en **Operator's manual**

Crawler dozer

Document ID

ORIGINAL OPERATOR'S MANUAL

Order number: 93517554
Issued: 01.09.2020
Version: 03
Author: LWT / Technical Documentation Department

Product ID

Manufacturer: Liebherr-Werk Telfs GmbH
Type: PR 726
Type no.: 1793 05_G8.0, 1793 4F_G8.0 (USA / CAN)
From Serial no.: 18370

Contact

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Steering: hydrostatic

Service brake: hydrostatic, self-restrictive, wear-free

Parking brake: wet disk brake, wear-free, automatic activation if the travel joystick is in neutral position

Cooling system: hydraulic oil cooler in the combi cooler, hydrostatic fan drive

Filtering: fine filtering in the supply pressure system

Final drive: spur gear with downstream planetary gear, double gear seal

Control system: proportional control lever for all travel movements and steering movements

Travel speed

Continuously adjustable

Speed range[A)]	Travel speed
Speed range I	2 to 4 mph
Speed range II	2 to 5 mph
Speed range III	4 to 7 mph

Tab. 3: Travel speed

A) All speed ranges can be adjusted on the travel joystick.

1.2.7 Working hydraulics

Hydraulic system: load-sensing on-demand control

Pump type: swash plate pump

Control valve block: three circuits, can be extended to four

Filtering: return filter with magnetic rod in the hydraulic tank

Control system: one control lever for all movements of the blade

Description	Unit	Value
Maximum flow rate	gal/min	36.98
Pressure limitation	psi	3,190.81

1.2.8 Operator's cab

Version:
- Enclosed operator's cab with positive pressure ventilation, mounted hydroelastically
- Can be raised by 40° using the hand pump
- Integrated roll over protective structure (ROPS) as per EN ISO 3471 and falling object protection (FOPS) as per EN ISO 3449

Operator's seat:
- Air-cushioned comfort seat
- Can be adjusted to the operator

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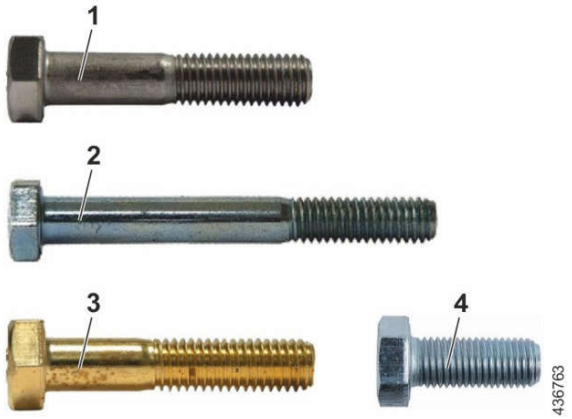
The prestressing forces and the tightening torques noted in the chart have been taken from the VDI (Association of German Engineers) guidelines 2230 of February 2003.

Assembly prestressing forces F_M and tightening torques M_A at 90% utilisation of the yield strength for shank bolts with standard or fine metric threads as per DIN ISO 262 (and DIN ISO 965-2); wrench sizes for hex head screw in accordance with DIN EN ISO 4014 to 4018, screws with external hexalobular driving feature according to DIN 34800 or socket head bolts according to DIN EN ISO 4762 and hole “middle” according to DIN EN 20273.

Note:
- Any tightening values noted in Liebherr service documentation drawings or documents must be adhered to and given preference over factory standards.
- For important screw connections, angle-controlled tightening can be advantageous. In this case, the necessary tightening values (joining moment, angle) must be determined by the technical customer service department for the individual case.
- When tightening in aluminium, with or without Helicoil insert and for weld nuts, the values for class 8.8 must be used. Any tightening values noted in Liebherr service documentation drawings or documents are binding, paramount and must be adhered to.

Metric standard thread and fine thread	Metric standard thread and fine thread
At least one element of the screwed connection (screws, washers, nuts, ...) with following surface: flZn = zinc coating (LH standard 10021432, LH standard 10215295 flZnnc-480h-L valid ≥M6)	**All elements of the screwed connection (screws, washers, nuts, ...) with following surface: black oxide or phosphated zinc plated (LH standard 10215295 Fe// ZnNi(12)5//Cn//T2)**
 **1**: Zinc coating	 **1**: Black oxide, phosphated, burnished **2**: Thick film passivation **3**: Yellow chromated **4**: Zinc plated Fe//ZnNi(12)5//Cn//T2

Tab. 9: Screw types

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The operator may only carry out work with the crawler tractor if there are no persons in the hazard zone.

In the event of danger to persons, the operator must stop the dangerous movement and give warning signs.

The operator must give warning signs (e.g. sounding the horn, light signals) in the event of danger to persons.

The operator must suspend operation if persons do not leave the hazard zone despite the warning.

The operator may only swing the work equipment over occupied operator platforms, operating stations and work stations of other equipment if these areas are secured against work equipment or loads falling by means of resistant protective roofs.

2.3.5 Operating conditions

Temperature range (ambient temperature)	-8 °F to 113 °F

Tab. 15: Operating conditions

Danger to life

Operation in the event of thunderstorms or bad weather

- If possible, suspend operation prior to the onset of a thunderstorm or bad weather.
- Put the working attachment down on the ground as flat as possible.
- Properly secure the machine.
- Close the windows.
- Turn diesel engine off.
- Set the starting switch to **0**.
- Make sure there is nobody in the area around machine.

Lightning strike

- Remain in the operator's cab.
- Do not leave the machine until all components are de-energised.

Contact with high voltage wiring

- Do not move the machine or working attachment.
- Remain in the operator's cab.
- Do not leave the machine until all components are de-energised.
- Ensure that all persons keep their distance from the machine and the high voltage wiring.
- Allow the voltage to shut down.

Damage

Improper operation if operating conditions deviate from the intended use

- Equip the machine according to the operating conditions.

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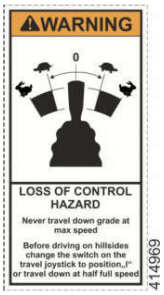
	Safety sign	Meaning
5		**ROPS/FOPS** Warns of risk of accidents potentially resulting in death or very severe injuries. **Structural changes (such as welding, drilling) on the ROPS/FOPS operator's cab are not permitted without prior consultation with Liebherr customer service.**
6		**Downhill travel** Warns of risk of accidents potentially resulting in death or very severe injuries. **Always adapt the travel speed to the working conditions. When driving downhill, drive only at low travel speed.**

Tab. 17: Safety signs in the operator's cab

2.5.2 Information signs

Information signs denote specific points relating to the operation, maintenance and characteristics of the machine.

NOTICE
Non-observance of the information signs!
Damage to machine.

- ▶ Observe the information signs.
- ▶ Check the condition of the information signs regularly.
- ▶ Replace incomplete, illegible or missing information signs immediately.

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24. For terrain which is difficult to gain an overview of and whenever necessary, ask for assistance of a guide. Have only one person signal you.
25. Danger of accidents due to restriction of vision for large machines! Take suitable measures to ensure a safe working application of machine on construction site.
26. Exclusively permit experienced personnel to secure loads and signal crane operator. Signaller must position himself within view of operator or be in voice contact with him.

2.6.7 Safety guidelines for turning machine off

1. Park machine only on firm and level ground. If it becomes necessary to park machine on a grade, it must be properly blocked and secured with wedges to prevent any unintentional movement.
2. Lower working attachment and lightly anchor working attachment on ground.
3. Bring all control levers to neutral position, switch parking switch to park position and turn engine off according to Operating instructions before leaving operator's seat.
4. Lock machine, remove all keys and secure machine to prevent unauthorized use and vandalism.
5. Never park machine in such a way as to block access to entrances, dock ladders, fire hydrants, etc.

2.6.8 Safety instructions for transporting machine

1. Use only suitable transport devices and lifting devices with sufficient load carrying capacity.
2. Park the machine on level ground and block the chains or wheels with wedges.
3. If necessary, remove parts of working attachment for duration of transport.
4. When loading a machine on a transport vehicle, be sure that the stipulated ramp incline angle is not exceeded and the ramp is covered with wooden planks to prevent slipping.
5. Before moving onto ramp, clean chains or wheels of machine, remove any snow, ice or mud.
6. Align machine with loading ramp.
7. Use a guide to signal machine operator. Drive onto ramp and onto transport vehicle very carefully.
8. Secure machine and remaining parts with chains and wedges to prevent them from slipping.
9. Relieve pressure from hydraulic lines and hoses, remove ignition key, lock cab and all covers before leaving machine.
10. Carefully check out transport route beforehand, especially in regards to width, height and weight limitations.
11. Check that there is enough clearance underneath all electrical lines, bridges, underpasses and in tunnels.
12. During unloading procedure, proceed with same caution as during loading procedure.
    Procedure:
    - Remove all chains and wedges. Start engine as outlined in operator's manual.
    - Carefully drive off loading platform down ramp.
    - Have another person guide and signal you.

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2.6.21 Safety notes for working on Common Rail System of Diesel engines

1. When diesel engine is running, fuel lines are constantly under fuel pressure of up to 31,908.14 psi.
   - When Diesel engine is running, never release fittings for fuel high pressure side on Common Rail System.
2. Fuel emerging under pressure can penetrate skin and cause severe injuries. There is a danger of fires due to fuel mist.
3. After stopping Diesel engine, wait at least one minute until pressure in fuel lines has been relieved.
4. Avoid staying near running Diesel engine.
5. Persons with a pacemaker must remain at a distance of at least 7.87“ in from diesel engine when it is running.
6. Do not touch energized parts on electrical connection of injectors when Diesel engine is running.
7. Modern components of Diesel injection consist of highly precise parts, which are subjected to extreme loads. Due to this high precision technology, ensure utmost cleanliness for all work on fuel system. Dirt particles above 0.01“ in can cause failure of components.
8. Before starting to work, it is **imperative** that following described measures be observed:
   - Before working on clean side of fuel system, clean Diesel engine and Diesel engine compartment (steam jets), fuel system must hereby remain closed.
   - Carry out a visual inspection for leaks or damage on fuel system.
   - Do not spray directly on electrical parts with steam jet, cover them first.
   - Bring Diesel engine into a clean area in workshop, where no work is carried out which can disperse dust (grinding, welding work, brake repairs, brake and performance tests, etc.).
   - Avoid air movements (possible dispersing dust caused by starting Diesel engines, workshop ventilation or heaters, drafts, etc.).
   - Clean and dry area of still closed fuel system with pressurized air.
   - Remove loose dust particles, such a paint chips and insulation material with a suitable suction device (industrial vacuum cleaner).
   - Cover areas of Diesel engine compartment, from which dirt particles could be released, with a new and clean protective sheeting.
   - Clean tools and work equipment before starting to work.
   - Use only tools, which are not damaged (cracked chrome coating).
   - Before starting disassembly work, wash your hands and put on clean work clothing.
9. While working, it is **imperative** that following described measures be observed:
   - After opening clean side of fuel system, do not use pressurized air for cleaning.
   - Remove loose dirt during installation work with a suitable suction device (industrial vacuum cleaner).
   - Use only lint-free cleaning cloths on fuel system.
   - When removing and installing components, do not use materials such as rags, cartons or wood, since they could secrete particles and fibers.
   - If paint chips are created when releasing connections (due to possible excess paint application), then remove these paint chips carefully before releasing fittings all way.
   - Close off all removed parts on clean side of fuel system **immediately** on their connection ports with suitable caps. Capping material must be packed dust-free until used and must be disposed after one-time use.
   - Store removed parts carefully in a clean, closed off container.

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Symbol	System status	Limitation
 Exhaust gas treatment malfunction: red  Diesel exhaust fluid level: red  Warning sound	**Stage 4:** Diesel exhaust fluid level 0% or exhaust treatment system malfunction as of 210 min	– Power is continuously reduced by 80%. – No longer possible to move machine out of danger zone due to position and soil characteristics.

Tab. 22: Warning and malfunction strategies

Note

If an additional malfunction of exhaust treatment system is detected within 40 operating hours of taking care of problem, then performance limitations will run through within a shorter time period.

Final limitation of system occurs within 30 minutes.

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Symbol	Information/meaning
	Yellow symbol: excessive coolant temperature
	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
	White symbol: diesel fuel tank content OK
	Red symbol: diesel fuel tank content on reserve

Tab. 31: Diesel fuel tank display

3.2.6 *Camera* (option) menu

Menu call-up: 

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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Symbol	Name	Information/meaning
	*Automatic reverse operation*[A)] button	Activate or deactivate automatic reverse operation.
	*Reverse manually* button	Start the additional reversal for set reverse duration. After being pressed, the button is greyed out and deactivated for 10 min.
	*Winter operation*[A)] button	Activate or deactivate continuous reverse operation.

Tab. 45: Reversible fan submenu

A) The activated function is shown in green.

Free Grade and Definition Grade[27)] submenu

Menu call-up:  > 

Both in the *Free Grade and Definition Grade* submenu and in the *start page* menu, the longitudinal incline on the left-hand side of the display and the lateral incline on the right-hand side of the display are shown.

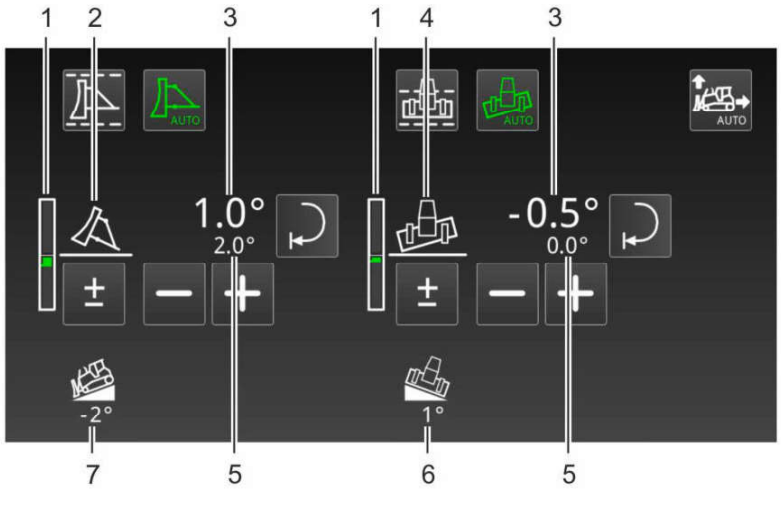

Fig. 259: Free Grade and Definition Grade submenu

1 Deviation between actual incline and target incline
2 Blade longitudinal incline
3 Actual incline
4 Blade lateral incline
5 Target incline
6 Machine lateral incline
7 Machine longitudinal incline

27) Option for emission stage IIIA

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[32)] 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.

3.3.2 Entry and exit lighting[33)]

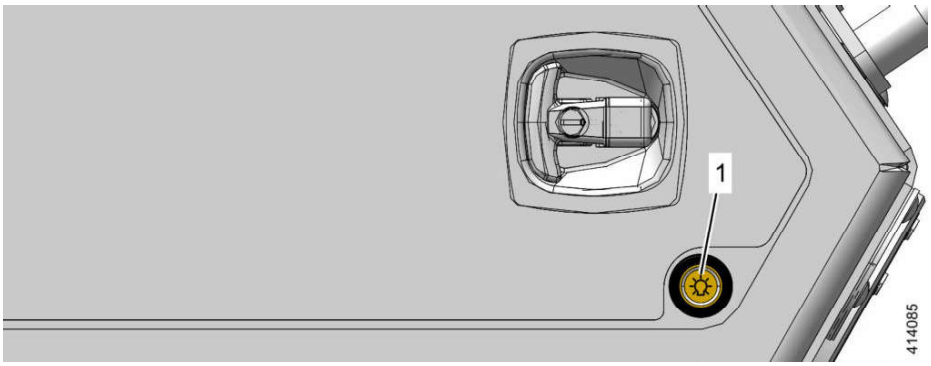

Fig. 304: Entry and exit lighting button

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*[20)] submenu, page 97)

3.3.3 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.

[32)] Option
[33)] Option for emission stage IIIA
[20)] Option for emission stage IIIA

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Adjusting the operator's seat depth horizontally

Fig. 322: Adjusting the operator's seat depth horizontally

7 *Seat surface horizontal* lever

- ▶ Push the lever **7** up.
- ▶ Adjust seat depth of operator's seat horizontally.
- ▶ Release the lever **7**.

Adjusting the operator's seat horizontally

Fig. 323: Adjusting the operator's seat horizontally

8 *Operator's seat horizontal adjustment* lever

- ▶ Pull the lever **8** up.
- ▶ Adjust the operator's seat horizontally.
- ▶ Release the lever **8**.

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Storage net

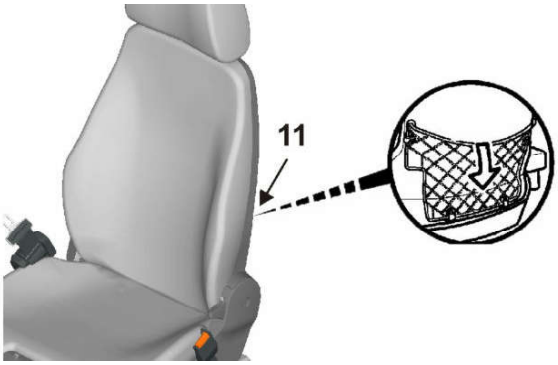

Fig. 341: Storage net

11 Storage net

The storage net is installed at the top on the rear of the backrest.

▶ To open the storage net, pull the upper band back.

3.3.9 Premium ISRI (option) operator's seat

The ergonomically designed operator's seat provides a high level of seat comfort.

The adjustability of the seat surface, backrest, suspension and armrests allows the operator to individually adjust the seat to ensure a comfortable seat position.

Vibration damping:

– The operator's seat installed in the machine complies with ISO 7096.
– If the machine is used in accordance with regulations, the vibration values transmitted by the operator's seat are less than or equal to the tested excitation vibration for the relevant machine class in accordance with ISO 7096, Class EM3.
– The evaluated vibration acceleration "a^{ZW}" values, measured in accordance with ISO 2631, Part 1 therefore comply with the requirements for protection against whole body vibration set out in EN 474-1.

Note

▶ When replacing a seat, only use original Liebherr operator seats with seat contact switch.

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Adjusting the armrest

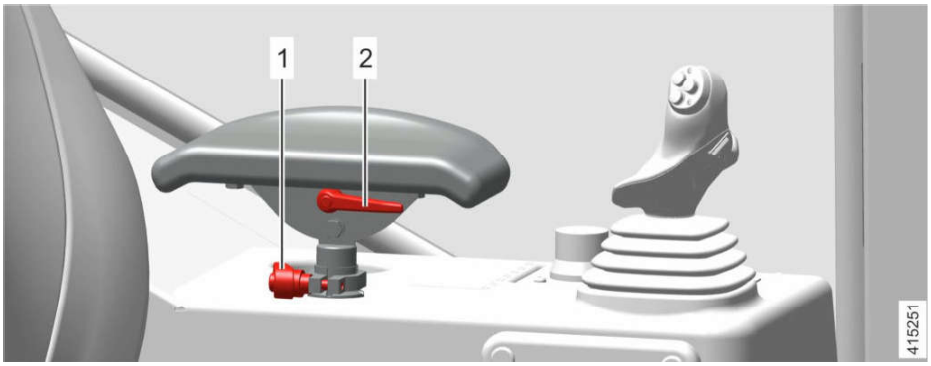

Fig. 359: Armrest

1 *Height and angle* handle **2** *Incline* handle

- ▶ Loosen the handle **1**.
- ▶ Adjust the height and angle.
- ▶ Fix the handle **1** in place.
- ▶ Loosen the handle **2**.
- ▶ Adjust the incline.
- ▶ Fix the handle **2** in place.

Adjusting the footrest (option)

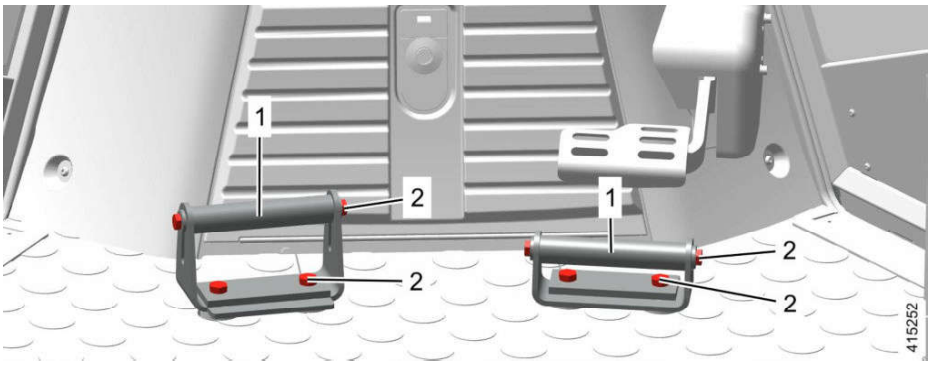

Fig. 360: Footrest

1 Footrest **2** Screw (8x)

- ▶ Loosen the screws **2**.
- ▶ Adjust the position of the footrest **1**.
- ▶ Tighten screws **2**.

3.3.12 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.

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3.3.21 Fire extinguisher (option)

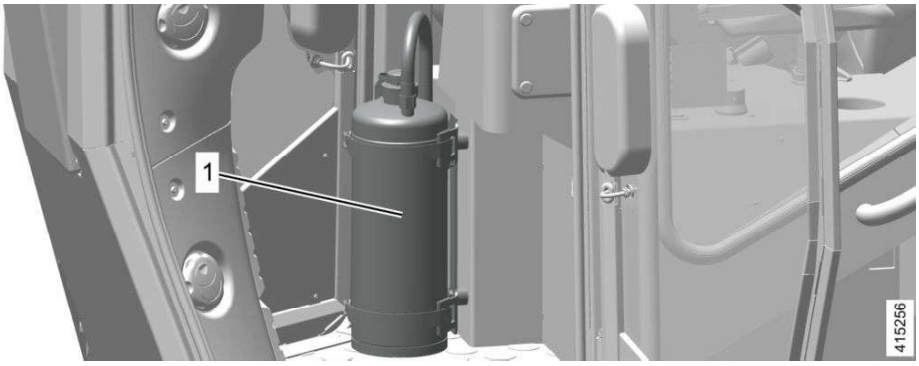

Fig. 401: Fire extinguisher

1 Fire extinguisher

The operator's cab is also prepared for the retrofit installation of a fire extinguisher.

▶ Contact Liebherr for the fire extinguisher installation kit.

3.3.22 Beacon (option)

The machine is also prepared in series for the retrofit installation of a beacon.

▶ Contact Liebherr for the beacon installation kit.

3.3.23 LiDAT

LiDAT is a data transmission and location system for Liebherr machines and machines of other manufacturers. Based on state-of-the-art data transmission technology, LiDAT provides information about the localisation and operation of the machines. LiDAT enables their efficient management, optimised job planning and remote monitoring.

With LiDAT all important machine data can be viewed at any time. The data is updated several times a day, depending on the subscription, and can be called up at any time with a web browser. Especially important information, such as the machine leaving a predefined zone or messages for certain operating conditions and job parameters can also be called up.

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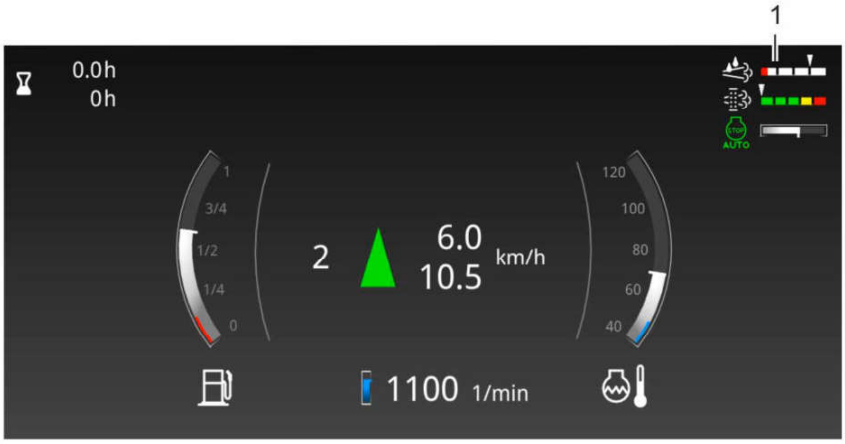

Fig. 421: Diesel exhaust fluid tank display

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**.

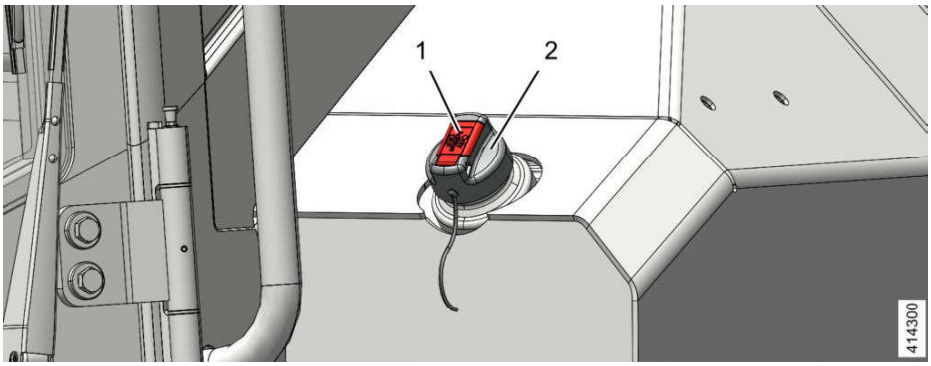

Fig. 422: Tank filler cap

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.

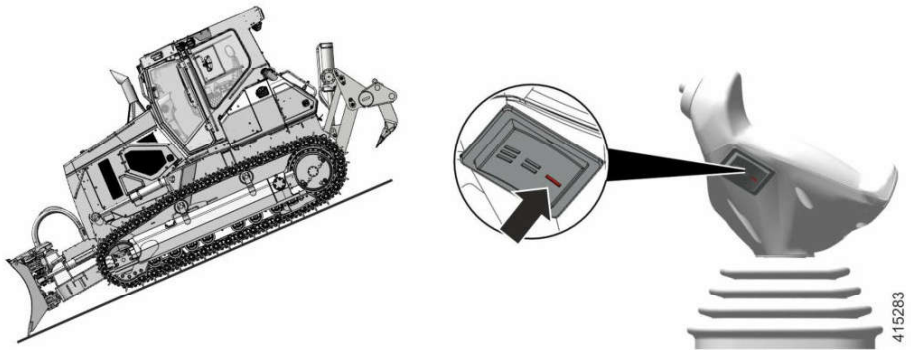

Fig. 439: Downhill travel

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 2 mph.
- ▶ Set engine speed controller to full load.
- ▶ Reduce the travel speed to keep the rpm under 2400 rpm.

Travel mode with engaged travel joystick

Adjusting travel speed

The travel speed can be reduced or increased in 0 mph 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 mph.

Name	Value
Adjustable travel speed	2 to 7 mph

Tab. 63: Adjustable travel speed

Note

To make optimum use of machine power:
- ▶ Carry out heavy pulling work at max. 2 mph.

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3.4.7 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.

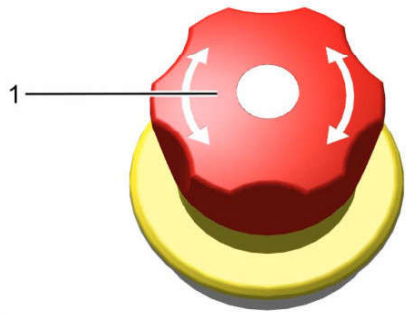

Fig. 458: Emergency stop button

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.

3.4.8 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 32 °F:
▶ Set the machine down on wooden boards.

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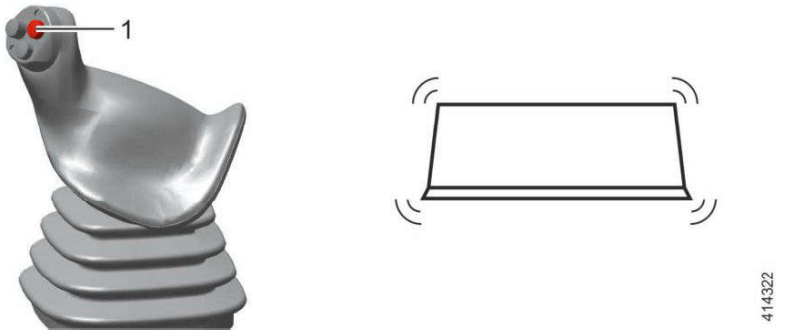

Fig. 477: Shaking the dozer blade

1 *Shake function* button

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

6-way blade

For side transport of material, the angling blade can be swung hydraulically to the left or right by 24°. The angling blade can also be swung under load.

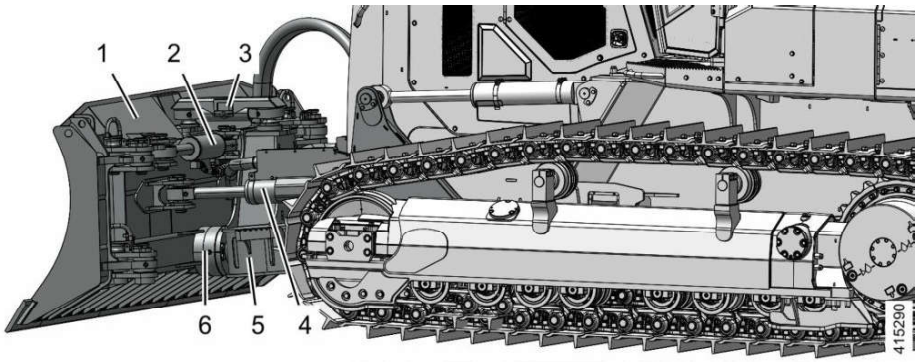

Fig. 478: 6-way blade

1 Dozer blade
2 Tilt cylinder
3 Strut
4 Swing cylinder
5 Push frame
6 Blade linkage

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Load status

The load status of the diesel particle filter is shown in the *start page* menu and in the *diesel particle filter* submenu.

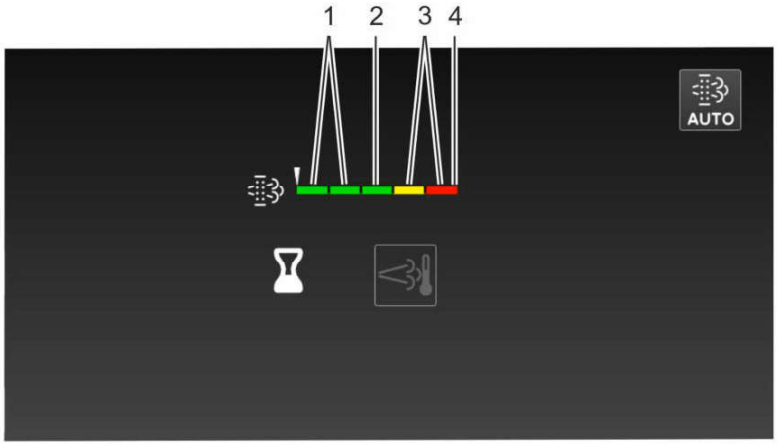

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Fig. 504: Load status

	Load status	Information/meaning
1	Low load	Automatic regeneration is not possible. Manual regeneration is possible.
2	Medium load	Automatic and manual regeneration are possible.
3	High load	Automatic and manual regeneration are possible.
4	100% load	Contact Liebherr customer service.

Tab. 65: Load status

Automatic regeneration

Regeneration takes place automatically during operation according to the state of load of the diesel particle filter. Only select automatic regeneration in environments that are **not** at risk of fire. Automatic regeneration can be deactivated for use in areas where there is a risk of fire. Fuel saving during regeneration in normal work cycle.

Activating the automatic regeneration

▶ Call up the *diesel particle filter* submenu.

▶ Press the *automatic regeneration* button: 

414570
  ▷ The *automatic regeneration* button is shown in green.
  ▷ Automatic regeneration is activated and starts depending on the load status of the diesel particle filter.

Regeneration needs to be stopped in an emergency:

▶ Deactivate regeneration.

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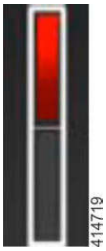
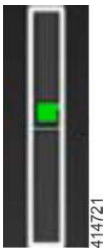
Display	Information/meaning
	Display red: deviation > 3° or 6%
	Display yellow: deviation > 1° or 2% and < 3° or 6%
	Display green: deviation < 1° or 2%

Tab. 67: Display for the deviation between the actual incline and the target incline

Calibration of the blade incline

It is necessary to calibrate the blade incline in the following situations:
- Each time the blade is installed
- Following adjustment of the cutting angle of the blade
- As a result of blade wear
- Following replacement of the blade sensor
- If blade incline does not match machine incline when blade is lowered to ground.

Button	Name	Information/meaning
	Cancel	Pressing the *cancel* button makes it possible to cancel the calibration.

Tab. 68: Calibration of the blade incline

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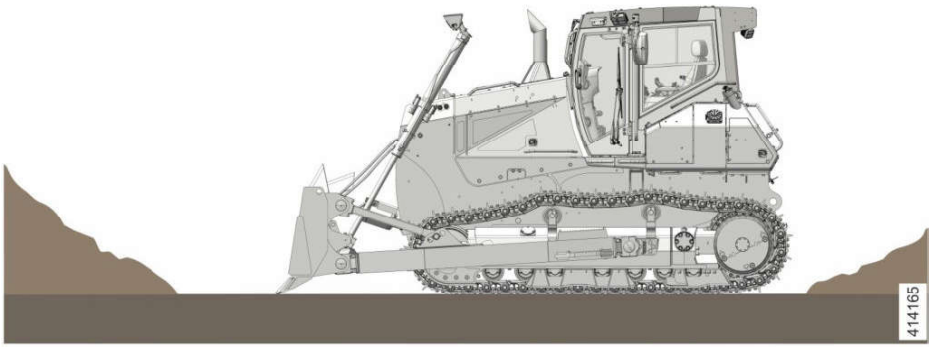

Fig. 534: Working face fine grading

- ▶ Establish a working face with a minimum dimension of the undercarriage length at the height of the desired level.
- ▶ Starting from this face, move the material in for the fine grade.
- ▶ To remove the undercarriage imprints: pull the working surface off backward with the blade release turned on.

3.5.3 Using several machines simultaneously

Parallel operation

If two crawler tractors are used simultaneously to move larger amounts of loose material, then use them in parallel operation. This working method significantly increases the total output.

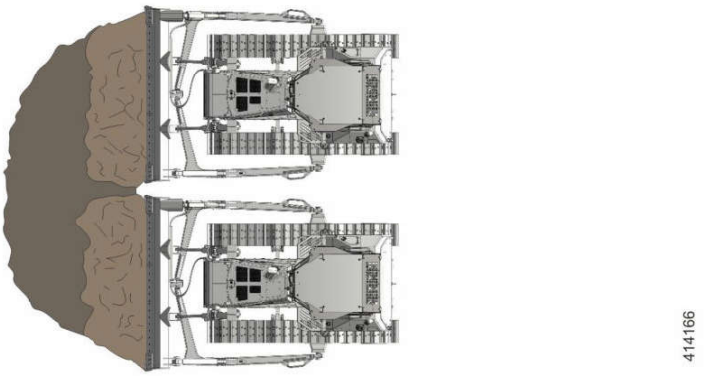

Fig. 535: Parallel operation with two machines

- ▶ Operate both machines with the blades as close to each other as possible.

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Installing the strut

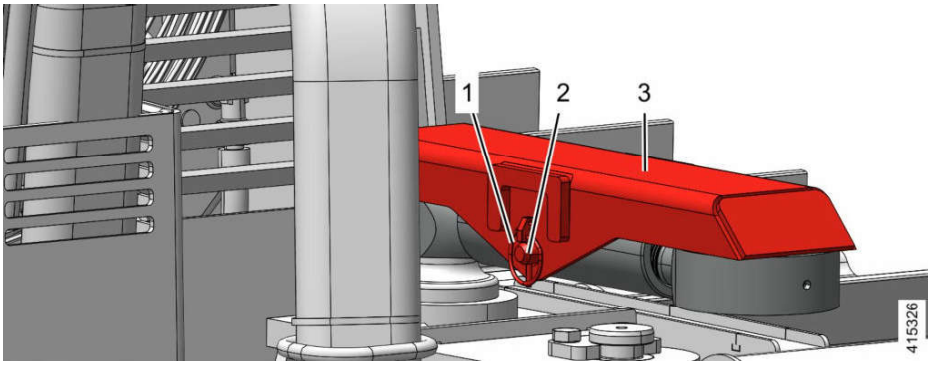

Fig. 552: Strut

1 Cotter pin
2 Twist guard
3 Cover

▶ Remove the cotter pin **1** and twist guard **2**.

▶ Remove the cover **3**.

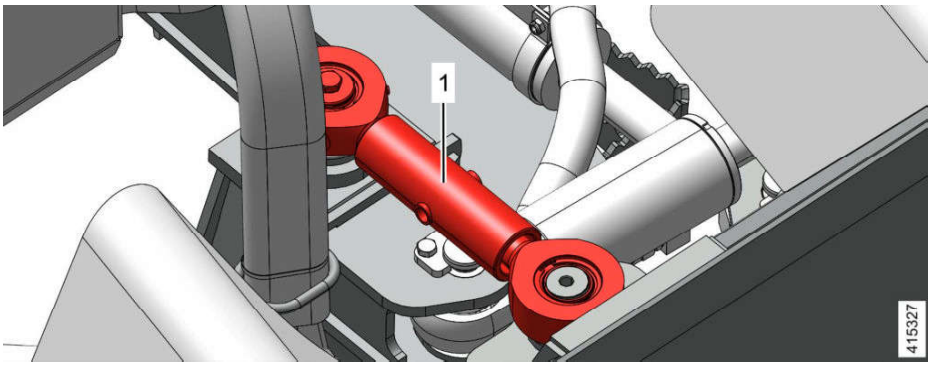

Fig. 553: Positioning the strut

1 Strut

▶ Position the strut **1** correctly.

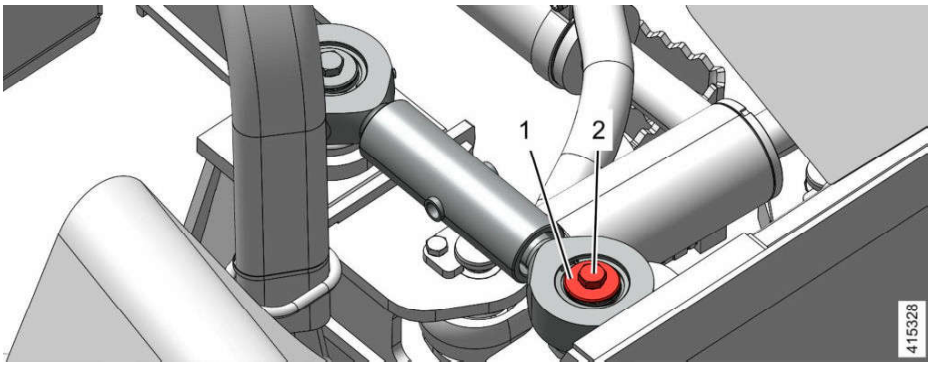

Fig. 554: Installing the strut

1 Shim
2 Screw

▶ Install the strut with shim **1** and screw **2**.

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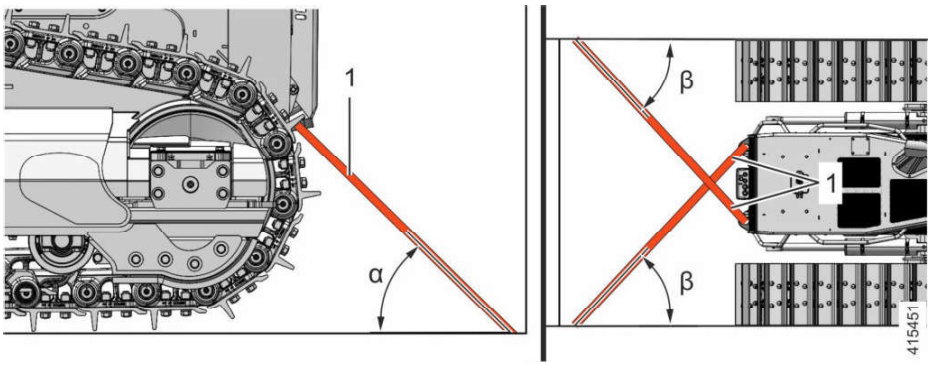

Fig. 571: Front rigging angle

1 Rigging chain

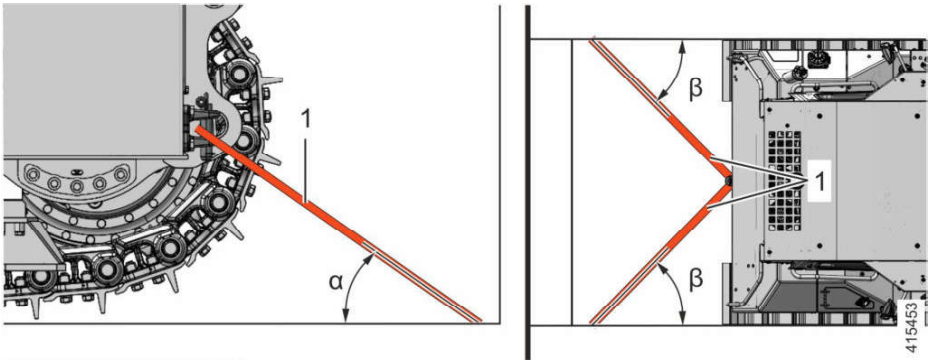

Fig. 572: Rear rigging angle

1 Rigging chain

Name	Value
Vertical rigging angle **α**	20° < α < 45°
Horizontal rigging angle **β**	20° < β < 50°

Tab. 70: Rigging angle

- ▶ Fasten rigging chain **1** to marked rigging points while adhering to the rigging angle (see: tab. 70, page 241) .
- ▶ Rig machine with min. 13,710 lb_f per chain.

Unloading the machine

DANGER
Person giving signals in danger area!
Danger to life.

- ▶ Make sure there are no unauthorised persons in danger area.
- ▶ Always maintain visual contact with person giving signals.

- ▶ Remove rigging chains and chocks.
- ▶ Access machine using a suitable access aid.

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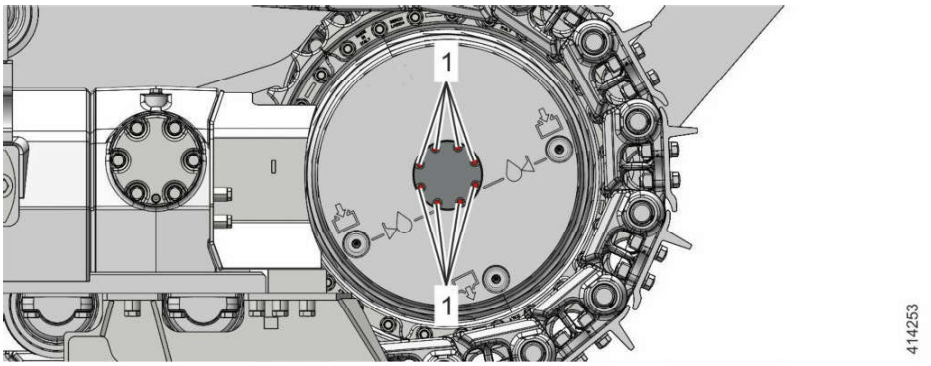

Fig. 586: Screws on the gear cover

1 Screw (8x)

▶ Remove the screws **1** on the gear cover.

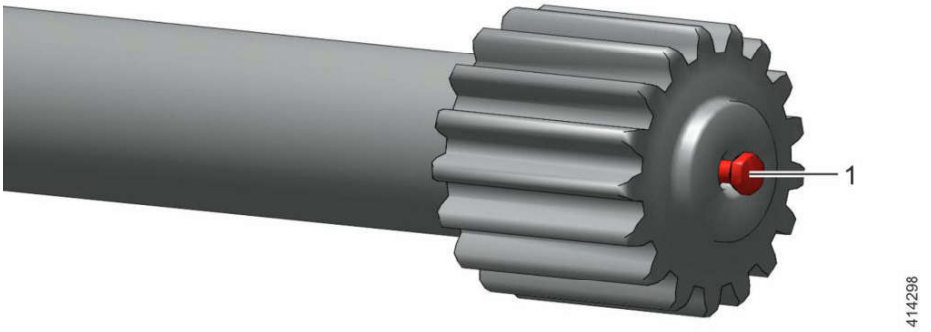

Fig. 587: Installation screw

1 Installation screw

▶ Screw in the installation screw **1** on the sun gear.

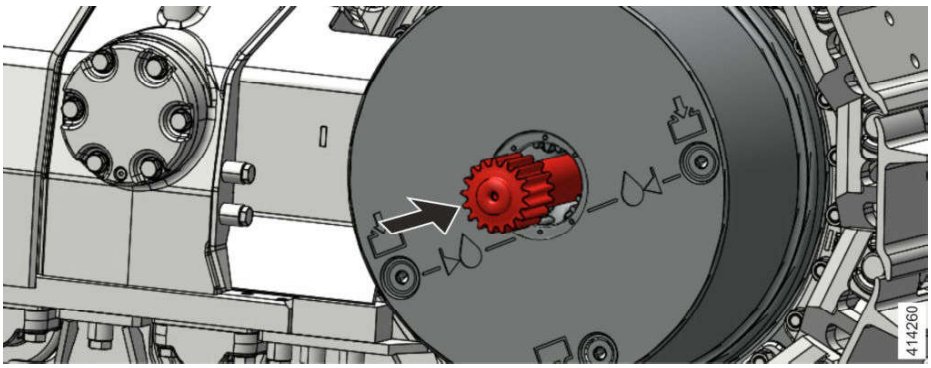

Fig. 588: Installing the sun gear

▶ Install the sun gear in the travel gearbox.

Malfunction / error	Cause	Remedy
Engine oil pressure too low	Oil level in oil pan too low	▶ Correct the oil level.
	Engine oil too thin	▶ Change the engine oil. ▶ Identify cause of the oil thinning and fix it.
	Oil pressure sensor defective	▶ Check the engine oil system. ▶ Replace the damaged oil pressure sensor.
	End regulating valve defective	▶ Contact Liebherr customer service.
	End regulating valve contaminated	▶ Contact Liebherr customer service.
	Bearing play too large due to wear or bearing damage	▶ Contact Liebherr customer service.
	Oil pump defective	▶ Check the oil pump. ▶ Change the oil pump if necessary.
	Oil filter blocked	▶ Change the oil filter.
	Oil pressure regulating valve defective	▶ Contact Liebherr customer service.
Engine oil in the cooling system	Oil cooler or oil cooler plate is leaking.	▶ Contact Liebherr customer service.
Coolant in the engine oil	O-rings on cylinder liners are leaking.	▶ Contact Liebherr customer service.
	Oil cooler or oil cooler plate is leaking.	▶ Contact Liebherr customer service.

4.1.2 Hydraulic system

Malfunction / error	Cause	Remedy
The *supply pressure* warning symbol is shown on the display when the diesel engine is running.	Excessive leakage	▶ Turn the diesel engine off immediately. ▶ Contact Liebherr customer service.
Abnormal noises from hydraulic pumps	Hydraulic pumps take in air.	▶ Turn the diesel engine off immediately. ▶ Check the oil level in the hydraulic tank. ▶ Check the suction lines for leaks.
No reaction to deflection of travel joystick	Emergency stop button pressed	▶ Release emergency stop button.
No response when actuating the “raise dozer blade”/“raise bucket” function	Blade release/bucket release activated	▶ Deactivate blade release/bucket release.

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Fuses of the diesel engine

▶ Identify fuse relating to the electrical failure determined using following table.

Fuse	Value	Unit	Name/Function
F700	5	A	Fuse for glow plug control
F705	5	A	Control B+ fuse

Tab. 77: Fuse of diesel engine

▶ Check relevant fuse and replace if necessary.

Relay

The relays are located in the battery compartment, in the operator's cab as well as on the circuit boards in the central electric compartment.

Relay	Name/Function
K1	Relay, intake air preheating
K3	ECU start-up locking relay
K4	Relay, power supplies
K7	1st relay, turn off travel (2nd shut-off path)
K8	2nd relay, turn off travel (2nd shut-off path)
K10	Relay, horn
K12	2nd relay, turn off working hydraulics (2nd shut-off path)
K14	1st relay, turn off working hydraulics (2nd shut-off path)
K19	Relay, power supplies
K20	Relay, front working headlight
K22	Relay, rear working headlight
K24	Relay, windscreen wiper motor for left cab door
K25	Relay, windscreen wiper motor for windscreen
K26	Relay, windscreen wiper motor for right cab door
K27	Relay, windscreen wiper motor for rear screen
K29	Relay, air conditioning condenser
K30	Relay, fuel water separator heating[A)]
K32	Relay, heating and air conditioning control element
K41	Relay, machine control[A)]
K49	Relay, entry and exit lighting[A)]
K59	15n relay

Tab. 78: Relay

A) Option

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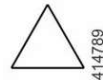
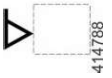
5.2.4 Symbols in the lubrication chart

Symbol	Meaning
	Cooling system
	Diesel engine
	Hydraulic system
	Splitter box
	Travel gearbox
	Travel gearbox duo cone slipring seal
	Axle bearing
	Lubricating point
	If necessary
h	Interval in operating hours
	Check oil level.
	Lubricate
	Observe the operator's manual.

Tab. 81: Symbols in the lubrication chart

Area of application	Specification	Identification
		VKA welding force: ≥ 2300 N (DIN 51350 / 4 — ASTM D 2596)

Tab. 105: Grease and other lubricants

Liebherr grease

Liebherr recommends the following grease products to obtain optimum lubrication results and additional protection from corrosion.

Area of application	Recommended lubricant	Specification	Identification
Standard	Liebherr Universal grease 9900	Soap based (Lithium complex)	KPF 2 N — 25 (DIN 51502)
			NLGI class: 2 (DIN 51818)
			VKA welding force: ≥ 5500 N (DIN 51350 / 4)
			with vapour phase corrosion protection
Low temperature	Liebherr Universal grease Arctic	Soap based (Lithium complex)	KPFHC 1 N — 60 (DIN 51502)
			NLGI class: 1 (DIN 51818)
			VKA welding force: ≥ 5500 N (DIN 51350 / 4)

Tab. 106: Grease and other lubricants

The temperature application ranges for Liebherr grease have been determined as follows:

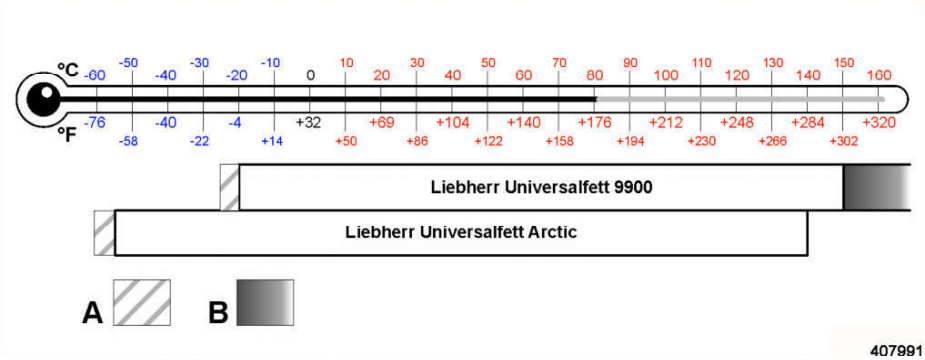


Fig. 629: Temperature application ranges for Liebherr greases

A Not used in central lubrication systems

B Short-term temperature peaks up to 392 °F

Grease for central lubrication system

△ Grease with high pressure additives (EP-grease) is recommended.

Use only grease with the same saponification type.

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NOTICE
Incorrect cleaning!
Damage to electrical components.

- ▶ Only clean electrical components with low pressure.

- ▶ If very dirty, clean the diesel engine and belly pan carefully with a steam cleaner.
- ▶ Install the belly pan cover **1** and belly pan cover **2**.

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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.

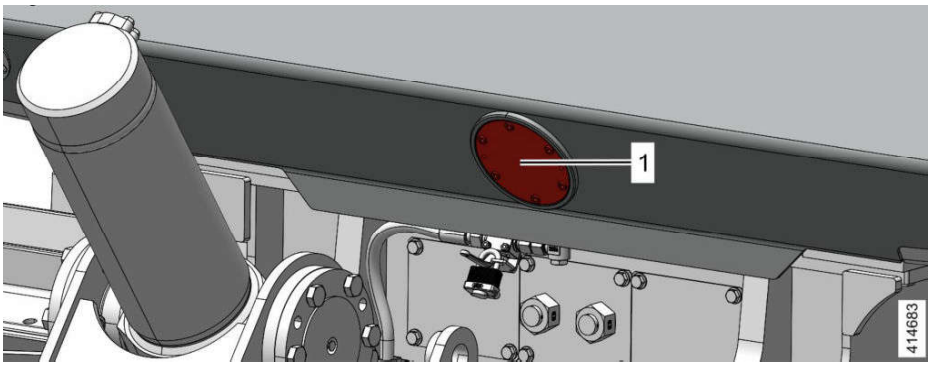

Fig. 658: Cover

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.

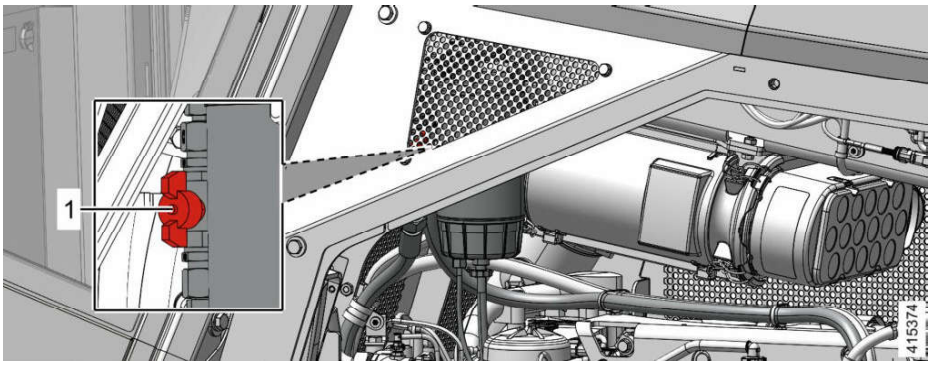

Fig. 659: Fuel system shut-off valve

1 Shut-off valve

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

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If the working headlight is set incorrectly:

▶ Adjust the working headlight.

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Selection of the ripper tooth tips

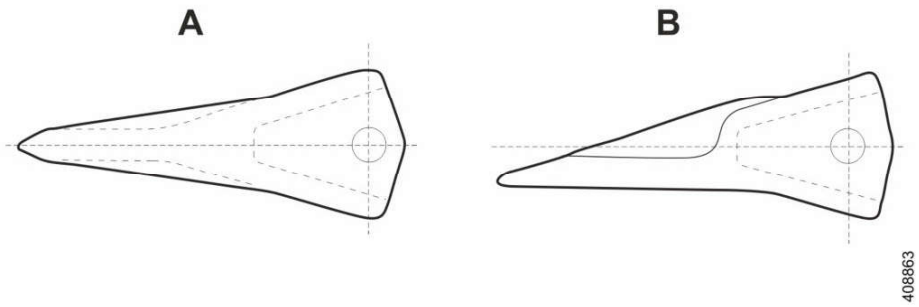

Fig. 686: Basic forms of the ripper tooth tips

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. 110: 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.

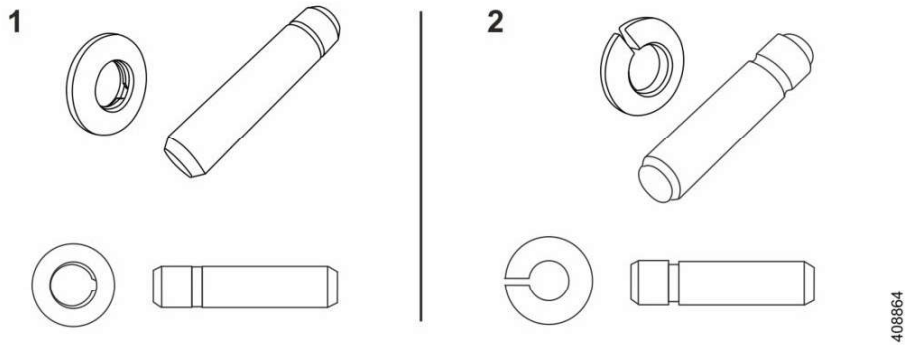

Fig. 687: Mounting variations

1 Mining version **2** Standard version

▶ Use a mounting variation according to the application.

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