en **Operating manual**

Wheel loader

L 524-659

From serial number 23960

Document ID

	ORIGINAL OPERATING MANUAL
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Contents

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1.2 Technical data

1.2.1 Information on vibrations

Hand, arm and whole-body vibrations

The driver'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. Therefore, in order to precisely assess the driver's exposure to vibrations during an 8-hour working day, use the Liebherr brochure on whole-body vibrations and the special software. Both of these are available from Liebherr dealers or with the documentation CD (Liebherr Parts) supplied with each new machine.

(For more information see: 2.4.19 Protection against vibrations, page 62)

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 mode	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

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1.2.19 Snow chains or guard chains


bpik0044

This equipment is optional.

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

Note
Failure to do this can damage the drive system.

▶ (For more information see: 2.4.18 Attachments and accessories, page 62)

1.2.20 Tyres with foam

This equipment is optional.

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

If the tyres are filled with foam, the ballast needs to be modified. (For more information see: 1.2.17 Ballast, page 28)

Note
Installing or changing the working attachment or tyres.

▶ (For more information see: 2.4.18 Attachments and accessories, page 62)

1.2.21 Complete machine with Z kinematics


bpik0039

The values stated refer to the machine:

- In its standard version
- With Michelin 17.5R25 XHA tyres
- Including all lubricants
- With a full tank
- With ROPS/FOPS cab and driver

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

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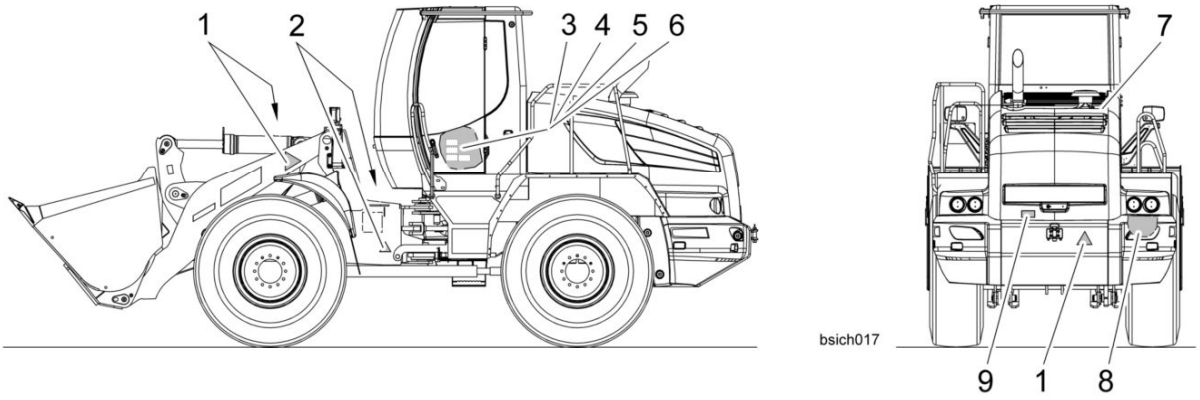

Fig. 31: Sign layout

1 *Working area* sign
2 *Articulation area* sign
3 *Accident prevention* sign
4 *Steering* sign
5 *ROPS/FOPS* sign
6 *Safety belt* sign
7 *Coolant* sign
8 *Voltage* sign
9 *Stationary engine* sign

Working area sign

Fig. 32: Working area sign

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

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

Articulation area sign

Fig. 33: 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 locked**

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- Maximum total weight
- Year of construction
- Maximum front axle load
- Maximum rear axle load
- Engine power
- Maximum speed
- Homolog. no. [34)]
- Maximum trailer weight [34)]

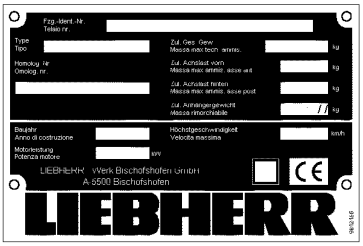

Fig. 60: Italian version of machine type plate

The stated maximum overall weight and axle loads refer to driving the machine on roads.

2.4 Safety instructions

2.4.1 General safety instructions

1. Familiarise yourself with the **“operating manual”** before starting up the machine.
   Make sure that you are in possession of and have read and understood additional instructions applicable to any special equipment installed on your machine.
2. Only expressly authorised personnel may operate, service or repair the machine.
   Observe the legal minimum ages.
3. Only trained or instructed personnel may operate the machine. Clearly assign responsibility for operation, rigging, maintenance and repair work.
4. Clearly establish the driver’s responsibilities (also with respect to traffic regulations) and authorise him to refuse to carry out unsafe instructions from third parties.
5. Personnel undergoing training, instruction or who are not yet fully qualified may only be allowed to work on the machine under constant supervision by an experienced person.
6. Now and again check that your personnel are working safely and are aware of possible dangers in observance of the **“operating manual”** .
7. Wear safe working clothes when working on the machine.
   Do not wear rings, wristwatches, ties, scarves, unbuttoned jackets, loose clothing or similar garments, as they can become caught in the machinery and cause injury.

[34)] Italian version only

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6. Lock all doors, covers and hoods on the machine.
7. Only allow experienced personnel to sling loads and direct crane drivers. The person giving directions must remain in sight of the operator or at least be in spoken contact with him.
8. Attach the lifting tackle to the lugs and bore holes provided on the machine.
9. Make sure the lifting tackle is long enough.
10. Carefully lift the machine.
11. **NOTICE! Keep out from under the machine when it is raised.**
12. When restarting the machine, proceed strictly according to the **"operating manual"** .

2.4.16 Safe maintenance of hydraulic hoses and hose lines

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

   Criteria:
   - Damage to the outer layer penetrating to the inner layer (e.g. abrasion, cuts and cracks)
   - Embrittlement of the outer layer (cracks in the hose material)
   - Deformation of the natural shape of the hose or the hose line, both when pressurised and depressurised, or at bends, e.g. layer separation, blistering
   - Leaks
   - Failure to observe installation requirements
   - Damage or deformation of the hose fittings, which reduces the strength of the fittings or the connection between the fitting and the hose
   - Slippage of the hose out of the fitting
   - Corrosion of the fitting, impairing its function and strength
   - Exceeded storage time or service life
8. Only use genuine spare parts to replace hoses and hose lines.
9. Lay and fit hoses and hose lines in the proper manner. Do not switch the connections.

2.4.17 Roll-over protection structure (ROPS) and falling object protection structure (FOPS)

The machine is equipped with a cab that is designed to protect the driver in the event of rolling over (ROPS) and falling objects (FOPS).

Preventing accidents

Depending on the job and the way the machine is operated, hazards can arise even when the protective apparatus is intact. Avoid all unsafe working practices.

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Opening the hinged window

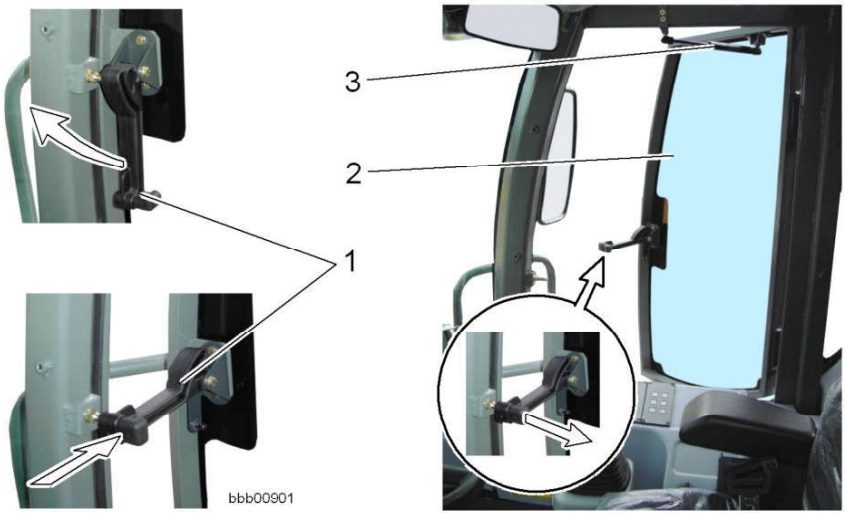

Fig. 68: Opening and closing the hinged window

1 Window opener lever
2 Hinged window
3 Gas-filled spring

▶ Push up the lever **1** until it locks into place.

To further open the hinged window:

▶ Release the lever **1** from the retaining pin and let it go.
▷ The gas-filled spring **3** opens the window.

Closing the hinged window

▶ Guide the lever **1** (see: fig. 68, page 71) over the retainer and push the hinged window down until it is closed.

3.2.5 Emergency exit

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The right window (hinged window) is designed as an emergency exit and should be used as such in an emergency situation.

An emergency hammer is installed in the driver's cab for breaking the windows. Before starting the machine, make sure there is an emergency hammer in the driver's cab.

Note
If it is not possible to safely leave the cab through the entry or hinged window in an emergency situation:

▶ Break the hinged window or rear window with the emergency hammer and leave the driver's cab!

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Adjusting the back rest inclination

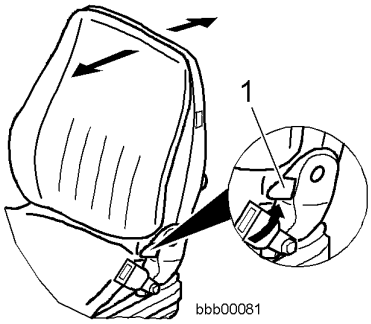

Fig. 88: Adjusting the back rest inclination

1 Lever for back rest inclination adjustment

- ▶ Raise the lever **1**.
- ▶ Move the back rest to the angle required.
- ▶ Let go of the lever **1**.

Activating and deactivating horizontal suspension on the driver's seat

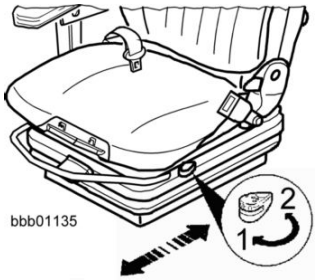

Fig. 89: Activating and deactivating horizontal suspension on the driver's seat

1 Horizontal suspension deactivated **2** Horizontal suspension activated

Under certain conditions you can increase comfort by activating the horizontal suspension.

Advantage: the driver's seat can better absorb shocks in the direction of travel.

- ▶ Position **1** = off
- ▶ Position **2** = on

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3.2.9 Seat belt

Safety aspects of the seat belt

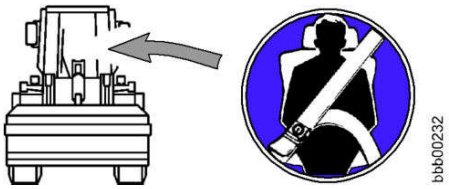

Fig. 106: Always wear a seat belt

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

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

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

WARNING
There is a risk of injuries if the seat belt is not fastened.
If the machine tips or rolls over, the driver could suffer fatal injuries if he is not wearing a safety belt.
If the machine is braked or stops abruptly, the driver may suffer severe injuries if he is not wearing a safety belt.

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

To guarantee your safety,

▶ Regularly check the condition, function and fastening of the seat belt.

▶ Immediately replace damaged parts.

▶ Do not twist the seat belt.

Fastening the seat belt

The seat belt is an automatic belt.

You do not need to adjust the belt length.

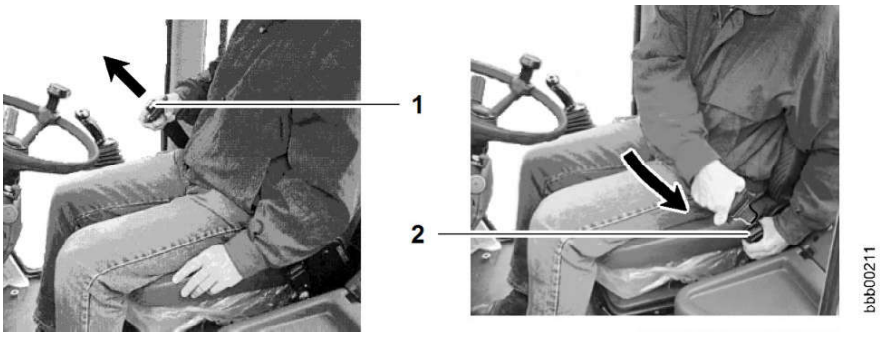

Fig. 107: Fastening the seat belt

1 Belt buckle

2 Snap lock

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▶ Move switch **2** to pos. **a**.
▷ The rear working floodlights are switched on.

▶ Move switch **2** to pos. **b**.
▷ The rear working floodlights are switched off.

Switching on the indicators

Ensure that the vehicle electrical system is switched on.

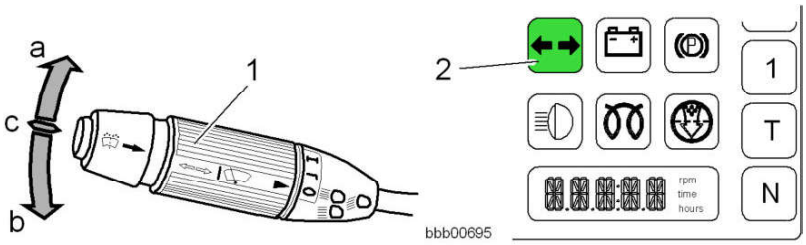

Fig. 121: Switching on the indicators

1 Stalk switch
2 Symbol field - indicators
a right indicators
b left indicators

▶ Move the steering column switch **1** in the **a** direction.
▷ The symbol field **2** flashes
▷ The right-hand indicators are switched on.

▶ Move the steering column switch **1** in the **b** direction.
▷ The symbol field **2** flashes
▷ The left-hand indicators are switched on.

Switching the flashing beacon on/off

This equipment is optional.

The switch for the working floodlights remains operational, even if the starting key has been removed.

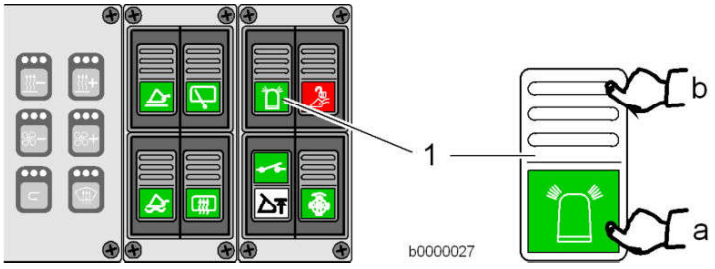

Fig. 122: Switching the flashing beacon on/off

1 Flashing beacon
a Switching on the flashing beacon
b Switching off the flashing beacon

Switching on the flashing beacon:

▶ Move switch **1** to pos. **a**.
▷ The flashing beacon is switched on.

Switching off the flashing beacon:

▶ Move switch **1** to pos. **b**.
▷ The flashing beacon is switched off.

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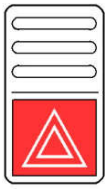
Hazard warning system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Hazard warning system switch

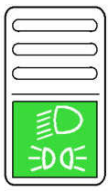
Field colour - red

Switches the hazard warning system on and off.

When you press the switch:
– The hazard warning system field flashes and all the hazard lights on the machine flash.
– The hazard warning system field goes out and all the hazard lights on the machine go out.

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

Profile lights and low beam

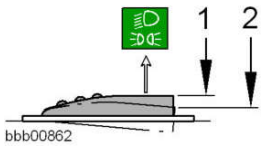


Profile lights and low beam switch

Field colour - green

Profile light function - switch/position 1
– Switches the profile lights on and off.

When you move the switch to position **1**, the following lights on the machine should light up:
- Left/right driving headlight (profile light)
- Left/right tail light



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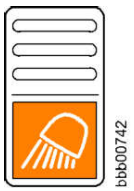
The profile lights also work when the ignition key is removed.

Low beam function - switch/position 2
– Switches low beam on and off.

When you move the switch to position **2**, the following lights on the machine should light up:
- Left/right driving headlight (low beam)
- Left/right tail light

Low beam is operational in starting key position **- I -** or **- II -**.

Front working floodlights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Front working floodlight switch

Field colour - orange

Switches the front working floodlights on and off.

When you press the button, the front working floodlights light up or go out.

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

Rear working floodlights

This equipment is optional.

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Head-level air distribution

Head-level air distribution button

For opening and closing the air distribution flaps.

Head-level air distribution.

When you press the button for the first time:
– Function ON
– All three LEDs on the button light up.
– The flaps are open

When you press the button a second time:
– Function OFF
– All three LEDs on the button go out.
– The flaps are closed

The air distribution can also be combined.

When a flap position is activated, the 3 corresponding LEDs light up.

Note
The setting remains stored after the ignition is switched off.

▶ This means the function is active when the ignition is switched on again.

Foot-level air distribution

Foot level air distribution button

For opening and closing the air distribution flaps.

Foot-level air distribution.

When you press the button for the first time:
– Function ON
– All three LEDs on the button light up.
– The flaps are open

When you press the button a second time:
– Function OFF
– All three LEDs on the button go out.
– The flaps are closed

The air distribution can also be combined.

When a flap position is activated, the 3 corresponding LEDs light up.

Note
The setting remains stored after the ignition is switched off.

▶ This means the function is active when the ignition is switched on again.

Mid-level air distribution

Mid-level air distribution button

For opening and closing the air distribution flaps.

Mid-level air distribution.

When you press the button for the first time:
– Function ON
– All three LEDs on the button light up.

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Selecting the air distribution

The air distribution can be set individually.

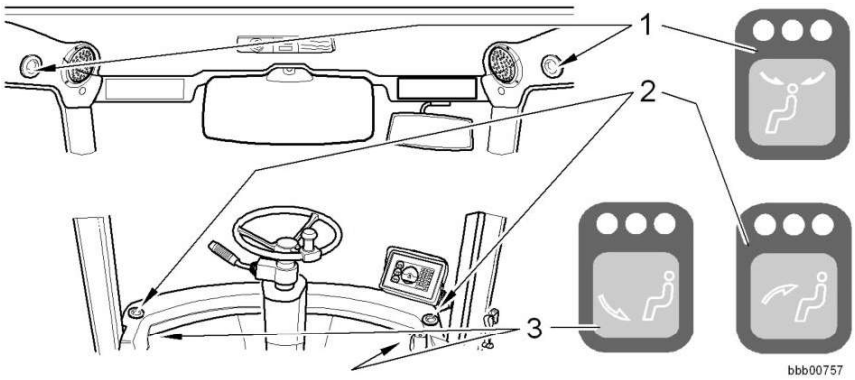

Fig. 219: Selecting the air distribution

1 Head level air distribution button
2 Mid-level air distribution button
3 Foot level air distribution button

To select the air distribution:

▶ Press the corresponding air distribution button.
▷ The air distribution can also be combined.

Recirculated air mode

You can temporarily shut off the fresh air supply if there are unpleasant smells outside. The air inside the cab is recirculated.

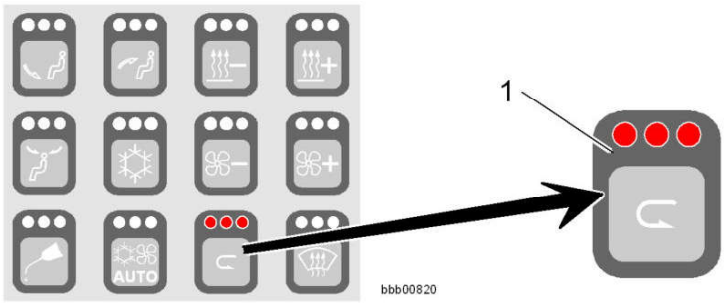

Fig. 220: Recirculated air mode

1 Recirculated air button

To activate recirculated air mode:

▶ Press the button **1**.
▷ All three LEDs on the button light up.
▷ The air inside the cab is recirculated.

To deactivate recirculated air mode:

▶ Press the button **1**.
▷ All three LEDs on the button go out.
▷ Fresh air supply is activated.

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Using the front windscreen wiper and washer system

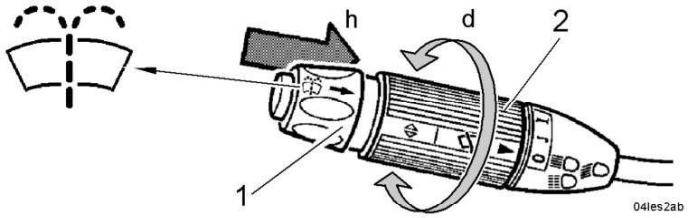

Fig. 234: Steering column switch

1	Button	**d**	Windscreen wiper activation
2	Handle	**h**	Windscreen wiper and washer system activation

To wipe the window:

▶ Turn the handle **2** to the required position **J – I**.

To wash the window:

▶ Press the button **1** on the steering column switch.
▷ Washer fluid is sprayed onto the front windscreen through the outlet nozzles.

Using the rear windscreen wiper and washer system

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

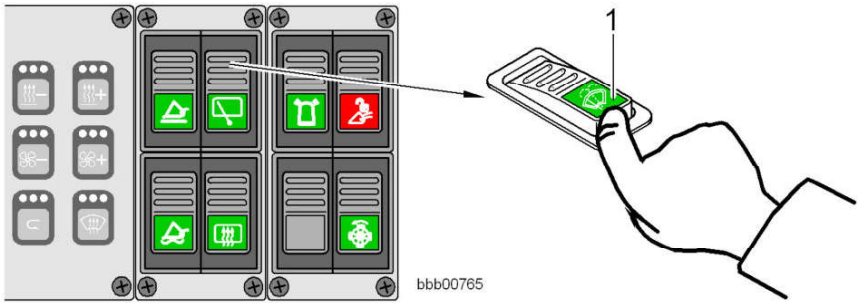

Fig. 235: Switches on the side console

1	Rear windscreen wiper and washer system switch

To wipe the window:

▶ Press the switch **1** once.
▷ The rear window wiper is activated.

To wash and wipe the window:

▶ Press the switch **1** a second time and hold it down.
▷ Washer fluid is sprayed onto the rear windscreen through an outlet nozzle.

To switch off the windscreen washer system:

▶ Release the switch **1** .

To switch off the windscreen wiper:

▶ Press the back of the switch **1** .

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3.3 Operation

3.3.1 Daily start-up

Ensure that:
- ❑ The maintenance tasks to be carried out daily or every 10 service hours have been performed (For more information see: 5.1 Maintenance and inspection schedule, page 265) .
- ❑ Enough diesel fuel is available for the daily workload (For more information see: Refuelling with diesel fuel, page 152) .

Operating position

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

Switch on the battery main switch

The battery main switch is located on the right-hand side rear of the engine compartment.

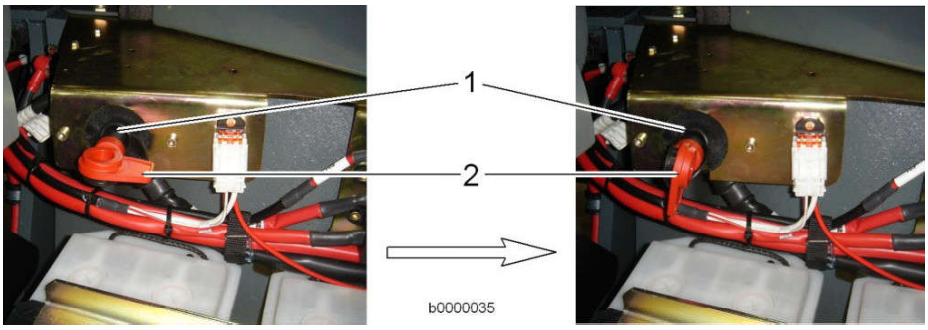

Fig. 249: Switch on the battery main switch

1 Battery main switch **2** Key

▶ Switch on the battery main switch **1** using the key **2**.

Closing the service doors, hatches and hoods

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

Release the articulation lock

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

▶ Release the articulation lock.

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Overspeed protection

When the machine reaches the maximum speed for the travel range, the travel hydraulic pump flow is reduced. The machine is braked hydrostatically.

CAUTION
When driving down a steep slope recklessly or too fast, the engine and the variable displacement motors can overspeed.

▶ Avoid driving downhill too fast.

Driving on a downhill slope

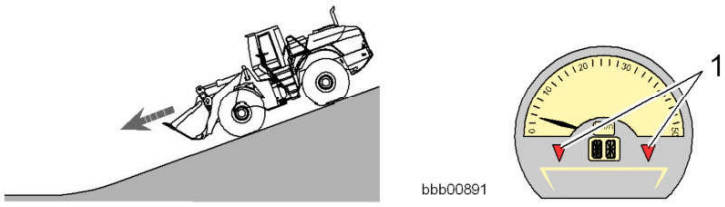

Fig. 272: Driving on a downhill slope

1 Overspeed protection indicator

If the machine exceeds the maximum road speed when driving downhill, the following warning message is activated:
– The overspeed protection indicator **1** flashes.
– This is accompanied by a continuous tone.

Note
If you see the “overspeed protection indicator” and hear the “additional warning tone”!

▶ Slow down immediately!

▶ Slow down using the brake pedal.

Driving with the Vmax (Tempomat) function

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

This function is only available in automatic travel range **A1-2**.

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

Turning off the battery main switch

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

If you are leaving the machine unattended:

NOTICE
Risk of damage to the electrical system.

▶ Never switch off the battery main switch if the engine is running.

(For more information see: 5.4.4 Switch off the battery main switch, page 291)

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

▶ Remove the battery main switch to protect the machine from unauthorised use.

Securing the machine

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

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

▶ Secure the machine against rolling away.

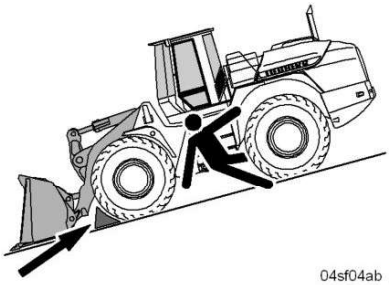

Fig. 291: Downhill slope

▶ Take the wedges out of their holders.

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

Parking position

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

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NOTICE
There is a risk of damage to the diesel particulate filter and engine.
If the machine idles for prolonged periods or is run in the lower load range, the maximum counterpressure may be exceeded.

▶ Run the machine in the higher load range.

Exhaust counterpressure monitor

Note
With turbo engines, the counterpressure may not exceed 200 mbar.

▶ The display and control unit indicates excessive levels with visible and audible signals.

Display and control unit:

Make sure that the electrical system is switched on or the engine is started.

Fig. 311: Display and control unit

1	Display and control unit	**3**	Reset button
2	Display	**4**	Diagnostic plug

To activate the display:

▶ Press the reset button **3**.
Possible displays:
- ▷ Exhaust counterpressure (mbar)
- ▷ Exhaust temperature (°C)
- ▷ Type / version
- ▷ Serial number
- ▷ Date / time
- ▷ Filter loading (%)

Language selection:

▶ Press the reset button **3** for about 10 seconds.
There are several languages available for the display:
- ▷ German
- ▷ English
- ▷ French
- ▷ Italian

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3.4 Working methods

This section describes the routine working methods.

3.4.1 Picking up and moving material

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

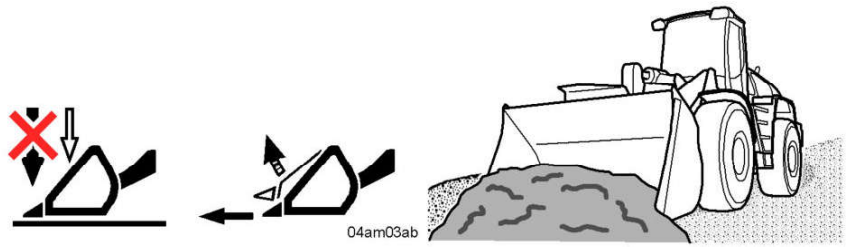

Fig. 320: Picking up and moving material

▶ Do not work with a strong downwards pressure on the bucket.

If you need to help the bucket penetrate the material:

▶ Gently tip the bucket up and down while driving into the material.

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

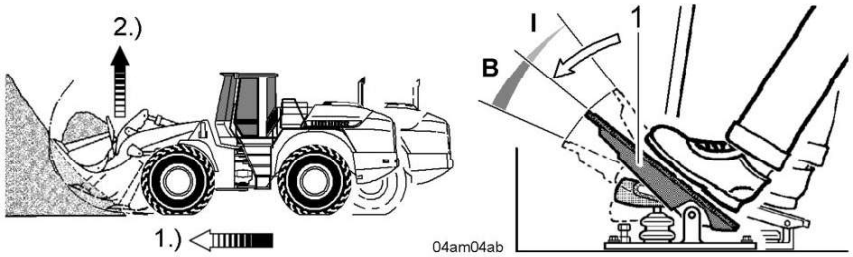

Fig. 321: Power distribution by inching

1 Inch/brake pedal
I Inching range
B Braking range

▶ Also press down the inch/brake pedal **1** in range **I** with the required force.
The power is adjusted:
▷ 1.) The power of the travel hydraulics is reduced.
▷ 2.) The power of the working attachment is reduced.
Power adjustment has the following advantages:
▷ The wheels no longer spin
▷ The fuel consumption is reduced.

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Fig. 340: Dumping

▶ Tip out the bucket.

NOTICE
There is a risk of damage to the machine.
Unnecessary jolting when tipping up and down against the bucket arm stops can increase wear on the bolts and bushings on the lift arms.

▶ Avoid unnecessary jolting.

To loosen material adhering to the bucket:

▶ Quickly tilt the bucket in and out, briefly jolting against the bucket arm stops.

Moving the machine back

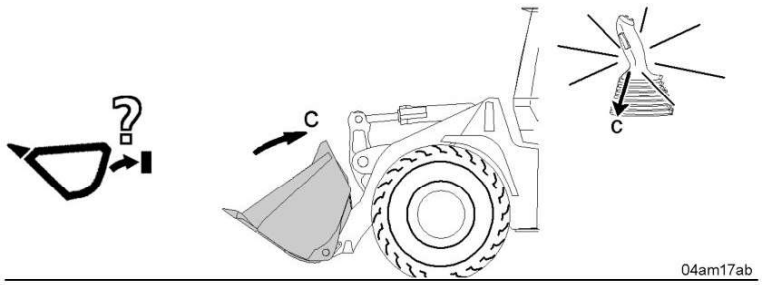

Fig. 341: Bucket position

NOTICE
There is a risk of damage to the machine.
Unnecessary jolting when tipping up and down against the bucket arm stops can increase wear on the bolts and bushings on the lift arms.

▶ Avoid unnecessary jolting.

▶ Tilt the bucket in.

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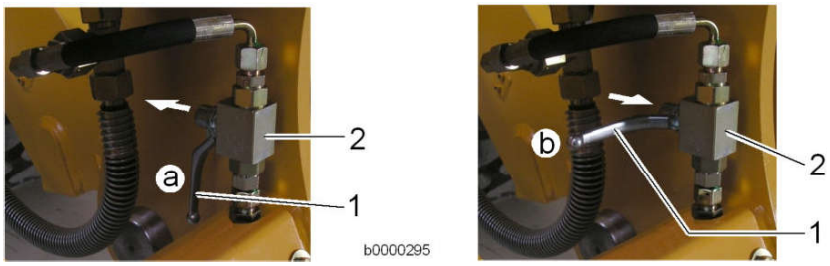

Fig. 360: Deactivating the quick-change device

1	Switch lever	**a**	Lever position when the quick-change device is activated
2	Changeover valve	**b**	Lever position when the quick-change device is deactivated

▶ Pull the switch lever **1** out of the twist lock, turn it to position **b** and engage it in the twist lock again.
▷ The function for unlocking the quick-change device is thus disabled.

Connecting the hydraulic lines

If the working attachment has an independent hydraulic circuit, the hydraulic supply lines must be connected.

WARNING
There is a risk of accidents from pressurised hydraulic lines.

▶ Depressurise the hydraulic circuits before connecting or disconnecting hydraulic lines and couplings.

▶ Depressurise the hydraulics (For more information see: Depressurising the hydraulics, page 206) .

▶ Take the caps off the line couplings.

▶ Connect the hydraulic lines according to their function.

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

▶ Check the hydraulic lines for leaks after connecting them.

▶ Check the connected working attachment is working properly.

3.5.2 Electro-hydraulically actuated quick-change device

This equipment is optional.

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Comfort control

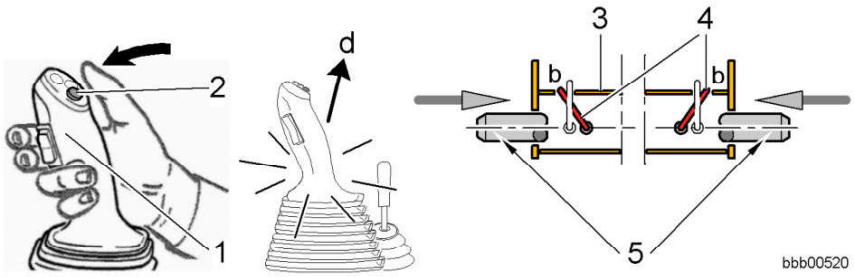

Fig. 372: Unlocking the working attachment - Comfort control

1 LH control lever
2 *Comfort control* button
3 Quick-change device
4 Mechanical indicator
5 Locking pins
b Unlocked position
d Direction of movement

▶ Press and hold the button **2**.
▷ Press the button **2** to disable the function for operating the lift and tilt cylinders.

▶ By moving the LH control lever **1** in direction **- d -** (to tilt out the working attachment) to the stop and keep it in this position.
▷ The pins **5** for the quick-change device **3** are retracted.

When the pins are completely retracted:

▶ Release the button **2** and the LH control lever **1** again.
▷ Release the button **2** to enable the function for operating the lift and tilt cylinders again.
▷ The working attachment is unlocked.

Button control

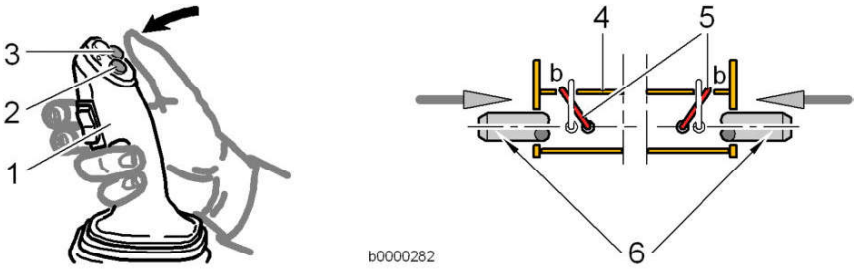

Fig. 373: Unlocking the working attachment using button control

1 LH control lever
2 *Pins retract* button
3 *Pins extend* button
4 Quick-change device
5 Mechanical indicator
6 Locking pins
b Unlocked position

▶ Press and hold the button **2**.
▷ The pins **6** for the quick-change device **4** are retracted.

When the pins are completely retracted:

▶ Release the button **2** again.
▷ The working attachment is unlocked.

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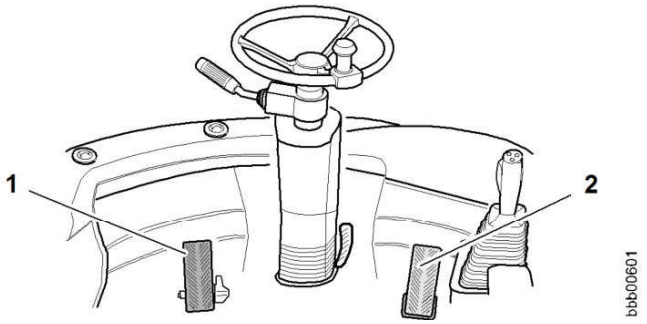

Fig. 388: Inch/brake pedal and gas pedal

1 Inch/brake pedal **2** Gas pedal

▶ Stop the machine.

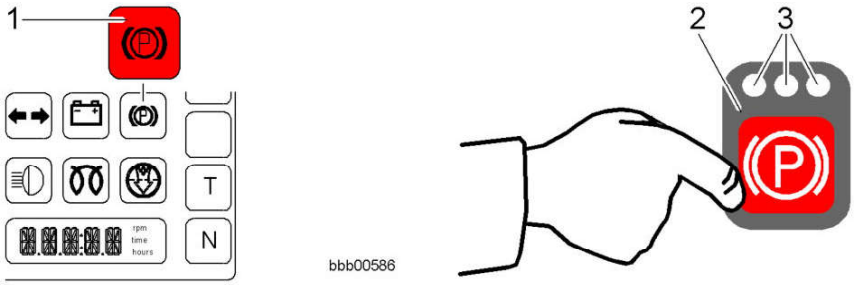

Fig. 389: Parking brake

▶ Engage the parking brake.

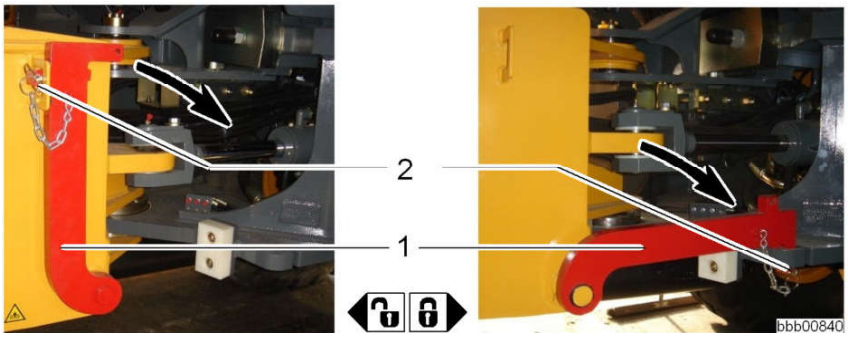

Fig. 390: Articulation lock open / closed

▶ Engage the articulation lock.

▶ Move the locking bar **1** to the bottom position.

▶ Secure the locking bar with the spring clip **2**.

▶ Lower the lift arms and lay the bucket down flat on the loading area.

▶ Turn off the engine.

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

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- ▶ First connect one jump lead to the positive terminal **3** of the flat battery and then to the positive terminal **1** of the external battery.
- ▶ Connect the second jump lead first to the negative terminal **2** of the external battery and then to the negative terminal **4** of the flat battery.
- ▶ Start the engine.

To disconnect the external battery:

Excess voltage can be avoided by switching on major consumers such as headlights.

Note
Before disconnecting the jump leads:

- ▶ Make sure the engine is at the lower idling speed.

- ▶ First disconnect the jump lead from the negative terminal **4** of the flat battery and then from the negative terminal **2** on the external battery.
- ▶ Then remove the second jump lead from the positive terminal **1** of the discharged battery and then from the positive terminal **3** of the external battery.

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Service code	Effect	Cause	Remedy
E5032	Engine shifts to neutral and the driver cannot select a travel direction after the speed is lowered	Variable displacement motor 1 speed sensor: overspeed	Contact LIEBHERR CUSTOMER SERVICE
E5035	Travel direction selection cannot be clearly detected	Travel direction switch: invalid switching condition	Contact LIEBHERR CUSTOMER SERVICE
E503A	The motor retains the old value	Variable displacement motor balance 2 maximum current too low	Contact LIEBHERR CUSTOMER SERVICE
E503B	The motor retains the old value	Variable displacement motor balance 2 maximum current too high	Contact LIEBHERR CUSTOMER SERVICE
E503C	The motor retains the old value	Variable displacement motor balance 2 minimum current too high	Contact LIEBHERR CUSTOMER SERVICE
E503D	The motor retains the old value	Variable displacement motor balance 2 minimum current too low	Contact LIEBHERR CUSTOMER SERVICE
E504D	Fixed gear 1 is engaged	Difference between variable displacement motor speed 2 and output speed in 1st and 2nd gear	Contact LIEBHERR CUSTOMER SERVICE
E504E	Fixed gear 1 is engaged	Engine speed 2 in 3rd gear	Contact LIEBHERR CUSTOMER SERVICE
E5052	Always shown with an additional error code (travel range restricted)	Gear changed for safety reasons	Depends on error - (see additional service code in error memory)
E5053	Always shown with an additional error code (travel range restricted)	Gear blocked due to error	Depends on error - (see additional service code in error memory)
E505F	Block curve calibration activated	Automatic engine speed setpoint activated for block curve calibration	None
E5066	Fixed gear 1 is engaged	Cardan shaft: overspeed	Reduce speed
E5068	Travel direction switched to neutral	Clutch not closed (in 1st and 2nd gear)	Contact LIEBHERR CUSTOMER SERVICE
E6000	Coolant temperature symbol field flashes and the STOP symbol field lights up, the continuous warning buzzer sounds	Coolant temperature above 100 °C for longer than 3 seconds	Clean the cooling system, contact LIEBHERR CUSTOMER SERVICE
E6001	Warning buzzer with intermittent tone, reduced engine power	Charge air temperature above 75 °C for longer than 3 seconds	Clean the cooling system, contact LIEBHERR CUSTOMER SERVICE

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Fuse	Value	Unit	Designation/function	Position
F01	100	A	Main fuse	Rear right of engine compartment
F02	100	A	Preglow	Rear right of engine compartment
F03	200	A	Emergency steering pump	Rear right of engine compartment

Tab. 27: Assignment of Mega fuses

▶ Remove the cover of the fuse box.

▶ Take out the defective fuse and replace it with a new one with the same rating.

Fuses in the driver's cab

The plug-in fuses are in the fuse box to the left of the driver's seat.

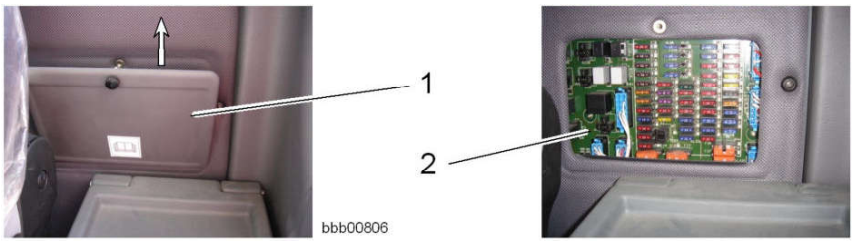

Fig. 408: Fuses with control board

1 Fuse box cover **2** Control board with fuses

▶ Remove the cover.

▶ Identify the defective fuse using the table below.

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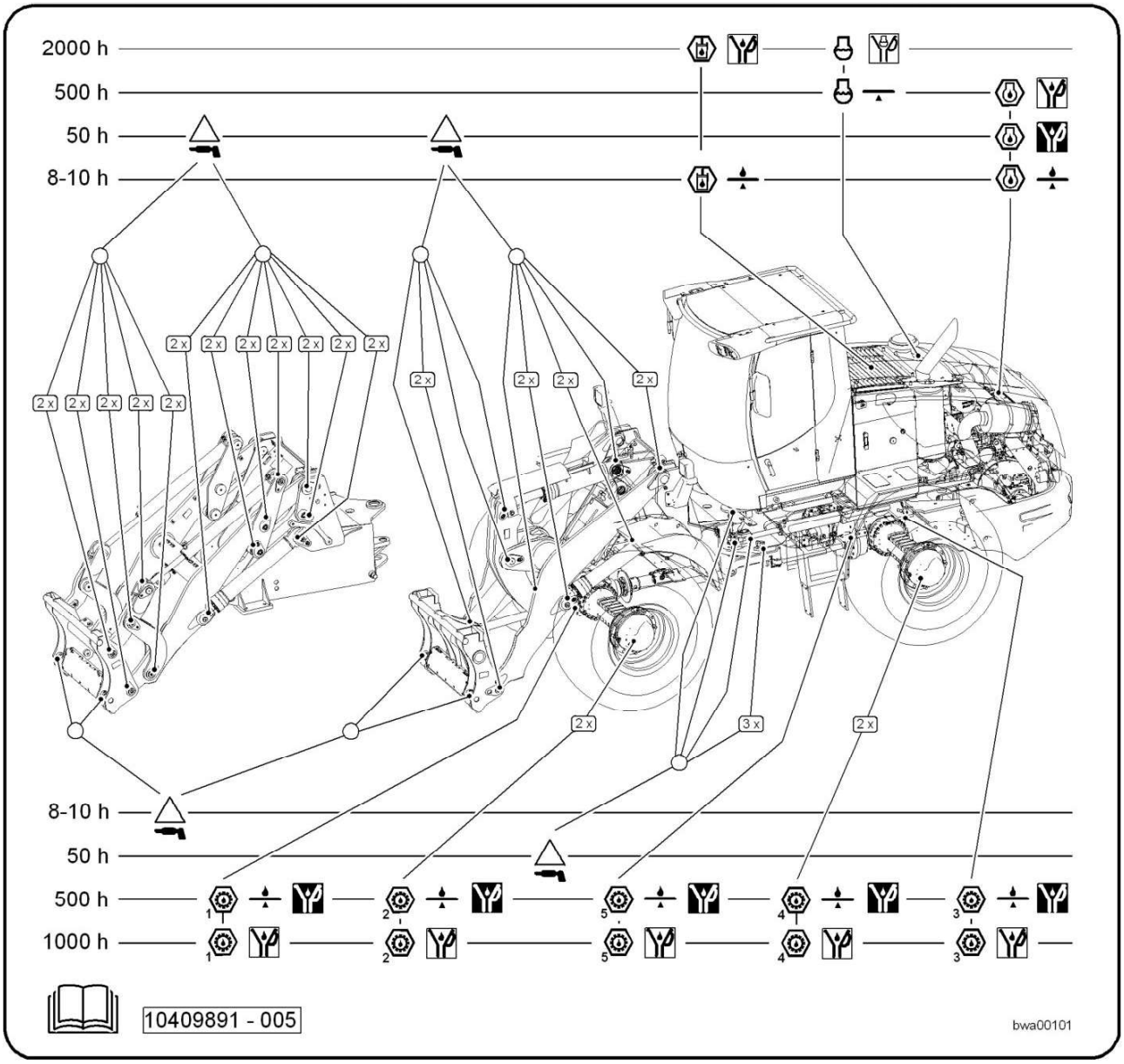

Fig. 412

Symbol	Description	Symbol	Description	Symbol	Description
bwa00077	Grease the general lubricating points	bwa00080	Oil change	bwa00084	Hydraulic tank
bwa00078	Check the oil level	bwa00081	First oil change	bwa00085	Engine
bwa00079	Checking the coolant level	bwa00083	Gear oil	bwa00086	Cooling system

3. Also activate the travel hydraulics after about 5 minutes. Warming up takes roughly 10 minutes in total.

If you perform a cold start at even lower temperatures, observe the following warm-up procedure: Warm the hydraulic tank before starting the engine. Then start the warm-up procedure from point **1**.

Biodegradable hydraulic oils

Bio-application means that the use of biodegradable or environmentally friendly hydraulic oil is prescribed at the operating site of the machine.

NOTICE
Ensure that hydraulic oils are not improperly mixed.
Mixing biodegradable ester-based hydraulic oils with each other or with mineral oils can cause aggressive reactions. This can damage the hydraulic system.

▶ Do not mix biodegradable hydraulic oils from different manufacturers or different kinds of mineral oils.

Liebherr oils

Liebherr recommends **Liebherr Hydraulic Plus** for the machine.

Auxiliary flow filters are not mandatory when using these hydraulic oils.

Third-party manufacturer oils

If you are unable to purchase this oil locally, only oils based on fully saturated synthetic ester (HEES) may be used after consultation with your local customer service.

NOTICE
When using synthetic esters:
Damage to the hydraulic system when operated without bypass filter! When using synthetic esters a bypass filter is strictly prescribed with the aim of keeping the water content in the oil below 1000 ppm (0.1%).

▶ Use a bypass filter (optional).

When using synthetic esters, we recommend changing the hydraulic hoses after 4000 service hours or after four years at the latest.

Vegetable oils are not permitted because of their poor resistance to high temperatures.

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Troubleshooting
If correct operation is not guaranteed, the cause must be remedied immediately.

▶ Contact Liebherr customer service.

5.4.4 Switch off the battery main switch

The battery main switch is located on the right-hand side rear of the engine compartment.

For certain maintenance jobs, the battery main switch must first be turned off.

Find out from the descriptions of the relevant maintenance tasks whether the battery main switch must be turned on or off.

Switch on the battery main switch after completing these maintenance tasks.

Note
Risk of damage to the electrical system.

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

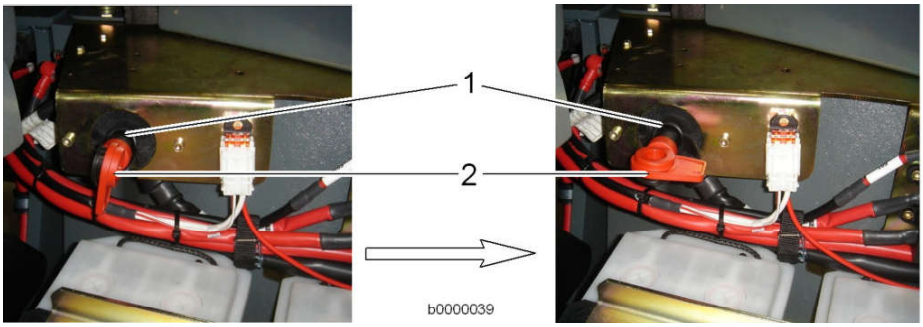

Fig. 431: Switching off the battery main switch

1 Battery main switch **2** Key

WARNING
Risk of accidents for maintenance personnel.
If a second party tampers with the machine this can place the maintenance personnel in extreme danger.

▶ The battery main switch must always be switched off for reasons of safety.

▶ Remove the key for reasons of safety.

▶ Switch off the battery main switch **1** using the key **2**.

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❑ The engine has cooled down.

Procedure

DANGER
There is a risk of fire and explosions.

- ▶ Do not smoke.
- ▶ Avoid naked flames.
- ▶ Only work with the engine switched off and cooled down.

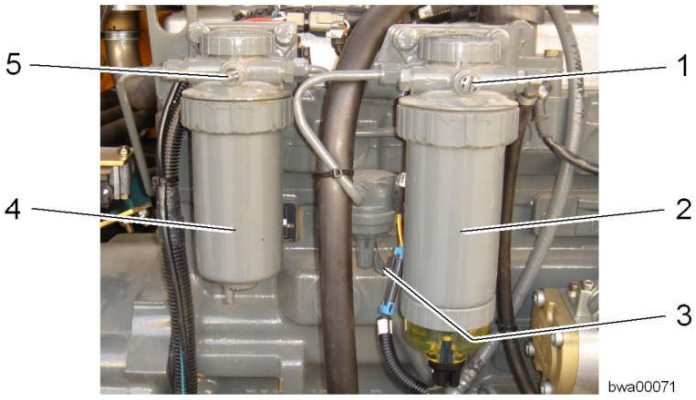

Fig. 440: Bleeding the fuel filter

CAUTION
Beware of fuel spurting out.

- ▶ Wear safety glasses.

Bleeding the fuel pre-filter:

- ▶ Release the bleeder screw **1** on the fuel pre-filter **2** and unscrew it by 2 or 3 turns.
- ▶ Operate the hand pump **3** until fuel comes out of the bleeder screw without bubbles.
- ▶ Tighten the bleeder screw **1**.
- ▶ Continue to operate the hand pump until you feel strong resistance.

Bleeding the fuel fine filter

- ▶ Release the bleeder screw **5** on the fuel fine filter **4** and unscrew it by 2 or 3 turns.
- ▶ Operate the hand pump **3** until fuel comes out of the bleeder screw without bubbles.
- ▶ Tighten the bleeder screw **5**.
- ▶ Continue to operate the hand pump until you feel strong resistance.

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NOTICE
Risk of damage to the cooling system
Careless handling can damage the cooler fins.

▶ Do not use hard objects or excessive water pressure for cleaning.

▶ Clean the cooler units **2** with compressed air, steam or water.

5.7.3 Changing the coolant

Use clean, fresh water with a pH value between 6.5 and 8.5 and a low sulphate / chlorine content for preparing the coolant.

The coolant must be prepared outside the cooling system.

Always dispose of any coolant which you have drained off but no longer need according to the applicable regulations.

Make sure that:
- ❑ The machine is in maintenance position 1.
- ❑ The engine compartment hood is open.
- ❑ You have a suitable receptacle and drain hose (on-board tools) ready.
- ❑ The mixing ratio of the new coolant must be correct. (For more information see: 5.7.1 Checking the coolant antifreeze and corrosion inhibitor concentration, page 306)

Procedure

CAUTION
There is a danger of scalding due to coolant escaping under pressure.

Only open the cap on the filler neck once the engine has cooled down.
▶ Check the coolant temperature (For more information see: Coolant temperature indicator, page 108)

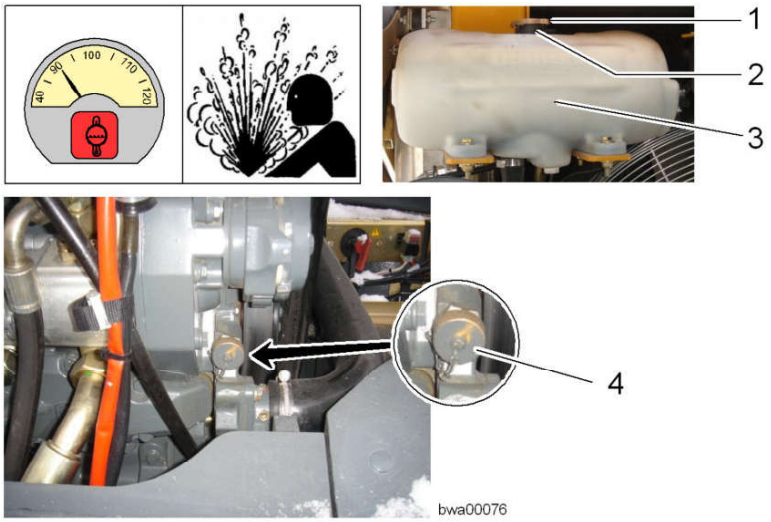

Fig. 451: Changing the coolant and antifreeze

1	Cap	**3**	Coolant equalizing reservoir
2	Filler neck	**4**	Engine drain plug

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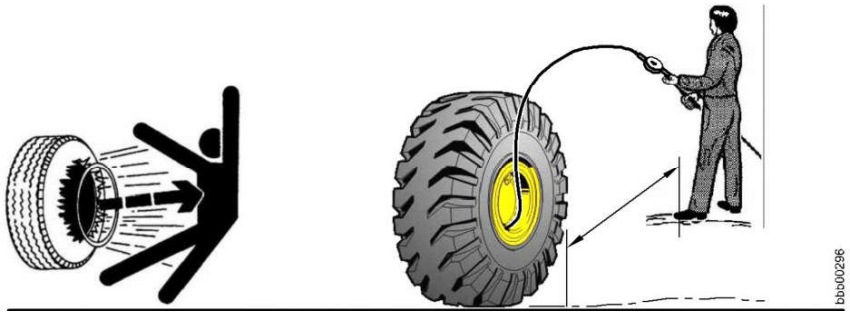

Fig. 462: Checking the tyre pressure

WARNING
Beware of injuries caused by exploding tyres or the sealing ring coming loose
Failure to act as instructed can lead to serious injury.

- ▶ Make sure there is no-one in the danger area.
- ▶ Use a sufficiently long hose with a self-locking adapter for filling the tyres.
- ▶ Keep a safe distance from the side of the tyre.

- ▶ Check the tyre pressure.

If the tyre pressure is not correct:
- ▶ Correct the tyre pressure.

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Lift arms with Z kinematics

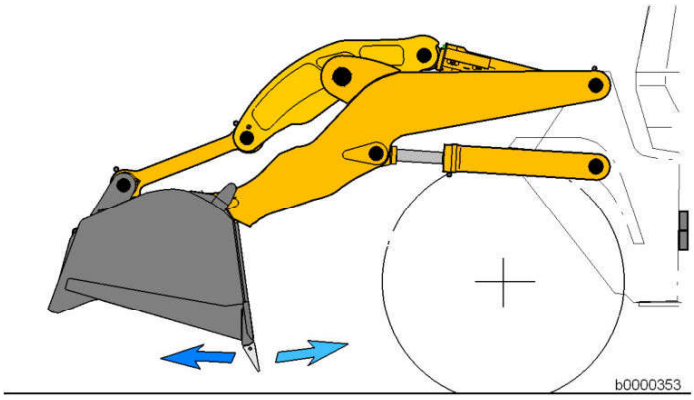

Fig. 479: Lift arms with Z kinematics

- ▶ Move the lift arms and the bucket to the position shown.
- ▶ Rapidly tilt the bucket in and out, and check the bearing points for noise and play.

Replace the bearing bushings if:
- There is a lot of play with the bucket bearings
- Loud noise occurs

Note
Replacing the bearing bushings

- ▶ Contact LIEBHERR CUSTOMER SERVICE.

Lift arms with parallel kinematics

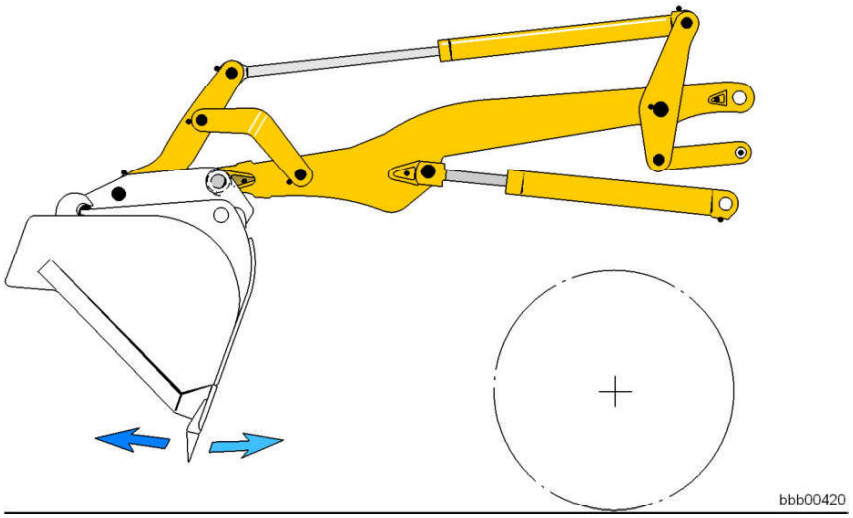

Fig. 480: Lift arms with parallel kinematics

- ▶ Move the lift arms and the bucket to the position shown.
- ▶ Rapidly tilt the bucket in and out, and check the bearing points for noise and play.

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