en **Operator's manual**

Telescopic handler

Document ID

ORIGINAL OPERATOR'S MANUAL

Order number: 93517493
Issued: 01.08.2019
Version: 02
Author: LWT / Technical Documentation Department

Product ID

Manufacturer: Liebherr-Werk Telfs GmbH
Type: T 60-9 3AS
Type no.: 1709
From Serial no.: 15682

Contact

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A – 6410 Telfs

LWT/93517493/02/01.08.2019/en

If a larger support is used instead of standard tyres, then the following formula is valid for the calculation of support surface:

Length (cm) x width (cm) x 0.8

Take the support load of installed working attachment from the respective load chart.

1.2.5 Trailer loads and support loads

To pull a trailer, the permissible trailer loads and support loads must be observed.

Permissible trailer load	Agricultural or forestry towing machine	Self-propelled machine	Maximum permissible support load
Trailer without brake	1000 kg	1000 kg	1000 kg
Trailer with overrun brake	8000 kg	8000 kg	1000 kg
Trailer with pneumatic or hydraulic brake including trailer brake overfeed	16000 kg	12000 kg	1000 kg[1)]
Towing device rear and front (maximum permissible pull force in kN	45	45	not permissible

Tab. 4: Permissible trailer loads

1. Taking account of permissible axle loads and maximum operating weight, a maximum of 1500 kg is permissible.
2. Deviating regulations may apply on a country-specific basis. However, the values stated here must not be exceeded!

1.2.6 Load charts

Note
The load charts are valid exclusively for stationary machines on level and solid ground, horizontally positioned, which are equipped with an approved working attachment and approved tyres.

If other working attachments are used:
▶ Contact Liebherr customer service.

The weight of the working attachment and the load carried must not exceed the values specified in the load curve for the respective area!

DANGER
Machine tipping!
Danger to life.

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

▶ Note appropriate load curve for the working attachment.

▶ Tyres are in good condition and filled with the prescribed pressure.

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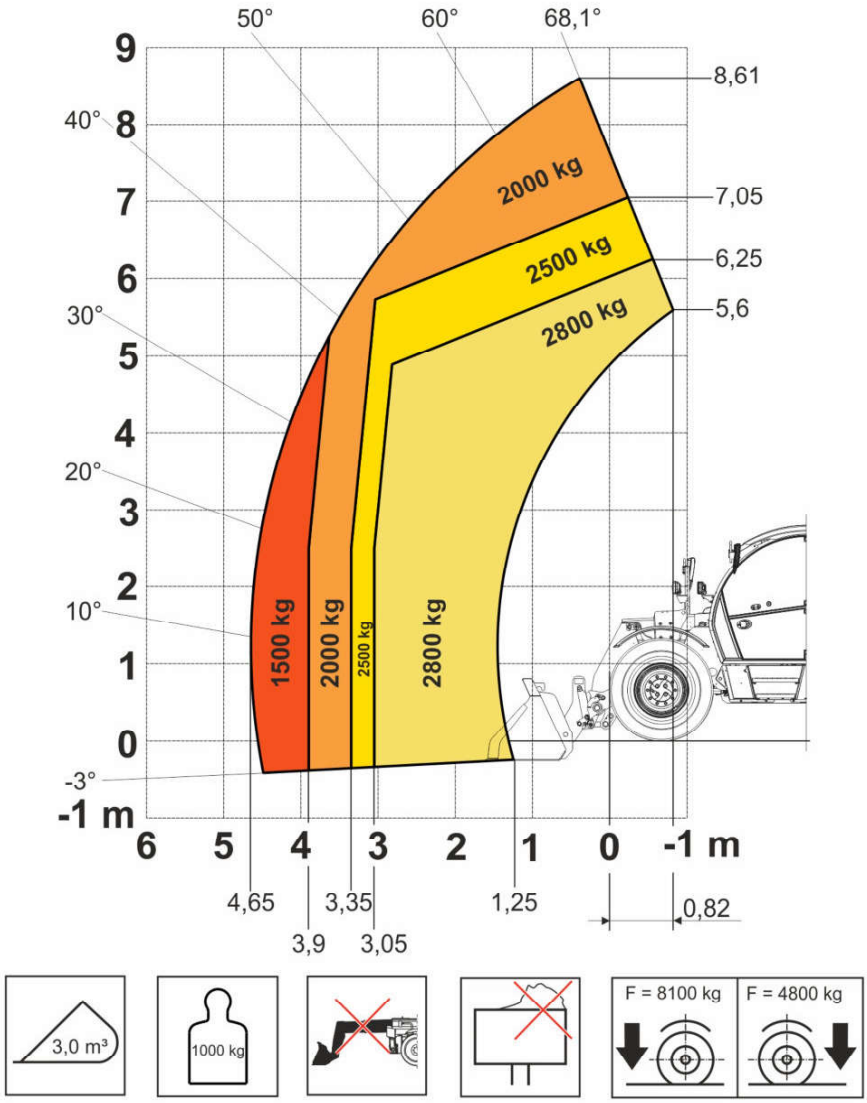
Load curve of lightweight bucket up to 3.00 m³ for T60-9

Load curve: Id. No. 12898809



Tab. 12: Load curve of heavy lift bucket up to 3.00 m³ for T60-9

Load curve applies to buckets up to a maximum of 3.00 m³, maximum own weight of 1000 kg and width of 2.5 m.

Example: when using a 2.00 m³ bucket, material with a maximum density of 1250 kg/m³ may be used.

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Performance
Impressive High-flyer –
the Jack of all Trades of Recycling

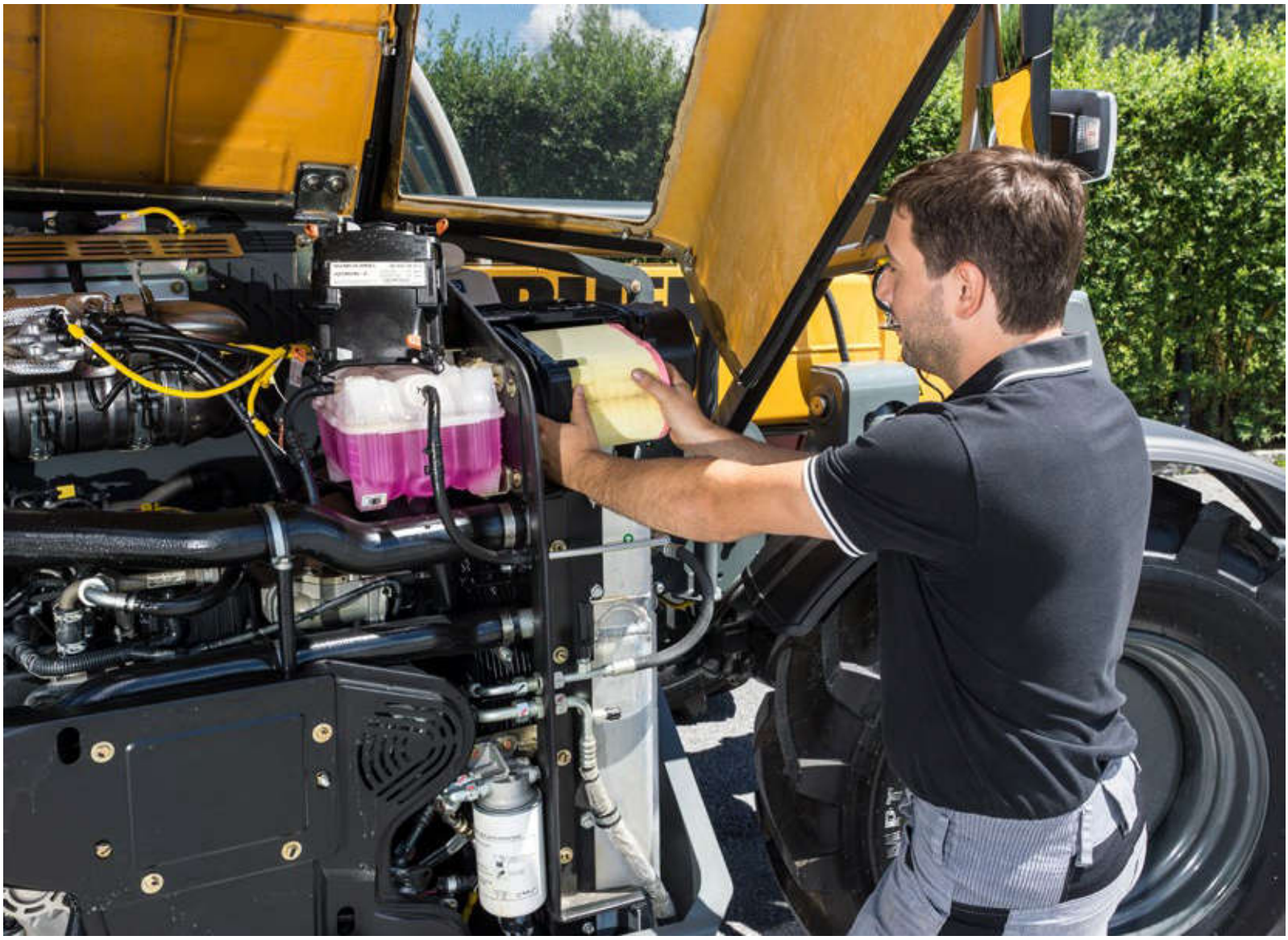
Efficiency
Make the Right Choice –
Sustainable and Economical

T 46-7s
Lifting Height 7.0 m / 23' ft in
Lifting Capacity 4.6 t
Engine Power 100 kW / 136 HP
Hydraulics 200 l / min. / 35.2 Imp.gpm
Pump flow max.

T 55-7s
Lifting Height 7.0 m / 23' ft in
Lifting Capacity 5.5 t
Engine Power 115 kW / 156 HP
Hydraulics 200 l / min. / 35.2 Imp.gpm
Pump flow max.

T 60-9s
Lifting Height 9.0 m / 26'6" ft in
Lifting Capacity 6.0 t
Engine Power 115 kW / 156 HP
Hydraulics 200 l / min. / 35.2 Imp.gpm
Pump flow max.

Maintainability



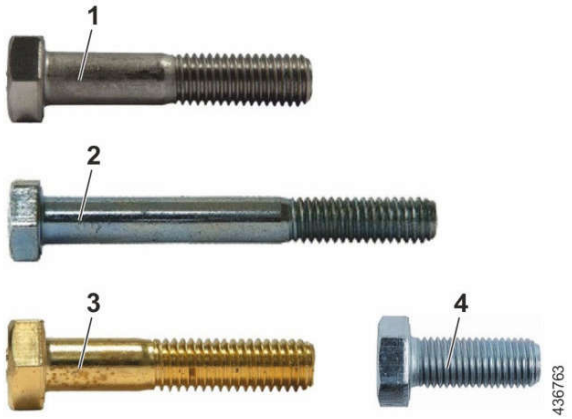
Don’t Settle for the Right Spare Part

When it comes to “service quality” Liebherr customers think short paths and quick response. This is why 98 per cent of our spare parts are not only stored in a central location but are dispatched in the shortest possible time. Our dense international service network, modern service stations as well as outstandingly trained technicians guarantee swift on-site support.

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. 22: Screw types

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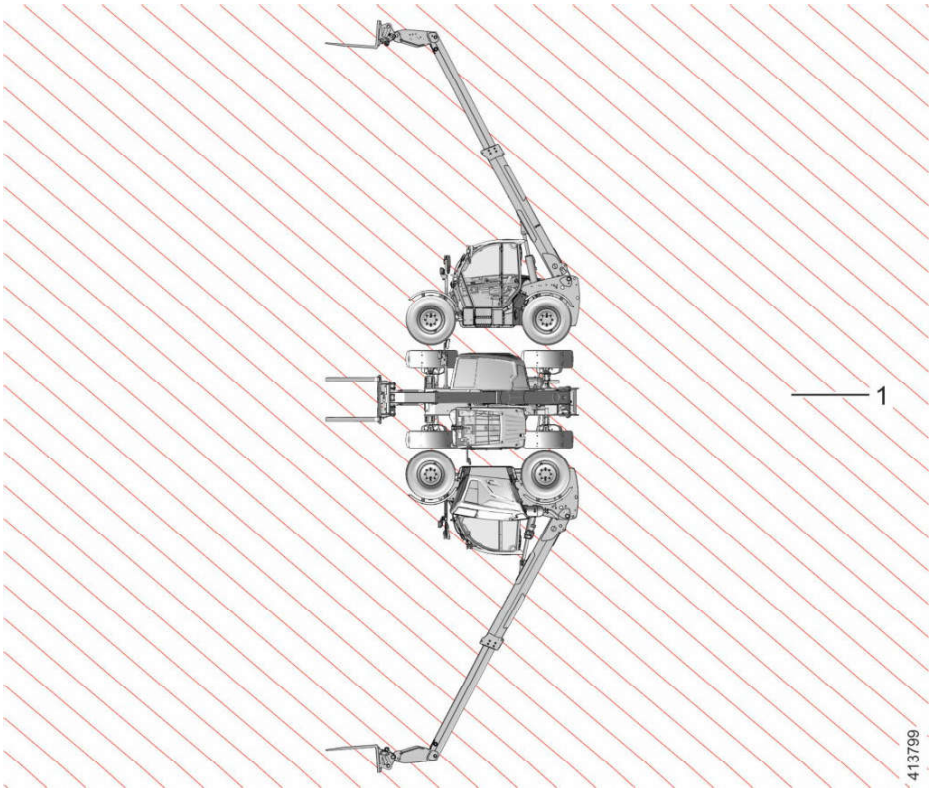

Fig. 51: Danger area of the machine

1 Danger area

Make sure that there are no persons within the danger area **1** of the telescopic handler.

The operator may only carry out work with the telescopic handler if there are no persons in the danger area.

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 danger area 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)	-20 °C to +45 °C

Tab. 27: Operating conditions

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Safety belt sign

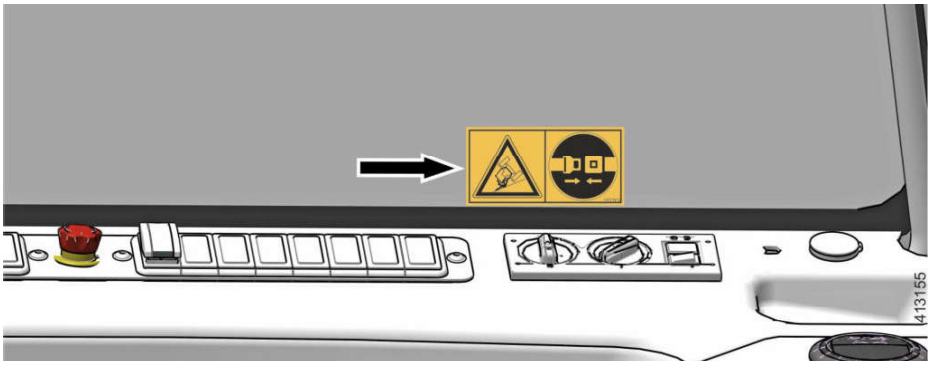

Fig. 57: Safety belt sign

The sign is located on the right-hand window in the operator's cab.

Indicates the importance of wearing the safety belt.

Meaning: **Always close the safety belt before putting the machine into service!**

ROPS/FOPS warning sign

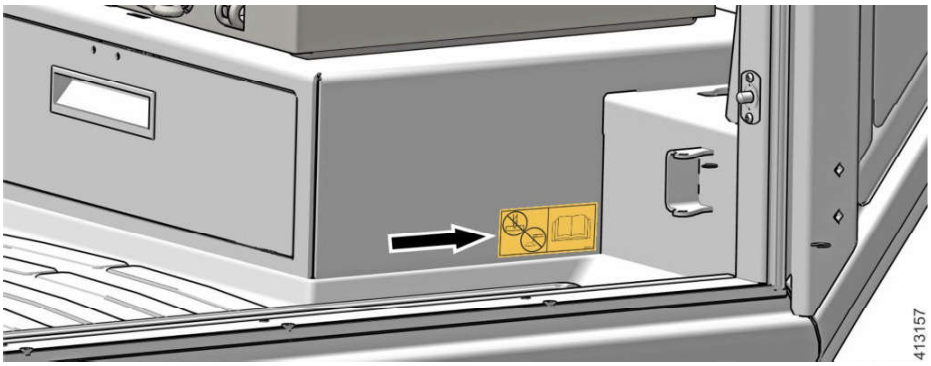

Fig. 58: ROPS/FOPS sign

The sign is located on the left below the operator's seat.

Warns of risk of accidents potentially leading to death or very severe injuries.

Meaning: **Structural modifications (e.g. welding, drilling) on the ROPS/FOPS operator's cab without consulting with Liebherr customer service are not permitted!**

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Tyre inflation pressure sign

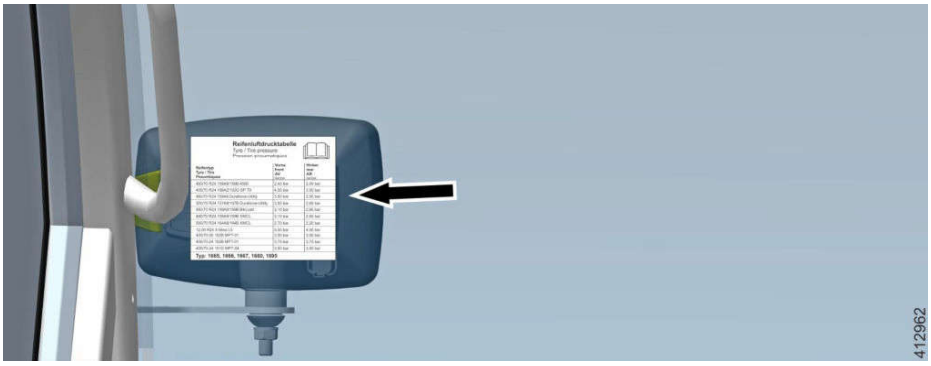

Fig. 77: Tyre inflation pressure sign

The sign is located on the front window in the operator's cab.

Denotes the permissible inflation pressure for the tyres.

Brake oil sign

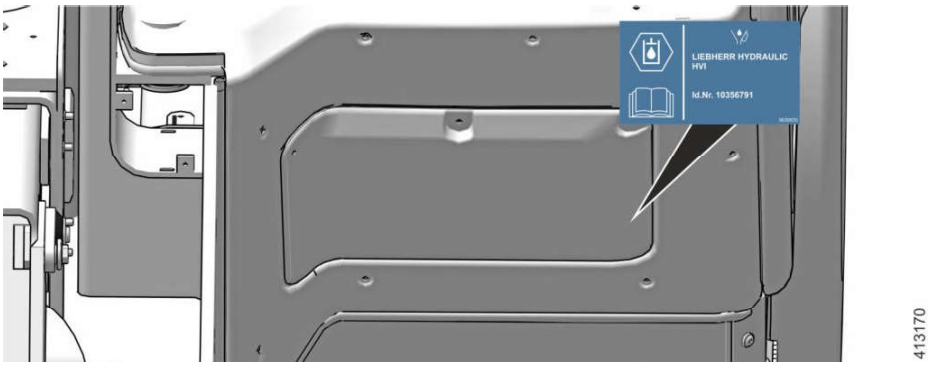

Fig. 78: Brake oil sign

The sign is located inside on the front console of operator's cab.

Denotes the brake oil specifications.

Load chart sign

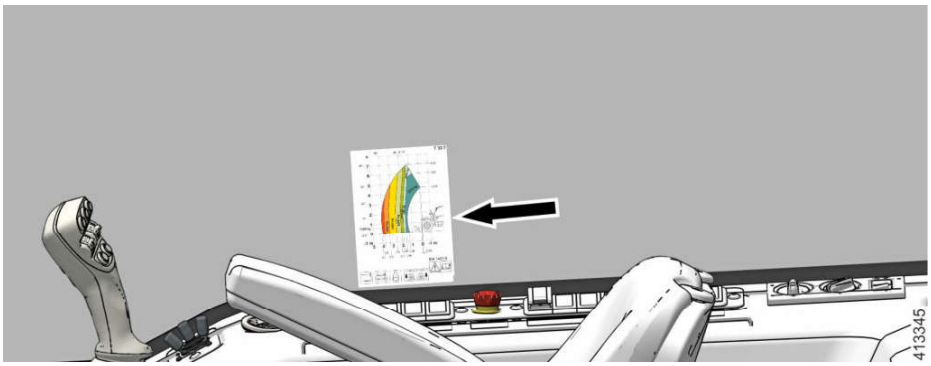

Fig. 79: Load chart sign

41. The machine must be utilized, driven and operated in such way that the stability is ensured and that there is no danger of tipping over.
42. Avoid any working movements which could cause the machine to tip over. However, if the machine does begin to tip or slide, retract the telescopic boom while simultaneously lowering the working attachment and turn the machine uphill. If possible, always work downhill or uphill, never sideways on a slope.
43. Always move slowly and carefully on rocky or slippery ground or on a slope.
44. Always adapt the travel speed to the working conditions.
45. Never travel on slopes which exceed the maximum permissible gradeability.
46. Only travel downhill at the permitted speed or you could loose control over the machine.
47. When loading a truck, make sure that the truck driver leaves the truck, even if the cab is FOPS protected.
48. For terrain which is difficult to gain an overview of and whenever necessary, ask for the assistance of a guide. Have only one person signal you.
49. Only permit experienced personnel to secure loads and signal the machine operators. The signaller must position himself within the view of the operator or be in voice contact with him.

2.6.7 Working in the vicinity of electrical overhead lines

1. When working with telescopic handlers near electrical overhead lines and overhead contact lines, a safety distance depending on the nominal voltage of the overhead lines between them and the telescopic handlers and its working equipment must be observed to avoid current transfer.
   This also applies for the distance between lines and accessory equipment as well as attached loads.
2. When approaching electrical overhead wires, consider all working movements of the telescopic handler, such as boom position, oscillation of ropes and dimensions of attached loads. Also observe ground unevenness, which can incline the telescopic handler and therefore move it closer to the overhead wires.
3. In case of wind, overhead wires as well as working equipment can swing out and thereby reduce the distance.
4. If a sufficient distance from electrical overhead wires and contact wires cannot be retained, then the operator must carry out other safety measures in consultation with the owner or operator of the lines to avoid current transfer.
   Other safety measures against current transfer can include the following:
   - Turning the current off,
   - Rerouting the overhead wires,
   - Cabling,
   - Limitation of working range of telescopic handlers.
5. In case of a current transfer, the operator of the telescopic handler must try to move the telescopic handler from the electric danger zone by lifting or lowering the working equipment, by driving or swinging out.
   If this is not possible, the following rules apply for the operator:
   - Do not leave the machine;
   - Warn people in the vicinity not to approach or touch the machine;
   - Have the power turned off!

The following safety distances must be adhered to:

Rated voltage	Safety distance
to 1000 V	1.0 m
from 1 kV to 110 kV	3.0 m

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WARNING
Some installations and equipment can limit the visibility of the machine operator.
Danger of accident!

- ▶ Pay attention to limitations in the visibility field and to blind spots.
- ▶ Use the aid of a guide if necessary.

Observe national regulations regarding visibility in the operator's cab. For countries within the European Economic Area, the Standard EN 15830 describes the test and evaluation methods for the visibility field of machine operator. Visibility field is tested in this case with standard equipment. Changes to the machine, such as installation or modification of components may not impact the visibility field. When changes impact the visibility field, then a test according to EN 15830 or the regulations valid on the job site must be carried out. Appropriate measures are to be taken, depending on the test result. The machine operator must be informed about the changes.

Field of vision

The field of vision describes the visible range the driver can see from the operator's seat.

The field of vision is determined according to EN 15830.

The figures below illustrate the field of vision in the near field and in the 12 m radius of driver from the operator's seat.

Not all areas of machine are located in the direct field of view.

WARNING
Danger of accident due to limited field of vision!
It can lead to severe injuries or death.

- ▶ Adjust the mirror.
- ▶ Adjust the visual aids {additional mirror (option) and/or camera (option)}.
- ▶ When working attachments are used that limit the field of view, measures must be taken to make sure that the machine is operated safely.
- ▶ Remove any obstacles in the work area.
- ▶ Make sure that no persons are within the danger zone.
- ▶ Do not move a load with raised telescopic boom.
- ▶ Move a load exclusively in transport position.

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

Restriction of field of vision for T60-9

Restriction of field of vision with load

The graphic describes the existing visual shadows with forklift device at retracted and raised telescopic boom of A = 450 mm and load in the field of vision radius of 12 metres.

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- The diesel engine is stopped.
- The parking brake is applied.
- Warning system is activated.
- Power supply remains switched on.

51 *Battery isolation* switch

412382

Press top part of switch: Power supply is activated.

Press bottom part of switch: Power supply is disconnected after 2 minutes.

Battery isolation indicator light lights up on the steering column.

52 *Tipping cylinder lock* switch (option)


412383

Press top part of switch: *Tipping cylinder lock* function is deactivated.

Press bottom part of switch: *Tipping cylinder lock* function is activated.

Tipping cylinder lock indicator light lights up on the display unit.

53 *Floating axle lock* switch (option)


412384

Press top part of switch: *Floating axle lock* function is deactivated.

Press bottom part of switch: *Floating axle lock* function is activated.

Floating axle lock indicator light lights up on display unit.

54 *Auto Power* switch (option)

412385

Press top part of switch: *Auto Power* function is deactivated.

Press bottom part of switch: *Auto Power* function is activated.

Auto Power symbol is shown on the display.

56 *Side window windscreen washer system* switch (option)


413225

Press top part of switch: *Side window windscreen wiper* is deactivated.

Press bottom part of switch: *Side window windscreen wiper* is activated.

Press bottom part of switch and hold (touch function): Side window windscreen washer system is activated.

57 *Trailer brake* button (option)


412505

Parking brake switch is activated.

Press button down: Trailer brake is released.

Release button: Trailer brake is activated.

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Status symbols	Name
 412228	High beam (For more information see: 3.1.11 Steering-column switch, page 118)
 412263	Quick coupler[A)] (For more information see: 3.5.2 Hydraulic quick coupler (option), page 263)
 412276	Shake/vibrate function[A)] (For more information see: Shake/vibrate function (option), page 211)
 412261	Tipping cylinder lock[A)] (For more information see: Tipping cylinder lock (option), page 210)
 412262	Bucket return[A)] (For more information see: Bucket repositioning (option), page 199)
 412267	Diesel engine stop If this is displayed, turn off the diesel engine and contact Liebherr customer service
 413640	Maintenance display Contact Liebherr customer service
 412233	Forward travel direction (For more information see: Forward travel, page 172)
 412234	Reverse travel direction (For more information see: Reverse travel, page 173)
 412227	Neutral position (For more information see: Before travel, page 172)
 412238	Front wheel steering (For more information see: Selecting front wheel steering mode, page 178)
 412240	All wheel steering (For more information see: Selecting all-wheel steering mode, page 179)
 412239	Crab steering (For more information see: Selecting crab steering mode, page 179)

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- ▶ Unlock door lock **2** with ignition key.
- ▶ Open cab door **1** with door handle **3**.
- ▶ Enter operator's cab.
- ▶ Before putting machine into service, close the cab door.
  ▷ The cab door engages in the door lock.

3.2.2 Emergency exit

Enter and leave the operator's cab always through the cab door.

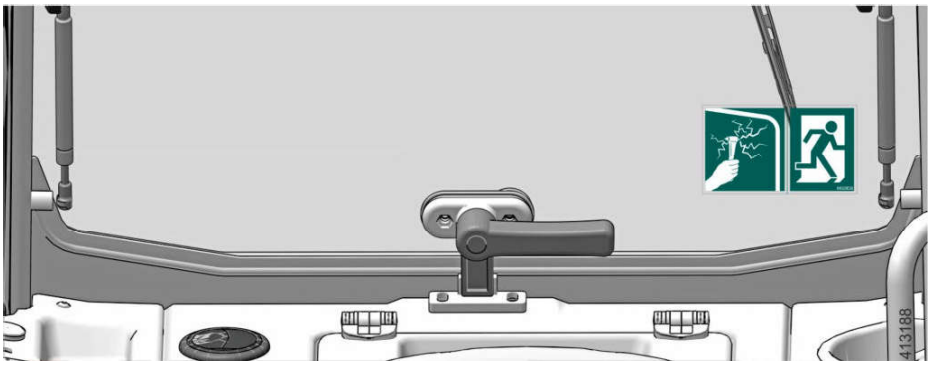

Fig. 155: Emergency exit

Use the rear cab window as an emergency exit.

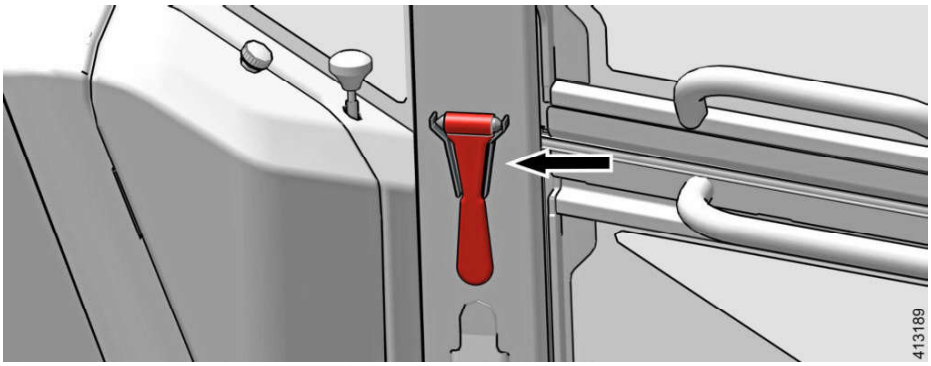

Fig. 156: Emergency hammer

The emergency hammer is located in the operator’s cab on the centre left window rail.

- ▶ In emergency situations, use the emergency hammer to break the rear cab window or another cab window, depending on the situation!

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Adjusting backrest incline

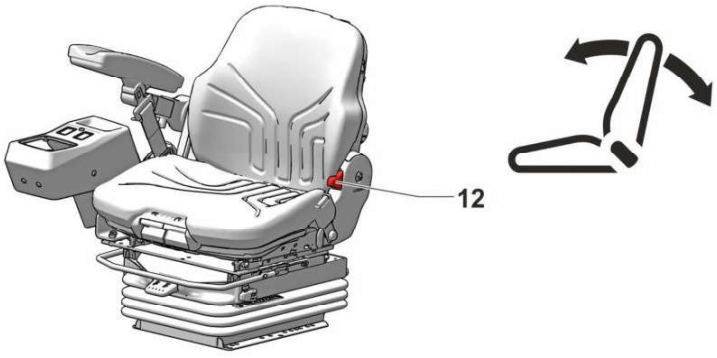

Fig. 175: Adjusting backrest incline

12 *Backrest inclination* handle

▶ Pull *Backrest inclination* handle **12** up.

▶ Adjust backrest to desired incline.

▶ Release *Backrest inclination* handle **12**.

Adjusting horizontal suspension

Impact loads in travel direction can be absorbed better through the horizontal suspension.

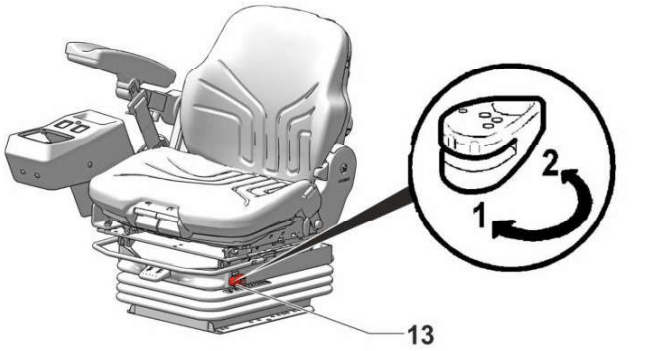

Fig. 176: Adjusting horizontal suspension

1 Horizontal suspension OFF
2 Horizontal suspension ON
13 *Horizontal suspension* handle

▶ Move *Horizontal suspension* handle **13** to Horizontal suspension ON **2**.
▷ Horizontal suspension is activated.

▶ Move *Horizontal suspension* handle **13** to Horizontal suspension OFF **1**.
▷ Horizontal suspension is deactivated.

Troubleshooting
Can operator's seat be moved to a different position when horizontal suspension is deactivated?

▶ Contact Liebherr customer service.

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Armrest: horizontal adjustment

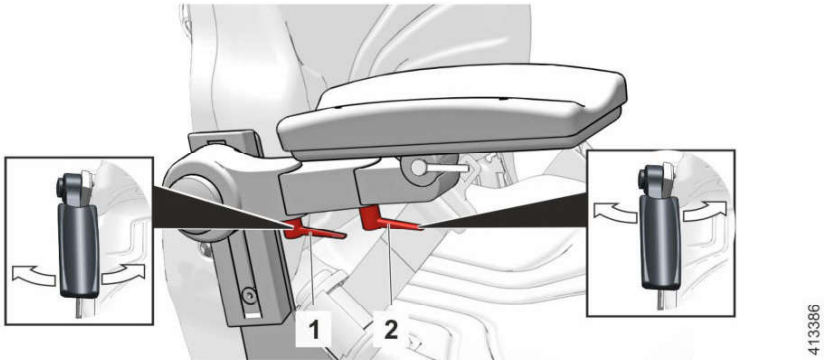

Fig. 195: Horizontal adjustment

- ▶ Loosen lever **1** or lever **2**.
- ▶ Adjust the armrest horizontally.
- ▶ Tighten lever **1** or lever **2** again.

Armrest: adjusting the incline and depth

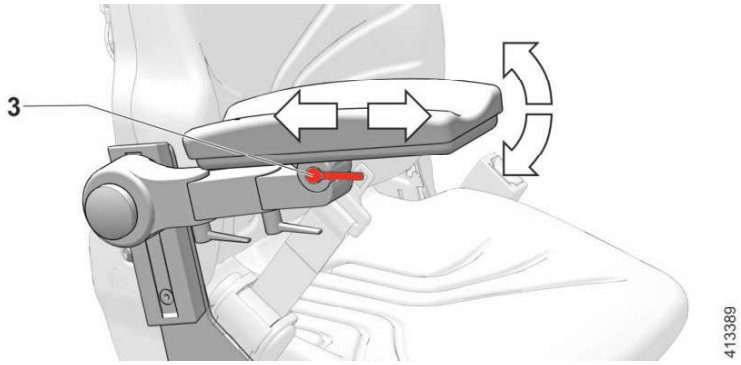

Fig. 196: Adjusting the incline and depth

- ▶ Loosen lever **3**.
- ▶ Adjust the incline and depth.
- ▶ Tighten lever **3** again.

3.2.7 Steering column and steering wheel

By changing the steering column, the steering wheel distance to the body, the steering wheel height and the steering wheel incline can be changed. The adjustments are infinitely variable.

WARNING
Improper steering mode change!
Injury.

- ▶ Set steering mode exclusively when machine is at a standstill.

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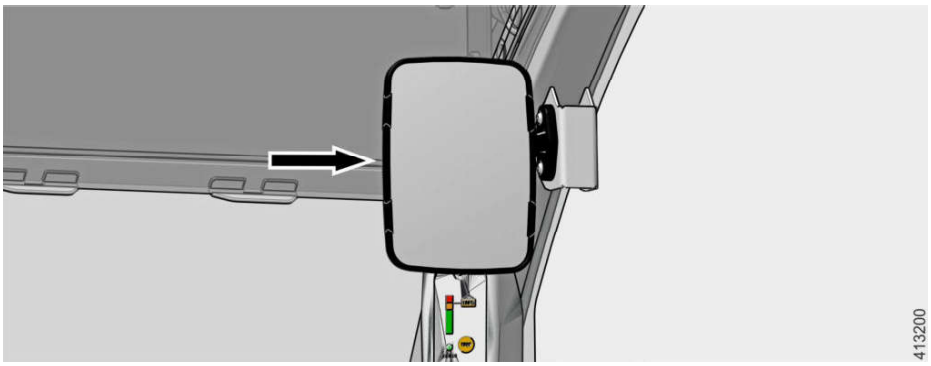

Fig. 216: Interior mirror

▶ Adjust the interior mirror before starting to work.

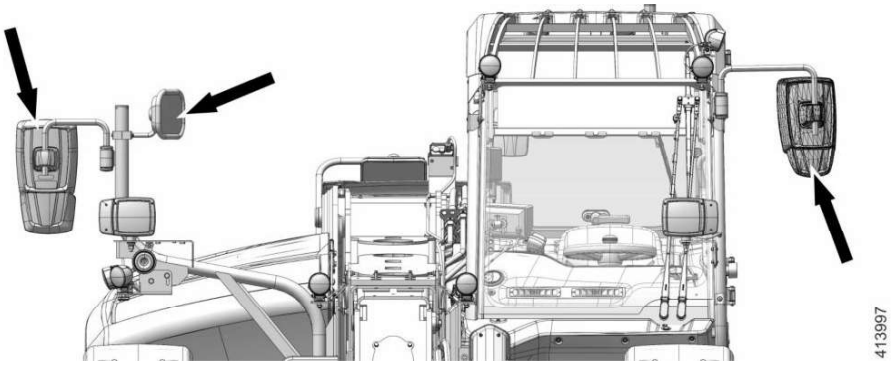

Fig. 217: Exterior mirror, front

▶ Adjust the exterior mirror at the front before starting to work.

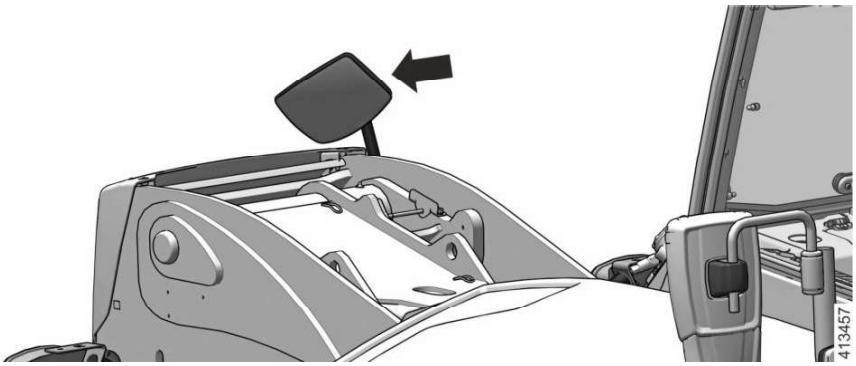

Fig. 218: Outside mirror, rear

▶ Adjust the outside mirror on the rear before starting to work.

3.2.14 Trailer mirror (option)

The trailer mirror needs to be installed if using a trailer coupling.

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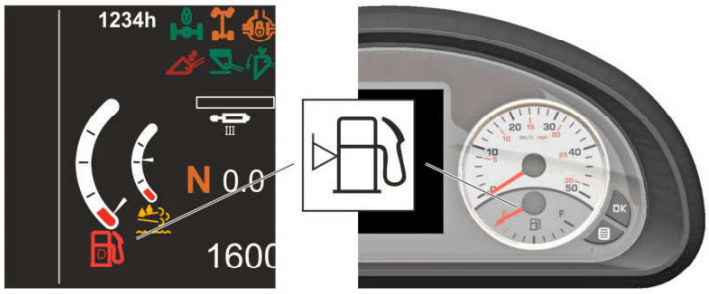
Refuelling with diesel



413838

Fig. 237: Fuel display

- ▶ Set starting switch to contact position.
- ▶ Check whether there is enough diesel fuel in the fuel tank on the fuel display.

406952

Fig. 238: Safety when refuelling

DANGER
Highly flammable fuel and operating fluids!
Danger to life.

- ▶ Smoking, naked lights and fire are prohibited.
- ▶ Exclusively refuel when diesel engine is switched off.

- ▶ Adhere to the safety regulations for refuelling. (For more information see: 2.6.3 Safety guidelines for fire and explosion prevention, page 78)

Preparing for travel mode

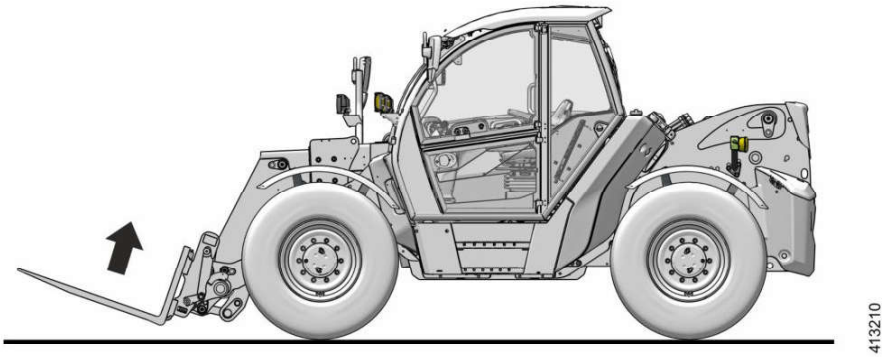


Fig. 257: Raising working attachment

▶ Raise working attachment so that no obstacles are touched.

Releasing parking brake

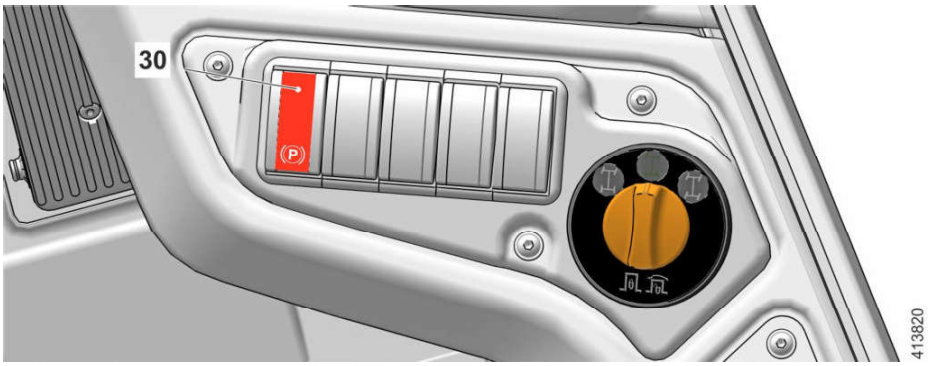


Fig. 258: Releasing parking brake

▶ Press *parking brake* switch **30** up.
▷ After the machine starts to travel, the *parking brake* symbol goes out on the monitor.

Bringing machine to operating temperature

If hydraulic oil is too cold, the machine will react sluggishly.

▶ Repeatedly actuate working hydraulic cylinder against stop.
▷ The hydraulic oil is thereby brought to operating temperature.

3.3.5 Driving

The machine's travel speed should be adapted to suit driving conditions and the load in question.

When driving with a load, drive at low travel speed to retain the manoeuvrability and avoid excessive strain.

When driving with a load, match the travel speed to the respective conditions.

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- Working attachments subsequently mounted to the machine, which may require a separate operating permit.
- The validity of vehicle documentation.
- Special authorisations and resulting requirements and conditions for operation on public roads.
- The relevant safety regulations.
- Instructions for safe travel.
- The road traffic regulations applicable in the country of use.

Prior to commencing on-road travel, take the following precautions:
- Remove the mounted front guard.
- Remove the guard mounted on the front headlights.
- Switch off working headlights.
- Drive exclusively with air-filled tyres.
- Do not tow any trailers or working attachments with the rear coupling (towing coupling).
- Install country-specific packages.
- Put the level adjustment[7)] in neutral position.
- Unlock the floating axle lock[7)] prior to travel mode.

Preparing for on-road travel

Stow the safety devices listed below on board, in accordance with the provisions of **German road traffic licensing regulations (STVZO)**.

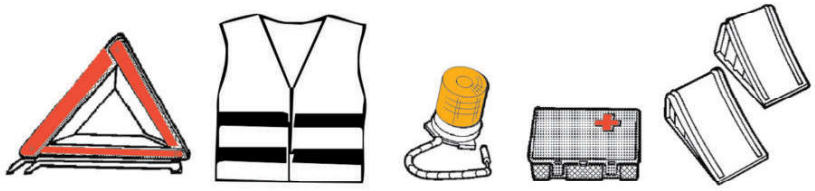

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Fig. 278: Safety equipment

- Warning triangle
- Safety vest
- Beacon
- First aid kit
- Chock(s)
- Number plate

7) Option

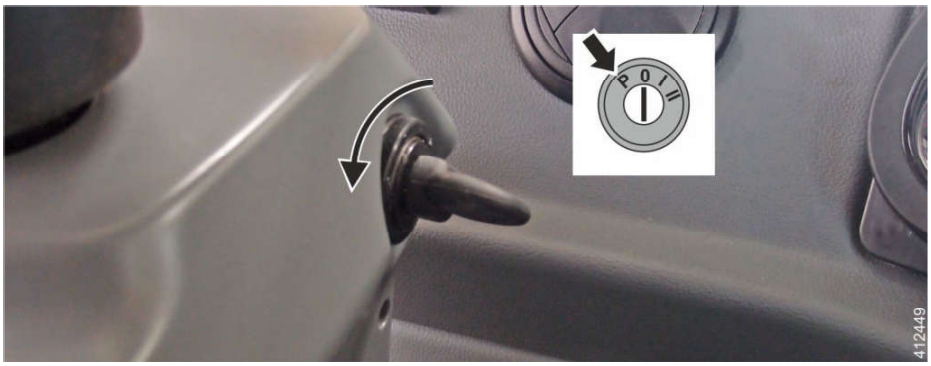

Fig. 297: Starting switch - park position

▶ Turn the starting switch to park position.
▷ The radio is operational.

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

▶ Secured the machine against being started unauthorisedly.

When you leave the machine:
▶ Turn starting switch to zero position and pull ignition key out.

3.3.9 Working with the working attachment

Preparations for working with the working attachment

When working with the working attachment, do not exceed the permitted load rating of the machine.

To ensure that the lifting process is safe, the load curve is binding.

Should the maximum permitted rated load of the working attachment exceed that of the machine, the rated load of the machine is always binding, taking into account possible differences in weight.

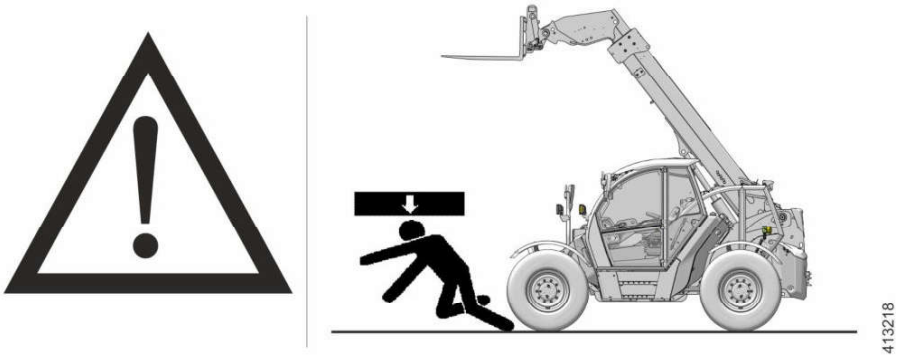

Fig. 298: Hazardous situation

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Setting the flow volume

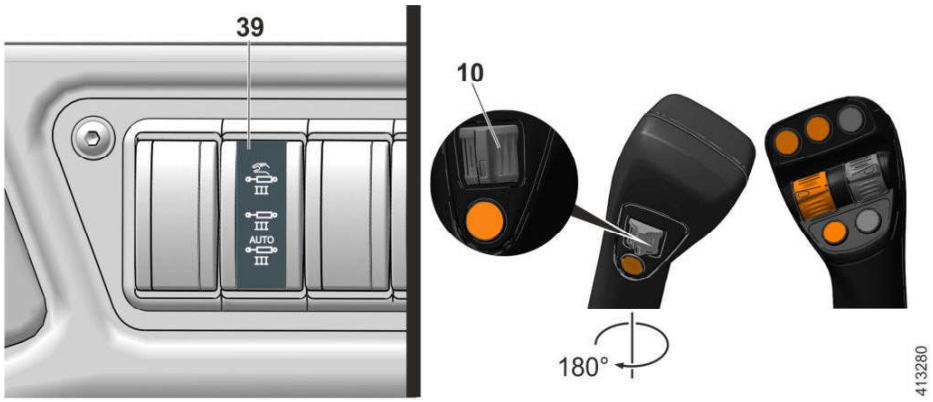

Fig. 315: Setting control circuit III flow volume

10 *Control circuit III* rocker switch **39** *Control circuit III* switch

▶ Put *control circuit III* switch **39** into middle position.
  ▷ *Control circuit III* symbol is shown on the display.
  ▷ Preset flow volume flashes on the display.

▶ Press *control circuit III* rocker switch **10** on control lever to the right or left.
  ▷ The flow volume changes in 1% increments.
  ▷ Flow volume flashes on the display.

Saving and activating the flow volume

▶ Press *control circuit III* rocker switch **10** on control lever to the right or left.

▶ Press *Control circuit III* switch **39** downwards.

▶ Release *Control circuit III* rocker switch **10** on the control lever.
  ▷ *Control circuit III AUTO* symbol is shown on the display.
  ▷ The set flow volume is shown on the display.
  ▷ The set flow volume is stored and archived.

Deactivating the flow volume

▶ Press *Control circuit III* switch **39** again.
  ▷ *Control circuit III* symbol is shown on the display.
  ▷ The set flow volume is deactivated.
  ▷ Set flow volume flashes on the display.

▶ Press *control circuit III* rocker switch **10** on control lever to the right or left.
  ▷ *Control circuit III* symbol is shown on the display.
  ▷ The set flow volume is deactivated.
  ▷ Set flow volume flashes on the display.

Control circuit III change over (option)

For working attachments with additional hydraulic functions.

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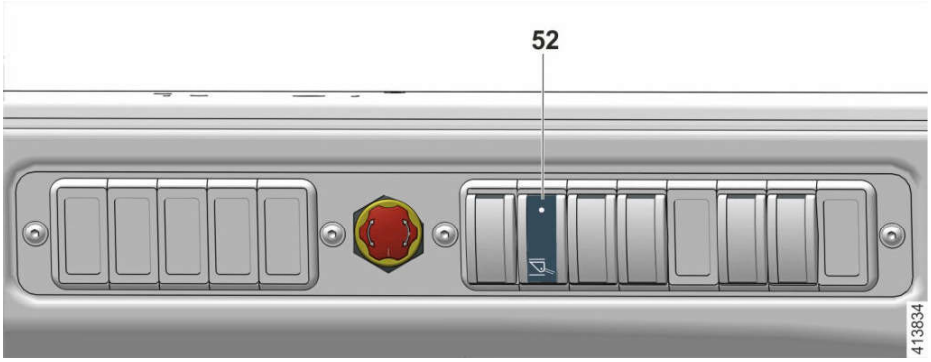

Fig. 331: Tipping cylinder lock

52 *Tipping cylinder lock* switch

Activating the tipping cylinder lock
▶ Press *tipping cylinder lock* switch **52** down.
  ▷ The *tipping cylinder lock* symbol is shown on the display.
  ▷ Tilting the working attachment in and out is deactivated.

Deactivating the tipping cylinder lock
▶ Press *tipping cylinder lock* switch **52** up.
  ▷ *Tipping cylinder lock* symbol goes out on the display.
  ▷ Tilting the working attachment in and out is activated.

Shake/vibrate function (option)

Activating the shake/vibrate function

Ensure that following requirements are met:
❑ The working hydraulics are unlocked.
❑ The bucket is not in the end position.

Fig. 332: Activating the shake/vibrate function

▶ Deflect the joystick repeatedly to the left and to the right via the tilt axle.

▶ Keep the joystick deflected.
  ▷ The shake/vibrate function is activated.
  ▷ *Shake/vibrate function* symbol is shown on the display.

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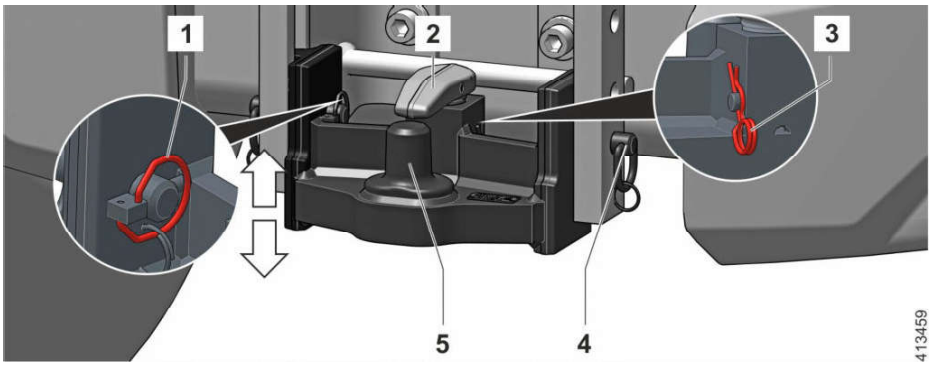

Fig. 347: Trailer coupling piton, height adjustable

1 Linch pin
2 Holding-down piece
3 Cotter pin
4 Connector pin
5 Coupling pin

▶ Loosen locking pins **1** of lateral connector pins **4**.

▶ Remove connector pins **4**.

▶ Move the trailer coupling up or down.

Once the desired height is reached:

▶ Insert lateral connector pins **4**.

▶ Secure connector pins **4** with locking pins **1**.

Opening the trailer coupling

▶ Remove cotter pin **3**.

▶ Swing hold-down device **2** to side by 90°.

▶ Remove contamination from the trailer coupling using a suitable tool.

Connecting trailer

Ensure that following requirements are met:

❑ Trailer is secured against rolling away.
❑ Trailer coupling and the pull device of trailer are at the same height.
❑ The trailer coupling is open.

▶ Slowly move machine backward until the pull device is above the coupling pin **5**.

▶ Turn diesel engine off.

▶ Engage parking brake.

▶ Lower the pull device.

▶ Swing hold-down device **2** back into travel direction.
▷ Hold-down device **2** is above the coupling pin **5**.

▶ Secure hold-down device **2** with a cotter pin **3**.

▶ Check whether the pull device of trailer is securely locked in the trailer coupling.

▶ Connect the hydraulic connections, compressed air connections and electrical connections.

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Lowering hitch trailer coupling

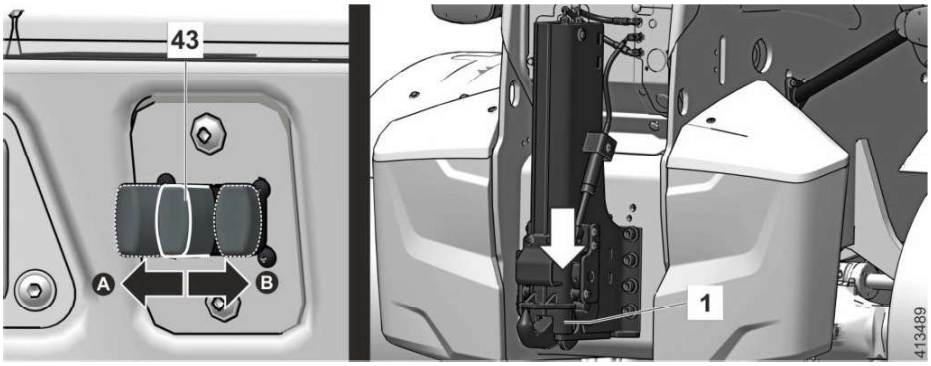

Fig. 356: Lowering hitch trailer coupling

1 Hitch trailer coupling **43** *Rear hydraulics* control lever

NOTICE
Improper lowering of the hitch trailer coupling!
Damage to the hitch trailer coupling.

▶ Ensure that the hitch trailer coupling does not come into contact with the ground after the lowering procedure.

▶ Pull *rear hydraulics* control lever **43** towards **B**.
▷ Hitch trailer coupling **1** is lowered.

▶ Lower hitch trailer coupling **1** until it is just above the ground.

Raising and locking hitch trailer coupling

▶ Slowly move machine backward until the hitch trailer coupling is under the pull device.

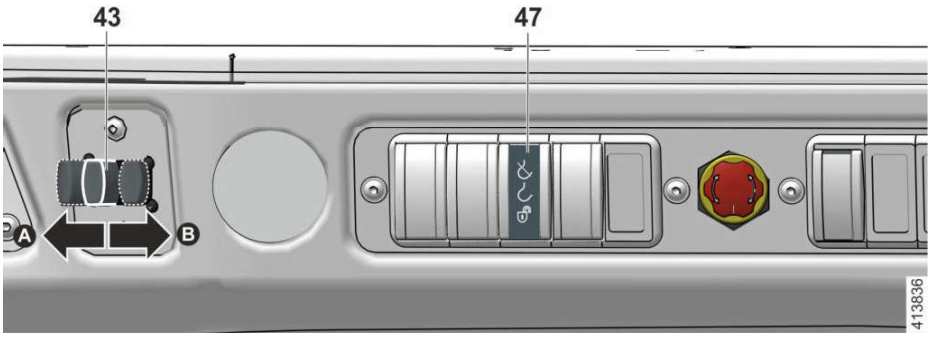

Fig. 357: Locking the hitch trailer coupling

43 *Rear hydraulics* control lever **47** *Auto-hitch* switch

▶ Press *rear hydraulics* control lever **43** towards **A**.
▷ Hitch trailer coupling is raised up to the stop.

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3.4 Work methods

The routine working methods are described in this section.

3.4.1 Collision between quick coupler and working attachment

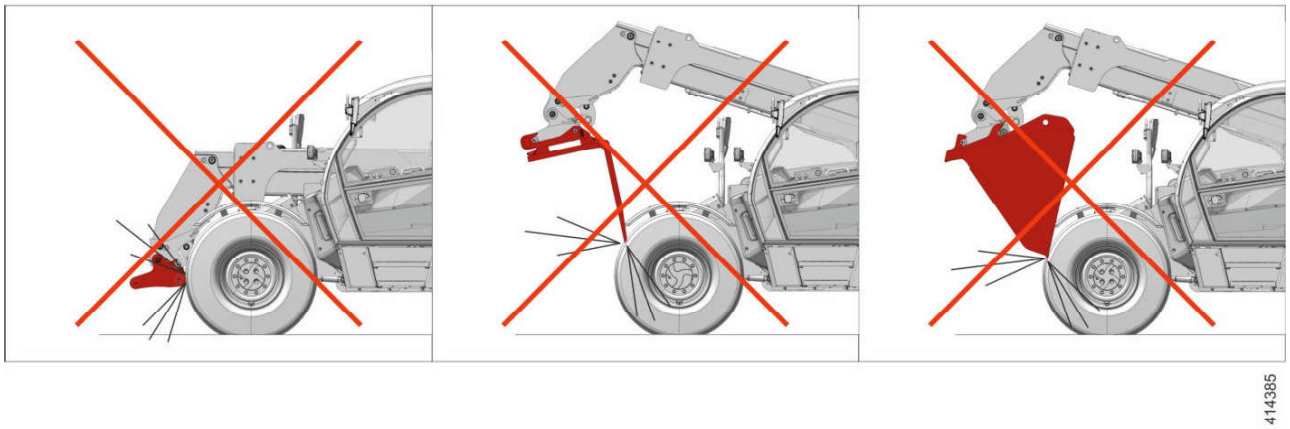

Fig. 375: Collision between quick coupler and working attachment

NOTICE
Working attachment collision!
Damage to tyres.

▶ When driving, tilt the working attachment in and lower it to the transport position.

If the quick coupler is fully tilted out, the quick coupler or the working attachment may collide with the machine.

3.4.2 Transport position

Only transport the loaded bucket and forklift in the transport position.

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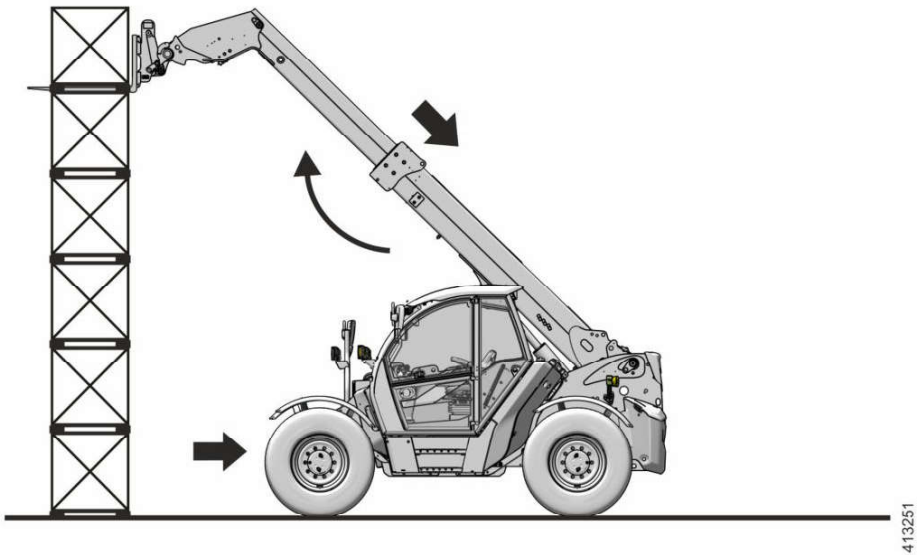

Fig. 392: Set the load on the stack

- ▶ Align the forklift horizontally.
- ▶ Set the load down on the stack carefully until the forklift is relieved.
- ▶ Drive the machine back slowly.
- ▶ Retract telescopic boom.
- ▶ Lower the telescopic boom.

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Leak oil port (option)

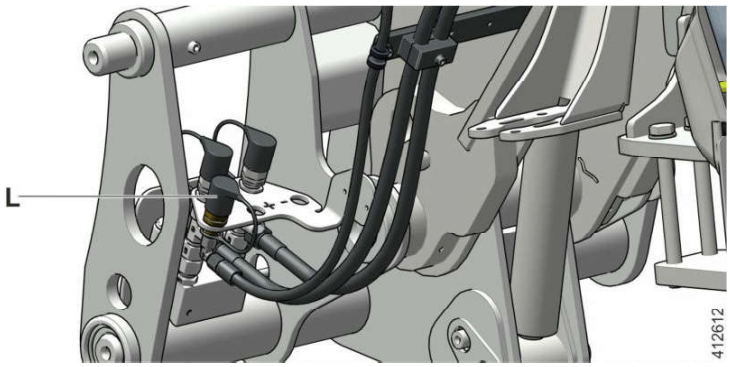

Fig. 410: Arrangement of leak oil line

L Leak oil port

▶ Disconnect the leak oil lines for the attached working attachment from the leak oil port **L**.

▶ Attach the protective cap to the leak oil port **L**.

Front socket (option)

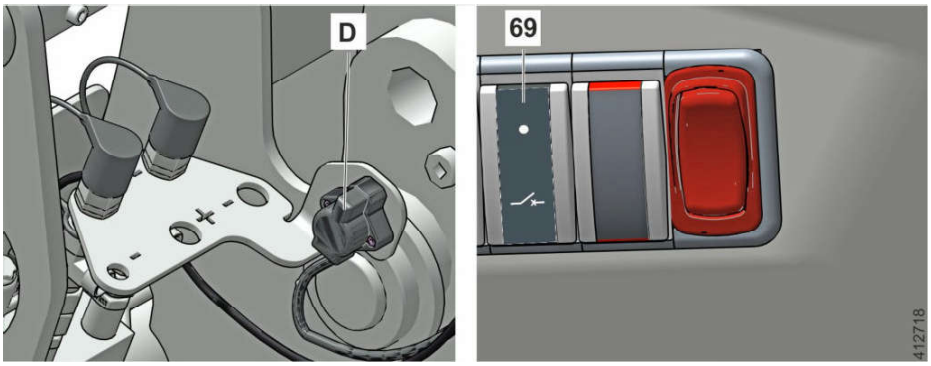

Fig. 411: Location of front socket

D Front socket

69 *Front socket* switch

▶ Press *front socket* switch **69** up.
▷ The front socket **D** is without current.

▶ Disconnect cables for working attachment from front socket **D**.

Removing the working attachment

WARNING
Working attachment falling over!
Risk of injury.

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

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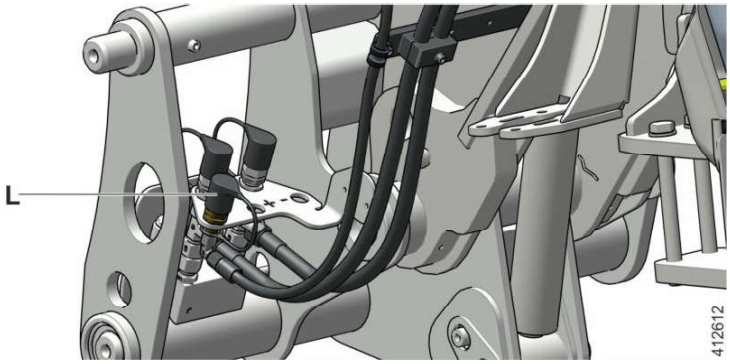

Fig. 431: Arrangement of leak oil line

L Leak oil port

- ▶ Remove protective cap from leak oil connection **L**.
- ▶ Connect the leak oil line to the leak oil connection **L**.
- ▶ Route hydraulic lines in such a way that they are not pinched when working with working attachment.

Control circuit III change over (option)

The control circuit III change over is attached on the front left of the change receptacle.

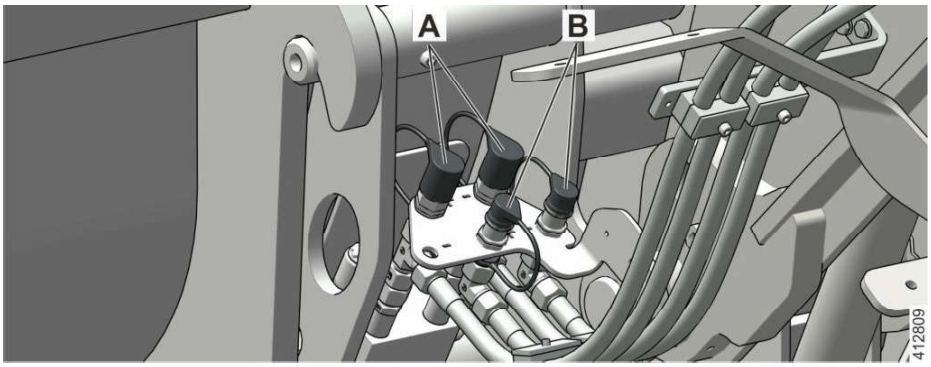

Fig. 432: Connecting hydraulic lines

A Connections, control circuit III

B Connections, control circuit III change over (option)

- ▶ Remove the protective cap from control circuit III change over connections **B**.
- ▶ Connect the hydraulic lines for the attached working attachment to control circuit III change over connections **B**.
- ▶ Route hydraulic lines in such a way that they are not pinched when working with working attachment.

Front socket (option)

The front socket is attached on the front left of the change receptacle.

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3.7 Emergency operations

3.7.1 Emergency mode function

The electronic system of machine is monitored by the electronic boxes for travel hydraulics, working hydraulics and engine control. Depending on the error which occurred, the machine is switched into different types of emergency modes.

Restricted operation

Emergency mode, travel hydraulics:
– Service code is displayed on the monitor.
– A maximum travel speed of up to 7 km/h is possible.

▶ Contact Liebherr customer service.

Failure of electronic box for working hydraulics or engine control:
– Limited scope of function of machine.

▶ Contact Liebherr customer service.

No operation

Failure, travel hydraulics:
– Service code is displayed on the monitor.
– The machine is stopped and can no longer be operated.

▶ Contact Liebherr customer service.

3.7.2 Towing machine

The following towing instructions are valid exclusively for exceptional situations to bring a disabled machine to a location where it can be repaired or loaded.

Towing speed and towing distance:
– max. towing speed no more than 2 km/h (walking speed),
– only short distances are permitted to tow the machine from the danger zone (max. 200 m).

Always use a transport vehicle to convey the machine over long distances!

Towing the machine is problematic and is always carried out at the owner's risk.

Damage or accidents which occur when towing the machine cannot be covered by the manufacturer's guarantee under any circumstances.

Towing safety

DANGER
Service brake and parking brake without function!
Danger to life.

▶ Secure machine with chocks to prevent it rolling away.

When towing, observe all specified safety regulations and the following recommendations:
– Observe the statutory provisions applicable on-site.

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SPN	FMI	Component	Problem detected	Possible cause	Effect	Remedy
000091	01	Accelerator pedal angle sensor	Measured voltage too low: greater than 5% of sensor supply but at least 50% "of difference between taught minimum value and 5% of sensor supply" less than taught minimum value.	Taught minimum value incorrect; taught value too high	Machine response: limited mode; accelerator pedal cannot be used	Contact Liebherr customer service.
000091	02	Accelerator pedal angle sensor	Measured voltage not within a range of 0 V to sensor supply, but greater	Short circuit to supply	Machine response: limited mode; accelerator pedal cannot be used	Contact Liebherr customer service.
000091	03	Accelerator pedal angle sensor	Measured voltage too high: greater than 95% of sensor supply but less than sensor supply	Short circuit to sensor supply	Machine response: limited mode; accelerator pedal cannot be used	Contact Liebherr customer service.
000091	04	Accelerator pedal angle sensor	Measured voltage too low: less than 5% of sensor supply	Broken cable, short circuit to ground	Machine response: limited mode; accelerator pedal cannot be used	Contact Liebherr customer service.
000091	07	Accelerator pedal angle sensor	Measured redundancy difference too high: greater than 500 mV, longer than 200 ms	Cable break of the redundant signal	Machine response: limited mode; accelerator pedal cannot be used	Contact Liebherr customer service.
000091	13	Accelerator pedal angle sensor	Taught values outside the permitted range	Accelerator pedal is not calibrated	Machine response: travel drive blocked until the accelerator pedal is taught correctly	Contact Liebherr customer service.
000096	16	Fuel tank immersion tube sensor	Measured resistance too high (>3000 Ohm)	Cable break	Fuel display remains at minimum/empty	Contact Liebherr customer service.
000116	16	Power brake pressure sensor	Measured voltage greater than 4.9 V	Short circuit to supply	No machine response; brake pressure can no longer be checked **Danger! Stop the machine!** 	Contact Liebherr customer service.

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SPN	FMI	Component	Problem detected	Possible cause	Effect	Remedy
520216	14	Crab steering solenoid valve	Shut off detected in control unit safety circuit	Short circuit to supply; error in the control unit safety circuit; error in the output end stage; internal supply to the control unit output defective	Crab steering not available	Contact Liebherr customer service.
520217	05	All-wheel steering solenoid valve	Measured current lower than 220 mA / overload detected at the control unit output for more than 2000 ms	Cable break / current load at the output too high	All-wheel steering not available	Contact Liebherr customer service.
520217	06	All-wheel steering solenoid valve	Measured output signal does not correspond to the command for more than 2000 ms	Short circuit to supply	All-wheel steering not available	Contact Liebherr customer service.
520217	14	All-wheel steering solenoid valve	Shut off detected in control unit safety circuit	Short circuit to supply; error in the control unit safety circuit; error in the output end stage; internal supply to the control unit output defective	All-wheel steering not available	Contact Liebherr customer service.
520218	05	Steering mode valve locking spool	Measured current lower than 220 mA / overload detected at the control unit output for more than 2000 ms	Cable break / current load at the output too high	Lock in the steering mode valve cannot be opened; steering mode cannot be switched	Contact Liebherr customer service.
520218	06	Steering mode valve locking spool	Measured output signal does not correspond to the command for more than 2000 ms	Short circuit to supply	Lock in the steering mode valve cannot be opened; steering mode cannot be switched	Contact Liebherr customer service.
520218	14	Steering mode valve locking spool	Shut off detected in control unit safety circuit	Short circuit to supply; error in the control unit safety circuit; error in the output end stage; internal supply to the control unit output defective	Lock in the steering mode valve cannot be opened; steering mode cannot be switched	Contact Liebherr customer service.

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SPN	FMI	Component	Problem detected	Possible cause	Effect	Remedy
520253	14	PF2: Bucket repositioning A proportional valve; tilt in; PF3: Tilt direction A proportional valve	Shut off detected in control unit safety circuit	Short circuit to supply; error in the control unit safety circuit; error in the output end stage; internal supply to the control unit output defective	PF2: tilting in during bucket repositioning not available; PF3: tilting in not available in general	Contact Liebherr customer service.
520254	02	PF2: Bucket repositioning B proportional valve; tilt out; PF3: Tilt direction B proportional valve	Measured current too high or too low: by 100 mA (by 10 mA in idle state) too high/too low for 2000 ms	Broken cable; short circuit to ground	PF2: tilting out during bucket repositioning not available; PF3: tilting out not available in general	Contact Liebherr customer service.
520254	06	PF2: Bucket repositioning B proportional valve; tilt out; PF3: Tilt direction B proportional valve	Measured overload at the control unit output: greater than 5 A	Current load at the output too high	PF2: tilting out during bucket repositioning not available; PF3: tilting out not available in general	Contact Liebherr customer service.
520254	14	PF2: Bucket repositioning B proportional valve; tilt out; PF3: Tilt direction B proportional valve	Shut off detected in control unit safety circuit	Short circuit to supply; error in the control unit safety circuit; error in the output end stage; internal supply to the control unit output defective	PF2: tilting out during bucket repositioning not available; PF3: tilting out not available in general	Contact Liebherr customer service.
520255	02	Minijoystick additional control circuits	Measured redundancy difference too high: greater than 200 mV, longer than 200 ms	Broken cable/ short circuit at redundant signal	Additional control circuits not available	Contact Liebherr customer service.
520255	03	Minijoystick additional control circuits	Measured voltage too high: higher than 4920 mV for more than 1000 ms	Short circuit to supply / sensor supply;	Additional control circuits not available	Contact Liebherr customer service.
520255	04	Minijoystick additional control circuits	Measured voltage too low: lower than 80 mV for more than 1000 ms	Broken cable; short circuit to ground;	Additional control circuits not available	Contact Liebherr customer service.

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SPN	FMI	Component	Problem detected	Possible cause	Effect	Remedy
520282	03	Battery + control box, working hydraulics	Measured voltage too high: >36 V for 2000 ms	Alternator faulty	Failures of any nature possible; inputs are being ignored, outputs not available	Contact Liebherr customer service.
520282	04	Battery + control box, working hydraulics	Measured voltage too low: <7 V for 2000 ms	Battery weak	Control unit A50 cannot work properly; proportional outputs not available	Contact Liebherr customer service.
520283	02	Working hydraulics control box	Measured voltage too high or too low: <3.5 V for 2000 ms or >7.5 V for 2000 ms	Battery voltage too low; short circuit to ground or output overloaded; short circuit to supply;	Connected sensors cannot work properly and are not being evaluated	Contact Liebherr customer service.
520284	14	Working hydraulics control box	Safety layer error, internal control unit communication error or memory error	Software version on primary and secondary controller do not match or internal defect	All functions associated with this control unit not available	Contact Liebherr customer service.
520285	14	Working hydraulics control box	Safety layer error, internal control unit communication error or memory error	Software version on primary and secondary controller do not match or internal defect	All functions associated with this control unit not available	Contact Liebherr customer service.
520286	14	Working hydraulics control box	Safety layer error, internal control unit communication error or memory error	Software version on primary and secondary controller do not match	All functions associated with this control unit not available	Contact Liebherr customer service.
520287	09	CAN 1 / communication I	CAN timeout of different signals	CAN line to a control unit disconnected; a control unit not supplied	Different functions not available	Contact Liebherr customer service.
520288	09	CAN 3 / communication III	CAN timeout of different signals	CAN line from A40 to A30 disconnected; A30 not supplied	Different functions not available	Contact Liebherr customer service.
520289	09	CAN 3 / communication III	CAN timeout of different signals	CAN line from A50 to A30 disconnected; A30 not supplied	Different functions not available	Contact Liebherr customer service.

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Malfunction / error	Cause	Remedy
Blower does not run in all stages	Mikro-Temperatur-Sicherung (MTS) - (micro temperature fuse) has triggered	Replace resistor and check blower motor for cause of function impairment
	Blower switch of CBM defective	Replace blower switch
	Connector plug loose	Check the plug connections on the device for tight seating and install correctly, if necessary / check connection on blower switch / open device and check electrical connections in device
Blower runs exclusively in highest stage	Preresistor on blower defective	Check preresistor
Blower does not run in highest stage	Back up fuse defective	Change the fuse
Heating cannot be turned off	Short circuit in cable or blower switch	Fix short circuit and install new cable(s) and / or switch(es), if necessary
	Water valve not correctly installed in feed line	Check flow direction on valve and correct, if necessary
	Wire pull for water valve incorrectly adjusted	Adjust wire pull
	Wire pull defective	Check wire pull and replace if necessary
No or insufficient heat output	Water flow temperature too low	Wait until Diesel engine is warm
	Vehicle thermostat is defective	Replace thermostat
	Heat exchanger fins dirty	Check heat exchanger and clean if necessary
	Water lines kinked or crushed	Remedy cause of problem or replace hoses
	Air intake filter dirty	Replacing the filter
	Water pump pressure too low	Coolant does not flow through heat exchanger Install additional or more powerful pump
	Contact dirty	Clean plug contacts Proceed carefully to avoid short circuit
	Electrical lines undersized	Route recommended cable diameter
Water emerges on device	Hose connection loose	Check seating of hose lines and tighten hose clamps
	Water hose damaged	Install new hose and connect
	Heat exchanger damaged	Install original spare part and connection (Caution! Observe safety instructions)

Coolant output:

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▶ Unscrew the knurled screws **1** on the cover **2**.

▶ Remove the cover **2**.

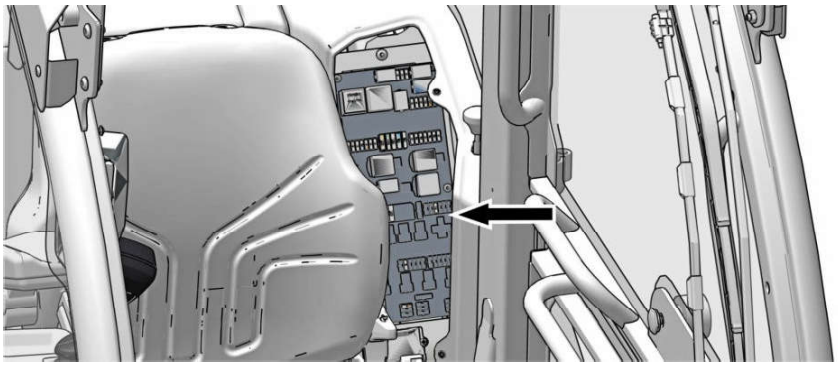

Fig. 478: Circuit board with relays

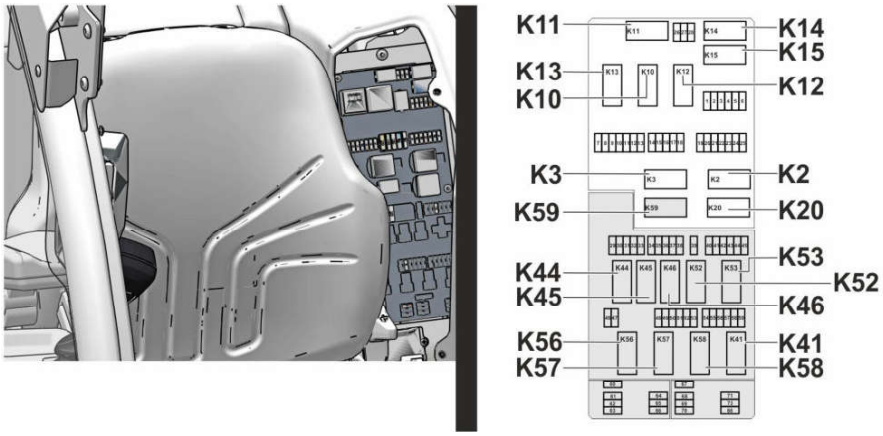

Fig. 479: Location of relays in the operator's cab

▶ Identify defective relay using the following table.

▶ Take out the defective relay and replace it with a new relay.

Relays	Name / Function
K2	Relay 70A
K3	Relay, emergency stop / electronics power supplies
K10	Interval relay, front windscreen washer system
K11	Relay, brake light
K12	Relay, reversing lights
K13	Indicators
K14	Relay, low beam
K15	Relay, high beam
K20	Relay 70A
K41	Relay, air brake system [12)]
K44	Relay, front working headlight[12)]

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5.2.4 Lubrication chart symbols

Symbol	Meaning
	Diesel engine
	Hydraulic
	Lubricating point
	Glide surfaces Telescopic boom
	Lubrication points front axle and rear axle
h	Intervals in operating hours
	Checking the oil level
	Grease
	For oil change intervals, pay attention to the notes in the operator's manual.

Tab. 41: Legend to symbols in the lubrication chart

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5.4 Preparatory maintenance tasks

5.4.1 Maintenance position

The basic maintenance position is described below.

The maintenance position allows access to the individual maintenance points.

Bring the machine into maintenance position with lowered telescopic boom

To bring the machine into maintenance position with lowered telescopic boom, proceed as follows:

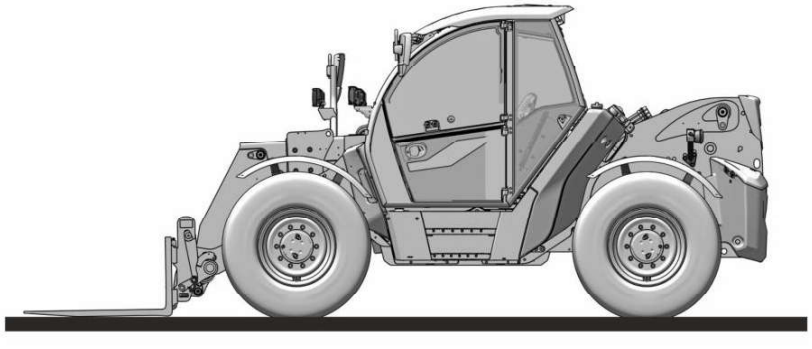

Fig. 494: Maintenance position

- ▶ Park the machine on solid and horizontal ground.
- ▶ Fully retract the telescopic boom.
- ▶ Lower the telescopic boom completely.
- ▶ Lower the working attachment onto the ground without pressure.
- ▶ Bring control lever to neutral position.

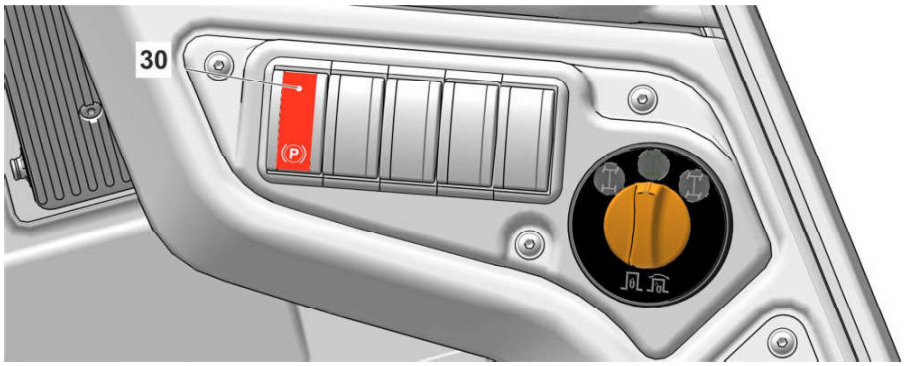

Fig. 495: Activating parking brake

30 *Parking brake* switch

- ▶ Press *parking brake* switch **30** down.
  - ▷ *Parking brake* symbol is shown on the display.

Name	Value	Unit
Factory setting of lubrication time	6	Minutes
Factory setting of cycle time	60	Minutes

Tab. 62: Factory setting

▶ Turn off the ignition: the lubrication time and cycle time are saved.

▶ Turn on the ignition: saved lubrication times and cycle times are continued.

Manual intermediate lubrication

Turn the manual intermediate lubrication on every time after the machine is washed.

The saved lubrication times and cycle times are reset and start again.

▶ Press the intermediate lubrication button **1**.
  ▷ Manual intermediate lubrication is turned on.

Signal displays

The pump functions are displayed by the LED **4** and LED **5** in the protective window of the control system.

Signal display	LED, red	LED, green	Continuous
Functional readiness	Lights up	Lights up	1.5 seconds
Lubrication active	Off	Lights up	During the entire lubrication
Grease level too low	Lights up	Off	Until the lubricant container is filled up
Excess pressure in the conduit system	Flashes in 1 second cycles	Lights up	
Rpm error on the pump motor	Flashes in 1 second cycles	Off	
CPU/ memory error	Flashes in 0.5 second cycles	Off	
Test lubrication (Permanent lubrication)	Flash alternately in 1 second cycles		

Tab. 63: Signal displays

Note

▶ Despite an installed central lubrication system, the telescopic boom must be lubricated by hand.

▶ Lubricate the telescopic boom as described.

Lubricating gliding carriage of hitch trailer coupling (option)

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

If the main filter element **2** is damaged:

▶ Replace the damaged main filter element **2**.

If the main filter element **2** does not show any signs of damage:

▶ Clean the main filter element **2**.

Cleaning the main filter element

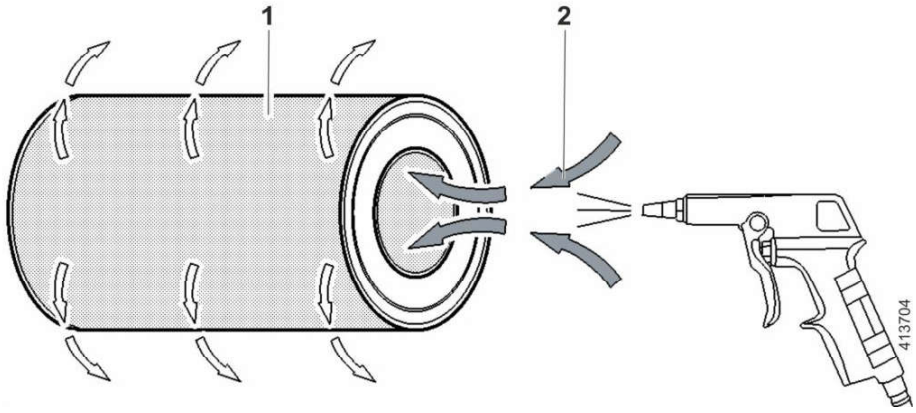

Fig. 524: Blow out main filter element

1 Main filter element **2** Compressed air

NOTICE
Incorrect cleaning!
Damage to the main element.

▶ Use compressed air at low pressure.

▶ Clean the main element with clean, oil-free compressed air.

▶ Do not knock out the main element.

▶ Clean the main filter element **1** from the inside to the outside with compressed air **2**.

Cleaning the filter housing

NOTICE
Incorrect cleaning!
Damage to the engine.

▶ Clean the filter housing with compressed air.

▶ Wipe the filter housing with a clean cloth.

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5.12 Heater, ventilation, air conditioning system

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Lubricating slide faces on telescopic boom

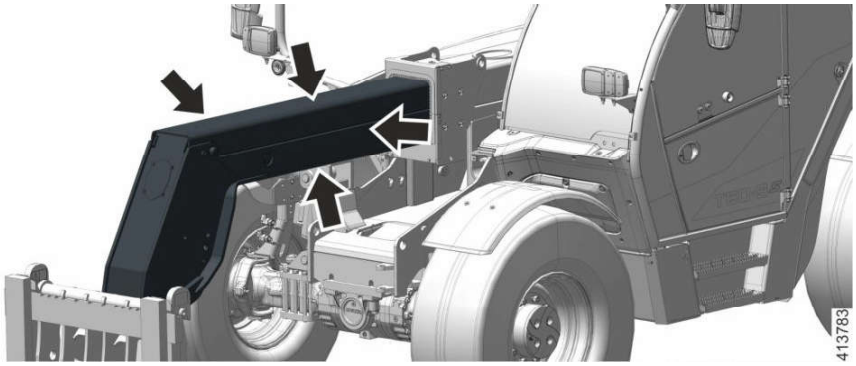

Fig. 548: Lubricating slide faces on telescopic boom

- ▶ Extend telescopic boom completely horizontally.
- ▶ Park machine properly.

DANGER
Persons in danger area!
Injury.

- ▶ Make sure there is nobody in danger area.

- ▶ Approach the telescopic boom from side.
- ▶ Lubricate the glide surfaces of telescopic boom with telescope grease. (For more information see: 5.3.10 Grease for the telescopic boom, page 360)
- ▶ Retract telescopic boom.
- ▶ Retract and extend telescopic boom until the telescope grease is distributed evenly across the glide surfaces.

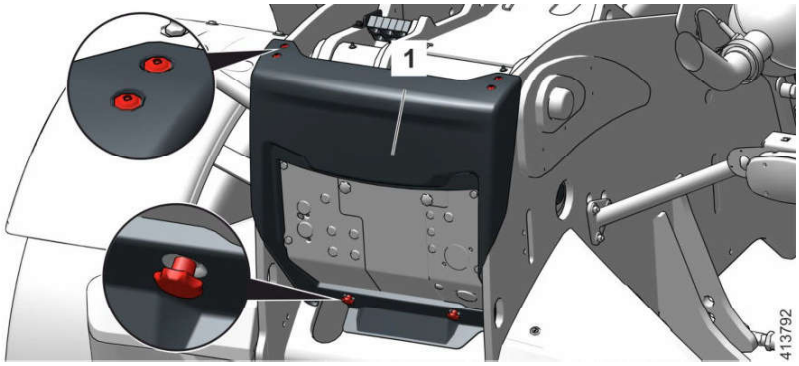

Fig. 549: Cover plate on the rear

- ▶ Undo screws on the cover plate **1**.
- ▶ Remove the cover plate **1**.

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