en **Operator's manual**

Crawler dozer

Document ID

ORIGINAL OPERATOR'S MANUAL

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From Serial no.: 16834

Contact

Liebherr-Werk Telfs GmbH
Hans Liebherr-Straße 35
A – 6410 Telfs

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Machine type	Typical work cycles	Weighted effective values in m/s² for light, normal and hard operating conditions[A)]								
		x-axis			y-axis			z-axis		
		light	normal	hard	light	normal	hard	light	normal	hard
Crawler tractor	Grading	0.31	0.53	0.75	0.24	0.41	0.59	0.39	0.70	1.01
	with ripper	0.61	0.89	1.18	0.56	0.85	1.14	0.74	1.02	1.30
	Transfer	0.31	0.62	0.93	0.29	0.57	0.86	0.63	0.97	1.31
Pipe layer	Work cycle	0.09	0.15	0.21	0.09	0.16	0.24	0.10	0.24	0.38
Conveyor mover	Work cycle		0.63			0.52			0.57	

Tab. 1: Whole body vibrations

A) The measurement uncertainty is defined in Standard EN 12096:1997.

1.2.2 CO_2 emissions of the diesel engine

This CO_2 measurement results from testing over a fixed test cycle, under laboratory conditions, a(n) (parent) engine representative of the engine type (engine family) and shall not imply or express any guarantee of the performance of a particular engine.

Engine type	Nominal output as per ISO 9249	High idle RPM	Code	EU 2016/1628 (Stage V)	CO_2 emissions during NRSC or RMC testing under standard laboratory test conditions	CO_2 emissions during NRTC testing with warm start under standard laboratory test conditions
D934 A7-25	200 kW	1900 min^{-1}	R04LW7101	V	699.88 g/kWh	720.01 g/kWh
D936 A7-05	320 kW	1900 min^{-1}	R06LW7101	V	667.43 g/kWh	684.93 g/kWh
D936 A7-25	300 kW	1900 min^{-1}	R06LW7105	V	677.80 g/kWh	697.15 g/kWh
D946 A7-05	330 kW	1900 min^{-1}	R06KW7102	V	675.60 g/kWh	697.10 g/kWh
D946 A7-25	330 kW	1900 min^{-1}	R06KW7101	V	675.80 g/kWh	674.52 g/kWh
D9508 A7-05	455 kW	1900 min^{-1}	V08MW7102	V	724.83 g/kWh	739.75 g/kWh
D9512 A7-04	565 kW	2000 min^{-1}	V12MQ7102	V	675.27 g/kWh	—

Tab. 2: CO_2 emissions of the diesel engine

Test conditions:
- NRSC/RMC: Non-Road Steady-state test Cycle / Ramped Modal Cycle; ‘Steady-state test cycle’ means a test cycle in which engine speed and torque are held at a finite set of nominally constant values; steady-state tests are either discrete mode tests or ramped-modal tests.
- NRTC: Non-Road Transient test Cycle; ‘Transient test cycle’ means a test cycle with a sequence of normalised speed values and torque values that vary on a second-by-second basis with time.

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1.3 Tightening torques

1.3.1 Preload values and tightening torques for screws with standard and fine metric thread according to DIN ISO 261

Screw connections should be mounted so that there is sufficient clamping force under operating loads to ensure that no shearing forces (FQ) act transversely to the screw axis. If the transverse forces are greater than the clamping force, this will lead to loosening and eventual failure of the connection. The respective required clamping effect is achieved during assembly by tightening the threaded parts.

Standards	Description
DIN ISO 261 (11/1999)	ISO general purpose metric screw threads - General plan (ISO 261:1998)
DIN ISO 262 (11/1999)	ISO general purpose metric screw threads - Selected sizes for screws, bolts and nuts (ISO 262:1998)
DIN ISO 965-2 (11/1999)	ISO general purpose metric screw threads - Tolerances - Part 2: Limits of sizes for general purpose external and internal screw threads - Medium quality (ISO 952-2:1998)
DIN EN ISO 4014 (06/2011)	Hexagon head screws with shank - Product grades A and B (ISO 4014:2011); German version EN ISO 4014:2011
DIN EN ISO 4016 (06/2011)	Hexagon head screws with shank - Product grade C (ISO 4016:2011); German version EN ISO 4016:2011
DIN EN ISO 4017 (05/2015)	Fasteners - Hexagon head screws with thread up to head - Product grades A and B (ISO 4017:2014) German version EN ISO 4017:2014
DIN EN ISO 4018 (07/2011)	Hexagon head screws with thread up to head - Product grade C (ISO 4018:2011); German version EN ISO 4018:2011
DIN EN ISO 4762 (06/2004)	Hexagon socket head cap screws (ISO 4762:2004) German version EN ISO 4762:2004
DIN EN 20273 (02/1992)	Fasteners; clearance holes for bolts and screws (ISO 273:1979); German version EN 20273:1991
DIN 34800 (11/2016)	Bolts and screws with external hexalobular driving feature with small flange
VDI 2230 Sheet1 (02/2003)	Systematic calculation of high stressed bolted joints - Joints with one cylindrical bolt
LH 10215295-002 (06/2015)	LN 252-8 Corrosion protection for low-value standard parts (C parts) salt spray mist test > 480 hours
LH 10021432-010 (06/2015)	Delivery specifications for steel fasteners with zinc coating (FIZn)

Tab. 9: Further applicable documentation

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A crawler tractor is a self-propelled, crawler-mounted machine with a device on which either dozer equipment is mounted for loosening, pushing and levelling material by means of a forward movement of the machine or on which equipment is mounted for pushing or pulling (e.g. ripper, winch).

The working tools must be designed for the respective machine and the respective application and be approved by Liebherr.

Safety - for operators and maintenance staff - is of primary importance. A variety of situations, problems or malfunctions on the machine can pose a safety risk if operators and maintenance staff are unaware of measures to avoid and avert the dangers arising in this regard.

To ensure proper use:
- Observe the operator's manual.
- Observe the maintenance manual.
- Observe maintenance intervals.
- Observe the specifications in the technical data.
- Attach the working tool for work.
- The operator's manual contains generally applicable, generally observable safety instructions and safety regulations and those which are to be complied with.
- The operator's manual explains the meaning of symbols and pictograms used in the signage associated with the machine.
- The operator's manual provides information about the required protective equipment and about the requirements that apply to the operating and maintenance staff.
- The operator's manual shows the location of the safety devices and falling object protective structures of the machine.
- The operator's manual provides information about hazards and residual risks which may also occur if the machine is used as intended.

Observance of national law, regulations, rules, principles of accident prevention and environmental protection as well as accident prevention regulations as amended also apply to the intended use.

Special applications require special equipment and possibly special safety devices. This equipment may only be installed and used after approval and according to specifications by the basic machine manufacturer.

2.3.3 Foreseeable misuse

Use outside the intended use is not intended by the manufacturer and therefore constitutes misuse.

The manufacturer is not liable for damage caused by misuse.

Misuse of the crawler tractor includes:
- Transport of persons
- Lifting persons up
- Installation and operation of working platforms
- Non-use of personal protective equipment (PPE)
- Unauthorised changes to the crawler tractor
- Increasing the load capacity, for example by adding an additional weight
- Use of attachment parts and attachments made by other manufacturers or such attachment parts and attachments which have not been approved by Liebherr for installation or attachment.
- Improper exiting of the crawler tractor
- Operating the crawler tractor although the operator is not in the operator's seat.
- Use in hoisting operation
- Exceeding the permissible technical total weight

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	Safety sign	Meaning
5		**Operator's cab support** Warns of risk of accidents potentially resulting in death or very severe injuries. **Denotes the correct procedure for raising the operator's cab.**
6		**Cab tilt unit** Warns of risk of accidents potentially resulting in death or very severe injuries. **Do not stand under the raised operator's cab unless the safety support bar is in place. The machine must not be started if the operator's cab is raised. Leave the parking switch in park position.**
7		**No naked flames; fire, open sources of ignition and smoking prohibited** Warns of risk of accidents potentially resulting in very severe injuries. **Fire, open sources of ignition and smoking in the vicinity of batteries prohibited.**

Tab. 17: Safety signs

Fig. 29: Location of safety signs in the operator's cab

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2. Visually check the machine for loose bolts, cracks, wear, leaks and intentional damage.
3. Never start or operate a damaged machine.
4. Make sure to correct any problems immediately.
5. Make sure that all hoods and covers are closed and locked. Check if all warning and reference signs are on the machine.
6. Clean all windows and mirrors, secure all doors and windows to prevent inadvertent movements.
7. Always enter and leave the machine using the ascending aids provided.
8. Make sure that no one works on or under the machine. Warn all persons in the surrounding area before operating the machine.
9. After entering the cab, adjust the operator's seat, the mirrors, the arm rests and the safety belt so that you can work comfortably.
10. The noise protection devices on the machine must be in protective position during operation.
11. Never operate the machine without the operator's cab or canopy.

2.6.5 Safety guidelines for start up

1. Before starting machine, check all indicator lights and instrument for proper function. Bring all control levers into neutral position.
2. Before starting engine, alert any nearby personnel that machine is being started by sounding horn.
3. Start machine only from operator's seat.
4. If no other instructions were issued, start engine according to guidelines in **operator's manual**.
5. Start engine and check all indicators, gauges, instruments and controls.
6. When operating in enclosed spaces, run engine only if there is sufficient ventilation. If necessary, open doors and windows to ensure sufficient fresh air supply.
7. Bring engine and hydraulic oil to operating temperature, low oil temperatures cause controls to be sluggish.
8. Check that control for attachment functions properly.
9. Move machine carefully into an open area and check all travel functions, check travel brake, steering function as well as turn signals and lights.

2.6.6 Safety guidelines for working

1. Before starting to work, familiarize yourself with the peculiarities of the job site, as well as the special regulations and warning signals. Part of the surrounding area includes, for example, the obstacles in the working or traffic area, the load bearing capacity of the ground and special protection required to secure the job site from public highway traffic.
2. Always keep a safe distance to overhangs, edges, embankments and unstable ground.
3. Be particularly cautious of changing ground conditions, unfavourable visibility and changing weather.
4. Familiarize yourself with location of power lines on jobsite and work particularly careful in their vicinity. If necessary, inform the responsible authorities.
5. Maintain a safe distance from electrical overhead lines. When working near electrical overhead lines, do not allow attachment too come close to wires. Risk of **fatal injury**!
   Inform yourself about required safety distances.
6. **If you do touch a high voltage power line, proceed as follows:**
   - Do not leave the machine!

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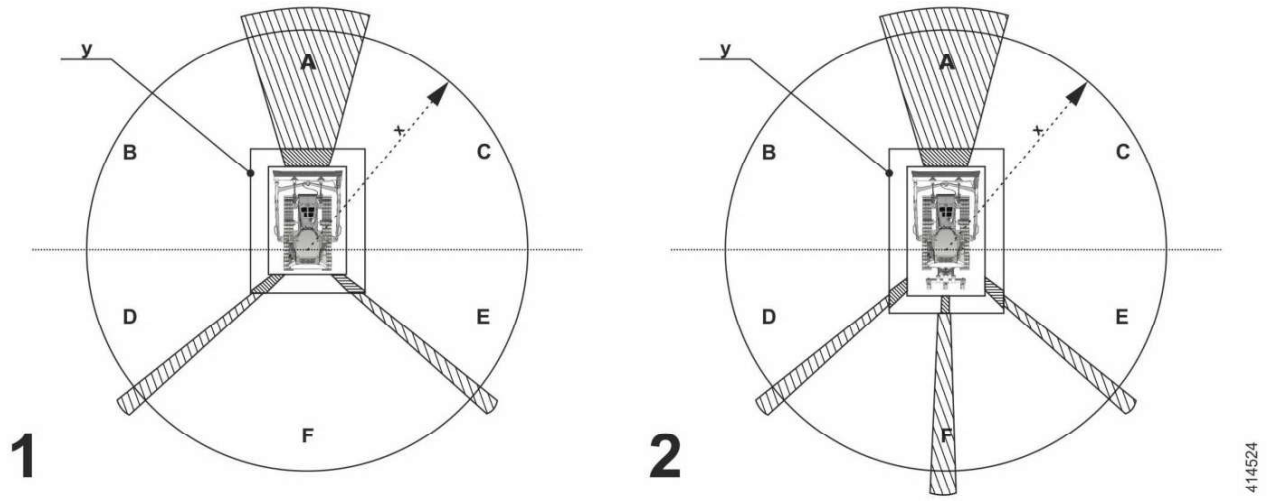

Fig. 61: Field of vision

1 Machine without rear equipment
2 Machine with rear equipment
x Radius: 12 m
y Near field: 1 m

The following areas cannot be seen from the operator's seat:
– Obscured view in area **A** due to front equipment
– Obscured view in area **D** and **E** due to C-pillars
– Obscured view in area **F** due to rear equipment

DANGER
Restricted field of vision!
Danger to life.

Before operation of the machine:
▶ Adjust the visual aids.
▶ Make sure that no persons are within the danger zone.
▶ Remove any obstacles in the work area.

The operator and construction site management must take measures to ensure that the obscured field of vision does not cause a safety hazard during operation.

Measures before and during operation

1. Make sure that persons establish contact with the operator before they approach the machine.
2. Check visibility aids for function, cleanliness and correct adjustment.
3. Adjust visibility aids in such a way that the best possible all around visibility is ensured.
4. Clean visibility aids and windows in the operator's cab immediately if dirt affects the visibility.
5. Have defective visibility aids repaired or replaced immediately.
6. Do not use sun visors if they limit visibility.
7. Always monitor the surroundings to recognize potential dangers in time.
8. Prefer direct visibility: plan the work in such a way that the visibility onto the work area is not limited by obstacles.
9. Work with a guide for tasks with limited visibility or defective visual aids. Agree on hand signals, for difficult tasks use additional voice contact (for example via radio).

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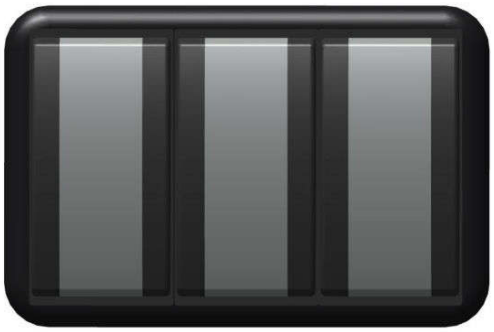
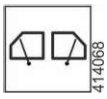
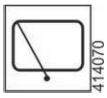
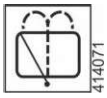


Fig. 72: Switch panel

Symbol	Name	Information/meaning
 414066	*Front window windscreen wiper* switch	Switch windscreen wiper for windscreen on and off.
 414067	*Front window windscreen washer system* switch	Switch windscreen washer system for windscreen on and off.
 414068	*Cab door windscreen wiper* switch	Switch windscreen wiper for cab doors on and off.
 414069	*Cab door windscreen washer system* switch	Switch windscreen washer system for cab doors on and off.
 414070	*Rear screen windscreen wiper* switch	Switch windscreen wiper for rear screen on and off.
 414071	*Rear screen windscreen washer system* switch	Switch windscreen washer system for rear screen on and off.
 414072	*Working headlight, front* switch	Switch front working headlight on and off.
 414073	*Working headlight, rear* switch	Switch rear working headlight and licence plate lighting (option) on and off.
 414074	*Working headlight, lift cylinder* switch	Switch working headlight for lift cylinder on and off.
 414811	*Beacon* switch	Switch beacon (option) on and off.

Tab. 22: Switches and buttons

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Symbol	Information/meaning
 414655	Red symbol: coolant temperature too high

Tab. 30: Coolant temperature

Time bar for speed limitation

The time bar for speed limitation **13** of the diesel engine is shown on the display if speed limitation is active. The time bar shows the time in which the maximum adjustable diesel engine speed is limited. The diesel engine rpm **12** also flashes.

Diesel fuel tank display

Symbol	Information/meaning
 414450	White symbol: diesel fuel tank content OK
 414387	Red symbol: diesel fuel tank content on reserve

Tab. 31: Diesel fuel tank display

Camera (option) menu

In addition to the mirrors, the camera system is an additional visual aid for monitoring areas which cannot be seen directly. The camera system serves only as an additional tool.

DANGER
Restricted camera visibility field!
Danger to life.

▶ Monitor the working area and travel route of the machine attentively.

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Button	Name	Information/meaning
	*Definition Grade in lateral direction*[A] button	Preselect or deselect Definition Grade in lateral direction.
	*Machine control*[A] (option) button	Preselect or deselect machine control of third party manufacturers.
	*Raise blade for reverse travel*[A] button	If the *raise blade for reverse travel* function is activated, the blade is raised automatically during reverse travel. For forward travel, the blade automatically moves back to the set incline. This function can only be activated with Definition Grade.
	*Reduce incline* button	Setting of the target incline in 0.1°-increments or 0.1%-increments
	*Increase incline* button	
	*Reverse sign* button	Incline signs are reversed.
	*Accept actual incline* button	The actual incline is accepted as the target incline.

Tab. 46: Free Grade and Definition Grade submenu

A) The activated function is shown in green.

Information menu

The active submenu is identified by a blue border.

Symbol	Submenu	Button	Submenu
	Fuel consumption and diesel exhaust fluid consumption		Time/route information
	Daily operating hours		

Tab. 47: Submenus

Switching on the battery main switch

▶ Set the battery main switch **3** to **ON**.
▷ Machine's electrical system is supplied with voltage.

Turning off battery main switch

NOTICE
Turning off of the power supply impermissibly!
Damage to the machine.

▶ Do not switch off the battery main switch until the indicator light has gone out.

Ensure that following requirements are met:
❑ Auxiliary heater[19] is deactivated.

If the indicator light **1** has gone out:
▶ Set the battery main switch **3** to **OFF**.
▷ Machine's electrical system is de-energised.

3.2.2 Entry and exit lighting (option)

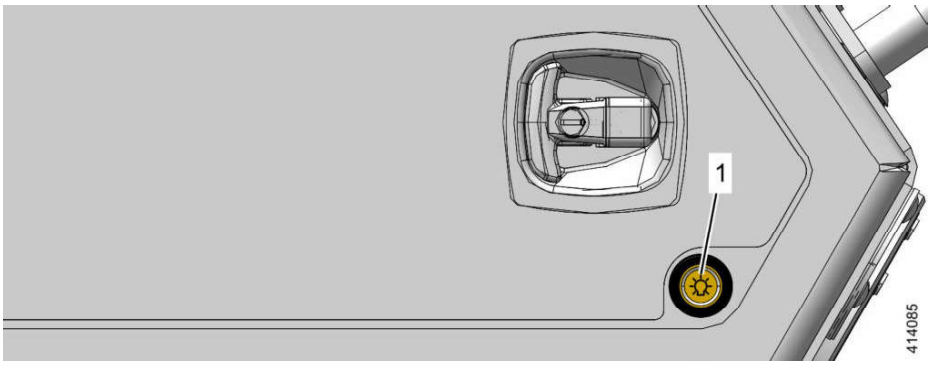

Fig. 304: Entry and exit lighting button

1 *Entry and exit lighting* button

▶ Switch on entry and exit lighting: press *Entry and exit lighting* button **1** on refuelling pump container.
▷ Entry and exit lighting on operator's cab lights up for set time.

(For more information see: *Entry and exit lighting* (option) submenu, page 96)

3.2.3 Entering and exiting the machine

Ensure that following requirements are met:
❑ The steps and tracks have been cleaned.
❑ The steps and tracks have been checked for proper condition.

[19] Option

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Adjusting the shock absorber

Fig. 322: Adjusting the shock absorber

11 *Shock absorption* lever

▶ Turn the lever **11** to the desired setting.
  ▷ soft **1**
  ▷ medium **2**
  ▷ hard **3**

Adjusting the headrest

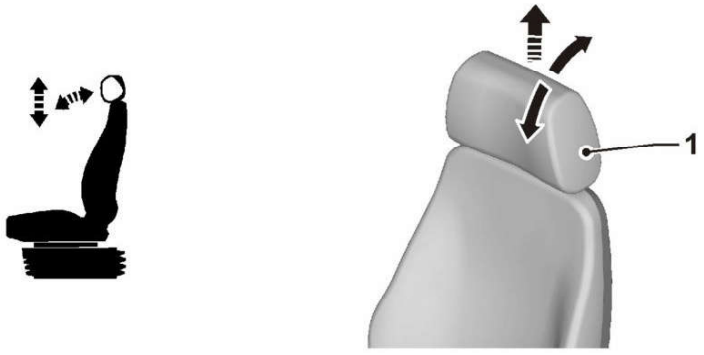

Fig. 323: Adjusting the headrest

1 *Headrest*

To adjust the height of the headrest:
▶ Pull the headrest out or push it in over the obvious notches.

To adjust the incline of the headrest:
▶ Push the headrest forward or backward.

To remove the headrest:
▶ Pull the headrest up past the end stop with one pull.

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Fig. 340: Operator's seat - main components and adjustment elements

1 Headrest
2 *Backrest inclination* lever
3 *Seat heater and seat climate control* switch [21)]
4 *Lumbar support* switch
5 *Horizontal suspension* lever
6 *Shock absorption* lever
7 *Seat height* turn handle
8 *Horizontal adjustment* lever
9 *Seat depth* lever
10 *Seat incline* lever
11 *Armrest adjustment* turn handle [21)]

Individual adjustment of ergonomic seat position

Individual adjustment of the operator's seat provides the greatest possible seating comfort for the operator.

Adjusting the backrest incline

Fig. 341: Adjusting the backrest incline

2 *Backrest inclination* lever

[21)] Option

Adjusting the footrest (option)

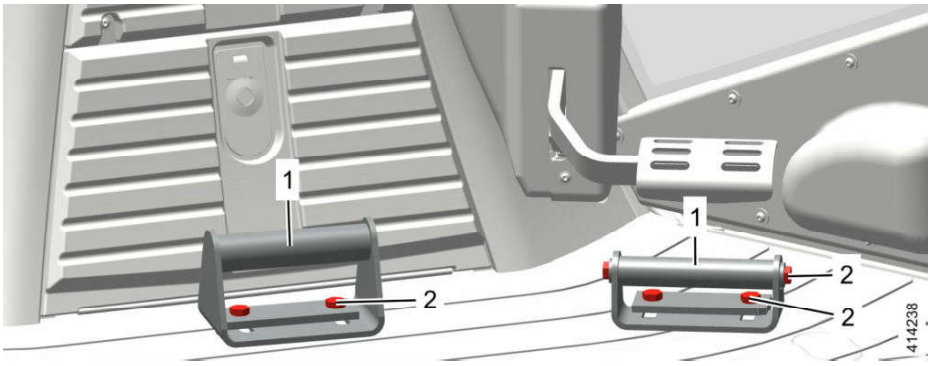

Fig. 359: Footrest

1 Footrest **2** Screw (6x)

▶ Loosen the screws **2**.

▶ Adjust the position of the footrest **1**.

▶ Tighten screws **2**.

3.2.12 Heating and air conditioning unit

To ensure well functioning ventilation, the filter for the heating and air conditioning unit must be serviced. A dirty filter restricts the air flow. To ensure the function of the air conditioning unit in the long run, put the air conditioning into operation at least once every 14 days.

Ensure that following requirements are met:
❑ Nozzles are opened.
❑ The diesel engine is started.

Turning the heating and air conditioning on

Fig. 360: Heating and air conditioning control element

▶ Press any button on the heating and air conditioning control element.

Note

The most recently saved settings are restored.

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- ▶ Put master key **2** in stop position **0**.
- ▶ Remove master key **2**.
- ▶ Insert ignition key **3** to be programmed into the starting switch **1** within 15 seconds and put it in contact position **I** for at least 1 second.
  ▷ Ignition key **3** is now programmed.
- ▶ Put ignition key **3** in stop position **0**.
- ▶ Remove ignition key **3**.

Note

Additional ignition keys can be inserted one after the other into the starting switch and put in contact position **I** for programming.

Deleting programmed ignition key

If a programmed ignition key has been lost, the programmed ignition keys can be deleted. All programmed ignition keys are deleted during the deletion process. After deletion, all available ignition keys can be reprogrammed.

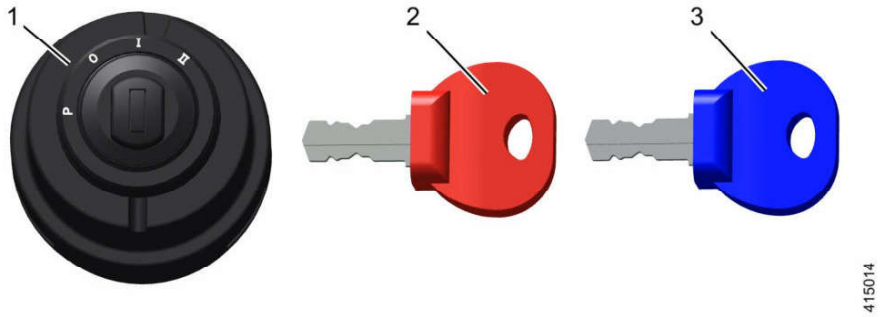

Fig. 400: Starting switch and ignition key

- ▶ Insert master key **2** into starting switch **1**.
- ▶ Put master key **2** in contact position **I** for at least 20 seconds.
  ▷ **All** programmed ignition keys **3** are deleted.

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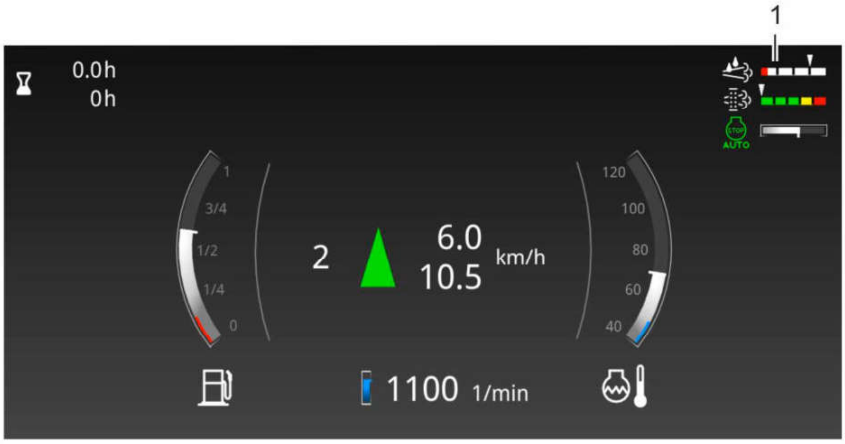

Fig. 420: Diesel exhaust fluid tank display

1 Diesel exhaust fluid tank display

▶ Check whether there is enough diesel exhaust fluid in tank on diesel exhaust fluid tank display **1**.

▶ Set the starting switch to stop position **0**.

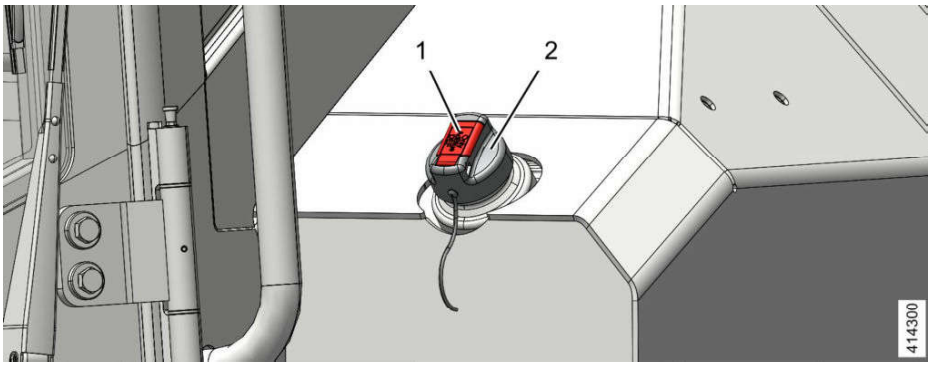

Fig. 421: Tank filler cap

1 Flap **2** Tank filler cap

▶ Open the flap **1**.

▶ Unlock the tank filler cap **2**.

▶ Turn the tank filler cap **2** anticlockwise.

▶ Remove the tank filler cap **2**.

NOTICE
Contamination of diesel exhaust fluid!
Damage to the exhaust treatment system.

▶ Ensure that no dirt or contamination gets into the diesel exhaust fluid tank.

▶ Ensure that only pure diesel exhaust fluid is used.

▶ Top up the diesel exhaust fluid through the filler pipe.

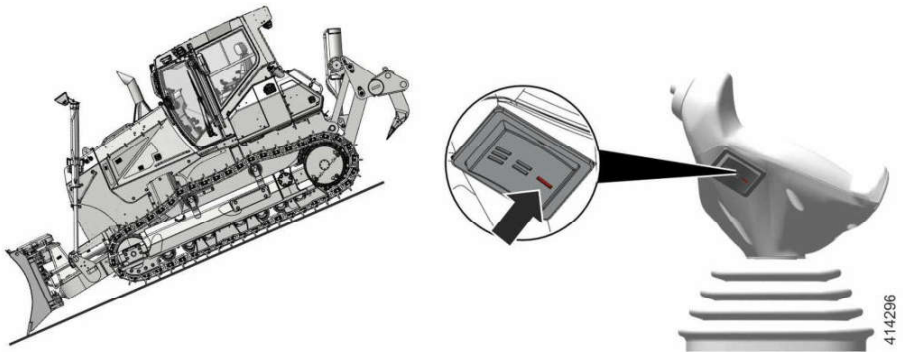

Fig. 438: Downhill travel

WARNING
Uncontrolled travel behaviour!
Danger to life.

- ▶ Move the switch on the travel joystick to I before driving on slopes.
- ▶ Travel at not more than 4 km/h.
- ▶ Set engine speed controller to full load.

Travel mode with engaged travel joystick

Adjusting travel speed

The travel speed can be reduced or increased in 0.5 km/h increments both before and while driving by using a button on the engaged travel joystick. The travel speed can be set separately for forward and reverse travel. After turning the diesel engine off, the travel speed is reset to the standard setting of 2.5 km/h.

Name	Value
Adjustable travel speed	2.5 to 11 km/h

Tab. 64: Adjustable travel speed

Note

To make optimum use of machine power:
- ▶ Carry out heavy pulling work at max. 2.5 km/h.

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3.3.7 Using the emergency stop button to stop and continue the operation

Using the emergency stop button to stop the operation

In dangerous or unclear situations, the machine can be stopped immediately by pressing the emergency stop button.

WARNING
Always wear a safety belt!
Injury.

▶ Always wear safety belt before putting machine into service.

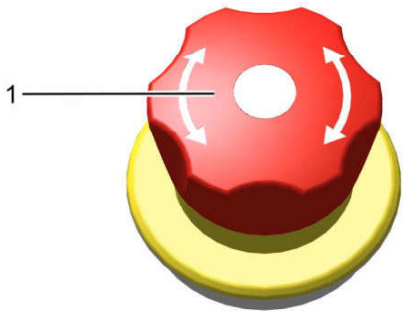

Fig. 457: Emergency stop button

1 Emergency stop button

▶ Press the emergency stop button **1**.
  ▷ The machine comes to an abrupt stop.
  ▷ The working attachment can no longer be actuated.
  ▷ Diesel engine continues running or switches off depending on the configuration.

Continuing the operation

▶ Set travel joystick to neutral position.

▶ To unlock the emergency stop button **1**: turn the emergency stop button **1** in the direction of the arrow.

3.3.8 Taking machine out of service

Ensure that following requirements are met:
❑ Travel joystick is in neutral position.

Parking the machine

If the ambient temperature is below 0 °C:
▶ Set the machine down on wooden boards.

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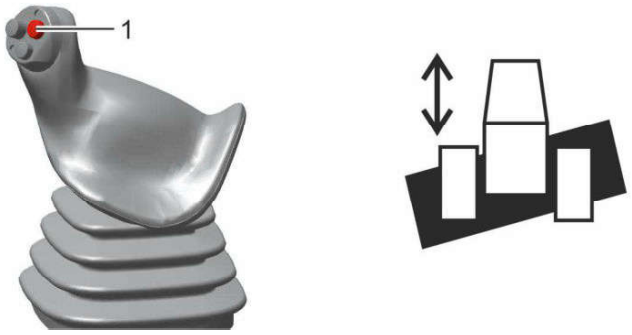

Fig. 476: Shaking the dozer blade

1 *Shake function* button

▶ Press and hold the *shake function* button **1**.

Mechanical cutting angle adjustment

The cutting angle of the dozer blade can be adapted to the current ground conditions by changing the strut as well as the tilt cylinder position in three stages.

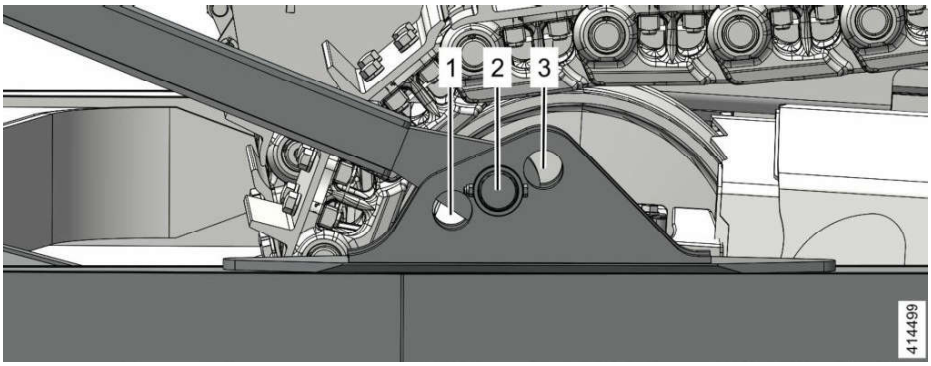

Fig. 477: Cutting angle positions

	Cutting angle position	Ground conditions	Cutting angle
1	Front	Hard ground	Steep cutting angle
2	Centre	Normal ground	Normal cutting angle
3	Rear	Soft ground	Flat cutting angle

Tab. 65: Cutting angle positions

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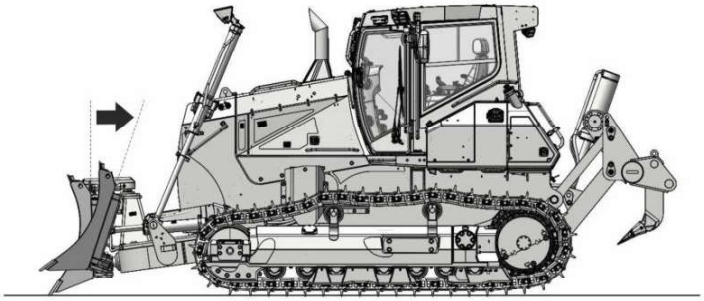

Fig. 498: Flat cutting angle

- ▶ Turn the threaded spindle **1** using control lever **2** in clockwise direction until the desired blade incline is reached.
- ▶ After adjustment procedure, install the cover, twist guard and cotter pin.

The 6-way blade is tilted by changing the blade incline.

- ▶ Align 6-way blade so that it is parallel to ground.

6-way blade with hinged corners and locking pins

The hinge mechanism makes it possible to swing back both blade corners 180° on a pivot joint.

Function

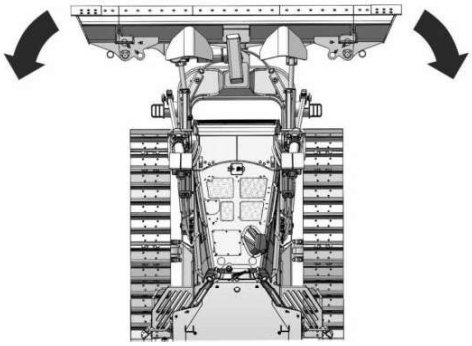

Fig. 499: Hinged corners

The 6-way blade with hinged corners is suitable for:
- Simpler transport of the machine with installed 6-way blade.
- For passing through narrow passages slowly.

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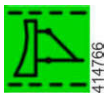
▶ To activate Free Grade in longitudinal direction: press the *Free Grade in longitudinal direction* button: 

▷ The *Free Grade in longitudinal direction* button is shown in green.
▷ *Free Grade in longitudinal direction* symbol is shown on the display:


▶ Drive forward.
▷ *Free Grade in longitudinal direction active* symbol is shown on the display:


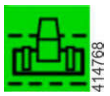
▷ The blade longitudinal incline and the actual incline are shown in green on the display.
▷ Free Grade in longitudinal direction is active.
▷ The blade remains at the set incline.

Free Grade in lateral direction

▶ Move the blade to the desired incline.

▶ To activate Free Grade in lateral direction: press the *Free Grade in lateral direction* button: 

▷ The *Free Grade in lateral direction* button is shown in green.
▷ *Free Grade in lateral direction* symbol is shown on the display: 

▶ Drive forward.
▷ *Free Grade in lateral direction active* symbol is shown on the display:


▷ The blade lateral incline and the actual incline are shown in green on the display.
▷ Free Grade in lateral direction is active.
▷ The blade remains at the set incline.

Free Grade in longitudinal direction and lateral direction

▶ Move the blade to the desired incline.

▶ Activate Free Grade in longitudinal and lateral direction: press *Free Grade in longitudinal direction* button and *Free Grade in lateral direction* button: 

▷ *Free Grade in longitudinal direction* button and *Free Grade in lateral direction* button are shown in green.

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3.4 Work methods

3.4.1 Grading

To strip material, different working methods can be selected, depending on the ground build up.

Increasing blade volume

This working method is used for dense ground. For increasing blade volume, material is taken up over the entire dozing distance.

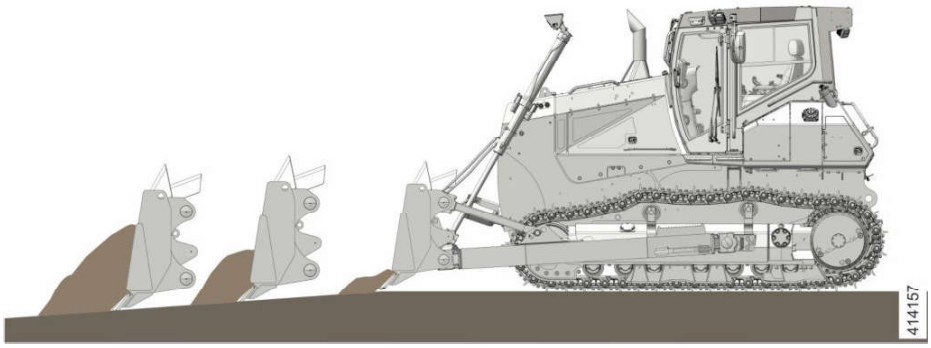

Fig. 537: Increasing blade volume

- ▶ Travel forward and, at the same time, slowly lower the dozer blade.
- ▶ Pick up material across the entire push distance.

Dozing with full blade

Use this working method for loose ground. With this method, the maximum push power is obtained with simultaneous retention of the grading track.

Note
The chains start to slip!

- ▶ Lift the blade slightly.

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- ❑ All bearings and trunnions are lubricated.
- ❑ A suitable lifting device is on hand.

Installing the trunnion

Depending on the travel gear version, different attachment parts need to be installed on the track roller frame.

Attachment parts on the track roller frame:
- L-travel gear: trunnion
- XL-travel gear: trunnion and plates
- LGP-travel gear: console and trunnion

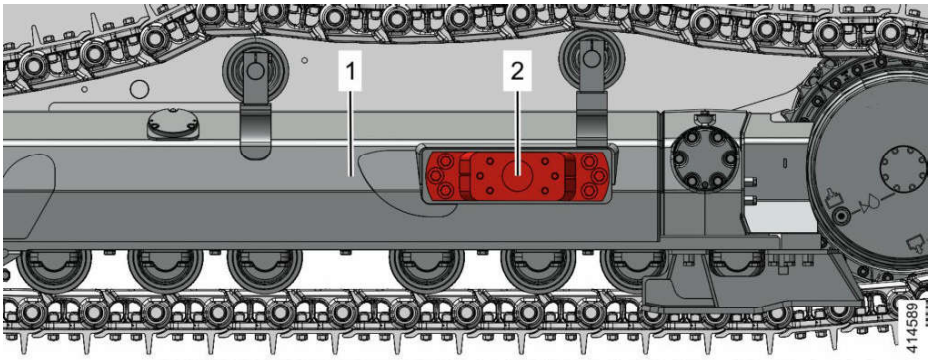

Fig. 553: Console

1 Track roller frame **2** Console

If the machine is equipped with LGP-travel gear:

▶ Install the console **2** on the left and right track roller frame **1**.

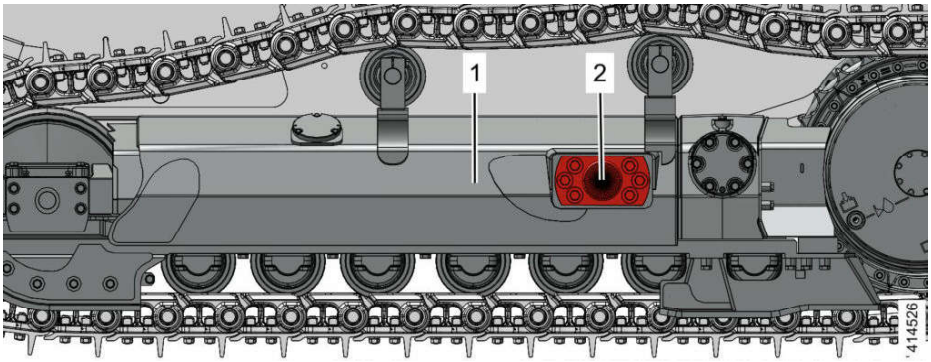

Fig. 554: Trunnion

1 Track roller frame **2** Trunnion

▶ Install the trunnion **2** on the left and right track roller frame **1**.

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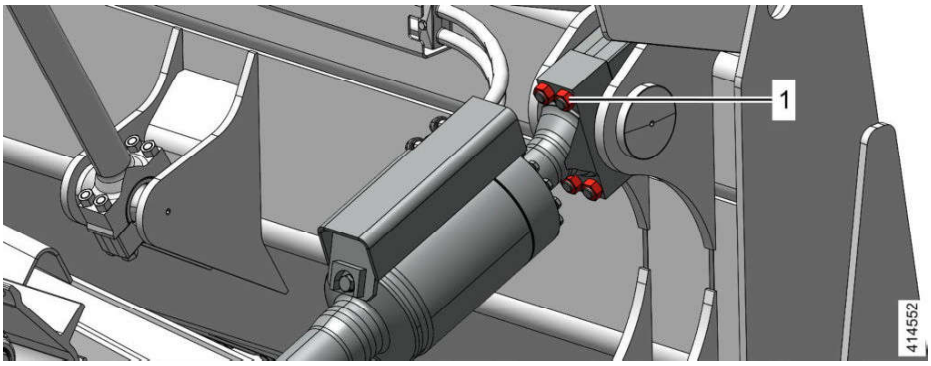

Fig. 575: Tilt cylinder

1 Nut (4x)

▶ Screw in nuts **1** and tighten to specified tightening torque.

▶ Fasten the slinging gear to the strut.

▶ Lift the strut with a lifting device.

▶ Position the strut correctly on the straight blade.

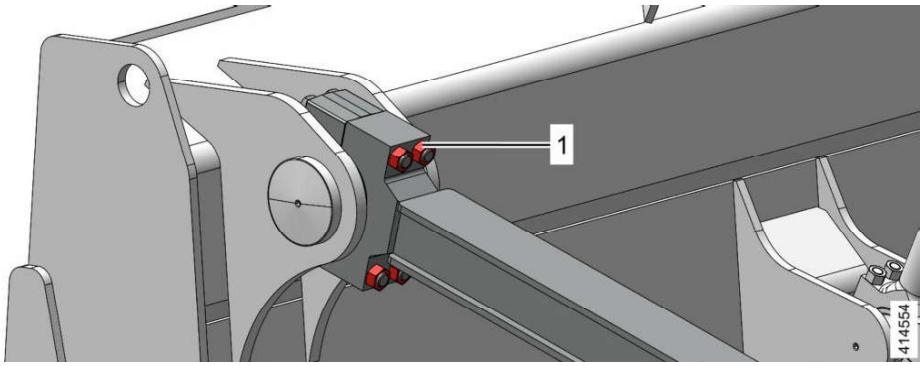

Fig. 576: Strut

1 Nut (4x)

▶ Screw in nuts **1** and tighten to specified tightening torque.

Aligning the machine to the working attachment

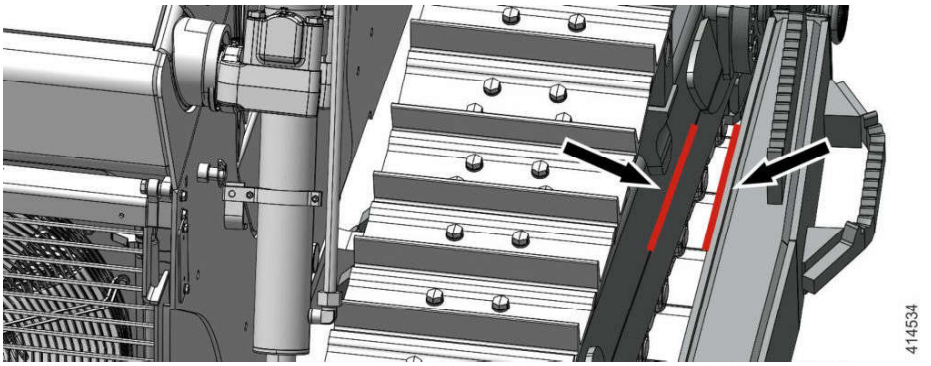

Fig. 577: Measuring the distance

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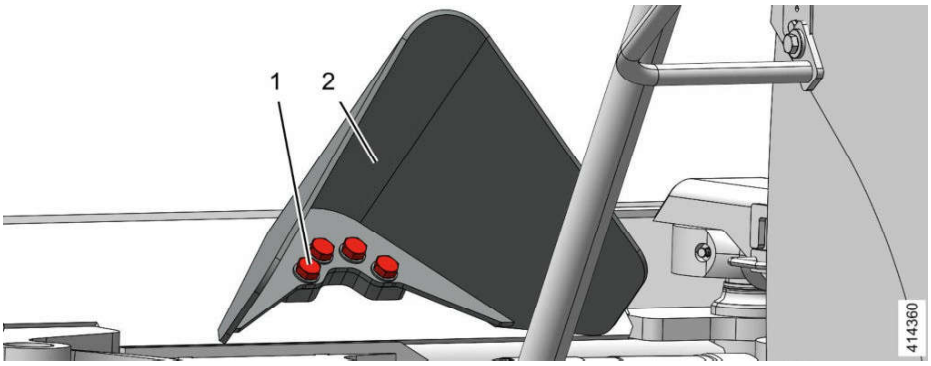

Fig. 598: Cylinder protector

1 Screw (4x) **2** Cylinder protector

▶ Loosen the screws **1** on the cylinder protector **2**.

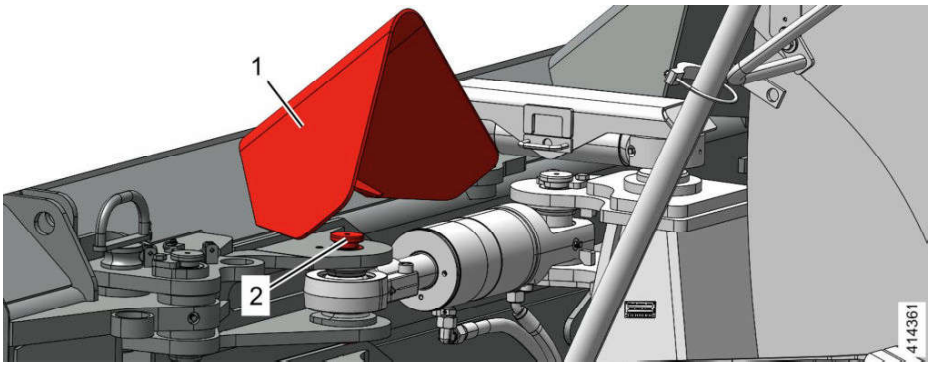

Fig. 599: Inserting the pin

1 Cylinder protector **2** Pin

▶ Press the cylinder protector **1** 2 to 3 cmupwards and, at the same time, insert the pin **2** from above.

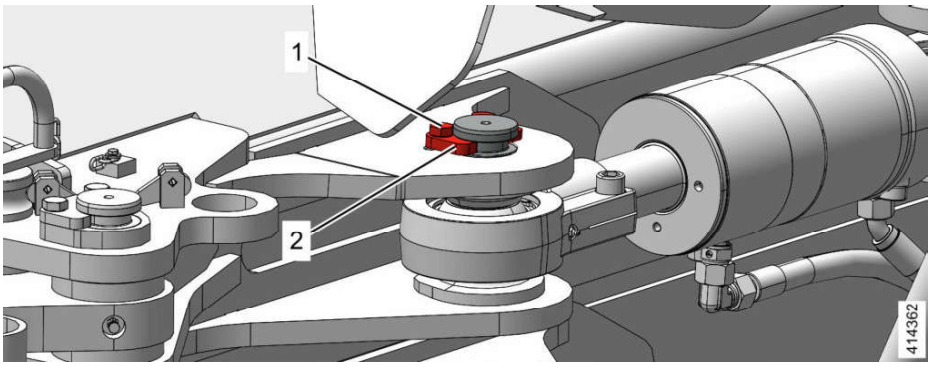

Fig. 600: Securing the pin

1 Screw (2x) **2** Retainer

▶ Affix the pin with retainer **2** and screws **1**.

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DANGER
Machine rolling away!
Danger to life.

▶ Ensure that the machine is secured against rolling away prior to installation and removal of the sun gears.

Ensure that following requirements are met:
- ❑ Chocks to secure the machine are present.
- ❑ A suitable towing machine as well as a tow rod are available.
- ❑ Required tool for removal of the sun gear is on hand.
- ❑ A hydraulic lift with a lifting force of at least 10 t is available.
- ❑ A sufficiently sized collecting pan is on hand.

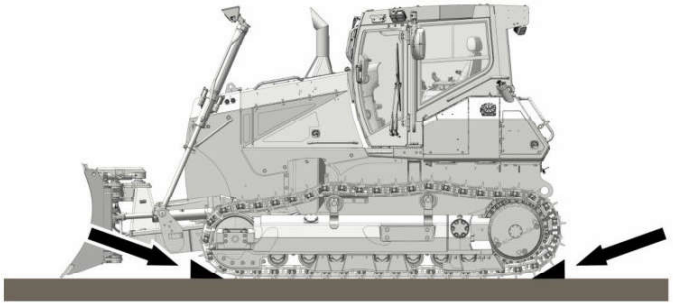

Fig. 616: Securing the machine to prevent it from rolling away

▶ Secure the machine with chocks to prevent it from rolling away.

or

Secure the machine with a suitable towing machine to prevent it from rolling away.

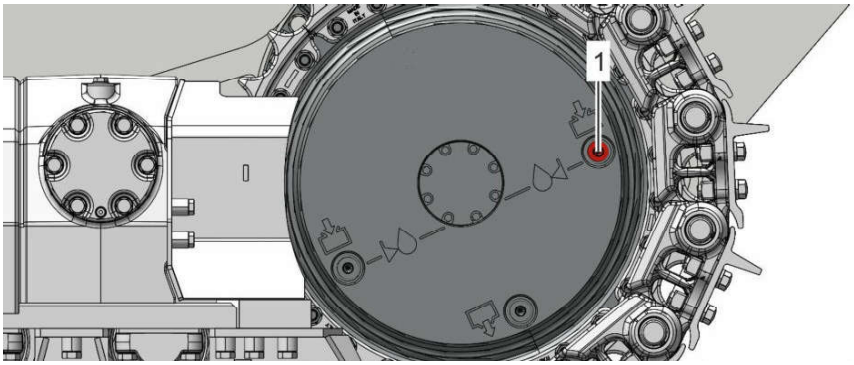

Fig. 617: Uppermost screw plug

1 Uppermost screw plug

▶ To vent the travel gearbox: loosen the uppermost screw plug **1** on the travel gearbox.
▷ Any pressure present in the travel gearbox can escape.

▶ Tighten the uppermost screw plug **1**.

Malfunction / error	Cause	Remedy
Diesel engine is hard to start.	Leaks or insufficient pressure in the fuel low pressure circuit	▶ Carry out a leak test (visual inspection).
	Engine compression too low	▶ Contact Liebherr customer service.
	Heater flange defective (in cold temperatures)	▶ Check the heater flange. ▶ Change the heater flange if necessary.
	Malfunction of the electronics	▶ Read out the error memory from the engine control unit.
	Rail pressure too low	▶ Check the rail for leaks.
	Air in fuel system	▶ Bleed fuel system.
	Air filter blocked	▶ Check the air filter for contamination.
	Substandard fuel quality	▶ Only use diesel fuel recommended by Liebherr.
	Injector defective	▶ Check the injectors.
	Valve clearance not set correctly	▶ Check the valve clearance. ▶ Adjust the valve clearance if necessary.
Diesel engine turns off unintentionally.	Power supply interrupted	▶ Contact Liebherr customer service.
	Leaks or insufficient pressure in the fuel low pressure circuit	▶ Carry out a leak test (visual inspection).
	Malfunction of the electronics	▶ Read out the error memory from the engine control unit.
	Fuel supply not ensured	▶ Check the fuel system.

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Fuse	Value	Unit	Name/Function
F60	25	A	Terminal 30 fuse[A)]
F62	3	A	Working joystick fuse
F64	1	A	Fuse, working hydraulics shut off (2nd shut-off path)
F110	15	A	Premium operator's seat fuse
F123	7.5	A	Fuse, terminal 30
F130	7.5	A	Engine brake flap fuse
F133	3	A	Pressure cut-off pressure sensor fuse[A)]
F135	3	A	NO_x sensor fuse
F136	1	A	Fuse, suction module
F153	10	A	Compact control system fuse
F154	1	A	Circuit board fuse[A)]
F158	10	A	Working hydraulics fuse
F170	1	A	Analogue module 2 logic fuse
F194	1	A	Free Grade and Definition Grade fuse

Tab. 73: Fuses in the central electric compartment

A) Option

▶ Check the relevant fuse and replace if necessary.

Fuses in the battery compartment

Note

Before turning the automatic circuit breaker on:

▶ Identify cause of overload and fix it.

▶ To establish the machine's power supply: press the button on the automatic circuit breaker.

▶ Open the battery compartment door.

▶ Remove the cover.

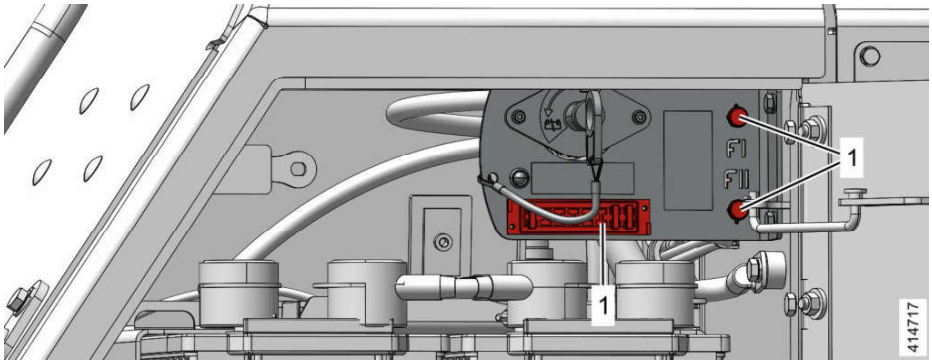

Fig. 636: Fuses in the battery compartment

1 Fuse

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5.2 Fill quantities, lubrication schedule

5.2.1 Recommended lubricants

Name	Recommended lubricant	Symbol	Quantity
Diesel engine (with filter change)	Liebherr-Motoroil 5W-30 Liebherr-Motoroil 5W-30 low ash A) Liebherr-Motoroil 10W-40 Liebherr-Motoroil 10W-40 low ash A)		29 l
Hydraulic system System content Tank contents	Liebherr Hydraulic Basic 68 Liebherr Hydraulic Basic 100 Liebherr Hydraulic HVI Liebherr Hydraulic Plus Liebherr Hydraulic Plus Arctic		 230 l 123 l
Travel gearbox (both left and right) L and XL with external push frame XL with internal push frame LGP with external push frame LGP with internal push frame, track width 2290 mm LGP with internal push frame, track width 2390 mm	Liebherr Hypoid 85W-140 EP Liebherr Syntogear Plus 75W-90		 15 l 22 l 22 l 26.5 l 30 l
Travel gearbox duo cone slipring seal	See hydraulic system		9.3 l
Axle bearing (both left and right)	See hydraulic system		4.5 l
Bearings and track tensioner	Liebherr Universal grease 9900 Liebherr Universal grease Arctic		4800 g

Tab. 79: Recommended lubricants

A) Use low ash engine oil for machines with a diesel particle filter.

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Oil analysis

		Dust intensive use	Normal use
Normal use (oil analysis optional)	**Liebherr Mineral oil**	Every 250 h, at least once a year	Every 1000 h, at least once a year
	Liebherr Hydraulic Basic 68		
	Liebherr Hydraulic Basic 100		
	Liebherr Hydraulic HVI		
Bio use (oil analysis required)	**Liebherr PAO biodegradable**	At the time of transfer, then every 250 h thereafter, at least once a year	At the time of transfer, then every 1000 h thereafter, at least once a year
	Liebherr Hydraulic Plus		
	Liebherr Hydraulic Plus Arctic		

Tab. 100: Oil analysis

Filter change

	Dust intensive use	Normal use
Liebherr return filter	Every 250 h	Once after 500 h, then every 1000 h thereafter
Liebherr breather filter	Every 500 h	Every 2000 h

Tab. 101: Filter change

Oil change

	Without oil analysis	With oil analysis[39)]
Liebherr Mineral oil	Every 3000 h	Every 6000 h
Liebherr Hydraulic Basic 68		
Liebherr Hydraulic Basic 100		
Liebherr Hydraulic HVI		
Liebherr PAO biodegradable	Every 4000 h[40)]	Every 10000 h
Liebherr Hydraulic Plus		
Liebherr Hydraulic Plus Arctic		

Tab. 102: Oil change

[39)] Change the oil after a negative oil analysis.
[40)] An oil analysis is prescribed for bio use.

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Moving machine into maintenance position

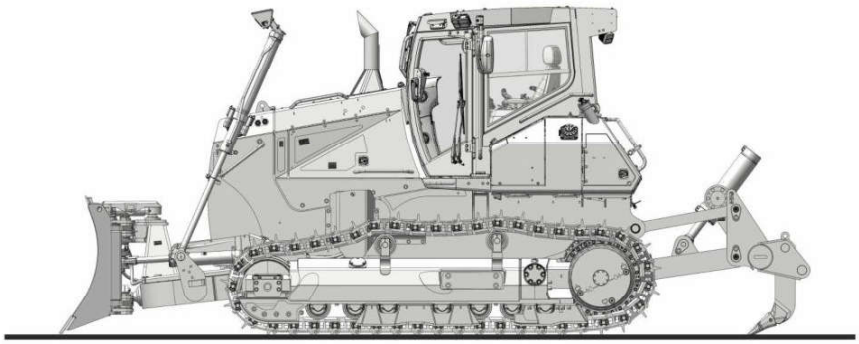

Fig. 677: Maintenance position

- ▶ Park the machine on solid and horizontal ground.
- ▶ Lower the working attachment to the ground.

Fig. 678: Parking switch

1 Parking switch
A Park position
B Operating position

- ▶ Set parking switch **1** to park position **A**.
- ▶ Turn diesel engine off.

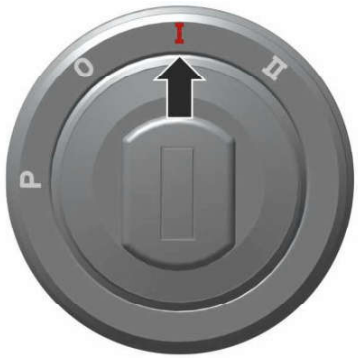

Fig. 679: Starting switch

- ▶ Set starting switch to contact position **I**.

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CAUTION
Contact with coolant!
Allergic reactions.

- ▶ Wear safety gloves and safety glasses.
- ▶ Avoid direct contact with coolant.
- ▶ In case of direct contact with coolant, rinse thoroughly with water.

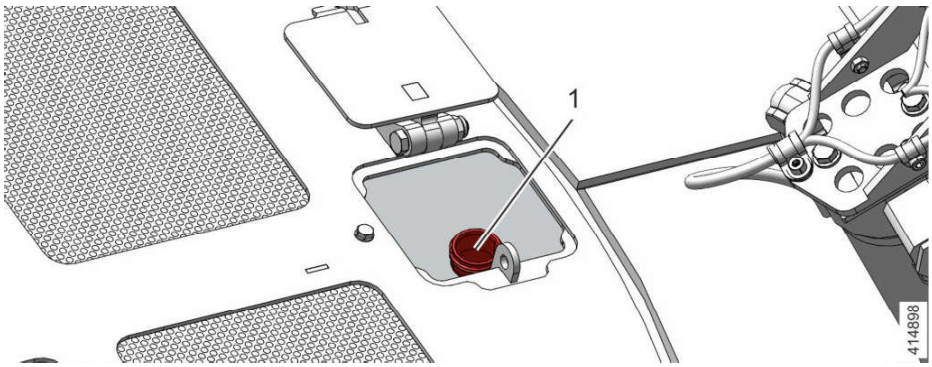

Fig. 690: Filler pipe

1 Filler pipe

- ▶ Refill coolant via filler pipe **1** up to middle of the sight glass.
- ▶ Close expansion tank with cover.
- ▶ Close flap.
- ▶ Lock the flap with a lock.

5.8.2 Cleaning the cooling system

Ensure that following requirements are met:
❑ Machine is in maintenance position.

Cleaning the cooling system

In order to ensure flawless cooling, the cooling system needs to be cleaned on a regular basis (particularly in relation to dust intensive applications). A contaminated cooling unit leads to overheating.

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Cleaning the fuel tank

Ensure that following requirements are met:
- ❑ Machine is in maintenance position.
- ❑ A suitable receptacle is available.
- ❑ The fuel tank has been emptied.

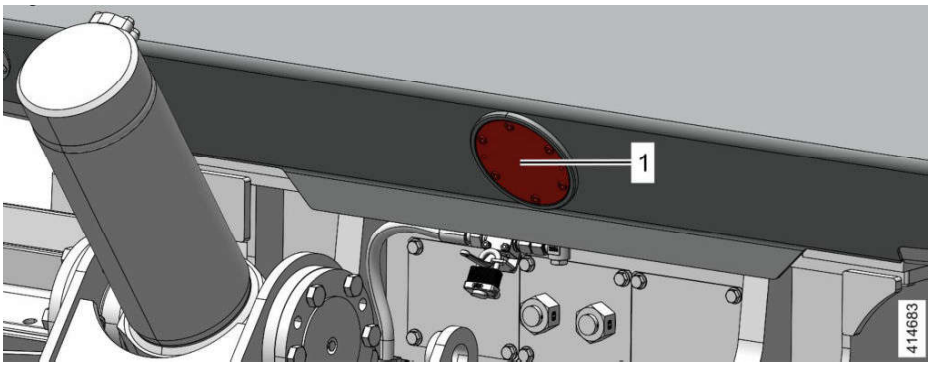

Fig. 709: Cover

1 Cover

▶ Remove the cover **1**.

▶ Check O-ring on the cover **1** and replace it if necessary.

▶ Clean the fuel tank.

▶ Install the cover **1** with O-ring.

▶ Refill the fuel tank.

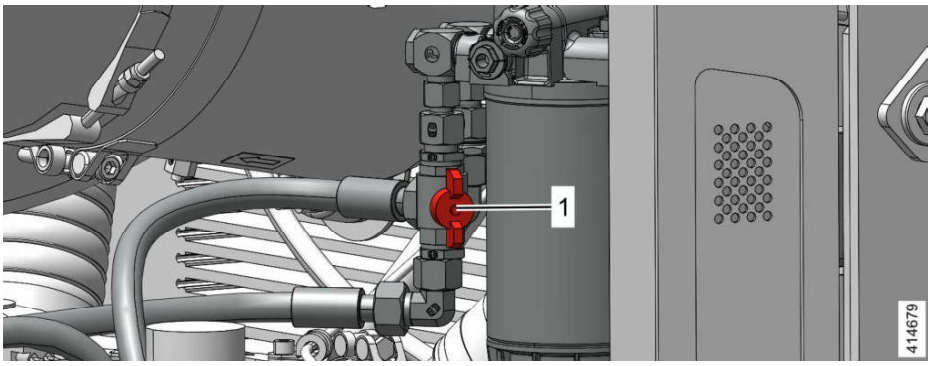

Fig. 710: Fuel system shut-off valve

1 Shut-off valve

▶ Open shut-off valve **1** for fuel system.

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If the LED light is faulty:

▶ Contact Liebherr customer service.

If the working headlight is set incorrectly:

▶ Adjust the working headlight.

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Selection of the ripper tooth tips

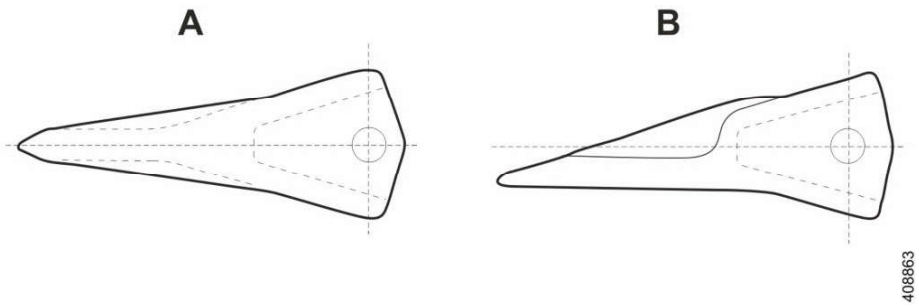

Fig. 737: Basic forms of the ripper tooth tips

A Symmetrical ripper tooth tip **B** Asymmetrical ripper tooth tip

Area of application	Ripper tooth tip
High impact loads	Symmetrical ripper tooth tip
Difficult penetration conditions and high density materials	Asymmetrical ripper tooth tip

Tab. 111: Selection of the ripper tooth tips

▶ Use ripper tooth tips according to the area of application.

Mounting variations of the ripper tooth tips

There are different mounting variations for the ripper tooth tips and the tooth guard.

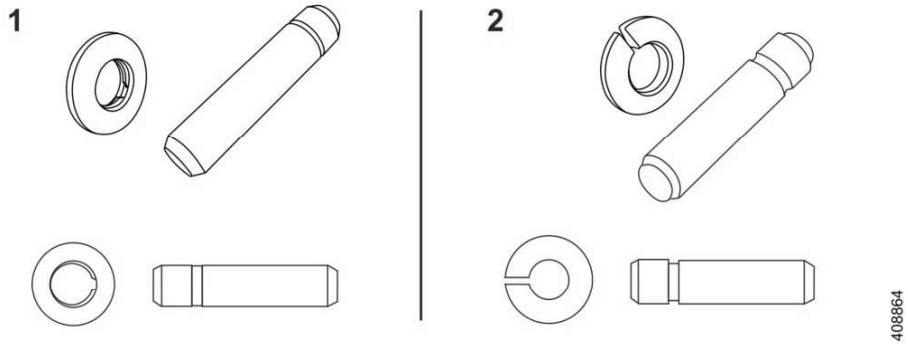

Fig. 738: Mounting variations

1 Mining version **2** Standard version

▶ Use a mounting variation according to the application.

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