f**.

The symbol field **2** for high beam lights up.
High beam is activated.

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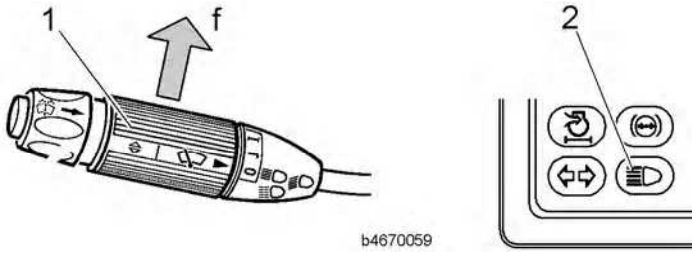
Switching off high beam



Steering column switch and display unit

1 Steering column switch
2 High beam symbol field

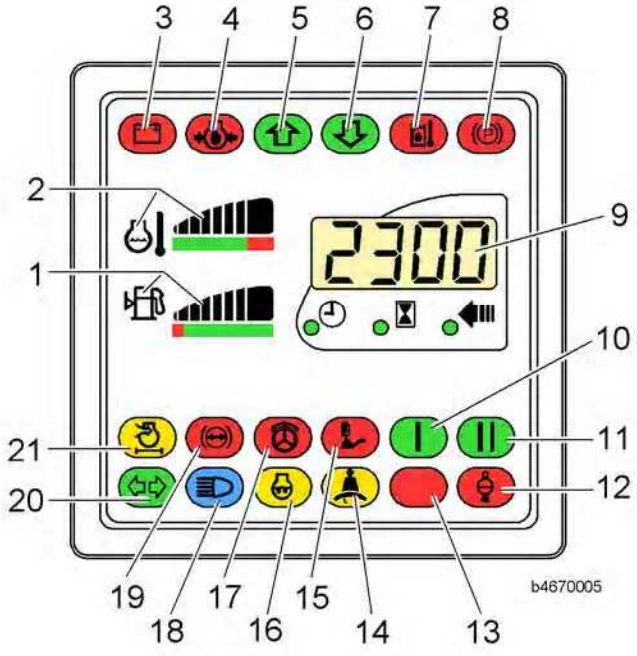
- To switch back to low beam, push the steering column switch in direction **f**.

The symbol field **2** for high beam goes out.
The driving light lights up.

3.2.11 Display unit

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

Layout



Display unit

1 Fuel supply segment field
2 Coolant temperature segment field
3 Battery charge (charge control) symbol field
4 Engine oil pressure symbol field
5 Forward travel direction symbol field
6 Reverse travel direction symbol field
7 Hydraulic oil and coolant overheating symbol field
8 Parking brake symbol field
9 Travel speed, service hours and clock LCD
10 Travel range I symbol field
11 Travel range II symbol field

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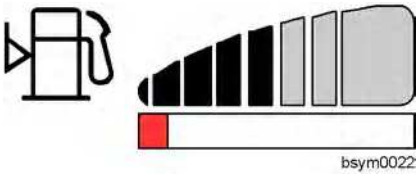
12 Engine overheating symbol field
13 Special function symbol field
14 Safety belt symbol field
15 Working hydraulics lockout symbol field
16 Preglow monitor symbol field
17 Emergency steering symbol field
18 High beam symbol field
19 Brake system accumulator pressure symbol field
20 Direction indicator system symbol field
21 Air filter contamination symbol field

The display unit is mounted at the front of the instrument panel.
It comprises segment and symbol fields, as well as an LCD for various warning and indicator functions.
Each symbol field is either red, yellow, green or blue.

Function description

Fuel supply tank content indicator



Fuel supply segment field

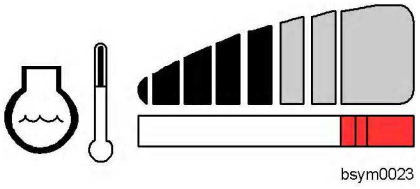
Segment field colour – black

On the bottom bar, the reserve level is marked in red.

Shows the content of the diesel fuel tank.

Warning function: if the fuel sensor fails, the middle bars 4 and 5 flash.

Coolant temperature indicator



Coolant temperature segment field

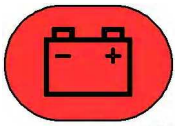
Segment field colour – black

On the bottom bar, the threshold level for overheating is marked in red.

Displays the coolant temperature.

Warning function:
– if the indicator sensor fails, the middle bars 4 and 5 flash.
  The warning function of the symbol field is accompanied after 10 seconds by an interval tone.

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.

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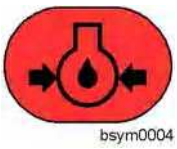
Engine oil pressure indicator


bsym0004

Engine oil pressure symbol field

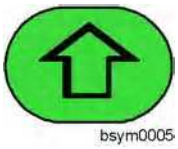
Symbol field colour – red

Warning functions:
– Lights up when the ignition key is in the ignition position **I**.
  The symbol field goes out when the engine is started.
– Lights up when the engine oil pressure drops. – **Requirement:** the engine must be running.


bpik0008

The warning function of the symbol field is accompanied after 10 seconds by an interval tone.

Forward travel direction indicator

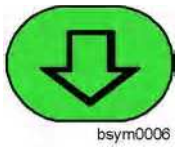

bsym0005

Forward travel direction symbol field

Symbol field colour – green

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

Reverse travel direction indicator


bsym0006

Reverse travel direction symbol field

Symbol field colour – green

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

Hydraulic oil and coolant overheating indicator


bsym0007

Hydraulic oil and coolant overheating symbol field

Symbol field colour – red

Warning functions:
– Lights up continuously when the hydraulic oil temperature is too high.
– Flashes when the coolant temperature is too high.
  The sequence is four flashes followed by a 5-second pause.

If the symbol field lights up:
– The fan turns at full speed
– The machine automatically switches to travel range **I** after 60 seconds
– The travel range **I** and **II** symbol fields flash alternately.


bpik0012

The warning function of the symbol field is accompanied by a tone sounding at intervals.

Audible warning: Interval tone (sequence: 1 tone followed by 10 seconds pause) sounds until the problem is rectified.

Parking brake activation indicator


04ml10ab

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.

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Travel speed, service hours and clock display

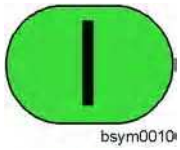
LCD display

Travel speed, service hours and clock LCD **1**

Field colour – yellow (backlit)

Display functions:
- Diode **2** indicates the travel speed of the machine.
- Diode **3** indicates the service hours of the machine.
- Diode **4** shows the time.

Travel range I indicator



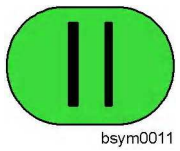
Travel range **I** symbol field

Symbol field colour – green

Displays that the selected travel range of the machine is **I**.

Lights up when the machine is moving in travel range **I**.

Travel range II indicator



Travel range **II** symbol field

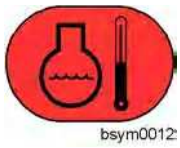
Symbol field colour – green

Displays that the selected travel range of the machine is **II**.

Lights up in key position **I** and when the engine is started.

Lights up when the machine is moving in travel range **II**.

Engine overheating indicator



Engine overheating symbol field

Symbol field colour – red

Warning function:
- Lights up when the coolant temperature is too high.

The warning function of the symbol field is accompanied after 10 seconds by an interval tone.

Special function

Special function symbol field

Not assigned. Symbol field colour – red

Reserve for special function.

Safety belt warning

Safety belt symbol field

Symbol field colour – yellow

Display function:
- Instructs the driver to use the safety belt.
  Flashes in key position**I**.
  The symbol field goes out 15 seconds after the engine is started.

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Working hydraulics lockout indicator

Working hydraulics lockout symbol field

Symbol field colour – red

Lights up when the working hydraulics lockout is activated.

Preglow monitoring

Preglow monitor symbol field

Symbol field colour – yellow

Functions:

– At low outside temperatures near 0°C.
  Lights up when the ignition key is turned to contact, operating and preglow position **I**.

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

Emergency steering indicator

Emergency steering 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: if the engine shuts down or if the steering oil supply fails when the machine is moving.
  The emergency steering pump is activated for approximately 50 seconds.

Audible warning:

– When the emergency steering function (emergency steering pump) is switched on, an interval tone sounds (without a pause).

High beam activation indicator

High beam symbol field

Symbol field colour – blue

Lights up when the high beam is activated.

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 10 seconds by an interval tone.

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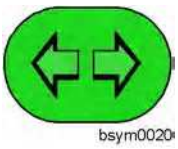
Direction indicator system activation indicator



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.

Air filter contamination indicator

Air filter contamination symbol field

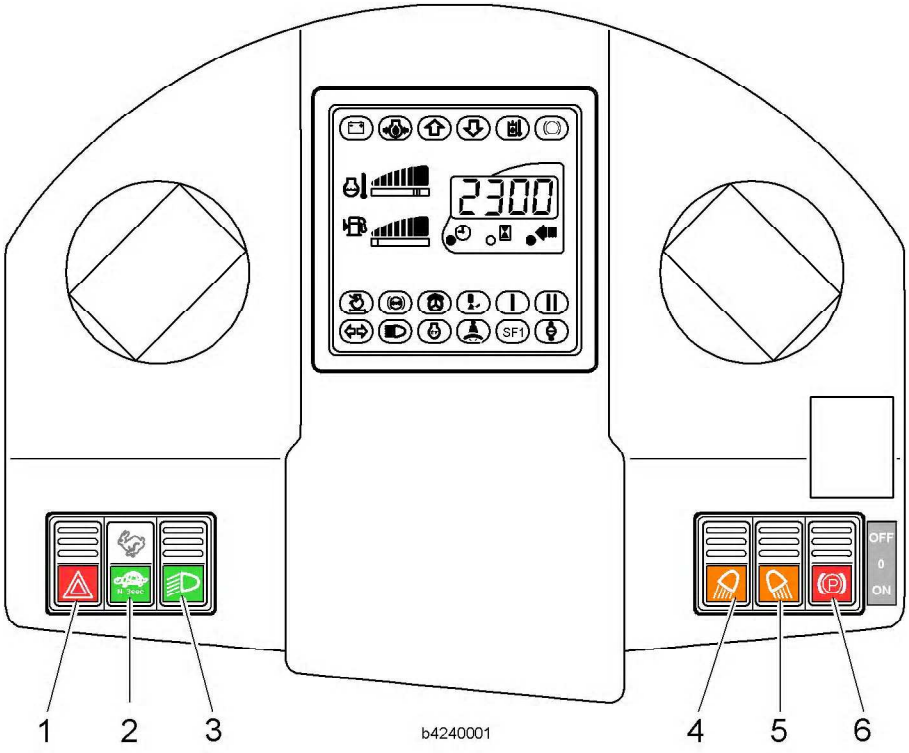
Symbol field colour – yellow

Lights up when the air filter is heavily contaminated.

3.2.12 Switches on the instrument panel

The layout and function of the switches on the instrument panel are described in this section.

Layout



Switches on the instrument panel

1 Hazard warning system switch
2 Travel range and neutral button
3 Parking / driving light switch
4 Front working floodlight switch
5 Rear working floodlight switch (optional)
6 Parking brake switch

The switches are built into the instrument panel.

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Function description

Switching on the hazard warning system


b4670027

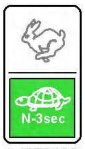
Hazard warning system switch

Field colour – red

Switches the hazard warning system on or off.

When you press the switch:
- If the hazard warning system field is flashing, all flashing lights on the machine are on.
- If the hazard warning system field goes out, all the flashing lights on the machine go out.

Selecting travel ranges



b4270120

Travel range and neutral button

Field colour – green

For switching to travel ranges **I**, **II** and neutral **N**.

After the electrical system has been turned on, travel range **II** is automatically selected.

You can only switch to a different travel range after selecting the travel direction.

Switching travel ranges:
- Press the tortoise symbol on the button to switch the travel range down to **I**.
- Press the hare symbol on the button to switch the travel range up to **II**.

Neutral function:

Press and hold down the button **2** on the **tortoise** symbol, and after three seconds the travel direction will switch to neutral **N**.

Switching on the parking light or driving light


b4670029

Parking / driving light switch

Field colour – green

Switch positions:
- Position I for parking light
- Position II for driving light

Function for parking light – switch position **I**:
- Switches the parking light on or off.
- When the switch is in position **I** the following lights on the machine must light up:
  - Left/right driving headlights (parking light)
  - Left/right tail lights

Function for driving light – switch position **II**:
- Switches the driving light on or off.
  This function is only possible when the machine's electrical system is switched on.
- When the switch is in position **II** the following lights on the machine must light up:
  - Left/right driving headlights
  - Left/right tail lights

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Switching on the front working floodlights


b4670030

Front working floodlight switch

Field colour – orange

Switches the front working floodlights on or off.

Press the switch to switch the front working floodlights on and off.

Switching on the rear working floodlights

This equipment is optional.


b4670031

Rear working floodlight switch

Field colour – orange

Switches the rear working floodlights on or off.

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

Releasing and applying the parking brake

b4670032

Parking brake switch

Field colour – red

Engages or releases the parking brake.

The parking brake is automatically engaged when you start the engine.

Press the switch to release or engage the parking brake.

OFF position
– When you press the switch to the OFF position the parking brake is released.

Middle positon 0.
– In this position you can select the travel functions.

ON position
– When you switch to the ON position the parking brake is engaged.
– When you press the switch to the “ON” position the travel direction is switched to neutral.

3.2.13 Switches on the side console

The layout and function of the switches on side console are described in this section.
The switches are built into the side console.
The switches have indicator lamps. These light up when the switches are activated.

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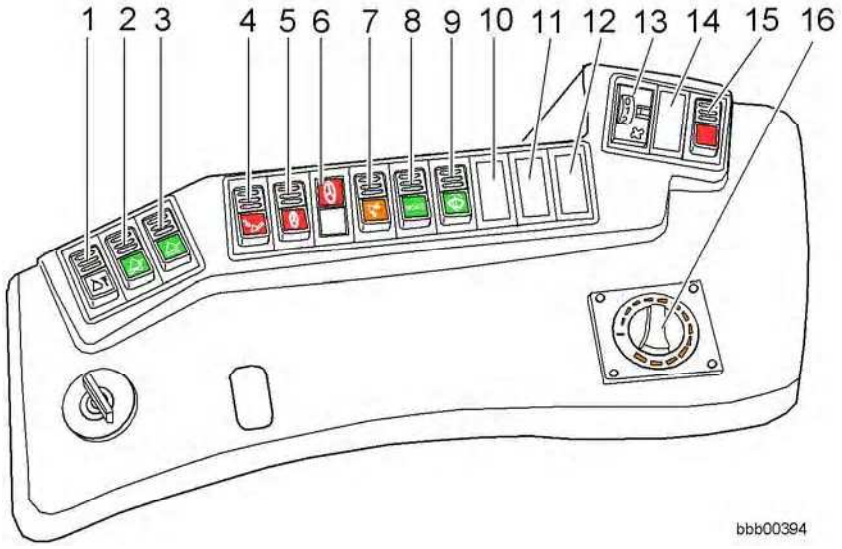
Layout



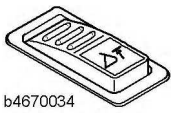
Controls on the side console

1 Lift kick-out switch
2 Float position switch
3 Bucket return-to-dig switch
4 Hydraulic quick-change device switch (optional)
5 Emergency steering button
6 Emergency steering check indicator lamp
7 Working hydraulics lockout switch
8 MODE button
9 Rear windshield wiper and washer system switch
10 Ride control switch (optional) *
11 Comfort control switch (optional) *
12 Indicator lamps for automatic LH lubricating system (optional) *
12 Switch for automatic TWIN lubricating system (optional) *
13 Blower motor switch
14 Air conditioning switch (optional) *
15 Engine diagnosis button
16 Heater knob

* The illustration above shows dummy plugs in the place of optional equipment.

Function description

Activating and deactivating the lift kick-out



Lift kick-out switch

Field colour – white

Switches the lift kick-out function on and off.

This function is only available once the engine has started.

When you press the switch, a solenoid on the pilot control device is activated.

The LIEBHERR control lever is held in the raised lift arm position by magnetic force until the limit switch on the front section switches off the solenoid in the pilot control device.

Activating and deactivating the float position


bbb00255

Float position switch

Field colour – green

Switches the float position function on or off.

This function is only available once the engine has started.

When you press the switch, a solenoid on the pilot control device is activated.

The LIEBHERR control lever is held in the float position by magnetic force.

Activating and deactivating the bucket return-to-dig function


bbb00256

Bucket return-to-dig switch

Field colour – green

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

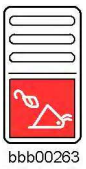
This function is only available once the engine has started.

When you press the switch, a solenoid on the pilot control device is activated.

The LIEBHERR control lever is held in the bucket tilt-in position by magnetic force until the limit switch on the tilt cylinder switches off the solenoid in the pilot control device.

Activating and deactivating the quick-change device

This equipment is optional for machines with Z lift arms.
This equipment is standard for machines with P lift arms.

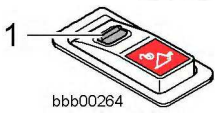

bbb00263

Hydraulic quick-change device switch

Field colour – red

Switches the hydraulic quick-change device function on or off.

This function is only available once the engine has started.



bbb00264

The switch is secured with a lock to prevent actuation by mistake. Before actuation, release the lock **1**.

When you press the switch:
- A solenoid valve is activated.
- A warning signal in the side console also sounds.
- Aditional activation of the working or steering hydraulics causes the locking mechanism of the quick-change device to retract.

Activating and deactivating the emergency steering


b4670033

Emergency steering button

Field colour – red

Starts and restarts 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.

Continuous operation of the emergency steering pump will overheat the pump motor. The thermostat in the pump motor automatically switches off the emergency steering pump if it overheats.

See the section on emergency operation in chapter 3.

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Emergency steering indicator


b4320101

Emergency steering check indicator lamp

Field colour – red

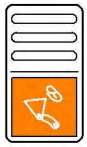
Display function:

– When you start the engine the indicator lamp lights up for four seconds.
  The emergency steering pump check takes place during this time.

Warning functions:

– If the emergency steering pump check fails, the lamp remains on until you switch off the ignition.
  Switch off the motor and rectify the problem: contact LIEBHERR CUSTOMER SERVICE.

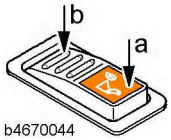
Activating and deactivating the working hydraulics lockout


bbb00257

Working hydraulics lockout switch

Field colour – orange

Disables and enables the working hydraulics functions.



b4670044

The switch has a switch function **a** and a button function **b**.

aSwitch function:

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

bButton function with the ignition switched off:

– When you press the switch **b** and at the same time operate the LH control lever, you can lower the lift arms and tilt out the bucket while the ignition is switched off.

Switching between the travel speed, clock and service hours

b4670045

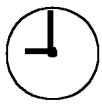
MODE button (LCD)

Field colour – green

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

Switching to the clock

Press the button once to switch the LCD display to the clock.

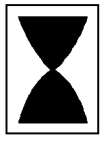

bsym0037

Setting the clock:

– Press and hold down the MODE button until the correct time is shown.

Switching to service hours

Press the button twice to switch the LCD display to service hours.


bsym0038

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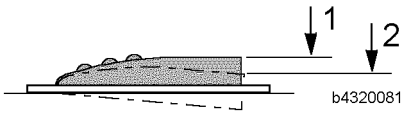
Switching the rear windshield wiper and washer system on and off


bbb00258



b4320081

Rear windshield wiper and washer system switch

Field colour – green

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

The switch has a switch function **1** and a button function **2**.

Switch functions:
– Switch to position **1** for wiping
– Press to position **2** for washing

Switching ride control (LFD system) on or off

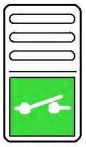
This equipment is optional.
Ride control switch


b4320084

Switches the ride control system on or off.

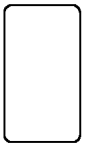
Switching comfort control on and off

This equipment is optional.
Comfort control switch


bbb00268

Switches the comfort control function on or off.

Dummy plug


b4670028

Dummy plug

Reserve for additional functions.

For example:
– Indicator lamps for automatic LH lubricating system
– (or) button for automatic TWIN lubricating system

Switching the blower on and off

b4320045

Blower motor switch

Functions:
– Switches the blower on or off.
– Regulates the blower levels for the heating, ventilation and air conditioning systems.

Blower speeds:
- Position **0** – Off
- Position **1** – Weak air flow
- Position **2** – Medium air flow
- Position **3** – Strong air flow

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Switching the air-conditioning on and off

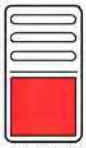

b4320082

This equipment is optional.
Air-conditioning switch

Switch on the blower motor before pressing this switch.

Switches the air-conditioning system on or off.

Engine diagnosis button


bbb00395

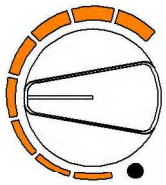
Engine diagnosis button

Displays service codes on the lamp in the button.

Activating the service code display:
– Switch off the ignition before pressing the button.
– Leave the ignition switched off for ten seconds.
– Simultaneously press the button and switch on the ignition.

See the service code tables in chapter 4.

Adjusting the heater


04se02ab

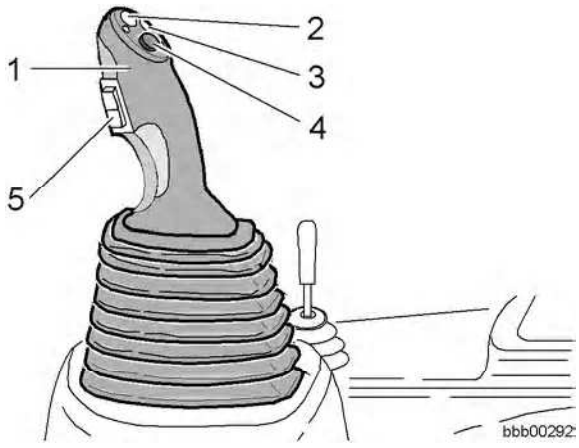
Heater knob

Regulates the temperature.

3.2.14 LIEBHERR control lever

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

Layout



LH control lever

1 Pilot control lever
2 Additional equipment button [1)]
3 Additional equipment button [1)]
4 Additional equipment button [1)]
5 Travel direction button

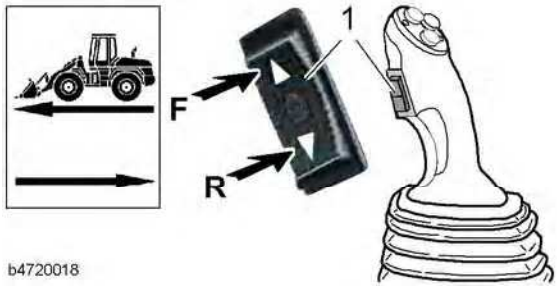
Alternative versions:
– The standard LIEBHERR control lever has no button for additional equipment.
– [1)]A LIEBHERR control lever with a button for additional equipment is optional.

Function description

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

Switching the travel direction

The travel direction cannot be selected while the parking brake is engaged.
Press the button 1 on the LH control lever to change the travel direction.
See the section on driving in chapter 3.



LH control lever

1 Travel direction button
F = **F**orward travel direction
R = **R**everse travel direction

- **Selecting the travel direction:**
  Press the button **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.

Selecting neutral travel direction:

- Press travel range and neutral button.

or

■ Press the parking brake switch.

NOTE: The procedure is described in detail in the section on switches on the instrument panel in chapter 3.

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Warning

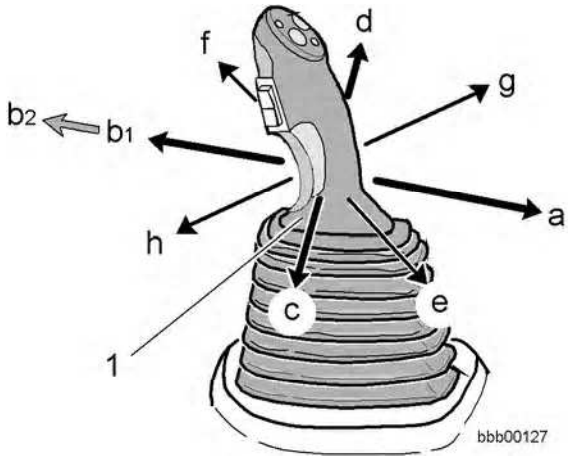
There is a risk of injuries if the seat belt is not fastened.
If the machine is braked or stops abruptly, the driver may suffer severe injuries if he is not wearing a seat belt.

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

When selecting neutral travel direction:
– Press the travel direction and neutral button to hydrostatically brake the machine.
– Press the parking brake switch to abruptly brake the machine.

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

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

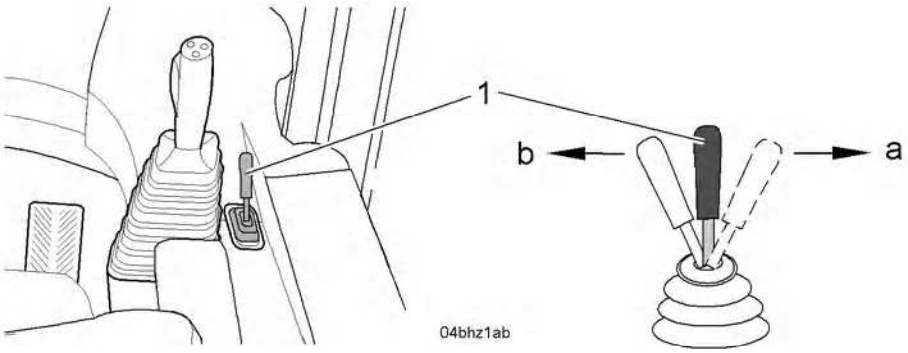
Movements of the LH control lever and associated functions:
a – Raises the lift arm
b1 – Normal lowering function – the lift arm is lowered slowly
b2 – Fast lowering function – the lift arm is lowered quickly
b2 – Float position – the lift arms are quickly lowered and lay on the ground under their own weight.
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

3.2.15 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.

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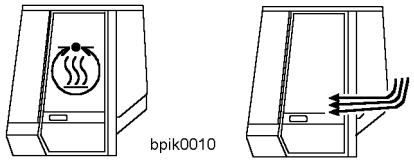
3.2.16 Heating and ventilation

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



A three-level radial blower ventialtes the cab.

An air filter fitted in the fresh air/recirculated air duct in front of the blower filters dust and other dirt out of the air taken in.

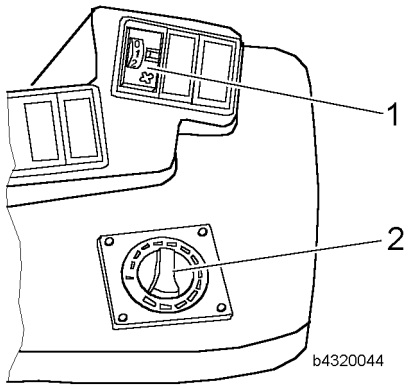
A lever in the rear right of the cab, which is is connected to the air flap, allows you to switch between fresh air and cab air circulation.

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

The temperature can be adjusted progressively.

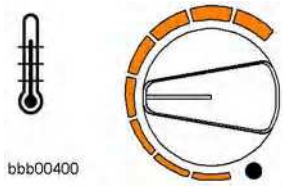


Heater controls

1 Blower motor switch 2 Heater knob

- Switch on the blower: Move the blower motor switch **1** to position1.

The air is blown into the cab through nozzles.



- To regulate the temperature: Turn the heater knob **2** to the required position.

Knob position:
– Blue for cold air
– Red for hot air

- To speed up the warming process:
  Turn the heater knob **2** all the way to the right. At the same time, move the air flap lever **1** to position **a** for recirculation and turn the blower motor switch **1** to position **3**. See also the sections on regulating the blower and the air supply.

Adjusting the blower

The blower motor knob switches the blower on and off.

Blower speeds:

Position **0** – Off

Position **1** – Weak air flow

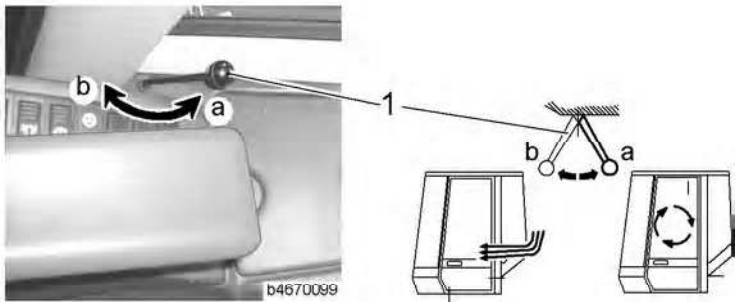
Position **2** – Medium air flow

Position **3** – Strong air flow

- Turn the blower motor knob to the required position.

The air is blown into the cab through nozzles.

Regulating the air supply



The air flap lever **1** is behind the driver's seat to the right.

Lever positions:
Position a – circulated air
Position b – fresh air

- To switch between fresh air and circulated air, Move the lever **1** to the required position.

LBH/02/003801/0003/7.05/en

3.2.17 Air-conditioning system


bsym0029

This equipment is optional.
The air taken in is filtered through a dry filter element.

The filtered air is 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.

In order to switch on the air-conditioning system:
– The engine must be running.
– The blower switch **2** must be set to at least level **1**.
– The temperature in the cab must be above +1 °C (below this temperature, the thermostat in in the evaporator is switched off).

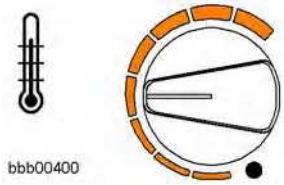
Switching on the air-conditioning system


b4320082

- Press the air-conditioning switch **3**.

The switch symbol lights up to indicate that the function is active.

Regulating the temperature


bbb00400

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

- Set the heater knob as required.

Turn clockwise = warmer

Turn anticlockwise = colder

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
– Turn the heater knob **4** all the way to the left
– Close the cab doors and windows
– Switch the air flap lever **1** to circulated air

- Turn on the air-conditioning system using the switch **3**.

Re-heat mode

On cold, damp days, you can use the air-conditioning system to de-humidify 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


b4320082

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

When the function is switched off, the light in the switch symbol goes out.

3.2.18 Interior cab lighting

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

LBH/02/003801/0003/7.05/en

Switching the interior lighting on and off

Interior lighting

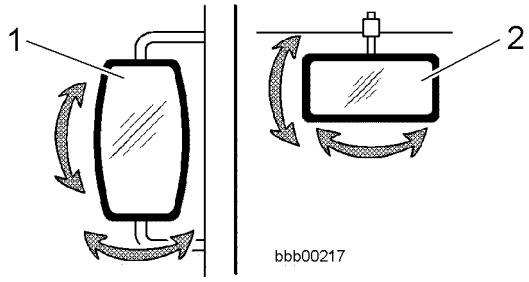
1 Interior lighting
2 Reading lamp
3 Interior lighting switch
4 Reading lamp switch

- 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.

3.2.19 Interior and exterior mirrors

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

Adjusting the mirrors



Adjusting the mirrors

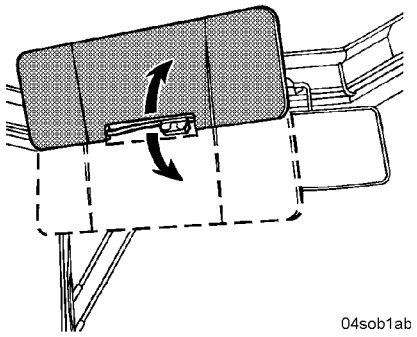
1 Exterior mirror
2 Interior mirror

- All mirrors can be adjusted individually.

3.2.20 Sun visor

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

Adjusting the sun visor

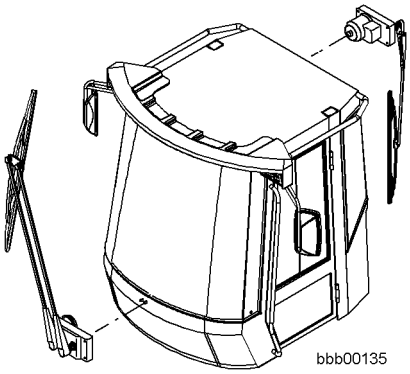


Adjusting the sun visor

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

3.2.21 Windshield wiper and washer system

Layout



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.

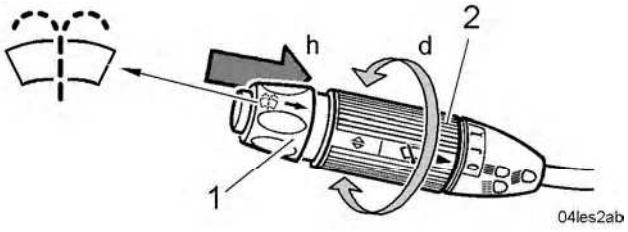
The switches for the rear washer and wiper system are in the right-hand side console. There is a spring-action button for activating the washer fluid pump.

Activating the windshield wiper and washer system

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

LBH/02/003801/0003/7.05/en

Using the front windshield wiper and washer system



Steering column switch

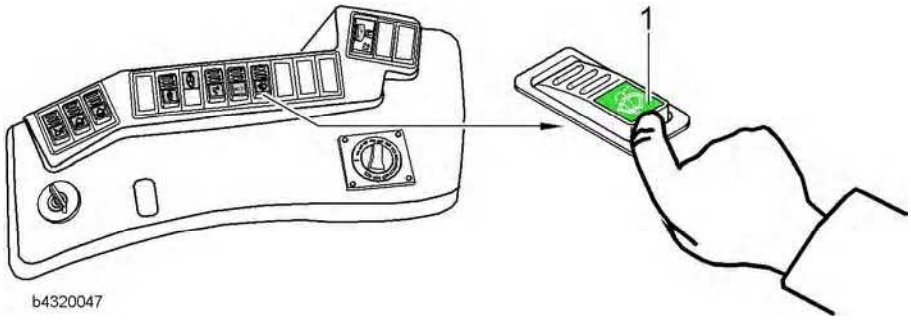
1 Button
2 Handle
d Windshield wiper activation
h Windshield wiper and washer system activation

- 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.

Using the rear windshield wiper and washer system

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



Switches on the side console

1 Rear windshield wiper and washer system switch

- To wipe the window, press the switch **1** once.

The rear windshield wiper is activated.

- Top wipe and wash the window, press the switch **1** again and hold it down.

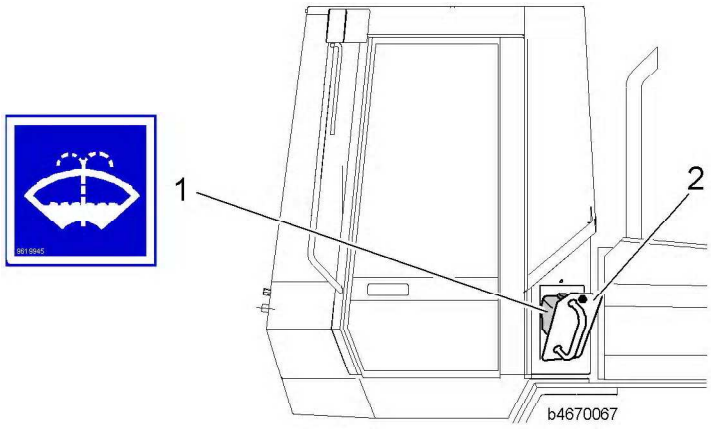
Washer fluid is sprayed onto the rear windscreen through an outlet nozzle.

- To switch off the windscreen washer, release the switch **1** .
- To switch off the windscreen wiper, push the switch **1** back.

LBH/02/003801/0003/7.05/en

3.2.22 Windshield washer fluid reservoir

Layout



Windshield washer fluid reservoir

1 Reservoir with filling inlet 2 Cover

The reservoir **1** is on the left side of the cab behind the cover **2**.

Topping up washer fluid

The filling quantity is 3.5 litres.

- Open the cover **2**.
- 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.

3.2.23 LIEBHERR automatic lubrication system

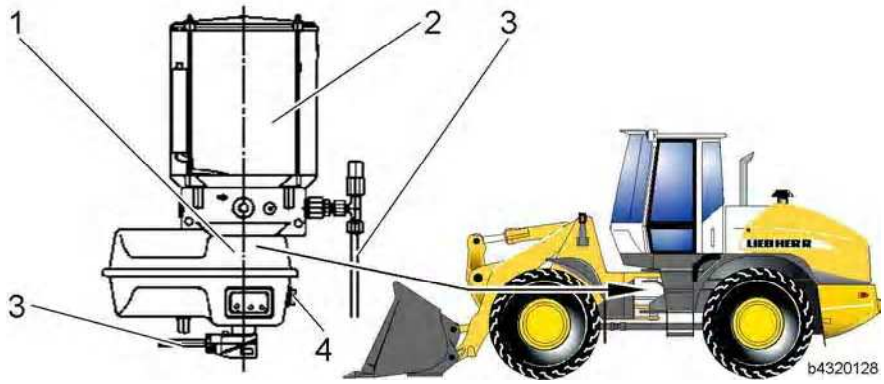
This equipment is optional.

LBH/02/003801/0003/7.05/en

Layout

The central lubrication pump with its transparent reservoir and integrated electronic control unit is installed on the left-hand side of the machine.

Two indicator lamps are positioned in the cab on the right side of the instrument panel.



Automatic lubrication system

1 Central lubrication pump
2 Transparent container
3 Lubricant supply lines
4 Non-scheduled lubrication button

The automatic central lubrication system consists of:

– The central lubrication pump with a transparent container and an integrated control unit
– The indicator lamps
– The electric button for non-scheduled lubrication
– One primary and several secondary distributors and the lubricant 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 and a cycle encoder on the main distributor monitor the lubrication of the individual lubrication points.

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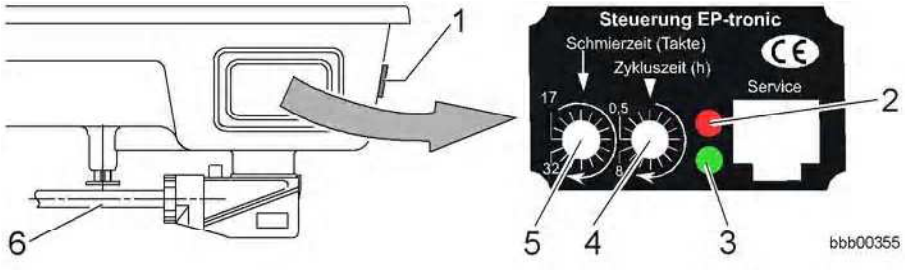
Lubrication and cycle times

The integrated control unit electronically controls the central lubrication system.



EP-tronic controller

1 Non-scheduled lubrication button
2 Red LED
3 Green LED
4 Cycle time display and setting
5 Lubrication time display and setting (cycles)
6 Connection cable

The green LED **3** lights up for 1.5 seconds after the ignition is switched on indicating that the system is ready.

You can also switch on the pump manually for one lubrication cycle using the non-scheduled lubrication button **1**.

The pump motor switches off ater the set lubrication time (cycle) **5**.

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

If you switch off the ignition during the lubrication or cycle time, the controller stops the time and saves it. When you turn the ignition on again, the controller reads the data from its memory and continues the function where it was interrupted.

Description	Value	Unit
Default lubrication time	20	Cycles
Default cycle time	0.5	h
Adjustable lubrication time	min. 17 max. 32	Cycles Cycles
Adjustable cycle time	min. 0.5 max. 8.0	h h

Lubrication and cycle time

LBH/02/003801/0003/7.05/en

Function test

There are two indicator lamps in the side console of the cab to show the status of the central lubrication system.
The functions of the indicator lamps correspond to those of the LEDs on the controller.

Controls on the side console

1 Cycle error indicator lamp 2 Lubrication indicator lamp

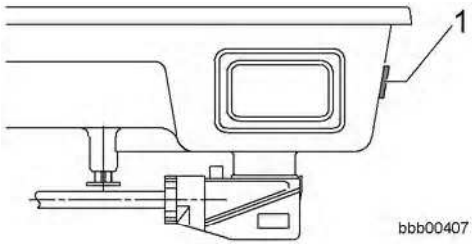

bsym0035

Display function of the red indicator lamp 1:
– Flashes after a cycle error.
(1 second on / 1 second off)
See the section on troubleshooting for the LIEBHERR automatic lubrication system in chapter 4.


bsym0036

Display functions of the green indicator lamp 2:
– Lights up for 1.5 seconds after the ignition is switched on, indicating that the central lubrication system is ready.
– Lights up during the entire lubrication process.
– Flashes after a cycle error.
(1 second on / 1 second off)
See the section on troubleshooting for the LIEBHERR automatic lubrication system in chapter 4.

Operating the central lubrication system



Using the button **1** on the engine housing, you can perform non-scheduled lubrication at any time.

Default setting for the lubrication and cycle time:
– See the section on lubrication and cyle times for the LIEBHERR automatic lubrication system in chapter 3.

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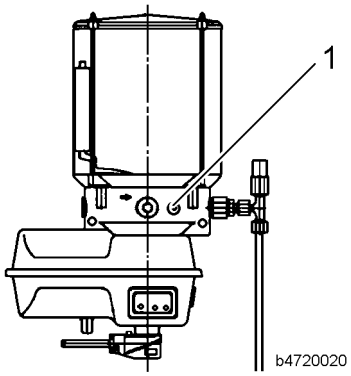
Filling the reservoir



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

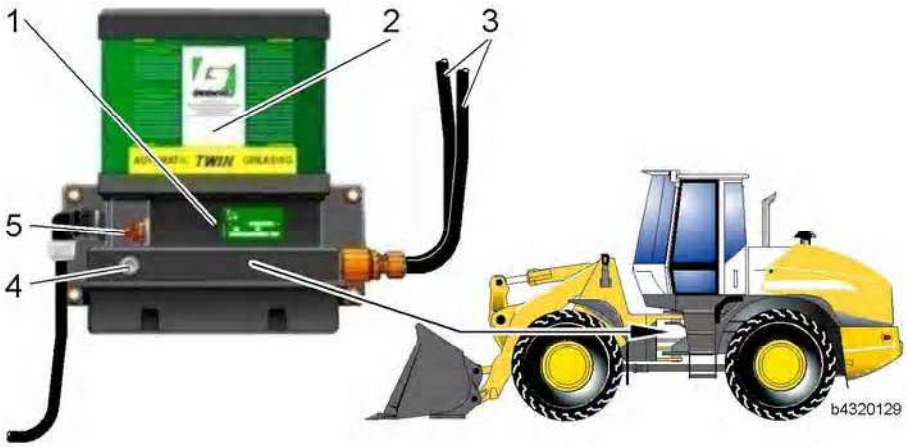
Grease specifications:
– See the lubricants and fuels listed in chapter 3.

3.2.24 TWIN automatic lubrication 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 lubrication system

1 Central lubrication pump
2 Transparent container
3 Lubricant supply lines
4 Non-scheduled lubrication button
5 Filling coupling with protective cover

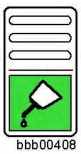
LBH/02/003801/0003/7.05/en

The automatic central lubrication system consists of:
– The central lubrication pump with a transparent container and an integrated control unit
– The dead time button with indicator lamp (in the cab)
Field colour – green
– 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 two-line 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.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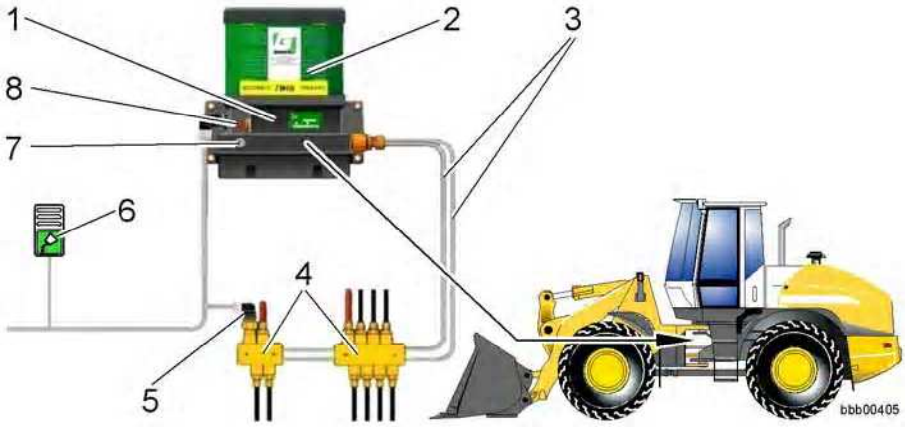
The set lubrication interval is displayed:
– Immediately after you switch on the ignition.
– On the dead time button by the green indicator lamp flashing.



Automatic lubrication system

1 Central lubrication pump
2 Transparent container
3 Lubricant supply lines
4 Distributor blocks
5 Pressure switch
6 Dead time button
7 Non-scheduled lubrication button
8 Filling coupling with protective cover

The electrically driven central lubrication pump **1** with an integrated controller delivers the grease (lubricant) to the distributor blocks **4** and metering valves.
The grease is delivered to the individual lubrication points using the measuring valves.
The electric pressure switch **5** monitors the system pressure in the main supply lines.
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	15	min

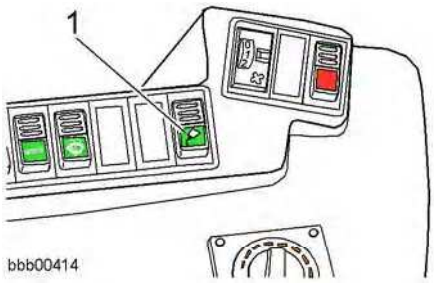
Description	Value	Unit
Dead time for normal use	30	min
Dead time for light use	45	min

Dead time

Setting the lubrication mode

Select the lubrication mode using the button **1** on the right in the side console.
Make sure that the electrical system is switched on.

Setting the desired lubricating mode



1 Dead time button with indicator lamp

- Setting the desired lubricating mode:
  Within 30 seconds of switching on the ignition, press the dead time button **1** during or after the flashing code of the indicator lamp.
- Press the dead time button **1** once, twice or three times.

After two seconds, the indicator flashes to show the selected setting.

Flashing code	Setting
Flashes once	Heavy use
Flashes twice	Normal use
Flashes three times	Light use

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.

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Test lubrication (non-scheduled lubrication)

Make sure that the electrical system is switched on.
During test (non-scheduled) lubrication, you can perform a one-off lubrication manually.

Use:
– To test the system.

- Press the non-scheduled lubrication switch 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.
During non-stop lubrication you can perform uninterrupted lubrication cycles.

Use:
– When first starting the system
– Filling the lubrication ducts in the steel components
– Pumping extra grease to all lubrication points (for example after cleaning the machine)
– To bleed the system

- 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.

3.2.25 Audible reverse warning device

This equipment is optional.
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.

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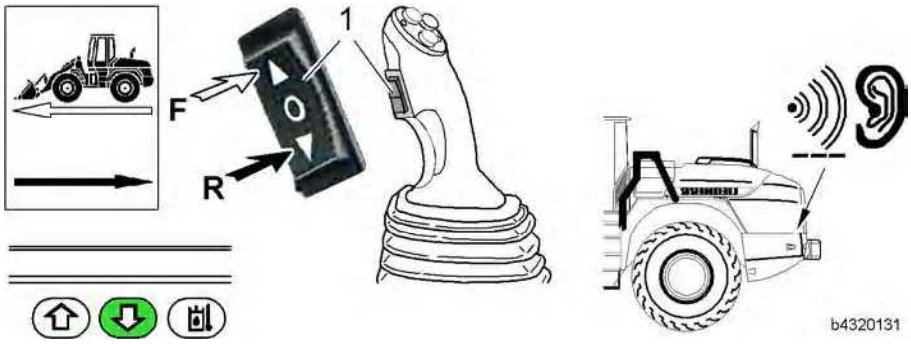
Activating the reverse warning device



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.

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

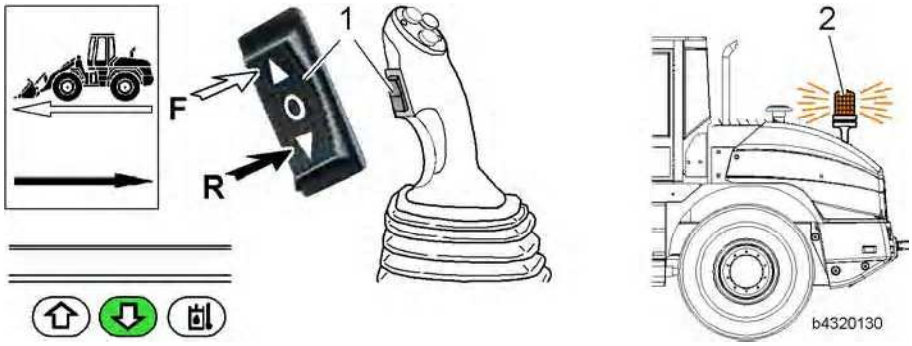
The reverse warning device, which is mounted at the back of the machine, on the left side in the engine compartment, emits an alarm tone of around 60 pulses per minute.
The alarm tone is roughly 5 decibels louder than the ambient noise.

3.2.26 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.
A yellow flashing beacon is mounted on the engine hood 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 lamp is electrically actuated when the travel direction switch is in the reversing position.



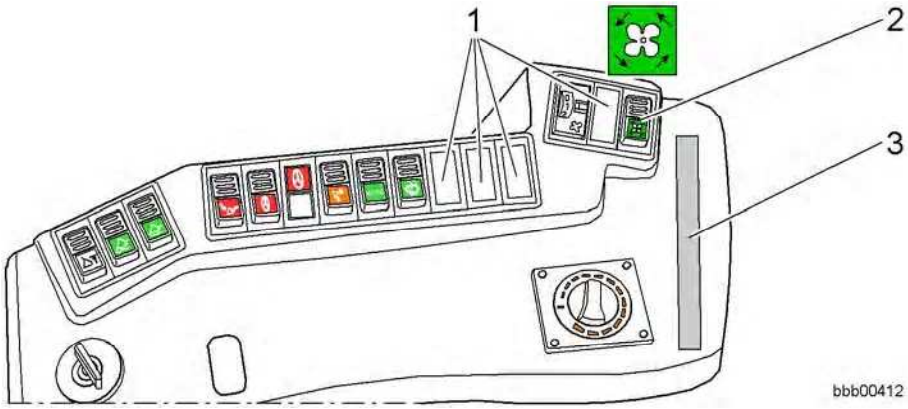
LH control lever and display unit

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

The warning lamp flashes.

3.2.27 Reversible fan drive

This equipment is optional.
The fan can be reversed to blow out (clean) the cooler.
The repeat intervals for fan reversal depend on how the machine is used.



Side console

1 Fan reversal button[1)]
2 Fan reversal button[2)]
3 Instruction decal

[1)]Applies to L524, L534 machine – depending on available space
[2)]Applies to L538 machine

Caution

There is a risk of damage to the machine.
If the cooler is dirty the machine may overheat.
! Only activate and deactivate fan reversal at low engine speeds.

Note the warning decal **3**.

Activating the (reversible) fan drive

- If a lint filter is fitted:
  Open each of the covers.
- Run the engine at lower idle speed.
- Press and hold the fan reversal button.
- Run the engine at upper idle speed until all the dust, dirt and lint is blown out.

Deactivating the (reversible) fan drive

- Run the engine at lower idle speed again.
- Release the fan reversal button.
- If a lint filter is fitted, close each of the covers again.

LBH/02/003801/0003/7.05/en

3.3 Handling

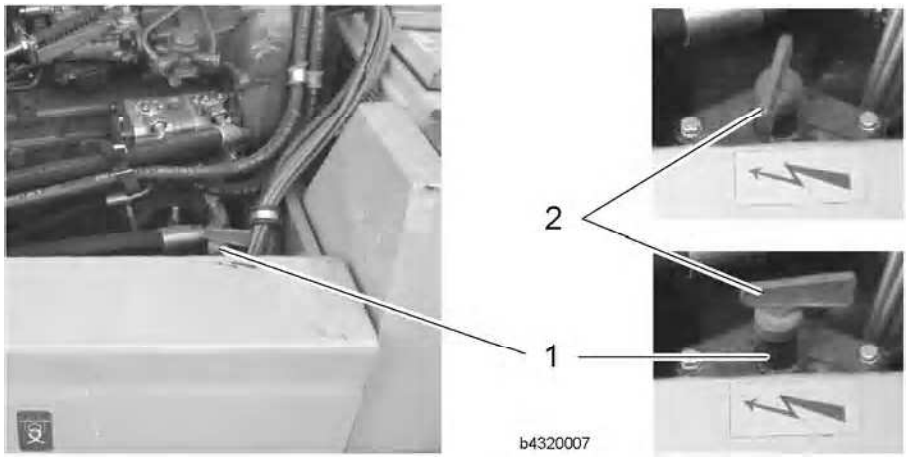
3.3.1 Daily start-up

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 Key

- Switch on the battery main switch.

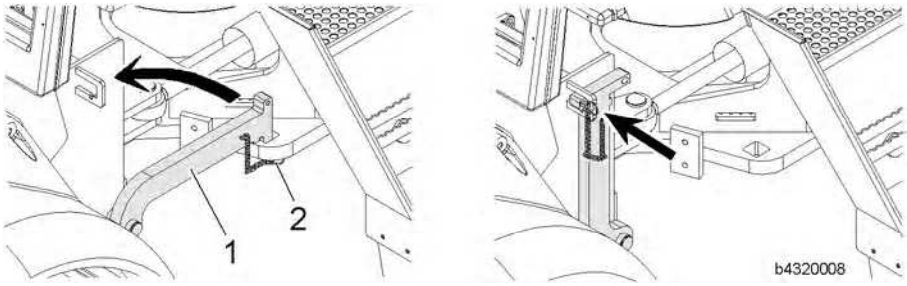
Closing the service doors, hatches and hoods

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

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.

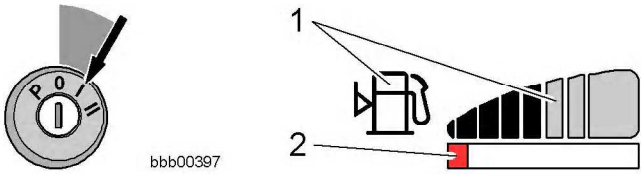


Articulation lock

1 Locking bar 2 Linch pin

- Pull out the linch pin **2**.
- Lift up the locking bar **1** and fix it in the top position using the linch pin **2**.

Refuelling with diesel fuel



Fuel supply display

Make sure that the electrical system is switched on.

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

Reserve fuel display:

On the bottom bar **2**, the reserve level is marked in red.

In this case, there are 30 litres left in the tank.

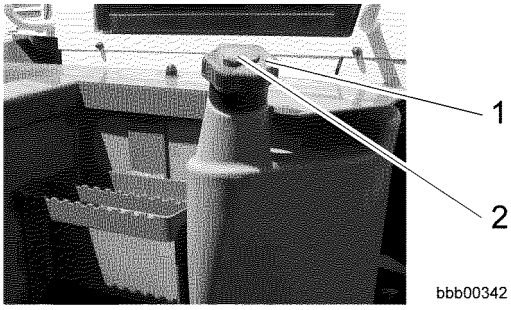
Safety while refuelling

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.



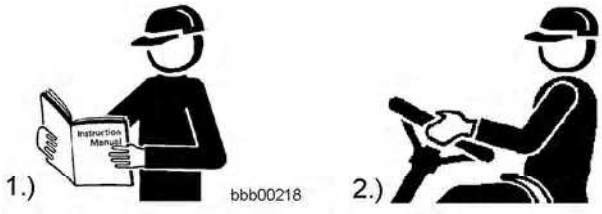
Fuel tank

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.
- Carefully clean around the tank cap **1** 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.

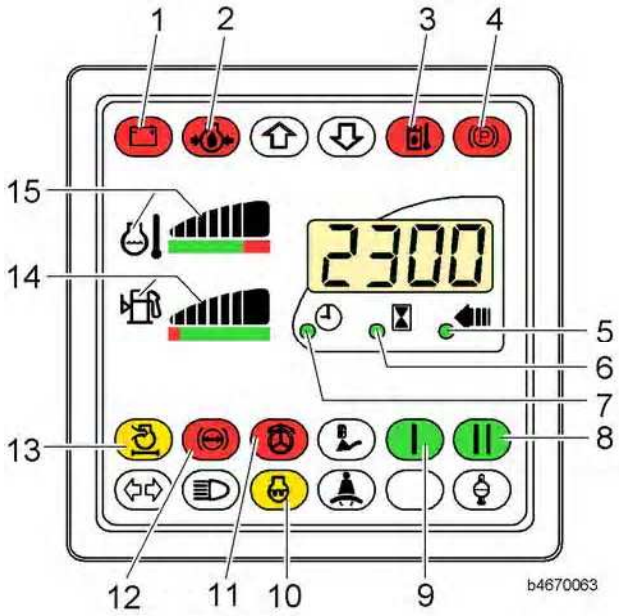
Starting procedure

Lamp check

During the lamp check, the control electronics test the following symbol fields.

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

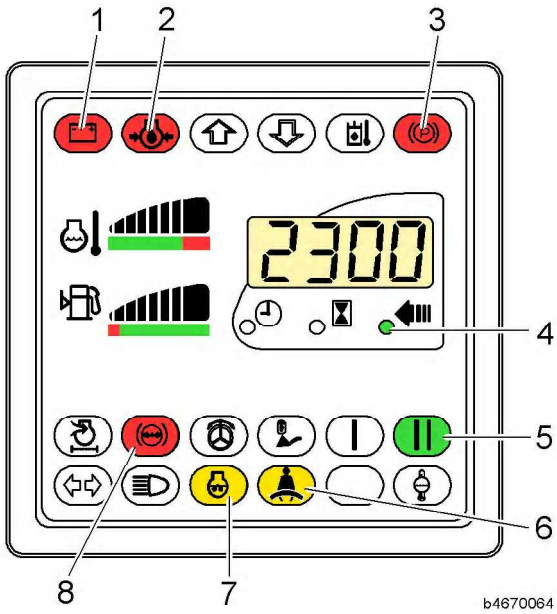
The following symbol fields only light up briefly (2.5 to 3 seconds).



Display unit during the lamp check

1 Battery charge (charge control) symbol field
2 Engine oil pressure symbol field
3 Hydraulic oil overheating symbol field
4 Parking brake symbol field
5 Travel speed diode
6 Service hours diode
7 Clock diode
8 Travel range **II** symbol field
9 Travel range **I** symbol field
10 Preglow monitor symbol field
11 Emergency steering symbol field
12 Brake system accumulator pressure symbol field
13 Air filter contamination symbol field
14 Fuel supply segment field
15 Coolant temperature segment field

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



Display unit during the lamp check

1 Battery charge (charge control) symbol field
2 Engine oil pressure symbol field
3 Parking brake symbol field
4 Travel speed diode
5 Travel range **II** symbol field
6 The safety belt symbol field flashes.
7 Preglow monitor symbol field[1)]
8 Brake system accumulator pressure symbol field[2)]

[1)] The preglow monitor symbol field **7** lights up at low outside temperatures.
[2)]The brake system accumulator pressure symbol field **8** only lights up if the brake system accumulator pressure is low.

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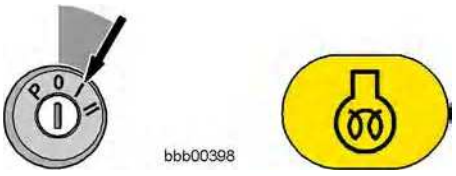
Preglowing the engine

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

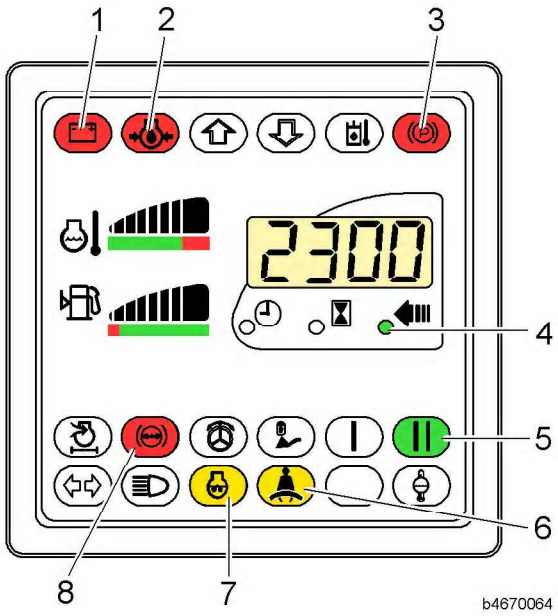
Preglowing does not take place at temperatures above zero.

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



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

The following symbol fields must light up:



Display unit during the lamp check

1 Battery charge (charge control) symbol field
2 Engine oil pressure symbol field
3 Parking brake symbol field
4 Travel speed diode
5 Travel range **II** symbol field
6 The safety belt symbol field flashes.
7 Preglow monitor symbol field[1)]
8 Brake system accumulator pressure symbol field[2)]

[1)] The preglow monitor symbol field **7** lights up at low outside temperatures.
[2)]The brake system accumulator pressure symbol field **8** only lights up if the brake system accumulator pressure is low.

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Starting the engine

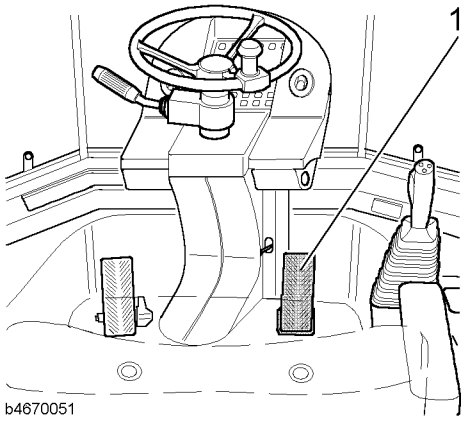
- At temperatures below zero:
  Wait until the symbol field **6** for the preglow monitor goes out.

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

Note: when the engine is being preheated, the symbol field **6** goes out when the preglow time has elapsed, i.e. when the engine is ready.

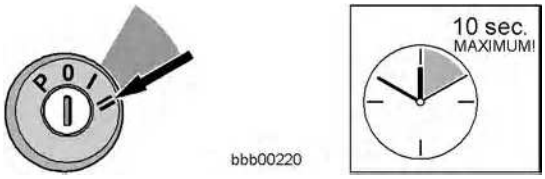
The preglow time can be as long as 120 seconds if the temperature is extremely cold.

The engine is ready to start.



Gas pedal

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



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.**
- Once the engine has started, decrease the speed immediately to a medium speed.
- If the engine does not start:
  Turn the ignition key back to the 0 position.

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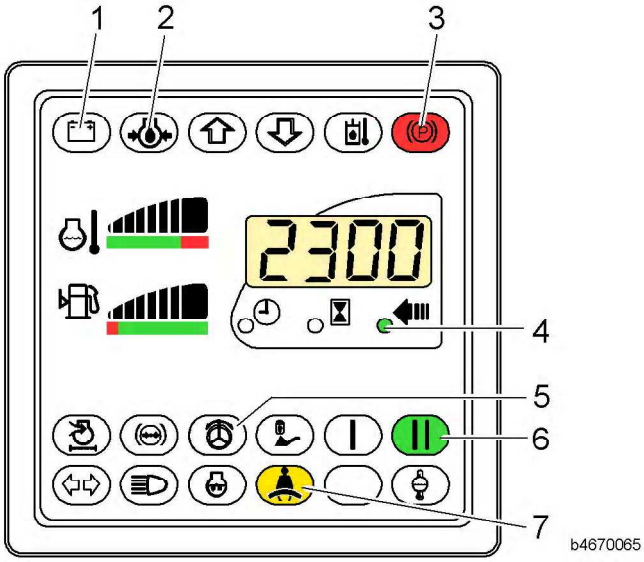
Troubleshooting

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.



Display unit

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

1 Battery charge (charge control) symbol field

2 Engine oil pressure symbol field

5 Emergency steering symbol field (only lights up briefly and then goes out)

When the engine starts, the following symbol fields must light up:

3 Parking brake symbol field

4 Travel speed diode

6 Travel range **II** symbol field

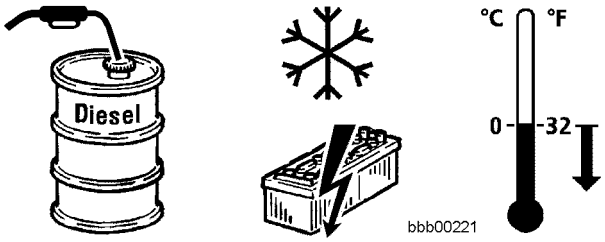
7 Safety belt symbol field (flashes for 15 seconds)

Troubleshooting
If the symbol fields **1, 2, 5** go out or the symbol fields **6, 7** and the diode **4** do not light up:

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

- 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.

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:
– The parking brake is automatically activated.
– When the parking brake is engaged, the travel lockout is active.
– The travel direction cannot be preselected.
– Travel range **II** is automatically activated.
– The travel direction can be selected.

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.

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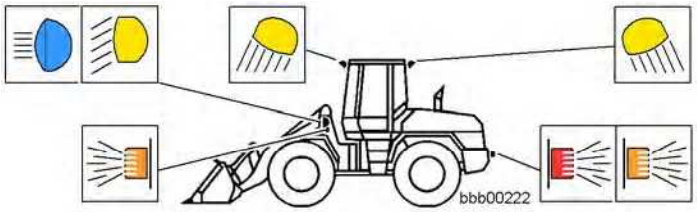
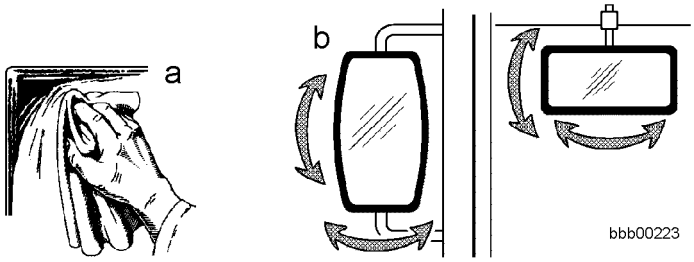
Checking the lights



Headlamp adjustment

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

Checking the interior and exterior mirrors



Interior and exterior mirrors

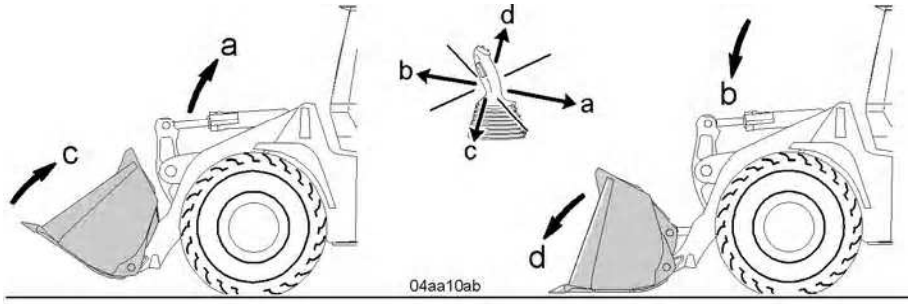
- Clean the interior and exterior mirrors.
- Adjust the interior and exterior mirrors.

Starting the machine

- 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.

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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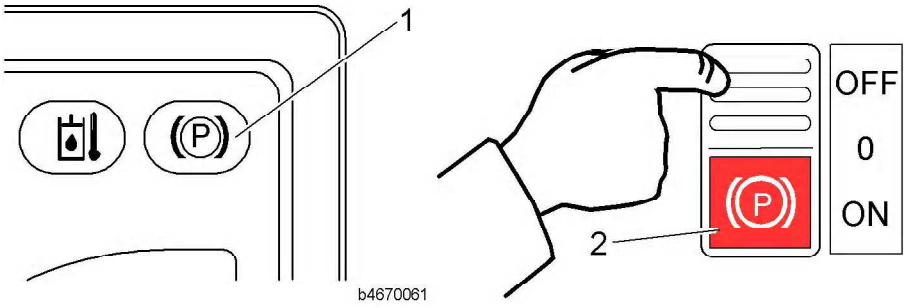
Releasing the parking brake

When the parking brake is engaged, the travel lockout is active.

The travel direction cannot be preselected.



Display unit and parking brake switch

1 Parking brake symbol field
2 Parking brake switch

- To release the parking brake, push the switch **2** back.

The symbol field **1** for the parking brake goes out.

Selecting the travel direction

After the electrical system has been turned on, neutral travel direction is automatically selected.

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

Travel direction switch and display unit

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

After the electrical system has been turned on, travel range **II** is automatically selected.

Select the travel range using the travel range and neutral button.

The selected travel range is shown on the instrument panel in the display unit.

See the section on the display unit in chapter 3.

You can shift to another travel range at any speed. If you shift down at a high speed, the machine is hydrostatically braked.

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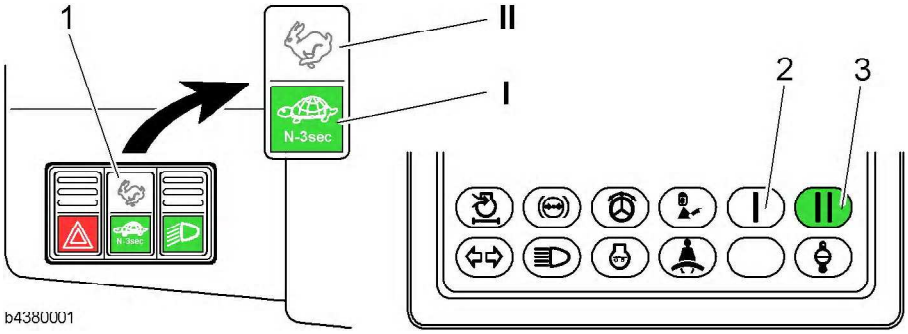
You can select the following travel ranges:
– Travel range **I** (tortoise symbol) for slow driving (e.g. on steep slopes).
– Travel range **II** (hare symbol) for normal working operation.

Travel speeds: See the section on the travel drive in chapter 1.



Travel range and neutral button

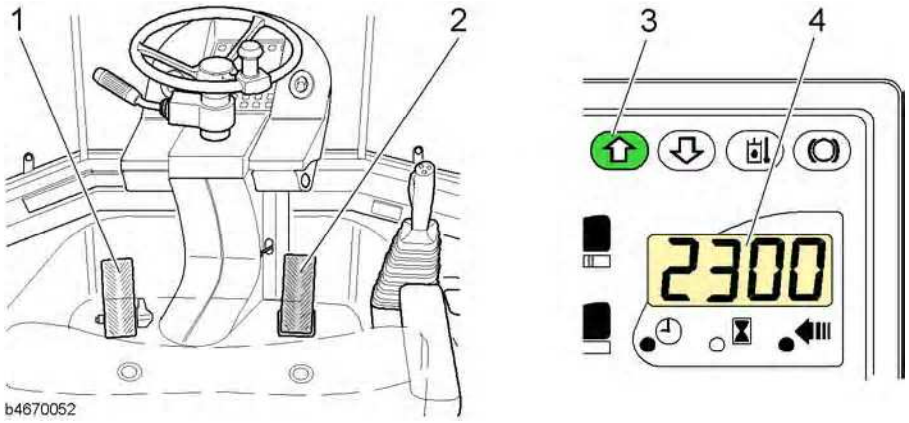
1 Travel range and neutral button
2 Travel range **I** symbol field
3 Travel range **II** symbol field
I Tortoise symbol (slow driving)
II Hare symbol (normal use)

- Depending on the operation, set the button **1** to travel range **I** or **II**.

The selected travel range is indicated by the symbol fields **2, 3** on the display unit.

Setting off

After the electrical system has been turned on, travel range **II** is automatically selected.
Make sure that you have carried out all the preparations for driving.
See the section on preparations for driving in chapter 3.



Gas pedal and travel speed display

1 Inch/brake pedal
2 Gas pedal
3 Travel direction symbol field
4 Travel speed LCD

- Push down the gas pedal **2**.

The machine starts moving.

- Control the travel speed using the gas pedal.

The travel speed is indicated by the travel speed LCD **4**.
The condition is that the “MODE” button is set to display the travel speed.

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.

Overspeed protection

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

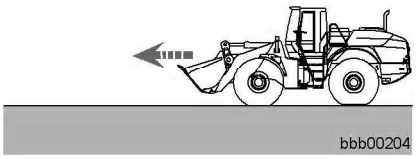
For your safety and that of the machine, it is equipped with an overspeed protection system and warning apparatus.

The overspeed protection system only has a limited hyrdaulic braking effect.

When driving down a steep slope, you must brake the machine using the service brake.

The overspeed protection system alone cannot provide protection against deliberately reckless driving down steep slopes.

Driving on even terrain

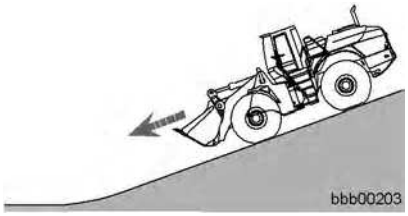


If the machine exceeds a certain speed in any direction (forward or reverse), it is hydraulically braked.

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

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

Driving on a steep downhill slope



If the machine exceeds a certain speed in any direction (forward or reverse), it is hydraulically braked.

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

Functions of the overspeed protection system:

Warns against excessive output speed
Protects the diesel engine from overspeed
Warns when rolling downhill too fast

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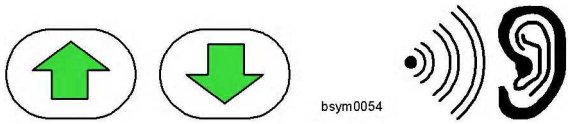
Overspeed causes the following actions:

– At travel speeds above 36.2 km/h
  The symbol fields for forward and reverse travel both flash.
– At even higher speeds:
  Above 37.2 km/h the electronic controller switches the travel drive to braking.
  The machine is braked hydrostatically.
  Above 41.7 km/h a permanent beep sounds.



Warning

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

- **If driving on a long, steep downhill slope:**
  First select the lowest travel range (see the section on general working methods in chapter 3).
- Ease off the gas pedal.
- Drive downhill carefully.

NOTE:
See the safety instructions for driving on slopes in chapter 2.

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

Driving without LFD

This equipment is optional.

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.

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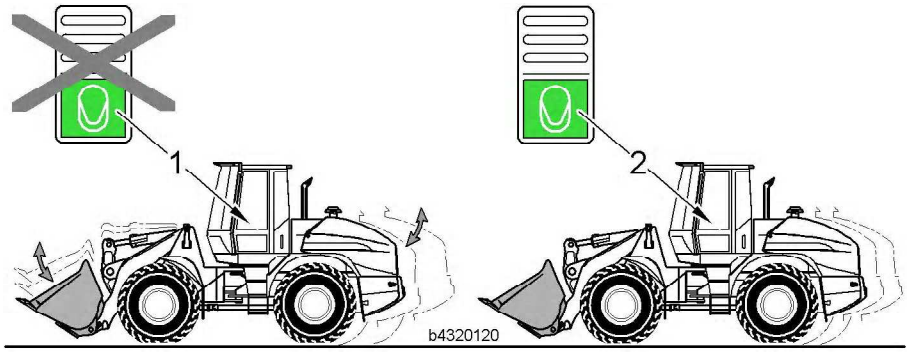
Driving with LFD

This equipment is optional.



Driving with or without LFD

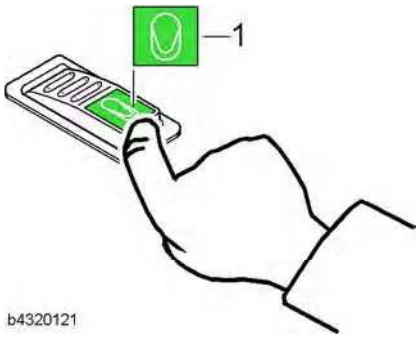
1 Driving without LFD 2 Driving with LFD

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

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



1 Ride control switch

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

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

The LFD system is now activated.

Reversing

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

If you change travel direction at a high speed, the machine is hydrostatically braked.

Travel direction switch and display unit

1 Travel direction switch 2 Forward travel direction symbol field

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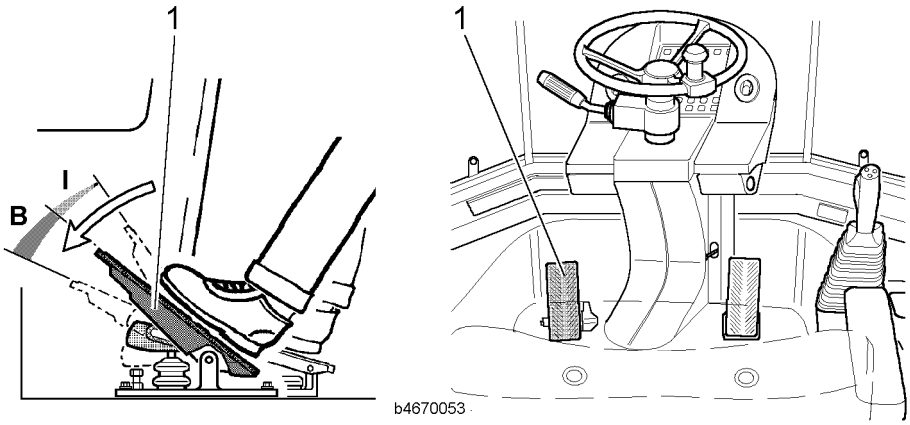
3 Reverse travel direction symbol field

- 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

You can support the reversing procedure by easing off the gas pedal or by gently pressing the inch/brake pedal **1**.

- **Support the reversing procedure if necessary.**

This results in smooth reversing action.

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.

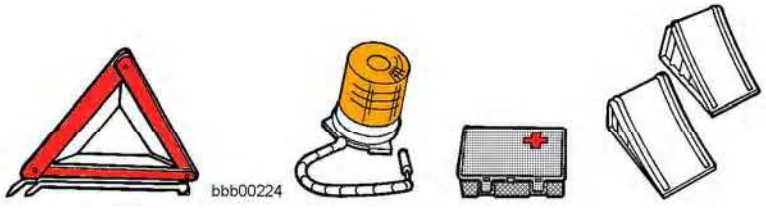
Before driving on public roads, find out the following:

– 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.

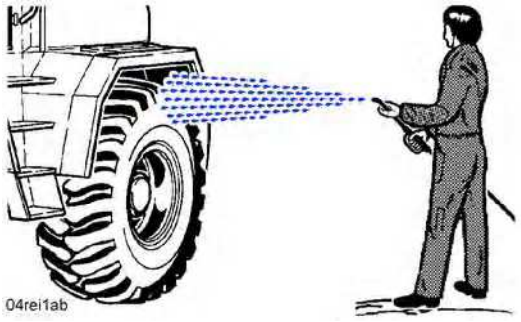
Preparing for driving on roads

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.

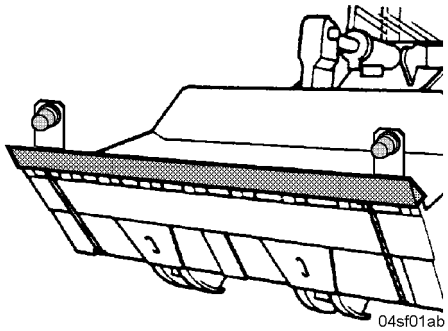


Washing

- 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.

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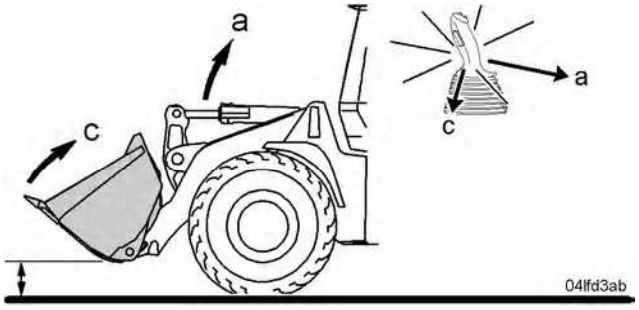
Driving You will find descriptions of work operations, driving, transport and transferring bulk material in the section on general working methods.



Transport height

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.

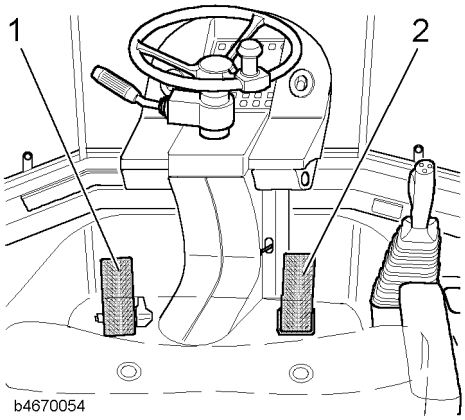
- Always drive with due care.
- Observe the highway code.

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

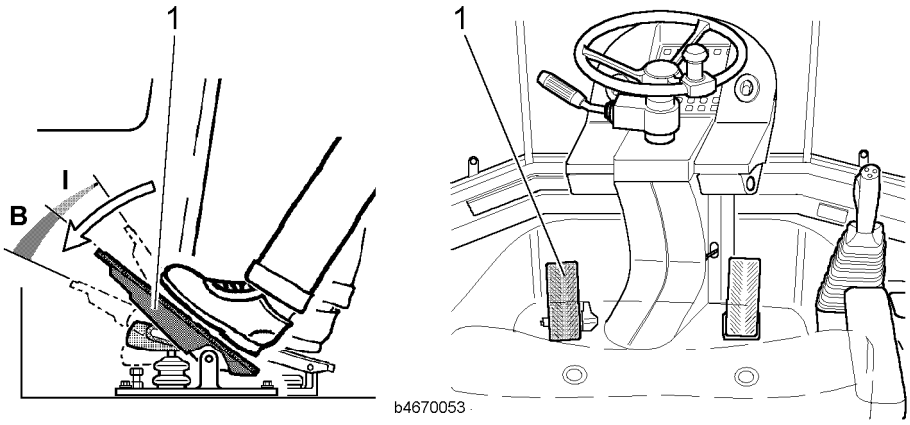
1 Inch/brake pedal 2 Gas pedal

- 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**.

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 the disc brake.



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.

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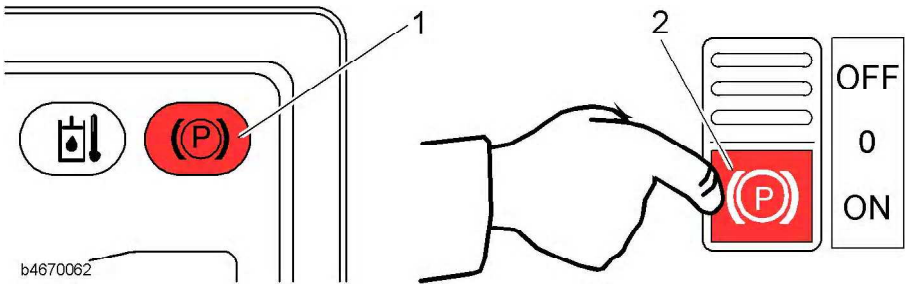
After the machine stops

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.



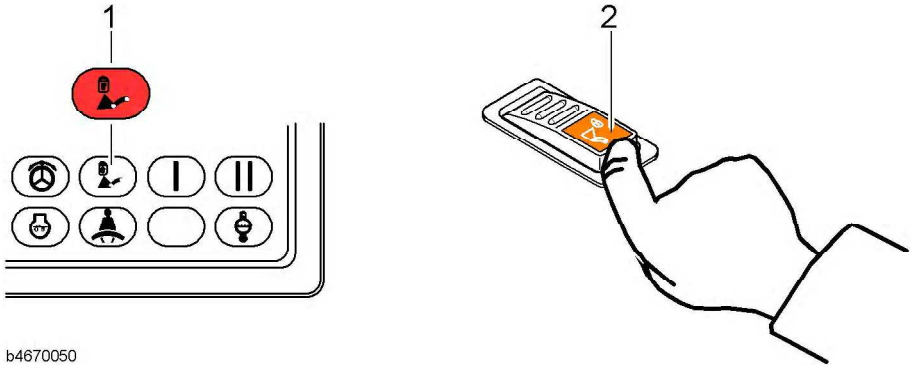
Display unit and parking brake switch

1 Parking brake symbol field
2 Parking brake switch

- Activate the parking brake with the switch **2**.

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



Display unit and working hydraulics lockout switch

1 Working hydraulics lockout symbol field
2 Working hydraulics lockout switch

- Press the button **2** for the working hydraulics lockout to prevent inadvertent activation of the working attachment.

The symbol field **1** for the working hydraulics lockout lights up.
The working hydraulics are no longer operational.

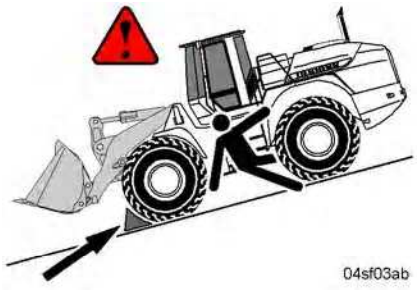
Securing the machine

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

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

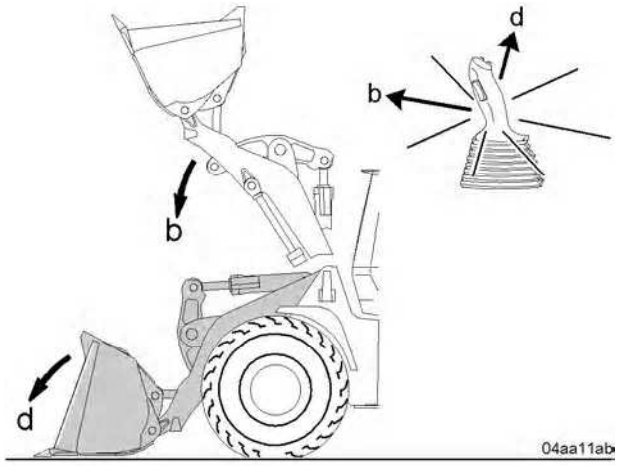
- Use the wedges to secure the machine against rolling away.

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.



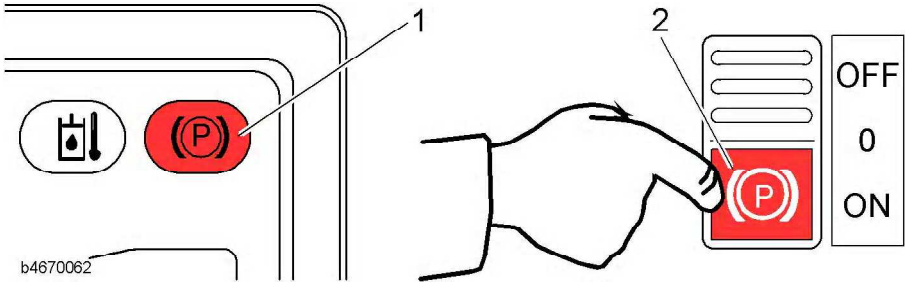
Bucket arm movement

- 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**.

LBH/02/003801/0003/7.05/en

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:



Display unit and parking brake switch

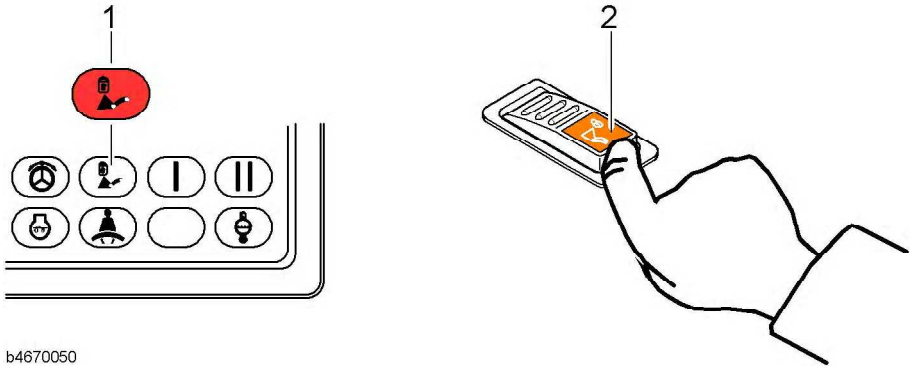
1 Parking brake symbol field
2 Parking brake switch

- **If necessary**, Activate the parking brake with the switch **2**.

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.



Display unit and working hydraulics lockout switch

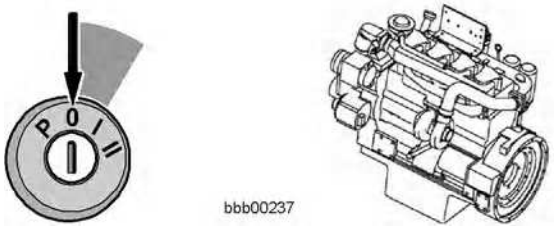
1 Working hydraulics lockout symbol field
2 Working hydraulics lockout switch

- **If necessary**, Press the switch **2** for the working hydraulics lockout to prevent inadvertent activation of the working attachment.

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 right of the engine compartment.

Caution

There is a risk of damaging the electrical system.
! Do not turn off the battery main switch while the engine is running.

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.

- First turn off the engine and then 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.

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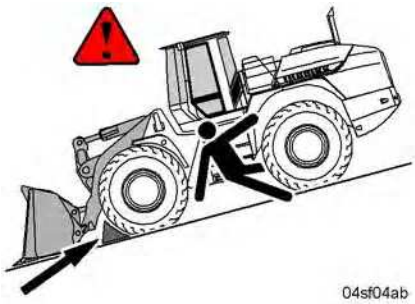
Danger

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.

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.

Igntion switch parking position

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.

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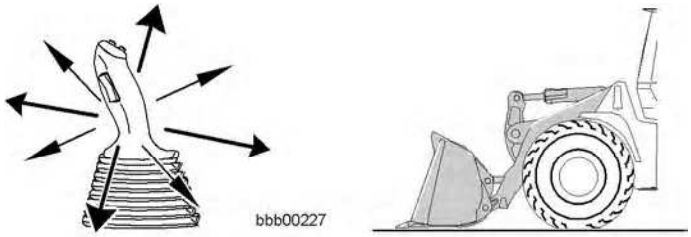
3.3.5 Operating the lift arms



LH control lever

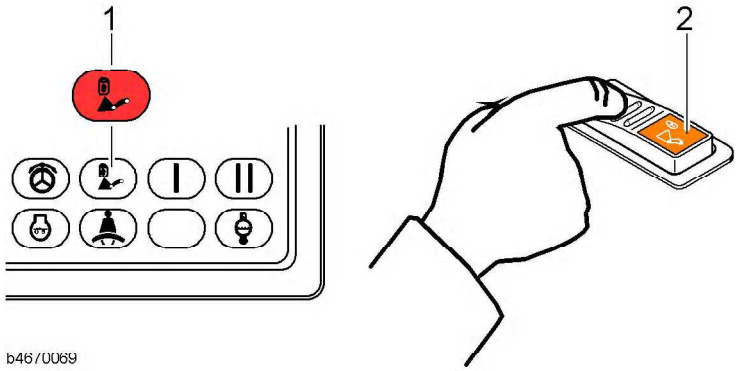
The movements of the lift arms and the working attachment (bucket) are controlled by the LH control lever.

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.**



Display unit and working hydraulics lockout switch

1 Working hydraulics lockout symbol field

2 Working hydraulics lockout switch

- Deactivate the working hydraulics lockout by pushing the switch **2** back.

The symbol field **1** for the working hydraulics lockout goes out.
The working hydraulics are now operational.
You can operate the working attachment.

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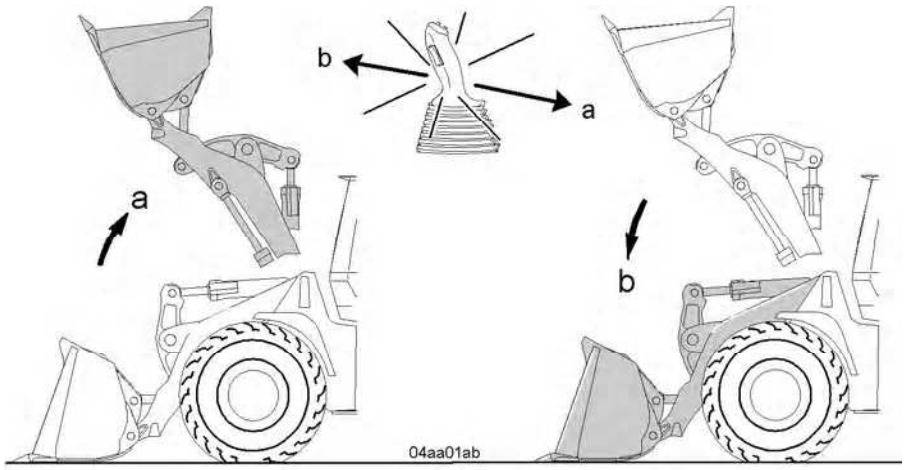
Operating the lift cylinders

The lift cylinders raise and lower the lift arms.

Raising or lowering the lift arms

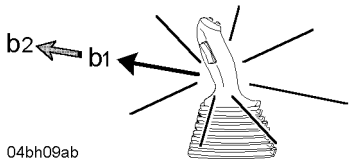


Raising or lowering the lift arms

- Move the LH control lever in direction **a**.

The lift arms are raised.

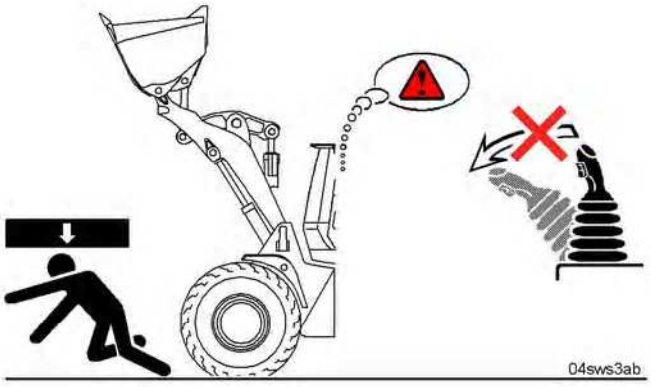
There are two ways to lower the lift arms:
– Slowly, using the normal lowering functions
– Quickly, using the quick drop function



LH control lever

- 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

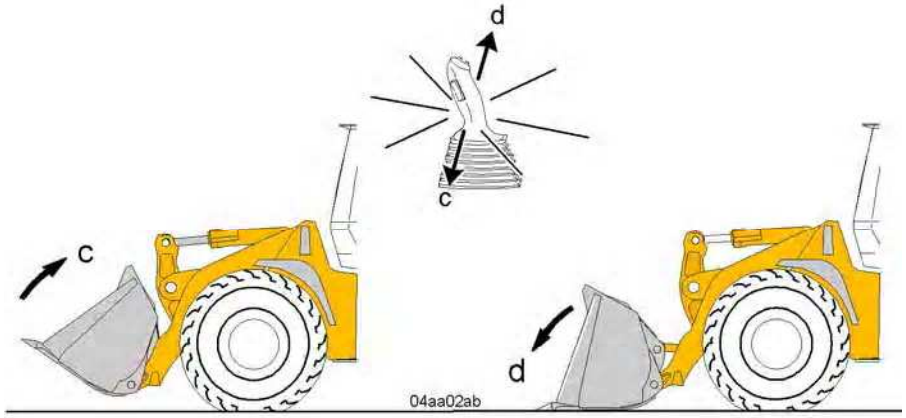
There is a risk of accidents when the working attachment is lowered quickly.
The raised working attachment is lowered quickly when you actuate the quick drop function.
Anyone standing under the working attachment will be crushed.
! Keep out of the danger area.

- 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

The tilt cylinder tilts 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.

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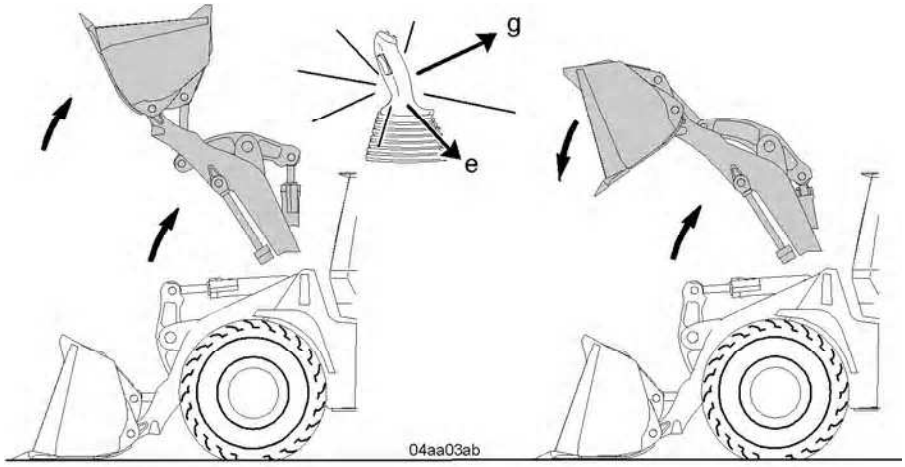
Operating the lift and tilt cylinders simultaneously

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

Raising the lift arms while tilting the bucket in or out



Working movements

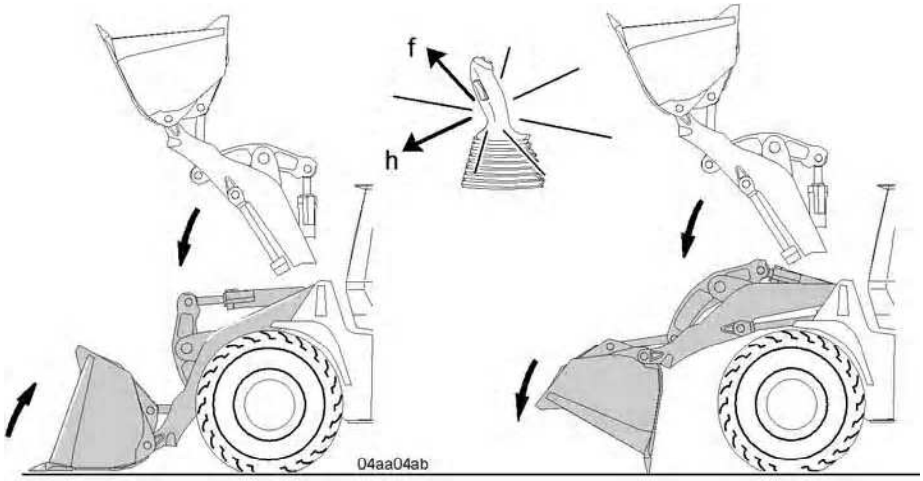
- Move the LH control lever in direction **e**.

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.

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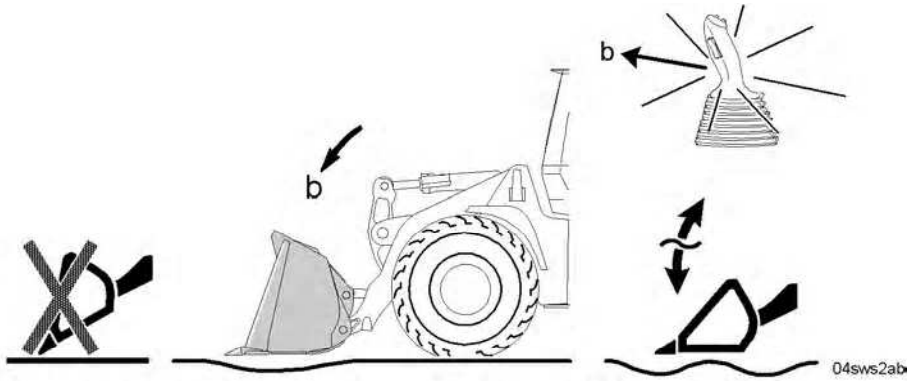
Float position



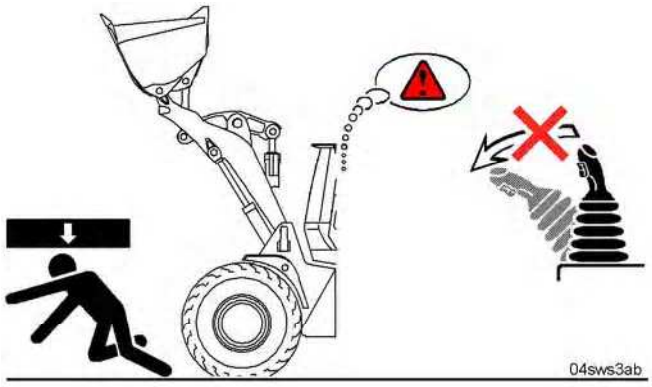
Bucket in float position

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

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.

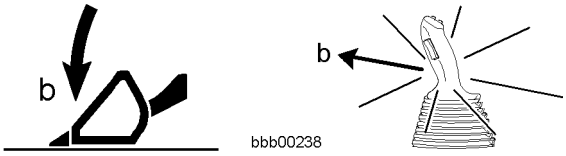


Danger

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.

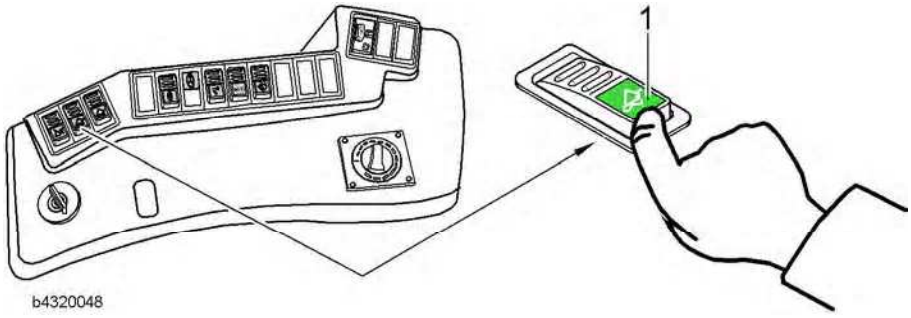
- Do not activate the float position function when the working attachment is raised.



Bucket position

LBH/02/003801/0003/7.05/en

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

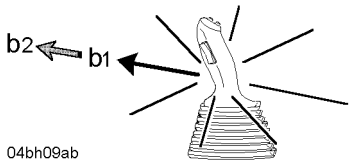


Switches on the side console

1 Float position switch

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

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



LH control lever

- 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.

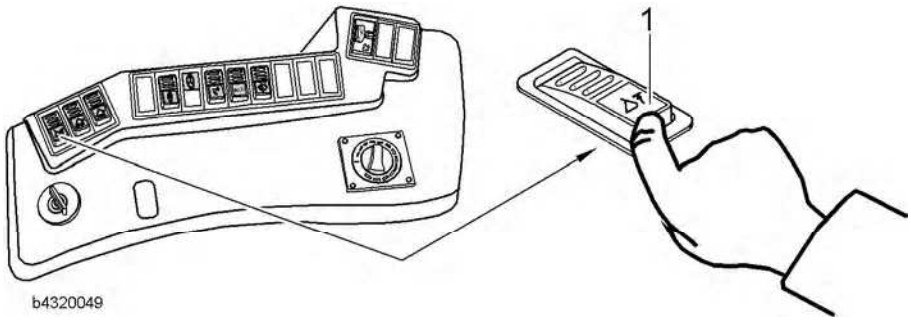
The float position function is now active.

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:

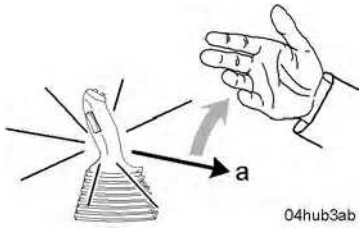


Switches on the side console

1 Lift kick-out switch

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

The lift kick-out function is now active.



LH control lever

- 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.

Caution

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.

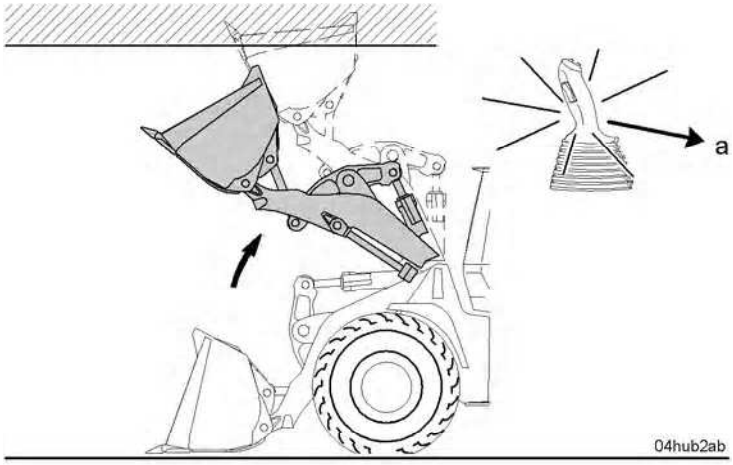
- Set the lift kick-out for a reduced dumping height.

Setting the lift kick-out for 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.

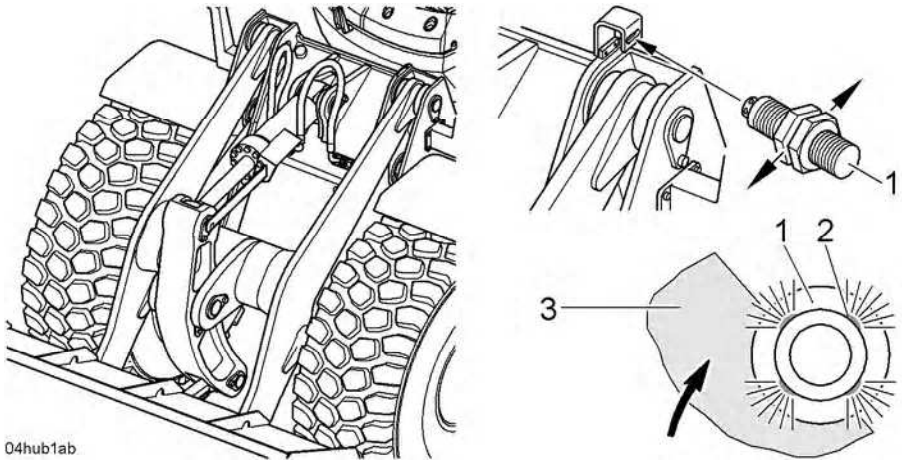
The procedure for re-adjusting the proximity switch is as follows.



Reduced dumping height

LBH/02/003801/0003/7.05/en

- 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.

- 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.

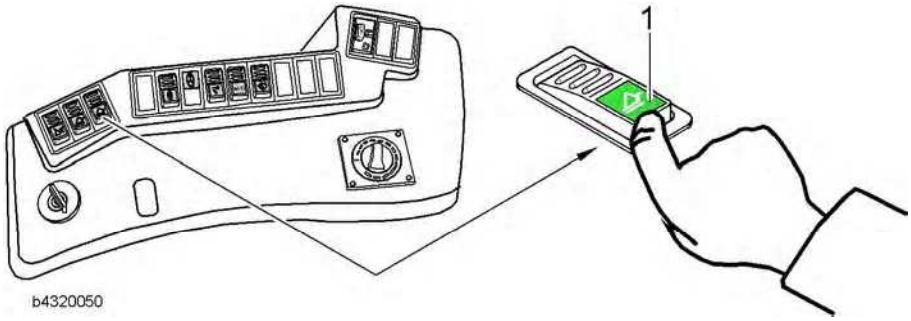
- Test the setting and re-adjust it if necessary.

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:



Switches on the side console

1 Bucket return-to-dig switch

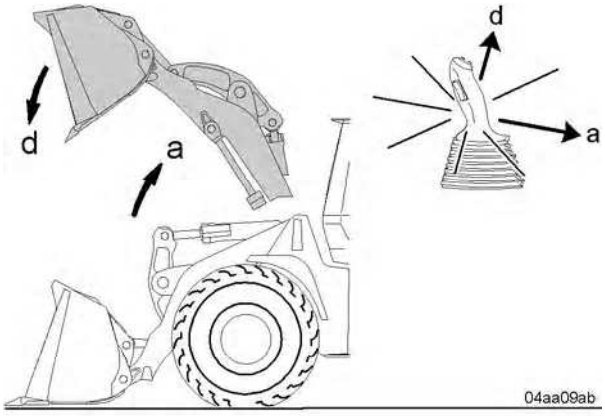
- Press the bucket return-to-dig switch **1**.

The automatic bucket return-to-dig function is now activated.

LBH/02/003801/0003/7.05/en

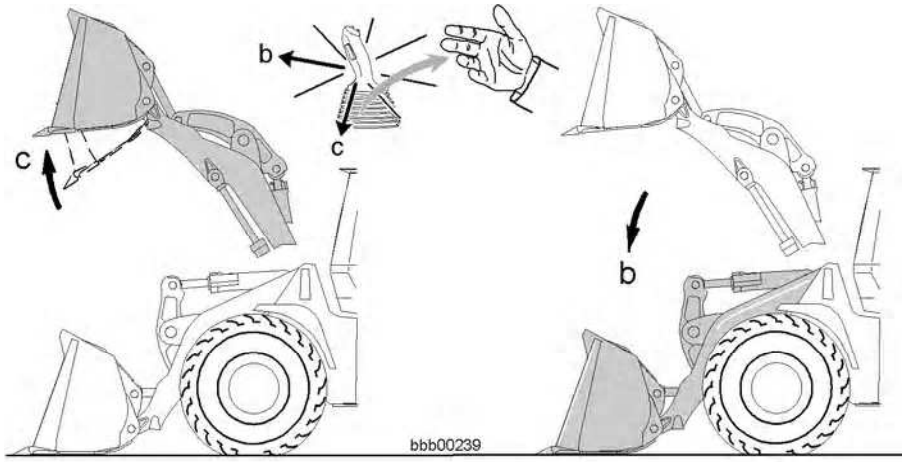
Using the automatic bucket return-to-dig function

Make sure the automatic bucket return-to-dig function is activated.



Working movements

- 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.

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Setting the digging position

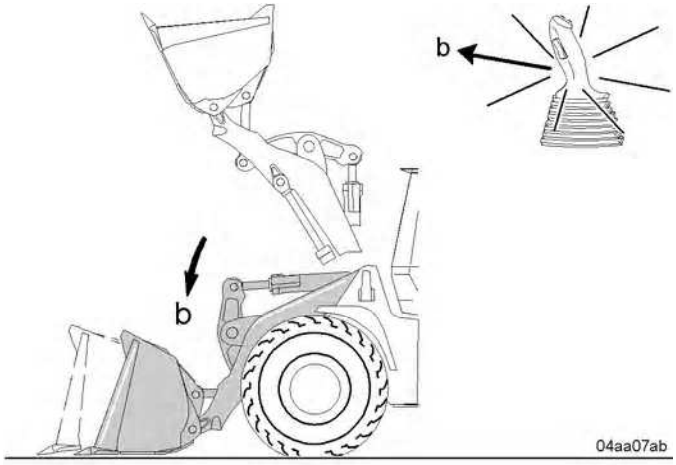
The proximity switch for the automatic bucket return-to-dig function is set at the factory.

If necessary, the proximity switch can be re-adjusted.

The procedure for re-adjusting the proximity switch is as follows.

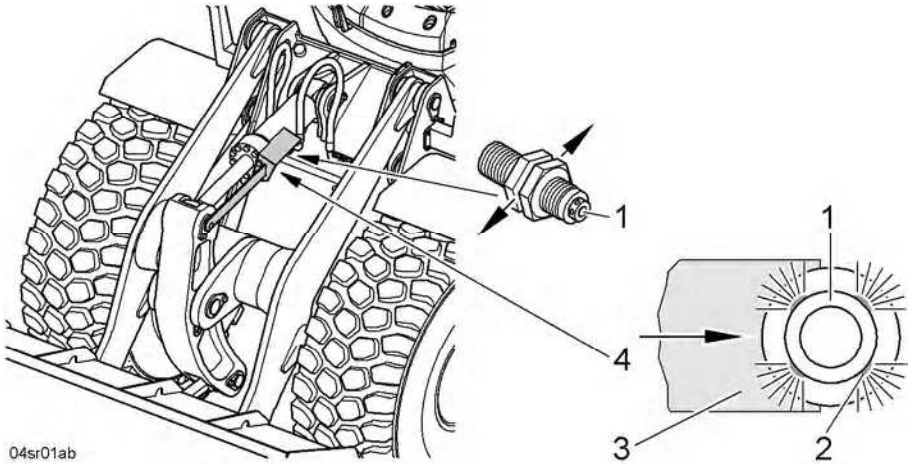
Rough adjustment

Make sure that the lift arms are lowered and the bucket is empty.



Rough digging position

- Using the LH control lever, move the loading bucket to the required digging position.



Setting up bucket return-to-dig

1 Proximity switch for automatic bucket return-to-dig
2 LED
3 Positioning curve
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.

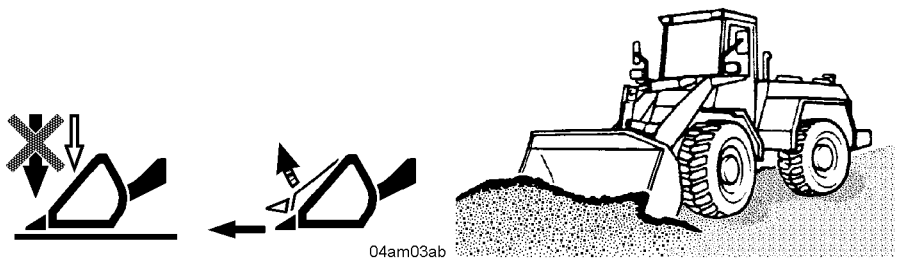
- Using the LH control lever, move the loading bucket to the exact digging position.
- Re-adjust the proximity switch as detailed in the section on rough adjustment.
- Test the fine adjustment The procedure is described in the section on using the automatic bucket return-to-dig function.

3.3.6 Working methods

This section describes the routine working methods.

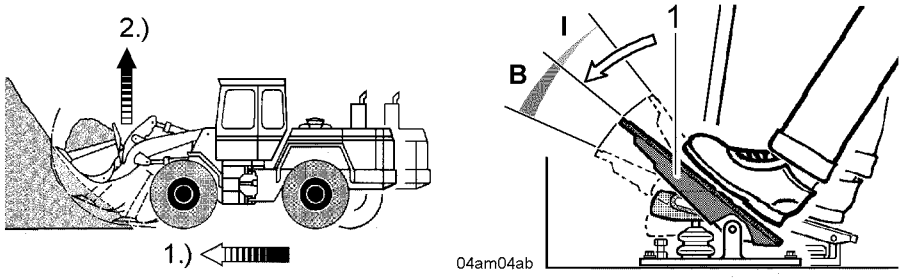
Picking up and moving material

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.

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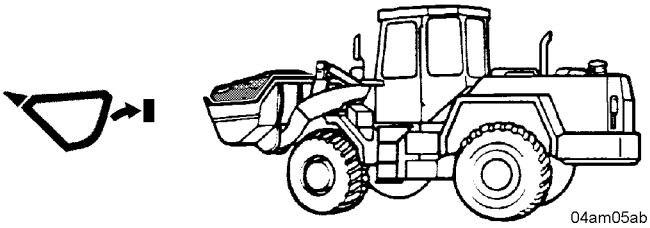
Power adjustment has the following advantages:
– The wheels no longer spin
– The fuel consumption is reduced.

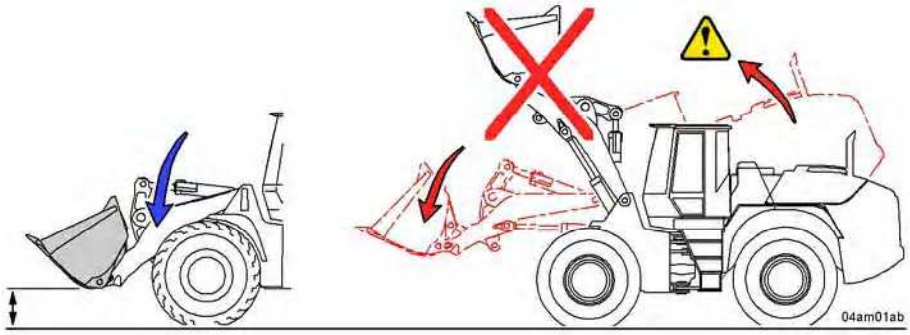


- Tilt in the loaded bucket as far as it will go and raise the lift arms.

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



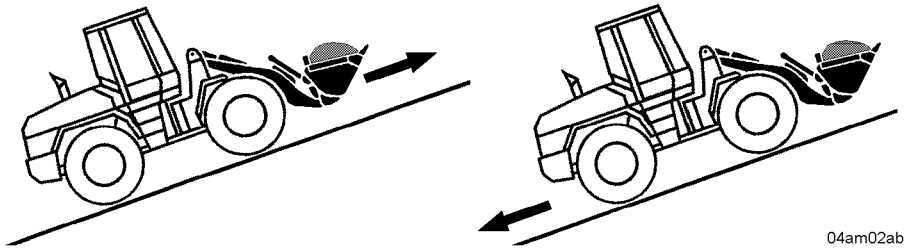
Bucket position

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

Warning

There is a risk of the machine tipping over.

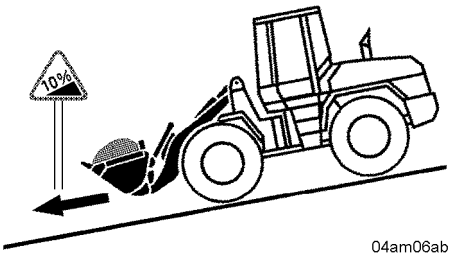
! Hold the loaded bucket low when transporting a load on steep terrain.

- 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.



Slope

Warning

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.

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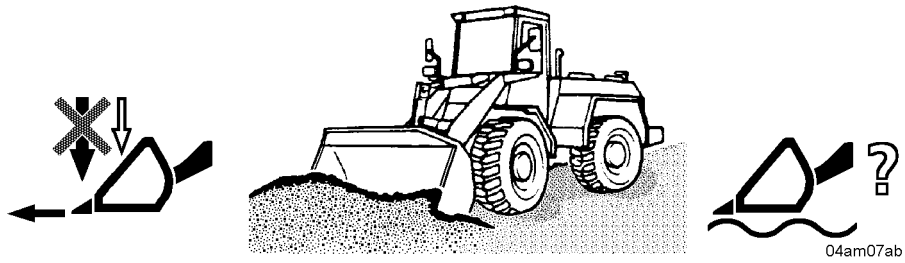
Grading work

Keep the bucket base horizontal when grading.

Grading

The following procedure is recommended to avoid any possible loss of traction.

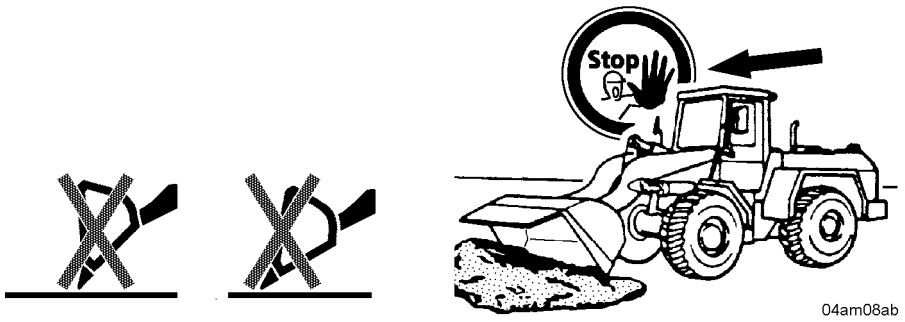


Procedure for grading

- 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.

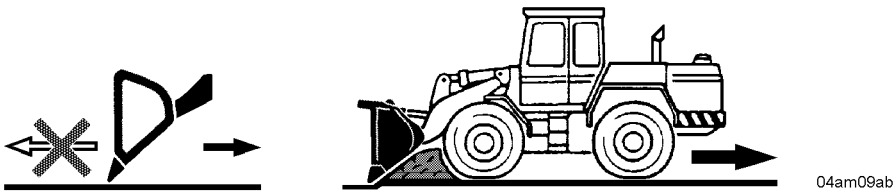
! Do not grade in the forward travel direction with the bucket tipped down.

- Keep the base of the bucket parallel to the ground.

or

- Gently set the bucket base down.

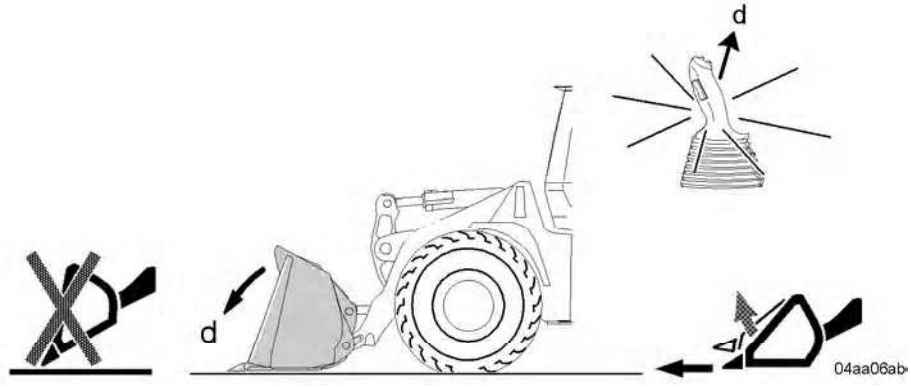
Scraping off material



- Tilt the bucket down and drive backwards.

Loading a heap

Picking up material



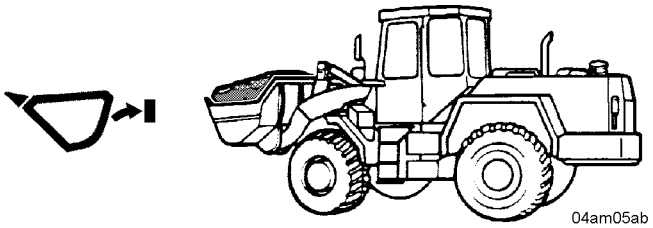
Bucket position

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.

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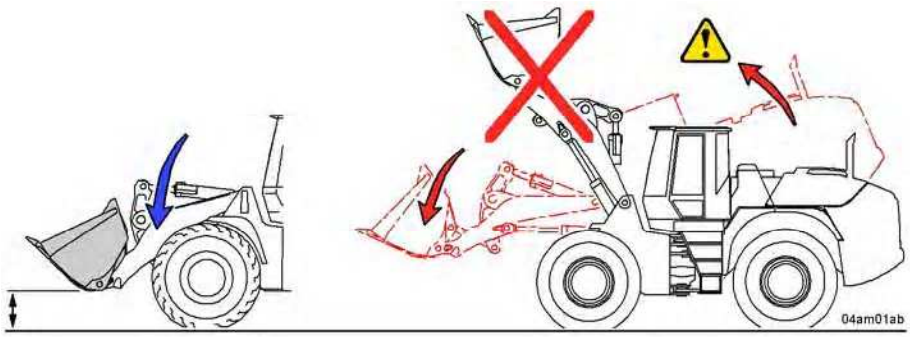
Transporting material

Keep the loaded bucket low during transport in order to improve the machine's stability and to ensure good viewing conditions.

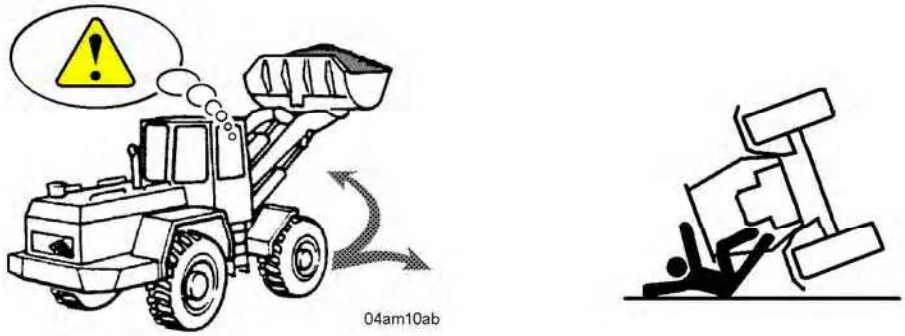


Bucket position

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

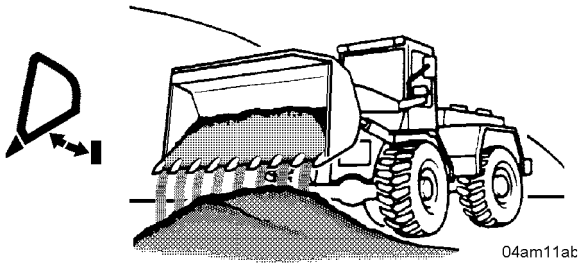
There is a risk of the machine tipping over.

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



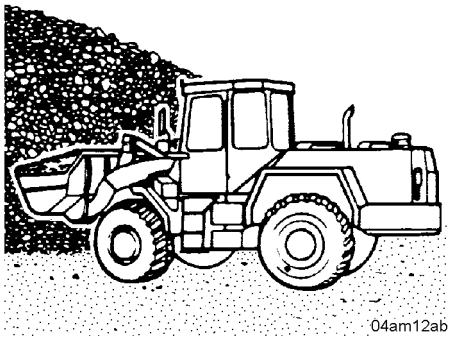
Dumping

- 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.

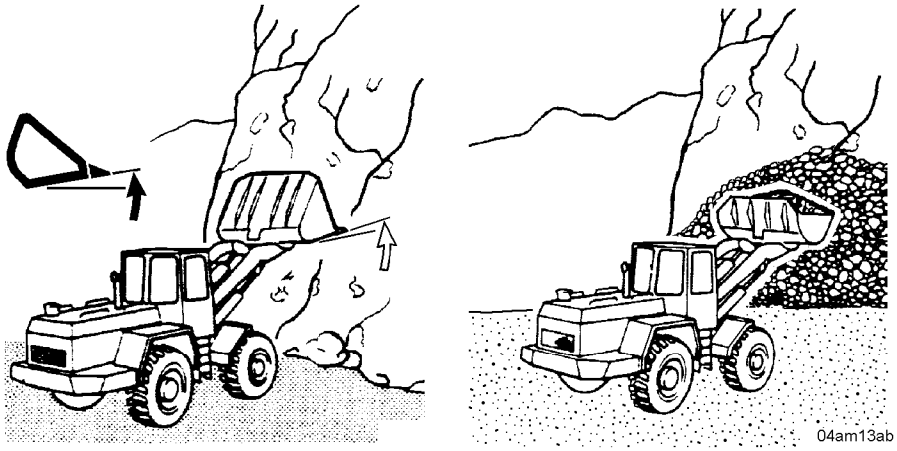


Removing bulk material 1

- 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.



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.

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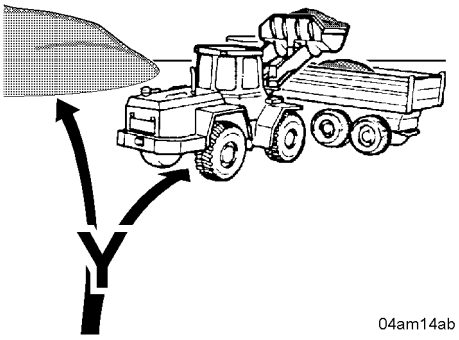
Loading a transport vehicle

Transport routes



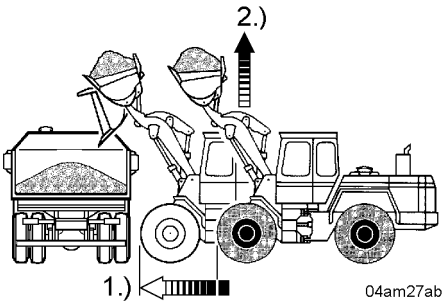
Y-movement

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.

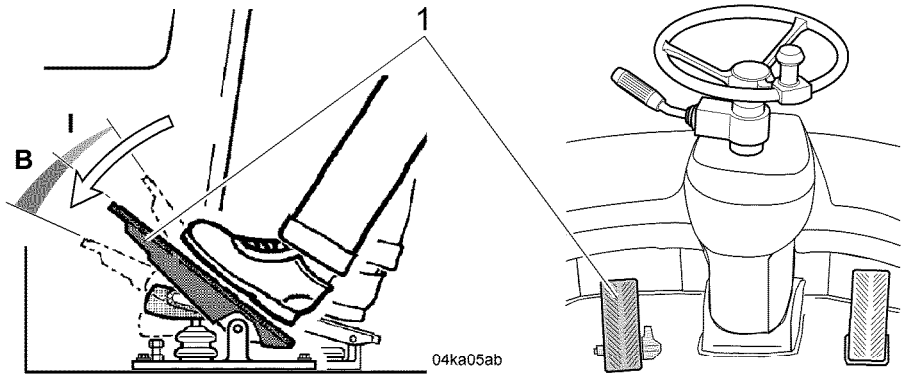


Unloading point

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.



Inch/brake pedal

1 Inch/brake pedal
I Inching range
B Braking range

- 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

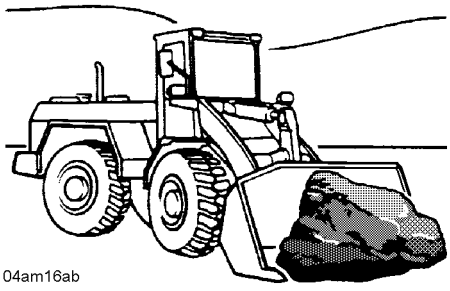
There is a risk of accidents through contact with overhead power lines.
There is a risk of **fatal injury**.

! 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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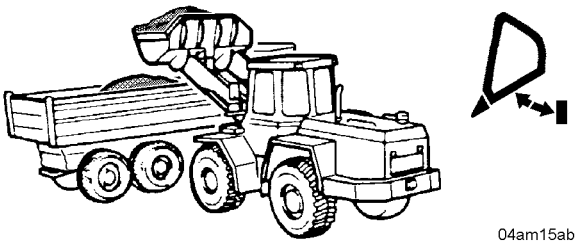
Loading sticky material

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.

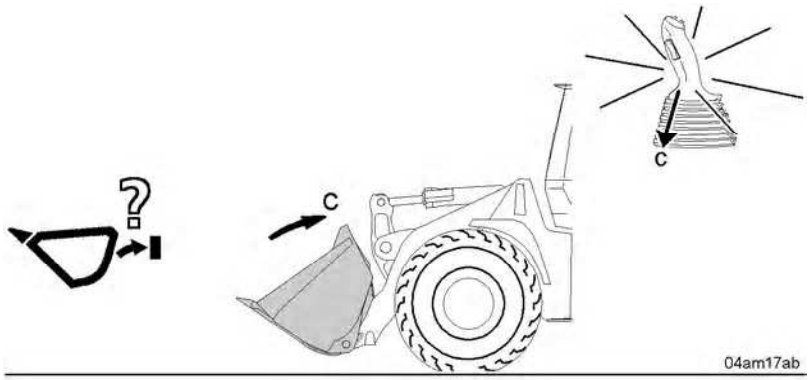
Caution

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

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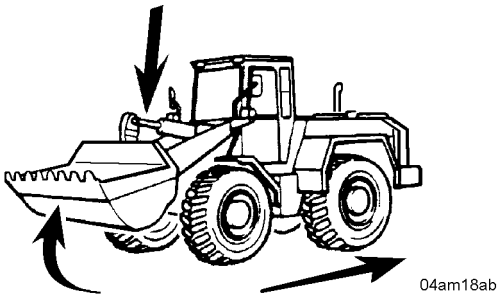
Caution

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.



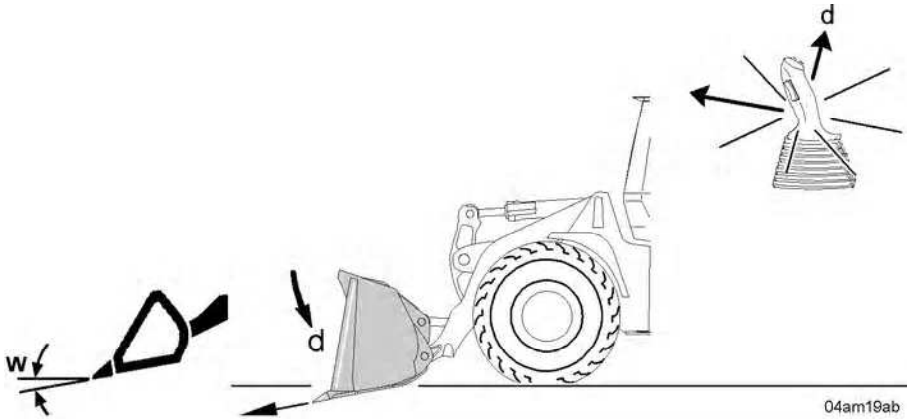
Lift arm position.

- Lower the lift arm when driving back.

Excavation

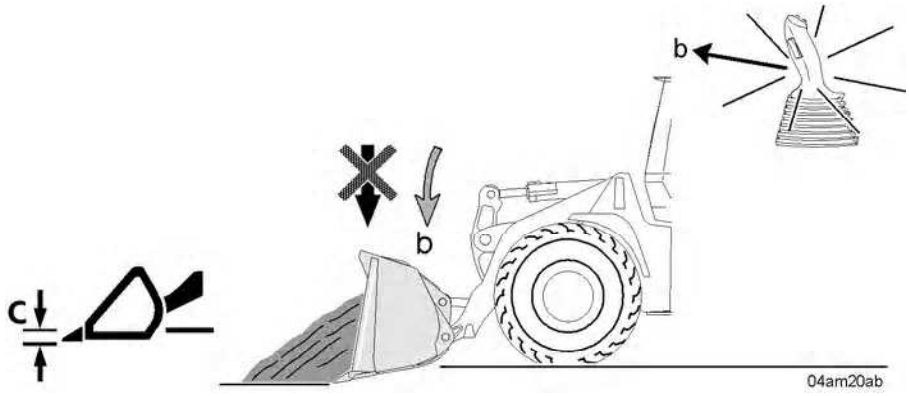
Lifting out soft material

This is how to excavate soft material.



Angle of penetration

- Lower the bucket to the ground.
- Set a small cutting angle **W** of no more than 10°.



Penetration depth

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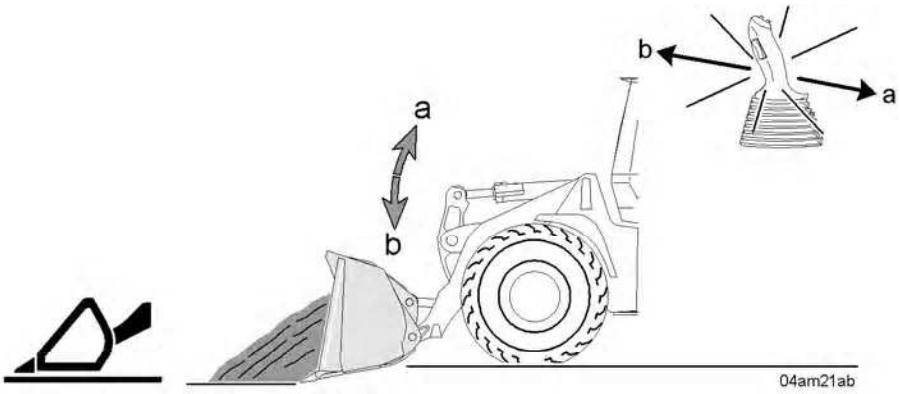
- When approaching with the machine, simultaneously press the lift arms down, until a sufficient penetration depth **C** is reached.
- The following procedure is recommended to avoid any possible loss of traction. Do not work with a strong downwards pressure on the bucket.

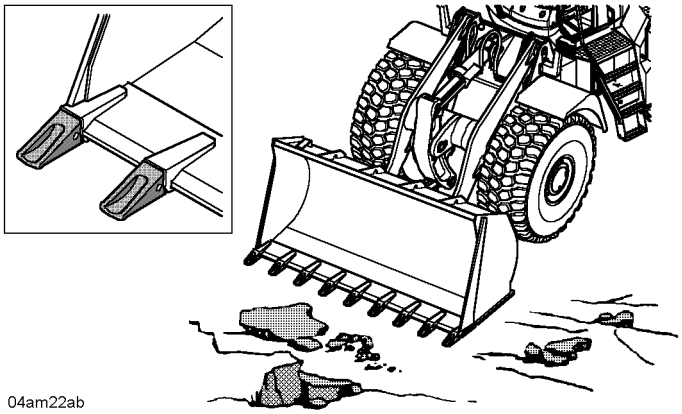


Lift arm movement

- 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.

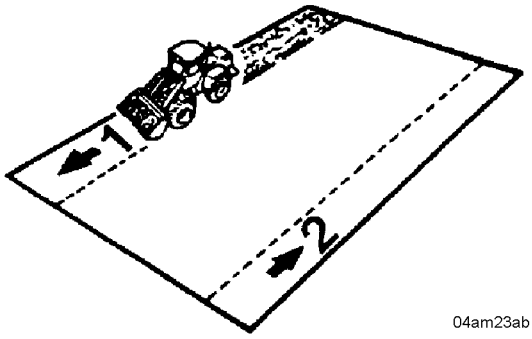


Working attachment

- For the subsequent procedure See the section on lifting out soft material.

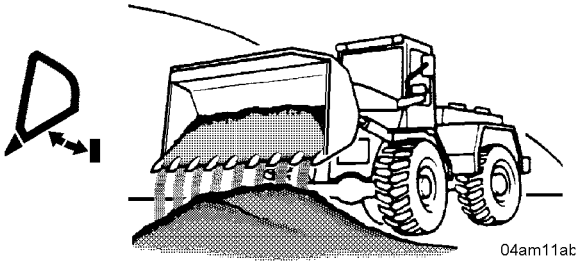
Example of foundation excavation

This is how to excavate foundations.



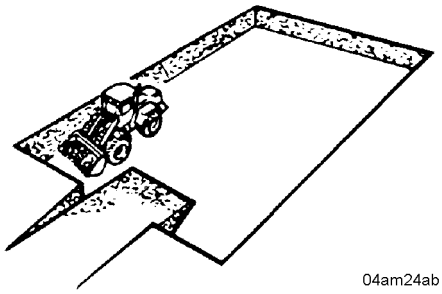
Lengthways cuts

- 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.



Heaping material

- Heap the material in one corner, leaving the sides of the foundations clear.

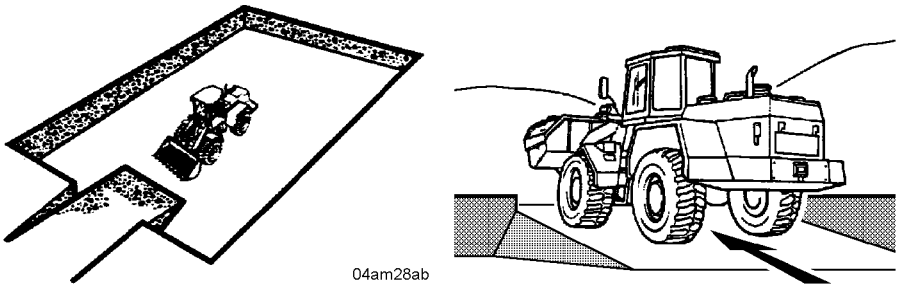


Pit corner

- 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.



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.

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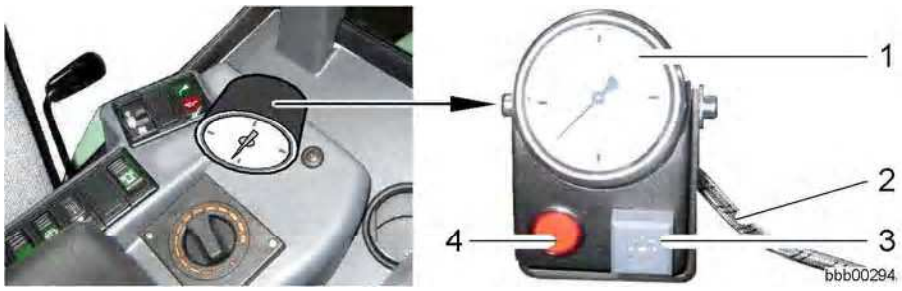
3.3.7 Soot particle filter

This equipment is optional.
This chapter describes how to operate the machine with a soot particle filter.

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.

Exhaust gas counterpressure display and monitoring



Exhaust gas counterpressure display and monitoring

1 Exhaust gas counterpressure display
2 Pressure line
3 Audible counterpressure monitor
4 Visual counterpressure monitor

Other components not shown:
- Soot particle filter in engine compartment
- Counterpressure line
- Data logger line
- Filter/drain unit - front/right, below the cab
- Data logger in the right in the cab below the LH control lever (pilot control device)

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.

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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.

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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

Information on exhaust measurements by the machine operator

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.

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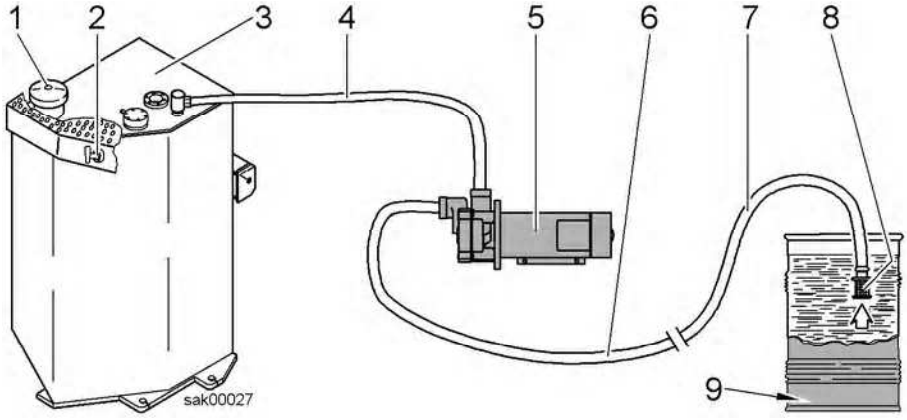
3.3.8 Filling the tank using the filling pump

This equipment is optional.



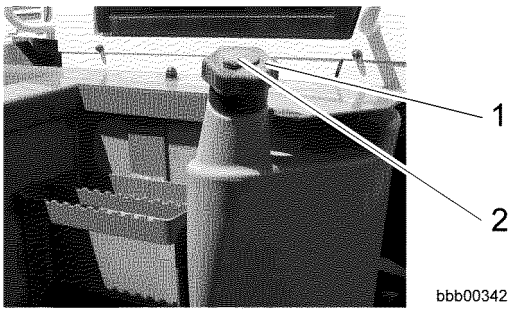
Refuelling pump

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, as 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 sealing cap **1** on the fuel tank filler neck is open.
– 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

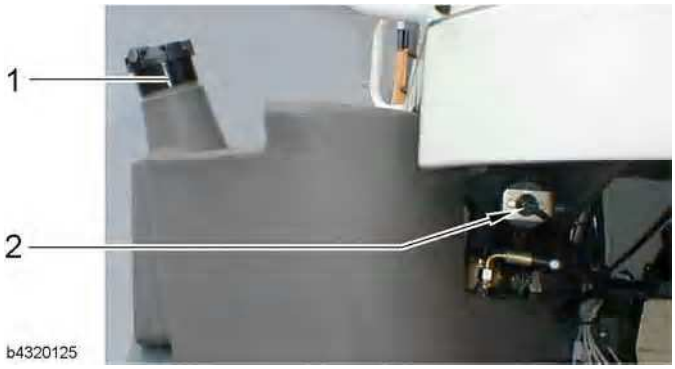
1 Tank cap 2 Cap

- 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 ON.

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**.

- When refuelling is complete, turn the key in the switch **2** to OFF and remove the key.
- Close the fuel tank sealing cap **1**.
- Disconnect the suction line extension **7** (with strainer) from the suction line **6**.
- Seal the lines with dummy plugs.

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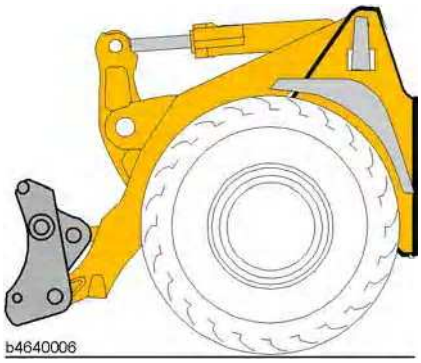
3.3.9 Operating the hydraulic quick-change device for Z lift arms

This equipment is optional.

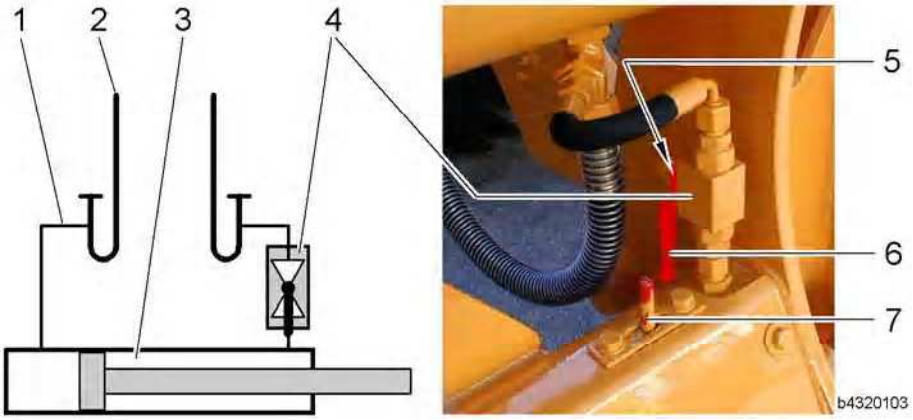


Quick-change device

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
2 Supply line for accessory kit
3 Hydraulic cylinder
4 Changeover valve
5 Anti-twist lock
6 Switch lever
7 Mechanical indicator

The hydraulic quick-change device is activated (enabled) or deactivated (blocked) using the changeover valve **4**.
The switch lever **6** is secured with an anti-twist lock **5** to prevent actuation by mistake.

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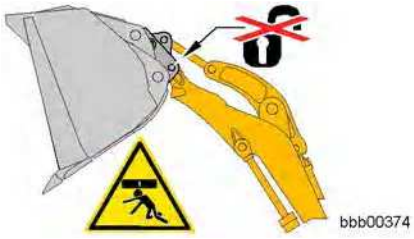
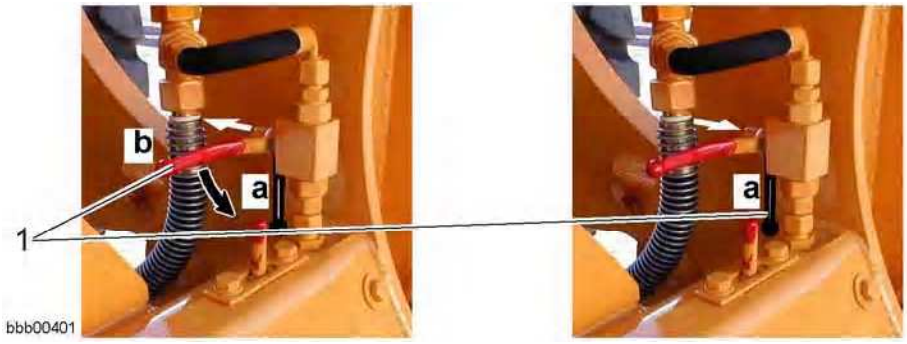
Make sure that:
– The lift arm is lowered to just above the ground.
– Where a working attachment with an independent hydraulic supply is mounted, all cylinders, valves etc. are in the initial position or closed.
– Where a working attachment is fitted, make sure that it is tilted in.



Danger

There is a risk of accidents if the working attachment drops.

! Do not activate the quick-change device when the working attachment is raised.



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:
  Pull the switch lever **1** out of the anti-twist lock, move it to position **a** and engage the anti-twist lock again.

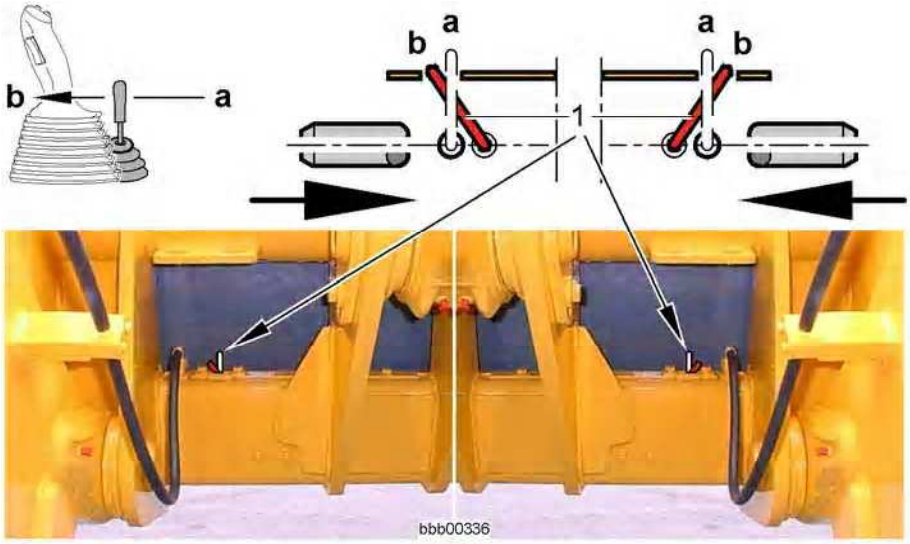
This opens the changeover valve.

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.

LBH/02/003801/0003/7.05/en

Warning

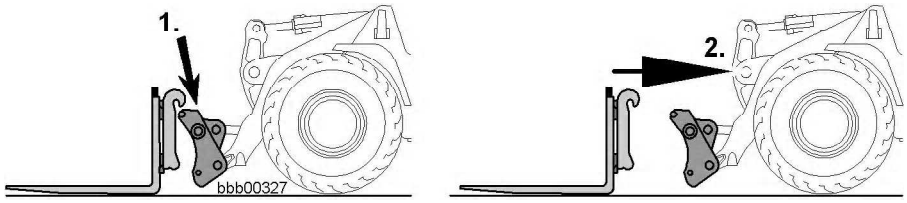
There is a risk of accidents if the working attachment is incorrectly set down.

! 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.

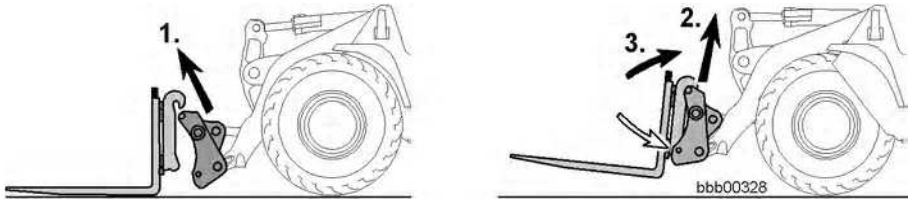
Take any contaminated soil for disposal, because hydraulic oil can pollute rivers and groundwater.

- Seal the line couplings with a cap.
- Place the hydraulic lines in the hose retainer.

LBH/02/003801/0003/7.05/en

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.

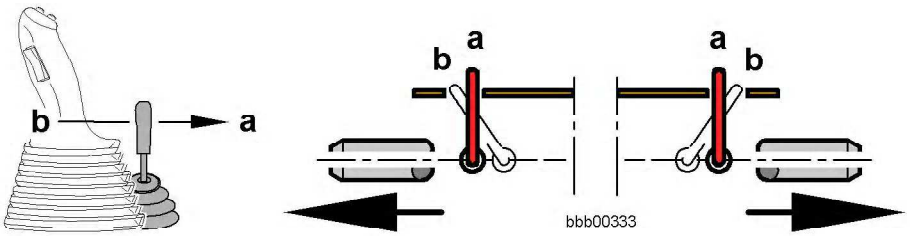
Locking the quick-change device

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.

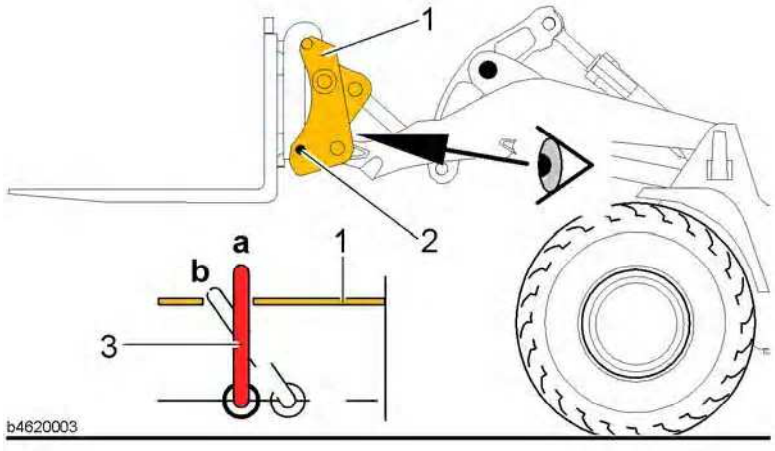
LBH/02/003801/0003/7.05/en

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

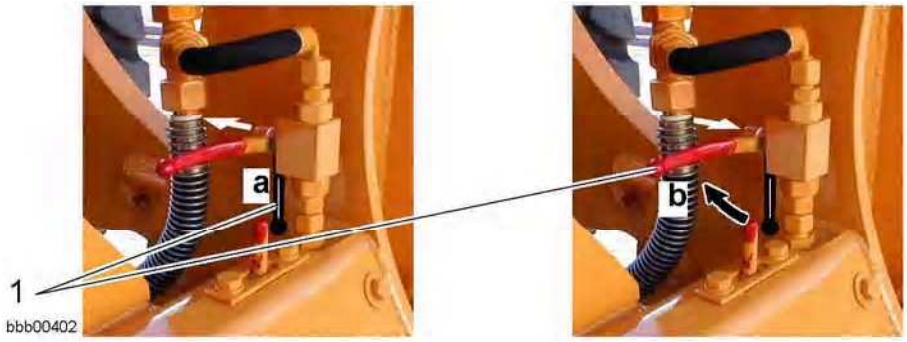
- Move the lift arm up until it is possible to see the display **3**.
- Get out of the machine and visually check that the locking pins **2** have actually locked the working attachment.
- Carry out the inspection on both sides of the machine.

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.



The picture shows two lever positions (open/closed).
Deactivate (block) the quick-change device with the changeover valve.

- Close the changeover valve

  Pull the switch lever **1** out of the anti-twist lock, move it to position **b** and engage the anti-twist lock again.

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:

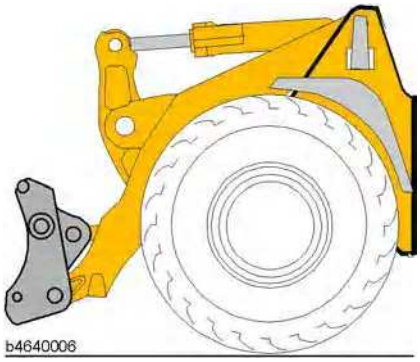
– Clean the line couplings before connecting.
– Do not connect the wrong ends of the hydraulic lines.
– Lay the hydraulic lines so that they cannot become caught in the working attachment during operation.
– Use any hose retainers provided when laying the lines.

- Check the hydraulic lines for leaks after connecting them.

LBH/02/003801/0003/7.05/en

3.3.10 Operating the combined electrohydraulic quick-change device for Z lift arms

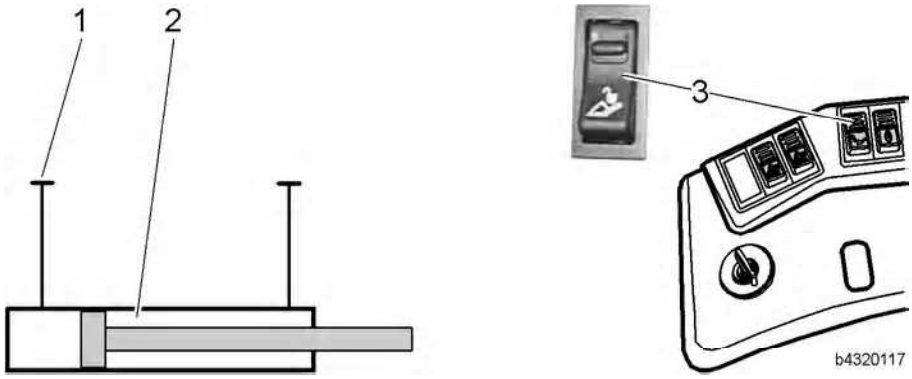
This equipment is optional.



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

1 Supply line for quick-change device
2 Hydraulic cylinder
3 Switch for hydraulic quick-change device (optional)

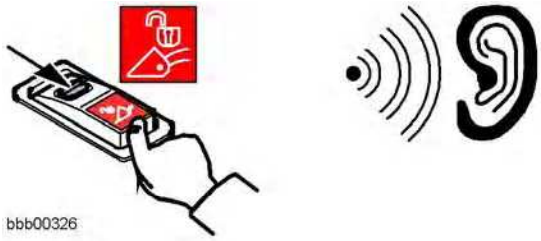
The combined, electro-hydraulically operated quick-change device is activated and deactivated using the switch **3** for the hydraulic quick-change device.

This is how to activate the quick-change device.

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.



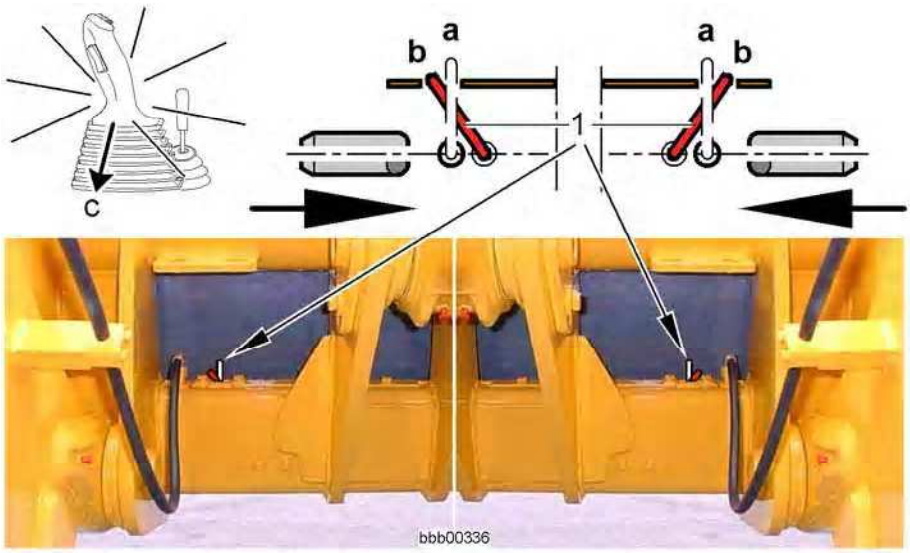
• Loosen the activation lock in the direction of the arrow and simultaneously push the switch forwards.

When you press the switch:
– A solenoid valve is activated.
– A warning signal in the side console also sounds.
– Aditional activation of the working or steering hydraulics causes the locking mechanism of the quick-change device to retract.

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
b Unlocked position

LBH/02/003801/0003/7.05/en

- 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.

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.).

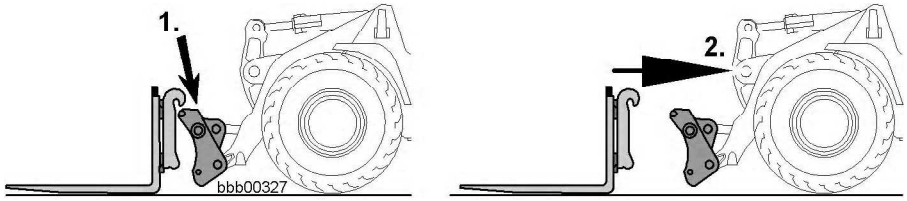
- Deactivate the quick-change device by pushing back the hydraulic quick-change device switch.

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

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.

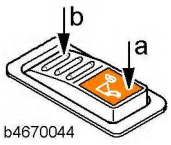
Depressurising the operating circuits

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.
- Press and hold down the working hydraulics lockout button (button function b) while moving all the control levers in both directions.
  See also the section on operation.



Disconnecting hydraulic lines

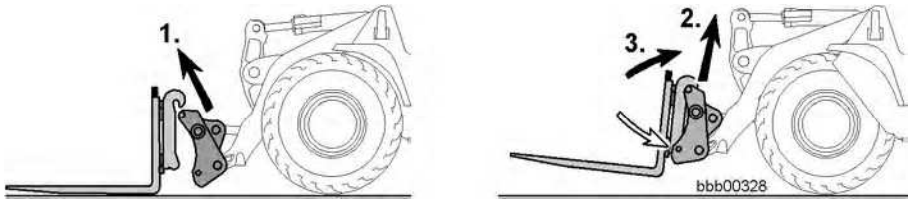
- Release the hydraulic lines and quick-release couplings from the machine.
- Make sure that no hydraulic oil leaks onto the ground.

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.

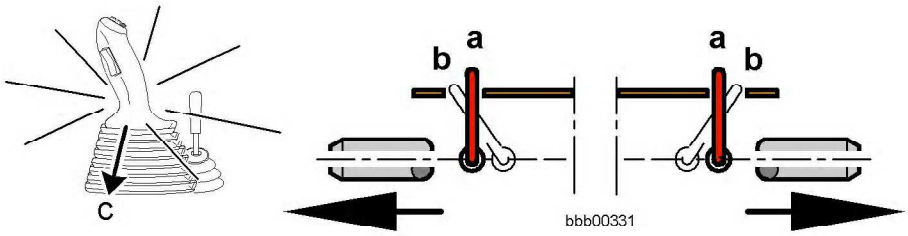
Make sure that:
– The working attachment is completely engaged in the quick-change device, so that the working attachment can be locked in place with the locking pins.
– The switch for the hydraulic quick-change device is turned off.

LBH/02/003801/0003/7.05/en

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.

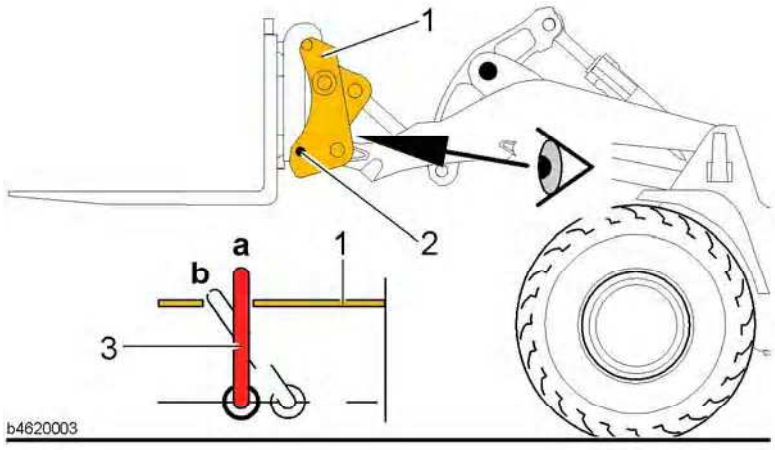
Make sure that the quick-change device is in a suitable position for inspection.

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

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:

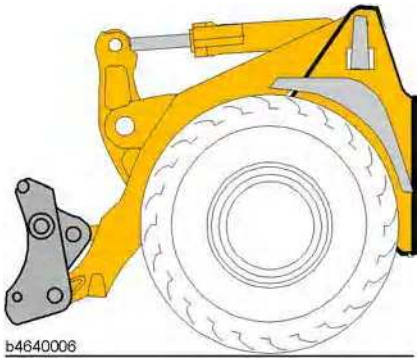
– Clean the line couplings before connecting.
– Do not connect the wrong ends of the hydraulic lines.
– Lay the hydraulic lines so that they cannot become caught in the working attachment during operation.
– Use any hose retainers provided when laying the lines.

- Check the hydraulic lines for leaks after connecting them.

LBH/02/003801/0003/7.05/en

3.3.11 Operating the combined electrohydraulic quick-change device with comfort control for Z lift arms.

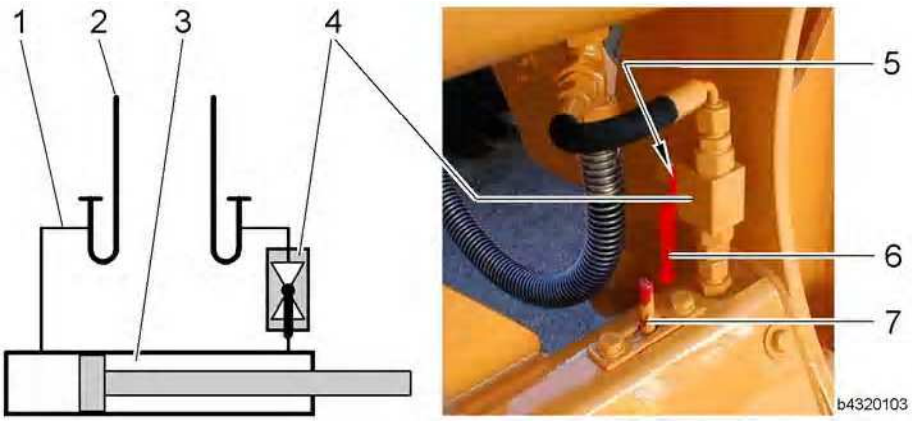
This equipment is optional.



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.**

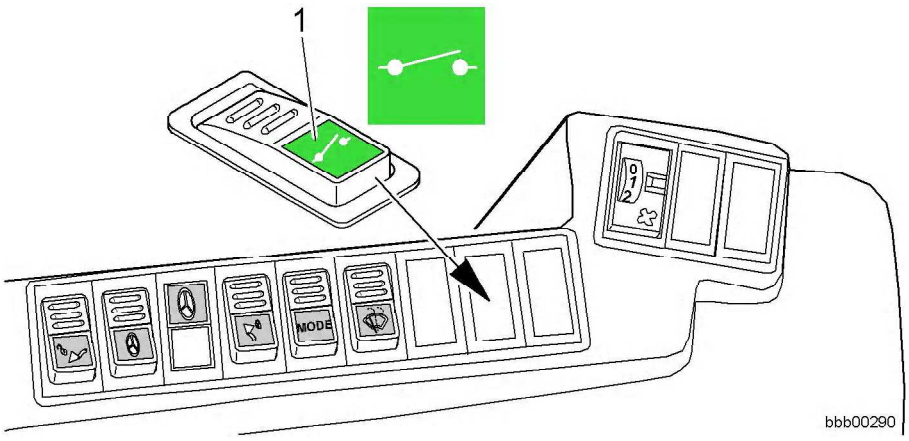
Activating the quick-change device



Hydraulic quick-change device

1 Supply line for quick-change device
2 Supply line for accessory kit
3 Hydraulic cylinder
4 Changeover valve
5 Anti-twist lock
6 Switch lever
7 Mechanical indicator

LBH/02/003801/0003/7.05/en

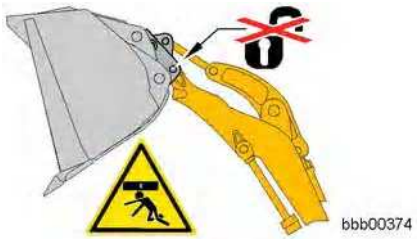


The combined, electro-hydraulically operated quick-change device with comfort control is activated and deactivated using the switch **1**.

This is how to activate the quick-change device.

Make sure that:

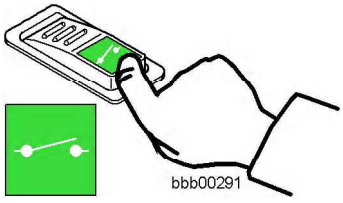
– The lift arm is lowered to just above the ground.
– Where a working attachment with an independent hydraulic supply is mounted, all cylinders, valves etc. are in the initial position or closed.
– Where a working attachment is fitted, make sure that it is tilted in.
– The changeover valve **4** is open.
  See the description on activating the hydraulic quick-change device in the section on the hydraulic quick-change device for Z lift arms version.



Danger

There is a risk of accidents if the working attachment drops.

! Do not actuate switch when the working attachment is raised.



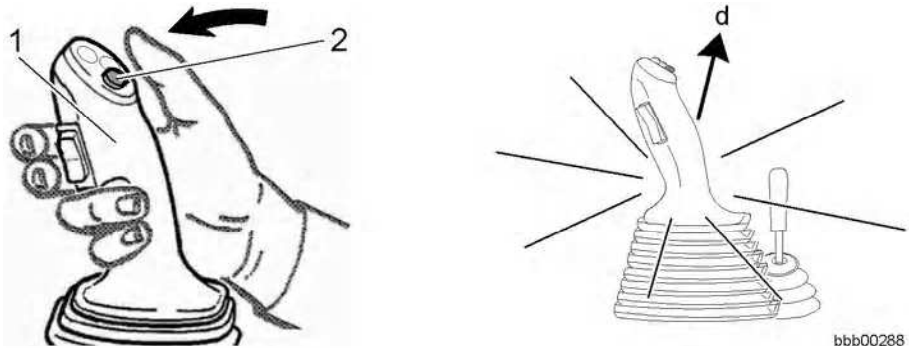
• Press the switch forwards.

The function for unlocking the quick-change device is thus enabled.

LBH/02/003801/0003/7.05/en

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 quick-change device 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 a Z-lift arm.

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.

Locking the quick-change device

The procedure for locking the quick-change device is as follows.

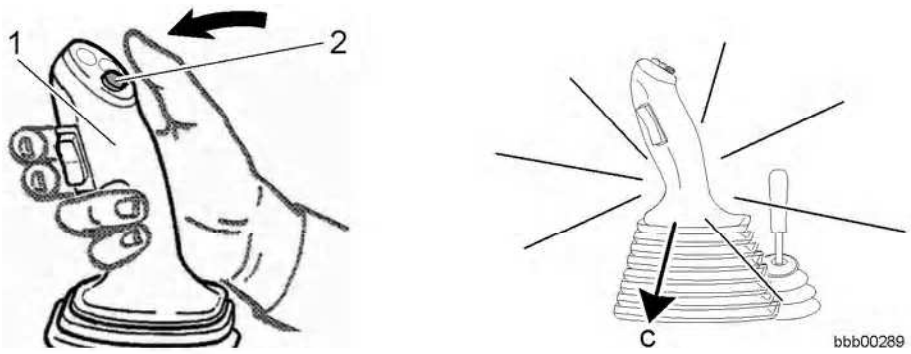
Make sure that:
– The working attachment is completely engaged in the quick-change device, so that the working attachment can be locked in place with the locking pins.
– The quick-change device has been activated using the switch **1**.

LBH/02/003801/0003/7.05/en

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.



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.

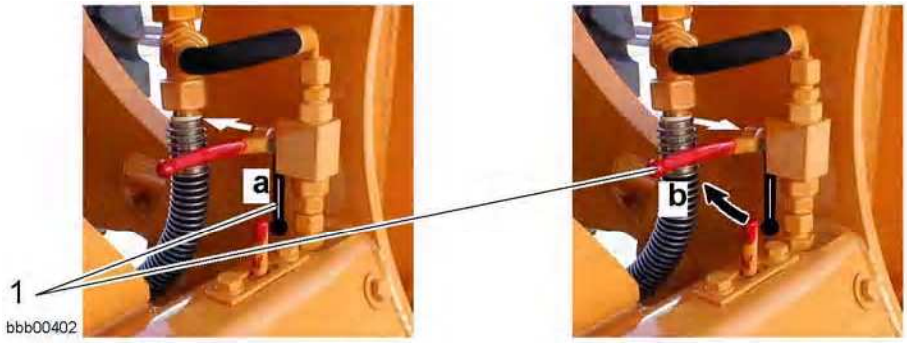
- When the locking pins are completely extended:
  Release the button **2** and the LH control lever **1** again.

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.



The picture shows two lever positions (open/closed).

- After the locking procedure:
  Deactivate the quick-change device with the changeover valve.

LBH/02/003801/0003/7.05/en

Checking that the working attachment is locked

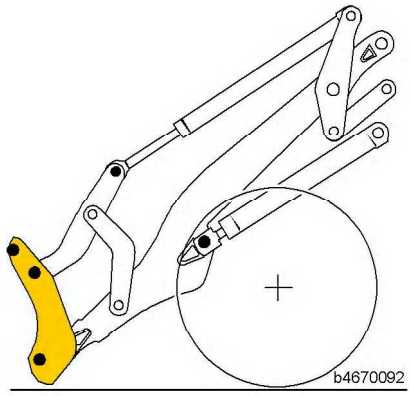
Procedure: as described in the section on operating the hydraulic quick-change device for a Z-lift arm.

Connecting the hydraulic lines

Procedure: as described in the section on operating the hydraulic quick-change device for a Z-lift arm.

3.3.12 Operating the combined electrohydraulic quick-change device for P lift arms

The quick-change device is standard on machines with P lift arms.

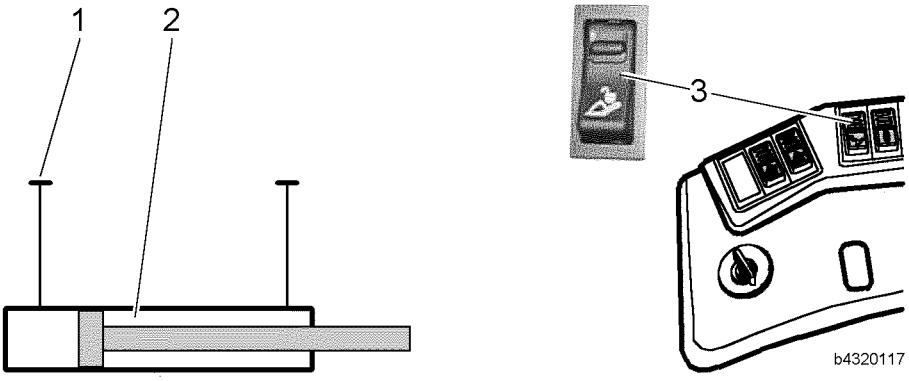


Quick-change device version:
- Combined electrohydraulic version.
  Electric activation and deactivation using switch.
  Hydraulic operation using the additional control lever.
- Mechanical locking indicator of the quick-change device.

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.**

LBH/02/003801/0003/7.05/en

Activating the quick-change device



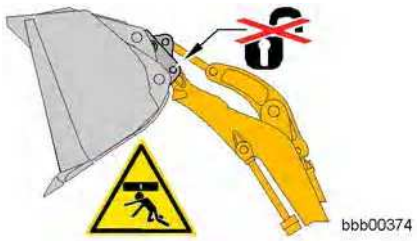
Hydraulic quick-change device

1 Supply line for quick-change device
2 Hydraulic cylinder
3 Switch for hydraulic quick-change device (optional)

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.

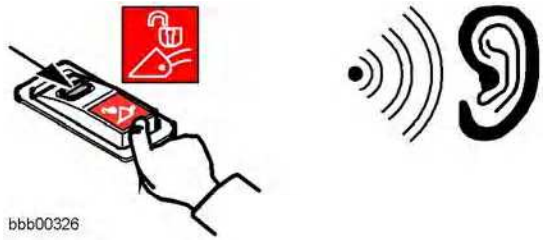
Make sure that:
– The lift arm is lowered to just above the ground.
– Where a working attachment with an independent hydraulic supply is mounted, all cylinders, valves etc. are in the initial position or closed.
– Where a working attachment is fitted, make sure that it is tilted in.



Danger

There is a risk of accidents if the working attachment drops.

! Do not activate the lockable switch when the working attachment is raised.



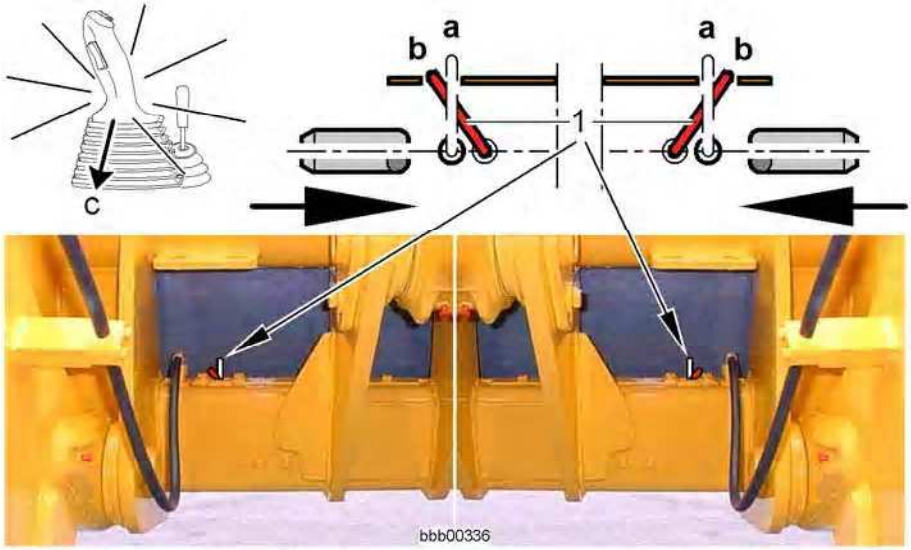
- Loosen the activation lock in the direction of the arrow and simultaneously push the switch forwards.

When you press the switch:
– A solenoid valve is activated.
– A warning signal in the side console also sounds.
– Aditional activation of the working or steering hydraulics causes the locking mechanism of the quick-change device to retract.

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
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.

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.).

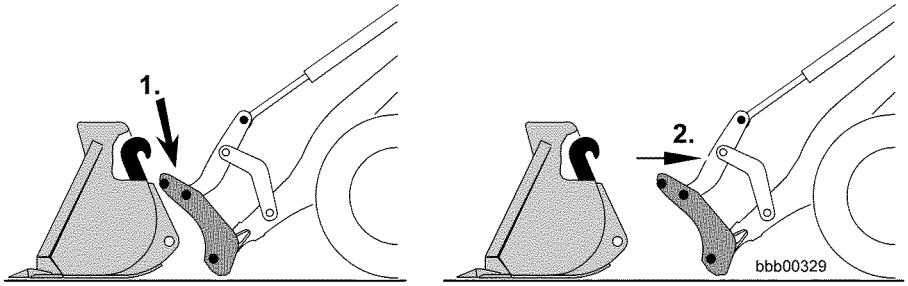
- Deactivate the quick-change device by pushing back the hydraulic quick-change device switch.

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

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

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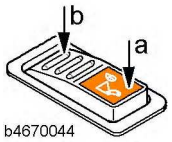
Warning

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.
- Press and hold down the working hydraulics lockout button (button function b) while moving all the control levers in both directions.

  See also the section on operation.



Disconnecting hydraulic lines

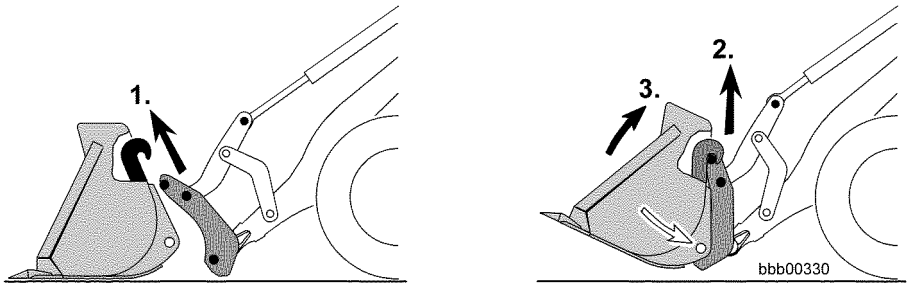
- Release the hydraulic lines and quick-release couplings from the machine.
- Make sure that no hydraulic oil leaks onto the ground.

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.

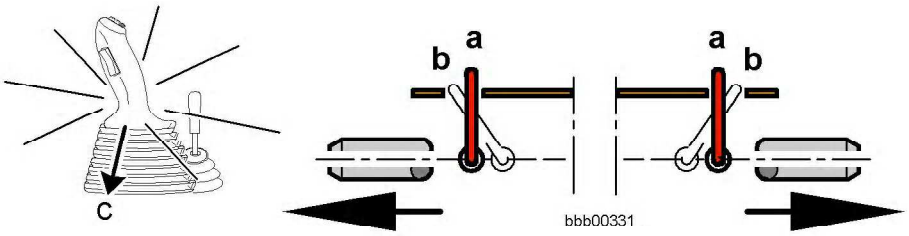
Make sure that:

– 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 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.

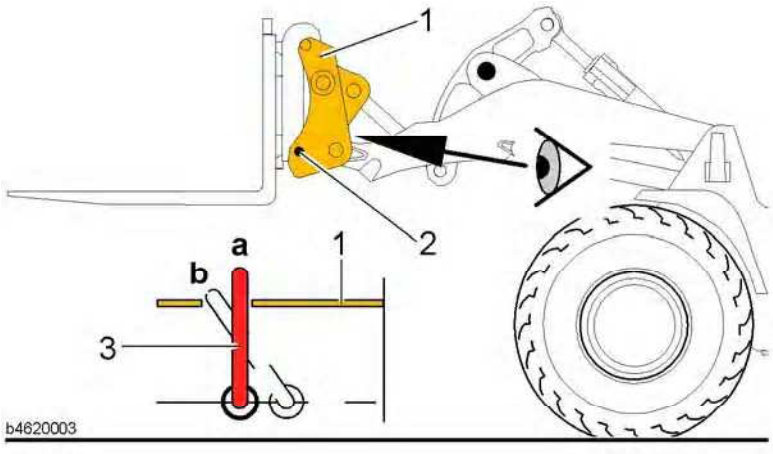
Make sure that the quick-change device is in a suitable position for inspection.

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.

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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

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.

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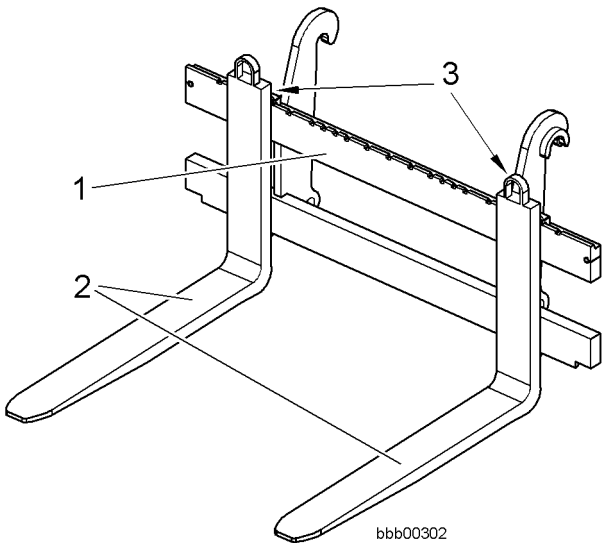
3.3.13 Forklift

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.



Forklift

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:

– Parallel load movement is not guaranteed with lift arms with Z-kinematics.
  This means that the attachment tilts in during the lift movement up to 2/3 of the maxiumum 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.

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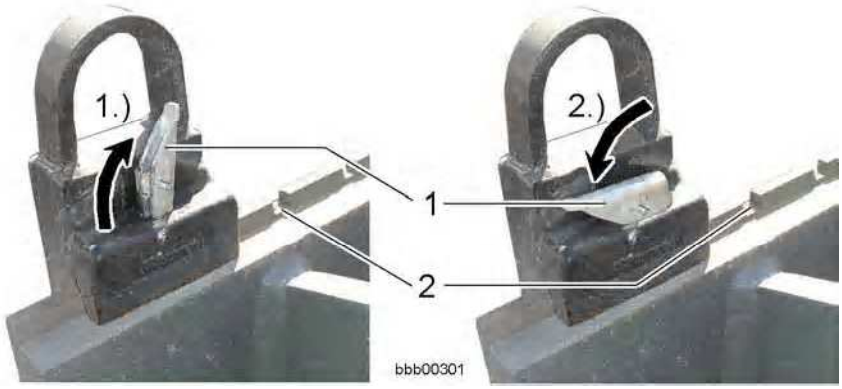
Adjusting the prongs on the fork carrier

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

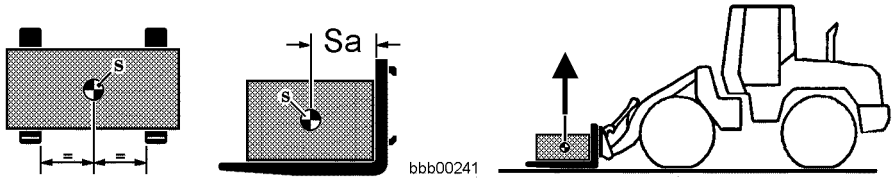
Warning

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.



Distance from centre of gravity

S Centre of gravity
Sa Distance from centre of gravity

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.

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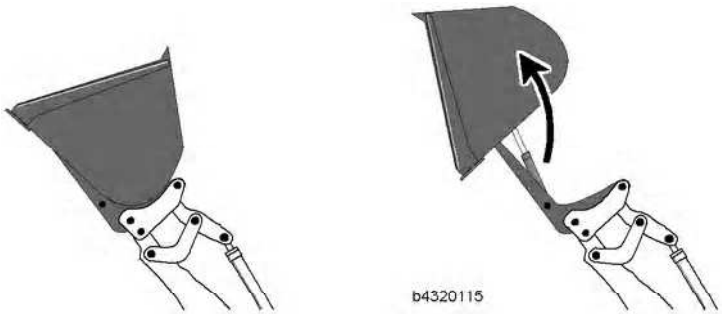
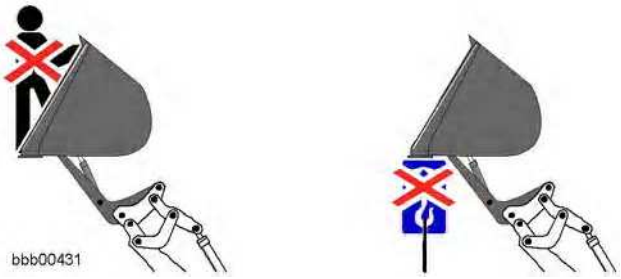
3.3.14 Using the high dump bucket

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

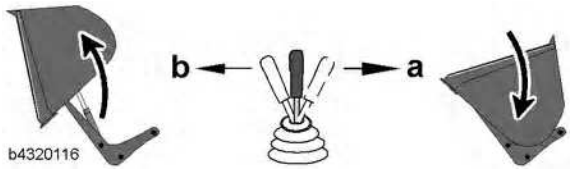
Before starting work:

- 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.

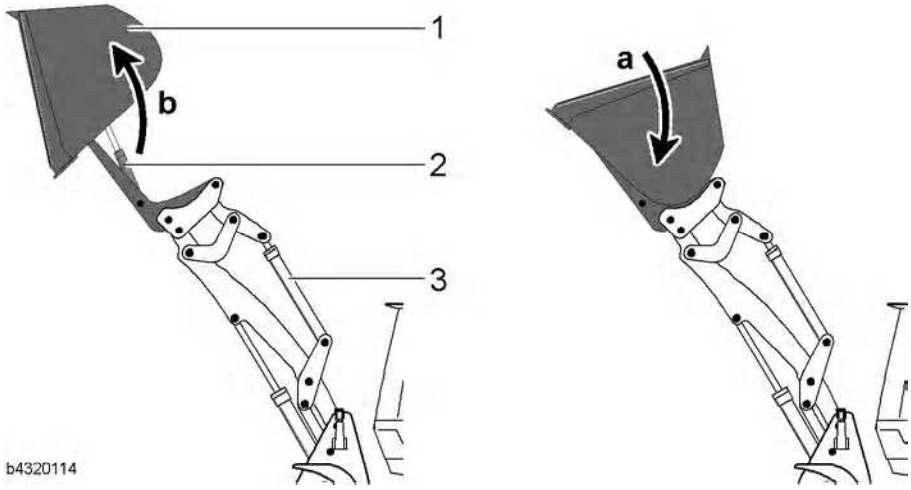
! Check to see that bucket tilts in and out properly.



- 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.



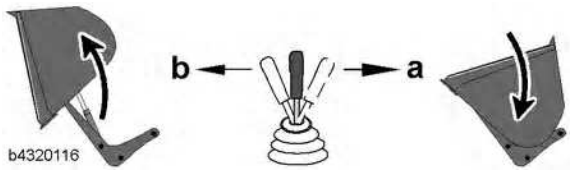
High dump bucket

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.

3.3.15 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, rail or sea transport

This is carried out when the machine has to be loaded by crane.

Necessary equipment:
- Slinging attachment or yoke **1** of the shipping company:
  Minimum length **b1** = 0.825 m
  Minimum length **b2** = 1.4 m
  Minimum length **l** = 4.5 m
- Lifting tackle **2**: Minimum rope length 3.0 m
- Lifting tackle **5**: Minimum rope length 3.4 m

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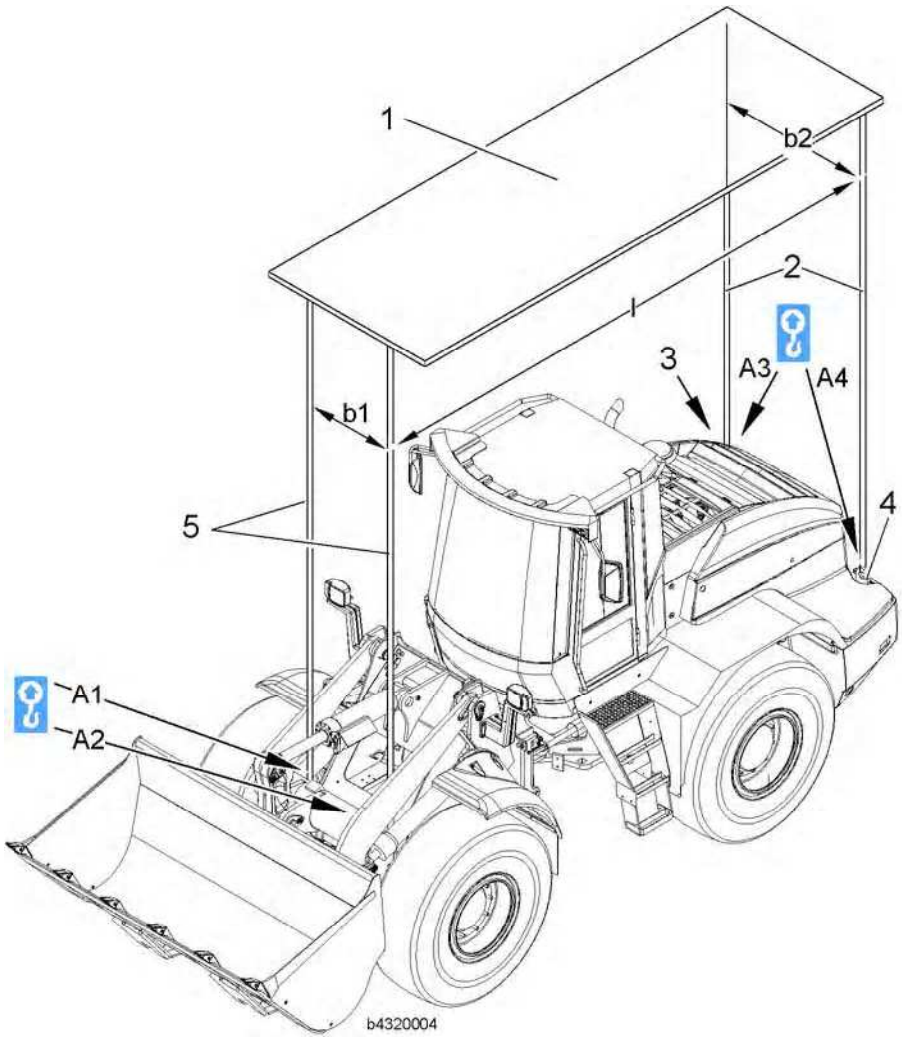
Additional equipment required (L538 only):
– Right lifting tackle **3**: LIEBHERR order no. 9840468 *
– Left lifting tackle **4**: LIEBHERR order no. 9840464 *

* This equipment is optional.



Loading diagram

1 Towing device/yoke
2 Rear lifting tackle (1-strand ropes)
3 Right lifting tackle (optional) *
4 Left lifting tackle (optional) *
5 Front lifting tackle (1-strand ropes)

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

*Option only required for L538.

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Caution

There is a risk of damage to the machine.
For reasons of structural engineering, the machine may not be lifted by its towing device.

! Do not lift the machine by its towing device.

- Attach the lifting tackle **3, 4** to the rear left and right-hand side of the machine.

Danger

There is risk of accidents if the suspended load falls.

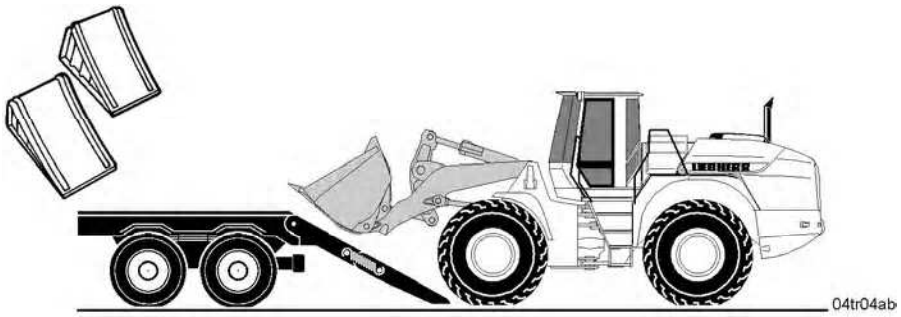
! Never stand under the machine when it is suspended.

- Attach the lifting tackle to the slinging and lifting points **A1, A2, A3, 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

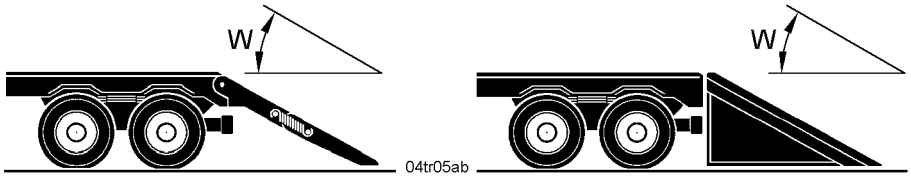
Before driving onto the loading area

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

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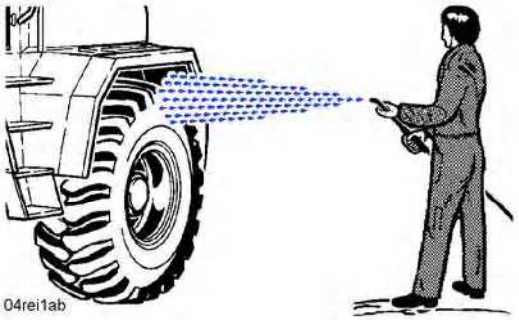
A ramp should be provided for driving the machine onto the loading area. The inclination of the ramp **W** may not exceed 30°.

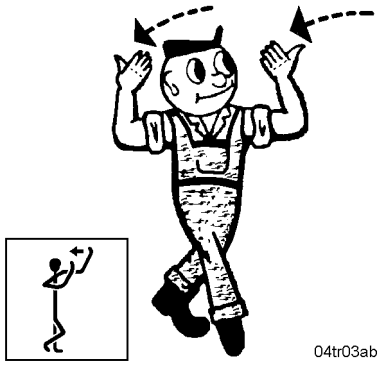


Washing

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.

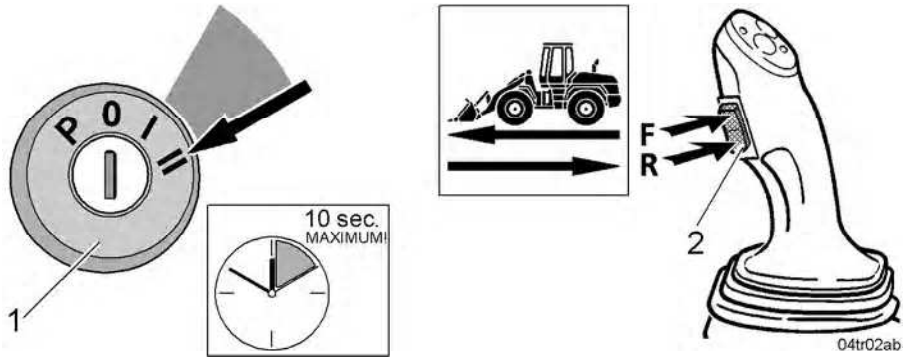


When driving onto the loading area have someone direct you.

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:



Starting the engine and selecting the travel direction

1 Ignition switch 2 Travel direction switch

- Start the engine.

This is the situation after the machine has been started:
– Travel range **II** is automatically activated.
– The parking brake is automatically activated.
– When the parking brake is engaged, the travel lockout is active.
– The travel direction cannot be preselected.

See also the sections on starting the diesel engine and driving mode.

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- 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.

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.

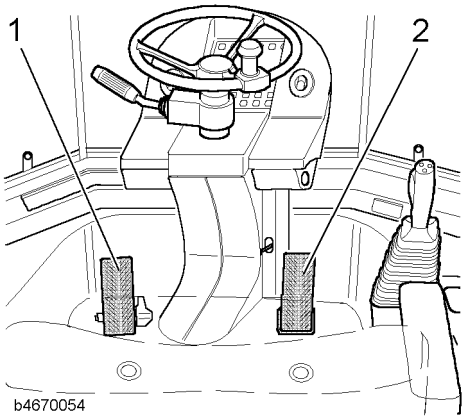
- Push down the gas pedal carefully.
- Carefully drive the machine to the loading area and stop.

After driving onto the loading area

For detailed descriptions, see the section on operation and handling.

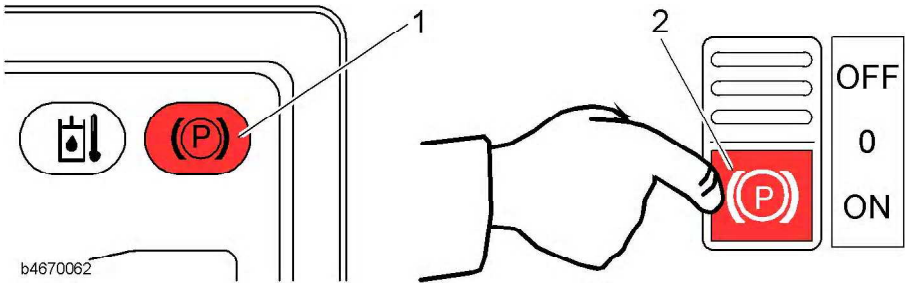
Make sure that the air stream produced during transport cannot enter the exhaust pipe opening.

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.



Parking brake

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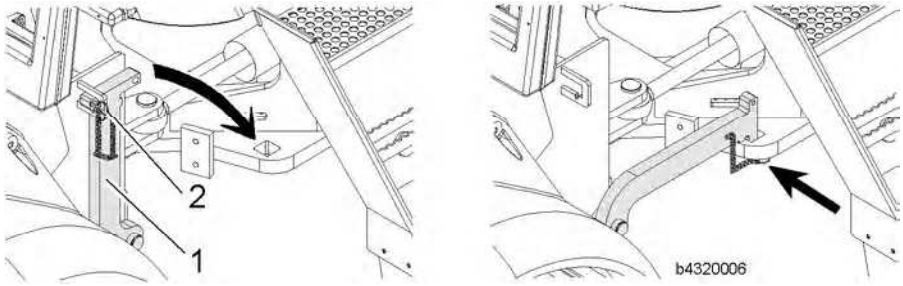
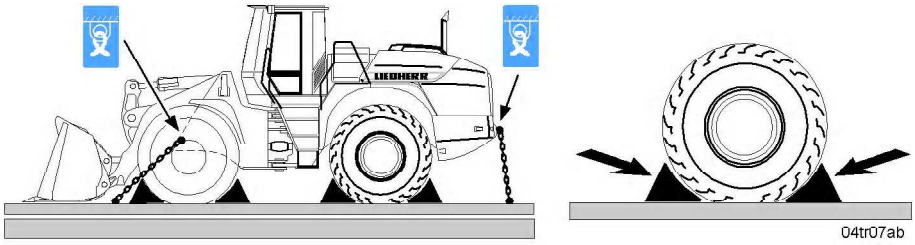
- Engage the parking brake.



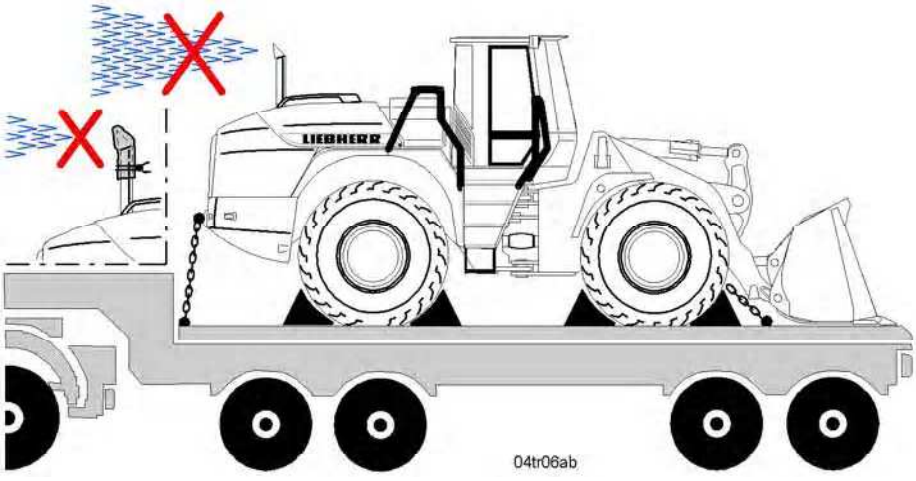
Articulation lock

- Engage the articulation lock.
- Fasten the locking bar **1** in the bottom position using the linch pin **2**.
- 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.

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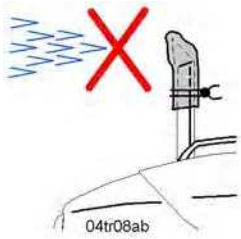
Caution

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.

- 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.

The machine must always be put on a transporter for longer distances.

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.

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Towing with the engine running

The travel drive must be switched to free circulation before you can tow the machine.

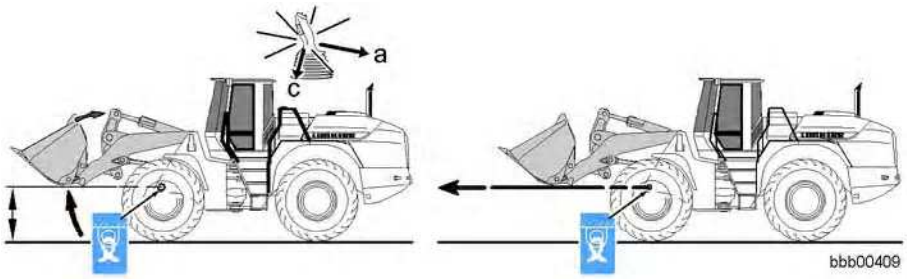
Switching the travel drive to free circulation impairs the hydrostatic braking effect.

– There is no hydrostatic braking force.
– You can no longer brake the machine using the brake pedal or the dual circuit brake system.

The following precautions must be taken before towing the machine.

Precautions:

– Put the machine in the towing position.
– Prepare towing ropes of sufficient strength.
– Switch the travel drive to free circulation.



Towing position

Putting the machine in the towing position

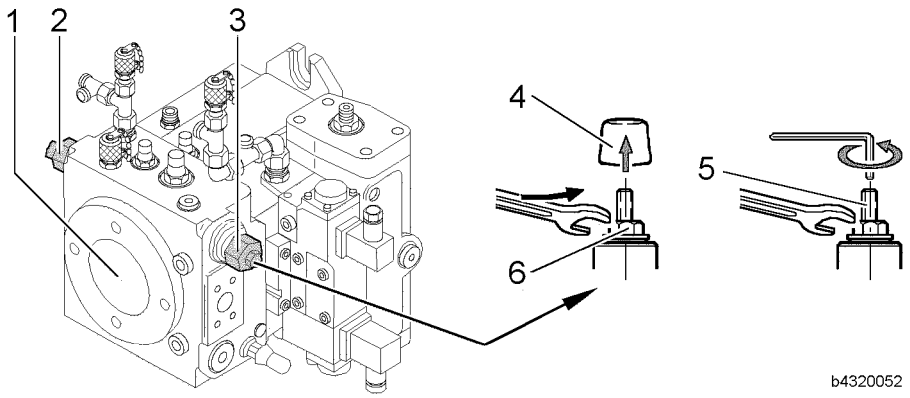
- Start up the engine.
- Raise the lifting gear above the towing drill hole.
- Tilt in the bucket as far as it will go.
- Feed the two towing ropes through the bore holes in the front section and secure them.
- Shut down the diesel engine.

Switching the travel drive to free circulation

Caution

There is a risk of accidents if the braking effect is impaired.
Switching the travel drive to free circulation impairs the braking effect.
You can no longer brake the machine using the brake pedal or the dual circuit brake system.

! Always drive carefully when in tow.



High pressure relief valves

1 Travel hydraulics variable adjustment pump
2 High pressure relief valve
3 High pressure relief valve
4 Sealed protective cap
5 Adjusting screw
6 Counter nut

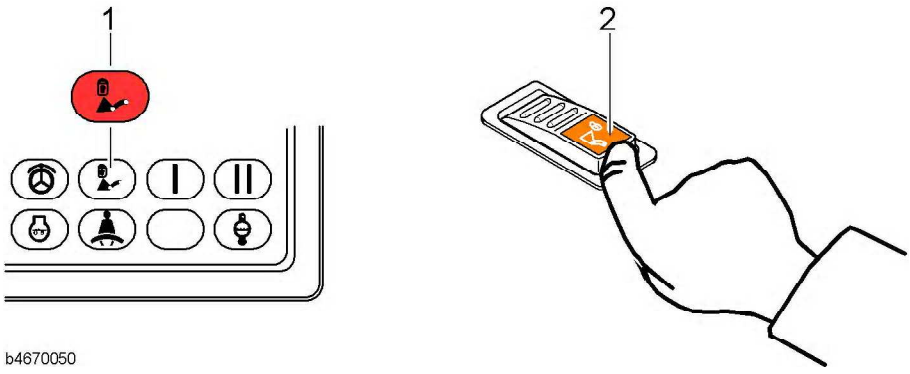
Switching the travel drive to free circulation: Release the valve insert of the high pressure relief valves **2, 3**.

- Remove the seal **4** from the protective cap.
- Take the protective cap **4** off the high pressure relief valve.
- Loosen the nut **6** using a 17 mm wrench.
- Loosen the adjusting screw **5** by two turns with a 5 mm allen key.

This allows the oil in the hydrostatic travel drive to circulate freely.

How to tow the machine

- Start the diesel engine.

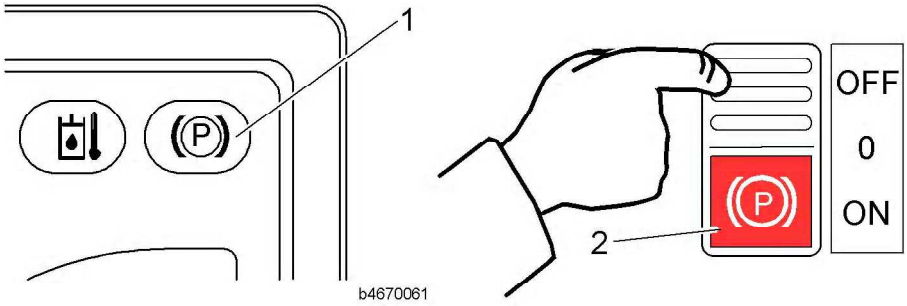


Display unit and working hydraulics lockout switch

1 Working hydraulics lockout symbol field
2 Working hydraulics lockout switch

- **If necessary**, Press the switch **2** for the working hydraulics lockout to prevent inadvertent activation of the working attachment.

The symbol field **1** for the working hydraulics lockout lights up.
The working hydraulics are no longer operational.



Display unit and parking brake switch

1 Parking brake symbol field 2 Parking brake switch

- To release the parking brake, push the switch **2** back.

The symbol field **1** for the parking brake goes out.
The parking brake is released and the machine can now be towed.

- Carefully tow the machine out of the danger area.
  Maximum towing speed 2 km/h
- **When towing has been completed:**
  Adjust the two high pressure relief valves to the correct value as before.

Caution

There is a risk of damage to the machine.
If the high pressure relief valves **2, 3** on the travel hydraulics variable displacement pump **1** are not correctly adjusted, the pump and motors of the travel hydraulics will be irreparably damaged.

! After finishing towing, readjust the high pressure relief valves.
! Adjustment may only be carried out by an authorised specialist.

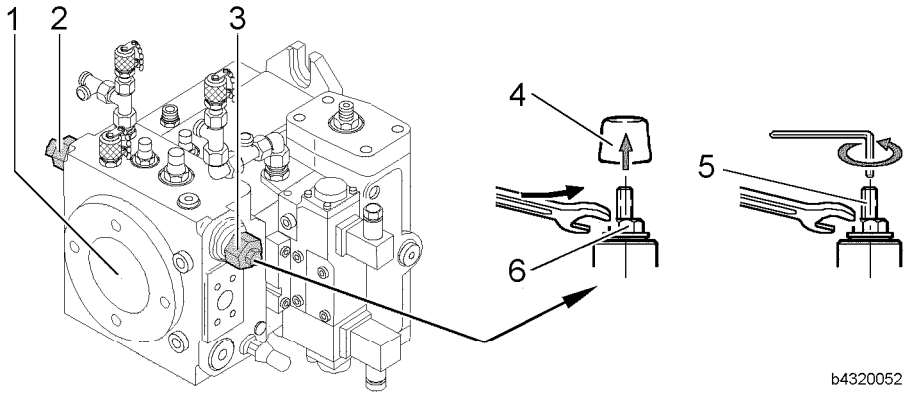
- Contact LIEBHERR CUSTOMER SERVICE.

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.
Switching the travel drive to free circulation impairs the hydrostatic braking effect.
The following precautions must be taken before towing the machine.

Precautions:
– Switch the travel drive to free circulation
– Release the parking brake mechanically
– Have a suitable tow bar of sufficient strength ready

Switching the travel drive to free circulation



High pressure relief valves

1 Travel hydraulics variable adjustment pump
2 High pressure relief valve
3 High pressure relief valve
4 Sealed protective cap
5 Adjusting screw
6 Counter nut

Switching the travel drive to free circulation: Release the valve insert of the high pressure relief valves **2, 3**.

- Remove the seal **4** from the protective cap.
- Take the protective cap **4** off the high pressure relief valve.
- Loosen the nut **6** using a 17 mm wrench.
- Loosen the adjusting screw **5** by two turns with a 5 mm allen key.

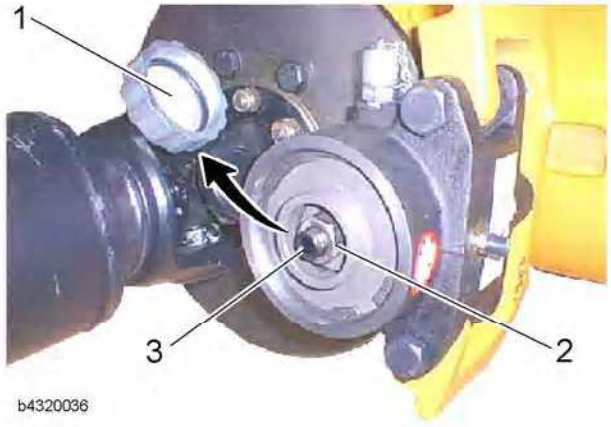
This allows the oil in the hydrostatic travel drive to circulate freely.

Mechanically releasing the parking brake

Danger

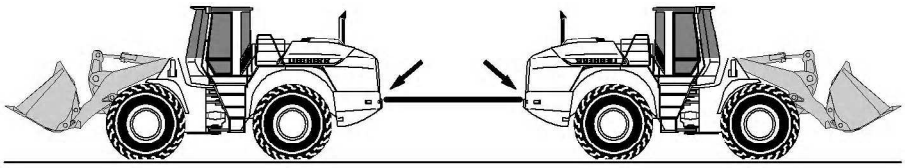
There is a risk of accidents if the machine suddenly rolls away.

! Make sure that the machine is secured against rolling away (for example with wedges) when carrying out work on the parking brake.



Parking brake

- Unscrew the sealing cap **1**.
- Loosen the counter nut **2**.
- Loosen the adjusting screw **3** anticlockwise until the brake pads no longer touch the brake discs.



Towing

- Attach and fasten the tow bar to the towing device on the rear section.

Warning

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.
- Carefully tow the machine out of the danger area.
  Maximum towing speed 2 km/h
- **When towing has been completed:**
  Adjust the two high pressure relief valves to the correct value as before.

Caution

There is a risk of damage to the machine.
If the high pressure relief valves **2, 3** on the travel hydraulics variable displacement pump **1** are not correctly adjusted, the pump and motors of the travel hydraulics will be irreparably damaged.

! After finishing towing, readjust the high pressure relief valves.

! Adjustment may only be carried out by an authorised specialist.

- Contact LIEBHERR CUSTOMER SERVICE.
- Correctly reset the parking brake.

Towing the machine when the steering system has failed

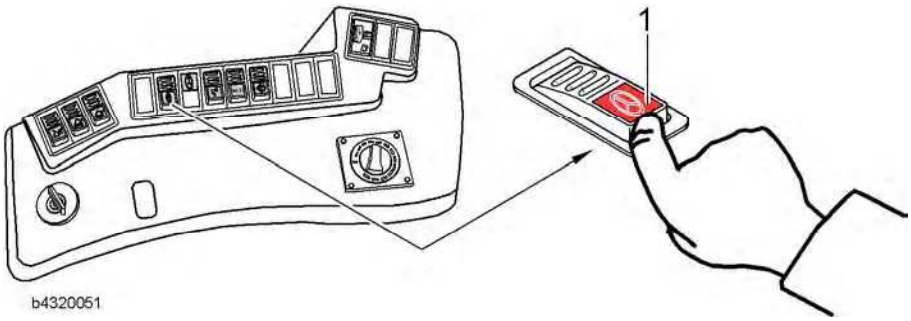
If the diesel engine or steering pump fails while the machine is moving, the emergency steering pump automatically starts up for around 50 seconds. The emergency steering pump then switches off automatically and steering is no longer possible.

If the ignition is on, you can steer using the emergency steering pump repeat start function.

Continuous operation of the emergency steering pump will overheat the pump motor. The thermostat in the pump motor automatically switches off the emergency steering pump if it overheats.

Make sure that the electrical system is switched on.

- If you need to steer the machine while it is towed:
  Press the button **1** to switch on the emergency steering pump before steering..



Switches on the side console

1 Emergency steering button

- Press and hold down the emergency steering button **1**.

The emergency steering pump can be operated until it is automatically switched off by the thermostat in the pump motor.

- If it is not possible to tow the machine out of the danger area during this time:
  Let the pump motor cool down until the thermostat switches on again.
- Press and hold down the emergency steering pump repeat start button **1**.

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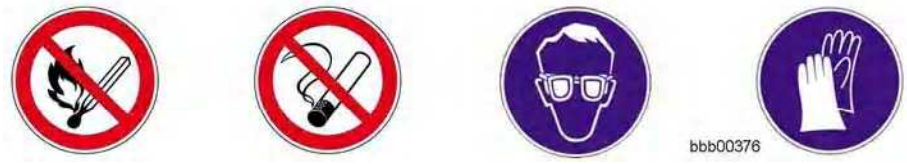
3.4.2 Jump starting

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

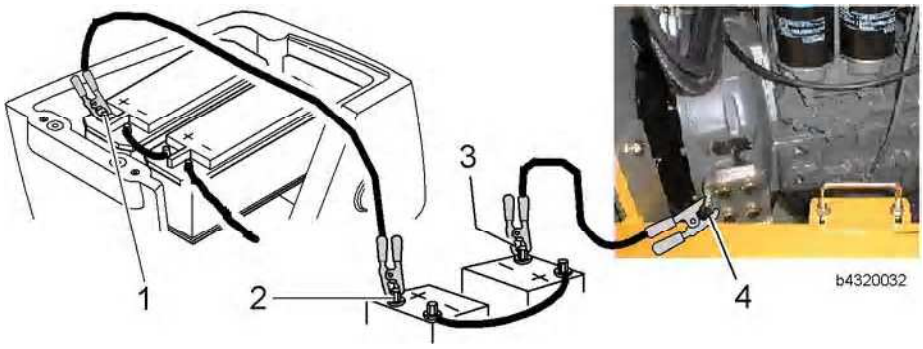
How to jump start the machine.



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.



Jump starting

1 Positive terminal of the flat battery
2 Positive terminal of external battery
3 Negative terminal of external battery
4 Earth point of the flat battery

- First connect one jump lead to the positive terminal **1** of the flat battery and then to the positive terminal **2** of the external battery.
- Connect the second jump lead to the negative terminal **3** of the external battery and then to the earth point **4** of the flat battery.
- Start up the engine. See the section on staring 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 remove the jump lead from the negative terminal of the external battery **3** and then from the earth point of the flat battery **4**.
- Then remove the jump lead from the positive terminal of the external battery **2** and then from the positive terminal of the flat battery **1**.

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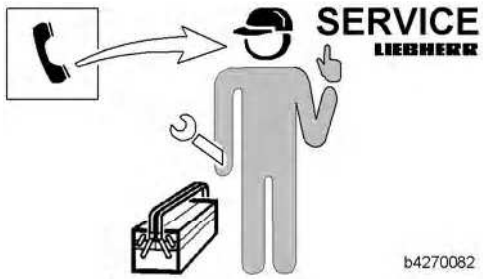
4 Malfunctions

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.

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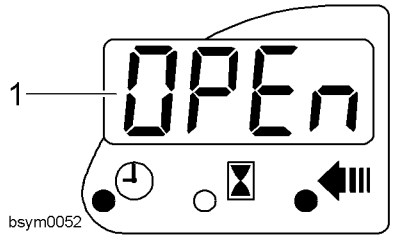
4.1 Service Code Table

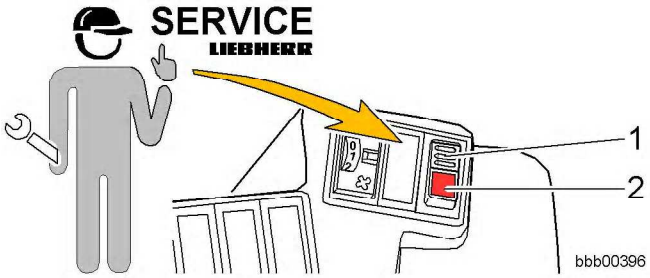
4.1.1 Service code indication on the display



1 Travel speed, service hours and clock LCD

Service-Code	Symptom	Cause	Solution
OPEN	“OPEN” is shown on the travel speed LCD when you switch the ignition on. The display unit switches to travel range I and an interval tone sounds (uninterruptedly).	Interruption between the speed sensor on the transfer gear and the display unit. Defective speed sensor on the transfer gear.	Contact LIEBHERR CUSTOMER SERVICE

4.1.2 Diesel engine diagnosis



Control panel

1 Engine diagnosis button 2 Lamp

The following functions are available:
– Error display during machine operation.
– Service code display at the push of a button.

Lamp function during machine operation:
– The lamp flashes or lights up to indicate engine problems.

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Lamp function when the button is pressed:
– Press the button and the lamp to perform diagnosis on the engine.

Activating the service code display:
– Switch off the ignition before pressing the button.
– Leave the ignition switched off for ten seconds.
– Simultaneously press the button and switch on the ignition.

Contact LIEBHERR CUSTOMER SERVICE.

Service code display
The service codes are displayed in succession.
First the active codes are displayed, followed by the stored codes,.

Service-Code	Symptom	Cause	Solution
Various flashing signals	Malfunctions on the machine	Engine problem	Contact LIEBHERR CUSTOMER SERVICE

4.1.3 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 three different audible warning signals:
– Interval tone (sequence: 1 tone followed by 10 seconds pause)
– Interval tone (without pause)
– Continuous tone

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Warning signal	Cause	Remedy
Hydraulic oil and coolant overheating symbol field flashes. The machine automatically switches to travel range I after 60 seconds The travel range I and II symbol fields flash alternately. Interval tone sounds (sequence: 1 tone followed by 10 seconds pause).	On L524 and L534 - coolant temperature above 103 °C On L538 - coolant temperature above 100 °C	Clean the cooling system or operate the machine at no load until the coolant temperature falls again.
	Error in the cooling or electrical system	Contact LIEBHERR CUSTOMER SERVICE
Hydraulic oil and coolant overheating symbol field flashes. The machine automatically switches to travel range I after 60 seconds The travel range I and II symbol fields flash alternately. Interval tone sounds (sequence: 1 tone followed by 10 seconds pause).	Hydraulic oil temperature above 106 °C	Clean the cooling system or operate the machine at no load until the hydraulic oil temperature falls again.
	Malfunction in the cooling, hydraulic or electrical system	Contact LIEBHERR CUSTOMER SERVICE
Engine overheating symbol field lights up and an interval tone (without pause) sounds after 10 seconds.	Coolant temperature above 100 °C	Clean the cooling system of operate the machine at no load until the coolant temperature falls again.
	Error in the cooling or electrical system	Contact LIEBHERR CUSTOMER SERVICE
Emergency steering symbol field lights up and an interval tone (without pause) sounds straight away.	Automatic activation of emergency steering function on failure of steering oil supply	Drive or tow the machine out of the danger area and call LIEBHERR CUSTOMER SERVICE.
	Error in the electrical system	Contact LIEBHERR CUSTOMER SERVICE
Engine oil pressure symbol field lights up and an interval tone (without pause) sounds after 10 seconds.	Insufficient engine oil	Check the oil level and top up if necessary.
	Error in the diesel engine lubricating oil supply	Contact LIEBHERR CUSTOMER SERVICE
Brake system accumulator pressure symbol field lights up and an interval tone (without pause) sounds after 10 seconds.	Brake accumulator pressure too low: due to machine not being used for a lengthy period	Start the engine: the brake accumulators are filled while the engine runs.
	Brake accumulator or brake system malfunction	Contact LIEBHERR CUSTOMER SERVICE
The symbol fields for forward and reverse travel both flash.	Travel speed of 36.2 km/h exceeded	Brake the machine.
The symbol fields for forward and reverse travel both flash. The machine switches down to travel range I.	Travel speed of 37.2 km/h exceeded	The travel speed of the machine is hydrostatically braked.
The symbol fields for forward and reverse travel both flash. Continuous tone sounds.	Travel speed of 41.7 km/h exceeded	Brake the machine.

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4.1.4 Troubleshooting for the LIEBHERR automatic lubrication system

This equipment is optional.

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 has no power.	Immediate action is required.
	No voltage from terminal 15 to terminal 5.	Check fuse F8 and change if necessary.
	No earth connection with the control device or the indicator light.	Check earth connection and re-establish if necessary.
	Indicator lamp is defective.	Replace indicator lamp.
	Wiring between the power source and the control device or between the control device and the indicator light interrupted.	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.	Check that each lubricating point is free.
	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.	Check the secondary line and replace if necessary.
	Distributor with insufficient flow selected.	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.

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4.1.5 Flashing codes for the TWIN automatic lubrication system

This equipment is optional.

Malfunction / flashing code	Cause	Remedy
Indicator lamp does not display a flashing code immediately after the ignition is turned on.	TWIN system is not energized.	Immediate action is required.
	No voltage from terminal 15 to terminal 3.	Check fuse F8 and change if necessary.
	No earth connection with the control device or the indicator light.	Check earth connection and re-establish if necessary.
	Indicator lamp is defective.	Replace indicator lamp.
	Wiring between the power source and the control device or between the control device and the indicator lamp interrupted.	Check wiring and repair if necessary.
		Contact LIEBHERR CUSTOMER SERVICE
Indicator lamp flashes (0.5 sec. on / 0.5 sec. off) for two minutes at the start of every cycle.	Minimum grease level reached in the container.	Refill the container (malfunction message is automatically reset).
Indicator lamp lights up constantly for 2 minutes at the end of the pumping phase.	Main supply line is defective (pump does not build up pressure).	Repair the line and bleed the system.
	Air in the system. This means that there is insufficient pressure within the highest permissible pump time.	Bleed the system (both main supply line channels) and conduct a test with one single cycle.
	Grease pressure switch defective.	Check the switch and replace if necessary.
	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.	Check the dosing unit and insert a new O-ring if necessary.
	5/2 shuttle valve defective. No pressure is built up.	Check the valve and replace if necessary.
	Other cause.	Contact LIEBHERR CUSTOMER SERVICE
The indicator light glows constantly.	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).	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.
	Minimum level message and failure to reach the pressure within the highest permissible pump time.	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.

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Malfunction / flashing 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.

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4.2 Eliminating malfunctions

4.2.1 Replacing fuses

Caution

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

Mega fuses

1 Fuse boxes
2 Screw-in fuse F01
3 Screw-in fuse F02
4 Screw-in fuse F03

Fuse	Value	Unit	Designation/function	Location
F01	100	A	Main fuse	Beside the battery main switch
F02	200	A	Emergency steering pump	Beside the battery main switch
F03	60	A	Preglow system	Beside the battery main switch

Mega fuses

- If you need to access the fuses:
  Open the engine compartment hood.
- Use the table above to identify the defective fuse.
- Open the appropriate fuse box **1**.
- Unscrew the defective fuse and replace it with a new one with the same rating.

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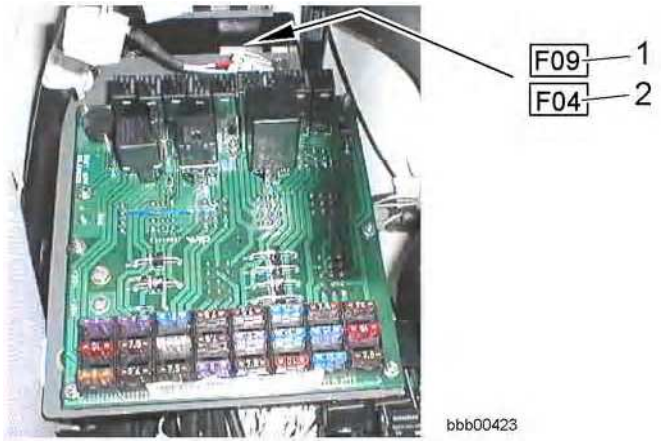
Maxi Fuses



Maxi Fuses

1 Plug-in fuse F09 [1)] 2 Plug-in fuse F04

[1)]For details see the section on plug-in fuses on the control unit and control panel.

Fuse	Value	Unit	Designation/function	Location
F04	60	A	Starter	Rear right of side console

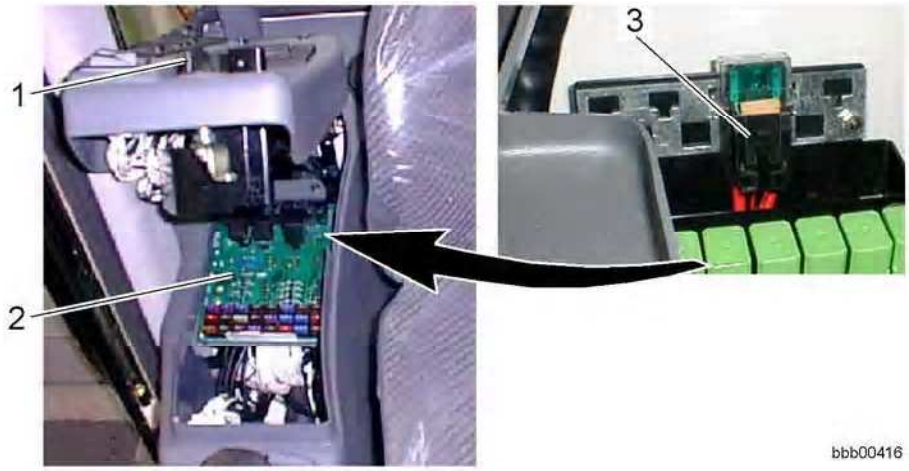
Maxi Fuses

- Open the catch **1** of the cover by turning it.

The cover of the side console lifts up.

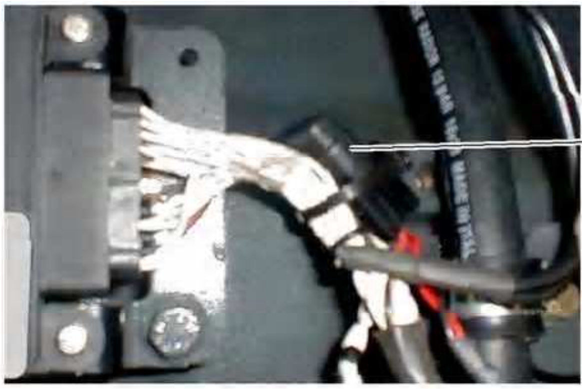
- Use the table above to identify the defective fuse.
- Take out the defective fuse and replace it with a new one with the same rating.

Plug-in fuses on the control unit and control panel



Fuse, controller and relay box

1 Cover catch
2 24 V control unit
3 Fuse F09

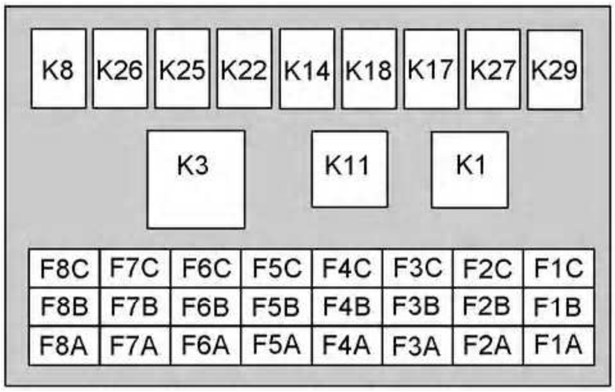


Fuse on diesel engine

1 Fuse F10

Fuse	Value	Unit	Designation/function	Location
F09	5	A	Diagnostic plug supply	Rear right of side console
F10	5	A	Control unit supply	In the right of the engine compartment on the back of the engine

Fuses



24 V control unit with plug-in fuses

Fuse	Value	Unit	Designation/function
F1A	7.5	A	Brake light
F2A	15.0	A	Lighting, switch lighting
F3A	10.0	A	Hazard warning system, emergency working attachment operation, flashing beacon
F4A	7.5	A	Right high beam
F5A	3.0	A	Right parking light, monitor background lighting
F6A	7.5	A	Power supply, emergency steering button, pressure switch B3a
F7A	7.5	A	Left high beam
F8A	5.0	A	Monitor (ignition +15)
F1B	10.0	A	Interior lighting, socket, radio (optional), compressor seat (optional)
F2B	15.0	A	Front wiper, horn
F3B	15.0	A	Front working floodlight
F4B	3.0	A	Left parking light, registration lighting

Fuse	Value	Unit	Designation/function
F5B	7.5	A	Ride control system (optional)
F6B	25.0	A	Option
F7B	7.5	A	Parking light, travel range switch supply
F8B	10.0	A	Engine stop
F1C	7.5	A	Working attachment supply, tank sensor, indictive sensor B29
F2C	7.5	A	Right driving light
F3C	15.0	A	Rear working floodlights
F4C	7.5	A	Rear wiper
F5C	7.5	A	Left driving light
F6C	15.0	A	Heater blower, air conditioning
F7C	3.0	A	Monitor supply +30
F8C	3.0	A	Monitor supply +15, preglow, engine stop

Fuse assignment

- Open the catch **1** of the cover by turning it.

The cover of the side console lifts up.

- Use the table above to identify the defective fuse.
- Take out the defective fuse and replace it with a new one with the same rating.

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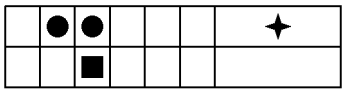
5 Maintenance

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.

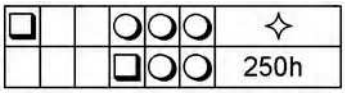


bsym0039

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.



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.

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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
							Complete machine
□							Have the driver lubricate the machine in accordance with the lubrication chart and instruct him on proper maintenance
□							Instruct the driver in the operation of all functions
□	●	●	❍	❍	❍		Check the machine for external damage
						✦	Make sure the bolted connections are tight
□						✦	Seal any leaks
			□	❍	❍		Check the hydraulic pressure according to the testing and adjustment plan - see the service manual
							Diesel engine
□	●	●	❍	❍	❍		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)
			❍	❍	❍		Change the engine oil filter
			❍	❍	❍		Check the V-ribbed belt
				❍	❍		Check the engine valve play
				❍	❍	✦	Replace the fuel pre-filter
				❍	❍	✦	Change the fuel fine filter
		●	❍	❍	❍	✦	Drain off condensate from the fuel filter
□		●	❍	❍	❍	✦	Drain off condensate and sediment from the fuel tank
		●	❍	❍	❍	✦	Clean the air filter service cap and dust extraction valve
				❍	❍		Check that the air filter vacuum switch works
						✦	Replace the air filter main element if indicated by the vacuum switch (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
							Soot particle filter (optional)
			❍	❍	❍		Check the soot particle filter pressure monitor for function, leaks and blockages
			❍	❍	❍	✦	Check and drain the soot particle filter condensate separator
				❍	❍		Change the soot particle filter condensate separator
				❍	❍	✧	Clean the soot particle filter
							Cooling system
□	●	●	❍	❍	❍		Check the coolant level

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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 the coolant antifreeze concentration
						✦	Clean the cooling system
					❍		Replace the coolant and antifreeze (or every 2 years)
Working hydraulics							
□	●	●	❍	❍	❍		Check the hydraulic tank oil level (take an oil sample every 500 hours for bio oil)
			❍	❍	❍		Drain off condensate and sediment from the hydraulic tank
					❍		Change the oil in the hydraulic tank and check the return strainer
□		■	❍	❍	❍	250h	Check and clean the magnetic rod on the hydraulic tank
			❍	❍	❍		Change the hydraulic tank return suction filter
				❍	❍		Change the hydraulic tank bleeder filter
				❍	❍		Lubricate the pilot control device solenoids, universal joints and tappets
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 linings
Electrical system							
□	●	●	❍	❍	❍		Check the indicator lamps and lighting
			❍	❍	❍		Check the batteries, fluid level and terminals
Transfer gear							
□			❍	❍	❍		Check the transfer gear oil level
			□	❍	❍		Change the transfer gear oil
Axles and tyres							
□		■	❍	❍	❍		Check the tightness of the wheels (once after 50, 100 and 250 h)
□			❍	❍	❍		Check the axle oil levels
			□	❍	❍		Change the axle oil
□		●	❍	❍	❍		Check and lubricate the cardan shaft(s)
□						✦	Check the tyre pressure
Machine frame and ballast weight							
□		●	❍	❍	❍		Lubricate the articulation bearing and rear oscillating bearing

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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
Lubrication system (optional)							
□		●	❍	❍	❍		Check whether metered quantities are adequate at the bearing points (grease collars) of the central lubrication system
□		●	❍	❍	❍		Check the pipes, hoses and lubrication points of the lubrication system
Cab, heating and air-conditioning							
						✦	Grease the cab door hinges
						✦	Clean or replace the fresh air and recirculated air filter
			❍	❍	❍		Check the indicator and filling level beads in the dryer-collector unit (optional) of the air conditioner
Lift arms and quick-change device							
□		●	❍	❍	❍	✦	Lubricate the lift arms and attachment
				❍	❍	✦	Check the lift arm bearing bushings
				❍	❍		Check the lift arms bucket stops (Z kinematics)
□	●	●	❍	❍	❍		Lubricate and test the quick-change device

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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	12.0	l
 06sy04ab	Diesel engine cooling system total capacity	Coolant	24.5	l
 06sy03ab	Hydraulic system total capacity	Engine oil SAE 20W -20	130	l
 06sy03ab	Hydraulic tank	Engine oil SAE 20W -20	100	l
 5 06sy18ab	Transfer gear	Gear oil SAE 90 LS	2.1	l
 1 06sy14ab	Front axle differential	Gear oil SAE 90 LS	12.2	l
 2 06sy15ab	Front axle wheel hubs	Gear oil SAE 90 LS	2.4	l
 3 06sy16ab	Rear axle differential	Gear oil SAE 90 LS	12.7	l

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	Name	Medium	Dosage	Units
 4 06sy17ab	Rear axle wheel hubs	Gear oil SAE 90 LS	2.5	l
 bsym0057	Fuel tank	Diesel	160.0	l
 bsym0029	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.

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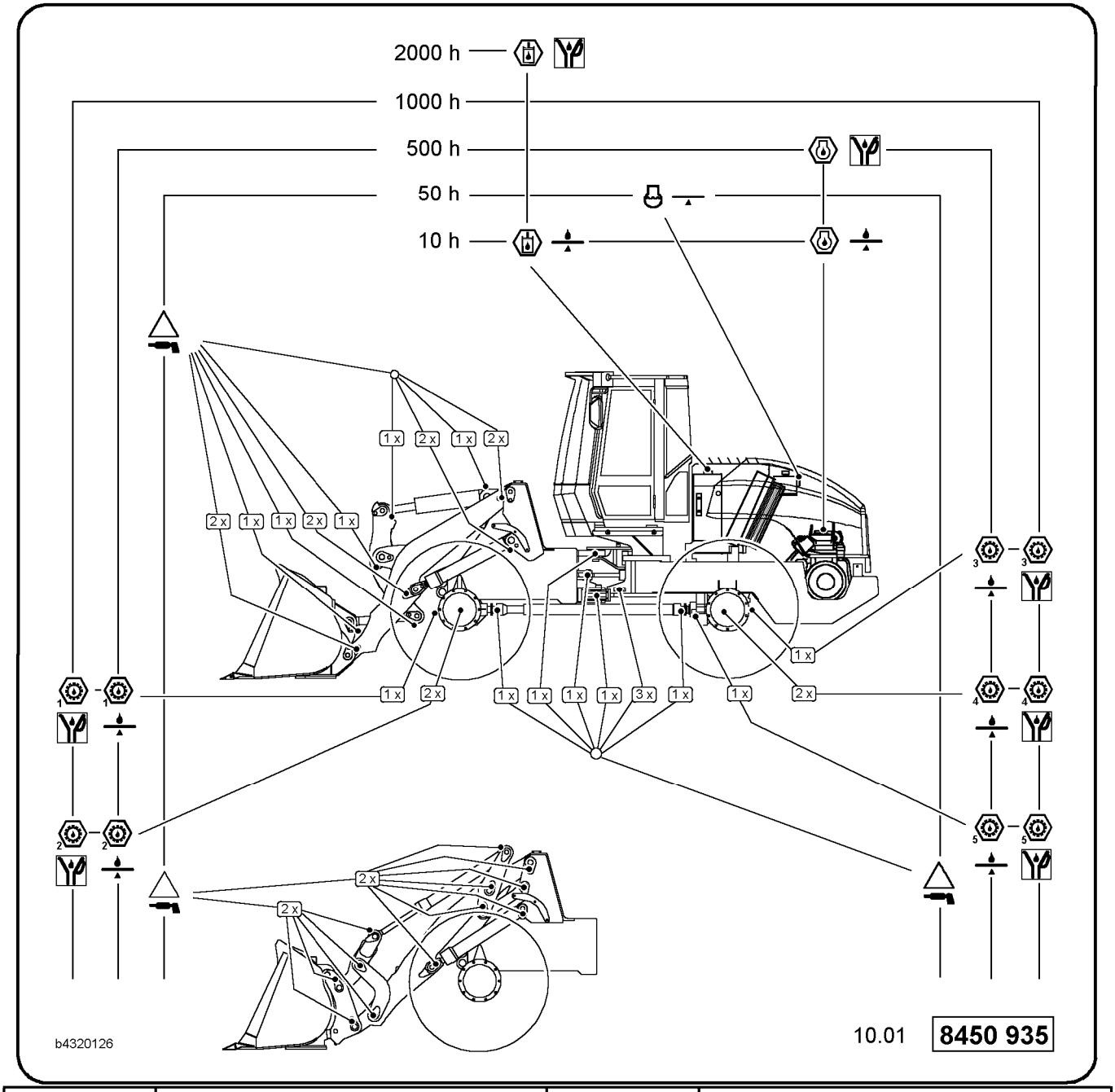

Symbol	Name	Symbol	Name
06sy09ab	General lubrication points	06sy01ab	Lubrication
06sy13ab	Checking the oil level	06sy21ab	Check the coolant level
06sy11ab	Oil change		

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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.

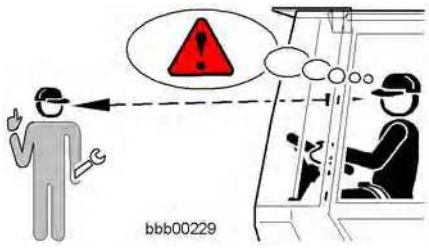
5.3.1 Preparatory tasks for maintenance

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

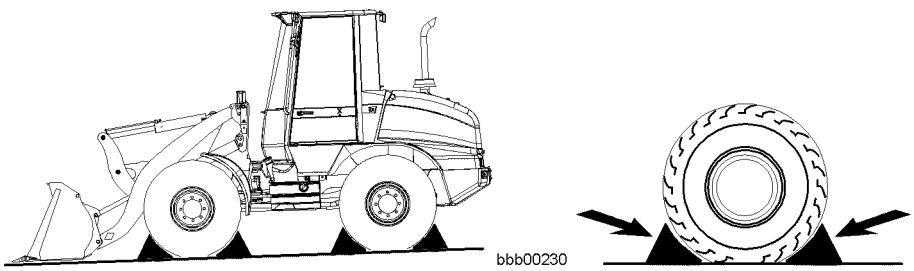
Make sure that visual contact between the operator in the cab and maintenance personnel is always maintained.

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

LBH/02/003801/0003/7.05/en

- Secure the machine against rolling away with wheel wedges.

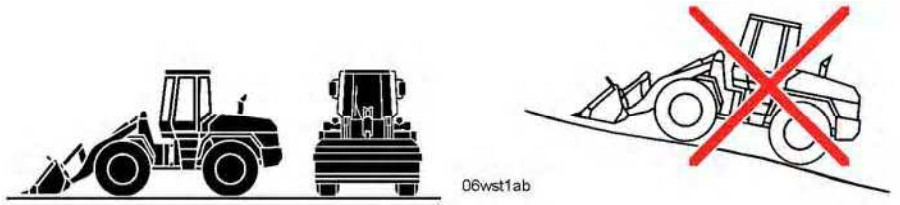
Maintenance positions

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.



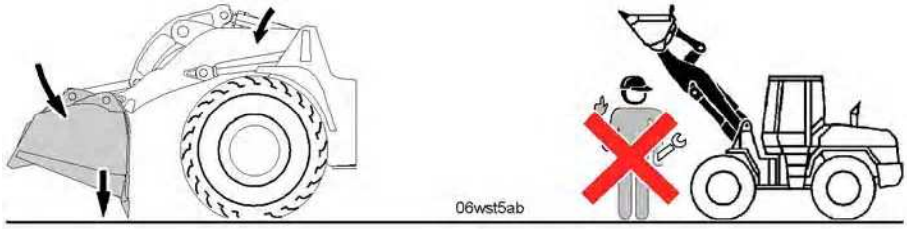
Maintenance position 1

- 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.

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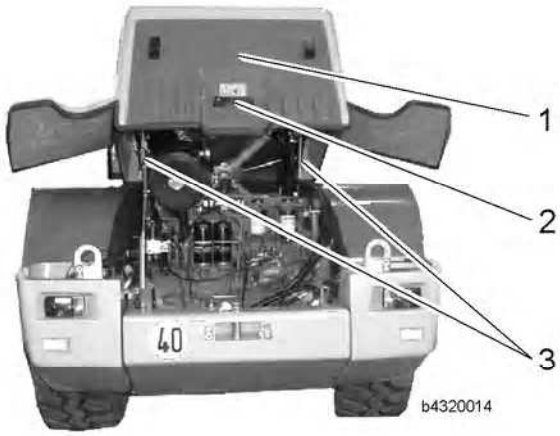
Opening the service door and hood

Opening the engine compartment hood

When the hood is open, you can access the following units:
– Diesel engine
– Air filter
– Hydraulic pumps
– Cooling system
– Batteries



Engine compartment hood

1 Engine compartment hood
2 Handle with lock
3 Gas-filled springs

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.

- Open the lock with the ignition key.
- Open the hood **1** using the handle **2** and lift it all the way up.

The hood is held in this position by two gas-filled springs **3**.

Warning

There is a risk of injuries if the hood falls shut.
! Check that the gas-filled springs securely hold the hood fully open.

- If not, rectify the problem immediately.

Troubleshooting
The function is not assured

- Contact LIEBHERR CUSTOMER SERVICE.

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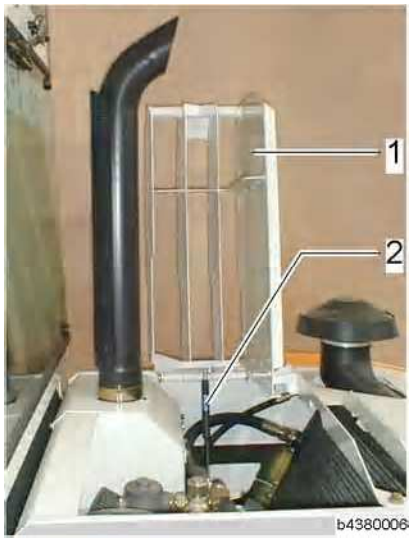
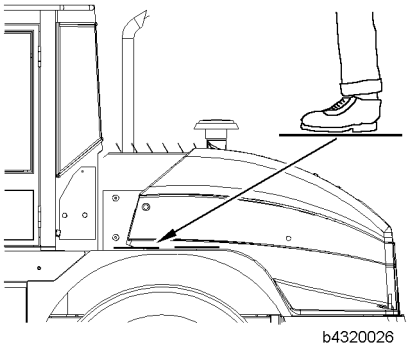
Opening the cooler flap



Cooler flap

1 Cooler flap 2 Gas-filled springs

When the flap is open, you can access the following units:
– Cooling system
– Hydraulic tank



Foot plate

- When opening or closing the flap, climb onto the machine via the cab access, making sure that you have secure footing.

Cooler flap

- Pull up the flap **1** until it is fully open.

The flap is held in this position by the gas-filled spring **2**.

Warning

There is a risk of injury if the flap falls shut.

! Check that the gas-filled springs securely hold it fully open.

- If not, rectify the problem immediately.

Troubleshooting

The function is not assured

- Contact LIEBHERR CUSTOMER SERVICE.

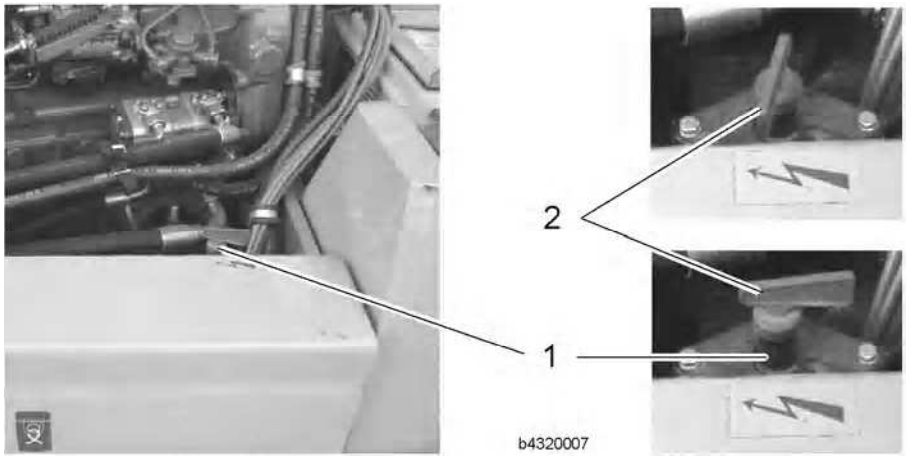
Turning off the battery main switch

The battery main switch is located at the rear right 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 Key

Caution

There is a risk of damaging the electrical system.

! Do not turn off the battery main switch while the engine is running.

- First turn off the engine and then turn off the battery main switch.

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.

- To turn off the battery main switch **1**, turn the key **2** to the **0** position.

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5.3.2 Checking the machine for external damage

Make sure that the machine is in maintenance position 1.

Procedure

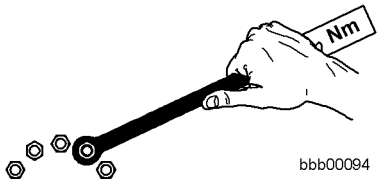

bsym0049

- 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



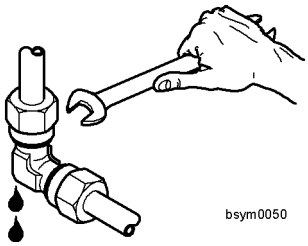
bbb00094

- Check that all bolts and screws are tight.
- Tighten any loose screws or bolts with the required tightening torque.

5.3.4 Sealing any leaks

Make sure that:
– The machine is in maintenance position 2.
– The appropriate service doors, hatches and hoods are open.

Procedure


bsym0050

- 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.

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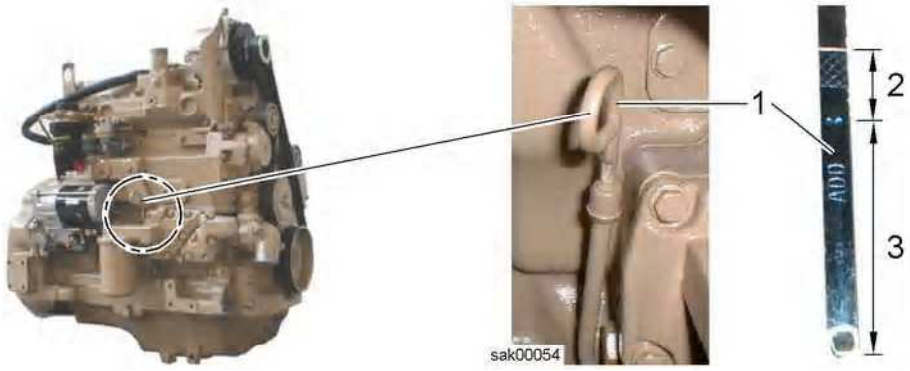
5.3.5 Checking the engine oil level

The oil filler neck is on the top of the engine on the valve cover.

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



Diesel engine dipstick

- Pull out the dipstick **1**, wipe it clean, and re-insert it.
- Pull out the dipstick **1** once again and read off the oil level.

The oil level must be within the cross hatching **2**.

- If the oil level is in the range **3** or below:
  Top up with engine oil. For the oil quality, see the lubricants and fuels listed in chapter 5.

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.

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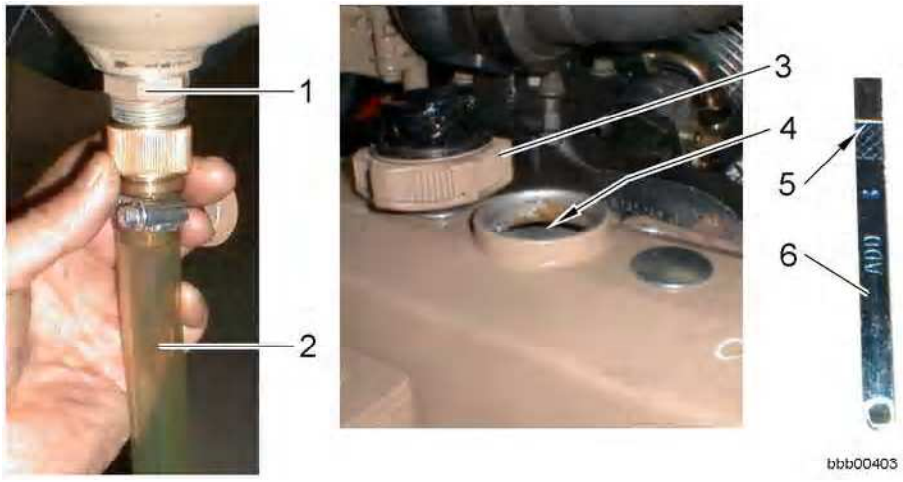
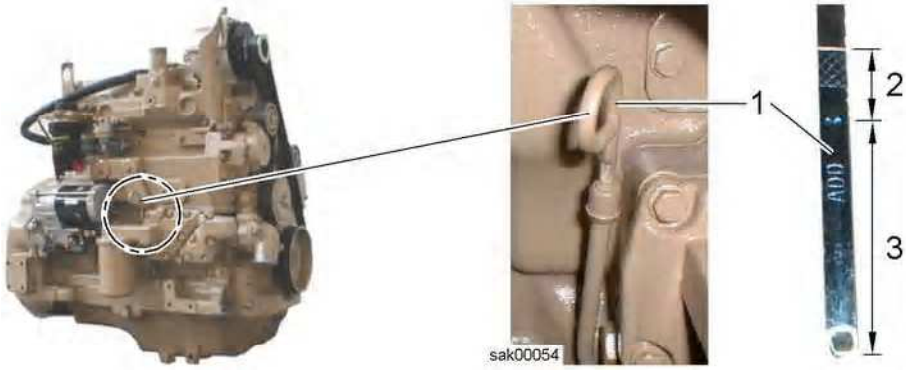
Procedure



Changing the engine oil

- Unscrew the cap of the oil drain valve **1** on the bottom of the oil pan.
- Screw the oil drain hose **2** to the oil drain valve **1**.
- Drain off the oil into the receptacle.
- Unscrew the oil drain hose **2** and put the cap back on the oil drain valve **1**.
- **When changing the engine oil and the oil filter:**
  Change the filter as described in the section on changing the oil filter.
- Top up the oil via the oil filler neck **4** to the top marking **5** on the cross hatching of the dipstick **6** (for the oil quality, see the section on lubricants and fuels in chapter 5).
- Clean the filler cap **3**, place it on the oil filler neck **4** and tighten it.
- Start the engine and check the oil pressure.



Diesel engine dipstick

- Turn off the engine and after 1 - 2 minutes, check the oil level on the dipstick **1**.
- Top up with oil if necessary.

5.3.7 Changing the engine oil filter

Make sure that:
– The machine is in maintenance position 1.
– The engine oil must have been drained.
– You have a LIEBHERR oil filter cartridge ready.

Procedure

Unscrewing the oil filter

- Release the oil filter cartridge **2** with a strap wrench **3** and unscrew it.
- Clean the seal surfaces of the filter bracket **1**, if necessary remove the old filter seal and anything left of it.
- Lightly coat the rubber seal ring on the new oil filter cartridge **2** with engine oil.
- Screw the new pil filter cartridge into the filter bracket **1**:
  until the seal touches the filter bracket **1**.
- Tighten the oil filter cartridge another half to three-quarter turn.
- **For filling the oil, see the section on changing the engine oil.**

5.3.8 Replacing the fuel pre-filter

Make sure that:
– The machine is in maintenance position 1.
– The engine compartment hood is open.
– You have a LIEBHERR fuel pre-filter cartridge ready.

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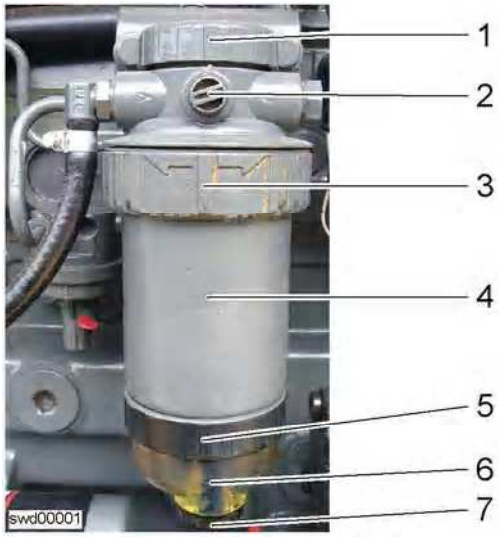
Replacing the fuel pre-filter

Procedure



- Carefully clean the fuel pre-filter and the area around it.
- Place a receptacle under the fuel pre-filter.
  If necessary, connect a drain hose to the drain valve.
- Open the drain screw **7** and the bleeder screw **2** on the fuel pre-filter by two or three turns:
  Drain off the condensate into a suitable receptacle.
- Unscrew the retaining ring **3** on the fuel pre-filter anticlockwise:
  (Use a strap wrench if necessary), take off the retaining ring and pull out the filter cartridge **4**.
- Unscrew the water separator **6** from the filter element.
- Dispose of the old filter element.

Fitting the new fuel fine filter

- Wash the water separator **6** and dry it with compressed air:
  Unscrew the (old) drain plug and dispose of it.
- Unscrew the drain plug from the new filter element and screw it into the clean water separator.
- Screw in and tighten the water separator **6** on the new filter element.
- Check the filter base and seal ring, clean them and replace them if necessary.

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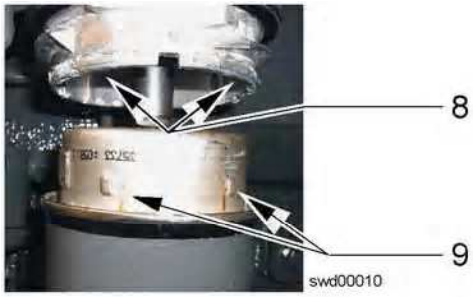
- Clean the seal on the filter head.
- Oil the seal on the new filter cartridge.
- Fit a new filter cartridge **4** on the filter base.



- Make sure that the slots **8** in the filter base and the lugs **9** on the filter cartridge are lined up.
- Fit the snap ring **3** and tighten it by 1/3 turn clockwise. The snap ring clicks into the notch.

Bleeding the fuel system

- Undo the bleeder screw **1** by two turns.
- Push the hand pump lever **2** until bubble-free fuel comes out of the bleeder screw **1**.
- Tighten the bleeder screw **1**.
- Push the hand pump lever **2** until the pump resistance subsides.
  Carry on pumping and loosen the bleeder screw **1**.

The remaining air escapes under pressure and the pump resistance increases.

- Close the bleeder screw **1** and push the hand pump lever **2** until the pump resistance subsides again.
- If you can feel no resistance accumulate while pushing the hand pump lever **2** or if no fuel comes out of the bleeder screw **1**:
  Briefly turn over the diesel engine with the starter, because the lever of the fuel pump is probably at the top of the cam.

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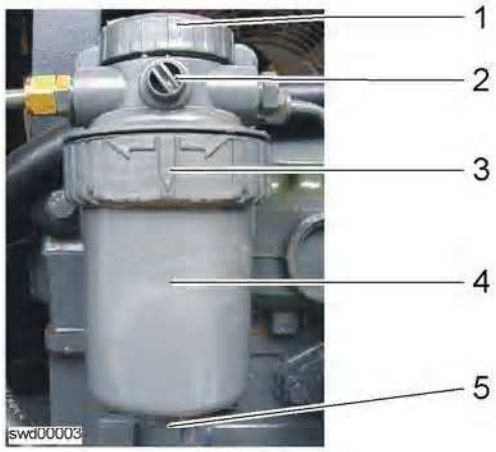
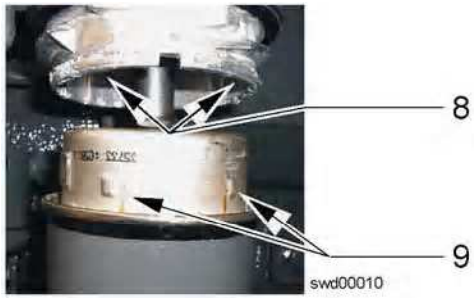
5.3.9 Changing the fuel fine filter

Make sure that:
– The machine is in maintenance position 1.
– The engine compartment hood is open.
– You have a LIEBHERR fuel fine filter cartridge ready.

Procedure for changing the fuel fine filter



- Carefully clean the fuel fine filter and the area around it.
- Place a receptacle under the fuel fine filter.
  If necessary, connect a drain hose to the drain valve.
- Open the drain screw **5** on the fuel fine filter by two or three turns:
  Drain off the condensate into a suitable receptacle.
- Unscrew the retaining ring **3** on the fuel fine filter anticlockwise:
  (Use a strap wrench if necessary), take off the retaining ring and pull out the filter cartridge **4**.
- Clean the seal on the filter head.
- Oil the seal on the new filter cartridge.



- Fit a new filter cartridge **4** on the filter base.
  Make sure that the slot **8** in the filter base and the lugs **9** on the filter element are lined up.
- Fit the snap ring **3** and tighten it by 1/3 turn clockwise.
  The snap ring clicks into the notch.

Bleeding the fuel system

Procedure: see the section on changing the fuel pre-filter.

5.3.10 Draining off condensate from the fuel filter

Make sure that:
– The machine is in maintenance position 1.
– The engine compartment hood is open.

Draining off condensate from the fuel fine filter

Procedure

- Place a receptacle under the fuel filter.
  If necessary, connect a drain hose to the drain valve.
- Tighten the bleeder screw **3**.
- Open the drain screw **1** by two or three turns:
  Drain off the condensate into a suitable receptacle until clean fuel flows out.
- Tighten the drain plug **1** again.
- Tighten the bleeder screw **3** again.

Draining off condensate from the fuel pre-filter

Procedure

- Place a receptacle under the fuel filter.
  If necessary, connect a drain hose to the drain valve.
- Tighten the bleeder screw **4**.
- Open the drain screw **6** by two or three turns:
  Drain off the condensate into a suitable receptacle until clean fuel flows out.
- Tighten the drain plug **6** again.
- Tighten the bleeder screw **4** again.

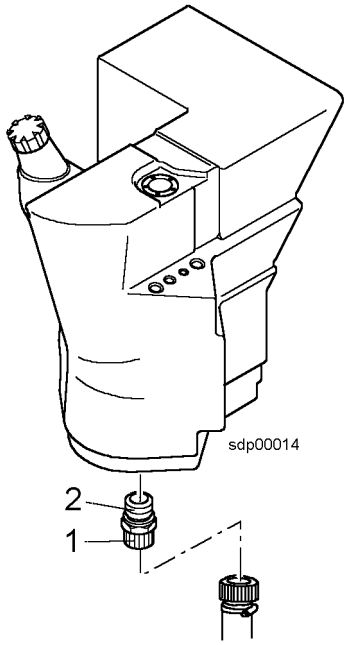
Bleeding the fuel system

Procedure: see the section on changing the fuel pre-filter.

5.3.11 Draining off condensate and sediment from the fuel tank

Make sure that the machine is in maintenance position 1.

Procedure



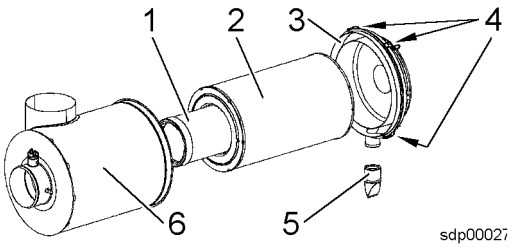
- Unscrew the sealing cap **1** on the drain valve **2** on the bottom of the fuel tank.
- Screw the drain hose onto the drain valve **2**.
- Drain the condensation and sediment into a suitable receptacle until clean fuel begins to flow.
- Unscrew the drain hose and screw the sealing cap **1** onto the drain valve **2** and tighten it.

5.3.12 Cleaning the air filter service cap and dust extraction valve

Important: With the engine running at lower idle speed, you should clearly feel air pulsating at the dust extraction valve.
If the valve is damaged, the dust extraction function is impaired and the filters become clogged more quickly.

Make sure that:
– The machine is in maintenance position 1.
– The engine compartment hood is open.

Cleaning the dust extraction valve



Air filter

1 Safety element
2 Main element
3 Service cap
4 Fixing clips
5 Dust extraction valve
6 Air filter housing

- 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.
- Put the service cap back on the filter housing. The dust extraction valve **5** must face down.

Only when the lid completely covers the filter housing can you close the fixing clips without excessive force.

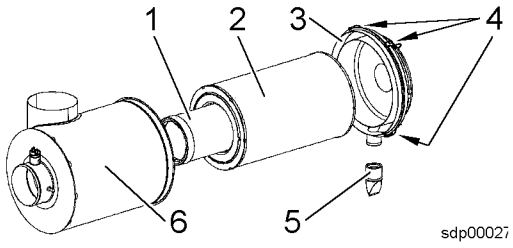
- Close the fixing clips.

5.3.13 Changing the air filter main element when indicated by the vacuum switch

Replace the main element **2** 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 hood is open.

Procedure



Air filter

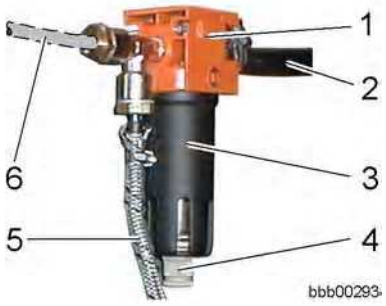
1 Safety element
2 Main element
3 Service cap
4 Fixing clips
5 Dust extraction valve
6 Air filter housing

- 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.

- Make sure that all dirt has been removed from the filter housing:
  Before you put in a new or cleaned filter element.
- The safety element **1** should be replaced every third time the main filter element **2** is replaced.
- Before installing the filter elements, lightly oil the seal surfaces.
  (On the main element **2** this is the inside, on the safety element **1** it is 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**.

5.3.14 Checking and draining the soot particle filter condensate separator

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.



Main components

1 Filter/drain unit
2 Counterpressure line
3 Condensate container
4 Drain plug
5 Exhaust gas counterpressure display line
6 Data logger line

Make sure that the machine is in maintenance position 1.

- **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.

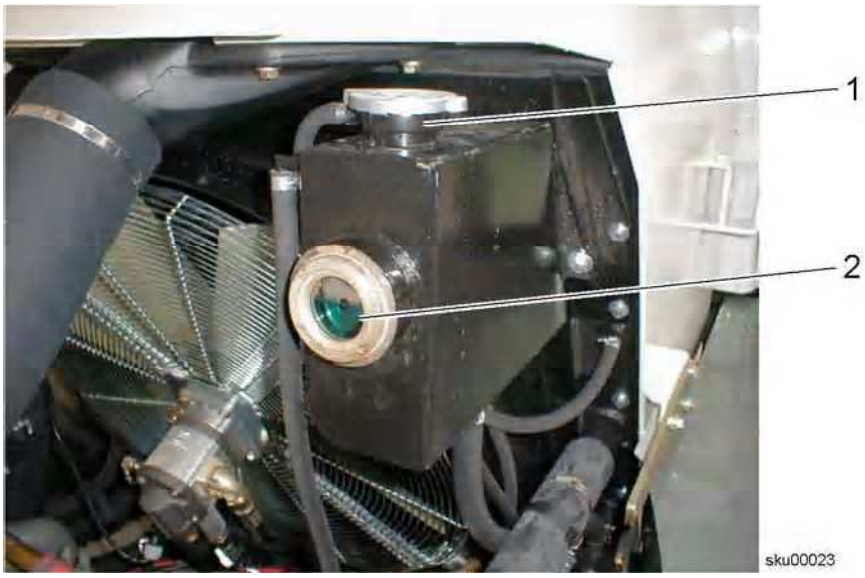
NOTE The condensate separator should be completely replaced after 1000 operating hours.
This must be done when cleaning the filter (every 1000 operating hours as prescribed).

- Contact LIEBHERR CUSTOMER SERVICE.

5.3.15 Checking the coolant level

Make sure that:
– The machine is in maintenance position 1.
– The engine compartment hood is open.

Procedure



- Check the coolant level in the sight glass **2** on the equalising reservoir. The coolant level should be visible in the sight glass **2**.
- If you cannot see the coolant level in the sight glass **2**:
  Top up the coolant via the filler neck **1** to the top of the sight glass.

5.3.16 Checking the coolant antifreeze concentration

All year round, the coolant must contain at least 50 % by volume of concentrated antifreeze, but not more than 60% by volume. This protects against freezing down to around - 37 °C.

Make sure that:
– The machine is in maintenance position 1.
– The engine compartment hood is open.
– The optical density tester or antifreeze tester is ready.

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Checking the antifreeze concentration

Caution

There is a danger of scalding due to coolant escaping under pressure.
Only open the sealing cap once the engine has cooled down.

! Only one or two of the bars on the coolant temperature indicator on the display unit need to be shown.

- Carefully open the sealing cap on the filler neck and let the pressure escape from the cooling system.
- Take a sample of the coolant and check the antifreeze concentration using the test tool.
- If the antifreeze concentration is too low:
  Correct the mixing ratio of the antifreeze in the coolant.

Correcting the antifreeze concentration

- If the antifreeze concentration is too low:
  Drain off the coolant and top up with pure antifreeze according to the following diagram.

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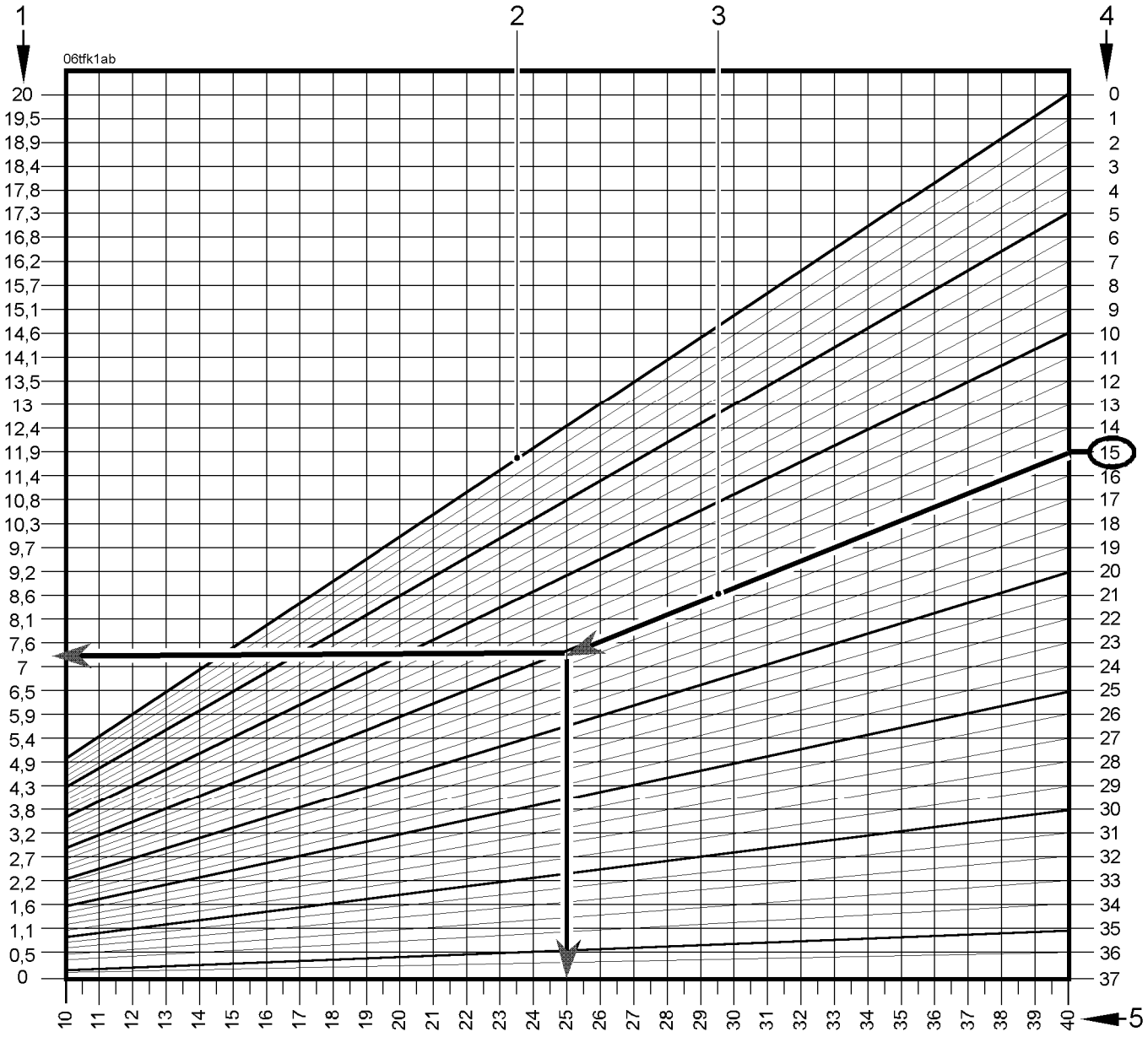
Caution

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 Amount of pure antifreeze to be added in litres
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 you measure a temperature of -15 °C 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.

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.

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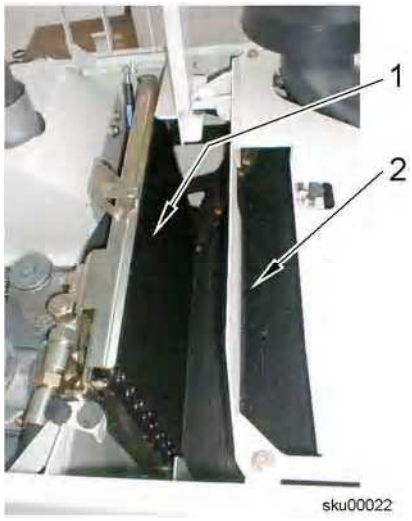
- To restore the correct mixing ratio, you must drain off at least the previously calculated quantity from the cooling system.
- Top up with the correct quantity of pure antifreeze and corrosion protection agent.
- The coolant previously drained off can be used if necessary to restore the required coolant level.

5.3.17 Cleaning the cooling system

Clean the cooler whenever necessary in order to ensure proper cooling. In dusty environments, check the cooler every day and clean it if necessary.
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 engine compartment hood is open.
– The cooler flap is open.
– The air conditioning condenser (optional) is pulled forward.

Procedure



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.

- Clean the cooler units **2** and air conditioning condenser (optional) **1** with compressed air, steam or water. Compressed air is preferable.

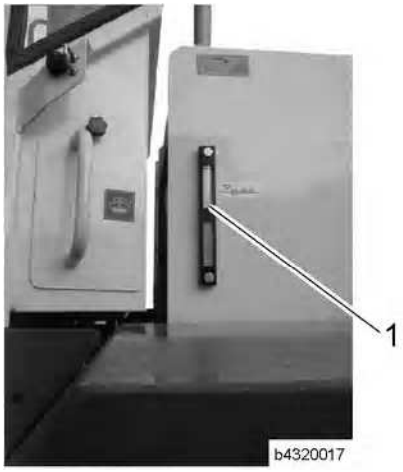
5.3.18 Checking the oil level in the hydraulic tank

Note

When using bio oil, take an oil sample every 500 hours.
! See the hydraulic oil section under lubricants and fuels.

Make sure that:
– The machine is cold.
– The machine is in maintenance position 1.
– The cooling system flap is open.

Checking the hydraulic oil level



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.

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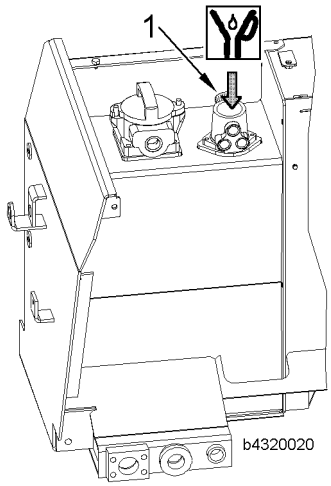
Topping up with hydraulic oil



- 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 the hydraulic oil to the red oil level mark in the sight glass (see the sticker).
- Put the cover on the housing with the spring and tighten it up.
- Screw on the bleeder filter.

5.3.19 Checking and cleaning the magnetic rod on the hydraulic tank

Make sure that:
– The machine is in maintenance position 1.
– The cooling system flap is open.

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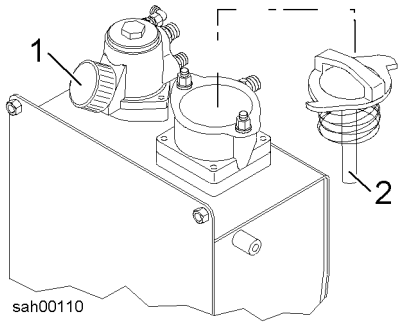
Procedure



- Release the tank pre-pressure: Unscrew the bleeder filter **1** on the hydraulic tank by two turns.
- Release the bolts on the lid and slowly lift the lid with the magnetic rod **2**.

Troubleshooting

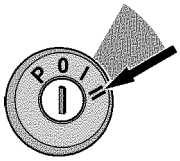
Serious contamination or large metal fragments on the magnetic rod may indicate damage to the hydraulic system.

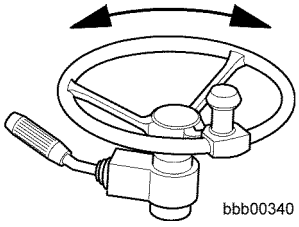
- In this event, locate the problem and rectify it.

- 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.
- Tighten the bleeder filter **1**.

5.3.20 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.

5.3.21 Lubricating the bearing points on the steering cylinders

Make sure that the machine is in maintenance position 1.

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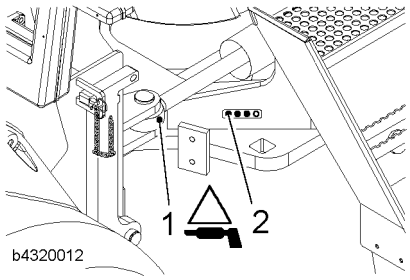
Procedure



Steering cylinder lubrication points

1 Lubrication point at rod end of bearing point

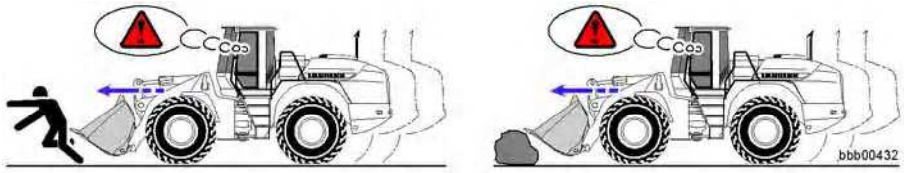
2 Lubrication point at base of bearing point

- Lubricate the bearing points on the steering cylinders.

5.3.22 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

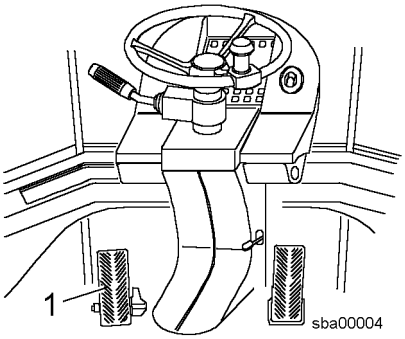


Warning

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.
- While moving, push the inch/brake pedal **1** 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.

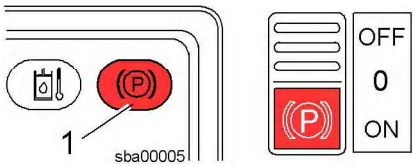
Checking the parking brake

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, select travel range 1 and forward travel direction.
- Drive the machine forwards at around 3 km/h and press the parking brake switch.

The symbol field **1** for the parking brake lights up.

The machine must come to an abrupt halt.

Troubleshooting

If the braking effect is too slight or entirely absent:

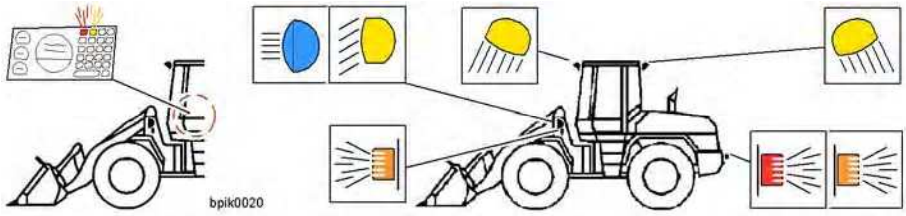
- Contact LIEBHERR CUSTOMER SERVICE.

5.3.23 Checking the indicator lamps and lighting

Make sure that:
– The machine is in maintenance position 1.
– The machine's electrical system is switched on.

Procedure

When you switch on the ignition, the lamps on the display unit are tested.
All symbol fields light up for three seconds.



- Switch on the ignition and check whether the symbol fields on the display unit light up.
- Check that all lights are working.

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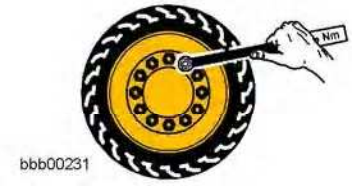
5.3.24 Checking the tightness of the wheels (once after 50, 100 and 250 h)

Make sure that:
– The machine is in maintenance position 1.
– A torque wrench with a measuring range of over 650 Nm is available.

Procedure



Note

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.

Note

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.

Wheel fastening:

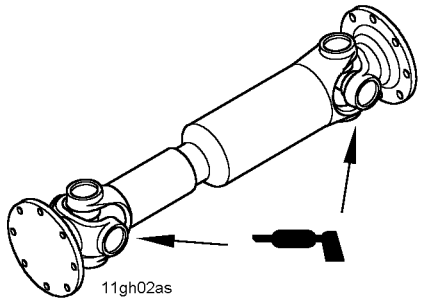
Description	Value	Unit
Wheel lug tightening torque	650	Nm
Wheel lug spanner size	30	mm

Wheel lug tightening torque and spanner size

5.3.25 Checking and lubricating the cardan shaft(s)

Make sure that:
– The machine is in maintenance position 1.
– Wedges are in place to secure the machine against rolling away.

Procedure



- Lubricate the drive shaft at both universal joints.
- Check the play of the drive shaft in the bearings.

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5.3.26 Checking 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

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.

5.3.27 Lubricating the articulation bearing and rear oscillating bearing

Make sure that:
– The machine is in maintenance position 1.
– The articulation lock is engaged.

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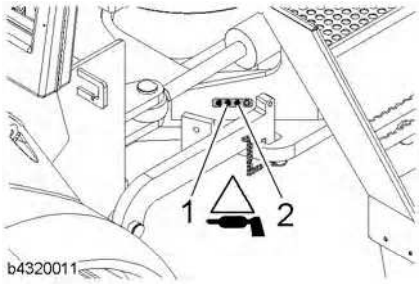
Lubricating the articulation bearing

Procedure



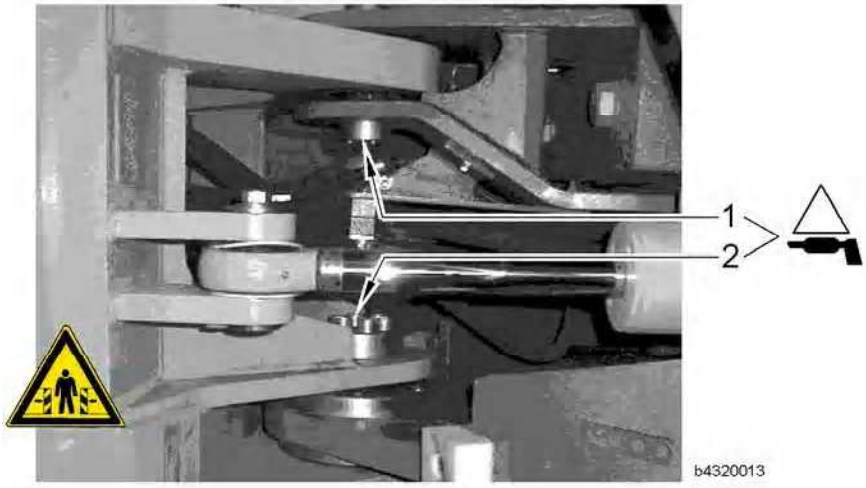
Lubrication points on the right-hand side of the central lubricating rail

1 Front oscillating bearing lubrication point
2 Rear oscillating bearing lubrication point

- Lubricate the oscillating bearing at the front and rear

Lubricating the rear oscillating bearing

Procedure



Articulation bearing lubrication points

1 Top articulation bearing lubrication point
2 Bottom articulation bearing lubrication point

- Lubricate the articulation bearing at the top and bottom.

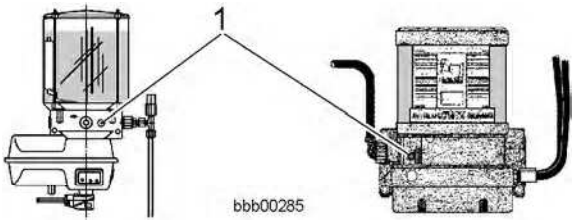
5.3.28 Checking whether metered quantities are adequate at the bearing points (grease collars) of the central lubrication system

This equipment is optional.

Make sure that the machine is in maintenance position 1.


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.

5.3.29 Checking the pipes, hoses and lubrication points of the lubrication system

This equipment is optional.

Make sure that the machine is in maintenance position 1.


bsym0049

- Visually examine the hose lines for defects.
- In case of any defects, locate and rectify the problem.

5.3.30 Greasing the cab door hinges

Make sure that the machine is in maintenance position 1.

Procedure


bsym0053

- Lubricate the door hinges with a grease gun.
  For lubricant specifications, see the section on lubricants and fuels.

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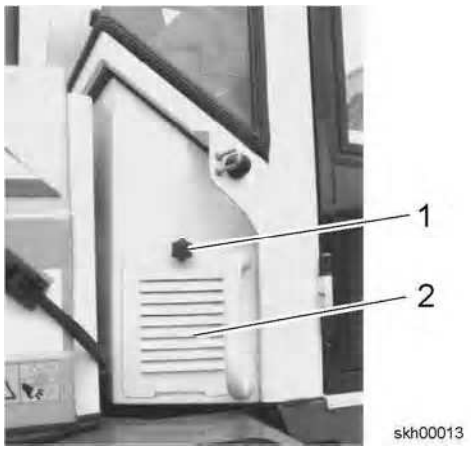
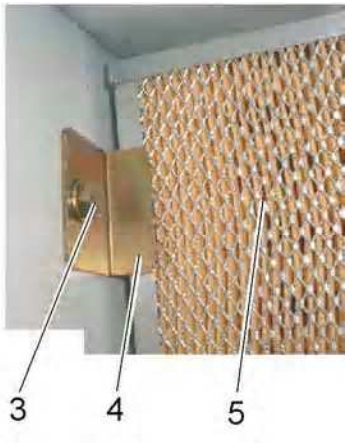
5.3.31 Cleaning or replacing the fresh air and recirculated air filter

The cab fresh air filter can be accessed from the right rear outside of the cab.
Make sure that the machine is in maintenance position 1.





Procedure

- Undo the star grip screw **1** and and take off the ventilation grille **2**.
- Undo the hex screw **3** and take off the holder **4**.
- Pull out the filter element **5** on the left and remove it.
- Clean or replace the filter element **5**.
- Carefully remove any dust which has collected in the fresh air filter duct.
  (The area behind the filter must be completely clean.)
- Put in the new or clean filter element **5** and fasten it with the holder **4** and screw.
  The holder **4** must exert moderate pressure on the seal surface of the filter element. Make sure it is correctly installed (the arrow shows the direction of air flow).
- Put in the ventilation grille **2** and fasten it with the star grip screws **1**.

5.3.32 Lubricating the lift arms and attachment (Z kinematics)

Make sure that the machine is in maintenance position 2.

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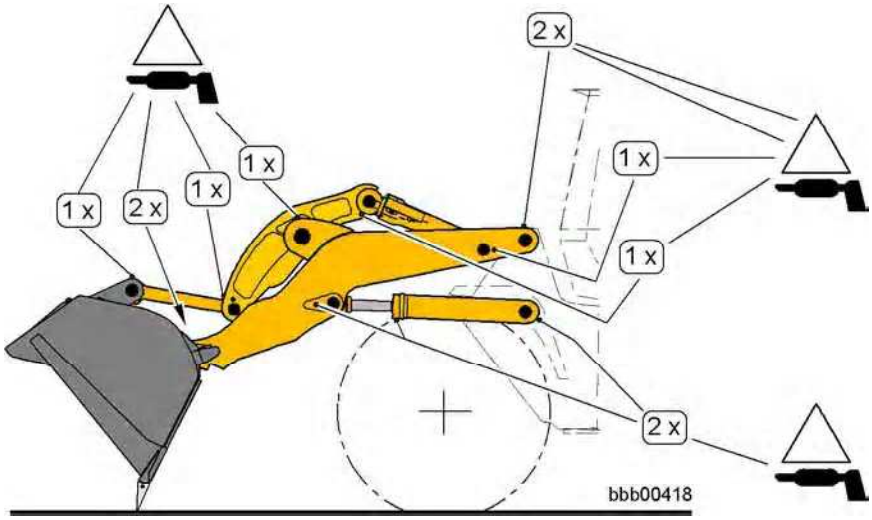
Procedure



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.
  For lubricant specifications, see the section on lubricants and fuels.
- If fitted, grease the lubrication points on the attachment.
- The lower bucket bearings should be lubricated daily if necessary.
- If fitted, lubricate the optional quick-change device.
  Procedure: see the section on lubricating the quick-change device.

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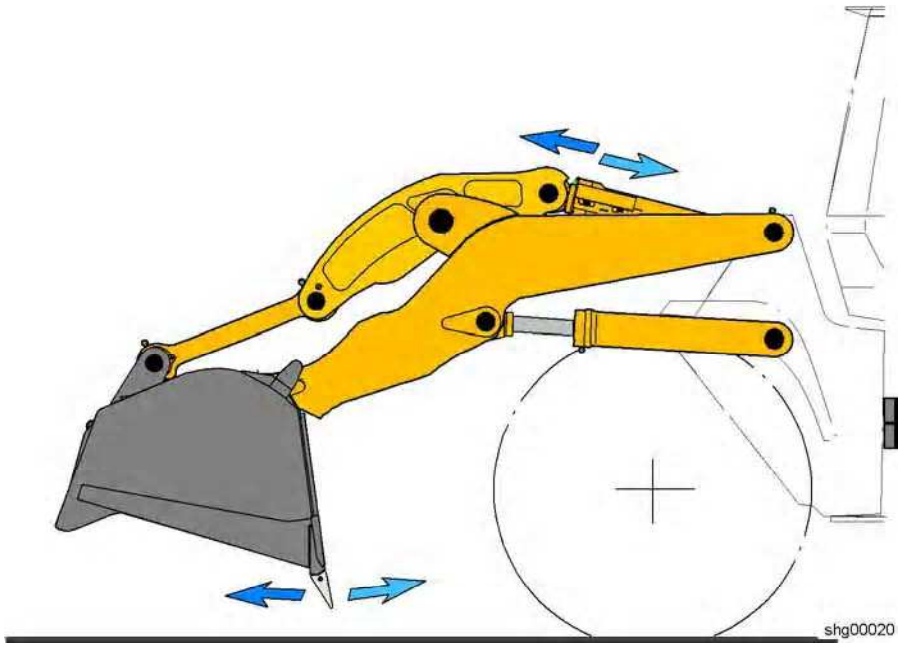
5.3.33 Checking the bearing bushings on the lift arms (Z kinematics)

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.



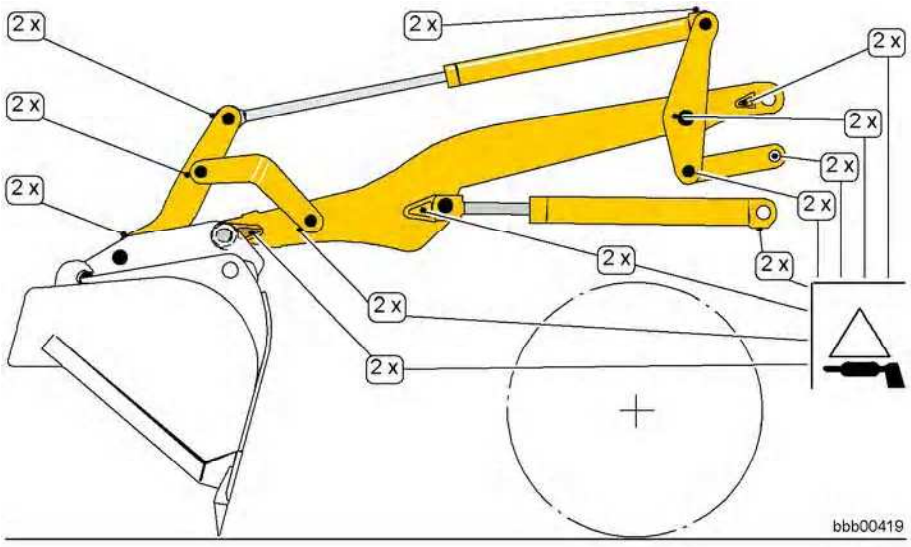
Lift arm bearing bushings

- 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.

5.3.34 Lubricating the lift arms and attachment (P kinematics)

Make sure that the machine is in maintenance position 2.

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.
  For lubricant specifications, see the section on lubricants and fuels.
- If fitted, grease the lubrication points on the attachment.
- The lower bucket bearings should be lubricated daily if necessary.
- Lubricate the quick-change device.
  Procedure: see the section on lubricating the quick-change device.

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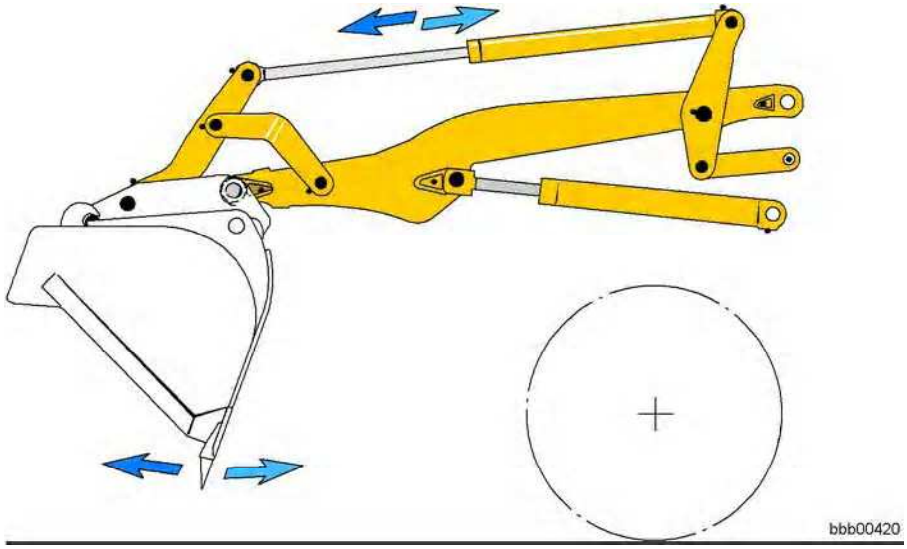
5.3.35 Checking the bearing bushings on the lift arms (P kinematics)

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.

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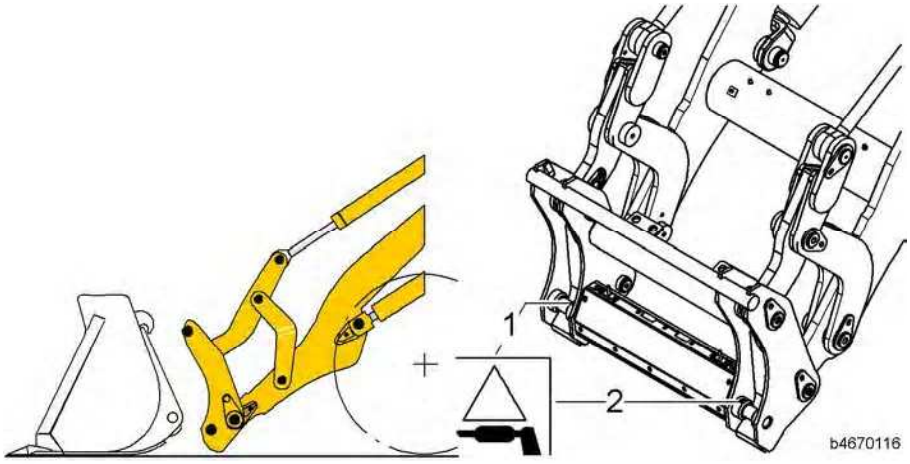
5.3.36 Lubricating and testing the quick-change device

Lubricating the quick-change device

Make sure that:
– The machine is in maintenance position 2.

If the lubricating points near the bucket coupling are poorly accessible:
– Make sure the working attachment is disconnected.



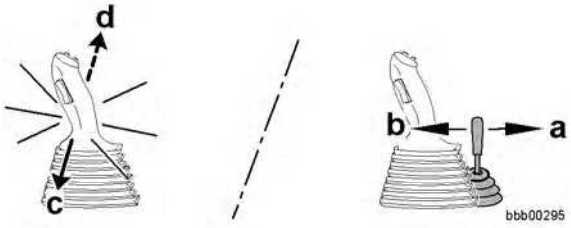
Quick-change device lubrication points

- Lubricate the quick-change device.
  For lubricant specifications, see the section on lubricants and fuels.

Testing the quick-change device

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.

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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.

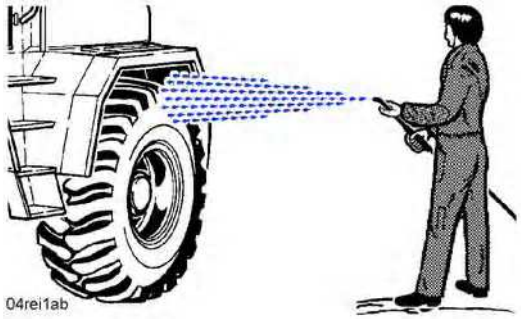
This prevents the locking pins from jamming and preventing the quick-change device from being released.

- To make sure, check:
  That the quick-change device is properly locked again.

5.3.37 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.

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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.

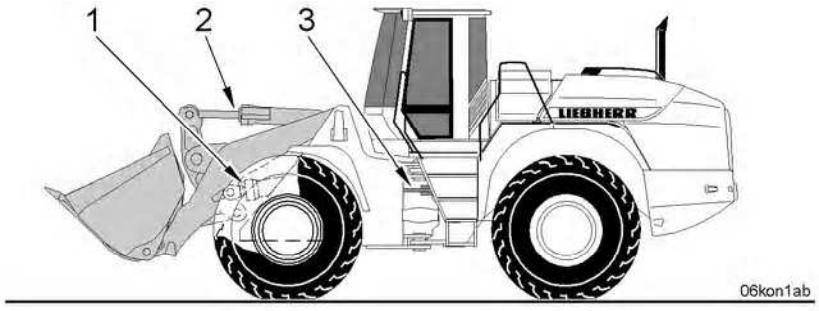
- Carefully clean the engine.

5.3.38 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.

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- 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.

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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.

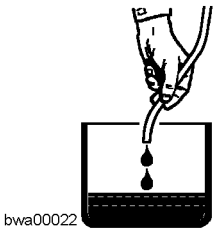
Disposing of used materials

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

Caution

Environmental and health hazard
! Observe the local regulations for protecting the environment when disposing of used materials.



Disposal

- Always collect and store used materials separately in suitable containers.
- Dispose of used materials properly at the official collection points.

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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:

Caution

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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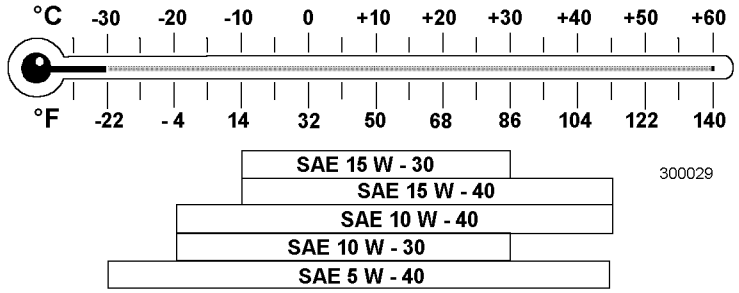
The selection of the SAE classification does not affect the quality of a lubricant oil.
If the viscosity is too high, starting can be difficult. If it is too low, lubricant efficiency may be impaired.
The temperature ranges detailed in the following diagram are guidelines - short-term deviations are 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.

If the specified service hours (Bh) are not attained in the course of a year, check the engine oil and filter 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
– Operating temperature 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	Up to 0.5%	250 h	500 h
	Above 0.5%	125 h	250 h
Below -10 °C	Up to 0.5%	125 h	250 h
	Above 0.5%	–	125 h

Oil change intervals in service hours (h)

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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

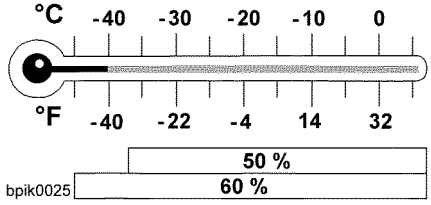
Drinking tap water is suitable with the following restrictions.
Appearance: colourless, clear, free of visible impurities.
Sea water, brackish water, salt water and industrial waste water are not suitable.

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

Fresh water quality

Coolant

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 it does not fall below 50% by volume.



Proportion in % of antifreeze and corrosion protection agent

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.

! Do not use more than 60% antifreeze and corrosion protection agent.

When carrying out maintenance work, check the concentration of anti-freeze and anti-corrosion agent and correct it if necessary.
The prescribed interval for changing the coolant is 2 years.

Approved antifreeze and corrosion protection agents

Approved antifreeze and corrosion protection agent for diesel engine cooling systems		
Product designation		**Manufacturer**
A	Agip Antifreeze Plus	Agip
	Aral Kühler-Frostschutz A	Aral
	AVIA Frostschutz APN (G48-00)	AVIA
C	Caltex Engine Coolant DB	Caltex
	Caltex Extended Life Coolant	Caltex
	Castrol Anti-Freeze O	Castrol
	Chevron DEX-COOL Extended Life Anti-Freeze/Coolant	Chevron Texaco
D	DEUTZ Kühlschutzmittel 0101 1490	DEUTZ
E	Esso Kühlerfrostschutz	Esso
F	Frostschutz Motorex (G 48-00)	Bucher + Cie
G	Glysantin (G48-00)	BASF
H	Havoline XLC	ARTECO
	Havoline DEX-COOL Extended Life Anti-Freeze/Coolant	Chevron Texaco
O	Organifreeze	Total
T	Total Antigel S-MB 486	Total
	Total Frostfrei	Total

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

Operating in hot climates

The engines are designed for use with glycol-based coolants.
Always use a recommended glycol-based engine coolant, even when operating the machine in a region where anti-freeze protection is not required.

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5.4.4 Hydraulic oils

Specifications

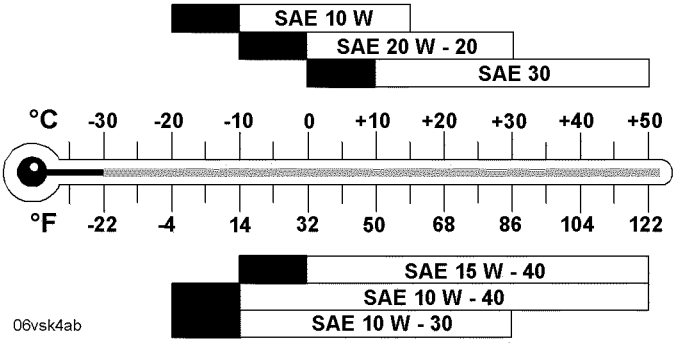
Only engine oils (mineral oils) meeting the following specifications and regulations are permitted.

Description	Specifications
API classification (American Petroleum Institute)	CF-4, CG-4, CH-4
ACEA classification (Association des Constructeurs Européens de l'Auto-mobile)	E2 , E3 , E4

Specifications and regulations for hydraulic oil

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.

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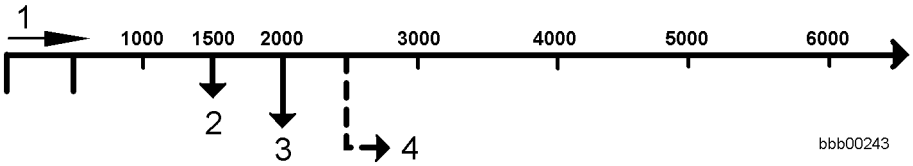
NOTE:

- **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

Axles and transfer gear

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.

For the viscosity class SAE 90 LS, an oil of the viscosity class SAE 80 W 90 LS can also be used.

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
- Grease for the automatic lubrication system

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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)

Grease for the automatic lubrication system

Greases with high-pressure additives (EP greases) are recommended.
Only use greases with the same type of saponification.


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Note:

Greases with solid lubricant particles such as graphite may not be used.

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