en **Operator's manual**

Wheel loader

Document ID

ORIGINAL OPERATOR'S MANUAL

Order number: 12254785
Issued: 2021-10-14
Version: 07
Author: LBH / Technical Documentation Department

Product ID

Manufacturer: Liebherr-Werk Bischofshofen GmbH
Type: L 506
Type no.: 1816
From Serial no.: 56304

Contact

Liebherr-Werk Bischofshofen GmbH
Dr. Hans Liebherr-Straße 4
A – 5500 Bischofshofen

Machine data:

Enter the following information on taking delivery. *You will find the information on the type plate of the machine. This will also be useful when you order spares.

* Vehicle ID number:

VATZ ..... ZB .....

* Year of manufacture:

.....

Commissioning date:

..... / ..... / .....

LIEBHERR

EC Declaration of Conformity

Original Declaration of Conformity

Herewith we declare that the machine/equipment designated below is designed and built in the version sold by us in such a way as to comply with the relevant fundamental safety and health criteria of the applicable EC Directive(s). This declaration shall cease to be valid if alterations are made to the machine/equipment without our prior agreement.

Category:	**WHEEL LOADER**
Make:	**LIEBHERR**
Type:	**L xxx**
Serial number:	***VATZxxxxxZB0xxxxx***
Engine power:	**xx kW at xxxx rpm**

1. Relevant regulations (last valid version):

1.1. 2006/42/EG
- 1.1.1. Documentation officer:
  Liebherr-Werk Bischofshofen GmbH, Dr.-Hans-Liebherr-Straße 4, A-5500 Bischofshofen
- 1.1.2. Submitted voluntary for a design type examination with:
  DGUV Test, Prüf- und Zertifizierungsstelle, Fachbereich Bauwesen, ID no 0515,
  Landsberger Straße 309, D-80687 München

1.2. 2014/30/EU

1.3. 2000/14/EC
- 1.3.1. Measured sound power level on machines representative for this type: xxx dB(A)
- 1.3.2. Guaranteed sound power level: xxx dB(A)
- 1.3.3. Applied conformity assessment procedure according to Annex VIII
- 1.3.4. Technical documentation archive location: Technical office
  Liebherr-Werk Bischofshofen GmbH, Dr.-Hans-Liebherr-Straße 4, A-5500 Bischofshofen
- 1.3.5. Notified body:
  DGUV Test, Prüf- und Zertifizierungsstelle, Fachbereich Bauwesen, ID no 0515,
  Landsberger Straße 309, D-80687 München

2. Applied harmonised standards, in particular:

2.1. EN 474-1

2.2. EN 474-3

3. Applied national technical standards and specifications, in particular:

–

LIEBHERR-WERK BISCHOFSHOFEN GMBH
A-5500 Bischofshofen

iV Gerhard Pirnbacher
(Head of Quality Management Dept.)

Bischofshofen, xxx

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Landesgericht Salzburg
FN 37715p.
DVR-Nr. 0029173
UID-Nr. ATU 36878401

Bankverbindungen:
UniCredit Bank Austria AG
IBAN AT 29 1100 0009 5459 3000
BLZ 12000 KTO 00954593000
BIC BKAUATWW
Erste Group Bank AG Wien
IBAN AT 25 2010 0403 1263 9400
BLZ 20100 KTO 40312639400
BIC GIBAATWG
HVB UniCredit Bank AG Memmingen
IBAN DE 3273 1200 7500 0265 6892
BLZ 73120075 KTO 2656892
BIC HYVEDEMM436

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Fig. 1: Example EC declaration of conformity for a wheel loader

The EC declaration of conformity delivered with the machine is valid in all member states of the European Economic Area (EWR) and must be kept in a safe place.

LIEBHERR

EC DECLARATION OF CONFORMITY

per the Machinery Directive 2006/42/CE, Annex II A

We hereby declare that the design and construction of the machine designated below, as well as the design marketed by us, conforms to the basic health and safety requirements of EC Directive(s). This declaration shall become void in the event of a modification that has not been approved by us beforehand.

Machine type:	Fork carrier with fork prongs
Manufacturing brand:	LIEBHERR
Type:	See type plate

1. Applicable provisions (the last valid version thereof):
   - 1.1. 2006/42/EC
     - 1.1.1. Authorised documentation representative:
       Liebherr-Werk Bischofshofen GmbH, Dr.-Hans-Liebherr-Straße 4, A-5500 Bischofshofen

2. Applied European harmonised standards:
   - 2.1. EN 474-1
   - 2.2. EN 474-3

3. Applied national standards and technical specifications:

LIEBHERR-WERK BISCHOFSHOFEN GMBH

Bischofshofen, 26.01.2016

p.p. Gerhard Pirnbacher
Head of Quality Management

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DPR no. 0029173
VAT ID no. ATU
36878401

Bank details:
UniCredit Bank Austria AG
IBAN AT 29 1100 0009 5459 3000
Sort code 12000 Acct. no. 00954593000
BIC BKAUATWW
Erste Group Bank AG Wien
IBAN AT 25 2010 0403 1263 9400
Sort code 20100 Acct. no. 40312639400
BIC GIBAATWG
HVB UniCredit Bank AG Memmingen
IBAN DE 3273 1200 7500 0265 6892
Sort code 73120075 Acct. no. 2656892
BIC HYVEDEMM436

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Fig. 2: EC declaration of conformity for fork carrier

The original copy of the EC declaration of conformity is not supplied, but can be requested from Liebherr customer service.

Preface

This operator's manual is intended for you as **operator** or **maintenance staff**. It contains warnings, important information and tips on handling the machine. It makes it easier for you to adapt to and familiarise yourself with the machine and helps to avoid malfunctions due to improper operation.

By observing the operator's manual, you will increase the reliability and service life of the machine.

This operator's manual must be kept with the machine. Make sure that a copy is always kept within reach at the workplace.

Read the operator's manual before putting into service and then later at regular intervals. Every person who works with or on the machine must know and apply this operator's manual.

Examples of this work:
- **Operation** including rigging and set up, troubleshooting, maintenance, disposal of lubricants and fuels
- **Servicing** including maintenance, inspection and repair work
- **Transport** or loading the machine

The operator must supplement the operator's manual with instructions concerning existing national accident prevention and environmental protection regulations. In addition to the operator's manual and applicable national and local legal accident prevention rules, observe the recognised technical regulations for safe and correct operation.

Some sections in this operator's manual do not apply to all machines.

Some illustrations in this operator's manual may show details and equipment that are different from those on your machine.

On some pictures, protective devices and covers have been removed for a better view.

Due to ongoing improvements to Liebherr machines, it is possible that changes to your machine are not included in this operator's manual. The continuous updating of the operator's manual only takes into account the latest software version. For optimal interaction between the machine and the operator's manual, the software version described in the operator's manual must correspond to the software version of the machine. The latest operator's manual is available on the MyLiebherr portal. To update the machine, contact Liebherr customer service.

For further explanations or information, contact Liebherr customer service.

For questions on regulation (EC) No. 1907/2006 (REACH), the following email is available: materialcompliance.EMT@liebherr.com.

All the documentation acquired for this machine (operator's manual, maintenance manual, spare parts catalogue,...) is available via MyLiebherr for the entire life of the machine.

https://www.myliebherr.com

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Liability and warranty

Due to the large number of products on offer from other manufacturers (such as fuels, lubricants, attachments and replacement parts), Liebherr cannot generally test the suitability and faultless function of all third-party products in or on Liebherr products. The same applies to any interdependency of third-party products with Liebherr products.

The use of third-party products in or on Liebherr machines is at the risk of the operator. Liebherr accepts no warranty or liability for damage of any kind in the event of breakdowns or damage to Liebherr machines caused by the use of third-party products.

In addition, Liebherr will also reject any warranty claims for damage caused by improper use, insufficient maintenance or failure to observe safety instructions.

Modifications, conditions, copyright

Liebherr reserves the right to make changes without notice as a result of technological development.

The information and illustrations in these instructions may not be reproduced, distributed or used for commercial purposes. All rights under copyright law are expressly reserved.

The warranty and liability terms contained in Liebherr's general conditions of trade are not affected by the information provided above.

Abbreviations used

IND-kinematics = kinematic version of the lift arms
LED = light emitting diode
LH-ECU = Liebherr Electronic Control Unit
LH = Liebherr
LKW = truck
P-kinematics = kinematic version of the lift arms
SKW = heavy lorry
UEC = universal earth mover controller
Z-kinematics = kinematic version of the lift arms

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Reply form

We need your help to continually improve our documentation. Please copy this page and fax it or e-mail it to us with your comments, ideas and suggestions for improvement.

To: Liebherr-Werk Bischofshofen GmbH
Dr. Hans Liebherr Straße 4
A-5500 Bischofshofen / Österreich

Fax: 0043 6462 888 341

E-mail: roland.weber@liebherr.com

Ideas, comments (please state the page number):

Overall, how would you judge this document?

Excellent	
Very good	
Good	
Satisfactory	
Poor	

Your data:

Machine / serial number:

Company:

Last name:

Address:

Telephone number:

Dealer:

Thank you for your help.

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Notes:

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1 Product description

1.1 Technical description

1.1.1 Overview of the complete machine

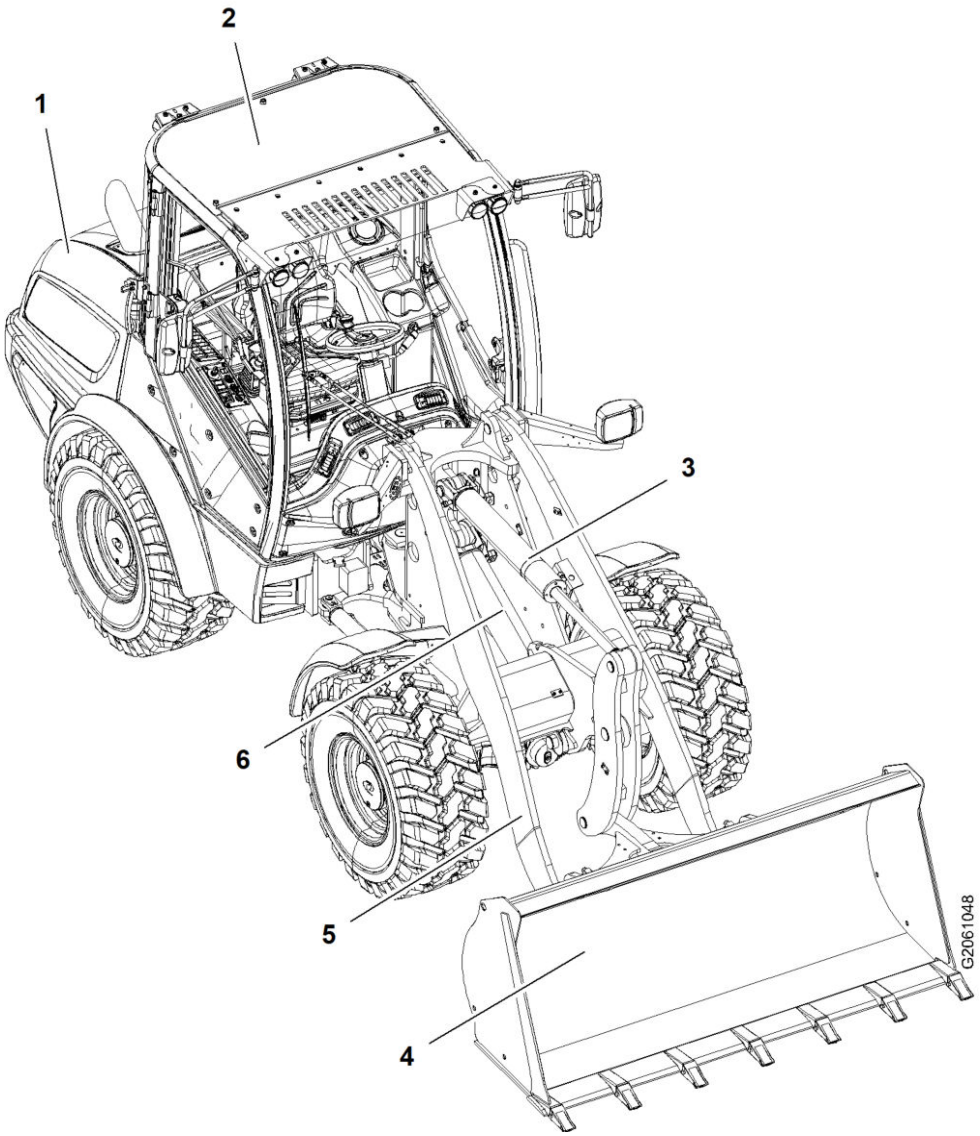

Fig. 3: Overview of the complete machine

1	Engine bonnet	**4**	Working attachment
2	Operator's cab	**5**	Lift arms
3	Tilt cylinder	**6**	Lift cylinder

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1.2 Technical data

1.2.1 Vibrations

Hand, arm and whole-body vibrations

The operator's seat installed in the machine by the manufacturer complies with ISO 7096:2000, EM3 for wheel loaders. If the seat is replaced, the new seat must also comply with this standard.

Hand/arm vibrations

When the machine is correctly operated, the weighted (frequency-evaluated) effective value for hand/arm vibrations as per ISO 5349-1:2001 is less than 2.5 m/s^2.

Whole-body vibrations

When the machine is correctly operated, weighted (frequency-evaluated) effective values for certain example applications of the machine can be seen in the tables listed below. These values are based on the information in the technical report ISO/TR 25398:2006 “Earth-moving machinery - Guidelines for assessment of exposure to whole-body vibration of ride-on machines - Use of harmonized data measured by international institutes, organizations and manufacturers”. The measuring method corresponds to ISO 2631-1:1997. The listed effective values for typical machines are given with standard deviations. These deviations are classified according to light, normal and heavy-duty operating conditions. The operator must classify the operating conditions according to the terrain, site conditions, site organisation, material, machine equipment, mode of operation and expertise of the driver.

Because the stated values are individual effective values for certain common applications, it is only possible to approximately assess the driver's exposure to vibrations.

(For more information see: 2.7.7 Protection against vibration, page 52)

Machine type	Typical working cycles	Weighted effective value in m/s^2 under light, normal and heavy-duty operating conditions [A)]								
		x axis			y axis			z axis		
		Light	Normal	Heavy	Light	Normal	Heavy	Light	Normal	Heavy
Wheel loader	Load & Carry	0.44	0.60	0.76	0.44	0.58	0.72	0.38	0.52	0.66
	Transfer	0.31	0.54	0.78	0.40	0.65	0.90	0.32	0.49	0.66
	V operation	0.50	0.71	0.91	0.37	0.60	0.83	0.40	0.54	0.68
	Mining	0.57	0.91	1.24	0.47	0.69	0.91	0.34	0.81	1.28

Tab. 1: Whole-body vibrations

A) The measuring uncertainty is defined in the EN 12096:1997 standard.

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1.2.2 CO_2 emissions from diesel engine

– The diesel engine and emission reduction system must be operated and maintained according to the operator's manual in order to maintain the emission performance of diesel engine.
– No manipulation of the diesel engine and emission reduction system may be performed.
– Faults occurring in the diesel engine and emission reduction system must be rectified immediately according to the operator's manual.
– In event of faults in the diesel engine and emission reduction system, warning messages are displayed on machine.
– Failure to observe warnings regarding the diesel engine and emission reduction system will trigger the prompt to take machine out of operation.

This CO_2 measurement is the result of testing a (master) engine representative of the engine model or family in a fixed test cycle under laboratory conditions and does not constitute an express or implied warranty of performance for a particular engine.

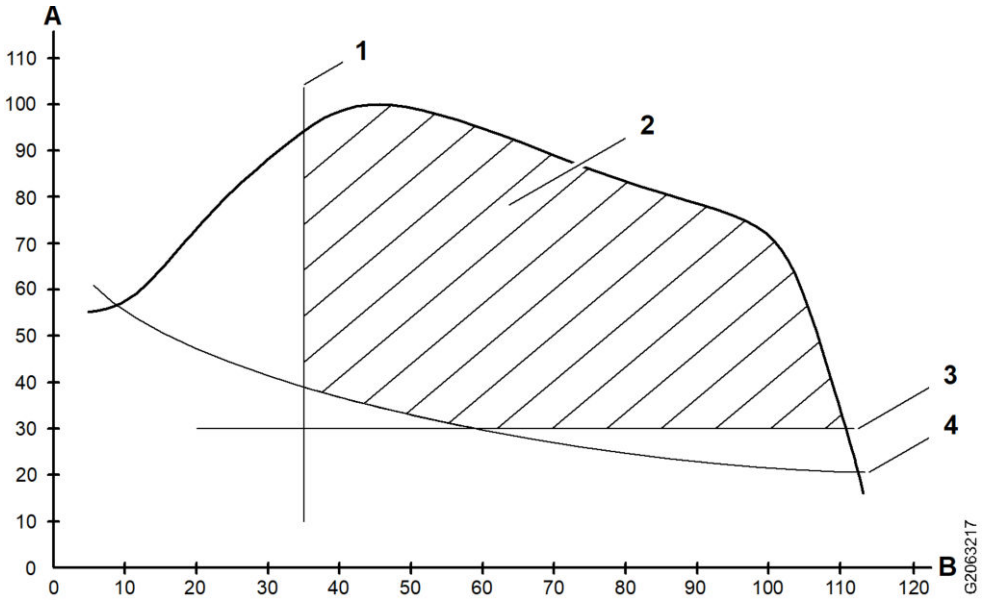

Fig. 4: CO_2 emissions from diesel engine

A Torque (% of maximum torque)
B Engine speed (%)
1 Engine speed A
2 Inspection range
3 30% torque
4 30% engine power

Engine model	Rated output	Upper idling speed	EU2016/ 1628	CO_2 emissions EU 2016/1628
4TNV98C-P	49.9 kW	2400 min^{-1}	V	794 g/kWh
4TNV98CT-XN	53.7 kW	2400 min^{-1}	V	738 g/kWh
4TNV98C-S	46.2 kW	2200 min^{-1}	V	794 g/kWh
4TNV98C-P	49.9 kW	2400 min^{-1}	V	794 g/kWh

Tab. 2: CO_2 emissions from diesel engine

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Test conditions:
– NRSC / RMC: stationary test cycle for mobile machines and devices / stepped multiphase cycle not intended for public roads. “Stationary test cycle” refers to a test cycle in which the speed and torque of the engine assume a finite number of nominally constant values; stationary tests are either single phase test cycles or stepped multiphase cycles.
– NRTC: transient test for non-road mobile machinery. “Transient test cycle” refers to a test cycle in which normalised speed and torque valueschange every second.

1.2.3 Sound level

The sound pressure level (L_{pA}) is determined according to ISO 6396. The measuring uncertainty is defined in this standard.

The sound power level (L_{WA}) is determined according to the directive 2000/14/EC. The measuring uncertainty is defined in the ISO 4871 standard.

Description	Unit	Value
Sound pressure level (L_{pA}) in operator's cab	dB(A)	78
Sound power level (L_{WA})	dB(A)	101

1.2.4 Diesel engine

Water-cooled normally aspirated diesel engine, optimum operating range up to 1500 m above sea level.

Common rail direct injection

Exhaust emissions are within thresholds of stage V.

Description	Unit	Value
Diesel engine		4TNV98C
Number of cylinders		4
Maximum gross power output (ISO 3046 and SAE J1995) at 2200 min^{-1}	kW	46
Maximum net power output (ISO 9249 and SAE J1349) at 2200 min^{-1}	kW	45
Nominal power (ISO 14396) at 2200 min^{-1}	kW	46
Maximum net torque (ISO 9249 and SAE J1349) at 1430 min^{-1}	Nm	239
Displacement	litres	3.319
Inclinability		30°

1.2.5 Electrical system

Description	Unit	Value
Operating voltage	V	12
Number of batteries		1

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Description	Unit	Value
Battery voltage	V	12
Battery capacity	Ah	100
Alternator	V / A	12 / 80
Starter	V / kW	12 / 3

1.2.6 Travel drive

Hydrostatic travel drive

Design: Swash plate - variable displacement pump and axial piston motor in a closed circuit.

Filter: Return-suction filter for closed circuit.

Control: Travel drive controlled by accelerator pedal and tractive force control pedal (inch pedal). Tractive force control pedal allows you to smoothly adapt tractive or thrust force to terrain and conditions. Forward travel and reverse travel are selected using control lever.

Travel speeds

– For forward and reverse travel
– With standard tyres

Description	Unit	Value
Fixed gear 1	km/h	0-6.0
Fixed gear 2	km/h	0-20.0

1.2.7 Axles

– Four-wheel drive
– Axle ratio: planetary drives in wheel hubs

Front axle

Rigidly mounted planetary axle.

Description	Unit	Value
Track width	mm	1350
Automatic differential lockout	%	45

Rear axle

Rigidly mounted planetary axle.

Description	Unit	Value
Track width	mm	1350
Automatic differential lockout	%	45

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1.2.8 Braking

The brake systems comply with the roadworthiness certification regulations.

Service brake

Self-arrest of hydrostatic travel drive acts on all four wheels, non-wearing, and additional hydraulic drum brake.

Parking brake

Mechanical drum brake.

1.2.9 Steering

Type: Central articulated pendulum joint

Description	Unit	Value
Angle of articulation to each side		40°
Articulated joint angle of articulation to each side		10°

1.2.10 Working hydraulics

Design: Gear pump for supplying working hydraulics and steering system (via priority valve)

Filter: Return-suction filter in hydraulic tank

Control: Direct operation with single control lever

Lifting cycle: Lift, neutral, lower, float position using latching control lever

Tilting cycle: Tilt in, neutral, tilt out

Additional hydraulics: 3rd control circuit optional

Description	Unit	Value
Maximum flow rate	l/min	70.4
Maximum operating pressure	bar	230

1.2.11 Lift arms

Powerful z-bar kinematics with parallel guide and hydraulic quick-change device as standard.

Working cycle time at rated load

Description	Unit	Value
Lifting	s	5.3
Tilting out	s	1.3

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Description	Unit	Value
Lowering (empty)	s	2.9

1.2.12 Operator's cab

Design:
– Elastically mounted, soundproofed cab
– Operator's cab door with 178° opening angle
– Right hinged window with vent opener
– 180° right hinged window (option)
– Single-pane safety glass
– Heated rear window
– All window panes are tinted
– ROPS rollover protection in accordance with EN/ISO 3471/EN 474-1
– FOPS stone impact protection in accordance with EN/ISO 3449/EN 474-1

Operator's seat

4-position, shock-absorbing operator's seat as standard (mechanically sprung, adjustable to driver’s weight)

1.2.13 Heating, ventilation

– Operator's cab and defroster and electrically heated rear window
– Fresh air filter
– Air circulation system and hot water heater
– Cab ventilation

Description	Unit	Value
Number of blower speeds		3
Heating power	kW	11

1.2.14 Air conditioning system

This equipment is optional.

Description	Unit	Value
Refrigerant		R134a
Cooling power	kW	6.4

1.2.15 Tow hitch

The tow hitch is attached to the back of the machine.

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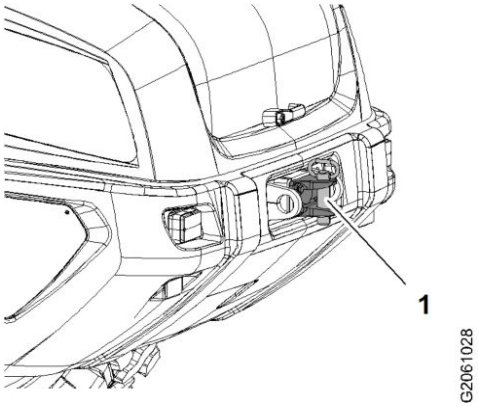

Fig. 5: Tow hitch

1 Tow hitch

The tow hitch **1** is for quickly towing the machine out of a danger zone onto a firm surface. (For more information see: 3.7.2 Recovering and towing machine, page 171)

Note

It may not be used for attaching a trailer!

The manufacturer will not be held liable for damage resulting from this.

1.2.16 Ballast

The ballast supplied ex works is configured according to the order information.

Key:
LR = pneumatic tyres
LR+RA = pneumatic tyres with foam filling
LR+K = pneumatic tyres with chains
x = required ballast

Ballast	LR	LR+RA	LR+K
Standard ballast	x	- -	- -
Special ballast	- -	x	x
Road ballast	x	- -	- -

Tab. 3: Ballast

1.2.17 Tyres

The following table lists all tyres approved by Liebherr for standard use, along with recommended tyre pressures. Certain ground conditions and uses of the machine require the tyre pressure to be adjusted. Precise details are available from the tyre manufacturer, tyre dealer or Liebherr customer service. Tyres not listed in the following table may only be used after consultation with Liebherr customer service.

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NOTICE
Different tyre diameters!
Damage to the travel drive.

- ▶ The diameter of the tyres on the front and rear axles may not differ by more than 3%.
- ▶ The diameter of the tyres on the left and right wheels may not differ by more than 1.5%.

Size and tread code		Change in operating mass	Width across tyres	Change in height	Tyre pressure		
					FA [A]	RA [B]	p - max. [C]
		kg	mm	mm	bar	bar	bar
Dunlop 15.5/55R18 SP PG7	L2	-32	1780	-28	3.25	2.25	4.00
Dunlop 365/70R18 SP T9	L2	-16	1780	1	3.50	2.75	3.75
Dunlop 365/80R20 SP T9	L2	+60	1770	+56	3.00	2.50	3.75
Dunlop 405/70R18 SP T9	L2	+40	1810	+24	3.00	2.50	3.75
Dunlop 405/70R20 SP T9	L2	+96	1810	+50	2.75	2.25	3.75
Firestone 340/80R18 Duraforce UT	L3	+21	1760	+15	3.00	2.50	4.00
Firestone 365/80R20 Duraforce UT	L3	+80	1780	+53	3.00	2.50	3.75
Firestone 400/70R20 Duraforce UT	L3	+122	1810	+43	2.50	1.75	4.00
Firestone 400/70R20 R8000 UT	L2	+99	1810	+43	2.50	2.00	4.00
Firestone 405/70R18 Duraforce UT	L3	+92	1820	+23	3.00	2.50	3.75
Michelin 400/70R20 BIBLOAD	L3	+96	1810	+38	2.50	1.90	4.40
Michelin 400/70R20 XMCL	L2	+112	1820	+44	2.50	1.90	4.00
Mitas 365/70R18 EM-01	L2	0	1780		3.75	3.00	3.75
Mitas 365/80R20 EM-01	L2	+60	1780	+52	3.00	2.50	3.75
Mitas 405/70R18 EM-01	L2	+56	1820	+25	3.00	2.50	3.75
Mitas 405/70R20 EM-01	L2	+92	1820	+50	2.75	2.25	3.75
Nokan 400/70R20 Hakkapeliitta TRI	L2	+112	1810	+48	2.80	1.80	4.00
Trelleborg 400/70R20 TH400	L2	+106	1810	+38	2.80	2.00	4.40

Tab. 4: Approved tyres for standard uses

A) Recommended tyre pressures on the front axle (for machine with standard equipment and cold tyres)
B) Recommended tyre pressures on the rear axle (for machine with standard equipment and cold tyres)
C) Maximum tyre pressure

Special tyres

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

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Size and tread code	Change in operating mass	Width across tyres	Change in height	Tyre pressure		
				FA [A]	RA [B]	p - max. [C]
	kg	mm	mm	bar	bar	bar
...						
...						
...						

Tab. 5: Special tyres

A) Front axle
B) Rear axle
C) Maximum tyre pressure

1.2.18 Snow chains or guard chains

This equipment is optional.

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

NOTICE
Improper assembly of the snow chains or tyre protection chains!
Damage to drive system.

▶ Install snow chains or tyre protection chains on all four wheels.

Use of snow chains or tyre protection chains requires an adjustment of ballast.

1.2.19 Foam-filled tyres

This equipment is optional.

Foam-filled tyres increase the weight of the machine.

Foaming tyres is not permissible without approval from Liebherr customer service.

NOTICE
Filling tyres with foam!
Damage to the machine.

▶ Contact Liebherr customer service.

1.2.20 Complete machine with loading bucket

Values stated refer to machine:

– In its standard version
– with 340/80R18 tyres (For more information see: 1.2.17 Tyres, page 24)
– Including all lubricants
– With a full fuel tank
– With ROPS/FOPS cab and operator
– On level and stable ground

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Note
Tyres and working attachments affect operating mass and tip load.

▶ Note tyre and working attachment specifications.

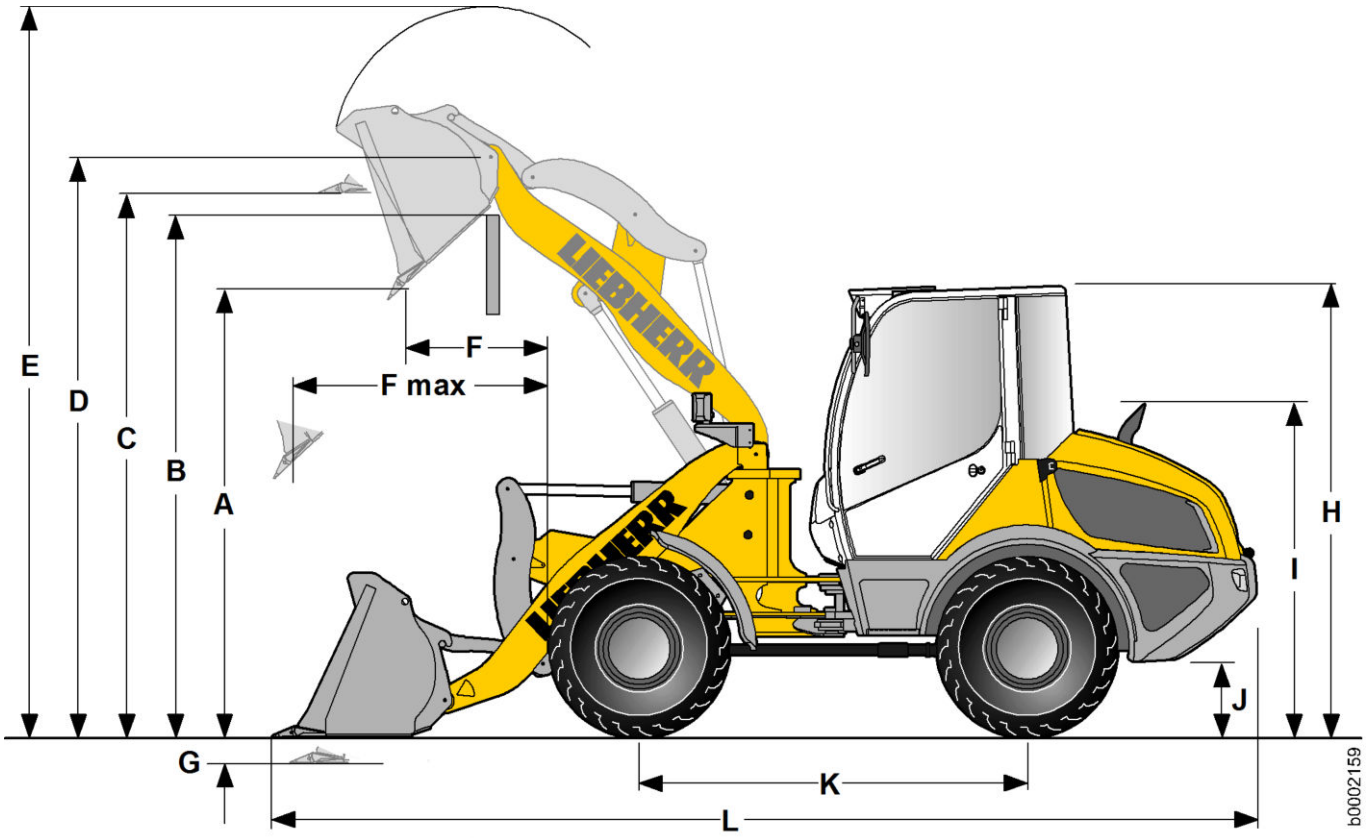

Fig. 6: Complete machine with loading bucket

	Designation	Unit	Value
	Load geometry		A)
	Cutting tool		B)
	Lift arm length	mm	2200
	Bucket capacity as per ISO 7546 C)	m^3	0.8
	Bucket width	mm	1900
	Specific material weight	t/m^3	1.8
A	Dumping height at maximum lifting height and 42° tilt out angle	mm	2525
B	Dump height	mm	2800
C	Maximum bucket base height	mm	2990
D	Maximum bucket pivot point height	mm	3190
E	Maximum bucket upper edge height	mm	4030
F	Reach at maximum lifting height and 42° tilt out angle	mm	750
F max.	Maximum reach at 42° tilt out angle	mm	1490
G	Digging depth	mm	70

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	Designation	Unit	Value
H	Height above operator's cab	mm	2460
I	Height above exhaust	mm	1810
J	Ground clearance	mm	325
K	Wheelbase	mm	2150
L	Overall length	mm	5415
	Turning radius over bucket outer edge (transport position)	mm	4230
	Breakout force (SAE)	kN	46
	Tipping load when straight	kg	3900
	Tipping load when articulated (ISO 14397-1)	kg	3450
	Operating weight	kg	5180

Tab. 6: Complete machine with loading bucket

A) Z-bar kinematics including quick coupler
B) Welded tooth holder with plug-in teeth
C) In practice, the bucket capacity can be around 10% greater than as calculated using the ISO 7546 standard. This depends on the type of material.

1.2.21 Working attachment: 4 in 1 bucket

Values stated refer to machine:

– with 340/80R18 tyres (For more information see: 1.2.17 Tyres, page 24)
– Including all lubricants
– With a full fuel tank
– With ROPS/FOPS cab and operator
– On level and stable ground

Note
Tyres and working attachments affect operating mass and tip load.

▶ Note tyre and working attachment specifications.

▶ See separate operator's manual for more information.

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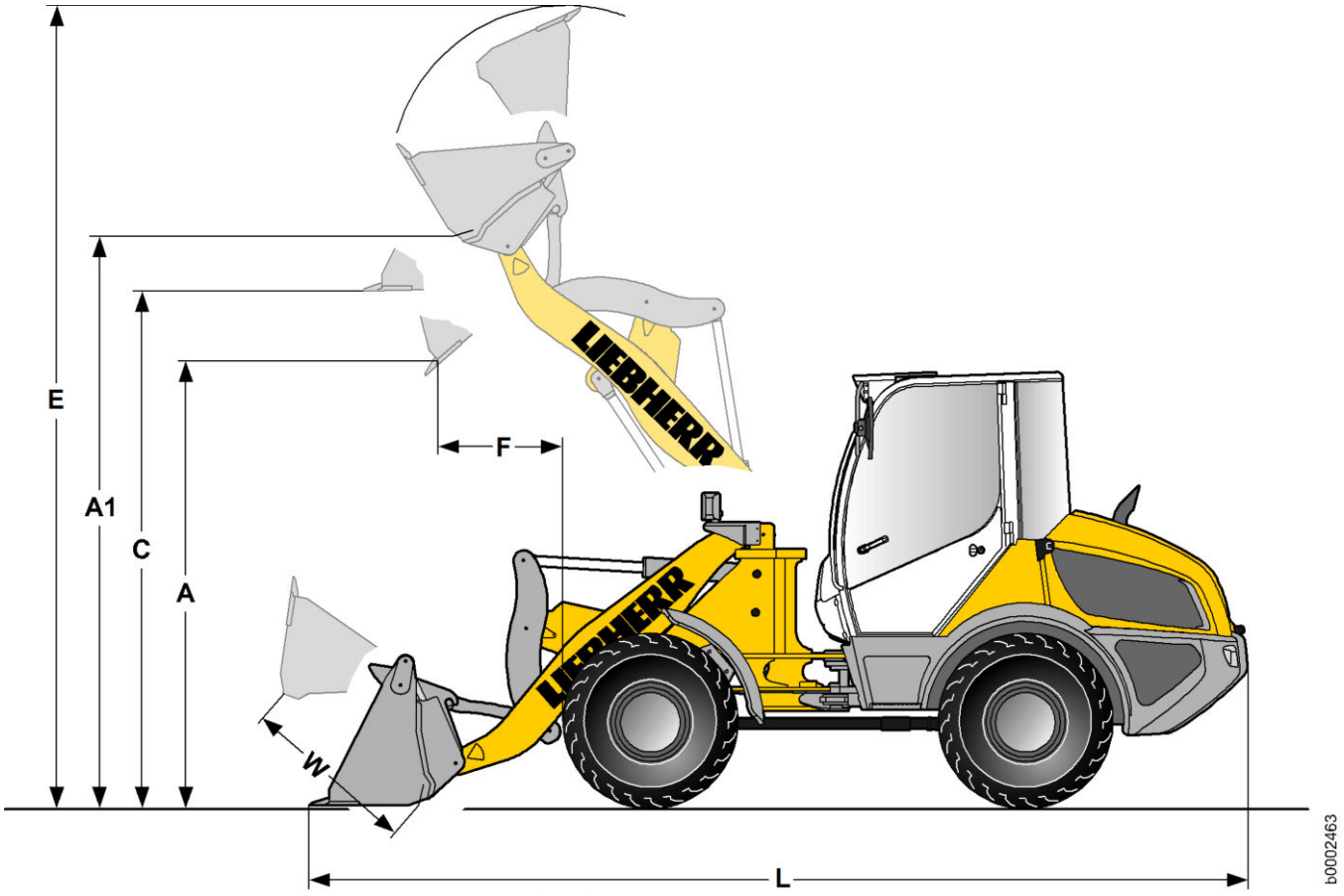

Fig. 7: Working attachment: 4 in 1 bucket

	Designation	Unit	Value
	Load geometry		A)
	Cutting tool		B)
	Bucket capacity	m^3	0.7
	Bucket width	mm	2100
	Specific material weight	t/m^3	1.8
A	Dumping height at maximum lifting height and 35° tilt-out angle	mm	2550
A1	Max. dumping height with open bucket	mm	3250
C	Maximum bucket base height	mm	2900
E	Maximum bucket upper edge height	mm	4660
F	Reach at maximum lifting height and 35° tilt-out angle	mm	770
L	Overall length	mm	5445
W	Max. bucket opening	mm	1008
	Turning radius over bucket outer edge	mm	4380
	Tipping load when straight	kg	3500
	Tipping load when articulated (ISO 14397-1)	kg	3100

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	Designation	Unit	Value
	Operating weight	kg	5490

Tab. 7: Working attachment: 4 in 1 bucket

A) Z-bar kinematics including quick coupler
B) Welded tooth holder with plug-in teeth

1.2.22 Working attachment: forklift

Values stated refer to machine:

– with 340/80R18 tyres (For more information see: 1.2.17 Tyres, page 24)
– Including all lubricants
– With a full fuel tank
– With ROPS/FOPS cab and operator
– On level and stable ground

Note
Tyres and working attachments affect operating mass and tip load.

▶ Note tyre and working attachment specifications.

▶ (For more information see: 3.3.9 Forklift, page 126)

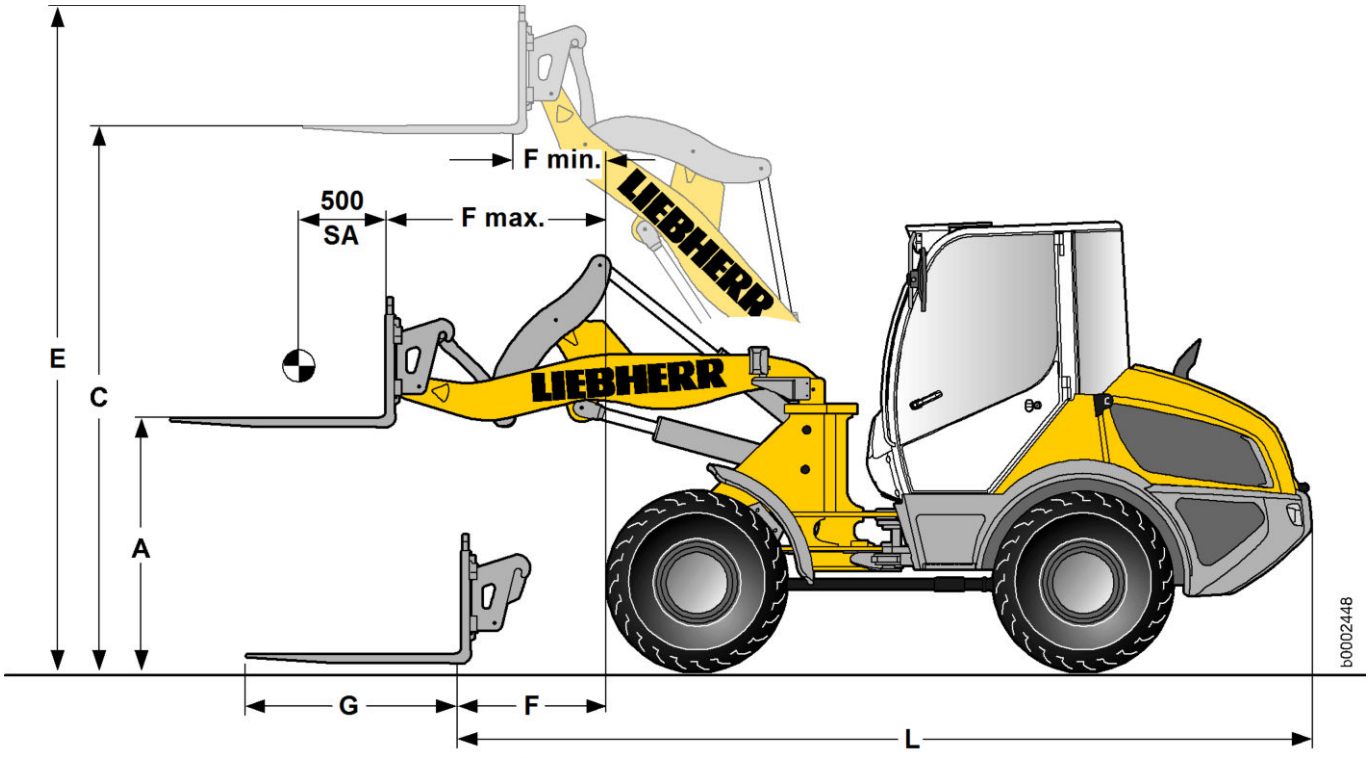

Fig. 8: Working attachment: forklift

	Designation	Unit	Value
	Forklift		FEM II
	Load geometry		A)

	Designation	Unit	Value
A	Lifting height at maximum reach	mm	1370
C	Maximum lifting height	mm	3000
E	Maximum height above fork carrier	mm	3680
F	Reach in loading position	mm	780
F max.	Maximum reach	mm	1220
F min.	Reach at maximum lifting height	mm	450
G	Fork prong length	mm	1200
L	Total wheel loader length	mm	4700
	Tipping load when straight	kg	3200
	Tipping load when articulated (ISO 14397-1)	kg	2800
	Maximum payload on uneven terrain = 60% of the static tipping load when articulated (EN 474-3)	kg	1650 B)
	Maximum payload on even terrain = 80% of the static tipping load when articulated (EN 474-3)	kg	2000 B) C)
	Operating weight	kg	5050

Tab. 8: Working attachment: forklift

A) Z-bar kinematics including quick coupler
B) Value is reduced when distance to centre of gravity (SA) is above 500 mm
C) Payload restricted by tilt cylinders

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2 Safety instructions

2.1 Information on these instructions

2.1.1 Representation of warning messages

Warning symbol

	Warning symbol warns of potential dangers. Obey all measures marked with this symbol to avoid injury or death.

Tab. 9: Warning symbol

Grading of warning messages

Grading of warning messages is defined by following signal words:

DANGER
WARNING
CAUTION
NOTICE

Definition of warning levels

	**DANGER**	Indicates an immediately hazardous situation which, if not avoided, will result in death or serious injury.
	**WARNING**	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
	**CAUTION**	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
	NOTICE	Indicates a hazardous situation which, if not avoided, could result in property damage.

Tab. 10: Warning levels

2.1.2 Graphic symbols in these instructions

Symbol	Meaning
	**Note** Identifies useful information and tips.

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Symbol	Meaning
□	**Precondition** Identifies conditions for subsequent action steps.
▶	**Action request** Identifies action steps.
▷	**Result** Identifies results of one or more action steps.
—	**List** Identifies individual items of a list.

Tab. 11: Symbols

2.2 Intended use

2.2.1 Laws, rules, guidelines and safety regulations

To ensure safe operation:
– Ask work site manager for safety regulations at place of use.
– Adhere to safety regulations at place of use.
– Adhere to traffic regulations.
– Adhere to valid guidelines from insurers (for example employers' professional liability insurance companies, accident insurance et cetera).
– Avoid working methods that can endanger safety.
– Adhere to all intervals specified for recurrent checks and inspections in this operator's manual.

2.2.2 Intended use

Wheel loader is used to pick up, move and dump following materials:
– Soil
– Stones
– Broken rocks
– Bulk materials

This applies to a standard machine in normal operating conditions. Special applications are described in a separate options operator's manual.

To ensure intended use:
– Adhere to operator's manual.
– Adhere to maintenance intervals.
– Observe inspection and maintenance tasks.
– Adhere to specifications in the technical data.
– When using machine on public roads, make sure it complies with applicable national regulations.
– Only lift loads with intended working attachments (fork prongs, crane boom), which must be fitted and functioning.
– Make sure that machines used underground (mining and tunnel construction) are fitted with systems to reduce exhaust emissions (such as diesel particulate filters).
– Adhere to individual country's requirements for underground operation.

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– For special uses use special working attachments and if necessary special safety equipment.
– Exclusively mount and use special working attachments with approval and as per stipulations of manufacturer of basic machine.
– Only use approved tyres.
– A suitably equipped workshop is absolutely essential for performing repair work.

Note

▶ Any other use or use beyond the stated use is improper use.

2.2.3 Foreseeable misuse

Do not use machine in following cases:
– Transport of persons without mounted and functioning safety equipment
– Lifting of persons without mounted and functioning safety equipment
– Driving with attached load
– Working in explosion hazard zones
– Working in contaminated environment without corresponding and necessary equipment
– Lifting of loads without suitable working attachment
– Pulling of loads (for example, containers, wagons, trailers) without suitable towing device
– Breaking rocks
– Hammering in posts
– Continuous driving of longer distances at high speed

Note

▶ The manufacturer accepts no liability for damage caused by improper use.

2.2.4 Operating conditions

– Outdoors
– Fording depth is same as maximum obstacle height.
– Operate machine in an ambient temperature of -25 °C to 45 °C.
– In case of divergent ambient temperatures, contact Liebherr customer service.

Danger to life

Operation during thunderstorms or storms

– If possible stop operation before a thunderstorm or storm.
– Put working attachment on the ground in flattest position possible.
– Secure machine correctly.
– Close window.
– Shut off diesel engine.
– Set ignition key to **0**.
– Make sure there are no persons in area around machine.

Lightning strike

– Remain in operator's cab.
– Do not leave machine until all components are voltage-free.

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Contact with high voltage cable

– Do not move machine and working attachment.
– Remain in operator's cab.
– Do not leave machine until all components are voltage-free.
– Make sure that all persons stay away from the machine and the high voltage cable.
– Have voltage switched off.

2.2.5 Disposal

Danger to life

Unapproved disposal of gas containers and pressure vessels

– Before disposal, completely depressurise pressure vessel.
– Before disposal, professionally empty pressure vessel.
– Adhere to safety instructions of pressure vessel manufacturer.

Unapproved disposal of refrigerant

– Have refrigerant disposed of by refrigerant recycling point.
– Adhere to safety data sheet of refrigerant during disposal.

Environmental pollution

Unapproved disposal of machine

– Make sure that the individual elements of the machine are disposed of correctly after the service life.
– Dispose of elements of machine in line with valid country-specific waste disposal guidelines and relevant valid laws.
– Remove fuels, operating fluids and lubricants from all components before disposal.
– Collect and store fuels, operating fluids and lubricants in suitable containers before disposal.
– Adhere to instructions of relevant manufacturer when disposing of fuels, operating fluids and lubricants.
– Have fuels, operating fluids and lubricants disposed of by old oil recycling point.

2.3 Description of staff

2.3.1 Personal protective equipment

Operators, assistants and maintenance staff are responsible for the following:
– Wearing personal protective equipment
– Regular cleaning and care of protective equipment
– Immediate replacement of damaged parts of protective equipment

The protective equipment consists of following elements:
– Protective helmet
– Safety glasses

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- Hearing protection
- Breathing equipment
- Protective gloves
- Warning clothing (reflective, in signal colour)
- Safety boots
- Special protective clothing
  - To prevent burns
  - To prevent freezing
  - To prevent acid burns
  - To prevent stabbing and cutting injuries

2.3.2 Requirements for staff

Staff meet the following requirements:
- The machine is operated, maintained and repaired exclusively by authorised and trained persons.
- All persons operating, maintaining or repairing the machine have the required minimum age.
- Staff training involves theoretical information (technology and safety) and practical training on the machine.
- Staff have read and understood the operator's manual and supplied documentation.
- Experienced staff continuously supervise following staff.
  - Staff undergoing training
  - Staff undergoing education
  - Staff undergoing instruction
  - Staff undergoing a general apprenticeship
- Staff agree to work in safety-aware and risk-aware manner.

2.3.3 Operating company

Responsibility

The operator is responsible for the following:
- The operator of the machine must ensure that no persons are in the operating area of the machine on the basis of a risk assessment conducted in respect of the operating site.
- If working attachments are used that deviate from the standard and result in limitations to the field of view, the operator must repeat the visual inspection.
- Make sure that exclusively trained staff operate the machine.
- Make sure that exclusively trained staff maintain the machine.
- If an electric motor is used, ensure that only a qualified and competent person connects the machine to the mains supply.
- If a machine with an “emergency actuation of parking brake” option is used, make sure that only qualified and authorised persons operate the machine.
- Check qualification of persons using the machine.
- Authorise activities of persons in handling the machine.
- Define competences and responsibilities for all persons involved in handling the machine.
- Have following staff continuously supervised by an experienced person.
  - Staff undergoing training
  - Staff undergoing education
  - Staff undergoing instruction
  - Staff undergoing a general apprenticeship
- Provide all persons tasked with handling the machine with the necessary protective equipment.

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– Check safety-aware work of staff at regular intervals.
– Check danger-aware work of staff at regular intervals.
– Make sure that machine is operated in flawless, safe condition.
– If flaws affecting safety occur: Immediately decommission machine.
– Perform inspections of machine prescribed by Liebherr punctually.
– Perform nationally mandated inspections of machine punctually.
– Adhere to national legal specifications on provision of machines and tools by the employer (hazard assessment and risk assessment conducted by the operator).
– Make sure that no retrofitting is performed on machine without consultation of the manufacturer.
– Use original Liebherr spare parts wherever possible.

2.3.4 Operator

Responsibility

Operator is responsible for following:
– Read the operator's manual.
– Read included documentation:
  • Operator's manuals for components
  • Operator's manuals from third party manufacturers
  • Additional instructions
– Wear personal protective equipment.
– Operate machine as intended.
– Avoid working methods that can endanger safety.
– Adhere to safety regulations at place of use.
– Maintain visual contact or voice contact with spotter.
– During operation, do not allow any other persons on machine.
– Report all changes to machine that affect safety to operating company.
– If it is no longer possible to work safely, stop operating the machine immediately.
– Only perform retrofittings of machine after consultation with manufacturer.
– Use original Liebherr spare parts wherever possible.

Requirement

The operator has following qualification and skills:
– Has completed the legally specified minimum age.
– Is physically and mentally capable of operating the machine safely.
  • Satisfactory eyesight
  • Satisfactory hearing ability
  • Quick reactions
  • Is able to estimate distance, height and gaps.
– Has the necessary authorisation for operation of machine.
– The operator has the necessary education (theoretical and practical) for the following:
  • Handling the machine type
  • Attaching
  • Spotting
  • Handling fire extinguishing equipment
– Knows all means of escape in an emergency.
– Is not under any physical or mental impairment that limits one of the prescribed requirements.
– Is not under the influence of alcohol.
– Is not under the influence of drugs.

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2.3.5 Maintenance staff

Responsibility

The maintenance staff are responsible for the following:
– Read the operator's manual.
– Read included documentation:
  • Operator's manuals for components
  • Operator's manuals from third party manufacturers
  • Additional instructions
– Maintain machine for safe and reliable function.
– Execute all maintenance tasks specified for maintenance staff in the maintenance and inspection schedule.
– Wear personal protective equipment.
– Adhere to safety regulations at place of use.
– Report all changes to machine that affect safety to operating company.
– Only perform retrofittings of machine after consultation with manufacturer.
– Use original Liebherr spare parts wherever possible.

Requirement

The maintenance staff have the following qualifications and skills:
– Are of the legally specified minimum age.
– Physically and mentally capable of servicing the machine:
  • Satisfactory eyesight
  • Satisfactory hearing ability
  • Quick reactions
  • Are able to estimate distance, height and gaps.
– Have the necessary authorisation for maintenance of the machine.
– Know the machine and the hazards.
– Know all procedures and precautions for maintenance.
– Have knowledge of handling special tools for maintenance and repair.
– Have special knowledge and experience handling hydraulic installations when working with hydraulic systems.
– Are not under any physical or mental impairment that limits one of the prescribed requirements.
– Are not under the influence of alcohol.
– Are not under the influence of drugs.

2.3.6 Authorised specialist staff

Responsibility

The authorised specialist staff have the following responsibilities:
– Read operator's manual.
– Read included documentation.
  • Operator's manuals for components
  • Operator's manuals from third party manufacturers
  • Additional instructions
– Maintain, repair, adjust and convert machine for safe and reliable function.
– Execute all maintenance and repair tasks and adjustment procedures specified for the authorised specialist staff in the maintenance and inspection schedule.
– Clearly define and label working position.
– Wear personal protective equipment.
– Use tools suitable for the work deployment.
– Adhere to safety regulations at place of use.

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– Report all changes to machine that affect safety to operating company.
– Use original Liebherr spare parts wherever possible.

Requirement

The authorised specialist staff have the following qualifications and skills:
– Reached the legally specified minimum age.
– Physically and mentally capable of maintaining, repairing, adjusting and converting the machine.
  • Satisfactory eyesight
  • Satisfactory hearing ability
  • Quick reactions
  • Able to estimate distance, height and gaps.
– The authorised specialist staff have completed training that complies with the country-specific laws, standards and guidelines.
– The authorised specialist staff have the following capabilities:
  • Able to assess work correctly.
  • Able to recognize dangers.
  • Able to take safety measures.
– Have knowledge and experience of the relevant field of activity.
– Know the relevant national standards.
– Have the necessary authorisation for maintenance, repair, adjustment and conversion of the machine.
– Know the machine and the hazards.
– Able to verify the documented qualification.
– Know all the procedures and precautions for maintenance, repair, adjustment and conversion.
– Have knowledge of handling special tools for maintenance, repair, adjustment and conversion.
– Have no physical or mental impairment that limits one of the prescribed requirements.
– Are not under the influence of alcohol.
– Are not under the influence of drugs.

2.3.7 Refrigeration technician

Responsibility

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

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Requirement

The refrigeration technician has following qualification and skills:
– Has completed the legally specified minimum age.
– Physically and mentally capable of servicing the machine:
  • Satisfactory eyesight
  • Satisfactory hearing ability
  • Quick reactions
  • Is able to estimate distance, height and gaps.
– The refrigeration technician has completed training that complies with the country-specific laws, standards and guidelines.
– The refrigeration technician has following skills:
  • Is able to assess work correctly.
  • Is able to recognise dangers.
  • Is able to take safety measures.
– Has knowledge and experience of the relevant field of activity.
– Knows the relevant national standards.
– Has the necessary authorisation for maintenance and repair of machine.
– Knows the machine and the hazards.
– Knows all procedures and precautions for maintenance.
– Has knowledge of handling special tools for maintenance and repair.
– Is not under any physical or mental impairment that limits one of the prescribed requirements.
– Is not under the influence of alcohol.
– Is not under the influence of drugs.

2.3.8 Slinger

Responsibility

Slinger is responsible for following:
– Wear personal protective equipment.
– Choose correct and undamaged slinging gear.
– Correctly attach slinging gear to load or lifting accessory.
– Correctly remove slinging gear from load or lifting accessory.
– Grant approval for movement or accompaniment.

Requirement

The slinger has following qualification and skills:
– Has completed the legally specified minimum age.
– Physically and mentally capable of slinging loads:
  • Satisfactory eyesight
  • Satisfactory hearing ability
  • Quick reactions
  • Is able to estimate distance, height and gaps.
– The slinger has following skills:
  • Is able to estimate mass distribution and load distribution.
  • Is able to operate radio units.
  • Is able to give clear instructions on radio units.
  • Is able to guide a load.
– Has the necessary authorisation for attaching loads.
– The slinger has the necessary education (theoretical and practical) for the following:
  • Selecting the suitable slinging gear
  • Attaching slinging gear
  • Securing to prevent unintended disengaging of slinging gear

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  - Avoiding damage to slinging gear
  - Spotting
  - Applying all necessary signal signs
- Is not under any physical or mental impairment that limits one of the prescribed requirements.
- Is not under the influence of alcohol.
- Is not under the influence of drugs.

2.3.9 Spotter

Responsibility

The spotter is responsible for the following:
- Wear personal protective equipment.
- Forward signals from slinger to operator.
- If the spotter is the only person for this purpose: Give instructions to operator.
- The spotter must be in the field of view of operator or have voice contact with the operator.

Requirement

The spotter has following qualification and skills:
- Has completed the legally specified minimum age.
- Physically and mentally capable of spotting and providing signals:
  - Satisfactory eyesight
  - Satisfactory hearing ability
  - Quick reactions
  - Is able to estimate distance, height and gaps.
- The spotter has following skills:
  - Is able to operate radio units.
  - Is able to give clear instructions on radio units.
  - Is able to guide a load.
  - Is able to ensure safe movement of load and machine.
- Has the necessary authorisation for giving signal signs.
- The spotter has the necessary education (theoretical and practical) for the following:
  - Spotting
  - Applying all necessary signal signs
- Is not under any physical or mental impairment that limits one of the prescribed requirements.
- Is not under the influence of alcohol.
- Is not under the influence of drugs.

2.4 Signs on the machine

There are various types of sign attached to your machine.

Sign types:
- Safety signs
- Information signs
- Type plates

The item codes can be found in the spare parts list.

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2.4.1 Safety signs

Obeying the instructions on the safety signs can prevent severe or even fatal injuries. Check regularly that the safety signs are complete and legible. Replace any missing or illegible safety signs immediately.

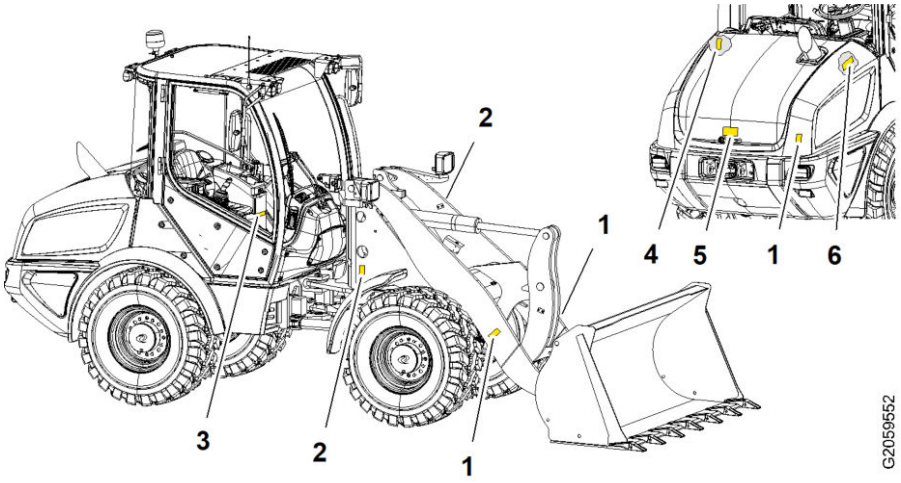

Fig. 18: Safety signs

	Safety sign	Description
1	 G2065830	**Danger area sign** Warns of the risk of accidents, possibly resulting in severe or even fatal injuries. Meaning: **Keep out of the danger area.**
2	 G2068041	**Articulation area sign** 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 secured.**
3	 G2065879	**Accident prevention sign** Refers to the instructions in the **operator's manual** for preventing accidents. Meaning: **Strictly observe the accident prevention instructions in the operator's manual when operating the machine.**

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	Safety sign	Description
4		**Voltage sign** Refers to the battery main switch. Meaning: **The electrical system is energised when the battery main switch is turned on.**
5		**Engine shutdown sign** Warns of the risk of accidents, possibly resulting in severe injuries. Meaning: **Only open when the diesel engine is off.**
6		**Cooling water sign** Warns of the risk of scalding and severe injuries caused by coolant escaping under pressure. Meaning: **Do not open the sealing cap on the filler pipe until the diesel engine has cooled down.**

Tab. 12: Safety signs

2.4.2 Information signs

The information signs provide information on the operation, maintenance and properties of the machine.

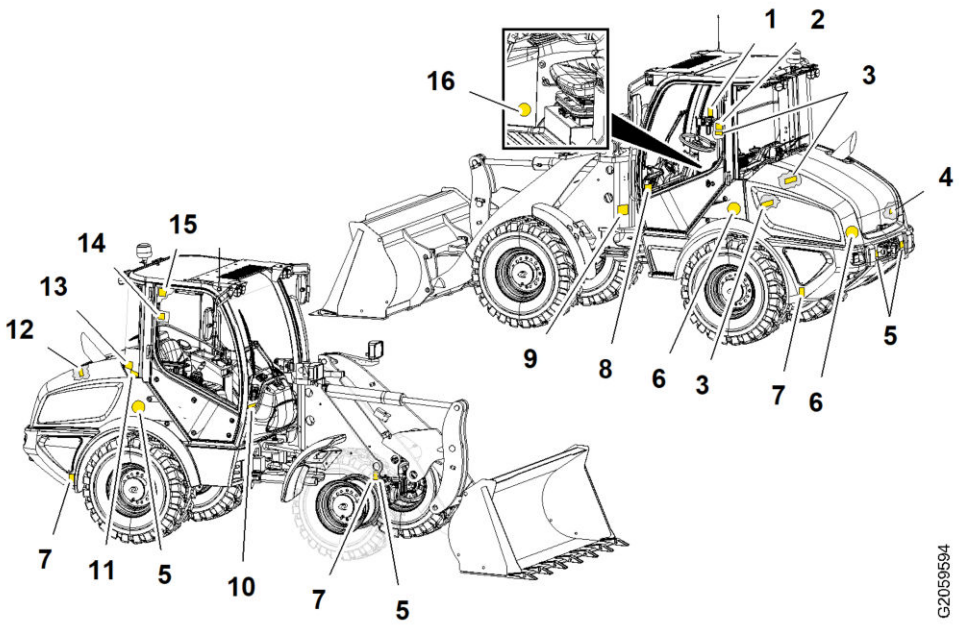

Fig. 25: Information signs

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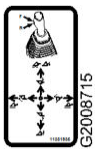
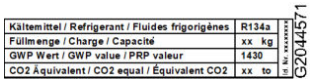
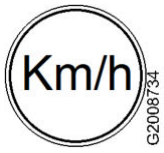
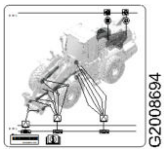
	Information signs	Description
1	 G2008715	**Working hydraulics** Indicates the actuating directions of the control lever.
2	 G2008712	**Noise output L_{WA}** States the sound power level of the machine in decibels.
3	 G2008736	**Hydraulic fluid** Indicates the hydraulic oil or brake oil to be used.
4	 G20445711	**Refrigerant** Indicates the filling quantity of refrigerant.
5	 G2008730	**Lifting point** Indicates the lifting points on the machine.
6	 G2008734	**Speed** Indicates the permitted travel speed for the machine. The applicable data is located on the machine.
7	 G2008732	**Lashing point** Indicates slinging points on machine.
8	 G2008709	**Fire extinguisher** (option) Indicates that there is a fire extinguisher in the operator's cab.
9	 G2008694	**Lubrication chart** Indicates the maintenance points and intervals for lubricants and fuels used by the machine.
10	 G2008717	**LiDAT** (Option) LiDAT is a data transfer and positioning system for Liebherr machines and those of other manufacturers.
11	 G2008726	**Coolant** Indicates the coolant to be used.

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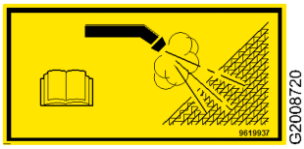
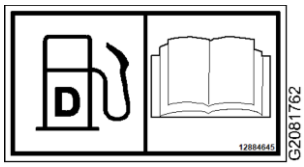
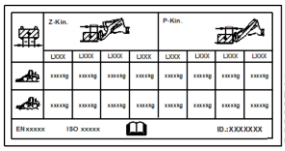
	Information signs	Description
12	 G2008720	**Radiator** Indicates cleaning of the cooling system.
13	 G2061762	**Diesel fuel** Indicates the diesel fuel to be used.
14	 G2008741	**Forklift operation load chart** (option) Indicates the maximum permissible load in fork-lift operation. The maximum permissible loads indicated on the sign refer to a machine equipped with standard tyres.
15	 G2008739	**Emergency exit** Indicates the emergency exit on the machine.
16	 G2072671	**Safety belt** Fasten your safety belt before putting the machine into service.

Tab. 13: Information signs

2.4.3 Identification plate

Among other things, the PIN (vehicle identification number) for identifying the machine is found on the type plate. The total weight and axle load specifications refer to driving the machine on roads.

The weight information on the identification plate covers the following:
– Standard tyres
– Attachments up to the maximum total weight

This may be exceeded with the following equipment:
– Foam-filled tyres
– Snow chains or guard chains
– Solid rubber tyres
– Attachments with special approval and other options that affect the weight

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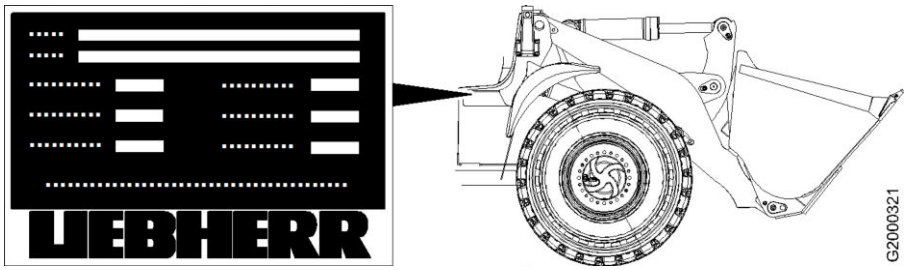

Fig. 42: Identification plate

2.5 Protective devices on the machine

2.5.1 Operator's cab

Danger to life

Unapproved working method

– Put on safety belt before starting work.
– Make sure that changes in the operator's cab (for example installation of accessories) do not restrict the operator's workspace.

Injuries

Objects in the operator's cab

– Remove objects that are not necessary for the work from the operator's cab.
– Stow and fasten objects that are necessary for the work before starting.
– Make sure that objects carried do not protrude into the operator’s workspace.

2.5.2 Roll over protective structure (ROPS)

Danger to life

Damaged falling object protective structures

– Do not put machine into service with damaged falling object protective structures.
– Do not put machine into service with deformed falling object protective structures.
– Do not use falling object protective structures with structural changes.
– Do not use repaired falling object protective structures.
– Do not perform welding on falling object protective structures.
– Do not cut or saw falling object protective structures.
– Do not drill falling object protective structures.

Exceeding of total weight

– Make sure that total weight of machine (see identification plate) is not exceeded.

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– Make sure that the machine does not exceed the total weight with heavy working tools.
– Make sure that the machine does not exceed the total weight after changing the working attachment.
– Make sure that the machine does not exceed the total weight with add-ons or after retrofitting.

2.5.3 Falling object protective structures (FOPS)

Danger to life

Damaged falling object protective structures

– Do not put machine into service with damaged falling object protective structures.
– Do not put machine into service with deformed falling object protective structures.
– Do not use falling object protective structures with structural changes.
– Do not use repaired falling object protective structures.
– Do not perform welding on falling object protective structures.
– Do not cut or saw falling object protective structures.
– Do not drill falling object protective structures.

2.6 Emergency equipment on the machine

2.6.1 Emergency exit (standard)

Danger to life

Incorrect labelling

– Make sure that all information signs are present.
– Make sure that all information signs are legible.

Incorrect equipment

– Make sure that emergency hammer (option) is present.
– Make sure that position of emergency hammer (option) is known.

2.6.2 Fire extinguisher (option)

Danger to life

Incorrect behaviour

– Make sure that all fastening points of fire extinguishers on the machine are known.
– Make sure that everyone is able to operate the fire extinguishers.
– Make sure that everyone knows local fire alarm options.
– Make sure that everyone knows the local fire-fighting possibilities.
– Before starting machine, unlock all locks of hoods and doors of machine.

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2.6.3 Emergency actuation of parking brake (option)

Danger to life

Incorrect behaviour

– Before every use of the machine, check the emergency actuation switch on the rear of the wheel loader for damage and make sure the seal has not been broken. If the seal or the switch is damaged, the wheel loader may not be put into operation! Contact Liebherr customer service.
– Ensure that a suitable towing machine or device, with sufficiently strong slinging gear is available for towing the machine in an emergency situation.
– Make sure that the current operating mass of the wheel loader is known.
– Ensure that the emergency plan, that has been drawn up containing all instructions and safety instructions arising from the hazard assessment of the working area around the wheel loader, is known.

2.7 Safe operation

2.7.1 Intoxicants

Danger to life

Physical and mental impairment

– Make sure that no persons working on or with the machine are under the influence of drugs.
– Make sure that no persons working on or with the machine are under the influence of alcohol.
– Make sure that no persons working on or with the machine are under the influence of medication.
– Make sure that no persons working on or with the machine are overtired.
– Make sure that no persons working on or with the machine are exhausted.

2.7.2 Dangerous fuels and operating fluids

Injury

Incorrect handling

– Adhere to safety instructions on handling oils, greases and chemical substances.
– In case of hot lubricants and fuels put on personal protective equipment.

Environmental damage

Incorrect disposal

– Dispose of lubricants and fuels safely and in eco-friendly manner.
– Adhere to guidelines applicable to disposal.

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2.7.3 Transporting machine

Danger to life

Machine tipping

– Make sure that the transport vehicle is authorised for the machine weight and machine size.
– Do not manoeuvre while driving on ramps.
– Before driving on ramps, clean mud, snow and ice off tyres or travel gear.
– Make sure that a spotter is available if necessary.
– To load and unload machine, use only sturdy, stable loading ramps.
– Make sure that width and angle of ramps match the gauge and climbing ability of machine.

Incorrect transport

– Park machine on level ground during preparation for transport (disassembly, cleaning).
– Secure machine against rolling away.
– Apply parking brake.
– Pull out ignition key.
– Leave operator's cab.
– All doors, windows and service access points are closed.
– Make sure that nobody is on the machine during transport.
– If necessary, dismantle a portion of working attachment from machine for duration of transport.
– Make sure that the road to be travelled is known.
– Make sure that all applicable limitations for width, height and weight are known.
– Drive carefully under electric cables and bridges.
– Drive carefully through tunnels.

2.7.4 Access to machine

Injury

Incorrect entry and exit

– Clean dirt, oil, ice and snow from steps, ladders, anti-slip mats, handrails and handles.
– Enter and exit carefully on muddy roads, ice, snow, traffic on access roads and in narrow conditions.
– Regularly check steps, ladders, anti-slip mats, handrails and handles and have them repaired if necessary.
– Before entering machine, clean mud, grease, ice and snow from shoes and climbing aids.
– Put on gloves for secure grip.
– Do not climb up or down using tyres, wheel hubs or rims.
– When exterior influences (for example wind) make opening and closing the door more difficult: Always guide door with your hand.
– Make sure that the opened or closed door has engaged properly.
– If the machine is still moving: Do not stand up from the operator's seat.
– Never jump off machine.
– Enter and leave the machine exclusively using the access system.
– Do not use control elements as handles.

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

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

2.7.5 Machine danger zone

The area in the immediate vicinity of the machine is considered to be the danger area and must be adapted according to the application for which the machine is used.

Following factors influence size of danger area:
– The travel speed and movement of the machine
– Working attachment installed
– Type of loading material
– Risk of loading material falling

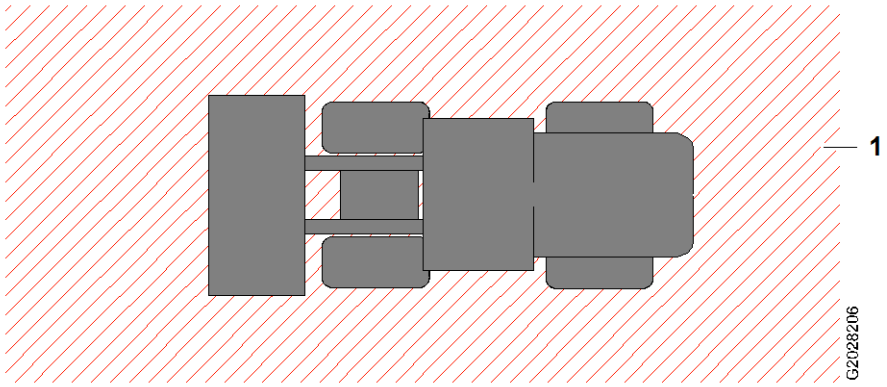

Fig. 43: Machine danger zone (view from above)

1 Danger zone

Danger to life

Unapproved presence in danger zone

– Make sure there is nobody in the danger area.

2.7.6 Visibility

Danger to life

Insufficient visibility

– If equipment is installed that deviates from the standard, the operator must re-evaluate the field of view and, if necessary, take measures.
– Make sure that persons approach the machine from the front and within operator's field of vision.
– Make sure that persons contact the operator before approaching the machine.

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– Make sure that no obstacles impair visibility in the working area.
– Use viewing devices to observe environment of machine if necessary.
– Use viewing devices if necessary to observe areas around the machine that cannot be seen directly.
– Position working attachment so that sufficient visibility is ensured.
– Work with spotter if visibility is restricted.
– Agree on which hand signs to use.
– If necessary communicate via radio.
– Make sure that spotter is outside danger zone.
– In conditions of poor visibility use illumination in accordance with the applicable regulations.
– Work with extra care and attention in poor visibility and changing weather.
– Only use sun visors if field of vision is not restricted.

Incorrect operation

– Comply with national regulations regarding sufficient visibility in the operator's cab.
– Before operation, check viewing devices for function, cleanliness and correct setting.
– Adjust mirrors so that the best possible all-round visibility is guaranteed.
– Immediately repair defective viewing devices or have them replaced.
– Clean dirty cab windows.
– Avoid covering of visual aids by working attachment.

Damage

Incorrect changes

– Make sure that modifications to the machine do not impair visibility.
– Perform risk analysis again.
– Test machine according to current standards.
– Test machine according to regulations applicable at place of use.
– Depending on the test result, take appropriate measures.
– Inform operator about modifications.

2.7.7 Protection against vibration

Injuries

Incorrect working method

– Use machine, working attachment and working tool adapted to the task.
– Check condition of machine (tyre pressure, brakes, steering, mechanical connections, ...).
– Ensure that operator's seat is functional and complies with national regulations.
– Adjust operator's seat to weight and size of operator.
– Adjust shock absorption to weight and size of operator.
– Do not use jerky movements to steer, brake, accelerate and shift gears.
– Do not use jerky movements to move and load working attachment.

Incorrect travel

– Adapt speed to route.
– Travel slowly on rough terrain.
– Travel around obstacles and very rough terrain.

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– Travel over longer distances (for example, on public roads) at a suitable (medium) speed.

Incorrect path of machine

– Remove large rocks and obstacles.
– Fill up channels and holes.
– Keep machines to hand for creating and maintaining suitable terrain conditions and calculate sufficient time.

Damage

Increased travel mode

– If machine is driven a lot: Stipulate use of special auxiliary systems for travel mode.
– Regulate speed to prevent swaying.

2.7.8 Operation of machine

Danger to life

Incorrect place of use

– Make sure that load capacity value of ground is sufficient.
– Do not exceed maximum inclination angle of machine while working.
– Do not exceed maximum inclination angle of machine when driving on ramps (side inclination).
– Make sure that ground offers sufficient grip.
– Assessment of subsoil conditions before starting work
– Adhere to safety gap from live overhead cables.
– Every line must be considered live.
– Keep a safe distance from overhangs, drops, slopes and unsafe terrain.

Incorrect use

– When working in following areas, adhere to the laws, regulations and rules applicable at the place of use.
  • Explosive area
  • Flammable area
  • Areas with underground lines (gas, electricity)
– Ensure that machines in enclosed spaces (for example, tunnels, hangars) are equipped with exhaust reduction components.
– Make sure that adequate ventilation and fresh air supply is ensured when operating in enclosed spaces.
– Never leave operator's seat while machine is still in motion.
– Never leave machine unattended with engine running.
– Clean machine regularly to remove flammable residues (for example dust, wood scraps).

Incorrect handling of electrical system

– Make sure there are no persons with a pacemaker in the vicinity of the running diesel engine.
– Before working on electrical system, make sure that affected parts are voltage-free.

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– Before working on electrical system, make sure that neighbouring parts are isolated.
– Have work on electrical systems performed exclusively by a qualified electrician.

Injuries

Incorrect protection

– If there is a danger of falling objects: Exclusively use machines with suitable falling object protective structures.
– If there is a danger of objects penetrating the operator's cab: Exclusively use machines with suitable falling object protective structures.
– If machine is used in toxic environment: Insert filters approved for the use in air conditioning.
– If machine is used in dust-intensive environment: Insert filters approved for the use in air conditioning.

Incorrect refuelling

– Do not touch fuels with your skin.
– Do not inhale fuel vapours.

Incorrect maintenance

– Make sure there is nobody in the danger area.
– Park machine and secure to prevent rolling or driving away.
– Park machine on level, firm ground.
– Park machine with lowered working attachment.
– When searching for leaks in the hydraulic system wear protective gloves.
– Exclusively search for leaks in the hydraulic system with cardboard or similar material.
– Hydraulic system must be depressurised before work can be carried out on it.
– Repairs to hydraulic hoses and hose lines are carried out by authorised specialist staff only.
– Lay and install hydraulic hoses and hose lines professionally.
– Do not weld or solder accumulators.
– Do not perform mechanical work on accumulators.
– Make sure that the permanent labelling of the accumulators (operating data) is kept visible.
– Be especially careful when removing or inserting bolts and pins as this can cause serious injury.
– Make sure that machine is supported in a proper and secure manner.

Crushing injuries

Unexpected movements of machine

– Make sure there is nobody in the danger area.
– Park machine and secure to prevent rolling or driving away.
– Do not work under working attachment unless it is supported or resting on ground.

Unintentional closing of service access points

– Ensure that the service access points cannot close unintentionally.

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Incorrect lifting tackle

– Exclusively use undamaged lifting accessories.
– Ensure that the load and tensile capacity of the lifting tackle is sufficient.

Incorrect work clothing

– Wear protective gloves when handling wire ropes.

Incorrect work equipment

– Exclusively align bores with suitable pin.

Burns

Incorrect maintenance

– Switch off diesel engine before any maintenance or repairs.

Hot, pressurised fuel and operating fluids

– Do not touch fuels and operating fluids and parts that carry fluids.
– Do not touch covers and parts that carry fluids.
– Avoid skin contact with hot surfaces and fuels and operating fluids.

Incorrect heat protection

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

Incorrect charging of battery

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

Incorrect handling of flammable liquids

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

Incorrect refuelling

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

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Damage to machine

– Before placing machine under heavy load, make sure that machine is at operating temperature.
– Never put damaged machine into operation.

Environmental pollution

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

2.8 Safe maintenance

2.8.1 Spare parts

Danger to life

Incorrect spare parts

– Use original spare parts.
– Make sure that the spare parts meet the technical requirements specified by the manufacturer.
– After replacing parts, tighten loosened screw connections with prescribed tightening torque.
– Find prescribed tightening torque in supplied documentation.
– If the tightening torque is not prescribed by the supplied documentation: Find prescribed tightening torque in Liebherr factory standard.
– If the tightening torque is not prescribed by the Liebherr factory standard: Find tightening torque in valid DIN standard, EN standard or ISO standard.

2.8.2 Heavy parts

Danger to life

Incorrect handling

– Exclusively use machine for load-lifting with sufficient loading capacity.
– Exclusively use suitable and functioning lifting accessories with sufficient loading capacity.
– Make sure there are no persons underneath raised loads.
– Exclusively task qualified and experienced persons with the attaching of loads.
– Exclusively task qualified and experienced persons with the directing of operators.
– Make sure that the spotter can be seen by the operator.
– Make sure that spotter and operator are in voice contact if necessary.

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Injury

Incorrect protective equipment

– Put on gloves when handling wire ropes.

2.8.3 Regular checks

Danger to life

Incorrect performance of checks

– Make sure that safety checks are performed regularly on the machine.
– Make sure that all checks are performed by suitable, competent and authorised persons.
– Adhere to national regulations.

2.9 Modifications to the machine

2.9.1 Modifications, add-ons and retrofittings

Danger to life

Incorrect changes to the machine

– Have changes, add-ons or retrofittings that could affect safety approved by the manufacturer.
– Have installation and adjustment of safety equipment and safety valves approved by the manufacturer.
– If attachment parts and add-on parts are not approved generally by Liebherr for installation or attachment, do not attach or install attachment parts and add-on parts to machine without written approval from Liebherr.
– Send all technical documents required for approval to Liebherr.

Incorrect welding work on the machine

– Only specialist staff may carry out welding.
– Only carry out welding, burning and grinding work on the machine if it is expressly permitted by the manufacturer.
– Before welding, burning and grinding, clean any dust and flammable materials from the machine and the area around it, and ensure adequate ventilation.
– Switch off ignition and battery main switch.
– Bring the ground of the welding machine as close as possible to the welding point.

Damage

– If attachment parts and add-on parts are supplied via the machine’s hydraulic system: Make sure that different oil types are not mixed.

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3 Handling and operation

3.1 Control elements

3.1.1 Operator's cab

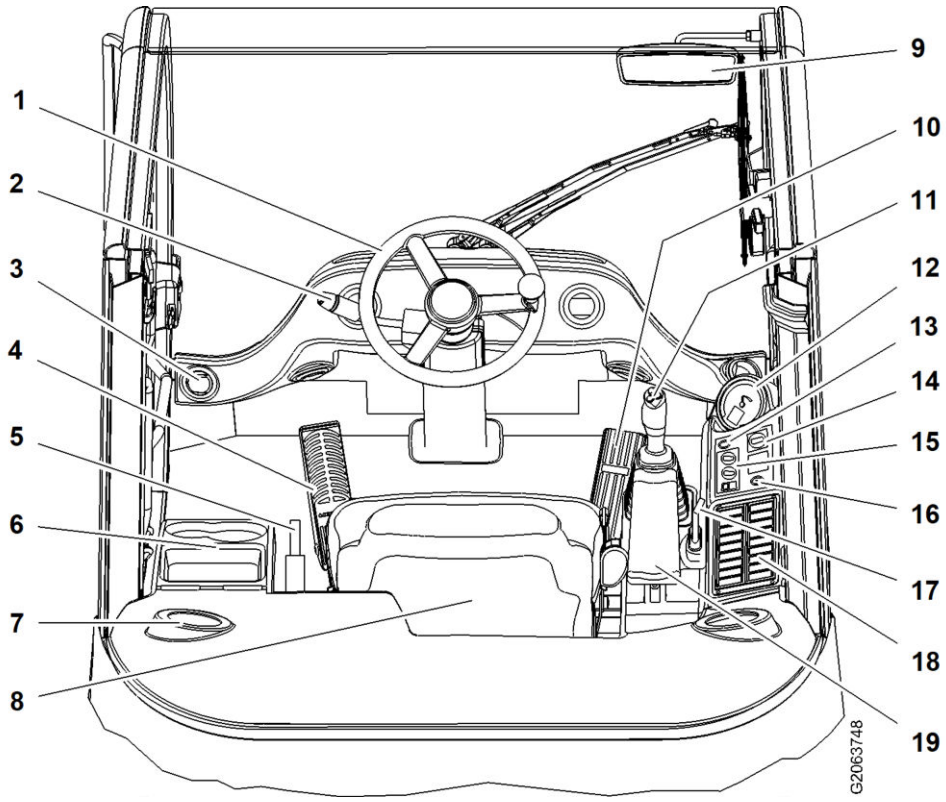

Fig. 44: Operator's cab

1 Steering wheel
2 Steering-column switch
3 Heating, ventilation and air conditioning outlet nozzles (option)
4 Inching brake pedal
5 Parking brake
6 Storage compartment
7 Speaker
8 Operator's seat
9 Interior mirror
10 Accelerator pedal
11 Control lever
12 Display
13 12V socket
14 Manual inching (option)
15 Heating, ventilation and air conditioning control unit (option)
16 Starting switch
17 Additional control lever (option)
18 Switch panel
19 Adjustable armrest

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3.1.2 Display

The display is the main source of information for operating the machine.

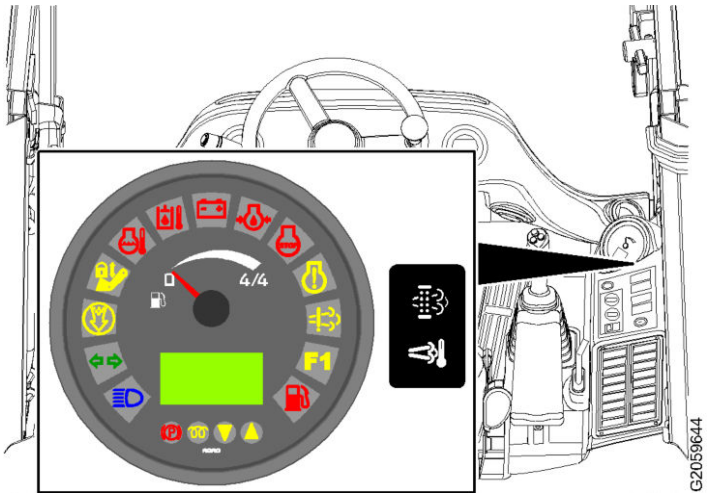

Fig. 45: Display

(For more information see: 3.2.15 Display, page 82)

3.1.3 Switches and buttons

The switches and buttons are used to activate and deactivate various functions on the machine. When a function is activated, the corresponding symbol lights up.

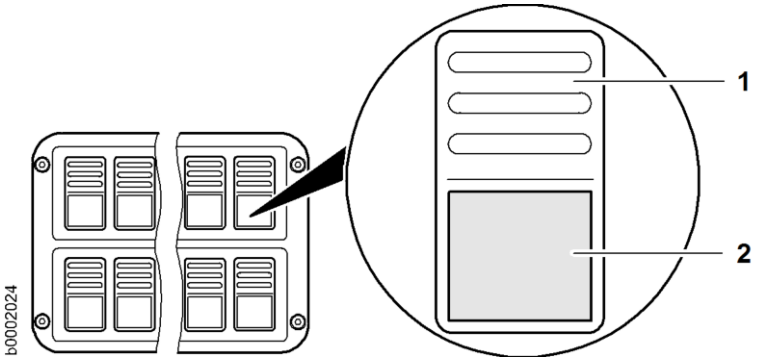

Fig. 46: Switches and buttons

1 Switch/button **2** Symbol

Symbol	Designation	Symbol	Designation
	*Hazard warning system* switch [A)]		*Quick coupler* switch
	*Working hydraulics lockout* switch/button [B)]		*Regenerate diesel particulate filter* switch/button
	*Fixed gear 1* switch		*Marker lights* [A)] , *low beam* switch

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Symbol	Designation	Symbol	Designation
	Rear window washer system button/switch		*Rear window heating* switch
	Exterior mirror heating switch (option)		*Continuous mode* switch (control lever lock) (option)
	Flashing beacon switch (option) A)		*Sweeper* switch (option)
	Visible reversing alarm switch (option)		*Audible reversing alarm* switch (option)
	Front working headlights switch A)		*Rear working headlights* switch (option) A)
	Ride control button (option) B)		*Comfort control / button control / mini-joystick* switch (option)
	Central lubrication system button (option) C)		*Streugerät* switch (option)

Tab. 14: Switches and buttons

A) The function can also be activated when the ignition key is taken out.
B) The setting remains stored after the ignition is switched off.
C) For additionally required intermediate lubrication between the lubrication cycles. For more information on the central lubrication system see the separate operating manual.

3.1.4 Control lever

Use the control lever to control the travel direction and movements of the working attachment.

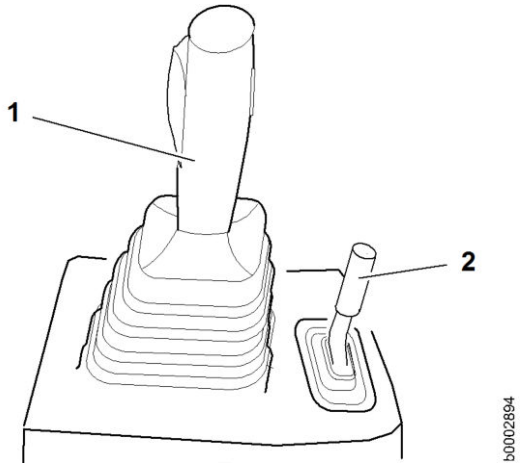


Fig. 67: Control lever

1 Control lever **2** Additional control lever

For more information see: and

3.2 Handling

3.2.1 Battery main switch

The battery main switch must be turned on before the machine can be started.

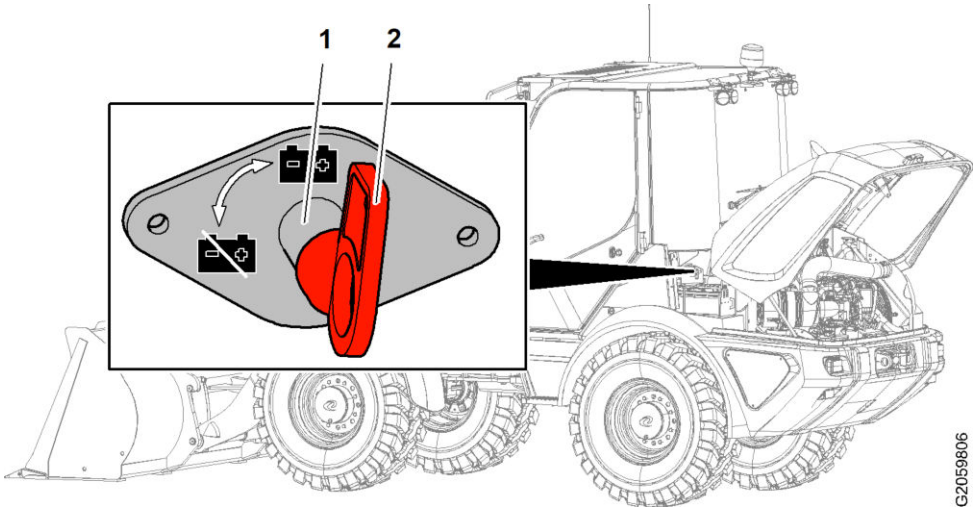
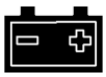


Fig. 68: Battery main switch

1 Battery main switch **2** Battery main switch key

Symbol	Function
	**OFF**
	**ON**

Tab. 15: Battery main switch

Turning on the battery main switch

▶ Set battery main switch **2** to **ON** .
▷ Electrical system of machine supplied with voltage.

Turning off the battery main switch

▶ Set battery main switch **2** to **OFF**.
▷ Electrical system of machine is de-energised.

3.2.2 Articulation lock

The articulation lock creates a rigid connection between the front section and the rear section. Steering is no longer possible.

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WARNING
Persons can become trapped in articulation area.

▶ Only engage or release articulation lock when diesel engine is switched off.

Engaging articulation lock

Make sure that following requirements are met:
❑ Machine is not steered all way when stopping diesel engine.

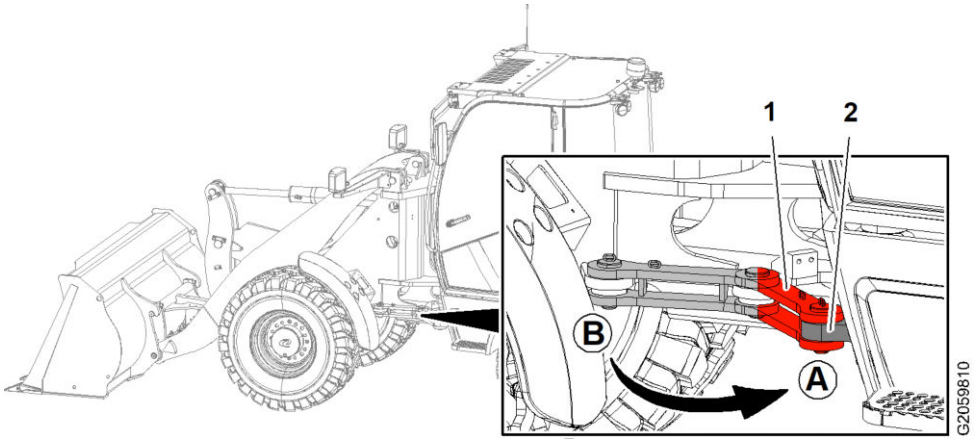

Fig. 71: Engaging articulation lock

1 Locking bar **2** Bracket

▶ Undo safety bar **1** of position **B** and move to position **A**.

▶ Place safety bar **1** in bracket **2**.

▶ Secure safety bar **1** with pin and split pin.

Troubleshooting
If articulation lock will not engage:

▶ Start diesel engine.

▶ Using careful steering movements, move safety bar **1** into position.

▶ Turn off diesel engine.

▶ Secure safety bar **1** with pin and split pin.

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Releasing articulation lock

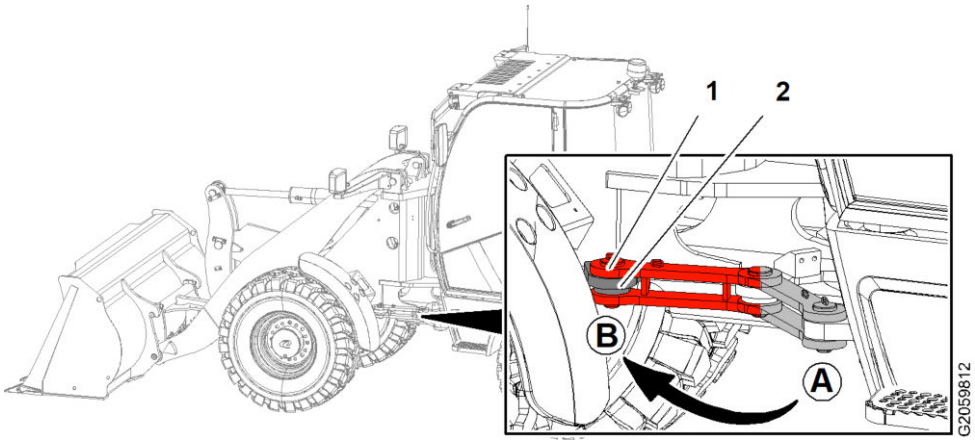

Fig. 72: Releasing the articulation lock

1 Locking bar **2** Bracket

- ▶ Undo safety bar **1** of position **A** and move to position **B**.
- ▶ Place safety bar **1** in bracket **2**.
- ▶ Secure safety bar **1** with pin and split pin.

3.2.3 Entering and leaving machine

Operator's cab access enables driver and maintenance staff to safely enter operator's cab and access maintenance positions on the machine.

WARNING
Unsafely entering and leaving the machine!
Falling.

- ▶ Only enter and leave the machine using the access aids.
- ▶ Do not use controls to hold onto.
- ▶ Never jump off the machine.

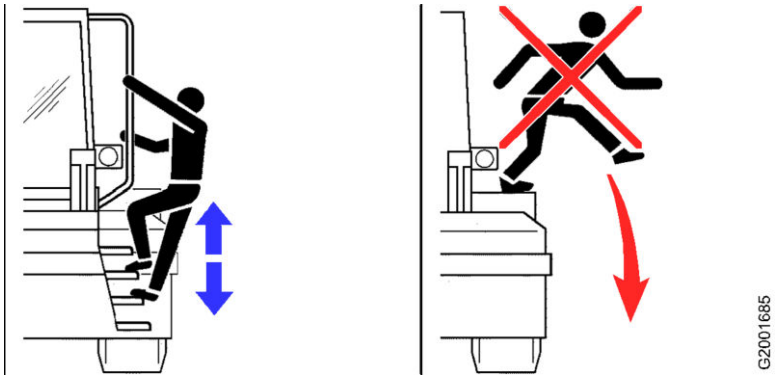

Fig. 73: Entering and leaving machine

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Entering operator's cab

Make sure that following requirements are met:
❑ Diesel engine is switched off.

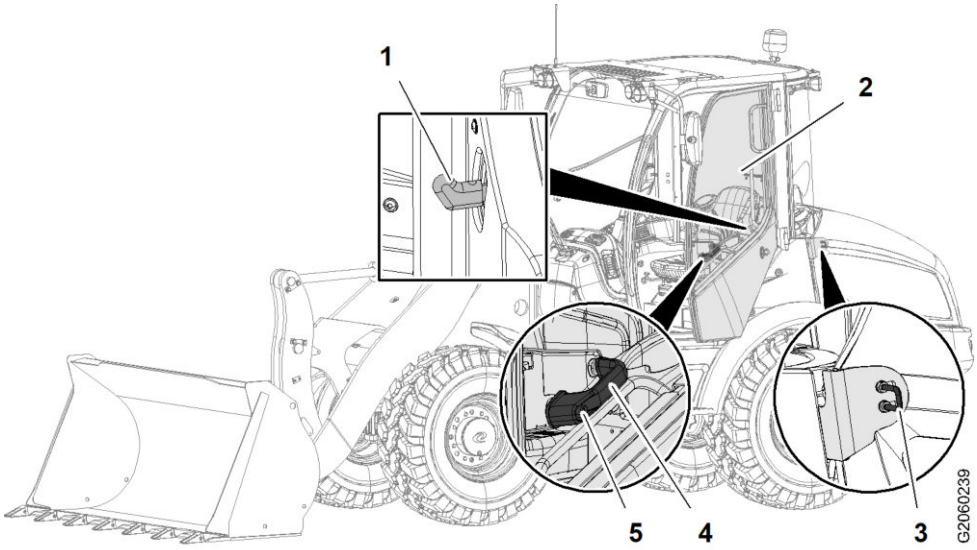

Fig. 74: Entering operator's cab

1 *Door holder* lever
2 Cab door
3 Door holder
4 Door handle
5 Door lock

▶ Open the door lock **5** with the ignition key.

▶ To open cab door: push in door lock **5** and let cab door **2** latch in door holder **3**.

▶ Enter operator's cab.

▶ To close cab door: push down lever **1** and close cab door.

Leaving operator's cab

Make sure that following requirements are met:
❑ Diesel engine is switched off.

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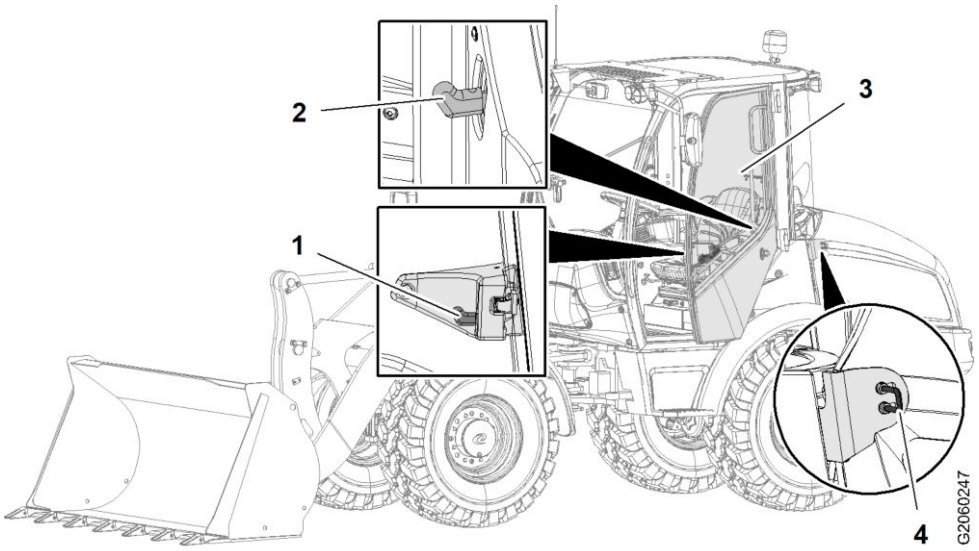

Fig. 75: Leaving operator's cab

1	*Door opener* lever	**3**	Cab door
2	*Door holder* lever	**4**	Door holder

▶ Open the cab door **3** with the lever **1** and latch it into the door holder **4**.

▶ Leave the operator's cab.

▶ Push down lever **2** and close cab door **3**.

3.2.4 Cab window

Right window

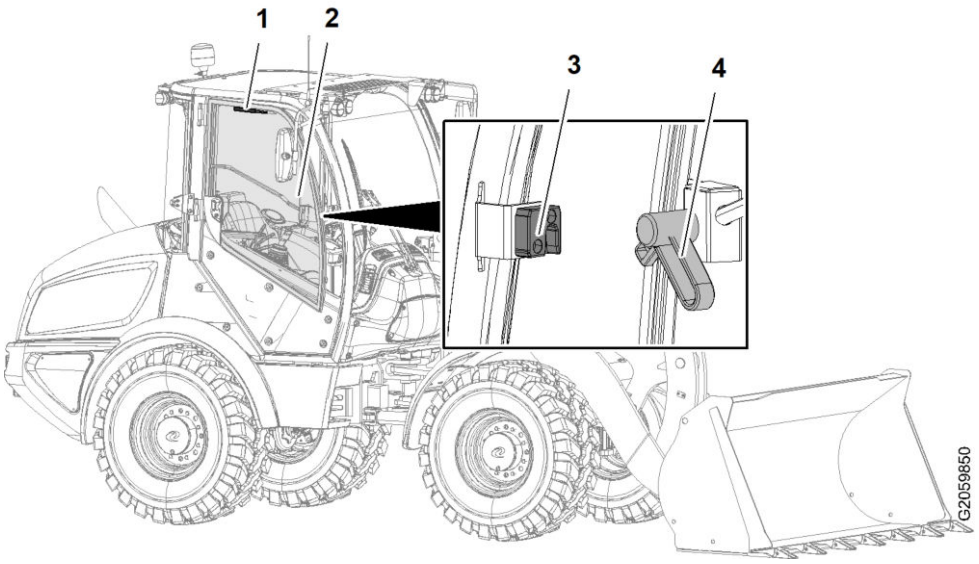

Fig. 76: Right window

1	Gas-filled spring	**3**	Retaining plate
2	Window	**4**	*Window opener* lever

▶ Open window: turn lever **4** up and open window **2** to stop.
▷ Gas-filled spring **1** holds window at limit stop.

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Note

This window position is not permissible in travel mode.

▶ Close window: close window **2** completely to retaining plate **3** and lock with lever **4**.

Right window gap venting

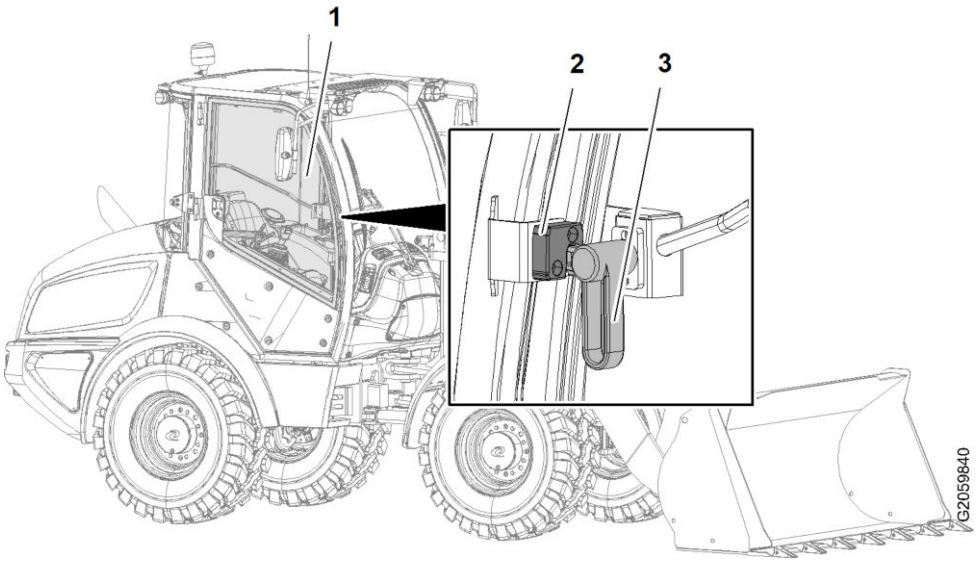

Fig. 77: Right window gap venting

1 Window
2 Retaining plate
3 *Window opener* lever

▶ Open window: turn lever **3** up and then lock with retaining plate **2**.

▶ Close window: turn lever **3** up, close window **1** completely to retaining plate **2** and lock with lever **3**.

Opening right window 180°

This equipment is optional.

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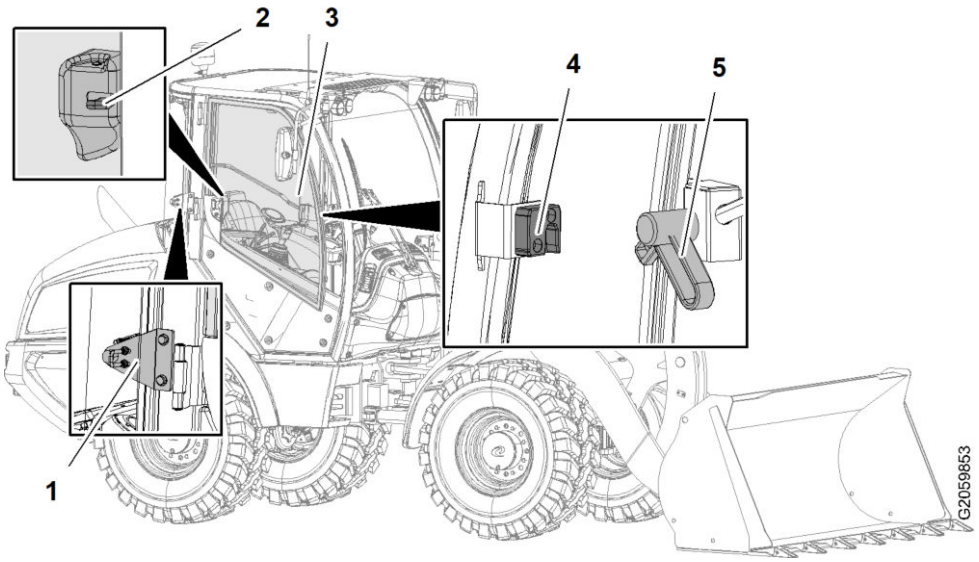

Fig. 78: Opening right window 180°

1 Window retainer
2 *Window unlocking* lever
3 Window
4 Retaining plate
5 *Window opener* lever

▶ To open window: turn lever **5** up and latch window **3** in window holder **1**.

▶ To open window: push lever **2** and lock window **3** with retaining plate **4**.

3.2.5 Emergency exit

Right cab window is designed as an emergency exit and should be used as such in an emergency.

Before starting machine, make sure that it is possible to get out via emergency exit.

Opening emergency exit

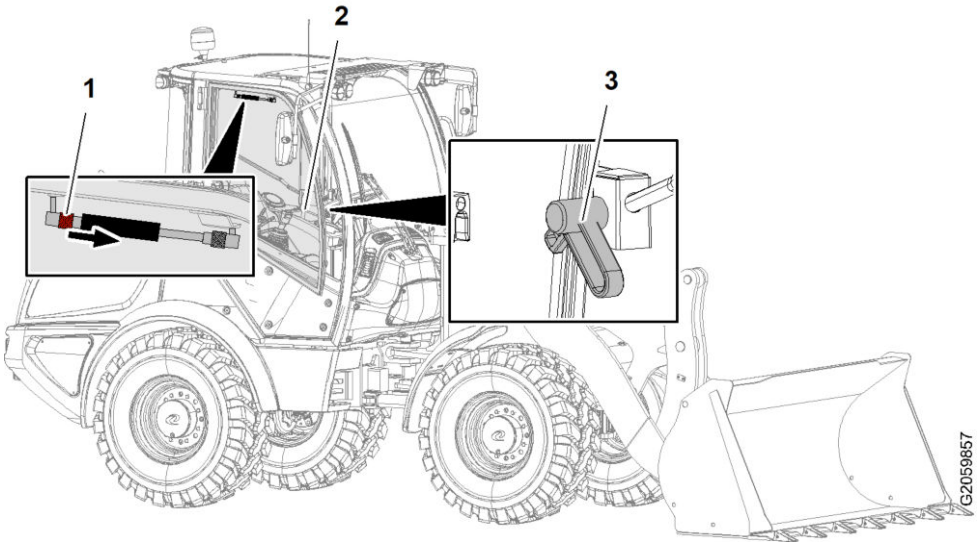

Fig. 79: Opening emergency exit

1 Gas-filled spring
3 Window opener lever

See next page for continuation of the image legend

2 Right cab window

▶ Turn off diesel engine.

▶ Push gas-filled spring **1** in direction of arrow and detach it.

▶ Open cab window **2** with lever **3**.

Leaving operator's cab through emergency exit

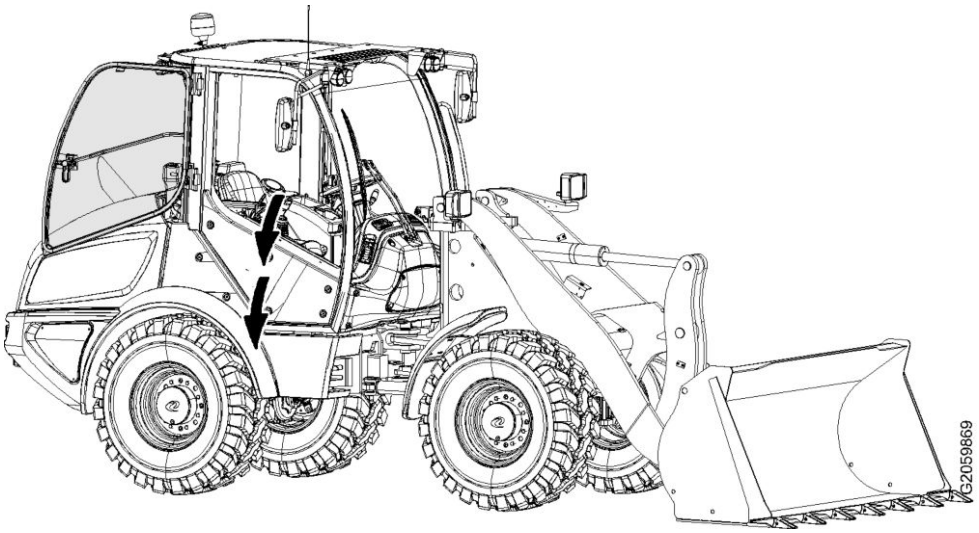

Fig. 80: Leaving operator's cab through emergency exit

▶ Leave operator's cab through emergency exit.

3.2.6 Fire extinguisher

This equipment is optional.

Note
Use, safety and inspection of the fire extinguisher!

▶ Find out about fire alarm options and fire fighting equipment on the site.

▶ Make sure you know where the fire extinguisher is located and how to use it.

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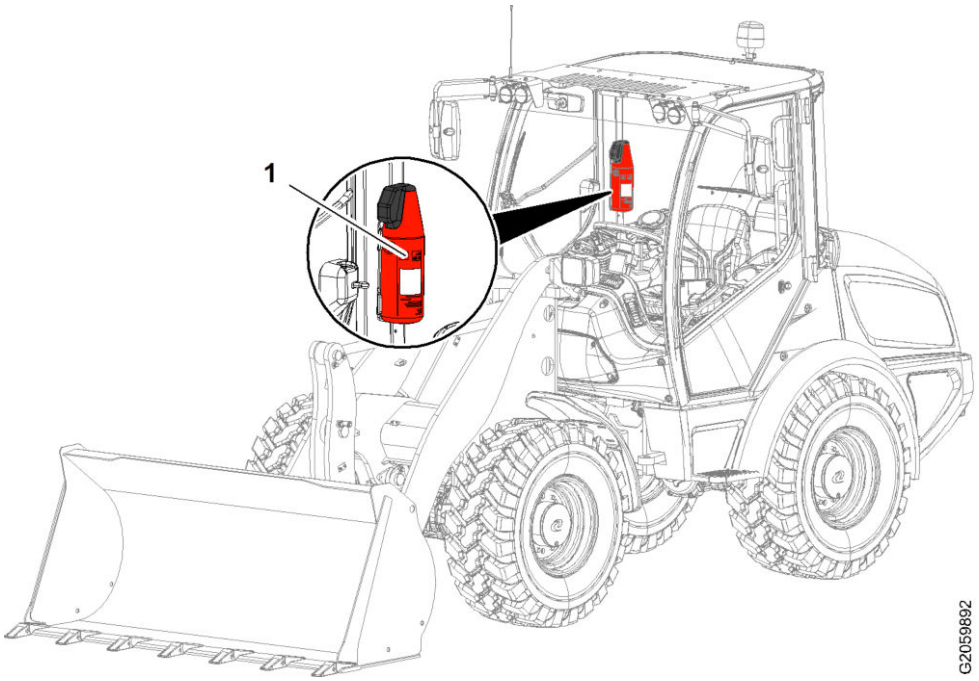

Fig. 81: Fire extinguisher

1 Fire extinguisher

When installing a fire extinguisher at a later point:
– Find out about the mounting options: contact Liebherr customer service.
– Observe the manufacturer's assembly instructions.

3.2.7 Operator's seat

The ergonomically designed operator's seat offers a high degree of comfort.

The adjustable operator's seat allows the operator to move the seat into a position that provides maximum individual comfort.

Shock absorption:
– The operator's seat installed in the machine complies with ISO 7096.
– When the machine is used correctly, the vibrations transmitted by the operator'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}”) were measured in accordance with ISO 2631, Part 1, and thus meet the standards for protection against overall body vibrations in EN 474-1.

Note the following when adjusting the operator's seat:
– The operator must easily reach the pedals without any effort.
– There is headroom in the operator's cab.
– The operator's seat does not vibrate on bumpy ground.
– The backrest does not touch the cab wall.

Note

Do not cover a heated operator's seat with seat covers or jackets!

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WARNING
Uncontrolled activation of the machine!
Risk of injury.

▶ Only carry out the adjustments when the engine is switched off.

Operator's seat: Grammer mechanical

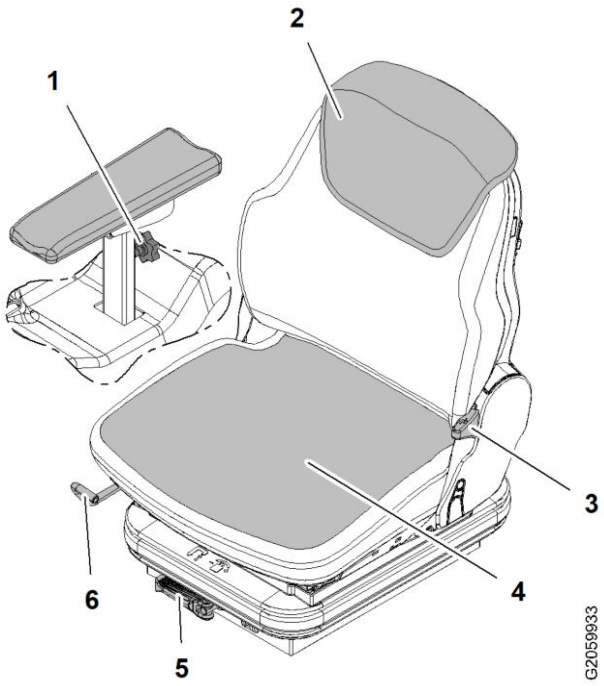
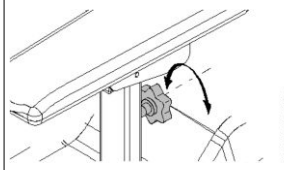
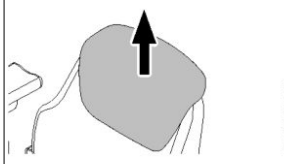
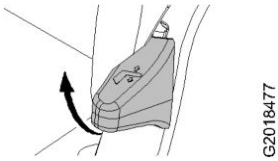


Fig. 82: Operator's seat: Grammer mechanical

	Adjustment options	
1	 G2059926	**Adjusting the arm rest** Loosen screw and adjust armrest by pulling up or pushing in.
2	 G2018479	**Backrest extension** Adjust height of backrest extension by pulling or pushing it.
3	 G2018477	**Backrest adjustment** Pull the lever all the way up and move the backrest to the required position by pressing your upper body against it.

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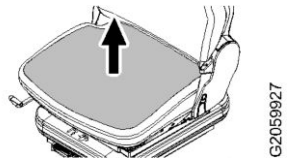
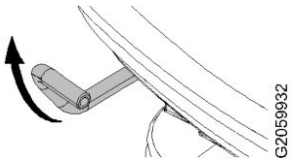
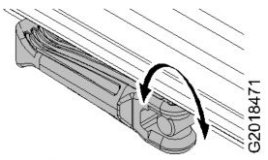
	Adjustment options	
4	 G2059927	**Height adjustment** Lift up the seat as necessary until you hear it catch. When you raise the driver's seat above the highest notch it sinks to the lowest position.
5	 G2059932	**Horizontal adjustment** Pull the lever all the way up and move the operator's seat.
6	 G2018471	**Setting driver’s weight** Turn lever and set driver’s weight. The set driver’s weight is shown in the sight glass.

Tab. 16: Operator's seat: Grammer mechanical

Operator's seat: Grammer pneumatic

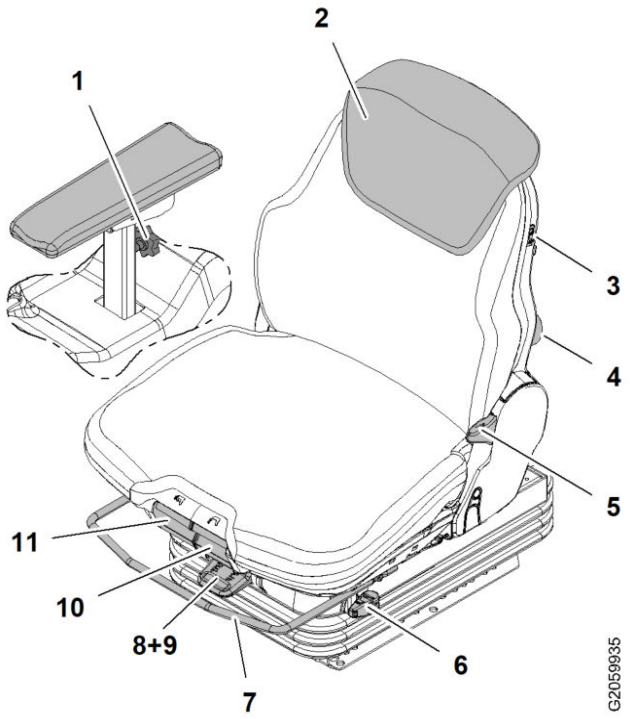


Fig. 89: Operator's seat: Grammer pneumatic

NOTICE
High compressor load!
Damage to the compressor.

▶ Do not press the button for longer than 1 minute.

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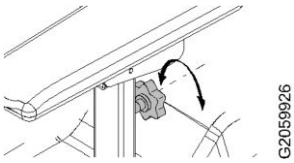
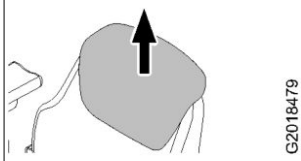
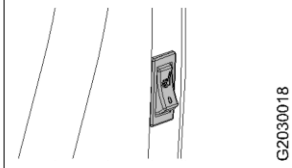
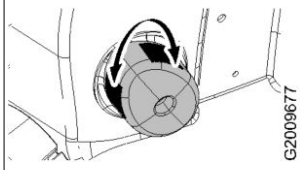
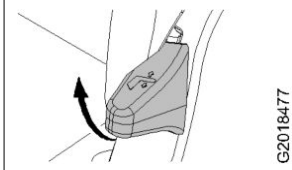
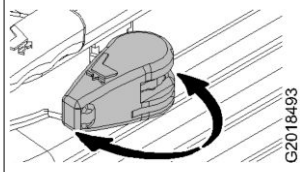
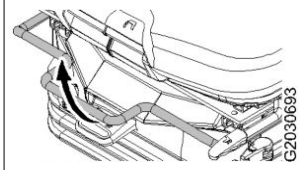
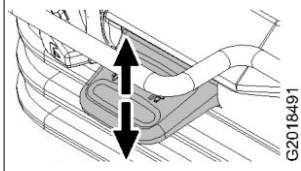
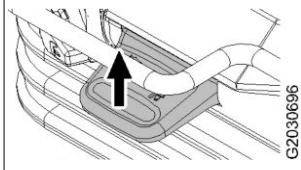
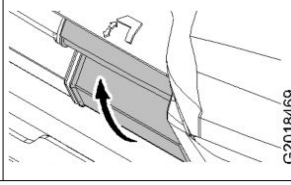
	Adjustment options	
1	 G2059926	**Adjusting the arm rest** Loosen screw and adjust armrest by pulling up or pushing in.
2	 G2018479	**Head rest** Adjust the inclination and height of the head rest by pulling or pushing it.
3	 G2030018	**Seat heating** Press the seat heating button to switch the seat heating on or off.
4	 G2009677	**Lumbar support adjustment** Turn the knob to adjust the contour of the backrest to your body.
5	 G2018477	**Backrest adjustment** Pull the lever all the way up and move the backrest to the required position by pressing your upper body against it.
6	 G2018493	**Longitudinal absorption** Move lever forward or back to activate or deactivate longitudinal absorption.
7	 G2030693	**Horizontal adjustment** Pull the lever all the way up and move the operator's seat.
8	 G2018491	**Height adjustment** Pull or push the lever to adjust the seat height as required.
9	 G2030696	**Setting driver’s weight** Do not make adjustment when machine is moving. Briefly pull lever to automatically adjust driver’s weight.
10	 G2018469	**Seat inclination adjustment** Pull up lever and adjust seat inclination by putting more or less weight on front of seat cushion.

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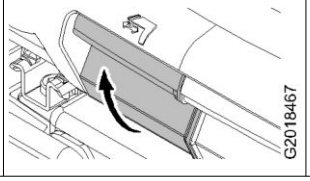
	Adjustment options	
11		**Seat cushion depth adjustment** Pull up the lever and move the seat cushion.

Tab. 17: Operator's seat: Grammer comfort

3.2.8 Safety belt

WARNING
Always wear a safety belt!
Injury.

▶ Always wear safety belt before putting machine into service.

Fastening the safety belt

Make sure that following requirements are fulfilled:
❑ Condition, function and fastening have been checked.
❑ Damaged parts have been replaced.
❑ The safety belt is not twisted.
❑ A proper seating position is adopted.

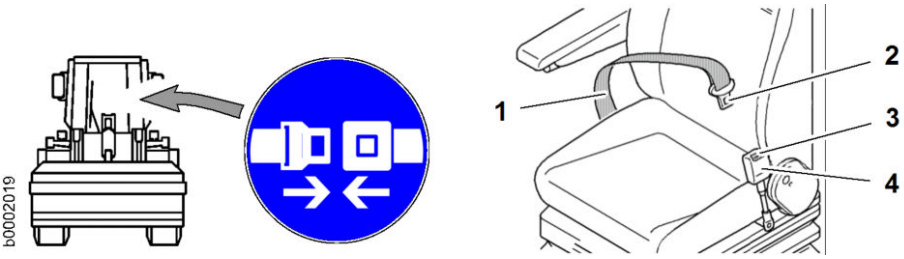


Fig. 101: Safety belt

1 Strap
2 Lug
3 Release button
4 Belt lock

▶ To fasten the safety belt: pull the strap **1** over your lap and lock the lug **2** into the belt lock **4**.

▶ To release the safety belt: press the release button **3**.

3.2.9 Steering wheel

You can change height of steering wheel and distance from your body by adjusting steering column. Steering wheel can be adjusted progressively.

WARNING
Uncontrolled steering movements!
Risk of injury.

▶ Only adjust the steering wheel when the engine is switched off.

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Adjusting distance from steering wheel to your body

This equipment is optional.

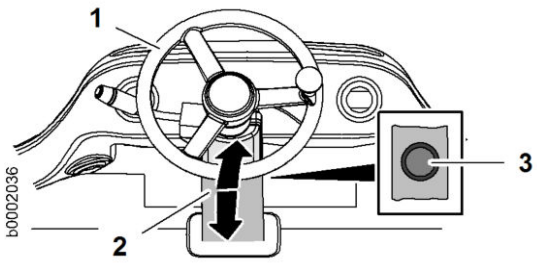

Fig. 102: Adjusting distance from steering wheel to your body

1 Steering wheel
2 Steering column
3 *Steering wheel distance* button

▶ Press and hold button **3**.
▷ Steering column **1** is unlocked.

▶ Adjust the distance from the steering wheel to your body.

▶ Release button **3**.
▷ Steering column **1** is locked.

3.2.10 Starting switch

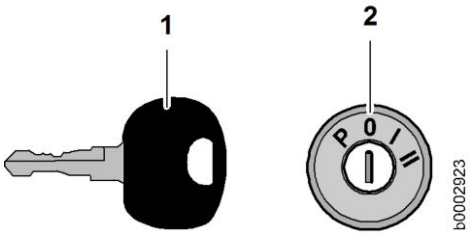

Fig. 103: Starting switch

1 Ignition key
2 Starting switch
P Park position
0 Ignition **OFF**
I Ignition **ON**, preglowing
II Starting position

The ignition key can be removed when it is in the 0 position.

The starting switch is equipped with a repeat start lock.

When the ignition key is in position **0** or position **P**, the following consumers can be switched on:
– Hazard warning system
– Front working headlights
– Rear working headlight (option)
– Beacon (option)
– Radio (option)
– Marker lights
– Tail light
– License plate lights (option)
– Interior lighting

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3.2.11 Electronic immobilizer

This equipment is optional.

Machine comes with two blue ignition key and a red master key. Machine can only be put into operation with a programmed ignition key.

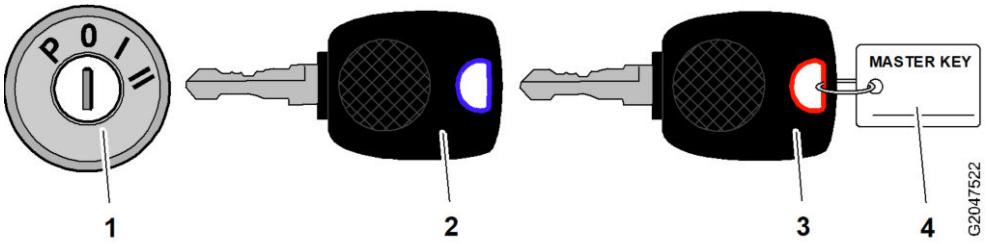

Fig. 104: Electronic immobilizer

1 Starting switch
2 Ignition key (blue)
3 Master key (red)
4 Type approval number

Note
Keep master key in a safe place away from machine.
Master key is only used to program ignition keys.

▶ Only start machine with programmed ignition key.

Note
If attempt is made to put machine into operation within short period with multiple unprogrammed ignition keys:
Immobiliser is active for 15 minutes.

▶ Use only programmed ignition keys.

Programming new ignition keys

A maximum of 10 ignition keys can be programmed with the master key.

▶ Insert master key **3** in starting switch **1** and put in position **I** for 5 seconds.

▶ Put master key **3** in **0** position and pull it out.

▶ Insert ignition key **2** to be programmed into starting switch **1** within 15 seconds and keep in position **I** for at least 1 second.
▷ Ignition key **2** is programmed.

Note
Program further ignition keys!

▶ Repeat entire procedure.

Deleting programmed ignition keys

Deleting programmed ignition keys is only possible with master key.

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Note
Deleting programmed ignition key!
This will cancel all programmed ignition keys.

▶ If necessary, reprogramme ignition key.

▶ Insert master key **3** in starting switch **1** and put in position **I** for 20 seconds.
▷ All programmed ignition keys **2** are deleted.

Troubleshooting

Possible faults and how to eliminate them:

Troubleshooting	Remedy
Putting machine into service not possible.	Use a programmed ignition key.
Ignition keys cannot be programmed.	No master key or wrong master key used. Master key left in starting switch too long or not long enough. Ignition key to be programmed has no transponder. Programming time for starting ignition key in starting switch too short.
Programmed ignition keys cannot be deleted.	No master key or wrong master key used. Master key not long enough in starting switch.

Tab. 18: Troubleshooting

Note
If the problem cannot be eliminated:

▶ Contact Liebherr customer service.

3.2.12 Steering-column switch

The steering column switch consists of the following control elements for:
– Indicator lights
– High beam
– Horn and headlight flasher
– Front windscreen wiper
– Front windscreen washer system

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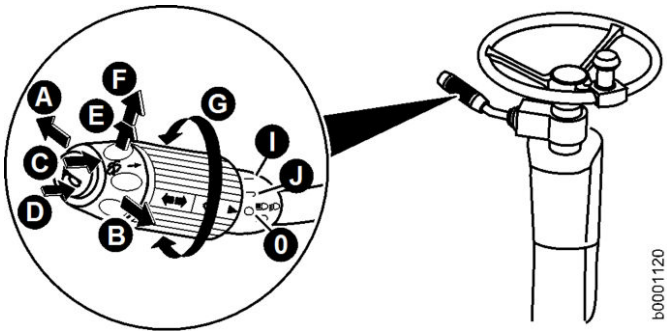

Fig. 105: Steering column switch

Functions of the steering column switch
- **A** - right indicator light
- **B** - left indicator light
- **C** - *front windscreen* washer system
- **D** - horn
- **E** - headlight flasher
- **F** - high beam
- **G** - *front windscreen wiper* knob
  - **0** - windscreen wiper off
  - **J** - intermittent operation
  - **I** - continuous operation

3.2.13 Lighting

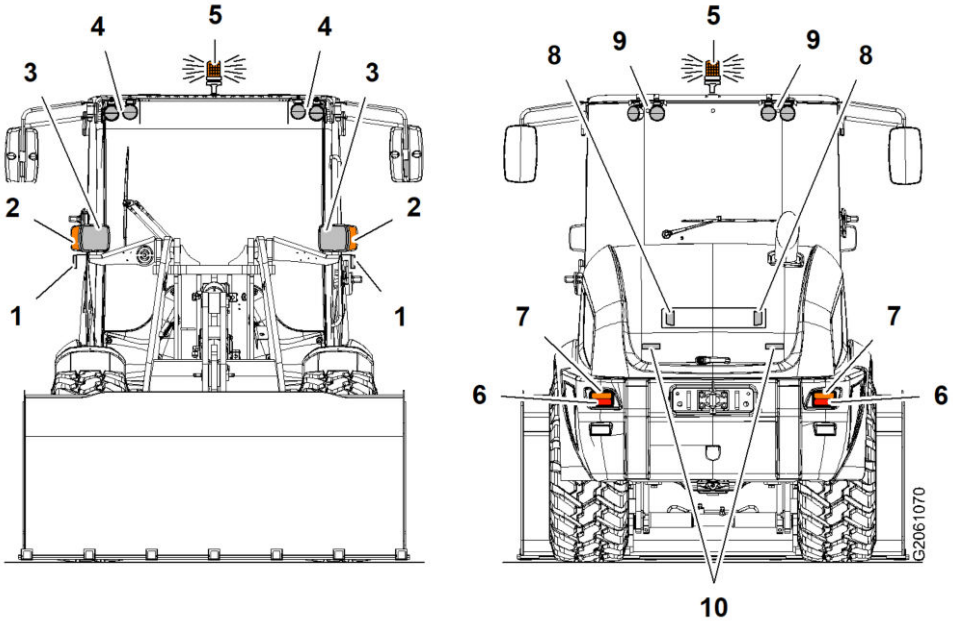

Fig. 106: Lighting

1	Marker lights (option)	**6**	Brake lights, tail lights
2	Front indicator light	**7**	Rear indicator lights
3	Driving headlights	**8**	Licence plate light (option)
4	Front working headlights	**9**	Rear working headlights (option)
5	Flashing beacon (option)	**10**	Flash (option)

Driving headlight includes:
– Low beam

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– Parking light
– High beam

Note
When you leave the operator's cab:

▶ Switch off the lights.

NOTICE
Battery discharged for too long!
Damage.

▶ Charge a flat battery as soon as possible.

Driving headlights, tail lights, marker lights (option) and licence plate lights (option)

The parking lights, tail lights, marker lights and licence plate lights remain operational even if the ignition key has been removed.

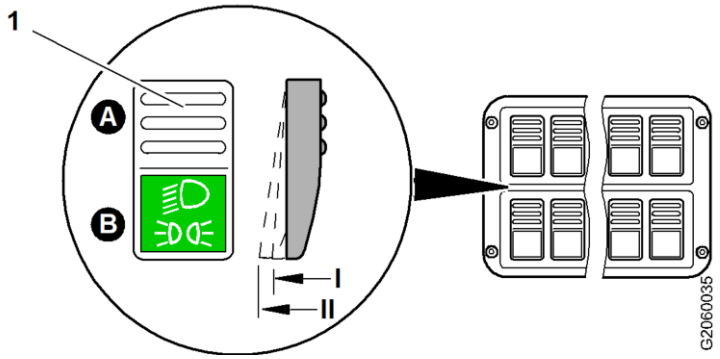

Fig. 107: Driving headlights, tail lights, marker lights (option) and licence plate lights (option)

1 *Marker lights and low beam* switch

▶ To switch on marker lights, tail lights and licence plate light: push switch **1** to position **B** in position **I**.

▶ To switch on low beam, tail lights and licence plate light: push switch **1** to position **B** in position **II**.

▶ To switch off the lighting: push the switch **1** to position **A**.

High beam

Make sure that following requirements are met:
❑ Low beam is activated.

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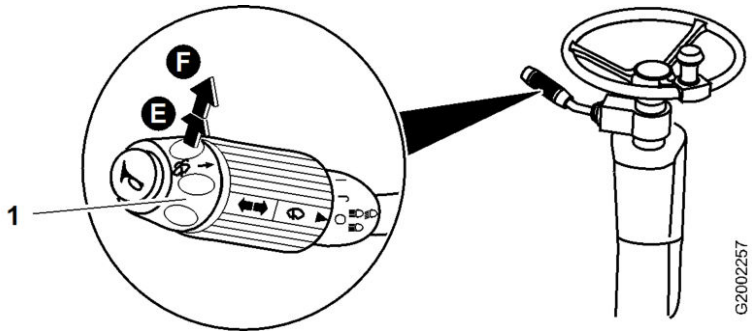

Fig. 108: High beam

1 Steering-column switch
E Headlight flasher
F High beam

▶ To switch on the high beam: push the steering-column switch **1** in direction **F**.
▷ *High beam* symbol is shown in display.

▶ To switch off the high beam: press the steering-column switch **1** in the direction **F** again.
▷ *High beam* symbol is not shown in display.

Working headlights

The working headlights still work when the ignition key has been taken out.

WARNING
The working headlights can become hot!
Burns, fire.

▶ Observe the minimum interval of 1 m to persons and material.

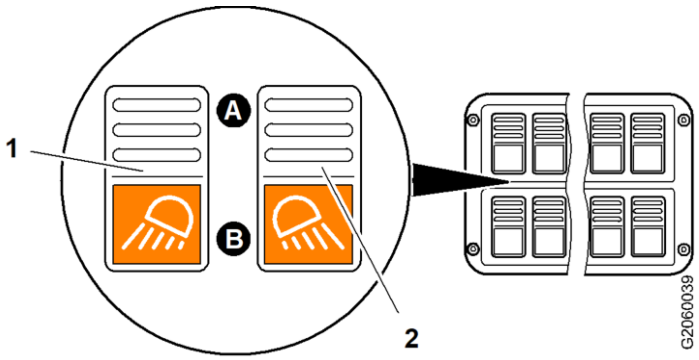

Fig. 109: Working headlights

1 *Front working headlights* switch
2 *Rear working headlight* switch (option)

▶ To switch on the front working headlights: push the switch **1** to position **B**.

▶ To switch off the front working headlight: push the switch **1** to position **A**.

▶ To switch on rear working headlights: push switch **2** to position **B**.

▶ To switch off the rear working headlight: push the switch **2** to position **A**.

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Indicator lights

Make sure that following requirements are met:
❑ The electrical system of the machine is switched on.

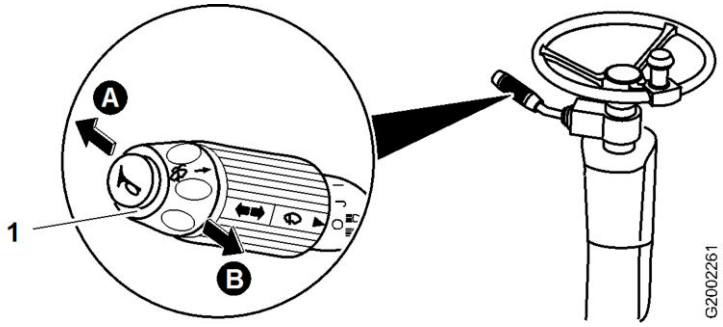

Fig. 110: Direction indicator lights

1 Steering-column switch
A Right indicator light
B Left indicator light

▶ To switch on the right indicator light: push the steering-column switch **1** in direction **A**.

▶ To switch on the left indicator light: push the steering-column switch **1** in direction **B**.

Flashing beacon

This equipment is optional.

The flashing beacon still works when the ignition key has been taken out.

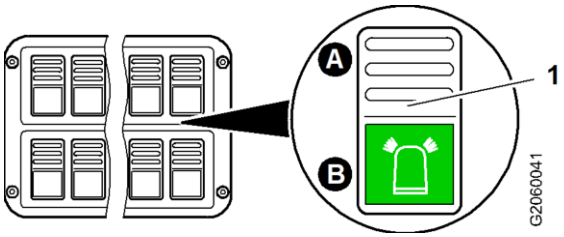

Fig. 111: Flashing beacon

1 *Flashing beacon* switch

▶ To switch on the beacon: push the switch **1** to position **B**.

▶ To switch off the beacon: push the switch **1** to position **A**.

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3.2.14 Interior illumination of operator's cab

Switching interior illumination on and off

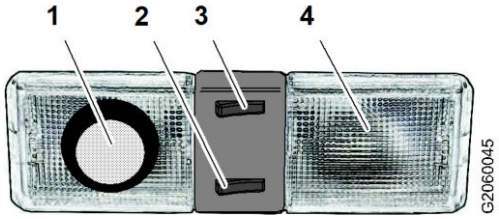

Fig. 112: Switching interior illumination on and off

1	Swivel reading lamp	**3**	*Reading lamp* switch
2	*Interior illumination* switch	**4**	Interior illumination

▶ Switch reading lamp on and off: press switch **3**.

▶ Switch interior illumination on and off: press switch **2**.

3.2.15 Display

The display is the main source of information for operating the machine. All functions are controlled using the control lever, switches and buttons.

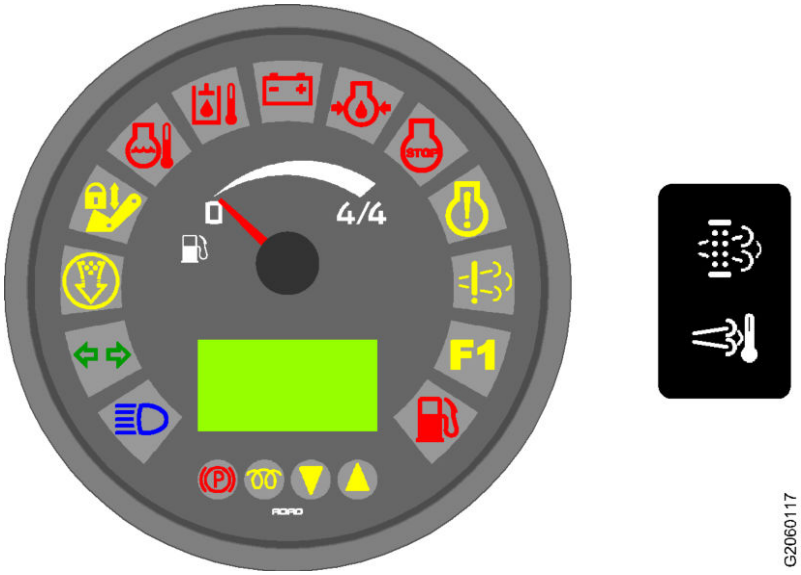

Fig. 113: Display

Machine status symbols	Designation
	High beam
	Indicator light, hazard warning system

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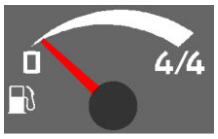
Machine status symbols	Designation
	Air filter contamination
	Working hydraulics lockout
	Fixed gear 1
	Forward travel direction
	Reverse travel direction
	Preglow indicator light (goes on when ignition is **ON** and at low temperatures)
	Parking brake (travel direction cannot be selected)
	Fuel level too low
	Fuel tank indicator
	Display functions: - Engine speed - Operating hours (ignition **ON**) - Service codes

Tab. 19: Machine status symbols

Machine warning symbols	Designation
	Coolant: temperature too high.
	Hydraulic oil: temperature too high.
	Flat battery.

Machine warning symbols	Designation
	Diesel engine: oil pressure too low.
	Turn off diesel engine.
	Diesel engine malfunction.

Tab. 20: Machine warning symbols

Diesel particulate filter warning symbols	Designation
	High exhaust temperature - Goes on if exhaust temperature exceeds 300 °C at outlet of exhaust pipe when diesel particulate filter is regenerating.
	Regenerate diesel particulate filter prompt – Goes on when condition of diesel particulate filter (soot particles) requires regeneration.
	Diesel engine warning – Goes on when exhaust counterpressure limit value in diesel particulate filter has been exceeded (excessive soot).
	Exhaust system malfunction – Goes on when an exhaust system malfunction occurs.

Tab. 21: Diesel particulate filter warning symbols

3.2.16 Control lever

The control lever is used for the following:
– Moving working attachment (For more information see: 3.3.7 Moving working attachment, page 119)
– Travel direction (For more information see: Selecting the travel direction, page 112)
– Float position (For more information see: Float position, page 122)

Following options are available for activating a working attachment with independent hydraulic supply:
– Control lever with comfort control
– Control lever with button control

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– Control lever with mini-joystick

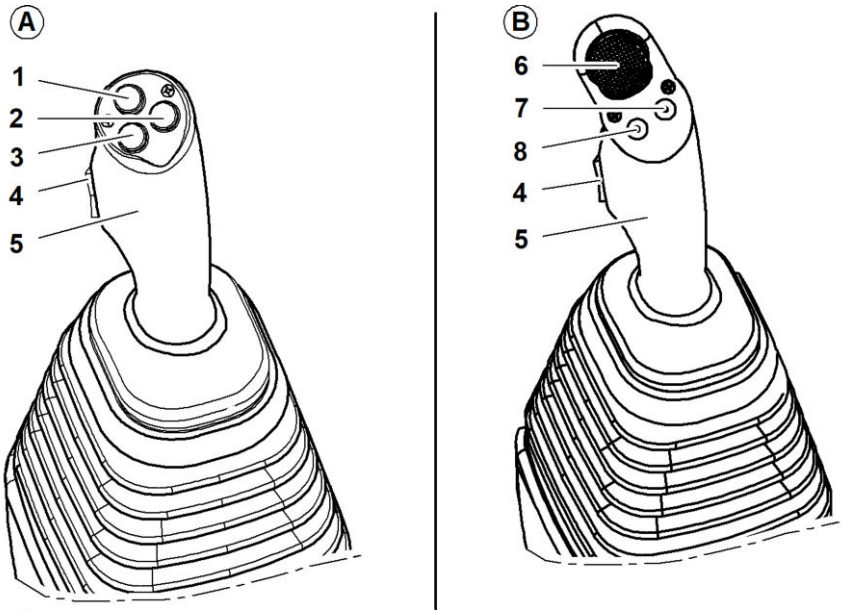

Fig. 136: Control lever

A	Control lever (comfort control or button control option)	**4**	*Travel direction* switch
B	Control lever with mini-joystick (option)	**5**	Control lever
1	Comfort control button	**6**	Mini-joystick
2	*Button control* button	**7**	Button not used
3	*Button control* button	**8**	*Comfort control* button

Controlling working attachment

Move the control lever to operate the working attachment.

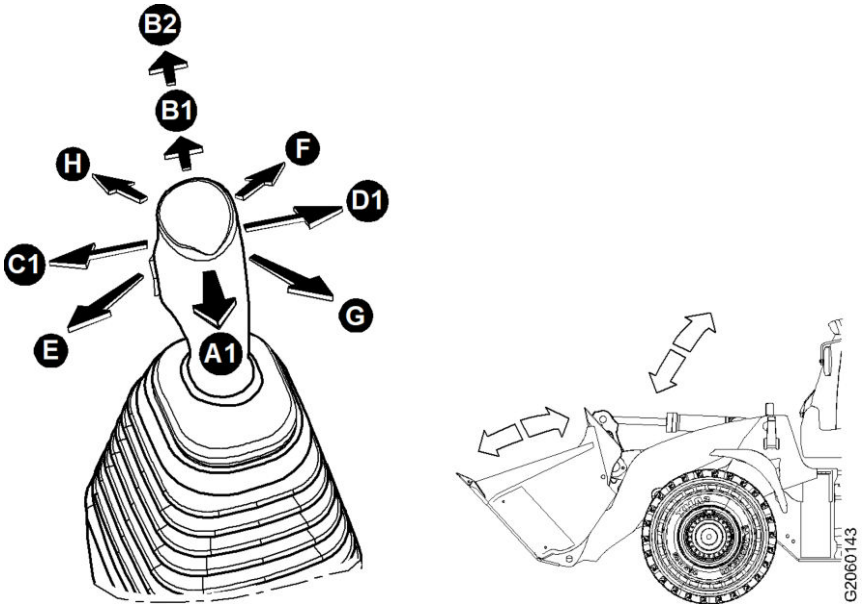

Fig. 137: Controlling the working attachment

Direction of control lever movement		Working attachment function	
A1	Back to action point	Raise the lift arms.	Standard
B1	Forward to action point	Lower the lift arms.	Standard
B2	Forward to limit	Float position	Standard
C1	Left to action point	Tilt the bucket in.	Standard
D1	Right to action point	Tilt the bucket out.	Standard
E	Diagonal	Raise the lift arms while tilting the bucket in.	Standard
F	Diagonal	Lower the lift arms while tilting the bucket out.	Standard
G	Diagonal	Raise the lift arms while tilting the bucket out.	Standard
H	Diagonal	Lower the lift arms while tilting the bucket in.	Standard

Tab. 22: Controlling the working attachment

3.2.17 Controlling a working attachment with an independent hydraulic circuit

This equipment is optional.

The following options are available for activation:
– Additional control lever (3rd function) (For more information see: Additional control lever, page 89)
– Button control (3rd function) (For more information see: Button control, page 90)
– Mini-joystick (3rd function) (For more information see: Mini-joystick, page 92)
– Comfort control (4th function) (For more information see: Comfort control, page 93)

DANGER
Unexpected movements of working attachment.
Fatal injury!

▶ Check whether control apparatus has been modified.

▶ Adjust control apparatus to working attachment.

▶ Familiarise yourself with the working attachment in a secure area.

▶ Observe operator's manual of working attachment.

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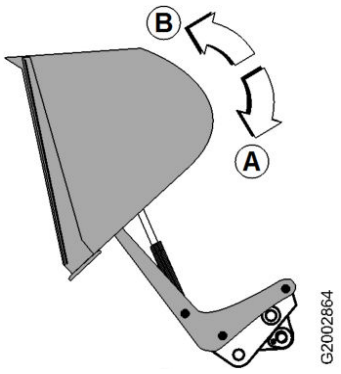
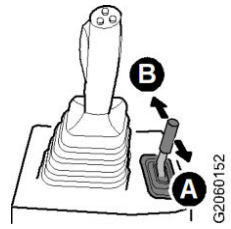
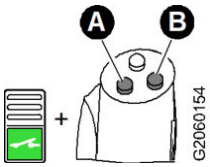
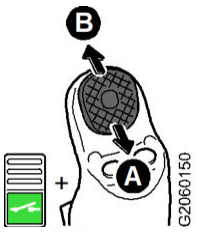
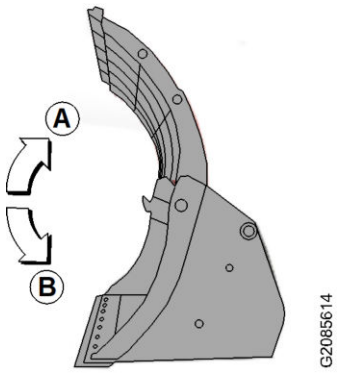
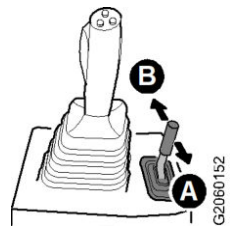
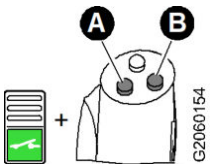
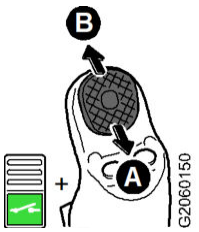
High dump bucket [A)]	Control	
		
		

Tab. 23: High dump bucket control system

A) To avoid damaging the tilt cylinder, always use the high dump function to empty material.

Bucket with downholder	Control	
		
		

Tab. 24: Bucket with downholder control system

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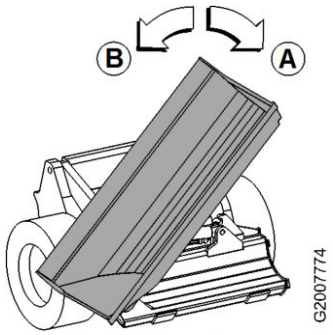
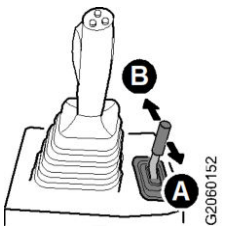
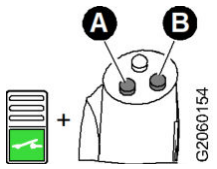
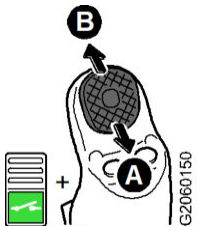
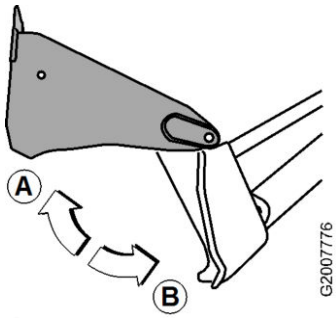
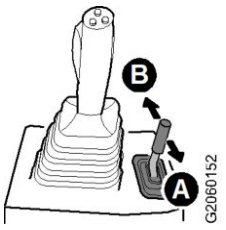
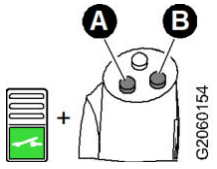
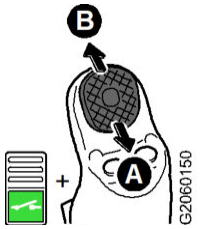
Side dump bucket	Control	
		
		

Tab. 25: Side dump bucket control system

4 in 1 bucket	Control	
		
		

Tab. 26: 4 in 1 bucket control system

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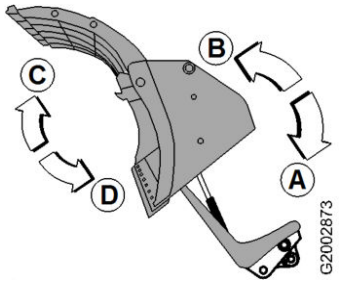
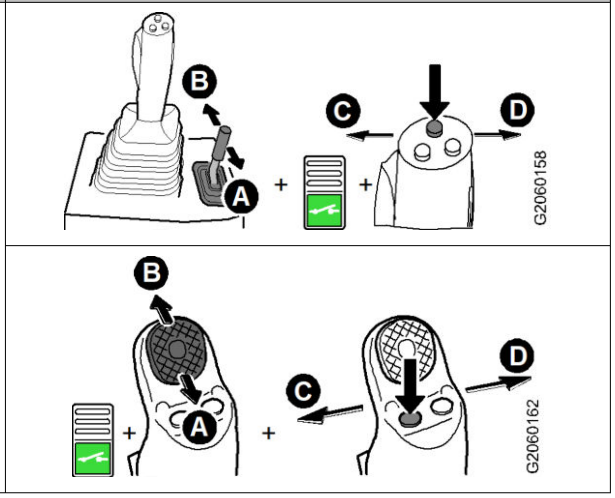
High dump bucket with downholder [A)]	Control
	

Tab. 27: High dump bucket with downholder

A) To avoid damaging the tilt cylinder, always use the high dump function to empty material.

Additional control lever

This equipment is optional.

Additional control lever is used for control of 3rd hydraulic function. This is needed for a mounted working attachment with its own hydraulic supply (for example, side dump bucket).

Additional control lever is available in two versions:
– Without continuous mode
– With continuous mode

WARNING
Movement of working attachment with additional operating lever possible despite activated working hydraulic lock!
Injury.

▶ Make sure there is nobody in danger area.

Additional control lever without continuous mode

Additional control lever **without continuous mode** automatically returns to middle position.

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Fig. 157: Additional control lever

1 Additional control lever

▶ Push additional control lever **1** in desired direction.
▷ The hydraulic working attachment is controlled (for example, tilting a side dump bucket in or out).

Additional control lever with continuous mode

Additional control lever **with continuous mode** remains in front position to use working attachment in continuous operation, e.g. sweeper.

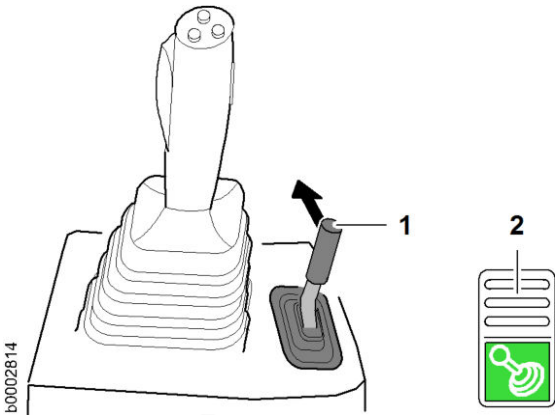

Fig. 158: Additional control lever with continuous mode

1 Additional control lever **2** *Continuous mode* switch

▶ Switch on continuous mode: press switch **2** and push additional control lever **1** .
▷ Additional control lever is locked.
▷ Continuous mode for working attachment is activated.

▶ Switch off continuous mode: press switch **2**.
▷ Additional control lever returns to middle position.
▷ Continuous mode for working attachment is switched off.

Button control

This equipment is optional.

Button control is used for control of 3rd hydraulic function. This is needed for a mounted working attachment with its own hydraulic supply (for example, side dump bucket).

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Controlling the working attachment

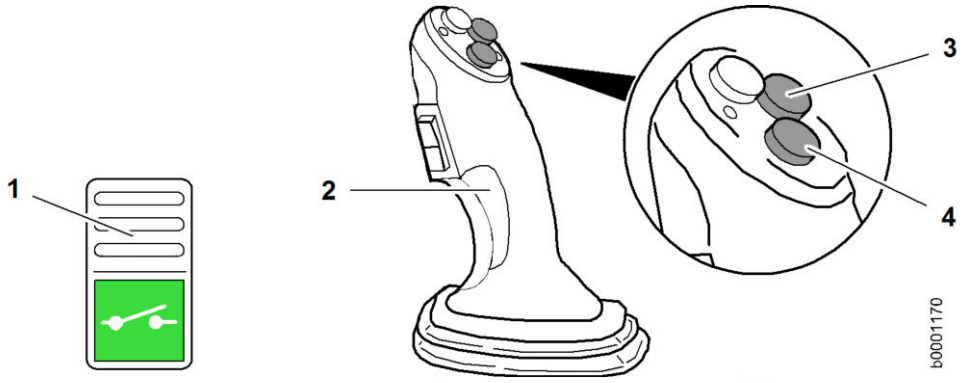

Fig. 159: Button control

1	*Button control* switch	**3**	*Button control* button
2	Control lever	**4**	*Button control* button

▶ Press the switch **1**.

▶ Grip the control lever **2** in your hand.

▶ Press button **3** or **4**.
▷ The hydraulic working attachment is controlled (for example, tilting a side dump bucket in or out).

▶ To deactivate the additional hydraulic function: Press **1** switch.

Working attachment continuous mode

This equipment is optional.

This function is for the continuous mode of a connected working attachment (for example a sweeper with a rotating brush roller). Button control is deactivated during continuous operation.

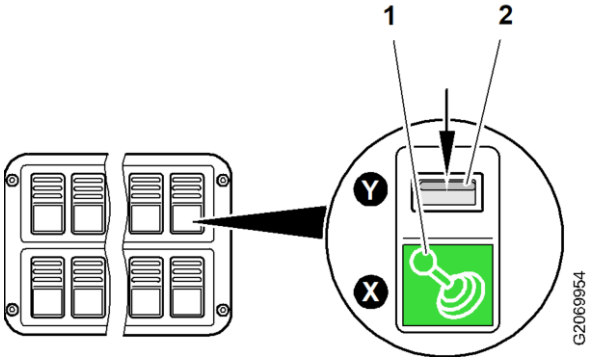

Fig. 160: Working attachment continuous mode

1	*Continuous mode* switch	**2**	Lockout

WARNING
Working attachment moves immediately when continuous mode is activated!
Injury.

▶ Make sure there is nobody in danger area.

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▶ Switch on continuous mode: release lockout **2** in direction of arrow while pressing switch **1** in position **X** for 2 seconds.
  ▷ A beep sounds.
  ▷ Continuous mode is activated **immediately** for working attachment.
  ▷ Button control is deactivated.

▶ Turn off continuous mode: push switch **1** to position **Y**.
  ▷ Continuous mode for working attachment is switched off.

Mini-joystick

Mini-joystick is used to control 3rd hydraulic function. This is needed for a mounted working attachment with its own hydraulic supply (for example, high dump bucket).

The working attachment can be controlled with a high degree of sensitivity, i.e. the further the mini-joystick is pushed in a direction, the faster the motion of the working attachment.

Controlling the working attachment

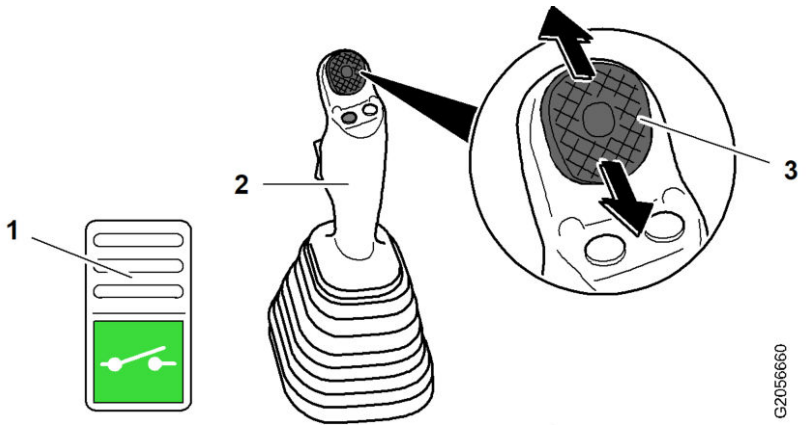

Fig. 161: Mini-joystick

1 *Mini-joystick* switch
2 Control lever
3 Mini-joystick

▶ Press the switch **1**.

▶ Grip the control lever **2** in your hand.

▶ Push the mini-joystick **3** in the desired direction.
  ▷ The hydraulic working attachment is controlled (for example, tilting a side dump bucket in or out).

Working attachment continuous mode

This equipment is optional.

This function is for the continuous mode of a connected working attachment (for example a sweeper with a rotating brush roller). Button control is deactivated during continuous operation.

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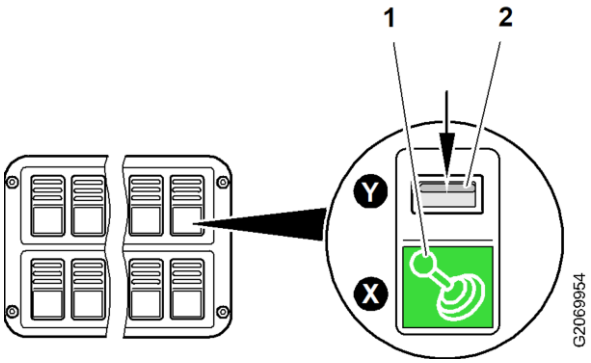

Fig. 162: Working attachment continuous mode

1 *Continuous mode* switch **2** Lockout

WARNING
Working attachment moves immediately when continuous mode is activated!
Injury.

▶ Make sure there is nobody in danger area.

▶ Switch on continuous mode: release lockout **2** in direction of arrow while pressing switch **1** in position **X** for 2 seconds.
  ▷ A beep sounds.
  ▷ Continuous mode is activated **immediately** for working attachment.
  ▷ Button control is deactivated.

▶ Turn off continuous mode: push switch **1** to position **Y**.
  ▷ Continuous mode for working attachment is switched off.

Comfort control

Comfort control is used for activation of 4th hydraulic function. This is needed for a mounted working attachment with its own hydraulic supply (for example, high dump bucket with downholder).

Working attachment can be controlled with a high degree of sensitivity, i.e. the further the control lever is pushed in a direction, the faster the working attachment moves.

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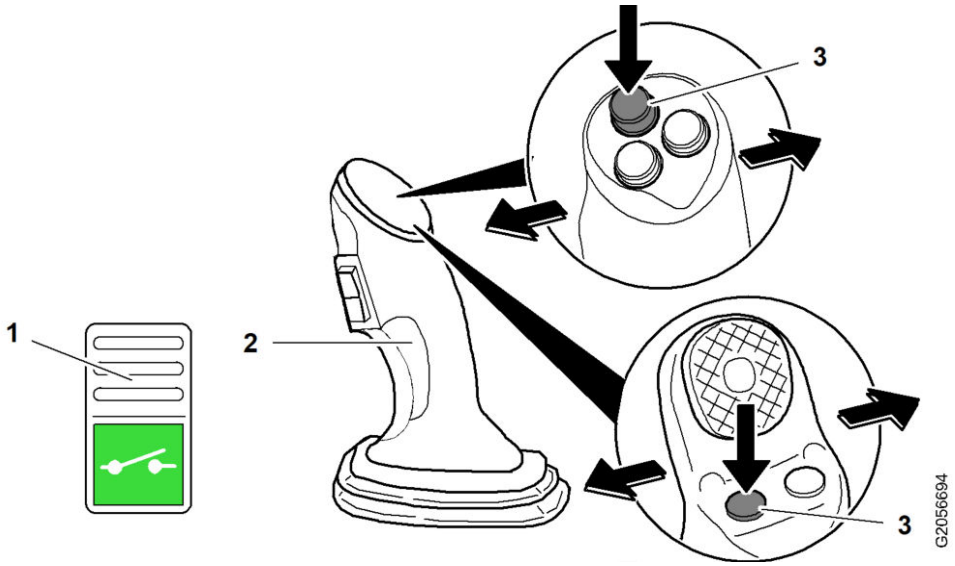

Fig. 163: Comfort control

1 *Comfort control* switch
2 Control lever
3 *Comfort control* button

▶ Press the switch **1**.

▶ Grip the control lever **2** in your hand.

▶ Press button **3** while pressing control lever **2** in desired direction.
▷ Hydraulic working attachment is actuated (for example, opening or closing a downholder).
▷ Function for tilting working attachment in and out with control lever is deactivated.

To deactivate the additional hydraulic function:

▶ Release the button **3**.
▷ Function for tilting working attachment in and out with control lever is re-activated.

3.2.18 Heating, ventilation, air conditioning (option)

Heating heats air according to selected temperature setting.

The air flow can be adjusted using the blower.

In air conditioning mode, the air is cooled and dried.

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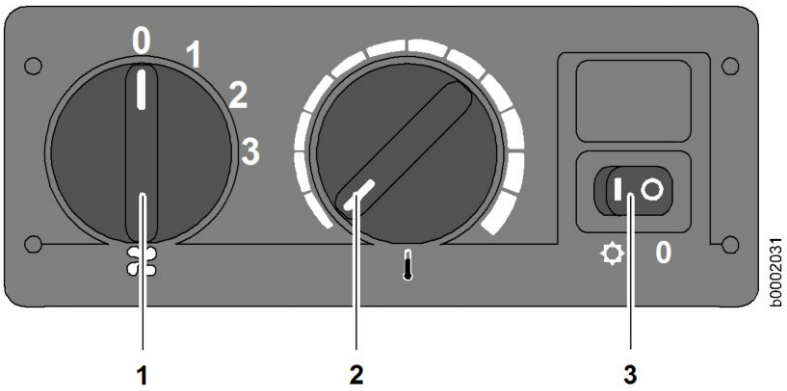

Fig. 164: Heating, ventilation

1 *Blower motor* knob
2 *Temperature* knob
3 *Air conditioning* switch (option)

Regulating temperature

The temperature can be adjusted progressively.

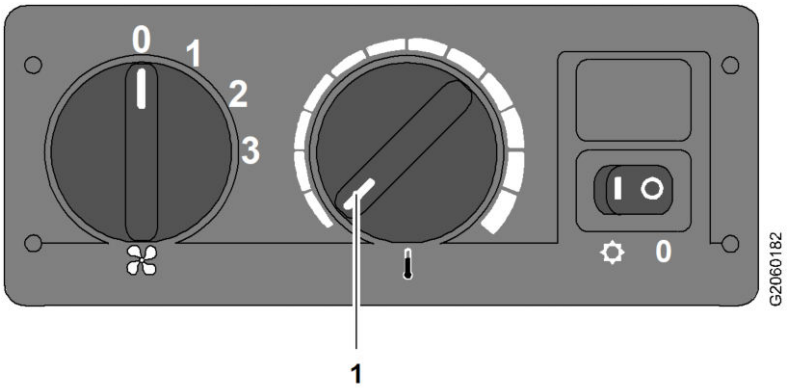

Fig. 165: Regulating the temperature

1 *Temperature* rotary switch

▶ Turn rotary switch **1** to required position.
▷ To the left is for cold.
▷ To the right is for warm.

Adjusting blower

Use rotary switch to switch blower on and off.

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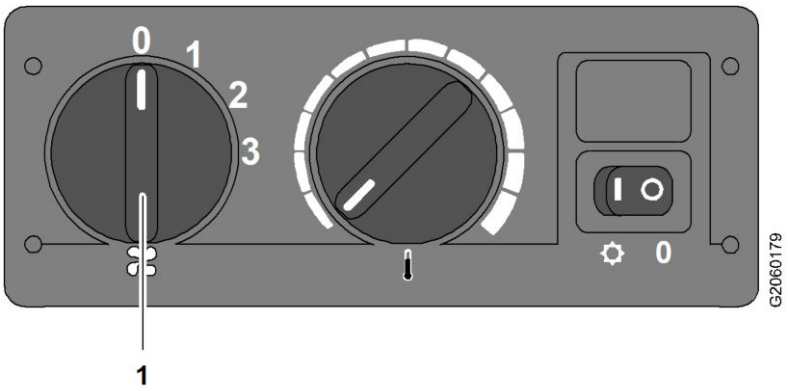

Fig. 166: Adjusting blower

1 *Blower motor* rotary switch

Blower levels:
Level **0** - **OFF** position
Level **1 to 3** – from low to high air flow

▶ Turn knob **1** to required position.
▷ Air flow is blown into operator's cab through nozzles.

Air conditioning mode

This equipment is optional.

In air conditioning mode, the air is cooled and dried.

Note
During air conditioning operation, the shaft seal ring in the air-conditioning compressor is also lubricated. This prevents refrigerant from escaping from the compressor.

▶ To guarantee the long-term function of the air conditioning, it is recommended to run the air conditioning system at least once every 14 days.

Make sure following preconditions are met:
❑ Diesel engine has started.
❑ Switch for blower motor is turned to at least level 1.
❑ Temperature in operator's cab is above 1 °C (below this temperature, temperature switch in evaporator is switched off).

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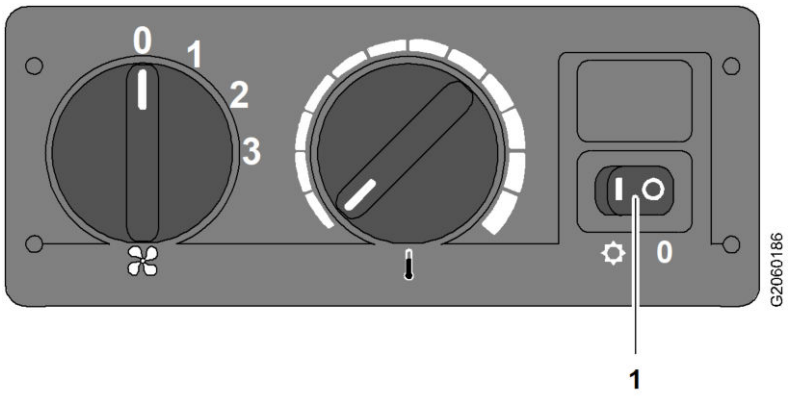

Fig. 167: Air conditioning mode

1 *Air conditioning* switch

▶ Switch on air conditioning: move switch **1** to position **I**.

▶ Switch off air conditioning: move switch **1** to position **0**.

Note

On cold, damp days, you can use air conditioning to dehumidify cab. Switch on the air conditioning in addition to the heating.

3.2.19 Rear window heater and exterior mirror heater (option)

This function is only available when the ignition is on.

Switching the rear window heater on and off

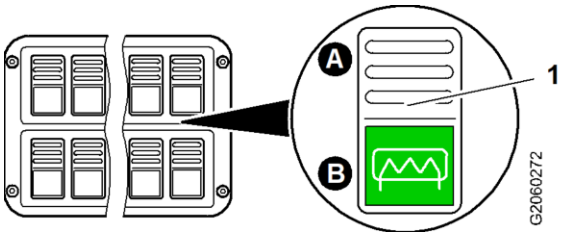

Fig. 168: Switching the rear window heater on and off

1 *Rear window heating* switch

▶ Turn on rear window heater: push switch **1** to position **B**.

▶ Turn off rear window heater: push switch **1** to position **A**.

Switching exterior mirror heater on and off

This equipment is optional.

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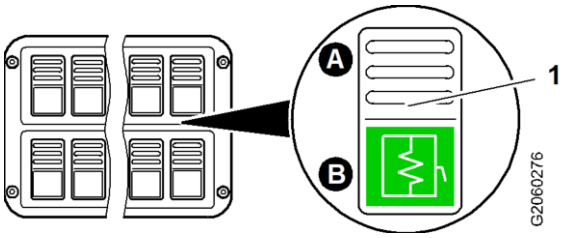

Fig. 169: Switching exterior mirror heater on and off

1 *Exterior mirror heating* switch

▶ Turn on exterior mirror heater: push switch **1** to position **B**.

▶ Turn off exterior mirror heater: push switch **1** to position **A**.

3.2.20 Interior and exterior mirrors

Machine is equipped with one interior and two exterior mirrors.

Adjusting the mirrors

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

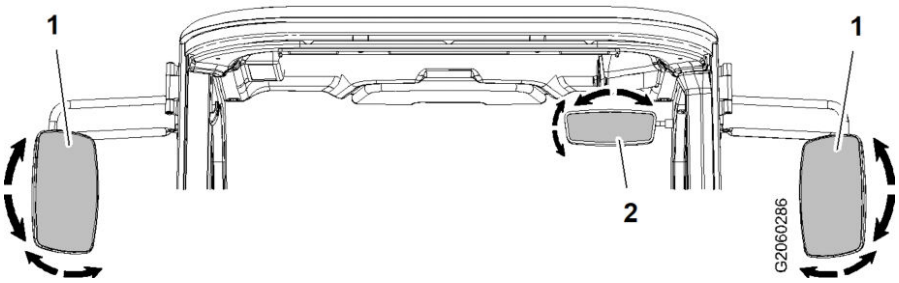

Fig. 170: Adjusting the mirrors

1 Interior mirror **2** Exterior mirror

Note
Adjust the mirrors!

▶ Mirrors and other visual aids (such as reversing camera) must always be adjusted to give best possible all-round view.

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3.2.21 Sun visor

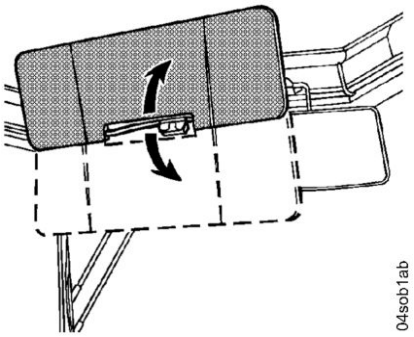

Fig. 171: Sun visor

3.2.22 Radio

This equipment is optional.

Observe the accompanying operating manual of the manufacturer.

3.2.23 Windscreen washer system

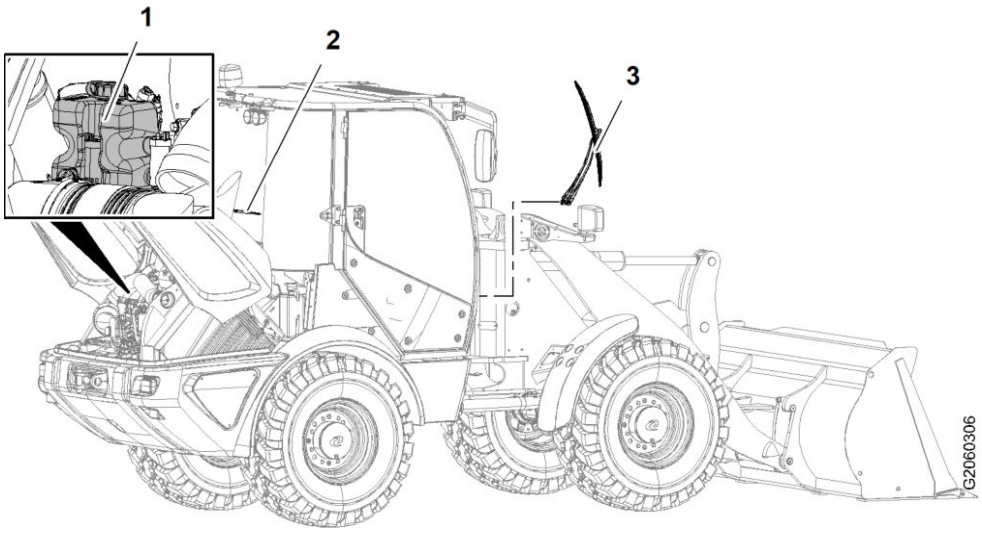

Fig. 172: Windscreen washer system

1 Windscreen washer tank
2 Rear windscreen washer system
3 Front windscreen washer system

The machine has an electric windscreen washer system for the front and rear windscreens.

The windscreen washer system consists of:
– Windscreen wipers
– Windscreen washer tank with pump
– Outlet nozzles for windscreen washer fluid

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Cleaning front windscreen

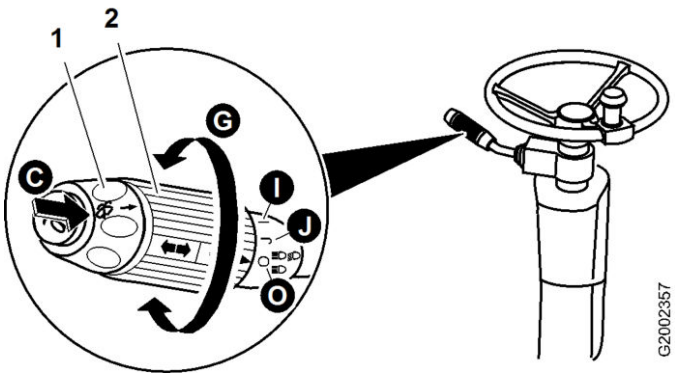

Fig. 173: Cleaning front windscreen

1	Button	**C**	Windscreen washer fluid activation
2	Rotary switchKnob	**G**	Windscreen wiper activation

▶ To switch on front windscreen wiper: turn rotary switch **2** to required position.
  ▷ **0** - windscreen wiper off
  ▷ **J** - intermittent operation
  ▷ **I** - continuous mode

▶ To turn on front windscreen washer and wiper: press and hold button **1** in direction of arrow.

Cleaning rear screen

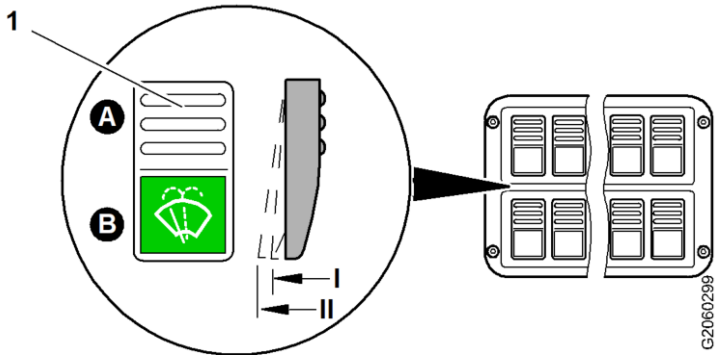

Fig. 174: Cleaning rear screen

1	*Rear screen washer system* switch

▶ To switch on rear screen wiper: push switch **1** at position **B** to position **I**.

▶ To switch off the rear screen wiper: push the switch **1** to position **A**.

▶ To switch on rear screen washer and wiper: push switch **1** at position **B** to position **II**.

▶ To switch off rear washer screen wiper: push switch **1** to position **A**.

3.2.24 Liebherr central lubrication system

This equipment is optional.

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The central lubrication system automatically greases all the connected lubrication points in succession.

NOTICE
Make sure all lubrication points are connected to the central lubrication system!
Damage to bearings.

▶ Observe the lubrication chart.

The central lubrication system with grease reservoir is installed on the left-hand side of the machine, behind the cab access.

Central lubrication system switch is located on switch panel in operator's cab.

Note
Changing lubricating cycle!

▶ See manufacturer's operator's manual supplied.

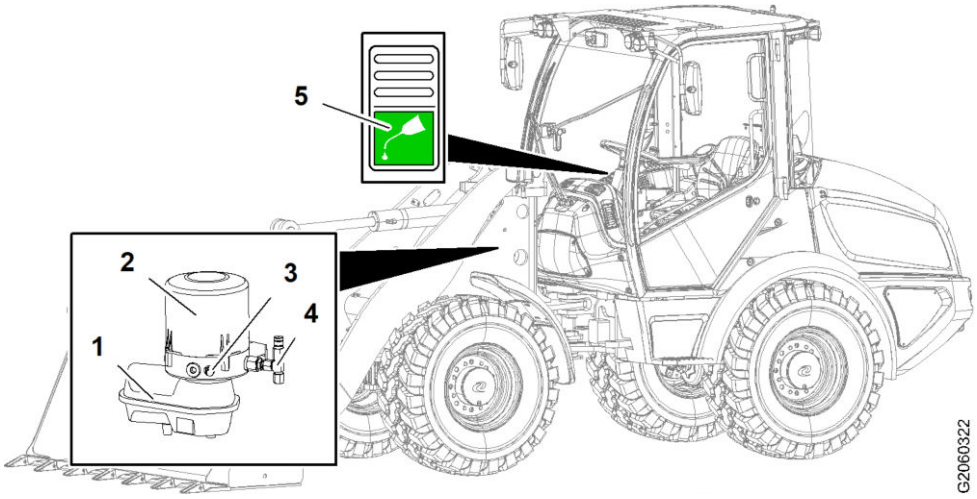

Fig. 175: Liebherr central lubrication system

1 Central lubrication pump
2 Grease reservoir
3 Filling port
4 Pressure relief valve
5 *Central lubrication system* key

Non-scheduled lubrication

You can perform intermediate lubrication at any time when the ignition is switched on. For example, this may be necessary after cleaning with the high-pressure cleaner.

If non-scheduled lubrication is performed:
– The current lubrication cycle is ended.
– The set lubrication cycle time is restarted from when the non-scheduled lubrication occurs.

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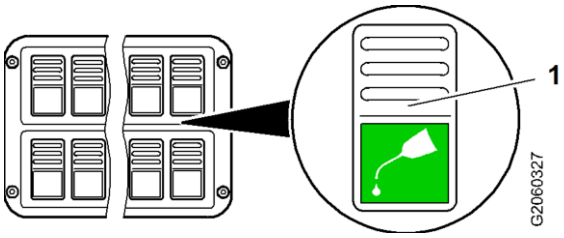

Fig. 176: Non-scheduled lubrication

1 *Central lubrication system* key

▶ To switch on intermediate lubrication: briefly press key **1**.

3.2.25 Reversing alarm

This equipment is optional.

The reversing alarm system warns anyone standing behind the machine while it is reversing.

Versions:
– Audible reversing alarm
– Visible reversing alarm

The reversing alarms can also be installed in combination.

The reversing alarm can also be deactivated.

Audible reversing alarm

Selectable functions:
– Audible reversing alarm active when travelling in reverse
– Deactivating the audible reversing up alarm

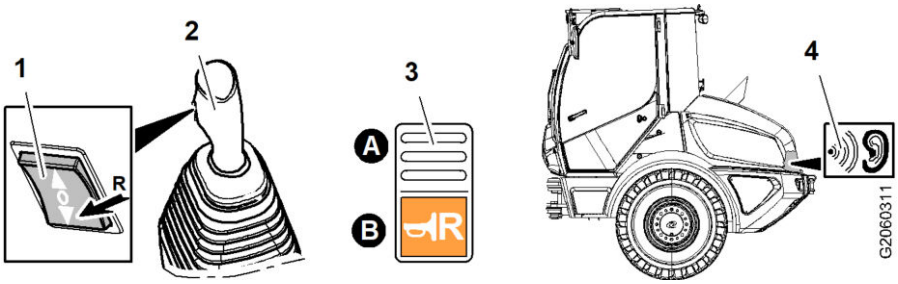

Fig. 177: Audible reversing alarm

1 *Travel direction* switch
2 Control lever
3 *Audible reversing alarm* switch
4 Reversing alarm
R Reverse travel direction

Audible reversing alarm active when travelling in reverse.

▶ Push the switch **3** to position **A**.

▶ Press the switch **1** in travel direction **R**.
▷ *Reverse travel direction* symbol is shown in display.
▷ Reversing alarm **4** is switched on.

Deactivating the audible reversing up alarm

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WARNING
Deactivated reversing alarm!
Risk of injury.

▶ Make sure there is nobody in the danger area.

▶ Push the switch **3** to position **B**.
▷ Reversing alarm **4** is switched off.

Visible reversing alarm

The following reversing warning apparatus is installed on the machine, depending on the version:
– Flashing light (LED) on the rear of the machine
– Flashing beacon on the rear of the machine
– Flashing beacon on the operator's cab

Flashing light (LED) on the rear of the machine

Selectable functions:
– Flashing light active in reverse travel direction
– Flashing light continuous mode

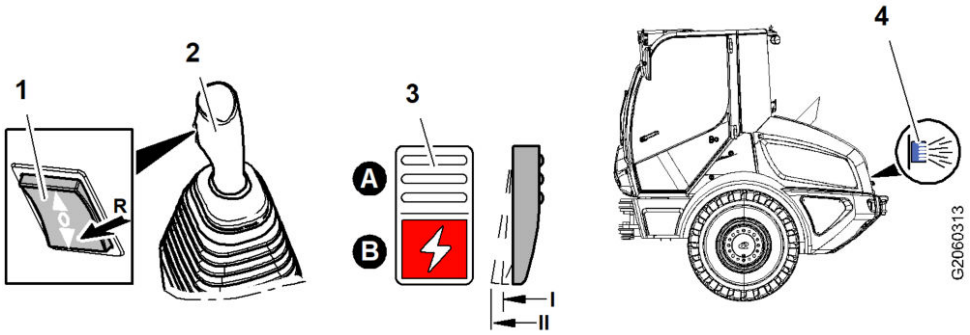

Fig. 178: Flashing light (LED) on the rear of the machine

1 *Travel direction* switch
2 Control lever
3 *Visible reversing alarm* switch
4 Flashing light (LED)
R Reverse travel direction

Flashing light active in reverse travel direction

▶ Push the switch **3** from position **B** to position **I**.

▶ Press the switch **1** in travel direction **R**.
▷ *Reverse travel direction* symbol is shown in display.
▷ The flashing light **4** is switched on.

Flashing light continuous mode

▶ Push the switch **3** from position **B** to position **II**.
▷ The flashing light **4** is switched on.

Switching off the flashing light

WARNING
Deactivated reversing alarm!
Risk of injury.

▶ Make sure there is nobody in the danger area.

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▶ Push the switch **3** to position **A**.
▷ The flashing light **4** is switched off.

Flashing beacon on the rear of the machine

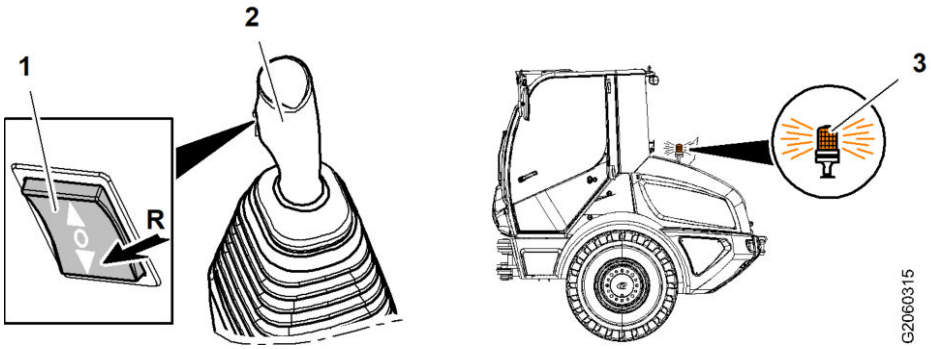

Fig. 179: Flashing beacon on the rear of the machine

1 *Travel direction* switch
2 Control lever
3 Flashing beacon
R Reverse travel direction

▶ Press the switch **1** in travel direction **R**.
▷ *Reverse travel direction* symbol is shown in display.
▷ The flashing beacon **3** is switched on.

Flashing beacon on the operator's cab

Selectable functions:
– Flashing beacon active when travelling in reverse
– Flashing beacon in continuous mode
– Flashing beacon off

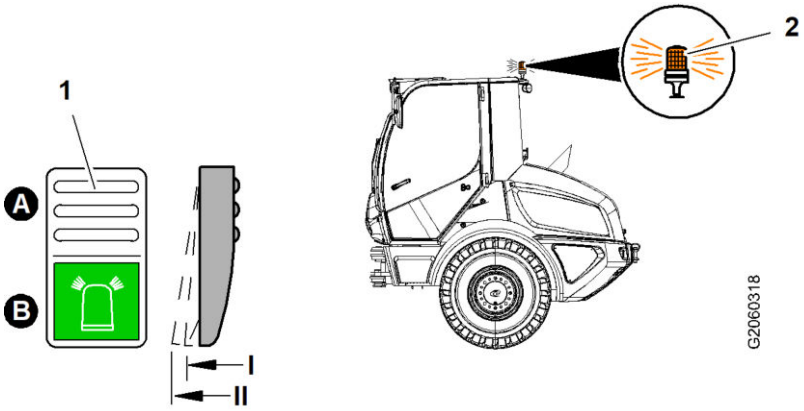

Fig. 180: Flashing beacon on the operator's cab

1 *Flashing beacon* switch
2 Flashing beacon

Flashing beacon active when travelling in reverse

▶ Push the switch **1** from position **B** to position **I**.
▷ The flashing beacon **2** is active when travelling in reverse.

Flashing beacon in continuous mode

▶ Push the switch **1** from position **B** to position **II**.
▷ The flashing beacon **2** is continuously active.

Flashing beacon off

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WARNING
Deactivated reversing alarm!
Risk of injury.

▶ Make sure there is nobody in the danger area.

▶ Push the switch **1** to position **A**.
▷ The flashing beacon **2** is switched off.

3.2.26 Cooling water preheating

This equipment is optional.

In cold weather, the cooling water preheating system warms the water-cooled engine before the wheel loader is started with the aid of a connection to the AC mains. The heating time depends on the outside temperature. The wheel loader is delivered with an extension lead in the storage compartment of the cab.

Activating cooling water preheating

Make sure that following requirement are met:
❑ A 230 V AC mains connection is available.

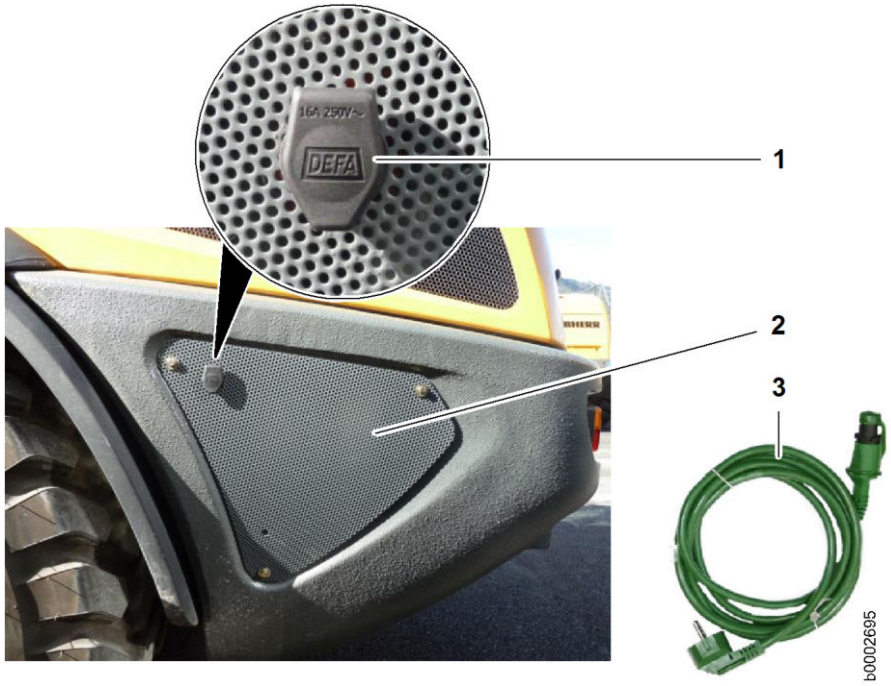

Fig. 181: Cooling water preheating

1 Plug with protective cover
2 Ballast cover
3 Extension lead

▶ Connect extension lead **3** to the plug connection **1**.

▶ Connect to the AC mains.
▷ Cooling water preheating is active.

▶ **To deactivate cooling water preheating:** disconnect from AC mains.

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3.2.27 Manual inching facility

This equipment is optional.

The manual inching facility can be used in addition to the inch pedal and is designed for when the machine is operated in a certain inching position for a prolonged period of time. It distributes the output smoothly between the travel hydraulics and the power demand of the working attachment when the machine is travelling at a slow, continuous speed.

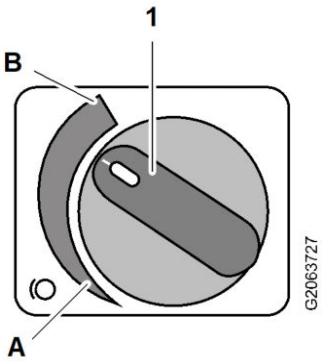

Fig. 182: Manual inching facility

1 Control dial

A	Increased performance of working hydraulics with correspondingly reduced travel speed
B	Standard setting of working hydraulics and travel speed

Tab. 28

Note

The function cannot be used when machine is stationary.

3.2.28 LiDAT

This equipment is optional.

LiDAT is a data transfer and positioning system for Liebherr machines and those of other manufacturers. Based on the latest data transfer technology LiDAT supplies information for the localisation and operation of the machines and thereby enables efficient management, optimised deployment planning and remote monitoring.

With LiDAT all important machine data can be viewed at all times. According to the subscription the data is updated several times a day and can be called up using a web browser at any time. Information that is particularly important such as leaving the machine of a predefined zone or reports of certain operating states and deployment parameters can also be requested.

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3.3 Operation

3.3.1 Daily start-up

Depending on where it is used (for example at a rubbish dump or sawmill), the machine may have to be cleaned every day before use.

Before starting up the machine, always make an inspection tour of it.

WARNING
Combustible deposits around the engine!
Injuries, fire.

▶ When working in a fire hazard zone: Clean the machine.

Putting the machine in the operating position

To put the machine into the operating position:

Make sure that following requirements are met:
- ❑ The daily maintenance tasks have been carried out.
- ❑ Battery main switch is on.
- ❑ The service hatches are closed.
- ❑ Articulation lock is released.

Testing

DANGER
Machine movements!
Danger to life.

▶ Make sure there are no persons in hazard zone.

▶ Perform all work movements multiple times with no load.

If the working tool does not function correctly:
▶ Do not use working tool.

▶ Rectify cause of fault.

Refuelling with diesel

Make sure that following requirements are met:
- ❑ Machine is in operating position.
- ❑ The working attachment is lying flat on the ground.
- ❑ Diesel engine is switched off.
- ❑ Specified diesel fuel is available.

Note
Ambient temperature below 0 °C!

▶ Make sure the diesel fuel is suitable for cold temperatures.

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WARNING
Highly flammable consumables!
Beware of burns.

▶ Avoid naked lights and fire.

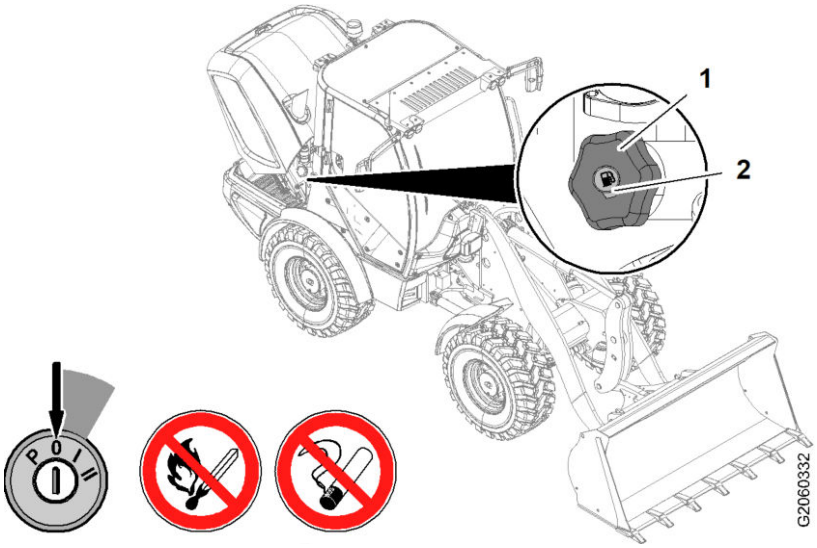

Fig. 183: Fuel tank

1 Tank filler cap **2** Protective cap

▶ Observe the safety regulations for refuelling.

▶ Open service hatches.

▶ Push off the protective cap **2**.

▶ Unlock the tank filler cap **1**, turn it anticlockwise and take it off.

▶ Insert the nozzle completely into the filler pipe and refuel.

▶ Put on the tank filler cap **1**, turn it clockwise and lock it.

▶ Close service hatches.

Note
Temperature differences can lead to condensation in the fuel tank.

If large temperature differences occur overnight:
▶ Completely fill the tank.

3.3.2 Starting diesel engine

NOTICE
Pressure spikes in hydraulic pump too high!
Damage.

▶ When warming up machine, do not exceed a diesel engine speed of 1600 rpm.

Note

The engine cannot be started by pushing or towing.

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The following precautions help you start the engine at cold temperatures:
– Fully charged battery

Starting procedure

Make sure the following preconditions are met:
❑ Machine is in operating position.
❑ You have fastened your safety belt.
❑ There are no persons or obstacles in the hazardous area of the machine.

▶ Sound the horn to warn bystanders.

▶ Turn the ignition key to position **I**.
▷ The system check is started.

Once the system check has been successfully completed, the following symbols remain lit:
▶ Note the information in the display.

Designation	
Preglow indicator light[A)]	
Battery charge	
Engine oil pressure	
Fixed gear [B)]	
Parking brake [C)]	

Tab. 29: Starting procedure

A) Lights up at low temperatures.
B) Lights up when fixed gear 1 is activated.
C) Lights up when parking brake is engaged.

If *preglow indicator light* symbol is lit:
▶ Wait until *preglow indicator light* symbol goes out.

▶ Turn the ignition key to the starting position **II** until the diesel engine starts.
▷ The display check is started again.
▷ All the symbols on the display briefly light up.

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Troubleshooting
If the engine does not start:

▶ Wait for 1 minute.
If the engine fails to start after three attempts:

▶ Contact Liebherr customer service.

▶ Check the engine oil pressure immediately after starting.

Troubleshooting
If the oil pressure does not go up within 5 seconds:

▶ Switch off the engine immediately.

▶ Contact Liebherr customer service.

Speed increase to improve battery charging performance

At low battery voltage, a higher charging performance is required when diesel engine is idling. This is provided by raising idling speed to 1400 min^{-1} for at least 30 minutes.

The idling speed is increased under the following conditions:
– Battery voltage is less than or equal to 12.8 V.
– The parking brake is engaged.
– Diesel engine speed is greater than 600 min^{-1}.

Increase of idling speed ends under following conditions:
– Battery voltage is greater than or equal to 13.2 V.
– The parking brake is released.
– Diesel engine speed is lower than 400 min^{-1}.

3.3.3 Travel mode

Preparations for travel mode

Make sure following preconditions are met:
❑ Machine is in operating position. (For more information see: Putting the machine in the operating position, page 107)
❑ The mirrors and other visual aids (such as the reversing camera) are adjusted for the best possible all-round view.
❑ All lighting equipment has been checked and correctly adjusted. (For more information see: 5.12.1 Checking function of lighting and horn, page 239)
❑ The steering system and service brake have been tested.
❑ The diesel engine has started.

WARNING
Always wear a safety belt!
Injury.

▶ Always wear safety belt before putting machine into service.

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Putting the working attachment into position

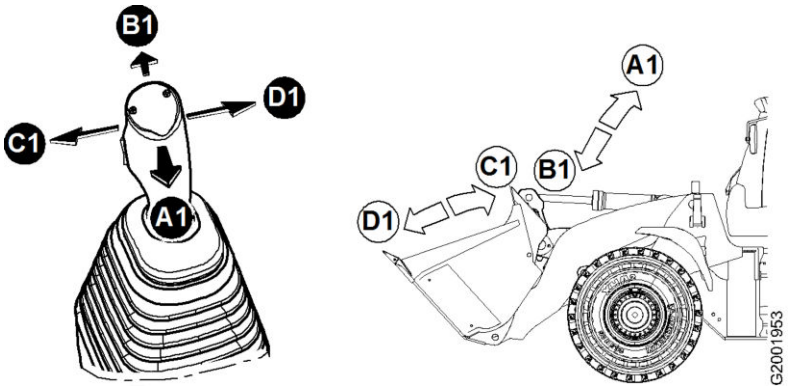

Fig. 190: Putting the working attachment into position

▶ Raise or lower the lift arms as required.

▶ Move the loading bucket into position.

Selecting fixed gears

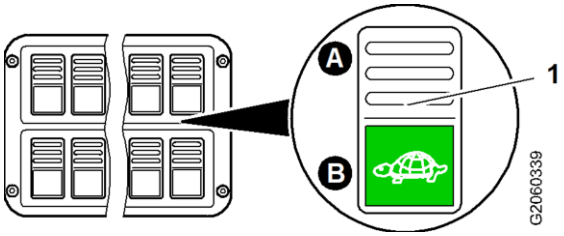

Fig. 191: Selecting fixed gears

1 *Fixed gear* switch
A Fixed gear 2
B Fixed gear 1

▶ Activate fixed gear 1: push switch **1** to position **B**.
▷ Fixed gear 1 appears in display.

▶ Activate fixed gear 2: push switch **1** to position **A**.
▷ *Fixed gear 1* symbol is not shown in display.

Releasing parking brake

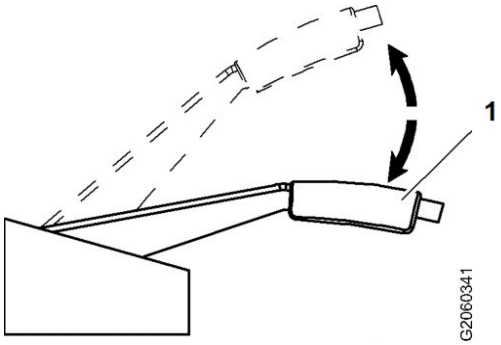

Fig. 192: Releasing parking brake

1 *Parking brake* lever

▶ Release parking brake using lever **1**.

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▷ *Parking brake* symbol is not shown in the display.

Selecting the travel direction

The travel direction cannot be selected while the parking brake is engaged.

Make sure that following requirements are met:
❑ Accelerator pedal is not pressed.
❑ The parking brake is released.

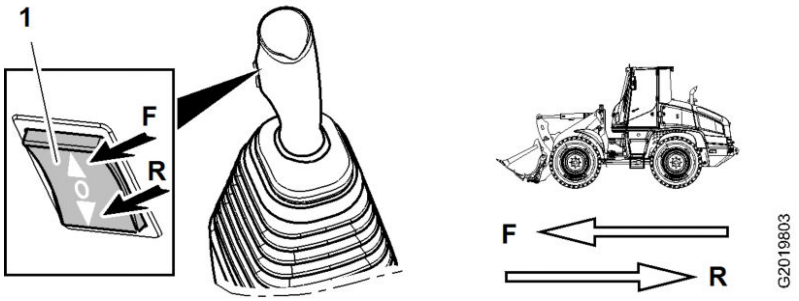

Fig. 193: Selecting the travel direction

1 *Travel direction* switch
F Forward travel direction
R Reverse travel direction
0 Neutral travel direction

▶ Use the switch **1** to select the required travel direction.
▷ *Travel direction* symbol is shown in display.

Driving

This section deals with the following topics:
– Setting off
– Driving with ride control
– Reversing

Setting off

Make sure that following requirements are met:
❑ The preparations for travel mode have been completed. (For more information see: Preparations for travel mode, page 110)

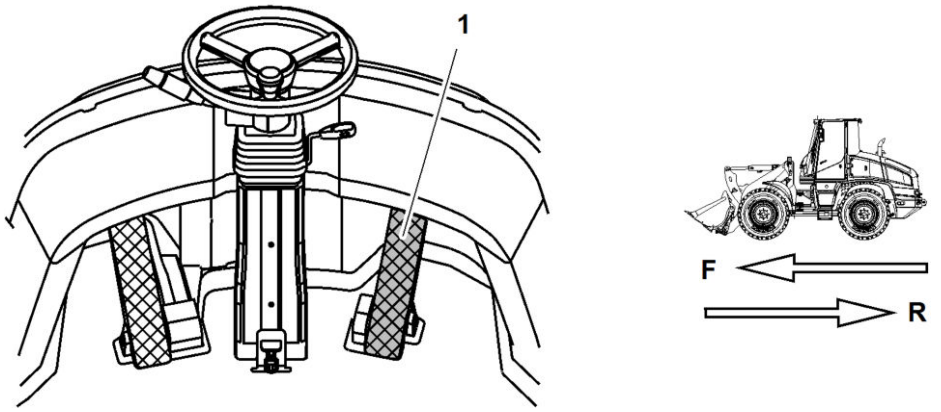

Fig. 194: Setting off

1 Accelerator pedal

▶ Carefully press down the accelerator pedal **1**.

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▷ The machine starts moving.

Driving with ride control

This equipment is optional.

Ride control can only be used in continuous mode.

If you travel long distances without ride control you may experience vibrations while driving.

The ride control system improves operator comfort in nearly all situations by reducing vibrations.

DANGER
Ride control deactivates pipe break protection!
Fatal injury.

▶ When performing lifting work which requires pipe break protection, deactivate ride control.

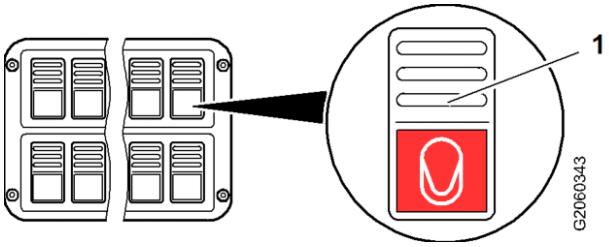

Fig. 195: Driving with ride control

1 *Ride control* switch

▶ To activate ride control: press switch **1**.
▷ *Ride control* symbol field in display is on.

▶ To deactivate ride control: press switch **1** again.
▷ *Ride control* symbol field in display is off.

Reversing

The machine can be reversed in any fixed gear and at any travel speed.

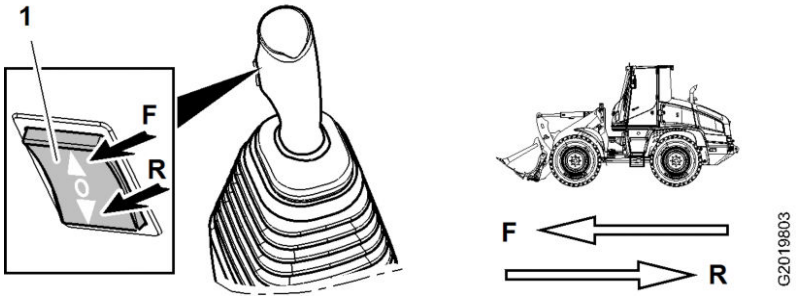

Fig. 196: Reversing

1 *Travel direction* switch
F Forward travel direction
0 Neutral travel direction
R Reverse travel direction

▶ To change the travel direction: Press the switch **1**.
▷ Depending on switch position, symbol for forward travel or for reverse travel is displayed.

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Braking

There are two ways to brake the machine:
– Using the hydrostatic circuit
– Using the service brake

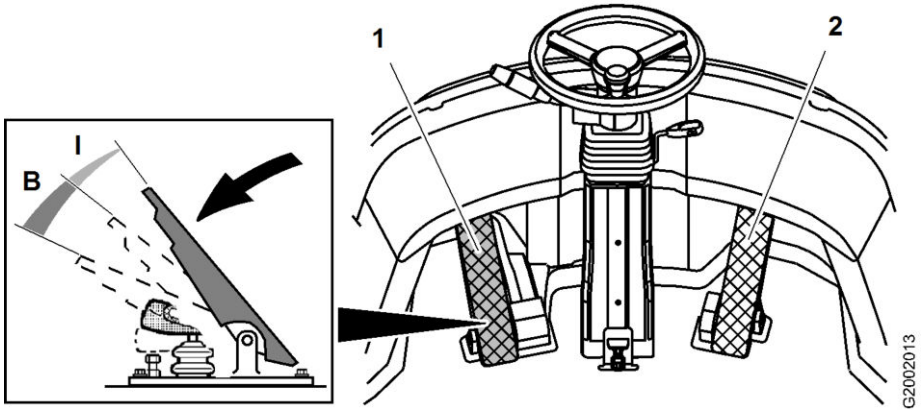

Fig. 197: Braking

1	Inching brake pedal	**I**	Hydrostatic braking pedal range
2	Accelerator pedal	**B**	Service brake braking range

▶ To brake the machine hydrostatically: Reduce the diesel engine speed using the accelerator pedal **2**.

or

Test the inching brake pedal **1** in the range **I**.

If hydrostatic braking is not sufficient, you must also brake the machine using the inching brake pedal **1**.

▶ To brake the machine with the service brake: Press the inching brake pedal **1** in the range **B**.
▷ The machine is braked accordingly.

If you need to brake in an emergency situation:
▶ Push the inching brake pedal **1** all the way down.

If the service brake does not function properly:

DANGER
Little or no braking effect.
Risk of fatal injury.

▶ Engage the parking brake.

▶ Switch off the ignition.

▶ Have the brake system inspected: contact Liebherr customer service.

If you leave the machine with the diesel engine running after stopping:

DANGER
Beware of the machine rolling away!
There is a risk of fatal injury.

▶ Secure the machine against rolling away.

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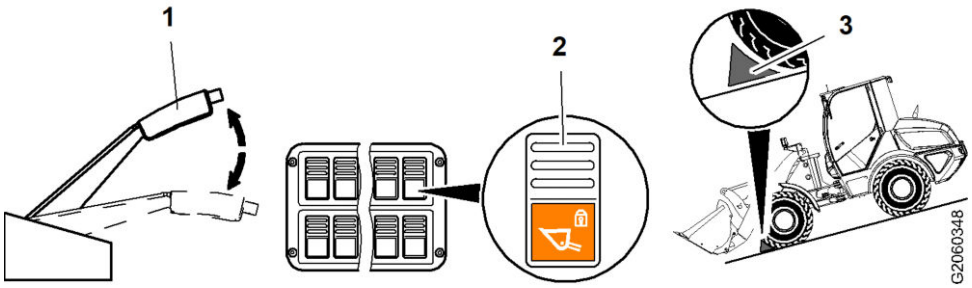

Fig. 198: After the machine stops

1 *Parking brake* lever
2 *Working hydraulics lockout* button
3 Chocks

▶ Parking brake with lever **1**.
  ▷ *Parking brake* symbol is shown in display.
  ▷ The parking brake is engaged.
  ▷ The travel direction is switched to neutral.

▶ Press the button **2** to activate the working hydraulics lockout.
  ▷ *Working hydraulics lockout* symbol is shown in display.
  ▷ Working hydraulics lockout is activated.

▶ Secure the machine with chocks **3**.

▶ Always supervise the machine.

3.3.4 Driving on public roads

Always observe national regulations for driving on public roads!

Before driving on public roads, find out about the route (roads, bridges, tunnels, underpasses, bottlenecks etc.) and any weight limits, bridge loads, width and height restrictions that apply.

DANGER
Long journeys at high speed without a break!
Burst tyres, overheated drive components.

▶ After driving at 40 km or after driving for an hour without a break, stop the machine for at least 30 minutes.

Make sure the following preconditions are met:
❑ The requirements for permission to drive on public roads are met.
❑ You are familiar with the relevant safety regulations.
❑ The safety equipment required by national regulations are complete.

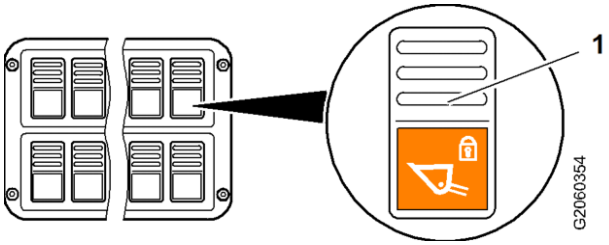

Fig. 199: Driving on public roads

1 *Working hydraulics lockout* button

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

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- ▶ Close all service hatches and lock them if possible.
- ▶ Travel with the working attachment lowered and tilted all the way back.
- ▶ Press button **1** to lock working hydraulics so that working attachment cannot be inadvertently actuated.
- ▶ Drive with appropriate care.
- ▶ Observe the highway code.

3.3.5 Shutting down the machine

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

– Lower working attachment. (For more information see: Lowering the working attachment, page 116)
– Turn off diesel engine. (For more information see: Switch off the diesel engine, page 116)
– Turn off battery main switch. (For more information see: Turning off the battery main switch, page 117)
– Secure machine. (For more information see: Securing the machine, page 118)

Lowering the working attachment

Make sure that following requirements are met:
❑ The working attachment is empty.

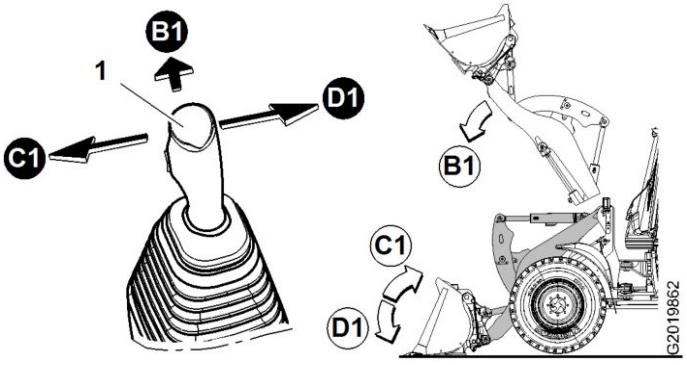

Fig. 200: Lowering the working attachment

1 Control lever

- ▶ Move the control lever **1** in direction **B1**.
  ▷ The lift arms are lowered.
- ▶ Lay the bucket down flat on the ground by moving the control lever **1** in direction **D1** or **C1**.

If a working attachment with a hydraulic function is installed:
- ▶ Tilt in, close or lock the working attachment, depending on its function.
- ▶ Lower the lift arms until the working attachment lies on the ground.

Switch off the diesel engine

Do not turn off the diesel engine until the machine has come to a complete halt.

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NOTICE
Insufficiently lubricated turbocharger!
Damage to the engine.

▶ Always make sure the machine is idle when you shut down the engine.

▶ Engage parking brake.

▶ Reduce the engine to idling speed by taking your foot off the travelling pedal.

▶ Let the diesel engine continue idling for another 10 to 15 seconds.

Fig. 201: Switch off the diesel engine

▶ Turn the ignition key to the **0** position and pull it out.
  ▷ All symbol LEDs go out.
  ▷ Working hydraulics lockout is activated.

Turning off the battery main switch

NOTICE
Voltage fluctuations!
Damage to the electrical system.

▶ Never turn off battery main switch when diesel engine is running.

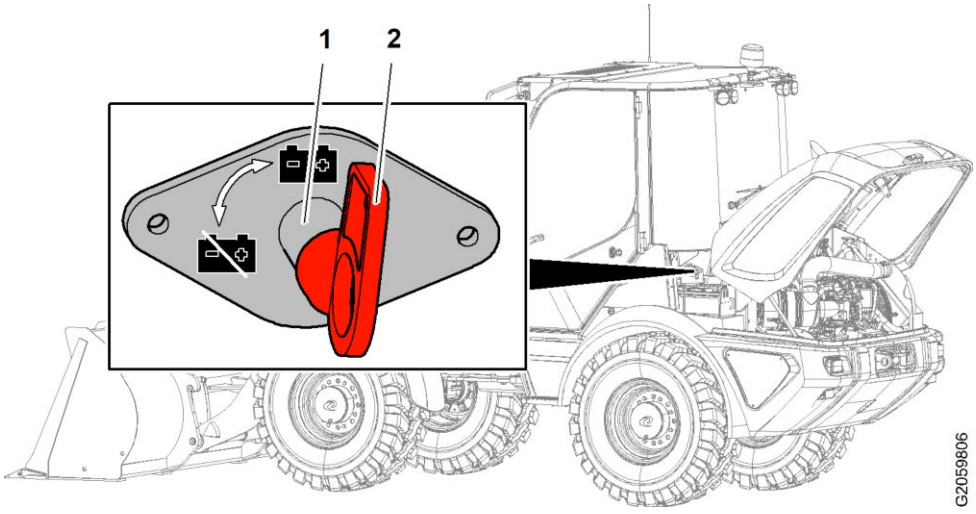

Fig. 202: Turning off the battery main switch

1 Battery main switch **2** Battery main switch key

Symbol	Function
	**OFF**

Symbol	Function
	**ON**

Tab. 30: Turning off the battery main switch

▶ Set battery main switch **2** to **OFF**.
▷ Electrical system of machine is de-energised.

Securing the machine

If parking machine on a slope:

DANGER
Beware of the machine rolling away!
There is a risk of fatal injury.

▶ Secure the machine against rolling away.

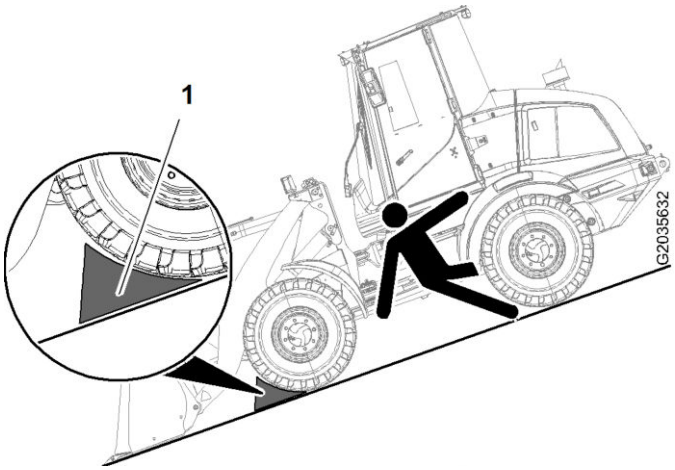

Fig. 205: Securing the machine

1 Chock

▶ Take the chocks **1** out of their holders.

▶ Use chocks **1** to secure the machine against starting to roll away.

Park position

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

Fig. 206: Park position

▶ Turn the ignition key to the park position **P**.

▶ You can keep the battery main switch turned on when parking the machine on public roads.

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The consumer units listed below are ready for operation:
▷ Interior lighting
▷ Hazard warning system
▷ Socket
▷ Front working headlights
▷ Beacon (option)
▷ Radio (option)
▷ Rear working headlight (option)

DANGER
Unauthorised starting up of the machine!
Risk of fatal injury.

▶ Secured the machine against being started unauthorisedly.

When leaving the machine:
▶ Turn the ignition key to the **0** position and pull it out.
  ▷ Power consumers on control panel can still be switched on. (For more information see: 3.2.10 Starting switch, page 75)

▶ Leave the operator's cab and lock the cab door.

3.3.6 Automatic engine shutdown

This equipment is optional.

The automatic engine shut down is controlled via a contact in the operator's seat.

Make sure that the following requirements are fulfilled:
❑ The parking brake is engaged.
❑ The working hydraulics lockout is activated.

▶ Leave the operator's cab.
  ▷ The diesel engine shuts down automatically after 5 minutes.

3.3.7 Moving working attachment

The movements of the lift arms and the bucket are controlled using the control lever.

Working movements:
– Raising and lowering the lift arms
– Tilt the bucket in and out
– Moving the lift arms and the bucket simultaneously
– Float position

Note

The working hydraulics must be released in order to move working attachments.

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Releasing the working hydraulics

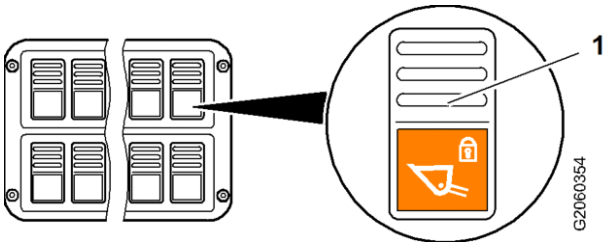

Fig. 207: Releasing the working hydraulics

2 *Working hydraulics lockout* switch

▶ Press switch **2**.
  ▷ *Working hydraulics lockout* symbol is not shown in display.
  ▷ The working hydraulics are ready for operation.

Raising and lowering the lift arms

WARNING
Persons in hazard zone!
Injury.

▶ Make sure there is nobody in hazard zone.

Raising the lift arms

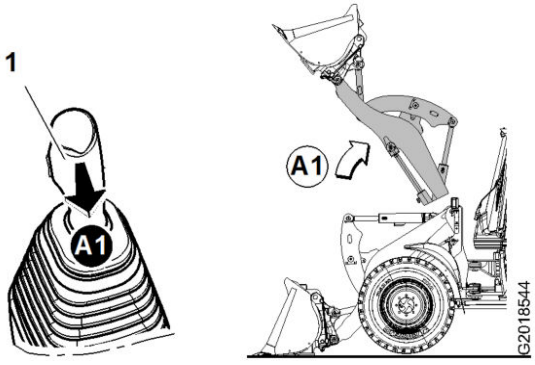

Fig. 208: Raising the lift arms

1 Control lever

▶ Move the control lever in direction **A1**.
  ▷ The lift arms are raised.

Lower the lift arms

There are two ways to lower the lift arms:
– Normal lowering function
– Quick drop function

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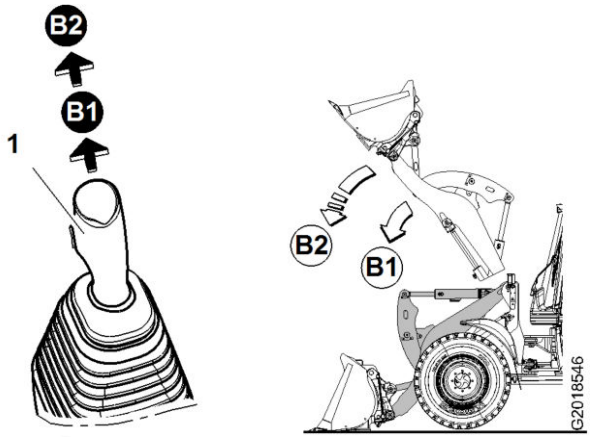

Fig. 209: Lower the lift arms

1 Control lever

▶ Normal lowering function: Move control lever to action point in direction **B1**.

▶ Quick lowering function: Move control lever to limit in direction **B2**.

Note
If diesel engine fails, lower lift arms and reduce hydraulic pressure.

▶

Tilting the bucket in and out

WARNING
Persons in hazard zone!
Injury.

▶ Make sure there is nobody in hazard zone.

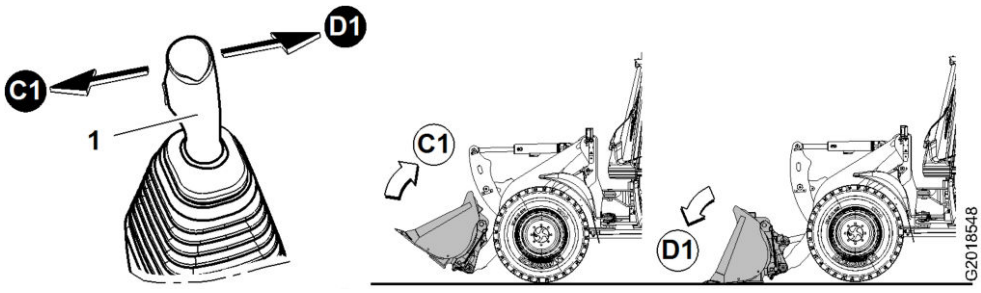

Fig. 210: Tilting the bucket in and out

1 Control lever

▶ To tilt in bucket: Move control lever **1** in direction **C1**.

▶ To tilt out bucket: Move control lever **1** in direction **D1**.

Moving lift arms and bucket simultaneously

The lift arms and bucket can be moved simultaneously by moving the control lever diagonally.

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WARNING
Persons in hazard zone!
Injury.

▶ Make sure there is nobody in hazard zone.

Raising the lift arms while tilting the bucket in or out

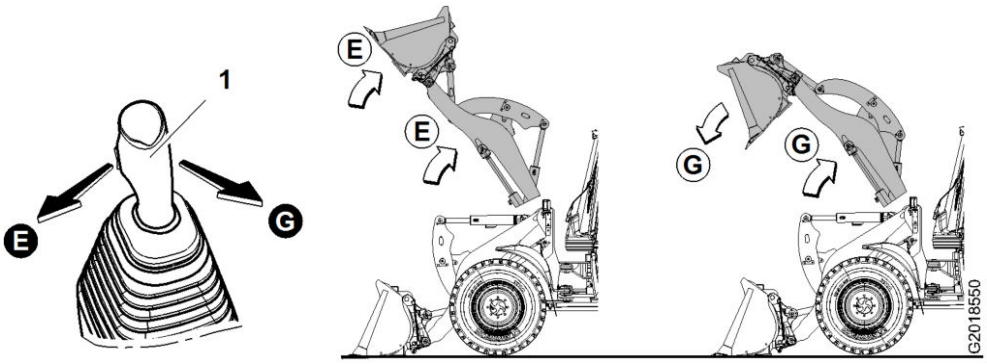

Fig. 211: Raising the lift arms while tilting the bucket in or out

1 Control lever

▶ To raise lift arms and tilt in bucket: Move control lever in direction **E**.

▶ To raise lift arms and tilt out bucket: Move control lever in direction **G**.

Lowering lift arms while tilting bucket in or out

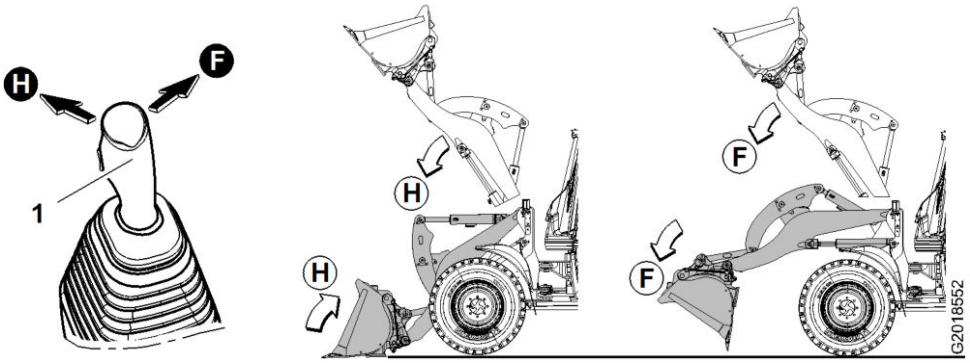

Fig. 212: Lowering lift arms while tilting bucket in or out

1 Control lever

▶ To lower lift arms and tilt in bucket: Move control lever in direction **H**.

▶ To lower lift arms and tilt out bucket: Move control lever in direction **F**.

Float position

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

If pipe break protection is fitted, the float position function is not available.

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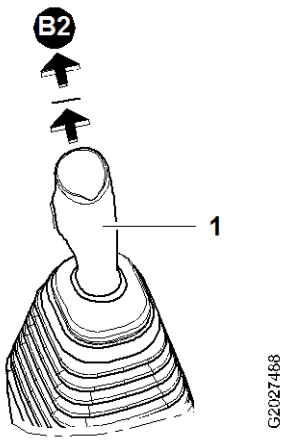

Fig. 213: Float position

1 Control lever

▶ Place the working attachment flat on the ground.

▶ To switch on float position: Move control lever **1** to limit in direction **B2**.
▷ Control lever is kept in this position.

▶ To switch off float position: Move control lever **2** back.

3.3.8 Regenerating the diesel particulate filter

The diesel particulate filter reduces the emission of soot particles. The expected minimum maintenance interval is at least 3000 operating hours, depending on the engine power.

Maintenance must be carried out when the symbol light in the display lights up or a service code is displayed. During maintenance, the diesel particulate filter is replaced with a clean one or a new one if too much ash has accumulated in it.

The ash accumulation module must be reset in the engine control unit if the diesel particulate filter is replaced with a new one. The serial number and maintenance data must be programmed into the engine control unit when the diesel particulate filter is replaced.

WARNING
Hot gas at the exhaust pipe!
Fire.

▶ Do not carry out regeneration in areas at risk of fire.

Note

If warning symbols are ignored for more than 20 hours, they are stored in engine control unit.

National authorities can evaluate stored records.

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Symbol	Meaning	Notes
	High exhaust temperature	Regeneration is in progress, which means high exhaust temperatures are generated. Normal operation can continue. Do not turn off the diesel engine if possible. Automatic regeneration can be deactivated when working in fire hazard zones. Fuel can be saved by regeneration in the normal working cycle.
	Regenerate diesel particulate filter prompt	The diesel particulate filter is contaminated. Manual regeneration can be carried out. Leave the fire hazard zone. Start regeneration as soon as possible.
	Exhaust system malfunction	Malfunction in conjunction with exhaust system. After 36 hours: torque reduction to 75%. After 64 hours: torque reduction to 50% and reduction of engine speed to 60%. Turn off diesel engine. Contact Liebherr customer service.
	Regenerate diesel particulate filter prompt	The diesel particulate filter is heavily contaminated. This results in reduced engine power. Carry out manual regeneration immediately. Leave the fire hazard zone before regeneration.
	Diesel particulate filter is overloaded	This results in greatly reduced engine power. Regeneration must be carried out by Liebherr customer service. Beware of damaging the filter. Turn off diesel engine. Contact Liebherr customer service.

Tab. 31: Symbols in the display

The following regeneration modes can be set:
– Automatic regeneration mode
– Regeneration mode disabled
– Manual regeneration mode

Automatic regeneration mode

Note

Regeneration mode for fire resistant and protected environments.

Regeneration of the diesel particulate filter takes place automatically during operation.

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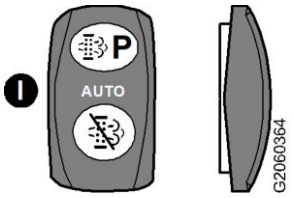
Switch/button position	Indicator in the display	Note
		*High exhaust temperature* symbol goes on at an exhaust temperature of > 300 °C at outlet of exhaust pipe.

Tab. 32: Automatic regeneration mode

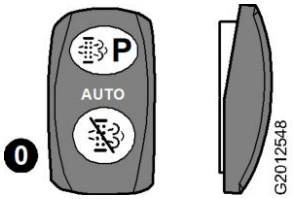
▶ Move the *regenerate diesel particulate filter* switch to position **I**.
  ▷ Regeneration starts according to the operating status of the diesel particulate filter.
  ▷ *High exhaust temperature* symbol goes on in the display at an exhaust temperature of > 300 °C at outlet of exhaust pipe.

Regeneration mode disabled

Note

Regeneration mode for environments with a fire hazard.

If the load condition of the diesel particulate filter is too high, the regeneration of the diesel particulate filter must be started manually in a fire resistant and protected environment.

Switch/button position	Indicator in the display	Note
		*Regenerate diesel particle filter prompt* symbol is shown
		*Diesel engine warning* symbol goes on in case of loss of power.

Tab. 33: Regeneration mode disabled

▶ Move the *regenerate diesel particulate filter* switch/button to position **0**.
  ▷ Active regeneration is deactivated.
  ▷ *Regenerate diesel particulate filter request* symbol in display is on.
  ▷ Machine can be operated without any loss of power until *diesel engine warning* symbol lights up.

Manual regeneration mode

Note

Regeneration mode for fire resistant and protected environments.

Do not leave the machine during manual regeneration.

During manual regeneration, only turn off the diesel engine in an emergency!

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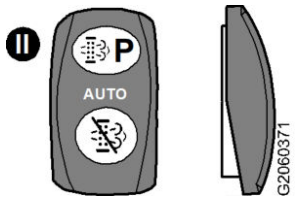
Switch/button position	Indicator in the display	Note
		*High exhaust temperature* symbol goes on at an exhaust temperature of > 300 °C at outlet of exhaust pipe.

Tab. 34: Manual regeneration mode

NOTICE
Combustible deposits on the exhaust system!
Fire.

- ▶ Clean the machine.
- ▶ Do not leave the operator's cab during manual regeneration.

- ▶ Warm up the diesel engine (so that the coolant temperature is above 85 °C).
- ▶ Park the machine on level ground.
- ▶ Allow the diesel engine to run at lower idling speed.
- ▶ Engage parking brake.
- ▶ Press the *regenerate diesel particulate filter* switch in position **II** for 3 seconds.
  - ▷ Regeneration of the diesel particulate filter is activated.
  - ▷ *High exhaust temperature* symbol goes on in the display at an exhaust temperature of > 300 °C at outlet of exhaust pipe.
  - ▷ The idling speed is increased without the operator having to use the accelerator pedal.
  - ▷ Regeneration is completed when diesel engine returns to lower idling speed and *high exhaust temperature* symbol goes out.
  - ▷ Regeneration can take up to 45 minutes.

If regeneration must be stopped in an emergency:
- ▶ Activate regeneration mode disabled. (For more information see: Regeneration mode disabled, page 125)

3.3.9 Forklift

This equipment is optional.

The forklift is mainly used for picking up, carrying and moving loads fastened on pallets. It is attached using the quick coupler on the fork carrier. (For more information see: 3.5 Fitting and removing the attachment, page 150)

For proper use of the forklift:
- – Observe the maximum loads specified in the cab (sign on the side window).
- – Observe the inspection and maintenance intervals specified in the ISO 5057 standard.
- – Observe the local regulations for operating forklifts.
- – Only use forks approved by Liebherr for forklift operation.

Do not use the forklift:
- – For breaking or levering out rocks, tree stumps or similar objects.
- – For lifting persons.
- – For lifting working platforms.

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WARNING
Beware of falling loads!
Risk of serious injury.

▶ Make sure there are no unauthorised persons in the danger area.

Note
Maintenance and inspection of the forklift!

▶ The customer is responsible for maintenance and inspection of the forklift, in particular the fork prongs, in accordance with the ISO 5057 standard!

Adjusting the prongs on the fork carrier

The fork prongs can be attached at any position on the fork carrier. The fork prong lock stops them from slipping.

Make sure following preconditions are met:
❑ The forklift is around 10 cm above the ground.
❑ The diesel engine is switched off.
❑ The wheel loader is secured against rolling away.

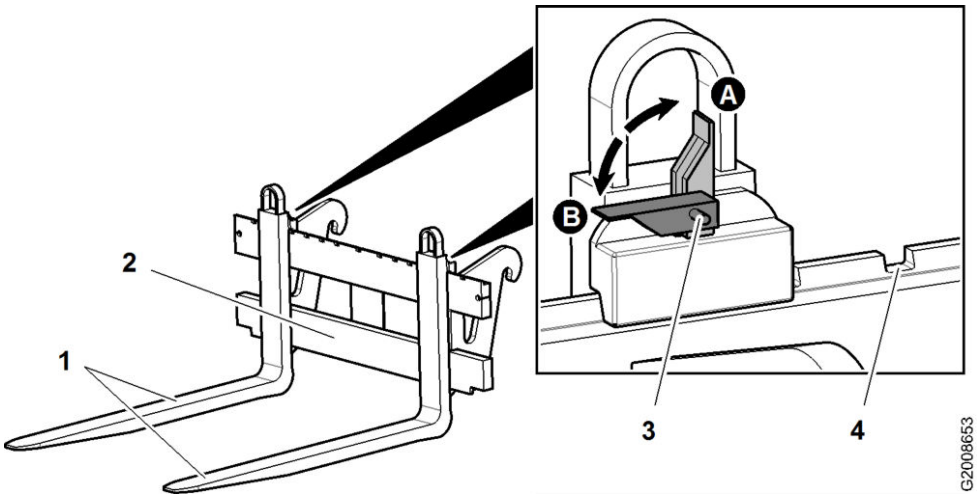

Fig. 228: Adjusting the prongs on the fork carrier

1 Fork prongs
2 Fork carrier
3 Fork prong lock
4 Notch
A Fork prong lock open
B Fork prong lock closed

▶ Open the fork prong lock **3**.

▶ Push the prongs **1** to the correct position.

▶ When closing the fork prong lock **3** let it latch in the notch **4**.
▷ The prongs are held tight.

Working with the forklift

Make sure that following requirements are fulfilled:
– You have checked the forklift for cracks and damage.
– The prongs are locked on the fork carrier.
– Movement behaviour of the lift arms is known.

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DANGER
Machine tipping!
Risk of fatal injury.

- ▶ Carry out load lifting work very carefully.

WARNING
Load slipping off the forks!
Risk of serious injury.

- ▶ Slightly tilt in the forklift.
- ▶ Carry out load lifting work very carefully.

The lever ratio of the kinematics in the topmost lifting range means that the load bearing capacity is restricted. (For more information see: 1.2 Technical data, page 18)

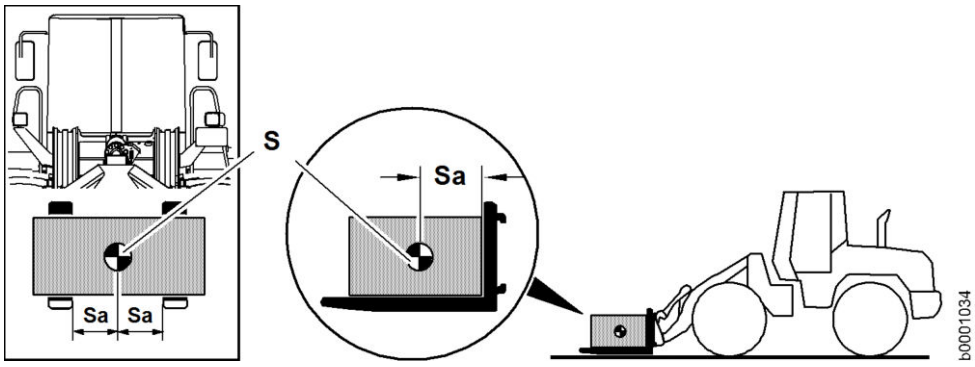

Fig. 229: Working with the forklift

S Centre of gravity **Sa** Distance from centre of gravity

Picking up the load

- ▶ Keep as close as possible to the centre of gravity **Sa** of the load.
- ▶ Ensure good stability of the load: install fork prongs to fork carrier as far to the outside as possible.

Travelling with a load

- ▶ When driving unloaded or carrying goods, tilt the forklift slightly in and carry it low.
- ▶ Travel at an appropriate speed for the load and the surface.
- ▶ If the load obstructs your view: drive in reverse.
- ▶ When driving on slopes, always keep the load uphill.
- ▶ Never drive across slopes.
- ▶ Never turn on slopes.
- ▶ Only lift and lower the load when at a standstill.

3.3.10 LIKUFIX-hydraulic coupling system

This equipment is optional.

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The LIKUFIX hydraulic coupling is mounted on the quick coupler. The connection of the hydraulic lines occurs automatically. The hydraulic lines no longer need to be manually connected.

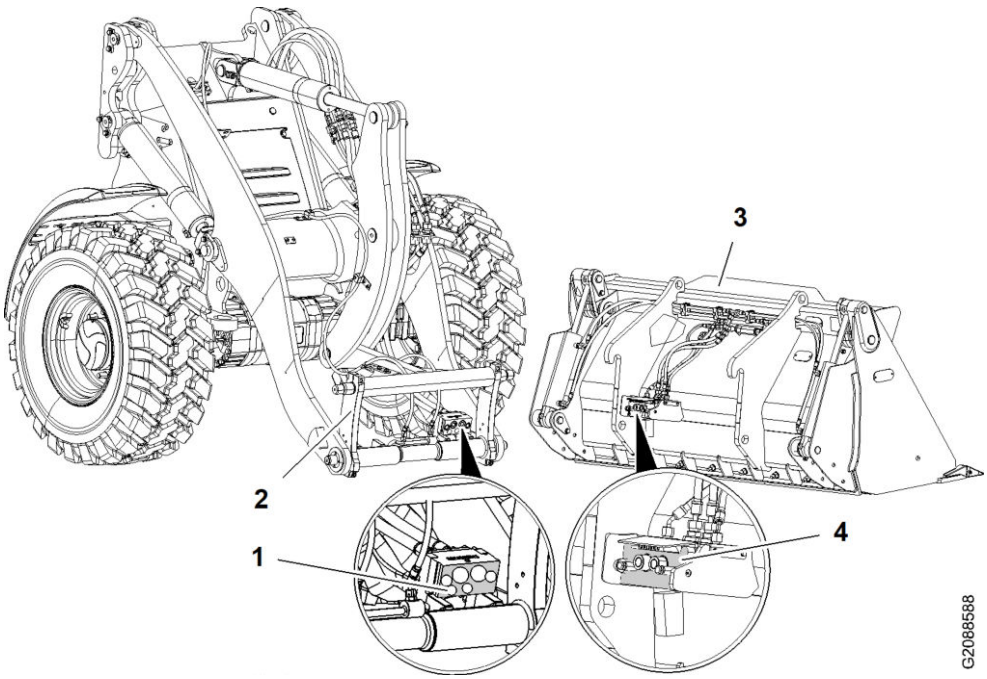

Fig. 230: LIKUFIX hydraulic coupling system

1	LIKUFIX hydraulic coupling on the quick coupler	**3**	Working attachment
2	Quick coupler	**4**	LIKUFIX hydraulic coupling on the working attachment

Proper use

The quick coupler described in this manual with the integrated LIKUFIX-hydraulic coupling system is used exclusively for changing working attachments quickly and safely. To guarantee secure locking, only use genuine Liebherr parts.

The quick coupler with the integrated LIKUFIX-hydraulic coupling system may only be used if the following requirements are fulfilled:

1. The **quick coupler is mounted on a Liebherr wheel loader** with a suitable mounting device. The use of the quick coupler with other construction machines is only permissible with the approval of Liebherr.
2. All hydraulic connections and prescribed safety equipment must be available or correspondingly retrofitted.
3. Proper use also includes observance of the **“operator's manual”** and adherence to the inspection and maintenance conditions.

Unlocking and disconnecting the working attachment

There are 3 alternatives:

– Unlocking and disconnecting with additional control lever
– Unlocking and disconnecting with button control
– Unlocking and disconnecting with mini-joystick

Make sure the following preconditions are met:

❑ The lift arms are lowered to just above the ground.

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❑ Cylinders, valves etc. on the working attachment are in the initial position or closed.

Unlocking and disconnecting with additional control lever

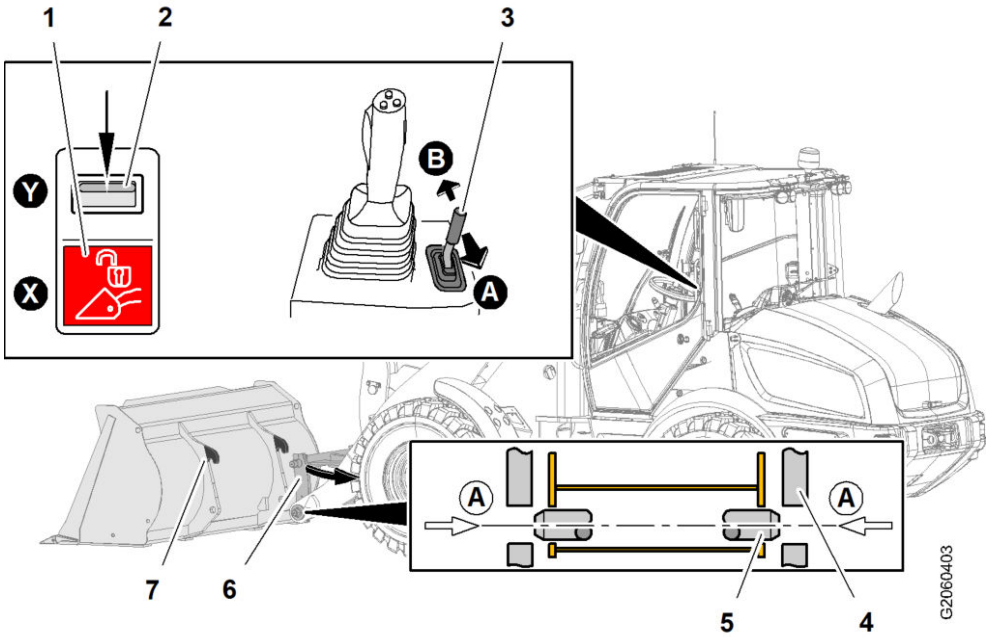

Fig. 231: Unlocking and disconnecting with additional control lever

1 *Quick coupler* switch
2 Lockout
3 Additional control lever
4 Working attachment
5 Locking pin
6 Quick coupler
7 Working attachment holder

▶ Set down the working attachment flat on firm, even ground.

▶ Secure the working attachment against falling over or rolling away.

▶ Release lockout **2** in direction of arrow while pressing switch **1** in position **X**.
▷ A warning tone sounds.

▶ Push additional control lever **3** in direction **A**.
▷ Locking pins **5** of the quick coupler **6** retract.

When the locking pins are completely retracted:
▶ Carefully move quick coupler **6** out of holder **7**.

If you are not going to install a working attachment:
▶ Push additional control lever **3** in direction **B**.
▷ Locking pins **5** of the quick coupler **6** extend.

▶ Push switch **1** to position **Y**.
▷ The warning tone stops.

Unlocking and disconnecting with button control

Make sure the following preconditions are met:
❑ The lift arms are lowered to just above the ground.
❑ Cylinders, valves etc. on the working attachment are in the initial position or closed.

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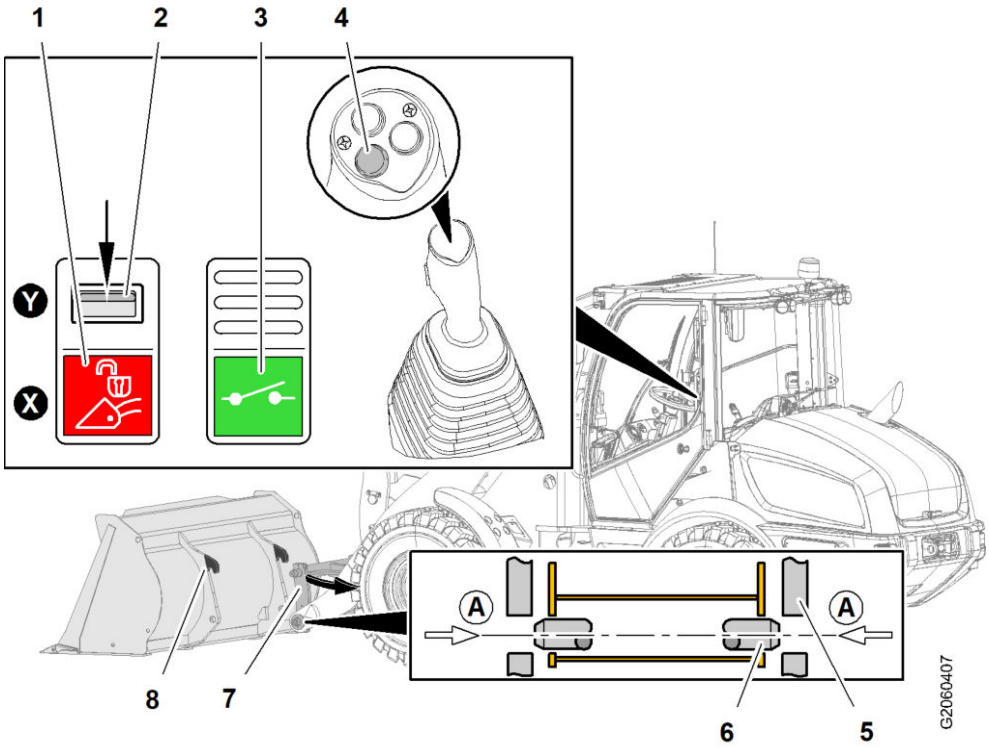

Fig. 232: Unlocking and disconnecting with button control

1	*Quick coupler* switch	**5**	Working attachment
2	Lockout	**6**	Locking pin
3	*Button control* switch	**7**	Quick coupler
4	*Button control* (locking pins retraction) button	**8**	Working attachment holder

▶ Set down the working attachment flat on firm, even ground.

▶ Secure the working attachment against falling over or rolling away.

▶ Release lockout **2** in direction of arrow while pressing switch **1** in position **X**.
▷ A warning tone sounds.

▶ Press the switch **3**.
▷ Button control is activated.

▶ Press and hold the button **4**.
▷ Locking pins **6** of the quick coupler **7** retract.

When the locking pins are completely retracted:
▶ Carefully move quick coupler **7** out of holder **8**.

If you are not going to install a working attachment:
▶ Release button **4**.
▷ Locking pins **6** of the quick coupler **7** extend.

▶ Push switch **1** to position **Y**.
▷ The warning tone stops.

▶ Press the switch **3**.
▷ Button control is deactivated.

Unlocking and disconnecting with mini-joystick

Make sure the following preconditions are met:
❑ The lift arms are lowered to just above the ground.

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❑ Cylinders, valves etc. on the working attachment are in the initial position or closed.

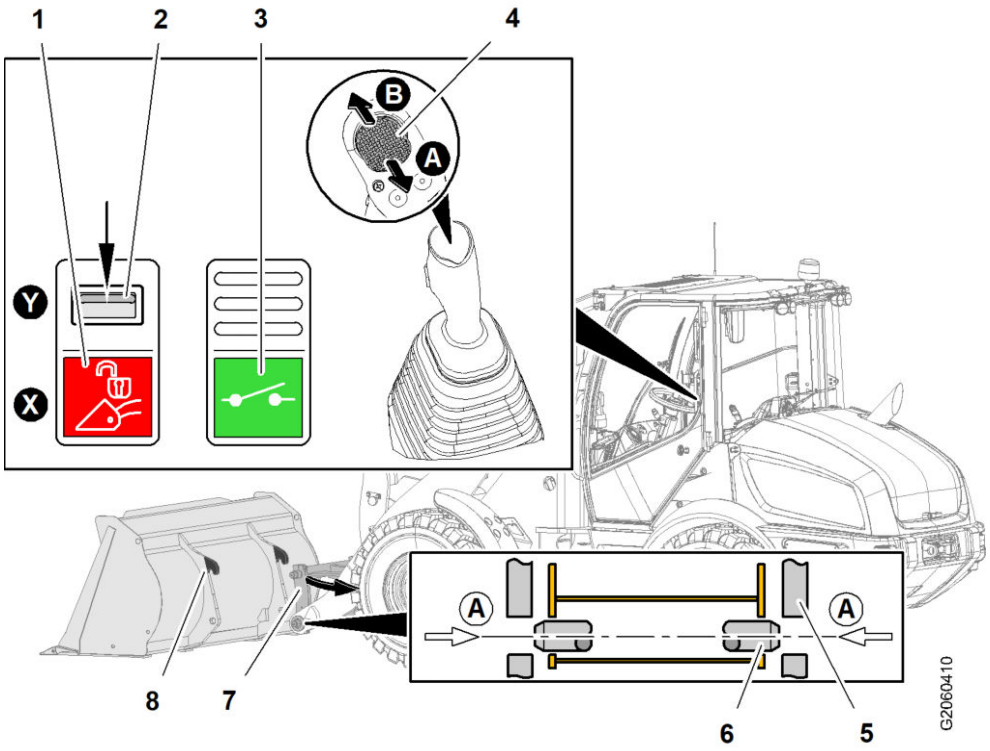

Fig. 233: Unlocking and disconnecting with mini-joystick

1	*Quick coupler* switch	**5**	Working attachment
2	Lockout	**6**	Locking pin
3	*Mini-joystick* switch	**7**	Quick coupler
4	Mini-joystick	**8**	Working attachment holder

▶ Set down the working attachment flat on firm, even ground.

▶ Secure the working attachment against falling over or rolling away.

▶ Release lockout **2** in direction of arrow while pressing switch **1** in position **X**.
▷ A warning tone sounds.

▶ Press the switch **3**.
▷ Mini-joystick is activated.

▶ Push and hold mini-joystick **4** in direction **A**.
▷ Locking pins **6** of the quick coupler **7** retract.

When the locking pins are completely retracted:
▶ Carefully move quick coupler **7** out of holder **8**.

If you are not going to install a working attachment:
▶ Push and hold mini-joystick **4** in direction **B**.
▷ Locking pins **6** of the quick coupler **7** extend.

▶ Push switch **1** to position **Y**.
▷ The warning tone stops.

▶ Press the switch **3**.
▷ Button control is deactivated.

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Mounting working attachment

DANGER
Falling working attachment!
Danger to life.

▶ Make sure there is nobody in danger area.

Note
Changing the working attachment alters the total weight of the machine!

▶ In order to ensure the roll over protective structure of the operator's cab, do not exceed the permissible total weight of the machine (see identification plate).

Note
No equipment or attachments from other manufacturers may be installed or attached to the machine without prior written consent from Liebherr.

▶ The appropriate technical documentation should be made available to Liebherr for this purpose.

Connecting and locking the working attachment

There are 3 alternatives:
– Connecting and locking with additional control lever
– Connecting and locking with button control
– Connecting and locking with mini-joystick

Connecting and locking with additional control lever

Make sure the following preconditions are met:
❑ The quick coupler is completely unlocked.

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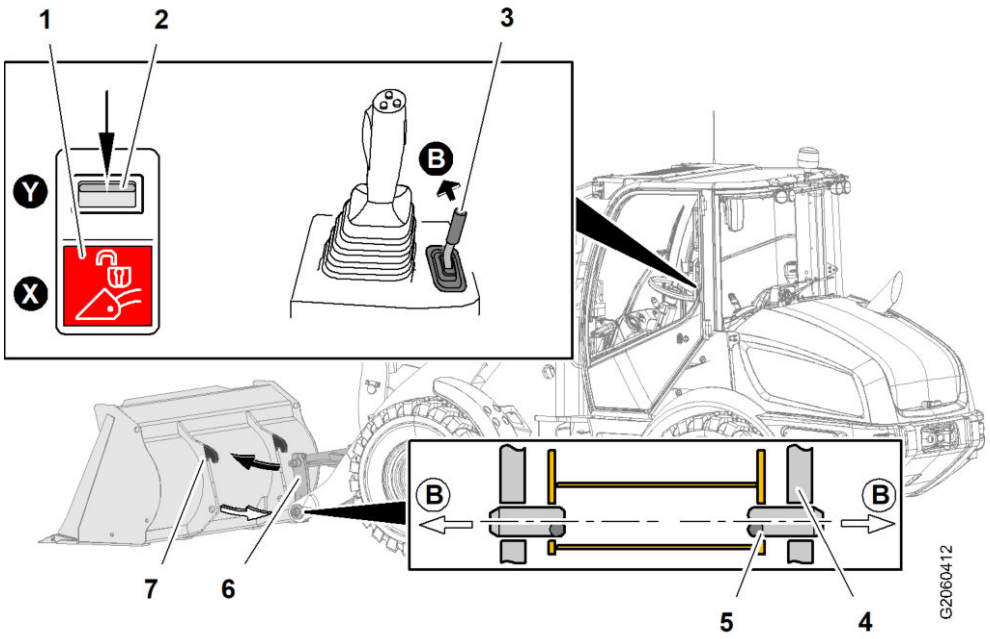

Fig. 234: Connecting and locking with additional control lever

1 *Quick coupler* switch
2 Lockout
3 Additional control lever
4 Working attachment
5 Locking pin
6 Quick coupler
7 Working attachment holder

If sealing surfaces of the LIKUFIX hydraulic coupling are contaminated:

▶ Clean seal surfaces.

▶ To uncouple working attachment: carefully move quick coupler **6** into holder **7**, slightly raise working attachment **4** and tilt it in.

Note
Working attachment is tilted in completely!
Locking of working attachment not possible.

▶ Only tilt working attachment until borehole of working attachment and locking bolt match up.

▶ Lock working attachment: push additional control lever **3** in direction **B**.
▷ Locking pins **5** of the quick coupler **6** extend.

▶ Push switch **1** to position **Y**.
▷ The warning tone stops.

▶ Perform lock check.

Connecting and locking with button control

Make sure the following preconditions are met:
❑ The quick coupler is completely unlocked.

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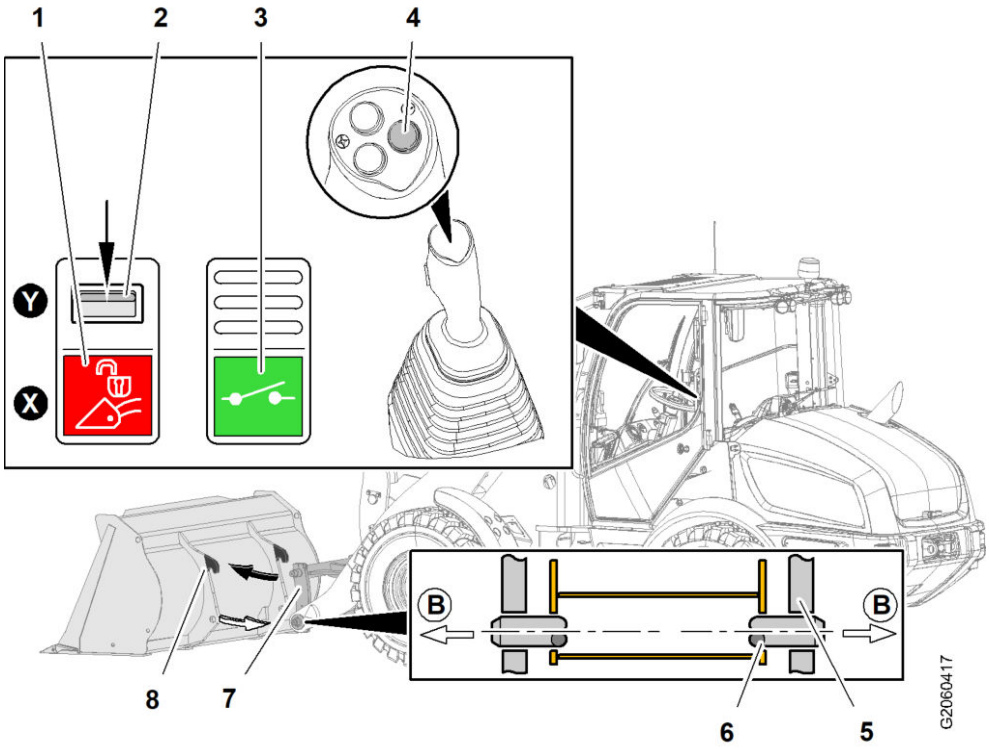

Fig. 235: Connecting and locking with button control

1	*Quick coupler* switch	**5**	Working attachment
2	Lockout	**6**	Locking pin
3	*Button control* switch	**7**	Quick coupler
4	*Button control* (hydraulic extension) button	**8**	Working attachment holder

If sealing surfaces of the LIKUFIX hydraulic coupling are contaminated:

▶ Clean seal surfaces.

▶ To uncouple working attachment: carefully move quick coupler **7** into holder **8**, slightly raise working attachment **5** and tilt it in.

Note
Working attachment is tilted in completely!
Locking of working attachment not possible.

▶ Only tilt working attachment until borehole of working attachment and locking bolt match up.

▶ Lock working attachment: press and hold button **4**.
▷ Locking pins **6** of the quick coupler **7** extend.

▶ Push switch **1** to position **Y**.
▷ The warning tone stops.

▶ Press the switch **3**.
▷ Button control is deactivated.

▶ Perform lock check.

Connecting and locking with mini-joystick

Make sure the following preconditions are met:
❑ The quick coupler is completely unlocked.

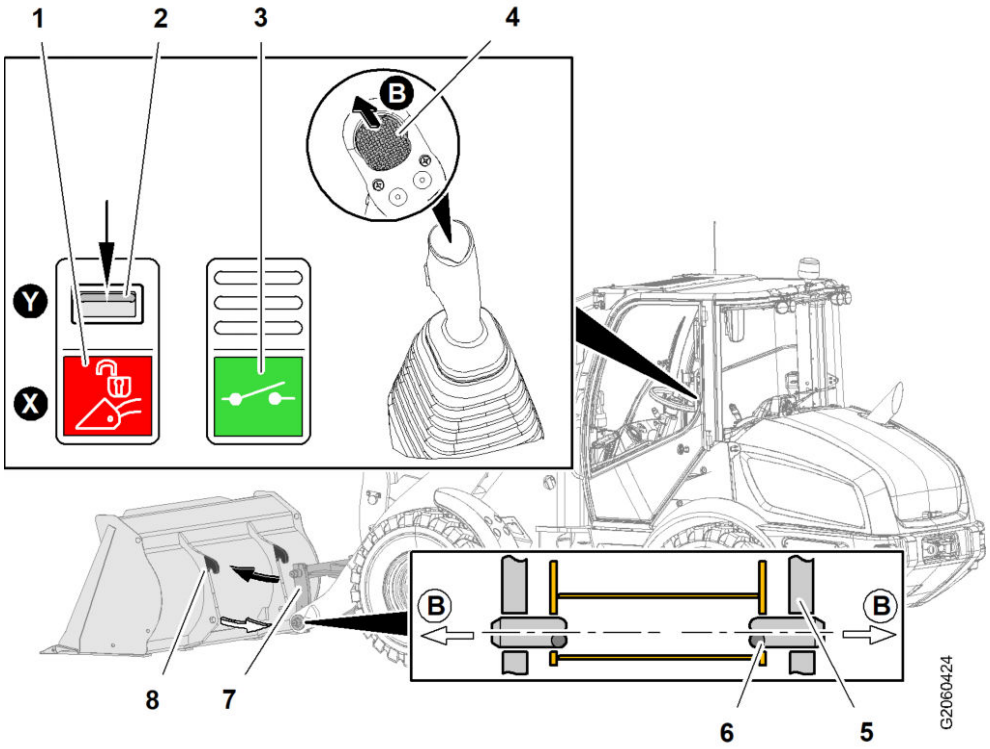

Fig. 236: Connecting and locking with mini-joystick

1	*Quick coupler* switch	**5**	Working attachment
2	Lockout	**6**	Locking pin
3	*Mini-joystick* switch	**7**	Quick coupler
4	Mini-joystick	**8**	Working attachment holder

If sealing surfaces of the LIKUFIX hydraulic coupling are contaminated:

▶ Clean seal surfaces.

▶ To uncouple working attachment: carefully move quick coupler **7** into holder **8**, slightly raise working attachment **5** and tilt it in.

Note
Working attachment is tilted in completely!
Locking of working attachment not possible.

▶ Only tilt working attachment until borehole of working attachment and locking bolt match up.

▶ Lock working attachment: push mini-joystick **4** in direction **B**.
▷ Locking pins **6** of the quick coupler **7** extend.

▶ Push switch **1** to position **Y**.
▷ The warning tone stops.

▶ Press the switch **3**.
▷ Mini-joystick is deactivated.

▶ Perform lock check.

Checking that the working attachment is locked

The fact that the attachment can be changed from the operator's cab does not release the operator from his / her duty to check it afterwards.

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Every time you change the attachment, make a *visual inspection* and a *mechanical check* to make sure that the working attachment is correctly locked.

DANGER
Falling working attachment!
Danger to life.

▶ Do not carry out any working movements using the working attachment before checking the locking mechanism.

Visual inspection

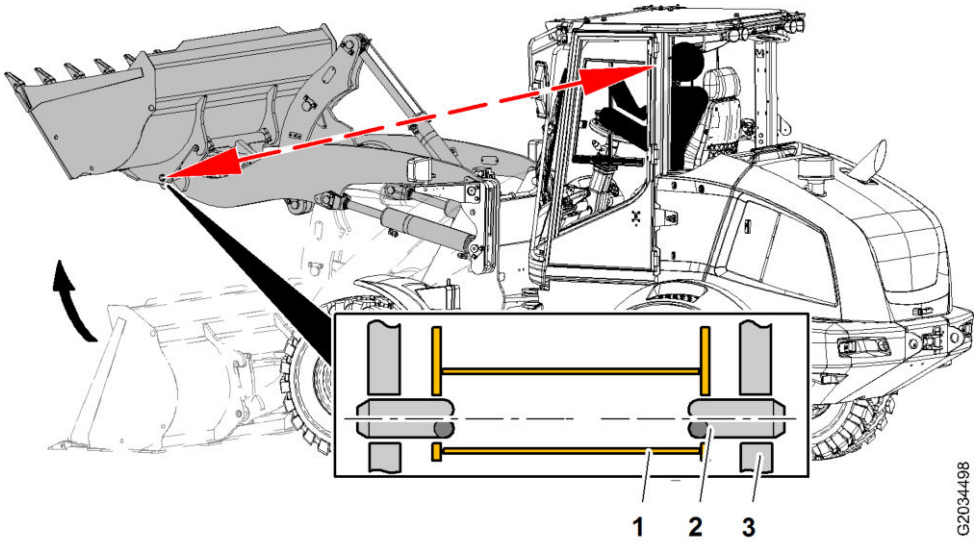

Fig. 237: Visual inspection

1 Quick coupler
2 Locking pin
3 Working attachment

▶ Move lift arms until you can see quick coupler **1** from operator's cab.

▶ Make a visual inspection on both sides.
▷ The locking pins **2** must have retracted as far as the outer hole on the working attachment **3**.

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Mechanical check

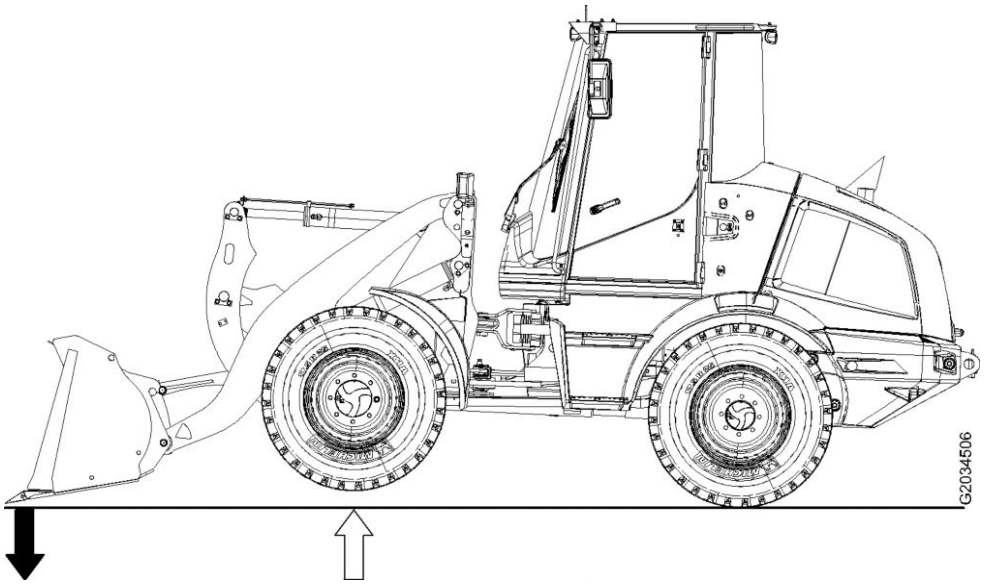

Fig. 238: Mechanical check

▶ Push the front edge of the bucket against the ground so that the front axle of the machine is slightly raised.
▷ The bucket must remain firmly attached to the quick coupler.

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3.4 Working methods

This section describes routine working methods.

The operator is responsible for:
– Properly picking up and carrying the load.
– Operating the machine safely at the workplace.

DANGER
Machine tipping!
Risk of fatal injury.

- ▶ Make sure that the ground surface has sufficient load capacity.
- ▶ Observe the maximum tipping load.
- ▶ Keep the load low during transportation.
- ▶ Do not change direction too quickly.
- ▶ Do not brake suddenly.

NOTICE
Improper material intake!
Damage to machine.

- ▶ Align bucket base parallel to ground.
- ▶ Reduce feed force with inching brake pedal.

3.4.1 Picking up material

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

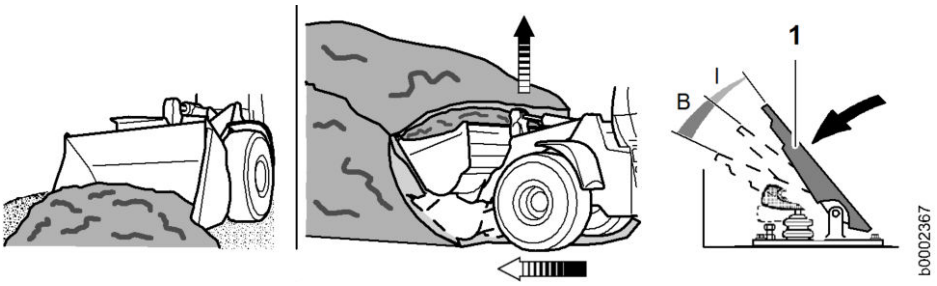

Fig. 239: Picking up material

1 Inching brake pedal
I Inching
B Braking

- ▶ Do not work with a strong downwards pressure on the working attachment.
- ▶ To provide better support, gently tilt the working attachment in and out while driving into the material.

Pressing the inching brake pedal reduces tractive force, which makes loading easier.

This is necessary when the machine is working on loose terrain and picking up solid or coarse material.

- ▶ Also move the inching brake pedal **1** within the range **I**.

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▷ The power of the travel hydraulics is reduced, which prevents the wheels from spinning.
▷ The power of the working attachment is reduced.

▶ Tilt in the loaded working attachment as far as it will go and raise the lift arms.

3.4.2 Transporting and moving material

Ensure that the machine is stable and visibility is clear. The working attachment should be moved into the transport position when transporting and transferring materials.

Transport position

The transport position means:
– The pivot point of the working attachment is approx. 40 cm above the ground.
– Working attachment tilted in

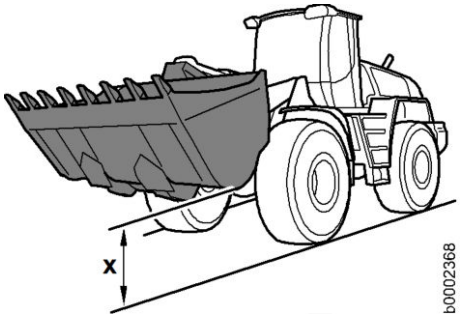

Fig. 240: Transport position

X Pivot point of the working attachment approx. 40 cm

▶ Put the working attachment into the transport position.

▶ Do not raise the lift arm until just before reaching the unloading point.

Transporting the load on a slope

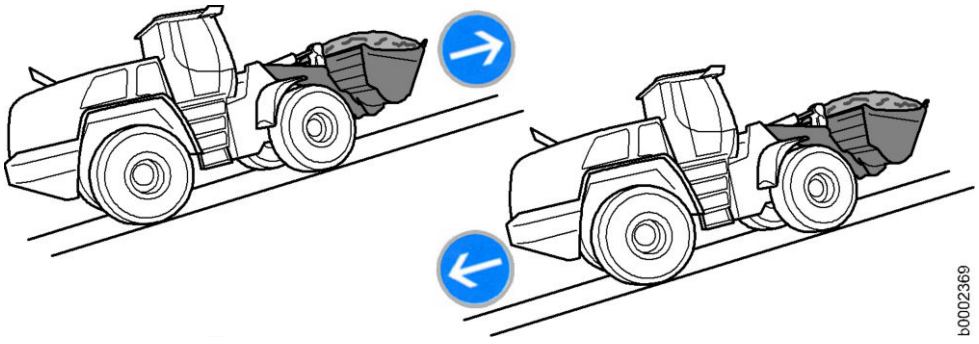

Fig. 241: Transporting the load on a slope

▶ When driving on slopes, always make sure the load faces uphill.

▶ Never drive across slopes.

▶ Never turn on slopes.

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Driving on slopes

Observe the safety instructions when driving on slopes.

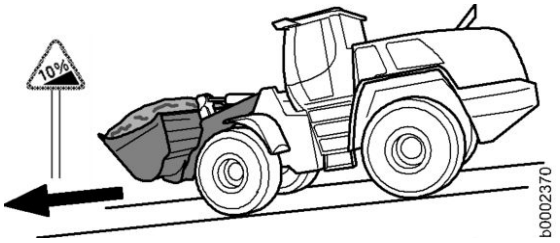

Fig. 242: Driving on slopes

▶ Ease off the accelerator pedal before driving onto the slope.

▶ Drive downhill carefully.

If necessary:
▶ Use the service brake.

If driving on a long, steep downhill slope:
▶ First switch to travel range **1** or fixed gear **1**.

3.4.3 Emptying the working attachment

This section describes emptying the working attachment of the following materials:
– Bulk material (stones, gravel)
– Adherent material (clay, compost)

NOTICE
Unnecessary jolting of the working attachment!
Damage to the lift arms and lay the working attachment flat.

▶ Avoid unnecessary jolting.

Bulk material

Fig. 243: Bulk material

▶ Tilt out the working attachment.
▷ Bulk material is emptied without leaving any residue.

Adherent material

Liebherr recommends using specially coated working attachments when working with adherent material. The material does not adhere. The duration of the loading cycle is reduced and the lifetime of the components is extended.

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If material adheres to the working attachment:
▶ Loosen the adherent matter manually
or

Quickly tilt the working attachment in and out, briefly jolting against the tilt-out stops of the bucket arm.

Note

Jolting against the tilt-out stops!

Jolting is only permissible when working with materials such as clay or compost.

Only use a **standard bucket** designed for a material weight greater than 1.3 t/m³ for jolting.

3.4.4 Handling materials with high dump buckets

The high dump bucket is used for loading light bulk material on trucks with high sides, wagons, silos etc. The special design achieves a greater dumping height. An appropriate working attachment must be fitted for other jobs that do not require a high dump function.

NOTICE
Unnecessary jolting of the working attachment!
Damage to the lift arms and lay the working attachment flat.

▶ Avoid unnecessary jolting.

Make sure that following requirements are met:
❑ Observe manufacturer's separate operating manual.
❑ The hydraulic lines of the high dump bucket are correctly connected.
❑ The functions have been checked.
❑ A high dump bucket with standard dump function has at most been tilted out until the bucket base is in a horizontal position.
❑ The tilt out duration for the high dump bucket is not less than 4 seconds.

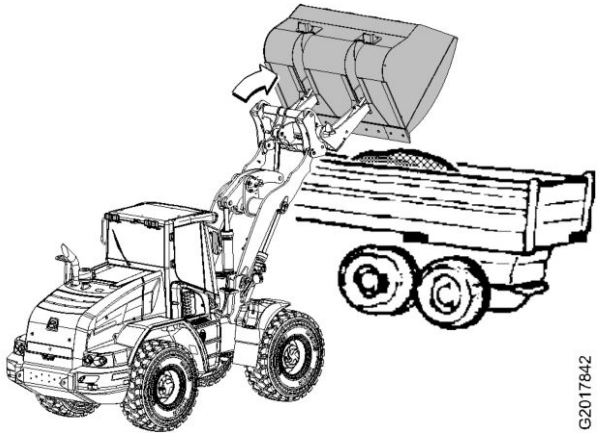

Fig. 244: Handling materials with high dump buckets

▶ Take up the bulk material with the high-dump function tilted in.

▶ Only use the high-dump function to empty the bulk material at the unloading site.

▶ If necessary, compress the material with the high-dump function tilted in.

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3.4.5 Loading with clamp buckets

Buckets with downholder clamps are mainly used for loading light bulky goods, such as compost, branches and garbage.

The downholder clamp is only used to keep the load in the working attachment.

NOTICE
Unnecessary jolting of the working attachment!
Damage to the lift arms and lay the working attachment flat.

▶ Avoid unnecessary jolting.

Make sure that following requirements are met:
❑ Observe manufacturer's separate operating manual.
❑ The hydraulic lines of the clamp buckets are correctly connected.
❑ The functions have been checked.

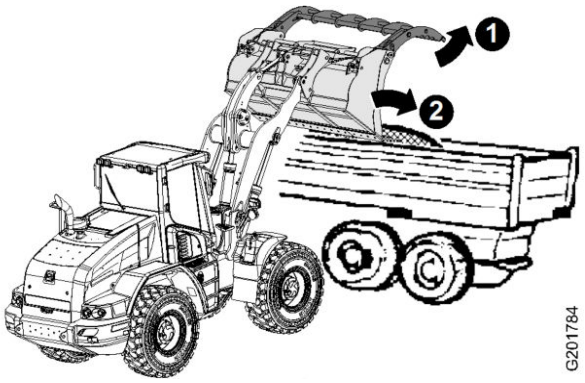

Fig. 245: Loading with clamp buckets

▶ Take up the loading material with the clamp bucket titled in and the downholder clamp open.

▶ At the unloading site, open the downholder clamp and empty the loading material.

3.4.6 Grading work

There are two different ways to carry out grading work.
– In forward travel direction
– In reverse travel direction

Grading in forward travel direction

The following procedures are recommended to avoid any possible loss of traction.
– Do not work with a strong downwards pressure on the working attachment.
– Use *float position* function.

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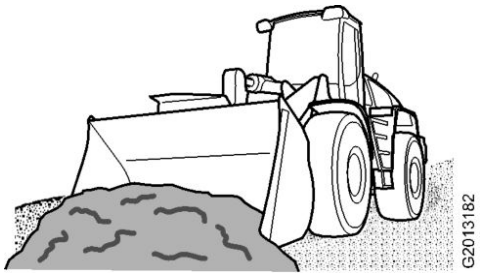

Fig. 246: Grading in forward travel direction

NOTICE
Incorrect use of the working attachment!
Damage to the machine.

▶ Do not grade in forward travel direction with the working attachment tilted out.

▶ Keep the working attachment parallel to the ground or tip it down slightly.

Grading in reverse travel direction

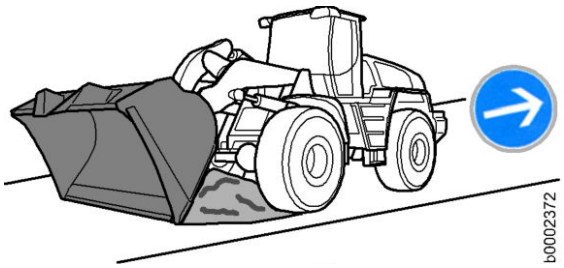

Fig. 247: Grading in reverse travel direction

NOTICE
Grading with the working attachment fully tilted out!
Damage to the lift arms.

▶ Do not tilt the bucket all the way out.

▶ Tilt the working attachment down and drive backwards.

3.4.7 Removing material from a slope or wall

Removing material from a slope

This is how to remove normal material such as sand or gravel.

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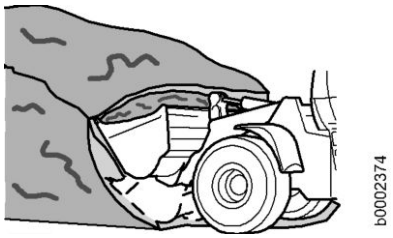

Fig. 248: Removing material from a slope

▶ Start at the foot of the slope and work upwards.

Removing material from a wall

This is how to remove hard material.

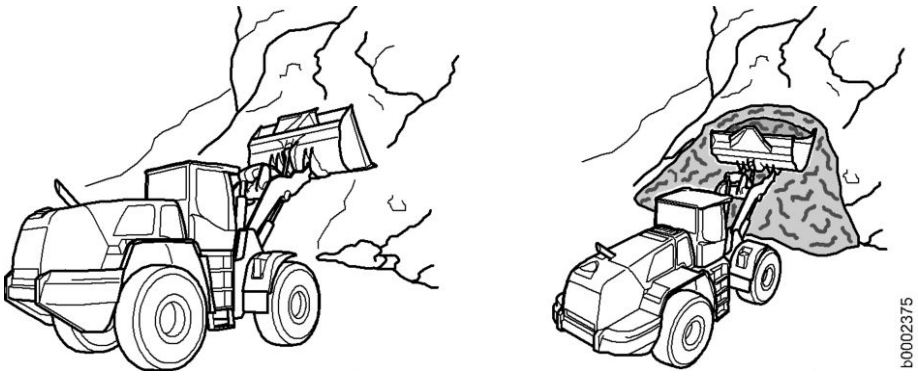

Fig. 249: Removing material from a wall

▶ Slightly tilt up the working attachment.

▶ Start removing material at the top and work downwards.

DANGER
Falling material!
Risk of fatal injury.

▶ Do not remove material from under overhangs.

▶ Remove overhangs first and then look out for slippage.

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3.4.8 Loading a transport vehicle

Transport routes

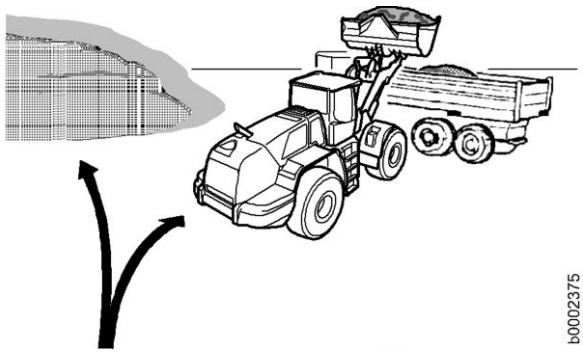

Fig. 250: Y movement

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**.

Loading procedure

If you slow down the machine with the inching brake pedal before reaching the truck:
– Loading is faster.
– Sensitive speed adjustment
– Optimum power adjustment for the working attachment

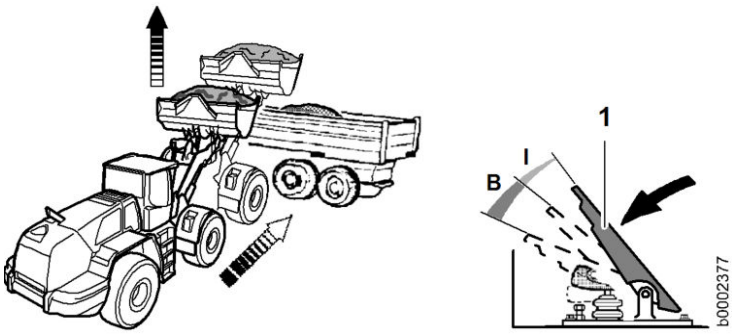

Fig. 251: Loading procedure

1 Inching brake pedal
I Inching
B Braking

▶ Shortly before reaching the unloading site, slow down the machine with the inching brake pedal and raise the lift arms.

DANGER
Falling material!
Risk of fatal injury.

▶ Make sure there is nobody in the danger area around the machine.

▶ Do not swing the attachment over areas where people are working.

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- ▶ Tip the material into the middle of the skip.
- ▶ Load long transport vehicles from front to back.

Working near overhead power lines

DANGER
Beware of flashover near overhead power lines!
Risk of fatal injury.

- ▶ Keep a safe distance.
- ▶ De-energise overhead power lines.

Fig. 252: Working near overhead power lines

- ▶ Keep the machine and attachment a safe distance away from power lines.

Loading large rocks

Make sure that following requirements are met:
❑ Transport vehicle is reinforced to withstand impact of large rocks.

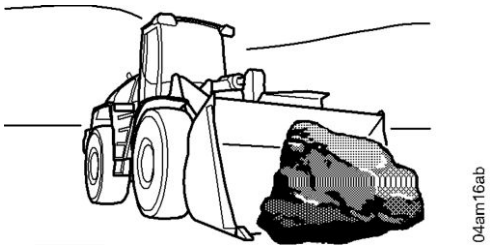

Fig. 253: Loading large rocks

- ▶ First put a load of smaller rocks into the transport vehicle.
- ▶ Carry on loading the transport vehicle.

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Moving the machine back

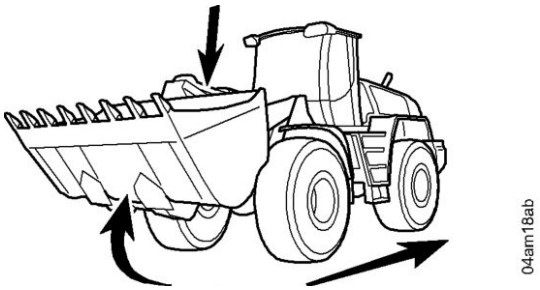

Fig. 254: Moving the machine back

- ▶ Tilt in the working attachment.
- ▶ When driving back, put the machine in the transport position.

3.4.9 Excavation

Excavating material

Use a working attachment with teeth for excavating hard material.

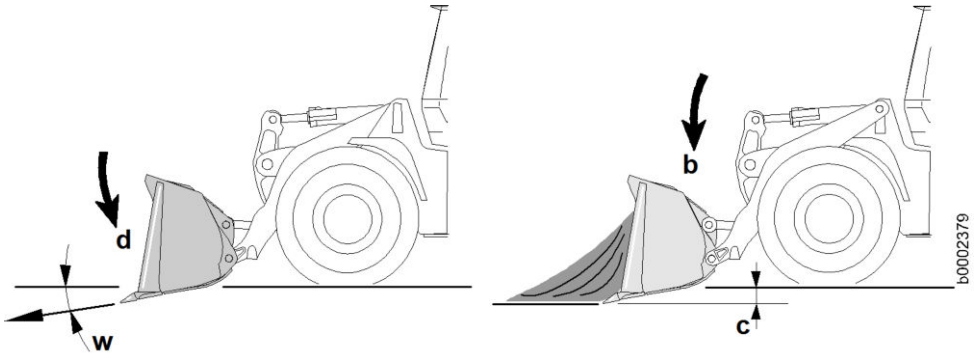

Fig. 255: Excavating material

- ▶ Lower the working attachment to the ground.
- ▶ Set a small cutting angle **W** of no more than 10°.
- ▶ Approach with the machine and press the lift arms down simultaneously, until a sufficient penetration depth **C** is reached.

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

- ▶ Do not work with a strong downwards pressure on the working attachment.

- ▶ Make horizontal cuts when driving forward.
- ▶ Raise and lower the lift arms slightly to provide better support.

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Excavating foundations

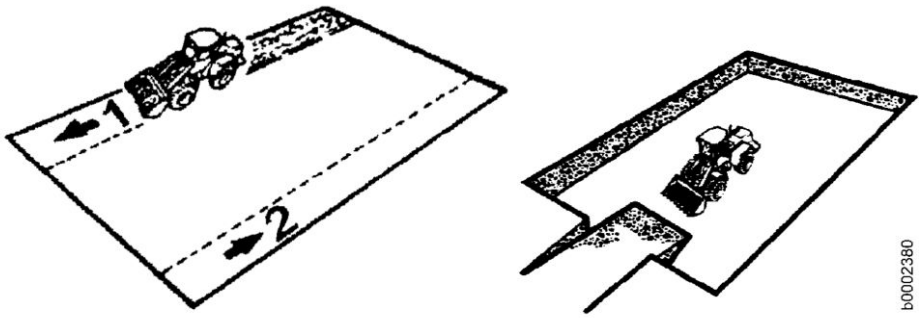

Fig. 256: Excavating foundations

▶ Make a first trench along the side of the pit.

When the first trench is down to a depth of approx. 1 m:

▶ Start a second trench along the opposite side.

▶ Excavate the middle area to the same depth as the two side trenches. Heap the material at one side.

When the foundations have been excavated to the required depth:

▶ Use the heaped material to create an exit ramp.

▶ Drive forwards out of the pit.

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3.5 Fitting and removing the attachment

3.5.1 Hydraulic connections for hydraulic working attachments

This equipment is optional.

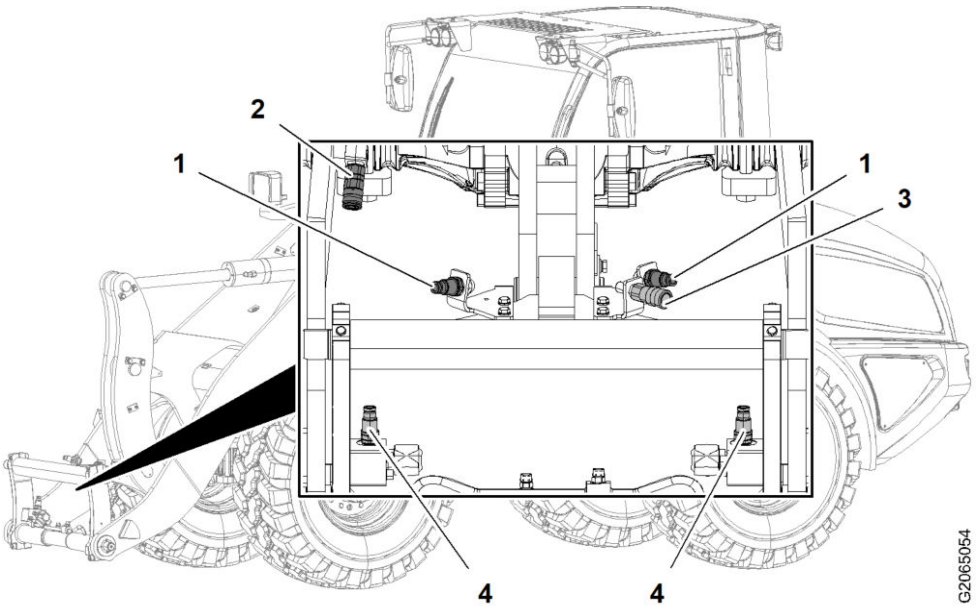

Fig. 257: Hydraulic connections for hydraulic working attachments

1	Connection for 3rd function	**3**	Leak oil line
2	Return line depressurised	**4**	Connection for 4th function

3.5.2 Removing the working attachment from the quick coupler

The quick coupler is fitted on the front of the attachment holder. It enables you to change the working attachment without getting out of the cab.

DANGER
Falling working attachment!
Danger to life.

▶ Make sure there is nobody in danger area.

Following tasks must be carried out in following sequence in order to safely remove working attachment:

1. Depressurise hydraulics. [24)]
2. Disconnect hydraulic lines. [24)]
3. Unlock and disconnect the working attachment.

[24)] If a working attachment with its own hydraulic supply is installed.

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Depressurising the hydraulics

If the working attachment has an independent hydraulic circuit, the hydraulic operating circuits must be depressurised.

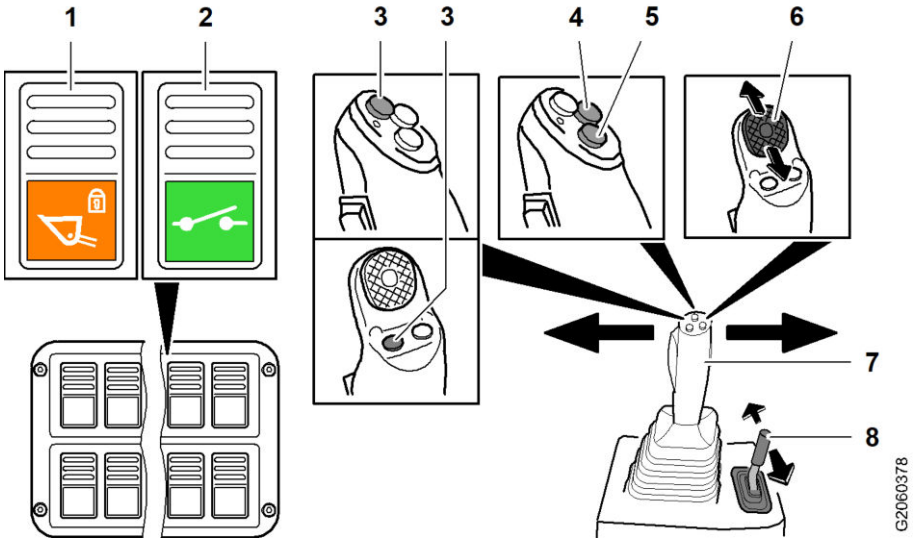

Fig. 258: Depressurising the hydraulics

1	*Working hydraulics lockout* button	**5**	*Button control* button
2	*Comfort control / button control / mini-joystick* switch	**6**	Mini-joystick
3	*Comfort control* button	**7**	Control lever
4	*Button control* button	**8**	Additional control lever

▶ Start the diesel engine and let it run for around 10 seconds.

▶ Lower the lift arms to just above the ground.

▶ Turn off diesel engine.

▶ Switch on ignition.

If working attachment is operated with additional control lever:

▶ Move additional control lever **8** several times in direction of arrow.
▷ The working attachment hydraulics have been depressurised.

If the working attachment is operated with comfort control:

▶ Press the switch **2**.

▶ Press and hold button **1** and, at same time, press button **3** and move control lever **7** several times in direction of arrow.
▷ The working attachment hydraulics have been depressurised.

If the working attachment is operated with button control:

▶ Press the switch **2**.

▶ Press and hold button **1** while repeatedly pressing button **4** and **5** on control lever **7**.
▷ The working attachment hydraulics have been depressurised.

If working attachment is operated with mini-joystick:

▶ Press the switch **2**.

▶ Press and hold button **1** while moving mini-joystick **6** on control lever **7** in direction of arrow several times.
▷ The working attachment hydraulics have been depressurised.

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Disconnecting the hydraulic lines

If the working attachment has its own hydraulic supply, the hydraulic lines must be disconnected.

Make sure the following preconditions are met:
- ❑ The working attachment is lying flat on the ground.
- ❑ Cylinders, valves, etc. on the working attachment are in the initial position or closed.
- ❑ The hydraulic system is depressurised.

Note
Hydraulic oil is harmful to the environment.
Make sure that no hydraulic oil leaks into the ground.

▶ Dispose of any contaminated soil in accordance with the local regulations.

WARNING
Pressurised hydraulic lines!
Risk of injury.

▶ Depressurise the hydraulic system before connecting and disconnecting.

▶ Detach the hydraulic lines from the installed working attachment.

▶ Seal the hydraulic line couplings with caps.

▶ Place the hydraulic lines in the hose retainer.

Unlocking and disconnecting the working attachment

There are 3 alternatives:
- – Unlocking and disconnecting with additional control lever
- – Unlocking and disconnecting with button control
- – Unlocking and disconnecting with mini-joystick

Make sure the following preconditions are met:
- ❑ The hydraulic lines are detached from the working attachment.
- ❑ The working attachment is lying flat on the ground.

Unlocking and disconnecting with additional control lever

WARNING
Working attachment falling over!
Injury.

▶ Make sure the working attachment is secured against falling over or rolling away.

WARNING
Unintentional actuation of working attachment!
Injury.

▶ Make sure the hydraulic line to the working attachment is disconnected.

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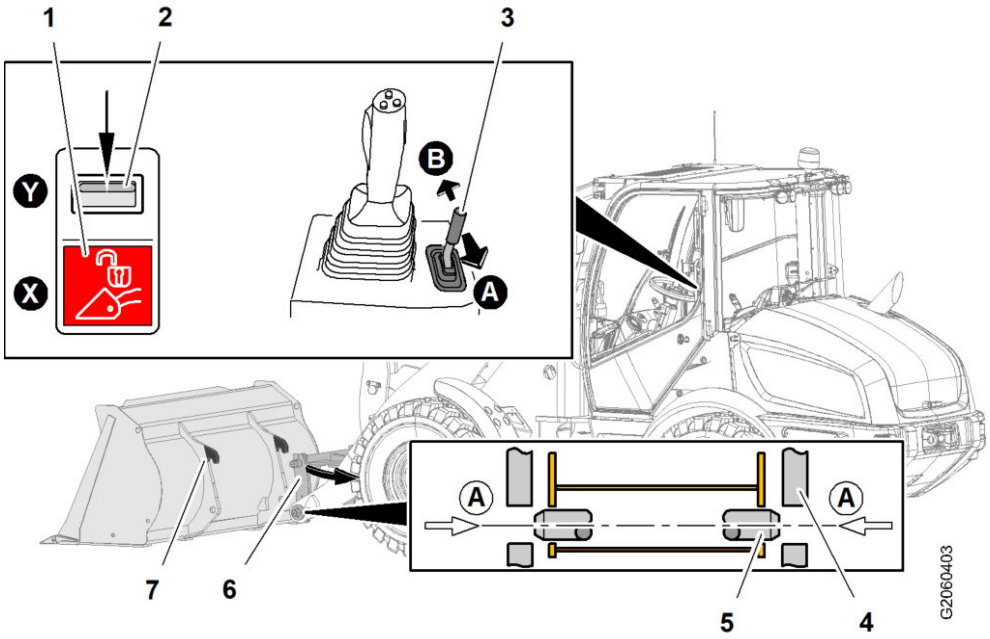

Fig. 259: Unlocking and disconnecting with additional control lever

1 *Quick coupler* switch
2 Lockout
3 Additional control lever
4 Working attachment
5 Locking pin
6 Quick coupler
7 Working attachment holder

▶ Set down the working attachment flat on firm, even ground.

▶ Secure the working attachment against falling over or rolling away.

▶ Release lockout **2** in direction of arrow while pressing switch **1** in position **X**.
▷ A warning tone sounds.

▶ Push additional control lever **3** in direction **A**.
▷ Locking pins **5** of the quick coupler **6** retract.

When the locking pins are completely retracted:
▶ Carefully move quick coupler **6** out of holder **7**.

If you are not going to install a working attachment:
▶ Push additional control lever **3** in direction **B**.
▷ Locking pins **5** of the quick coupler **6** extend.

▶ Push switch **1** to position **Y**.
▷ The warning tone stops.

Unlocking and disconnecting with button control

Make sure the following preconditions are met:
❑ The hydraulic lines are detached from the working attachment.
❑ The working attachment is lying flat on the ground.

WARNING
Working attachment falling over!
Injury.

▶ Make sure the working attachment is secured against falling over or rolling away.

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WARNING
Unintentional actuation of working attachment!
Injury.

▶ Make sure the hydraulic line to the working attachment is disconnected.

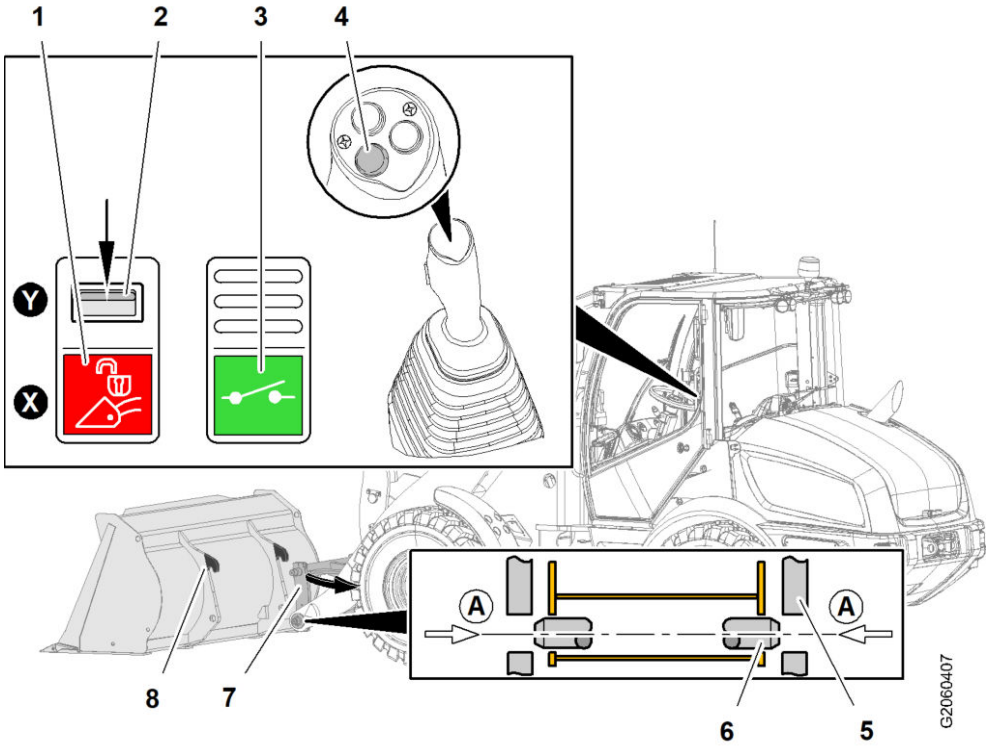

Fig. 260: Unlocking and disconnecting with button control

1	*Quick coupler* switch	**5**	Working attachment
2	Lockout	**6**	Locking pin
3	*Button control* switch	**7**	Quick coupler
4	*Button control* (hydraulic retraction) button	**8**	Working attachment holder

▶ Set down the working attachment flat on firm, even ground.

▶ Secure the working attachment against falling over or rolling away.

▶ Release lockout **2** in direction of arrow while pressing switch **1** in position **X**.
▷ A warning tone sounds.

▶ Press the switch **3**.
▷ Button control is activated.

▶ Press and hold the button **4**.
▷ Locking pins **6** of the quick coupler **7** retract.

When the locking pins are completely retracted:
▶ Carefully move quick coupler **7** out of holder **8**.

If you are not going to install a working attachment:
▶ Release button **4**.
▷ Locking pins **6** of the quick coupler **7** extend.

▶ Push switch **1** to position **Y**.
▷ The warning tone stops.

▶ Press the switch **3**.

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▷ Button control is deactivated.

Unlocking and disconnecting with mini-joystick

Make sure the following preconditions are met:
❑ The hydraulic lines are detached from the working attachment.
❑ The working attachment is lying flat on the ground.

WARNING
Working attachment falling over!
Injury.

▶ Make sure the working attachment is secured against falling over or rolling away.

WARNING
Unintentional actuation of working attachment!
Injury.

▶ Make sure the hydraulic line to the working attachment is disconnected.

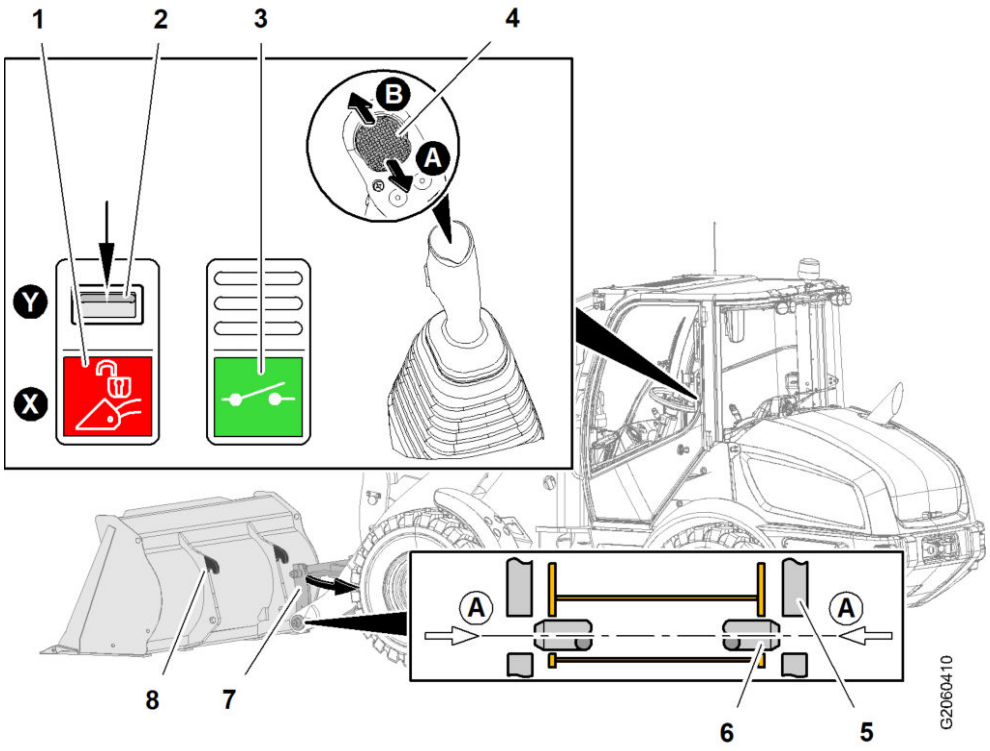

Fig. 261: Unlocking and disconnecting with mini-joystick

1	*Quick coupler* switch	**5**	Working attachment
2	Lockout	**6**	Locking pin
3	*Mini-joystick* switch	**7**	Quick coupler
4	Mini-joystick	**8**	Working attachment holder

▶ Set down the working attachment flat on firm, even ground.

▶ Secure the working attachment against falling over or rolling away.

▶ Release lockout **2** in direction of arrow while pressing switch **1** in position **X**.
▷ A warning tone sounds.

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▶ Press the switch **3**.
▷ Mini-joystick is activated.

▶ Push and hold mini-joystick **4** in direction **A**.
▷ Locking pins **6** of the quick coupler **7** retract.

When the locking pins are completely retracted:
▶ Carefully move quick coupler **7** out of holder **8**.

If you are not going to install a working attachment:
▶ Push and hold mini-joystick **4** in direction **B**.
▷ Locking pins **6** of the quick coupler **7** extend.

▶ Push switch **1** to position **Y**.
▷ The warning tone stops.

▶ Press the switch **3**.
▷ Button control is deactivated.

3.5.3 Fitting working attachments to the quick coupler

The quick coupler is fitted on the front of the attachment holder. It enables you to change the working attachment without getting out of the cab.

DANGER
Falling working attachment!
Danger to life.

▶ Make sure there is nobody in danger area.

Note
Changing the working attachment alters the total weight of the machine!

▶ In order to ensure the roll over protective structure of the operator's cab, do not exceed the permissible total weight of the machine (see identification plate).

Note
No equipment or attachments from other manufacturers may be installed or attached to the machine without prior written consent from Liebherr.

▶ The appropriate technical documentation should be made available to Liebherr for this purpose.

Following tasks must be carried out in following sequence in order to safely install working attachment:
1. Connect and lock the working attachment.
2. Checking that the working attachment is locked
3. Connect hydraulic lines. [25)]

Connecting and locking the working attachment

There are 3 alternatives:
– Connecting and locking with additional control lever
– Connecting and locking with button control
– Connecting and locking with mini-joystick

[25)] If a working attachment with its own hydraulic supply is installed.

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Connecting and locking with additional control lever

Make sure the following preconditions are met:
❑ The quick coupler is completely unlocked.

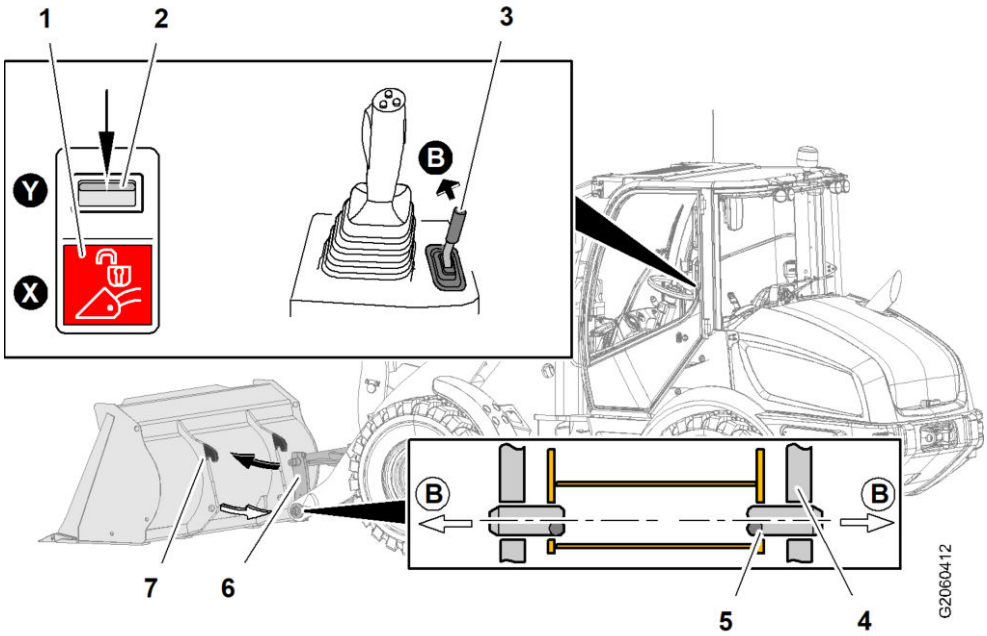

Fig. 262: Connecting and locking with additional control lever

1 *Quick coupler* switch
2 Lockout
3 Additional control lever
4 Working attachment
5 Locking pin
6 Quick coupler
7 Working attachment holder

▶ To uncouple working attachment: carefully move quick coupler **6** into holder **7**, slightly raise working attachment **4** and tilt it in.

Note
Working attachment is tilted in completely!
Locking of working attachment not possible.

▶ Only tilt working attachment until borehole of working attachment and locking bolt match up.

▶ Lock working attachment: push additional control lever **3** in direction **B**.
▷ Locking pins **5** of the quick coupler **6** extend.

▶ Push switch **1** to position **Y**.
▷ The warning tone stops.

▶ Perform lock check.

Connecting and locking with button control

Make sure the following preconditions are met:
❑ The quick coupler is completely unlocked.

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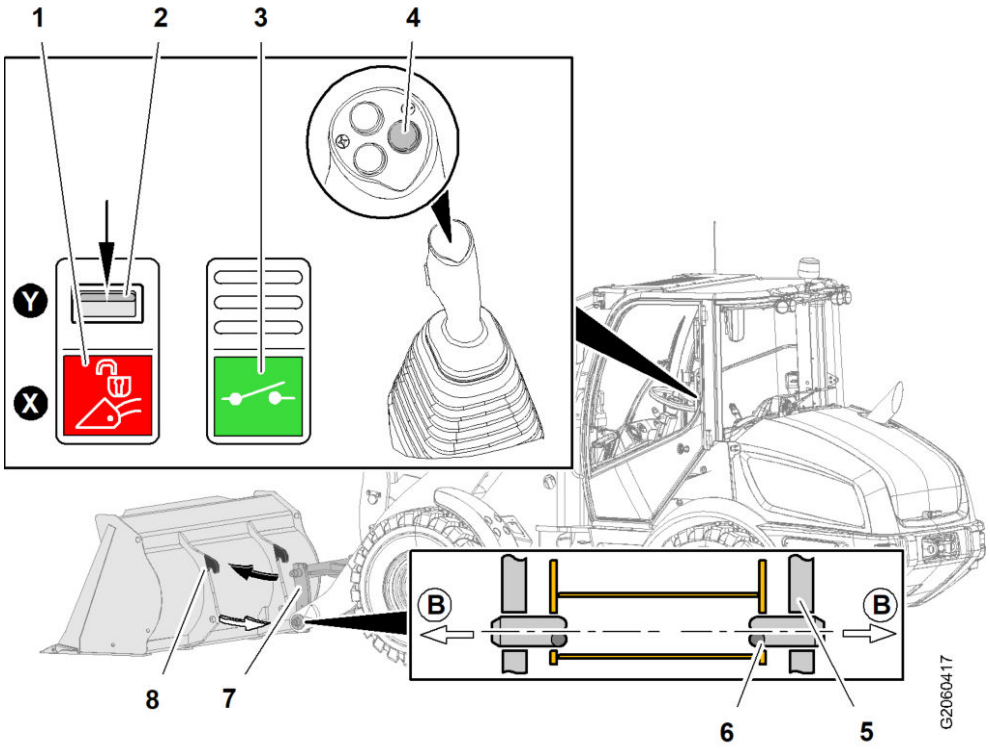

Fig. 263: Connecting and locking with button control

1	*Quick coupler* switch	**5**	Working attachment
2	Lockout	**6**	Locking pin
3	*Button control* switch	**7**	Quick coupler
4	*Button control* (hydraulic extension) button	**8**	Working attachment holder

▶ To uncouple working attachment: carefully move quick coupler **7** into holder **8**, slightly raise working attachment **5** and tilt it in.

Note
Working attachment is tilted in completely!
Locking of working attachment not possible.

▶ Only tilt working attachment until borehole of working attachment and locking bolt match up.

▶ Lock working attachment: press and hold button **4**.
▷ Locking pins **6** of the quick coupler **7** extend.

▶ Push switch **1** to position **Y**.
▷ The warning tone stops.

▶ Press the switch **3**.
▷ Button control is deactivated.

▶ Perform lock check.

Connecting and locking with mini-joystick

Make sure the following preconditions are met:
❑ The quick coupler is completely unlocked.

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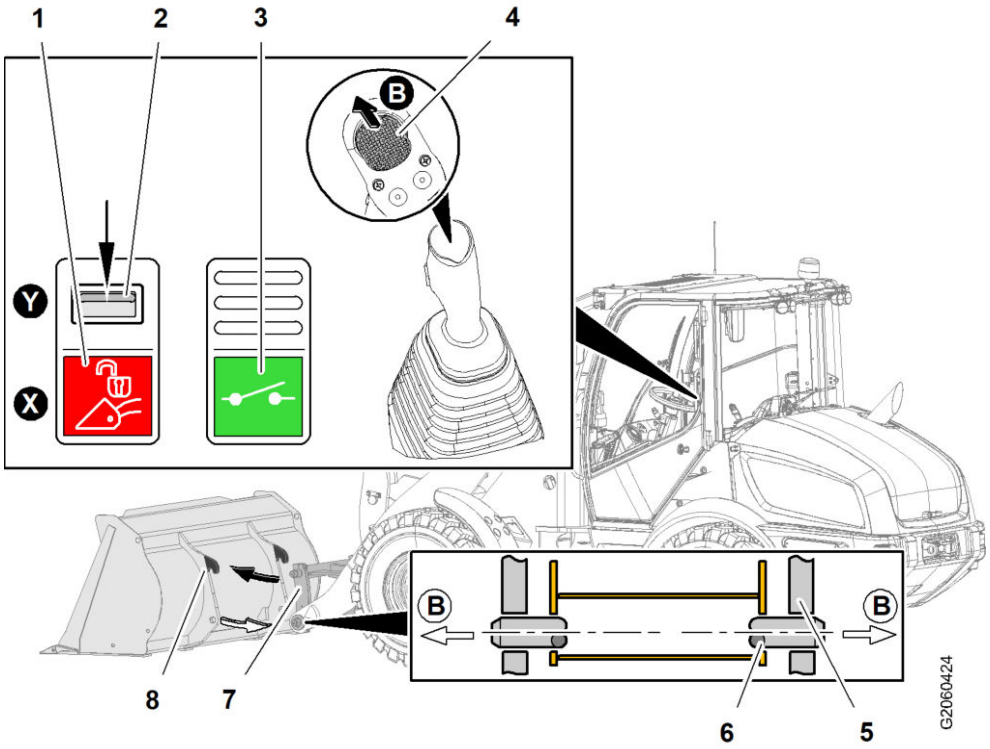

Fig. 264: Connecting and locking with mini-joystick

1	*Quick coupler* switch	**5**	Working attachment
2	Lockout	**6**	Locking pin
3	*Mini-joystick* switch	**7**	Quick coupler
4	Mini-joystick	**8**	Working attachment holder

▶ To uncouple working attachment: carefully move quick coupler **7** into holder **8**, slightly raise working attachment **5** and tilt it in.

Note
Working attachment is tilted in completely!
Locking of working attachment not possible.

▶ Only tilt working attachment until borehole of working attachment and locking bolt match up.

▶ Lock working attachment: push mini-joystick **4** in direction **B**.
▷ Locking pins **6** of the quick coupler **7** extend.

▶ Push switch **1** to position **Y**.
▷ The warning tone stops.

▶ Press the switch **3**.
▷ Mini-joystick is deactivated.

▶ Perform lock check.

Checking that the working attachment is locked

The fact that the attachment can be changed from the operator's cab does not release the operator from his / her duty to check it afterwards.

Every time you change the attachment, make a *visual inspection* and a *mechanical check* to make sure that the working attachment is correctly locked.

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DANGER
Falling working attachment!
Danger to life.

▶ Do not carry out any working movements using the working attachment before checking the locking mechanism.

Visual inspection

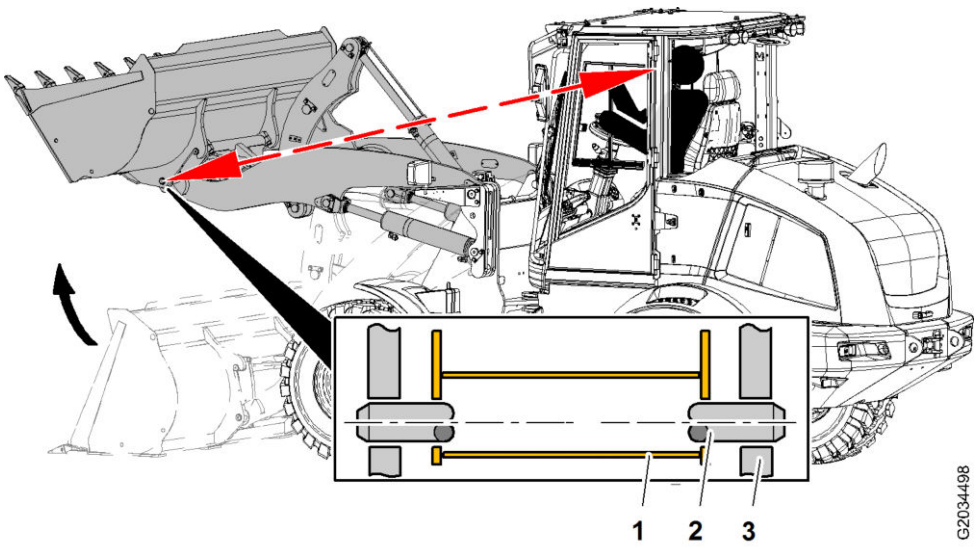

Fig. 265: Visual inspection

1 Quick coupler
2 Locking pin
3 Working attachment

▶ Move lift arms until you can see quick coupler **1** from operator's cab.

▶ Make a visual inspection on both sides.
▷ The locking pins **2** must have retracted as far as the outer hole on the working attachment **3**.

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Mechanical check

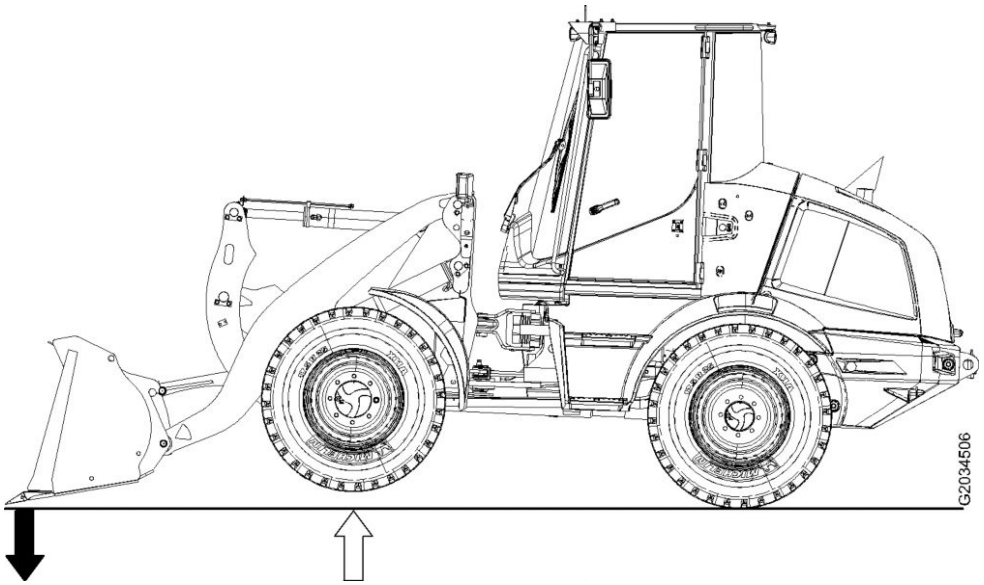

Fig. 266: Mechanical check

▶ Push the front edge of the bucket against the ground so that the front axle of the machine is slightly raised.
  ▷ The bucket must remain firmly attached to the quick coupler.

Connecting the hydraulic lines

If the working attachment has its own hydraulic supply, the hydraulic lines must be connected.

Make sure the following preconditions are met:
❑ The working attachment is properly fitted to the quick coupler.
❑ You have checked that it is locked.
❑ The hydraulic system is depressurised.

WARNING
Pressurised hydraulic lines!
Risk of injury.

▶ Depressurise the hydraulic system before connecting and disconnecting.

Note
Hydraulic oil is harmful to the environment.
Make sure that no hydraulic oil leaks into the ground.

▶ Dispose of any contaminated soil in accordance with the local regulations.

▶ Depressurise hydraulics.

▶ Take the caps off the hydraulic line couplings.

▶ Connect the hydraulic lines according to their function.

Note the following points when connecting:
– Clean the hydraulic line couplings before connecting.
– Do not connect the wrong ends of the hydraulic lines.

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– Lay the hydraulic lines so that they cannot become caught in the working attachment during operation.
– Use the hose retainers provided when laying the lines.

▶ Check the hydraulic lines for leaks after connecting them.

▶ Check the connected working attachment is working properly.

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3.6 Transport

3.6.1 Transporting the machine

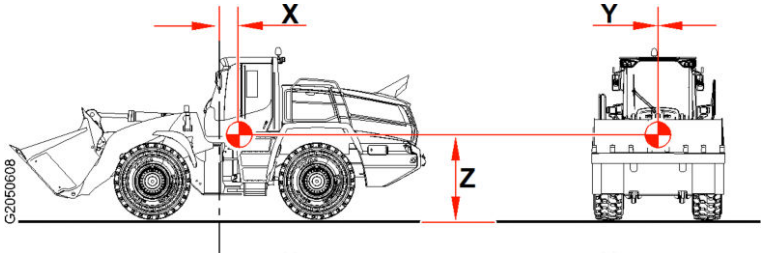
Note
Clean the machine before transport.

▶ Remove any loose parts, coarse dirt, mud, ice, snow etc.

Transporting the machine by lorry or rail

Machine-specific lashing specifications

The following values apply to a machine in its standard version and may vary accordingly depending on the configuration.

Machine centre of gravity		
		
Reference point: articulated joint centre	X	0 - 200 mm
	Y	0 mm
Reference point: operator’s cab floor	Z	0 mm

Tab. 35: Machine centre of gravity

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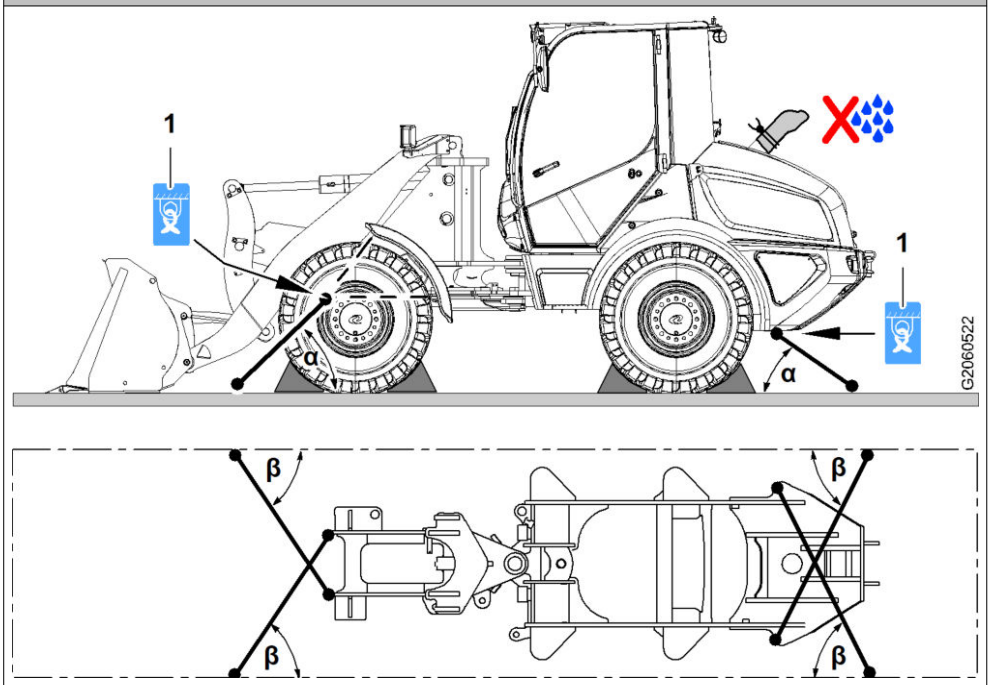
Interface parameter	
	
Contact type (contact surfaces)	Rubber on steel
Coefficient of friction **μ**	0.4
Recommended type of lashing agent	Chain
Vertical lashing angle **α**	20° to 40°
Longitudinal horizontal angle **β**	20° to 40°
Lashing point designation	According to ISO 6405

Tab. 36: Interface parameter

Lashing capacity			
Weight of machine	**Minimum required lashing capacity**	**Minimum required lashing force on the means of transport**	**Maximum required lashing force on the machine**
8 t	3 t		
14 t	5 t		
20 t	7 t		
29 t	10 t		
40 t	15 t		

Tab. 37: Lashing capacity

Driving the machine onto the loading area

Observe general safety regulations and country-specific regulations.

Find out about weight and main dimensions of the machine (For more information see: 1.2 Technical data, page 18) (For more information see: 2.4.3 Identification plate, page 46)

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Fig. 269: Transporting the machine by lorry or rail

The inclination of the ramp **W** may not exceed 30°.

Make sure the following preconditions are met:
- ❑ A ramp is available for driving the machine onto the loading area.
- ❑ A person is available to give direction signals.
- ❑ Loading area and tyres are freed from dirt, mud, ice, snow, etc.

DANGER
Person giving signals in the danger area!
Risk of fatal injury.

- ▶ Make sure there are no unauthorised persons in the danger area.
- ▶ Always maintain visual contact with the person giving the signals.

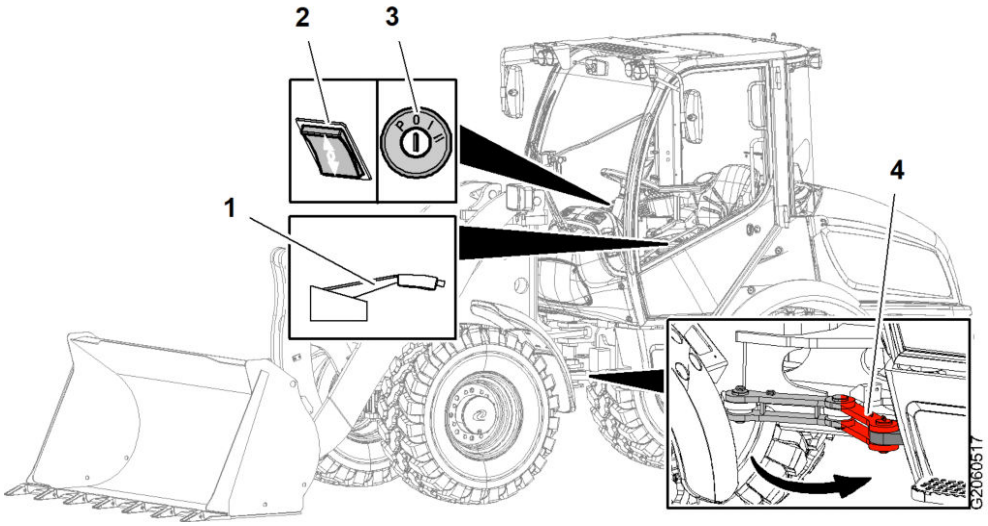

Fig. 270: Driving the machine onto the loading area

1	Parking brake	**3**	Starting switch
2	*Travel direction* switch	**4**	Articulation lock

- ▶ Start the diesel engine with starting switch **3**.
- ▶ Release parking brake **1**.
- ▶ Preselect travel direction with switch **2**.
- ▶ Drive the machine to the loading area and stop.
- ▶ Engage parking brake **1**.
- ▶ Engage the articulation lock **4**.
- ▶ Lower the lift arms and lay the loading bucket down flat on the loading area.
- ▶ Start the diesel engine with the starting switch **3**.
- ▶ Close and lock the doors and service hatches on the machine.

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Securing the machine

Make sure the following preconditions are met:
- ❑ Suitable tensioning ropes or chains are available to lash the machine down.
- ❑ Wedges are available.

DANGER
Beware of machine slipping!
Danger to life.

▶ Secure machine against slipping.

▶ Fasten lashing material crosswise to the lashing points on the low-bed truck, maintaining specified **lashing angles α** and **β**. (For more information see: Machine-specific lashing specifications, page 163)

▶ If necessary, also secure with chocks.

NOTICE
Risk of water in the exhaust system!
Risk of damage to the exhaust system.

▶ Prevent water from entering.

▶ Seal the exhaust system using waterproof material which cannot slip.

Driving the machine off the loading area

Make sure the following preconditions are met:
- ❑ A person is available to give direction signals.
- ❑ Tensioning ropes, tensioning chains and wedges have been removed.
- ❑ The exhaust system sealing material has been removed.
- ❑ A suitable ramp is available for driving machine off loading area.

DANGER
Person giving signals in the danger area!
Risk of fatal injury.

▶ Make sure there are no unauthorised persons in the danger area.

▶ Always maintain visual contact with the person giving the signals.

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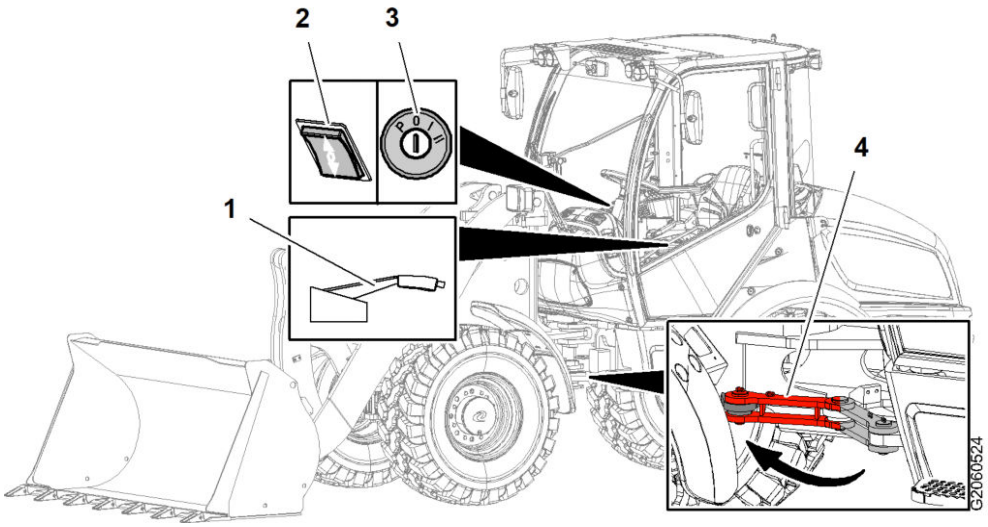

Fig. 271: Driving the machine off the loading area

1	Parking brake	**3**	Starting switch
2	*Travel direction* switch	**4**	Articulation lock

WARNING
Risk of locked steering!
Risk of injury.

▶ Before driving off the loading area: Release the articulation lock.

▶ Release the articulation lock **4**.

▶ Start the diesel engine with starting switch **2**.

▶ Move lift arms into transport position.

▶ Release parking brake **1**.

▶ Preselect travel direction with switch **3**.

▶ Carefully drive the machine off the loading area.

Lifting the machine by crane

Observe the general safety instructions when lifting the machine by crane

Find out about:
– Weight and main dimensions of the machine (For more information see: 1.2 Technical data, page 18) (For more information see: 2.4.3 Identification plate, page 46)

NOTICE
Leaking fuel and operating fluid!
Risk of damage to the machine.

▶ Always make sure the machine is level when lifting it.

Make sure the following preconditions are met:
❑ Working attachment and loading equipment is lowered and tilted back to its limit.
❑ Articulation lock is engaged.
❑ The control lever is in neutral position.

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- ❑ Diesel engine is switched off.
- ❑ Doors and service hatches on machine are closed and locked.

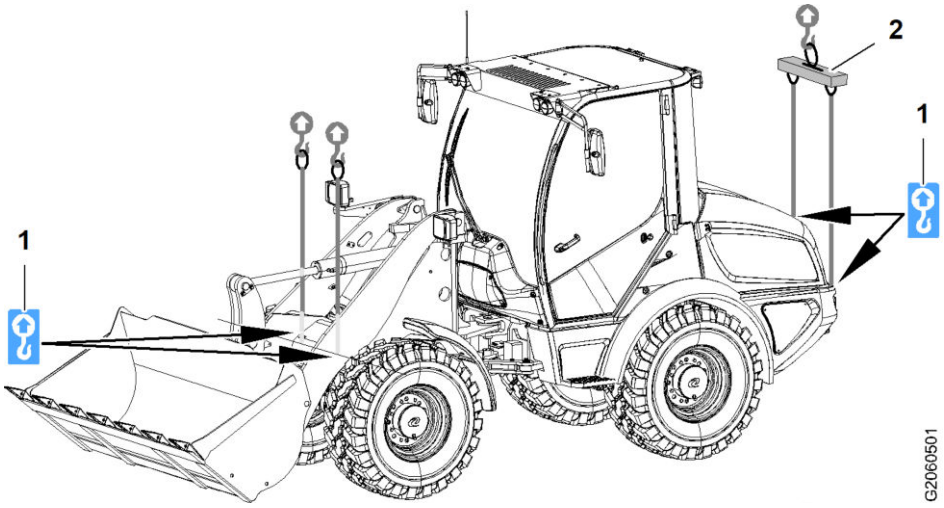

Fig. 272: Lifting the machine by crane

1 Lifting points **2** Crossbar

DANGER
Beware of falling loads!
There is a risk of fatal injury.

- ▶ Align slinging gear vertically (maximum angle of incline = 10°).
- ▶ Make sure there is nobody in the danger zone under the suspended machine.

NOTICE
Improper lifting of the machine!
Damage to the machine.

- ▶ Ensure that the slinging gear is only in contact with the lifting points.

- ▶ Attach slinging gear with crossbar **2** as shown to the lifting points **1** on the machine.
- ▶ Carefully lift machine and load it.

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3.7 Emergency modes

This section describes the emergency modes of the machine.

This section describes emergency modes of machine.
– Lowering lift arms if diesel engine fails
– Towing machine
– Jump starting procedure

3.7.1 Lowering lift arms if diesel engine fails

If the diesel engine fails, lower the lift arms and depressurise the hydraulic system.

Lowering the lift arms and depressurising the hydraulics

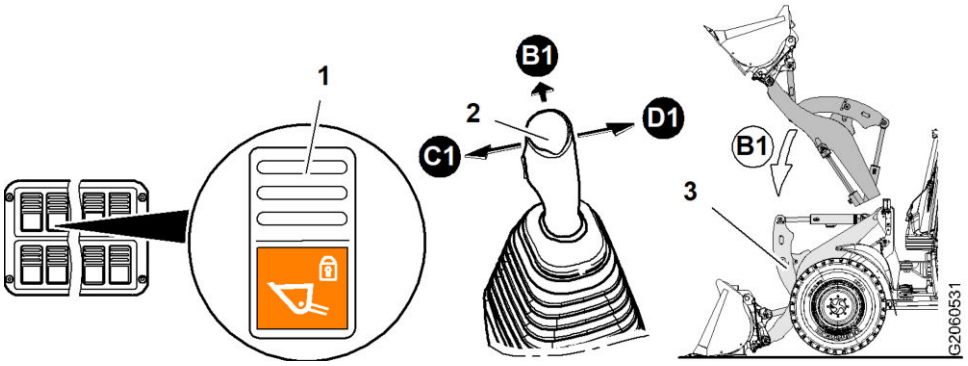

Fig. 273: Lower the lift arms

1 *Working hydraulics lockout* button
2 Control lever
3 Lift arms

▶ Switch on ignition.

▶ Press and hold down button **1** while moving control lever **2** in direction **B** and lower lift arms **3** to ground.

▶ Press and hold button **1** and at same time move control levers **2** several times in direction **C** and **D**.
▷ Hydraulics are depressurised.

Depressurising the hydraulics of the working attachment

If the working attachment has an independent hydraulic circuit, the hydraulic operating circuits must be depressurised.

Make sure that following requirements are met:
❑ The lift arms have been lowered.

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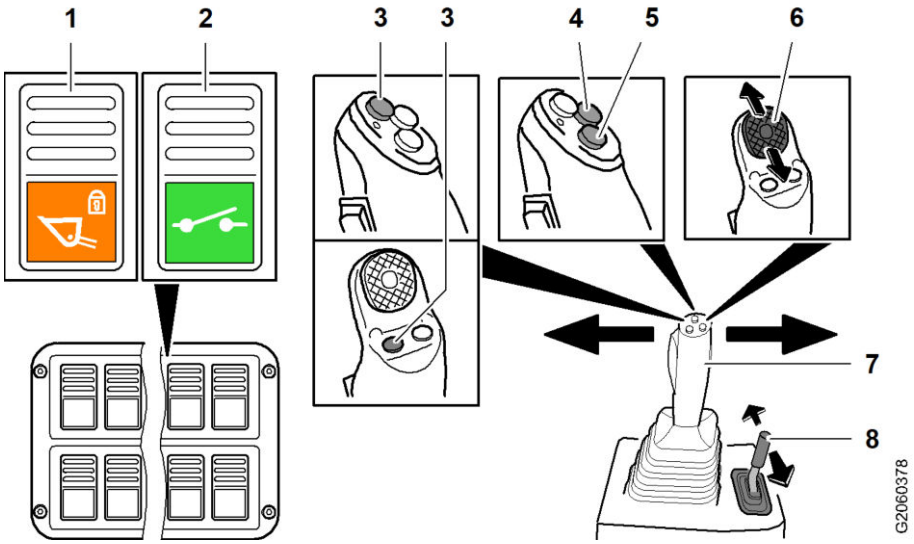

Fig. 274: Depressurising the hydraulics

1	*Working hydraulics lockout* button	**5**	*Button control* button
2	*Comfort control / button control / mini-joystick* switch	**6**	Mini-joystick
3	*Comfort control* button	**7**	Control lever
4	*Button control* button	**8**	Additional control lever

▶ Start diesel engine and let it run for around 10 seconds.

▶ Lower the lift arms to just above the ground.

▶ Turn off diesel engine.

▶ Switch on ignition.

If working attachment is operated with additional control lever:

▶ Move additional control lever **8** several times in direction of arrow.
▷ Working attachment hydraulics have been depressurised.

If the working attachment is operated with comfort control:

▶ Press switch **2**.

▶ Press and hold key **1** and, at same time, press button **3** and move control lever **7** several times in direction of arrow.
▷ Working attachment hydraulics have been depressurised.

If the working attachment is operated with button control:

▶ Press switch **2**.

▶ Press and hold button **1** while repeatedly pressing button **4** and **5** on control lever **7**.
▷ Working attachment hydraulics have been depressurised.

If working attachment is operated with mini-joystick:

▶ Press switch **2**.

▶ Press and hold button **1** while moving mini-joystick **6** on control lever **7** in direction of arrow several times.
▷ Working attachment hydraulics have been depressurised.

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3.7.2 Recovering and towing machine

The machine has towing devices attached to it so that it can be quickly recovered from hazard zone and towed away if it is unable to move under its own power. This means the machine can be towed for repairs to a suitable place for loading in accordance with the following instructions.

Instructions for recovering and towing a broken-down machine:
- Observe the local legal regulations.
- Use appropriate slinging gear and towing equipment of sufficient tensile strength.
- Avoid sudden loads on the slinging gear, towing equipment and recovery equipment.
- Make sure the load on the attachment points is evenly distributed.
- Avoid diagonal loads. Pull the machine, as straight forward or straight back as possible (maximum diagonal load = 20°).
- The maximum tensile load must not exceed the operating mass of the machine to be towed.
- The power and braking force of the towing machine must be sufficient for the route (uphill slopes).
- Towing machine and machine being towed must be in same weight class.
- Maximum permissible towing speed is 2 km/h.
- The maximum permissible towing distance is 1 km.
- For long distances, load the machine onto a transport vehicle or trailer.
- If the machine is stuck or there is no solid ground, a professional towing or recovery contractor must be called.

Note
Towing the machine can present problems and is always in the responsibility of the operator.

▶ The manufacturer will not be held liable for damage or accidents caused by towing.

There are two different methods of towing:
- Towing with the diesel engine running
- Towing with diesel engine off

Towing with the diesel engine running

Keep the towing as short as possible and only do it on solid ground.

The following precautions must be taken before towing the machine:
1. Put the machine in the towing position. (For more information see: Putting machine in towing position, page 172)
2. Switch the travel pump to free circulation. [26)]

Make sure that following requirements are met:
- ❑ Parking brake is engaged.
- ❑ Service brake and steering are working.
- ❑ Sufficiently strong slinging gear and towing equipment is available.

[26)] When travel drive is not in free circulation mode, machine may not be towed further than 200 m.

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Putting machine in towing position

Make sure that following requirements are met:
❑ Machine is in maintenance position 2.

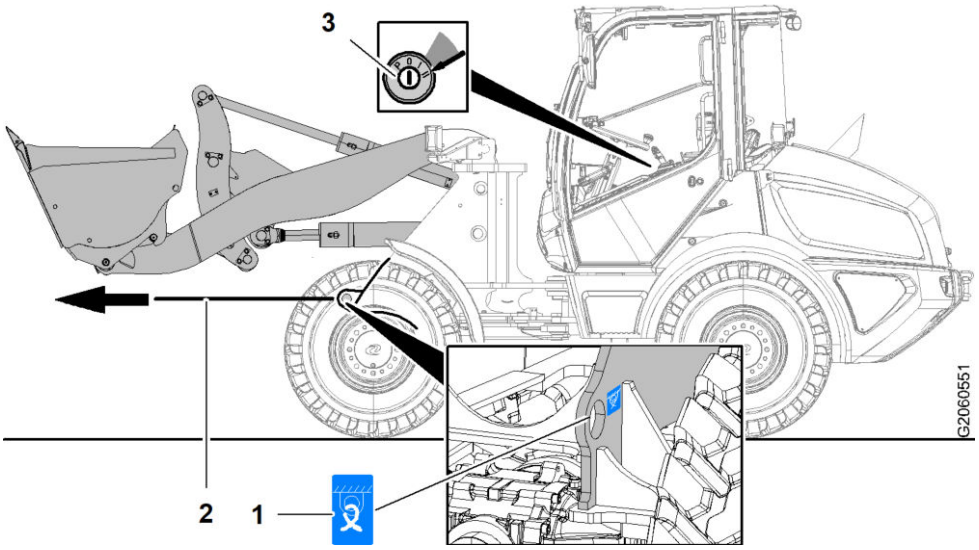

Fig. 275: Putting machine in towing position

1 Lashing points
2 Slinging gear
3 Starting switch

▶ Fasten the slinging gear **2** to the lashing points **1** on both sides.

▶ Switch on the battery main switch.

▶ Release the articulation lock.

▶ Start the diesel engine with starting switch **3**.

▶ Raise the lift arms above the lasing points **1**.

▶ Tilt in the bucket as far as it will go.

▶ Start the diesel engine with the starting switch **3**.

Switching the travel pump to free circulation

Make sure that following requirements are met:
❑ Service access is open.

WARNING
The hydrostatic brake circuit of the travel drive is disabled!
Risk of injury.

▶ Brake the machine with the inch/brake pedal.

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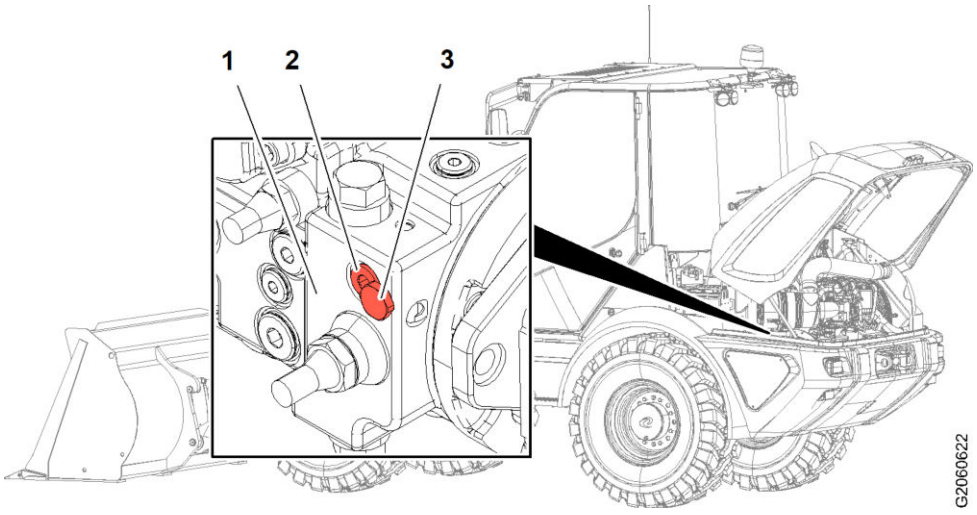

Fig. 276: Switching travel pump to free circulation

1 Travel pump
2 Adjusting screw
3 Stop bolt

▶ Unscrew the adjusting screw **2** of the travel pump **1** up to the stop bolt **3**.
▷ The travel pump **1** is switched to free circulation.

Towing machine

Make sure that following requirements are met:
❑ Machine is in towing position. (For more information see: Putting machine in towing position, page 172)
❑ Slinging gear is fastened to the lashing points on both sides.

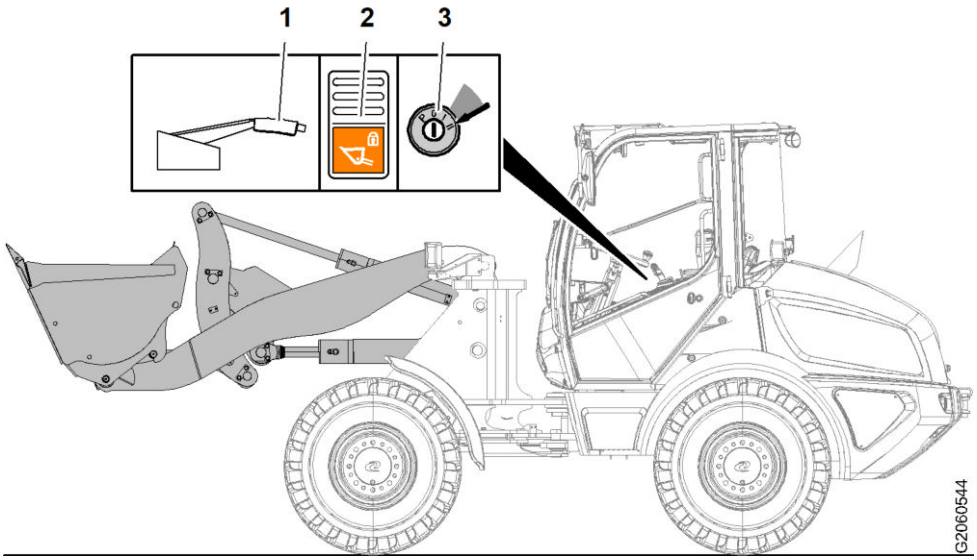

Fig. 277: Towing machine

1 Parking brake
2 *Working hydraulics lockout* button
3 Starting switch

▶ Start the diesel engine with starting switch **3**.
▶ Press the button **2** to lock the working hydraulics.
▶ Release parking brake **1**.

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▶ Carefully tow machine out of hazard zone at no more than 2 km/h.

When towing has been completed:
▶ Engage parking brake.

▶ Switch off diesel engine using starting switch.

▶ Take the travel pump out of free circulation mode. (For more information see: Switching the travel pump to free circulation, page 172)
▷ Travel functions of the machine are operational again.

▶ Contact Liebherr customer service.

Towing with diesel engine off

Keep the towing as short as possible and only do it on solid ground.

If the diesel engine fails, the brakes and steering function are impaired.

The following precautions must be taken before towing the machine:
1. Switch the travel pump to free circulation. [27)]

Make sure that following requirements are met:
❑ The parking brake is engaged.
❑ Have a towing bar of sufficient strength available.

Switching the travel pump to free circulation

Make sure that following requirements are met:
❑ Service access is open.

WARNING
The hydrostatic brake circuit of the travel drive is disabled!
Risk of injury.

▶ Brake the machine with the inch/brake pedal.

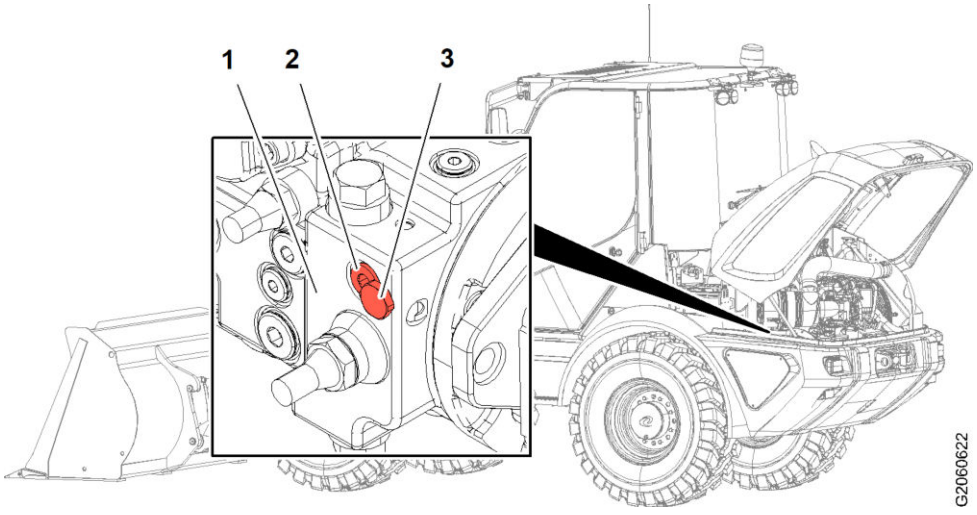

Fig. 278: Switching travel pump to free circulation

1 Travel pump
2 Adjusting screw
3 Stop bolt

[27)] When travel drive is not in free circulation mode, machine may not be towed further than 200 m.

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▶ Unscrew the adjusting screw **2** of the travel pump **1** up to the stop bolt **3**.
▷ The travel pump **1** is switched to free circulation.

Towing machine

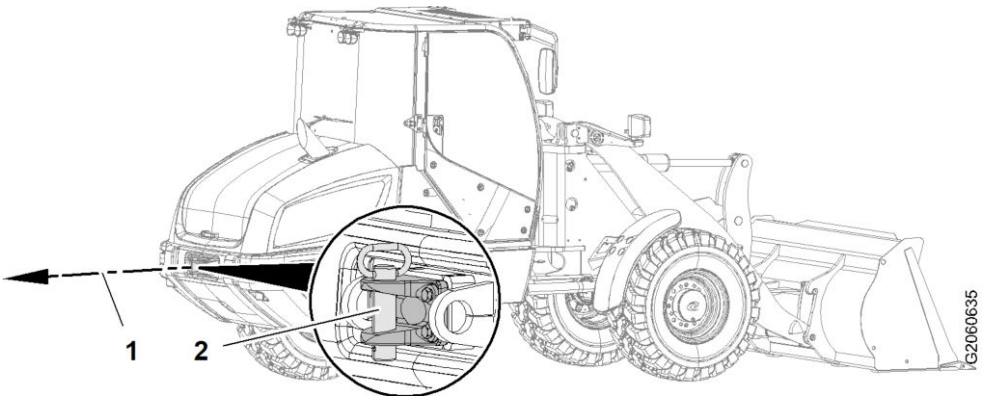

Fig. 279: Towing machine

1 Towing bar **2** Tow hitch

WARNING
Steering out of operation!
Injury.

▶ Carefully tow away the machine.

▶ Attach the towing bar **1** to the tow hitch **2** and secure it.

▶ Release parking brake.

▶ Carefully tow machine at no more than 2 km/h.

When towing has been completed:
▶ Engage parking brake.

▶ Take travel pump out of free circulation mode. (For more information see: Switching the travel pump to free circulation, page 174)

▶ Contact Liebherr customer service.

3.7.3 Jump starting procedure

If you have problems starting, the machine can be jump started with external batteries.

Make sure that following requirements are met:
❑ Following safety precautions are observed.

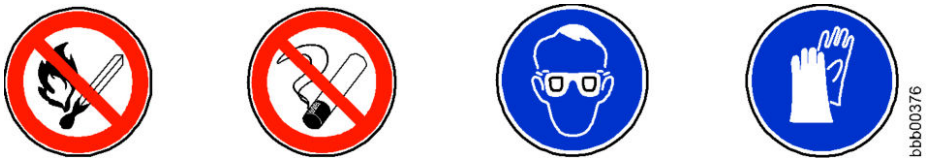

Fig. 280: Jump starting procedure

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WARNING
Gas forming in the batteries!
Explosion.

- ▶ Avoid naked lights and fire.
- ▶ Wear safety glasses and protective gloves.

NOTICE
Flat battery and donor battery with different voltages!
Damage.

- ▶ Use batteries of the same voltage.

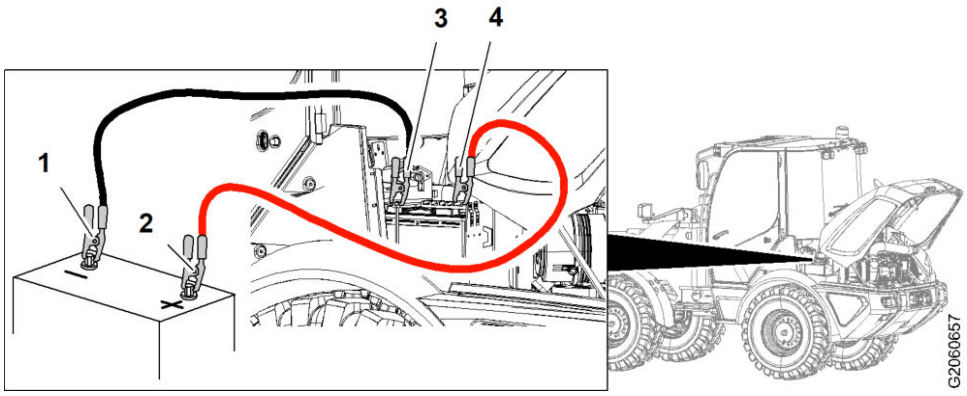

Fig. 281: Jump starting procedure

1	Negative pole of donor battery	**3**	Grounding point of discharged battery
2	Positive terminal of donor battery	**4**	Positive terminal of flat battery

- ▶ Only use jump leads of a suitable cross-section.
- ▶ First connect one jump lead to the positive terminal **4** of the flat battery and then to the positive terminal **2** of the external battery.
- ▶ Connect second jump cable first to negative pole **1** of external battery and then to grounding point **3** of flat battery.
- ▶ Start diesel engine.

When jump starting is complete:

- ▶ Switch on major consumers such as headlights.
  - ▷ This prevents excess voltage.
- ▶ Make sure diesel engine of machine is at lower idling speed.
- ▶ First disconnect jump cable from grounding point **3** of flat battery and then from negative pole **1** on external battery.
- ▶ Then remove second jump lead from positive terminal **4** of discharged battery and then from positive terminal **2** of donor battery.

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4 Malfunctions

Warning and error messages:
– Various faults are indicated by corresponding symbols or service codes in the display.
– Some warning messages are accompanied by audible signals.

Finding and eliminating faults:
– Analyse the cause of the fault and correct it immediately.
– Before calling in Liebherr customer service, make sure you know the **type number** and **serial number** of the affected machine.
– Never perform any work for which you have not been trained or instructed.

Note
Unable to eliminate the fault!

▶ Contact Liebherr customer service.

4.1 Servicecodes

4.1.1 Service code indicator in the display

If an error occurs while you are putting machine into service or operating machine, this is shown on display. Depending on the cause of the error, restricted travel mode may still be possible.

The following must be taken into account:
– Each service code is accompanied by a single beep.
– If several service codes are active, they are displayed successively.

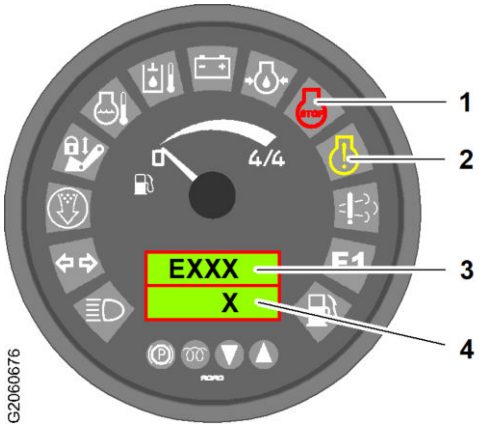

Fig. 282: Service code indicator in the display

1 STOP symbol
2 Diesel engine warning
3 Service code
4 Service code index

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Service code always begins with an **E** (ERROR). This **E** is not included in following table.

Note
Service code!

- ▶ Rectify the malfunction in accordance with the service code table below.
- ▶ If service code is not listed, contact Liebherr customer service.

Note
In some cases, after correcting a diesel engine malfunction, associated service code is still active. Some diesel engine service codes are only reset after switching the battery main switch off.

- ▶ Turn off the battery main switch.

Service code	Index	Description	Component	Remedy
6E	0	Coolant temperature too high	Coolant temperature sensor	Clean the cooler.
AE	0	Fuel temperature too high	Fuel temperature sensor	Clean the fuel cooler.
7F853	0	Air filter contamination	Air filter	Change the air filter.
7F859	0	Water sensor activated	Fuel pre-filter	Drain water separator.
E88	16	Excessive ash in diesel particulate filter	Diesel particulate filter	Perform manual regeneration.
E87	16	Regeneration mode suppressed for too long	Diesel particulate filter	Perform manual regeneration.
E6F	14	Regeneration is necessary but regeneration mode is suppressed.	Diesel particulate filter	Allow regeneration and operate the machine in a safe range or perform manual regeneration.

Tab. 38: Service codes

4.1.2 Malfunction display service codes

Service code	Effect	Cause	Remedy
Err001	Data sector write error	Faulty data in memory, internal memory defective	Turn off the ignition, wait 5 seconds and turn it on again. If service code occurs regularly: contact Liebherr customer service.

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Service code	Effect	Cause	Remedy
Err002	Data sector read error	Faulty data has been read, internal memory defective	Turn off the ignition, wait 5 seconds and turn it on again. If service code occurs regularly: contact Liebherr customer service.
Err003	Value outside defined limits	Internal error	Turn off the ignition, wait 5 seconds and turn it on again. If service code occurs regularly: contact Liebherr customer service.
Err006	ADC channel not correctly configured	Defective program routine or software error	Turn off the ignition, wait 5 seconds and turn it on again. If service code occurs regularly: contact Liebherr customer service.
Err008	EEPROM defective	Manufacturing fault	Turn off the ignition, wait 5 seconds and turn it on again. If service code occurs regularly: contact Liebherr customer service.
Err00E	Timeout ADC	Controller error	Turn off the ignition, wait 5 seconds and turn it on again. If service code occurs regularly: contact Liebherr customer service.
Err00F	Timeout read ADC	Controller error	Turn off the ignition, wait 5 seconds and turn it on again. If service code occurs regularly: contact Liebherr customer service.
Err010	Calculation error	Defective program routine or software error	Turn off the ignition, wait 5 seconds and turn it on again. If service code occurs regularly: contact Liebherr customer service.
Err014	CAN controller incorrectly initialised	CAN controller does not react as expected	Turn off the ignition, wait 5 seconds and turn it on again. If service code occurs regularly: contact Liebherr customer service.
Err015	SW-Timer error	Defective program routine or software error	Turn off the ignition, wait 5 seconds and turn it on again. If service code occurs regularly: contact Liebherr customer service.

Tab. 39: Malfunction display service codes

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4.2 Problems - Cause - Remedy

4.2.1 Warning symbols

The following table contains explanations of warning symbols, causes and remedies.

Symbol in the display	Meaning	Cause	Remedy
	Engine oil pressure too low	Engine oil pressure too low	Switch off the machine, contact Liebherr customer service
	Coolant temperature too high	Coolant temperature above 115 °C	Clean the cooling system, contact Liebherr customer service
	Fuel level too low	Fuel tank is empty	Refuel
	Hydraulic oil temperature too high	Hydraulic oil temperature above 95 °C	Clean the cooling system, contact Liebherr customer service
	Battery not charging	Fault in the electrical system	Contact Liebherr customer service
	Switch off machine	Fault on machine	Contact Liebherr customer service
	Diesel particulate filter warning	High load condition of the diesel particulate filter	Regenerating the diesel particulate filter
	Diesel engine warning	Diesel engine malfunction	Contact Liebherr customer service
	Air filter contamination	Air filter is dirty	Clean/replace air filter, contact Liebherr customer service
	Exhaust system malfunction	Malfunction in conjunction with exhaust system	Switch off machine, contact Liebherr customer service

Tab. 40: Warning symbols

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4.2.2 Troubleshooting

Engine		
Malfunction/fault	**Cause**	**Remedy**
Starter does not turn or only with difficulty	Battery main switch is off	Turn on the battery main switch
	Main fuse defective	Check the main fuse F01
	Battery defective or discharged	Check the battery, charge or replace it if necessary
	Battery terminals loose	Grease the battery poles and tighten the terminals
	Starter defective	Check the starter, check the fuse F03
Starter turns, engine does not start.	Engine too cold	Preglow the engine sufficiently before starting
	Fuel tank is empty	Fill the tank
	Fuel not suitable for ambient temperature	Fill up with winter diesel for cold temperatures
	Fuel filter or fuel pre-filter contaminated	Replace the fuel filter and clean the fuel pre-filter
Engine is not operating at full power	Insufficient fuel supply to engine	Clean the fuel pre-filter Replace the fuel filter
	Insufficient air supply to engine	Check the air filter and replace it if necessary
Engine gets hot	The radiator is dirty	Clean the radiator
	Engine cooling system thermostat defective	Check the thermostat
Battery charge indicator light does not go out	Engine idle speed too low after starting	Press the accelerator until the indicator lamp goes out, check the alternator
	V-belt is torn or slides	Check and replace V-belt

Tab. 41: Troubleshooting the engine

Travel hydraulics / driving mode		
Malfunction/fault	**Cause**	**Remedy**
Travel direction cannot be preselected	Parking brake is applied	Release the parking brake and preselect the travel direction
	Fuse blown	Check fuse F15, replace if necessary
	Travel direction switch defective	Check the travel direction switch
The parking brake has been released but the parking brake indicator lamp does not go out	The parking brake switch is faulty	Check/adjust the switch and replace it if necessary

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Travel hydraulics / driving mode		
Malfunction/fault	**Cause**	**Remedy**
The machine will not move even though the engine is running and the travel direction can be preselected	Replenishing pressure too low	Check the replenishing pressure, carry out the test according to the testing and adjustment checklist
	Control pressure too low or not available	Check the control pressure, check the control valve, check the travel direction solenoid, carry out the test according to the testing and adjustment checklist
	High pressure too low	Check the towing bypass valve, carry out the test according to the testing and adjustment checklist
The hydraulic oil gets too hot	The hydraulic oil cooler is dirty	Clean hydraulic oil cooler
	V-belt of the fan blade is torn or slides	Check and adjust V-belt
	Hydraulic oil temperature switch B8 is defective or shorted to earth	Check the hydraulic oil temperature switch B8, check the wiring

Tab. 42: Troubleshooting the travel hydraulics / driving mode

Working hydraulics / working attachment		
Malfunction/fault	**Cause**	**Remedy**
The working attachment does not move when the control lever is operated	Lack of hydraulic oil	Check the oil level in the hydraulic fluid reservoir, top up if necessary
	Working hydraulics lockout is activated	Deactivating the working hydraulics lockout
	Fuse blown	Check fuse F28, replace if necessary

Tab. 43: Troubleshooting the working hydraulics / working attachment

Steering system		
Malfunction/fault	**Cause**	**Remedy**
No steering function	Lack of hydraulic oil	Check the oil level in the hydraulic fluid reservoir, top up if necessary
	Articulation lock is engaged	Move the locking bar to the top position

Tab. 44: Troubleshooting the steering system

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Brake system		
Malfunction/fault	**Cause**	**Remedy**
The service brake has little or no effect	Insufficient hydraulic oil in the brake system	Check the brake system for leaks Check the level in the equalizing reservoir (top up with hydraulic oil if necessary)
	Air in the brake circuit	Bleeding the brake system
	Brake linings are severely worn	Replacing the brake shoes
	Adjuster malfunctions	Check the adjuster
	Brake master cylinder or inching valve malfunction	Check the brake master cylinder or the inching valve
The parking brake has little or no effect	The brake cable setting is incorrect	Set the brake cable
	Brake linings are severely worn	Replacing the brake shoes

Tab. 45: Troubleshooting the brake system

Electrical system		
Malfunction/fault	**Cause**	**Remedy**
Some of the lights do not work	Fuse blown	Check fuse(s), replace if necessary
	Bulb defective	Replace bulb Check connections

Tab. 46: Troubleshooting the electrical system

Heater		
Malfunction/fault	**Cause**	**Remedy**
The heater does not work	Water supply to heater interrupted	Check the water valve
The heater/blower fan does not work	Fuse blown	Check fuse F19, replace if necessary

Tab. 47: Troubleshooting the heater

4.2.9 Troubleshooting the Liebherr central lubrication system

This automatic central lubrication system is optional.

Malfunction	Cause	Remedy
Pump working but not delivering fluid	Air trapped in pump piston	Bleed the pump
	Filling level below minimum	Fill the reservoir
	Pump element defective	Replace the pump element

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Malfunction	Cause	Remedy
No grease collar on any lubrication points	Pump not working	Contact Liebherr customer service.
	Pause time too long	Reduce the pause time or increase the lubrication time
	System blocked	See the section on grease escaping from the pressure relief valve
No grease collar on several lubrication points	Line to auxiliary distributor burst or leaking	Replace the lines
	Leaky screw connections	Tighten or replace the screw connections
No grease collar on one lubrication point	Supply line broken or leaking	Replace the line
	Leaky screw connection	Tighten or replace the screw connection
Grease escaping from pressure relief valve	System pressure too high	Check the system
	Progressive distributor blocked	Replace the distributor
	System blocked	Repair the blocked/jammed bearing
	Valve spring defective	Replace the pressure relief valve

Tab. 48: Troubleshooting the Liebherr central lubrication system

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4.3 Problem remedy

4.3.1 Replacing fuses

NOTICE
Incorrect fuse rating!
Damage.

▶ Use a fuse of the correct rating.

Note

Terminal 30: power supply with battery main switch **ON**

Terminal 15: power supply with ignition **ON**

Make sure that following requirements are met:
❑ The affected circuit has been checked.
❑ The battery main switch of the machine is turned off.

NOTICE
Live components!
Risk of injury.

▶ Turn off the battery main switch.

Fuses are fitted at 2 places on the machine:
❑ Fuse board in operator's cab
❑ Fuses in the battery compartment

Fuses on the fuse board in the cab

Circuit board with the plug-in fuses is positioned behind right outer panel below hinged window.

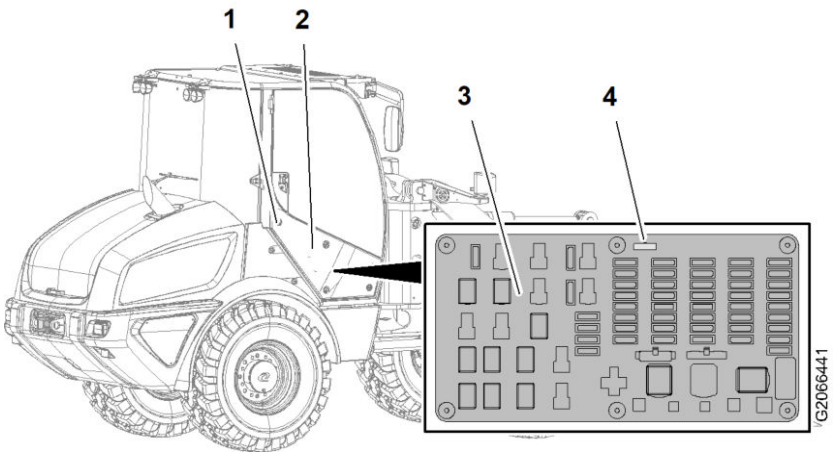

Fig. 293: Fuses on the fuse board in the cab

1	Bolts (5x)	**3**	Fuse board
2	Cover	**4**	TEST

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Note
Check the fuses!

- ▶ Push in fuse in the TEST slot.
- ▶ If the fuse is intact, the LED lights up.

If fuses have to be replaced:

- ▶ Turn off the battery main switch.
- ▶ Loosen and remove screw **1**.
- ▶ Remove the cover **2**.
- ▶ Identify the defective fuse using the table below.
- ▶ Take out the defective fuse and replace it with a new one.
- ▶ Reinstall cover **2**.
- ▶ Screw in and tighten screws **1**.

Fuse	Value	Unit	Designation/function
F1	5	A	Quick coupler
F2	7.5	A	Left high beam
F3	7.5	A	Right high beam
F4	7.5	A	Right-hand driving light
F5	7.5	A	Left-hand driving light
F6	5	A	Right-hand parking light
F7	5	A	Left-hand parking light
F8	15	A	Radio, socket, operator's seat
F9	10	A	Rear window heater
F10	10	A	Parking brake
F11	20	A	Rear window heater
F12	10	A	Switch lighting
F13	10	A	Regulated flow rate
F14	10	A	Diesel particulate filter
F15	10	A	Sensors
F15A	10	A	Spare
F16	40	A	Starter
F17	40	A	Spare
F18	10	A	Rear windscreen washer system
F19	20	A	Heating, air conditioning
F20	15	A	Front windscreen washer system
F21	15	A	Parking light
F22	5	A	Central lubrication system
F23	10	A	Spare
F24	10	A	Pipe break protection, operator's cab fan

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Fuse	Value	Unit	Designation/function
F25	5	A	Flashing beacon, steering-column switch
F26	10	A	Central control unit
F27	10	A	Driving lights
F28	10	A	Working hydraulics lockout
F29	20	A	Starter switch bypass
F30	10	A	Radio terminal 30
F31	15	A	Front working headlights
F32	15	A	Working headlight rear, interior lighting
F33	10	A	Central control unit
F34	10	A	Central control unit
F35	10	A	Central control unit
F36	10	A	Display
F37	10	A	Central control unit
F38	10	A	Control lever lock
F39	10	A	Diagnosis
F40	10	A	Reversing signal, terminal 30
F41	20	A	Spare

Tab. 49: Fuses on the fuse board in the cab

Fuses in the battery compartment

Fuses are located above battery.

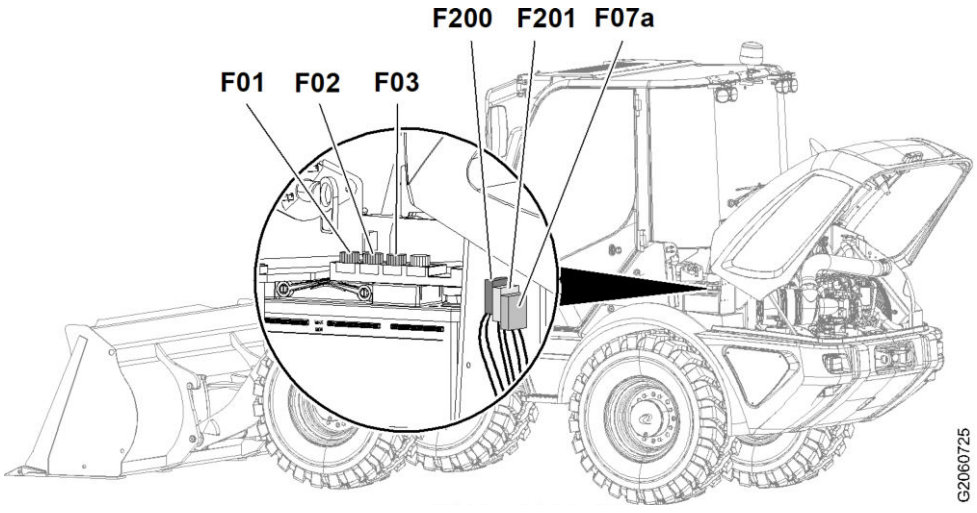

Fig. 294: Fuses in the battery compartment

If fuses have to be replaced:

▶ Switch off ignition.

▶ Replace defective fuse with a new one.

▶ Tighten the fuse holder insulating nut to 12 Nm.

Item	Fuse	Value	Unit	Designation/function
1	F01	100	A	Fuse, terminal 30, fuse board
2	F02	75	A	Fuse, diesel engine active
3	F03	50	A	Preglow system fuse
4	F200	20	A	Fuse, engine control unit
5	F201	20	A	Fuse, engine control unit
6	F07a	10	A	Hazard warning system fuse

Tab. 50: Fuses in the battery compartment

Plug-in fuses for LiDAT

This equipment is optional.

Plug-in fuses for LiDAT are located on a separate relay board next to fuse board.

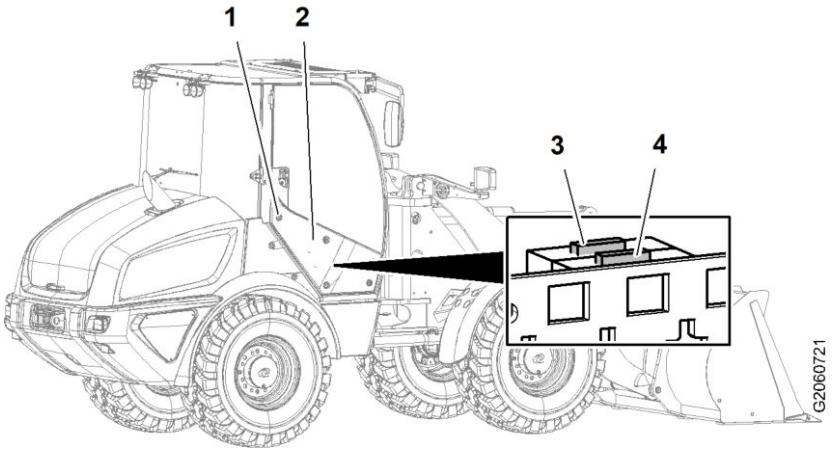

Fig. 295: Plug-in fuses for LiDAT

1 Bolts (5x)
2 Cover
3 Fuse F81 (7.5 A)
4 Fuse F80 (7.5 A)

If fuses have to be replaced:

- ▶ Turn off the battery main switch.
- ▶ Loosen and remove screw **1**.
- ▶ Remove the cover **2**.
- ▶ Take out the defective fuse and replace it with a new one.
- ▶ Reinstall cover **2**.
- ▶ Screw in and tighten screws **1**.

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5 Maintenance

5.1 Maintenance and inspection schedule

General information

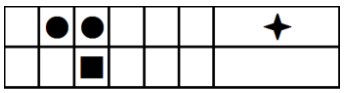
Shorten maintenance intervals depending on conditions of use, for example:
– Dust-intensive use
– Oil quality
– Fuel quality

Ensure that lubricants, liquids and replaced parts are disposed of safely and in an environmentally friendly manner. Comply with applicable country-specific guidelines and applicable laws in country of use.

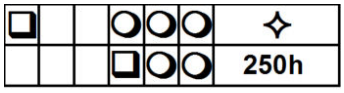
Service packs in spare parts catalogue contain spare parts required for maintenance activities.

The following abbreviations are used in this section:
– h = operating hours

Various symbols (solid or empty circles, boxes and stars) are used to indicate the maintenance tasks, which fall into two main types.

 G2036200	**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. Maintenance interval: on delivery, every 10 and 50 service hours (h), and at unscheduled times.

Tab. 51: Machine operator

 G2036201	**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 specialist staff from Liebherr or its authorised dealers. Maintenance interval: on delivery and every 500, 1000, 2000, 3000 service hours (h), and at unscheduled times.

Tab. 52: Authorised specialist staff

You will find a list of the spare parts needed for maintenance and inspection work in the service package of the spare parts list.

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

Maintenance / inspection after service hours								Tasks to be performed		
On handover	All 8-10 h	All 50 h	All 500 h	All 1000 h	All 2000 h	Other intervals	Additional labelling	**By maintenance staff** ■ Once-only activity ● Repeat interval ✦ If necessary ❄ Annually before the winter **By authorised specialist staff** ☐ Once-only activity ❍ Repeat interval ✧ If necessary **Additional labelling** Assistance required Have this task carried out exclusively by a certified electrician	Confirm tasks	See page
Overall machine										
☐	●	●	❍	❍	❍			Check the machine is in the proper condition.		209
	●	●	❍	❍	❍			Remove loose parts, dirt, ice and snow from machine.		210
				❍	❍			Adjust the machine according to the testing and adjustment check-list.		
				❍	❍			Corrosion protection system for fittings and electrical contacts (option): Replacing VCI capsules (at least once a year).		
				❍	❍			Analysis of hydraulic oil: generally recommended (at least every 2 years); mandatory if a service agreement, additional guarantee or powerline guarantee is in place.		
						✧		Optional fuel analysis: only recommended.		
Drive group										
☐	●	●	❍	❍	❍			Checking diesel engine oil level.		219
			❍	❍	❍			Change diesel engine oil (at least once a year or according to engine oil quality and complicating factors). (For more information see: 5.3.5 Engine oils, page 199)		
			❍	❍	❍			Diesel engine: Change the oil filter (with every oil change).		
		■	❍	❍	❍	●250 h		Diesel engine: check V-belt.		220
					❍			Diesel engine: change V-belt (at least every 2 years).		
				❍	❍			Check the engine valve clearance.		
☐			❍	❍	❍	✦		Drain the condensate and sediment from the fuel tank.		223
	●	●	❍	❍	❍			Drain off condensate from the fuel pre-filter.		224
			❍	❍	❍			Fuel pre-filter: Change the filter element.		
			❍	❍	❍			Fuel fine filter: Change the filter element.		
		●	❍	❍	❍			Clean the service cover and dust discharge valve of the air filter system.		225
				❍	❍			Check air filter vacuum switch function.		
				❍	❍	✦		Clean or change the main element of the air filter system (when indicated by the vacuum switch, or at least once a year).		226
					❍	✦		Clean the safety element of the air filter system (after replacing the main element three times, or every year at the latest).		229
			❍	❍	❍			Diesel engine: Check that the intake and exhaust system is in good condition and not loose or leaking.		

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

Maintenance / inspection after service hours							Tasks to be performed			
On handover	All 8-10 h	All 50 h	All 500 h	All 1000 h	All 2000 h	Other intervals	Additional labelling	**By maintenance staff** ■ Once-only activity ● Repeat interval ✦ If necessary ❄ Annually before the winter **By authorised specialist staff** ☐ Once-only activity ❍ Repeat interval ✧ If necessary **Additional labelling** Assistance required Have this task carried out exclusively by a certified electrician	Confirm tasks	See page
						✧		Diesel particulate filter: Clean or change. the filter module (after service display)		
Cooling system										
☐	●	●	❍	❍	❍			Check the coolant level in the cooling system.		231
			❍	❍	❍			Coolant: checking the antifreeze and corrosion protection agent concentration.		
						✦		Clean the cooling system.		232
					❍			Cooling system: Change the coolant (at least every 2 years).		
Hydraulic components										
☐	●	●	❍	❍	❍			Check oil level in hydraulic tank.		234
			❍	❍	❍			Hydraulic tank: Drain off condensate and sediment.		
				❍	❍			Hydraulic tank: Change. the return suction filter cartridge		
					❍			Hydraulic tank: Change the breather filter.		
						✧		Hydraulic tank: change oil.		
Steering system										
☐	●	●	❍	❍	❍			Test steering.		236
☐		●	❍	❍	❍			Steering cylinder: lubricate bearing.		236
Brake system										
			❍	❍	❍			Test service brake and parking brake.		
☐		●	❍	❍	❍			Check oil level in brake system.		237
				❍	❍			Service brake: Check the gap and wear on the brake linings		
Electrical system										
☐	●	●	❍	❍	❍		Assistance required	Check the function of the lighting and horn.		239
			❍	❍	❍			Batteries: Check the acid level and terminals.		
				❍	❍			Control lever: Change the travel direction switch rocker and cap		
Gearbox										
☐			❍	❍	❍			Transmission: Check the oil level.		
			☐	❍	❍			Transmission: Change the oil.		
Axles and drive shafts										
☐			❍	❍	❍		Assistance required	Axles Check the oil levels.		

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Maintenance and inspection schedule

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

Maintenance / inspection after service hours								Tasks to be performed		
On handover	All 8-10 h	All 50 h	All 500 h	All 1000 h	All 2000 h	Other intervals	Additional labelling	**By maintenance staff** ■ Once-only activity ● Repeat interval ✦ If necessary ❄ Annually before the winter **By authorised specialist staff** ☐ Once-only activity ❍ Repeat interval ✧ If necessary **Additional labelling** Assistance required Have this task carried out exclusively by a certified electrician	Confirm tasks	See page
			☐	❍	❍			Axles Change the oil.		
			☐		❍			Axles: check tightening torque of fastening bolts.		
			❍	❍	❍			Check the cardan shafts.		
☐		●	❍	❍	❍			Check the tyre pressure.		240
☐		■	❍	❍	❍			Check wheel tightness.		240
Steel parts of the basic machine										
☐		●	❍	❍	❍			Lubricating the articulated bearing		242
						✦		Lubricate the articulation stops.		242
			❍	❍	❍			Lubricate the moving parts of the engine bonnet with penetrating oil.		
			❍	❍	❍			Clean and maintain the seals of the service hatches.		
Working attachment										
☐		●	❍	❍	❍	✦		Lubricate the lift arms and working attachment.		244
				❍	❍			Lift arms: Check the bucket bearing bushings.		
				❍	❍			Lift arms: Check the bucket stops.		
☐	●	●	❍	❍	❍			Quick coupler: check function.		245
☐	●	●	❍	❍	❍			Clean the LIKUFIX hydraulic coupling (option).		245
Operator's cab, heating and air conditioning										
			❍	❍	❍	✦		Clean operator's cab air filter.		246
				❍	❍	✦		Change operator's cab air filter.		247
			❍	❍	❍			Safety belt: Check the condition and function.		
			❍	❍	❍			Windscreen washer system: Check the function.		
			❍	❍	❍	✦		Fill windscreen washer fluid in the windscreen washer system.		247
			❍	❍	❍			Cab: Lubricate the lock and cylinder with penetrating oil.		
				❍	❍	✦		Clean and maintain the seals of the operator’s cab.		248
			❍	❍	❍			Air conditioning (option): check V-belt.		
					❍			Air conditioning (option): change V-belt (at least every 2 years).		
		●	❍	❍	❍			Air conditioning (option): drain condensate.		249
			❍	❍	❍			Heating air conditioning (optional): Check the function.		

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

Maintenance / inspection after service hours								Tasks to be performed		
On handover	All 8-10 h	All 50 h	All 500 h	All 1000 h	All 2000 h	Other intervals	Additional labelling	**By maintenance staff** ■ Once-only activity ● Repeat interval ✦ If necessary ❄ Annually before the winter **By authorised specialist staff** ☐ Once-only activity ❍ Repeat interval ✧ If necessary **Additional labelling** Assistance required Have this task carried out exclusively by a certified electrician	Confirm tasks	See page
Lubrication system										
☐		●	❍	❍	❍			Central lubrication system (option): check level grease reservoir.		250
☐		●	❍	❍	❍			Central lubrication system (option): check pipes, hoses and lubrication points for leaks and damage.		251
☐		●	❍	❍	❍			Central lubrication system (option): check lubrication of bearings.		251

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5.2 Filling quantities and lubrication chart

Specifications in the quantity 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.

5.2.1 Lubricant filling quantity

Designation	Quantity
Diesel engine (with filter change)	10.2 l
Hydraulic system: system content	90 l
Hydraulic system: tank capacity (exchange amount)	55 l
Brake system: system content	0.8 l
Transmission	1 l
Front axle	6.0 l
Rear axle	6.0 l

Tab. 53: Lubricant filling quantity

5.2.2 Fuel and operating fluid filling quantity

Designation	Quantity
Fuel tank	50 l
Cooling system (system content)	12 l
Windscreen washer system	1.5 l
Air conditioning refrigerant	$1.15^{+0.02}$ kg
CO_2 equivalent	1.64 t
Refrigerant oil for air conditioning compressor	150 cm^3.

Tab. 54: Fuel and operating fluid filling quantity

5.2.3 Lubrication chart

The lubrication chart provides an overview of the location of the maintenance points on the machine and of the maintenance intervals.

Information on:
– Performance of maintenance tasks (For more information see: 5.1 Maintenance and inspection schedule, page 189)
– Lubricants and fuels (For more information see: 5.3 Lubricants and fuels, page 197)
– Filling quantities (For more information see: 5.2 Filling quantities and lubrication chart, page 194)

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Lubrication chart

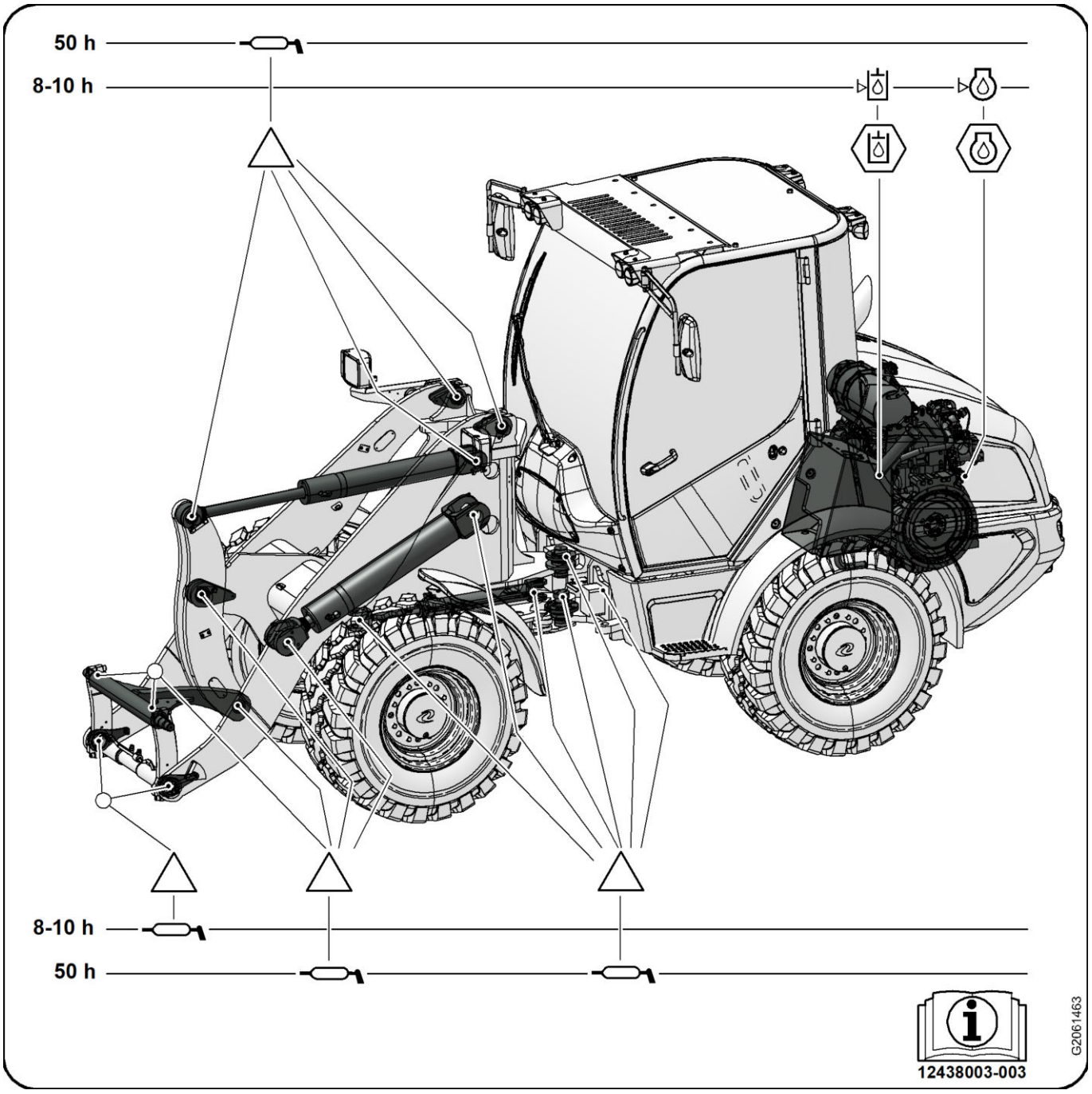

Fig. 298: Lubrication chart

Symbol	Designation	Symbol	Designation	Symbol	Designation
 b0000638	Lubricating point	 b0000760	Checking diesel engine oil level	 b0000761	Check oil level in hydraulic tank

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Symbol	Designation	Symbol	Designation	Symbol	Designation
 b0000648	Perform lubrication	 b0000762	Fluid filling point	 b0000763	Observe the operator's manual

Tab. 55: Lubrication chart symbols

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5.3 Lubricants and fuels

5.3.1 General information on lubricants and fuels

General questions

For general questions on lubricants and fuels, please contact the Liebherr Lubricant Hotline by e-mail.

Liebherr Lubricant Hotline (e-mail): lubricants@liebherr.com

Safety data sheets

Safety data sheets for lubricants and fuels are available online via the Liebherr lubricant portal.

Liebherr lubricant portal: lubricants.liebherr.com

Technical data sheets and specific Liebherr standards

For technical data sheets and specific Liebherr standards: contact Liebherr customer service.

5.3.2 General information on changing lubricants and fuels

The values stated for filling quantities in the lubricant table and fuels table are only guidelines. After every oil change or refill, check the corresponding level.

NOTICE
Improper change of lubricants and fuels!
Damage to machine.

▶ Observe manufacturer's instructions for lubricants and fuels.

NOTICE
Contamination due to dirt!
Damage to machine.

▶ Clean filler plugs, filler caps and drain plugs, including their environment, before opening.

When inspecting and changing lubricants and fuels, consider following, among other things:
– Local environmental guidelines.
– Specifications according to operator's manual.
– Avoid naked lights and fire.

5.3.3 Converting hydraulic system from mineral oils to biodegradable hydraulic fluids

For operation of Liebherrearth moving machines with biodegradable hydraulic fluids, we recommend **Liebherr Hydraulic Plus**.

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In the case of a machine equipped with biodegradable hydraulic fluid at the factory, a corresponding information label is attached.

Procedure for later conversion

NOTICE
Non-approved oil!
Damage to the hydraulic system.

- ▶ Only use oil that meets the Liebherr specifications.
- ▶ Do not mix different oils.

- ▶ In case of subsequent conversion of machine to a biodegradable hydraulic fluid, contact Liebherr customer service!
- ▶ Request **instructions** and **conversion guidelines** from Liebherr and observe them!

5.3.4 Diesel fuels

Minimum quality requirement

Approved diesel fuels	As per DIN EN 590, ASTM D 975 1-D / 2-D
	Emission stage V
Maximum sulphur content	10 ppm
Minimum cetane number	45
Lubricity at 60 °C (HFRR)	Maximum 460 µm

Tab. 56: Minimum quality requirement

Do not mix diesel fuel with additives.

Operating temperatures of diesel fuels

Approved diesel fuels according to DIN EN 590	Cloud point	Ambient temperature
Class standard	-7 °C	to -10 °C
Arctic class 0	-10 °C	to -13 °C
Arctic class 1	-16 °C	to -20 °C

Tab. 57: Operating temperatures of diesel fuels

For applications under -10 °C use preheating or arctic diesel. For more information about arctic diesel grades, see table on operating temperatures and DIN EN 590.

Minimum quality requirement

Specification
DIN EN 590

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Specification
ASTM D 975 1-D/2-D
LH-00-FUEL

Tab. 58: Minimum quality requirement

5.3.5 Engine oils

Liebherr recommendation

Cold-start temperature according to SAE J300	Designation	Changing interval
-30 °C	Liebherr engine oil 5W-30 low ash	Every 500 h, at least once a year
-25 °C	Liebherr engine oil 10W-40 low ash	Every 500 h, at least once a year

Tab. 59: Recommendation for engine oils

Minimum quality requirement

Specification
ACEA E6
API CJ-4
LH-00-ENG LA

Tab. 60: Minimum requirement for engine oils

When using engine oils from other manufacturers, the oil change interval must be reduced to 250 operating hours.

A longer interval can be used for engine oils from other manufacturers if the results of an oil analysis are possible. The oil change interval of 500 operating hours or once a year must not be exceeded.

In the case of engine oils from other manufacturers, it is possible that the service life may differ from the Liebherr recommendation.

5.3.6 Refrigerant

Description	Air conditioning
Refrigerant	R134a
Greenhouse gas potential	1430
CO_2 equivalent of 1 kg of R134a	1.43 t

Tab. 61: Minimum quality requirement

The air conditioning system contains fluorinated greenhouse gases.

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5.3.7 Coolant

Requirements for the water used

Make sure that the water meets the following requirements:
– Corresponds to the guidelines for drinking water issued by the World Health Organisation (WHO) in 2006

Antifreeze and corrosion inhibitor

Liebherr recommendation

Type	Designation
Concentrate	Liebherr-Antifreeze OS Concentrate
Premix[28)]	Liebherr-Antifreeze OS Mix

Tab. 62: Recommendation for anti-freeze and corrosion protection agent

Ambient temperature	Mixing ratio
Down to -50 °C	40% water 60% antifreeze/corrosion inhibitor
Down to -37 °C	50% water 50% antifreeze/corrosion inhibitor

Tab. 63: Mixing ratio

Minimum quality requirement

Specification
ASTM D6210
LH-01-COL

Tab. 64: Specification

In the case of coolants from other manufacturers, it is possible that the service life may differ from the Liebherr recommendation.

Obtain information on the change intervals from manufacturers or suppliers.

5.3.8 Hydraulic oil

Liebherr recommendation

Ambient temperature	Designation
	Liebherr mineral oil
From -40 °C to 45 °C	Liebherr Hydraulic HVI
From -10 °C to 45 °C	Liebherr Hydraulic Basic 68

[28)] Premix = pre-prepared mixture (50% water and 50% antifreeze/corrosion inhibitor)

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Ambient temperature	Designation
	Liebherr-PAO[29] biodegradable
From -25 °C to 45 °C	Liebherr Hydraulic Plus

Tab. 65: Recommendation for hydraulic oils

Minimum quality requirement

Specification
EMT LH-00-Minimum-HYE

Tab. 66: Minimum quality requirement

In the case of hydraulic oils from other manufacturers, it is possible that the service life may differ from the Liebherr recommendation.

Obtain information on the change intervals from manufacturers or suppliers.

Oil analysis

	Hydraulic oil	Interval
Normal use (oil analysis optional)	**Mineral oil**	
	Liebherr Hydraulic HVI	First after 1000 h, then every 1000 h, at least once a year
	Liebherr Hydraulic Basic 68	
Bio use (oil analysis prescribed)	**Biodegradable**	
	Liebherr Hydraulic Plus	First after 1000 h, then every 1000 h, at least once a year

Tab. 67: Oil analysis

Oil change

Hydraulic oil	Without oil analysis	With oil analysis[30]
Mineral oil		
Liebherr Hydraulic HVI	Every 3000 h	Every 6000 h
Liebherr Hydraulic Basic 68		
Biodegradable		
Liebherr Hydraulic Plus	Every 4000 h	Every 10000 h

Tab. 68: Oil change

[29] PAO = polyalphaolefin

[30] If the result of the oil analysis is positive, the oil can continue being used. If the result of the oil analysis is negative, the oil must be changed.

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5.3.9 Transmission

Liebherr recommendation

Ambient temperature	Designation
-30 °C to 50 °C	Liebherr Gear Basic 90 LS

Tab. 69: Liebherr recommendation

Minimum quality requirement

Specifications
ZF: TE-ML 05C

Tab. 70: Minimum quality requirement

In the case of lubricants from other manufacturers, it is possible that the service life may differ from the Liebherr recommendation.

Obtain information on the change intervals from manufacturers or suppliers.

5.3.10 Axle oil

Liebherr recommendation

Ambient temperature	Designation
-30 °C to 50 °C	Liebherr Gear Basic 90 LS

Tab. 71: Liebherr recommendation

Minimum quality requirement

Specifications
ZF: TE-ML 05C

Tab. 72: Minimum quality requirement

Only axle oils with a phosphorus content of at least **1900 mg/kg** may be used for wheel loaders.

In the case of lubricants from other manufacturers, it is possible that the service life may differ from the Liebherr recommendation.

Obtain information on the change intervals from manufacturers or suppliers.

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5.3.11 Brake oil

Liebherr recommendation

Ambient temperature	Designation
-40 °C to 45 °C	Liebherr Hydraulic HVI

Tab. 73: Liebherr recommendation

Only use hydraulic oil as brake fluid.

Other products such as brake fluids or engine oils will damage the brake system.

When using oil from other manufacturers, you must obtain information from the **Liebherr Lubricant Hotline**.

5.3.12 Lubrication grease

Liebherr recommendation

Ambient temperature	Designation
Down to -20 °C	Liebherr universal grease 9900
Down to -55 °C	Liebherr Arctic universal grease

Tab. 74: Liebherr recommendation

Minimum quality requirement

Thickener	Shelf life	Specification
Soap-based (lithium complex)	At least 3 years	Pumpability as per KP 2 K (DIN 51502)
		VKA welding force: ≥ 6000 N (DIN 51350, 4 – ASTM D 2596)

Tab. 75: Minimum quality requirement

When using grease from other manufacturers, you must obtain information from the **Liebherr Lubricant Hotline**.

5.3.13 Windscreen washer fluid

Liebherr recommendation

Liebherr recommends standard windscreen washer fluid with anti-freeze.

Minimum quality requirement

Use mixture of water and denatured alcohol.

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5.4 Safety precautions

Observe the relevant **safety instructions** when carrying out all maintenance, inspection or repair work. Local health and safety regulations, accident prevention regulations and national laws must be observed.

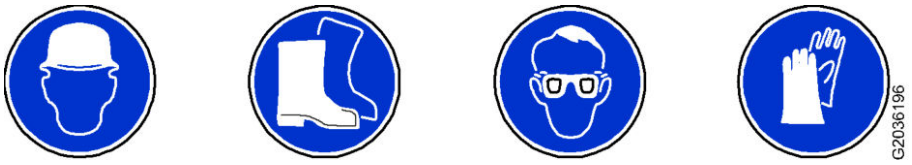

Fig. 299: Safety precautions

Make sure that following requirements are met:
- ❑ Suitable protective equipment is present.
- ❑ The driver and maintenance staff are in visual contact.

Protective equipment must be worn for some tasks:
- – Hard hat
- – Safety footwear
- – Safety glasses
- – Protective gloves

WARNING
Persons in hazard zone!
Injury.

▶ Make sure there is nobody in hazard zone.

▶ Wear appropriate working clothing.

▶ Always maintain visual contact with the maintenance staff.

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5.5 Preparatory tasks for maintenance

Before performing the various maintenance tasks, move the machine to the maintenance position unless otherwise explicitly specified in the description.

The various maintenance tasks include:
– Lubricating the lift arms and attachment
– Checking the oil level in the engine, transmission, axles, hydraulic tank, etc.
– Changing filters

5.5.1 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**, carry out following steps.

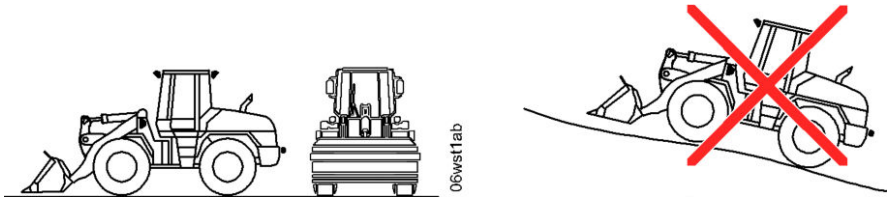

Fig. 300: Maintenance position 1

- ▶ Park machine on firm, level ground.
- ▶ Lower lift arms.
- ▶ Lay bucket flat on the ground.
- ▶ Engage parking brake.
- ▶ Turn off diesel engine.
- ▶ Take out ignition key.
- ▶ Turn off the battery main switch.

Maintenance position 2

To move the machine into maintenance position **2**, carry out following steps.

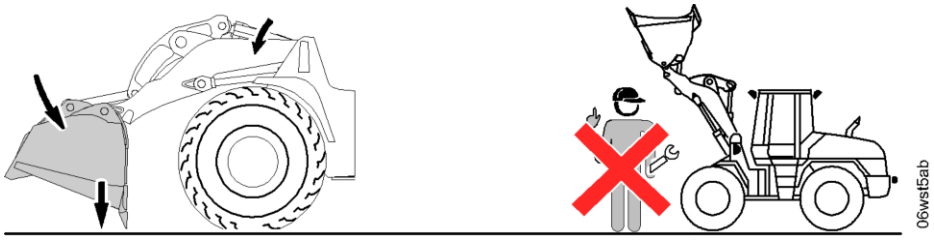

Fig. 301: Maintenance position 2

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- ▶ Park machine on firm, level ground.
- ▶ Engage articulation lock.
- ▶ Lower the lift arms.
- ▶ Tilt the bucket out and set it down on the ground on its teeth or cutting edge.
- ▶ Engage parking brake.
- ▶ Turn off diesel engine.
- ▶ Take out ignition key.
- ▶ Turn off the battery main switch.

5.5.2 Opening the service hatches

Opening and closing the engine hood

When engine bonnet open, you can access following components:
– Diesel engine
– Hydraulic pumps
– Air filter
– Battery
– Battery main switch
– Fuses in battery compartment
– Windscreen washer tank
– Brake fluid equalising reservoir
– Cooling system
– Air conditioning condenser unit (option)
– Hydraulic tank

WARNING
Hot components!
Risk of injury.

- ▶ Do not open the service hatch until the engine has cooled down.

WARNING
Rotating components!
Injury.

- ▶ Exclusively open service hatch when diesel engine is shut down.

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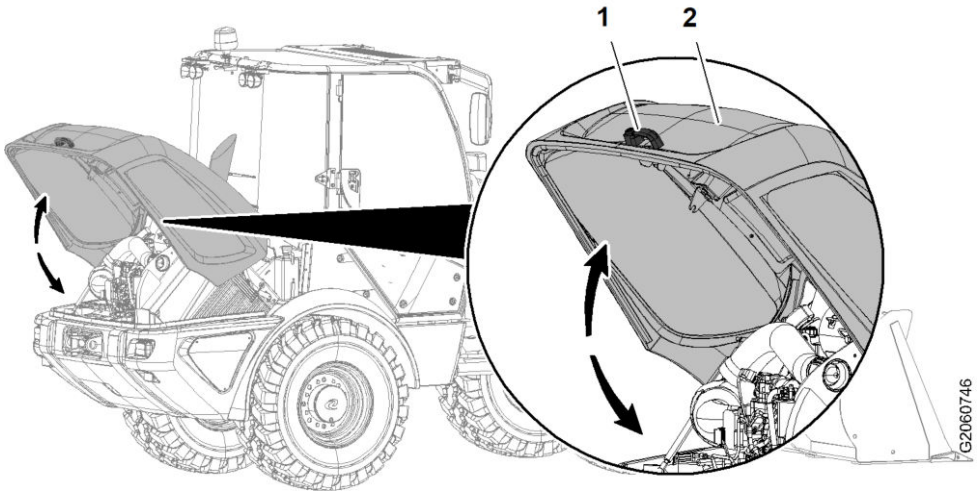

Fig. 302: Opening and closing engine bonnet

1 Handle **2** Engine bonnet

CAUTION
Engine hood falling shut
Injury.

▶ Only open the engine hood when the gas-filled springs function properly.

To open engine bonnet:

▶ Open the lock with the ignition key.

▶ Open the engine hood **2** with the handle **1**.
▷ The engine hood **2** is held in this position by gas-filled springs.

Troubleshooting
If the gas-filled spring does not hold the hood open:

▶ Contact Liebherr customer service.

To close engine bonnet:

▶ Close the engine hood **2** with the handle **1**.

▶ Close the lock with the ignition key.

5.5.3 Turning off battery main switch

Battery main switch is located on left side of engine compartment.

For certain maintenance tasks, battery main switch must first be turned off.

Find out from descriptions of relevant maintenance tasks whether battery main switch must be turned on or off.

Turn on battery main switch after completing these maintenance tasks.

NOTICE
Voltage fluctuations!
Damage to the electrical system.

▶ Never turn off the battery main switch when the engine is running.

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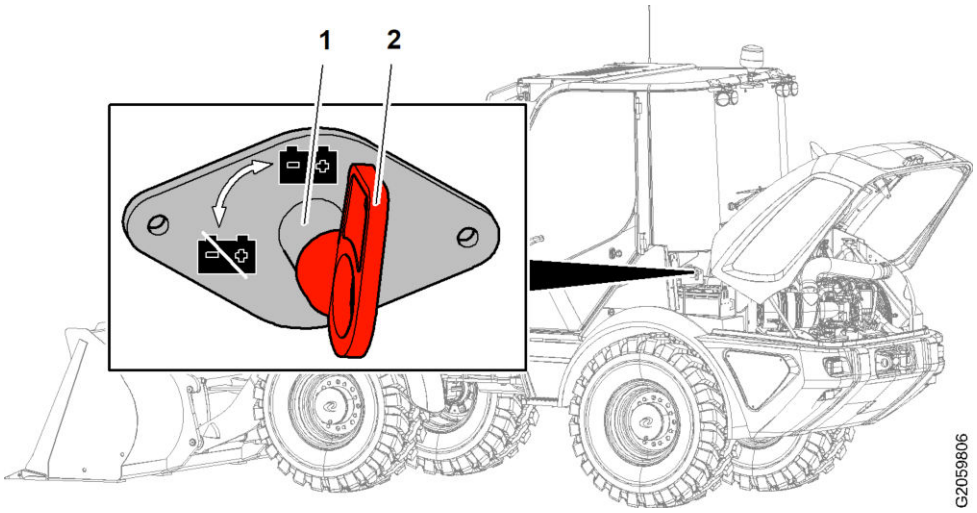
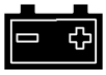


Fig. 303: Turning off the battery main switch

1 Battery main switch **2** Battery main switch key

Symbol	Function
	**OFF**
	**ON**

Tab. 76: Turning off battery main switch

- ▶ Turn off diesel engine.
- ▶ Set battery main switch **2** to **OFF**.
  ▷ Electrical system of machine is de-energised.
- ▶ Remove battery main switch key **2**.

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5.6 Overall machine

5.6.1 Checking the machine is in the proper condition

Make sure that following requirements are met:
❑ The machine is parked in a safe place.

WARNING
Damaged components!
Risk of injury.

▶ Replace damaged components.

▶ Contact Liebherr customer service.

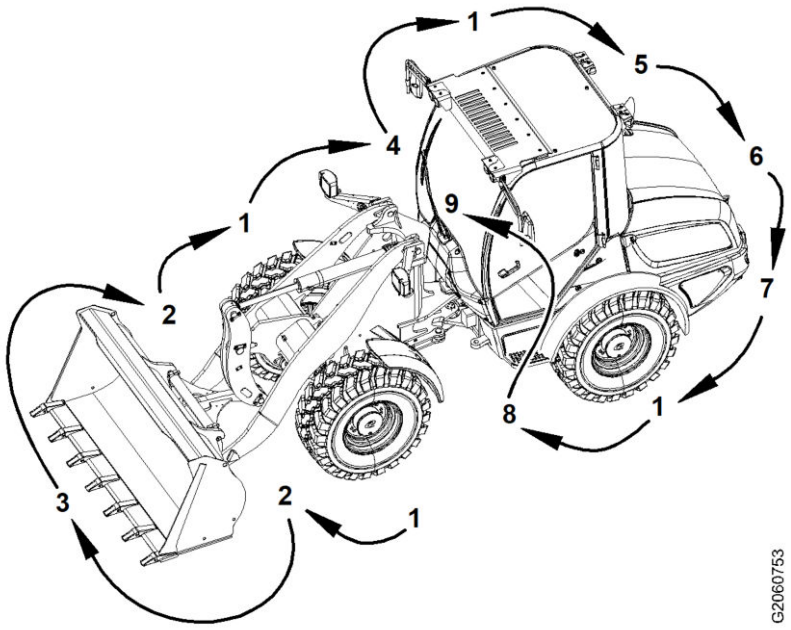

Fig. 306: Checking the machine is in the proper condition

▶ Check the machine is in the proper condition.

Position	Component	Check
1	Tyres	Check the tyres for loose wheel bolts, damage and stones in the tread.
2	Bucket bearings and lift arms	Check that the bucket bearings and lift arms are sufficiently lubricated and free of damage.
3	Working attachment	Check the working attachment for wear and damage.
4	Side window	Check that the side window is clean and free of damage.

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Position	Component	Check
5	Cooling system, windscreen washer tank	Check the cooling system for damage and contamination. Check the filling level of the windscreen washer tank.
6	Underside of machine	Look under the machine for leaks. Look for accumulations of dirt which might indicate leaks. Tighten any loose hydraulic connections with the required tightening torque.
7	Hydraulic oil level, brake oil equalising reservoir	Check hydraulic oil level and brake oil equalising reservoir.
8	Central lubrication system	Check the grease level in the central lubrication system.
9	Operator's cab	Check that the left side window, the windscreen and the rear window are clean and free of damage. Test the steering, service brake, lights and horn and check them for damage. Check the mirrors and other visual aids for damage.
1-9	Bolted connections	Check the machine for missing bolts. Replace the missing bolts and tighten them with the requisite torque. Check the machine for loose bolt connections. Tighten any loose screws or bolts with the required tightening torque.

Tab. 77: Checking the machine is in the proper condition

5.6.2 Removing loose parts, dirt, ice and snow from machine

Make sure the following preconditions are met:
❑ Machine is in maintenance position 1.

Note
Ensure safe machine operation.

▶ Remove any loose parts, coarse dirt, mud, ice, snow etc.

▶ Carefully clean machine with a high-pressure cleaner.
▷ (For more information see: 5.6.4 Cleaning machine, page 214)

5.6.3 Checking the hydraulic lines for damage

Damage to hydraulic lines is divided into three types of damage:
– Minor damage
– Medium damage
– Severe damage

The type of damage determines whether the hydraulic line is renewed or whether the machine can be operated with the damaged hydraulic line.

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The general safety instructions must be observed when working on the hydraulic system.

Make sure that following requirements are met:
❑ Machine is in maintenance position 2.

Minor damage to the hydraulic lines

Wear or damage to the outer jacket of the hydraulic line

Wear or damage to the outer jacket of the hydraulic line is caused by friction or contact with other components. As long as the steel fabric of the hydraulic line is not damaged or not visible, this is classified as minor damage.

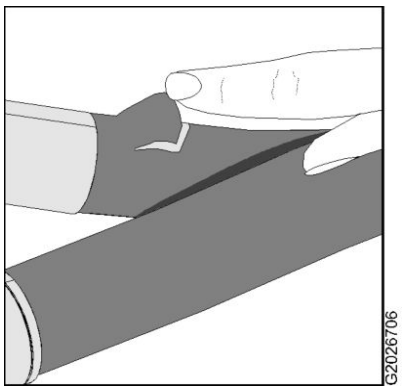

Fig. 307: Wear or damage to the outer jacket of the hydraulic line

▶ Document the damage and observe whether the condition deteriorates.

▶ Check the routing of the hydraulic line, contact Liebherr customer service if necessary.

If the condition deteriorates:
▶ Have the hydraulic lines replaced by Liebherr customer service.

Moist surfaces, no visible oil leak

Moist spots can be seen on the surface. An oil leak or oil drops are not visible. As long as you do not observe an obvious oil leak, it is classified as minor damage.

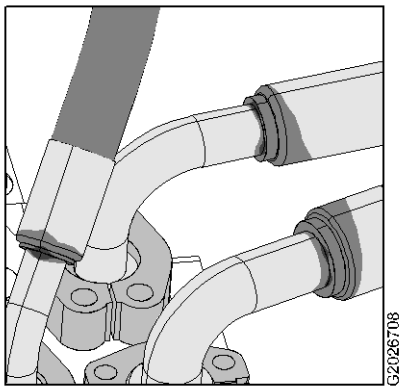

Fig. 308: Moist surfaces, no visible oil leak

▶ Document the damage and observe whether the condition deteriorates.

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If the condition deteriorates:
▶ Have the hydraulic lines replaced by Liebherr customer service.

Medium damage to the hydraulic lines

Cracks or cuts up to the steel fabric or steel fabric exposed due to damage to the outer jacket

The damage to the outer jacket (such as cracks, cuts or abrasions) through which the steel fabric is exposed is classified as medium damage if the steel fabric is undamaged. Damage to the steel fabric is classified as severe damage.

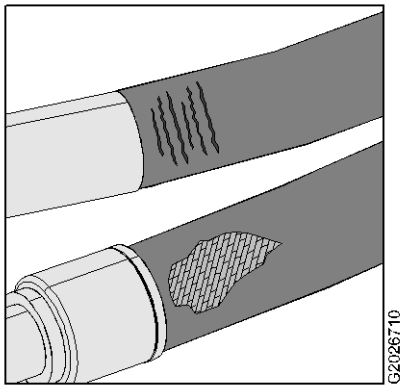

Fig. 309: Cracks or cuts up to the steel fabric or steel fabric exposed due to damage to the outer jacket

▶ Document the damage and observe whether the condition deteriorates.

If the condition deteriorates:
▶ Have the hydraulic lines replaced immediately by Liebherr customer service.

If the condition does not deteriorate:
▶ Have the hydraulic line replaced within the next 250 operating hours by Liebherr customer service.

Moist surfaces, slight oil leak visible

Moist spots can be seen on the surface. Slight oil leak or small oil drops are visible. As long as you do not observe a severe oil leak, it is classified as medium damage.

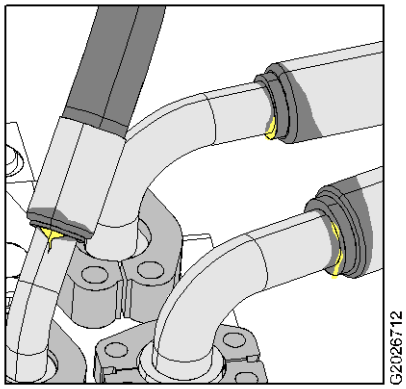

Fig. 310: Moist surfaces, slight oil leak visible

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▶ Document the damage and observe whether the condition deteriorates.

If the condition deteriorates:
▶ Have the hydraulic lines replaced immediately by Liebherr customer service.

If the condition does not deteriorate:
▶ Have the hydraulic line replaced within the next 250 operating hours by Liebherr customer service.

Severe damage to the hydraulic lines

DANGER
Hydraulic oil discharged under high pressure!
Fatal injury.

▶ Do not operate the machine.

Visible oil leak

Oil leaks from the hydraulic line. Leaking oil is classified as severe damage.

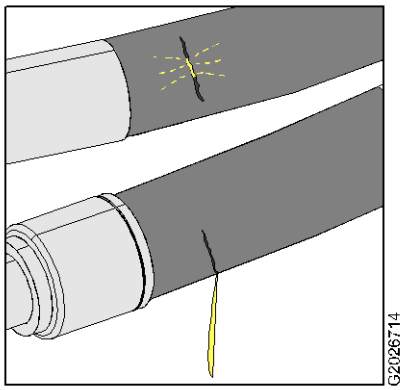

Fig. 311: Visible oil leak

▶ Take the machine out of operation and secure it against restarting.

▶ Have the damaged hydraulic line replaced immediately by Liebherr customer service.

Damaged or corroded steel fabric

Damaged or corroded steel fabric is classified as severe damage.

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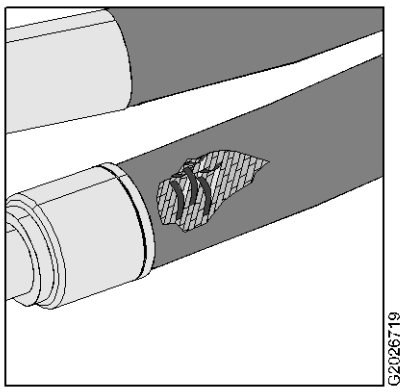

Fig. 312: Damaged or corroded steel fabric

- ▶ Take the machine out of operation and secure it against restarting.
- ▶ Have the damaged hydraulic line replaced immediately by Liebherr customer service.

Cracks on the clamping sleeve or blisters on the outer jacket

Cracks on the clamping sleeve or blisters on the outer jacket are classified as severe damage.

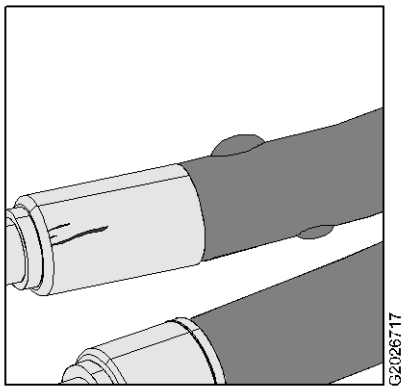

Fig. 313: Cracks on the clamping sleeve or blisters on the outer jacket

- ▶ Take the machine out of operation and secure it against restarting.
- ▶ Have the damaged hydraulic line replaced immediately by Liebherr customer service.

5.6.4 Cleaning machine

Thoroughly clean machine of all dirt and deposits in following situations:
– After completing each job
– Before maintenance work
– Before repairs

NOTICE
Beware of corrosive materials and working environments.
Risk of damage to the machine.

- ▶ Clean the machine thoroughly after completing the work.

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Regular cleaning prevents dirt and foreign particles from getting into the machine.

Clean the machine immediately after the following work:
– Working in salty environments (for example contact with road salt, or by the sea)
– Working with alkaline or acidic substances
– Working with corrosive materials (such as lime compounds or cement)

NOTICE
Always carry out cleaning correctly
Risk of damage to the machine.

▶ Only clean electrical systems, cables and wiring harnesses with low-pressure equipment.

▶ Only clean soundproofing material with low-pressure equipment.

▶ When new (or after respraying), do not clean the machine with a high-pressure cleaner for two months.

▶ Observe the operating manual of the high-pressure cleaner.

CAUTION
High-pressure jet!
Risk of injury.

▶ Wear protective clothing and safety glasses.

Cleaning the outside of the machine

Before cleaning

Make sure that following requirements are met:
❑ Machine is in maintenance position 2.

Before washing with water or with a high-pressure cleaner, carry out following tasks in order to prevent water from getting inside.

▶ Lubricate all bearings and pin connections.

▶ Clean oil, fuel and maintenance products from all connections and bolts.

If components behind openings have to be prevented from water getting in:

▶ Cover or mask the openings.

Components particularly at risk are:
– Electric motors
– Control units
– Electrical components
– Relay boards and fuse boards
– Plug connections
– Sensors
– Air filter
– Exhaust system

Cleaning

▶ Do not clean the machine with aggressive cleaning agents or combustible liquids.

▶ Soften up dirt with water.

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▶ Rinse off the softened dirt with water.

If the diesel engine has to be cleaned:

▶ Open the service hatch.

NOTICE
Incorrect cleaning!
Damage to diesel engine.

▶ When cleaning with engine bonnet open, close opening to air filter system so is it watertight.

▶ Clean the diesel engine.

After cleaning

▶ Remove all masking and covers over openings and components.

▶ Check all fuel lines, engine oil lines and hydraulic lines (for leaks, loose connections, abrasion and damage).

▶ Repair any defects immediately.

▶ To displace any water that has penetrated: lubricate all bearings and pin connections again.

▶ If necessary, renew the corrosion protection on components and surfaces.

If the diesel engine has been cleaned:

▶ Let the diesel engine warm up at idling speed.
▷ This allows the engine to dry better.

Cleaning the interior of the operator's cab

Note

Only clean the interior equipment of the operator's cab with warm water, without any cleaning additives.

▶ Wipe surfaces with a soft, damp cloth.

Cleaning rear window of operator's cab

Rear window only needs to be cleaned after working in very dirty environments.

Make sure that following requirements are met:
❑ Machine is in maintenance position 1.
❑ Cab door is closed.
❑ Suitable climbing aids are available.

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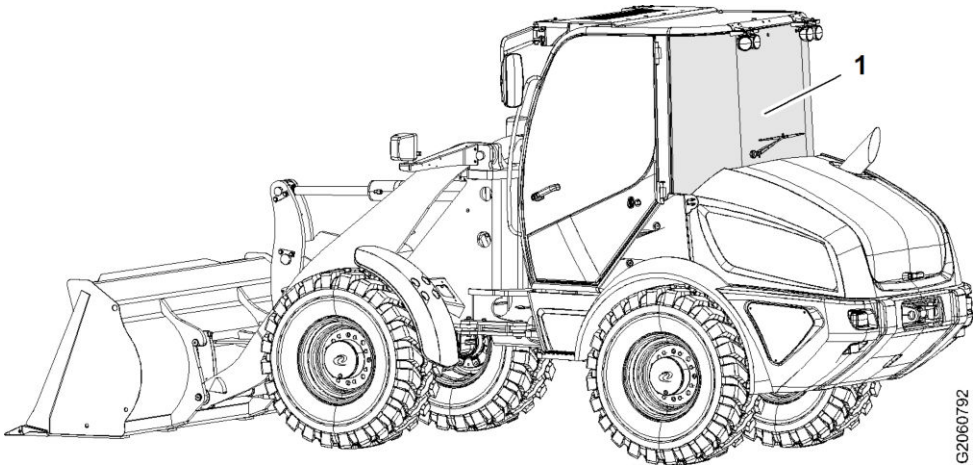

Fig. 314: Cleaning rear window of operator's cab

1 Rear window

WARNING
Access to the rear window:
Injury.

▶ Use the provided footplate, handrail and suitable climbing aids.

▶ Access to rear window: use suitable climbing aid.

▶ Use commercial glass cleaner.

▶ Use lint-free cleaning cloths.

5.6.5 Shutting down the machine for a lengthy period

If the machine is put out of service for a lengthy period without preservation, it must be put back into service at 14 day intervals (at maximum) in order to minimise corrosion and the resulting damage.

▶ All oil levels must be checked before putting into service.

▶ Carry out all daily prescribed maintenance work before putting into service every time. Carry out all additional temporary maintenance work as per inspection plan, at the latest at the intended intervals.

▶ Put machine back into service and operate until the diesel diesel engine and hydraulic system have reached the prescribed operating temperature in the hydraulic tank and in the coolant circuit (see the section on the operation of the “display”).

▶ Activate all the functions of the travel and working hydraulics and of the other hydraulic components, and operate alternately for approx. 20 minutes in total. Hydraulic cylinders must each be extended and retracted over their full stroke length.

▶ When switching off the machine, retract all the hydraulic cylinders completely if possible, and fill up the fuel tank. If the surface is soft, put the machine on wooden blocks or similar, and secure against rolling.

▶ Turn the battery main switch to the **OFF** position.

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5.6.6 Deactivating the machine

To deactivate the machine:

▶ Contact Liebherr customer service.

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5.7 Drive group

5.7.1 Checking diesel engine oil level

Make sure that following requirements are met:
- ❑ Machine is in maintenance position 1.
- ❑ Service access is open.
- ❑ Engine is level and has been switched off for 10 minutes.
- ❑ Diesel engine has cooled down.

Checking oil level

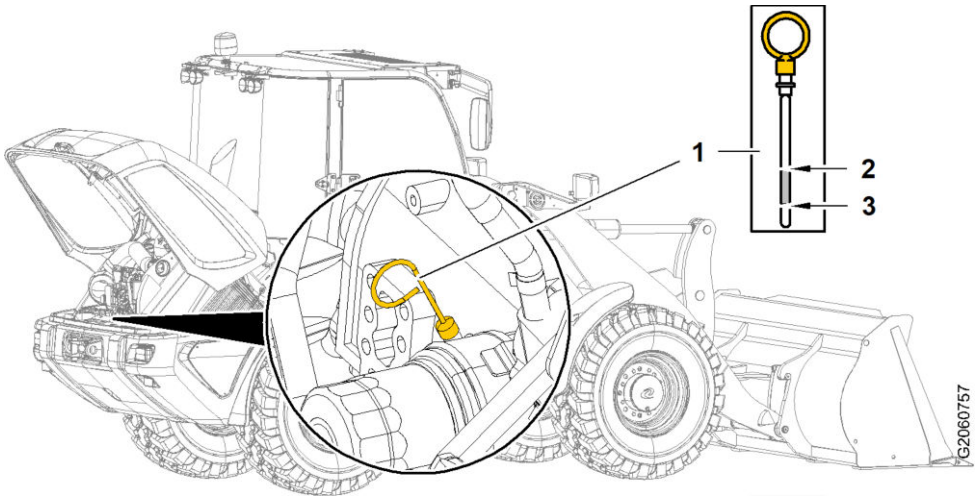

Fig. 315: Checking the oil level

1 Dipstick
2 Maximum oil level
3 Minimum oil level

▶ 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 on the dipstick **1** must be between the maximum **2** and minimum **3**.

If the oil level is below the minimum **3**:
▶ Put in the dipstick **1**.

▶ Top up engine oil. (For more information see: Topping up oil, page 220)

Troubleshooting
If oil level is too high:

▶ Contact Liebherr customer service.

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Topping up oil

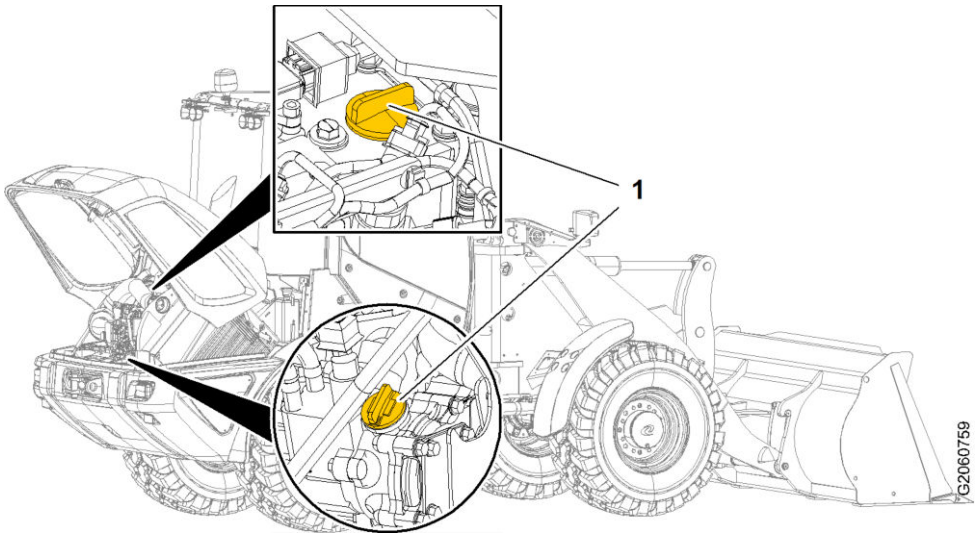

Fig. 316: Topping up oil

1 Cover

▶ Open one of covers **1**.

NOTICE
Non-approved oil!
Damage.

▶ Only use oil that meets the Liebherr specifications.

▶ Top up appropriate amount of engine oil via filler pipe cover **1**. (For more information see: 5.3.5 Engine oils, page 199)

▶ Do not fill diesel engine oil above maximum level.

▶ Clean cap **1**, place it on filler pipe and close it.

5.7.2 Diesel engine: checking V-belt

Make sure that following requirements are met:
❑ Machine is in maintenance position 1.
❑ Diesel engine has cooled down.
❑ Service access is open.

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Checking V-belt for damage

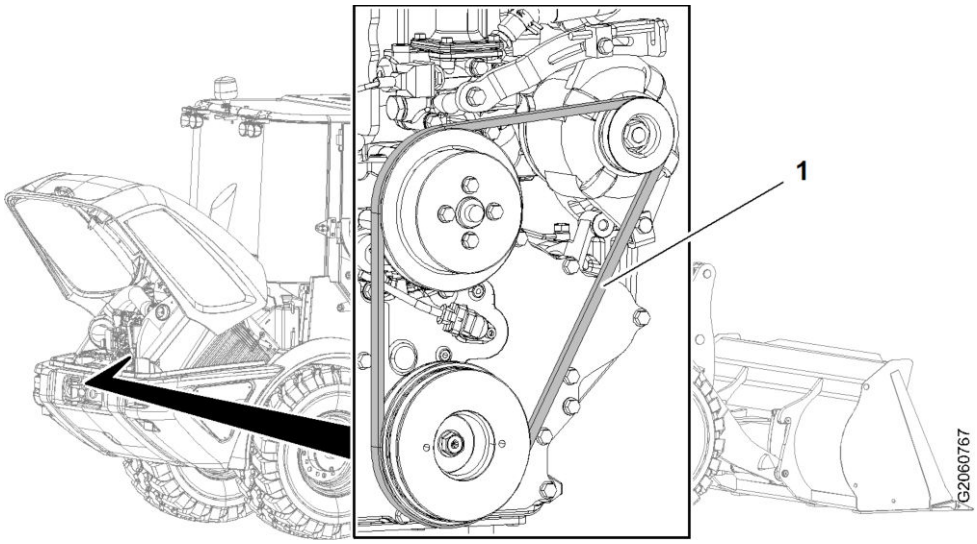

Fig. 317: Checking V-belt for damage

1 V-belt

▶ Check V-belt **1** for following damage:
- ▷ Rupture on V-belt profile
- ▷ Rubber knobs in V-belt base
- ▷ Accumulated dirt or grit
- ▷ Belt profile coming loose from belt base
- ▷ Cracks on V-belt back
- ▷ Cracks in V-belt profile

If V-belt is damaged:
▶ Have V-belt **1** replaced by Liebherr customer service.

Checking V-belt tension

Note

V-belt tension is set at factory and must be retightened when belt tension decreases.

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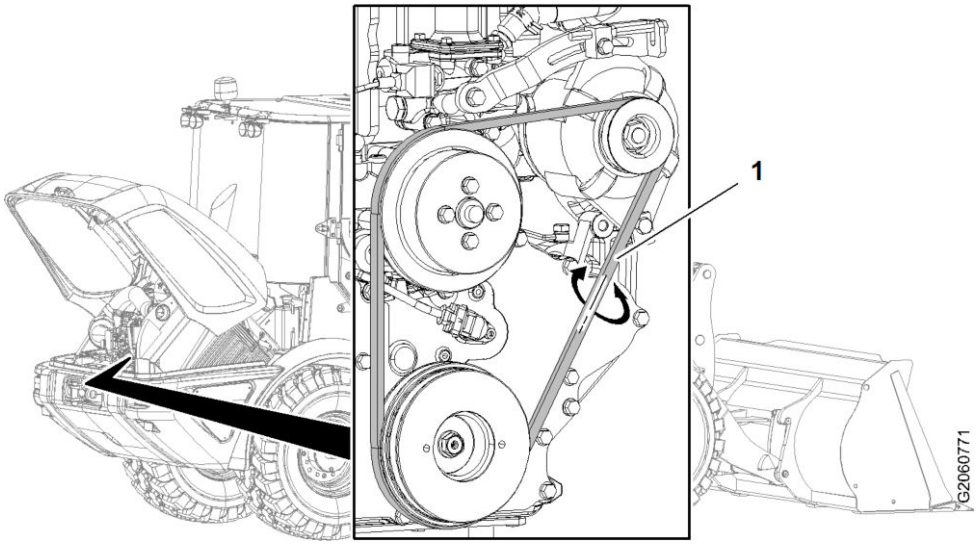

Fig. 318: Checking V-belt tension

1 V-belt

V-belt tension is checked in middle on longest side of V-belt **1**.

▶ Turn V-belt **1** 90° with thumb, index finger and moderate force.
  ▷ V-belt **1** can be turned about 90°.
  ▷ V-belt tension is correct.

If V-belt **1** can be turned more than 90°.
▶ Set V-belt tension. (For more information see: Setting V-belt tension, page 222)

Setting V-belt tension

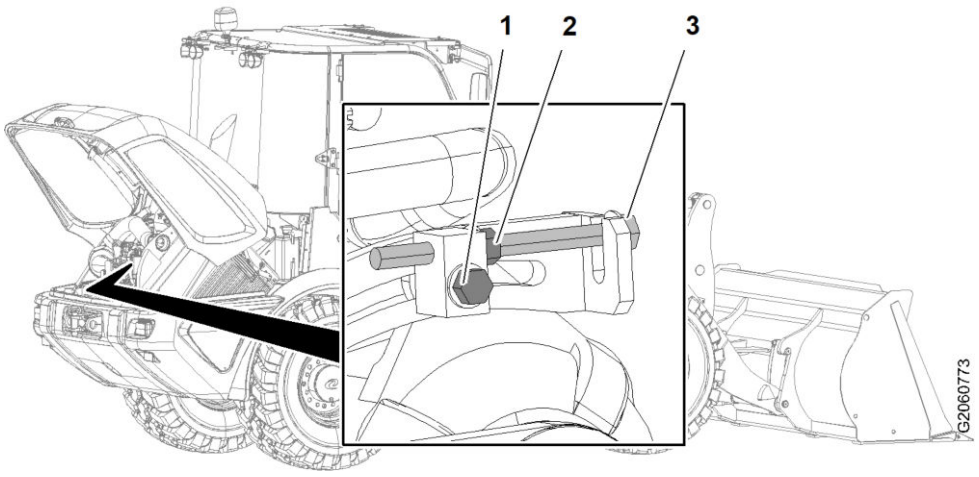

Fig. 319: Setting V-belt tension

1 Screw
2 Counter nut
3 Adjusting screw

▶ Loosen nut **2** and screw **1**.

▶ Adjust V-belt tension with screw **3**.

▶ Tighten nut **2** and screw **1**.

▶ Check V-belt tension and correct if necessary.

▶ Start diesel engine and let it run for 5 minutes.

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▶ Turn off diesel engine.

▶ Put machine in maintenance position 1.

WARNING
Hot components!
Risk of injury.

▶ Do not open the service hatch until the engine has cooled down.

▶ Check V-belt tension again and correct it if necessary.

5.7.3 Draining condensate and sediment from fuel tank

Make sure that following requirements are met:
❑ Machine is in maintenance position 1.
❑ You have a suitable receptacle ready.
❑ The machine has been out of operation for at least 3 hours.

WARNING
Highly flammable consumables!
Beware of burns.

▶ Avoid naked lights and fire.

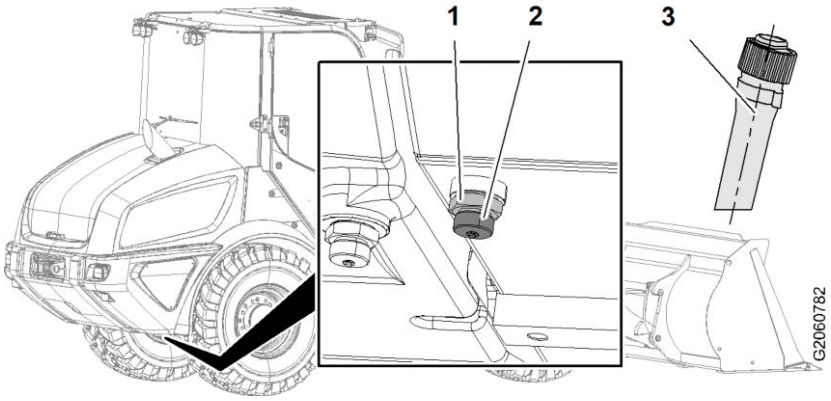

Fig. 320: Draining condensate and sediment from the fuel tank

1 Drain valve
2 Sealing cap
3 Drain hose

▶ Place a receptacle under the fuel tank.

▶ Unscrew the cap **2** of the drain valve **1**.

▶ Screw the drain hose **3** onto the drain valve **1**.
▷ Condensate and sediment drain off.

▶ Drain the condensation and sediment into a suitable receptacle until clean fuel begins to flow.

▶ Unscrew the drain hose **3**.

▶ Screw the cap **2** onto the drain valve **1** and tighten it.

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5.7.4 Draining off condensate from the fuel pre-filter

When the water level probe in the fuel pre-filter is activated (the service code is displayed), the water collector tank must be drained.

Make sure that following requirements are met:
- ❑ Machine is in maintenance position 1.
- ❑ Service access is open.
- ❑ You have a suitable receptacle ready.
- ❑ Diesel engine has cooled down.

WARNING
Highly flammable consumables!
Beware of burns.

▶ Avoid naked lights and fire.

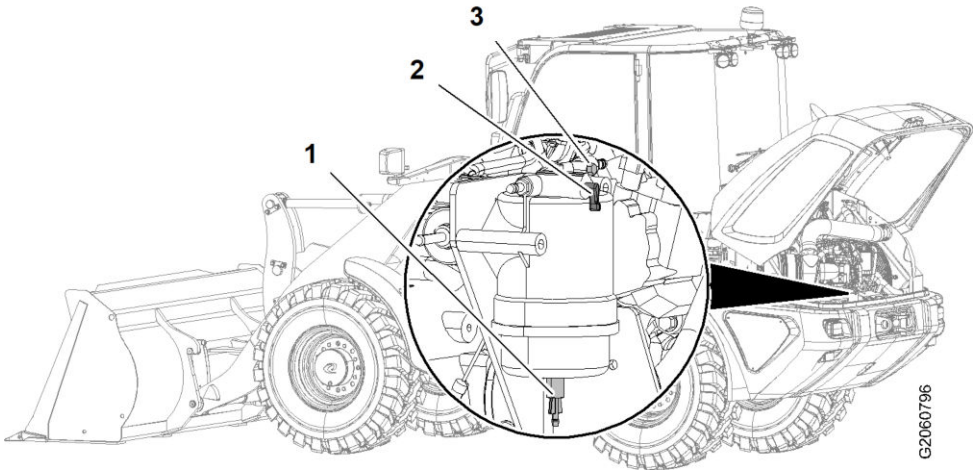

Fig. 321: Draining off condensate from fuel pre-filter

1 Drain valve
2 Fuel line shut-off valve
3 Bleeder screw

Note
To prevent condensate flowing back into fuel tank:

▶ Open fuel line shut-off valve in front of drain valve.

▶ Place a receptacle under fuel pre-filter.

▶ Close shut-off valve **2**.

▶ Open bleeder screw **3**.

▶ Open the drain valve **1** until clean fuel flows out.

When clean fuel flows out:

▶ Close the drain valve **1**.

▶ Close the bleeder screw **3**.

▶ Open shut-off valve **2**.

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5.7.5 Cleaning service cover and dust discharge valve of air filter system

Note
If the valve is damaged, the dust discharge function is impaired and the filters become clogged more quickly.

▶ With the diesel engine running at lower idle speed, you should clearly feel air pulsating at the dust discharge valve.

Make sure that following requirements are met:
- ❑ Machine is in maintenance position 1.
- ❑ Service access is open.
- ❑ Diesel engine has cooled down.
- ❑ Suitable protective equipment is used.

Cleaning the service cover

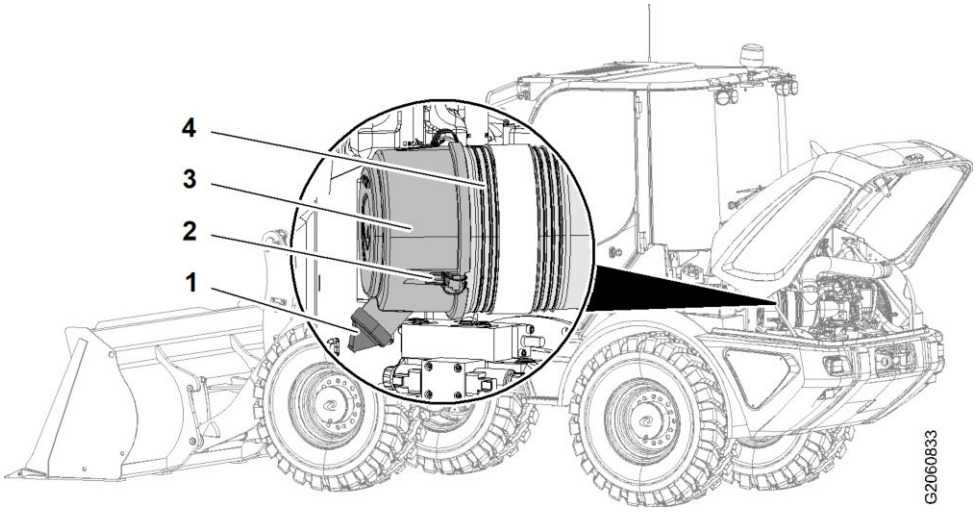

Fig. 322: Clean service cover and dust discharge valve of air filter system.

1	Dust discharge valve	**3**	Service cover
2	Fixing clips	**4**	Filter housing

▶ Open fixing clips **2** and take off service cover **3**.

▶ Clean the service cover **3** and place it back onto the filter housing **4**.
▷ The dust discharge valve **1** must face down.

▶ Place the service cover **3** fully over the filter housing **4**.

▶ Close the fixing clips **2**.

Cleaning the dust discharge valve

Note
When using the machine in dusty conditions:

▶ Check and empty the dust discharge valve more often.

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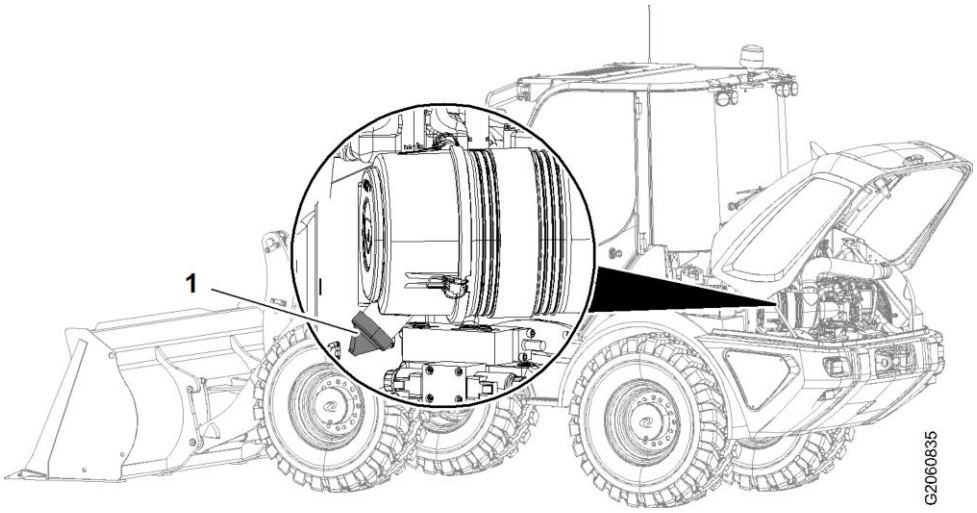

Fig. 323: Cleaning the dust discharge valve

1 Dust discharge valve

▶ Press the rubber lip on the dust discharge valve **1**.
▷ Dust discharge valve **1** is emptied.

If dust discharge valve **1** is damaged or stays open:

▶ Replace dust discharge valve **1**.

5.7.6 Cleaning or changing the main element of the air filter system

Make sure that following requirements are met:
- ❑ Machine is in maintenance position 1.
- ❑ Service access is open.
- ❑ Diesel engine has cooled down.
- ❑ Suitable protective equipment is used.

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Removing the main element

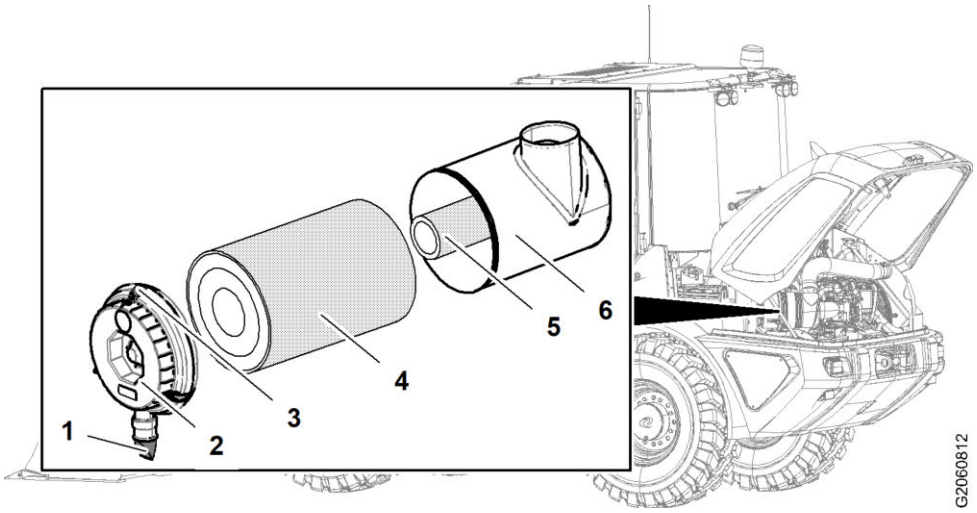

Fig. 324: Removing the main element

1	Dust discharge valve	**4**	Main element
2	Service cover	**5**	Safety element
3	Fixing clips	**6**	Filter housing

NOTICE
Always carry out maintenance correctly.
Damage to the engine.

▶ Always replace damaged filter elements.

▶ Release the fixing clips **3** on the service cover **2**.

▶ Take off the service cover **2**.

▶ Remove the main element **4** and check it for damage before cleaning it.

If the main element is damaged:
▶ Change the damaged filter element.

If the main element is not damaged:
▶ Clean the main element.

Cleaning the main element

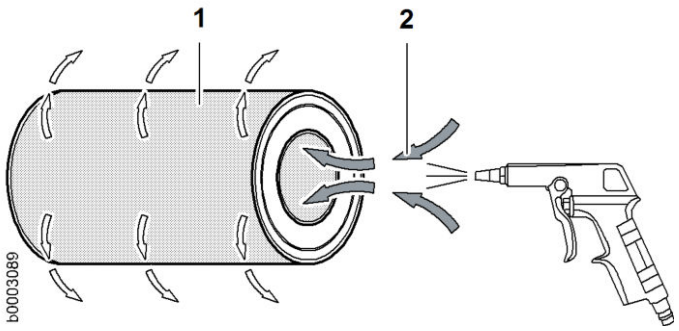

Fig. 325: Cleaning the main element

1	Main element	**2**	Compressed air

NOTICE
Incorrect cleaning!
Damage to the main element.

- ▶ Use compressed air at low pressure.
- ▶ Clean the main element with clean, oil-free compressed air.
- ▶ Do not knock out the main element.

▶ Clean the main element **1** from the inside out with compressed air **2**.

Cleaning the service cover and filter housing

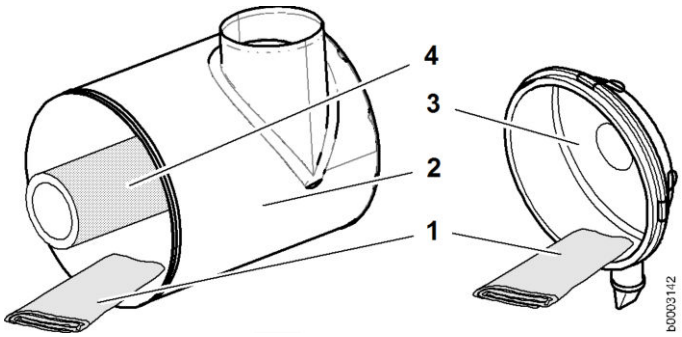

Fig. 326: Cleaning the service cover and filter housing

1	Cloth	**3**	Service cover
2	Filter housing	**4**	Safety element

NOTICE
Incorrect cleaning!
Damage to the engine.

- ▶ Clean the filter housing with compressed air.
- ▶ Wipe the filter housing with a clean cloth.

▶ Clean the inside of the filter housing **2** and the service cover **3** with a cloth **1**.

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Installing the main element

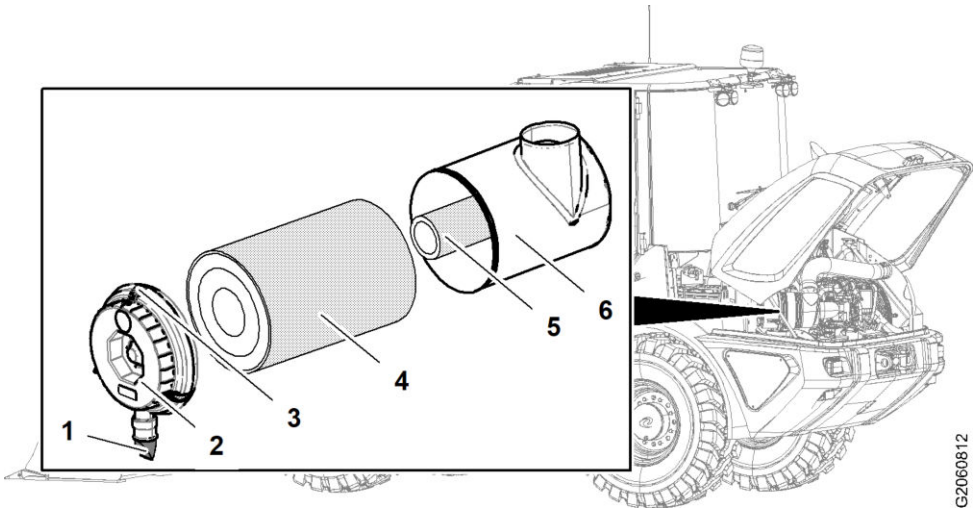

Fig. 327: Installing the main element

1	Dust discharge valve	**4**	Main element
2	Service cover	**5**	Safety element
3	Fixing clips	**6**	Filter housing

▶ Lightly oil the sealing face of the main element **4**.

▶ Install the main element **4**.

▶ Put the clean service cover **2**, with the dust discharge valve **1** facing down, on the filter housing **6**.

▶ Close the fixing clips **3**.

Note
If *air filter contamination* symbol lights up again a few operating hours after main element has been cleaned:

▶ Change main element.

Note
If *air filter contamination* symbol remains lit after main element has been changed:

▶ Change safety element.

5.7.7 Changing the safety element of the air filter system

NOTICE
Always carry out maintenance correctly.
Damage to the engine.

▶ Do not clean the safety element.

▶ Only replace the safety element.

Make sure that following requirements are met:
❑ Machine is in maintenance position 1.
❑ Service access is open.

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- ❑ Diesel engine has cooled down.
- ❑ Suitable protective equipment is used.

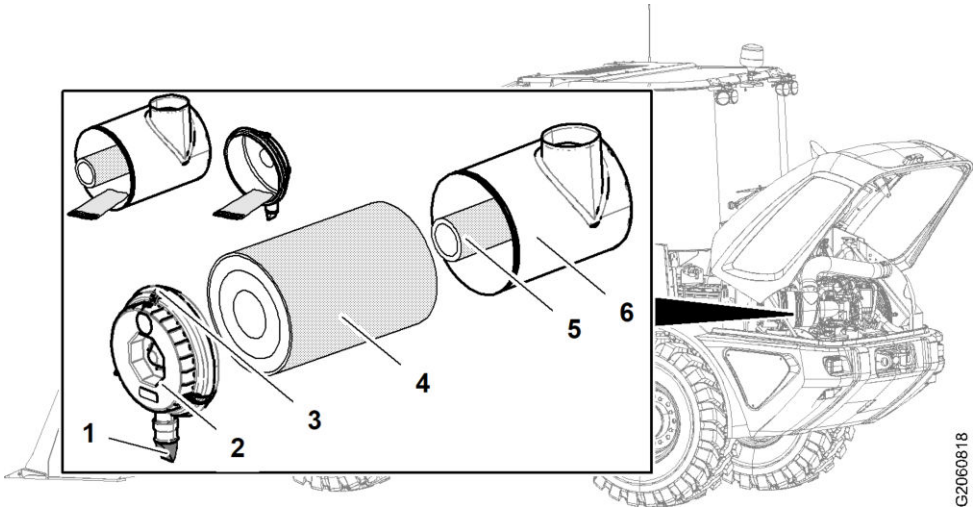

Fig. 328: Changing the air filter safety element

1	Dust discharge valve	**4**	Main element
2	Service cover	**5**	Safety element
3	Fixing clips	**6**	Filter housing

- ▶ Release the fixing clips **3** on the service cover **2**.
- ▶ Take off the service cover **2**.
- ▶ Remove the main element **4**.
- ▶ Clean the service cover **2** and the filter housing **6** with a clean cloth.
- ▶ Remove the safety element **5**.
- ▶ Lightly oil the sealing faces of the new safety element **5** and the main element **4**.
- ▶ Install the new safety element **5** and the main element **4**.
- ▶ Put the service cover **2**, with the dust discharge valve **1** facing down, on the filter housing **6**.
- ▶ Close the fixing clips **3**.

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5.8 Cooling system

5.8.1 Checking coolant level in cooling system

Make sure that following requirements are met:
- ❑ Machine is in maintenance position 1.
- ❑ Service access is open.
- ❑ Diesel engine has cooled down.

Checking coolant level

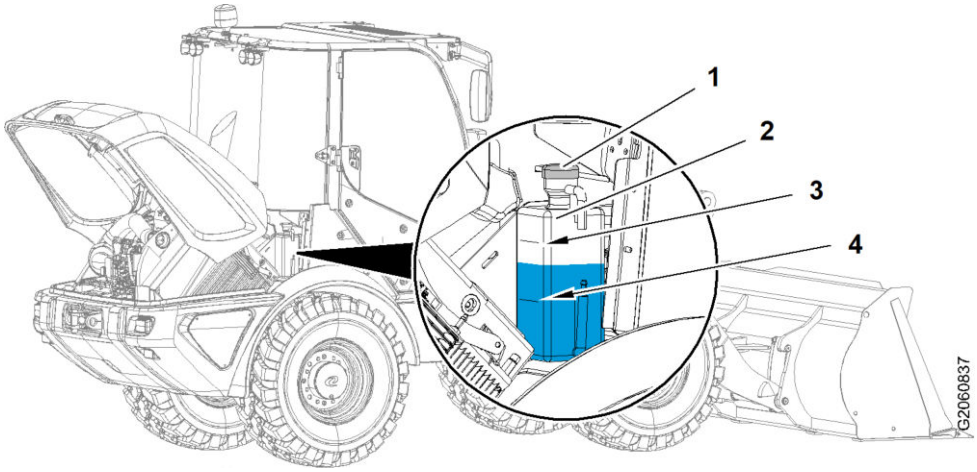

Fig. 329: Checking the coolant level

1	Equalising reservoir cap	**3**	Maximum coolant level
2	Equalising reservoir	**4**	Minimum coolant level

▶ Check coolant level in equalising reservoir **2**.
  ▷ The coolant level must be between the maximum **3** and minimum **4**.

If coolant is below minimum level **4**:
▶ Top up coolant. (For more information see: Topping up coolant, page 232)

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Topping up coolant

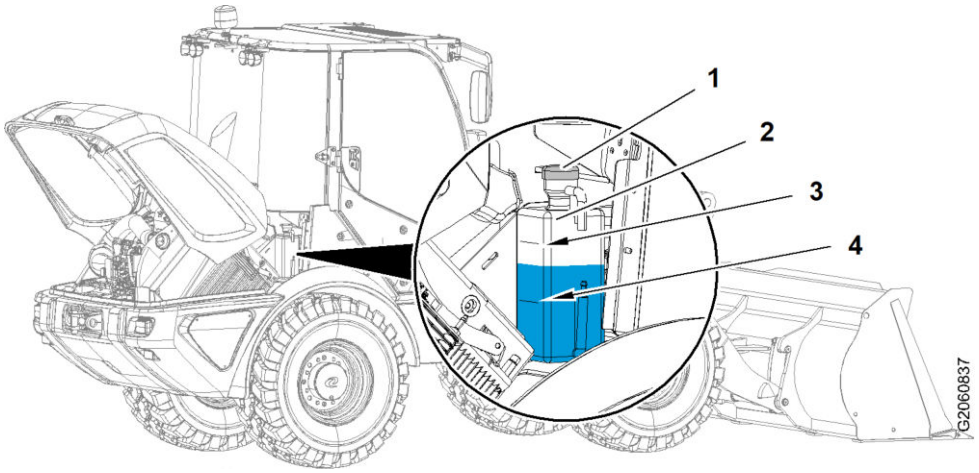

Fig. 330: Topping up coolant

1	Equalising reservoir cap	**3**	Maximum coolant level
2	Equalising reservoir	**4**	Minimum coolant level

CAUTION
Hot, pressurised fuel and operating fluids!
Beware of burns.

▶ Let diesel engine cool down.

▶ Carefully open cover **1** of equalising reservoir **2**.

NOTICE
Non-approved coolant!
Damage to the engine and cooling system.

▶ Only use coolant that meets the Liebherr specifications.

▶ Do not mix coolants with and without silicates.

▶ Top up coolant. (For more information see: 5.3.7 Coolant, page 200)
▷ Coolant level should now be between maximum **3** and minimum **4**.

▶ Close the cover **1** of the equalising reservoir **2**.

5.8.2 Cleaning the cooling system

Clean the coolers whenever necessary in order to ensure proper cooling. In dusty environments, check the coolers every day and clean them if necessary.

Dirty cooler units cause overheating. This results in an audible and visual warning with simultaneous power reduction of the travel drive.

Dust and other dirt can be removed from the cooling fins using a high-pressure cleaner or compressed air. Compressed air is preferable.

Make sure that following requirements are met:
❑ Machine is in maintenance position 1.
❑ Service access is open.

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NOTICE
Incorrect cleaning!
Damage to diesel engine.

▶ When cleaning with engine bonnet open, close opening to air filter system so is it watertight.

NOTICE
Incorrect cleaning!
Damage to the cooling system.

▶ Do not use hard objects or excessive water pressure.

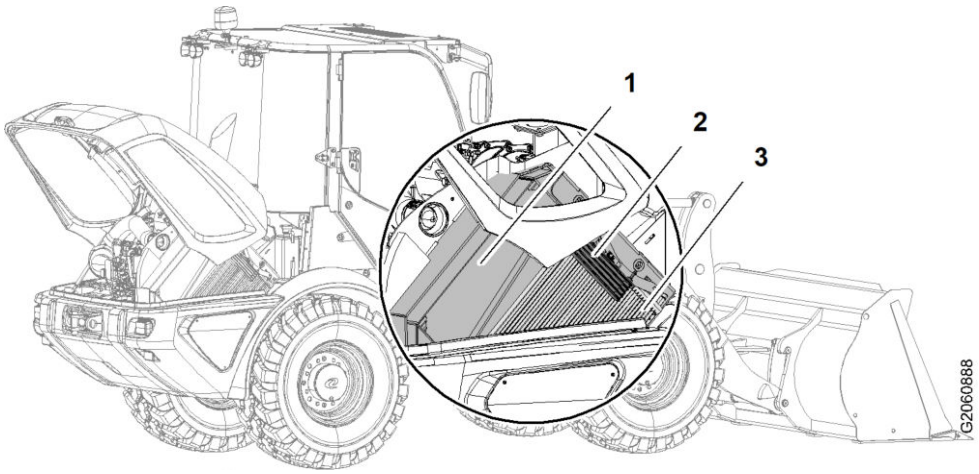

Fig. 331: Cleaning cooling system

1 Cooler unit
2 Fuel cooler
3 Condenser unit (option)

▶ Clean cooler units **1**, fuel cooler **2** and condenser unit **3** with a high-pressure cleaner or compressed air.

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5.9 Hydraulic components

5.9.1 Checking oil level in hydraulic tank

Make sure that following requirements are met:
- ❑ Machine is in maintenance position 1.
- ❑ Machine is cold.
- ❑ Service access is open.

Checking oil level

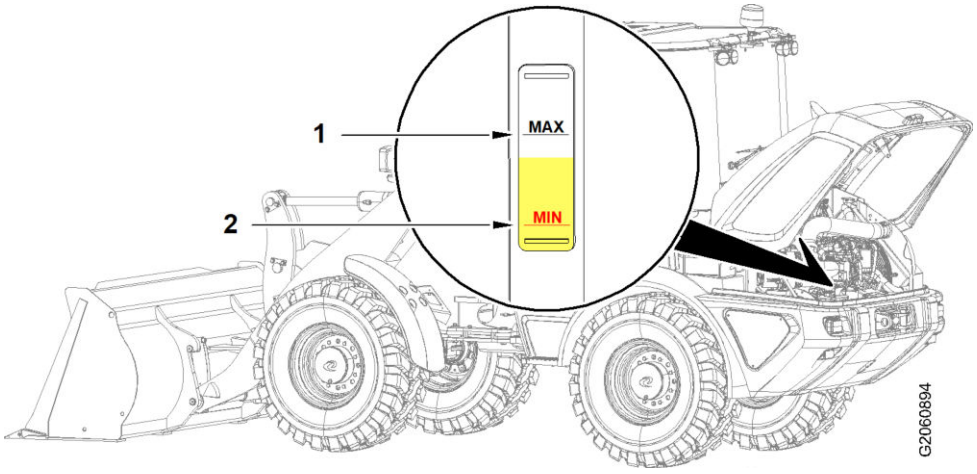

Fig. 332: Checking the oil level

1 Maximum oil level **2** Minimum oil level

Note
To check the oil level:

▶ Put the machine in maintenance position 1.

▶ Check the oil level.
  ▷ The oil level must be between the maximum **1** and minimum **2**.

If the oil level is below the minimum **2**:
▶ Top up with hydraulic oil. (For more information see: Topping up oil, page 235)

Troubleshooting
If oil is above maximum level **1**:

▶ Contact Liebherr customer service.

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Topping up oil

Note
To top up oil:

- ▶ Put the machine in maintenance position 1.
- ▶ Always pour in oil through return strainer.
- ▶ Oil specification:

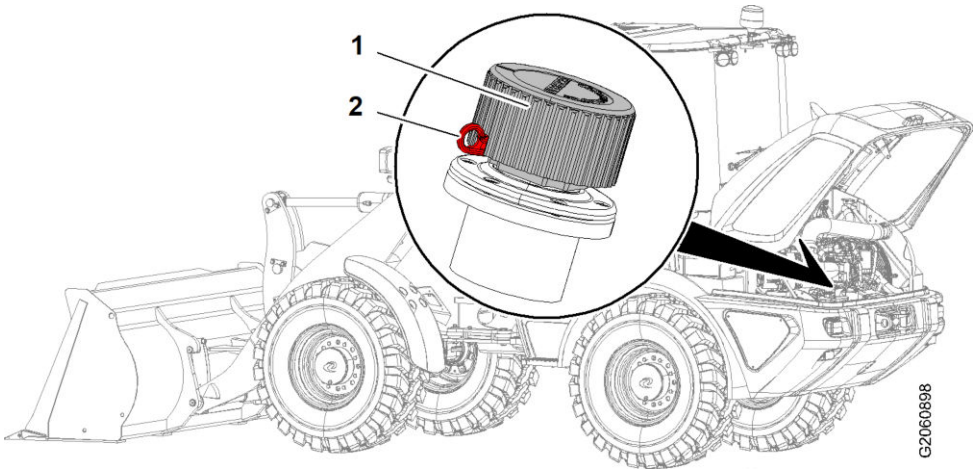

Fig. 333: Topping up the oil

1 Breather filter **2** Plug

- ▶ Insert connector **2** in breather filter **1**.
  ▷ Anti-twist device of breather filter **1** is released.
- ▶ Unscrew breather filter **1** from hydraulic tank.

NOTICE
Non-approved oil!
Damage to the hydraulic system.

- ▶ Only use oil that meets the Liebherr specifications.
- ▶ Do not mix different oils.

- ▶ Top up appropriate amount of hydraulic oil via filler strainer of breather filter **1**.
- ▶ Screw in breather filter **1**.
- ▶ Remove the plug **2** for protection against unauthorised opening, and keep it in a safe place.

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5.10 Steering system

5.10.1 Test steering

Make sure that following requirements are fulfilled:
- ❑ Working attachment is in transport position.
- ❑ Articulation lock is released.
- ❑ There is enough space to test the steering.

WARNING
Persons in hazard zone!
Injury.

▶ Make sure there is nobody in hazard zone.

▶ Start diesel engine.

▶ Without moving machine, turn steering in both directions and check that it is functioning properly.

5.10.2 Steering cylinder: lubricating bearing

Make sure that following requirements are fulfilled:
- ❑ Machine is in maintenance position 1.
- ❑ The lubricating point has been cleaned.

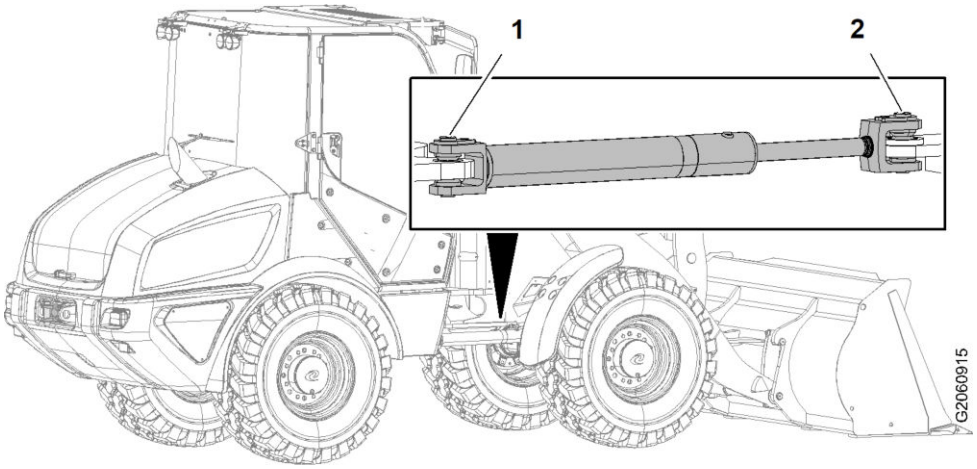

Fig. 334: Steering cylinder: lubricating bearing

1 Steering cylinder, piston side **2** Steering cylinder, ring side

▶ Take cap off grease fitting.

▶ Grease bearing of steering cylinder at lubricating points **1-2**.

▶ Put cap on grease fitting.

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5.11 Brake system

5.11.1 Checking oil level in brake system

Make sure that following requirements are met:
- ❑ Machine is in maintenance position 1.
- ❑ Service access is open.

Checking oil level

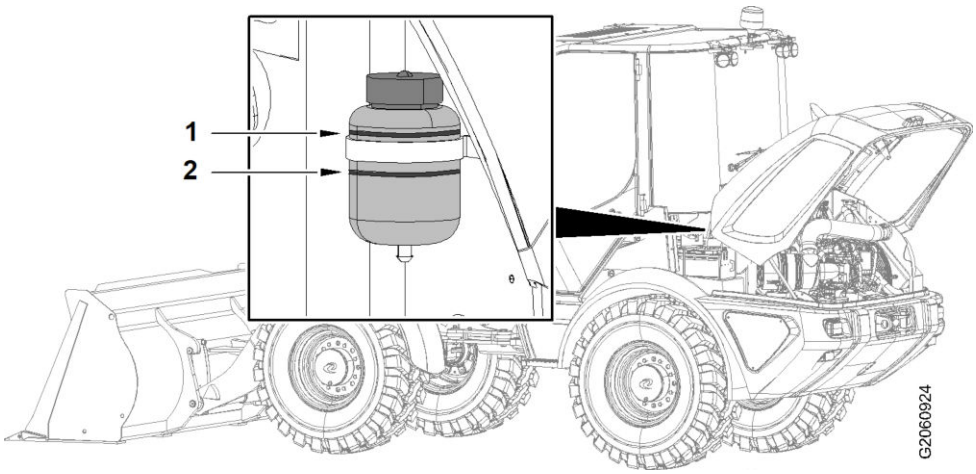

Fig. 335: Checking the oil level

1 Maximum oil level **2** Minimum oil level

▶ Check the oil level.
▷ The oil level must be between the maximum **1** and minimum **2**.

If the oil level is below the minimum **2**:
▶ Top up brake oil. (For more information see: Topping up oil, page 237)

Topping up oil

NOTICE
Non-approved oil.
Damage to the brake system.

▶ Ony use oil that meets the Liebherr specifications.

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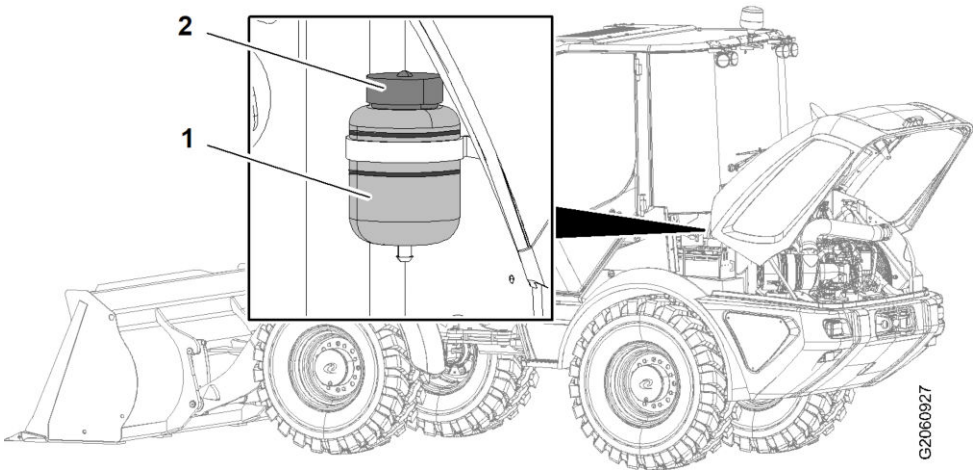

Fig. 336: Topping up oil

1 Equalising reservoir **2** Equalising reservoir cap

- ▶ Open cover **2** of equalising reservoir **1**.
- ▶ Top up appropriate amount of brake oil. (For more information see: 5.3.11 Brake oil, page 203)
- ▶ Clean cap **2**.
- ▶ Put cap **2** back onto equalising reservoir **1** and close it.

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5.12 Electrical system

5.12.1 Checking function of lighting and horn

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

All the lights can be tested without starting the machine.

WARNING
The working headlights can become hot!
Burns, fire.

▶ Observe the minimum interval of 1 m to persons and material.

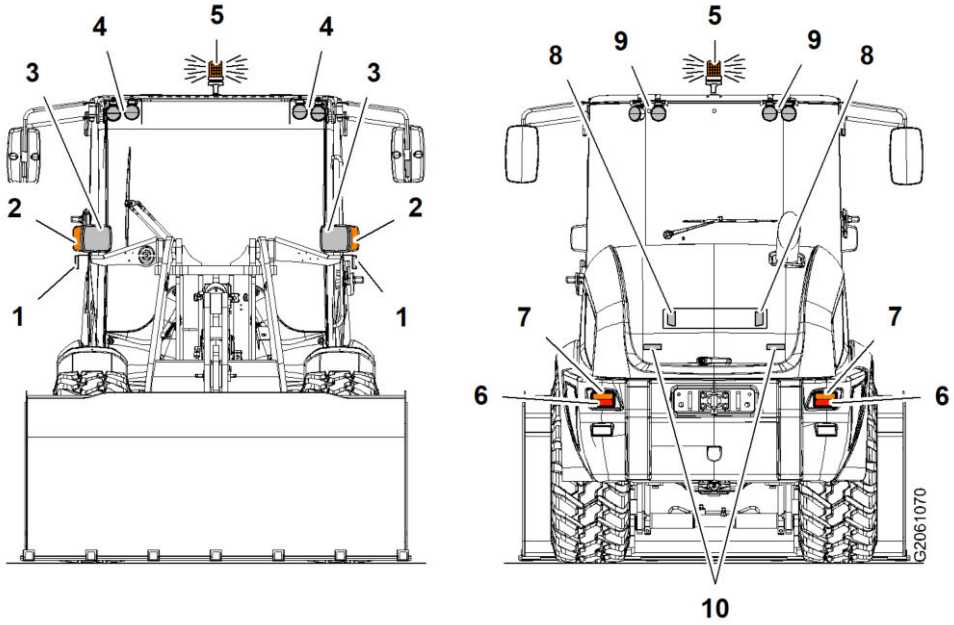

Fig. 337: Lighting

1	Marker lights (option)	**6**	Brake light, tail light
2	Front indicator light	**7**	Rear indicator light
3	Driving headlights	**8**	Licence plate light (option)
4	Front working headlights	**9**	Rear working headlight (option)
5	Flashing beacon (option)	**10**	Flash (option)

▶ Turn on all lights.

▶ Check all the lights work properly.

When checking brake lights:
▶ Press inching brake pedal.

If lights have to be adjusted or defective bulbs replaced:
▶ Contact Liebherr customer service.

▶ To check horn, sound it using button on steering-column switch. (For more information see: 3.2.12 Steering-column switch, page 77)

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5.13 Axles and drive shafts

5.13.1 Tyres: checking tyre pressure

Make sure the following preconditions are met:
- ❑ Machine is in maintenance position 1.
- ❑ You have the recommended tyre pressures from the manufacturer or dealer at hand.

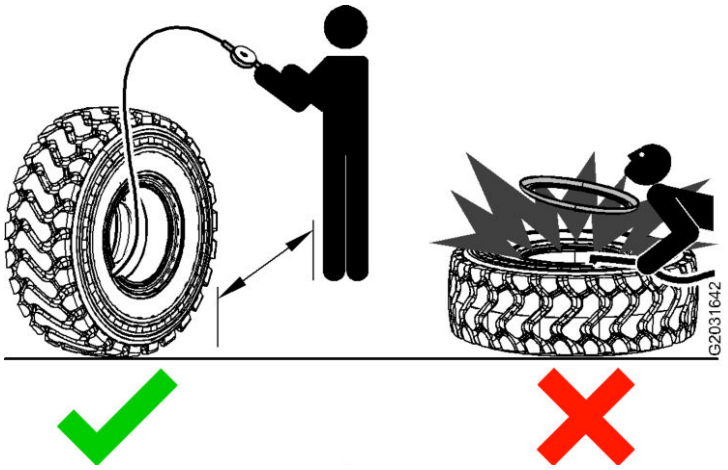

Fig. 338: Tyres: checking tyre pressure

DANGER
Tyre lock rings coming loose!
Fatal injury.

- ▶ Make sure there is no one in the danger area.
- ▶ Keep a safe distance to the side.
- ▶ Use a sufficiently long filling hose with a self-retaining valve.

- ▶ Check the tyre pressure.

If the tyre pressure is not correct:
- ▶ Correct the tyre pressure.

5.13.2 Checking wheel tightness

Make sure that following requirements are met:
- ❑ Machine is in maintenance position 1.

Make sure that following special tools are ready:
- ❑ A torque wrench with a measuring range of over 450 Nm is available.

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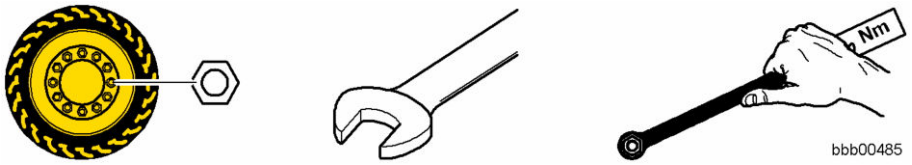

Fig. 339: Checking wheel tightness

Designation	Value
Spanner size	27 mm
Tightening torque	450 Nm

Tab. 78: Checking the wheel tightness

▶ Check that all the nuts on the four wheels have been tightened with the required torque.

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5.14 Steel parts of the basic machine

5.14.1 Lubricating articulated bearing

Make sure that following requirements are met:
- ❑ Machine is in maintenance position 1.
- ❑ Lubricating point has been cleaned.

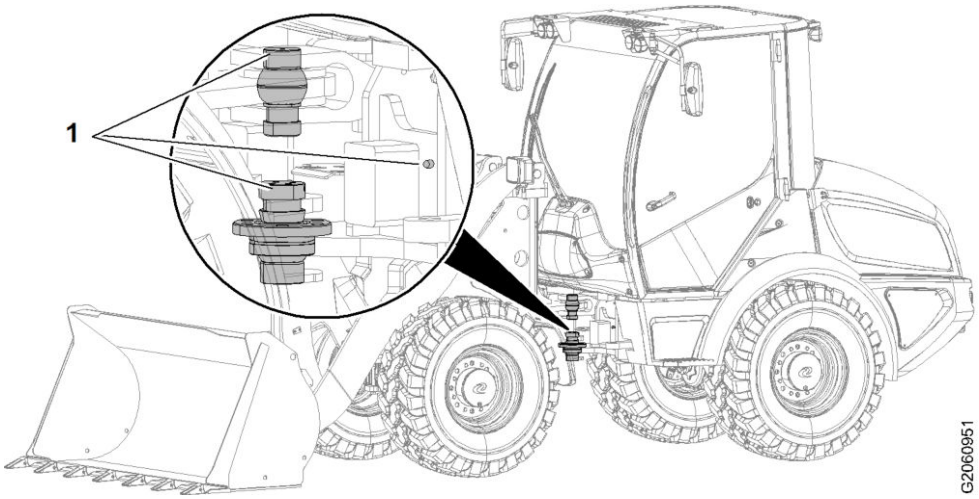

Fig. 340: Lubricating articulated bearing

1 Lubricating points on articulated bearing (3x)

▶ Take cap off grease fitting.

Lubricate the articulated bearing:

▶ Grease the rear axle oscillating bearing lubrication points **1**.

▶ Put cap on grease fitting.

5.14.2 Lubricating articulation stops

Make sure that following requirements are met:
- ❑ Machine is in maintenance position 1.

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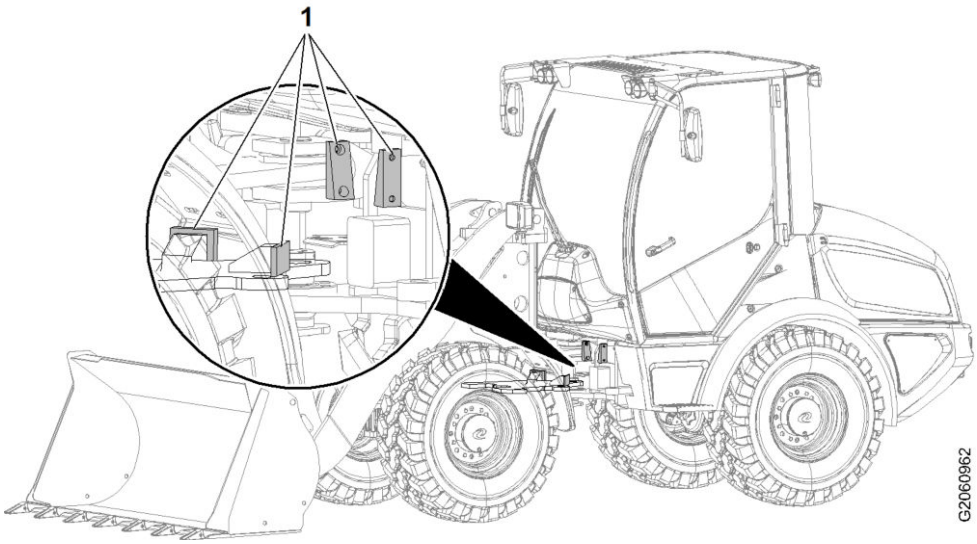

Fig. 341: Lubricating articulation stops

1 Articulation stops

▶ Lubricate articulation stops **1** with grease.

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5.15 Working attachment

5.15.1 Lubricating the lift arms and working attachment

For jobs that require daily cleaning, the lift arms and attachment must be lubricated every day.

Make sure that following requirements are fulfilled:
- ❑ Machine is in maintenance position 2.
- ❑ The working attachment is disconnected for lubricating points near the bucket coupling, which are difficult to access.
- ❑ The lubricating point has been cleaned.

Lubricating the lift arms

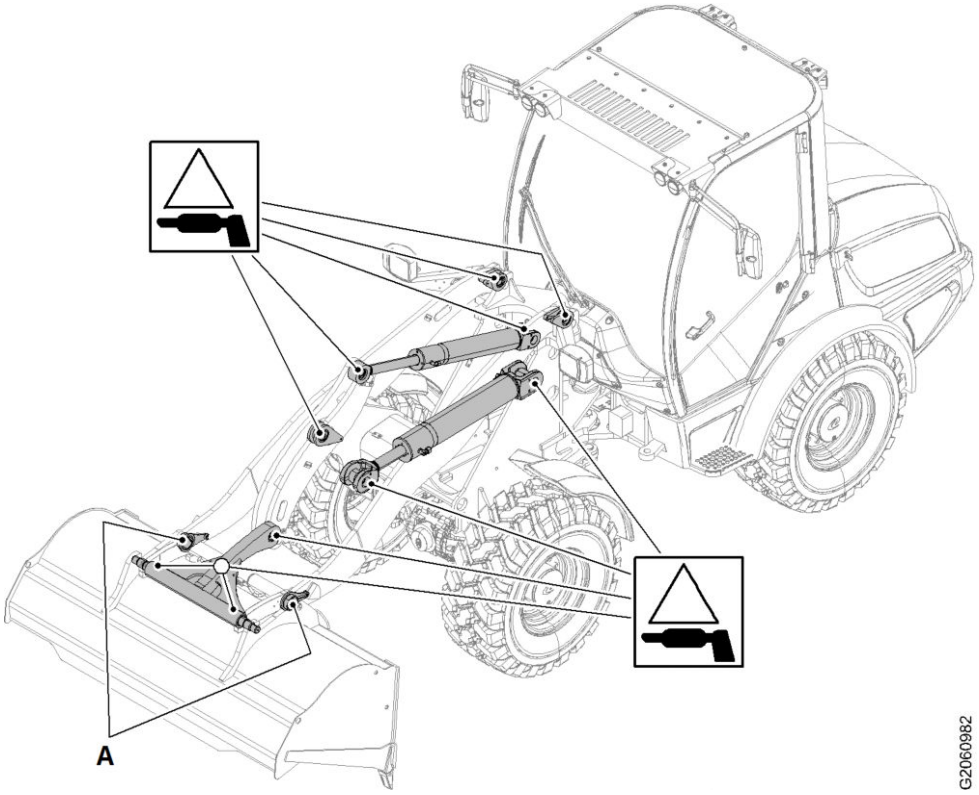

Fig. 342: Lubricating the lift arms

A Lower bucket bearing

▶ Take cap off grease fitting.

▶ Grease the lift arm bearings at the lubrication points.

▶ The lower bucket bearings **A** should be lubricated daily in accordance with requirements.

▶ Put cap on grease fitting.

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Lubricating the attachment

Note
Lubricate attachment.

- ▶ Ensure that the lubricating points are easy to access. Disconnect the attachment if necessary.
- ▶ For detailed information on the maintenance of non-Liebherr attachments, see the operator's manual from the manufacturer.

5.15.2 Quick coupler: checking function

Make sure the following preconditions are met:
- ❑ Diesel engine has started.
- ❑ The lift arms have been lowered.
- ❑ The working attachment is tilted in.

WARNING
Persons in hazard zone!
Injury.

- ▶ Make sure there is nobody in hazard zone.

- ▶ Unlock quick coupler and lock it again. (For more information see: 3.5 Fitting and removing the attachment, page 150)
  - ▷ This prevents the locking pins from jamming and preventing the quick coupler from being released.
- ▶ For safety reasons, check that quick coupler is locked again.

5.15.3 Cleaning LIKUFIX hydraulic coupling

This equipment is optional.

Make sure the following preconditions are met:
- ❑ Machine is in maintenance position 1.
- ❑ Working attachment is removed.

- ▶ Remove coarse dirt from the quick coupler.
- ▶ Clean all the hydraulic coupling parts as well as the sealing surfaces with a clean, oil-soaked cloth.
- ▶ After cleaning, apply some contact spray (Cramolin).

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5.16 Operator's cab, heating and air conditioning

5.16.1 Cleaning operator's cab air filter

Make sure that following requirements are fulfilled:
- ❑ Machine is in maintenance position 1.
- ❑ Suitable protective equipment is used.

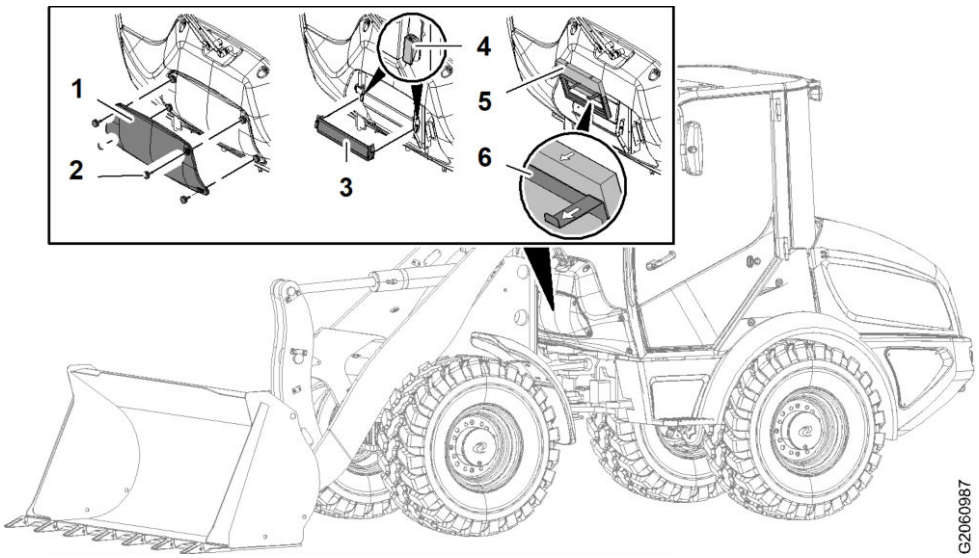

Fig. 343: Cleaning operator's cab air filter

1 Cover
2 Nut (4x)
3 Retaining plate
4 Fastening clip (2x)
5 Cab air filter
6 Filter holder

- ▶ Loosen and unscrew nut **2**.
- ▶ Take off cover **1**.
- ▶ Lift up fastening clip **4** to release them and remove retaining plate **3**.
- ▶ Pull out filter holder **6**.
- ▶ Take out cab air filter **5** and clean it (blow it out).
- ▶ Carefully clean out any dust in air filter duct. (Area behind filter must be completely clean.)
- ▶ Put clean cab air filter **5** into filter holder **6** making sure direction of arrow is correct.
- ▶ Push in filter holder **6**.
- ▶ Fit retaining plate **3** and close fastening clip **4**.
- ▶ Close cover **1**.
- ▶ Screw on and tighten nut **2**.

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5.16.2 Changing operator's cab air filter

Make sure that following requirements are met:
- ❑ Machine is in maintenance position 1.
- ❑ Suitable protective equipment is used.

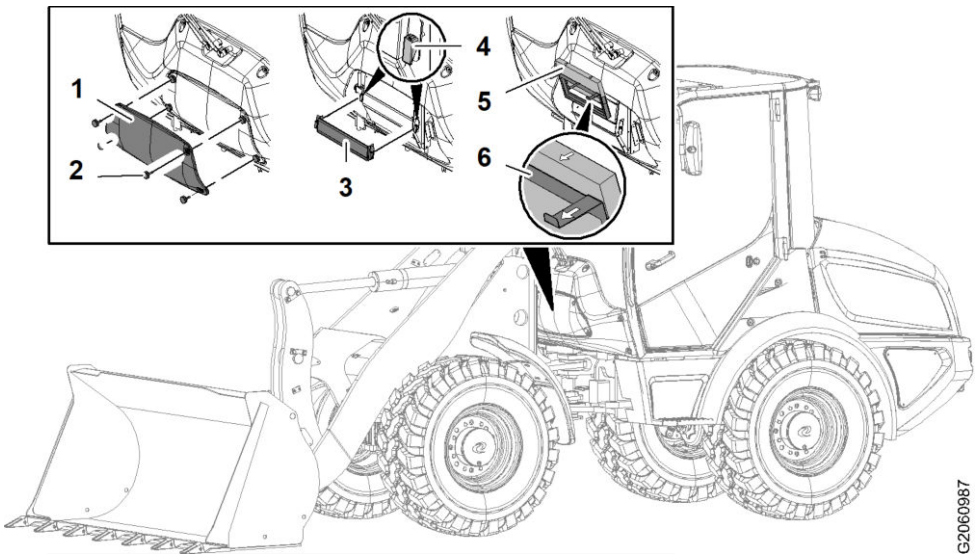

Fig. 344: Cleaning operator's cab air filter

1	Cover	**4**	Fastening clip (2x)
2	Nut (4x)	**5**	Cab air filter
3	Retaining plate	**6**	Filter holder

- ▶ Loosen and unscrew nut **2**.
- ▶ Take off cover **1**.
- ▶ Lift up fastening clip **4** to release them and remove retaining plate **3**.
- ▶ Pull out filter holder **6**.
- ▶ Take out cab air filter **5** and dispose of it.
- ▶ Carefully clean out any dust in air filter duct. (Area behind filter must be completely clean.)
- ▶ Put new cab air filter **5** into filter holder **6** making sure direction of arrow is correct.
- ▶ Push in filter holder **6**.
- ▶ Fit retaining plate **3** and close fastening clip **4**.
- ▶ Close cover **1**.
- ▶ Screw on and tighten nut **2**.

5.16.3 Windscreen washer system: filling windscreen washer fluid

Make sure that following requirements are fulfilled:
- ❑ Machine is in maintenance position 1.
- ❑ Service access is open.

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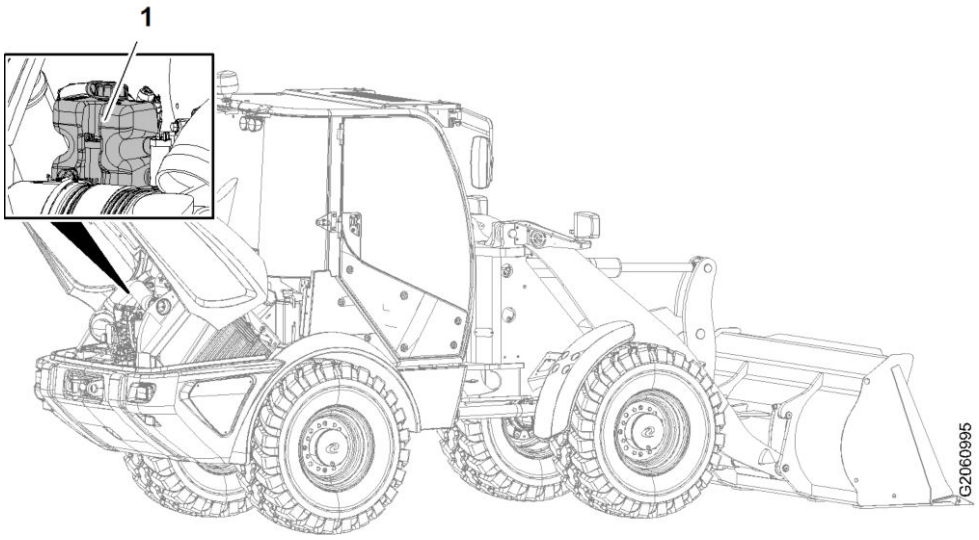

Fig. 345: Windscreen washer system: filling windscreen washer fluid

1 Cover

The filling quantity is approximately 1.5 l.

- ▶ Open cover **1** on the reservoir.
- ▶ Top up with standard windscreen washer fluid as necessary.
- ▶ Use commercial antifreeze windscreen washer.
- ▶ Add an appropriate quantity of antifreeze windscreen washer before the winter starts.

5.16.4 Operator's cab: cleaning and maintaining seals

Make sure that following requirements are fulfilled:
❑ Machine is in maintenance position 1.

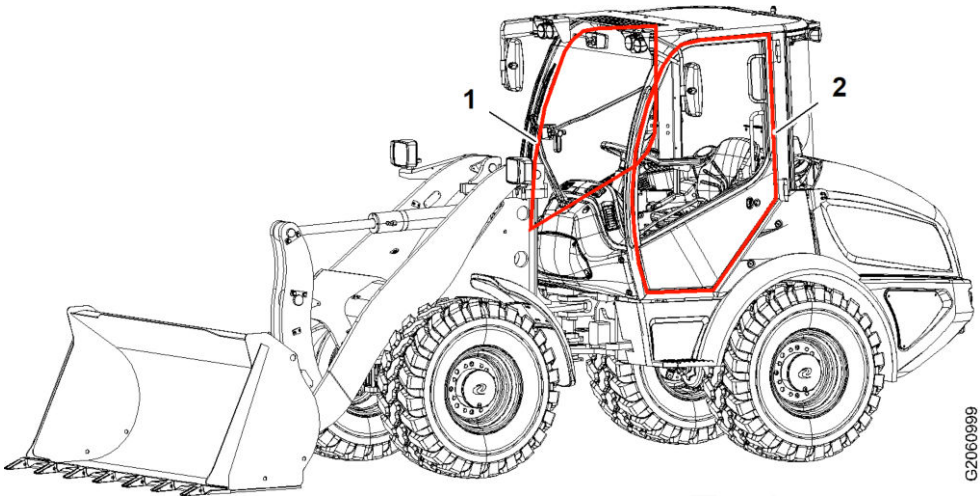

Fig. 346: Operator's cab: cleaning and maintaining seals

1 Right window seal **2** Cab door seal

- ▶ Wipe the seals **1** and **2** with a damp cloth.
- ▶ Spray seals **1** and **2** with silicon spray.

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5.16.5 Air conditioning: draining condensate

Make sure that following requirements are met:
❑ Machine is in maintenance position 1.

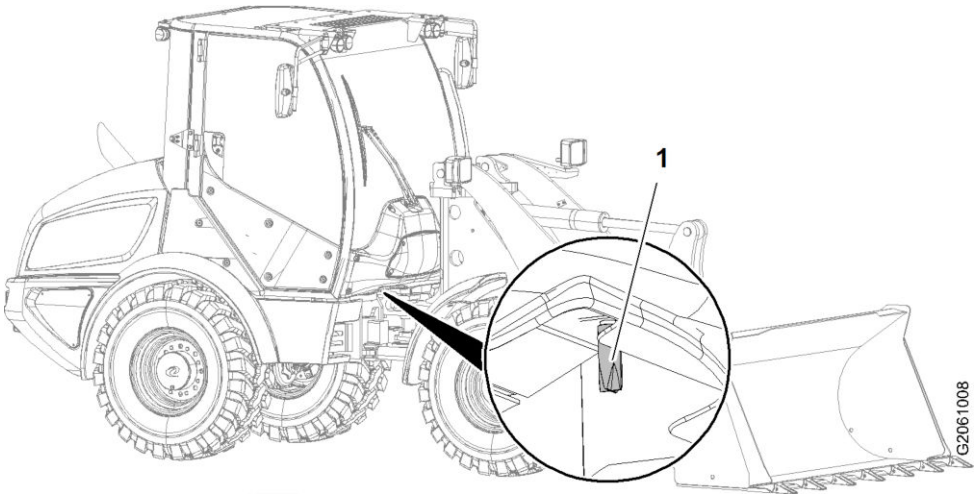

Fig. 347: Air conditioning: draining condensate

1 Water membrane

▶ Press the water membrane **1** on the air conditioning unit.
▷ This allows condensate to escape from the air conditioning unit.

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5.17 Lubrication system

5.17.1 Central lubrication system: checking level in grease reservoir

This equipment is optional.

Central lubrication system is attached to front section.

Make sure that following requirements are fulfilled:
❑ Machine is in maintenance position 1.

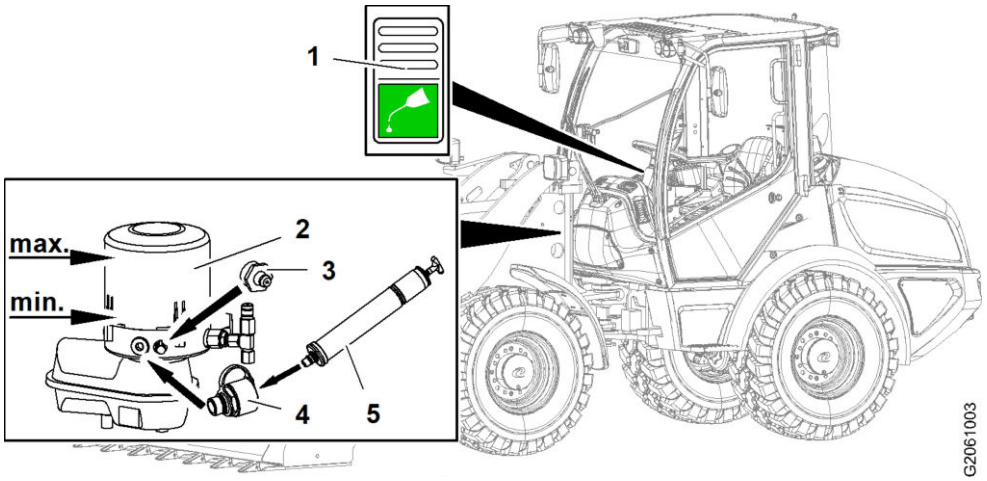

Fig. 348: Central lubrication system: checking level in grease reservoir

1 *Central lubrication system* button
2 Grease reservoir
3 Grease fitting
4 Filling coupling (fast filling)
5 Fast filling pump

▶ Visually check the level in the grease reservoir **2**.
▷ It must be within the minimum and maximum lubricant levels.

Note
Mixing of lubricant greases!
Malfunction in central lubrication system.

▶ Ensure proper miscibility of lubricant greases.

▶ If necessary, contact **Liebherr Lubricant Hotline**.

NOTICE
Dirty grease reservoir!
Damage to the central lubrication system.

▶ Pay attention to cleanliness when filling the grease reservoir.

To fill grease reservoir:
▶ Fill grease reservoir via grease fitting **3**.
or

for rapid filling, connect the fast filling pump **5** to the filling coupling **4**.

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5.17.2 Central lubrication system: checking pipes, hoses and lubrication points for leaks and damage.

This equipment is optional.

Make sure the following preconditions are met:
❑ Machine is in maintenance position 2.

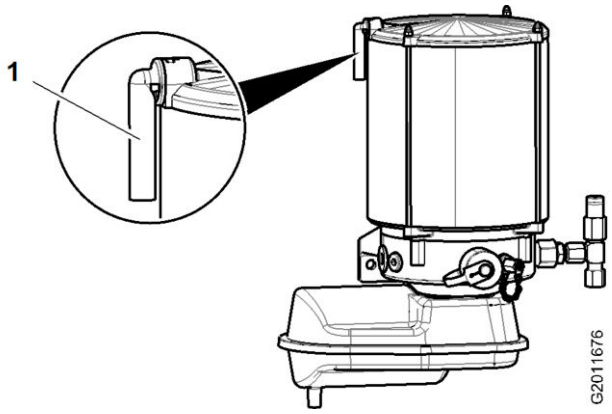

Fig. 349: Central lubrication system: checking pipes, hoses and lubrication points for leaks and damage.

1 Bleeder

▶ Check the bleed valve **1** on the central lubrication system for defects.

▶ Visually examine all pipes for defects.

If there are defects:
▶ Find the cause and rectify it.

5.17.3 Central lubrication system: checking lubrication of bearings

This equipment is optional.

Make sure the following preconditions are met:
❑ Machine is in maintenance position 2.

▶ Visually inspect whether metered quantities are adequate at bearing points.

NOTICE
Insufficient lubrication!
Damage to the bearings.

▶ Lubricate more often.

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