EN

LIEBHERR

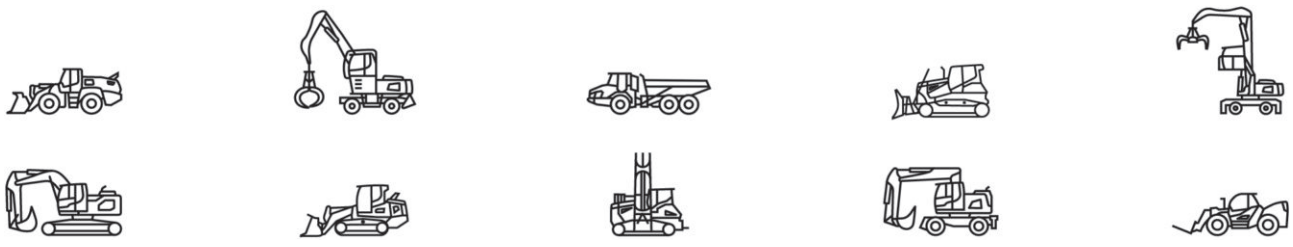
Operator's manual

Telescopic handler

Type: T 60-9
Type no.: 1709
Additional: 3AS, 05S
Generation: G4
Order number: 93517630
Issued: 01/12/2023
Manufacturer: Liebherr-Werk Telfs GmbH

One Portal, all services:

my.liebherr.com



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Operator's manual

Telescopic handler

Document ID

	ORIGINAL OPERATING INSTRUCTIONS
Order number:	93517630
Issued:	01/12/2023
Version:	09
Author:	LWT / Technical documentation department

Product ID

Manufacturer:	Liebherr-Werk Telfs GmbH
Type:	T 60-9
Type no.:	1709
Additional:	3AS, 05S
Generation:	G4-D
Market:	USA/CAN
from serial no.:	20156

Contact: Liebherr-Werk Telfs GmbH
Hans Liebherr-Straße 35
6410 Telfs
Austria

Machine data

Add the following data when you receive the machine. This will be useful when you order spare parts.

* You can find this information on the identification plate of the machine.

*** PIN (identification number):** ␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣

*** Year of manufacture:** ␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣

Commissioning date: ␣␣/␣␣/␣␣␣␣

LWT/93517630/09/01/12/2023/en

LWT/93517630/09/01/12/2023/en

Proposition 65

⚠ WARNING

This product can expose you to chemicals including lead and lead compounds, which are known to the State of California to cause cancer and birth defects or other reproductive harm.
For more information go to www.P65warnings.ca.gov.

⚠ WARNING

Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.
▶ Always start and operate the engine in a well-ventilated area.
▶ If in an enclosed area, vent the exhaust to the outside.
▶ Do not modify or tamper with exhaust system.
▶ Do not idle the engine except as necessary.
For more information go to www.P65warnings.ca.gov/diesel.

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LWT/93517630/09/01/12/2023/en

LWT/93517630/09/01/12/2023/en

Preface

This operator's manual is written for **operators** and **maintenance staff**. It contains warnings, important information and suggestions for using the machine. It makes it possible to get to know the machine and avoid malfunctions due to incorrect use.

Compliance with the operator's manual increases the reliability and the service life of the machine.

The operator's manual is part of the machine. One copy must always be present in the cab.

The operator's manual must be read before the first putting into service and read regularly afterwards. Every person working with or on the machine must be familiar with and apply this operator's manual.

Examples of such tasks:

- **Control** including equipment and installation, troubleshooting, maintenance, removing lubricants and fuels
- **Service** including maintenance, inspection and repair work
- **Transport** or loading of the machine

In addition to the operator's manual, the operating company must adhere to the national regulations on accident prevention and environmental protection. In addition to the operator's manual and the locally applicable regulations on accident prevention, the recognised procedures for safe and correct use of the machine must be adhered to.

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

Certain details and tools shown in this operator's manual can differ from those on your machine.

In some drawings, certain safety devices and sealing covers are not shown, in order to make the representation clearer.

Due to continuous improvements to Liebherr machines, it is possible that changes to your machine are not contained in this operator's manual. The continuous updating of the operator's manual considers only the latest software version. For optimum compatibility between machine and operator's manual, the software version described in the operator's manual must match the software version of the machine. The latest operator's manual is available on the MyLiebherr portal. For machine updates, contact Liebherr customer service.

For further explanations or information, contact Liebherr customer service.

For questions regarding Regulation (CE) No. 1907/2006 (REACH), following e-mail address is available:

Email: materialcompliance.EMT@liebherr.com

All the documentation procured for this machine (operator's manual, maintenance manual, spare parts catalogue etc.) is available on MyLiebherr throughout the service life of the machine.

0005253-01

Home page: www.myliebherr.com

Liability and warranty

Due to the great variety of products offered by other manufacturers (for example operating fluids, lubricants, assembly tools and spare parts), Liebherr cannot guarantee the perfect function or conformity of products from other manufacturers with Liebherr products. The same applies to potential interactions between third-party products and Liebherr products.

The operating company is responsible for estimating the consequences of combining products from other manufacturers with Liebherr products. The Liebherr warranty covers no errors or damage caused by the use of products from other manufacturers. Any liability on the side of Liebherr is excluded for errors or damage caused by the use of products from other manufacturers.

In addition, Liebherr rejects the warranty clauses in case of incorrect use, inadequate maintenance or non-compliance with safety notes.

LWT/93517630/09/01/12/2023/en

LWT/93517630/09/01/12/2023/en

Contents

LWT/93517630/09/01/12/2023/en

Contents

LWT/93517630/09/01/12/2023/en

Contents

LWT/93517630/09/01/12/2023/en

Contents

LWT/93517630/09/01/12/2023/en

Contents

LWT/93517630/09/01/12/2023/en

Contents

LWT/93517630/09/01/12/2023/en

Documentation system

Designations

Information with special meaning is highlighted in this documentation by symbols, typography or wording.

Symbols for notes

The symbols for notes and their function are described below:

	Degree of hazard (for example, WARNING): Triangular symbols indicate the degree of hazard in warning messages.
	Note: Indicates useful information.
	Tip: Indicates useful tips.

Symbols for logistic information

The following symbols indicate logistical information for the preparation of work:

	Tools, devices and aids from the work described below
	Spare parts from the work described below
	Tightening torques from the work described below
	Fuel and operating fluid from the work described below

Meaning of the typography

The typographic highlighting and their function are described below:

«Air conditioning unit» button	Shows the designation of control elements, displays, symbols, menus, signs and certain components.
1	Reference to an item number in a figure
Y50	Identifies an equipment code (example: solenoid valve).
▸	Identifies an action step.
✔	Identifies an expected result.
✕	Identifies an unexpected result.
–	Identifies individual items of a list.
☑	Identifies a prerequisite for following steps of action.
→	Identifies a reference to a standard or specification.

LWT/93517630/09/01/12/2023/en

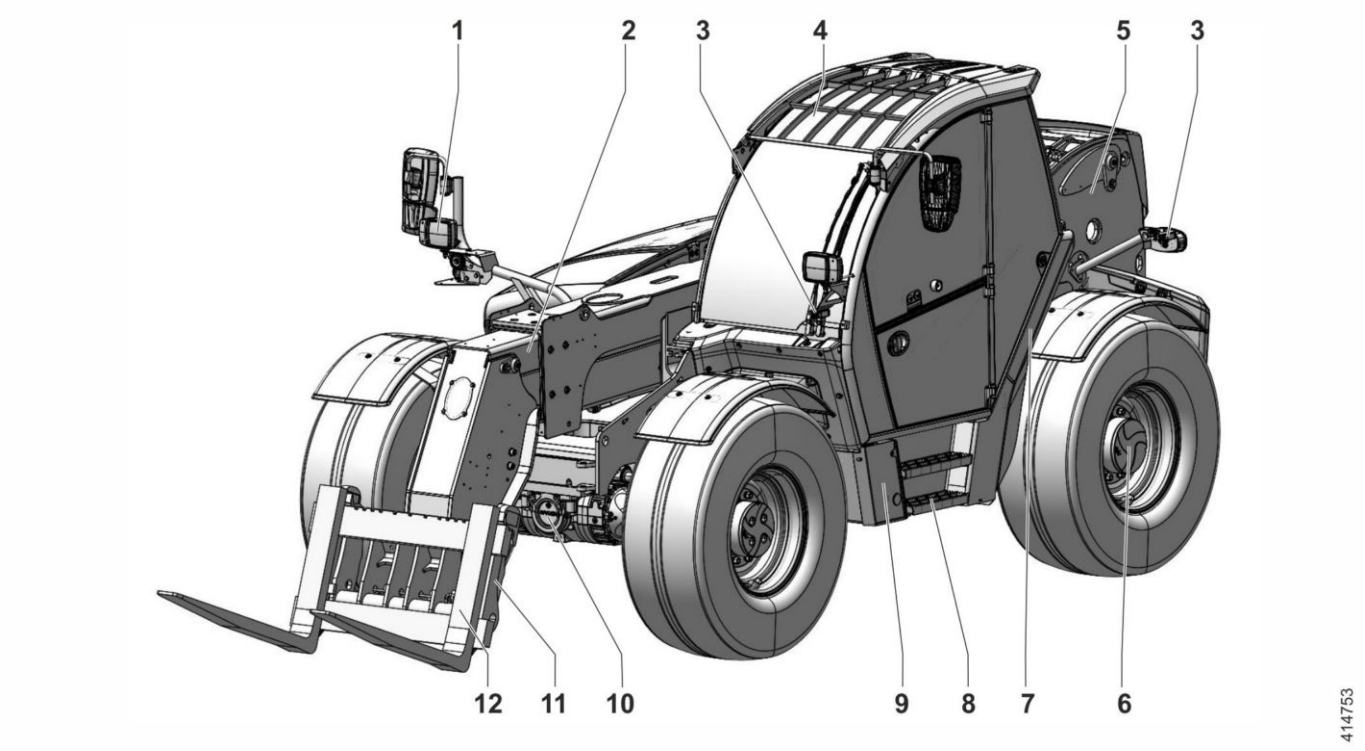
LWT/93517630/09/01/12/2023/en

1 Product description

1.1 Technical description

1.1.1 Design overview

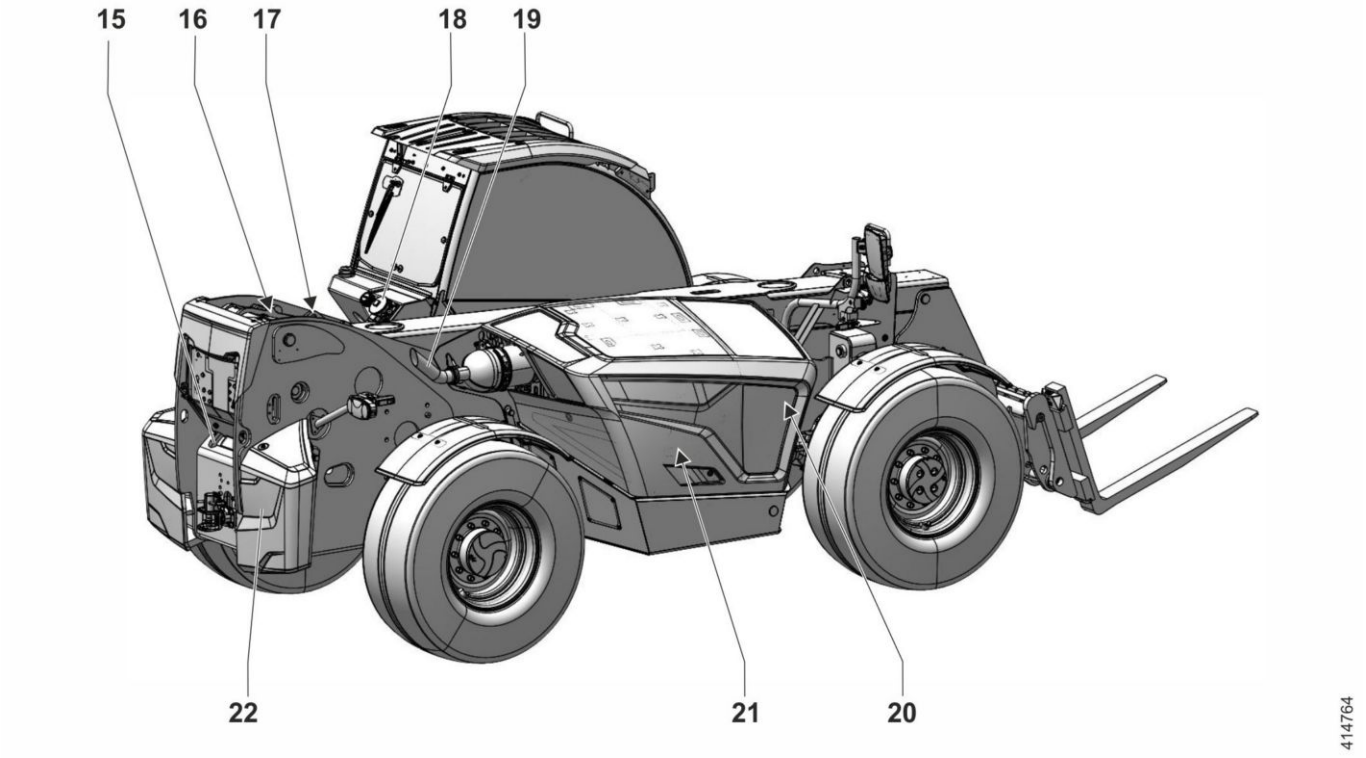
This section comprises an overview of the machine and descriptions of the components shown.



Complete machine - front view

1	Headlights	**7**	Fuel tank
2	Telescopic boom	**8**	Cab access
3	Side marker light	**9**	Battery
4	Operator's cab	**10**	Front axle
5	Main frame	**11**	Tool holder
6	Rear axle	**12**	Fork carrier

LWT/93517630/09/01/12/2023/en



Complete machine - rear view

15	Diesel exhaust fluid tank[1)]	**19**	Exhaust system
16	Balancing cylinder	**20**	Cooling system
17	Lift cylinder	**21**	Engine arrangement
18	Hydraulic tank	**22**	Ballast weight

[1)] For emission stage V

1.2 Technical data

The most important technical data can be found in the following enclosed brochure.

1.2.1 Vibrations

1.2.1.1 Hand, arm and whole body vibration emission

The operator's seat installed in this machine by the manufacturer meets ISO 7096:2000, EM3 for telescopic handlers. When replacing the seat, make sure that the new seat also meets this standard.

LWT/93517630/09/01/12/2023/en

1.2.1.2 Hand-arm vibrations

When using the machine as it was intended, the weighted (frequency valued) effective value of hand-arm vibrations according to ISO 5349-1:2001 is below 2.5 m/s² (8.20 ft/s²).

1.2.1.3 Whole body vibrations

When using the machine as intended, weighted (frequency valued) effective values for certain application examples of machine can be provided according to the below listed chart. These values meet the specifications of Technical Report ISO/TR 25398:2006 „Earth-moving machinery - Guidelines for assessment of exposure to whole-body vibration of ride-on machines - Use of harmonized data measured by international institutes, organizations and manufacturers“. The test procedure used in that case meets ISO 2631-1:1997. The listed effective values of represented machines are noted with deviations (standard deviation). These deviations are divided into light, normal and hard operating conditions. The division of operating conditions must be made by the user according to the view points of terrain conditions, condition of job site, organisation of job site, material, machine equipment, working procedure and education level of the operator. Page 96

Whole body vibrations

Machine type	Typical work cycles	Weighted effective values in m/s² (ft/s²) for light, normal and hard operating conditions [2]								
		x-axis			y-axis			z-axis		
		light	normal	hard	light	normal	hard	light	normal	hard
Telescopic handler	Work cycle	0.28 (0.919)	0.52 (1.706)	0.76 (2.493)	0.27 (0.886)	0.40 (1.31)	0.53 (1.739)	0.42 (1.378)	0.56 (1.837)	0.71 (2.329)

[2] The measurement uncertainty is defined in Standard EN 12096:1997.

The values were determined according to EN 13059 on telescopic handlers with standard equipment (driving on test track with sleepers).

1.2.2 CO_2 emissions from the diesel engine[3]

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

CO_2 emissions of the diesel engine

Engine type	Nominal power	High idle RPM	Exhaust gas treatment	97/68/EC stage	CO_2 emissions during NRSC or RMC testing under standard laboratory test conditions	CO_2 emissions during NRTC testing with warm start under standard laboratory test conditions
TCD 3.6 L4	100 kW (134.1 hp)	2,300 min^{-1}	DOC-DPF / SCR	V	691.21 g/kWh	705.07 g/kWh
3.6 L4 D914	105 kW (140.8 hp)	2,300 min^{-1}	DOC-DPF / SCR	V	690.7 g/kWh	694.7 g/kWh
TCD 4.1 L4	115 kW (154.2 hp)	2,300 min^{-1}	DOC-DPF / SCR	V	684.87 g/kWh	707.03 g/kWh

Test conditions:

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

[3] For emission stage V

LWT/93517630/09/01/12/2023/en

1.2.3 Sound level

Sound level

	T 60-9 G4-D	
	Emission stage ECE-R.96 (Stage IIIA derivative)	Emission stage V
Sound pressure level (L_{pA}) in operator's cab	75 dB(A)	75 dB(A)
Sound power level (L_{WA}) in surrounding area (2000/14/EC)	108 dB(A)	108 dB(A)

The sound pressure level (L_{pA}) is determined according to the following standard:

→ DIN EN 1459-1

The noise data is in line with the following standards:

→ ISO 4871

→ EN 12053

→ EN 12053-A

The noise data was determined for a work cycle from the weighted values for the operating statuses and their duty cycles according to the following standard:

→ EN 12053

→ EN 12053-A

Operating statuses and their duty cycles:

- Driving
- Lifting
- Idling

When industrial trucks are used, higher noise levels can occur due to different operating modes, environmental influences and additional noise sources (e.g. working tools).

The sound power level is determined according to following directive:

→ 2000/14/EC

The measurement uncertainty of the sound power level is defined in the following directive and standard:

→ RfU 07-003 R2

→ ISO 7574-4

1.2.4 Maximum operating weight

The maximum permissible operating weight of the machine may not be exceeded for reasons of machine safety and operating suitability.

In case the maximum operating weight is being exceeded due to special retrofit installations (for example front or rear installations or protective equipment), request a written approval from Liebherr.

The maximum permissible operating weight of the machine is: T46-7 = 12,000 kg (26,455.5 lb), T55-7 = 13,000 kg (28,660.1 lb) and T60-9 = 13,000 kg (28,660.1 lb).

LWT/93517630/09/01/12/2023/en

1.2.5 Static and dynamic tests

The telescopic handler passed the static and dynamic tests in accordance with the DIN EN 1459-1 standard.

1.2.6 Support loads

The tyres of telescopic handler must transfer significant forces into the ground.

In certain cases, a single tyre must absorb almost the entire weight of telescopic handler including the load and transfer it into the ground.

The ground must be able to support the support load in any case!

DANGER

Danger of tipping the machine if the ground does not have sufficient load bearing capacity!

- ► Inquire with construction site management or an expert about the permissible ground pressure. Do not exceed the ground pressure.

If the load bearing capacity of ground is not sufficient to deflect the support loads into the ground:

- ► Use support plates or wooden planks to increase the support surface.

DANGER

Machine tipping!

Danger to life.

- ► Use exclusively stable materials, such as wooden planks or support plates, to support the tyres underneath.
- ► To obtain even pressure distribution on the support surface, place the tyres in the centre of support.

DANGER

Machine tipping!

Danger to life.

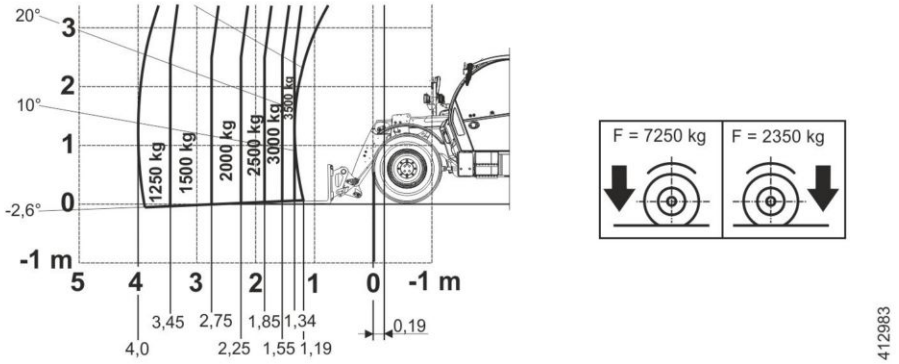
- ► The stated support loads on the front tyres and on the rear tyres are valid exclusively for the operation with standard forklift.
- ► For a different working attachment, refer to the relevant load curve for the support loads.

1.2.6.1 Calculation of ground pressure

To calculate the actual ground pressure, use the following formula:

– Support load according to load chart / support surface = calculated ground pressure

LWT/93517630/09/01/12/2023/en



Calculation of ground pressure

Calculation example for front tyres (solid ground):

Support load (F) on the front tyres = 6,550 kg (14,440.3 lb)

Support load 6,550 kg (14,440.3 lb) / support surface (see table) 392 cm² (60.8 in²) = 16.7 kg/cm² (237.5 lb/in²) calculated ground pressure

Calculation example for front tyres (loose ground):

Support load (F) on the front tyres = 6,550 kg (14,440.3 lb)

Support load 6,550 kg (14,440.3 lb) / support surface (see table) 714 cm² (110.7 in²) = 9.2 kg/cm² (130.9 lb/in²) calculated ground pressure

Calculation example for rear tyres (solid ground):

Support load (F) on the rear tyres = 2,300 kg (5,070.6 lb)

Support load 2,300 kg (5,070.6 lb) / support surface (see table) 210 cm² (32.6 in²) = 10.95 kg/cm² (155.75 lb/in²) calculated ground pressure

Calculation example for rear tyres (loose ground):

Support load (F) on the rear tyres = 2,300 kg (5,070.6 lb)

Support load 2,300 kg (5,070.6 lb) / support surface (see table) 382 cm² (59.2 in²) = 6.02 kg/cm² (85.62 lb/in²) calculated ground pressure

Support loads of tyres

Solid ground

Support loads of tyres on solid ground

Support load (kg) per tyre according to load chart	Permissible ground pressure (kg/cm²)	Support surface (cm²)
3,000 (6,613.9)	14.3 (203.4)	210 (32.6)
4,000 (8,818.5)	14.8 (210.5)	270 (41.9)
5,000 (11,023.1)	15.5 (220.5)	324 (50.2)
6,000 (13,227.7)	16.2 (230.4)	371 (57.5)
7,000 (15,432.4)	16.9 (240.4)	414 (64.2)
8,000 (17,637.0)	17.7 (251.8)	451 (69.9)
9,000 (19,841.6)	18.6 (264.6)	485 (75.2)
10,000 (22,046.2)	19.5 (277.4)	514 (79.7)

Support loads of tyres

Loose ground

LWT/93517630/09/01/12/2023/en

Support loads of tyres on loose ground

Support load (kg) per tyre according to load chart	Permissible ground pressure (kg/cm²)	Support surface (cm²)
3,000 (6,613.9)	7.8 (110.9)	382 (59.2)
4,000 (8,818.5)	8.2 (116.6)	491 (76.1)
5,000 (11,023.1)	8.5 (120.9)	588 (91.1)
6,000 (13,227.7)	8.9 (126.6)	675 (104.6)
7,000 (15,432.4)	9.3 (132.3)	753 (116.7)
8,000 (17,637.0)	9.7 (138.0)	821 (127.3)
9,000 (19,841.6)	10.2 (145.1)	881 (136.6)
10,000 (22,046.2)	10.7 (152.2)	934 (144.8)

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.

1.2.7 Trailer loads and support loads

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

Permissible trailer loads for T 46-7

Permissible trailer load	Agricultural or forestry towing machine	Self-propelled machine	Maximum permissible support load
Trailer without brake	1,000 kg (2,204.6 lb)	1,000 kg (2,204.6 lb)	1,000 kg (2,204.6 lb)
Trailer with overrun brake	8,000 kg (17,637.0 lb)	8,000 kg (17,637.0 lb)	1,000 kg (2,204.6 lb)
Trailer with pneumatic or hydraulic brake including trailer brake overfeed	16,000 kg (35,274.0 lb)	12,000 kg (26,455.5 lb)	1,000 kg (2,204.6 lb)[1)]
Towing device rear and front (maximum permissible pull force in kN (lb_f))	45 (10,120)	45 (10,120)	Not permissible

Permissible trailer loads for T 55-7 and T 60-9

Permissible trailer load	Agricultural or forestry towing machine	Self-propelled machine	Maximum permissible support load
Trailer without brake	1,000 kg (2,204.6 lb)	1,000 kg (2,204.6 lb)	1,000 kg (2,204.6 lb)
Trailer with overrun brake	8,000 kg (17,637.0 lb)	8,000 kg (17,637.0 lb)	1,000 kg (2,204.6 lb)
Trailer with pneumatic or hydraulic brake including trailer brake overfeed	20,000 kg (44,092.5 lb)	12,000 kg (26,455.5 lb)	1,000 kg (2,204.6 lb)[1)]
Towing device rear and front (maximum permissible pull force in kN (lb_f))	45 (10,120)	45 (10,120)	Not permissible

1. Taking account of permissible axle loads and maximum operating weight, a maximum of 1,500 kg (3,306.9 lb) is permissible.
2. Deviating regulations may apply on a country-specific basis. However, the values stated here must not be exceeded!

LWT/93517630/09/01/12/2023/en

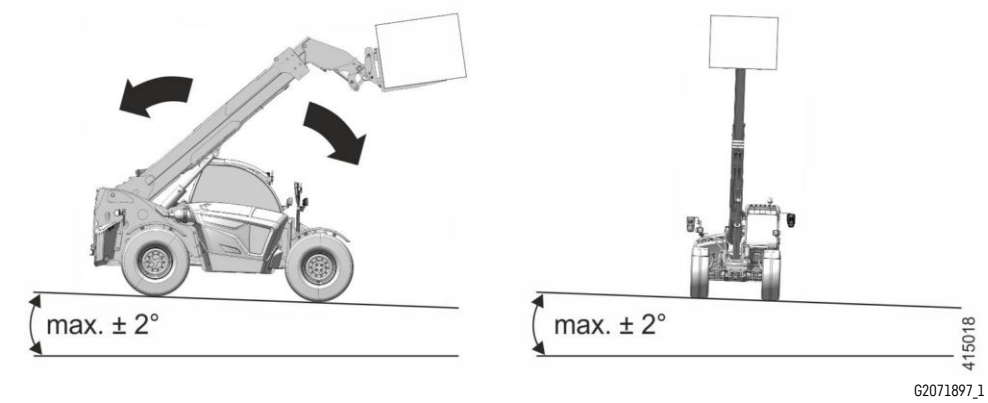
1.2.8 Stability during operation

Under the following conditions, the telescopic handler complies with stability during operation.

1.2.8.1 Lifting operation

Conditions for lifting operation:

- Machine is at a standstill.
- Machine is on level and solid ground. (Maximum lateral incline and maximum longitudinal incline are ± 2°.)
- Wind speed is ≤ 10 m/s (32.8 ft/s).
- Maximum lifting load is not exceeded.

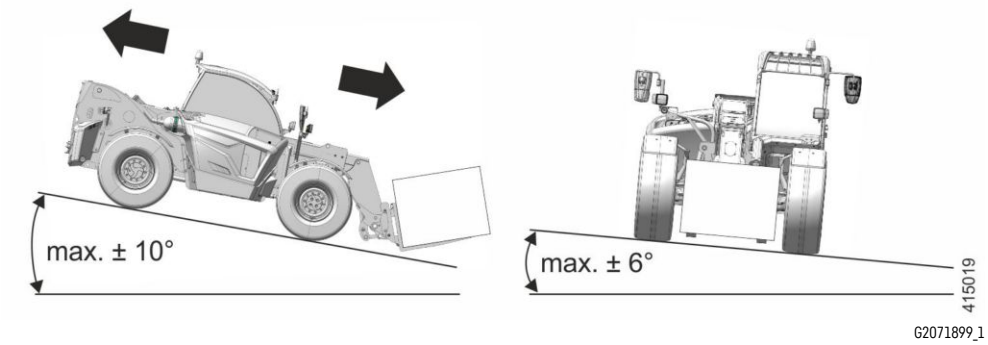


Stability in lifting operation

1.2.8.2 Transport operation

Conditions for transport operation:

- Machine is in transport position.
- Machine is on solid ground.
- Maximum longitudinal incline of ± 10° is adhered to.
- Maximum lateral incline of ± 6° is adhered to.
- Maximum lifting load is not exceeded.
- Maximum permitted travel speed of 10 km/h (6.2 mph) at nominal load is adhered to.



Stability in transport operation

LWT/93517630/09/01/12/2023/en

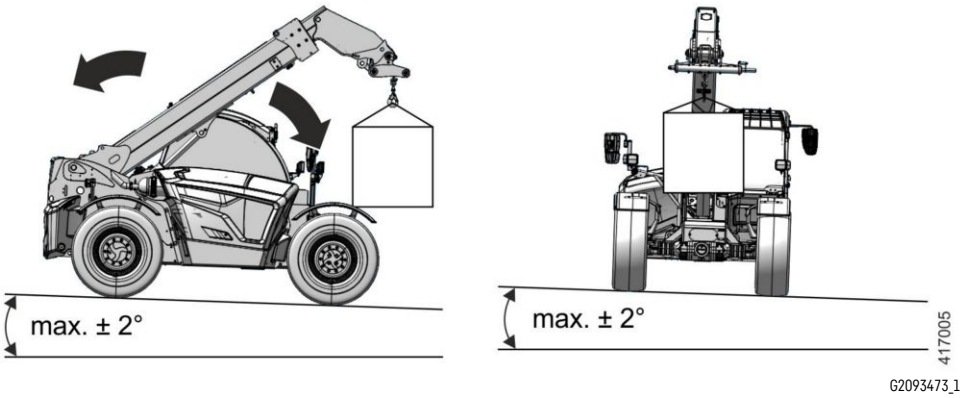
1.2.9 Stability while working with the lifting eye

Under the following conditions, the telescopic handler complies with stability during operation with the lifting eye.

1.2.9.1 Lifting operation

Conditions for lifting operation:

- Machine is at a standstill.
- Machine is on level and solid ground.
- Maximum longitudinal incline of ± 2° is adhered to.
- Maximum lateral incline of ± 2° is adhered to.
- The tilt angle of the quick coupler is 90° or the maximum possible tilt angle.
- Maximum permissible wind speed depends on the nature of the load. Avoid letting the load swing on the boom extension. Maximum permissible wind speed is 5 m/s (16.4 ft/s).
- Maximum lifting load is not exceeded.



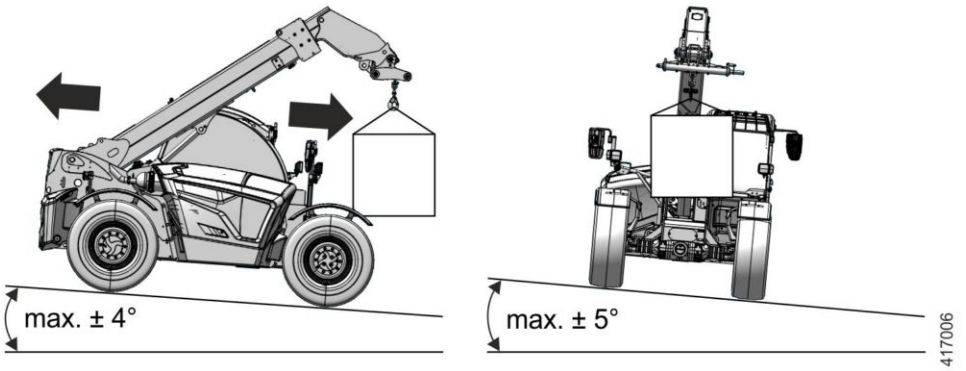
Stability in lifting operation

1.2.9.2 Transport operation

Conditions for transport operation:

- Machine is on solid ground.
- Maximum longitudinal incline of ± 4° is adhered to.
- Maximum lateral incline of ± 5° is adhered to.
- Maximum lifting load is not exceeded.
- Approved lifting angle with freely suspended load of 40 ° to 50 ° is adhered to.
- Maximum telescopic extension 1,000 mm (39.37 in).
- The tilt angle of the quick coupler is 90° or the maximum possible tilt angle.
- Select the travel speed so that the load does not swing. Maximum permitted travel speed of 3 km/h (1.9 mph) is adhered to.

LWT/93517630/09/01/12/2023/en



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Stability in transport operation

1.2.10 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 hazard zone.
► Note appropriate load curve for working attachment.
► Make sure tyres are in good condition.
► Make sure tyres have the specified tyre pressure.

Note

If load chart is missing:

► Request load chart from Liebherr customer service.

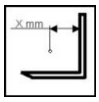
LWT/93517630/09/01/12/2023/en

1.2.10.1 Retrofitting or modifying the quick coupler

- Only attach quick couplers approved by Liebherr.
- Perform driving and stacking tests in accordance with EN 1459.
- Observe safety instructions when using the machine with the quick coupler. Page 97

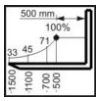
1.2.10.2 Symbols on load charts

Fork with load centre of gravity „X“ mm („X“ in)



- Refer to dimension „X“ mm („X“ in) from the load chart.
- Check the identification plate on the working attachment to ensure validity of load chart.

Fork with increasing load centre of gravity



Information regarding the remaining load carrying capacity with increasing load centre of gravity
Example: fork with load centre of gravity of 500 mm (19.69 in)

Remaining load carrying capacity

Load centre of gravity	Remaining load carrying capacity
500 mm (19.69 in)	100%
700 mm (27.56 in)	71%
1,100 mm (43.31 in)	45%
1,500 mm (59.06 in)	33%

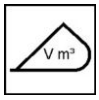
Quick coupler

- All quick couplers approved by the manufacturer

Scorpion quick coupler

- Scorpion quick coupler

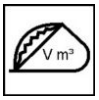
Bucket with maximum contents „V“ m³ („V“ ft³)



- Refer to contents „V“ m³ („V“ ft³) from the load chart.
- Check the identification plate on the working attachment to ensure validity of load chart.

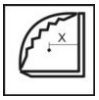
LWT/93517630/09/01/12/2023/en

Hydraulic buckets with maximum contents „V“ m³ („V“ ft³)



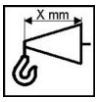
- Refer to contents „V“ m³ („V“ ft³) from the load chart.
- Check the identification plate on the working attachment to ensure validity of load chart.

Hydraulic grapple with load centre of gravity „X“ mm („X“ in) in front of stop plate



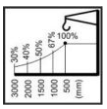
- Refer to dimension „X“ mm („X“ in) from the load chart.
- Check the identification plate on the working attachment to ensure validity of load chart.

Load hook with forward reach „X“ mm („X“ in)



- Refer to dimension for the forward reach „X“ mm („X“ in) from the load chart.
- Check the identification plate on the working attachment to ensure validity of load chart.

Load hook with increasing load centre of gravity

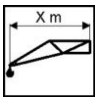


Information regarding the remaining load carrying capacity with increasing load centre of gravity
Example: load hook with load centre of gravity of 500 mm (19.69 in)

Remaining load carrying capacity

Load centre of gravity	Remaining load carrying capacity
500 mm (19.69 in)	100%
1,000 mm (39.37 in)	67%
1,500 mm (59.06 in)	50%
2,000 mm (78.74 in)	40%
2,500 mm (98.43 in)	33%
3,000 mm (118.11 in)	30%

Boom extension with forward reach „X“ m („X“ ft)



- Refer to dimension for the forward reach „X“ m („X“ ft) from the load chart.
- Check the identification plate on the working attachment to ensure validity of load chart.

Permissible own weight „M“ of working attachment

- Refer to own weight „M“ (mass) from the load chart.
- Check the identification plate on the working attachment to ensure validity of load chart.

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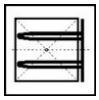
Permissible own weight „M“ of ballast weights

– Refer to own weight „M“ (mass) from the load chart.

Positioning load in centre of fork arms

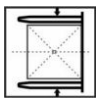


– Position the fork arms symmetrically.

Filling the bucket evenly

– Make sure that the centre of gravity of the load is in the middle.

Taking up a load centred



– Pick up a load in such a way that the centre of gravity of the load is centred.

Load hook in loaded condition

– Do not lower the load hook in loaded condition under the horizontal.

Avoiding swaying of load on load hook

– Only lift loads vertically.

Boom extension in loaded condition

– Do not lower the boom extension in loaded condition under the horizontal.

Avoiding oscillation of load on boom extension

– Only lift loads vertically.

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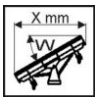
Do not filling bucket with extended telescopic boom

- Retract the telescopic boom completely before loading material into the bucket.

Operating self-supporting optional equipment on a level surface

- Operation for self-supporting optional equipment is only permissible on level ground

Self-supporting optional equipment with transport width „x“ mm and swivel angle „w°“

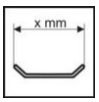


- Refer to transport width „x“ mm from the load chart.
- Refer to swivel angle „w°“ from the load chart.

Do not actuate self-supporting optional equipment with extended telescopic boom

- Retract telescopic boom completely before working with the self-supporting optional equipment.

Blade with „x“ mm width



- Refer to dimension for the width „x“ mm from the load chart.
- Check the identification plate on the working attachment to ensure validity of load chart.

Blade with permissible horizontal force „F“

- Refer to permissible horizontal force „F“ from the load chart.

Do not actuate the blade with extended telescopic boom

- Retract telescopic boom completely before working with the blade.

Tyres of category 1

- See sign «Tyre inflation pressure».

LWT/93517630/09/01/12/2023/en

Tyres of category 2

– See sign «Tyre inflation pressure».

Maximum support load „F“ occurring on rear tyres during operation

– Refer to occurring support loads „F“ from the load curve.

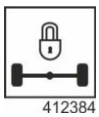
The occurring support load is used to calculate the occurring ground pressure and to evaluate the load bearing capacity of the ground.

Maximum support load „F“ occurring on front tyres during operation

– Refer to occurring support loads „F“ from the load curve.

The occurring support load is used to calculate the occurring ground pressure and to evaluate the load bearing capacity of the ground.

Floating axle blocking


412384

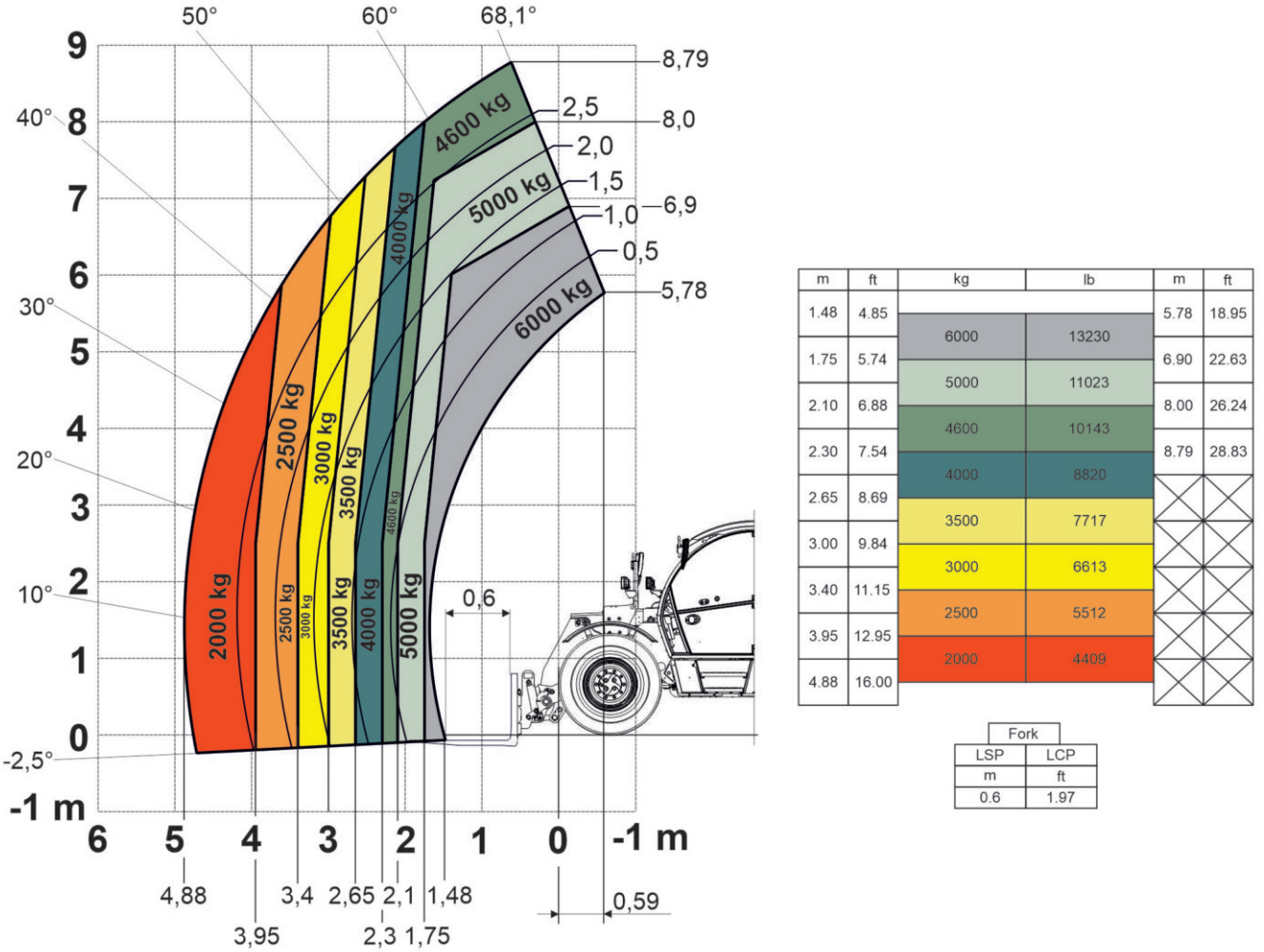
– Rear axle blocked

LWT/93517630/09/01/12/2023/en

1.2.10.3 Load curve of standard fork for T60-9

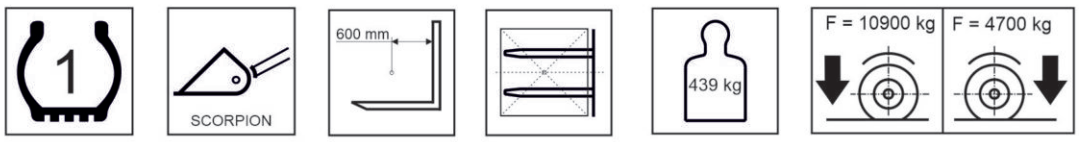
Load curve of standard fork for T60-9

Load curve: item code 12902362



m	ft	kg	lb	m	ft
1.48	4.85	6000	13230	5.78	18.95
1.75	5.74	5000	11023	6.90	22.63
2.10	6.88	4600	10143	8.00	26.24
2.30	7.54	4000	8820	8.79	28.83
2.65	8.69	3500	7717		
3.00	9.84	3000	6613		
3.40	11.15	2500	5512		
3.95	12.95	2000	4409		
4.88	16.00				

Fork	
LSP	LCP
m	ft
0.6	1.97



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The load curve applies to all standard forks and to forks with the equivalent own weight and overall centre of gravity with Scorpion quick coupler and the following tyres:

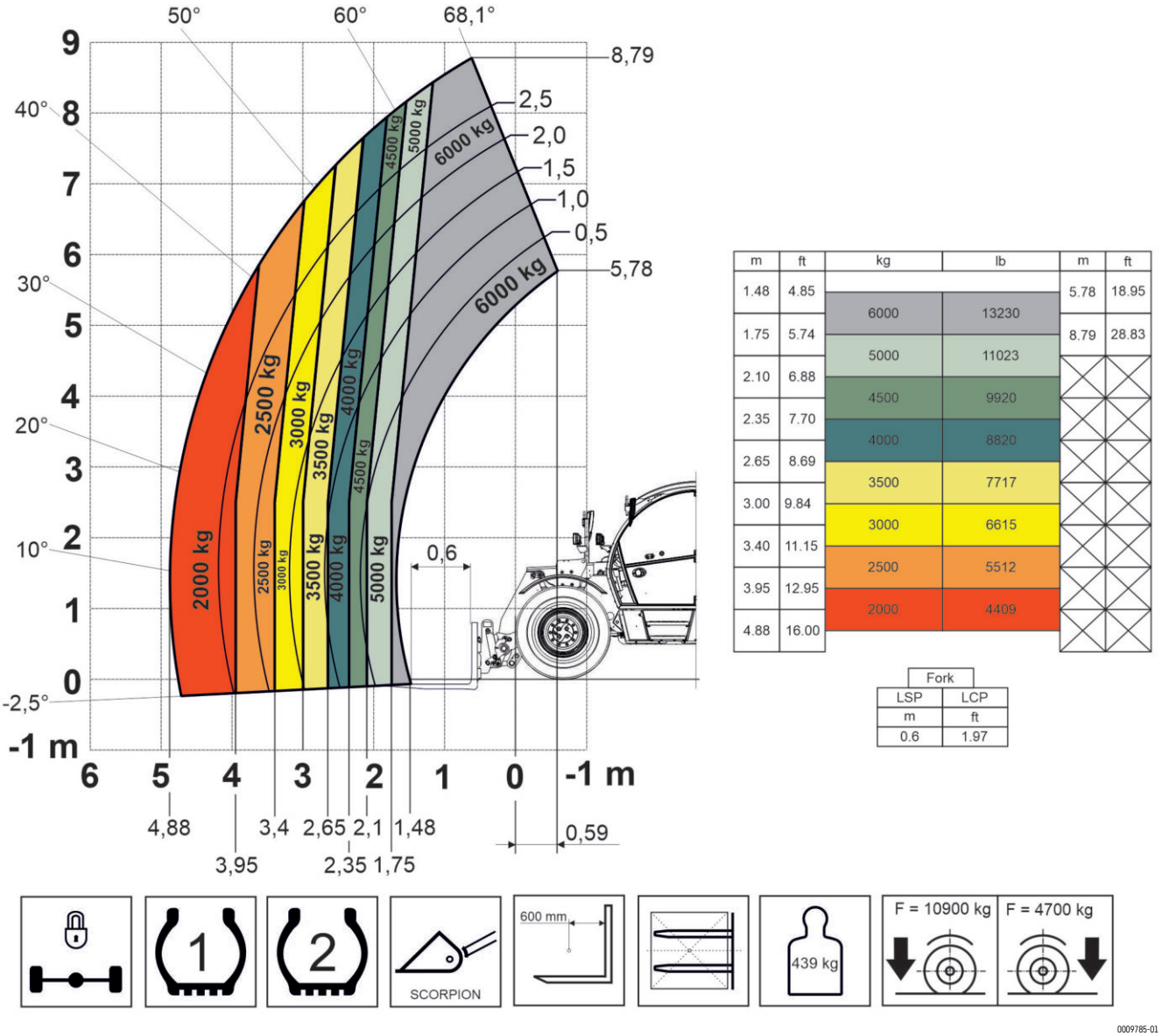
Alliance A 580 500/70 R24 164A8/164B	Michelin Power CL 440/80-24 168A8
Alliance Multiuse 550 500/70 R24 164A8/164B	Michelin XMCL 500/70 R24 164A8/164B

LWT/93517630/09/01/12/2023/en

1.2.10.4 Load curve of standard fork for T60-9 with floating axle blocking

Load curve of standard fork for T60-9 with floating axle blocking

Load curve: item code 12898806



m	ft	kg	lb	m	ft
1.48	4.85	6000	13230	5.78	18.95
1.75	5.74	5000	11023	8.79	28.83
2.10	6.88	4500	9920		
2.35	7.70	4000	8820		
2.65	8.69	3500	7717		
3.00	9.84	3000	6615		
3.40	11.15	2500	5512		
3.95	12.95	2000	4409		
4.88	16.00				

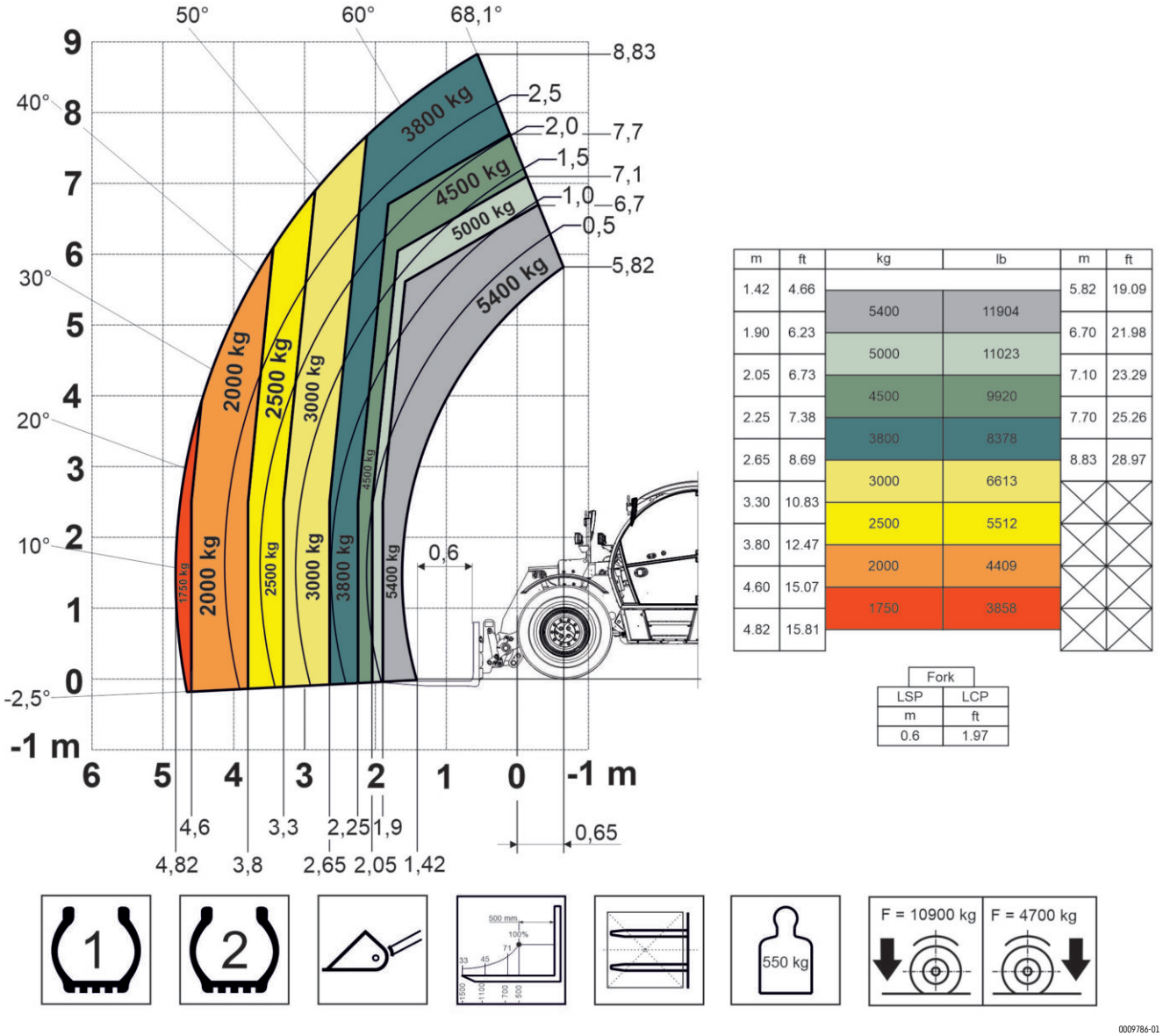
Fork	
LSP	LCP
m	ft
0.6	1.97

The load curve applies to all standard forks and to forks with the equivalent own weight and overall centre of gravity with Scorpion quick coupler and active floating axle blocking.

1.2.10.5 Load curve of special fork for T60-9

Load curve of special fork for T60-9

Load curve: item code 12898807



m	ft	kg	lb	m	ft
1.42	4.66			5.82	19.09
1.90	6.23	5400	11904	6.70	21.98
2.05	6.73	5000	11023	7.10	23.29
2.25	7.38	4500	9920	7.70	25.26
2.65	8.69	3800	8378	8.83	28.97
3.30	10.83	3000	6613		
3.80	12.47	2500	5512		
4.60	15.07	2000	4409		
4.82	15.81	1750	3858		

Fork	
LSP	LCP
m	ft
0.6	1.97

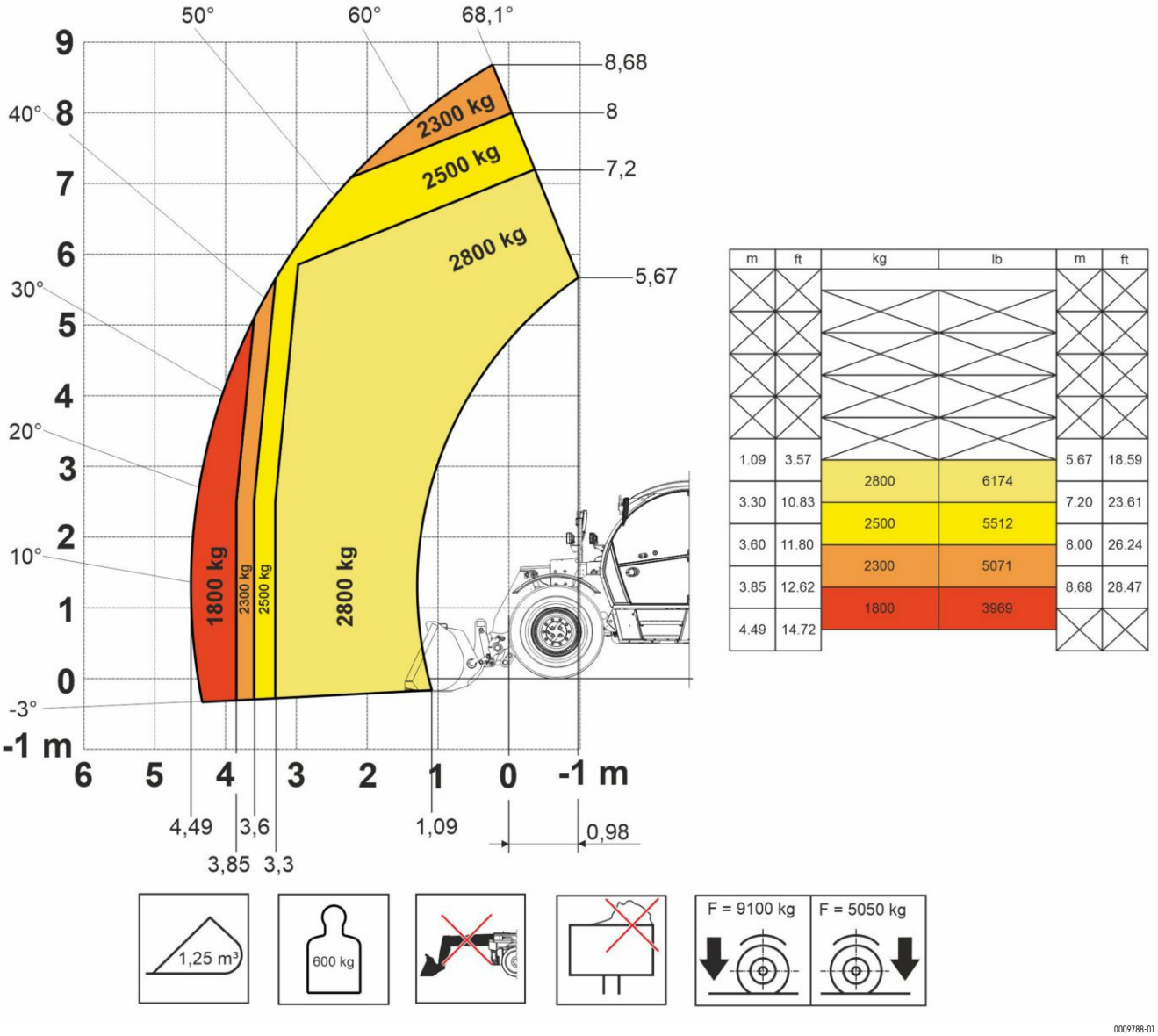
The load curve applies to all forks, which are not regarded as standard forks, up to a maximum own weight of 550 kg (1,212.5 lb).

LWT/93517630/09/01/12/2023/en

1.2.10.6 Load curve of heavy load bucket up to 1.25 m³ (44.14 ft³) for T60-9

Load curve of heavy load bucket up to 1.25 m³ (44.14 ft³) for T60-9

Load curve: item code 12898808



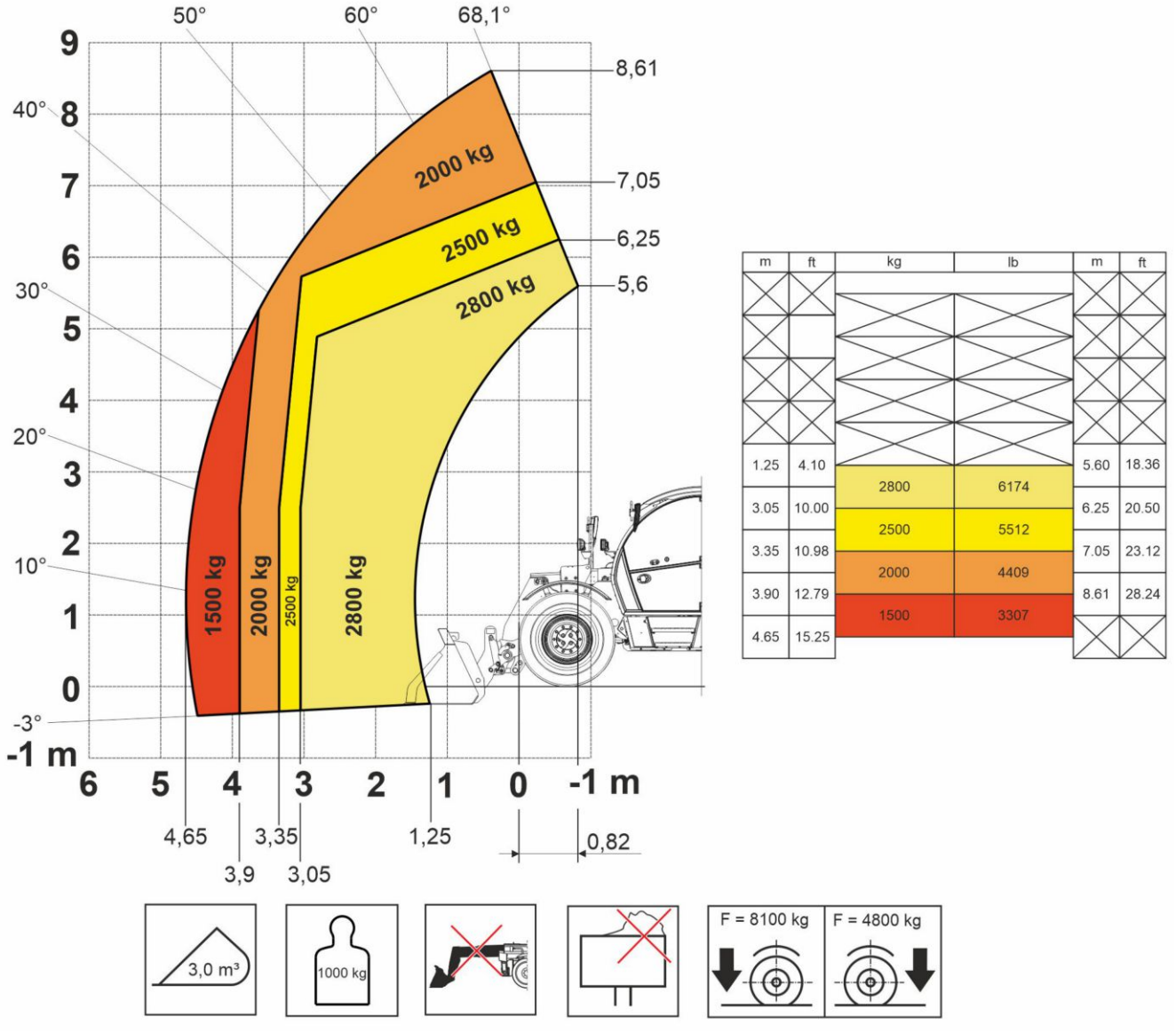
Load curve applies to buckets up to a maximum of 1.25 m³ (44.14 ft³), maximum own weight of 600 kg (1,322.8 lb) and width of 2.5 m (8.20 ft).

Example: when using a 1.25 m³ (44.14 ft³) bucket, material with a maximum density of 2,080 kg/m³ (129.85 lb/ft³) may be used.

1.2.10.7 Load curve of lightweight bucket up to 3.00 m³ (106 ft³) for T60-9

Load curve of lightweight bucket up to 3.00 m³ (106 ft³) for T60-9

Load curve: item code 12898809



m	ft	kg	lb	m	ft
1.25	4.10	2800	6174	5.60	18.36
3.05	10.00	2500	5512	6.25	20.50
3.35	10.98	2000	4409	7.05	23.12
3.90	12.79	1500	3307	8.61	28.24
4.65	15.25				

Load curve applies to buckets up to a maximum of 3.00 m³ (106 ft³), maximum own weight of 1,000 kg (2,204.6 lb) and width of 2.5 m (8.20 ft).

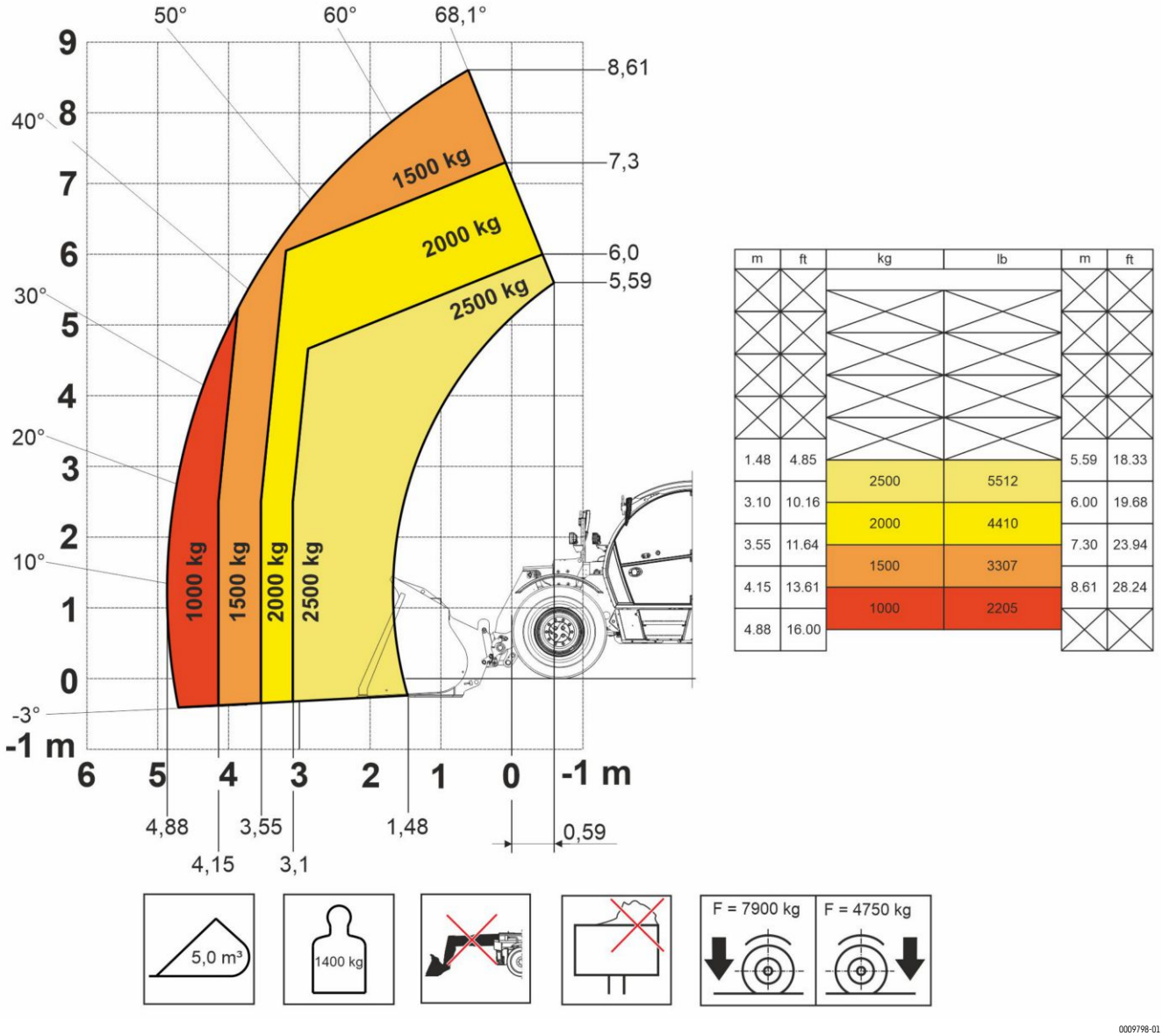
Example: when using a 2.00 m³ (71 ft³) bucket, material with a maximum density of 1,250 kg/m³ (78.03 lb/ft³) may be used.

LWT/93517630/09/01/12/2023/en

1.2.10.8 Load curve of lightweight bucket up to 5.00 m³ (177 ft³) for T60-9

Load curve of bucket up to 5.00 m³ (177 ft³) for T60-9

Load curve: item code 12898814



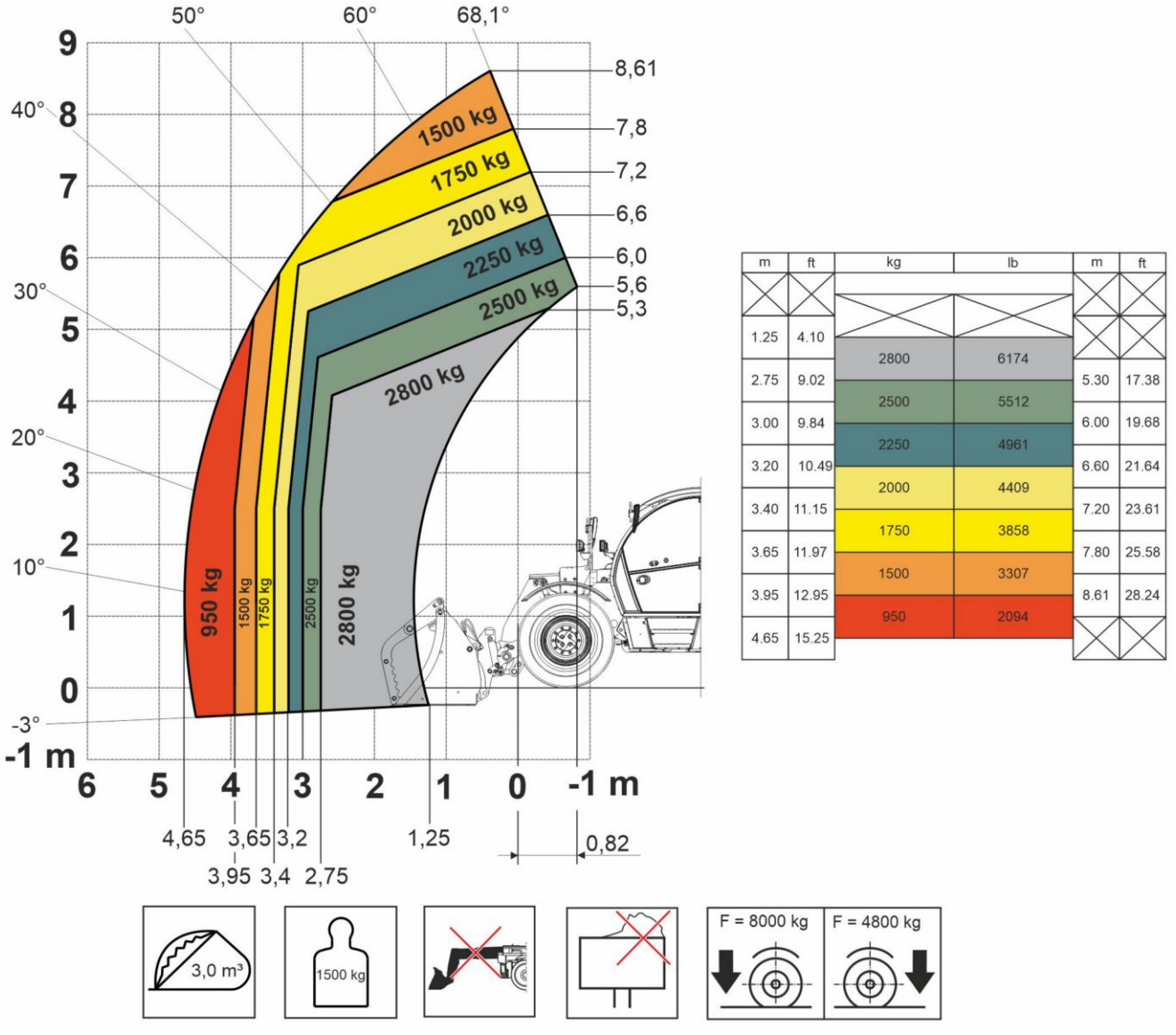
Load curve applies to buckets up to a maximum of 5.00 m³ (177 ft³) and a maximum own weight of 1,400 kg (3,086.5 lb).

Example: when using a 4.00 m³ (141 ft³) bucket, material with a maximum density of 575 kg/m³ (35.90 lb/ft³) may be used.

1.2.10.9 Load curve of hydraulic bucket up to 3.00 m³ (106 ft³) for T60-9

Load curve of hydraulic bucket for T60-9

Load curve: item code 12898810



m	ft	kg	lb	m	ft
1.25	4.10	2800	6174	5.30	17.38
2.75	9.02	2500	5512	6.00	19.68
3.00	9.84	2250	4961	6.60	21.64
3.20	10.49	2000	4409	7.20	23.61
3.40	11.15	1750	3858	7.80	25.58
3.65	11.97	1500	3307	8.61	28.24
3.95	12.95	950	2094		
4.65	15.25				

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Load curve applies to buckets with additional hydraulic functions up to a maximum of 3.0 m³ (106 ft³), maximum own weight of 1,500 kg (3,306.9 lb) and width of 2.5 m (8.20 ft).

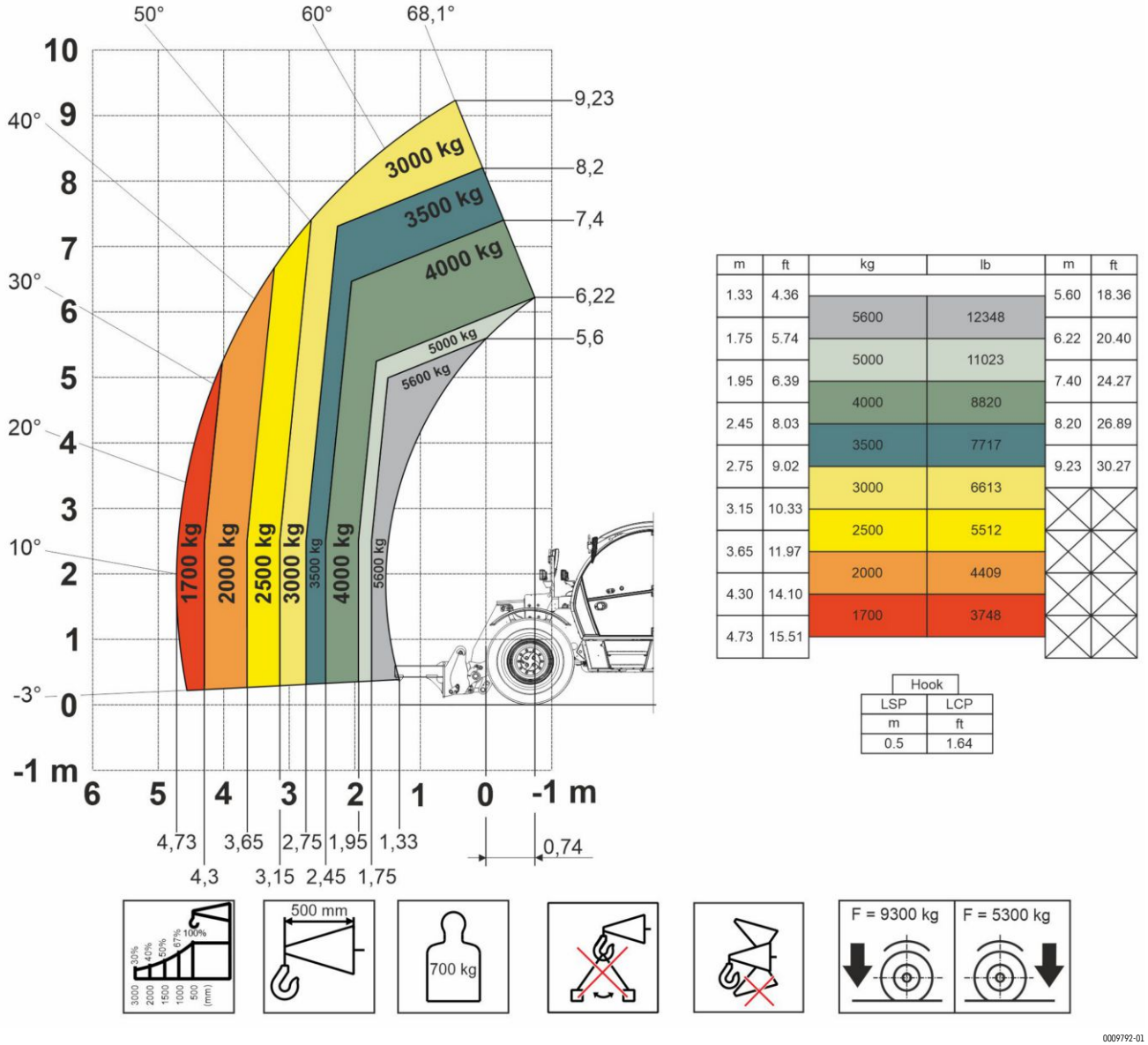
Example: grappling bucket, hold-down bucket, bottom-dump bucket, silage bite bucket

LWT/93517630/09/01/12/2023/en

1.2.10.10 Load curve of load hook for T60-9

Load curve of load hook for T60-9

Load curve: item code 12898811



m	ft	kg	lb	m	ft
1.33	4.36			5.60	18.36
1.75	5.74	5600	12348	6.22	20.40
1.95	6.39	5000	11023	7.40	24.27
2.45	8.03	4000	8820	8.20	26.89
2.75	9.02	3500	7717	9.23	30.27
3.15	10.33	3000	6613		
3.65	11.97	2500	5512		
4.30	14.10	2000	4409		
4.73	15.51	1700	3748		

Hook	
LSP	LCP
m	ft
0.5	1.64

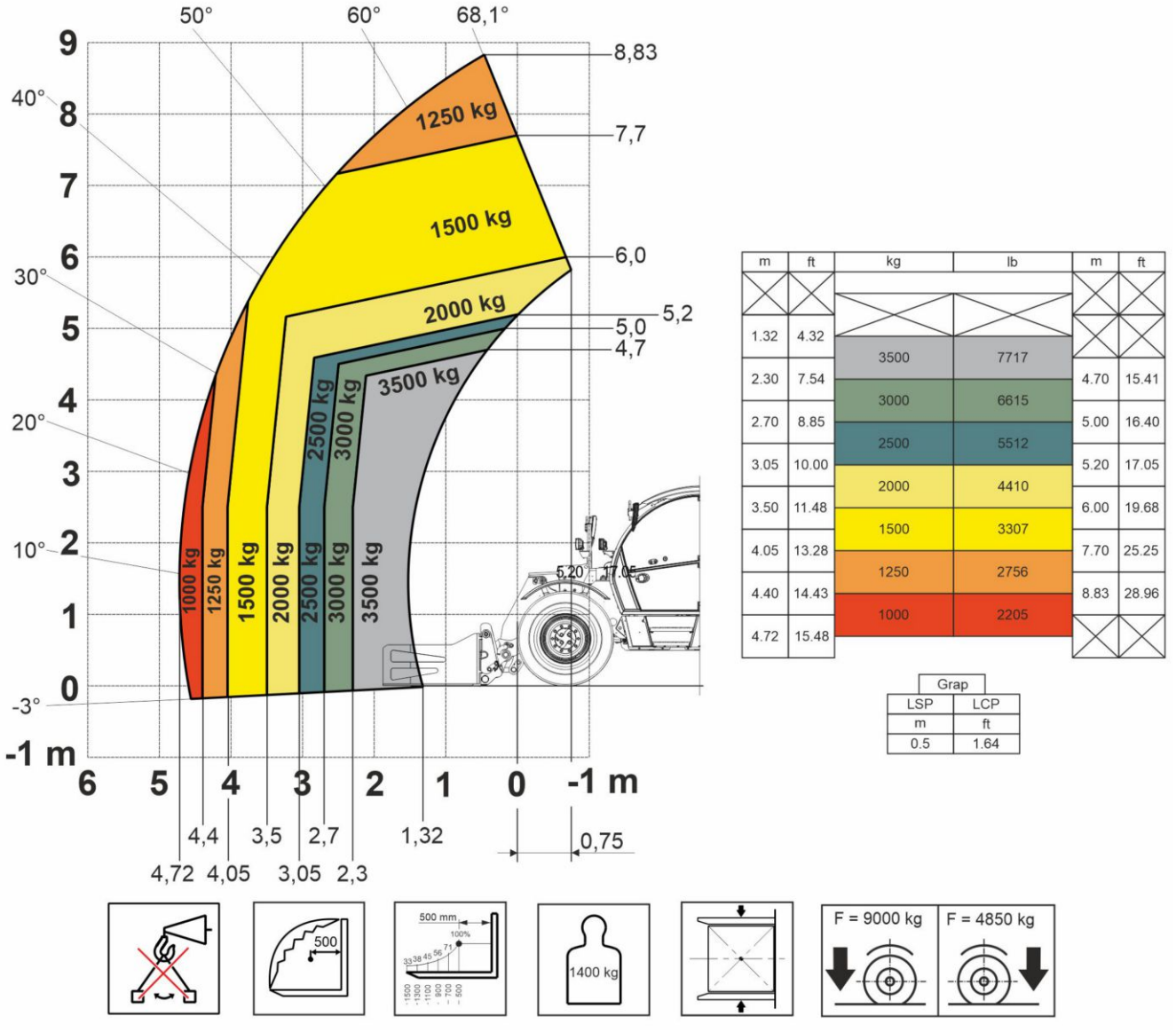
Load curve applies to load hooks with a length of 500 mm (19.69 in) and a maximum own weight of 700 kg (1,543.2 lb).

Example: directly attachable load hook, load hook with attachable fork arms, lifting eyes with load hook

1.2.10.11 Load curve of optional working tools for T60-9

Load curve of optional working tools for T60-9

Load curve: item code 12898813



m	ft	kg	lb	m	ft
1.32	4.32	3500	7717		
2.30	7.54	3000	6615	4.70	15.41
2.70	8.85	2500	5512	5.00	16.40
3.05	10.00	2000	4410	5.20	17.05
3.50	11.48	1500	3307	6.00	19.68
4.05	13.28	1250	2756	7.70	25.25
4.40	14.43	1000	2205	8.83	28.96
4.72	15.48				

Grap	
LSP	LCP
m	ft
0.5	1.64

The load curve applies to all working attachments with additional hydraulic functions (closing, clamping, holding, etc.). Load curve applies to all working attachments with a greatly deviating centre of gravity.

Load curve does **not** apply to buckets with an additional hydraulic function as there is a separate load curve to this end.

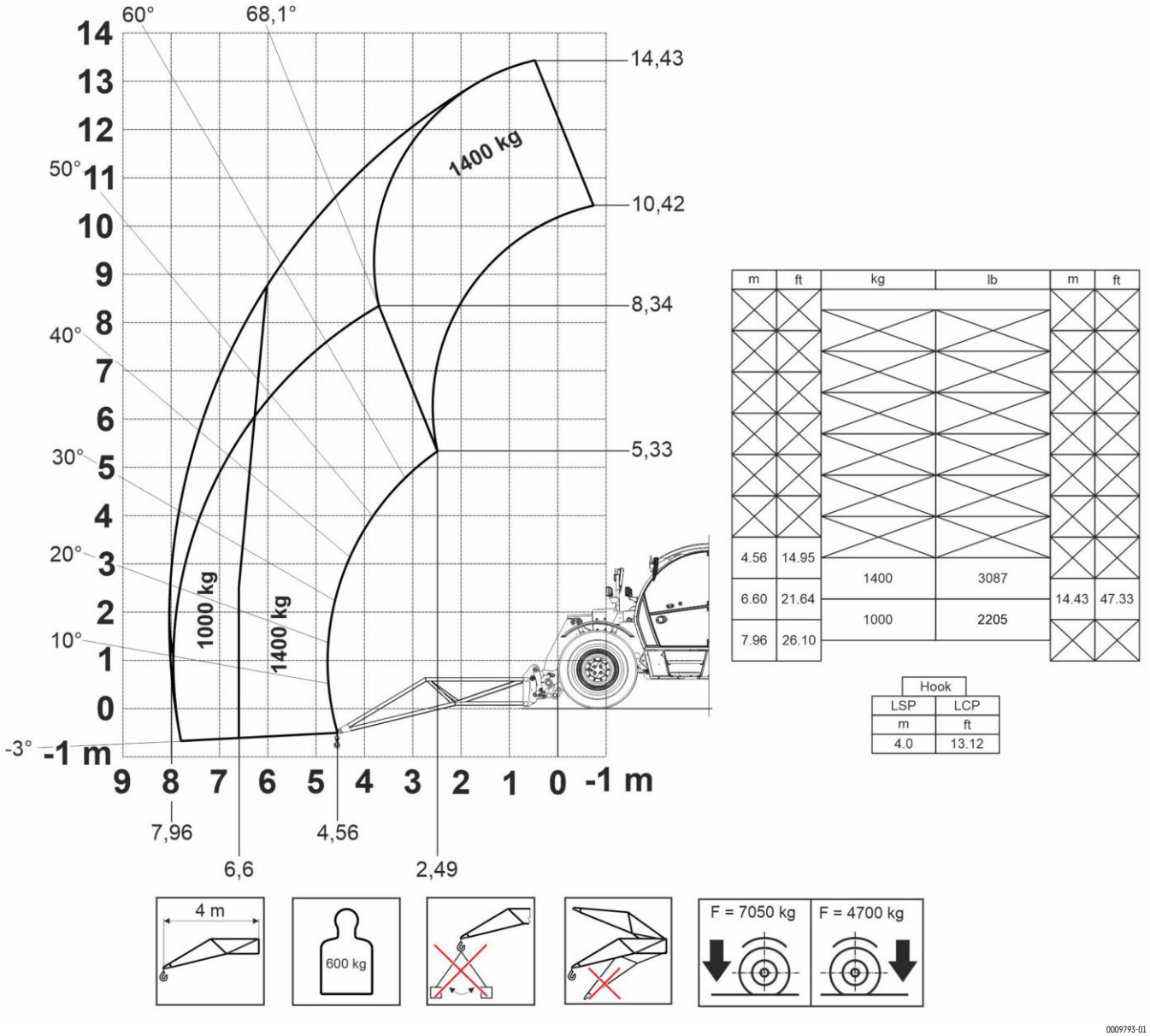
Example: pallet fork with hydraulic fork adjustment, log grapple, fork arm turning device, box turning device, fork with gripper, bale clamp, bale gripper, round bale tongs and square bale tongs, manure tongue, manure fork, greenage fork, silage tongue, silage cutter, bale spit, big bag carrier

LWT/93517630/09/01/12/2023/en

1.2.10.12 Load curve of boom extension for T60-9

Load curve of boom extension for T60-9

Load curve: item code 12898812

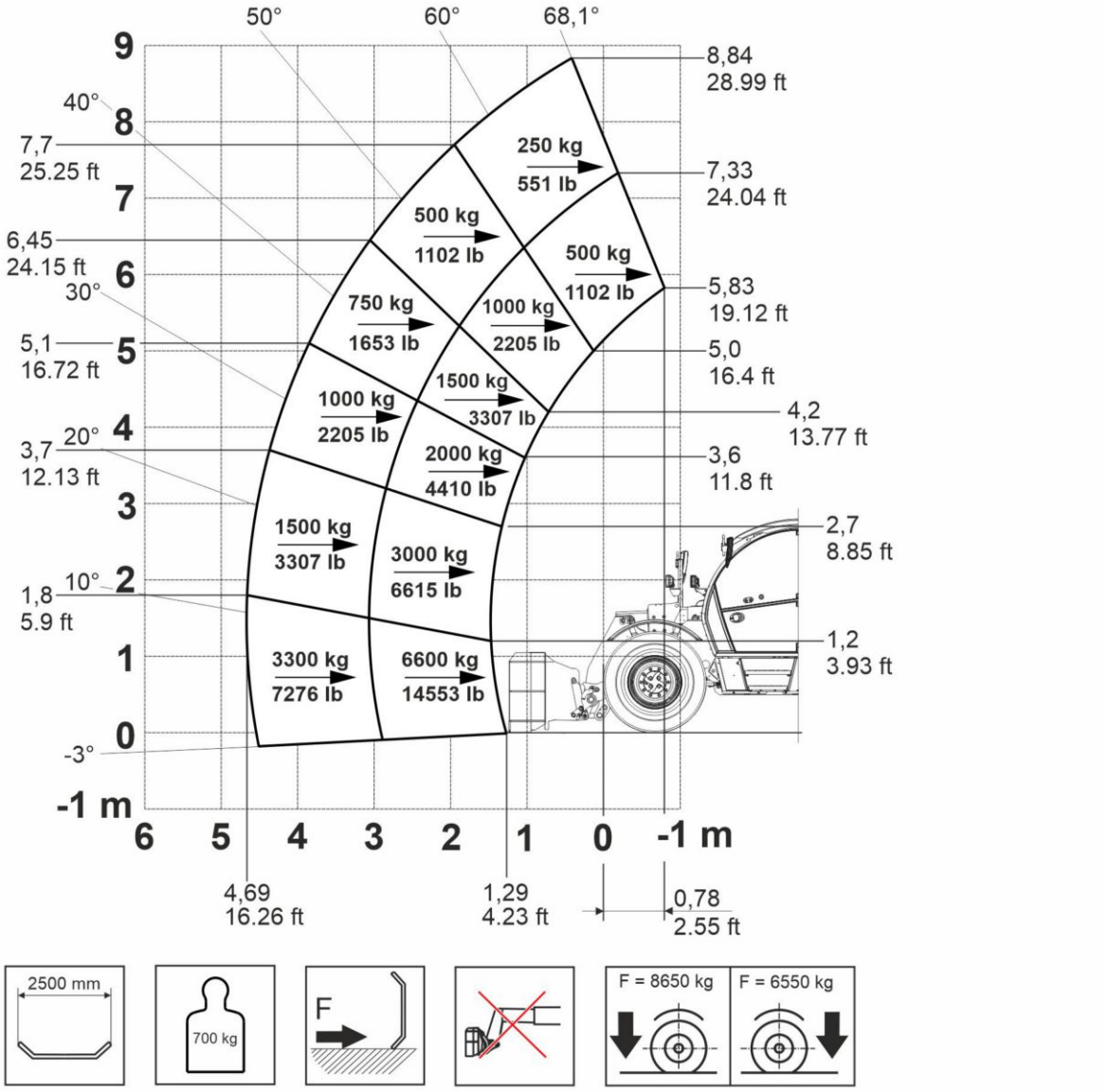


Load curve applies to boom extensions with a length of 4.00 m (13.1 ft) and a maximum own weight of 600 kg (1,322.8 lb).

1.2.10.13 Load curve of blades for T60-9

Load curve of blades for T60-9

Load curve: item code 12898815



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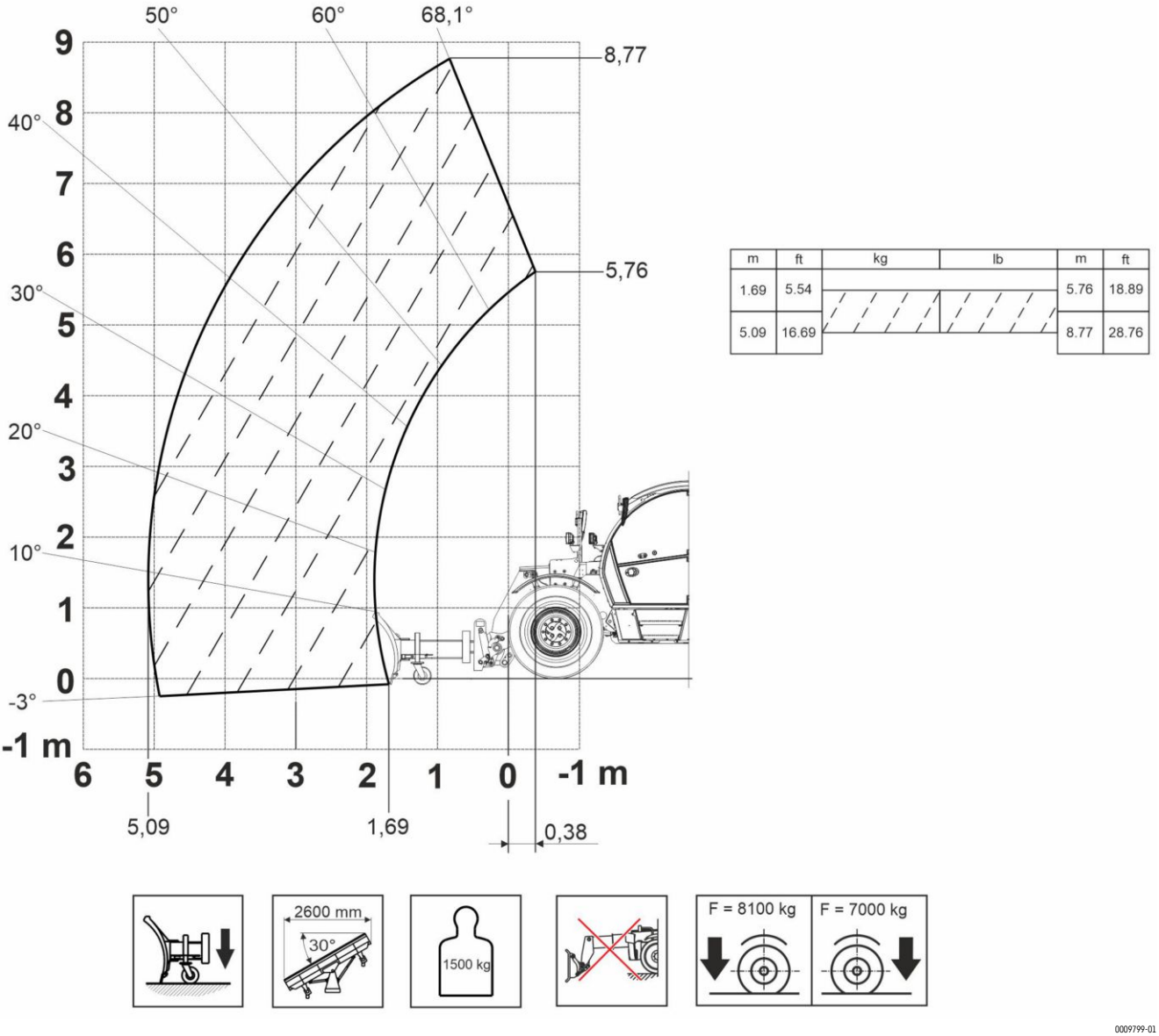
Load curve applies to pusher blades up to a maximum width of 2.5 m (8.20 ft) and a maximum own weight of 700 kg (1,543.2 lb).

LWT/93517630/09/01/12/2023/en

1.2.10.14 Load curve of self-supporting special attachments for T60-9

Load curve of self-supporting special attachments for T60-9

Load curve: item code 12898816



m	ft	kg	lb	m	ft
1.69	5.54			5.76	18.89
5.09	16.69			8.77	28.76

Load curve applies to working attachments which have their own stabiliser during operation up to a maximum own weight of 1,500 kg (3,306.9 lb) and are swung a maximum width of 2.5 m (8.20 ft).

Example: self-supporting snow blade, self-supporting street sweeper

1.2.11 Working tools

Only the following working tools approved by the manufacturer are approved for use on the telescopic handler.
Driving on public roads with working tools is not permitted. Remove working tool prior to driving on public roads.
Note the associated load chart when using the working tool.

1.2.11.1 Working tools T60-9

Working tools T60-9

Description	Quick coupler	ID number	Width/length	Maximum load	Maximum bucket content	Maximum bulk density
Rigid fork carrier without prongs	Scorpion	12561545	1,200 mm (47.24 in)/ –	6 t (6.6 ton_{US})	–	–
	Manitou	12898555				
	Liebherr	12897058				
	JCB	12975764	1,370 mm (53.94 in)/ –			
Fork, rigid	Scorpion	12561545/12562015	1,200 mm (47.24 in)/ –	6 t (6.6 ton_{US})	–	–
	Manitou	12898555/12562015				
	Liebherr	12897058/12562015				
	JCB	12975764/12562015	1,370 mm (53.94 in)/ –			
Fork, rigid, extra-wide	Scorpion	12962626/13412265	2,300 mm (90.55 in)/ –	5 t (5.5 ton_{US})	–	–
	Manitou	13412568/13412265				
Fork, floating	Scorpion	12815881/12820728	1,530 mm (60.24 in)/ –	6 t (6.6 ton_{US})	–	–
	Manitou	12900317/12820728				
	Liebherr	12899081/12820728				
	JCB	12933641/12820728	1,395 mm (54.92 in)/ –			
Heavy lift bucket with cutting edge	Scorpion	12568598	2,500 mm (98.43 in)/ –	–	1.2 m^3 (42.4 ft^3)	1,800 kg/m^3 (112.37 lb/ft^3)
	Scorpion	13526083				
	Manitou	12568971				
Heavy lift bucket with reversible blade	Scorpion	12973263	2,500 mm (98.43 in)/ –	–	1.2 m^3 (42.4 ft^3)	1,800 kg/m^3 (112.37 lb/ft^3)
	Scorpion	13526092				
	Manitou	12994188				
Heavy lift bucket with cutting edge	Scorpion	12564352	2,500 mm (98.43 in)/ –	–	1.5 m^3 (53.0 ft^3)	1,800 kg/m^3 (112.37 lb/ft^3)
	Scorpion	13526094				
	Manitou	12567946				
	Liebherr	12900906				
Heavy lift bucket with teeth	Scorpion	13452262	2,500 mm (98.43 in)/ –	–	1.5 m^3 (53.0 ft^3)	1,800 kg/m^3 (112.37 lb/ft^3)
	Scorpion	13528071				
	Manitou	13452566				
	Liebherr	13452771				
Heavy lift bucket with cutting edge	Scorpion	12875766	2,500 mm (98.43 in)/ –	–	1.7 m^3 (60.0 ft^3)	1,800 kg/m^3 (112.37 lb/ft^3)
	Scorpion	13528082				
	Manitou	12887420				
Lightweight bucket	Scorpion	12579391	2,500 mm (98.43 in)/ –	–	3 m^3 (106 ft^3)	900 kg/m^3 (56.19 lb/ft^3)
	Scorpion	12888990				
	Manitou	12888994				
	Liebherr	12898243				
Lightweight bucket	Scorpion	12822936	2,600 mm (102.36 in)/ –	–	3.7 m^3 (130.7 ft^3)	900 kg/m^3 (56.19 lb/ft^3)
	Scorpion	12888992				

LWT/93517630/09/01/12/2023/en

Description	Quick coupler	ID number	Width/length	Maximum load	Maximum bucket content	Maximum bulk density
Lightweight bucket	Manitou	12888995	2,600 mm (102.36 in)/ –	–	3.7 m³ (130.7 ft³)	900 kg/m³ (56.19 lb/ft³)
	Liebherr	12898245				
	JCB	12935024				
Lightweight bucket	Scorpion	12822937	2,600 mm (102.36 in)/ –	–	4.5 m³ (158.9 ft³)	900 kg/m³ (56.19 lb/ft³)
	Scorpion	12888993				
	Manitou	12888996				
	Liebherr	12898247				
Boom extension	Scorpion	12921763/12921805	1,244 mm (48.98 in)/ 3,900 mm (153.54 in)	1 t (1.1 ton_{US})	–	–
	Manitou	12921764/12921805				
	Liebherr	12921766/12921805				
	JCB	12921767/12921805				
Load hook with container hook	Scorpion	12921763/12959393	1,244 mm (48.98 in)/ –	6 t (6.6 ton_{US})	–	–
	Manitou	12921764/12959393				
	Liebherr	12921766/12959393				
	JCB	12921767/12959393				
Hold-down bucket	Scorpion	12921763/ 12944687/12973829	2,500 mm (98.43 in)/ –	–	2.2 m³ (77.7 ft³)	1,000 kg/m³ (62.43 lb/ft³)
	Manitou	12921764/ 12944687/12973911				
	Liebherr	12921766/ 12944687/12973911				
	JCB	12921767/ 12944687/12973829				
Pusher blade with extension	Scorpion	12921763/ 13425475/13424437	2,500 mm (98.43 in)/ –	–	–	–
	Manitou	12921764/ 13425475/13424437				
	Liebherr	12921766/ 13425475/13424437				
	JCB	12921767/ 13425475/13424437				
Bale clamp	Scorpion	12561997/ 12944605/13404036	1,200 mm (47.24 in)/ –	3 t (3.3 ton_{US})	–	–
	Manitou	12561757/ 12944605/13404070	1,160 mm (45.67 in)/ –			
	Liebherr	12895620/ 12944605/13404062	1,220 mm (48.03 in)/ –			
	JCB	12975763/ 12944605/13404036	1,370 mm (53.94 in)/ –			
Rotary device	Scorpion	12561997/ 12944617/13404575	1,200 mm (47.24 in)/ –	5 t (5.5 ton_{US})	–	–
	Manitou	12561757/ 12944617/13404584	1,160 mm (45.67 in)/ –			
	Liebherr	12895620/ 12944617/13404672	1,220 mm (48.03 in)/ –			
	JCB	12975763/ 12944617/13404675	1,370 mm (53.94 in)/ –			
Fork adjustment	Scorpion	12561197/ 12944634/13404036	1,200 mm (47.24 in)/ –	3 t (3.3 ton_{US})	–	–
	Manitou	12561757/ 12944634/13404070	1,160 mm (45.67 in)/ –			
	Liebherr	12895620/ 12944634/13404062	1,220 mm (48.03 in)/ –			
	JCB	12975763/ 12944634/13404036	1,370 mm (53.94 in)/ –			

LWT/93517630/09/01/12/2023/en

Description	Quick coupler	ID number	Width/length	Maximum load	Maximum bucket content	Maximum bulk density
Street sweeper with side brush, left	Scorpion	13526583/ 12944635/13522258	2,830 mm (111.42 in)/ –	–	–	–
	Manitou	13526592/ 12944635/13522319				
	Liebherr	13526596/ 12944635/13522319				
	JCB	13526600/ 12944635/13522258				
Street sweeper with side brush, right	Scorpion	13526583/ 12944636/13522258	2,830 mm (111.42 in)/ –	–	–	–
	Manitou	13526592/ 12944636/13522319				
	Liebherr	13526596/ 12944636/13522319				
	JCB	13526600/ 12944636/13522258				

1.2.12 Tyres

The following table lists all tyres and rims approved by Liebherr as well as the associated recommended tyre pressures. Tyres not listed in the following table may only be used following consultation with Liebherr customer service.

The following data regarding air pressure in the tyres refers to:

- Basic air pressure recommendations (according to the set value at delivery from the factory)
- Tyres in cold condition
- An operational machine (basic machine with standard attachment and the permissible load for it)

1.2.12.1 Tyre inflation pressure for T60-9

Tyre pressure table for T60-9

Description	Tyre size	Rim size	Offset	Inflation pressure, front axle	Inflation pressure, rear axle	Tyre category
Alliance A580	500/70 R24 164A8/164B	24x DW15L	20	4.40 bar (63.8 psi)	4.00 bar (58 psi)	1
Alliance 550 Multiuse	500/70 R24 164A8/164B	24x DW15L	20	4.40 bar (63.8 psi)	4.00 bar (58 psi)	1
Alliance I-331	600/55-26.5 170A8	26.5x AG20.00 TH2	50	3.60 bar (52.2 psi)	2.70 bar (39.2 psi)	2
Camso MPT 793S (full rubber)	375/85-24	10.0-24	5	–	–	–
Michelin BibLoad foam-filled	460/70 R24 159A8/159B	24x DW15L	5	–	–	–
Michelin BibLoad	500/70 R24 164A8/164B	24x DW15L	20	4.40 bar (63.8 psi)	4.00 bar (58 psi)	2
Michelin BibLoad	480/80 R26 167A8/167B	26x DW16L	19	4.00 bar (58 psi)	3.70 bar (53.7 psi)	2
Michelin Power CL	440/80-24 168A8	24x DW15L	5	5.00 bar (73 psi)	4.40 bar (63.8 psi)	1
Michelin XMCL	480/80 R26 167A8/167B	26x DW16L	19	4.00 bar (58 psi)	3.70 bar (53.7 psi)	2
Michelin XMCL	500/70 R24 164A8/164B	24x DW15L	20	4.40 bar (63.8 psi)	4.00 bar (58 psi)	1
Michelin X Mine L5	17.5 R25	14-25	25	6.00 bar (87 psi)	4.00 bar (58 psi)	1
Nokian TRI2	500/70 R24 159D	24x DW15L	20	4.00 bar (58 psi)	4.00 bar (58 psi)	2

LWT/93517630/09/01/12/2023/en

1.2.12.2 Snow chains or tyre protection chains (option)

NOTICE

Improper assembly of the snow chains or tyre protection chains!

Damage to drive system.

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

The installation of snow chains or tyre protection chains must be made on all four tyres.

1.2.12.3 Tyre foaming

NOTICE

Filling tyres with foam!

Damage to the machine.

► Contact Liebherr customer service.

Tyre foaming changes the weight of the machine.

Tyre foaming is not permitted without the approval of Liebherr customer service.

1.2.12.4 Spare tyres

Only tyres that conform to the design, dimension and specification of the fitted tyres may be used as spare tyres.

1.3 Tightening torques

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

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

Further applicable documentation

Standards	Description
DIN ISO 261 (11/1999)	ISO general purpose metric screw threads - General plan (ISO 261:1998)
DIN ISO 262 (11/1999)	ISO general purpose metric screw threads - Selected sizes for screws, bolts and nuts (ISO 262:1998)
DIN ISO 965-2 (11/1999)	ISO general purpose metric screw threads - Tolerances - Part 2: Limits of sizes for general purpose external and internal screw threads - Medium quality (ISO 965-2:1998)
DIN EN ISO 4014 (06/2011)	Hexagon head screws with shank - Product grades A and B (ISO 4014:2011); German version EN ISO 4014:2011
DIN EN ISO 4016 (06/2011)	Hexagon head screws with shank - Product grade C (ISO 4016:2011); German version EN ISO 4016:2011

LWT/93517630/09/01/12/2023/en

Standards	Description
DIN EN ISO 4017 (05/2015)	Fasteners - Hexagon head screws with thread up to head - Product grades A and B (ISO 4017:2014) German version EN ISO 4017:2014
DIN EN ISO 4018 (07/2011)	Hexagon head screws with thread up to head - Product grade C (ISO 4018:2011); German version EN ISO 4018:2011
DIN EN ISO 4762 (06/2004)	Hexagon socket head cap screws (ISO 4762:2004) German version EN ISO 4762:2004
DIN EN 20273 (02/1992)	Fasteners; clearance holes for bolts and screws (ISO 273:1979); German version EN 20273:1991
DIN 34800 (11/2016)	Bolts and screws with external hexalobular driving feature with small flange
VDI 2230 Sheet1 (02/2003)	Systematic calculation of high stressed bolted joints - Joints with one cylindrical bolt
LH 10215295-002 (06/2015)	LN 252-8 Corrosion protection for low-value standard parts (C parts) salt spray mist test > 480 hours
LH 10021432-010 (06/2015)	Delivery specifications for steel fasteners with zinc coating (FlZn)

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.

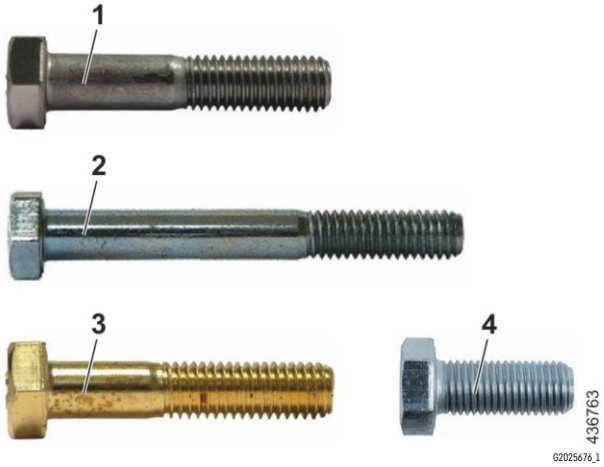
Assembly prestressing forces F_M and tightening torques M_A at 90% utilisation of the yield strength for shank bolts with standard or fine metric threads as per DIN ISO 262 (and DIN ISO 965-2); wrench sizes for hexagon head screw in accordance with DIN EN ISO 4014 to 4018, screws with external hexalobular 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.

LWT/93517630/09/01/12/2023/en

Screw types

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

Prestressing forces and tightening torques for screws

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)			
Minimum total coefficient of friction μ_G= 0.09				Minimum total coefficient of friction μ_G= 0.11			
Thread	Grade	Assembly prestressing forces F_M in kN (lb_f)	Tightening torques M_A in N·m (ft·lb_f)	Thread	Grade	Assembly prestressing forces F_M in kN (lb_f)	Tightening torques M_A in N·m (ft·lb_f)
				M 4	8.8	4.5 (1,012)	2.9 (2.14)
					10.9	6.6 (1,484)	4.3 (3.17)
					12.9	7.7 (1,731)	5.0 (3.7)
				M 5	8.8	7.3 (1,641)	5.7 (4.20)
					10.9	10.7 (2,405)	8.4 (6.20)
					12.9	12.5 (2,810)	9.8 (7.23)
M 6	8.8	10.6 (2,383)	8.6 (6.34)[4]	M 6	8.8	10.3 (2,316)	9.9 (7.30)
	10.9	15.5 (3,485)	12.6 (9.29)[4]		10.9	15.2 (3,417)	14.5 (10.69)
	12.9	18.2 (4,092)	14.7 (10.84)[4]		12.9	17.7 (3,979)	16.9 (12.46)
M 7	8.8	15.3 (3,440)	13.9 (10.25)[4]	M 7	8.8	15.0 (3,370)	16.1 (11.87)
	10.9	22.5 (5,058)	20.4 (15.05)[4]		10.9	22.0 (4,950)	23.6 (17.41)
	12.9	26 (5,850)	23.9 (17.63)[4]		12.9	26 (5,850)	28 (20.7)
M 8	8.8	19.3 (4,339)	20.6 (15.19)[4]	M 8	8.8	18.9 (4,249)	23.8 (17.55)
	10.9	28 (6,290)	30 (22.1)[4]		10.9	28 (6,290)	35 (25.8)
	12.9	33 (7,420)	35 (25.8)[4]		12.9	32 (7,190)	41 (30.2)
M 8 x 1	8.8	21 (4,720)	21.7 (16.01)[4]	M 8 x 1	8.8	20.5 (4,609)	25 (18.4)
	10.9	31 (6,970)	32 (23.6)[4]		10.9	30 (6,740)	37 (27.3)
	12.9	36 (8,090)	37 (27.3)[4]		12.9	35 (7,870)	43 (31.7)

LWT/93517630/09/01/12/2023/en

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)			
Minimum total coefficient of friction μ_G= 0.09				Minimum total coefficient of friction μ_G= 0.11			
Thread	Grade	Assembly prestressing forces F_M in kN (lb_f)	Tightening torques M_A in N·m (ft·lb_f)	Thread	Grade	Assembly prestressing forces F_M in kN (lb_f)	Tightening torques M_A in N·m (ft·lb_f)
M 9 x 1	8.8	27 (6,070)	31 (22.9)[4)]	M 9 x 1	8.8	27 (6,070)	36 (26.6)
	10.9	40 (8,990)	46 (33.9)[4)]		10.9	39 (8,770)	53 (39.1)
	12.9	47 (10,570)	53 (39.1)[4)]		12.9	46 (10,340)	62 (45.7)
M 10	8.8	31 (6,970)	40 (29.5)	M 10	8.8	30 (6,740)	47 (34.7)
	10.9	45 (10,120)	59 (43.5)		10.9	44 (9,890)	68 (50.2)
	12.9	53 (11,910)	69 (50.9)		12.9	52 (11,690)	80 (59.0)
M 10 x 1	8.8	35 (7,870)	44 (32.5)	M 10 x 1	8.8	34 (7,640)	51 (37.6)
	10.9	51 (11,470)	64 (47.2)		10.9	50 (11,240)	75 (55.3)
	12.9	60 (13,490)	75 (55.3)		12.9	59 (13,260)	88 (64.9)
M 10 x 1.25	8.8	33 (7,420)	42 (31.0)	M 10 x 1.25	8.8	32 (7,190)	49 (36.1)
	10.9	48 (10,790)	62 (45.7)		10.9	47 (10,570)	72 (53.1)
	12.9	56 (12,590)	72 (53.1)		12.9	55 (12,360)	84 (62.0)
M 12	8.8	45 (10,120)	69 (50.9)	M 12	8.8	44 (9,890)	80 (59.0)
	10.9	66 (14,840)	102 (75.2)		10.9	64 (14,390)	118 (87.0)
	12.9	77 (17,310)	119 (87.8)		12.9	75 (16,860)	140 (103.3)
M 12 x 1.25	8.8	50 (11,240)	74 (54.6)	M 12 x 1.25	8.8	49 (11,020)	86 (63.4)
	10.9	73 (16,410)	109 (80.4)		10.9	71 (15,960)	125 (92.2)
	12.9	85 (19,110)	125 (92.2)		12.9	84 (18,880)	150 (110.6)
M 12 x 1.5	8.8	47 (10,570)	72 (53.1)	M 12 x 1.5	8.8	46 (10,340)	83 (61.2)
	10.9	69 (15,510)	105 (77.4)		10.9	68 (15,290)	122 (90.0)
	12.9	81 (18,210)	123 (90.7)		12.9	79 (17,760)	145 (106.9)
M 14	8.8	61 (13,710)	110 (81.1)	M 14	8.8	60 (13,490)	125 (92.2)
	10.9	90 (20,230)	160 (118.0)		10.9	88 (19,780)	185 (136.4)
	12.9	105 (23,600)	190 (140.1)		12.9	103 (23,160)	220 (162.3)
M 14 x 1.5	8.8	67 (15,060)	117 (86.3)	M 14 x 1.5	8.8	66 (14,840)	135 (99.6)
	10.9	99 (22,260)	170 (125.4)		10.9	96 (21,580)	200 (147.5)
	12.9	115 (25,850)	200 (147.5)		12.9	113 (25,400)	235 (173.3)
M 16	8.8	84 (18,880)	170 (125.4)	M 16	8.8	82 (18,430)	195 (143.8)
	10.9	123 (27,650)	250 (184.4)		10.9	120 (26,980)	290 (213.9)
	12.9	145 (32,600)	290 (213.9)		12.9	140 (31,470)	340 (250.8)
M 16 x 1.5	8.8	91 (20,460)	175 (129.1)	M 16 x 1.5	8.8	89 (20,010)	205 (151.2)
	10.9	135 (30,350)	260 (191.8)		10.9	130 (29,230)	300 (221.3)
	12.9	155 (34,850)	300 (221.3)		12.9	150 (33,720)	360 (265.5)
M 18	8.8	102 (22,930)	235 (173.3)	M 18	8.8	100 (22,480)	270 (199.1)
	10.9	150 (33,720)	350 (258.1)		10.9	145 (32,600)	400 (295.0)
	12.9	175 (39,340)	410 (302.4)		12.9	170 (38,220)	470 (346.7)
M 18 x 1.5	8.8	117 (26,300)	260 (191.8)	M 18 x 1.5	8.8	115 (25,850)	300 (221.3)
	10.9	175 (39,340)	380 (280.3)		10.9	170 (38,220)	440 (324.5)
	12.9	200 (44,960)	440 (324.5)		12.9	200 (44,960)	520 (383.5)
M 18 x 2	8.8	110 (24,730)	245 (180.7)	M 18 x 2	8.8	107 (24,050)	290 (213.9)
	10.9	160 (35,970)	360 (265.5)		10.9	160 (35,970)	420 (309.8)
	12.9	190 (42,710)	420 (309.8)		12.9	185 (41,590)	490 (361.4)
M 20	8.8	130 (29,230)	330 (243.4)	M 20	8.8	130 (29,230)	380 (280.3)

LWT/93517630/09/01/12/2023/en

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)			
Minimum total coefficient of friction μ_G= 0.09				Minimum total coefficient of friction μ_G= 0.11			
Thread	Grade	Assembly prestressing forces F_M in kN (lb_f)	Tightening torques M_A in N·m (ft·lb_f)	Thread	Grade	Assembly prestressing forces F_M in kN (lb_f)	Tightening torques M_A in N·m (ft·lb_f)
M 20	10.9	190 (42,710)	490 (361.4)	M 20	10.9	190 (42,710)	560 (413.0)
	12.9	225 (50,580)	570 (420.4)		12.9	220 (49,460)	660 (486.8)
M 20 x 1.5	8.8	150 (33,720)	350 (258.1)	M 20 x 1.5	8.8	145 (32,600)	420 (309.8)
	10.9	215 (48,330)	520 (383.5)		10.9	215 (48,330)	610 (449.9)
	12.9	250 (56,200)	610 (449.9)		12.9	250 (56,200)	720 (531.0)
M 22	8.8	165 (37,090)	450 (331.9)	M 22	8.8	160 (35,970)	520 (383.5)
	10.9	240 (53,950)	660 (486.8)		10.9	235 (52,830)	770 (567.9)
	12.9	280 (62,950)	770 (567.9)		12.9	270 (60,700)	900 (663.8)
M 22 x 1.5	8.8	180 (40,470)	480 (354.0)	M 22 x 1.5	8.8	180 (40,470)	570 (420.4)
	10.9	270 (60,700)	700 (516.3)		10.9	260 (58,450)	830 (612.2)
	12.9	310 (69,690)	820 (604.8)		12.9	310 (69,690)	970 (715.4)
M 24	8.8	190 (42,710)	570 (420.4)	M 24	8.8	185 (41,590)	660 (486.8)
	10.9	280 (62,950)	840 (619.6)		10.9	270 (60,700)	970 (715.4)
	12.9	320 (71,940)	980 (722.8)		12.9	320 (71,940)	1,140 (840.8)
M 24 x 1.5	8.8	220 (49,460)	620 (457.3)	M 24 x 1.5	8.8	215 (48,330)	730 (538.4)
	10.9	320 (71,940)	910 (671.2)		10.9	320 (71,940)	1,080 (796.6)
	12.9	380 (85,430)	1,070 (789.2)		12.9	370 (83,180)	1,250 (922.0)
M 24 x 2	8.8	210 (47,210)	600 (442.5)	M 24 x 2	8.8	205 (46,090)	710 (523.7)
	10.9	310 (69,690)	890 (656.4)		10.9	300 (67,440)	1,040 (767.1)
	12.9	360 (80,930)	1,040 (767.1)		12.9	350 (78,680)	1,220 (899.8)
M 27	8.8	245 (55,080)	830 (612.2)	M 27	8.8	240 (53,950)	970 (715.4)
	10.9	360 (80,930)	1,230 (907.2)		10.9	360 (80,930)	1,450 (1,069.5)
	12.9	420 (94,420)	1,450 (1,069.5)		12.9	420 (94,420)	1,650 (1,217.0)
M 27 x 1.5	8.8	280 (62,950)	900 (663.8)	M 27 x 1.5	8.8	280 (62,950)	1,060 (781.8)
	10.9	410 (92,170)	1,300 (958.8)		10.9	410 (92,170)	1,550 (1,143.2)
	12.9	480 (107,910)	1,550 (1,143.2)		12.9	480 (107,910)	1,850 (1,364.5)
M 27 x 2	8.8	270 (60,700)	880 (649.1)	M 27 x 2	8.8	260 (58,450)	1,030 (759.7)
	10.9	400 (89,920)	1,300 (958.8)		10.9	390 (87,680)	1,500 (1,106.3)
	12.9	460 (103,410)	1,500 (1,106.3)		12.9	460 (103,410)	1,800 (1,327.6)
M 30	8.8	300 (67,440)	1,140 (840.8)	M 30	8.8	290 (65,190)	1,300 (958.8)
	10.9	440 (98,920)	1,650 (1,217.0)		10.9	430 (96,670)	1,950 (1,438.2)
	12.9	520 (116,900)	1,950 (1,438.2)		12.9	510 (114,650)	2,250 (1,659.5)
M 30 x 1.5	8.8	350 (78,680)	1,240 (914.6)	M 30 x 1.5	8.8	350 (78,680)	1,450 (1,069.5)
	10.9	520 (116,900)	1,800 (1,327.6)		10.9	510 (114,650)	2,150 (1,585.8)
	12.9	610 (137,130)	2,150 (1,585.8)		12.9	590 (132,640)	2,500 (1,843.9)
M 30 x 2	8.8	340 (76,440)	1,220 (899.8)	M 30 x 2	8.8	330 (74,190)	1,450 (1,069.5)
	10.9	500 (112,400)	1,800 (1,327.6)		10.9	490 (110,160)	2,100 (1,548.9)
	12.9	580 (130,390)	2,100 (1,548.9)		12.9	570 (128,140)	2,450 (1,807.0)
M 33	8.8	370 (83,180)	1,550 (1,143.2)	M 33	8.8	370 (83,180)	1,800 (1,327.6)
	10.9	550 (123,640)	2,250 (1,659.5)		10.9	540 (121,400)	2,600 (1,917.7)
	12.9	640 (143,880)	2,600 (1,917.7)		12.9	630 (141,630)	3,100 (2,286.4)
M 33 x 1.5	8.8	430 (96,670)	1,650 (1,217.0)	M 33 x 1.5	8.8	420 (94,420)	1,950 (1,438.2)
	10.9	630 (141,630)	2,450 (1,807.0)		10.9	620 (139,380)	2,900 (2,138.9)

LWT/93517630/09/01/12/2023/en

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)			
Minimum total coefficient of friction μ_G= 0.09				Minimum total coefficient of friction μ_G= 0.11			
Thread	Grade	Assembly prestressing forces F_M in kN (lb_f)	Tightening torques M_A in N·m (ft·lb_f)	Thread	Grade	Assembly prestressing forces F_M in kN (lb_f)	Tightening torques M_A in N·m (ft·lb_f)
M 33 x 1.5	12.9	740 (166,360)	2,800 (2,065.2)	M 33 x 1.5	12.9	730 (164,110)	3,400 (2,507.7)
M 33 x 2	8.8	420 (94,420)	1,600 (1,180.1)	M 33 x 2	8.8	410 (92,170)	1,900 (1,401.4)
	10.9	610 (137,130)	2,400 (1,770.1)		10.9	6,020 (1,353,350)	2,800 (2,065.2)
	12.9	720 (161,860)	2,800 (2,065.2)		12.9	700 (157,370)	3,300 (2,434.0)
M 36	8.8	440 (98,920)	1,950 (1,438.2)	M 36	8.8	430 (96,670)	2,300 (1,696.4)
	10.9	650 (146,130)	2,900 (2,138.9)		10.9	630 (141,630)	3,400 (2,507.7)
	12.9	760 (170,850)	3,400 (2,507.7)		12.9	740 (166,360)	3,900 (2,876.5)
M 36 x 1.5	8.8	520 (116,900)	2,150 (1,585.8)	M 36 x 1.5	8.8	510 (114,650)	2,600 (1,917.7)
	10.9	760 (170,850)	3,200 (2,360.2)		10.9	750 (168,610)	3,800 (2,802.7)
	12.9	890 (200,080)	3,700 (2,729.0)		12.9	870 (195,580)	4,400 (3,245.3)
M 36 x 3	8.8	470 (105,660)	2,050 (1,512.0)	M 36 x 3	8.8	460 (103,410)	2,400 (1,770.1)
	10.9	690 (155,120)	3,000 (2,212.7)		10.9	680 (152,870)	3,500 (2,581.5)
	12.9	810 (182,100)	3,500 (2,581.5)		12.9	790 (177,600)	4,100 (3,024.0)
M 39	8.8	530 (119,150)	2,500 (1,843.9)	M 39	8.8	520 (116,900)	3,000 (2,212.7)
	10.9	770 (173,100)	3,700 (2,729.0)		10.9	760 (170,850)	4,400 (3,245.3)
	12.9	910 (204,580)	4,400 (3,245.3)		12.9	890 (200,080)	5,100 (3,761.6)
M 39 x 1.5	8.8	610 (137,130)	2,800 (2,065.2)	M 39 x 1.5	8.8	600 (134,890)	3,300 (2,434.0)
	10.9	900 (202,330)	4,000 (2,950.2)		10.9	880 (197,830)	4,800 (3,540.3)
	12.9	1,050 (236,050)	4,700 (3,466.5)		12.9	1,030 (231,550)	5,600 (4,130.3)
M 39 x 3	8.8	560 (125,890)	2,600 (1,917.7)	M 39 x 3	8.8	550 (123,640)	3,100 (2,286.4)
	10.9	820 (184,340)	3,900 (2,876.5)		10.9	810 (182,100)	4,500 (3,319.0)
	12.9	960 (215,820)	4,500 (3,319.0)		12.9	940 (211,320)	5,300 (3,909.1)

[4)] The tightening torques for flZn screws <M10 are non-binding information, because no fixed coefficient of friction window is defined in the standard LH10215295. According to the state of the art and practical experience, the considered coefficients of friction for the respective coatings on small screw diameters are adhered to.

LWT/93517630/09/01/12/2023/en

Masters for all tasks

T 46-7s T 55-7s T 60-9s

LIEBHERR

Telescopic handlers

Lift height
7.0 – 9.0 m /
23' – 26'6" ft in

Lift capacity
4.6 – 6.0 t

Engine
Stage V
Stage IIIA / Tier 3

Performance

Impressive high-flyer –
the jack of all trades of recycling

Efficiency

Make the right choice –
sustainable and economical

Reliability

Telescopic handlers developed
for extreme jobs

Comfort

A Liebherr product is an investment
in productive staff

Maintainability

Don’t settle for the right spare part

T 46-7s

Lift height
7.0 m / 23' ft in
Lift capacity
4.6 t
Engine power
100 kW, 105 kW / 136 HP
Hydraulics
200 l / min. / 35.2 Imp.gpm
pump flow max.

T 55-7s

Lift height
7.0 m / 23' ft in
Lift capacity
5.5 t
Engine power
115 kW / 156 HP
Hydraulics
200 l / min. / 35.2 Imp.gpm
pump flow max.

T 60-9s

Lift height
9.0 m / 26'6" ft in
Lift capacity
6.0 t
Engine power
115 kW / 156 HP
Hydraulics
200 l / min. / 35.2 Imp.gpm
pump flow max.

Performance

Impressive high-flyer – the jack of all trades of recycling

In industrial material transshipment and particularly, in recycling companies, the challenge is to maximally utilise available storage space – length times width times height. This is where the Liebherr telescopic handlers show their strengths as high-performance do-it-all machines: swift and nimble, equipped with strong work hydraulics and capable of lifting large material loads up to even the tallest storage shelves.

A powerhouse for every situation

When driving or stockpiling
Its hydrostatic drive system provides plenty of get-up-and-go and high tractive power from a standstill. During the seamless transition to loading operation, the load-independent flow distribution system guides the power to the functions you need at any given moment. At the same time all hydraulic functions are operated simultaneously and allow quick stockpiling up to maximum height while having large power reserves.

When unloading
Even with cohesive material dumping at large height works effortlessly thanks to the maximum dumping angle and the optional vibration function. The standard end position damper for all hydraulic functions is easy on the machine's components and provides outstanding comfort.

Dynamic and precise material transshipment

Productive in confined spaces
The next step is all about sorting the valuable raw material and transshipping it as fast as possible. Dynamically and precisely switching between acceleration and deceleration is when the Liebherr drive system – which does without gear changes – shows all its strengths. Using the "All wheel steering" mode with its tight turning circle the material can be taken up and transferred to the sorting system in even the most confined spaces.

Safe transport
The loading shovel's large adjustment angle allows for safe material transport and simple dumping. A drive vibration damper prevents rocking and loss of loads. Always having a perfect view of the work equipment operators can furthermore identify and sort out foreign objects.

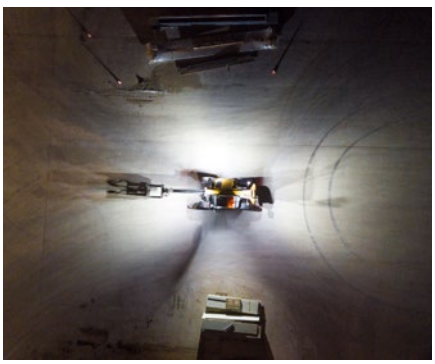
Quick acceleration, quick tool change

40 km/h / 27.7 mph – not just on the speedometer
When transferring material across large distances Liebherr telescopic handlers impress with genuine speeds of up to 40 km/h / 24.7 mph thanks to their high-performance drive systems. An enormous bonus when efficiently transporting full bale clamp loads.

Large quick coupler selection
Quick and effortless tool change thanks to built-in hydraulic quick coupler – also works with third-party tools from Manitou, Kramer or JCB. Liebherr's strong work hydraulics with optional fine control function also supply particularly power-hungry attachment tools.

Auto power for quick work cycles
To always be able to access the required power from the work hydraulics the optional auto power function automatically adapts the engine speed – without changing the drive speed.

Four electronically selectable steering modes for maximum agility
Front wheel and all wheel steering, crab steering as well as front wheel steering with freely selectable rear axle position: The compact Liebherr telescopic handlers allow for small turning circles in confined spaces.



Ideal industrial machinery for multi shift operation
The comprehensive visibility and lighting concept turns night into day and extends its possible uses when light conditions change.

Efficiency

Make the right choice – sustainable and economical

More and more industrial companies rely on intelligent technology for more economic sustainability. The best example for this is modern regional district heating supply. This is where Liebherr's telescopic handlers guarantee adaptive adjustment of tractive and lifting power at low fuel consumption thanks to electronically controlling both drive system and work hydraulics.

Smart means universal – take the timber industry, for example

Best manoeuvrability
Particularly due to their versatile application Liebherr telescopic handlers are the first choice in timber processing: Thanks to all-wheel drive, a short wheelbase and great turning angles they effortlessly manoeuvre on the entire premises, both inside and outside.

Strong work hydraulics for all tools
When stacking or loading using the fork or lightweight bucket they wow with a high load capacity and a great view of the load. Thanks to the standard work circuit 3 on the telescopic head furthermore allows for the use of tools that require an additional hydraulic function (example: timber grab with downholder).

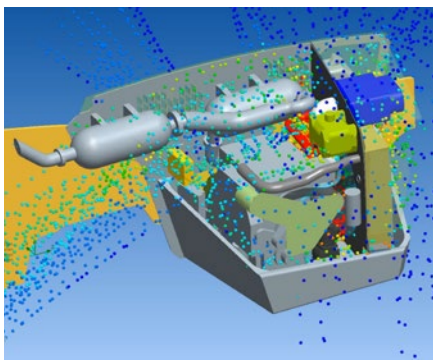
Using its high-performance work hydraulics (200 l/min. / 35.2 Imp.gpm) with leakage oil line and high volume flow one can furthermore use special tools such as timber tongs or branch saws.

Protecting resources is the smart way

The hydrostatic Liebherr drive system
In our modern district heating grids, "using energy intelligently" means utilising the right technology around the clock. Even storing biomass right after delivery can make a significant difference: Liebherr's hydrostatic drive system sets an ideal balance between maximum speed and ample tractive power at any given time. This speeds up work cycles.

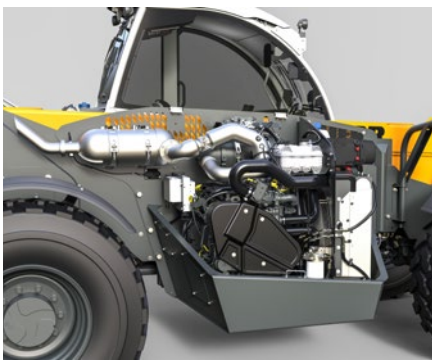
Auto hill assist
When stockpiling the standard auto hill assist function automatically prevents the vehicle from rolling backwards on inclines. The independently (un)locking parking brake makes stopping and setting off on inclines child's play.

Electronic pilot controls
The electronic pilot controls allow for extremely swift communication between all components and makes it possible to automate certain movements. The optional bucket return – from dumping at great height back to loading position – happens automatically and its angle can be programmed freely.



Flow-optimised cooling system
The sophisticated air guidance, in combination with the suction fan and large size cooling unit, keeps the machine at an ideal operating temperature even on hot days. As an option, a reversible fan can be used to free the air intake surface of any dirt or contamination and thereby ensure optimum cooling.

Economical interaction between all drive components
The powerful hydrostatic drive system provides maximum tractive power (up to 103 kN) in every work situation. The interaction of the electronically controlled drive components with the diesel engine and the work hydraulics reduces the fuel consumption while maximising output.



Modern engines and efficient exhaust gas after-treatment
Utilising diesel engines (100 / 115 kW) of emission stage V including electronic drive control systems makes Liebherr telescopic handlers particularly energy-efficient. The exhaust gas is cleaned in two stages via a diesel oxidation catalytic converter (DOC), a diesel particle filter (DPF) combined with an SCR catalytic converter.

Reliability

Wear intensive or weighing in at several tonnes – telescopic handlers developed for extreme jobs

Protecting machine and components is extremely important to Liebherr – from development to testing to assembly. Thanks to realistic computer simulations, extensive endurance tests and modern production methods all telescopic handlers are built for the toughest industrial applications.

Recycling version telescopic handlers

Protection when driving
To make sure operator and machine always operate safely around the scrap yard Liebherr telescopic handlers can be equipped with the right tires. The underbody protector and special protective grids reduce the risk of foreign objects entering the machine.

Load pick-up protection
If the operator decides to pick up some material afterwards the standard boom guide prevents the telescope boom from bending. An optional wiping tool makes sure that material sticking to the boom does not reach its inside after picking up the load.

Perfect work station lighting
Special lighting packages are available for special jobs or working under unfavourable lighting conditions such as unloading containers.

Strong and precise, even in the maximum load range

4x4 forklift in construction site operation
Customers from the building industry use Liebherr telescopic handlers where conventional forklifts and fast-erecting cranes reach their limits – for example when tasked with loading and unloading on uneven ground, driving into buildings or manoeuvring building material into buildings through windows at great height.

Built to be used off-road
When transporting material off-road its all-wheel drive and full locking differential assure safe driving. When lifting and stacking goods Liebherr machines benefit from their high structural stability while their level compensation system compensates for slants. Furthermore, their intelligent overload warning system constantly informs the operator about the current load carrying situation. In hazardous situations only stabilising movements of the work hydraulics are possible.

When even paper can't get to you

Highly resistant in production and recycling
Paper dust and cellulose are aggressive substances that can cling to and bake onto machine components during transshipment. In order to prevent them from entering the telescope boom one can attach special dirt guards. Furthermore, one can use wax instead of grease to lubricate the boom. Reversible fans allow for the automatic regular or spontaneous cleaning of the cooling elements. It is also recommended to opt for a central lubrication unit that – on Liebherr machines – also lubricates the telescopic head.

Continuously variable hydrostatic drive system
- Jolt-free driving without gear changes
- Virtually zero brake wear thanks to self-contained hydrostatic system
- Precise, rapid and safe manoeuvring

Load moment plus
Liebherr telescopic handlers have a high load capacity at maximum reach and lifting height. With the optional "Load Moment Plus" package the load moment can be increased by up to 25 per cent at fully extended telescope boom.

Telescopic handlers as professional sweeping machines
- Manual control package for pre-selectable drive speeds
- Constant flow rate to adjust sweeping rate
- Hydraulic work circuit 3
- Power outlet to operate a water spray device

Comfort

You don’t just decide to buy a Liebherr product. You invest in productive staff.

Liebherr telescopic handlers are more than just ancillary equipment. Industrial customers use them as multi-functional key machines in single or multi shift operation. This is why we have designed our telescopic handlers around the operator – pursuing the goal of making him get into his machine with a smile on his lips in the morning and leaving it relaxed in the evening.

It's all a question of perspective and overview

Get in the operator's seat ...
Before starting work proper all Liebherr telescopic handlers provide a high level of comfort. Thanks to wide-opening doors and a swivelling steering column operators can enter the large cabin effortlessly.

... adjust ...
Once in the cabin the operator uses a few simple steps to adjust his seat, steering column and armrest to his requirements.

... and be on top of things
Liebherr telescopic handlers always provide perfect views of tires, attachment tools and load. Apart from comfortable standard equipment such as the spherical wide-angle mirrors several camera options provide additional perspectives.

Precisely position and delicately place loads

Unobstructed views
When stacking shelves no cross-beam obstructs the operator's view through the front and roof windows. Positions in his line of sight the ribs of the protective grid and the single-part roof and front wipers allow unobstructed views of the load at all times. The continuously variable sunblinds follow the cabin roof's contour lines, thus increasing headroom.

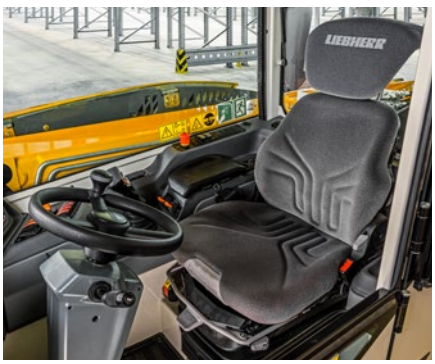
Full control with one hand
Attached to the seat the multi-functional joystick moves with it and controls up to six functions: Changing direction, controlling the telescopic boom, selecting drive speed ranges, work cycle 3 controls, bucket return (optional) and differential lock.

Getting in and out with a smile on your lips

Driving and operating comfort for long jobs
Working with Liebherr telescopic handlers is supposed to be fun – no matter how long the job takes. This is why we place great importance on ergonomics, for example with our newly designed suspended inching / brake pedal or the joystick which is attached to and moves with the operator's seat. The cabin's hydro suspension furthermore filters impacts and bumps. Spacious storage options, cooled storage compartment, stereo as well as built-in USB charging port complete the cabin's comfort equipment.

"Logical" means not overloaded and clearly arranged
The most important machine parameters and other useful information is displayed on the large, TFT colour display. Unambiguous colour coding of drive, work hydraulics, safety and lighting buttons allows for intuitive operation.

Safe placing thanks to fine control
To precisely put down goods to be stacked at great height the operator can activate the fine controls via a toggle switch. This reduces the work hydraulics' speed.



Seating comfort to the power of three
The standard mechanical seat in the new telescopic handlers already provides a high comfort level. The air-sprung or low-frequency sprung seats – both heated – are even more comfortable.

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 highlight of your work day

Why complicated when it can be done in a simple way?
Daily maintenance prior to start-up should never be a tedious duty. After all it's an important factor to ensure your machine's long service life.

Maintenance friendliness is key
All maintenance points on Liebherr telescopic handlers are easy to access. Thanks to their wide opening bonnet daily inspection is done quickly and easily.

We think service

Standstill is not an option
Despite long and predicable service intervals: Service notifications usually surprise customers and interrupt work processes. This is why the entire Liebherr service chain strives to achieve "maximum machine availability". Short response times and fast deliveries are topmost priorities.

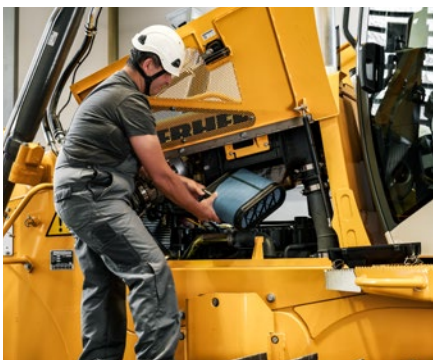
Less effort – lower costs
Thanks to service-oriented machine layouts all maintenance points are always easy to access. This facilitates maintenance as well as installing spare parts and minimises maintenance costs.

Strong service partner

Safe partnership with first-rate service
A dense network of competent Liebherr service partners – from dealerships to own locations – guarantees uninterrupted spare parts supply. The logistics centre in Oberopfingen serves as the central hub to supply customers all over the world. 47,000 m² of space house some 100,000 different earth moving equipment spare parts.

From Oberopfingen to the whole wide world
Mostly automated warehouse technology and picking allow for the dispatch of 1,600 individual orders per day – almost all of them on the same day the order was received. Using "sales order tracking" every delivery can be tracked in real time from shipping to delivery.

Dependable lubrications
The following versions are available to make machine maintenance even easier:
- "Easy Lube" with easy-access lubrication points on the outside
- "Centralised Lube" via three combined points
- "Auto Lube" via an automated central lubrication system



Our most important measuring tool wears an overall
- All Liebherr customer service technicians receive intensive training and further education
- Not only in terms of remote diagnosis and error analysis but most of all on how to provide the right solution for individual machines at the customer's site

30 hectares of spare parts
The Oberopfingen high-bay warehouse is equipped with some 60,000 automated pallet and 33,000 manual storage pitches while the small parts warehouse has 122,000 container pitches. This is where we store spare parts of various weights – from one gram to 40 tonnes.

Technical data

Engine

Deutz Diesel engine	TCD 3.6 L4[1] or TCD 4.1 L4[2] Emissions reglulations EU Stage V or IIIA
Rated power ISO 14396	100 kW, 105 kW / 136 HP at 2,300 rpm[1] 115 kW / 156 HP at 2,300 rpm[2]
Max. torque	500 Nm at 1,600 rpm[1] 609 Nm at 1,600 rpm[2]
Displacement	3.6 l / 220 in³ [1] 4.1 l / 250 in³ [2]
Design	4-cylinder in-line engine, water-cooled, turbocharger, air-to-air aftercooler
Injection system	Electronic common-rail injection
Air filter	Dry air filter with safety cartridge and dust ejector
Cooling system	Hydrostatically powered, thermostatically controlled fan
Operating voltage	12 V
Batteries	12 V / 180 Ah
Alternator	14 V / 150 A
Starter	3.2 kW / 4 HP[1] 4.0 kW / 5 HP[2]

Travel drive

Design	Stepless hydrostatic travel drive with axial piston variable displacement pump and Liebherr hydro motor in a closed circuit, forward and reverse travel achieved by changing the flowdirection of the variable displacement pump
Filter system	Pressure filter for closed circuit
Control	Via electronic accelerator and combined brake-inch pedal, constant adjustment of tractive force at maximum diesel engine speed. Changes of direction can be selected using multifunction joystick
Travel speed	Stepless variable 0 – 40 km/h / 24.7 mph 0 – 30 km/h / 18.6 mph (optional) 0 – 20 km/h / 12.4 mph (optional)

Sound levels

Operator sound expsure ISO 6396:1992	
L_{pA} (at the cab)	79 dB(A)
Exterior sound pressure 2000/14/EC	
L_{WA} (to the environment)	107 dB(A) [1] 108 dB(A) [2]

Brakes

Service brake	Deceleration effective on all four wheels by hydrostatic travel drive, hydrostatically operated wet multiple-disc brakes in the front axle (internal)
Parking brake	Internal hydraulic spring-loaded brakes inside the front axle

Operator's cab

Cab	Resiliently mounted, closed cab with positive pressure ventilation. Integrated ROPS / FOPS structure, tinted safety glass for the single front and roof panel, wind-screen wiper and washing system for front and rear windscreen, steering column inclination adjustable using foot pedal. The upper part of the cabin door can be opened 180° and locked at this possition.
Operator's seat	Cushioned driver's seat, adjustable, with safety belt. Adjustable to suit weight of the driver
Ventilation	3-speed fan with fresh-air intake and filtering, 6 adjusta-ble air nozzles, 2 air outlets on front windscreen, hinged rear window
Heating	Warm-water heating
Vibration emission	
Hand / arm vibrations	< 2.5 m/s², according with ISO 5349-1:2001
Whole-body vibrations	0.19 – 0.71 m/s², complies with technical report ISO/TR 25398:2006
Measuring inaccuracy	According with standard EN 12096:1997

Tyres

Standard tyre equipment	Michelin XMCL 460/70-24 for T 46-7s Michelin XMCL 500/70-24 for T55-7s and T 60-9s
Design	Tubeless tyres on one-piece rims
Special tyre equipment	As specified by manucaturer

Steering

Design	Hydraulic steering of front and rear axles
Types of steering	Steering modes 3 + 1 electronically switchable: – Front wheel steering (for road driving) – Four-wheel steering – Crab steer – 4th steering type is the lockable rear axle in any position

[1] T 46-7s
[2] T 55-7s and T 60-9s

Axels

Drive	All-wheel drive
Front axles	Steering knuckle control, rigid mounting, at 9 m model level adjustment with 5° oscillation
Rear axles	Steering knuckle control, fitted to swing with a 10° oscillation (for T 60-9s: 9° oscillation)
Differential	100 % Slip diferential in the front axle
Transmission	Planetary gear in the wheel hubs

Refill capacities

		T 46-7s	T 55-7s	T 60-9s
Fuel tank	Imp.gal	190/41.8	190/41.8	190/41.8
Cooling system	Imp.gal	18.5/4.1	24/5.3	24/5.3
Engine oil (incl. filter change)	Imp.gal	8.5/1.9	9.5/2.1	9.5/2.1
Hydraulic tank	Imp.gal	160/35.2	160/35.2	160/35.2
Total hydraulics	Imp.gal	230/50.6	230/50.6	260/57.2
Differential gears front	Imp.gal	9.0/2.0	12/2.6	12/2.6
Differential gears rear	Imp.gal	9.0/2.0	13.5/3	13.5/3
Front axle hub, each	Imp.gal	1.0/0.2	2.0/0.4	2.0/0.4
Rear axle hub, each	Imp.gal	1.0/0.2	2.0/0.4	2.0/0.4
Diesel Exhaust Fluid (DEF) tank	Imp.gal	10/2.2	20/4.4	20/4.4

Performance data

		T 46-7s	T 55-7s	T 60-9s
Operating weight with standard forks, with a full fuel tank, minimum configuration, Michelin XMCL (460/70-24) tyres for T 46-7s and T 55-7s Michelin XMCL 500/70 -24 for T 60-9s and without operator	lb	8,995/19,831	10,600/23,369	11,700/25,794
Max. lift capacity	lb	4,600/10,141	5,500/12,125	6,000/13,228
Max. lift height	ft in	7,032/23'1"	7,032/23'1"	8,780/28'10"
Max. forward reach to front carriage	ft in	3,800/12'6"	3,930/12'11"	4,880/16'0"

Hydraulics

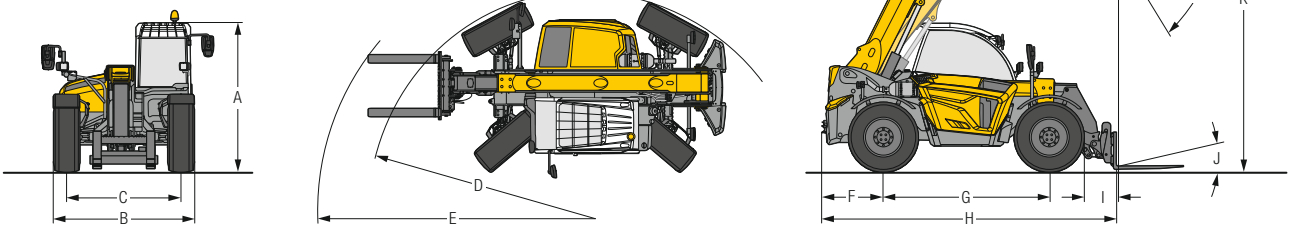
Hydraulic system	Load sensing-pump
Pump flow max.	200 l/min. / 35.2 Imp.gpm at 2,200 rpm (Diesel engine)
Max. operating pressure	240 bar / 3,480 psi
Filter system	Return oil filter and intake filter
Control	Multifunction joystick
Controlled functions	Lift, lower, tipping inwards, tipping outwards, retract, extend, close, open, forwards, backwards “subdivision of 3 speed ranges”
Control valves	Load-control valves on lifting, tilt and telescopic cylinders
End position damping	Lift, lower, tilt, dump and tipping inwards

Cycle times (without load, without end position damping)

		T 46-7s	T 55-7s	T 60-9s
Lifting	sec	5.5	7.0	9.0
Lowering	sec	6.0	6.5	8.4
Extend	sec	4.6	5.2	7.5
Retract	sec	3.8	4.5	6.0
Tilting inwards, full angle	sec	2.9	3.1	3.2
Tilting outwards, full angle	sec	3.2	3.2	3.3

[1] T 46-7s
[2] T 55-7s and T 60-9s

Dimensions



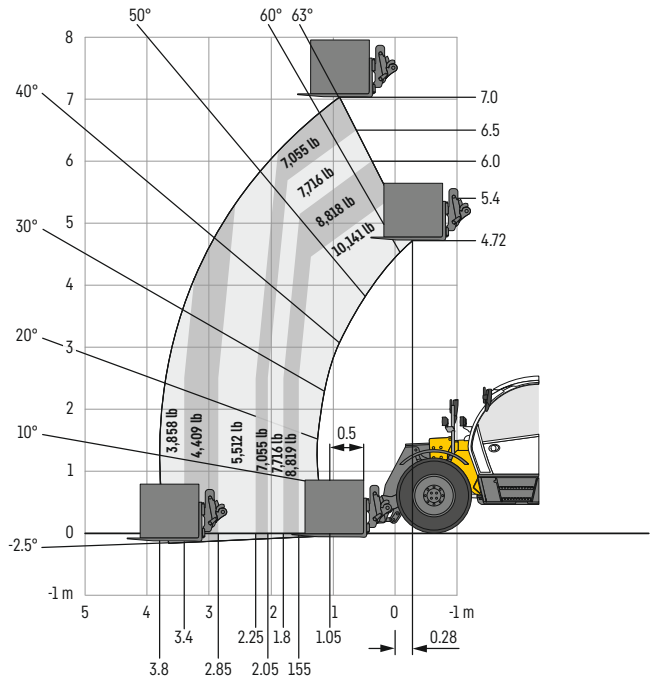
Dimensions (all specifactions with standard tyres, standard fork or standard bucket)

		T 46-7s	T 55-7s	T 60-9s
A Height over cab	ft in	2,590 / 8'6"	2,622 / 8'7"	2,622 / 8'10"
B Overall width over standard tyres	ft in	2,514 / 8'3"	2,521 / 8'3"	2,521 / 8'3"
C Track gauge	ft in	2,040 / 6'8"	2,040 / 6'8"	2,040 / 6'8"
D Outside turning radius over tyres	ft in	3,833 / 12'7"	3,902 / 12'10"	4,090 / 13'5"
E Outside turning radius over forks	ft in	4,706 / 15'6"	4,757 / 15'7"	5,215 / 17'1"
F Rear overhang	ft in	977 / 3'2"	1,019 / 3'4"	1,217 / 4'
G Wheels base	ft in	2,950 / 9'8"	2,950 / 9'8"	3,150 / 10'4"
H Overall lenght to front carriage	ft in	5,145 / 16'11"	5,145 / 16'11"	5,939 / 19'6"
I Reach at max. lifting height with extended telescope and max. tip out angle	ft in	625 / 2'1"	625 / 2'1"	310 / 1'2"
J Max. tip out angle, lower pallet fork		20°	20°	20°
K Dumping height at max. lifting angle of 63° at 7 m and 68° at 9 m with extendet telescope and max. tip out angle	ft in	6,100 / 20'0"	6,100 / 20'0"	7,945 / 26'1"
L Max. tip out angle, standard bucket at max. lifting angle		42°	43,8°	43,8°
M Max. tip out angle, standard bucket at 4 m loading edge		55°	55°	58,5°
Ground clearance (middle of vehicle)	ft in	410 / 1'4"	410 / 1'4"	438 / 1'5"
Max. rotation angle, machine mounting		152°	152°	152°

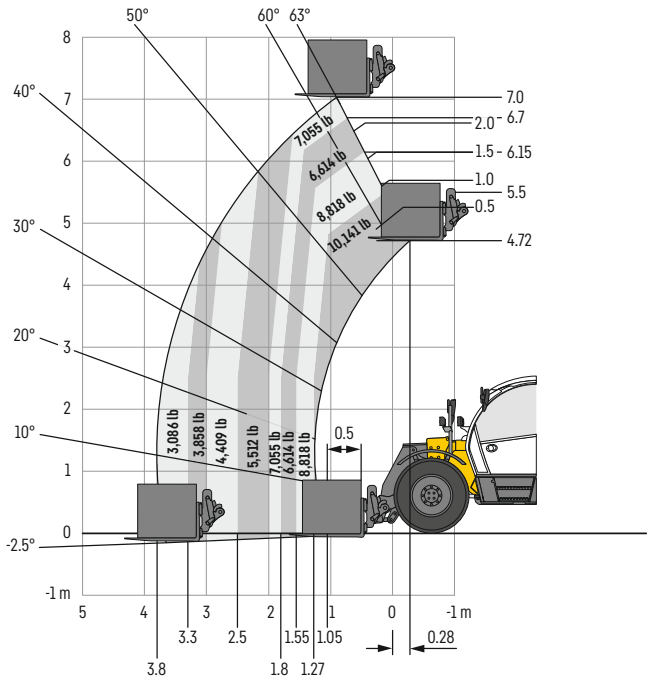
Load charts (acc. to EN 1459)

All specifications with standard quick coupler, load centre 500 mm / 1'8" ft in [1] or 600 mm / 2' ft in [2], standard tyres and standard fork

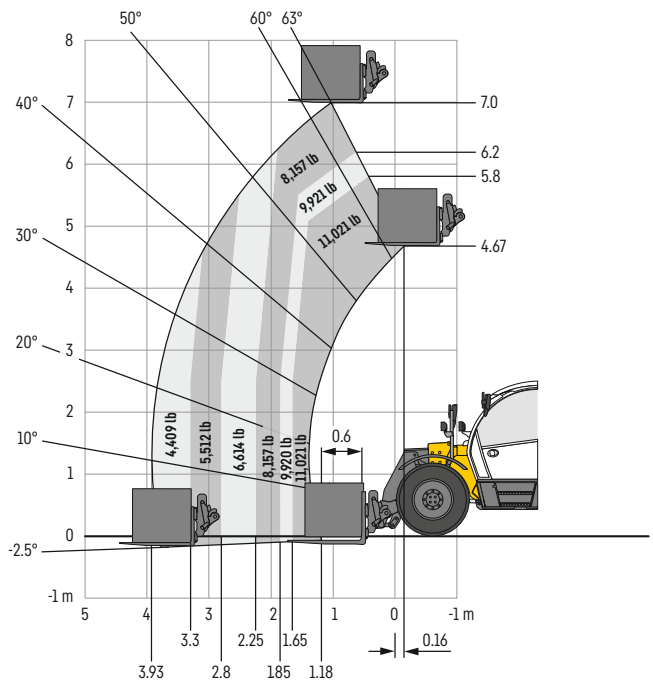
T 46-7s Load Moment Plus



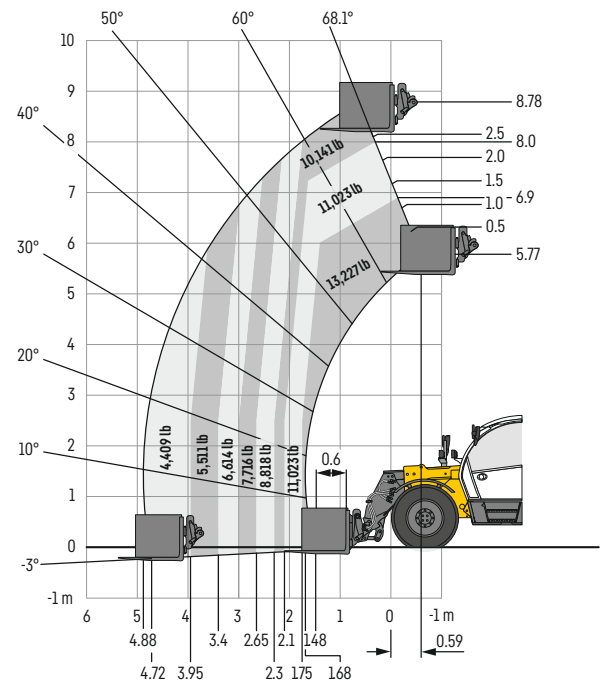
T 46-7s



T 55-7s



T 60-9s

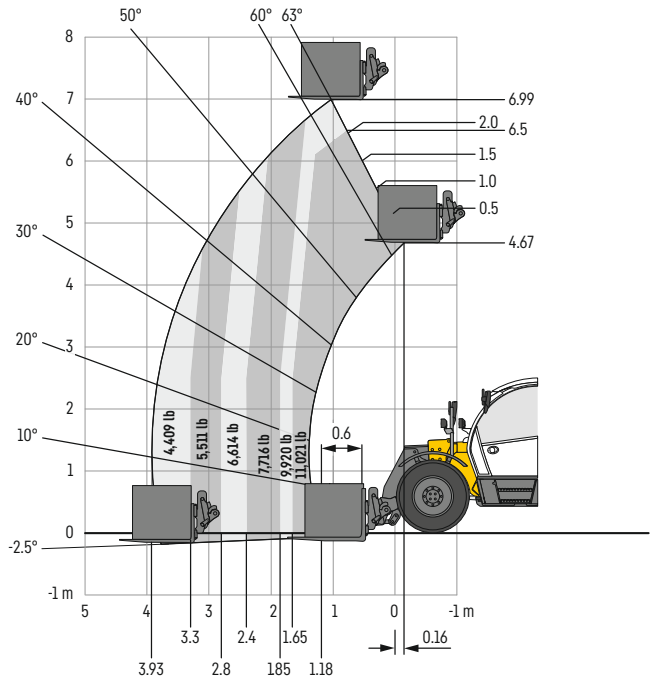


[1] T 46-7s
[2] T 55-7s and T 60-9s

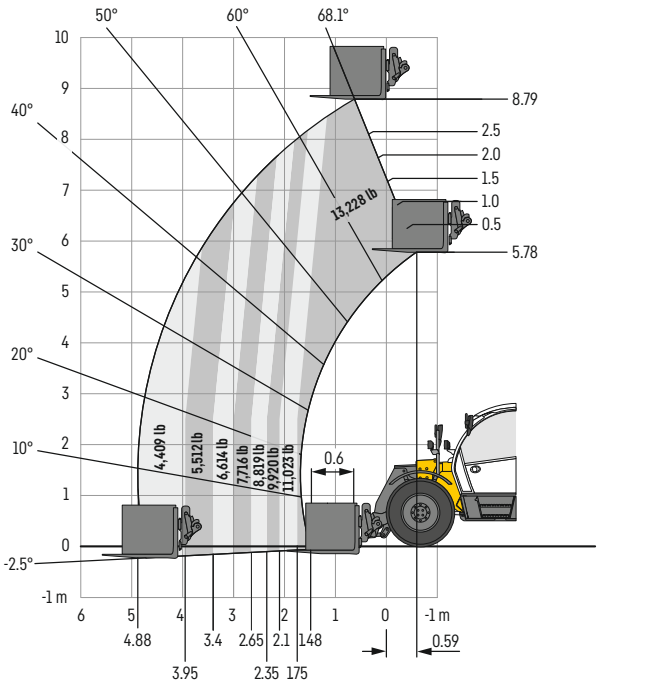
Load charts (acc. to EN 1459)

All specifications with standard quick coupler, load centre 500 mm / 1'8" ft in [1] or 600 mm / 2' ft in [2], standard tyres and standard fork

T 55-7s with pivoting axle lock



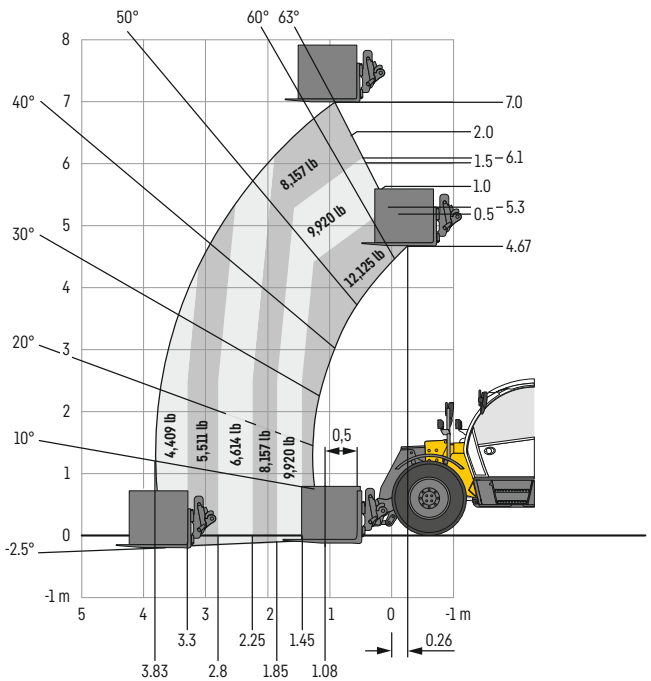
T 60-9s with pivoting axle lock



Comparative load charts T 55-7s

All specifications with standard quick coupler, load centre 500 mm / 1'8" ft, in standard tyres and standard fork

T 55-7s



[1] T 46-7s
[2] T 55-7s and T 60-9s

Equipment

Base machine

	T46-7s	T55-7s	T60-9s
100 % Slip differential in front axle	●	●	●
2 piece telescopic boom	●	●	●
3 + 1 steering modes electronic switchable	●	●	●
7 pin rear plug socket	+	+	+
Armrest multiple adjustable	●	●	●
Auto Hill Assist	●	●	●
Boom guidance on the base frame	●	●	●
Boom suspension – Comfort Drive	+	+	+
Hydraulic fluid level monitor	+	+	+
Illuminated licence plate holder	+	+	+
Inch brake pedal	●	●	●
Level compensation front axle (for 9 m model)	–	–	●
LiDAT – Data transmission system	+	+	+
Load moment plus load increase	+	–	–
Lubrication preparation for Auto-Lube	+	+	+
Lubrication through automatic central lube unit (also in telescopic head) – Auto-Lube	+	+	+
Lubrication through outward extended lubrication points – Easy-Lube	+	+	+
Lubrication through three central points – Centralised-Lube	+	+	+
Main frame and under chassis cover[1)]	+	+	+
Main frame cover	+	+	+
Mirror for the right front area	+	+	+
Mirror with view of towing hitch	+	+	+
Rear floating axle lock hydraulic	–	–	+
Rear floating axle lock mechanical	–	+	+
Rear axle with 10° oscillation angle (for T 60-9s: 9° oscillation angle)	●	●	●
Road-use registration Germany	+	+	+
Special paint	+	+	+
Tool kit	+	+	+
Towing hitch front	+	+	+
Towing hitch rear	●	●	●
Towing hitch with automatic interlock	+	+	+
Wax protection for aggressive media (wax protection on telescopic head and an the unit front)	+	+	+
Wax protection for sea transport	+	+	+
Wide-angle mirror	●	●	●

Hydraulic system

	T46-7s	T55-7s	T60-9s
Autopower Function	+	+	+
Bucket return / vibrating bucket function	+	+	+
Constant flow rate for hydraulic system at telescopic head	+	+	+
Constant flow rate for rear hydraulic system	+	+	+
Dirt deflector on boom	●	●	●
Extension for hydraulic circuit-3 (hydraulic and electric)	+	+	+
Fine tuning for working hydraulics	+	+	+
High flow at the telescopic head	+	+	+
Hydraulic circuit-3 at telescopic head	●	●	●
Hydraulic fluid preheat via external 230 V power supply[1)]	+	+	+
Hydraulic pump, flow rate 200 l/min. / 44 Imp.gpm	●	●	●
Hydraulic system can be deactivated (for road travel)	●	●	●
Leakage oil line[1)]	+	+	+
Preperation for electric on telescopic head	+	+	+
Pressure release for hydraulic system at telescopic head	●	●	●
Rear hydraulics, preparation	+	+	+
Rear hydraulics, single acting	+	+	+
Rear hydraulics, single acting and double acting	+	+	+
Socket on telescopic head	+	+	+
Tipping cylinder lock	+	+	+
Weighing system[1)]	+	+	+

Operator's cab

	T46-7s	T55-7s	T60-9s
12 V power socket	●	●	●
2 part driver's door (upper part can be opened 180°)	●	●	●
Air-conditioner	+	+	+
Coat hook and storage compartments	●	●	●
Color display 3.5"	●	●	●
Color display 7"	+	+	+
Dome light	●	●	●
Halogen drive lighting and working lights (cab front, cab rear and right front, right rear facing)	●	●	●
Heated rear and right screen[1)]	+	+	+
Heater	●	●	●
Interior mirror	+	+	+
Multifunction bracket	+	+	+
Multifunction joystick (mounted directly at operator's seat)	●	●	●
Operator's seat, air-suspended including heated seat and back rest extension	+	+	+
Operator's seat, low frequency air-suspended including heated seat and back rest extension	+	+	+
Operator's seat, manually adjustable with fabric cover and backrest extension	●	●	●
Radio preparation kit	+	+	+
Radio with hands-free system and USB	●	●	●
Steering column inclination adjustable using foot pedal	●	●	●
Steering column with multiple adjustment (height, inclination and steering wheel angle)	+	+	+
Stowage compartment below the seat	●	●	●
Sun visor for roof and front window	+	+	+
USB charging socket (2 outlet)	●	●	●
Windshield wiper and washer system right side window	+	+	+
Windshield wipers and washer system front and roof with intermittent function	●	●	●
Windshield wipers and washer system, rear	●	●	●
Working lights directed onto towing hitch (Halogen or LED)	+	+	+
Working lights directed to the left and right (LED)	+	+	+
Working lights on boom (Halogen or LED)	+	+	+
Working lights on the cab, front (LED)	+	+	+
Working lights on the cab, rear (LED)	+	+	+

Tyres

	T46-7s	T55-7s	T60-9s
Alliance A580 – 460 / 70 R 24	+	+	–
Alliance A580 – 500 / 70 R 24	+	+	–
Alliance Multiuse 500/70 R 24[1)]	+	+	+
Camso MPT 793S 375/85-R 24 solid tyres	+	+	+
Firestone Duraforce-Utility – 460 / 70 R 24	+	–	–
Firestone Duraforce-Utility – 500/70 R 24[1)]	+	–	–
Michelin BibLoad – 500 / 70 R 24[1)]	+	+	+
Michelin BibLoad foamed – 460/70 R 24	+	+	+
Michelin PowerCL 440/80 R 24[1)]	+	+	+
Michelin XMCL – 460 / 70 R 24	●	+	–
Michelin XMCL – 500 / 70 R 24	+	●	●

● = Standard
+ = Option
1) available track shoes on demand at your dealer

Equipment

Safety	T46-7s	T55-7s	T60-9s
Angle display on the boom	+	+	+
Anti-theft protection CESAR (Construction Equipment Security and Registration)	+	+	+
Anti-theft protection via ignition key[1)]	+	+	+
Back-up alarm, acoustic	●	●	●
Emergency exit via the rear window	●	●	●
Emergency package (first aid kit, warning vest and warning triangle)	+	+	+
Emergency stop	●	●	●
End position damping for lifting, lowering, tilting, dumping and tipping inwards	●	●	●
Fire extinguisher 2 kg / 4 lb	+	+	+
Hazard warning lights	●	●	●
Level indicator via spirit level	●	●	●
Lifting cylinder support (for maintenance work)	+	+	+
Overload warning system with acoustiv and visual signal incompliance with EN 15000	●	●	●
Protective grille for front windscreen	+	+	+
Protective grille for top windscreen	●	●	●
Rear view and side view camera	+	+	+
Rear view camera	+	+	+
ROPS / FOPS integrated	●	●	●
Rotating beacon yellow foldable (halogen or LED)	+	+	+
Wheel chock (1x)	+	+	+
Wheel chock (2x)	+	+	+

Travel drive	T46-7s	T55-7s	T60-9s
Air filter with automatic dust ejector	+	–	–
Deactivation of all wheel drive (only for 40 km/h version)[1)]	–	+	+
Emission stage IIIA/Tier 3	+	+	+
Emission stage V	●	●	●
Fan drive hydrostatic, stepless	●	●	●
Fan drive, reversible	+	+	+
Four-wheel drive, permanent	●	●	●
Manual control pack for engine and drive speed	+	+	+
Travel drive, hydrostatic	●	●	●
Travel drive: 20 km/h / 12.4 mph / 100 kW / 82 kN / 18,428 lbf drawbar pull[1)]	+	–	–
Travel drive: 20 km/h / 12.4 mph / 115 kW / 103 kN / 23,147 lbf drawbar pull[1)]	–	+	+
Travel drive: 30 km/h / 18.6 mph / 100 kW / 82 kN / 18,428 lbf drawbar pull[1)]	+	–	–
Travel drive: 30 km/h / 18.6 mph / 115 kW / 103 kN / 23,147 lbf drawbar pull[1)]	–	+	+
Travel drive: 40 km/h / 24.7 mph / 100 kW / 62 kN / 13,933 lbf drawbar pull	●	–	–
Travel drive: 40 km/h / 24.7 mph / 115 kW / 77 kN / 17,304 lbf drawbar pull	–	●	●

Attachments	T46-7s	T55-7s	T60-9s
Hydraulic quick coupler, JCB Q-Fit	+	+	+
Hydraulic quick coupler, Liebherr	+	+	+
Hydraulic quick coupler, Manitou	+	+	+
Hydraulic quick coupler, Scorpion	+	+	+
Mechanical quick coupler, Manitou	+	+	+
Mechanical quick coupler, Scorpion	●	●	●
Universal mounting plate for Scorpion	+	+	+

● = Standard
+ = Option
1) available track shoes on demand at your dealer

Options and/or special attachments, supplied by vendors other than Liebherr, are only to be installed with the knowledge and approval of Liebherr in order to retain warranty.

⚠ WARNING

Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.
- Always start and operate the engine in a well-ventilated area.
- If in an enclosed area, vent the exhaust to the outside.
- Do not modify or tamper with exhaust system.
- Do not idle the engine except as necessary.

For more information go to www.P65warnings.ca.gov/diesel.

⚠ WARNING

This product can expose you to chemicals including lead and lead compounds, which are known to the State of California to cause cancer and birth defects or other reproductive harm.
For more information go to www.P65warnings.ca.gov.

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2 Safety guidelines, signs

Working with the machine is dangerous. Serious or fatal injuries can happen to you, the operator, the driver or maintenance staff. If you regularly read and observe the various safety instructions, you can prevent dangers and accidents.

This applies especially for personnel who are working only intermittently on the machine, such as for set up or maintenance, etc.

The following information comprises safety instructions which, if followed conscientiously, will guarantee your safety and that of other persons, as well as avoid damage to the machine.

The required safety precautions are described in this manual when describing work, which can pose a danger for man or machine.

2.1 Designation of safety advice

 G058646_1	This is a warning sign. Warns of possible danger of injury. Follow all measures, which are marked with this warning sign to avoid injuries or death.

The warning sign always appears in connection with the signal words:

DANGER
WARNING
CAUTION

 G058646_1	**DANGER**	Designates an immediate dangerous situation which will lead to death or serious injury if it is not prevented.
 G058646_1	**WARNING**	Indicates a dangerous situation which could result in death or serious injury if it is not prevented.
 G058646_1	**CAUTION**	Designates a dangerous situation which could lead to slight or medium-grade injuries if it is not prevented.
	NOTICE	Indicates a dangerous situation which could result in material damage if it is not prevented.

2.1.1 Additional rules and guidelines

Following these notes does not relieve you of responsibility for following additional rules and guidelines!

Also to be noted are:

- The safety regulations that apply at the job site
- Statutory „road traffic regulations“
- The guidelines provided by professional associations

2.2 Proper use

2.2.1 Laws, rules, guidelines and safety regulations

To ensure safe operation:

- Ask the supervisor about the safety regulations at the job site.
- Observe safety regulations at the job site.
- Observe the road traffic regulations.
- Observe the applicable insurer guidelines (e.g. German Employers' Liability Insurance Association, accident insurance, ...).
- Avoid questionable working methods.
- Observe all intervals specified in this operator's manual for recurring and one-off tests and inspections.

2.2.2 Intended use

The telescopic handler is an all-terrain industrial truck with variable reach for operation on unsurfaced ground and damaged ground (for example on construction sites).

A telescopic handler is used with the aid of working tools for handling different loads (transporting, lifting and depositing loads, as well as moving loads on unsurfaced ground).

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

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

To ensure proper use:

- Observe operator's manual.
- Observe maintenance manual.
- Observe maintenance intervals.
- Observe specifications in the technical data.
- Attach working tool for work (for example, forklift).
- Only lift loads with prescribed, attached and functional safety devices.
- The operator's manual contains generally applicable, generally observable safety instructions and safety regulations and those which must be complied with.
- The operator's manual explains the meaning of symbols and pictograms used in the signage associated with the machine.
- The operator's manual provides information about the required protective equipment and about the requirements that apply to the operating and maintenance staff.
- The operator's manual shows the location of the machine's safety devices and safety equipment.
- The operator's manual provides information about hazards and residual risks which may also occur if the machine is used as intended.

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

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

LWT/93517630/09/01/12/2023/en

2.2.3 Foreseeable misuse

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

The manufacturer is not liable for damage caused by misuse.

Misuse of the telescopic handler includes:

- Transport of persons
- Lifting persons up
- Installation and operation of working platforms
- Stacking and unstacking on slopes
- Processing of flexible intermediate bulk containers carried under the forks of the telescopic handler
- Stepping on the raised fork arms
- Exceeding the maximum load capacity
- Increasing the load capacity, for example by adding an additional weight
- Non-use of personal protective equipment (PPE)
- Improper exiting of the telescopic handler
- Operating the telescopic handler although the operator is not in the operator's seat.
- Use of attachment parts and attachments made by other manufacturers or such attachment parts and attachments which have not been approved by Liebherr for installation or attachment.
- Unauthorised modifications to the telescopic handler
- Use in bodies of waters or flooded areas
- Transport of liquids in the bucket
- Exceeding the permissible technical total weight or the technically permissible axle load
- Use in firetraps or potentially explosive areas
- Use in forestry operations
- Use with hazardous substances
- Use in sprayers or spray application
- Use in conjunction with harmful substances
- Towing with the telescopic handler

The listing is only an example and is not necessarily 100% complete.

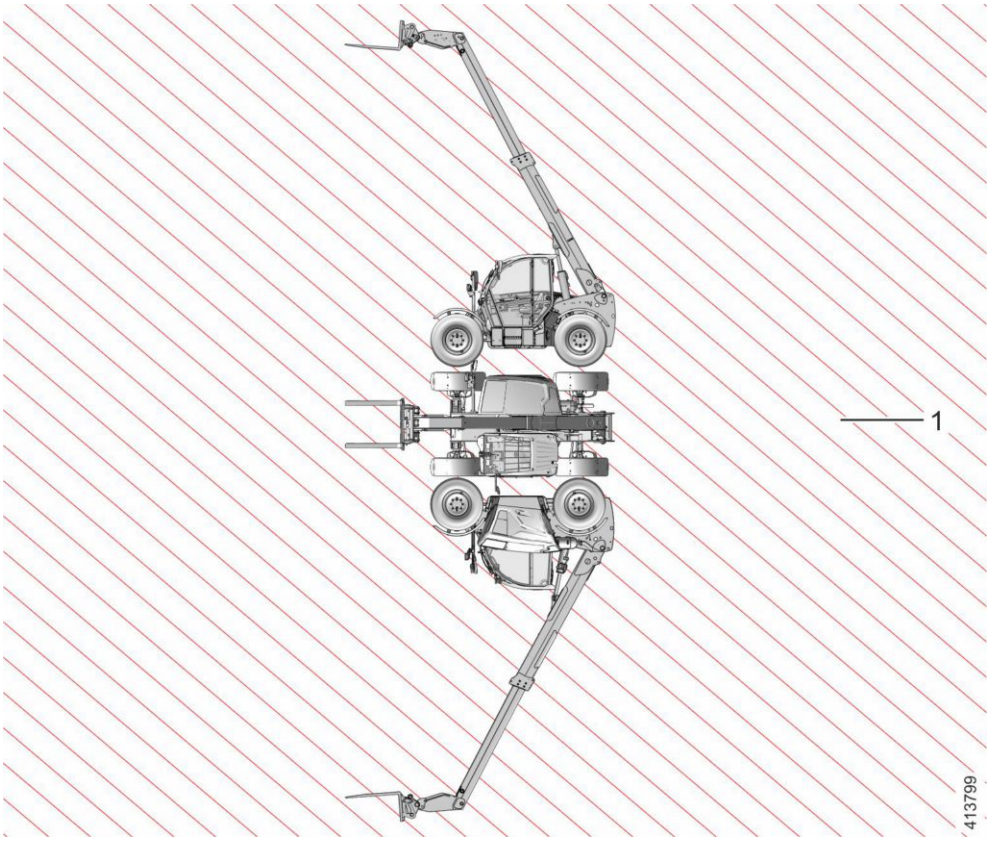
2.2.4 Hazard zone of the machine

Hazard zone is the area around the telescopic handler in which persons can be reached by working movements of the telescopic handler, its working equipment and working tools, or by a swinging load, by a falling load or by any falling work equipment.

The following factors influence the size of the hazard zone:

- Travel speed and movements of the telescopic handler
- Fitted working attachment
- Type of load
- Falling load
- Tilting movement of the telescopic handler
- Tilting movement of the working attachment

LWT/93517630/09/01/12/2023/en



Hazard zone of the machine

1 Hazard zone

Make sure that there are no persons within the hazard zone **1** of the telescopic handler.

The operator may only carry out work with the telescopic handler 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.

2.2.5 Operating conditions

Operating conditions

Temperature range (ambient temperature)	-20 °C (-4.0 °F) to 45 °C (113.0 °F)

LWT/93517630/09/01/12/2023/en

2.2.5.1 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 windows.
- Turn diesel engine off.
- Set starting switch to **0**.
- Make sure there is nobody in the area around machine.

Lightning strike

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

Contact with high voltage wiring

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

2.2.5.2 Damage

Improper operation if operating conditions deviate from the intended use

- Equip machine according to the operating conditions.

The following operating conditions deviate from the intended use:

- Dust-intensive applications
- Contaminated areas
- Lower or higher ambient temperatures

Improper operation in a corrosive environment or with corrosive material

- Clean machine regularly to remove corrosive substances (such as salt, phosphates, fertilizers).
- If necessary, treat metallic surfaces with preservative wax.
- Derust, prime and repaint damaged and corroded steel parts.
- Ensure that piston rods of hydraulic cylinders are completely covered with a film of oil.
- If piston rods are not completely covered with a film of oil: retract and extend piston rods across the entire stroke.
- If it is not possible to retract and extend the piston rods across the entire stroke: clean and preserve the piston rods.

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2.2.6 Disposal

If the end of the useful life of the machine, or components thereof, is reached and they are transferred for scrapping, the components must be disposed of properly. In this regard, the regulations stipulated by the competent local authorities must be observed.

The fuel and operating fluids in the machine require special disposal and must not be released into the environment.

2.2.6.1 Danger to life

Impermissible disposal of gas containers and pressurised containers

- Completely relieve the pressurised container of pressure prior to disposal.
- Empty pressurised containers properly prior to disposal.
- Observe the safety instructions of the pressurised container manufacturer.

Impermissible disposal of refrigerant

- Have refrigerant disposed of by a refrigerant recycling point.
- Observe the safety data sheet for the refrigerant during disposal.

2.2.6.2 Environmental pollution

Impermissible disposal of the machine

- Ensure that the individual components of the machine are disposed of properly at the end of their useful life.
- Dispose of machine components in accordance with the applicable country-specific waste disposal guidelines and applicable laws.
- Remove fuel and operating fluids and lubricants from all components prior to disposal.
- Collect and store fuel and operating fluids and lubricants in suitable containers prior to disposal.
- When disposing of fuel and operating fluids and lubricants, observe the instructions of the respective manufacturer.
- Have fuel and operating fluids and lubricants disposed of by a used oil recycling point.
- Have metal parts disposed of by a metal recycling point.
- Have plastics disposed of by a plastic recycling point.
- Have rubber disposed of by a rubber recycling point.
- Have electronic components disposed of by an electronics recycling point.

2.3 Description of personnel

2.3.1 Personal protective equipment

Operators, assistants and maintenance staff are responsible for the following:

- Wearing of personal protective equipment
- Regular cleaning and care of protective equipment
- Immediate replacement of damaged parts of the protective equipment

The personal protective equipment consists of the following components:

- Hard hat
- Safety glasses

LWT/93517630/09/01/12/2023/en

- Hearing protection
- Breathing mask
- Protective gloves
- Warning apparel (reflective, in signal colour)
- Safety shoes
- Special protective clothing:
  - Against burns
  - Against reductions of body temperature
  - Against itching
  - Against needlestick and cutting injuries

2.3.2 Requirements for personnel

- Ensure that only authorised and trained persons operate, maintain or repair the machine.
- Ensure that all persons who operate, maintain or repair the machine are of the prescribed minimum age.
- Ensure that the training for personnel includes theoretical information (technique and safety) and practical training on the machine.
- Ensure that the personnel have read and understood the operator's manual and the other documentation supplied.
- Ensure that any person either still to be trained or already in training to operate or work on the machine is always under the constant supervision and guidance of an experienced instructor or operator.
- Regularly check that personnel are working in a safety-conscious and risk-aware manner.
- Clearly define the responsibilities of personnel for operation, setup, maintenance and repair.

2.3.3 Operator

2.3.3.1 Responsibility

The operating company has the following duties:

- Ensure that only trained personnel operate the machine.
- Ensure that only trained personnel maintain the machine.
- Check the qualifications of the persons working with the machine.
- Authorise the activities of the persons working with the machine.
- Determine the competencies and responsibilities of all persons working with the machine.
- Ensure the following personnel are under constant supervision of an experienced person:
  - Personnel to be trained
  - Personnel to be taught
  - Personnel to be instructed
  - Personnel in general training
- Make the requisite protective equipment available to all persons working with the machine.
- Check that personnel are working in a safety-conscious manner at regular intervals.
- Check that personnel are working in a risk-aware manner at regular intervals.
- Ensure that the machine is operated in perfect, safe condition.
- If defects which affect safety occur: take the machine out of operation immediately.
- Carry out inspections of the machine prescribed by Liebherr in accordance with the inspection intervals.
- Carry out nationally prescribed inspections of the machine in accordance with the inspection intervals.
- Observe national legal requirements for the provision of machines and tools by the employer (hazard assessment and risk assessment by the operating company).

LWT/93517630/09/01/12/2023/en

- Report every accident involving the machine to Liebherr:
  - With serious injuries
  - With significant property damage
- Allow Liebherr personnel to have unrestricted access to the machine in connection with the product monitoring obligation.
- Create an operational plan for the machine.
- Clearly define the responsibility of personnel (for operation, setup, maintenance and repair).
- Ensure that no modifications are carried out on the machine without prior consultation with the manufacturer.
- Use only original Liebherr spare parts.

2.3.4 Operator

2.3.4.1 Responsibility

The operator has the following duties:

- Read operator's manual.
- Read other documentation supplied:
  - Operator's manuals for the components
  - Operator's manuals of third-party manufacturers
  - Additional manuals
- Wear personal protective equipment.
- Operate machine in accordance with intended use.
- Avoid questionable working methods.
- Observe safety regulations at the job site.
- Report all safety-impacting changes to the machine to the operating company.
- If a safe manner of working is no longer possible: stop operating machine immediately.
- Modifications to machine may only be carried out after prior consultation with manufacturer.
- Use only original Liebherr spare parts.

2.3.4.2 Requirement

The operator possesses following skills and qualifications:

- Has reached the minimum age prescribed by law.
- Is physically and mentally capable of operating the machine safely:
  - Sufficient vision
  - Sufficient hearing
  - Short reaction time
- Has the requisite authorisation to operate the machine.
- Is able to estimate distance, height and clearances.
- Knows all escape routes in the event of an emergency.
- Does not have any physical or mental impairment that impinges upon any of the stated requirements (e.g. alcohol, drugs, medication).

The operator has the requisite training (theoretical and practical) for the following:

- Working with the machine type
- Attaching
- Instructing
- Handling fire extinguishing equipment

LWT/93517630/09/01/12/2023/en

2.3.5 Maintenance staff

2.3.5.1 Responsibility

Maintenance staff have following duties:

- Read operator's manual.
- Read other documentation supplied:
  - Operator's manuals for the components
  - Operator's manuals of third-party manufacturers
  - Additional manuals
- Maintain machine to ensure safe and reliable function.
- Perform all prescribed maintenance tasks.
- Observe safety regulations at the job site.
- Report all safety-impacting changes to the machine to the operating company.
- Modifications to machine may only be carried out after prior consultation with manufacturer.
- Use only original Liebherr spare parts.

2.3.5.2 Requirement

Maintenance staff possess following skills and qualifications:

- Has reached the minimum age prescribed by law.
- Is physically and mentally capable of maintaining the machine:
  - Sufficient vision
  - Sufficient hearing
  - Short reaction time
- Has requisite authorisation to maintain the machine.
- Is able to estimate distance, height and clearances.
- Has knowledge of the machine and the hazards.
- Knows all procedures and precautions pertaining to maintenance.
- Is aware of how to handle special tools for maintenance and repair.
- Does not have any physical or mental impairment that impinges upon any of the stated requirements (e.g. alcohol, drugs, medication).

2.3.6 Person attaching loads

2.3.6.1 Responsibility

The person attaching loads has the following duties:

- Wear personal protective equipment.
- Select proper and intact slinging gear.
- Attach slinging gear to the load or load lifting equipment properly.
- Remove slinging gear from load or load lifting equipment properly.
- Grant approval for movement or accompaniment.

LWT/93517630/09/01/12/2023/en

2.3.6.2 Requirement

The person attaching the loads possesses the following skills and qualifications:

- Has reached the minimum age prescribed by law.
- Is physically and mentally capable of attaching loads:
  - Sufficient vision
  - Sufficient hearing
  - Short reaction time
- Has the requisite authorisation to attach loads.
- Is able to estimate distance, height and clearances.
- Is able to estimate mass distribution and load distribution.
- Is able to operate radios.
- Is able to give clear instructions on radios.
- Is able to guide a load.
- Does not have any physical or mental impairment that impinges upon any of the stated requirements (e.g. alcohol, drugs, medication).

The person attaching the loads has the requisite training (theoretical and practical) for the following:

- Selection of the appropriate slinging gear
- Attachment of slinging gear
- Securing against the unintentional removal of slinging gear
- Prevention of damage to slinging gear
- Instructing
- Use of all requisite signals

2.3.7 Guide

2.3.7.1 Responsibility

The guide has the following duties:

- Wear personal protective equipment.
- Forwards signals from the person attaching the loads to the operator.
- If the guide is the only person for this: give instructions to the operator.

2.3.7.2 Requirement

The guide possesses the following skills and qualifications:

- Has reached the minimum age prescribed by law.
- Is physically and mentally capable of instructing persons:
  - Sufficient vision
  - Sufficient hearing
  - Short reaction time
- Has the requisite authorisation to give signals.
- Is able to estimate distance, height and clearances.
- Is able to operate radios.
- Is able to give clear instructions on radios.
- Is able to guide a load.

LWT/93517630/09/01/12/2023/en

- Is able to ensure safe movement of load and machine.
- Does not have any physical or mental impairment that impinges upon any of the stated requirements (e.g. alcohol, drugs, medication).

The guide has the requisite training (theoretical and practical) for the following:

- Instructing
- Use of all requisite signals

2.4 Signs on the machine

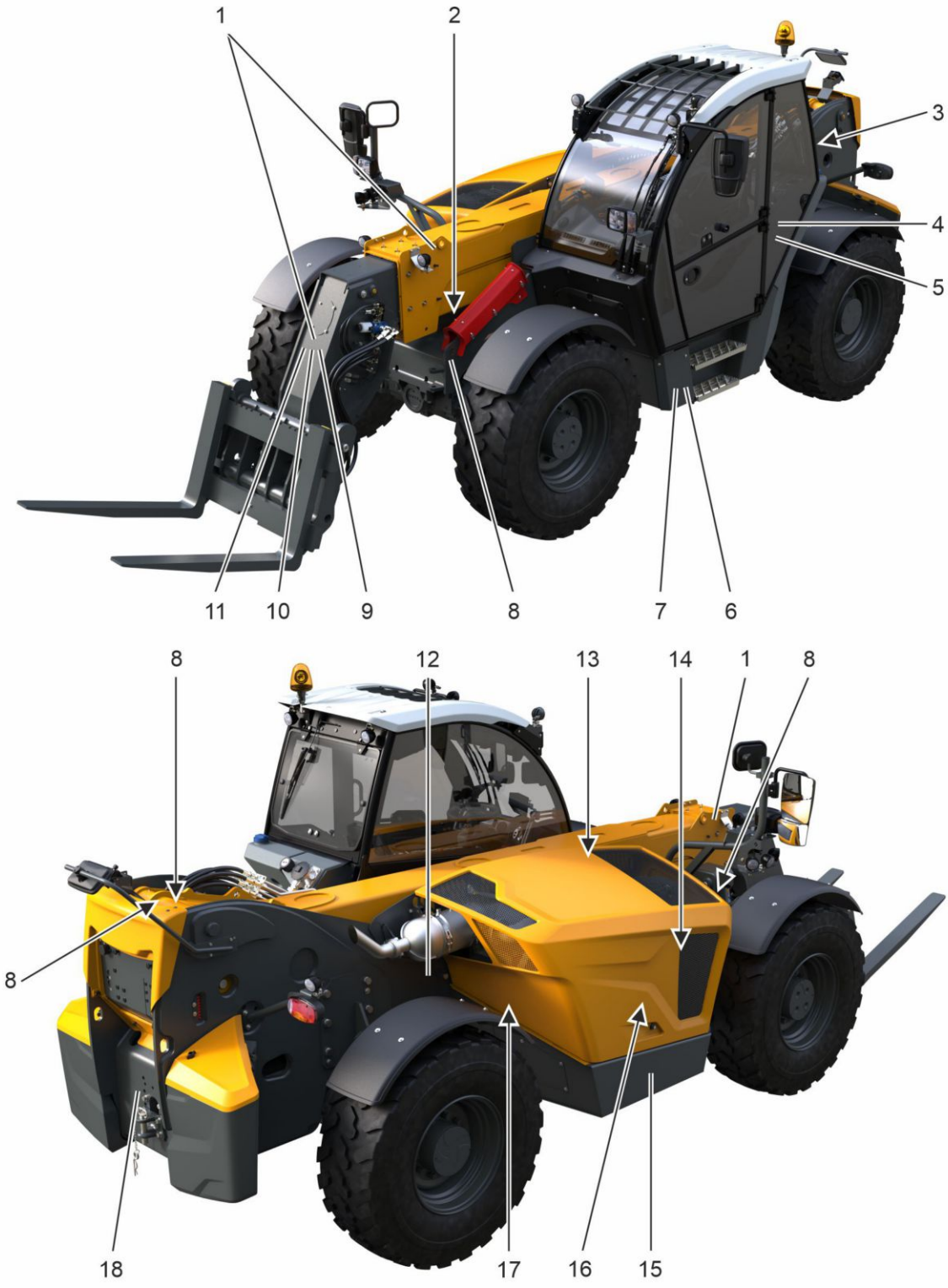
The machine displays the following types of signs:

- Safety signs
- Information signs
- Identification plates

The item codes are noted in the spare parts list.

LWT/93517630/09/01/12/2023/en

2.4.1 Warning signs on the machine



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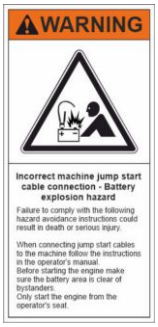
Arrangement of warning signs on the machine

LWT/93517630/09/01/12/2023/en

	Sign	Meaning
1		**Raised machine components or load** Warns of risk of accidents potentially resulting in death or very severe injuries. **Maintain a safe distance to the hazard zone below raised machine components or a load.** **When performing maintenance or repair work, or when parking the machine, always lower raised machine components or loads to the ground before doing so.**
2		**Work under raised telescopic sections** Warns of risk of accidents potentially resulting in death or very severe injuries. **Secure the lift cylinder with the lift cylinder locking device before entering the hazard zone.**
3		**Reservoir pressure** The reservoir contains oil and/or gas under pressure. Warns of risk of accidents potentially resulting in death or very severe injuries. **Have the pressure accumulators removed or repaired by a Liebherr dealer.**
4		**Lead exposure** Warns of danger of exposure to chemical substances.
5		**Exhaust emissions** Warns of danger of exposure to chemical substances.
6		**Incorrect connection of jump-start cable** Warns of risk of accidents potentially resulting in death or very severe injuries. **Follow the instructions in the operator's manual when connecting the jump-start cable.** **Before starting the diesel engine, make sure that no persons are in the vicinity of the battery.**
7		**Machine rolling away** Warns of risk of accidents potentially resulting in death or very severe injuries. **Before uncoupling or parking the machine, secure the machine against unintended rolling away with wheel chocks or other suitable safety devices.**

LWT/93517630/09/01/12/2023/en

	Sign	Meaning
8		**Slinging / lifting point** Warns of risk of accidents potentially resulting in death or very severe injuries. **Only use the marked lifting points to lift the machine. Maintain a safe distance to the hazard zone below the raised machine.**
9		**Falling working tools** Warns of risk of accidents potentially resulting in death or very severe injuries. **Always make sure the working tool lock is engaged.**
10		**Passenger transport** Warns of risk of accidents potentially resulting in death or very severe injuries. **Never work from or allow riders on the telescopic arm or its attachments.**
11		**Falling loads** Warns of risk of accidents potentially resulting in death or very severe injuries. **Only use the telescopic handler for handling round bales if it is equipped with an approved round bale handling attachment.** **Handle raised loads with caution. Transport loads at a low height.**
12		**Risk of burns** Warns of risk of accidents potentially resulting in death or very severe injuries. **Keep a safe distance away from hot surfaces. Avoid contact with hot surfaces.**

LWT/93517630/09/01/12/2023/en

	Sign	Meaning
13		**Coolant** Warns of risk of accidents potentially resulting in death or very severe injuries. **Before removing the filler cap, wait for the cooling system to cool down. Always remove the filler cap with extreme care. Follow the procedure in the operator's manual.**
14		**Rotating fan** Warns of risk of accidents potentially resulting in death or very severe injuries. **Never reach into the fan area where machine components are in motion.**
15		**Leaving the operator's cab** Warns of risk of accidents potentially resulting in death or very severe injuries. **Before leaving the operator's cab, always apply the parking brake, stop the diesel engine and remove the ignition key.**
16		**Belt drive** Warns of risk of accidents potentially resulting in death or very severe injuries. **Never reach into a belt drive in motion. Do not reach behind or remove the guard while the diesel engine is running.**
17		**Running over by the machine** Warns of risk of accidents potentially resulting in death or very severe injuries. **Only start the diesel engine from the operator's seat and with the transmission in park or neutral.** **Never combine or short circuit the terminals of the starter solenoid.**

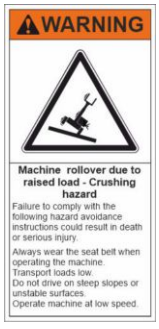
	Sign	Meaning
18		**Accident prevention** Warns of risk of accidents potentially resulting in death or very severe injuries. **Before operating the machine, read and follow the safety and operating instructions in this operator's manual.**

LWT/93517630/09/01/12/2023/en

2.4.2 Safety signs in the operator's cab

0009813-01

Location of safety signs in the operator's cab

	Sign	Meaning
1		**Safety belt** This machine is equipped with a rollover protective system. The safety belt is a part of this protective system. Warns of risk of accidents potentially resulting in death or very severe injuries. **Always wear the safety belt when operating the machine. Always securely fasten the safety belt. Never wear a safety belt loosely or with slack in the belt system.**
2		**Lead exposure** Warns of danger of exposure to chemical substances.
3		**Oil pressure** Warns of risk of accidents potentially resulting in death or very severe injuries. **Avoid contact with fluid escaping under pressure.Have leakage repair performed by a Liebherr dealer.**
4		**Leaving the operator's cab** Warns of risk of accidents potentially resulting in death or very severe injuries. **Before leaving the operator's cab, always apply the parking brake, stop the diesel engine and remove the ignition key.**
5		**Tipping hazard** Warns of risk of accidents potentially resulting in death or very severe injuries. **Always wear the safety belt when operating the machine. Do not drive on steep drop-offs or unstable surfaces. Operate the machine at low speed.**

LWT/93517630/09/01/12/2023/en

	Sign	Meaning
6		**Towing a trailer** The machine can exceed the maximum permissible transport speed of the towed trailer. Exceeding the maximum permissible transport speed of the towed trailer will result in reduced braking effect and reduced vehicle train stability. Warns of risk of accidents potentially resulting in death or very severe injuries. **Do not exceed the maximum permissible transport speed of the towed trailer.** **If the trailer manufacturer does not specify the maximum permissible transport speed, do not exceed the maximum permissible transport speed and towing weight of the machine.** **Do not operate towed trailers without a service brake if the trailer weight exceeds the maximum permissible towing weight of the machine.** **Do not operate towed trailers without a parking brake if the trailer weight exceeds the maximum permissible towing weight of the machine.** **Adhere to the maximum permissible transport speeds and towing weights of the machine listed in the chapter «Technical data» in this operator's manual.**
7		**Falling working tools** Warns of risk of accidents potentially resulting in death or very severe injuries. **Always make sure the working tool lock is engaged.**
8		**Falling loads** Warns of risk of accidents potentially resulting in death or very severe injuries. **Only use the telescopic handler for handling round bales if it is equipped with an approved round bale handling attachment.** **Handle raised loads with caution. Transport loads at a low height.**

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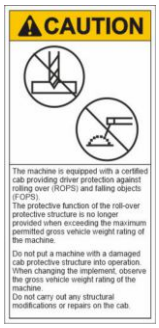
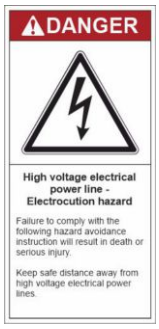
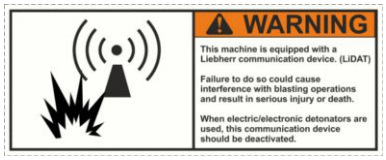
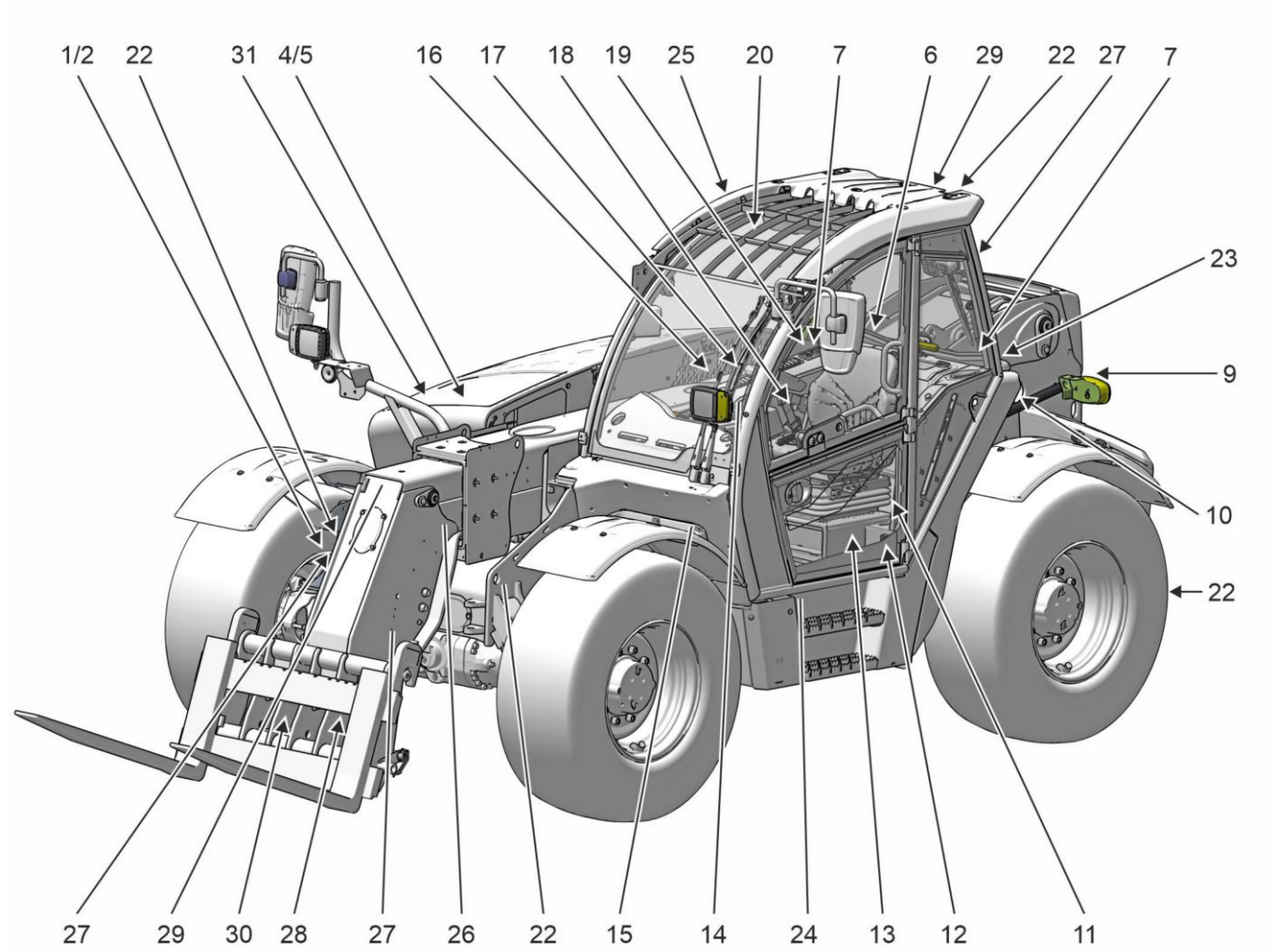
	Sign	Meaning
9		**ROPS and FOPS** The machine is equipped with a certified operator's cab, which provides roll-over (ROPS) and falling objects (FOPS) protection for the operator. The protective function of roll-over protection is no longer ensured if the maximum permissible total weight of machine is exceeded. – **Do not put a machine with a damaged cab protective structure into operation.** – **When changing the working attachment, observe the permissible total weight of the machine.** – **Do not carry out any structural modifications or repair the operator's cab.**
10		**Electric shock** Warns of risk of accidents potentially resulting in death or very severe injuries. **Keep a safe distance away from high voltage electrical power lines.**
11		**Accident prevention** Warns of risk of accidents potentially resulting in death or very severe injuries. **Before operating the machine, read and follow the safety and operating instructions in this operator's manual.**
12		**Exhaust emissions** Warns of danger of exposure to chemical substances.
13		**LiDAT** Warns of risk of accidents potentially resulting in death or very severe injuries. **Maintain the legally specified safety clearance for blasting work. Deactivate LiDAT when performing blasting work with electric detonators.**

LWT/93517630/09/01/12/2023/en

2.4.3 Information signs

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

2.4.3.1 Location of information signs



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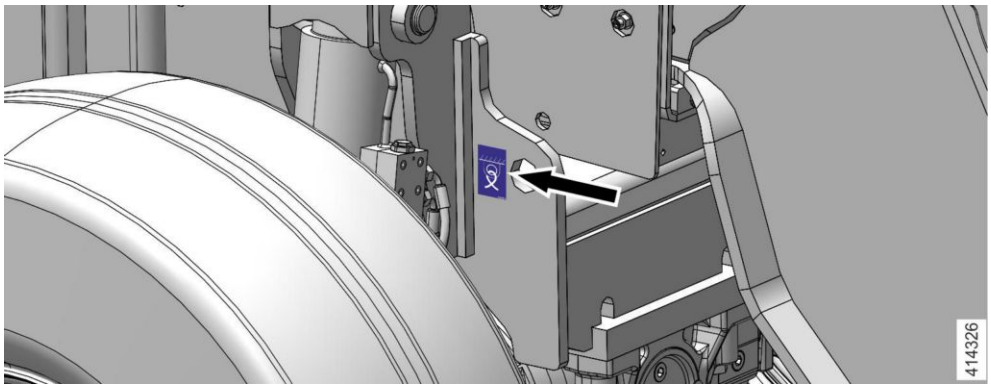
Location of information signs

1	«Rigging point» sign	**17**	«Control lever» sign
2	«Slinging / lifting point» sign	**18**	«Gradual travel device and manual throttle» sign[6]
4	Coolant «sign»	**19**	«Rear hydraulics» sign[6]
5	«Windscreen washer fluid» sign	**20**	«Working headlights» sign[6]
6	«Noise protection» sign	**22**	«Recovery point» sign
7	«Emergency exit» sign	**23**	«Tank nozzle» sign
9	«Diesel exhaust fluid» sign[5]	**24**	«Preheating 120 V» sign[6]
10	«Hydraulic oil» sign	**25**	«Floating axle lock» sign[6]
11	Lubrication chart	**26**	«Switching position» sign[6]
12	«Wheel lugs» sign	**27**	«Manual lubricating points» sign[6]
13	«ROPS/FOPS» sign	**28**	«Front socket» sign[6]
14	«Tyre inflation pressure» sign	**29**	«High flow» sign[6]
15	«Brake oil» sign	**30**	«Maximum load capacity» sign[6]
16	«Load chart» sign	**31**	«Refrigerant» sign[6]

[6] Option

[5] For emission stage V

«Rigging point» sign



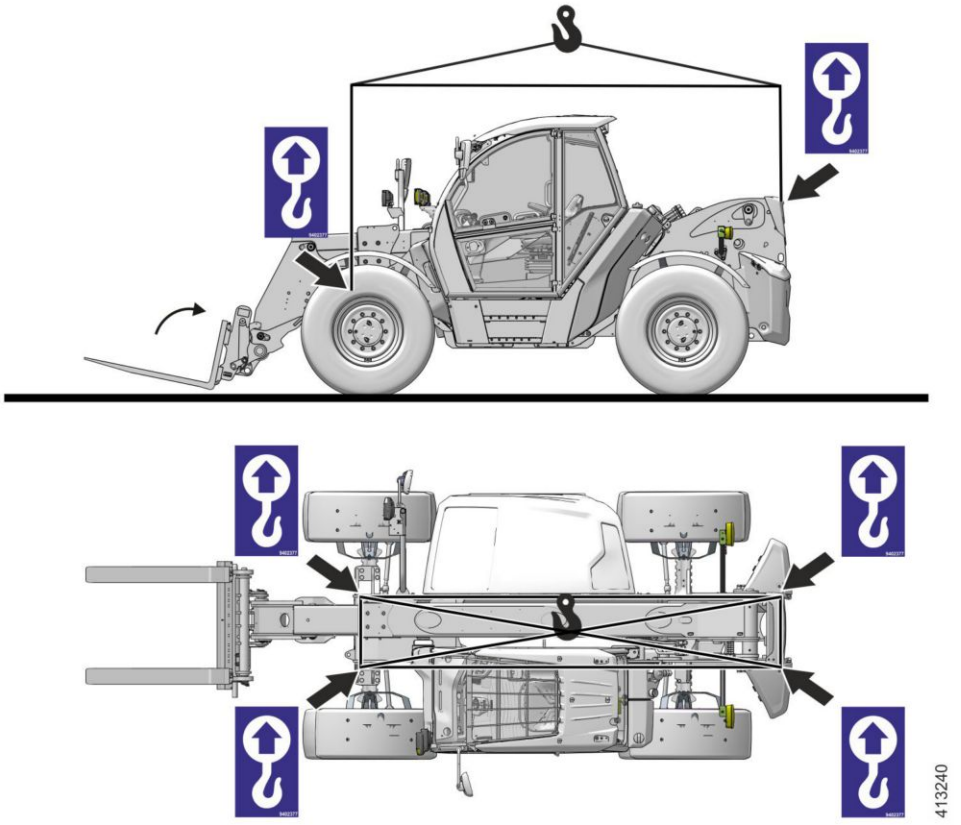
G2063259_1

«Rigging point» sign

The sign is located on the machine's rigging points.

Indicates the machine's rigging points.

«Slinging / lifting point» sign



G2036693_2

«Slinging / lifting point» sign

The sign is located on the slinging / lifting points of the machine.

Indicates the machine's slinging / lifting points.

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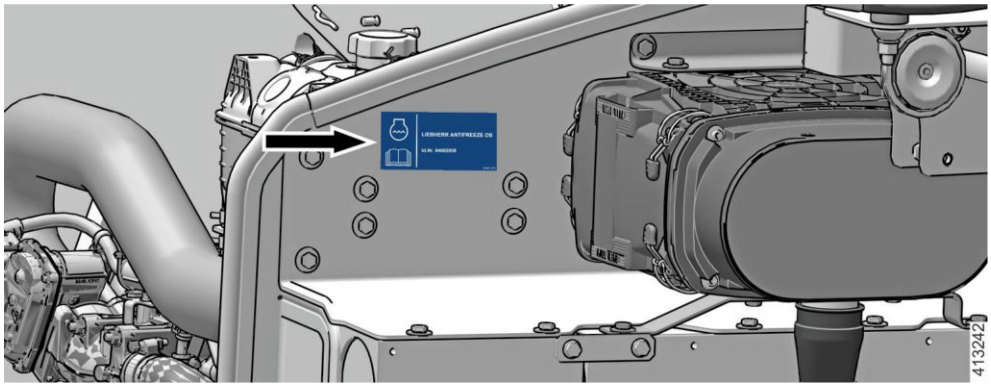
«Coolant» sign



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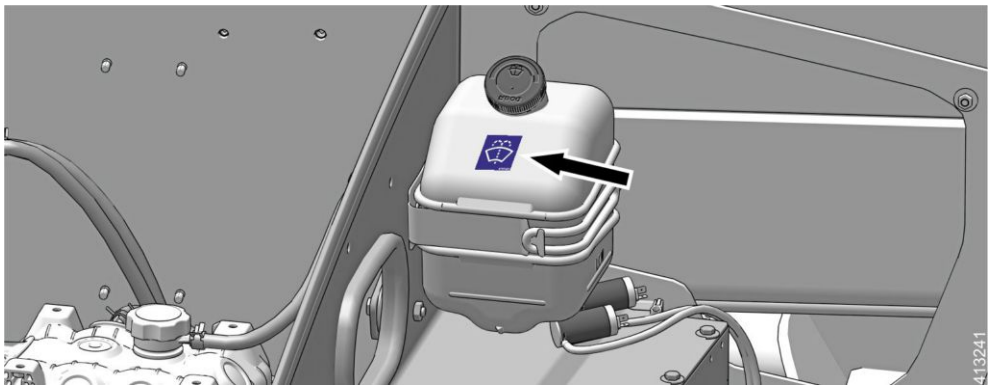
«Coolant» sign

The sign is located on the side next to the coolant tank.

Shows the specification of coolant in the cooling system.

«Windscreen washer fluid» sign



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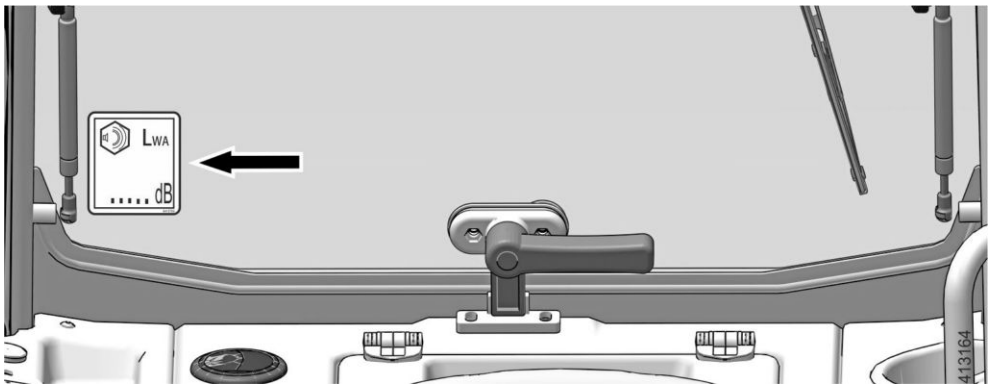
«Windscreen washer fluid» sign

The sign is located on the windscreen washer tank.

Indicates the reservoir for the windscreen washer fluid.

«Noise protection» sign



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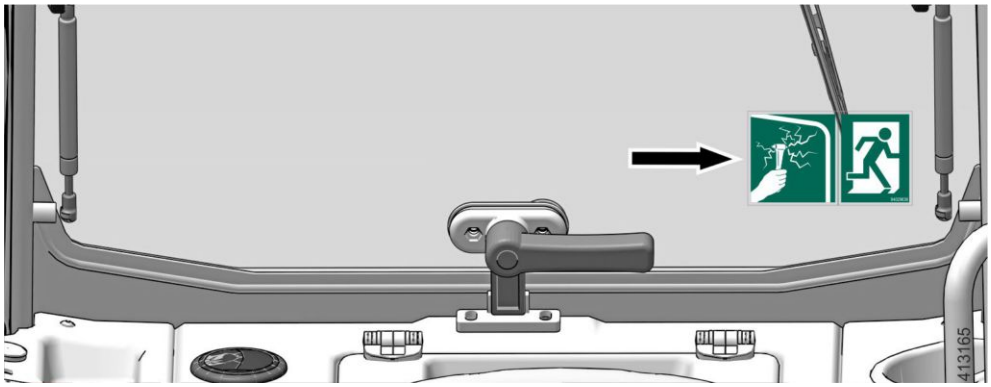
«Noise protection» sign

The sign is located on the inside of rear cab window.

Specifies the sound power level of the machine in decibels.

«Emergency exit» sign



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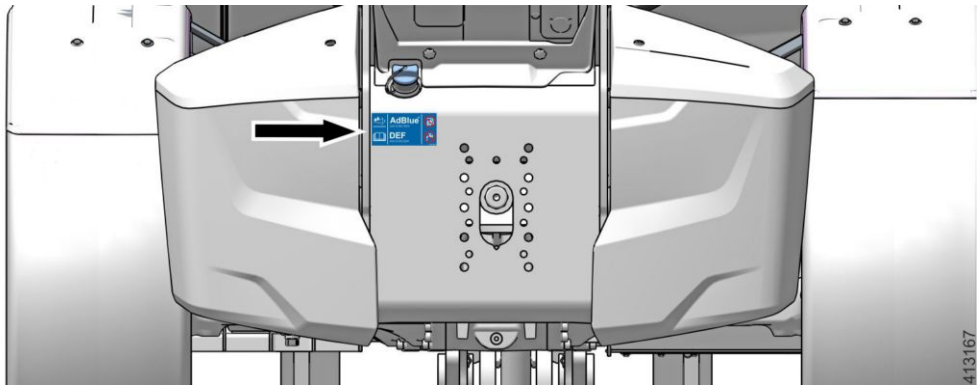
«Emergency exit» sign

The sign is located on inside on the right cab window and the rear cab window.

Denotes the emergency exit.

«Diesel exhaust fluid» sign



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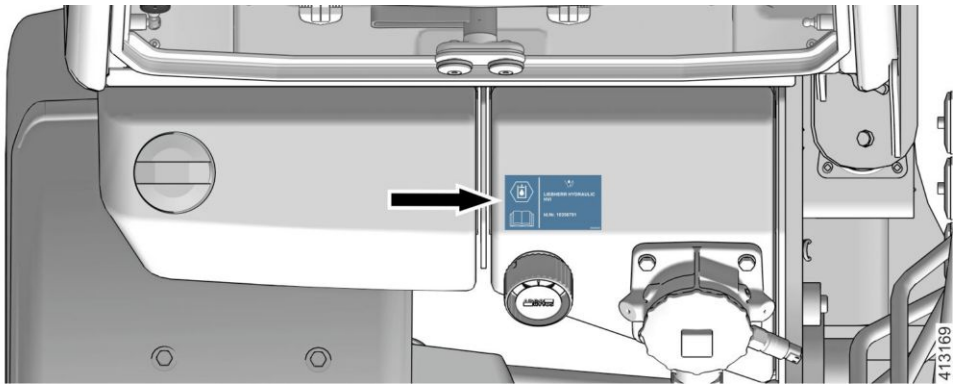
«Diesel exhaust fluid» sign

The sign is located below the filler pipe of the diesel exhaust fluid tank.

Indicates the specifications for the diesel exhaust fluid.

«Hydraulic oil» sign



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«Hydraulic oil» sign

The sign is located next to the hydraulic oil filler pipe.

Indicates the filled Liebherr hydraulic oil.

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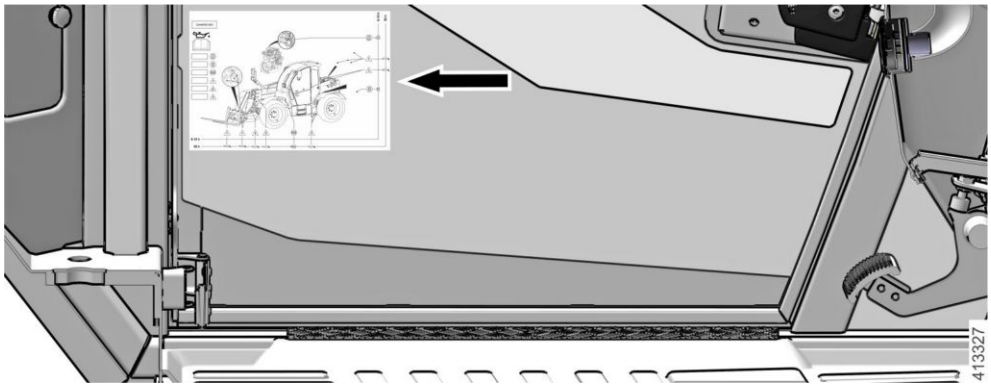
Lubrication chart



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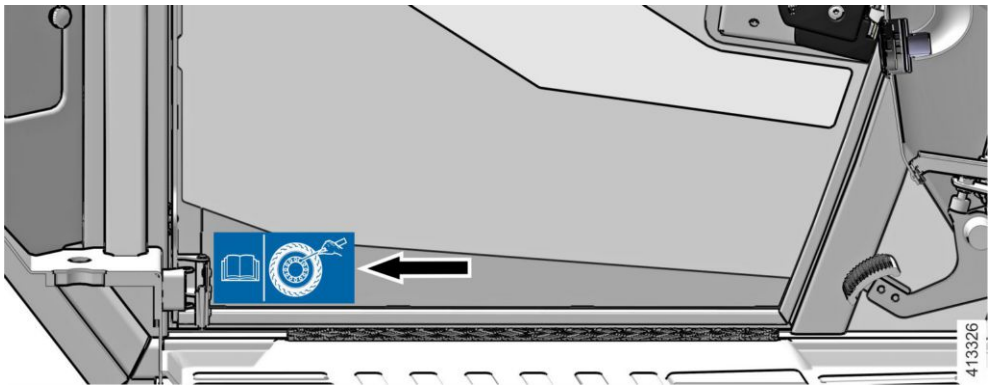
Lubrication chart

The sign is located inside on the cab door.

The lubrication chart shows all parts that are filled with oil and grease, along with their inspection and replacement intervals.

«Wheel lugs» sign



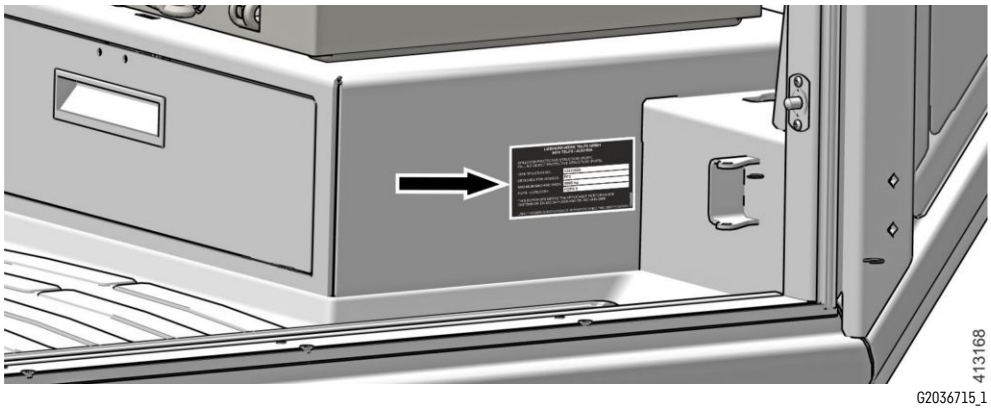
G2040400_2

«Wheel lugs» sign

The sign is located inside on the cab door.

Denotes the specified maintenance interval for „**Checking mounting of wheel lugs**“ in the operator's manual.

«ROPS/FOPS» sign



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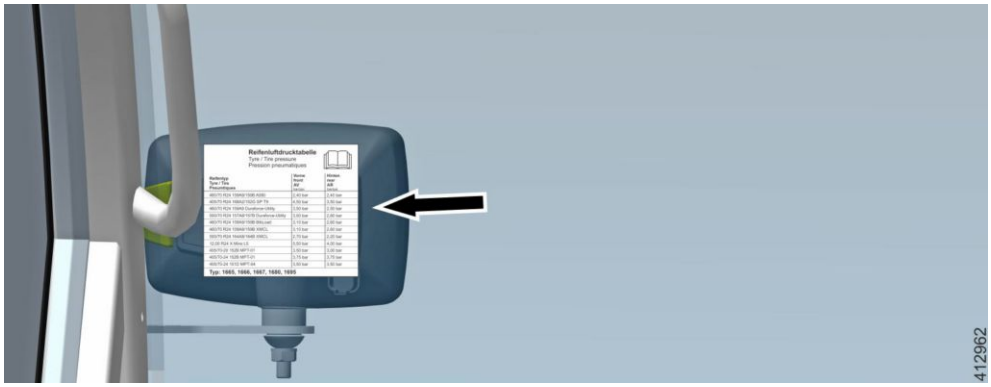
«ROPS/FOPS» sign

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

It shows the maximum load of the roll over protective structure.

«Tyre inflation pressure» sign



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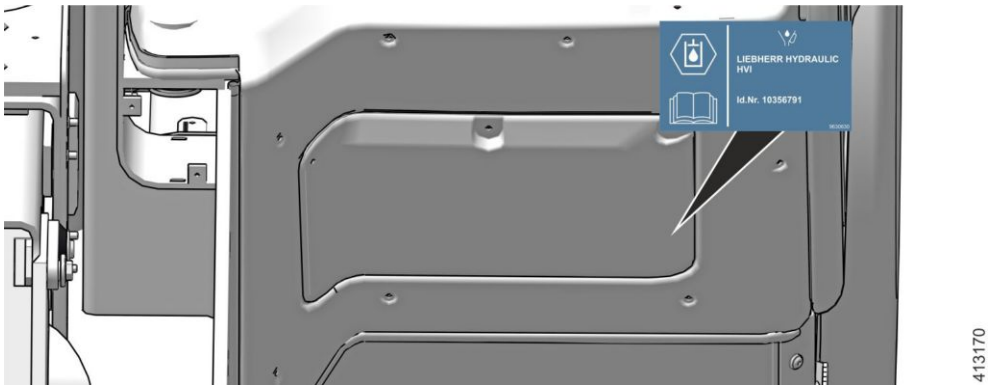
«Tyre inflation pressure» sign

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

Denotes the permissible inflation pressure for the tyres.

«Brake oil» sign



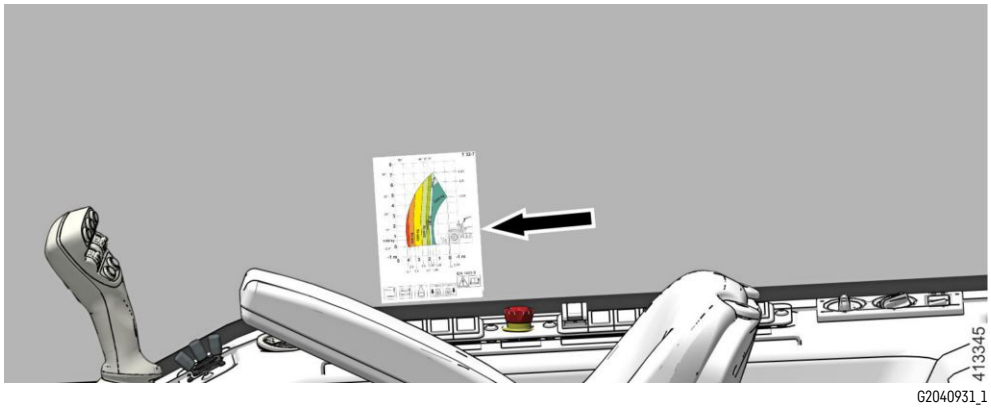
G2036716_1

«Brake oil» sign

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

Denotes the brake oil specifications.

«Load chart» sign



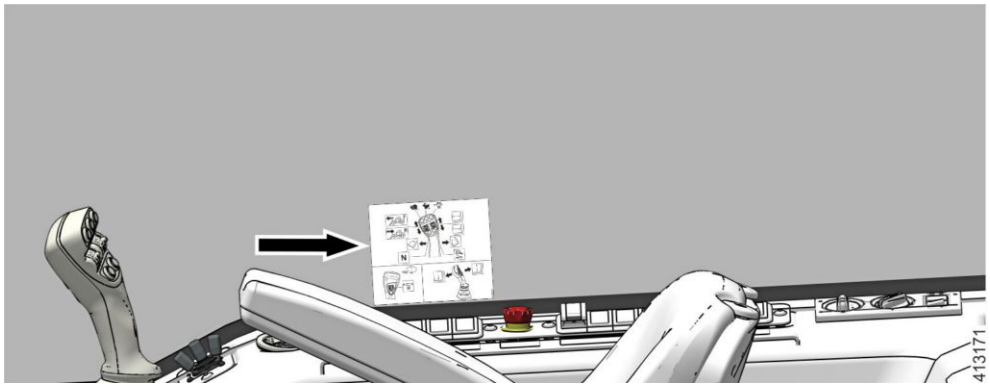
G2040931_1

«Load chart» sign

The sign is located on the right-hand cab window.

When lifting a load, always pay attention to the load curve for the particular working attachment.

«Control lever» sign



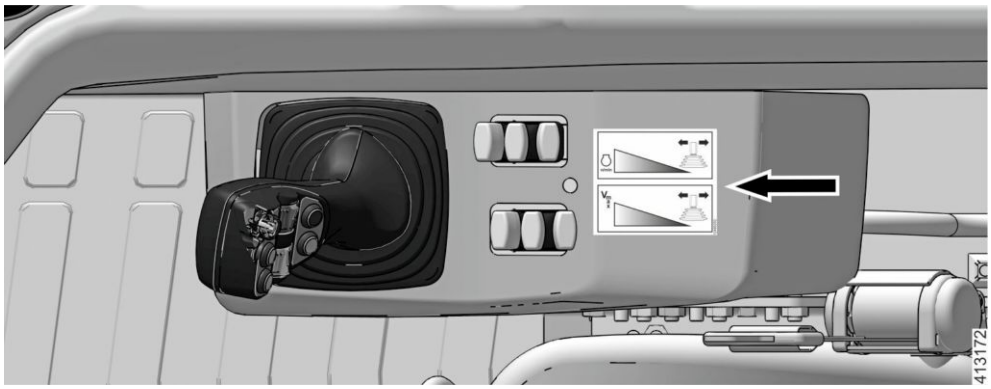
G2036717_1

«Control lever» sign

The sign is located on the right-hand cab window.

Shows the functions of control lever.

«Gradual travel device and manual throttle» (option) sign



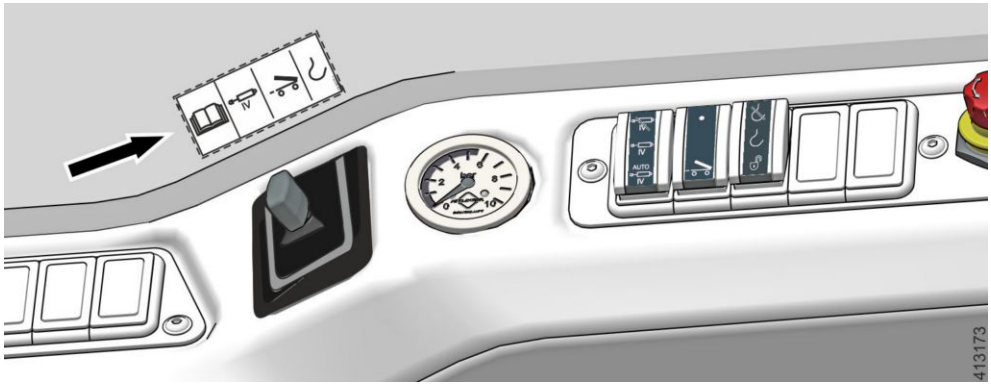
G2036704_1

«Gradual travel device and manual throttle» sign

The sign is located on right of operator's cab near the control levers.

Shows operation of gradual travel device and manual throttle.

«Rear hydraulics» (option) sign



G2036718_1

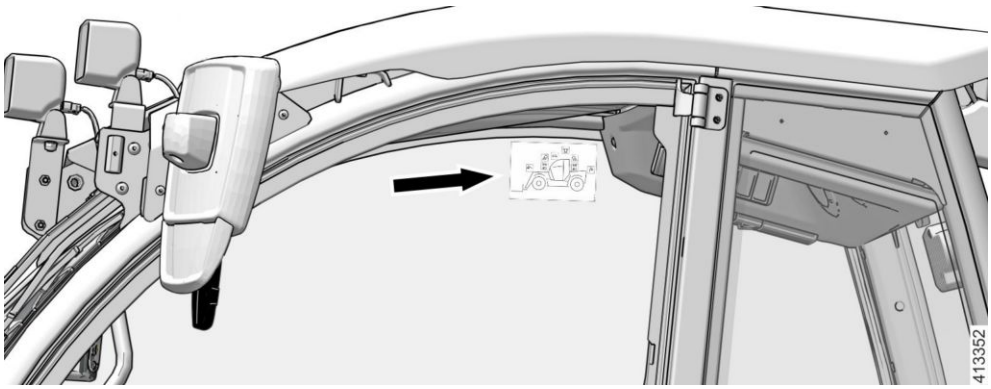
«Rear hydraulics» sign

The sign is located on the right of the operator's cab.

Shows the functions of the side console control elements.

LWT/93517630/09/01/12/2023/en

«Working headlights» (option) sign



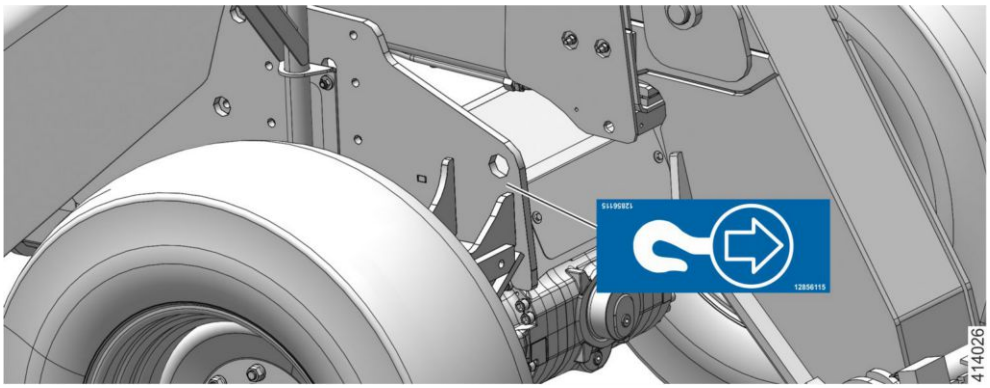
G2040956_1

«Working headlights» sign

The sign is located on the right-hand cab window.

Shows the location of working headlights.

«Recovery point» sign



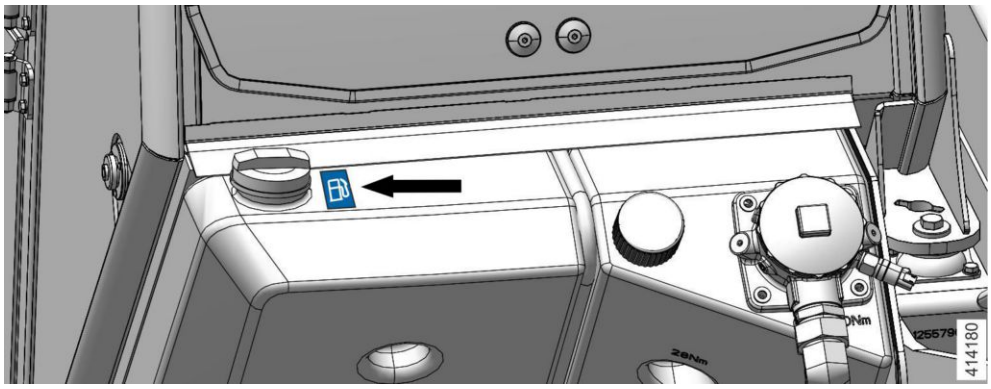
G2055777_1

«Recovery point» sign

The sign is located on the machine's recovery points.

Indicates the machine's recovery points.

«Tank nozzle» sign



G2060345_1

«Tank nozzle» sign

The sign is located on the fuel tank next to the filler pipe.

Indicates the fuel filler pipe.

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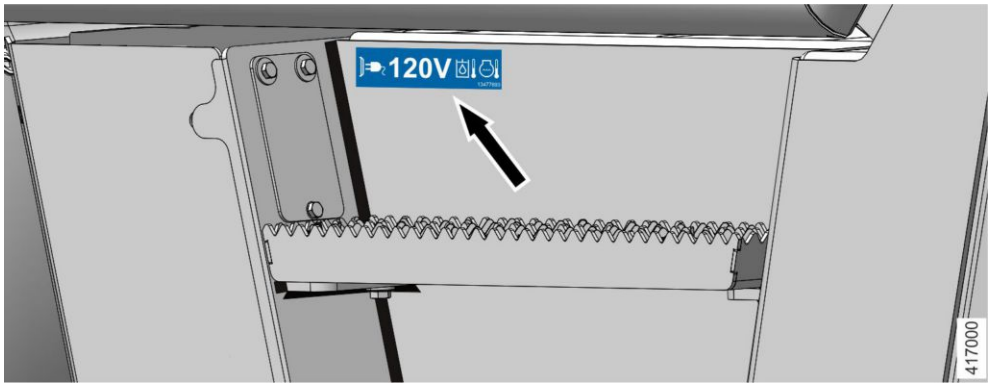
«Preheating 120 V» (option) sign



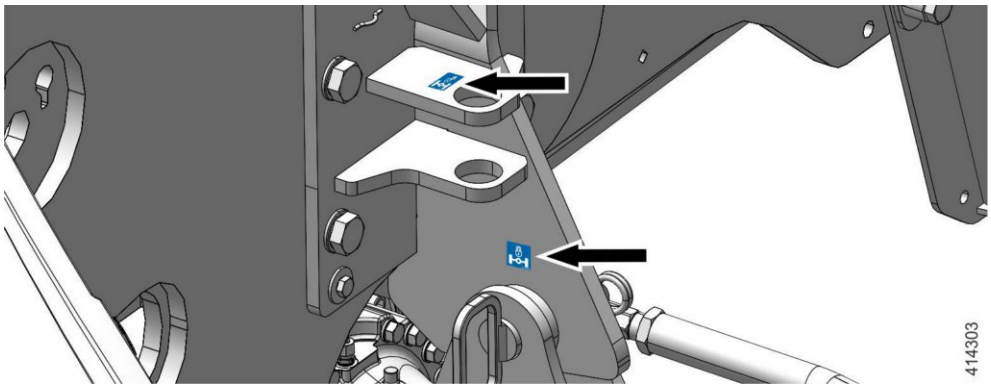
417000-01

Preheating 120 V sign

The sign is located on the left-hand cab access of the machine.

Indicates the plug connection for preheating 120 V.

«Floating axle lock» (option) sign



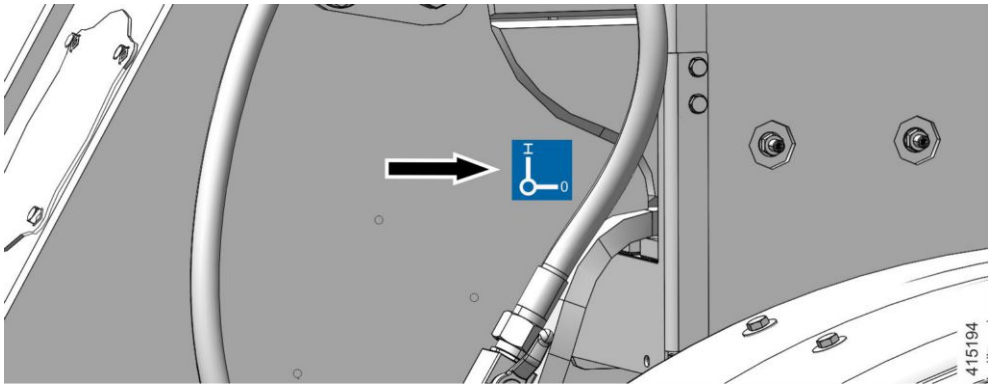
G2063004_1

«Floating axle lock» signs

The signs are located on the rear right of the main frame.

Indicate the functions of the mechanical floating axle lock.

«Switching position» sign (option)



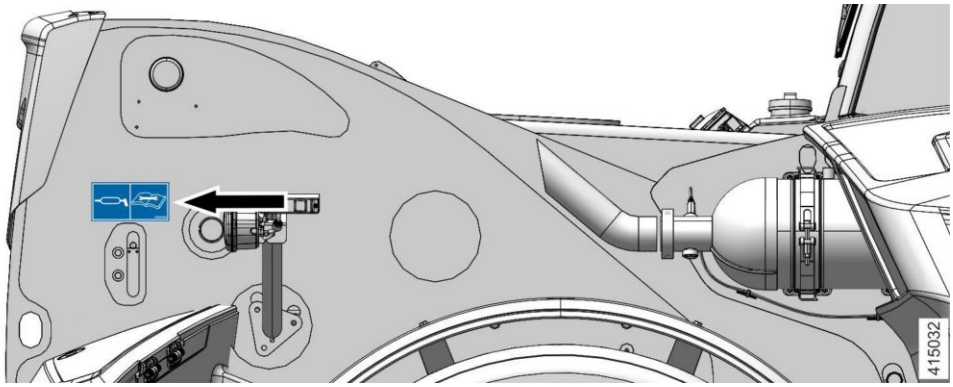
G2074859_1

«Switching position» sign

The sign is located on front left on the telescopic boom.

Shows the ball valve switching positions of the control circuit III High Flow.

«Manual lubricating points» (option) sign

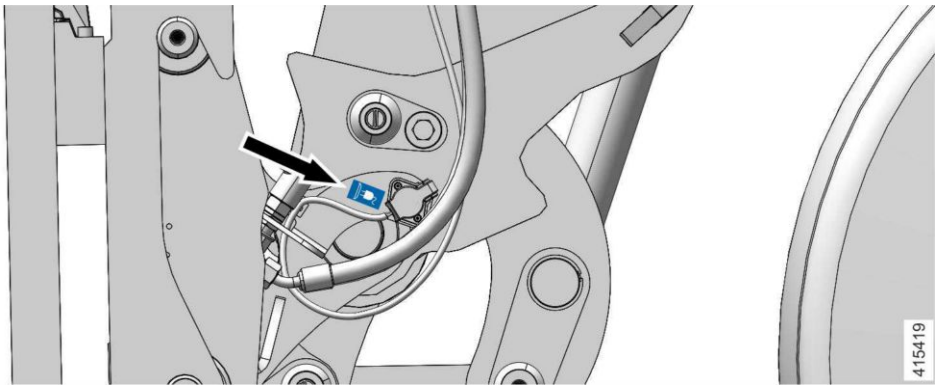


G2071990_1

«Manual lubricating points» sign

The sign is located on the left on the telescopic boom head as well as at the front right and back right on the main frame.
Indicates the lubricating points of the manual central lubricating system.

«Front socket» (option) sign

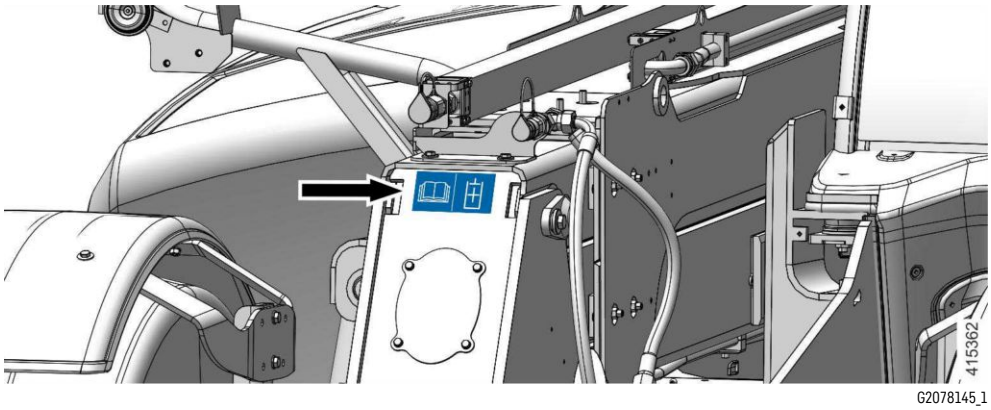


G2078826_1

«Front socket» sign

The sign is located on front left on the quick coupler.
Indicates the front socket.

«High flow» (option) sign

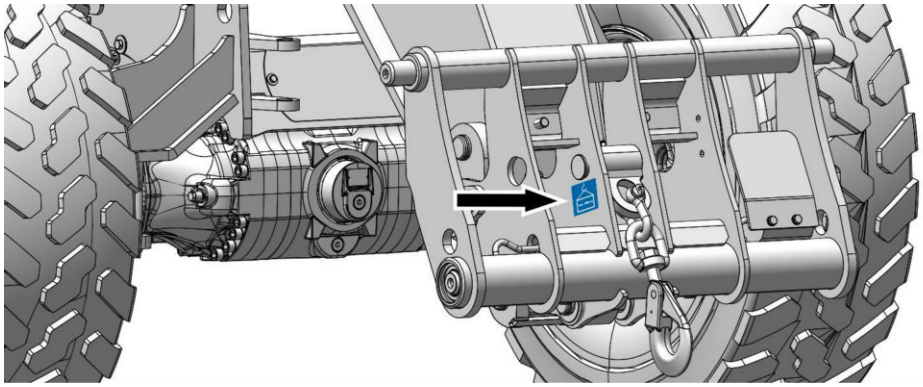


G2078145_1

«High flow» sign

The sign is located at the front on the telescope head and on the rear ball valve.
Indicates the connections and operation of the high flow control circuit III.

«Maximum load capacity» sign (option)

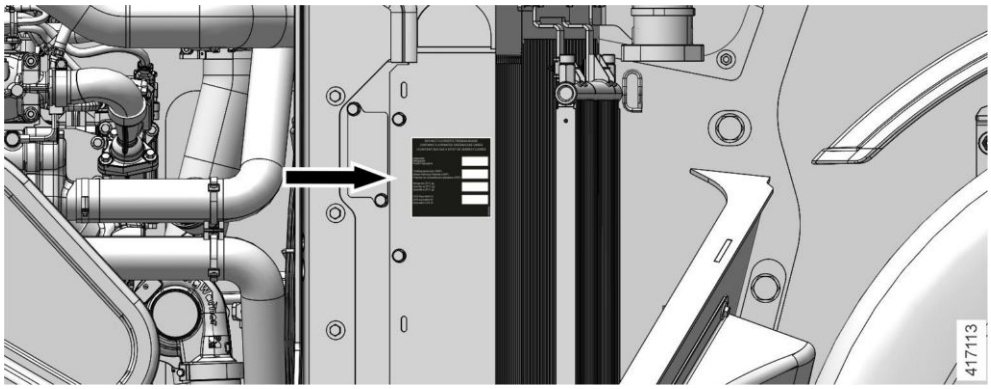


G2094098_1

«Maximum load capacity» sign

The sign is located on the front right of the machine's quick coupler.
It indicates the maximum load capacity of the lifting eye.

«Refrigerant» sign (option)



G2094648_1

«Refrigerant» sign

The sign is located next to the air conditioning condenser.
It indicates the filled refrigerant and its global warming potential and CO_2 equivalence.

For emission stage V

2.4.4 Machine identification plate

0009687-01

Machine identification plate

The plate is located on front right on the main frame.

Information on identification plate:

- Serial number
- Model number
- Year of manufacture
- Maximum permissible operating mass
- Maximum permissible lifting load
- Maximum permissible support load
- Maximum permissible trailer load

2.5 Safety instructions

2.5.1 General safety instructions

1. Please familiarize yourself with the **operator's manual** before putting the machine into service.
   Make sure that you have obtained, read and understand any additional instructions relating to special accessories for machine.
2. Only explicitly authorized personnel may operate, maintain or repair the machine.
   Observe the permissible minimum legal age limit!
3. Use only trained or instructed personnel, clearly determine the responsibility of the personnel for operation, set up, maintenance and repairs.
4. Determine the operator responsibility (also in regards to traffic regulations) and allow him to refuse unsafe instructions from third persons.
5. Do not allow any person either still to be trained or already in training to operate or work on machine unless under constant supervision and guidance of an experienced instructor or operator.
6. Check and observe any person working or operating the machine at least periodically if they observe safety instructions and guidelines given in the **operator's manual**.
7. Always wear proper work clothing when operating or working on the machine.
   Avoid wearing rings, watches, ties, scarves, open jackets, loose clothing, etc. There is a danger of injury, as they can get stuck or be pulled in.
   Prescribed for specific tasks: safety glasses, safety shoes, safety helmet, work gloves, reflective vest, hearing protection, ...
8. Consult the supervisor at the jobsite for special safety instructions.
9. When entering or exiting, never use the steering column, control console or joystick as handholds. This could trigger inadvertent movement of machine and cause serious accidents.
10. Never jump off the machine. When climbing on or off the machine, use the intended steps, ladders, catwalks and handles. Use both hands for support and face machine.
11. Keep steps, ladders and handles free of oil, grease, mud, snow and ice. These precautions will minimize the danger of slipping, stumbling or falling.
12. Familiarise yourself with the emergency exits. These are via the right cab window or through the rear cab window.
13. If no other instructions are given, proceed as follows for maintenance and repair work.
    Procedure:
    - Park the machine on solid and level ground.
    - Retract the telescopic boom completely and lower the working attachment to the ground.
    - Before leaving the machine, activate the parking brake.
    - Deactivate the working hydraulics.
    - Switch off all power consumers, turn the engine off, and remove the ignition key.
14. Before working on the hydraulic circuit, you must also press the switch for the working hydraulic lock and simultaneously move all pilot control units (joystick and pedals) in both directions to relieve the servo pressure and the remaining pressures in the working circuits. Then release internal hydraulic tank pressure.
15. Lock the working hydraulic before leaving the operator's seat to prevent inadvertent actuation.
16. Secure all loose parts on machine.

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17. Never operate a machine without a complete walk around inspection. Check if all warning signs are on the machine and if they are all legible.
18. Observe all signs with danger and safety instructions.
19. For special applications, this machine must be equipped with specific safety devices. In this case, use the machine only if they are installed and functioning.
20. Never make any changes or additions and modifications on the machine, which could affect the safety, without obtaining explicit approval from the supplier. This also applies to installation and adjustment of safety devices and safety valves as well as to any welding on load carrying parts.
21. Avoid staying near running Diesel engine. Persons with a pacemaker may not stay near a running diesel engine (minimum distance 50 cm (19.7 in)).
22. Do not touch current carrying components on electrical connection of solenoid valve controlled injection pumps (Unit Pumps) when Diesel engine is running.

2.5.2 Safety instructions for crushing and burn prevention

1. Never work underneath the working attachment as long as it is not safely resting on the ground or properly supported.
2. Never use damaged tackle or tackle which is insufficient in its load carrying capacity (such as cables, chains, ...).
   Always wear work gloves when handling wire cables.
3. When working on the working attachment, never align bores with your fingers, always use a suitable alignment tool.
4. When engine is running, make sure that no objects touch fan. Any objects falling or protruding into fan will be thrown out or destroyed and can damage fan.
5. Avoid contact with any components containing coolant. There is a danger of burns.
6. Check coolant level only after cap of expansion tank is cool enough to touch. Turn cap carefully to relieve pressure.
7. At or near operating temperature, engine and hydraulic oil are hot. Do not allow hot oil or oil-bearing parts to touch skin.
8. Always wear safety glasses and work gloves when handling batteries. Avoid sparks and open flames.
9. Never permit anyone to hand guide attachment into proper position.
10. Check if the open position of the engine bonnet is ensured by the gas cylinder. If function is not ensured, then problem must be remedied immediately.
11. Before putting the machine into service, close and lock the engine bonnet and all covers.
12. Never lay underneath machine unless machine is properly and safely supported.
13. Avoid skin contact with hot surfaces and fluids. There is a danger of burns.

2.5.3 Safety guidelines for fire and explosion prevention

1. Engine must be turned off when refueling.
   In addition, heater must also be turned off before refueling.
2. Do not smoke and avoid open flames when refueling and where batteries are charged.
3. Always start engine as described in „**operator's manual**“
4. Check electrical system. Correct any defects, such as loose connections, chafed wiring or burnt out fuses and bulbs immediately.
5. Never store flammable fluids on machine except in appropriate storage tanks.
6. Regularly inspect all lines, hoses and fittings for leaks and damage. Repair any leaks immediately and replace damaged components.
   Any oil escaping from leaks can easily cause a fire.
7. Be certain that all clamps and protective guards are properly installed to prevent vibration, rubbing and heat build up.
8. Starter fluid (ether) is especially flammable! Never use cold start ether near heat sources, open flames (for example cigarettes) or in insufficiently ventilated areas.
9. Never use flame glow system or preheat systems when using cold start ether! (Danger of explosion)
10. Know location of fire extinguishers, make sure you know how to use them properly and check out location of where to report a fire and inform yourself about fire fighting capabilities before you start to work.

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2.5.4 Safety guidelines for machine start up

1. Before starting the machine, always perform a thorough walk around inspection.
2. Visually check the machine for loose bolts, cracks, wear, leaks and intentional damage.
3. Never start or operate a damaged machine.
4. Make sure to correct any problems immediately.
5. Make sure that all hoods and covers are closed and locked. Check if all warning and reference signs are on the machine.
6. Clean all windows and mirrors, secure all doors and windows to prevent inadvertent movements.
7. Make sure that no one works on or under the machine. Warn all persons in the surrounding area before operating the machine.
8. After entering the cab, adjust the operator's seat, the mirrors, the arm rest and the seatbelt so that you can work comfortably.
9. The noise protection devices on the machine must be in protective position during operation.

2.5.5 Safety instruction for start up

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

2.5.6 Safety guidelines for working

1. Before starting to work, familiarize yourself with the peculiarities of the job site, as well as the special regulations and warning signals. Part of the surrounding area includes, for example, the obstacles in the working or traffic area, the load bearing capacity of the ground and special protection required to secure the job site from public highway traffic.
2. Always keep a safe distance to overhangs, edges, embankments and unstable ground.
3. Be particularly cautious of changing ground conditions, unfavourable visibility and changing weather.
4. Do not carry out any loading procedures in strong wind, which could endanger the machine and the load. This applies especially for wind susceptible loads.
5. Familiarize yourself with the location of power lines on the jobsite and work particularly careful in their vicinity. If necessary, inform the responsible authorities.
6. Maintain a safe distance from electrical overhead lines. When working near electrical overhead lines, do not allow the working attachment to come close to the wires.
   Risk of **fatal injury**!
   Inform yourself about required safety distances.
7. **If you do touch a high voltage power line, proceed as follows:**
   - Do not leave the machine!
   - If possible, move the machine a sufficient distance away from the danger zone.
   - Warn all personnel in the surrounding area not to come close to the machine and not to touch the machine.
   - Instruct someone to turn the electric power off.
   - Do not leave the machine until you are assured that the power line, which has been touched or damaged is no longer energized and the power has been turned off!

LWT/93517630/09/01/12/2023/en

8. Before moving the machine or working with the machine, always make sure that the equipment is safely secured.
9. Before starting to work, always check the brake system as outlined in the operator's manual.
10. When travelling on public roads, highways or properties, always observe the valid traffic regulations and, if necessary, first bring the machine into proper condition to meet federal and local highway standards.
11. The installed working attachment must be emptied and brought into transport position.
12. While travelling with the machine, the hydraulic functions may not be used.
13. Drive with a raised telescopic boom only in exceptional cases and with utmost caution. Drive very slowly and brake cautiously. Make sure the visibility is sufficient.
14. When driving on a public road, make sure the lighting, blinkers and windscreen wipers are clean and functioning.
15. Drive on public roads only with air or water filled tyres.
16. On public roads set the specified steering mode.
17. Have a defective tire replaced immediately with a new tyre in an authorized service center.
18. Always turn on the lights if visibility is poor or as dusk approaches. When driving on public roads, turn the working headlights off.
19. Inquire about the traffic regulations valid in the user country.
20. Never allow another person to ride along on the machine.
21. Operate the machine only when seated and with the safety belt fastened.
22. Never adjust the operator’s seat while driving.
23. As a rule, never let any body parts, especially arms and legs hang out or stick out from the operator's cab.
24. In the event that the machine should tip over, remain seated with the safety belt secured. Experience has shown that it is safer to remain in the operator's cab.
25. Report any functional problems or defects, make sure that all necessary repairs are completed immediately.
26. Personally make sure that no one is endangered by moving the machine.
27. Never leave the operator’s seat as long as the machine is still moving.
28. Never leave the operator’s seat of the machine with a raised load.
29. Never leave the machine unattended while the engine is running.
30. Before taking on a load, determine its weight and its centre of gravity.
31. Make sure that the carrying capacity of your working attachment is sufficient.
32. Make sure that the correct load chart according to the installed working attachment is used.
33. Observe the symbols on the respective load chart. The symbols contain important safety guidelines and information for proper operation of the installed working attachment.
34. Never lift or transport loads, which are heavier than the actual load given in the load chart
35. Make sure that the transported load is balanced and is properly rigged so that it cannot fall down.
36. For loads with moveable centre of gravity (for example liquids), pay attention to possible movements of the centre of gravity. Proceed extremely cautious and try to keep the movements of the centre of gravity to a minimum.
37. When moving a load, lower the working attachment to transport position and keep the load as close to the ground as possible.
38. If you use tackle, always hang the load as short as possible and close to the ground.
39. The maximum permissible incline and side slope of the machine depends on the installed working attachment as well as on the ground conditions!
40. If you need to transport a bulky load, which affects the visibility to the front, drive in reverse, but only in exceptional cases and not over longer distances.
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.

LWT/93517630/09/01/12/2023/en

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.

2.5.7 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
above 110 kV to 220 kV	4.0 m
above 200 kV to 380 kV	5.0 m
if rated voltage is unknown	5.0 m

2.5.8 Safety instructions for travelling on downhill slopes

1. Always travel downhill with caution and never at maximum travel speed as otherwise you could lose control over the machine.
   Travel speeds:
   - As a rule, the maximum travel speeds specified in the **operator's manual** must not be exceeded.
   - Exceeding the maximum travel speed can cause damage to the machine, such as the travel motor, transmission, axles, drive shafts, diesel engine.
2. Before travelling on a downhill slope, the travel range must therefore be selected in such a way that the entire downhill slope can be navigated without any risk being posed to other road users, the operator or the machine.
3. When travelling on a downhill slope, the accelerator pedal must also be released.

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2.5.9 Safety instructions for parking the machine

1. Park the machine only on level ground, if possible (incline 0 ± 2 %). If it becomes necessary to park the machine on a grade, it must be properly blocked and secured with wedges to prevent any unintentional movement.
2. Lower the working attachment and lightly anchor the working attachment in the ground.
3. Bring all control levers to neutral position, block the working hydraulics, activate the parking brake and turn the engine off according to the directions in the operator's manual before leaving the operator's seat.
4. Lock the machine, remove all keys and secure the 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.

2.5.10 Safety guidelines for transporting the 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 the attachment for the duration of transport.
4. When loading a machine on a transport vehicle, be sure that the loading ramp incline does not exceed 30° and is covered with wooden planks to prevent slipping.
5. Remove any snow, ice or mud from the chains / wheels of the machine before moving onto the ramp.
6. Align the machine with the loading ramp.
7. A guide must signal the machine operator. Drive onto the ramp and onto the transport vehicle very carefully.
8. Have blocks and wedges ready to block the machine, if necessary, to prevent the machine from rolling backward.
9. Tilt the working attachment in and drive up the ramp. Always keep the working attachment close to the loading surface.
10. After the loading procedure, lower the attachment onto the loading surface.
11. Secure the machine and the remaining parts with chains and wedges to prevent them from slipping.
12. Relieve the pressure from the pressure lines, apply the parking brake, remove the ignition key, lock the driver's cab doors and all covers before leaving the machine.
13. Carefully check out the transport route beforehand, especially in regards to width, height and weight limitations.
14. Check that there is enough clearance underneath all electrical lines, bridges, underpasses and in tunnels.
15. During the unloading procedure, proceed with the same caution as during the loading procedure.
    Procedure:
    - Remove all chains and wedges. Start the engine as outlined in the Operating instructions.
    - Carefully drive off the loading platform down the ramp.
    - Keep the working attachment as close as possible above the ground.
    - Have another person guide and signal you.

2.5.11 Safety instructions for towing and recovering the machine

1. Always follow the correct procedure according to the instructions in the **operator's manual**, refer to section „Towing and recovering the machine".
2. The machine may only be towed and recovered in exceptional circumstances, for example to move the machine from a dangerous area for repair.
3. Before recovering or towing, check all towing and pull devices for safety and stability.
4. The rod, which is used to tow the machine must be adequate to pull the machine and must be connected to the appropriate bores and towing devices. Damage or accidents which occur when towing or recovering the machine cannot be covered by manufacturer's guarantee under any circumstances.
5. During towing procedure, keep within required transport position, permissible speed and distance.
6. When returning machine to operation, proceed only as outlined in operator's manual.
7. After the towing or recovering procedure, be certain to return the machine to series condition.

LWT/93517630/09/01/12/2023/en

2.5.12 Safety guidelines for maintenance

1. Never perform any maintenance or repairs for which you are not qualified or you do not understand.
2. Observe the stated intervals or time periods for repeat checks and inspections as outlined in the operating instructions. Always use appropriate tools to carry out maintenance work.
3. The chart in these operating instructions defines exactly who must or may carry out which type of work. The operator may only carry out work marked in the maintenance and inspection schedule with „by maintenance personnel“. The remaining tasks may only be carried out by expert technicians with appropriate training.
4. Spare parts must meet the technical requirements set forth by the manufacturer. This is always ensured by using Original spare parts. Spare parts, which do not meet the technical requirements of the manufacturer can impact the safety and function of the machine.
5. Always wear safe work clothing when maintaining the machine. For certain work, safety glasses and work gloves are required, in addition to a hard hat and safety shoes.
6. Keep unauthorized personnel away from the machine during maintenance.
7. Secure a wide-ranging area for service, as necessary.
8. Inform the operator before carrying out any special task or maintenance work. Make sure he knows the person who is in charge of the work.
9. If not otherwise noted in these operating instructions, carry out all maintenance work on the machine on firm and level ground, with the engine turned off.
10. During maintenance and repairs, make sure you always tighten any loosened screw connections.
11. If it becomes necessary to remove any safety devices during set up, maintenance and repairs, the safety devices which were removed must be reinstalled immediately after completion of the maintenance and repair work and then be inspected for proper function.
12. Before any maintenance and repair work, especially when working under the machine, attach an easily visible warning sign **„DO NOT TURN ON“** on the ignition switch. Pull the ignition key off.
13. Before any maintenance and repairs, clean the machine, especially connections and fittings to remove oil, fuel or cleaning substances. Never use aggressive cleaning substances. Use only lint-free cleaning cloths.
14. To clean the machine, never use flammable cleaning fluids.
15. Before any welding, cutting and grinding, clean the machine and surrounding area of dust and flammable substances and assure adequate ventilation.
    - Otherwise there is a **DANGER OF EXPLOSION!**
16. Before cleaning with water, steam (high pressure cleaner) or other cleaning fluids, cover / tape off all openings whose safety and function could be affected by infiltration of water, steam or cleaning fluid.

    Electrical motors, switch boxes and battery compartments are especially endangered.

    Further procedure:
    - Make sure that the temperature sensor of the fire warning system and the fire extinguisher do not come in contact with hot cleaning fluids when cleaning the operator's cab. Otherwise they could trigger the fire extinguishing system.
    - After cleaning, completely remove the covers and tapes.
    - After cleaning the machine, check all fuel, engine oil, hydraulic oil lines for leaks, loose connections, chafing and damage.
    - Fix any defects immediately.
17. Adhere to the product safety guidelines issued for handling of oils, greases and other chemical substances.
18. Ensure safe and environmentally friendly disposal of operating and service fluids as well as exchange parts.
19. Be very careful when handling any hot components or service fluids on the machine as there is a danger of burns and scalding.
20. Operate combustion engines and fuel operated heaters only in sufficiently ventilated areas. Before starting the machine in a closed area, make sure the ventilation is sufficient. Always follow all regulations valid for the current job site.
21. Perform any welding, cutting or grinding work on the machine only if this work has been explicitly authorized, as there can be a danger of fire or explosion.
22. The operator’s cab windows are made of safety glass. Damaged operator’s cab windows must always be replaced immediately.
    - Only safety glass may be used for the operator’s cab windows.
    - Use only Original Liebherr spare parts.

LWT/93517630/09/01/12/2023/en

23. Do not attempt to lift heavy parts. Use suitable lifting devices with sufficient load carrying capacity.
    Procedure:
    - When replacing individual parts and larger components, attach and secure them carefully to the lifting tackle, to avoid any danger.
    - Use only suitable and technically sound lifting devices as well as load tackle with sufficient load carrying capacity.
    - **Do not allow anyone to work or remain underneath suspended loads.**
24. Do not use damaged or insufficiently sized ropes or cables. Always wear work gloves when handling wire cables.
25. Only permit experienced personnel to secure loads and signal operators. The guide must position himself within view of the operator or be in voice contact with him.
26. When working overhead during installation work, use appropriate safe access ladders and working platforms. Never use machine parts as access aids. Wear a harness / anti-fall guards when working in great heights. Keep all handles, steps, railings, platforms, ladders free of dirt, ice and snow.
27. When working on the working attachment, make sure it is safely supported. Never use metal on metal support.
28. Never lay underneath the machine unless the machine is properly and safely supported with wooden beams.
29. Always support the machine in such a way that any shifting weight will not endanger the stability of the machine and avoid steel to steel contact.
30. Only authorized, especially trained personnel may work on the travel gears, brake and steering system.
31. If the machine must be repaired while parked on a slope, the track chains or wheels must be blocked with wedges to prevent any movement. Bring the working attachment into maintenance position.
32. Only authorized personnel with specialized training and experience in hydraulics may work on the hydraulic system.
33. Wear protective gloves when checking for leaks. Fluid escaping from a small hole can have enough pressure to penetrate the skin.
34. Never loosen any hydraulic oil lines or fittings before the working attachment has been lowered and the engine has been turned off. Release the hydraulic tank pressure by removing the breather filter.
35. Regularly inspect all hydraulic oil lines, hoses and fittings for leaks and externally visible damage. Fix any defects immediately. Oil spray can lead to injuries and fires.
36. Before beginning any repairs, be sure that all air and hydraulic pressure lines are relieved in any of the systems and pressure lines you need to gain access to, according to the component group descriptions.
37. Route and install hydraulic hoses and air pressure lines properly. Do not mix up the connections. All fittings, including length and quality of hose lines must match the specified requirements.
    Use only Liebherr replacement parts.
38. Replace hydraulic hoses and lines in regular intervals, as stated, even if no safety relevant defects can be seen.
39. Only qualified electricians or trained personnel under the guidance and supervision of a licensed electrician may work on the electrical equipment of the machine, according to the electro-technical rules and regulations.
40. Only use Original fuses with the correct amperage. In case of problems in the electric energy supply, turn the machine off immediately.
41. Inspect and check the electronic equipment on the machine regularly. Correct any defects, such as loose connections, burnt or chafed wiring or burnt out fuses and bulbs immediately.
42. If any work is necessary on energized, voltage carrying parts, a second person must be utilized to disconnect the emergency off or master switch in case a problem should arise. Rope off the work area off with a red and white safety chain and a warning sign. Use only insulated tools.
43. When working on high voltage carrying components, turn off the power supply, then connect the supply cable to the ground and use a grounding rod to ground these parts, such as the condensers.
44. Check all disconnected parts first if they are really free of voltage, ground them and then short circuit them. Insulate adjacent, voltage carrying parts.

LWT/93517630/09/01/12/2023/en

2.5.13 Safety guidelines for welding work on the machine

1. Disconnect the battery before working on the electrical system or before carrying out any arc welding work on the machine.
   Always disconnect the negative terminal (-) first and reconnect it last.
   In addition, before any welding work on the machine, unplug the plugs on the electronic boxes, the electronic load display as well as the plugs on the display units and on the joystick.
   For arc welding on the machine, make the ground point in immediate vicinity of the welding location.

2.5.14 Safety guidelines for working on the working attachment

1. Never work underneath the working attachment as long as it is not safely resting on the ground or properly supported.
2. Do not attempt to lift heavy parts. Use suitable lifting devices with sufficient load carrying capacity.
3. When working with wire cables, always wear gloves!
4. Never loosen any hydraulic oil lines or fittings before the working attachment has been lowered and the engine has been turned off. Then release the internal tank pressure.
5. After completion of all maintenance and repair work, make sure that all lines, hoses and fittings are properly connected and retightened.
6. Removing and installing tempered steel bolts and pins can be dangerous, metal chips can cause severe injuries.
   Always wear gloves and safety glasses.
7. If possible, use special tools (such as mandrels, pin pullers, etc.).

2.5.15 Safety guidelines for loading the machine with a crane

1. Retract the telescopic boom completely, empty the working attachment, lower the working attachment and tilt in to stop.
2. Bring the control lever into neutral position.
3. Before you leave the driver's seat: Turn the engine off according to the directions in the Operating instructions, block the working hydraulic and apply the parking brake.
4. Close all doors, covers and hoods on the machine properly.
5. Fold the outside mirrors in.
6. Only permit experienced personnel to secure loads and signal operators. The signaller must position himself within the view of the operator or be in voice contact with him.
7. Attach the suspension on the designated brackets or bore holes on the machine.
8. Make sure the suspension is of sufficient length.
9. During the loading procedure **no** personnel may be in, on or under the machine.
10. Carefully lift the machine.
11. **It is prohibited for anyone to be underneath the lifted machine.**
12. When returning the machine to operation, proceed only as outlined in the Operating instructions.

2.5.16 Safety instructions for maintenance of hydraulic hoses and hose lines

1. Hydraulic lines and hoses may never be repaired! This is strictly prohibited!
2. All hoses, hose lines and fittings must be checked regularly, and at least once per year for leaks and any externally visible damage! Any damaged parts must be replaced immediately. Oil spray can lead to injuries and fires.
3. Even if hoses and hose lines are properly stored and used, they undergo a natural aging process. For that reason, their service life is limited.
4. Improper storage, mechanical damage and improper use are most frequent causes of hose failures.
5. Service life of a hose line may not exceed six years, including a storage period of a maximum of two years (always check manufacturer's date on hoses).
6. Using hoses and lines close to limit ranges of permitted use can shorten service life (for example at high temperatures, frequent working cycles, extremely high impulse frequencies, multi shift operation).

LWT/93517630/09/01/12/2023/en

7. Hoses and lines must be replaced if any of following conditions are found during an inspection:
   Criteria:
   - Damage to outer layer as far as intermediate layer (e.g. chafing, cuts and cracks).
   - Brittleness of outer layer (hose material cracking);
   - Deformations, which differ from natural shape of hose or hose line, when under pressure or not under pressure, or in bends, e.g. separation of layers, blisters or bubble formation;
   - Leaks;
   - Failure to follow installation instructions;
   - Damage or deformation in hose fittings, which reduce stability of fitting or connection from hose to fitting;
   - Hose slipping out of fitting;
   - Corrosion of fitting, which reduces function and strength;
   - Storage time or service life has been exceeded.
8. When replacing hoses and hose lines, use only Original spare parts.
9. Route and install hoses and hose lines properly. Do not mix up connections.

2.5.17 Safety guidelines for maintenance work on machines with hydro accumulators

1. Only especially trained expert personnel may work on hydro accumulators.
2. Improper mounting and handling of hydro accumulators can cause severe accidents.
3. Do not operate damaged hydro accumulators.
4. Before working on hydro accumulators, relieve pressure in hydraulic system (hydraulic system including hydraulic tank), as described in these operating instructions.
5. Do not weld or solder on hydro accumulator and do not carry out any mechanical work.
   Hydro accumulator can be damaged due to heat exposure and can rupture due to mechanical treatment. **THERE IS A DANGER OF EXPLOSION!**
6. Fill hyrdo accumulator only with nitrogen. When using oxygen or air, there is a **DANGER OF EXPLOSION!**
7. Accumulator housing can become hot during operation, there is a danger of burning.
8. New hydro accumulators must be charged to required pressure for application before use.
9. Operating data (minimum and maximum pressure) is marked permanently on hydro accumulators. Make sure that marks remain visible.

2.5.18 Roll over protective structure (ROPS) and falling object protection structure (FOPS)

Machine is equipped with an operator's cab, which provides overroll (ROPS) and falling objects (FOPS) protection for machine operator.

2.5.18.1 Avoid accidents

Dangerous situations can occur depending on application and method of operation, even with intact protective devices. Avoid all unsafe methods of operation.

Note

Total weight of machine!

- When installing working tools and attachments, make sure that total weight of machine is below weight for which roll over protective structure was certified. Protective function of roll over protective structure is not longer ensured if maximum permissible overall weight of machine is exceeded (see identification plate).

Following changes on machine can cause maximum permissible total weight to be exceeded:

LWT/93517630/09/01/12/2023/en

- Use of attached tools which are too heavy
- Change of working attachment
- Additions or modifications on machine

A machine with a damaged cab protective system (ROPS, FOPS) may not be placed into operation.

Damage to operator's cab can be caused by following work and occurrences:

- Welding, cutting or drilling of holes
- Attaching fittings
- Deformation after an accident
- Falling objects

Structural changes or repair of any kind are prohibited.

2.5.18.2 Avoid injuries

Roll over protective structure of operator's cab protects operator only when operator is wearing the safety belt.

Any changes in interior of operator's cab, for example as a result of installation of accessories, may not restrict working area of operator.

Any objects carried in operator's cab may not protrude into working area of operator. Loose objects must be stored safely.

2.5.19 Equipment and attachment parts

1. Equipment and attachment parts made by other manufacturers or those which were not approved by Liebherr for installation or attachment may not be installed on the machine without prior written approval by Liebherr.
   Liebherr must be provided with the required technical documentation necessary for this purpose.
2. When attaching equipment parts which are supplied via the machine's hydraulics system, such as for example an add-on unit with cylindrical movement, make sure that different types of oil are not mixed together. Mixing environmentally friendly hydraulic oils made by different manufacturers and mixing them with mineral oils must be avoided at all times.
3. After installation and modification of any equipment or tires, the stability of the machine according to **EN 1459 B** must be checked and ensured.

2.5.20 Protection from vibrations

1. Vibration impact on mobile construction machinery is usually result of manner of utilization. Especially following parameters have a significant influence:
   Terrain conditions: unevenness and potholes;
   Operating techniques: speed, steering, braking, control of operating elements of machine during travel as well as working.
2. Machine operator determines vibration impact to a large extent, as he himself selects speed, gear ratio, working manner and travel route. This results in a wide range of various vibration impacts for same machine type.
3. Full body vibration impact for machine operator can be reduced if following recommendations are observed:
   Select appropriate machine, equipment parts and auxiliary devices for corresponding tasks.
   Use a machine equipped with appropriate seat (i.e. for earth moving machines, for example hydraulic excavators, a seat which meets EN ISO 7096).
4. Keep seat in good order and adjust it as follows:
   Seat adjustment and suspension should be made according to weight and size of operator.
   Check suspension and adjustment mechanism regularly and make sure that characteristics of seat remains as specified by seat manufacturer.
5. Check maintenance condition of machine, particularly with regard to: tyre pressure, brakes, steering, mechanical connections, etc.

LWT/93517630/09/01/12/2023/en

6. Do not steer, brake, accelerate and shift or move and load attachment of machine in a jerky manner.
7. Match machine speed to travel route to avoid vibration impacts.
   Decrease speed when driving on pathless terrain.
   Drive around obstacles and avoid very impassable terrain.
8. Keep quality of terrain where machine is working and travelling in good order:
   Remove large rocks and obstacles;
   Fill furrows and holes.
   To establish and retain suitable terrain conditions, keep machines available and allow for sufficient time.
9. Travel longer distances (i.e. on public roads) with suitable (medium) speed.
10. For machines, which are frequently used for travel, utilize special auxiliary systems for travel (if installed), which reduce vibration for this application.
    If such auxiliary systems are not available, regulate speed to keep machine from "rocking".

2.5.21 Safety guidelines for machine application in material handling operation

1. Particularly when working with a grapple it can be necessary to move the machine with a raised working attachment and picked up load, for example when handling wood or timber.
   - This will shift the centre of gravity of the machine upwards. The travel behavior of the machine will be strongly influenced, for example reduction of dynamic stability.
     For that reason, the following rules must be strictly observed:
     - Match your travel behavior to the changed machine characteristics and surrounding conditions.
     - Avoid sudden speed changes, such as braking, acceleration, changes in travel direction.
     - Move the machine only after you have taken on and raised the load safely.
     - If the working attachment is raised, there is a danger due to possible oscillating movements and falling of the picked up load.
     - A protective grill for the front window should be installed on the front on the operator's cab.
     - A protective roof (FOPS) according to ISO 10262 is part of the operator's cab.
     - Only the maximum permissible load may be picked up with the working attachment.
       Note: The weight of absorbent material, such as wooden logs, can change. The existing influencing factors for a natural product, such as moisture, must be considered. When maneuvering with a load, keep it as close to the machine as possible and at a slight distance to the ground.
       Avoid abrupt deceleration or acceleration of the working and travel functions.
2. The working sequences when working with machines with optional equipment require special instruction and training of the operator.
   The operation in the work cycle is only permitted after the operator has received sufficient training and practical experience.

2.5.22 Safety instructions for machine application with quick coupler

1. Quick couplers made by other manufacturers or those which were not approved by Liebherr for installation or attachment may not be installed on the machine without prior written approval by Liebherr.
2. When retrofitting or modifying a quick coupler approved by Liebherr, the driving test and stacking test must be carried out in accordance with EN 1459.
3. Make sure that there are no persons within the work area of the working attachment when installing or removing working attachments. Move the working hydraulic as slowly as possible when installing or removing a working attachment. Familiarize yourself with the function of the quick coupler before installing or removing the working attachment.
4. Always keep the working attachment as close to the ground as possible when locking and unlocking to avoid dangerous movements.
5. If necessary, use a suitable access aid to reach the locking pins and connections. Never stand on the working attachment.

LWT/93517630/09/01/12/2023/en

6. Every time the working attachment is changed, the operator must ensure that the locking pins of the quick coupler are inserted in the respective bores on the working attachment and that they accept it correctly. The working attachment must be visually checked to ensure that it is seated tightly.
7. In addition, a work cycle should also be carried out with the working attachment, raising it only to the point where the correct seating, for example, the pin in the pin eye can be checked by tilting it in and out.

2.5.23 See and be seen

You as the machine operator perceive the most information for your work visually. You can only minimise possible dangers to yourself and others if there is sufficient vision while travelling and working.

Since there is no direct view onto all areas in the surroundings, visual aids (such as mirrors and cameras) are installed on the machine. These visual aids are to be used for the areas around the machine which are not directly visible.

WARNING

Some installations and equipment can limit the visibility of the machine operator.

Danger of accident!

- ► Pay attention to limitations in the field of vision and to blind spots.
- ► Use the help of a guide if necessary.

Observe national regulations regarding vision in the operator's cab. For countries within the European Economic Area, the Standard EN 15830 describes the test and evaluation methods for the machine operator's field of vision. The field of vision is tested in this case with standard equipment. Changes to the machine, such as installation or modification of components may not impact the field of vision. When changes impact the field of vision, 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.

2.5.23.1 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 (39.4 ft) 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 hazard zone.
- ► Do not move a load with raised telescopic boom.
- ► Move a load exclusively in transport position.

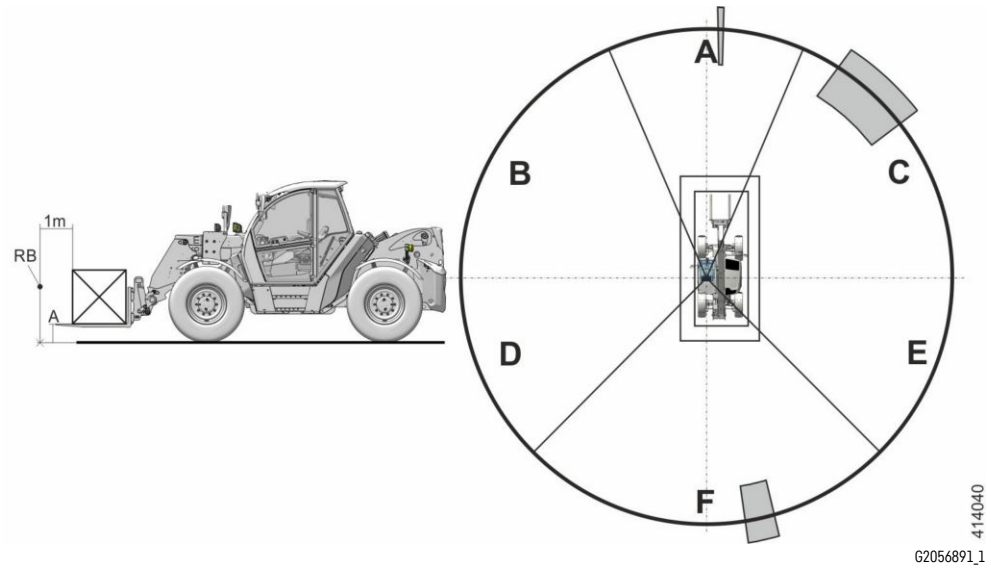
The machine operator and construction site management must take measures to ensure that the obscured field of vision does not cause a safety hazard during operation.

LWT/93517630/09/01/12/2023/en

2.5.23.2 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 (17.72 in) and load in the field of vision radius of 12 metres.



Field of vision measurement with load

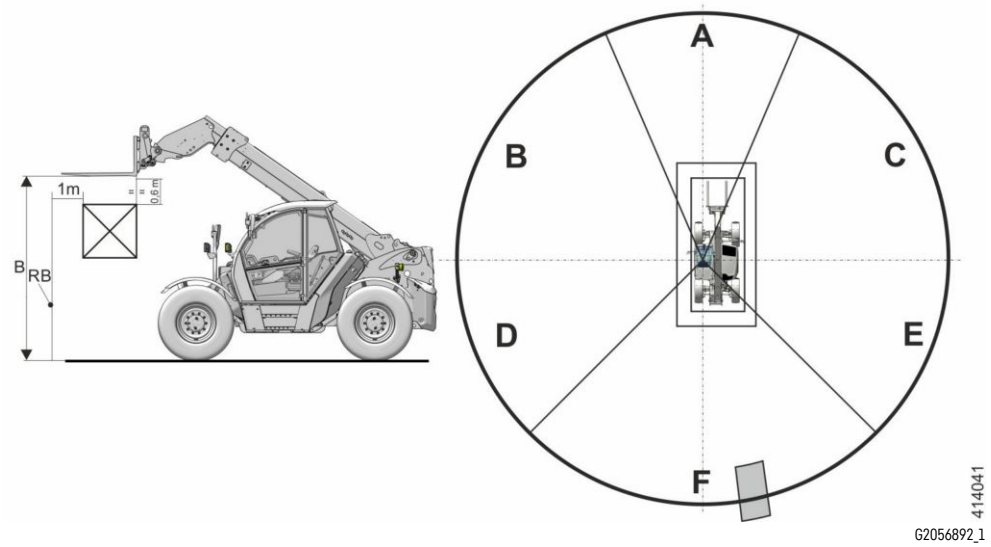
Height A = 500 mm +/- 50 mm.
RB = Right angled 1 m limit

The following visual shadows cannot be seen from the operator's seat:

– Areas with a grey background in the sectors **A**, **C** and **F** indicate the restrictions in the field of vision.

Restriction of field of vision with attached load

The graphic describes the existing visual shadows with forklift device at retracted and raised telescopic boom of B = 2,200 mm (86.61 in) and load in the field of vision radius of 12 metres.



Field of vision measurement with attached load

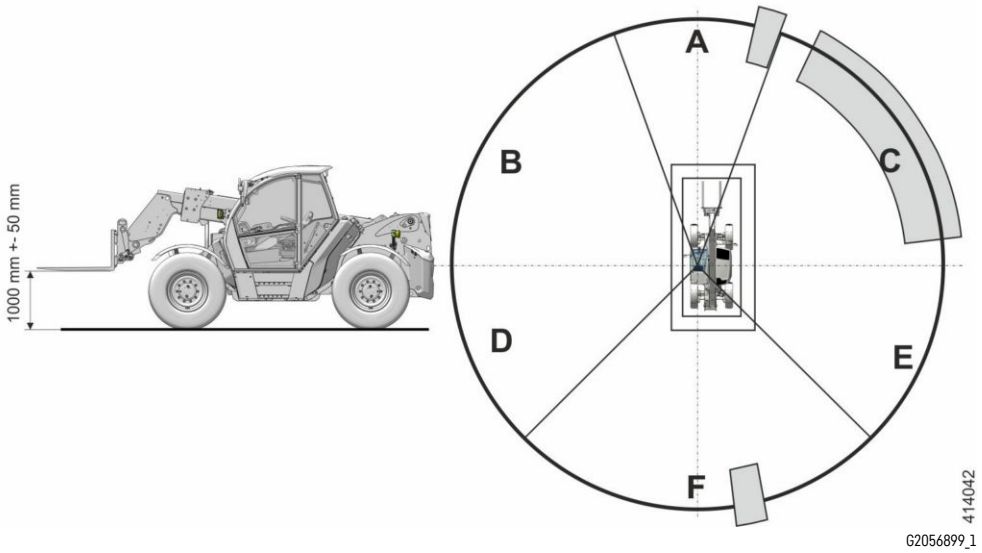
Height B = 2200 mm +/- 50 mm.
RB = Right angled 1 m limit

The following visual shadows cannot be seen from the operator's seat:

– Areas with a grey background in sector **F** indicate the restrictions to the field of vision.

Restriction to field of vision for truck loading

The graphic describes the existing visual shadows with forklift device at retracted and raised telescopic boom of B = 1,000 mm (39.37 in) and load in the field of vision radius of 12 metres.



Field of vision measurement for truck loading

Height = 1000 mm +/- 50 mm.

The following visual shadows cannot be seen from the operator's seat:

– Areas with a grey background in the sectors **A**, **C** and **F** indicate the restrictions in the field of vision.

2.5.23.3 Measures before and during operation

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

LWT/93517630/09/01/12/2023/en

2.5.24 Trailer operation

1. The machine must be approved for trailer operation.
2. Adhere to the national regulations regarding trailer operation.
3. The relevant national operator's license is required.
4. Transportation of persons on/in trailers is NOT permitted.
5. Comply with the maximum permissible support load and trailer load.
6. Do not exceed the permissible speed of trailer.
7. Trailer operation at the towing device of machine is not permitted.
8. The operating behaviour of machine changes for trailer operation. The operator must be familiar with this and act accordingly.
9. Observe steering mode of machine and turning range of trailer.
10. Secure the trailer against rolling away prior to connection and disconnection (parking brake, suitable chocks for example).
11. No persons may stand in space between machine and trailer when connecting a trailer.
12. Connect trailer to the machine properly.
13. Make sure that all devices are in proper working order (brakes, lighting systems for example).
14. Prior to driving off, make sure that there are no persons between machine and trailer.

2.5.25 Air brake system for trailers

1. If a trailer is connected, do not drive off until the pressure gauge in the operator's cab displays the specified pressure. Page 264
2. For journeys without a trailer, the covers of coupling heads on the machine need to be closed.
3. Close the coupling head lid on the parked trailer or hang it on the existing dummy coupling heads.
4. Prior to connecting and disconnecting the trailer, make sure that the sealing rings of coupling heads are neither damaged nor contaminated.
5. Prior to commencing a journey with a trailer: put lever of trailer brake power regulator in the position appropriate to the load status (empty, 1/2 load, loaded).
6. The application of the new EU regulation 167/2013 may lead to a different braking behaviour of the tractor-trailer/towed equipment combination compared to the previous EU directive 2003/37. Correct adjustment of the braking performance between tractor and trailer/towed implement must be ensured.
7. Never exceed maximum permissible total weight of trailer.
8. The travel speed of machine with trailer must not exceed the maximum permissible highest speed of slowest trailer that is carried along.
9. Without exception, have repairs and adjustment work on the air brake system carried out by an approved workshop.

2.5.26 Hydraulic trailer brake

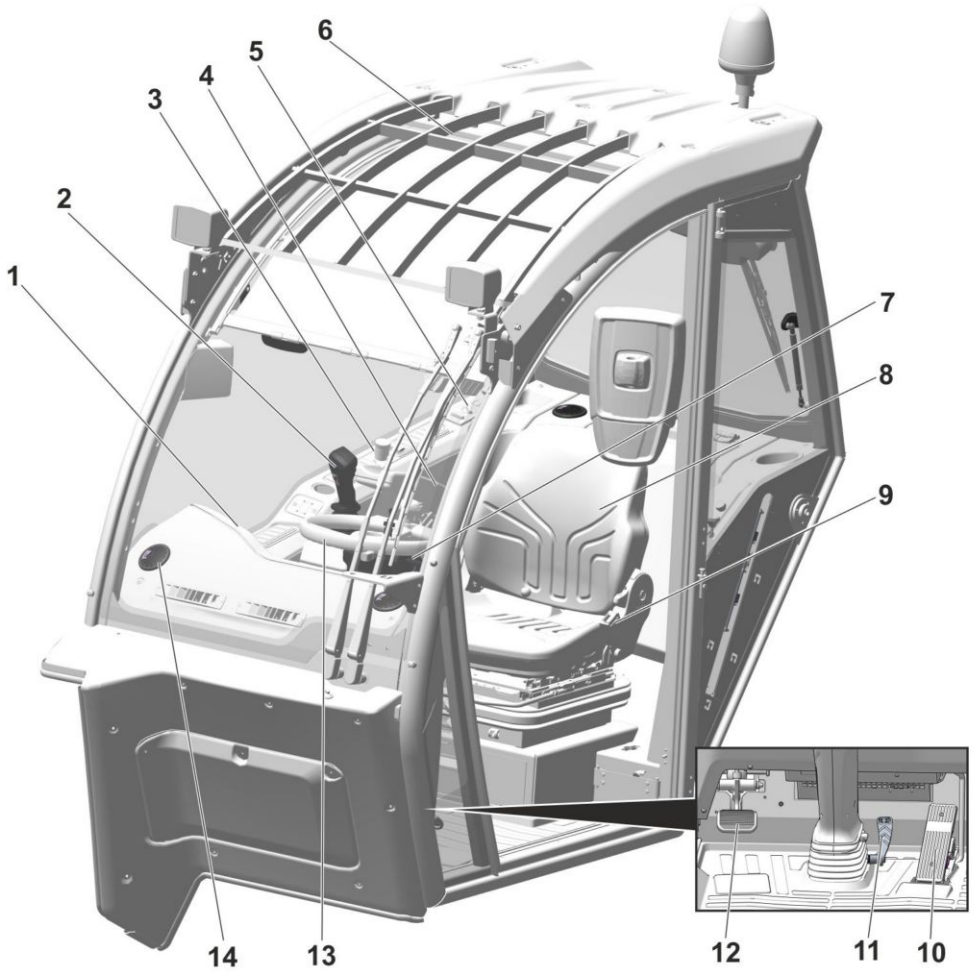
1. Only trailers with hydraulic brakes may be used if such trailers are approved for full braking with a maximum braking pressure of 150 bar (2,176 psi).
2. The application of the new EU regulation 167/2013 may lead to a different braking behaviour of the tractor-trailer/towed equipment combination compared to the previous EU directive 2003/37. Correct adjustment of the braking performance between tractor and trailer/towed implement must be ensured.
3. Never exceed maximum permissible total weight of trailer.
4. The travel speed of machine with trailer must not exceed the maximum permissible highest speed of slowest trailer that is carried along.
5. Without exception, have repairs and adjustment work on the hydraulic brake carried out only by an approved workshop.

LWT/93517630/09/01/12/2023/en

3 Operation and control

3.1 Operating and control elements

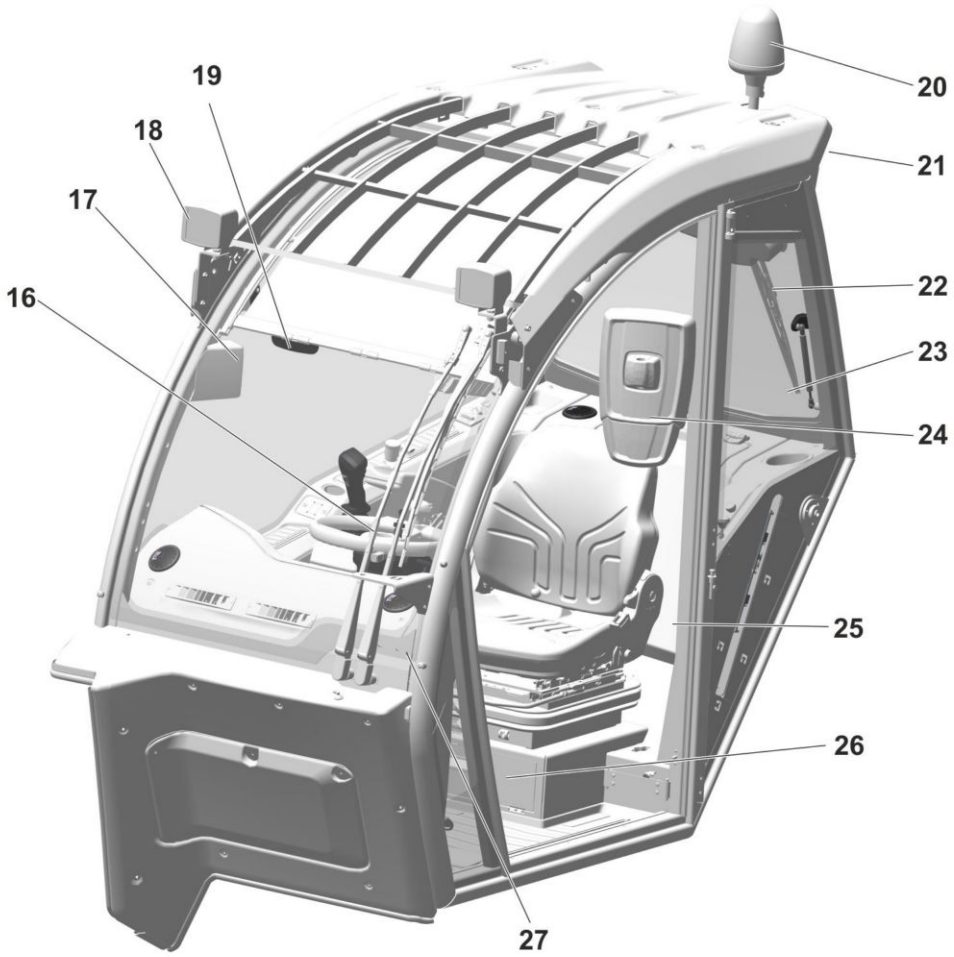
3.1.1 Operator's cab



Interior view of operator's cab

1	Display unit	**8**	Operator's seat
2	Control lever	**9**	Safety belt
3	Side console control elements	**10**	Accelerator pedal
4	Armrest	**11**	Lever adjustment of steering column
5	Heating and air conditioning unit control elements	**12**	Inching brake pedal
6	Interior lighting	**13**	Steering wheel and steering column
7	Steering-column switch	**14**	Vents for heating

LWT/93517630/09/01/12/2023/en



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Interior view of operator's cab

16	Windscreen wiper, windscreen	**22**	Windscreen wiper, rear screen
17	Load torque display	**23**	Emergency exit
18	Working headlight, front[8)]	**24**	Exterior mirror
19	Interior mirror[8)]	**25**	Relays and fuses
20	Beacon[8)]	**26**	Compartment for documentation
21	Working headlights, rear[8)]	**27**	Level display[9)]

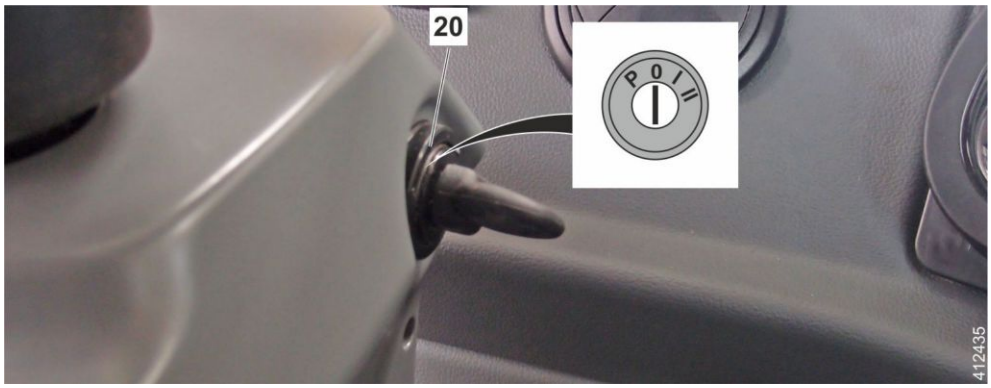
[8)] Option

[9)] Option for T60-9

LWT/93517630/09/01/12/2023/en

3.1.2 Control elements in the operator's cab

3.1.2.1 20 Starting switch



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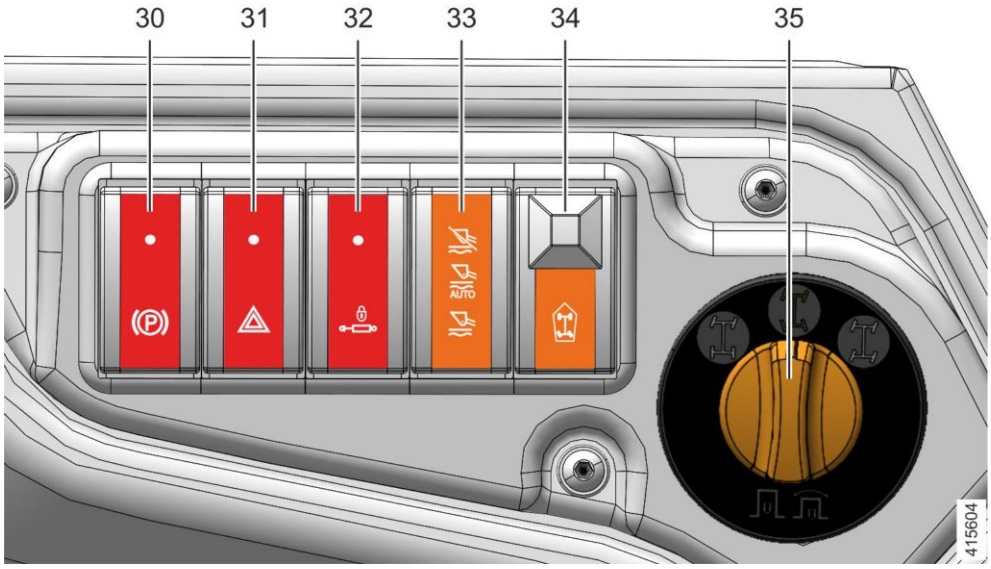
Starting switch

Switch positions:

P - Parking position
0 - Zero position (diesel engine and electronics off)
I - Contact position, operating position, preheat position
II - Starting position

3.1.2.2 Control elements, front



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Control elements, front

LWT/93517630/09/01/12/2023/en

30 «Parking brake» switch

Press top part of switch: Parking brake is deactivated.

Press bottom part of switch: Parking brake of machine and trailer is activated.

«Parking brake» symbol is shown on the display.

31 «Warning system» switch

Press bottom part of switch: Machine blinker flashes.

«Blinker» indicator light on the steering column flashes.

Press top part of switch: Machine blinker turns off.

«Blinker» indicator light on the steering column turns off.

The switch also functions when the starting switch is in zero or parking position.

32 «Working hydraulics off» switch

Press top part of switch: Working hydraulics off is deactivated.

Press bottom part of switch: Working hydraulics off is activated. The working hydraulics cannot be activated

«Working hydraulics off» symbol is shown on the display.

33 «Ride control» switch (option)

Press top part of switch: Function is deactivated.

Switch in middle position: Function is automatically activated starting at a travel speed of 7 km/h (4.3 mph).

«Auto ride control» symbol is shown on the display.

Press bottom part of switch: Function is activated.

«Ride control» symbol is shown on the display.

34 «Front axle steering with adjusted rear axle» button

35 «Steering modes» rotary switch

Put rotary switch in the desired steering mode.

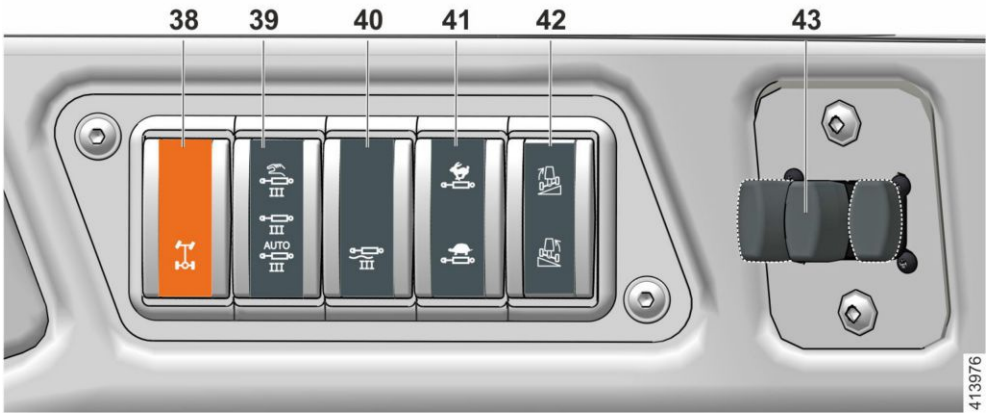
Steering mode is shown on the display.

Pull up rotary switch: «Steering modes» rotary switch is locked.

Press rotary switch: «Steering modes» rotary switch is enabled.

LWT/93517630/09/01/12/2023/en

3.1.2.3 Control elements, side console, front



G2052507_1

Control elements, side console, front

38 «4x4 shut-off» button (option)


414419

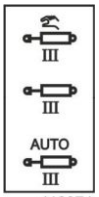
Press bottom part of button: 4x4 shut-off is activated.

«4x4 shut-off» indicator light lights up on display unit.

Press bottom part of button when 4x4 shut-off is active: 4x4 shut-off is deactivated.

«4x4 shut-off» indicator light goes out on display unit.

39 «Control circuit III» switch (option)



412374

Press top part of switch: Control circuit III manual operation

Switch in middle position: Adjust flow volume.

Press bottom part of button: Store flow volume.

40 «Control circuit III pressure relief» button (option)

412375

To dissipate the pressure in the hydraulic lines:

Press button for 5 to 10 seconds: control circuit III is relieved of pressure.

«Control circuit III pressure relief» symbol is shown on the display.

41 «Working hydraulics fine control» switch (option)


412381

Press top part of switch: Working hydraulics fine control is deactivated.

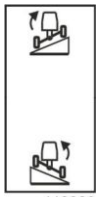
«Working hydraulics fine control „Hare (OFF)“» symbol is shown on the display.

Press bottom part of switch: Working hydraulics fine control is activated.

«Working hydraulics fine control „Tortoise (ON)“» symbol is shown on the display.

LWT/93517630/09/01/12/2023/en

42 «Level adjustment» button


412380

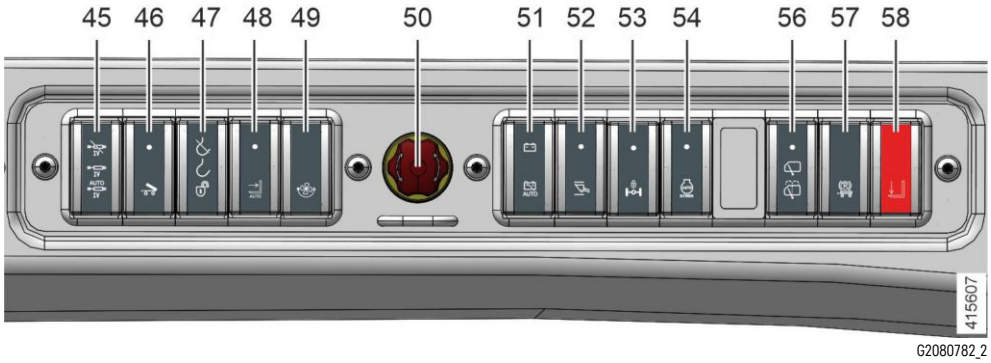
Press button on right: Level adjustment to the right

Press button on left: Level adjustment to the left

43 «Rear hydraulics» control lever (option)

The various functions of rear hydraulics are activated with the control lever.

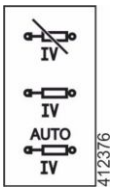
3.1.2.4 Control elements, side console, rear



G2080782_2

Control elements, side console, rear

45 «Additional control circuit IV» switch (option)



412376

Press top part of switch: Additional control circuit IV is deactivated.

Switch in middle position: Set the desired flow volume with the «Additional control circuit» control lever.

Flow volume is shown as a percentage (%) on the display.

«Auxiliary control circuit IV» symbol is shown on the display.

Press bottom part of switch: Flow volume is saved.

«Auxiliary control circuit IV AUTO» symbol is shown on the display.

46 «Tipper» switch (option)


412377

Press top part of switch: Function is deactivated.

Press bottom part of switch: Function is activated.

«Tipper» symbol is shown on the display.

47 «Auto-hitch» switch (option)


412378

Press top part of switch: Auto-hitch function is deactivated.

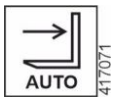
Switch in middle position: auto-hitch is locked.

«Auto-hitch locked» symbol is shown on the display.

Press bottom part of switch: Auto-hitch is not locked.

«Auto-hitch unlocked» symbol is shown on the display.

48 «Automatic retraction of telescope» switch (option)



417071

Press switch upward: «Automatic retraction of telescope» is deselected.

Press switch downward: «Automatic retraction of telescope» is preselected.

49 «Reversible fan control» button (option)


410650

Press bottom part of button and hold it.

The mode switches between automatic and manual control of the reversible fan.

Press bottom part of button.

Reversible fan is activated.

50 Emergency stop button

The machine stops immediately when the emergency stop button is pressed.

- 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 two 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 display unit.

LWT/93517630/09/01/12/2023/en

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)

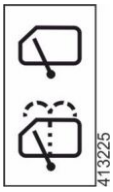
412385

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.

Switch centre position: Side window windscreen wiper is activated.

Press bottom part of switch: Side window windscreen washer system is activated.

57 «Trailer brake» button (option)

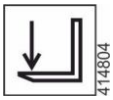

412505

«Parking brake» switch is activated.

Press bottom part of button and hold it: Trailer brake is released.

Release button: Trailer brake is activated.

58 «Emergency down» button (option)


414804

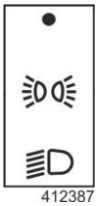
Press bottom part of button and hold it: Emergency down is activated.

3.1.2.5 Control elements - roof console right

G2036038_2

Control elements - roof console right

60 «Parking light and driving light» switch


412387

Press top part of switch: Parking light, driving light and side marker lights are switched off.
Switch in centre position: Parking light and side marker lights are switched on.
Press bottom part of switch: Driving light and side marker lights are switched on.

61 «Beacon» switch (option)


414845

Press top part of switch: Beacon is switched off.
Press bottom part of switch: Beacon is switched on.

62 «Working headlights, front» switch (option)


414846

Press top part of switch: Front working headlights are switched off.
For on-road travel, the working headlights must be switched off.
Press bottom part of switch: Front working headlights are switched on.

63 «Working headlights, rear» switch (option)


414847

Press top part of switch: Rear working headlights are switched off.
For on-road travel, the working headlights must be switched off.
Press bottom part of switch: Rear working headlights are switched on.

64 «Working headlights on telescopic boom» switch (option)


412388

Press top part of switch: Working headlights on the telescopic boom are switched off.
For on-road travel, the working headlights must be switched off.
Press bottom part of switch: Working headlights on the telescopic boom are switched on.

65 «Working headlights, side» switch (option)


412389

Press top part of switch: Working headlights on the side are switched off.
For on-road travel, the working headlights must be switched off.
Press bottom part of switch: Side working headlights are switched on.

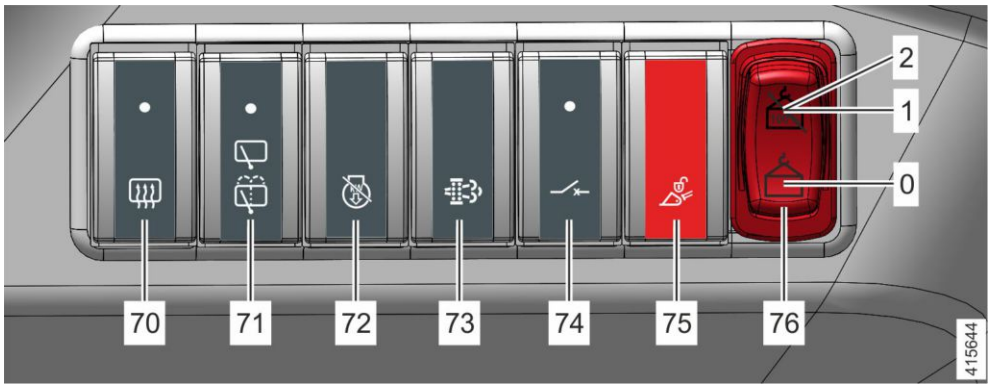
66 «Working headlights, rear» switch (option)


412390

Press top part of switch: Rear working headlights are switched off.
For on-road travel, the working headlights must be switched off.
Press bottom part of switch: Rear working headlights are switched on.

LWT/93517630/09/01/12/2023/en

3.1.2.6 Roof console control elements, left

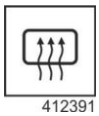


G2081643_1

Roof console control elements, left

[10] For emission stage V

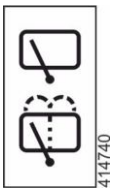
70 «Window heating» button (option)


412391

Press bottom part of button: Right-hand side window and rear screen are heated.

Switches off after a certain time.

71 «Rear screen windscreen washer system» switch


414740

Press top part of switch: Rear screen windscreen wiper is deactivated.

Press switch to centre position: Rear screen windscreen wiper is activated.

Press bottom part of switch: Rear screen windscreen washer system is activated.

72 «Bypass output reduction»[10] button


413563

Press bottom part of button: Output reduction of diesel engine is cancelled for 30 minutes. Page 274

Move the machine out of the hazard zone.

73 «Exhaust gas treatment regeneration»[10] button


412392

Press bottom part of button: Regenerate exhaust gas treatment.

«Exhaust gas treatment regeneration» symbol is shown on the display.

Press button again: Active regeneration is aborted.

If the function is active:

- Apply the parking brake. Page 105
- Activate working hydraulics off. Page 105

LWT/93517630/09/01/12/2023/en

74 «Front socket» switch (option)


412394

Press top part of switch: Front socket is without current.

Press bottom part of switch: Front socket is live.

75 «Quick coupler» button (option)


412395

«Control circuit III» switch must be in manual operation position.

Press bottom part of button and hold it: Quick coupler is activated.

«Quick coupler» indicator light lights up on display unit.

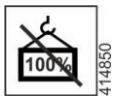
When this function is activated, an acoustic signal sounds.

76 «Load torque limitation» switch with touch function


414849

Stage 0:

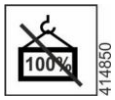
- Engaged
- Press bottom part of switch.
- Machine monitors load-increasing machine functions and does not permit loads over 100% in any operating status.
- When 90% load torque has been reached, an acoustic warning signal sounds in one second intervals.
- When 100% load torque has been reached, only load reducing movements are possible.



414850

Stage 1:

- Engaged
- Move switch to middle position.
  «Load torque limitation active» symbol is shown on the display.
  «Load torque limitation restricted» symbol is shown on the display during travel mode.
- Machine monitors all machine functions and permits loads over 100% in certain operating statuses.
- When 90% load torque has been reached, an acoustic warning signal sounds in one second intervals.
- **Stage 1** cannot be activated at a hoist angle over 40°.



414850

Stage 2:

- Touching
- Press top part of button and hold it.
  A warning sound is emitted.
  «Load torque limitation deactivated» symbol is shown on the display.
- The touch function enables larger loads over 100 % to be manually permitted in exceptional circumstances for a limited time.

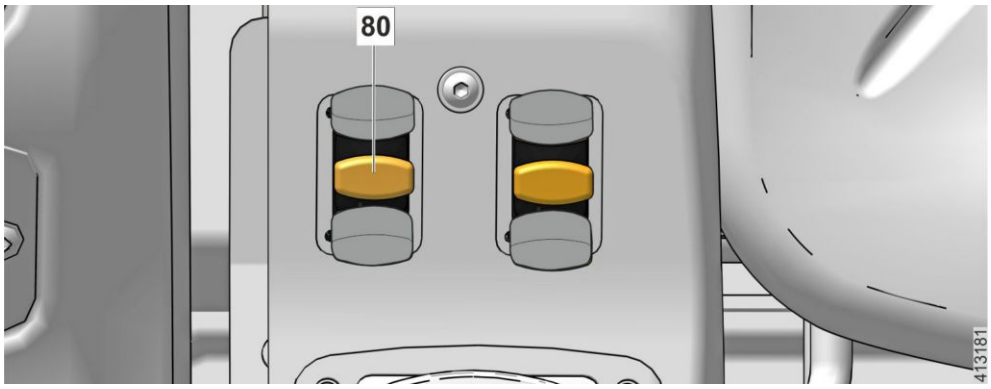
Note

Machine stability at risk!

- ► For safety reasons, **stage 2** is permissible only with two hand operation.
- ► Hold button down.
- ► **Stage 2** is only available for 60 seconds.
- ► The working hydraulics are locked after 60 seconds.
- ► **Stage 0** is used automatically after 60 seconds.

LWT/93517630/09/01/12/2023/en

3.1.2.7 80 «Manual throttle» control lever (option)

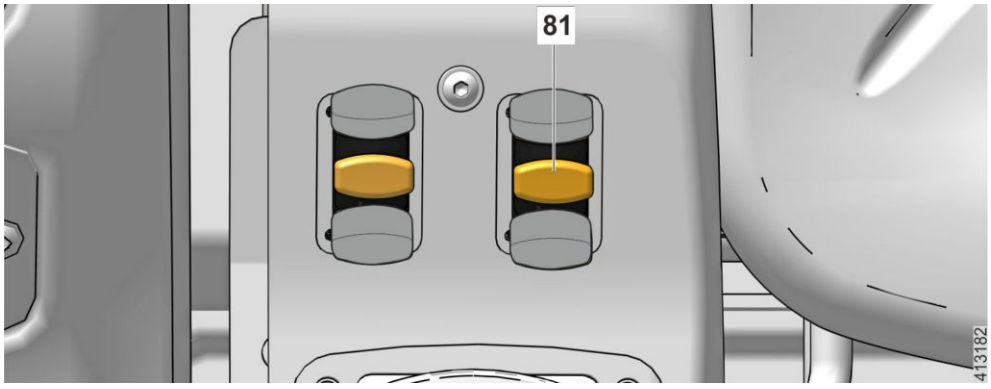


G2036110_1

«Manual throttle» control lever

A travel command is given with the control lever **80** and the engine speed is continuously adjusted.

3.1.2.8 81 «Gradual travel device» control lever (option)



G2036111_1

«Gradual travel device» control lever

Control lever **81** is used to continuously regulate the maximum travel speed.

3.1.2.9 90 «Heating and air conditioning» control elements

G2036113_1

Control elements for the heating and air conditioning

90	«Heating» control elements	**91**	«Air conditioning» control elements

Location of control elements for the heating Page 154 and the air conditioning. Page 155

LWT/93517630/09/01/12/2023/en

3.1.2.10 95 USB charging socket (option), 96 Radio (option), 97 Socket

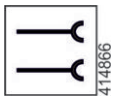
G2044550_1

USB charging socket, radio, socket

95	USB charging socket (option)	**97**	12 V socket
96	Radio (option)		

USB charging socket **95** for charging electronic devices

Operation of the radio **96** is described in the separate radio operator's manual.



The 12 V socket **97** is installed on the right-hand side next to the radio **96**.

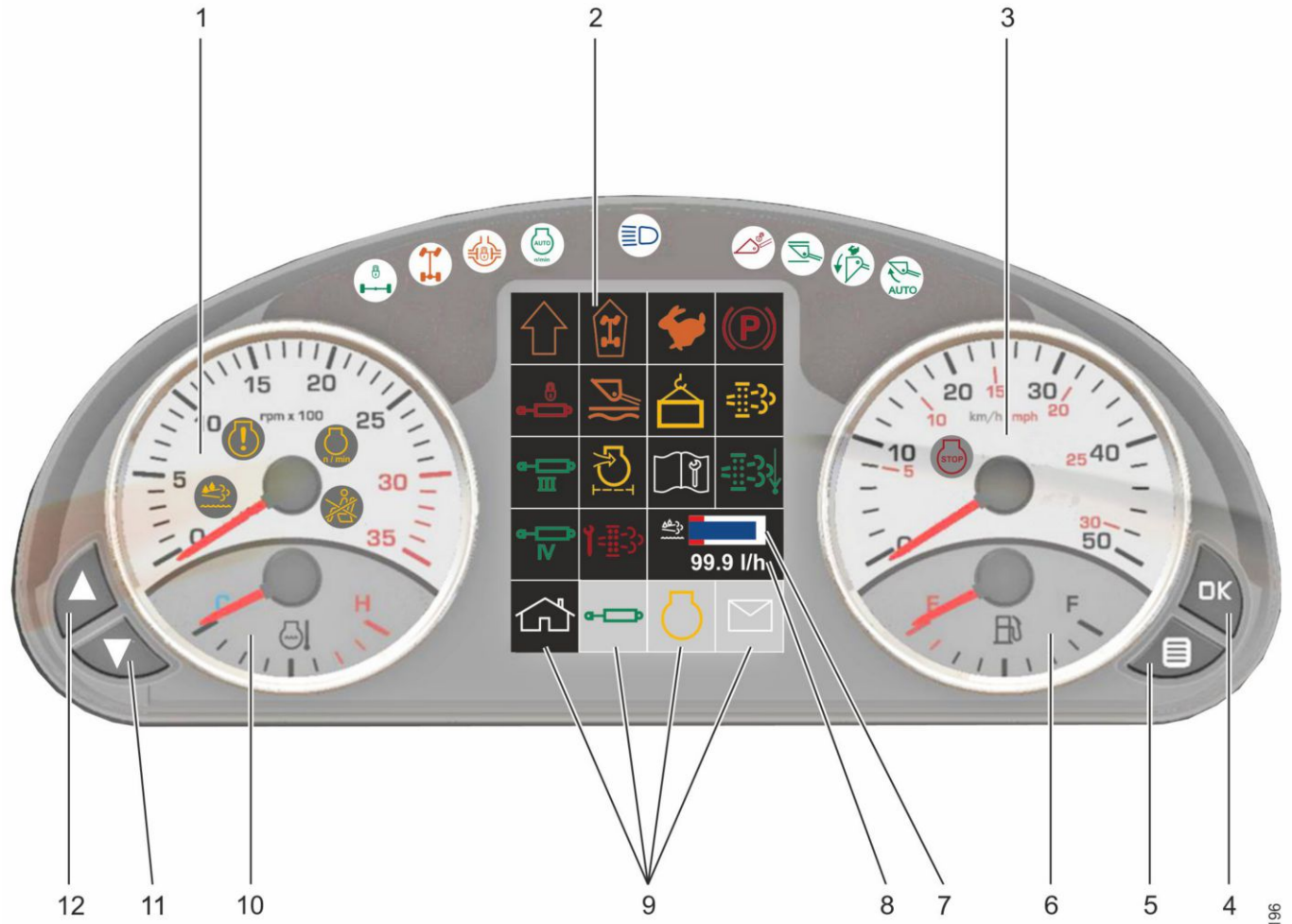
Auxiliary devices (maximum load 10 A) can be connected via the 12 V socket **97**.

Only usable if starting switch is in contact position.

3.1.3 3.5" display unit

The display unit is the central information source for the operation of machine. It provides information about the machine's operating data and functions.

LWT/93517630/09/01/12/2023/en



G2074957_4

3.5" display unit

1	Engine speed display	**7**	Diesel exhaust fluid tank content[11]
2	Display	**8**	Current fuel consumption
3	Travel speed display	**9**	Menu bar
4	«Menu start page» button	**10**	Coolant temperature display
5	«Service codes» button	**11**	«Menu bar/Software versions downwards» button
6	Diesel fuel tank content display	**12**	«Menu bar/Software versions upwards» button

[11] For emission stage V

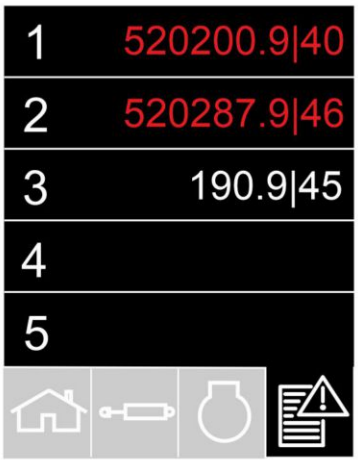
The menu bar **9** is permanently displayed on the display **2**.

The «Menu bar/Software versions downwards» button **11** and the «Menu bar/Software versions upwards» button **12** can be used to move to the next menu item.

A symbol highlighted in black identifies the active menu.

LWT/93517630/09/01/12/2023/en

3.1.3.1 Service codes menu



0009194-01

Service codes menu bar

The «Service codes» menu displays the current service codes of the machine:

- Red service code: Error **not** corrected
- White service code: Error corrected

The service code contains the following information:

- SPN (Suspect Parameter Number)
- FMI (Failure Mode Identifier)
- Source Address

The source address specifies which control unit the service code is assigned to.

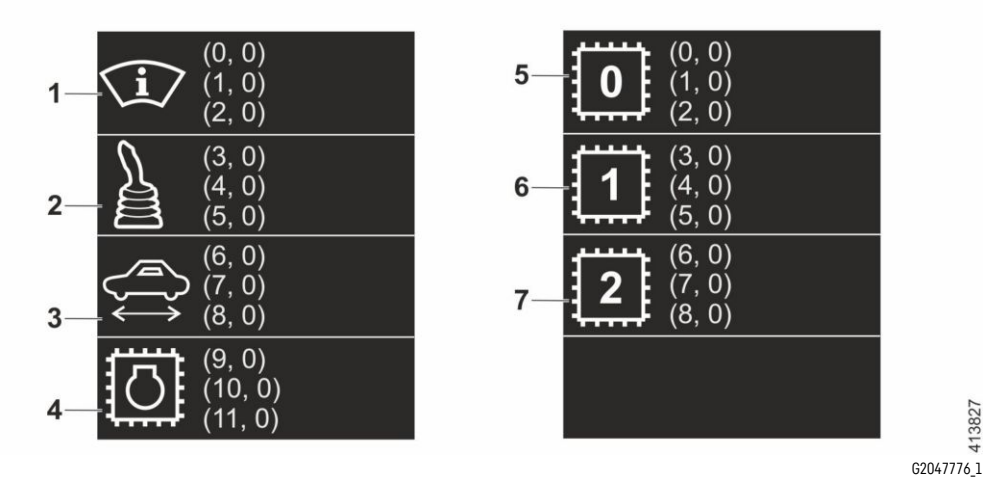
Service codes are shown in this format: „SPN.FMI|Source Address“.

3.1.3.2 Software versions menu

Press «Menu bar/Software versions downwards» button and «Menu bar/Software versions upwards» button at the same time:

- **Software version image 1 menu** is displayed.

LWT/93517630/09/01/12/2023/en



Software version image 1 menu and software version image 2 menu

1	Display unit software version	**5**	Operator's cab control unit software version
2	Control lever software version	**6**	Option package 1 software version
3	Travel control software version	**7**	Option package 2 software version
4	Engine control software version		

Use «Menu bar/Software versions downwards» button and «Menu bar/Software versions upwards» button to switch to **Software version menu image 2**.

3.1.4 7" display unit

The display unit is the central information source for the operation of machine. It provides information about the machine's operating data and functions.

0011357-01

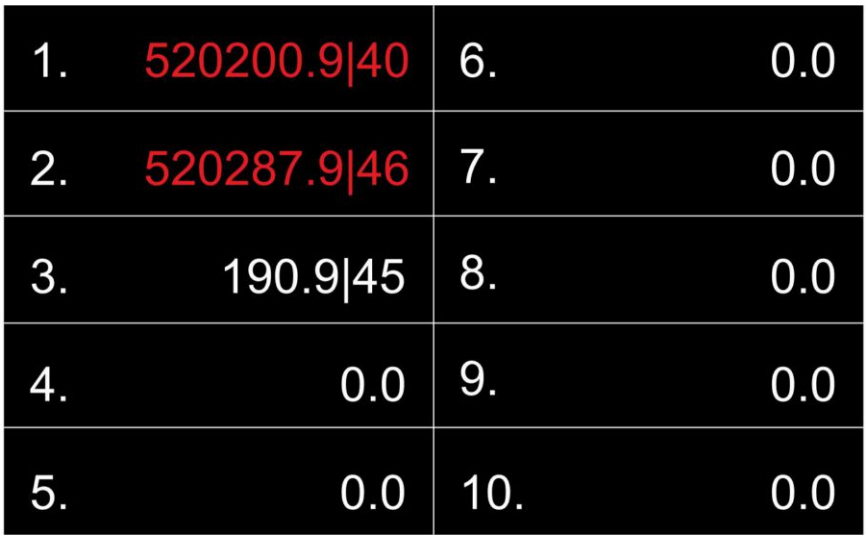
7" display unit

1	Diesel fuel tank content display	**8**	Diesel engine speed
2	Diesel exhaust fluid tank content display[12)]	**9**	«Service codes» button
3	Operating hours of machine	**10**	«Start page» button
4	Start page menu	**11**	«Software versions downwards» button
5	Soot loading in the diesel particulate filter[12)]	**12**	«Software versions upwards» button
6	Brake accumulator pressure display	**13**	Travel speed
7	Coolant temperature display	**14**	Current fuel consumption

[12)] For emission stage V

LWT/93517630/09/01/12/2023/en

3.1.4.1 Service codes menu



0009198-01

Service codes menu

The «Service codes» menu displays the current service codes of the machine:

- Red service code: Error **not** corrected
- White service code: Error corrected

The service code contains the following information:

- SPN (Suspect Parameter Number)
- FMI (Failure Mode Identifier)
- Source Address

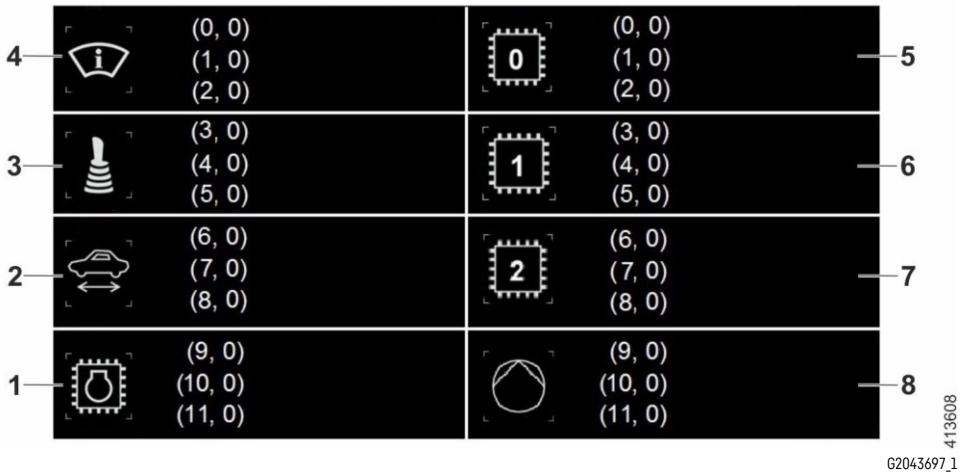
The source address specifies which control unit the service code is assigned to.

Service codes are shown in this format: „SPN.FMI|Source Address“.

3.1.4.2 Software versions menu

Press «Software versions downwards» button and «Software versions upwards» button on the display simultaneously:

- **Software versions menu** is displayed.



Software versions menu

1	Engine control software version	**5**	Operator's cab control unit software version
2	Travel control software version	**6**	Option package 1 software version
3	Control lever software version	**7**	Option package 2 software version
4	Display unit software version	**8**	Pump control software version

3.1.5 Status symbols of the display units

Status symbols of display units

Status symbols	Designation
 412288	Flashes when diesel exhaust fluid tank fill level is too low Display in the event of exhaust gas treatment error[14)] ↘ Page 271
 412229	Display in the event of a service code or diesel engine malfunction Contact Liebherr customer service.
 412283	Diesel engine speed/hydraulic motor speed too high Reduce travel speed to avoid damage to the diesel engine or hydraulic motor. Contact Liebherr customer service.
 412287	Operator absence detection
 412246	Floating axle blocking
 412264	4x4 shut-off
 412273	Differential lock
 412226	Auto Power[13)]
 412228	High beam ↘ Page 129

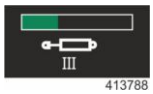
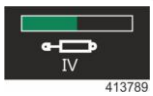
LWT/93517630/09/01/12/2023/en

Status symbols	Designation
 412263	Quick coupler[13]
 412276	Shake/vibrate function[13]
 412261	Tipping cylinder lock[13]
 412262	Bucket repositioning[13]
 412267	Diesel engine stop If this is displayed, switch off diesel engine and contact Liebherr customer service.
 413640	Maintenance display Indicates next maintenance service. Contact Liebherr customer service. Reset the maintenance display: Press and hold «Menu bar/Software versions downwards» button and «Service codes» button at the same time until the symbol is no longer shown in the display.
 412233	Forward travel direction
 412234	Reverse travel direction
 412227	Neutral conditions Indicates unfulfilled neutral conditions for travel mode.
 412238	Front wheel steering
 412240	All wheel steering
 412239	Crab steering
 412237	Front axle steering with adjusted rear axle
 412244	Hoist gear suspension[13]
 412245	Auto hoist gear suspension[13]
 412268	Slow travel stage
 412270	Middle travel stage

Status symbols	Designation
 412269	Fast travel stage
 412231	Load torque limitation active Page 112
 412235	Load torque limitation restricted Page 112
 412232	Load torque limitation deactivated Page 112
 412974	Auto hold Display after 5 seconds of machine downtime Machine parking brake is applied. Trailer brake is **not** applied.
 412236	Parking brake activated Page 105 Machine parking brake and trailer brake are applied.
 412230	Maximum travel speed of the machine
 412275	Exhaust gas treatment contaminated[14] Page 271
 412274	Exhaust gas treatment heavily contaminated. Reduced engine power[14] Page 271
 412277	Active exhaust gas treatment regeneration[14] Page 271
 414000	Ash deposit, diesel particulate filter[14] Page 271
 413786	Brake accumulator pressure too low
 412278	Hydraulic oil level too low Page 443
 412279	Hydraulic oil temperature too high Contact Liebherr customer service.
 412280	Coolant temperature too high Contact Liebherr customer service.
 412281	Water in fuel water separator Page 436
 412282	Return filter contamination
 412284	Air filter contamination Page 438

LWT/93517630/09/01/12/2023/en

Status symbols	Designation
 412225	Error in brake system Contact Liebherr customer service.
 412271	Trailer brake error Contact Liebherr customer service.
 412241	Working hydraulics “Off”
 414803	Emergency down[13] Page 333
	Emergency steering Contact Liebherr customer service.
 417070	Automatic retraction of telescope[13]
 412243	Fine control, working hydraulics “Off”[13]
 412242	Fine control, working hydraulics “On”[13]
 412254	Additional control circuit IV on rear[13]
 412255	Additional control circuit IV auto on rear[13]
 412258	Auto-hitch locked[13] Page 256
 412259	Auto-hitch unlocked[13] Page 256
 412260	Tipper active[13]
 412247	Flow volume of control circuit III[13]
 412248	Stored flow volume of control circuit III[13]
 413639	Change over of control circuit III[13]
 412266	Change over of control circuit III auto[13]
 412249	Pressure relief of control circuit III[13]

Status symbols	Designation
 412291  413788	Flow volume of control circuit III
 412292  413789	Flow volume of control circuit IV[13]
 412252	Exhaust gas treatment regeneration cool-down phase[14]
 412286	Reversible fan active[13]
 415918	Reversible fan automatic[13]
 415919	Reversible fan manual[13]
 412250	Request to regenerate exhaust gas treatment[14] Page 271
 412251	Exhaust gas treatment regeneration warm-up phase[14]
 412293	Soot loading, diesel particle filter[14] Page 276
 412294	Remaining time for manual regeneration[14] Page 275

[13] Option

[14] For emission stage V

3.1.6 Load torque limitation

DANGER
Machine tipping!
Danger to life.
- ► Observe load chart.
- ► Observe load torque display.
- ► Reduce forward reach.

Note
The load torque limitation is a warning device, which notifies that the tipping edge to the front is being approached.
- ► Check load torque limitation before every shift.

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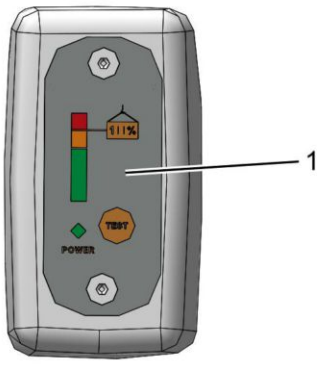


412321

G2021438_2

Load torque display

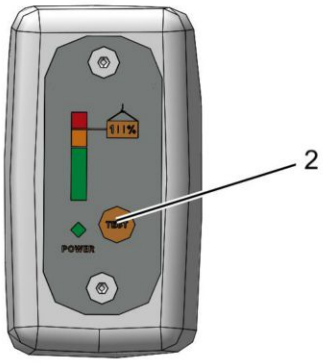
1 Load torque display

The load torque display **1** is to be used as an additional aid.

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

- Optical and audible warning sound if maximum lifting load is exceeded.
- The five LEDs show if the stability limit of the machine in tipping direction to the front is, or is not, being exceeded when lifting a load.
- The further the stability limit approaches the limit value in tipping direction to the front, the more LEDs light up.

3.1.6.1 Dimming function of the load torque limitation



414077

G2058433_1

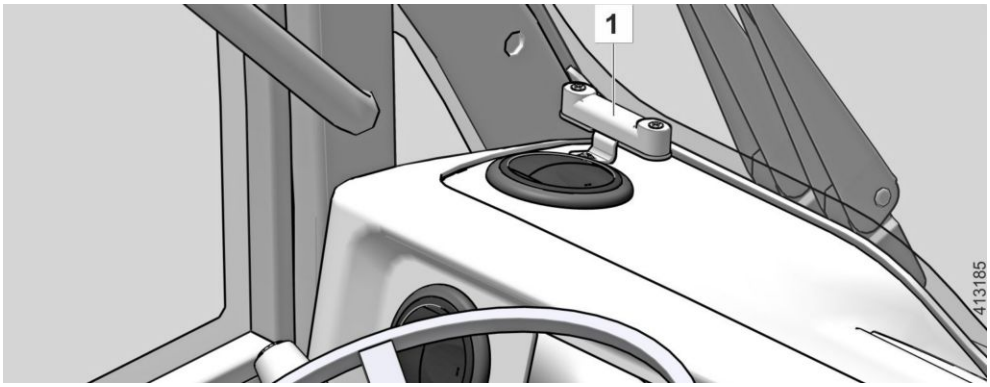
Dimming function

2 Button

Button **2** can be pressed to reduce the brightness of the display.

Button **2** can be pressed again to increase the brightness of the display.

3.1.7 Level display (option)



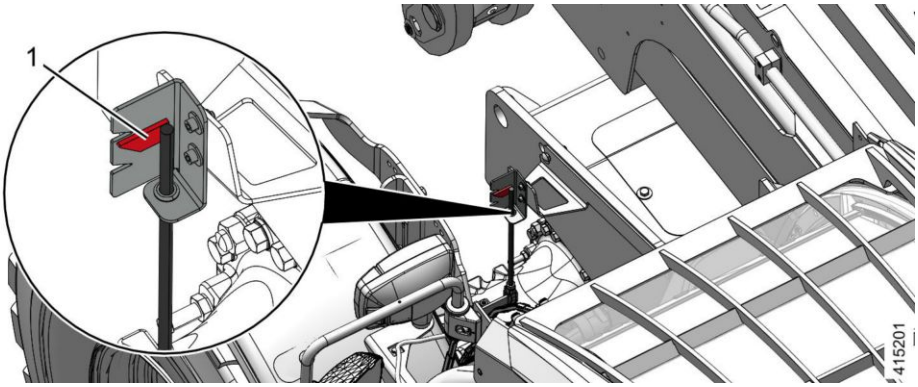
G2036225_1

Level display

1 Level display

Level display **1** indicates the lateral incline angle of machine.

3.1.8 Level display on floating axle (option)



G2075109_1

Level display on floating axle

1 Level display on floating axle

The level display on the floating axle indicates the lateral incline angle of the machine.

The level display on the floating axle is located on the front left of the main frame.

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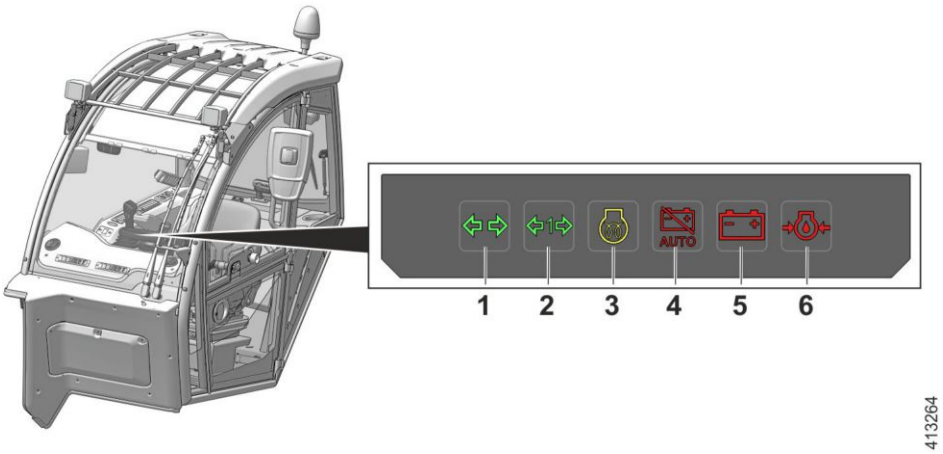
3.1.9 Display unit on steering column



LED display on steering column

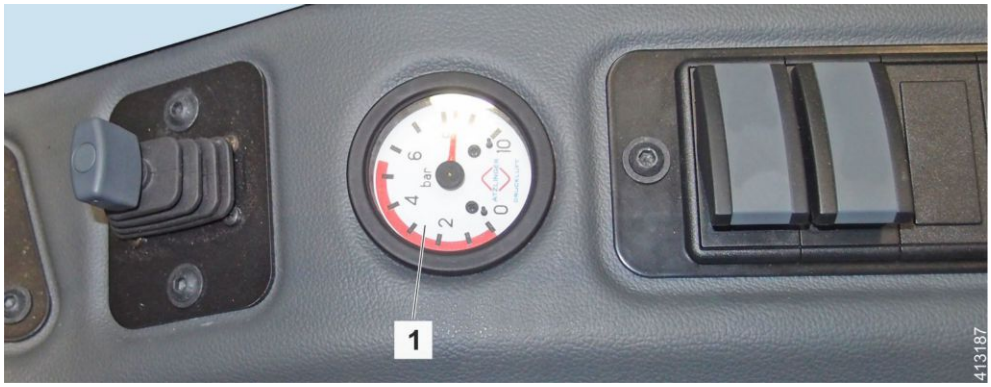
Steering column symbols

Status symbols	Designation
 406023	Blinker system Page 129
 412515	Trailer blinkers[15]
 403081	Pre-heat system
 AUTO 412516	Battery isolation Page 212
 403078	Battery (goes out once the diesel engine has started)
 403071	Lights up in case of a drop in engine oil pressure. Contact Liebherr customer service

[15] Option

3.1.10 Air brake system pressure gauge (option)

The pressure gauge of air brake system is installed in the front right section of operator's cab.



G2036228_2

Pressure gauge of air brake system

1	Pressure gauge

Pressure gauge **1** displays the air pressure of the air brake system in bar.

3.1.11 Control lever

The control lever is installed on the right next to the operator's seat.

The travel directions and movements of working attachment are controlled with the control lever.

3.1.11.1 Layout

G2036230_1

Control lever layout

1	Control lever
2	Neutral travel direction button
3	Travel directions rocket switch
4	Slow travel stage button
5	Fast travel stage button
6	Change over control circuit III button (option)
7	Telescopic boom rocker switch
8	Bucket repositioning button (option)
10	Control circuit III rocker switch
11	Differential lock button

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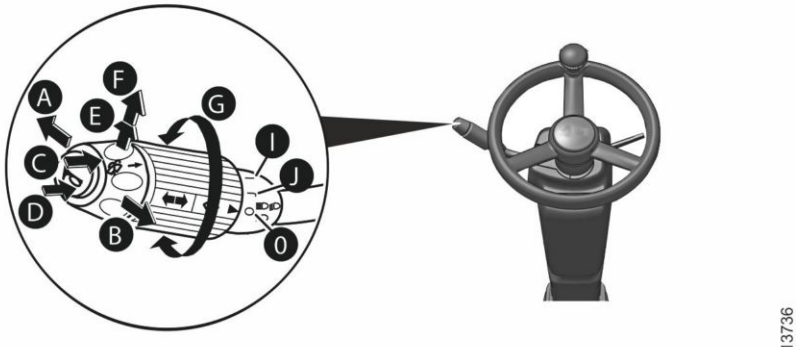
3.1.12 Steering-column switch

The steering-column switch is installed on the left hand side on the steering column.

The steering-column switch consists of following control elements:

- Indicator light
- High beam
- Horn sound and headlight flasher
- Windscreen wiper for front window
- Windscreen washer system for front window

3.1.12.1 Functional description



Steering-column switch

Functions of steering-column switch:

A - Right indicator light
B - Left indicator light
C - Middle position: Neutral position
D - Horn sound
E - Headlight flasher
F - High beam
G - Front window washer system rotary switch
0 - Windscreen wiper off
J - Intermittent operation
I - Continuous operation

3.2 Operation

3.2.1 Entry

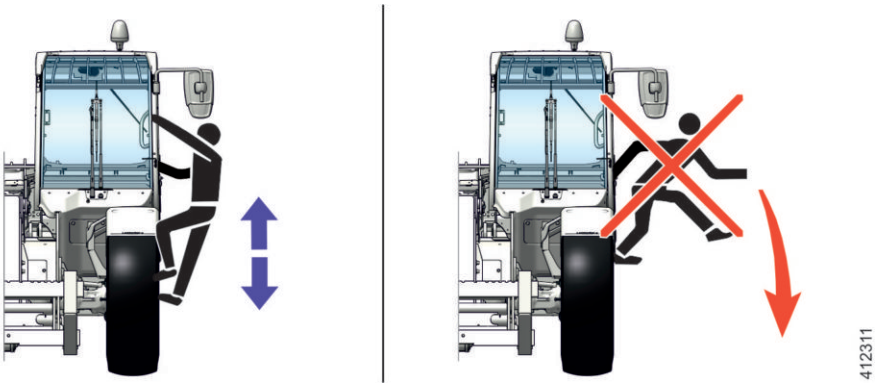
Enter and leave the machine using the ascending aids provided.

The cab access steps must be cleaned before access.

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

Familiarise yourself with the emergency exits. These are via the right cab window or through the rear cab window. Page 131

LWT/93517630/09/01/12/2023/en

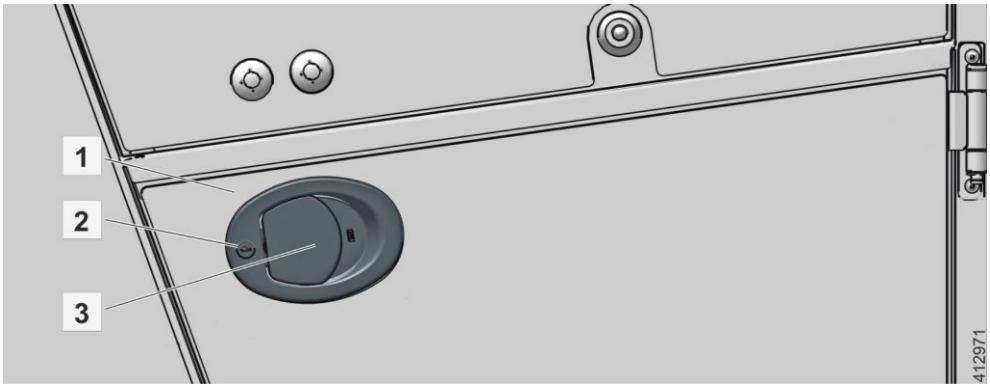


G2021040_1

Entering and leaving the operator's cab

WARNING
Improper entering and exiting!
Falling.
- ► When entering and exiting the machine, maintain three-point contact.
- ► Exclusively enter and leave machine using access aids.

3.2.1.1 Entering operator's cab



G2030309_2

Entering operator's cab

1	Cab door	**3**	Door handle
2	Door lock		

- ► 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.

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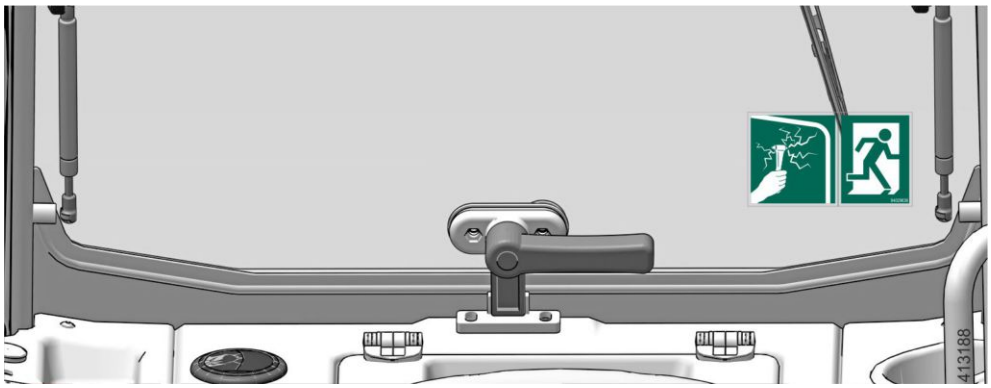
3.2.2 Emergency exit

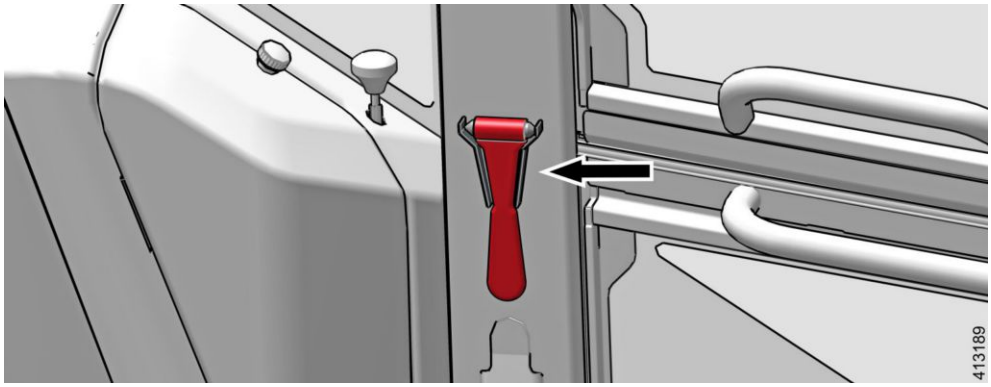
Enter and leave the operator's cab always through the cab door.



G2036234_1

Emergency exit

Use the rear cab window as an emergency exit.

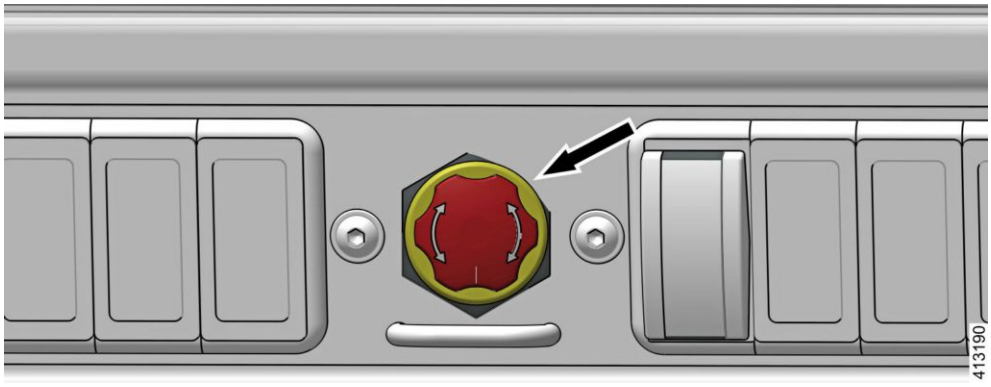


G2036237_1

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!



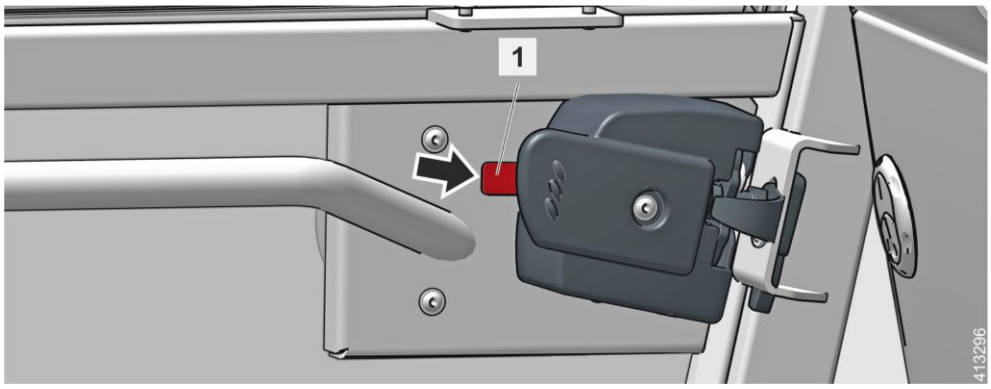
G2036239_2

Emergency stop button

- ► Before leaving the operator's cab, press the emergency stop button.
  ✔ The travel drive, the working attachment and the diesel engine stop abruptly.

3.2.3 Door lock

The cab door is held in closed position by the door lock.



G2043843_1

Opening cab door inside

- ► Push handle **1** on the cab door inward.
- ► Open cab door from inside.

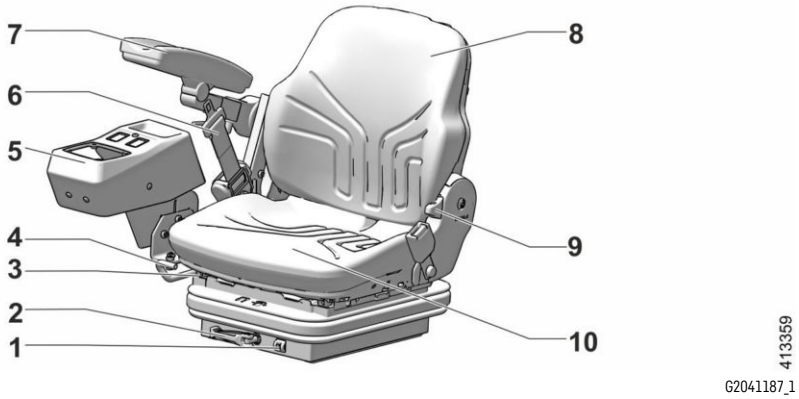
WARNING
Open cab door!
Injury.
- ► Before operating the machine, close the lower half of cab door.

- ► Before putting machine into operation, close the cab door.
  ✔ The cab door engages in the door lock.

3.2.4 Operator's seat

The seat is paramount to ensuring that the vibrations transferred to the operator are reduced. If the seat needs to be replaced, contact the manufacturer.

3.2.4.1 Operator's seat with mechanical suspension



G2041187_1

Main components and adjustment elements

1	Weight display	**2**	«Seat suspension» turn handle

LWT/93517630/09/01/12/2023/en

3	Seat height adjustment	**7**	Armrest Page 150
4	«Horizontal adjustment» lever	**8**	Backrest
5	Control lever console	**9**	«Backrest inclination» handle
6	Safety belt	**10**	Seat surface

Individual adjustment of ergonomic seat position

WARNING
Adjustment of operator's seat during operation!
Injury.
► Adjust the operator's seat of machine before putting it into service.

Adjusting body weight

Individually adjusting the seat suspension to the body weight of the operator.

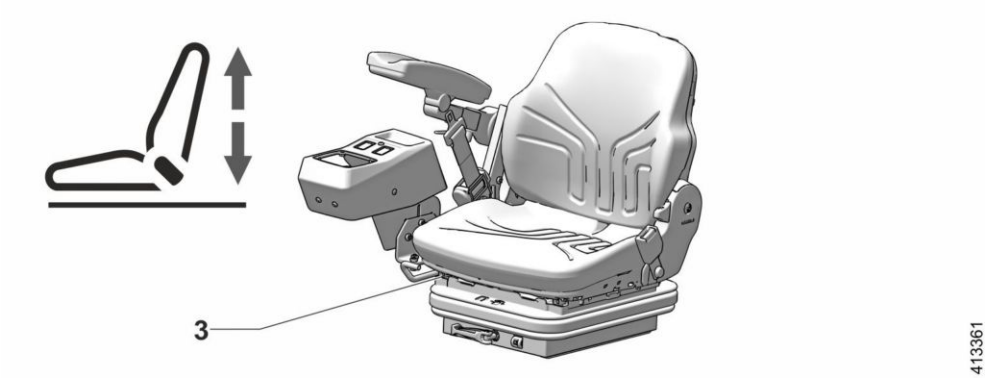
413360
G2041188_1

Adjusting body weight

1	Weight display	**2**	«Seat suspension» turn handle

► Turn «Seat suspension» turn handle **2** clockwise.
✔ A higher body weight is set.
✔ Set body weight is shown on weight display **1**.
► Turn «Seat suspension» turn handle **2** anticlockwise.
✔ A lower body weight is set.
✔ Set body weight is shown on weight display **1**.

Adjusting operator's seat height



Adjusting operator's seat height

3 Seat height adjustment

► Raise operator's seat to desired height via audible lock-in positions.

Note
If the operator's seat is raised further than the highest lock-in position, it drops to the lowest position.

Adjusting operator's seat horizontally

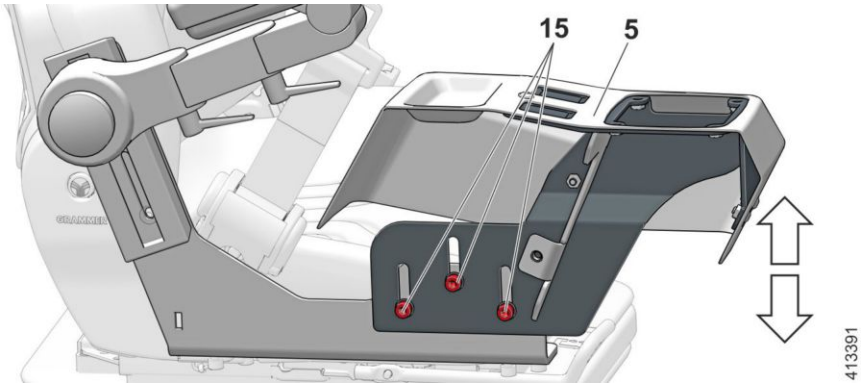
Adjusting operator's seat horizontally

4 «Horizontal adjustment» lever

► Pull «Horizontal adjustment» lever **4** up.
► Adjust operator's seat horizontally.
► Release «Horizontal adjustment» lever **4**.

LWT/93517630/09/01/12/2023/en

Control lever console - Adjusting the height

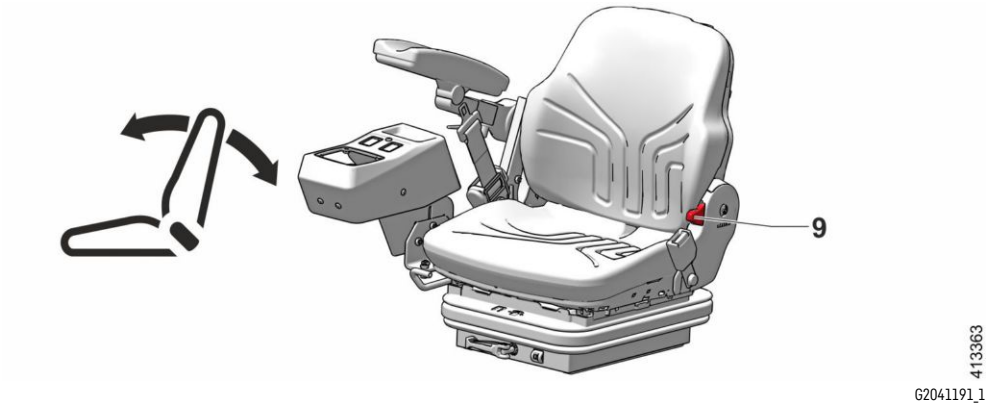


Control lever console - Adjusting the height

5	Control lever console	**15**	Screw (3x)

- ► Loosen the screws **15**.
- ► Adjust the control lever console **5** to the desired height.
- ► Tighten screws **15**.

Adjusting backrest incline



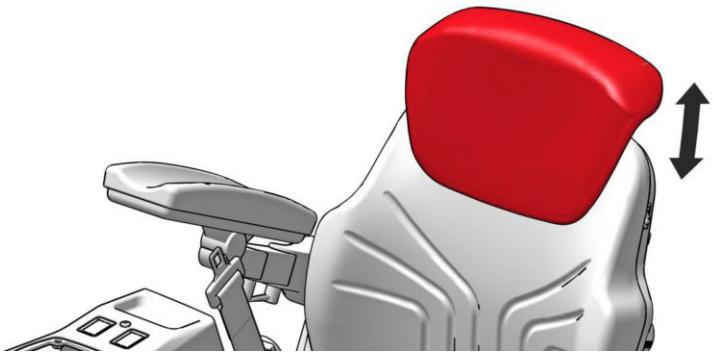
Adjusting backrest incline

9	«Backrest inclination» handle

- ► Pull «Backrest inclination» handle **9** up.
- ► Adjust backrest to desired incline.
- ► Release «Backrest inclination» handle **9**.

LWT/93517630/09/01/12/2023/en

Adjusting headrest (option)



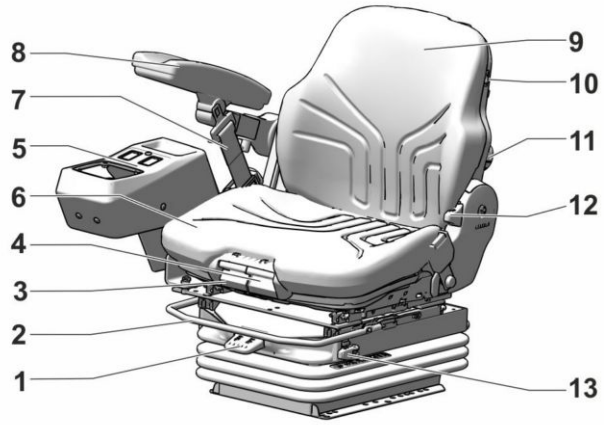
Adjusting headrest

► Pull headrest out or push it in over perceptible notches.

If headrest needs to be removed:

► Pull headrest up abruptly over end stop.

3.2.4.2 Operator's seat with pneumatic suspension



Main components and adjustment elements

1	«Weight adjustment and seat height adjustment» handle	**8**	Armrest Page 150
2	«Horizontal adjustment» handle	**9**	Backrest
3	«Seat depth» handle	**10**	«Seat heater» switch
4	«Seat surface incline» handle	**11**	Hand wheel «Lumbar support»
5	Control lever console	**12**	«Backrest inclination» handle
6	Seat surface	**13**	«Horizontal suspension» handle
7	Safety belt		

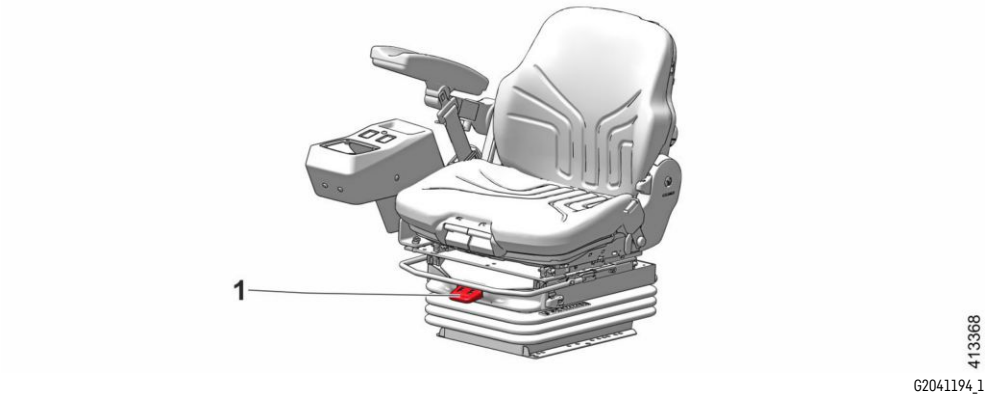
LWT/93517630/09/01/12/2023/en

Individual adjustment of ergonomic seat position

WARNING
Adjustment of operator's seat during operation!
Injury.
► Adjust the operator's seat of machine before putting it into service.

Adjusting body weight and operator's seat height

Adjusting body weight



Adjusting body weight

1 «Weight adjustment and seat height adjustment» handle

► Sit on operator's seat.
► Lift «Weight adjustment and seat height adjustment» handle **1** briefly or press it.

Adjusting operator's seat height

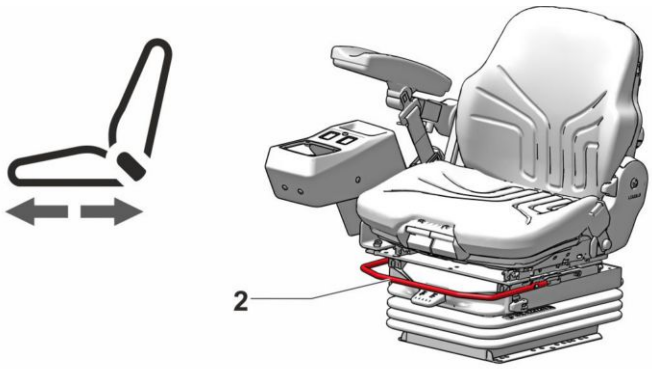
Adjusting operator's seat height

1 «Weight adjustment and seat height adjustment» handle

► Push «Weight adjustment and seat height adjustment» handle **1** up.
✔ Operator's seat is set higher.

► Push «Weight adjustment and seat height adjustment» handle **1** down.
✔ Operator's seat is set lower.

Adjusting operator's seat horizontally

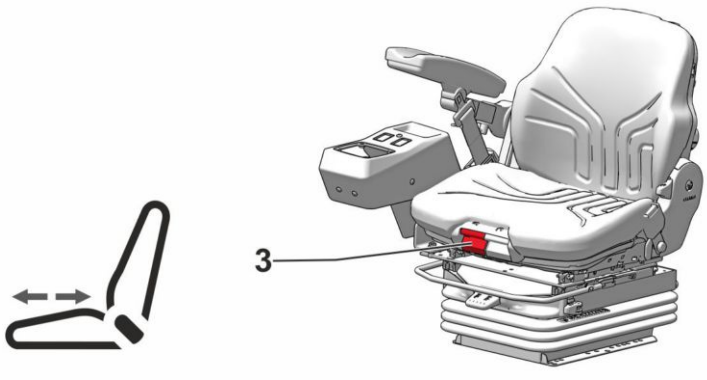


Adjusting operator's seat horizontally

2 «Horizontal adjustment» handle

► Pull «Horizontal adjustment» handle **2** up.
► Adjust operator's seat horizontally.
► Release «Horizontal adjustment» handle **2**.

Adjusting seat depth horizontally



Adjusting seat depth horizontally

3 «Seat depth» handle

► Push «Seat depth» handle **3** up.
► Adjust seat depth horizontally.
► Release «Seat depth» handle **3**.

LWT/93517630/09/01/12/2023/en

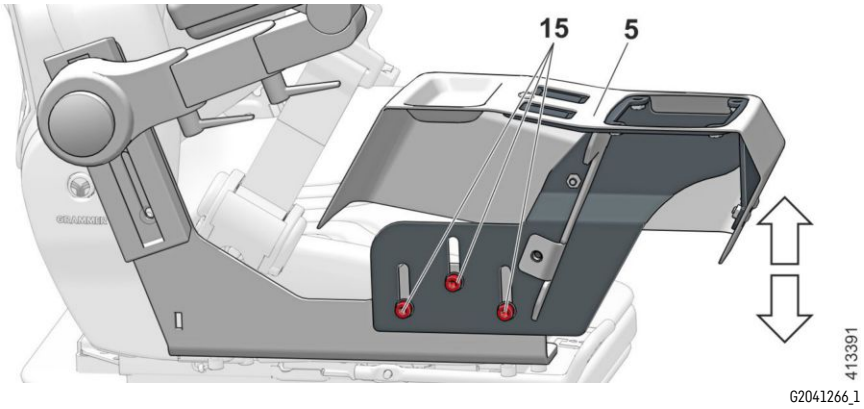
Adjusting seat surface incline

Adjusting seat surface incline

4	«Seat surface incline» handle

- ► Push «Seat surface incline» handle **4** up.
- ► Adjust vertical seat surface incline.
- ► Release «Seat surface incline» handle **4**.

Control lever console - Adjusting the height

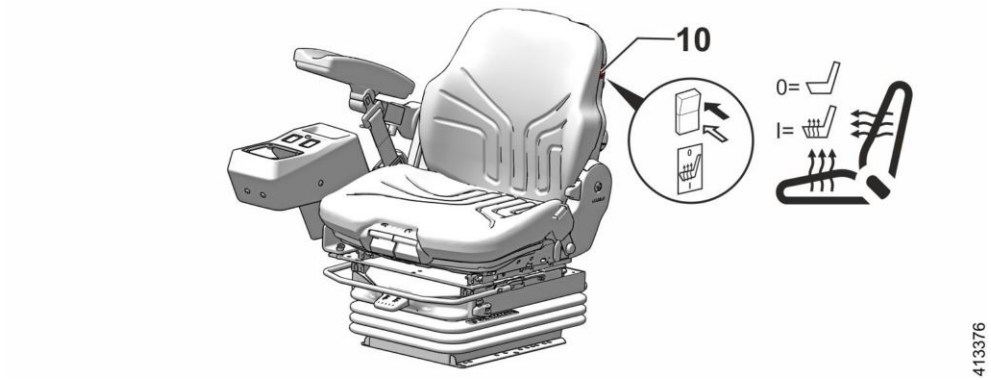


Control lever console - Adjusting the height

5	Control lever console	**15**	Screw (3x)

- ► Loosen the screws **15**.
- ► Adjust the control lever console **5** to the desired height.
- ► Tighten screws **15**.

Seat heater



Seat heater

10 «Seat heater» switch

- ► Press «Seat heater» switch **10** up.
  - ✔ Seat heater is activated.
- ► Press «Seat heater» switch **10** down.
  - ✔ Seat heater is deactivated.

Adjusting lumbar support

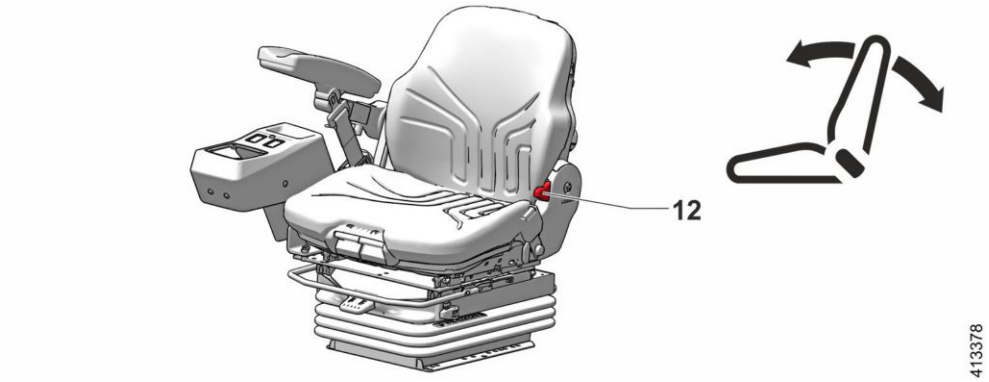
Adjusting lumbar support

11 Hand wheel «Lumbar support»

- ► Turn «Lumbar support» hand wheel **11** clockwise or anticlockwise.
  - ✔ Lumbar support is set.

LWT/93517630/09/01/12/2023/en

Adjusting backrest incline



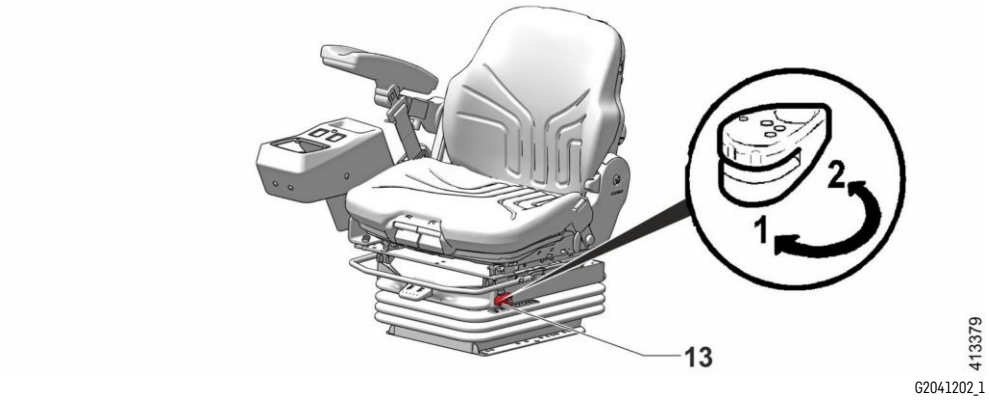
Adjusting backrest incline

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.



Adjusting horizontal suspension

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

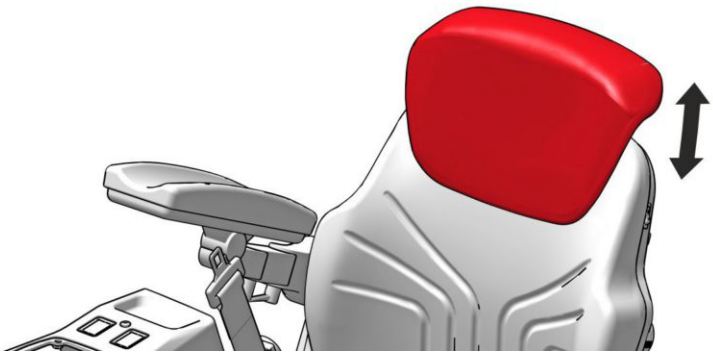
- ► Move «Horizontal suspension» handle **13** to Horizontal suspension ON **2**.
  - ✔ Horizontal suspension is activated.
- ► Move «Horizontal suspension» handle **13** to Horizontal suspension OFF **1**.
  - ✔ Horizontal suspension is deactivated.

Troubleshooting

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

- ► Contact Liebherr customer service.

Adjusting headrest (option)



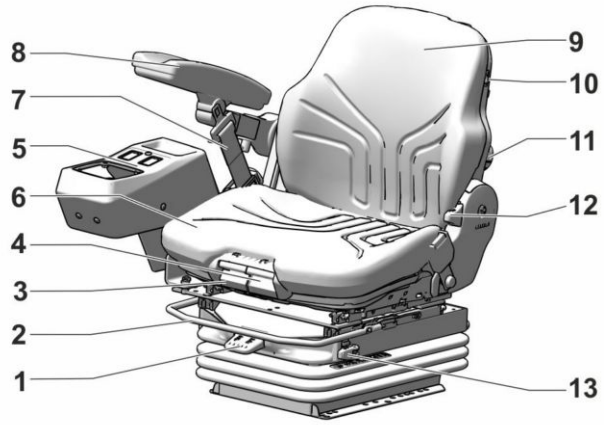
Adjusting headrest

► Pull headrest out or push it in over perceptible notches.

If headrest needs to be removed:

► Pull headrest up abruptly over end stop.

3.2.4.3 Operator's seat and low frequency damping



Main components and adjustment elements

1	«Weight adjustment and seat height adjustment» handle	**8**	Armrest Page 150
2	«Horizontal adjustment» handle	**9**	Backrest
3	«Seat depth» handle	**10**	«Seat heater» switch
4	«Seat surface incline» handle	**11**	Hand wheel «Lumbar support»
5	Control lever console	**12**	«Backrest inclination» handle
6	Seat surface	**13**	«Horizontal suspension» handle
7	Safety belt		

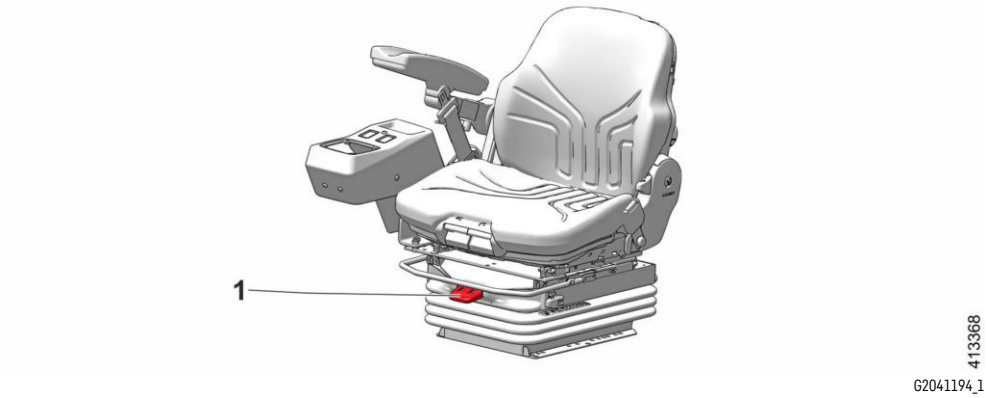
LWT/93517630/09/01/12/2023/en

Individual adjustment of ergonomic seat position

WARNING
Adjustment of operator's seat during operation!
Injury.
► Adjust the operator's seat of machine before putting it into service.

Adjusting body weight and operator's seat height

Adjusting body weight



Adjusting body weight

1 «Weight adjustment and seat height adjustment» handle

► Sit on operator's seat.
► Lift «Weight adjustment and seat height adjustment» handle **1** briefly or press it.

Adjusting operator's seat height

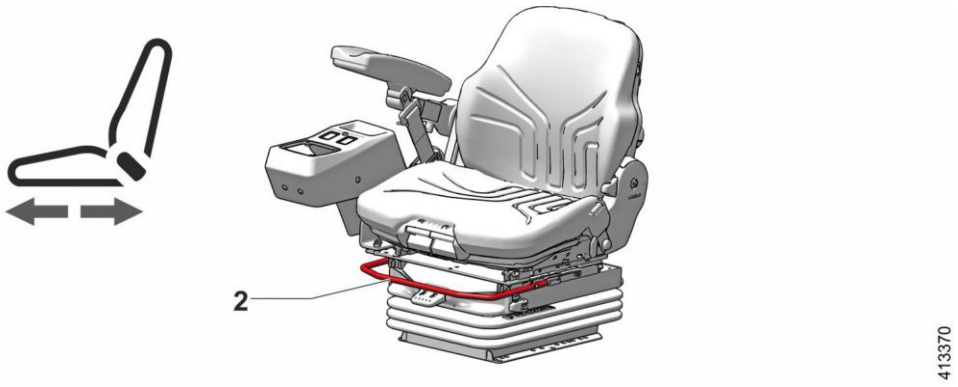
Adjusting operator's seat height

1 «Weight adjustment and seat height adjustment» handle

► Push «Weight adjustment and seat height adjustment» handle **1** up.
✔ Operator's seat is set higher.

► Push «Weight adjustment and seat height adjustment» handle **1** down.
✔ Operator's seat is set lower.

Adjusting operator's seat horizontally

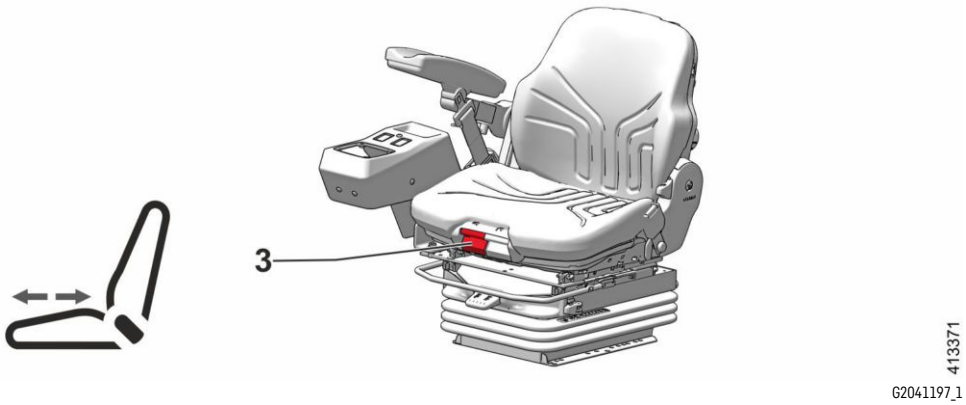


Adjusting operator's seat horizontally

2 «Horizontal adjustment» handle

► Pull «Horizontal adjustment» handle **2** up.
► Adjust operator's seat horizontally.
► Release «Horizontal adjustment» handle **2**.

Adjusting seat depth horizontally



Adjusting seat depth horizontally

3 «Seat depth» handle

► Push «Seat depth» handle **3** up.
► Adjust seat depth horizontally.
► Release «Seat depth» handle **3**.

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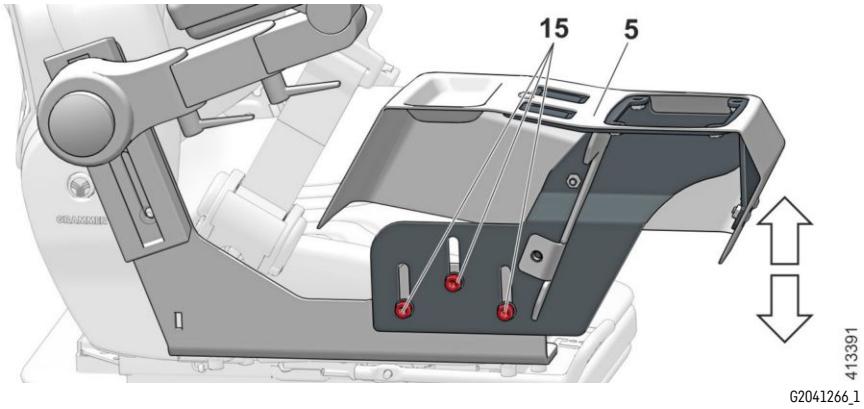
Adjusting seat surface incline

Adjusting seat surface incline

4	«Seat surface incline» handle

- ► Push «Seat surface incline» handle **4** up.
- ► Adjust vertical seat surface incline.
- ► Release «Seat surface incline» handle **4**.

Control lever console - Adjusting the height

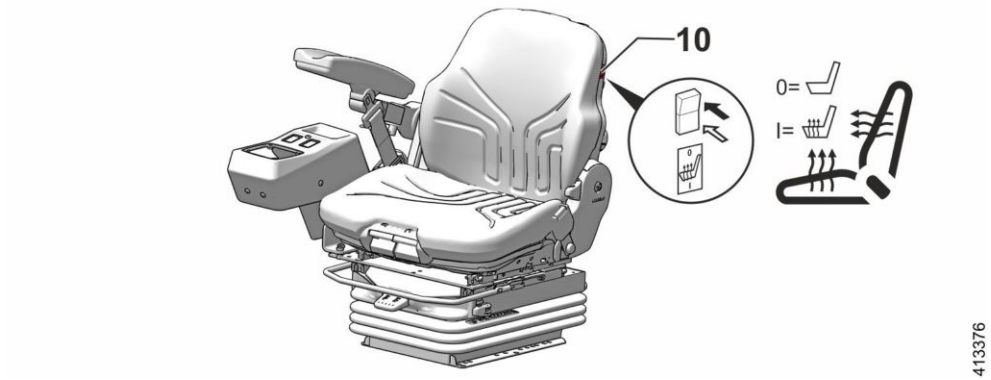


Control lever console - Adjusting the height

5	Control lever console	**15**	Screw (3x)

- ► Loosen the screws **15**.
- ► Adjust the control lever console **5** to the desired height.
- ► Tighten screws **15**.

Seat heater



Seat heater

10 «Seat heater» switch

- ► Press «Seat heater» switch **10** up.
  - ✔ Seat heater is activated.
- ► Press «Seat heater» switch **10** down.
  - ✔ Seat heater is deactivated.

Adjusting lumbar support

Adjusting lumbar support

11 Hand wheel «Lumbar support»

- ► Turn «Lumbar support» hand wheel **11** clockwise or anticlockwise.
  - ✔ Lumbar support is set.

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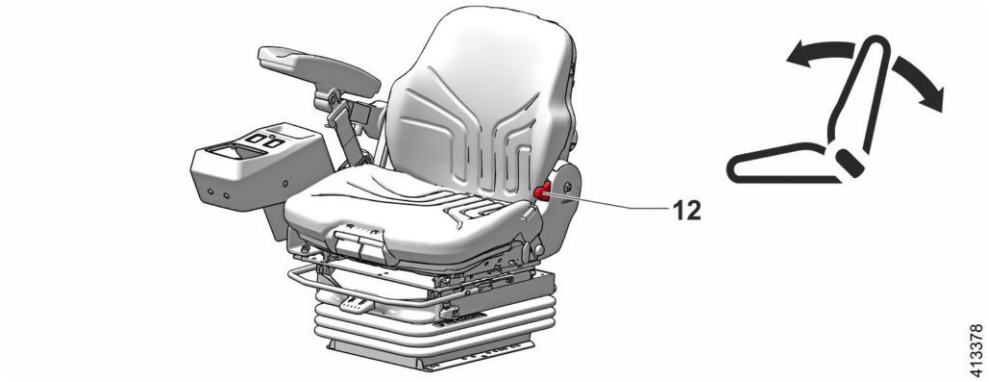
Adjusting backrest incline



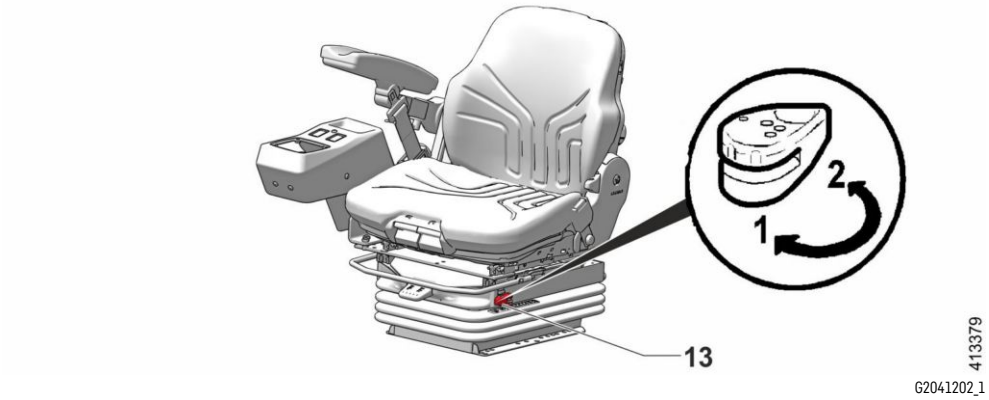
Adjusting backrest incline

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.



Adjusting horizontal suspension

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

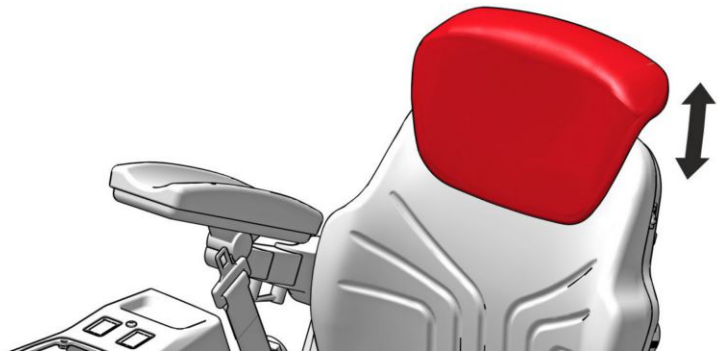
- ► Move «Horizontal suspension» handle **13** to Horizontal suspension ON **2**.
  ✔ Horizontal suspension is activated.
- ► Move «Horizontal suspension» handle **13** to Horizontal suspension OFF **1**.
  ✔ Horizontal suspension is deactivated.

Troubleshooting

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

- ► Contact Liebherr customer service.

Adjusting headrest (option)



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G2041192_1

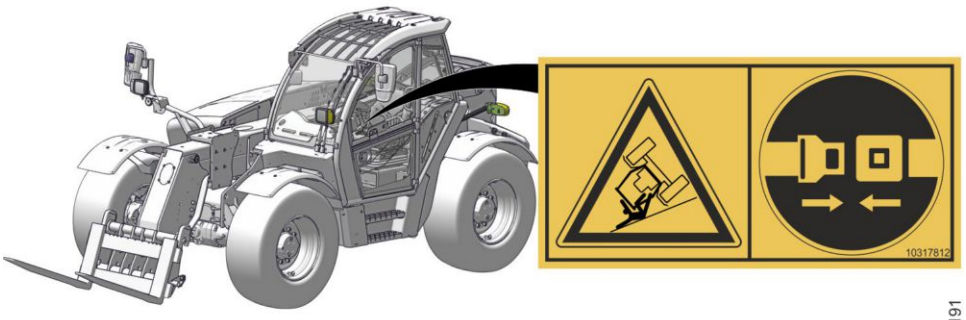
Adjusting headrest

► Pull headrest out or push it in over perceptible notches.

If headrest needs to be removed:

► Pull headrest up abruptly over end stop.

3.2.5 Safety belt



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Safety belt sign

WARNING
Always wear a safety belt!
Injury.
► Always wear safety belt before putting machine into service.

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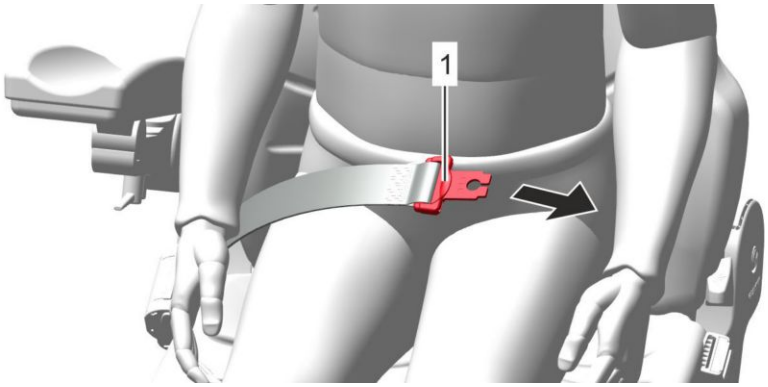
3.2.5.1 Fastening safety belt

Ensure that following requirements are met:

- ☑ The condition, function and attachment of the safety belt have been checked.
- ☑ Damaged parts have been replaced.
- ☑ The safety belt is not twisted.
- ☑ A proper seating position has been adopted.



Fastening safety belt

1 Buckle tongue

► Slowly pull the safety belt by the buckle tongue **1** over your body at lap height.

Note
In the event of jerky pulling, the belt retractor blocks the safety belt.

Locking the safety belt

1 Buckle tongue **2** Buckle

► Put the buckle tongue **1** into the buckle **2** until the buckle tongue **1** locks in place.
► Pull to check that the buckle tongue **1** is locked in the buckle **2**.

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3.2.5.2 Releasing safety belt

G2062430_1

Releasing safety belt

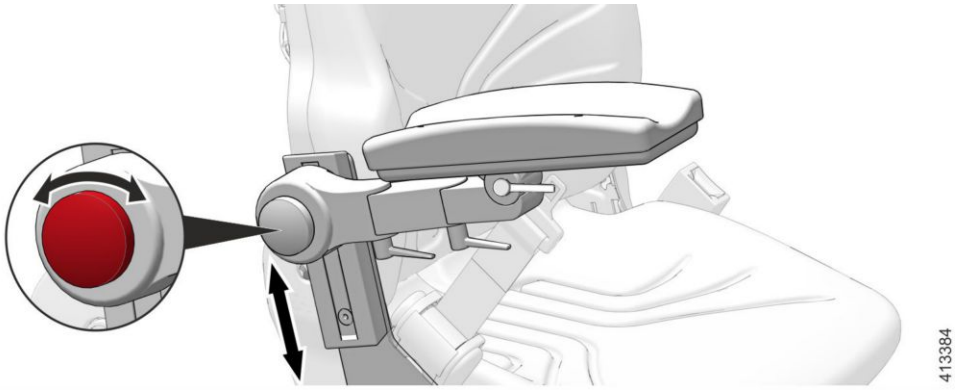
1	Unlock button	**2**	Buckle

► Press the unlock button **1** at the buckle **2**.

3.2.6 Adjusting the armrest

The armrest can be adjusted individually.

3.2.6.1 Armrest: adjusting the height



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Adjusting the height

► Loosen the hand wheel.
► Adjust the height of the armrest.
► Tighten the hand wheel again.

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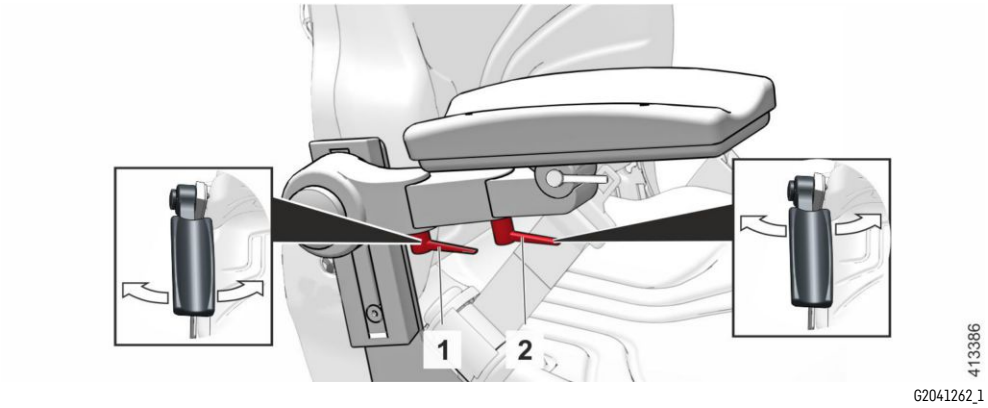
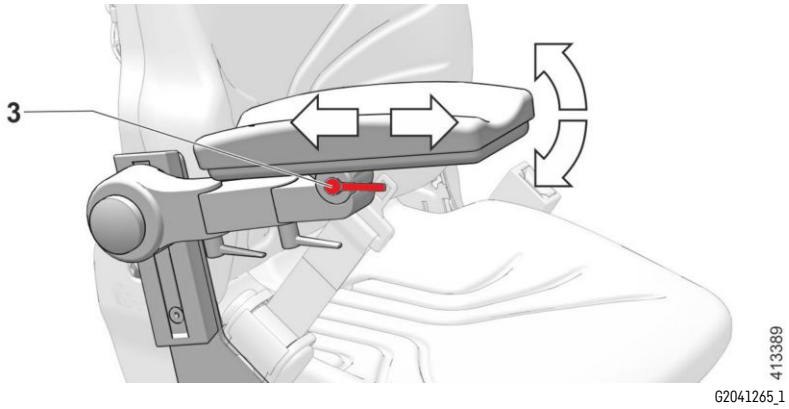
3.2.6.2 Armrest: horizontal adjustment



Horizontal adjustment

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

3.2.6.3 Armrest: adjusting the incline and depth



Adjusting the incline and depth

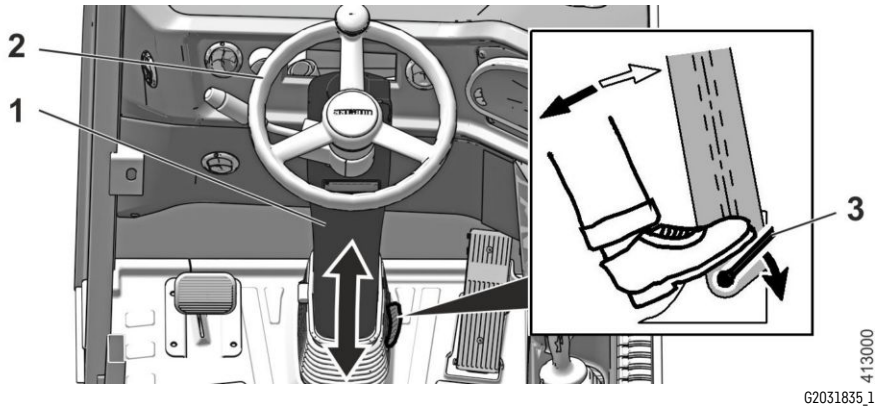
- ► Loosen lever **3**.
- ► Adjust the incline and depth.
- ► Tighten lever **3** again.

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
Adjusting the steering column during operation!
Injury.
- ► Adjust steering column of machine before putting it into service.

3.2.7.1 Adjusting steering wheel distance to the body

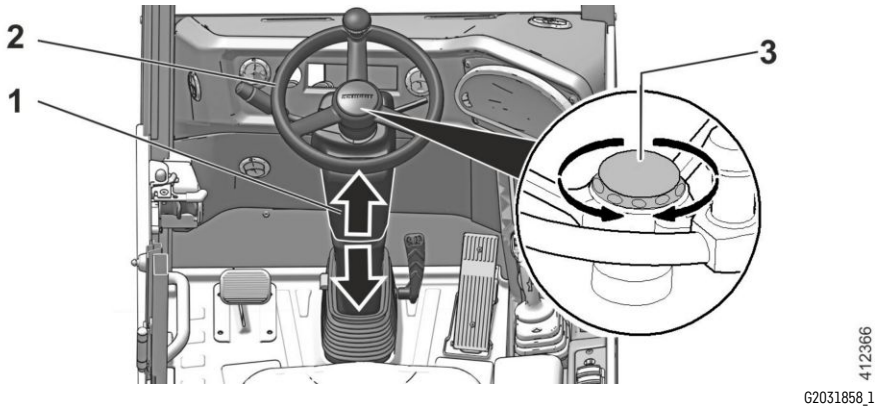


Adjusting steering wheel distance to the body

1	Steering column	**3**	Lever
2	Steering wheel		

- ► Push lever **3** with your foot in direction of arrow.
  - ✔ The steering column **1** is unlocked.
- ► Adjust the desired steering wheel distance to body.
- ► Release the lever **3**.
  - ✔ The steering column **1** is locked.

3.2.7.2 Adjusting steering wheel height



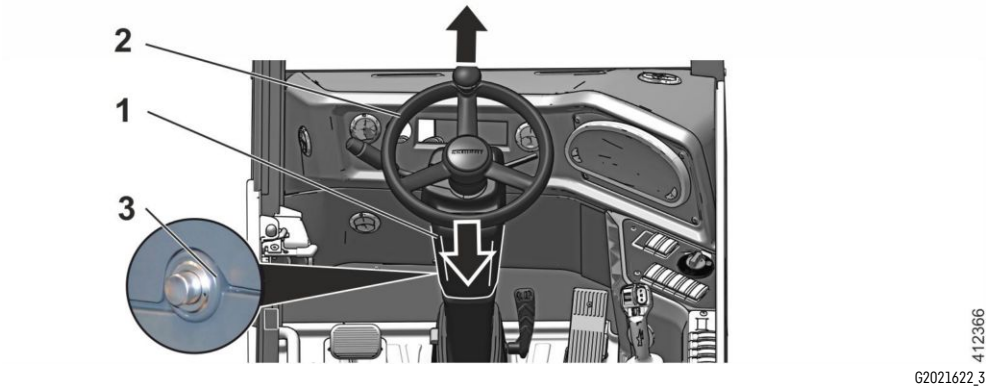
Adjusting steering wheel height

1	Steering column	**3**	Steering wheel hub
2	Steering wheel		

- ► Release the steering wheel hub **3**.
  - ✔ The steering column **1** is unlocked.
- ► Set desired steering wheel height.
- ► Tighten the steering wheel hub **3**.
  - ✔ The steering column **1** is locked.

LWT/93517630/09/01/12/2023/en

3.2.7.3 Adjusting steering wheel incline



Adjusting steering wheel incline

1	Steering column	**3**	Button
2	Steering wheel		

- ► Press and hold button **3** down.
  - ✔ The steering column **1** is unlocked.
- ► Set desired steering wheel incline.
- ► Release the button **3**.
  - ✔ The steering column **1** is locked.

3.2.7.4 Checking function of steering system

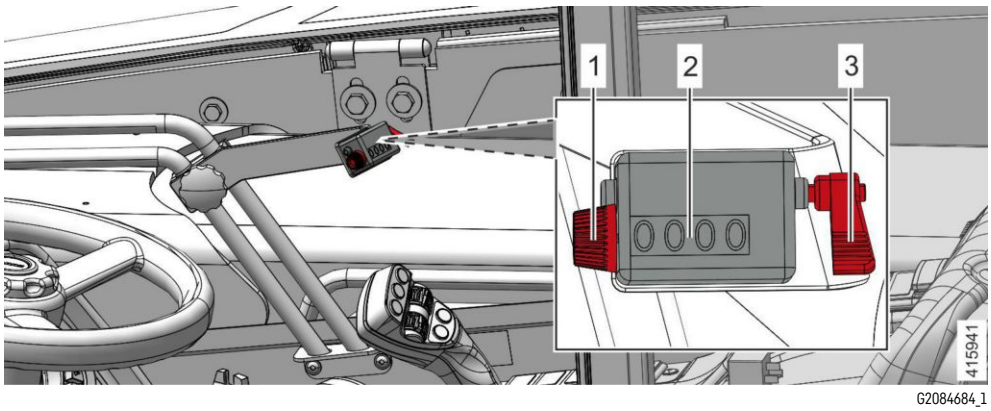
If steering column is adjusted:

- ► Check function of steering system. Page 452

3.2.8 Load cycle counter (option)

The load cycle counter is located in the operator's cab.

3.2.8.1 Counting load cycles

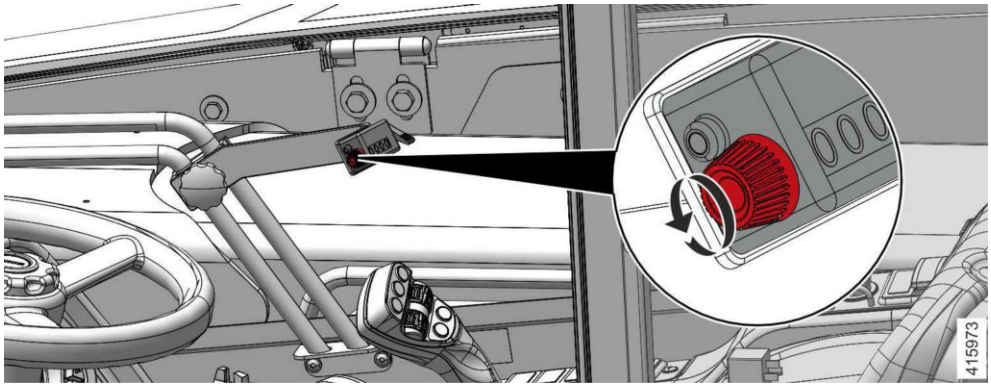


Load cycle counter

1	Knob	**3**	Lever
2	Display		

► Press lever **3**.
✔ Number on display **2** is increased by the value 1.

3.2.8.2 Resetting load cycle counter



G2085009_1

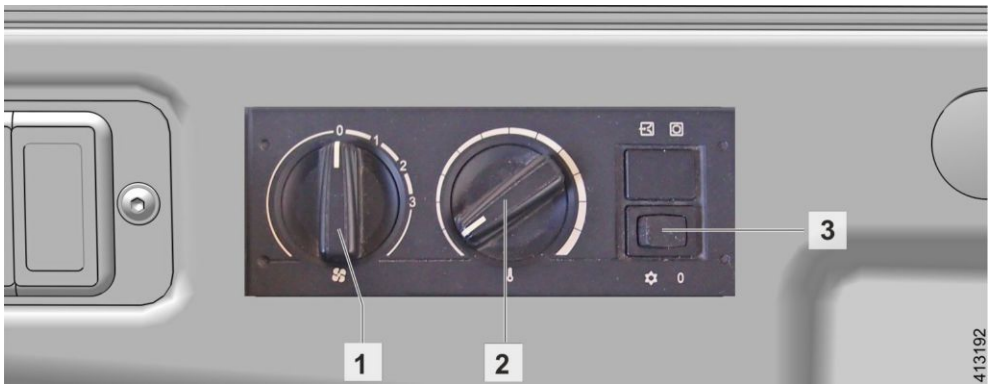
Resetting load cycle counter

► Turn the knob counter-clockwise.
✔ Display is reset.

3.2.9 Heating, ventilation

The operator's cab is equipped with a warm water heater. The operator's cab can also be equipped with an optional air conditioning system.

3.2.9.1 Turning the heating on and off



G2036245_2

Control elements of heating

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

Make sure the following preconditions are met:

☑ The electrical system of the machine is turned on.
☑ The nozzles for the desired air flow are open - for example, directed to the body, to the windscreen or to the rear window.

To turn heating on:

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► Move blower knob **1** to stage 1.
✔ The air is blown via the vents into the operator's cab.

Temperature regulation is continuous.

To increase temperature:

► Turn temperature regulator **2** in a clockwise direction.

To decrease temperature:

► Turn temperature regulator **2** in an anticlockwise direction.

3.2.9.2 Regulating blower

The blower is turned on or off with the blower knob **1**.

G2036246_1

Blower knob

Blower stages:

Stage 0 - position OFF
Stage 1 - weak air flow
Stage 2 - medium air flow
Stage 3 - strong air flow

► Switch blower knob **1** to the desired stage.
✔ The air is blown via vents into the operator's cab.

3.2.10 Air conditioning system (option)

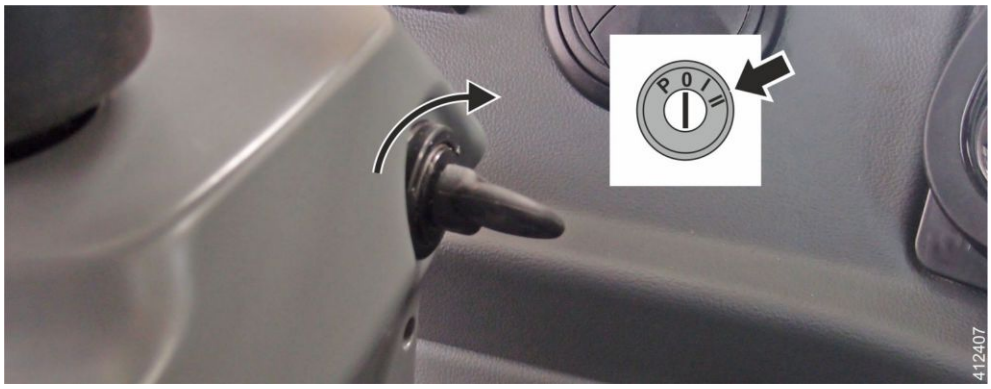
To ensure proper working order in long run, we recommend operating the air conditioning according to the information in the „maintenance and inspection schedule".

On damp days, the air conditioning can dehumidify the air in the cab.

The temperature in the cab becomes more comfortable and the windows will not fog up.

LWT/93517630/09/01/12/2023/en

3.2.10.1 Turning on the air conditioning



G2021926_1

Starting the diesel engine

The air conditioning only works if the diesel engine is running.

► Start diesel engine.

G2036251_1

Main switch for the air conditioning system

► Turn on main switch **4** for the air conditioning on the side console.

G2036246_1

Blower knob

► Set blower knob **1** at least to stage 1.

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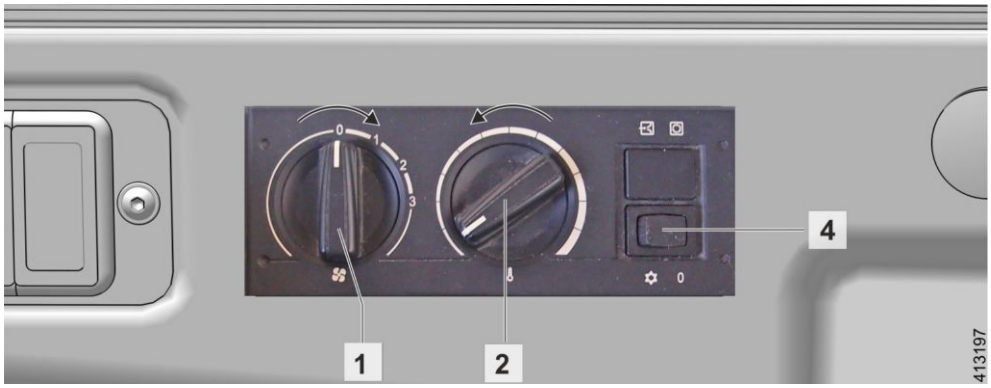
G2036253_1

Temperature regulator

► Select the desired air temperature with the temperature regulator **2**.
✔ The temperature in the operator's cab is lowered by turning the control dial in clockwise direction.

3.2.10.2 Air conditioning at full power



G2036254_1

Air conditioning at full power

For optimum cooling of operator's cab:

► Turn temperature regulator **2** in an anticlockwise direction to the stop.
► Set the highest blower stage.
► Close windows.

3.2.11 Reversible fan (option)

The reversible fan cleans the cooling system.

3.2.11.1 Reversible fan

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«Reversible fan» button

Activating reversible fan

► Press bottom part of «Reversible fan» button.
✔ «Reversible fan active» symbol is shown on the display.

Activating reversible fan manually

If reversible fan is activated automatically:

► Press bottom part of «Reversible fan» button and hold for longer than 5 seconds.
✔ «Reversible fan manual» symbol is shown on the display for 2 seconds.
✔ The reversible fan is only activated by pressing the «Reversible fan» button.

Activating reversible fan automatically

If reversible fan is activated manually:

► Press bottom part of «Reversible fan» button and hold for longer than 5 seconds.
✔ «Reversible fan automatic» symbol is shown on the display for 2 seconds.
✔ The reversible fan is activated at the specified intervals automatically.

3.2.12 Cab window and sun blind

Upper section of operator's cab door and the rear operator's cab window can be opened.

Lower section of operator's cab door must always be closed during operation.

3.2.12.1 Opening upper section of operator's cab door

The upper section of operator's cab door has an opening angle of 180°. Actuating the handle can open and lock the upper section of operator's cab door.

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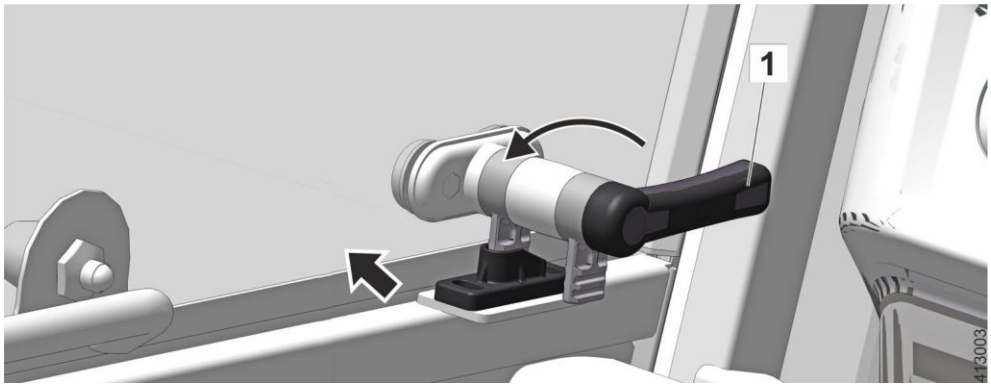
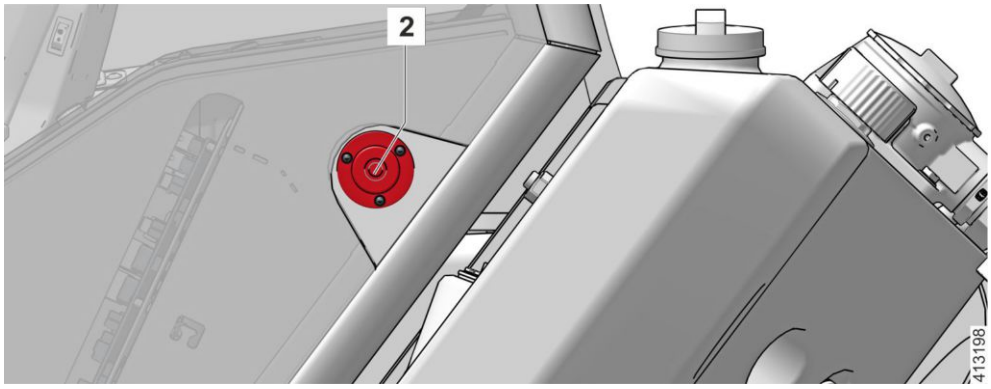


G2031889_2

Opening upper section of operator's cab door

- ► Turn the handle **1** up.
- ► Open upper section of operator's cab door.

3.2.12.2 Locking upper section of operator's cab door



G2036260_1

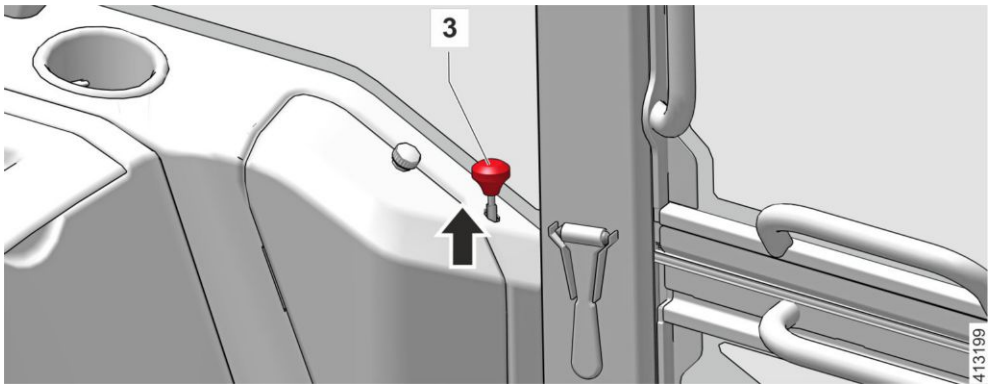
Locking upper section of operator's cab door

- ► Fully open upper section of operator's cab door.
  - ✔ Upper section of operator's cab door locks in place in the locking mechanism **2**.

Note

- ► Always lock opened upper section of operator's cab door in the locking mechanism!

3.2.12.3 Unlocking the upper section of operator's cab door



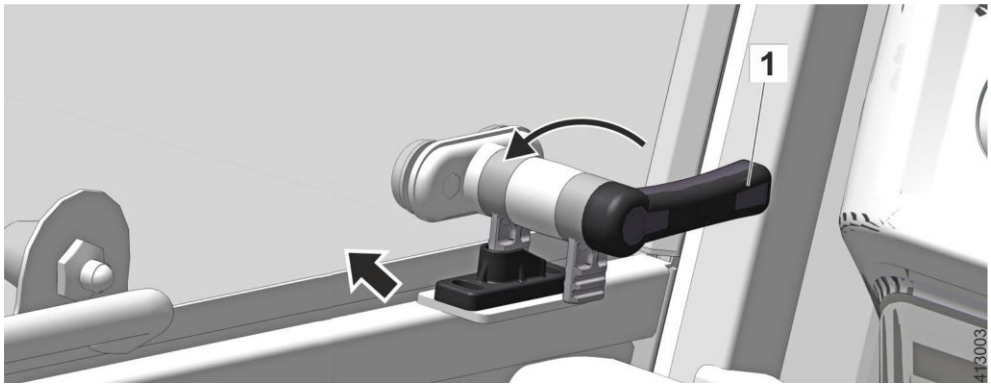
G2036262_1

Unlocking the upper section of operator's cab door

- ► Pull lever **3**.
  - ✔ Upper section of operator's cab door is unlocked.

3.2.12.4 Opening a gap in upper section of operator's cab door

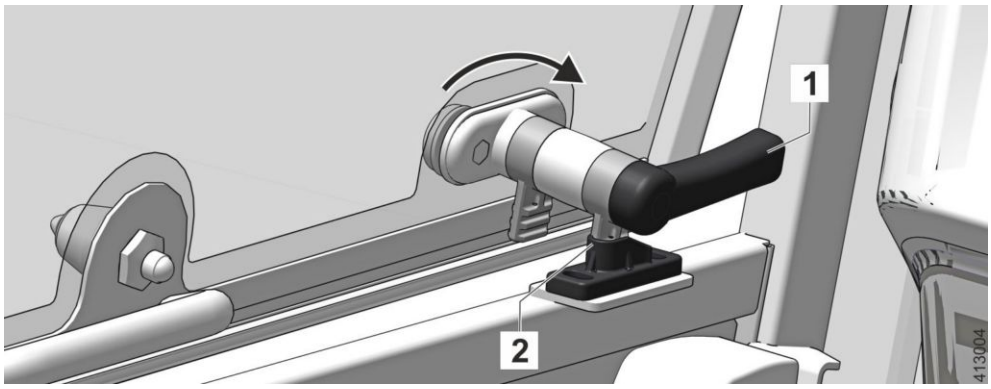
The upper section of operator's cab door can be locked to ventilate the operator's cab.



G2031889_2

Opening a gap in upper section of operator's cab door

- ► Turn the handle **1** up.
- ► Open a gap in upper section of operator's cab door.

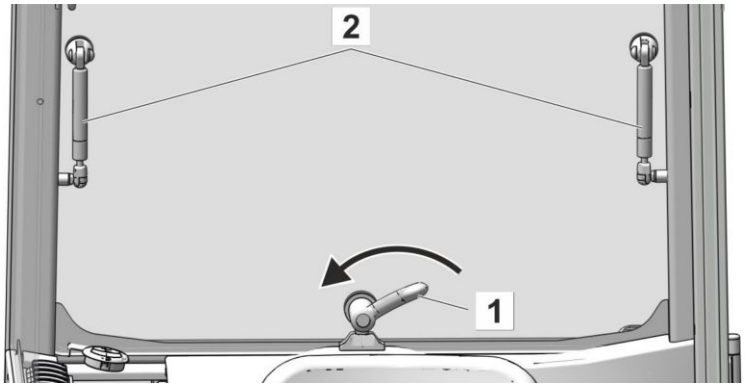


G2031891_2

Locking upper section of operator's cab door

► Push handle **1** down.
✔ Upper section of operator's cab door locks in place in the holder **2**.

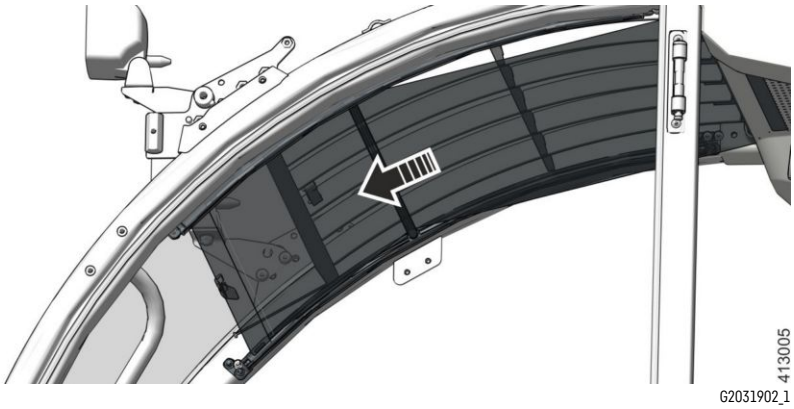
3.2.12.5 Open the rear cab window



Open the rear cab window

► Turn handle **1** to the left.
► Open the cab window.
✔ Cab window is held in this position by pneumatic springs **2**.

3.2.12.6 Sun blind (option)

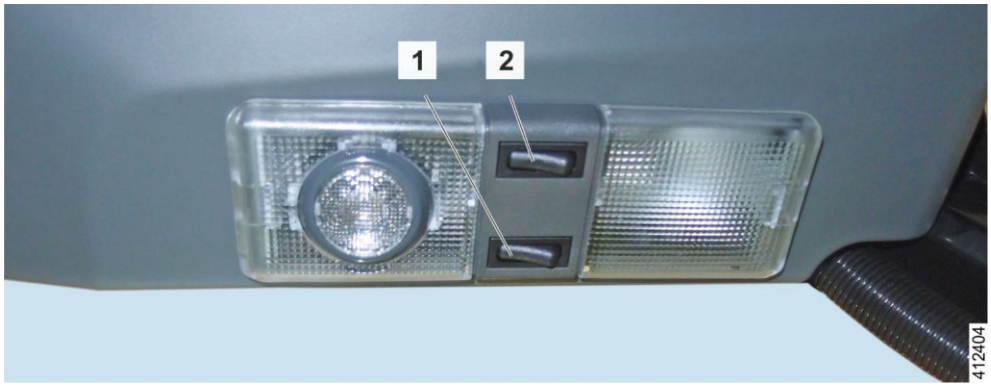


Adjust sun blind

► Pull sun blind over the head to the desired position.
✔ Sun blind is held in this position.

3.2.13 Interior light of operator's cab and reading light

The interior light of cab and the reading light are located on right in the roof of operator's cab.



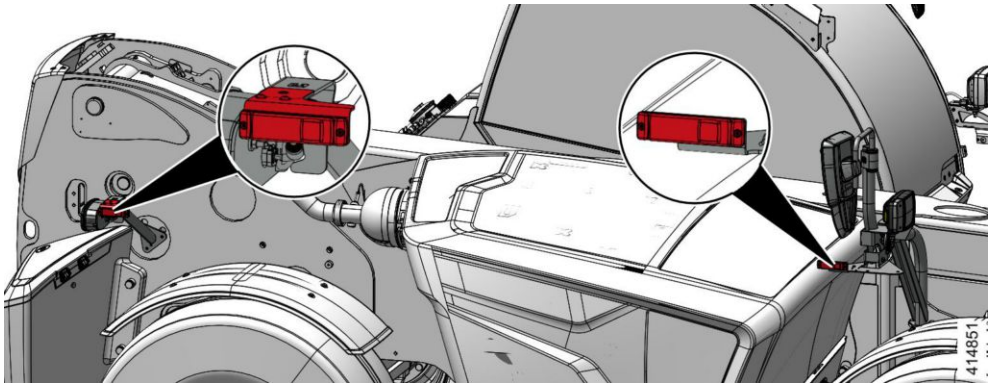
G2021891_2

Interior light of operator's cab and reading light

- ► To switch the interior lighting on or off, actuate switch **2**.
- ► To switch reading light on or off, actuate switch **1**.

3.2.14 Side marker lights

The side marker lights are located on the left and right rear headlights and on the left and right front headlights.



G2069553_1

Side marker lights

- ► Switch on the side marker lights: set «Parking light and driving light» switch to centre position.
  or
  Press «Parking light and driving light» switch down.
- ► Switch off side marker lights: Push «Parking light and driving light» switch up.

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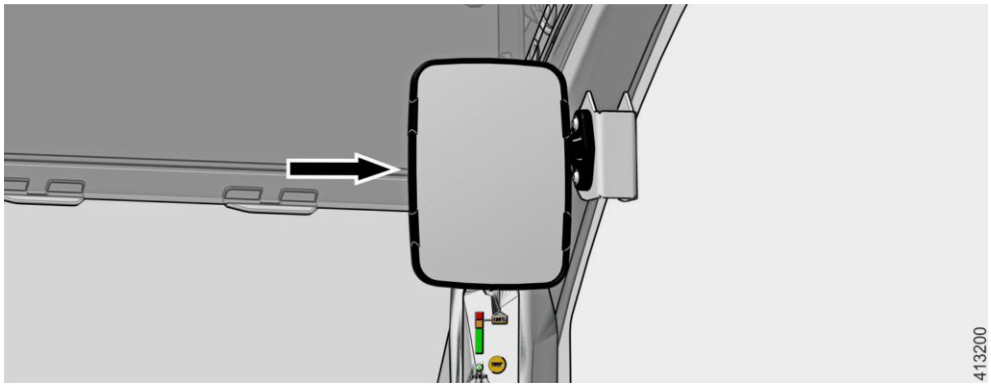
3.2.15 Visual aid in operator's cab (equipment variant)



G2036270_1

Visual aid in operator's cab

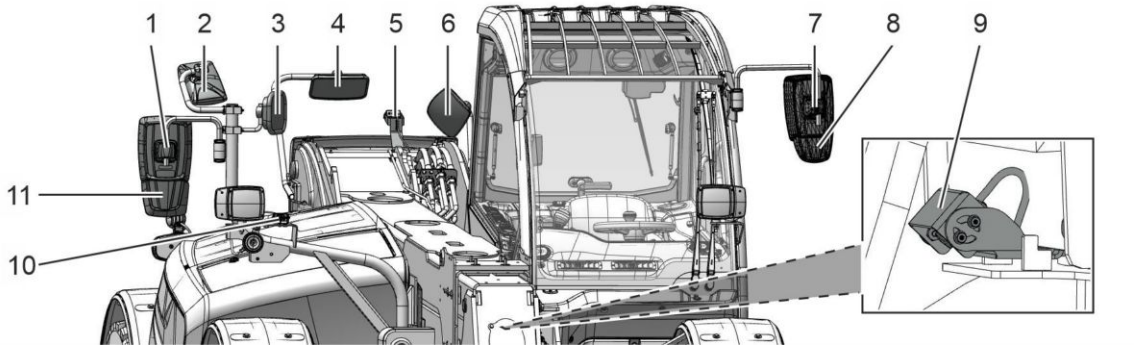
► Adjust visual aid in operator's cab before starting work.

3.2.16 Visual aids

Ensure that following requirements are met:

☑ Machine is parked on horizontal and solid ground.
☑ Diesel engine is turned off.
☑ The operator's seat has been adjusted.
☑ Tyres are aligned parallel to machine's longitudinal axis.

3.2.16.1 Overview of visual aids



0015305-02

Overview of visual aids

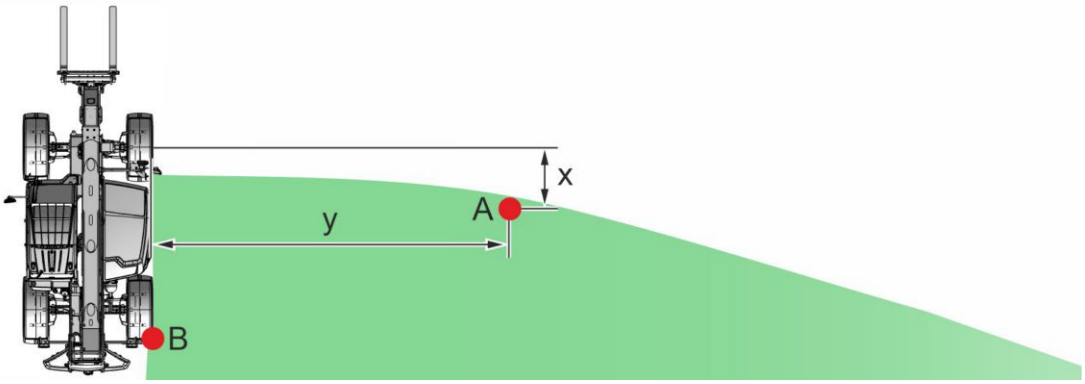
1	Right rear-view mirror	**7**	Left rear-view mirror
2	Additional mirror[16)]	**8**	Left side mirror
3	Front mirror	**9**	Boom camera[16)]
4	Rear visual aid[16)]	**10**	Side camera
5	Reversing camera[16)]	**11**	Right side mirror
6	Rear mirror		

[16)] Equipment variant

3.2.16.2 Mirrors

Right side mirror and right rear-view mirror

Checking area covered by right side mirror and right rear-view mirror



0009168-01

Area covered by right side mirror and right rear-view mirror

A Object

B Rear right mudguard

Clearances

Designation	Value
x	1.4 m (4.59 ft)
y	4.6 m (15.09 ft)

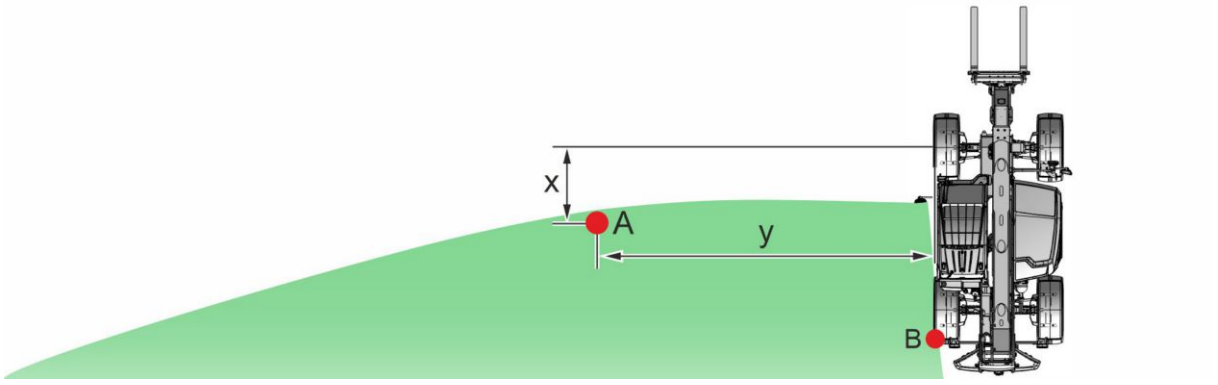
- ► Place object **A** on ground 4.6 m (15.09 ft) to the right of outer surface of the right wheel heads and 1.4 m (4.59 ft) behind the front axle centreline.
- ► Check area covered by right side mirror and right rear-view mirror.
  - ✔ Object **A** is visible in right side mirror.
  - ✔ Rear right mudguard **B** is visible in right rear-view mirror.

If area covered by right side mirror and right rear-view mirror is incorrect:

- ► Adjust right side mirror and right rear-view mirror.

Left side mirror and left rear-view mirror

Checking area covered by left side mirror and left rear-view mirror



0009170-01

Area covered by left side mirror and left rear-view mirror

A Object

B Rear left mudguard

LWT/93517630/09/01/12/2023/en

Clearances

Designation	Value
x	1.9 m (6.23 ft)
y	4.3 m (14.11 ft)

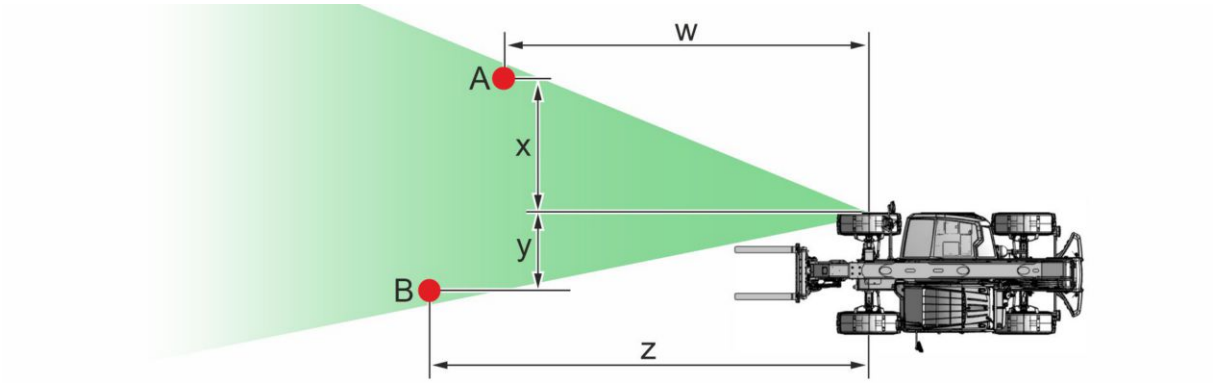
- ► Place object **A** on ground 4.3 m (14.11 ft) to the left of outer surface of the left wheel heads and 1.9 m (6.23 ft) behind front axle centreline.
- ► Check area covered by left side mirror and left rear-view mirror.
  - ✔ Object **A** is visible in left side mirror.
  - ✔ Rear left mudguard **B** is visible in left rear-view mirror.

If area covered by left side mirror and left rear-view mirror is incorrect:

- ► Adjust left side mirror and left rear-view mirror.

Front mirror

Checking area covered by front mirror



0009177-01

Area covered by front mirror

A Object

B Object

Clearances

Designation	Value
w	8.3 m (27.23 ft)
x	4.2 m (13.78 ft)
y	0.8 m (2.62 ft)
z	9.8 m (32.15 ft)

- ► Place object **A** on ground 4.2 m (13.78 ft) to the right of outer surface of the right wheel heads and 8.3 m (27.23 ft) in front of the front axle centreline.
- ► Place object **B** on ground 0.8 m (2.62 ft) to the left of outer surface of the right wheel heads and 9.8 m (32.15 ft) in front of front axle centreline.
- ► Check area covered by front mirror.
  - ✔ Object **A** and object **B** are visible in front mirror.

If area covered by front mirror is incorrect:

- ► Adjust front mirror.

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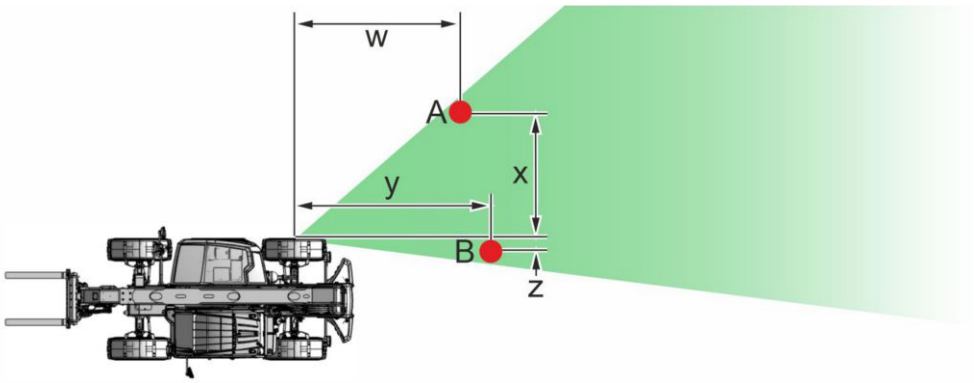
Rear mirror

Checking area covered by rear mirror



0009214-01

Area covered by rear mirror

A Object **B** Object

Clearances

Designation	Value
w	2.6 m (8.53 ft)
x	3 m (9.8 ft)
y	3.2 m (10.50 ft)
z	0.2 m (0.66 ft)

- ► Place object **A** on ground 3 m (9.8 ft) to the right of outer surface of the right wheel heads and 2.6 m (8.53 ft) behind the rear axle centreline.
- ► Place object **B** on ground 0.2 m (0.66 ft) to the left of outer surface of the right wheel heads and 3.2 m (10.50 ft) behind the rear axle centreline.
- ► Check area covered by rear mirror.
  - ✔ Object **A** and object **B** are visible in rear mirror.

If area covered by rear mirror is incorrect:

- ► Adjust rear mirror.

Additional mirror (equipment variant)

If the High Flow equipment variant is installed, the additional mirror must be fitted.

Checking area covered by additional mirror

Ensure that following requirements are met:

☑ Right side mirror and right rear-view mirror are folded in.

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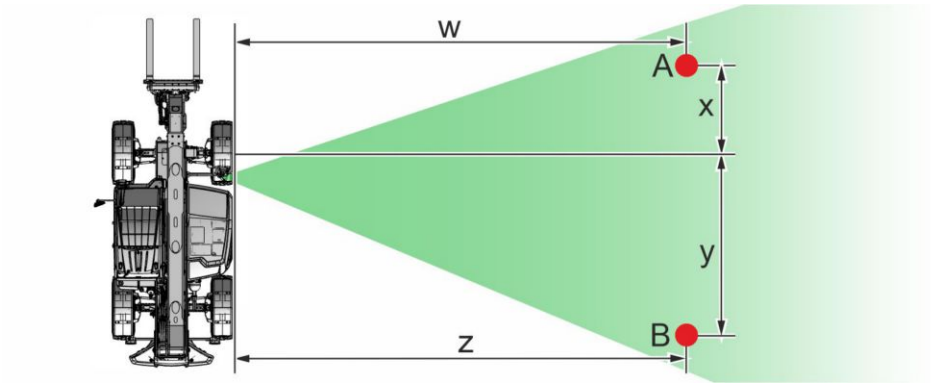


0015312-01

Area covered by additional mirror

A Object **B** Object

Clearances

Designation	Value
w	4.0 m (13.1 ft)
x	1.5 m (4.92 ft)
y	4.3 m (14.11 ft)
z	4.0 m (13.1 ft)

- ► Place object **A** on ground 4 m (13.1 ft) to the right of outer surface of the right wheel heads and 1.5 m (4.92 ft) in front of the front axle centreline.
- ► Place object **B** on ground 4 m (13.1 ft) to the right of outer surface of the right wheel heads and 4.3 m (14.11 ft) behind the front axle centreline.
- ► Check area covered by additional mirror.
  ✔ Object **A** and object **B** are visible in additional mirror.

If area covered by additional mirror is incorrect:

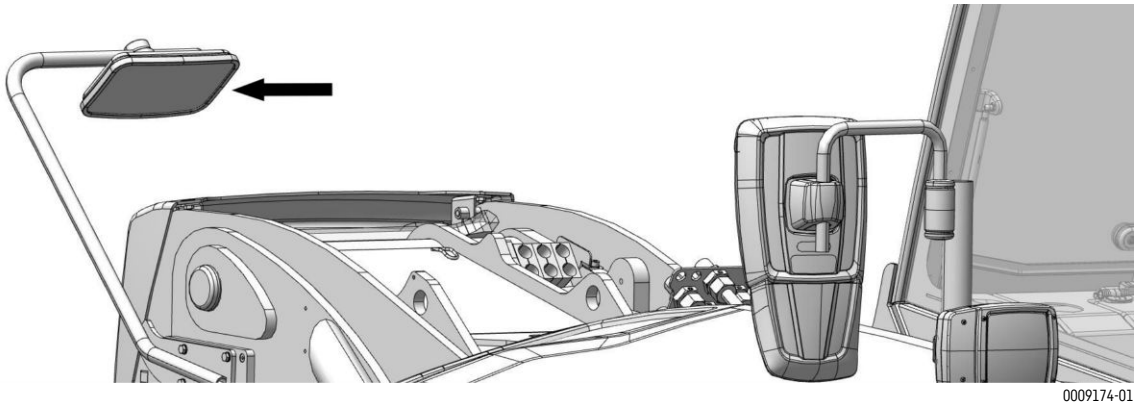
- ► Adjust additional mirror.

3.2.16.3 Visual aids

Rear visual aid (equipment variant)

The rear visual aid must be installed if using a trailer coupling.

Checking area covered by rear visual aid



0009174-01

Rear visual aid

► Check area covered by rear visual aid.
✔ Trailer coupling is visible in rear visual aid.

If area covered by rear visual aid is incorrect:

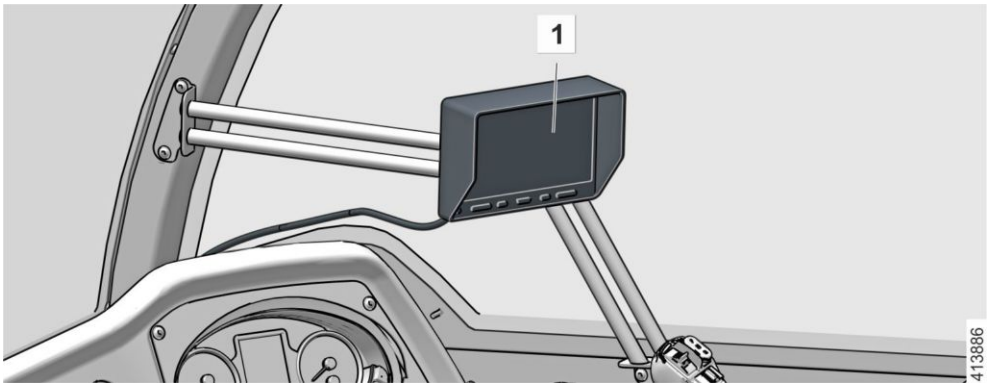
► Adjust rear visual aid.

3.2.16.4 Camera system (equipment variant)

In addition to the mirrors, the camera system provides an additional visual aid. It helps the operator to monitor the areas which cannot be seen directly.

The camera system consists of:

- Display in operator's cab
- Reversing camera on rear on main frame (equipment variant)
- Side camera for front right headlight (equipment variant)
- Side camera for front right headlight (equipment variant)



G2048725_1

Display in operator's cab

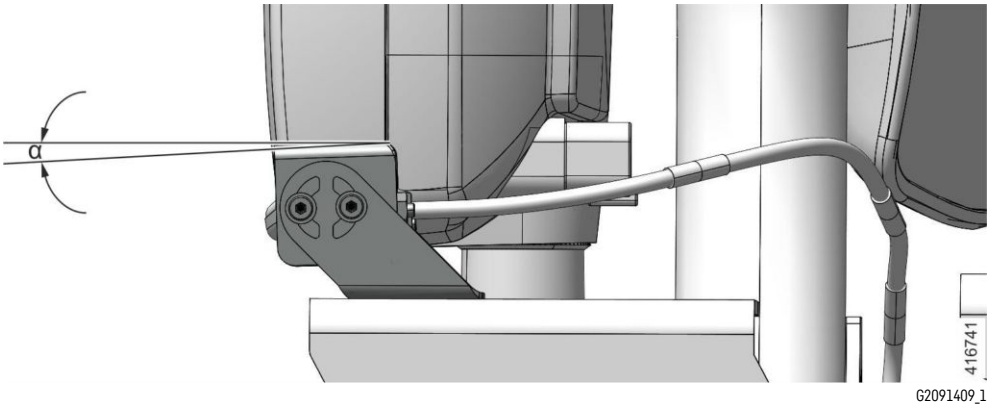
1 Display

Camera image is shown on the display **1**.

Refer to the operator's manual provided by the manufacturer for the camera for details of operation, adjustment and maintenance.

Side camera (equipment variant)

Checking alignment of the side camera



G2091409_1

Alignment of the side camera

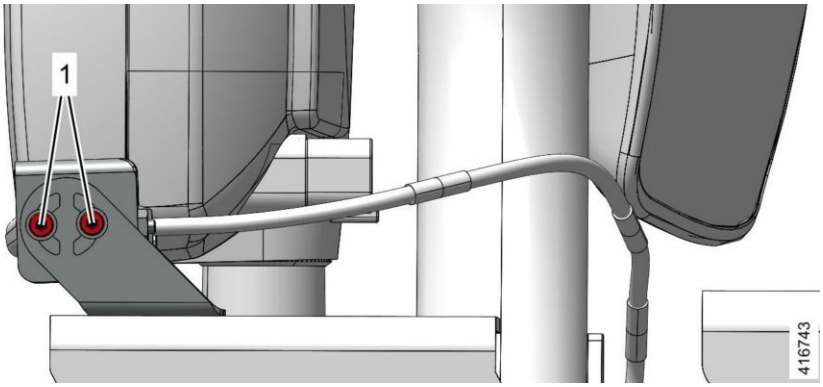
LWT/93517630/09/01/12/2023/en

► Measure angle α from the horizontal to the bottom.
✔ Angle α is 2°.

If angle α is not 2°:

► Correct angle α of the side camera.

Correcting angle α of the side camera



G2091413_1

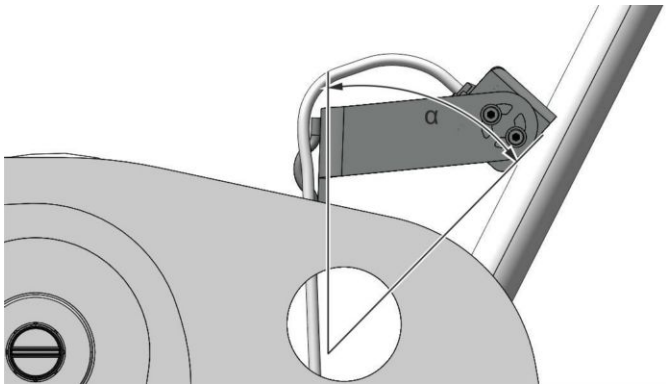
Screws on side camera

1 Screw (4x)

► Loosen screws **1**.
► Correct angle α of the side camera.
► Tighten screws **1**.

Reversing camera (equipment variant)

Checking the alignment of the reversing camera



G2091411_1

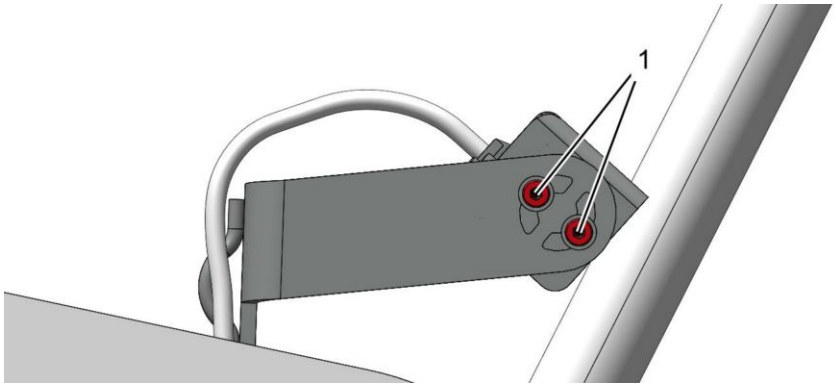
Reversing camera alignment

► Measure angle α from the perpendicular to the bottom.
✔ Angle α is 50°.

If angle α is not 50°:

► Correct angle α of the reversing camera.

Correcting angle α of the reversing camera



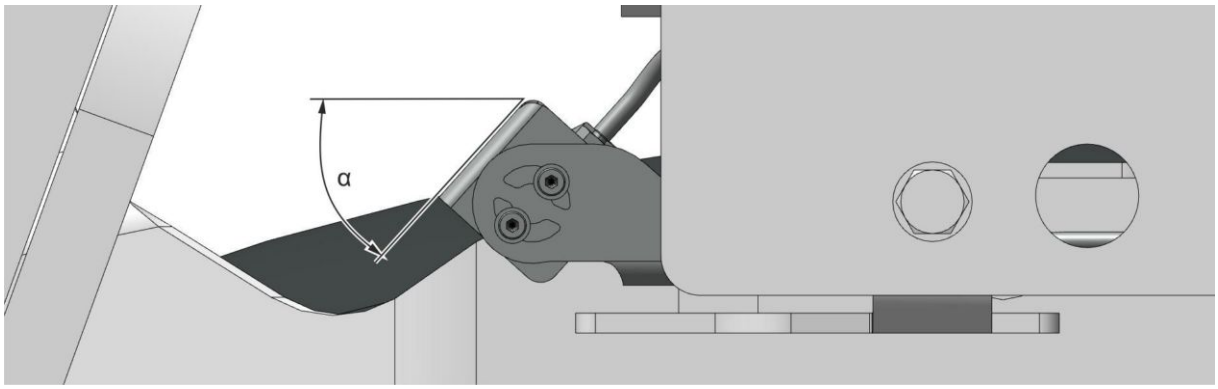
Screws on reversing camera

1 Screw (4x)

- ► Loosen screws **1**.
- ► Correct angle α of the reversing camera.
- ► Tighten screws **1**.

Boom camera (equipment variant)

Checking alignment of the boom camera



Boom camera alignment

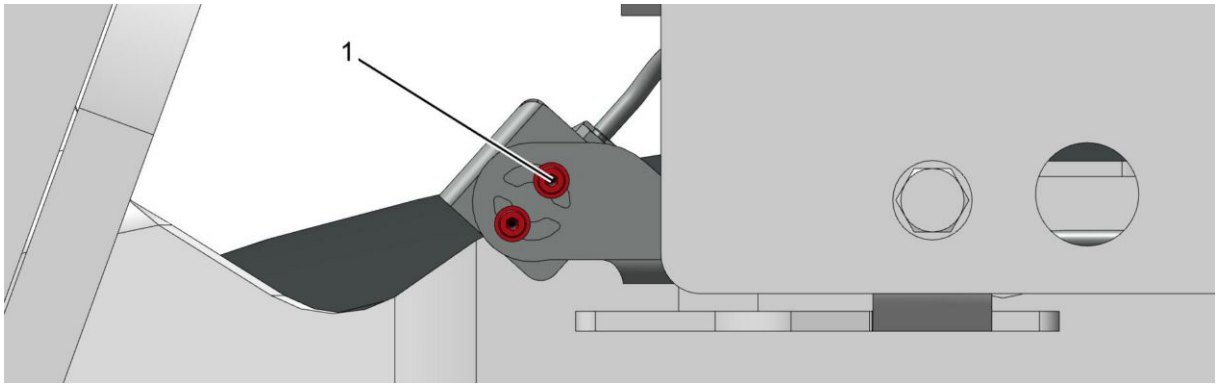
- ► Measure angle α from the horizontal to the bottom.
  ✔ Angle α is 48°.

If angle α is not 48°:

- ► Correct angle α of the boom camera.

LWT/93517630/09/01/12/2023/en

Correcting angle α of the boom camera



0015278-01

Screws on boom camera

1	Screw (4x)

- ► Loosen screws **1**.
- ► Correct angle α of the boom camera.
- ► Tighten screws **1**.

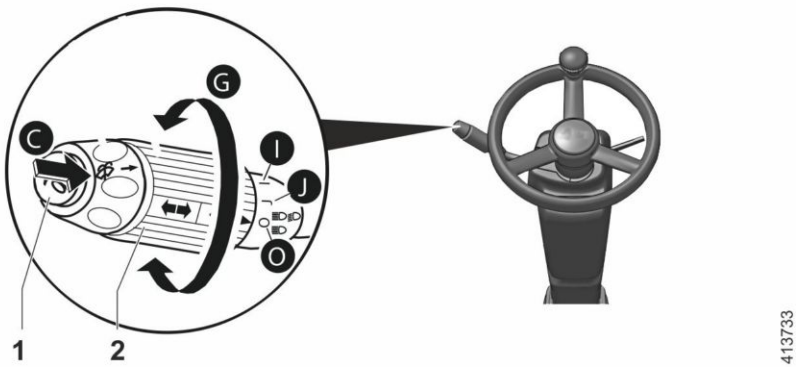
3.2.17 Windscreen wiper and windscreen washer system

The machine is equipped with an electric windscreen washer system for the front window and the rear screen. It consists of operating elements, the windscreen wipers, the windscreen washer tank and the nozzles for the windscreen washer fluid.

Ensure that following requirements are met:

- ☑ The electrical system of the machine is turned on.
- ☑ The windscreen wiper blades are not frozen to the window.

3.2.17.1 Operating windscreen wipers and windscreen washer system of the windscreen



413733

G2045853_1

Windscreen washer system for windscreen

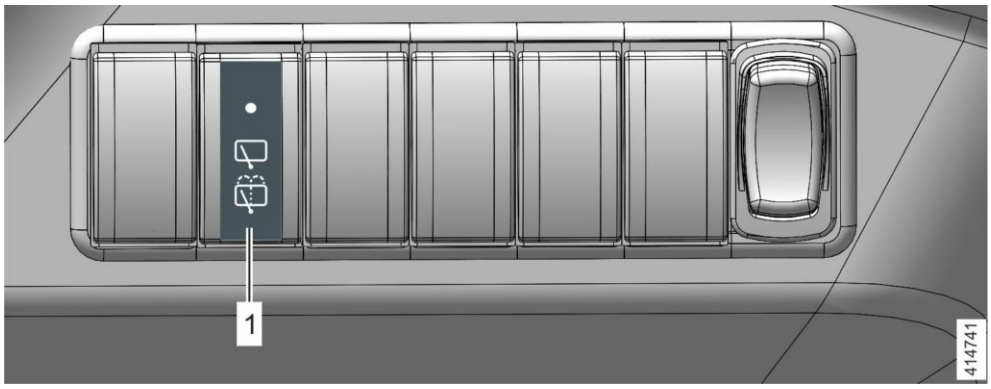
1	Button	**I**	Continuous mode
2	Rotary switch	**J**	Intermittent operation
C	Windscreen washer system actuation	**O**	Windscreen wiper off
G	Windscreen wiper actuation		

Stages of rotary switch

Symbol	Stage
I	Continuous mode
J	Intermittent operation
0	Windscreen wiper off

- ► Set rotary switch **2** to the desired stage.
- ► Activate windscreen washer system: Press and hold button **1** down.
  - ✔ Windscreen washer fluid is sprayed on windscreen via nozzles.
  - ✔ Windscreen wiper is switched on.

3.2.17.2 Operating windscreen wipers and windscreen washer system of the rear screen



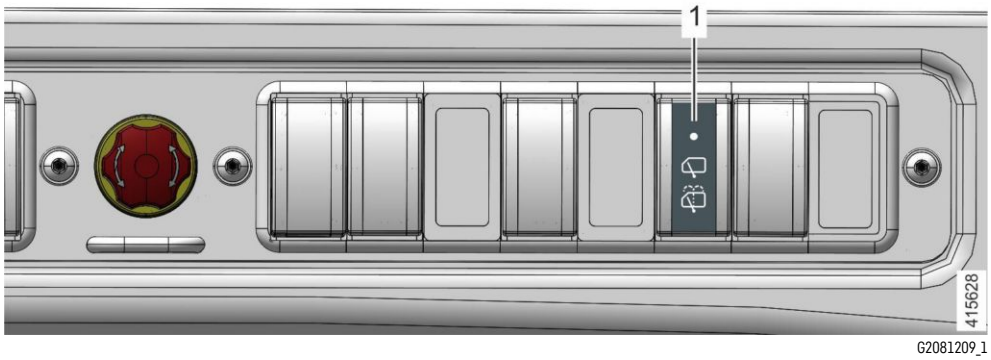
G2068355_1

«Windscreen washer system for rear screen» switch

1 «Windscreen washer system for rear screen» switch

- ► Activate windscreen wiper: Set «Windscreen washer system for rear screen» switch **1** to centre position.
- ► Activate windscreen washer system: Push «Windscreen washer system for rear screen» switch **1** down.
- ► Deactivate windscreen wiper and windscreen washer system: Push «Windscreen washer system for rear screen» switch **1** up.

3.2.17.3 Operating side window windscreen washer system (option)



G2081209_1

«Side window windscreen washer system» switch

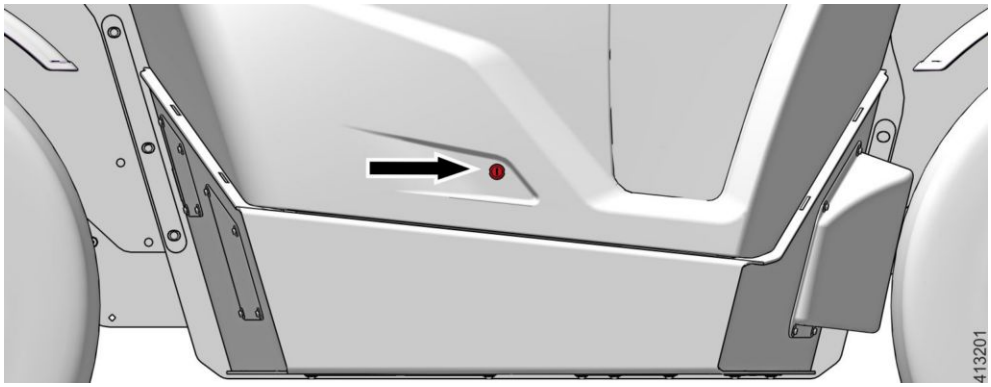
1 «Side window windscreen washer system» switch

LWT/93517630/09/01/12/2023/en

- ► Activate windscreen wiper: Set «Side window windscreen washer system» switch **1** to centre position.
- ► Activate windscreen washer system: Push «Side window windscreen washer system» switch **1** down.
- ► Deactivate windscreen wiper and windscreen washer system: Push «Side window windscreen washer system» switch **1** up.

3.2.18 Windscreen washer tank

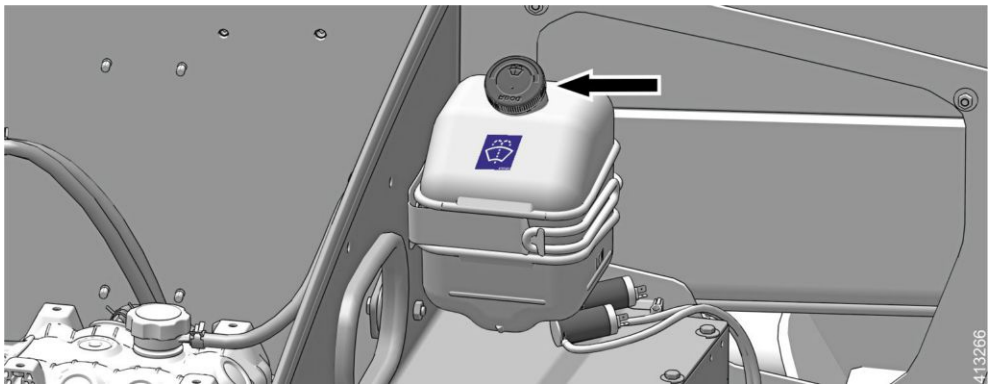
The windscreen washer tank is installed on right in the engine compartment.



G2036272_1

Location of windscreen washer tank

- ► Open engine bonnet.
  - ✔ Engine bonnet is held in this position by the gas cylinder.



G2040442_1

Windscreen washer tank

- ► Open the cover.
- ► If necessary, add commercially available windscreen washer fluid.

NOTICE

Danger of damage for the windscreen washer system due to icing!

Icing causes the windscreen washer system to fail or be damaged.

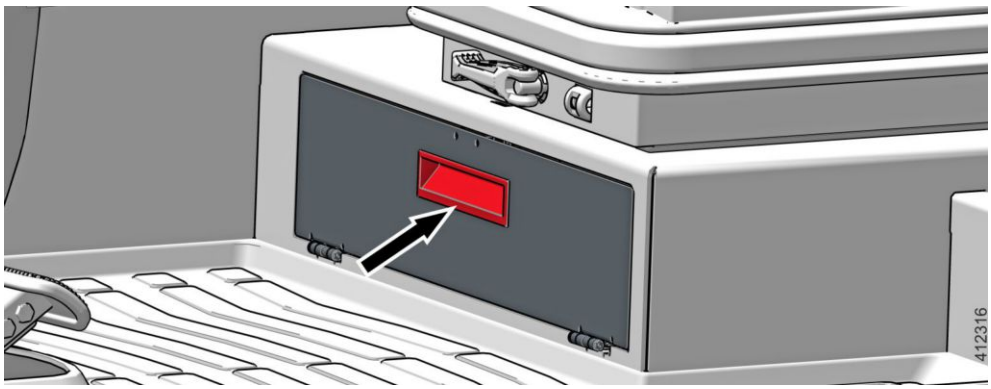
- ► Make sure to protect the windscreen washer system from ice formation by adding anti-freeze!

- ► Use commercially available anti-freeze.

► Before start of cold season add appropriate amount of anti-freeze.

3.2.19 Compartment for documentation

The compartment underneath the operator's seat is intended for the machine documentation.



G2021128_3

Compartment

► Place operator's manual of machine in the compartment underneath the operator's seat.

Note

► **Always store the operator's manual in the machine!**

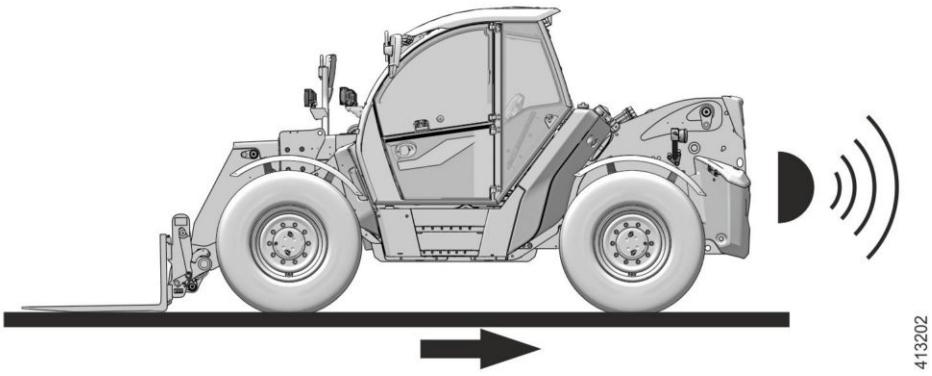
3.2.20 Reversing warning device (option)

The reversing warning device sounds if the switch for travel direction is moved into position for „reverse travel“.

Personnel near the machine are warned by the horn.

The reversing warning device is located in the rear of machine. The sound level is set automatically.

Prior to putting the machine into service, actuate the «switch for travel direction» in the „reverse travel“ position to check the function of reversing warning device.



G2040452_1

Checking the reversing warning device

LWT/93517630/09/01/12/2023/en

WARNING
Risk of accident when backing up the machine!
When backing up, personnel near the machine can be overlooked.
- ► Always make a check personally to ensure that no one is endangered when the machine is moved, even though a reversing warning device is installed.

- ► Start machine.
- ► Release parking brake.

412306
G2021018_1

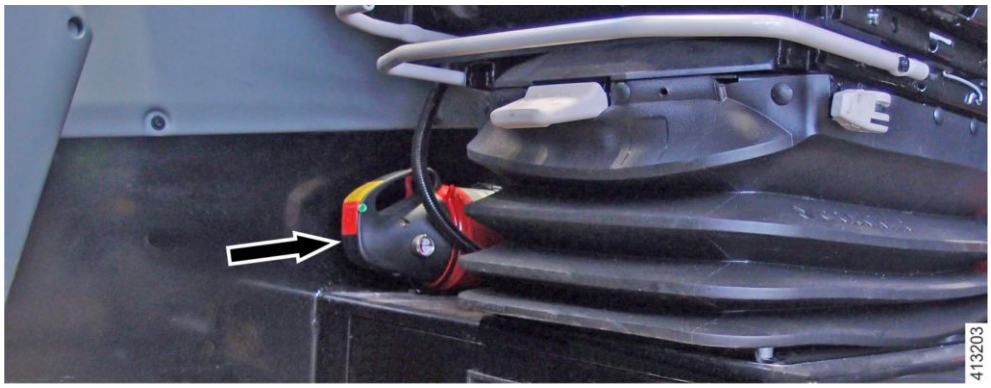
Reverse travel button

- ► Press rocker switch **3** back: machine travels in reverse.
  ✔ The reversing warning device emits a sound.

3.2.21 Fire extinguisher (Option)

3.2.21.1 Mounting location of fire extinguisher

For retrofit installation of a fire extinguisher, a mounting location on the right hand side next to the operator's seat is available.



413203
G2040455_2

Mounting location of fire extinguisher

- ► Contact Liebherr for fire extinguisher installation kit.

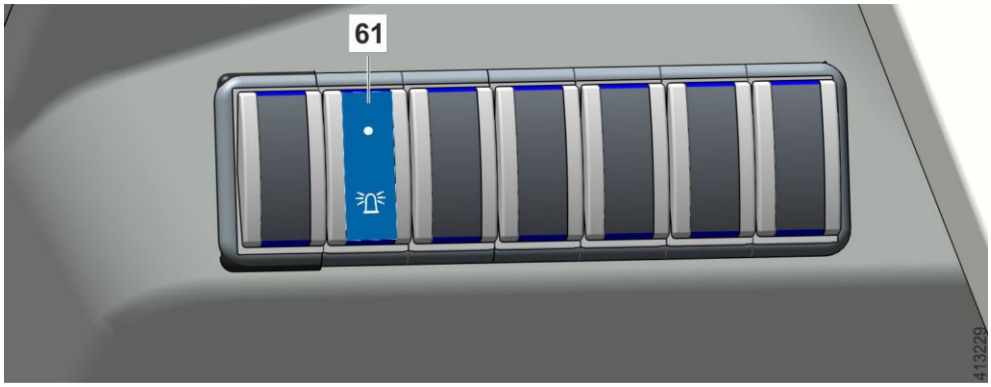
LWT/93517630/09/01/12/2023/en

3.2.22 Beacon (option)

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

The beacon is also functioning when ignition key is pulled off.

3.2.22.1 Operation of the beacon



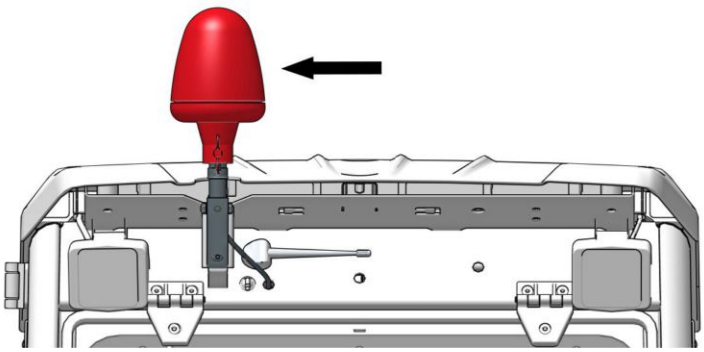
G2036276_2

«Beacon» switch

61 «Beacon» switch

- ► To switch on beacon: press bottom part of «beacon» switch **61**.
- ► To switch off beacon: press top part of «beacon»switch **61**.

3.2.22.2 Halogen beacon



G2036278_1

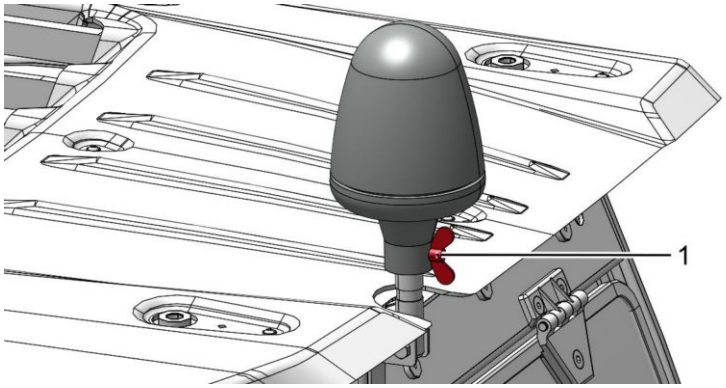
Location of the halogen beacon

The halogen beacon is located on the rear of the operator's cab.

LWT/93517630/09/01/12/2023/en

Removing halogen beacon

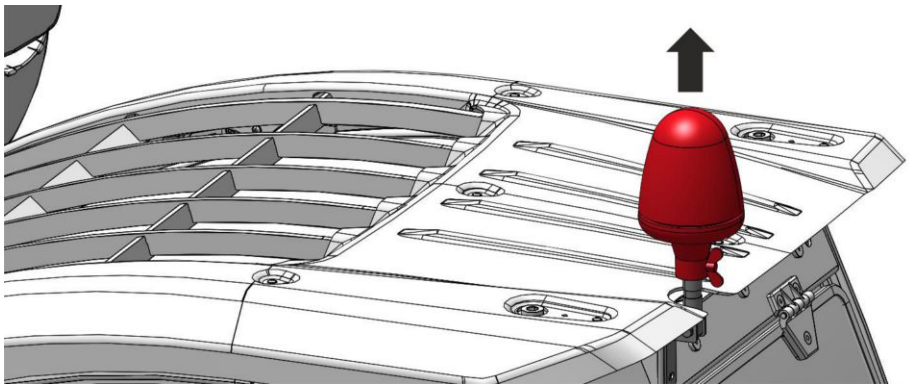
The halogen beacon can be removed for driving under low passages.



Wing nut

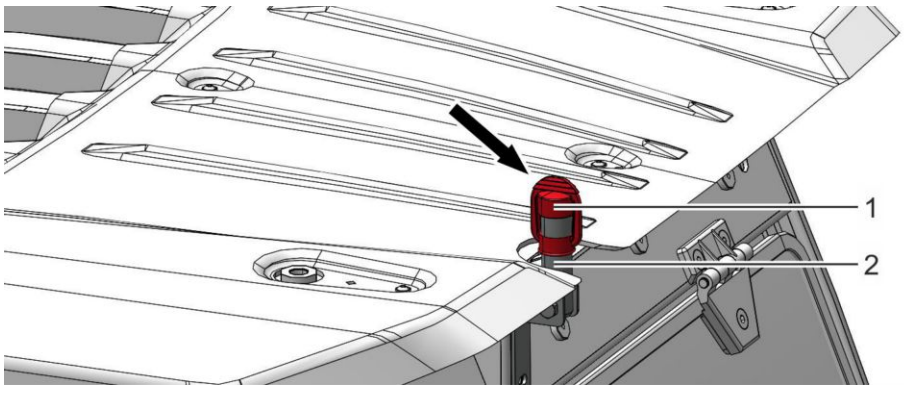
1	Wing nut

► Remove wing nut **1**.



Removing halogen beacon

► Pull the halogen beacon upwards.

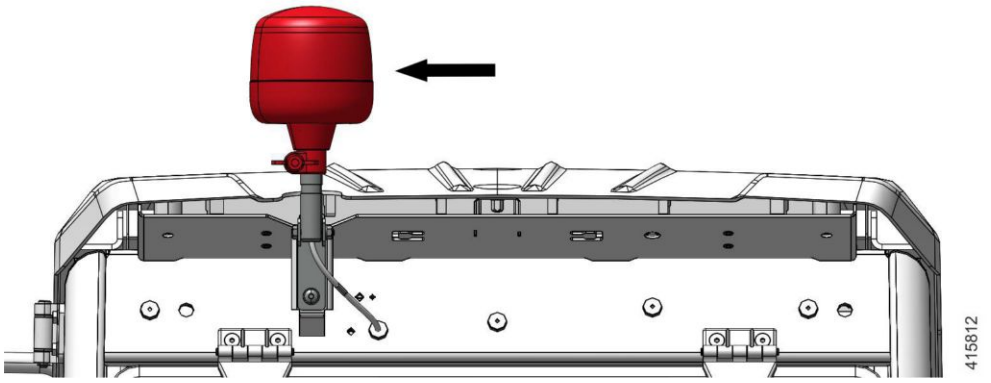


Cover

1	Cover	**2**	Snap-on pipe

► Close snap-on pipe **2** with cover **1**.

3.2.22.3 LED beacon



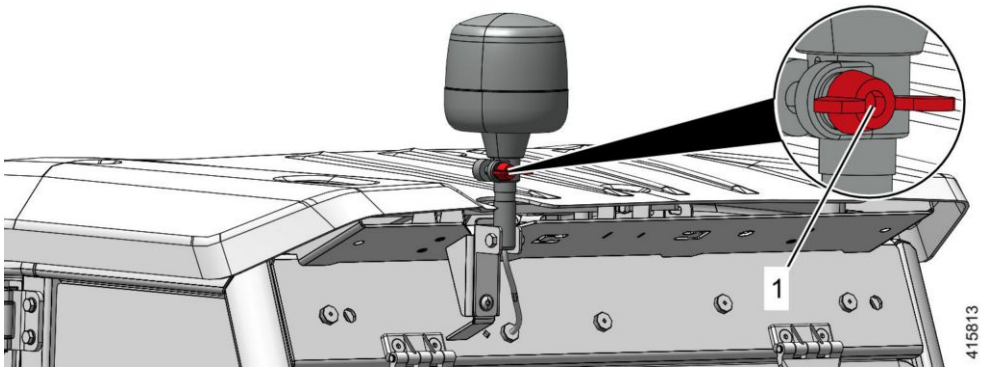
G2083646_1

Location of the LED beacon

The LED beacon is located on the rear of the operator's cab.

Removing LED beacon

The LED beacon can be removed for driving under low passages.

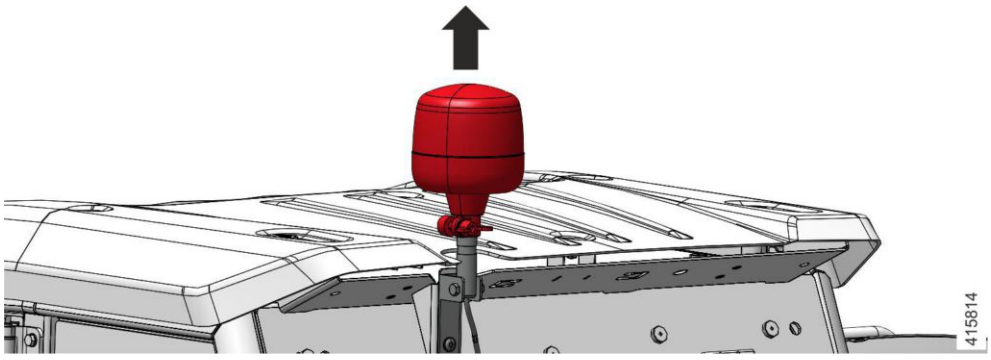


G2083651_1

Wing nut

1 Wing nut

► Remove wing nut **1**.

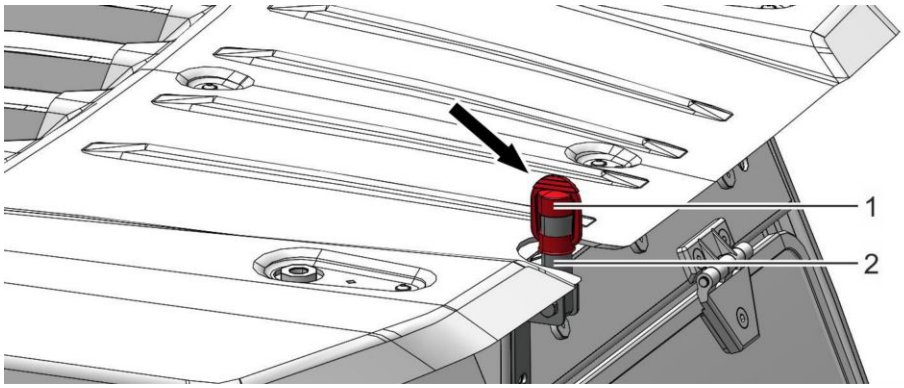


G2083648_1

LED beacon

LWT/93517630/09/01/12/2023/en

► Pull the LED beacon upwards.

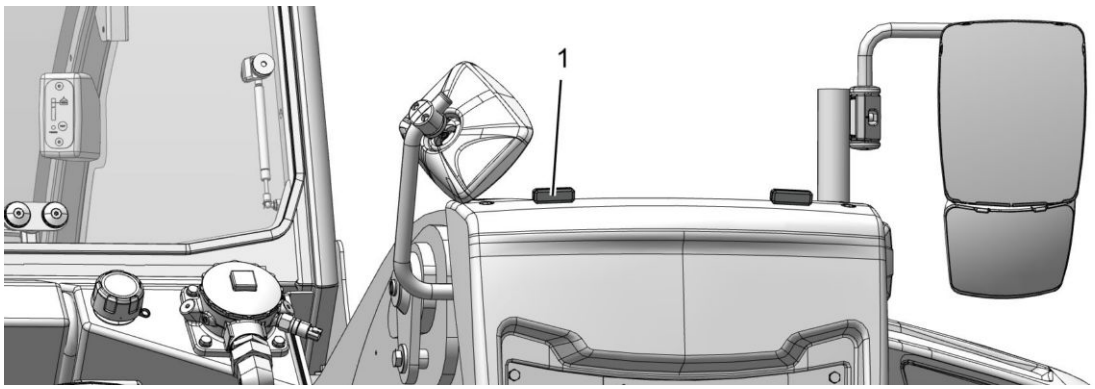


Cover

1	Cover	**2**	Snap-on pipe

► Close snap-on pipe **2** with cover **1**.

3.2.23 Flashing beacons (equipment variant)



Flashing beacons

1 Flashing beacon
Quantity 2 pcs

3.2.23.1 Switching on flashing beacons (equipment variant)

Procedure

► Press «Travel direction» button backward.
✔ Reverse travel direction is selected.
✔ Flashing beacons are flashing.

3.2.23.2 Switching off flashing beacons

Procedure

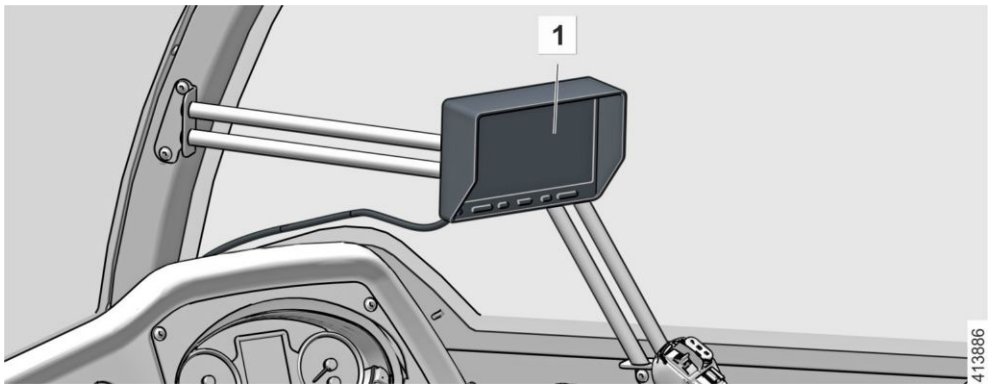
► Press «Travel direction» button forward.
✔ Forward travel direction is selected.

3.2.24 Camera system (equipment variant)

In addition to the mirrors, the camera system provides an additional visual aid. It helps the operator to monitor the areas which cannot be seen directly.

The camera system consists of:

- Display in operator's cab
- Reversing camera on rear on main frame (equipment variant)
- Side camera for front right headlight (equipment variant)
- Boom camera on pivot section (equipment variant)



G2048725_1

Display in operator's cab

1 Display

The camera image is shown on the display **1**.

Refer to the operator's manual provided by the manufacturer for the camera for details of operation, adjustment and maintenance.

3.2.25 LiDAT (option)

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.

LWT/93517630/09/01/12/2023/en

3.3 Operation

3.3.1 Operating machine on a daily basis

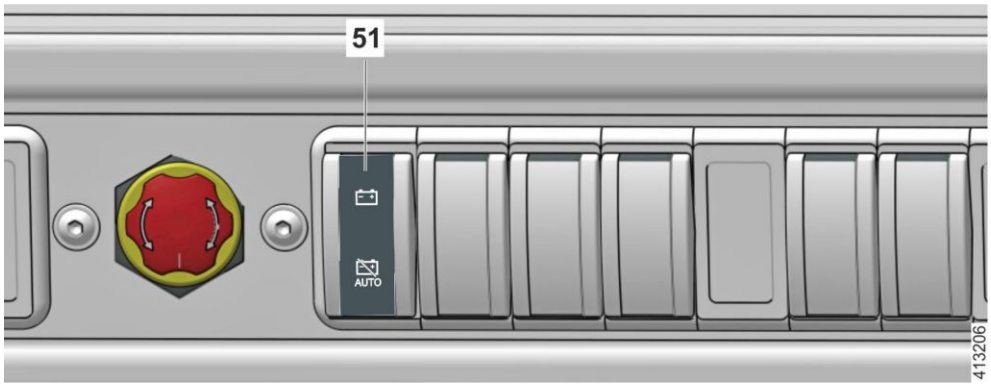
Make sure the following preconditions are met:

- ☑ Daily maintenance tasks are taken care of.
- ☑ Working hydraulics are locked.
- ☑ Sufficient diesel fuel for daily work is available as per the specification. Page 411
- ☑ Sufficient diesel exhaust fluid for daily work is available as per the specification.[17)]

[17)] For emission stage V

3.3.1.1 Adopting operating position

Connecting the battery



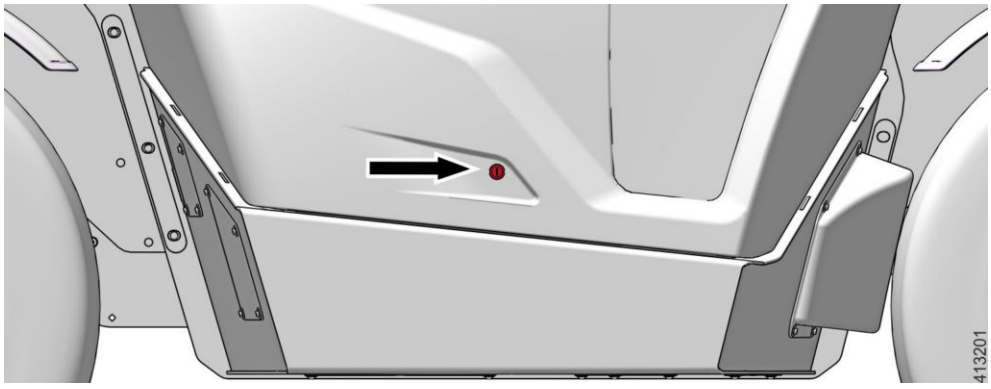
G2036455_2

«Battery isolation» switch

51 «Battery isolation» switch

► Press top part of «Battery isolation» switch **51**.
✔ Power supply is activated.

Closing the service accesses



G2036272_1

Locking doors

► Close all service doors, flaps and hoods and lock them, if possible.

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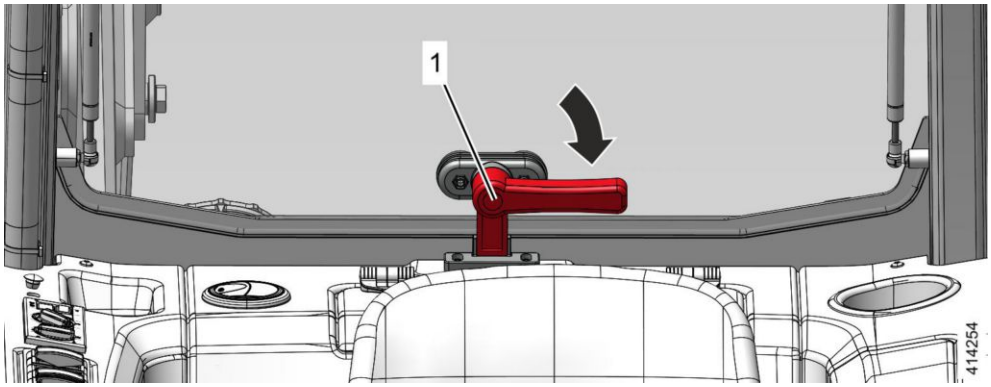
Closing the rear cab window



G2061922_1

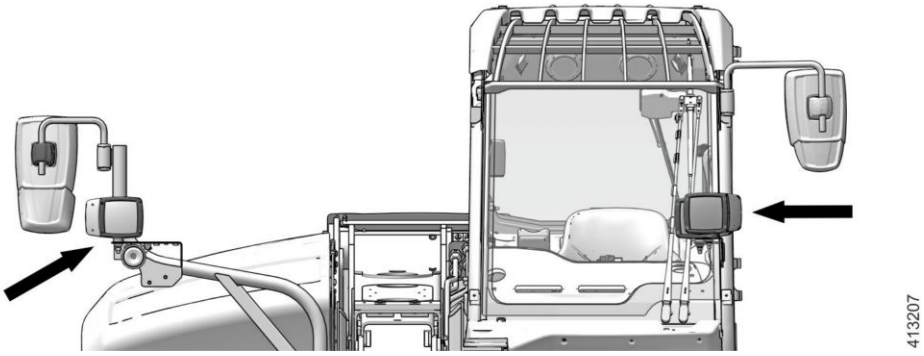
Closing the cab window

1 Handle

► Close the cab window with the handle **1**.

Note
The machine may only be put into operation if the cabin window is closed.

Checking lighting systems



G2036459_1

Headlight adjustment

► Check the lighting systems.
► Adjust headlight if necessary.

Adjusting the interior mirror and exterior mirror

► Adjust the interior mirror and exterior mirror.

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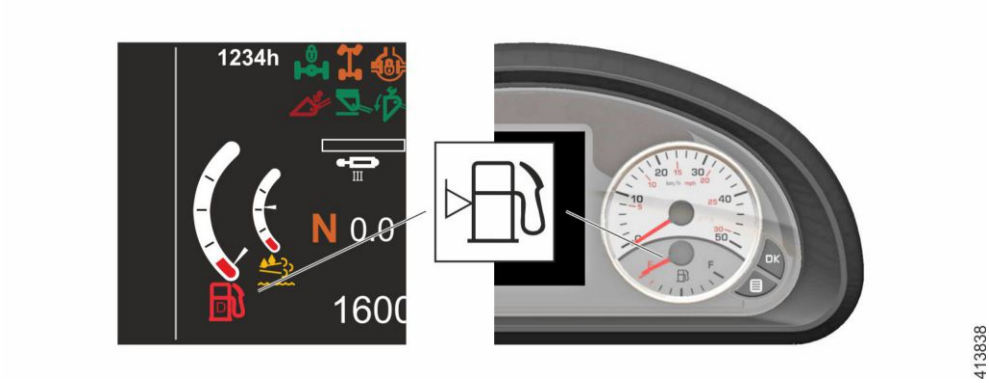
Refuelling with diesel

► Set starting switch to contact position **I**.



Fuel display

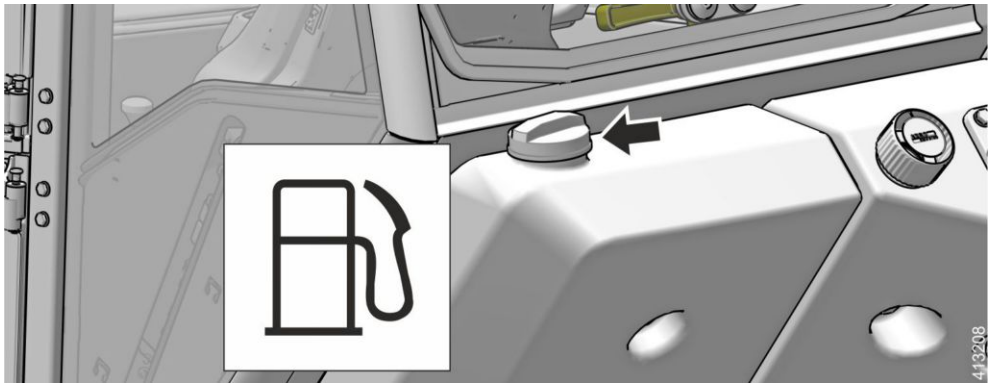
► Check whether there is still enough diesel fuel in fuel tank on fuel display.

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.

► Observe safety instructions for fire and explosion prevention. Page 87

Safety when refuelling

► Set the starting switch to zero position **0**.



G2036463_1

Tank filler cap

- ► Unlock lock.
- ► Remove tank filler cap.

Only refuel with clean diesel.

- ► Fill with clean diesel fuel via integrated strainer.

Note

To counteract condensation in fuel tank:

- ► Fill completely after end of work or after a shift change.

Topping up diesel exhaust fluid[17)]

CAUTION

Corrosive diesel exhaust fluid!

Injuries.

- ► Do not inhale vapours.

If skin comes into contact with diesel exhaust fluid:

- ► Clean affected areas with plenty of water and soap.

If eyes come into contact with diesel exhaust fluid:

- ► Rinse eyes under running water for at least 15 minutes.
- ► Consult a doctor if irritation persists.

If diesel exhaust fluid was swallowed:

- ► Do not vomit.
- ► Rinse mouth and drink plenty of water.
- ► Consult a doctor immediately.
- ► Adhere to safety data sheet of diesel exhaust fluid.

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

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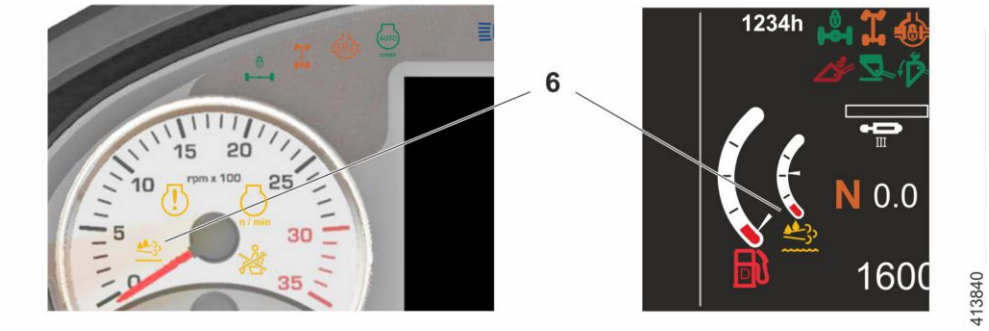


G2047876_1

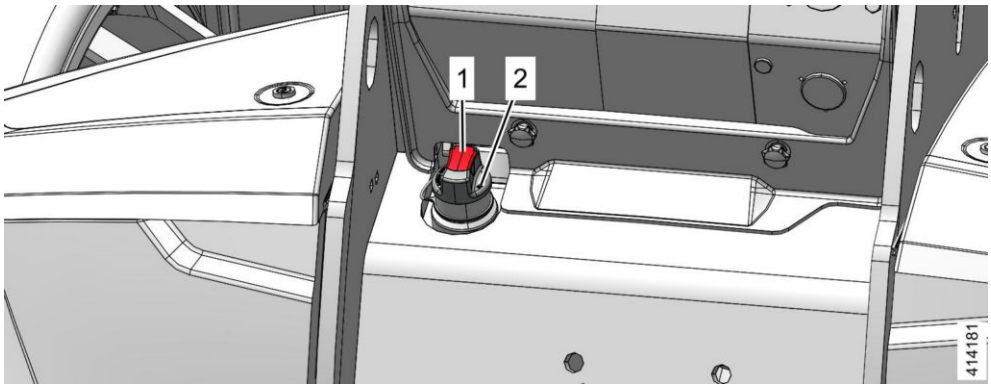
Diesel exhaust fluid display

6 «Diesel exhaust fluid» indicator light

If «diesel exhaust fluid» indicator light **6** lights up (diesel exhaust fluid level below 15%):

► Top up diesel exhaust fluid.

CAUTION
Irritant fuel and operating fluids!
Injury.
► Do not let diesel exhaust fluid come into contact with your skin or eyes.
► Observe manufacturer's instructions.



G2060388_1

Tank filler cap

1 Flap

2 Tank filler cap

► Open flap **1**.
► Unlock tank filler cap **2**.
► Remove tank filler cap **2**.

NOTICE

Contamination of diesel exhaust fluid!

Damage to the exhaust treatment system.

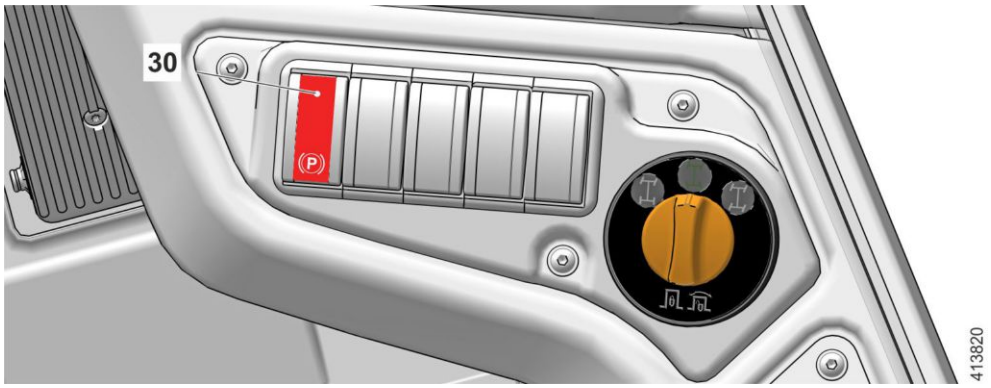
- ► Ensure that no dirt or contamination gets into the diesel exhaust fluid tank.
- ► Ensure that only pure diesel exhaust fluid is used.

- ► Top up diesel exhaust fluid through filler pipe.

If diesel exhaust fluid comes in contact with painted surfaces or aluminium surfaces:

- ► Rinse affected areas immediately with water.
- ► Attach tank filler cap **2** and close it.
- ► Lock tank filler cap **2**.
- ► Close flap **1**.

Releasing parking brake



«Parking brake» switch

30 «Parking brake» switch

- ► Press top part of «Parking brake» switch **30**.
  - ✔ After machine starts to travel, «Parking brake» symbol is hidden on the display.

3.3.2 Using machine at low or high ambient temperatures

Note

Pay attention to the temperature application range for the lubricants filled in the machine!

- ► Fill the machine with lubricants and service fluids according to the temperature at the jobsite.

Your machine can be utilized up to an ambient temperature of -20 °C (-4.0 °F) to 45 °C (113.0 °F) without additional working attachments and without restrictions.

From a constant ambient temperature below -20 °C (-4.0 °F) or above 45 °C (113.0 °F), special working attachments must be installed to ensure proper operation.

If the ambient temperature is below -20 °C (-4.0 °F) or above 45 °C (113.0 °F):

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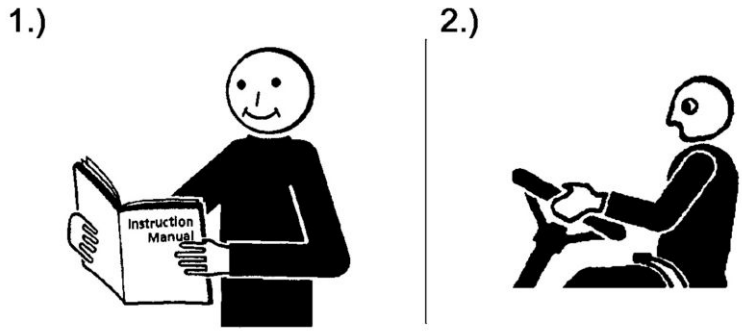
► Contact Liebherr customer service or the manufacturer.

3.3.3 Starting the diesel engine



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G058798_1

Operator's manual

1	Read and understand	**2**	Drive and work

Operate the machine only if you have read and understood the operator's manual!

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G077765_1

Personnel transport prohibited

DANGER
Impermissible transport of personnel!
Danger to life.
► It is forbidden to transport personnel or let them ride along on the machine and the working attachment.

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3.3.3.1 Preparations for start

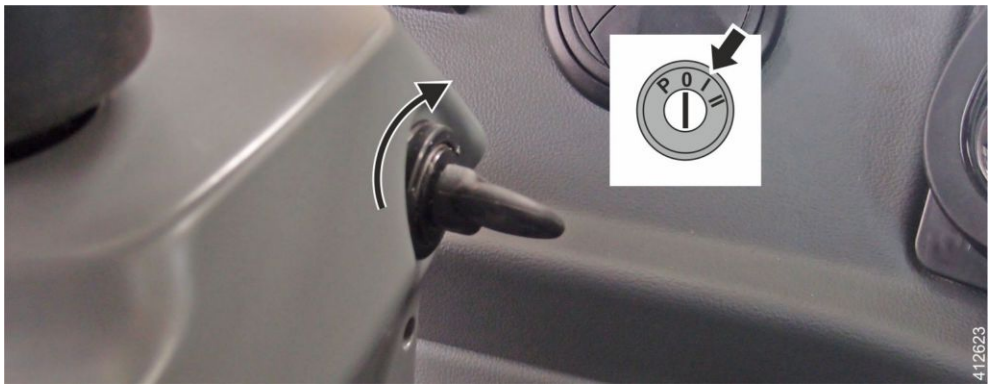
Ensure that following requirements are met:

☑ Machine is in operating position.

3.3.3.2 Carrying out the starting procedure

Checking the indicator lights

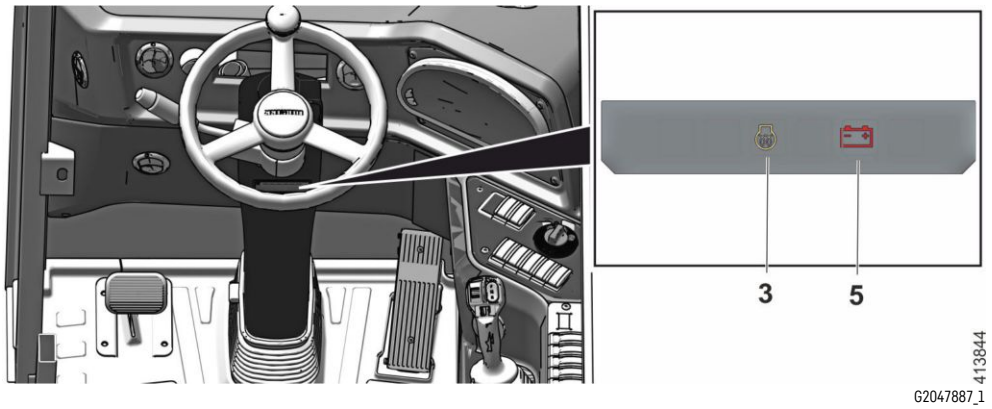
When the starting switch is in contact position, the indicator lights and the control electronics are checked.



G2024290_1

Starting switch contact position

► Set starting switch to contact position „I“.



G2047887_1

Indicator lights

✔ All indicator lights light up for a short time (duration 2 - 3 seconds).

The following indicator lights light up continuously on the steering column:

✔ «Pre-heat system» indicator light **3**

✔ «Battery charge» indicator light **5**

The following symbols light up continuously on the display:

✔ «Steering modes» symbol

✔ «Travel stages» symbol

✔ «Auto hold» symbol (when the machine is at a standstill for 5 seconds)

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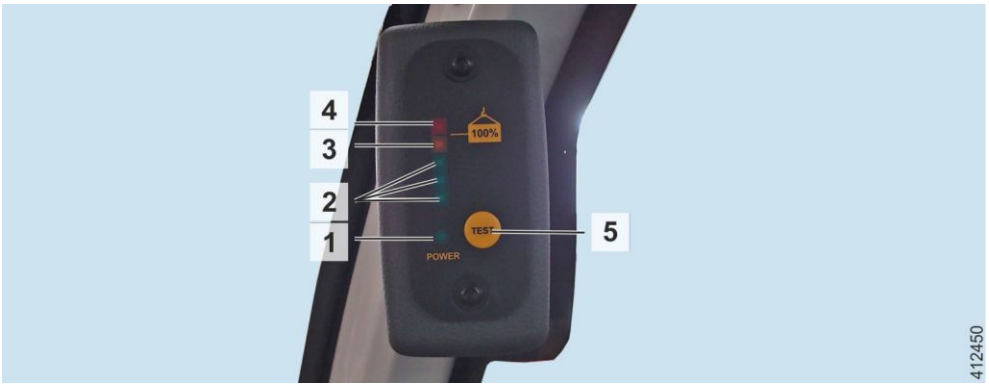
Checking the load torque display



G2022492_5

Checking the load torque display

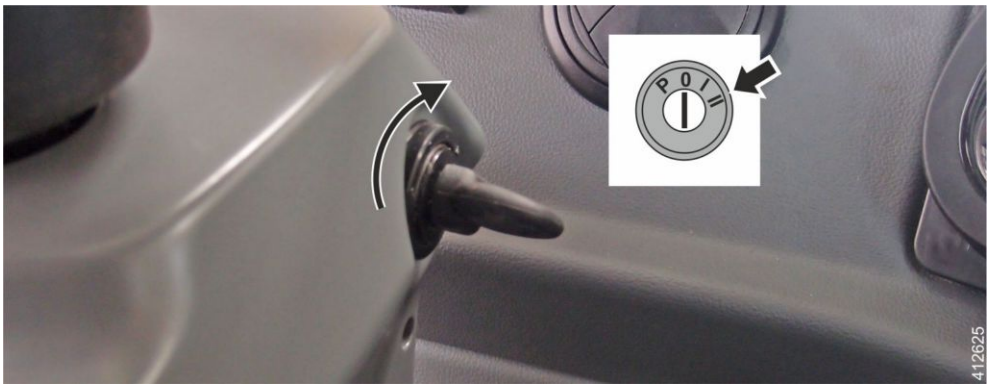
- ► Press the test switch **5**.
  - ✔ All LEDs **1-4** flash.
- ► Let go of test switch **5**.
  - ✔ The LED **1** lights up.

Starting the diesel engine

The preheat time depends on the existing ambient temperature and the electric starting conditions.

The diesel engine is equipped with an automatic pre-heat system. If the starting switch is set to contact position „I“, the pre-heat system starts automatically and the «pre-heat system» indicator light lights up.

- ► Wait until «pre-heat system» indicator light goes out.
  - ✔ When the «pre-heat system» indicator light goes out, pre-heat time is over.
  - ✔ The diesel engine is ready to start.



G2024304_1

Starting switch starting position

- ► Turn starting switch to starting position „II“ and hold it in this position until diesel engine starts.
- ► Do not try to start the engine for longer than maximum 10 seconds without a break.

Troubleshooting

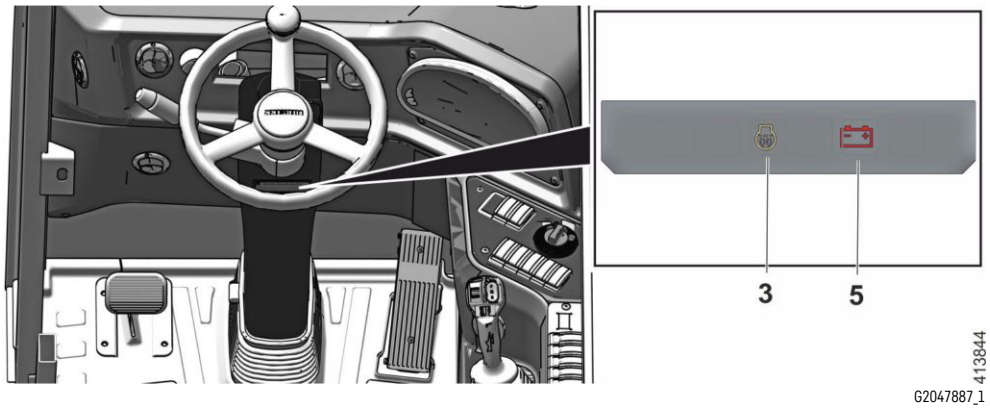
Diesel engine does not start?

- ► Reset the starting switch to zero position.
- ► Repeat the starting procedure after waiting for 120 seconds.

If diesel engine does not start after two starting procedures:

- ► Find the cause with the troubleshooting chart and remedy it.

- ► Release starting switch when diesel engine is running.
  - ✔ The starting switch returns by itself to operating position.
- ► Do not subject the diesel engine to a full load until after a short warm up period.
- ► Only switch on all shut-off power consumers after the diesel engine has been started (e.g. headlights, windscreen wipers, etc.).



Indicator lights turn off

3	«Pre-heat system» indicator light	**5**	«Battery» indicator light

After the diesel engine has started, the following indicator lights go out on the steering wheel:

- ✔ «Pre-heat system» indicator light **3**
- ✔ «Battery charge» indicator light **5**

Troubleshooting

The indicator lights do not turn off?

- ► Turn the diesel engine off and remedy the cause.

Synchronising the steering

The steering must be synchronised for every starting procedure of the diesel engine.

Ensure that following requirements are met:

- ☑ Machine is parked on horizontal and solid ground.
- ☑ Diesel engine is idling.
- ☑ All-wheel steering mode is selected.

- ► Move the steering wheel to the left.
- ► Move the steering wheel to the right.
- ► Align wheels parallel to longitudinal axis of machine.
  - ✔ «All-wheel steering» symbol is shown permanently on the display.
  - ✔ Steering is synchronised.

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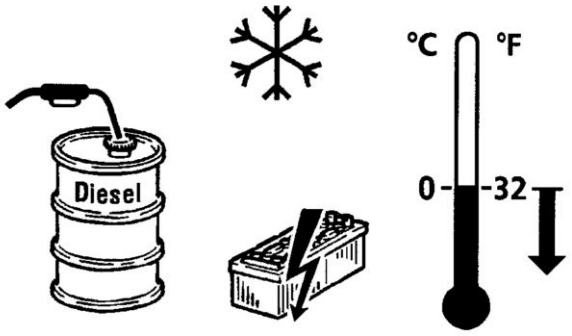
3.3.3.3 Starting preparations in freezing temperatures



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G058790_1

Winter operation

The following preparations improve the starting behaviour at low temperatures.

Preparations:

- Check the battery charge.
- Recharge the battery if necessary.
- Use winter fuel. See „lubricants and fuels“ section under winter operation.

WARNING
Ether-based starting aids!
Risk of explosion.
► Do not use ether based starting aids.

► Carry out the listed preparations for starting at freezing temperatures.

NOTICE
Improper use of the diesel engine!
Damage to the diesel engine.
► Let the diesel engine warm up before loading.

► After starting procedure, do not subject the diesel engine to a full load until after a short warm up period.

3.3.3.4 Preheating 230 V/120 V (option)

The preheating serves solely to heat the hydraulic oil and coolant before putting the machine into service at low ambient temperatures below -5 °C (23.0 °F). The heating duration is dependent on the ambient temperature.

Continuous heating of the hydraulic oil and the coolant only takes place if the preheating is activated over a **longer period of time**.

The connector plug is located at the cab access to the operator's cab.

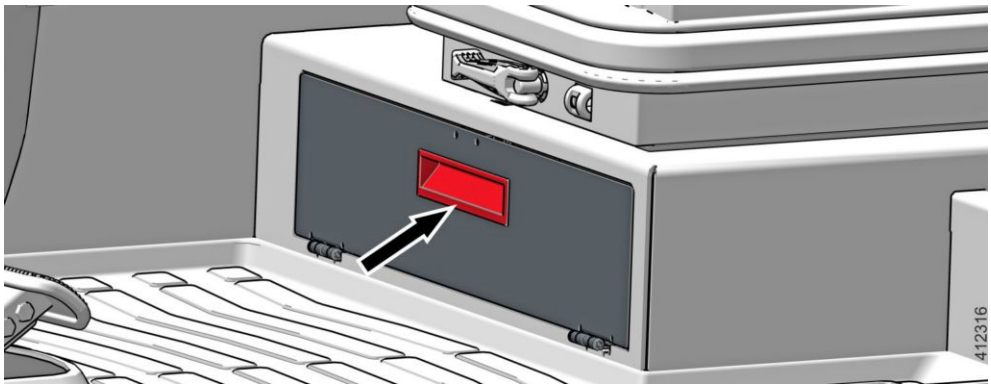
NOTICE

Incorrect use of the preheating!

Damage to the diesel engine.

► Only activate the preheating at temperatures below -5 °C (23.0 °F).

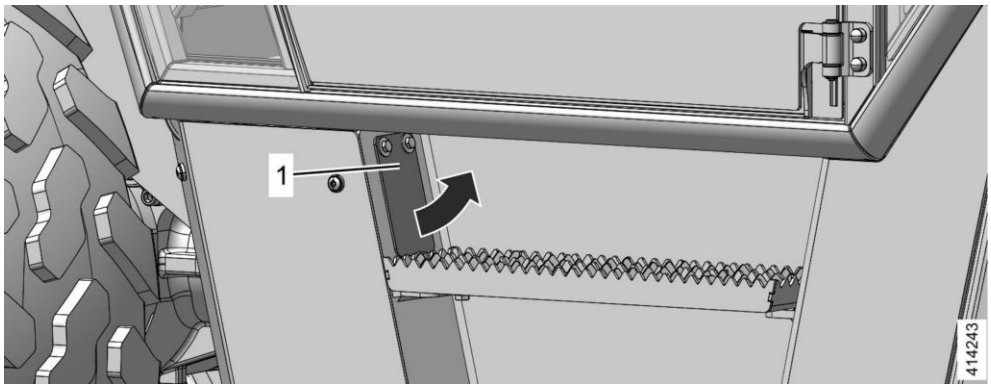
Activating preheating



G2021128_3

Compartment

► Remove the extension cable from the compartment.

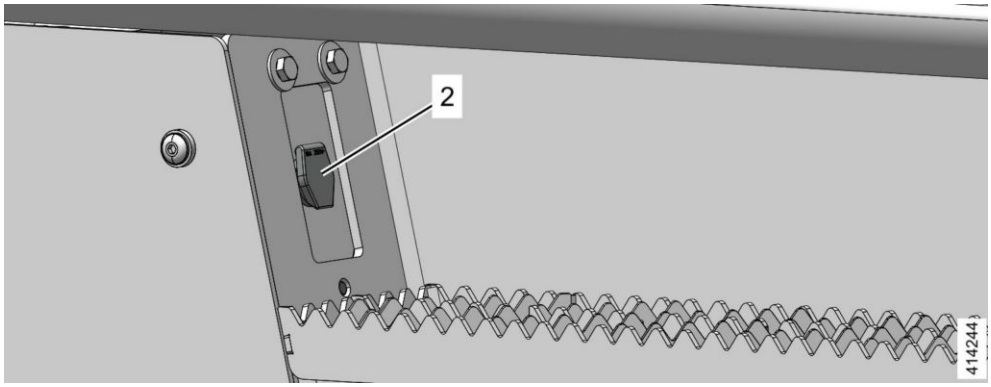


G2061838_1

Cover, preheating

1 Cover

► Fold cover **1** up.
✔ The plug connection is exposed.



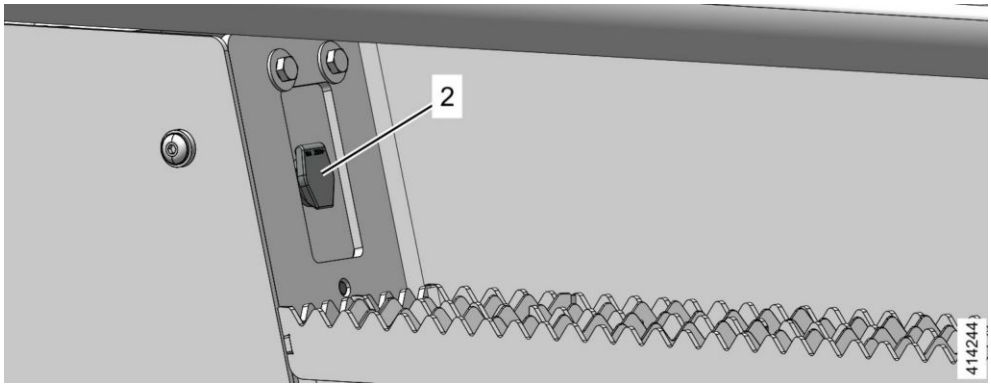
G2061839_1

Plug connection

2 Plug connection

► Connect plug connection **2** for AC mains (230 V/120 V) using an extension cord.
✔ Preheating active.

Deactivating the preheating

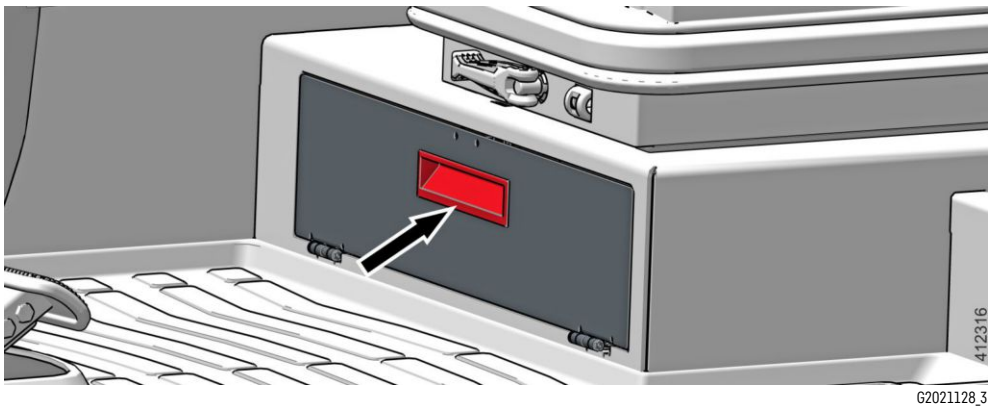


G2061839_1

Plug connection

2 Plug connection

► Unplug plug connection **2** for the AC mains (230 V/120 V).
✔ Preheating deactivated.



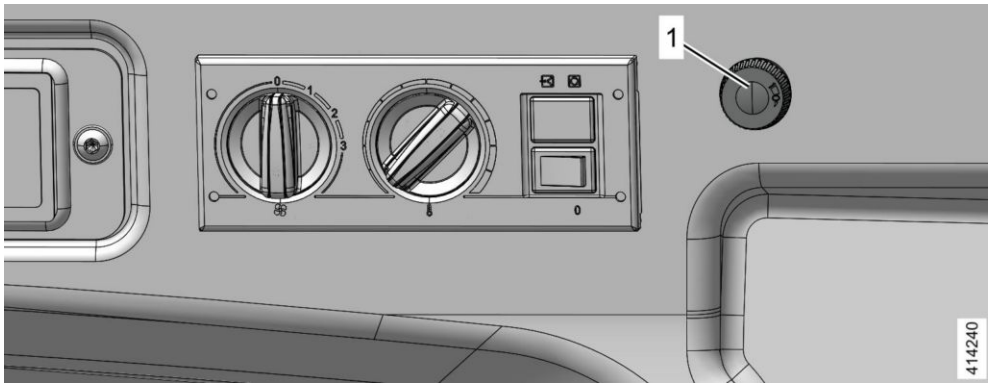
G2021128_3

Compartment

► Stow the extension cable in the compartment.

3.3.3.5 Fuel preheating 12 V (option)

The fuel preheating is used to heat the fuel prior to putting the machine into service at low ambient temperatures. Preheating ends automatically at a fuel temperature of 50 °C (122.0 °F).



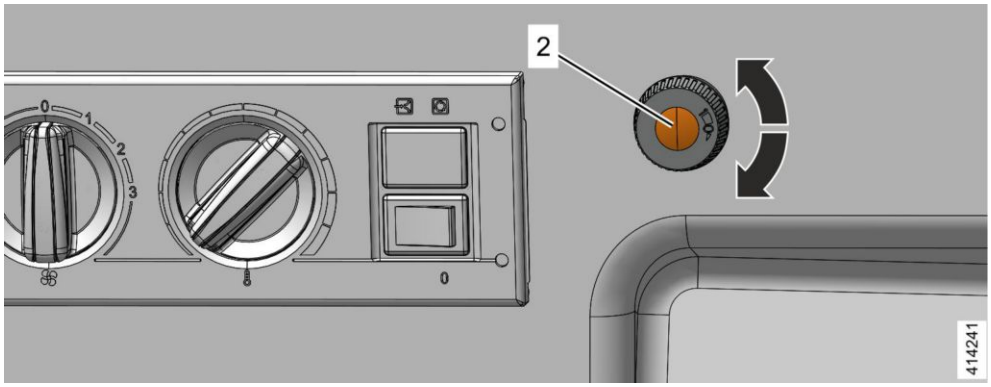
G2061821_1

Fuel preheating knob

1 Knob

The knob **1** is located on right in the operator's cab.

Activating the fuel preheating



G2061822_1

Activating the fuel preheating

2 Indicator light

► Turn knob in an anticlockwise direction to stop.
✔ Fuel preheating is activated.
✔ The indicator light **2** lights up.

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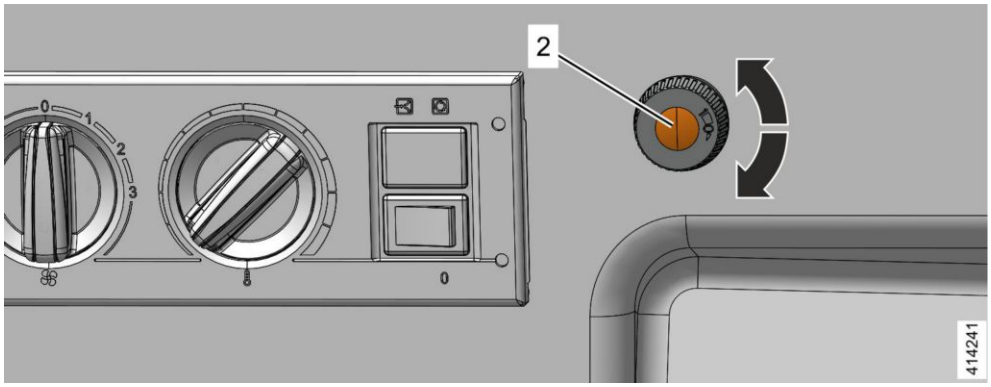
Deactivating fuel preheating



G2061822_1

Activating the fuel preheating

2 Indicator light

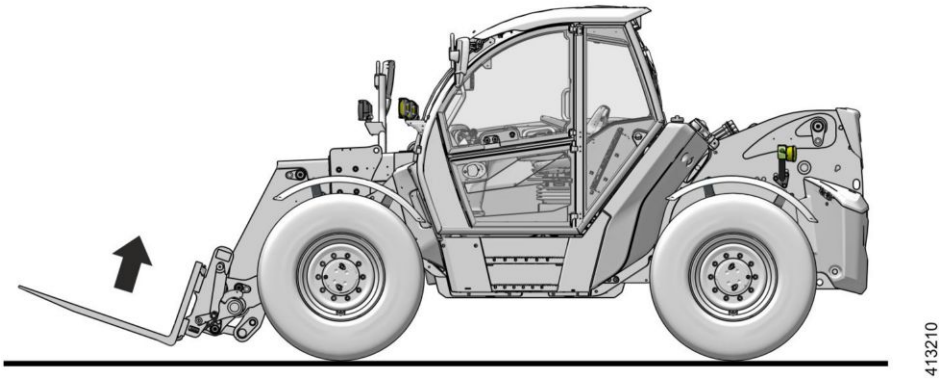
- ► Turn knob in a clockwise direction to stop.
  - ✔ Fuel preheating is deactivated.
  - ✔ The indicator light **2** goes out.

3.3.4 Travel mode

The preparations for travel mode must be carried out in the specified sequence.

Make sure that the machine is in operating position. Page 181

3.3.4.1 Preparing for travel mode



G2036470_1

Raising working attachment

- ► Raise working attachment so that no obstacles are touched.

3.3.4.2 Releasing the parking brake

Releasing the parking brake

► Press top part of «Parking brake» switch **30**.
✔ After machine starts to travel, the «Parking brake» symbol goes out on the display.

3.3.4.3 Bringing machine to operating temperature

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

► Repeatedly actuate working hydraulic cylinder against stop.
✔ This brings the hydraulic oil to operating temperature.

3.3.5 Driving

The machine's travel speed must 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.

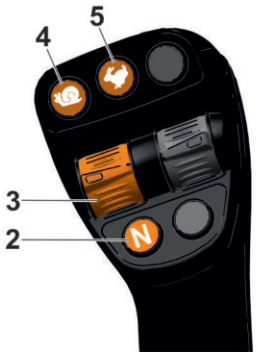
When driving with a load, adapt the travel speed to the respective conditions.

3.3.5.1 Neutral conditions for enabling travel mode

Make sure the following preconditions are met:

☑ Accelerator pedal is in neutral position.
☑ The diesel engine is started.
☑ A proper seating position has been adopted.

LWT/93517630/09/01/12/2023/en



412306
G2021018_1

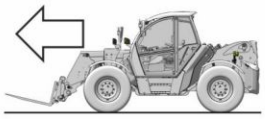
Control lever

2	«Neutral travel direction» button	**4**	«Slow travel stage» button
3	«Travel direction» rocker switch	**5**	«Fast travel stage» button

- ► Press «Neutral travel direction» button **2**.
  - ✔ Travel mode is enabled.
- ► Select travel direction.

Troubleshooting
Symbol for travel direction flashing on the display?
Neutral conditions are not met.
- ► Check neutral conditions.

3.3.5.2 Forward travel



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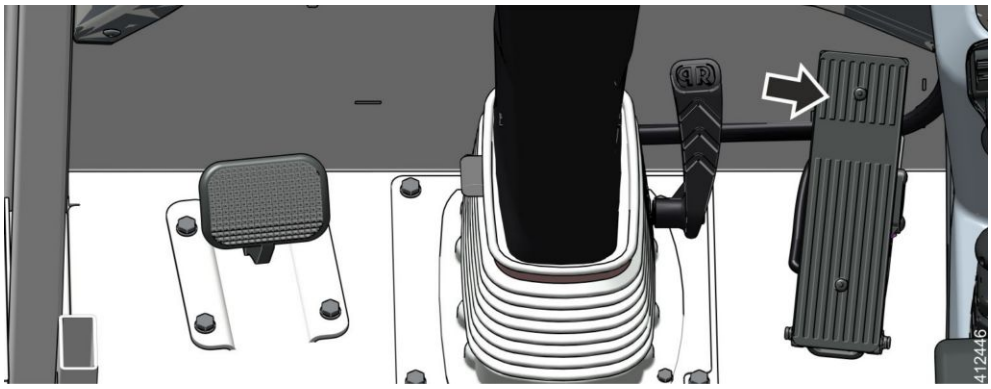
G2041240_2

Forward travel

2	«Neutral travel direction» button	**3**	«Travel direction» rocker switch

- ► Press «Travel direction» rocker switch **3** forward.
  - ✔ Forward travel direction is selected.
  - ✔ «Forward travel direction» symbol is shown on the display.

Troubleshooting
«Forward travel direction» symbol flashing on the display?
Accelerator pedal does not reach neutral position.
► Check accelerator pedal.
► If necessary, clean the area below and around the accelerator pedal.
If the «Forward travel direction» symbol continues to flash on the display:
► Contact Liebherr customer service.



G2022414_1

Accelerator pedal

► Actuate accelerator pedal with your right foot.
✔ The machine drives forward.
✔ The travel speed is controlled using the accelerator pedal.

3.3.5.3 Reverse travel

G2041241_2

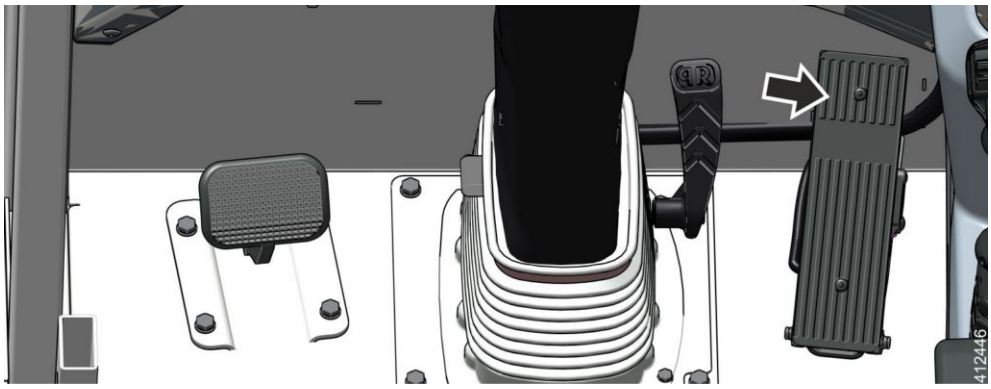
Reverse travel

3 «Travel directions» rocker switch

► Press «Travel directions» rocker switch **3** backward.
✔ Reverse travel direction is selected.
✔ «Reverse travel direction» symbol is shown on the display.

LWT/93517630/09/01/12/2023/en

Troubleshooting
«Reverse travel direction» symbol flashing on the display?
Accelerator pedal does not reach neutral position.
► Check accelerator pedal.
► If necessary, clean the area below and around the accelerator pedal.
If the «Reverse travel direction» symbol continues to flash on the display:
► Contact Liebherr customer service.



G2022414_1

Accelerator pedal

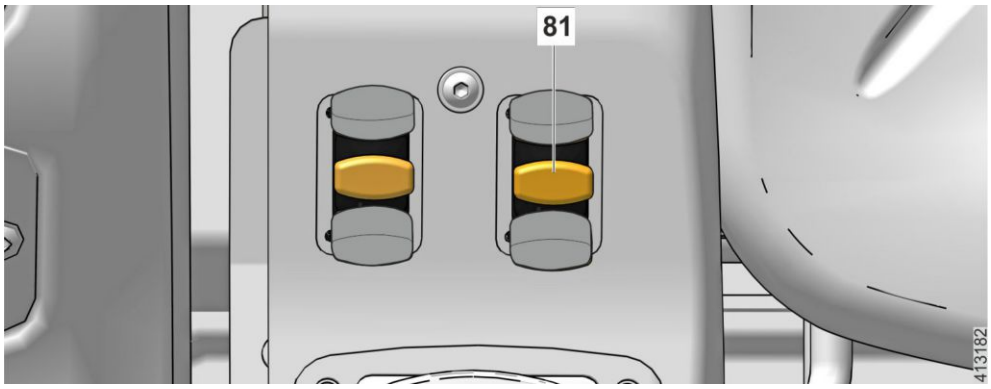
► Actuate accelerator pedal with your right foot.
✔ The machine drives in reverse.
✔ The travel speed is controlled using the accelerator pedal.

3.3.5.4 Gradual travel device (option)

This function enables stepless control of the maximum travel speed.

The gradual travel device function can be combined with manual throttle function.

The function is useful for operation with hydraulic working attachments (such as street sweeper), as a steady travel speed is guaranteed.



G2036111_1

Gradual travel device control lever

81 Control lever

► Move the control lever **81** forwards.
✔ Maximum travel speed increases.

✔ Maximum travel speed is shown on the display.

► Move the control lever **81** backwards.

✔ Maximum travel speed decreases.

✔ Maximum travel speed is shown on the display.

Note

Control lever **81** is only active in combination with the travel speed ranges.

3.3.5.5 Travel speed ranges

The machine has three travel stages.

Refer to the table for travel speeds of travel stages.

Travel speeds of travel stages

Travel speed of machine	 412268 G2020333_1	 412270 G2020335_1	 412269 G2020334_1
Maximum 40 km/h (24.9 mph)	15 km/h (9.3 mph)	30 km/h (18.6 mph)	40 km/h (24.9 mph)
Maximum 30 km/h (18.6 mph)	15 km/h (9.3 mph)	22 km/h (13.7 mph)	30 km/h (18.6 mph)

Selecting travel stages

413821
G2047804_1

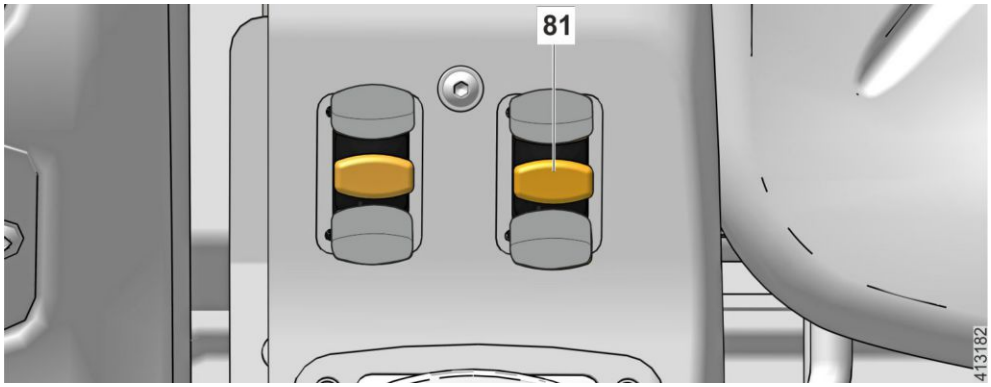
Selecting travel stages

4 «Slow travel stage» button

5 «Fast travel stage» button

► Press «Slow travel stage» button **4**.

✔ «Slow travel stage (snail)» symbol is shown on the display.



G2036111_1

Gradual travel device control lever

81 Control lever

- ► Press control lever **81** backwards or forwards.
  ✔ Travel speed reduces or increases.
- ► Press «Fast travel stage» button.
  ✔ «Fast travel stage (hare)» symbol is shown on the display.
- ► Press control lever **81** backwards or forwards.
  ✔ Travel speed reduces or increases.
- ► Press and hold «Slow travel stage» button or «Fast travel stage» button.
  ✔ «Normal travel stage (tortoise)» symbol is shown on the display.
- ► Press control lever **81** backwards or forwards.
  ✔ Travel speed reduces or increases.

3.3.5.6 Differential lock

The differential lock in the front axle locks the differential gear's balancing effect.

The driving force therefore acts evenly on both front axle wheels.

The maximum travel speed of the machine is automatically reduced to 10 km/h (6.2 mph) if the differential lock is activated.

NOTICE

Incorrect use of the differential lock!

Damage to the differential gear.

- ► Only activate the differential lock when working on slopes or on slippery ground.
- ► Only activate and deactivate the differential lock when the machine is at a standstill.
- ► Deactivate the differential lock when cornering.

Make sure the following preconditions are met:

☑ Machine is at a standstill.

Activating differential lock

«Differential lock» button

1 «Differential lock» button

► Press and hold the «Differential lock» button **1** on the control lever.
✔ «Differential lock» symbol is shown on the display.
✔ Differential lock is activated.

Deactivating differential lock

«Differential lock» button

1 «Differential lock» button

► Release «Differential lock» **1** button.
✔ «Differential lock» symbol is no longer shown on the display.
✔ Differential lock is deactivated.

3.3.5.7 4x4 shut-off (option)

The machine changes from all-wheel driving to front-wheel driving via the 4x4 shut-off.

The 4x4 shut-off enables a more economical driving style.

The 4x4 shut-off may only be used on flat terrain or for on-road travel.

Make sure the following preconditions are met:

☑ Machine is at a standstill.

LWT/93517630/09/01/12/2023/en

Activating 4x4 shut-off

G2053320_1

«4x4 shut-off» button

1 «4x4 shut-off» button

► Press the «4x4 shut-off» button **1**.
✔ The «4x4 shut-off» symbol is shown on the display.
✔ All-wheel drive is deactivated.

Deactivating 4x4 shut-off

G2053320_1

«4x4 shut-off» button

1 «4x4 shut-off» button

► Press the «4x4 shut-off» button **1**.
✔ «4x4 shut-off» symbol is no longer shown on the display.
✔ All-wheel drive is activated.

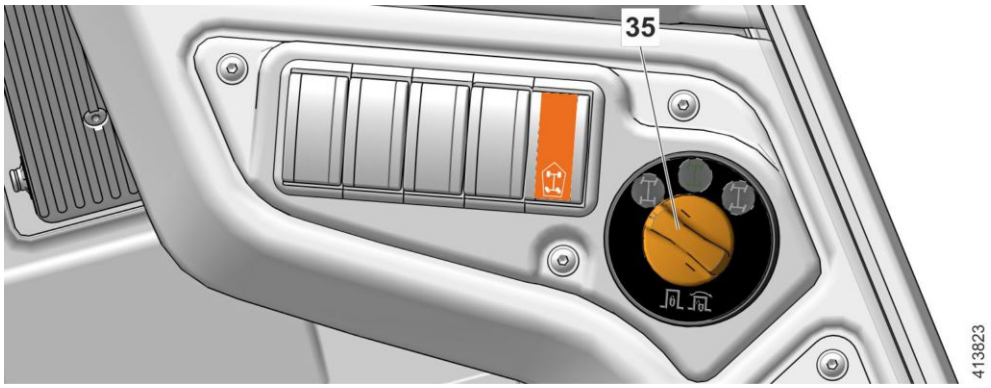
3.3.5.8 Steering modes

The «Steering modes» rotary switch and the «Front axle steering with adjusted rear axle steering» button can be used to select four different steering modes.

WARNING
Improper steering mode change!
Injury.
► Set steering mode exclusively when machine is at a standstill.

Selecting front wheel steering mode

In the front wheel steering mode, only the front wheels are steered.



G2047814_1

Steering mode - Front wheel steering

35 «Steering modes» rotary switch

► Press «Steering modes» rotary switch **35** and turn it to the left.
✔ «Front wheel steering» symbol flashes on the display.
► Move steering wheel to left and right until «Front wheel steering» symbol is shown continuously on the display.
✔ Front wheel steering mode is set.
► When driving on public roads, always select front wheel steering mode.

Selecting all-wheel steering mode

In all-wheel steering mode, the front and rear wheels are steered in opposite directions to obtain a tighter turning circle.

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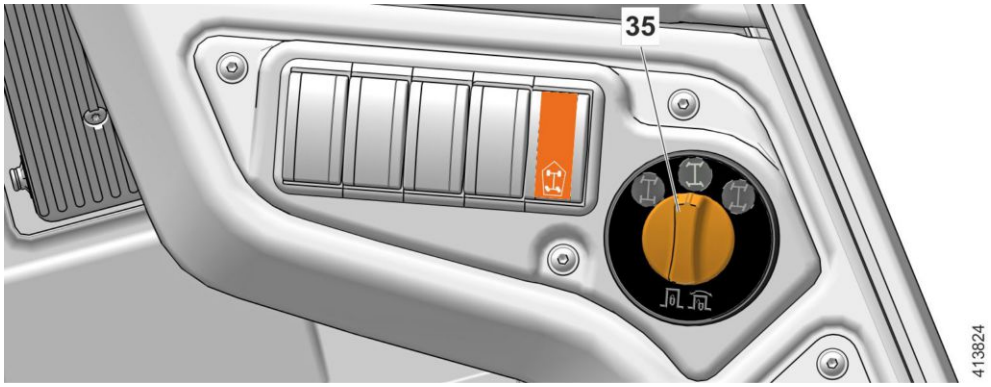


G2047812_1

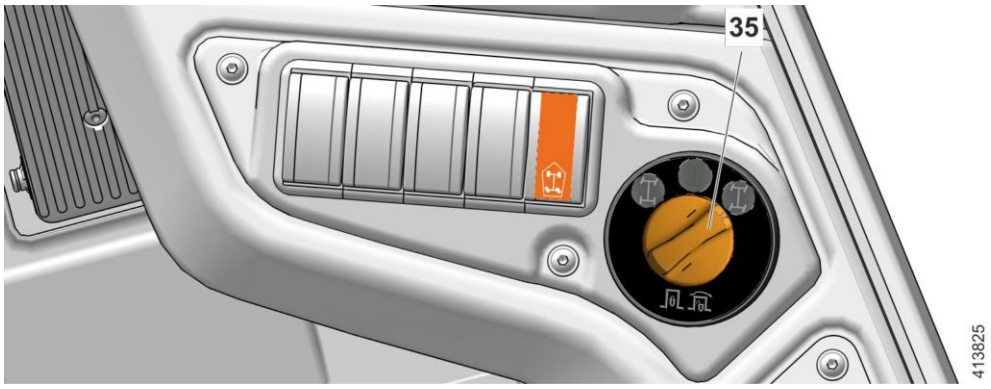
Steering mode - All-wheel steering

35 «Steering modes» rotary switch

- ► Press «Steering modes» rotary switch **35** and turn it to middle position.
  ✔ «All-wheel steering» symbol flashes on the display.
- ► Move steering wheel to left and right until «All-wheel steering» symbol is shown continuously on the display.
  ✔ All-wheel steering mode is set.

Selecting crab steering mode

In crab steering, the front and rear wheels are turned in the same direction so that the machine simultaneously drives forward (or reverse) and to the side.



G2047816_1

Steering mode - Crab steering

35 «Steering modes» rotary switch

- ► Press «Steering modes» rotary switch **35** and turn it to right.
  ✔ «Crab steering» symbol flashes on the display.
- ► Move steering wheel to left and right until «Crab steering» symbol is shown continuously on the display.
  ✔ Crab steering mode is set.

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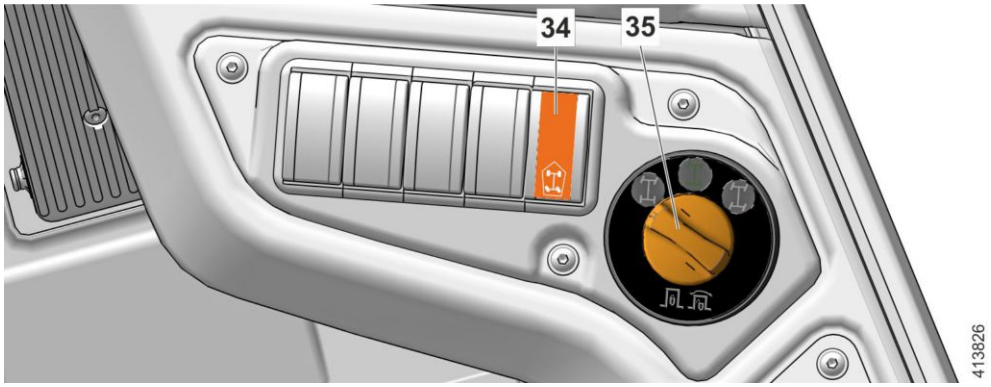
Selecting front axle steering with adjusted rear axle without lock button mode

Valid from serial number 20156 to serial number 21354.

With front axle steering with adjusted rear axle mode, the steering angle of rear axle can be fixed in the desired position.

The front axle steering with adjusted rear axle mode is suitable for precise working in restricted spaces.



Front axle steering with adjusted rear axle mode

34 «Front axle steering with adjusted rear axle» button **35** «Steering modes» rotary switch

- ► Select front axle steering mode.
- ► Press and hold down «Front axle steering with adjusted rear axle» button **34**.
  - ✔ The «Front axle steering with adjusted rear axle» symbol flashes on the display.
  - ✔ Front axle steering with adjusted rear axle is activated.
- ► Turn steering wheel until the desired steering angle is reached for the rear axle.
- ► Release «Front axle steering with adjusted rear axle» button **34**.
  - ✔ Steering angle for the rear axle is fixed.
  - ✔ The «Front axle steering with adjusted rear axle» symbol is shown on the display.

Troubleshooting

Is the steering angle of the rear axle not aligned correctly?

- ► Press and hold down «Front axle steering with adjusted rear axle» button **34**.
- ► Realign the steering angle with the steering wheel.
- ► Release «Front axle steering with adjusted rear axle» button **34**.

Front axle steering with adjusted rear axle with lock button mode

Selecting front axle steering with adjusted rear axle with lock button mode

Valid from serial number 21355.

With front axle steering with adjusted rear axle mode, the steering angle of rear axle can be fixed in the desired position.

The front axle steering with adjusted rear axle mode is suitable for precise working in restricted spaces.

- ► Select all-wheel steering mode.
- ► Turn steering wheel until the desired steering angle is reached for the rear axle.

LWT/93517630/09/01/12/2023/en

G2080837_1

Front axle steering with adjusted rear axle mode

1	Locking mechanism	**3**	«Front axle steering with adjusted rear axle» button
2	«Steering modes» rotary switch		

- ► Press «Steering modes» rotary switch **2** and turn it to the left.
- ► Push lock **1** on «Front axle steering with adjusted rear axle» button **3** to the rear and press button.
  - ✔ The «Front axle steering with adjusted rear axle» symbol flashes on the display.
- ► Release «Front axle steering with adjusted rear axle» button **3**.
  - ✔ Front axle steering with adjusted rear axle mode is set.
  - ✔ Steering angle for the rear axle is fixed.
  - ✔ The «Front axle steering with adjusted rear axle» symbol is shown on the display.

Note

If front axle steering with adjusted rear axle mode is selected, the maximum travel speed is restricted to 15 km/h (9.3 mph).

Correcting steering angle for rear axle

The steering angle for the rear axle can be corrected without changing the steering mode.

G2080837_1

Correcting steering angle for rear axle

1	Locking mechanism	**3**	«Front axle steering with adjusted rear axle» button
2	«Steering modes» rotary switch		

- ► Push lock **1** on «Front axle steering with adjusted rear axle» button **3** to the rear, then press and hold button.
  - ✔ The «Front axle steering with adjusted rear axle» symbol flashes on the display.

LWT/93517630/09/01/12/2023/en

- ► Turn steering wheel until the desired steering angle is reached for the rear axle.
- ► Release «Front axle steering with adjusted rear axle» button **3**.
  - ✔ Front axle steering with adjusted rear axle mode is set.
  - ✔ Corrected steering angle for the rear axle is fixed.
  - ✔ The «Front axle steering with adjusted rear axle» symbol is shown on the display.

3.3.6 Braking

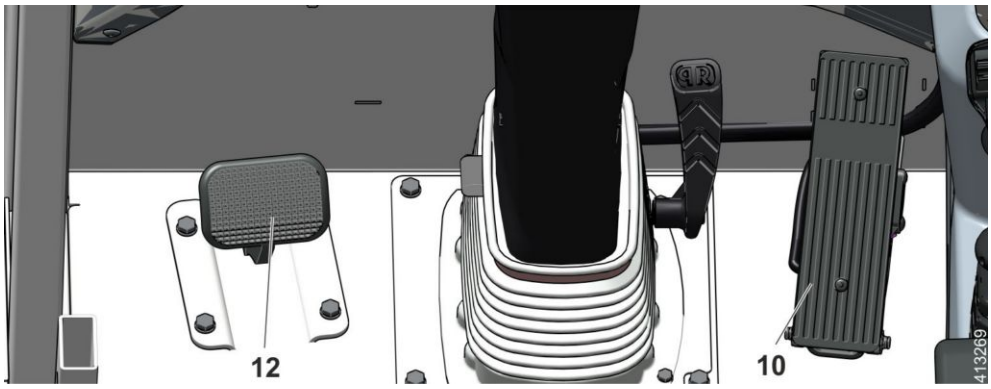
WARNING
Always wear a safety belt!
Injury.
► Fasten your safety belt before starting up machine.

There are two ways to slow the machine down:

- Brake with hydrostatic circuit.
- Brake with hydrostatic circuit and service brake.

3.3.6.1 Braking with hydrostat

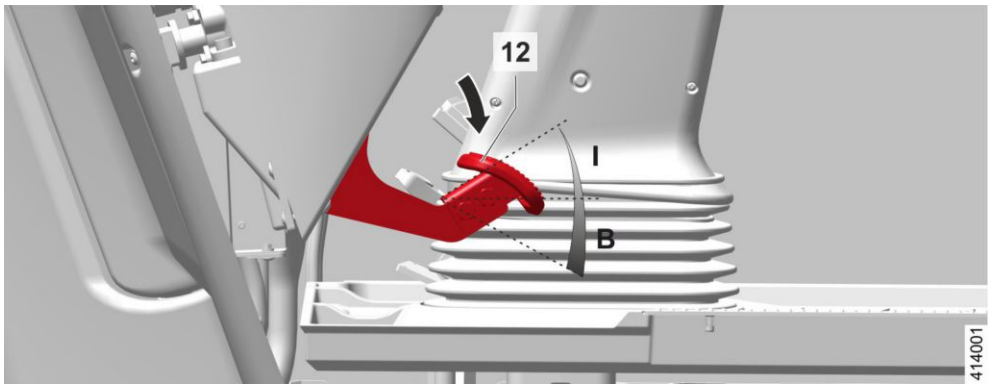
Machine is hydrostatically slowed down by reducing the diesel engine speed.



G2040468_1

Inching brake pedal and travelling pedal

12	Inching brake pedal	**10**	Accelerator pedal



G2054719_1

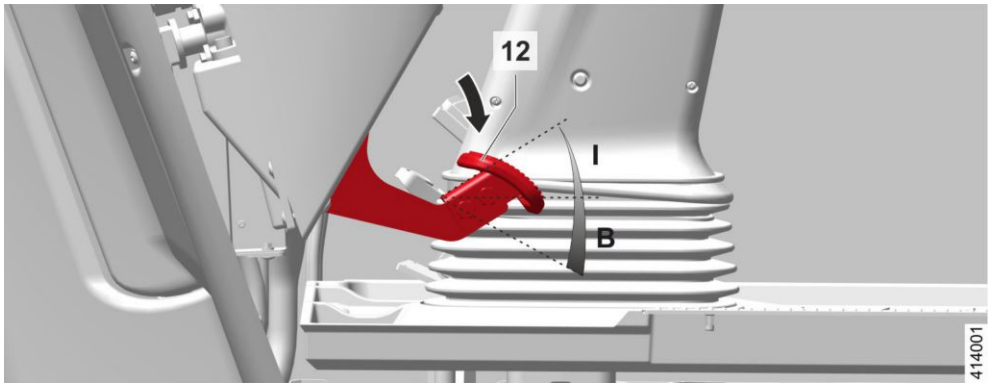
Inching brake pedal

LWT/93517630/09/01/12/2023/en

► Reduce diesel engine speed using the accelerator pedal **10**.
or
Actuate inching brake pedal **12** in the range of pedal travel **I**.
✔ Machine is hydrostatically slowed down.

3.3.6.2 Braking with the hydrostat and the service brake

If the hydrostatic braking action is not sufficient, the machine must be additionally slowed down using the service brake.



G2054719_1

Inching brake pedal

► Actuate inching brake pedal **12** in the range of pedal travel **B**.
✔ Machine is braked hydrostatically and with the service brake.

Troubleshooting
Little or no braking effect?
► Take machine out of service immediately.
► Contact Liebherr customer service.

3.3.6.3 Braking in danger situations

WARNING
Always wear a safety belt!
Injury.
► Fasten your safety belt before starting up machine.

► Depress inching brake pedal **12** fully.
✔ Machine is slowed down severely.

3.3.6.4 Parking brake

Activate parking brake:

- By switching on the «Parking brake» switch **30**.
- In case of a failure of travel hydraulics.
- Automatically after 5 seconds of machine downtime.
- In case the machine starts to roll inadvertently (Anti roll function).

G2047791_1

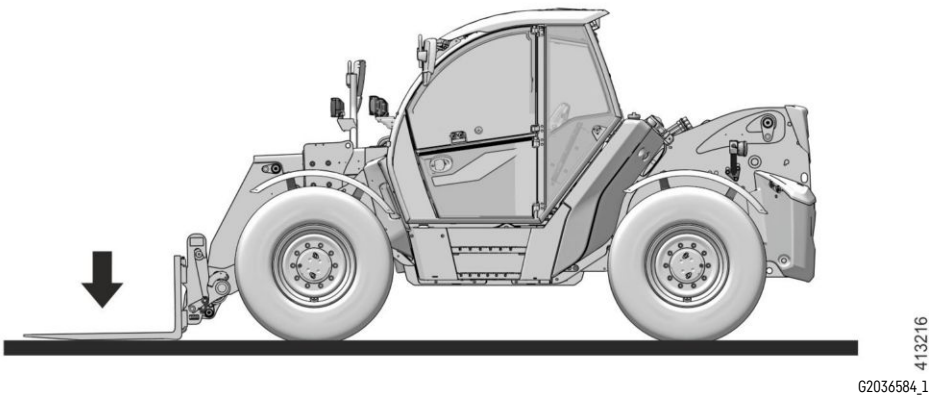
Turning on parking brake

► Press bottom part of «Parking brake» switch **30**.
✔ «Parking brake» symbol lights up on the display.

3.3.7 Taking machine out of service

Before switching the diesel engine off and leaving the machine, make the following preparations.

3.3.7.1 Lowering working attachment



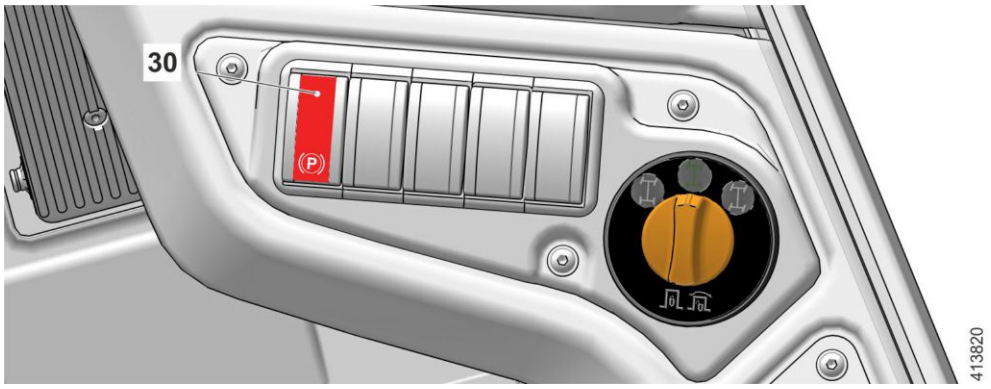
G2036584_1

Lowering working attachment

► Park the machine on horizontal and level ground.
► Fully retract the telescopic boom.
► Lower working attachment.

LWT/93517630/09/01/12/2023/en

3.3.7.2 Activating the parking brake



G2047791_1

Activating the parking brake

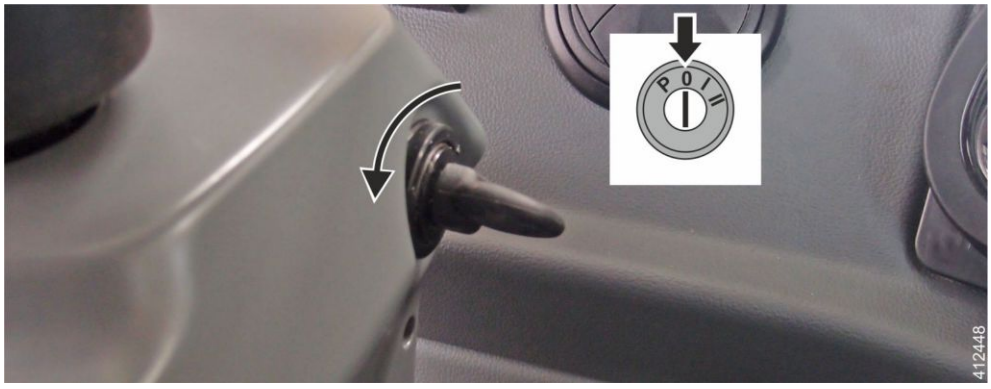
30 «Parking brake» switch

- ► Press bottom part of «Parking brake» switch **30**.
  ✔ «Parking brake» symbol is shown on the display.

3.3.7.3 Turning the diesel engine off

WARNING
Turn the diesel engine off if it is running at full load!
Damage to the diesel engine.
- ► Only shut the diesel engine down at a low engine speed.

- ► Take foot off the accelerator pedal to reduce engine rpm to low idle rpm.
- ► Continue to let diesel engine run at idling speed for 1 minute.
- ► Switch all currently active electrical consumers off (such as headlights or windscreen wipers).



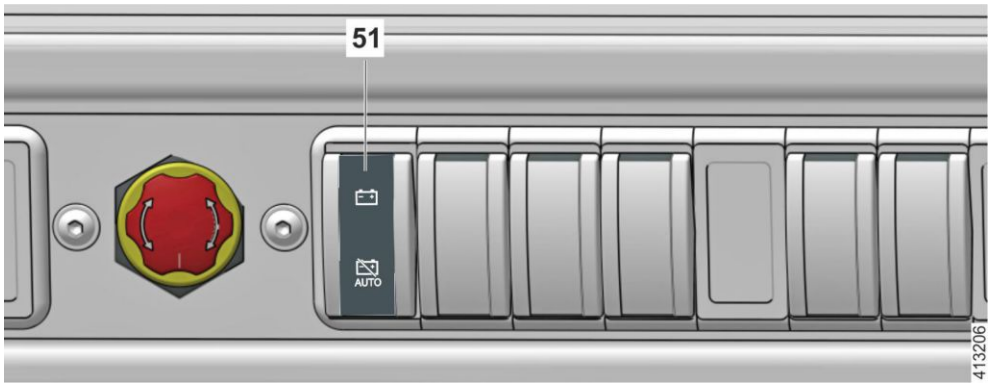
G2022464_1

Starting switch - zero position

- ► Set starting switch to zero position.
- ► Remove ignition key.
  ✔ All indicator lights go out.

3.3.7.4 Disconnecting the battery

► Before leaving the machine or before maintenance and repair work, disconnect the battery.



G2036455_2

«Battery isolation» button

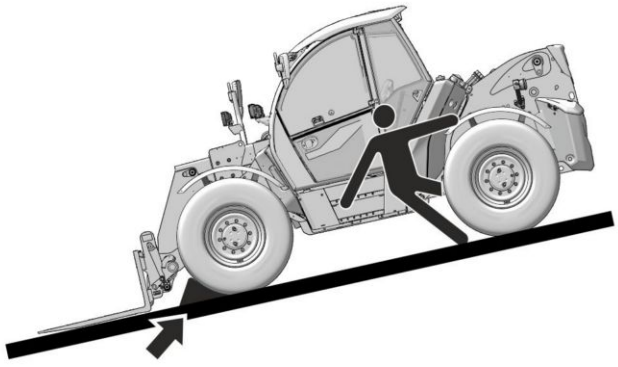
51 «Battery isolation» button

► Press bottom part of «battery isolation» button **51**.
✔ Power supply is disconnected after 2 minutes.
✔ «Battery isolation» indicator light lights up on steering column.

3.3.7.5 Securing the machine

If the machine must be parked on a downhill slope, make the following preparations.

DANGER
Machine rolling off!
Danger to life.
► Secure the machine to prevent it from rolling off.



G2036588_1

Securing the machine

► Lower working attachment to the ground.
► Lightly anchor working attachment in ground.

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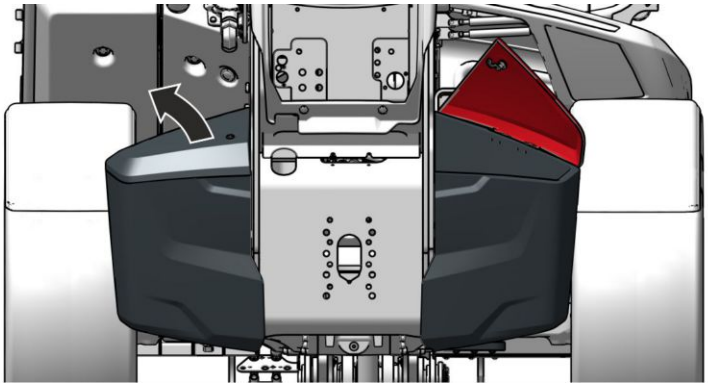
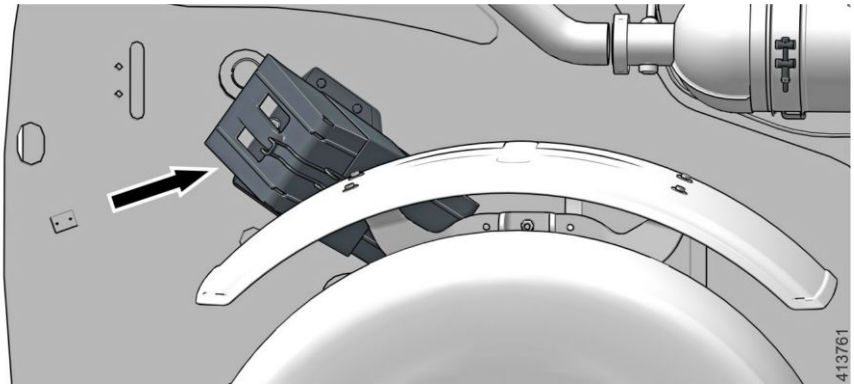


G2046311_1

Chock(s) in ballast weight

- ► Open the cover on the ballast weight.
- ► Remove the chock(s).[18)]

or



G2046548_1

Chock(s) on the main frame

Take chock(s) from retainer on main frame.

- ► Secure the machine with chocks to prevent it from rolling off.

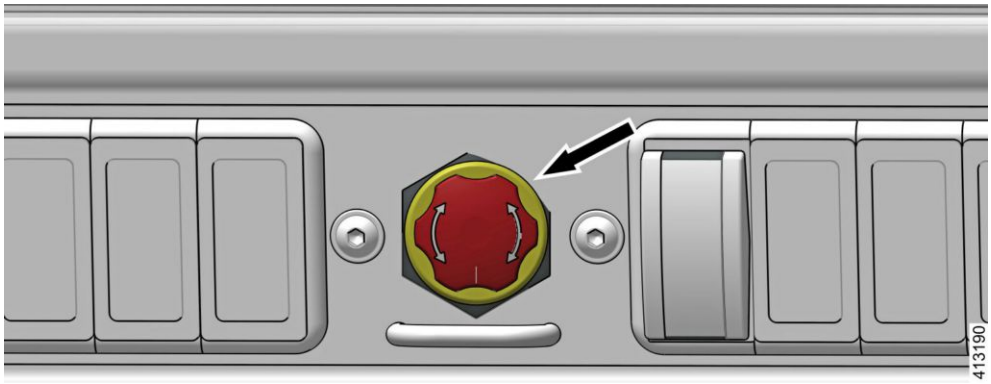
[18)] Option for T46-7

3.3.7.6 Using the emergency stop button to stop/continue the travel drive

Stopping the travel drive

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

WARNING
Always wear a safety belt!
Injury.
- ► Fasten your safety belt before starting up machine.

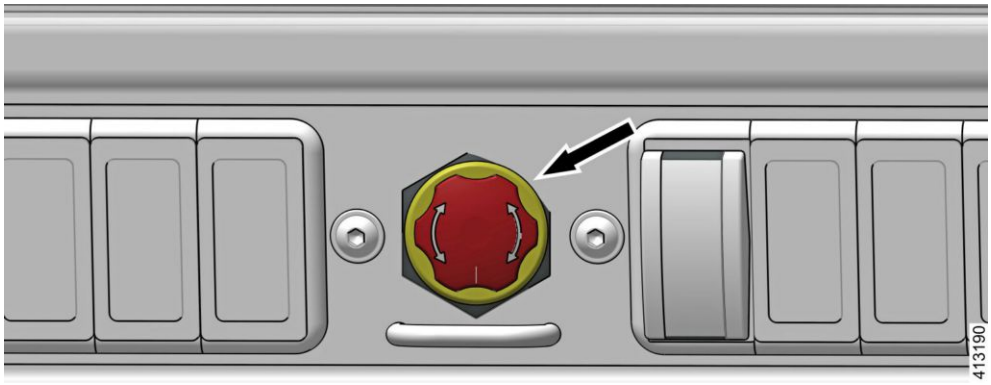


G2036239_2

Emergency stop button

- ► Press the emergency stop button.
  - ✔ The travel drive is stopped abruptly.
  - ✔ The diesel engine is stopped.
  - ✔ The parking brake is applied.
  - ✔ Power supply remains switched on.
  - ✔ Warning system is activated.

Continuing operation



G2036239_2

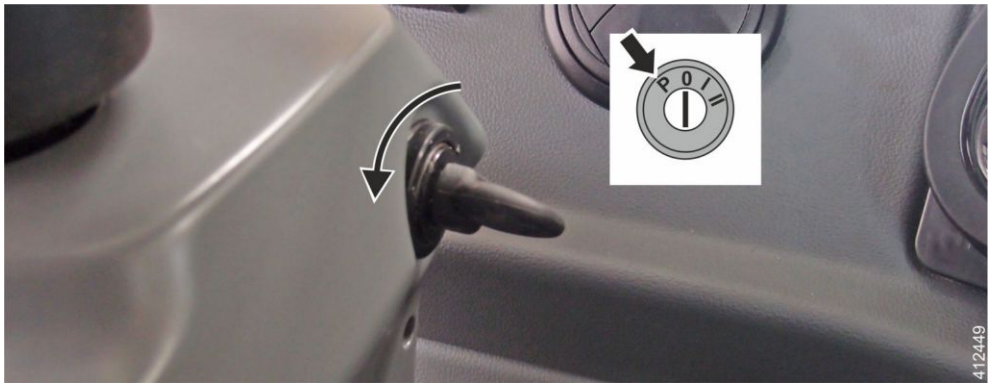
Release emergency stop button

- ► Lift the emergency stop button until it engages.
  - ✔ Take machine properly into operation again.

3.3.7.7 Selecting park position

Ignition key cannot be removed in park position.

LWT/93517630/09/01/12/2023/en



G2022465_1

Starting switch - park position

- ► Set starting switch to park position.
  ✔ 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:

- ► Put starting switch in zero position and pull ignition key out.

3.3.8 Working with working attachment

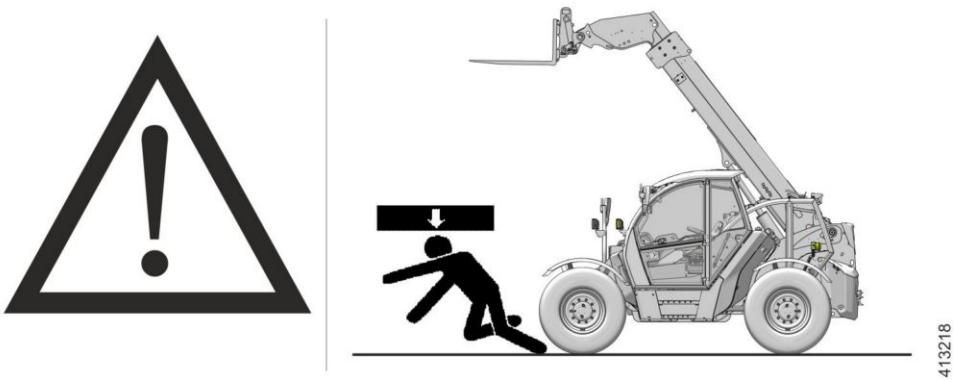
3.3.8.1 Preparations for working with working attachment

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 pertaining load curve is binding.

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

Observe the safety notes when working with the working attachment. Page 87 Page 88 Page 90



G2040480_1

Hazardous situation

Function of load torque display

The load torque display is an additional aid.

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

- Visual and audible warning sound if maximum lifting load is exceeded
- Indicates whether stability limit of the machine in forwards tipping direction has been exceeded or not, while lifting the load in question.

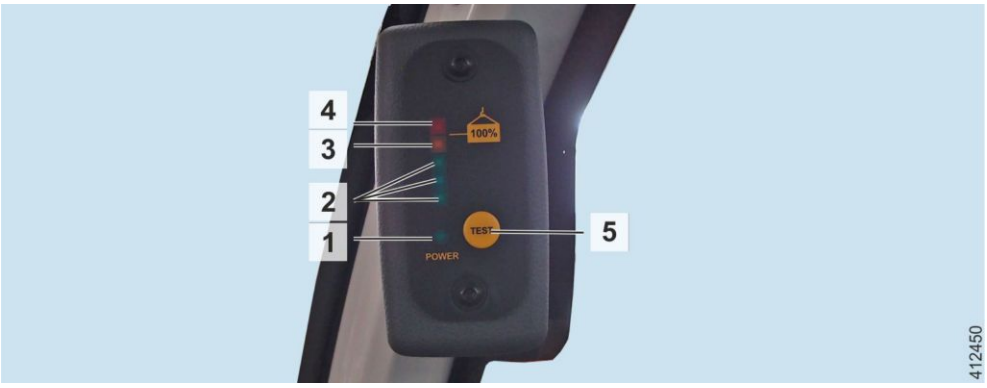
The load torque display warns the operator only in case of insufficient stability in longitudinal and forward direction.

The load torque display only works as designed if following conditions are met:

- Machine is at a standstill.
- Machine is on stable, flat and firm ground.
- Machine is performing loading or set-down functions.
- Load torque limitation is activated.
- Tyres are aligned parallel to the machine's longitudinal axis.

The load torque display does not warn the operator of a danger of tipping over in the following cases:

- Lateral tilting
- Tilting backwards
- Sudden overloading
- Swinging load
- Travelling with a raised load
- Cornering with a raised telescopic boom
- Travelling in areas or on surfaces with obstacles and potholes
- Travelling or turning on an incline
- Abrupt braking or acceleration
- Travelling too fast or taking corners too sharply



G2022492_5

Load torque display

Diodes **2** light up:

- Stability limit of machine is not endangered.

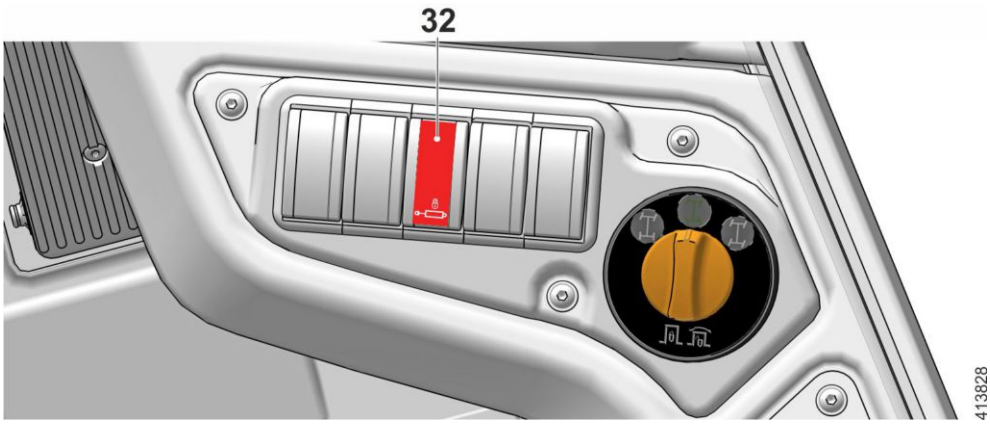
Diodes **2** and **3** light up:

- Stability limit of machine is reached.

Diodes **2**, **3** and **4** light up:

– Stability limit of machine is exceeded.

Unlocking working hydraulics



G2047821_1

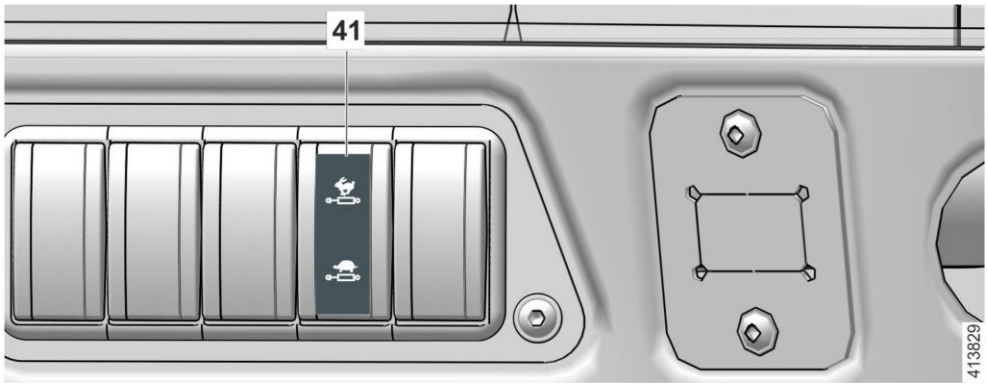
Unlocking working hydraulics

32 «Working hydraulics off» switch

► Press top part of «Working hydraulics off» switch **32**.
✔ «Working hydraulics off» symbol is hidden on the display.

Working hydraulics fine control (option)

The function enables a more precise and safer way of working.



G2047827_1

Working hydraulics fine control

41 «Working hydraulics fine control» switch

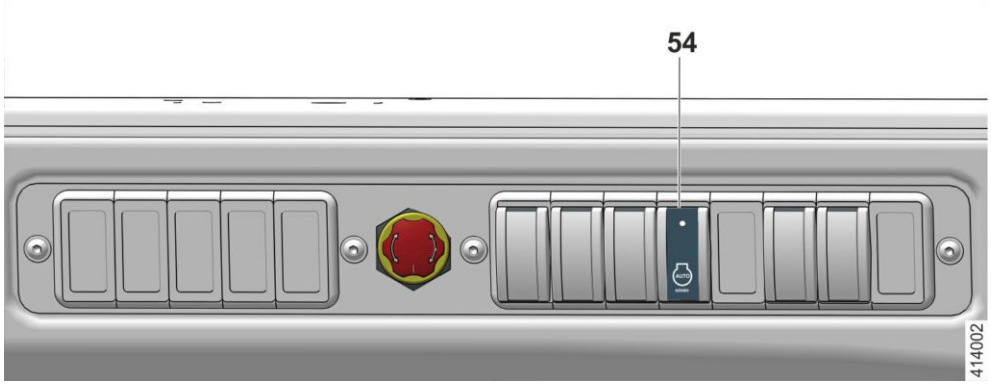
► Press bottom part of «Working hydraulics fine control» switch **41**.
✔ «Working hydraulics fine control function “Tortoise (ON)”» symbol is shown on the display.
✔ Speed of the working hydraulics is reduced.
► Press top part of «Working hydraulics fine control» switch **41**.
✔ «Working hydraulics fine control function “Hare (OFF)”» symbol is shown on the display.
✔ Speed of the working hydraulics is increased to the maximum extent.

LWT/93517630/09/01/12/2023/en

Auto Power (option)

The Auto Power function automatically increases the diesel engine speed when the working hydraulics are actuated.

This causes the movement to be carried out faster without the speed having to be increased by means of the accelerator pedal.



G2054752_1

Auto Power switch

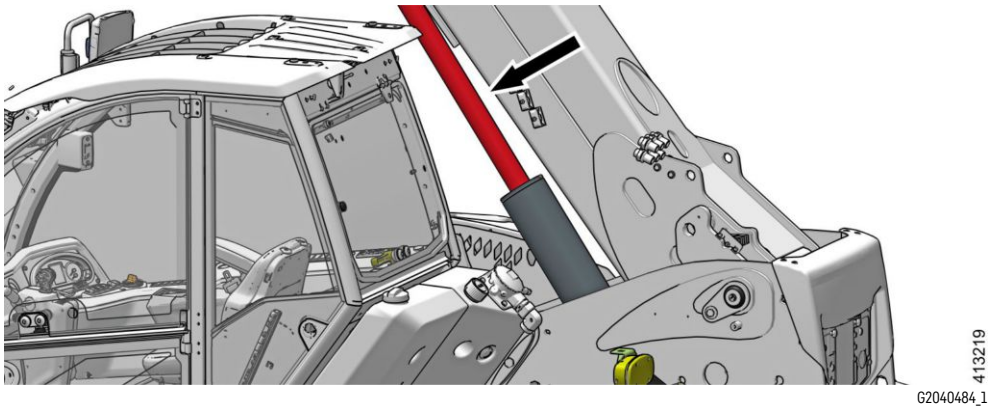
54 «Auto Power» switch

- ► Press bottom part of «Auto Power» **54** switch.
  - ✔ «Auto Power» symbol is shown on the display.
  - ✔ Auto Power is activated.
- ► Press top part of «Auto Power» **54** switch.
  - ✔ «Auto Power» symbol is hidden on the display.
  - ✔ Auto Power is deactivated.

3.3.8.2 Raising and lowering telescopic boom

The telescopic boom is raised or lowered using the lift cylinder.

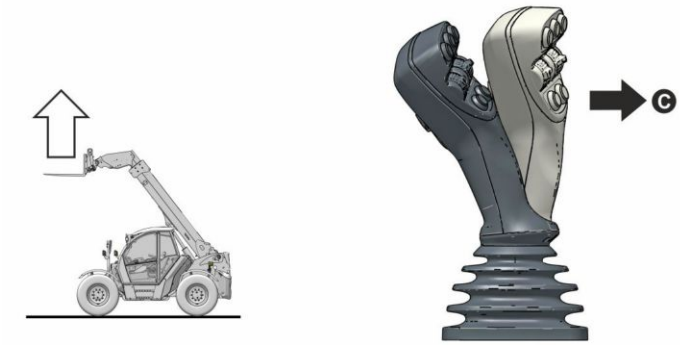
The speed with which the telescopic boom is raised or lowered depends on the degree of lever deflection.



G2040484_1

Lift cylinder

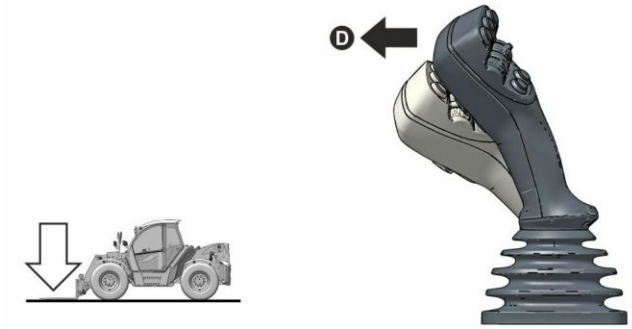
WARNING
Beware of falling loads!
Injury.
- ► Never stand or work under suspended loads.



413271
G2040487_1

Raising the telescopic boom

- ► Move control lever to **C**.
  - ✔ Telescopic boom is raised.
- ► Release the control lever.
  - ✔ The control lever automatically returns to neutral position.
  - ✔ The telescopic boom remains in the set position.



413272
G2040488_1

Lowering telescopic boom

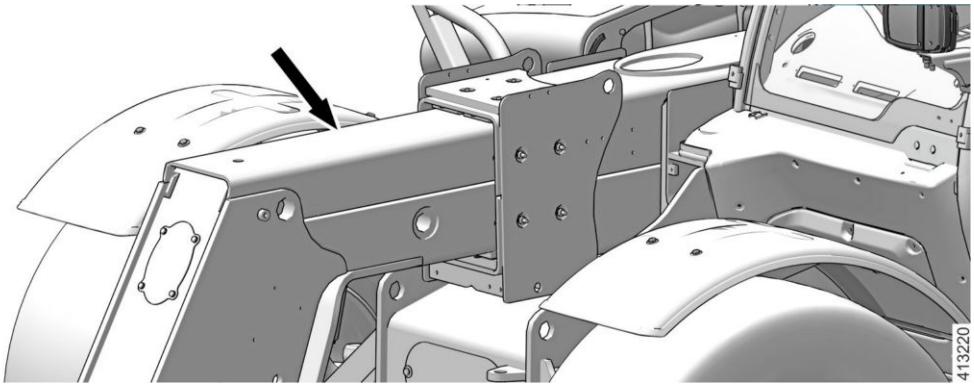
- ► Move control lever to **D**.
  - ✔ Telescopic boom is lowered.
- ► Release the control lever.
  - ✔ The control lever automatically returns to neutral position.
  - ✔ The telescopic boom remains in the set position.

3.3.8.3 Extending and retracting the telescopic boom

The telescopic cylinder is located in the telescopic boom.

The telescopic boom is extended or retracted using the telescopic cylinder.

LWT/93517630/09/01/12/2023/en



G2040490_1

Telescopic cylinder

WARNING
Beware of falling loads!
Injury.
► Never stand or work under suspended loads.

G2040491_1

Extending the telescopic boom

7 «Telescopic boom» rocker switch

► Press «Telescopic boom» rocker switch **7** forward.
✔ The telescopic boom is extended.
► Release «Telescopic boom» rocker switch **7**.
✔ «Telescopic boom» rocker switch **7** resets itself to neutral position.
✔ The telescopic boom remains in the set position.

LWT/93517630/09/01/12/2023/en

G2040492_1

Retracting the telescopic boom

7 «Telescopic boom» rocker switch

- ► Press «Telescopic boom» rocker switch **7** backwards.
  - ✔ Telescopic boom is retracted.
- ► Release «Telescopic boom» rocker switch **7**.
  - ✔ «Telescopic boom» rocker switch **7** resets itself to neutral position.
  - ✔ The telescopic boom remains in the set position.

3.3.8.4 Automatic retraction of telescope (option)

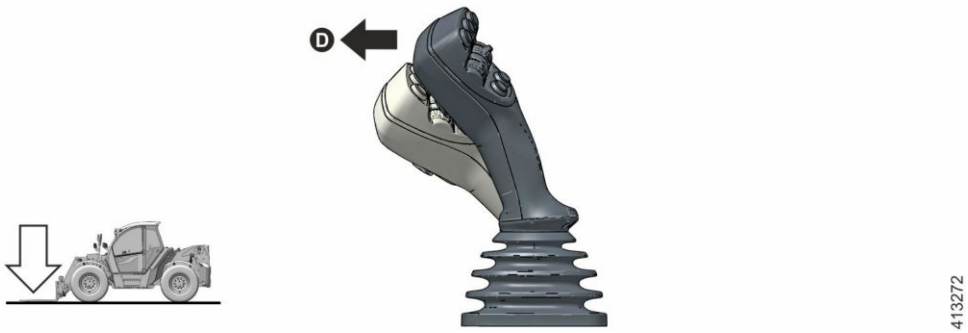
The automatic telescope retraction function automatically retracts the telescopic boom when lowering.

G2094194_1

«Automatic retraction of telescope» switch

1 «Automatic retraction of telescope» switch

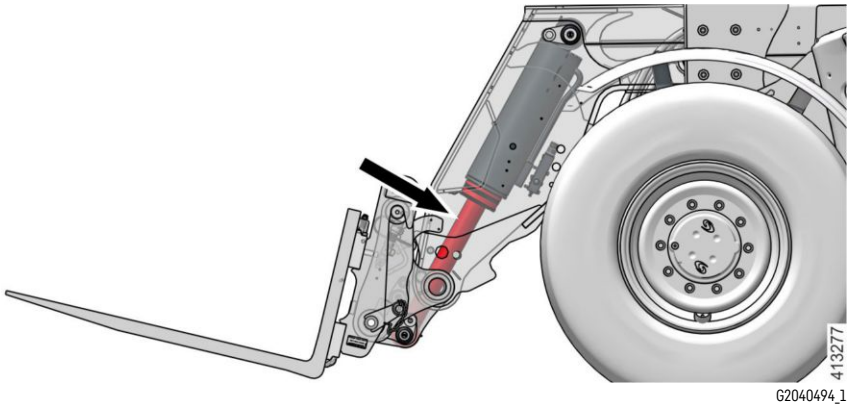
- ► Preselect automatic telescope retraction: Press «Automatic retraction of telescope» switch **1** down.
  - ✔ «Automatic retraction of telescope» symbol is shown on the display.



Lowering telescopic boom

- ► Activate automatic telescope retraction: Move control lever to **D**.
  - ✔ Telescopic boom is lowered and simultaneously retracted.
  - ✔ Automatic retraction of telescope symbol flashes on display.
- ► Deselect automatic telescope retraction: Press «Automatic retraction of telescope» switch upward.

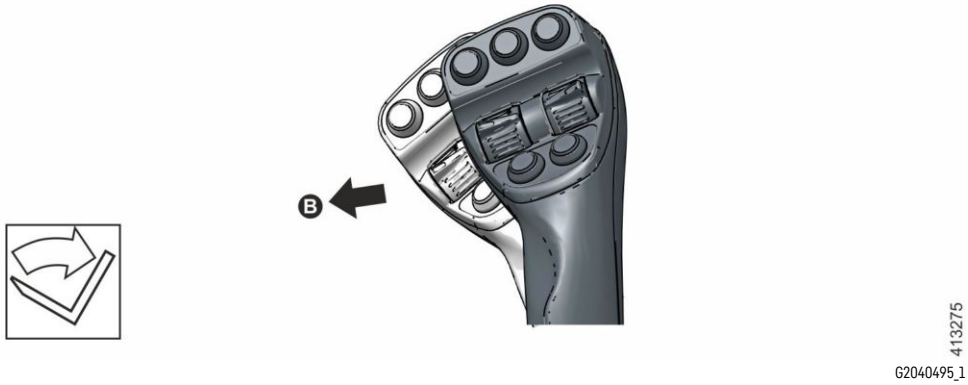
3.3.8.5 Tilting working attachment in and out



Tilt cylinder

The tilt cylinder is located in the head of the telescopic boom.

The tilt cylinder can be used to tilt the working attachment in or out.



Tilting working attachment in

- ► Move control lever to **B**.
  - ✔ Working attachment is tilted in.

- ► Release the control lever.
  - ✔ The control lever automatically returns to neutral position.
  - ✔ Working attachment remains in set position.

413276
G2040496_1

Tilting working attachment out

- ► Move control lever to **A**.
  - ✔ Working attachment is tilted out.
- ► Release the control lever.
  - ✔ The control lever automatically returns to neutral position.
  - ✔ Working attachment remains in set position.

3.3.8.6 Bucket repositioning (option)

Bucket repositioning is used for certain loading work that repeatedly requires a certain tilt angle.

413830
G2047829_1

Bucket repositioning button

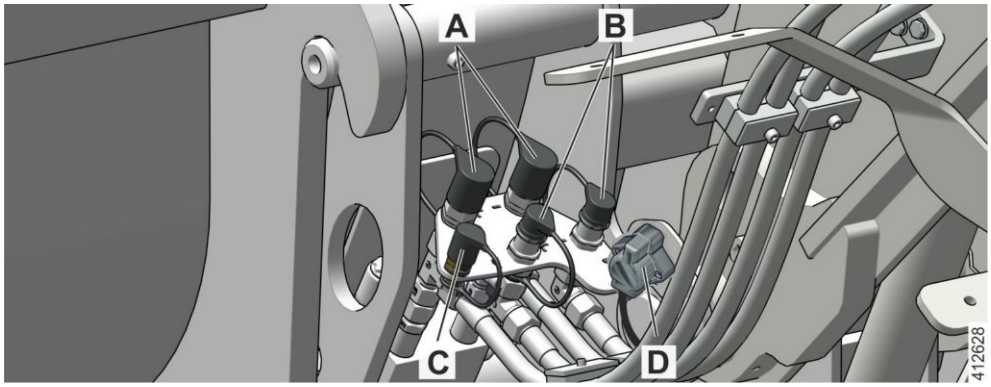
8 «Bucket repositioning» button

- ► Put working attachment at the desired tilt angle.
- ► To save tilt angle: Press «Bucket repositioning» button **8** for 3 seconds.
  - ✔ «Bucket repositioning» symbol is shown on the display.
  - ✔ Acoustic warning signal sounds.
  - ✔ Tilt angle is saved.
- ► To pick up loading material: Briefly press «Bucket repositioning» button **8**.
  - ✔ Working attachment automatically positions itself at the stored tilt angle.
  - ✔ «Bucket repositioning» symbol is shown on the display.

► To delete tilt angle: Press «Bucket repositioning» button **8** for 15 seconds.
✔ Tilt angle is deleted.

3.3.8.7 Control circuit III

For operating working attachments with hydraulic functions.



G2024343_2

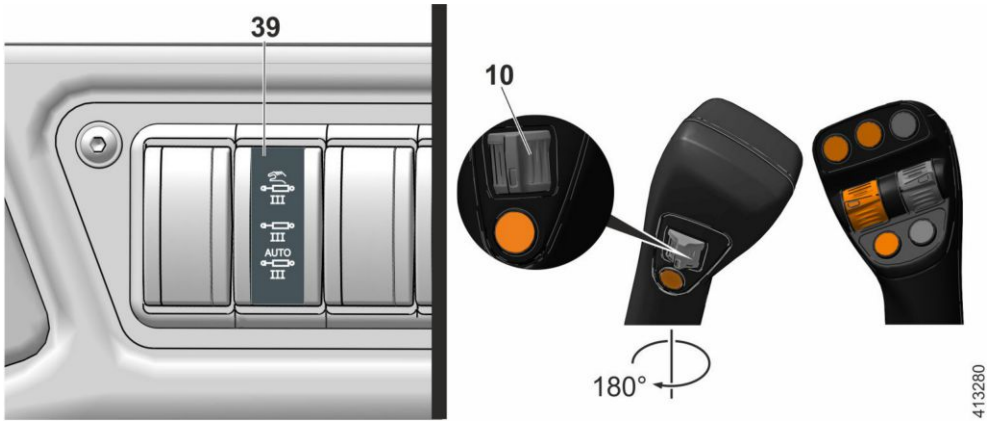
Connections, control circuit III

A	Connections, control circuit III	**C**	Leak oil port (option)
B	Connections, control circuit III change over (option)	**D**	Front socket (option)

Operation, control circuit III

Make sure the following preconditions are met:

☑ The working attachment is connected.



G2040500_1

Activating control circuit III

10	«Control circuit III» rocker switch	**39**	«Control circuit III» switch (option)

If machine is equipped with a «Control circuit III» switch **39**:

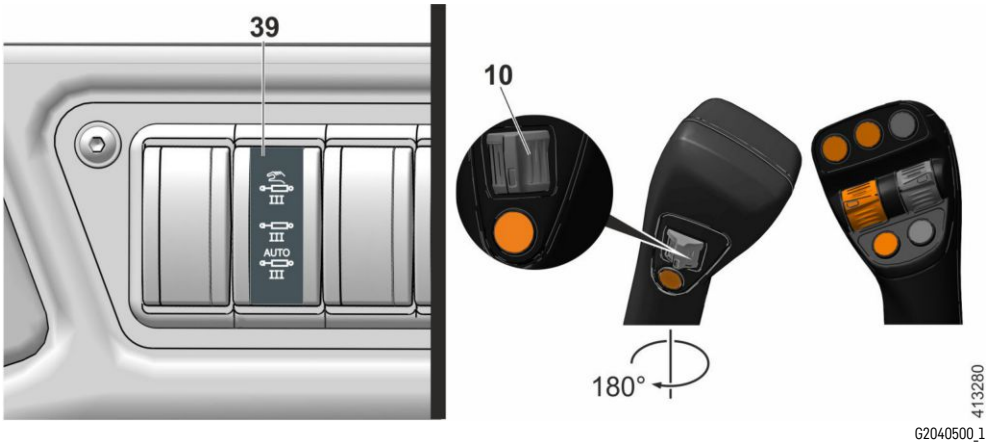
► Press top part of «Control circuit III» switch **39**.
► Press «Control circuit III» rocker switch **10** to right or left and hold.
✔ Control circuit III connections **A** are pressurised with hydraulic oil.

LWT/93517630/09/01/12/2023/en

Control circuit III flow volume (option)

The preset oil volume of high flow control circuit III and high flow control circuit III can be changed by setting the flow volume.

Setting the flow volume



Setting control circuit III flow volume

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

- ► Set «Control circuit III» switch **39** to the 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.
  - ✔ 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 the bottom part of «Control circuit III» switch **39**.
- ► Release «Control circuit III» rocker switch **10** on 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 activated.

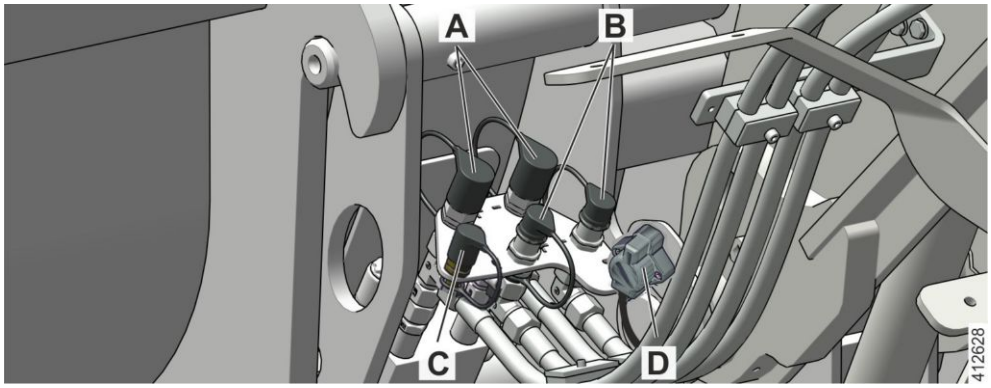
Deactivating flow volume

- ► Press the bottom part of «Control circuit III» switch **39**.
  - ✔ «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.

LWT/93517630/09/01/12/2023/en

Control circuit III changeover (option)

For working attachments with additional hydraulic functions.



G2024343_2

Connections, control circuit III

A	Connections, control circuit III	**C**	Leak oil port (option)
B	Connections, control circuit III change over (option)	**D**	Front socket (option)

Switching of control circuit III can be changed over from the control circuit III connections **A** to the additional control circuit III change over connections **B**.

G2047835_1

Control circuit III change over

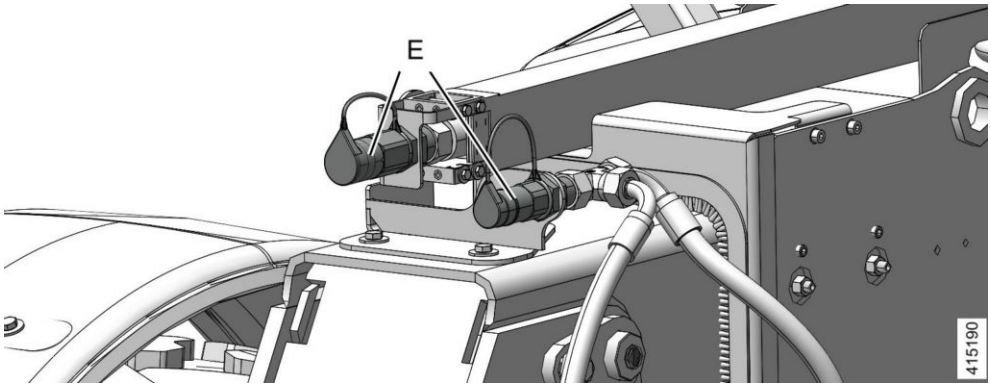
6	«Control circuit III change over» button	**10**	«Control circuit III» rocker switch

- ► Press «Control circuit III change over» button **6** on control lever.
  - ✔ «Control circuit III change over» symbol is shown on the display.
  - ✔ The additional control circuit is activated.
- ► Press «Control circuit III» rocker switch **10** to right or left and hold.
  - ✔ Control circuit III change over connections **B** are pressurised with hydraulic pressure.

LWT/93517630/09/01/12/2023/en

3.3.8.8 High flow control circuit III (option)

For operating working attachments that require large oil quantities.



G2074924_1

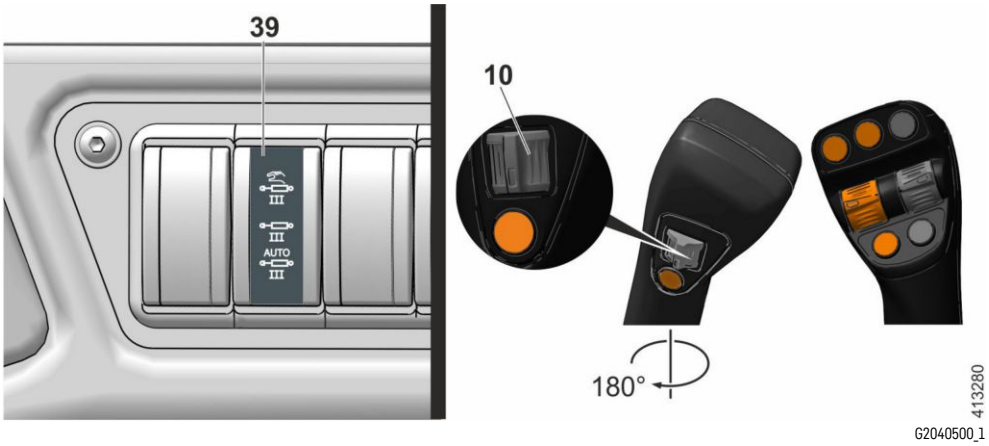
High flow control circuit III connections

E	High flow control circuit III connections

Operation of the high flow control circuit III

Make sure the following preconditions are met:

☑ The working attachment is connected.



G2040500_1

Activating control circuit III

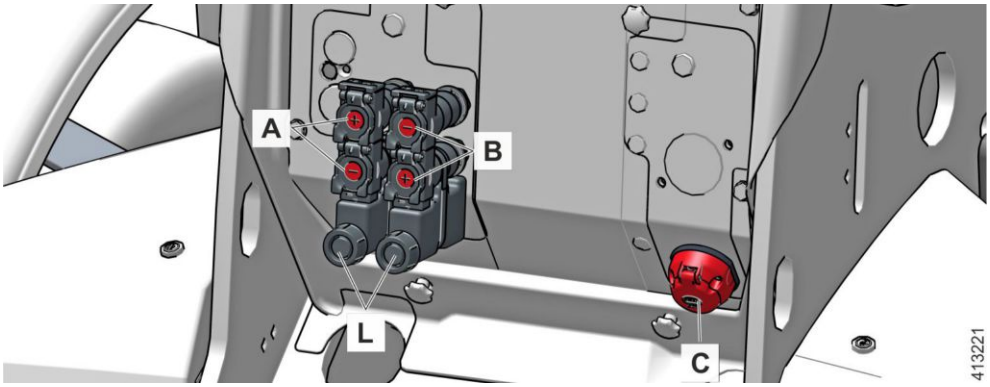
10	«Control circuit III» rocker switch	**39**	«Control circuit III» switch (option)

If machine is equipped with a «Control circuit III» switch **39**:

- ► Press top part of «Control circuit III» switch **39**.
- ► Press «Control circuit III» rocker switch **10** to right or left and hold.
  - ✔ Control circuit III High Flow connections are pressurised with hydraulic oil.

3.3.8.9 Control circuit IV (option)

For operating rear working attachments with hydraulic functions.



G2040527_1

Connections, control circuit IV

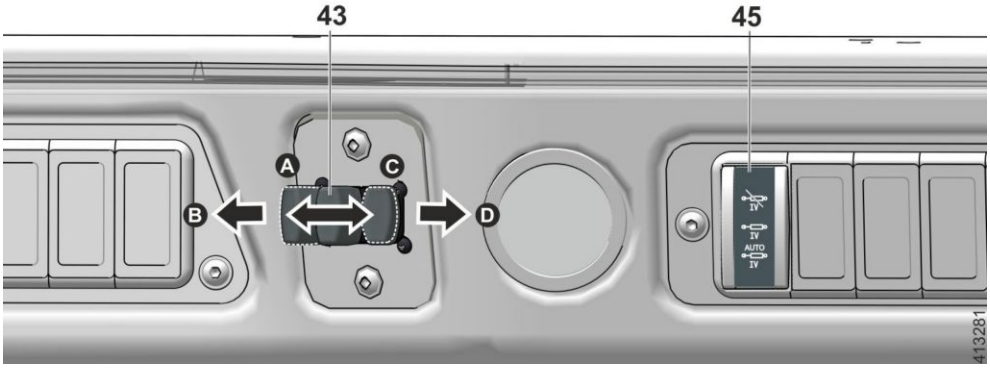
A	Connections, control circuit IV	**C**	Rear socket (option)
B	Tipper connections (option)	**L**	Leak oil reservoir (option)

Depressurising control circuit IV hydraulic system

Before attaching or removing the working attachment, the hydraulic system must be depressurised.

Make sure the following preconditions are met:

☑ Cylinders of the working attachment are in the home position.
☑ Diesel engine is running.



G2040502_1

Depressurising hydraulics

43	«Rear hydraulics» control lever	**45**	«Control circuit IV» switch

► Set «Control circuit IV» switch **45** to the middle position.
✔ Control circuit IV is activated.
► Move «Rear hydraulics» control lever **43** forwards over pressure point **A**.
✔ «Rear hydraulics» control lever **43** locks in place.
✔ The pressure in the hydraulic lines is reduced.

LWT/93517630/09/01/12/2023/en

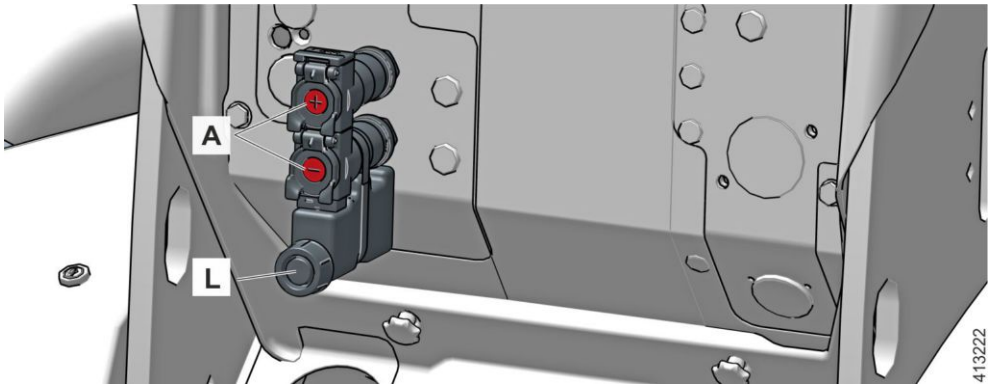
Connecting the control circuit IV connections

The connections are at the rear on the carrier frame.

WARNING
Incorrectly connected hydraulic lines!
Crushing injuries.
- ► Before start of operations, check all functions in a safe operating area.
- ► Make sure that the hydraulic lines are properly connected.
- ► Observe the third-party manufacturer documentation for the working attachment.
- ► Check the operating direction of control elements prior to using the working attachment.

Make sure the following preconditions are met:

☑ The hydraulic system has been depressurised.
☑ The hydraulic lines have been cleaned.



Connections, control circuit IV

A	Connections, control circuit IV	**L**	Leak oil reservoir

- ► Fold up the protective cap for the hydraulic lines.
- ► Connect hydraulic lines for the attached working attachment to control circuit IV connections **A**.
- ► Route the hydraulic lines in such a way that they are not pinched when working with the working attachment.
- ► Empty the oil in leak oil reservoir **L** on a regular basis and dispose of it in an environmentally sound manner.

Connecting the tipper connection (option)

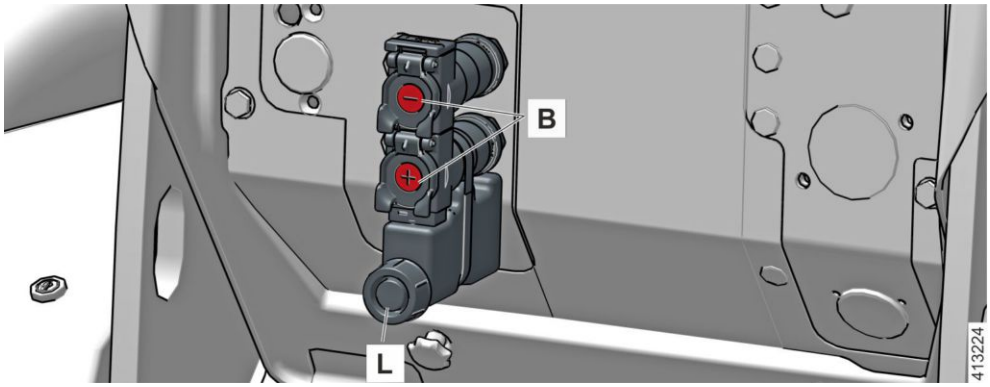
The connections are at the rear on the carrier frame.

WARNING
Incorrectly connected hydraulic lines!
Crushing injuries.
- ► Before start of operations, check all functions in a safe operating area.
- ► Make sure that the hydraulic lines are properly connected.
- ► Observe the third-party manufacturer documentation for the working attachment.
- ► Check the operating direction of control elements prior to using the working attachment.

LWT/93517630/09/01/12/2023/en

Make sure the following preconditions are met:

☑ The hydraulic system has been depressurised.
☑ The hydraulic lines have been cleaned.



G2040532_1

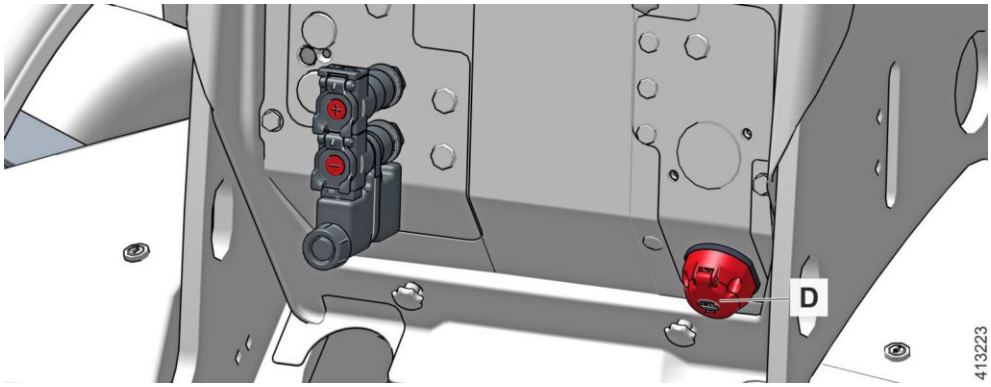
Tipper connections

B	Tipper connections	**L**	Leak oil reservoir (option)

► Fold up protective caps of hydraulic lines.
► Connect the hydraulic lines for the attached working attachment to tipper connections **B**.
► Route hydraulic lines in such a way that they are not pinched when working with the working attachment.
► Empty the oil in «leak oil reservoir» **L** on a regular basis and dispose of it in an environmentally friendly manner.

Connecting the rear socket (option)

The rear socket is at the rear on the carrier frame.



G2040504_1

Location of rear socket

D	Rear socket

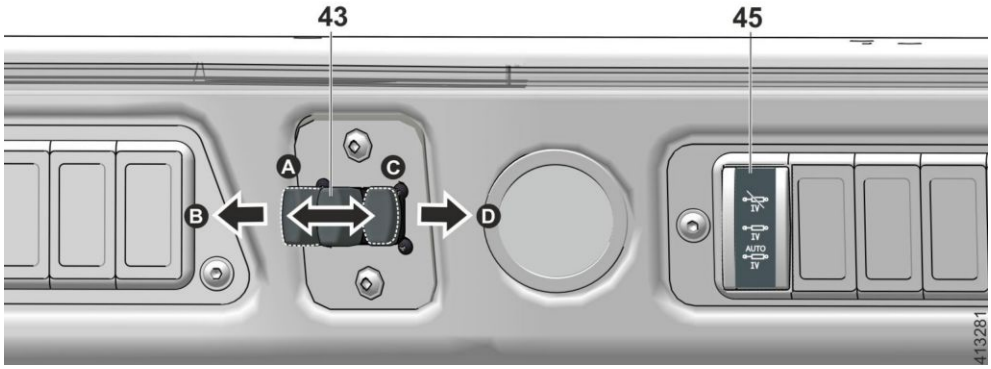
► Connect cables for working attachment to rear socket **D**.

LWT/93517630/09/01/12/2023/en

Operation, control circuit IV

Make sure the following preconditions are met:

☑ The working attachment is connected.



G2040502_1

Activating control circuit IV

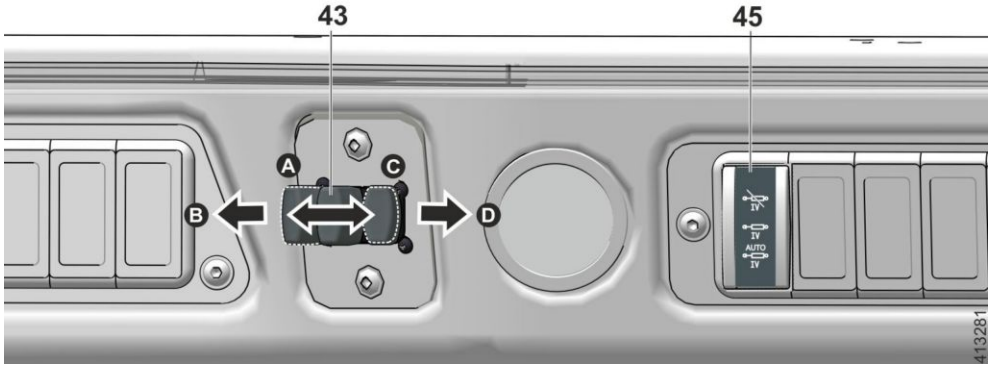
43	«Rear hydraulics» control lever	**45**	«Control circuit IV» switch

► Set «Control circuit IV» switch **45** to the middle position.
  ✔ Additional control circuit IV is activated.
  ✔ «Control circuit IV» symbol is shown on the display.
► Push «Rear hydraulics» control lever **43** forwards or backwards.
  ✔ Control circuit IV connections **A** are pressurised with hydraulic oil.

Control circuit IV flow volume (option)

The preset oil volume of control circuit IV can be changed by setting the flow volume.

Setting the flow volume



G2040502_1

Setting control circuit IV flow volume

43	«Rear hydraulics» control lever	**45**	«Control circuit IV» switch

► Set «Control circuit IV» switch **45** to the middle position.
  ✔ «Control circuit IV» symbol is shown on the display.
  ✔ Preset flow volume flashes on the display.
► Press «Rear hydraulics» control lever **43** towards **A** or **C**.
  ✔ Flow volume changes in 1% increments.
  ✔ Flow volume flashes on the display.

LWT/93517630/09/01/12/2023/en

Saving and activating the flow volume

- ► Press «Rear hydraulics» control lever **43** towards **A** or **C**.
- ► Press the bottom part of «Control circuit IV» switch **45**.
- ► Release «Rear hydraulics» control lever **43**.
  - ✔ «Control circuit IV AUTO» symbol is shown on the display.
  - ✔ The set flow volume is saved and activated upon the touch function being released.
  - ✔ The set flow volume is shown on the display.

Deactivating flow volume

- ► Press the bottom part of «Control circuit IV» switch **45**.
  - ✔ «Control circuit IV» symbol is shown on the display.
  - ✔ The set flow volume is deactivated.
  - ✔ Set flow volume flashes on the display.

Operation of the tipper connection

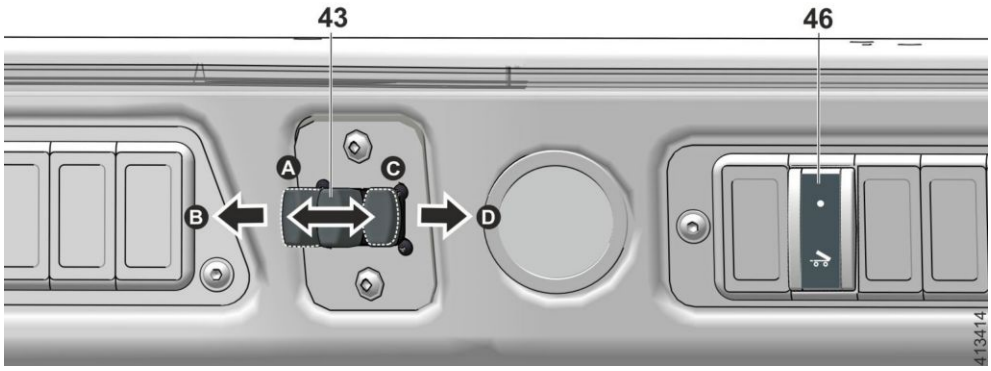
Valid from serial number 20156 to serial number 21354

For operating trailers with a tip function

DANGER
Trailer tipping over!
Death.
- ► Only tip trailer on flat and secure terrain.

Make sure the following preconditions are met:

☑ The working attachment is connected.



G2041518_1

Activating tipper

43	«Rear hydraulics» control lever	**46**	«Tipper» switch

- ► Press bottom part of «Tipper» switch **46**.
  - ✔ Tipper function is activated.
  - ✔ «Tipper» symbol is shown on the display.
- ► Move «Rear hydraulics» control lever **43** forwards as far as pressure point **A**.
  - ✔ Tipper is raised.

LWT/93517630/09/01/12/2023/en

► Move «Rear hydraulics» control lever **43** forwards over pressure point **A**.
✔ «Rear hydraulics» control lever **43** locks in place.
✔ Tipper is lowered.

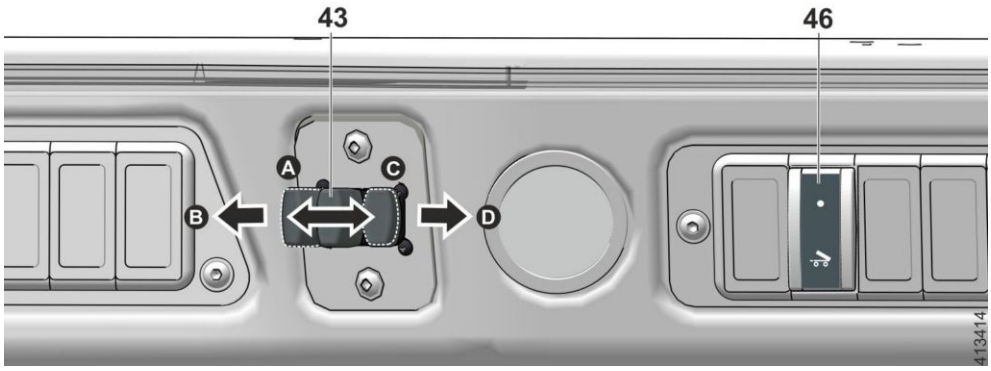
Operation of the tipper connection

Valid from serial number 21355

For operating trailers with a tip function

DANGER
Trailer tipping over!
Death.
► Only tip trailer on flat and secure terrain.

Make sure the following preconditions are met:
☑ The working attachment is connected.



G2041518_1

Activating tipper

43	«Rear hydraulics» control lever	**46**	«Tipper» switch

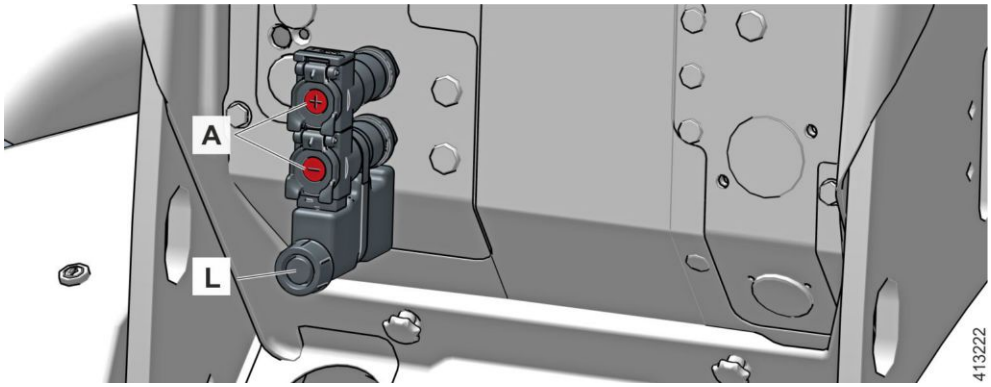
► Press bottom part of «Tipper» switch **46**.
✔ Tipper function is activated.
✔ «Tipper» symbol is shown on the display.
► Move «Rear hydraulics» control lever **43** backwards as far as pressure point **C**.
✔ Tipper is raised.
► Move «Rear hydraulics» control lever **43** forwards over pressure point **A**.
✔ «Rear hydraulics» control lever **43** locks in place.
✔ Tipper is lowered.

LWT/93517630/09/01/12/2023/en

Disconnecting the control circuit IV connections

Make sure the following preconditions are met:

☑ The hydraulic system has been depressurised.



G2040503_2

Connections, control circuit IV

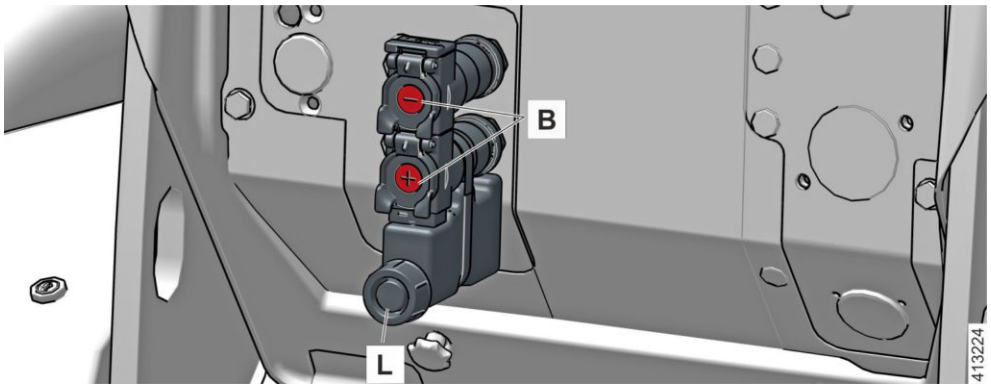
A	Connections, control circuit IV	**L**	Leak oil reservoir

► Disconnect hydraulic lines for the attached working attachment from control circuit IV connections **A**.

Disconnecting the tipper connection (option)

Make sure the following preconditions are met:

☑ The hydraulic system has been depressurised.



G2040532_1

Tipper connections

B	Tipper connections	**L**	Leak oil reservoir (option)

► Disconnect the hydraulic lines for the attached working attachment from tipper connections **B**.

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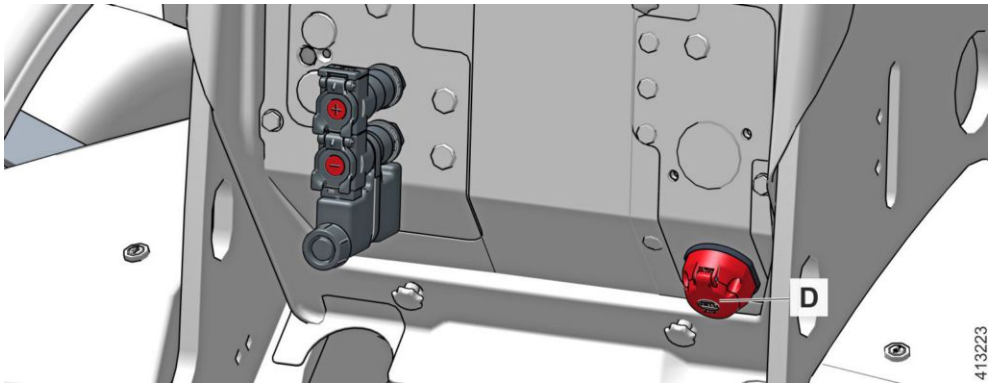
Disconnecting the rear socket (option)



Location of rear socket

D Rear socket

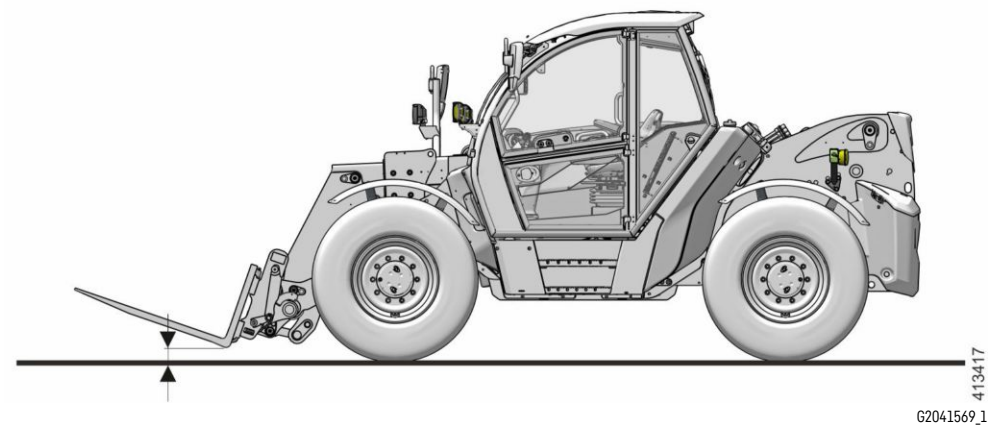
► Disconnect cables for working attachment from rear socket **D**.

3.3.8.10 Ride control (option)

Ride control improves the travel comfort by reducing the vehicle vibrations.

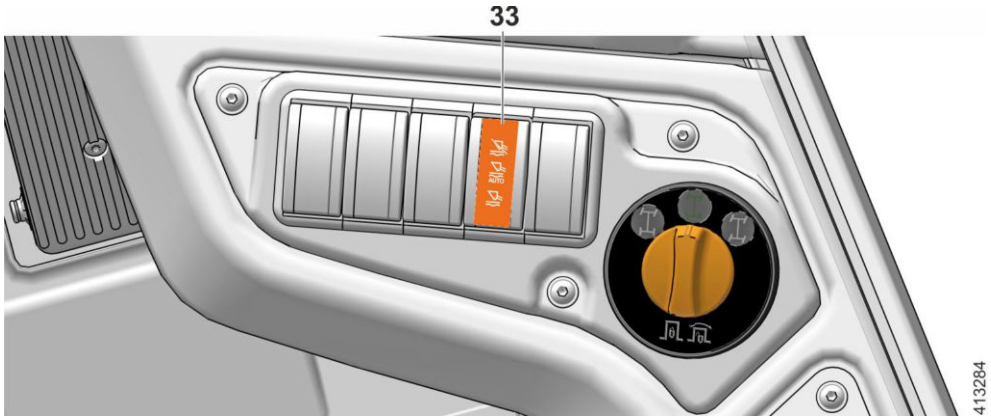
For this reason, ride control should be switched on for longer travel routes.

Ride control is deactivated automatically when a hoist angle of 35° has been reached. Once the hoist angle is less than 35°, ride control is reactivated.



Lowering working attachment

► Put the working attachment in transport position.



G2040507_1

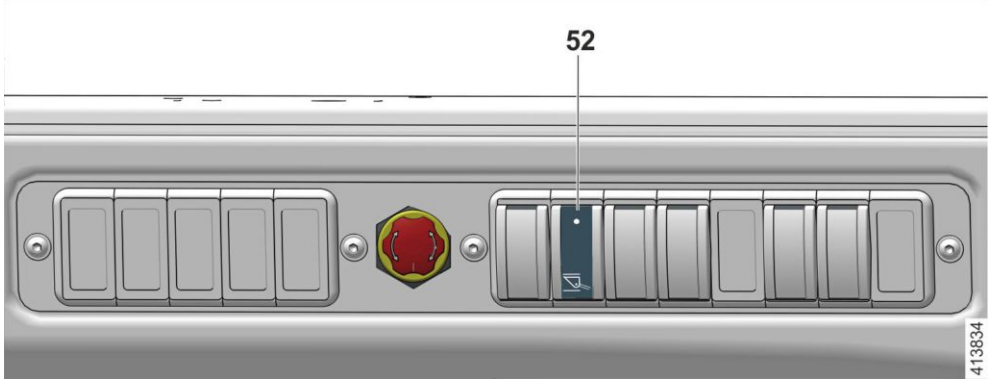
«Ride control» switch

33 «Ride control» switch

- ► Press bottom part of «Ride control» switch **33**.
  - ✔ Ride control is activated.
  - ✔ «Ride control» symbol is shown on the display.
- ► Set «Ride control» switch **33** to the middle position.
  - ✔ «Auto ride control» symbol is shown on the display.
  - ✔ Ride control is automatically activated from a travel speed of 7 km/h (4.3 mph).
- ► Press top part of «Ride control» switch **33**.
  - ✔ Ride control is deactivated.
  - ✔ «Ride control» symbol is hidden on the display.

3.3.8.11 Tipping cylinder lock (option)

For tasks in which the tilting cylinder must not be actuated.



G2047845_1

Tipping cylinder lock

52 «Tipping cylinder lock» switch

- ► To activate the tipping cylinder lock: Press bottom part of «Tipping cylinder lock» switch **52**.
  - ✔ «Tipping cylinder lock» symbol is shown on the display.
  - ✔ Tilting the working attachment in and out is deactivated.
- ► Deactivate the tipping cylinder lock: Press top part of «Tipping cylinder lock» switch **52**.
  - ✔ «Tipping cylinder lock» symbol is hidden on the display.
  - ✔ Tilting the working attachment in and out is activated.

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3.3.8.12 Shake/vibrate function (option)

Activating the shake/vibrate function

Make sure the following preconditions are met:

☑ The working hydraulics are unlocked.
☑ The bucket is not in the end position.

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.

Troubleshooting
Is «Shake/vibrate function» symbol flashing?
Requirements are not met.
► Ensure that all requirements are met.

Deactivating the shake/vibrate function

► Put the control lever in neutral position.
✔ The shake/vibrate function is deactivated.
✔ «Shake/vibrate function» symbol is hidden on the display.

3.3.8.13 Manual throttle (option)

With the manual throttle function, a travel command is given and the diesel engine speed is regulated.

The function enables a constantly higher level of working hydraulics performance.

Manual throttle function can be combined with the **gradual travel device** function.

Make sure the following preconditions are met:

☑ Travel joystick is in neutral position.
☑ «Manual throttle» control lever is in neutral position.

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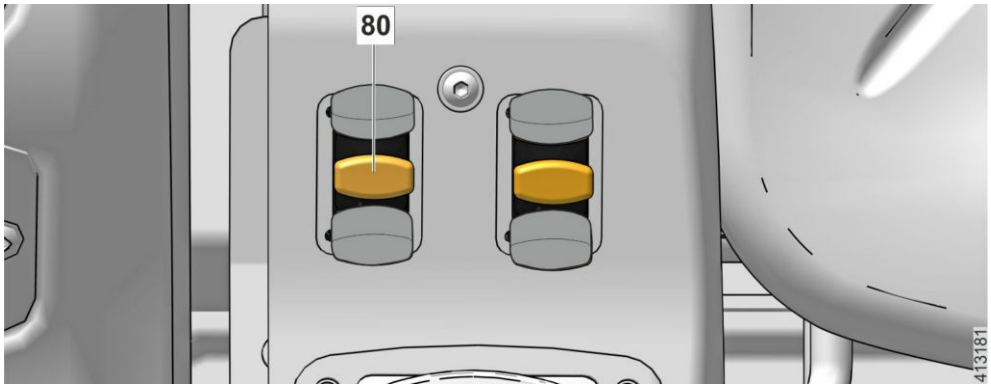
Operating manual throttle

► Select travel direction.



G2036110_1

«Manual throttle» control lever

80 «Manual throttle» control lever

► Push «Manual throttle» control lever **80** forward.
  ✔ Machine travels forward or backward.
  ✔ The engine speed increases.
► Pull «Manual throttle» control lever **80** back.
  ✔ Travel speed of machine is reduced.
  ✔ The engine speed decreases.

Troubleshooting
Machine does not start to move when «Manual throttle» control lever is actuated?
«Manual throttle» control lever is actuated before travel direction is selected.
► Press «Neutral travel direction» button.
► Set «Manual throttle» control lever to zero position.
► Select travel direction.
► Actuate «Manual throttle» control lever.

Braking

► Press inching brake pedal.
  ✔ Machine is braked without resetting travel command of the «Manual throttle» control lever.
► Depress inching brake pedal fully.
  ✔ Travel command of the «Manual throttle» control lever is reset.

If the travel command of the «Manual throttle» control lever is reset:

► Set «Manual throttle» control lever to zero position.
► Set desired engine speed with «Manual throttle» control lever.
  ✔ Machine travels forward or backward.

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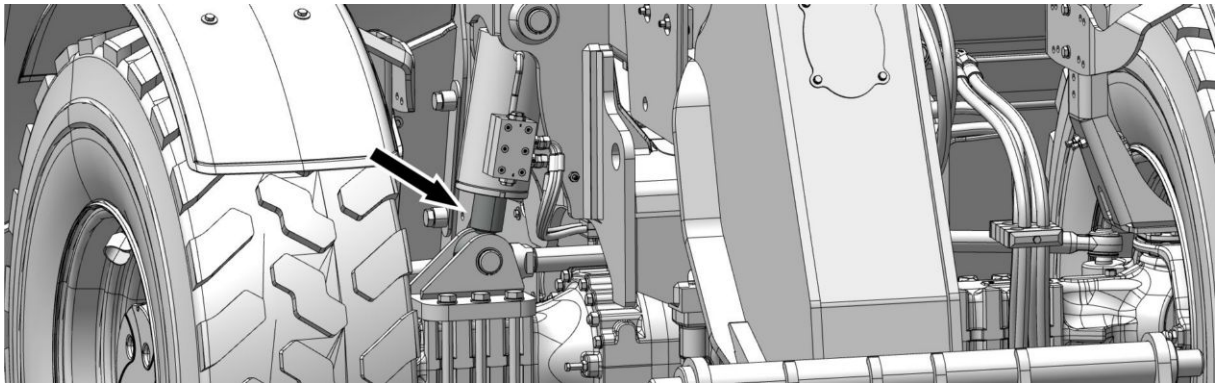
3.3.8.14 Level adjustment (option)

The level adjustment allows the machine to remain level for working on uneven ground. The machine can only be tilted to the right or left max. 5°.

Levelling can only be activated if the hoist angle is less than 20°.



0017993-01

Level adjustment cylinder

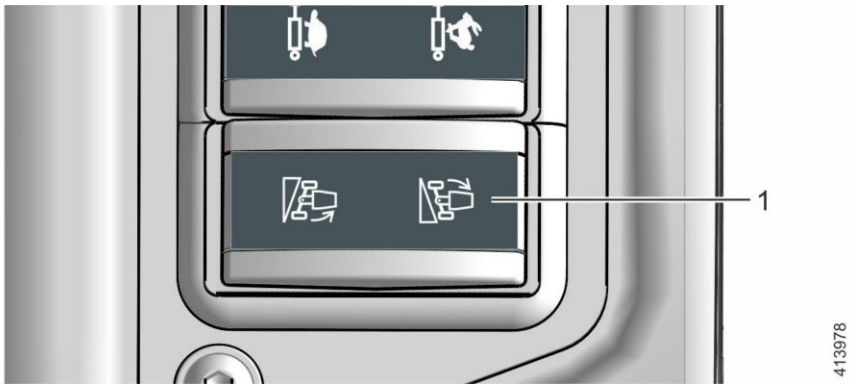
The level adjustment cylinder is attached to the front right of chassis frame.

Tilting machine

Make sure the following preconditions are met:

☑ Floating axle is unlocked.

DANGER
Machine tipping!
Danger to life.
► Ensure that level adjustment cylinder and floating axle lock are in neutral position prior to travel mode.



«Level adjustment» button

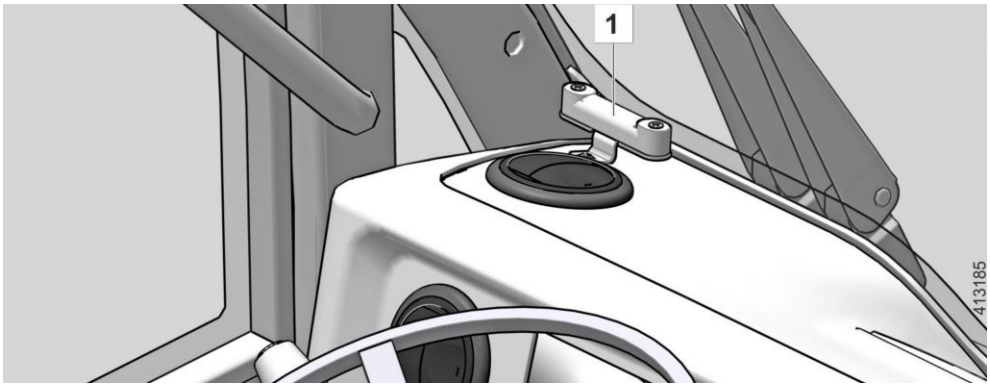
1 «Level adjustment» button

► Press «Level adjustment» button **1** on right.
✔ Machine tilts to right.

► Press «Level adjustment» button **1** on left.
✔ Machine tilts to left.

Troubleshooting
Level adjustment is not carried out?
Floating axle lock is activated.
► Deactivate floating axle lock.

Reading lateral incline angle on level display



G2036225_1

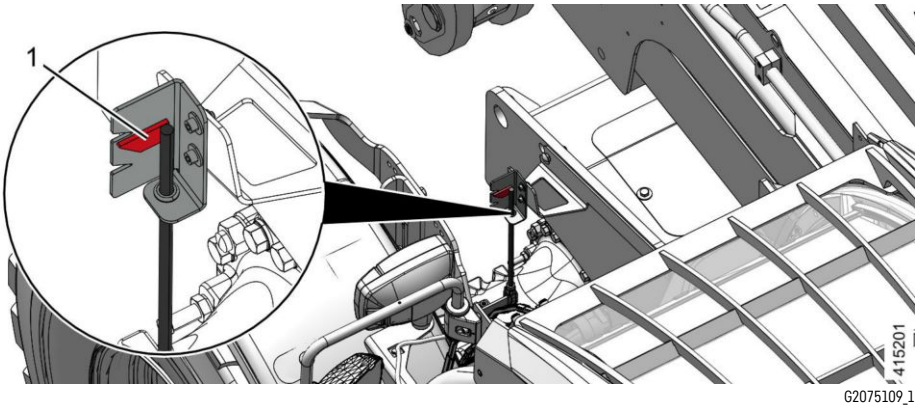
Level display

1 Level display

The machine is straight when the bubble is in the centre of tube.

► Read lateral incline angle of machine on Level display **1**.

Reading lateral incline angle on level display on floating axle (option)



G2075109_1

Level display on floating axle

1 Level display on floating axle

The machine is level when the indicator bar is level with the lower edge of the first notch.

► Read lateral incline angle of the machine on Level display on floating axle **1**.

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Aligning machine horizontally

If working application with machine has been completed:

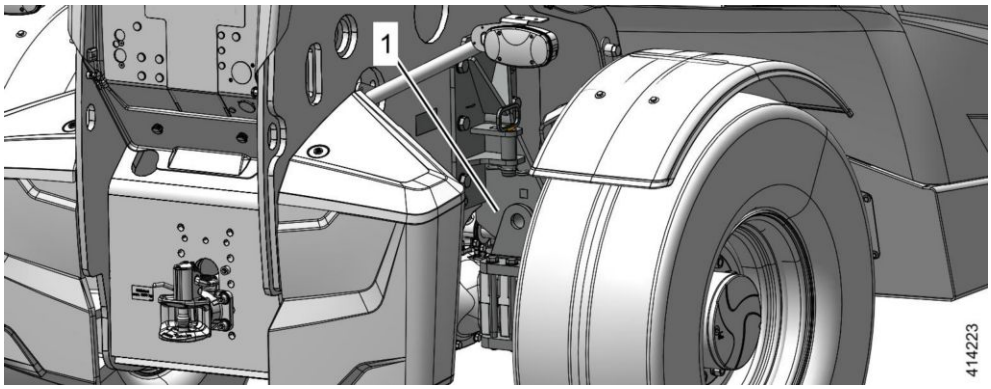
► Align machine at a right angle to axles.

3.3.8.15 Mechanical floating axle lock (option)

The floating axle lock prevents the rear axle from swaying and increases the stability of the machine.

Only use the floating axle lock on level and solid ground.

The floating axle lock is installed at the rear right on the main frame and on the rear axle.



G2061240_1

Mechanical floating axle lock

1 Floating axle lock

NOTICE

Incorrect use of the floating axle lock!

Damage to the main frame.

► Unlock the floating axle during level adjustment.

The floating axle must not be locked if a level adjustment is being carried out.

Driving with the floating axle lock

Driving with a locked floating axle is only permitted at speeds not exceeding 10 km/h (6.2 mph).

Driving with a locked floating axle is not permitted for on-road travel, on uneven ground or on public roads.

Locking the floating axle

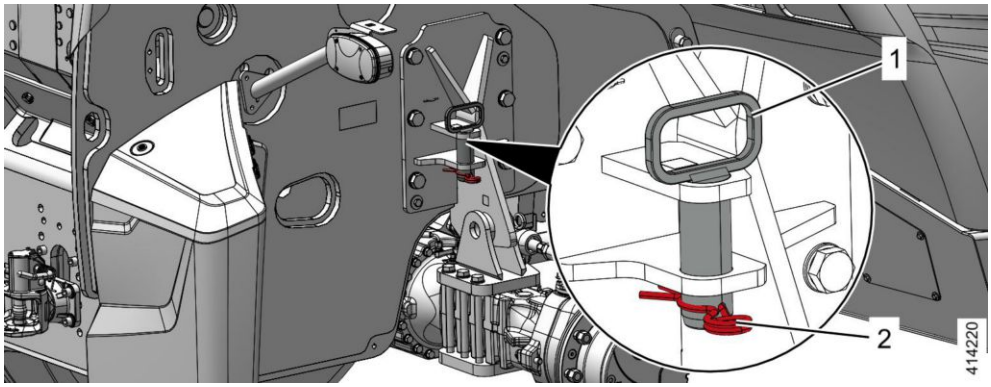
Make sure the following preconditions are met:

☑ Rear tyres are fully turned to the left or right.

☑ The machine has been properly put out of operation. Page 210

LWT/93517630/09/01/12/2023/en

DANGER
Unauthorised commissioning of the machine!
Danger to life.
► Secure the machine against unauthorised commissioning.

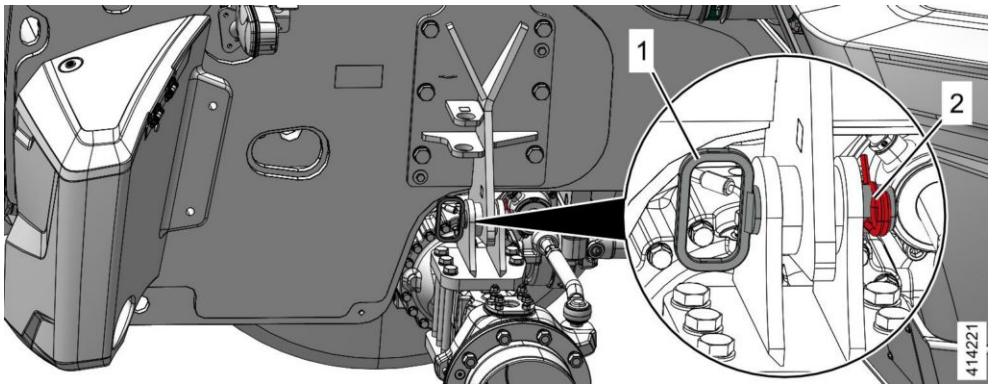


G2060954_1

Removing pins

1	Pin	**2**	Cotter pin

► Remove cotter pin **2**.
► Unpin pin **1**.



G2060955_1

Locking the floating axle

1	Pin	**2**	Cotter pin

► Insert pin **1**.
► Secure pin **1** with a cotter pin **2**.
✔ Floating axle locked.

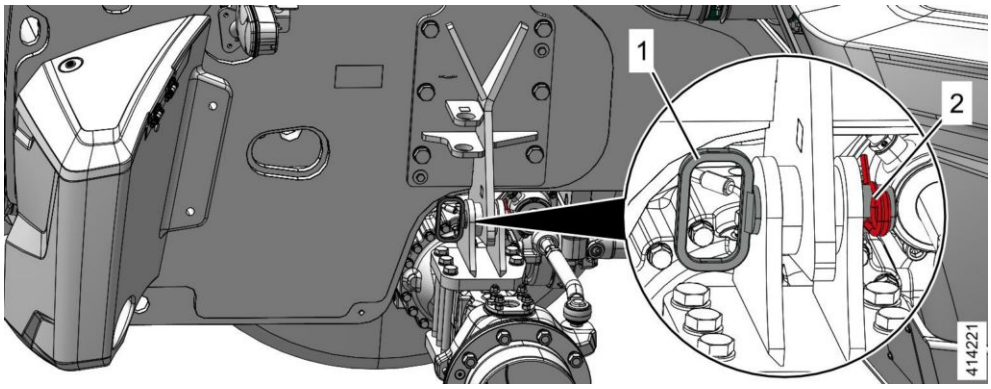
LWT/93517630/09/01/12/2023/en

Unlocking the floating axle

Make sure the following preconditions are met:

☑ Rear tyres are fully turned to the left or right.
☑ The machine is has been properly put out of operation. Page 210

DANGER
Unauthorised commissioning of the machine!
Danger to life.
► Secure the machine against unauthorised commissioning.

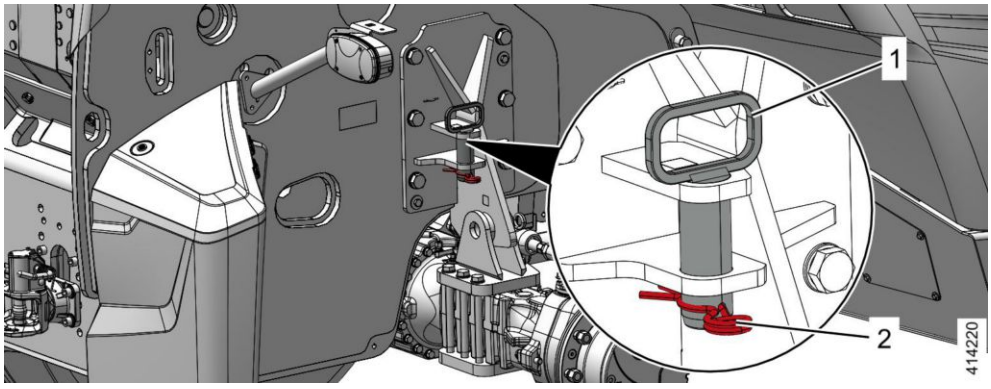


G2060955_1

Unlocking the floating axle

1	Pin	**2**	Cotter pin

► Remove cotter pin **2**.
► Unpin pin **1**.



G2060954_1

Inserting pin

1	Pin	**2**	Cotter pin

► Insert pin **1**.
► Secure pin **1** with a cotter pin **2**.
✔ Floating axle is unlocked.

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3.3.8.16 Hydraulic floating axle lock (option)

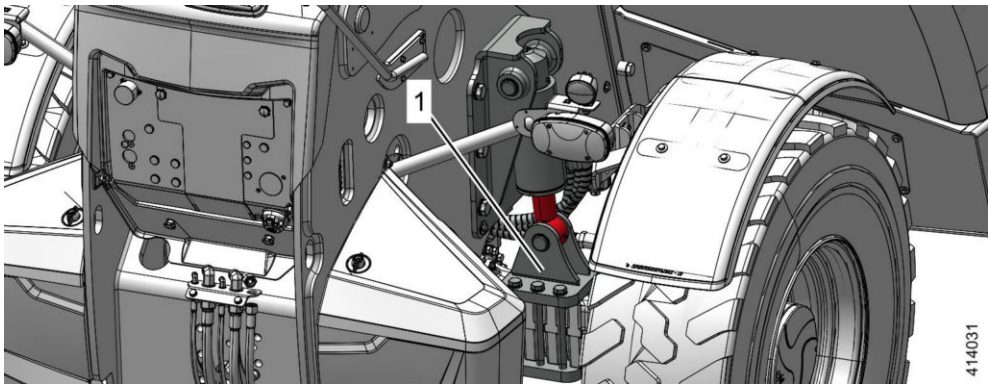
The floating axle lock prevents the rear axle from swaying in its current inclination. The floating axle lock prevents the rear axle from swaying and increases the stability of the machine.

The floating axle lock cylinder remains locked in its current position if the floating axle lock is active.

The floating axle lock must not be active if a level adjustment is being carried out.

Only use the floating axle lock on level and solid ground.

The floating axle lock is at the back right on the main frame.



G2056224_2

Floating axle lock

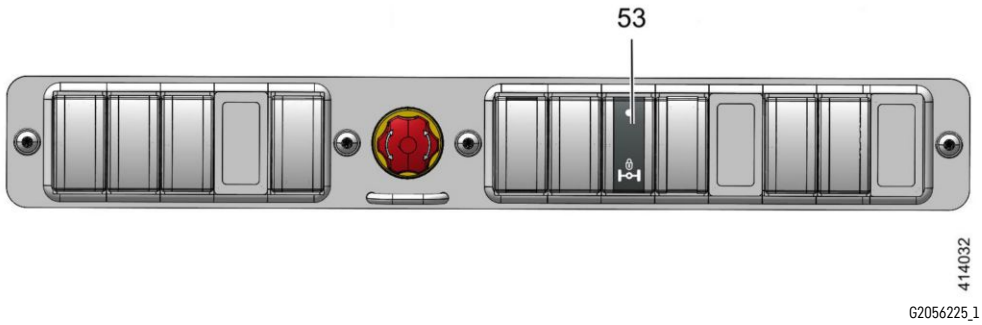
1 Floating axle lock

Driving with the floating axle lock

Driving with a locked floating axle is only permitted at speeds not exceeding 10 km/h (6.2 mph).

Driving with a locked floating axle is not permitted for on-road travel, on uneven ground or on public roads.

Locking the floating axle



G2056225_1

Side control element

53 «Floating axle lock» button

- ► Press bottom part of «Floating axle lock» button **53**.
  - ✔ Floating axle is locked.
  - ✔ The «Floating axle lock» symbol is shown on the display.

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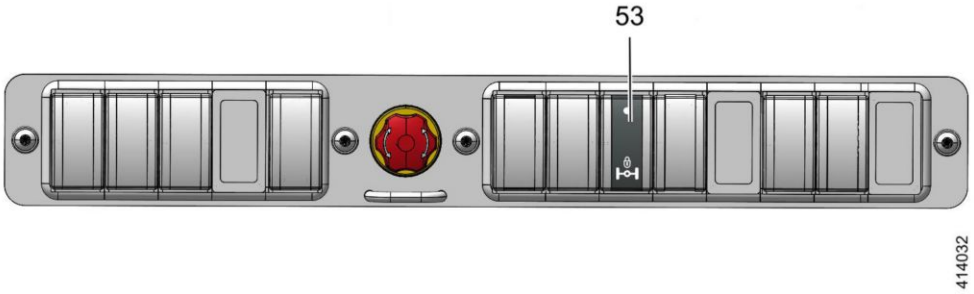
Unlocking the floating axle



Side control element

53	«Floating axle lock» button

- ► Press top part of «Floating axle lock» button **53**.
  - ✔ Floating axle is unlocked.
  - ✔ The «Floating axle lock» symbol is hidden on the display.

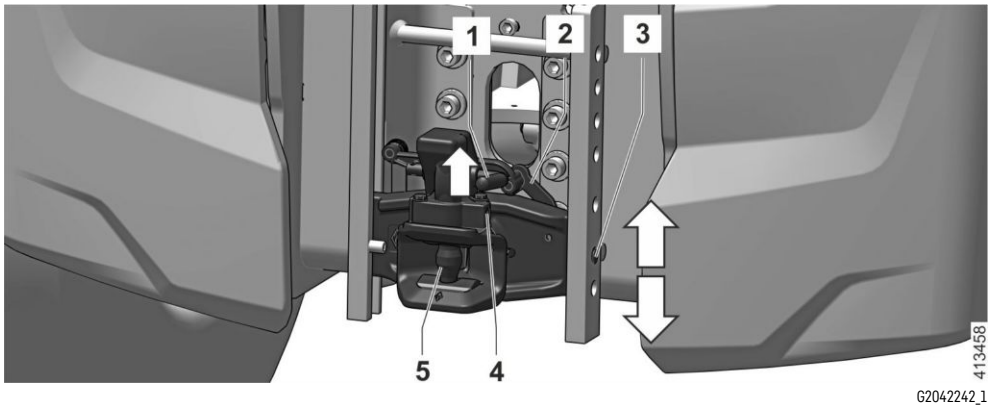
3.3.9 Trailer couplings (option)

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

3.3.9.1 Automatic trailer coupling, height adjustable

Height adjustment of trailer coupling

Adjust the automatic trailer coupling to height of trailer prior to attachment.



Automatic trailer coupling, height adjustable

1	Lever	**4**	Retaining pin
2	Handle	**5**	Coupling pin
3	Locking pin		

- ► Pull handle **2** up and to the right.
  - ✔ Locking pins **3** are retracted.

► Move the trailer coupling up or down.

Once desired height is reached:

► Let go of handle **2**.
✔ The locking pins **3** lock in place in the holder plate.

Opening the trailer coupling

► Pull lever **1** upward until it locks in place.
✔ Lateral retaining pins **4** are extended.
✔ The coupling pin **5** is pushed upward and locked.

CAUTION
The trailer coupling closes automatically!
Crushing injuries.
► Ensure that there are no body parts or objects inside of the closing range.

► Remove contamination from automatic trailer coupling using a suitable tool.

Connecting trailer

Ensure that following requirements are met:

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

► Slowly move machine backward until the pull device of trailer has triggered the locking mechanism of automatic trailer coupling.
✔ Coupling pin **5** is pressed downward.
✔ Lateral retaining pins **4** are retracted.
✔ Lever **1** falls down.
► Turn diesel engine off.
► Engage parking brake.
► Check whether the pull device of trailer is securely locked in the automatic trailer coupling.
► Connect hydraulic connections, compressed air connections and electrical connections.

Disconnecting the trailer

Ensure that following requirements are met:

☑ Trailer is secured against rolling away.

► Loosen the hydraulic connections, compressed air connections and electrical connections.
► Pull lever **1** upward until it locks in place.
✔ Lateral retaining pins **4** are extended.
✔ Coupling pin **5** is pushed upward and locked.
► Slowly move machine forward.

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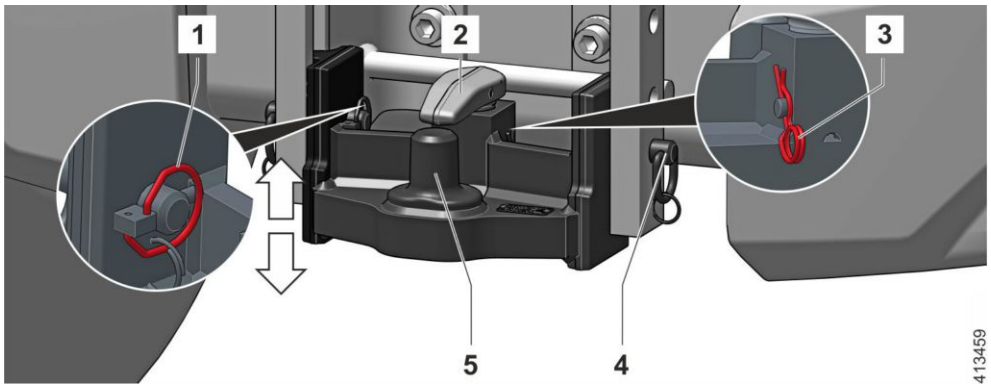
3.3.9.2 Piton trailer coupling, height adjustable

Height adjustment of trailer coupling

Adjust the Piton trailer coupling to height of trailer prior to attachment.



Piton trailer coupling, height adjustable

1	Linchpin	**4**	Connector pin
2	Downholder	**5**	Coupling pin
3	Cotter pin		

- ► Loosen linchpins **1** of lateral connector pins **4**.
- ► Remove connector pins **4**.
- ► Move the trailer coupling up or down.

Once desired height is reached:

- ► Insert lateral connector pins **4**.
- ► Secure connector pins **4** with linchpins **1**.

Opening the trailer coupling

- ► Remove cotter pin **3**.
- ► Swing downholder **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 downholder **2** back into travel direction.
  - ✔ Downholder **2** is above the coupling pin **5**.
- ► Secure downholder **2** with a cotter pin **3**.

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- ► Check whether the pull device of trailer is securely locked in the trailer coupling.
- ► Connect hydraulic connections, compressed air connections and electrical connections.

Disconnecting the trailer

Ensure that following requirements are met:

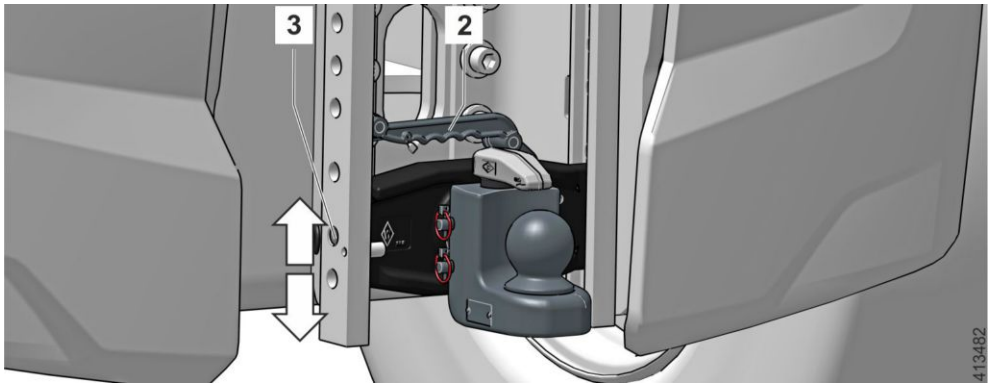
☑ Trailer is secured against rolling away.

- ► Loosen the hydraulic connections, compressed air connections and electrical connections.
- ► Remove cotter pin **3**.
- ► Swing downholder **2** to side by 90°.
- ► Raise pull device with a suitable device.
- ► Slowly move machine forward.

3.3.9.3 Trailer coupling ball head, height adjustable

Height adjustment of trailer coupling

Adjust the trailer coupling ball head to height of trailer prior to attachment.



G2042246_1

Trailer coupling ball head, height adjustable

2	Handle	**3**	Locking pin

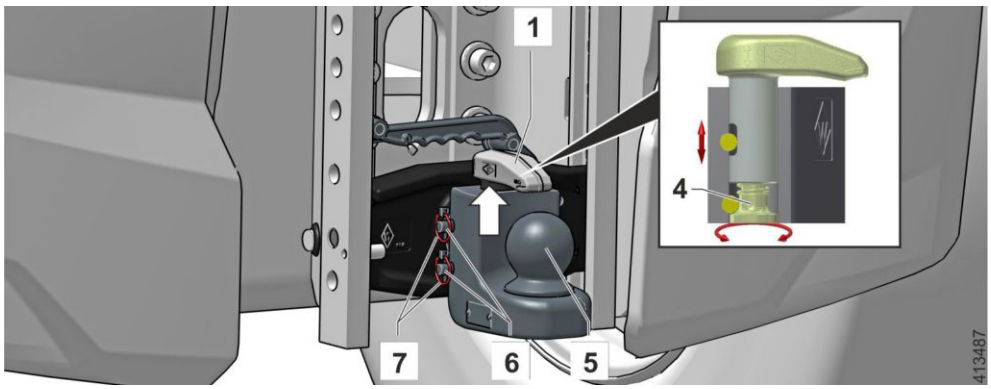
- ► Pull handle **2** up and to the right.
  - ✔ Locking pins **3** are retracted.
- ► Move the trailer coupling up or down.

Once desired height is reached:

- ► Let go of handle **2**.
  - ✔ The locking pins **3** lock in place in the holder plate.

LWT/93517630/09/01/12/2023/en

Height adjustment of downholder



G2042327_1

Height adjustment of downholder

1	Downholder	**6**	Pin
4	Adjustment bolt	**7**	Linchpin
5	Ball head		

- ► Loosen linchpins **7** of lateral pins **6**.
- ► Pull out pins **6**.
- ► Pull downholder **1** out of the bore.
- ► Turn adjustment screw **4** on the downholder **1**.

Once desired height is reached:

- ► Put downholder **1** in the bore.
- ► Insert pins **6**.
- ► Secure pin **6** with linchpin **7**.

Opening the trailer coupling

- ► Loosen upper linchpin **7**.
- ► Pull out upper pin **6**.
- ► Swing downholder **1** 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 pull device is above ball head **5**.
- ► Turn diesel engine off.
- ► Engage parking brake.
- ► Lower the pull device.
- ► Swing downholder **1** back into travel direction.
  - ✔ Downholder **1** is above the ball head **5**.
- ► Secure downholder **1** with pins **6** and linchpins **7**.
- ► Check whether the pull device of trailer is securely locked in the trailer coupling.

LWT/93517630/09/01/12/2023/en

► Connect hydraulic connections, compressed air connections and electrical connections.

Disconnecting the trailer

Ensure that following requirements are met:

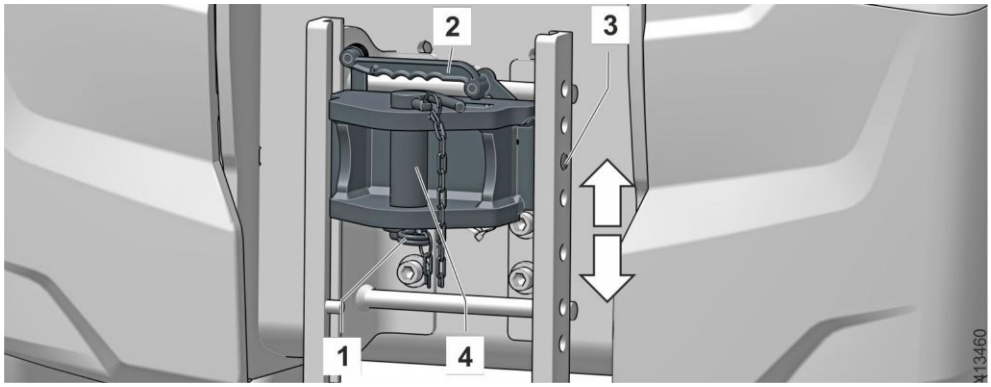
☑ Trailer is secured against rolling away.

► Loosen the hydraulic connections, compressed air connections and electrical connections.
► Loosen upper linchpin **7**.
► Pull out upper pin **6**.
► Swing downholder **1** to side by 90°.
► Raise pull device with a suitable device.
► Slowly move machine forward.

3.3.9.4 Cuna trailer coupling, height adjustable

Height adjustment of trailer coupling

Adjust the Cuna trailer coupling to height of trailer prior to attachment.



G2042234_1

Cuna trailer coupling, height adjustable

1	Cotter pin	**3**	Locking pin
2	Handle	**4**	Coupling pin

► Pull handle **2** up and to the right.
✔ Locking pins **3** are retracted.
► Move the trailer coupling up or down.

Once desired height is reached:

► Let go of handle **2**.
✔ The locking pins **3** lock in place in the holder plate.

LWT/93517630/09/01/12/2023/en

Opening the trailer coupling

- ► Remove cotter pin **1**.
- ► Remove coupling pin **4**.
- ► 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.
- ► Turn diesel engine off.
- ► Engage parking brake.
- ► Insert the coupling pin **4** through the pull device.
- ► Secure coupling pin **4** with a cotter pin **1**.
- ► Check whether the pull device of trailer is securely locked in the trailer coupling.
- ► Connect hydraulic connections, compressed air connections and electrical connections.

Disconnecting the trailer

Ensure that following requirements are met:

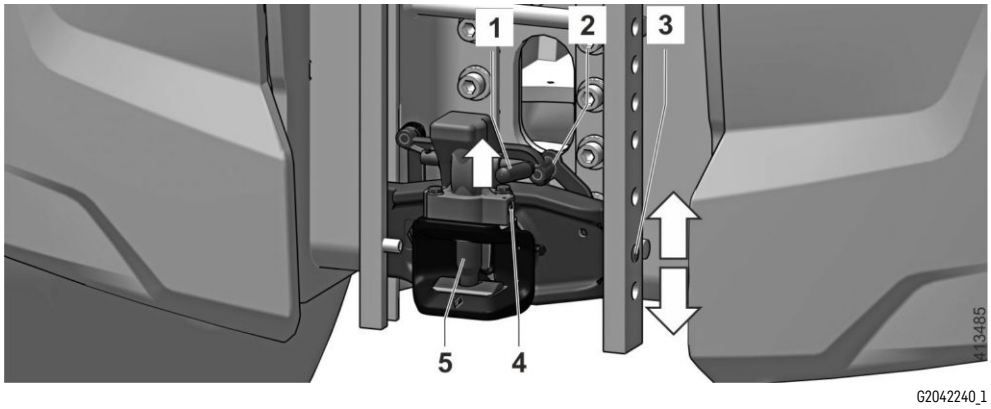
- ☑ Trailer is secured against rolling away.

- ► Loosen the hydraulic connections, compressed air connections and electrical connections.
- ► Remove cotter pin **1**.
- ► Remove coupling pin **4**.
- ► Slowly move machine forward.

3.3.9.5 Country-specific automatic trailer coupling, height adjustable

Height adjustment of trailer coupling

Adjust the country-specific automatic trailer coupling to height of trailer prior to attachment.



G2042240_1

Country-specific automatic trailer coupling, height adjustable

1	Lever	**4**	Retaining pin
2	Handle	**5**	Coupling pin
3	Locking pin		

► Pull handle **2** up and to the right.
✔ Locking pins **3** are retracted.
► Move the trailer coupling up or down.

Once desired height is reached:

► Let go of handle **2**.
✔ The locking pins **3** lock in place in the holder plate.

Opening the trailer coupling

► Pull lever **1** upward until it locks in place.
✔ Lateral retaining pins **4** are extended.
✔ The coupling pin **5** is pushed upward and locked.

CAUTION
The trailer coupling closes automatically!
Crushing injuries.
► Ensure that there are no body parts or objects inside of the closing range.

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

Connecting trailer

Ensure that following requirements are met:

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

► Slowly move machine backward until the pull device of trailer has triggered the locking mechanism of automatic trailer coupling.
✔ The coupling pin **5** is pressed downward.
✔ Lateral retaining pins **4** are retracted.
✔ The lever **1** falls down.
► Turn diesel engine off.
► Engage parking brake.
► Check whether the pull device of trailer is securely locked in the trailer coupling.
► Connect hydraulic connections, compressed air connections and electrical connections.

Disconnecting the trailer

Ensure that following requirements are met:

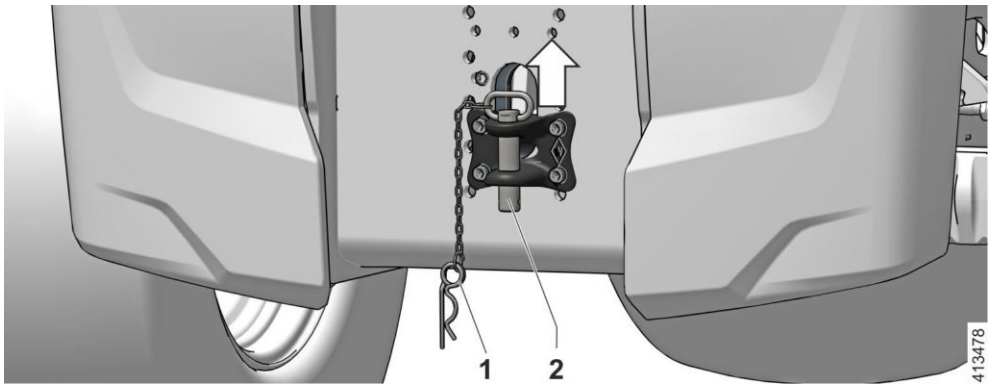
☑ Trailer is secured against rolling away.

► Loosen the hydraulic connections, compressed air connections and electrical connections.
► Pull lever **1** upward until it locks in place.
✔ Lateral retaining pins **4** are extended.
✔ The coupling pin **5** is pushed upward and locked.
► Slowly move machine forward.

LWT/93517630/09/01/12/2023/en

3.3.9.6 Manoeuvring coupling

Opening manoeuvring coupling



Manoeuvring coupling

1	Cotter pin	**2**	Coupling pin

- ► Remove cotter pin **1**.
  - ✔ Remove coupling pin **2**.
- ► 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.
- ► Turn diesel engine off.
- ► Engage parking brake.
- ► Insert the coupling pin **2** through the pull device.
- ► Secure coupling pin **2** with a cotter pin **1**.
- ► Check whether the pull device of trailer is securely locked in the trailer coupling.
- ► Connect hydraulic connections, compressed air connections and electrical connections.

Disconnecting the trailer

Ensure that following requirements are met:

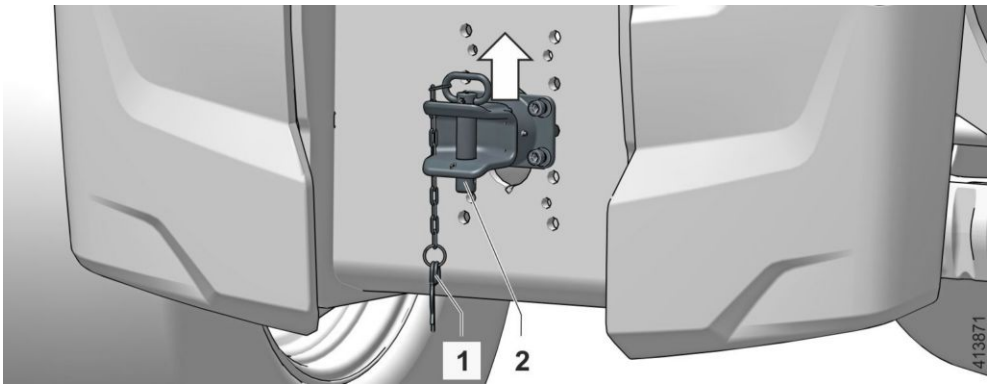
- ☑ Trailer is secured against rolling away.

- ► Loosen the hydraulic connections, compressed air connections and electrical connections.
- ► Remove cotter pin **1**.
- ► Remove coupling pin **2**.
- ► Slowly move machine forward.

LWT/93517630/09/01/12/2023/en

3.3.9.7 Non-automatic pin coupling

Opening non-automatic pin coupling



G2048344_1

Non-automatic pin coupling

1	Cotter pin	**2**	Coupling pin

- ► Remove cotter pin **1**.
- ► Remove coupling pin **2**.
- ► Remove contamination from the non-automatic pin coupling using a suitable tool.

Connecting trailer

Ensure that following requirements are met:

- ☑ Trailer is secured against rolling away.
- ☑ Non-automatic pin coupling and the pull device of trailer are at the same height.
- ☑ Non-automatic pin coupling is open.

- ► Slowly move machine backward.
- ► Turn diesel engine off.
- ► Engage parking brake.
- ► Insert the coupling pin **2** through the pull device.
- ► Secure coupling pin **2** with a cotter pin **1**.
- ► Check whether the pull device of trailer is securely locked in the non-automatic pin coupling.
- ► Connect hydraulic connections, compressed air connections and electrical connections.

Disconnecting the trailer

Ensure that following requirements are met:

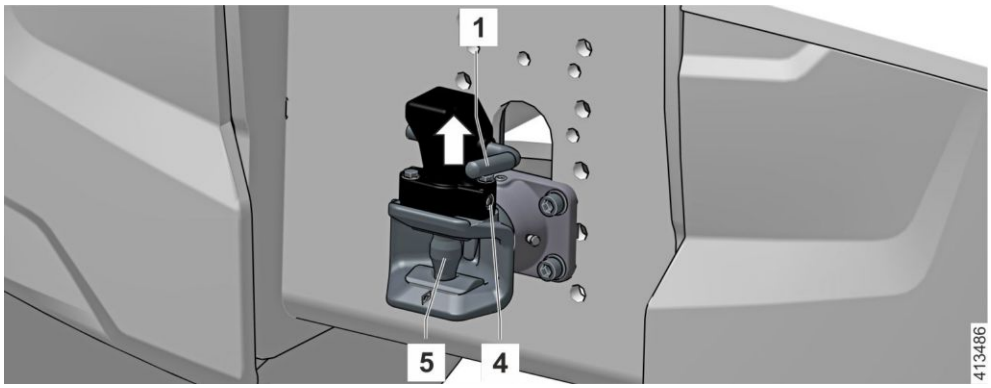
- ☑ Trailer is secured against rolling away.

- ► Loosen the hydraulic connections, compressed air connections and electrical connections.
- ► Remove cotter pin **1**.
- ► Remove coupling pin **2**.
- ► Slowly move machine forward.

LWT/93517630/09/01/12/2023/en

3.3.9.8 Automatic pin coupling

Opening automatic pin coupling



G2042247_1

Automatic pin coupling

1	Lever	**5**	Coupling pin
4	Retaining pin		

- ► Pull lever **1** upward until it locks in place.
  - ✔ Lateral retaining pins **4** are extended.
  - ✔ The coupling pin **5** is pushed upward and locked.

CAUTION
The trailer coupling closes automatically!
Crushing injuries.
- ► Ensure that there are no body parts or objects inside of the closing range.

- ► Remove contamination from the automatic pin coupling with a suitable tool.

Connecting trailer

Ensure that following requirements are met:

- ☑ Trailer is secured against rolling away.
- ☑ Automatic pin coupling and the pull device of trailer are at the same height.
- ☑ Automatic pin coupling is open.

- ► Slowly move machine backward until the pull device of trailer has triggered the locking mechanism of automatic pin coupling.
  - ✔ Coupling pin **5** is pressed downward.
  - ✔ Lateral retaining pins **4** are retracted.
  - ✔ The lever **1** falls down.
- ► Turn diesel engine off.
- ► Engage parking brake.
- ► Check whether the pull device of trailer is securely locked in the automatic pin coupling.
- ► Connect hydraulic connections, compressed air connections and electrical connections.

LWT/93517630/09/01/12/2023/en

Disconnecting the trailer

Ensure that following requirements are met:

☑ Trailer is secured against rolling away.

- ► Loosen the hydraulic connections, compressed air connections and electrical connections.
- ► Pull lever **1** upward until it locks in place.
  - ✔ Lateral retaining pins **4** are extended.
  - ✔ The coupling pin **5** is pushed upward and locked.
- ► Slowly move machine forward.

3.3.9.9 Hitch trailer coupling

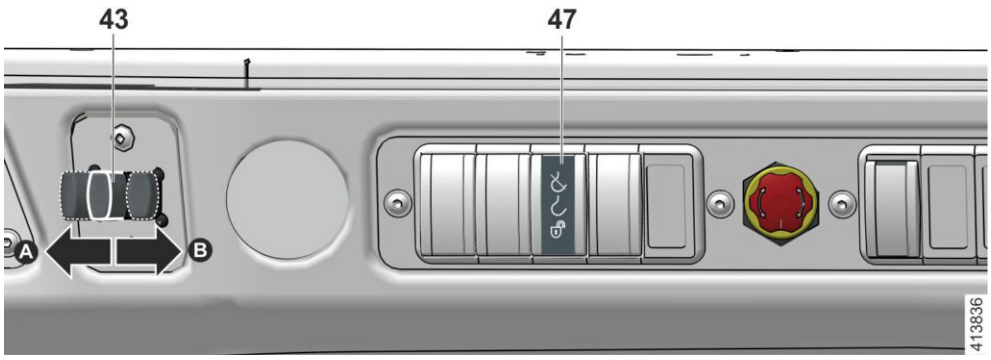
Valid from serial number 20156 to serial number 21354

With the hitch trailer coupling it is possible to connect a trailer with a hitch eyehook from operator's seat to the machine.

Ensure that following requirements are met:

– Trailer is secured against rolling away.

Unlocking hitch trailer coupling



G2047850_1

Unlocking hitch trailer coupling

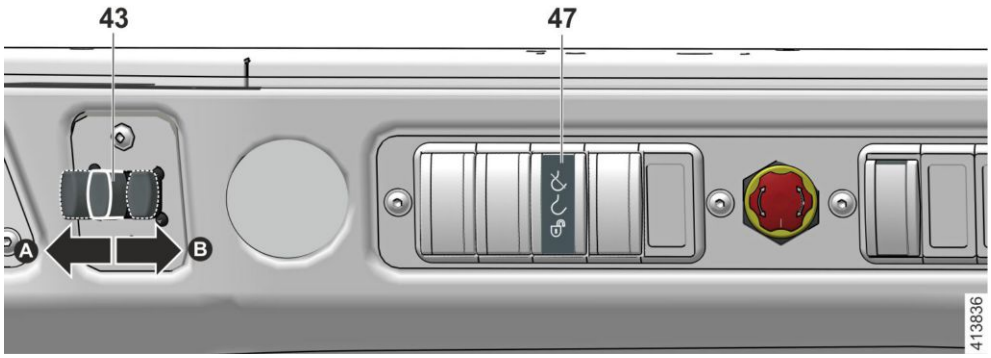
43	«Rear hydraulics» control lever	**47**	«Auto-hitch» switch

- ► Press bottom part of «Auto-hitch» switch **47** and hold it.
- ► Move «Rear hydraulics» control lever **43** to **A**.
  - ✔ Safety locking mechanism of hitch trailer coupling is unlocked.
  - ✔ «Auto-hitch unlocked» symbol is shown on the display.

Note

When hitch trailer coupling is unlocked, the travel speed is reduced to 5 km/h (3.1 mph).

Lowering hitch trailer coupling

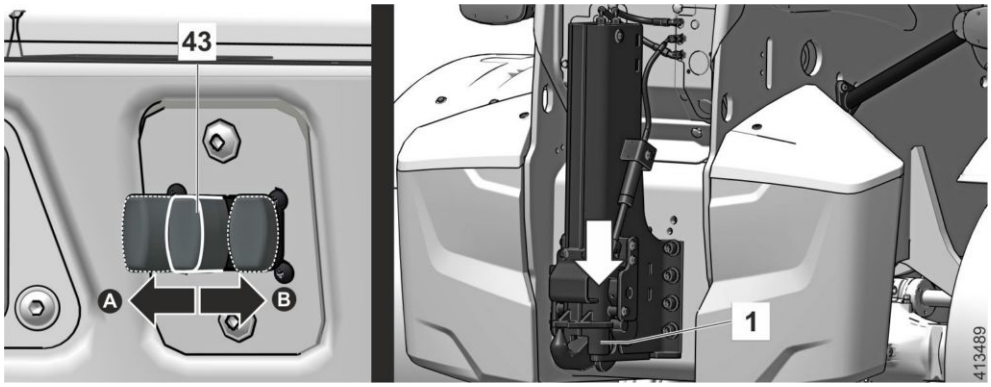


G2047850_1

Unlocking hitch trailer coupling

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

► Press bottom part of «Auto-hitch» switch **47** and hold it.



G2042343_1

Lowering hitch trailer coupling

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

► Move «Rear hydraulics» control lever **43** to **B**.
✔ Hitch trailer coupling **1** is lowered.

NOTICE

Improper lowering of the hitch trailer coupling!

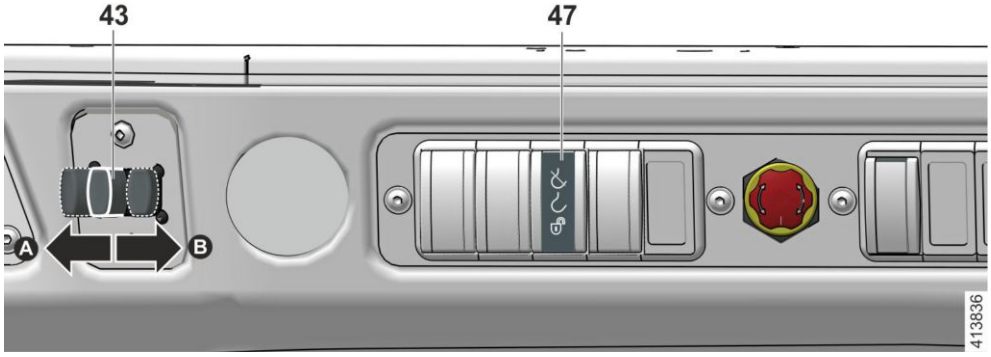
Damage to the hitch trailer coupling.

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

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

Raising and locking hitch trailer coupling

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

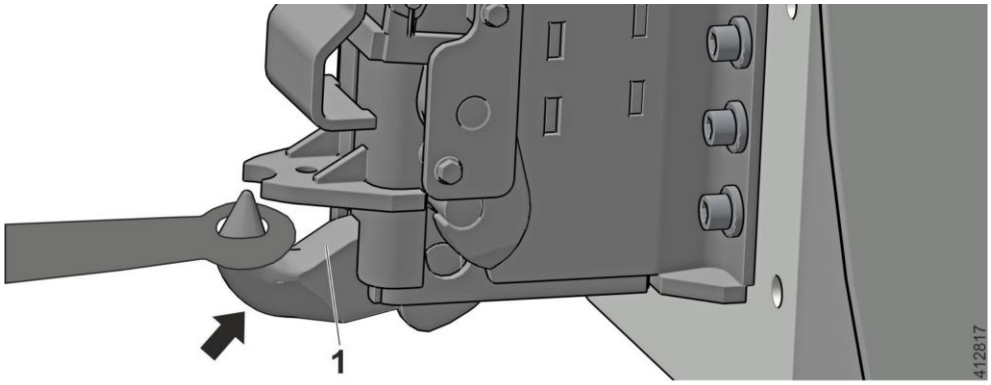


G2047850_1

Locking the hitch trailer coupling

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

► Move «Rear hydraulics» control lever **43** to **A**.
✔ Hitch trailer coupling is raised.



G2028245_1

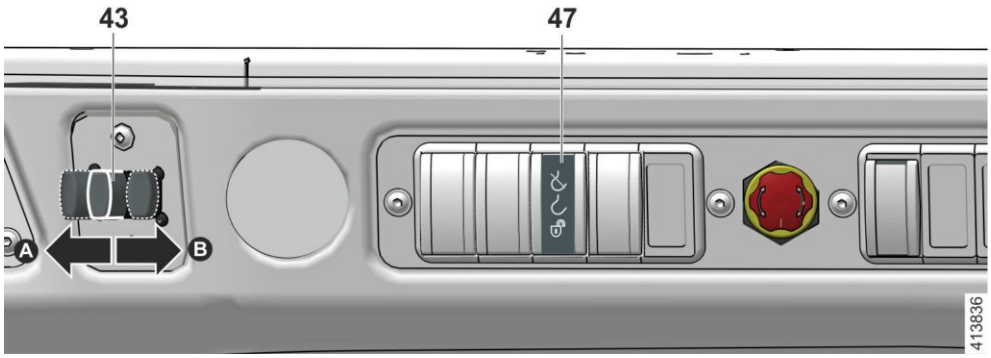
Raising hitch trailer coupling

1	Hitch trailer coupling

► Raise hitch trailer coupling **1** to stop.
► Move «Rear hydraulics» control lever to **B**.
✔ Hitch trailer coupling **1** is locked.
✔ «Auto-hitch locked» symbol is shown on the display.
► Turn diesel engine off.
► Engage parking brake.
► Check whether the pull device of trailer is securely locked in the trailer coupling.
► Connect hydraulic connections, compressed air connections and electrical connections.

LWT/93517630/09/01/12/2023/en

Disconnecting the trailer from the hitch trailer coupling



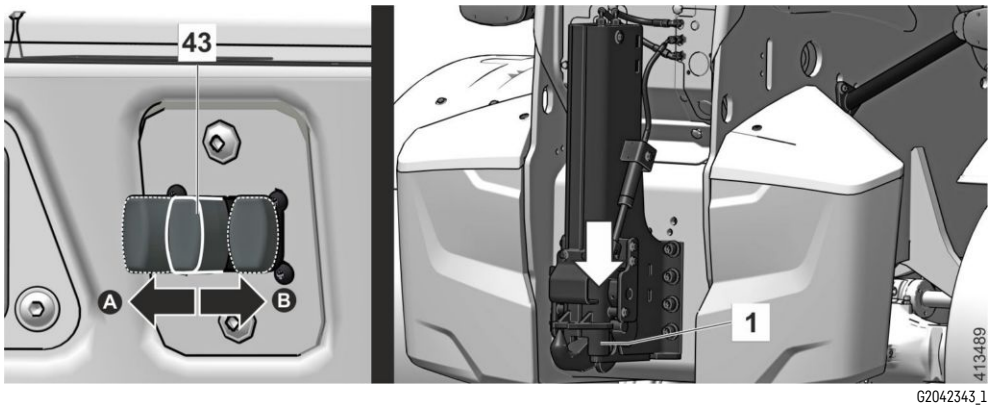
G2047850_1

Unlocking hitch trailer coupling

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

- ► Press bottom part of «Auto-hitch» switch **47**.
- ► Move «Rear hydraulics» control lever **43** to **A**.
  - ✔ Hitch trailer coupling is unlocked.
  - ✔ «Auto-hitch unlocked» symbol is shown on the display.

Note
When hitch trailer coupling is unlocked, the travel speed is reduced to 5 km/h (3.1 mph).



G2042343_1

Lowering hitch trailer coupling

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

- ► Move «Rear hydraulics» control lever **43** to **B**.
  - ✔ Hitch trailer coupling **1** is lowered.

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.

LWT/93517630/09/01/12/2023/en

- ► Slowly move machine forward.
- ► Move «Rear hydraulics» control lever **38** to **A**.
  - ✔ Hitch trailer coupling **1** is raised.
- ► Raise hitch trailer coupling **1** to stop.
- ► Press «Rear hydraulics» control lever **38** to **B**.
  - ✔ Hitch trailer coupling **1** is locked.
  - ✔ «Auto-hitch locked» symbol is shown on the display.
- ► Turn diesel engine off.
- ► Engage parking brake.

3.3.9.10 Hitch trailer coupling

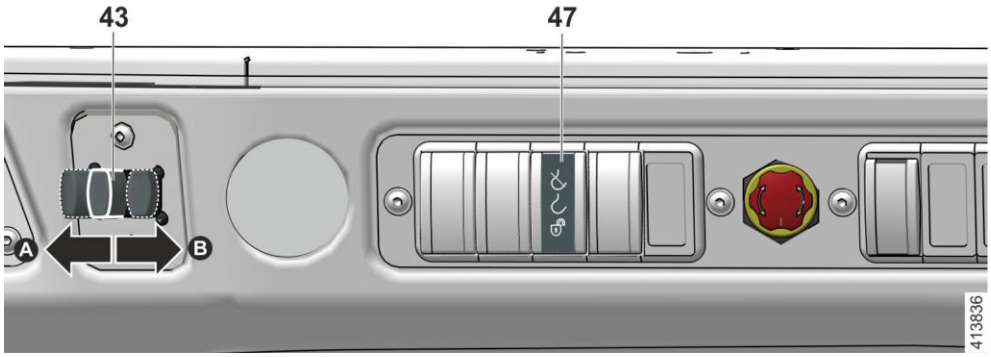
Valid from serial number 21355

With the hitch trailer coupling it is possible to connect a trailer with a hitch eyehook from operator's seat to the machine.

Ensure that following requirements are met:

– Trailer is secured against rolling away.

Unlocking hitch trailer coupling



G2047850_1

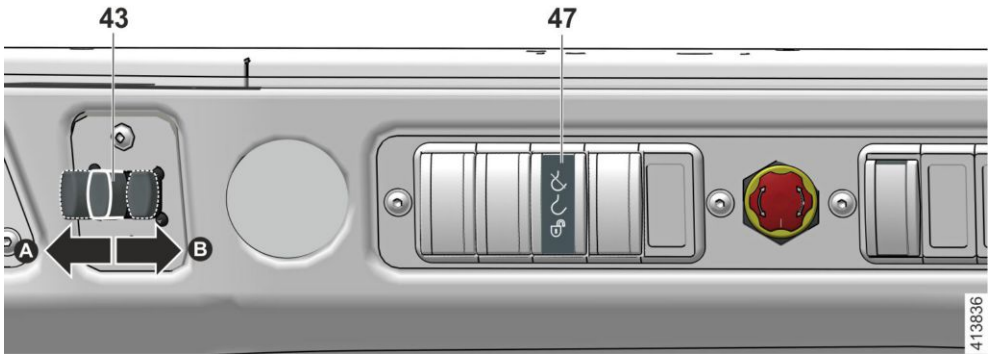
Unlocking hitch trailer coupling

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

- ► Press bottom part of «Auto-hitch» switch **47** and hold it.
- ► Move «Rear hydraulics» control lever **43** to **B**.
  - ✔ Safety locking mechanism of hitch trailer coupling is unlocked.
  - ✔ «Auto-hitch unlocked» symbol is shown on the display.

Note
When hitch trailer coupling is unlocked, the travel speed is reduced to 5 km/h (3.1 mph).

Lowering hitch trailer coupling

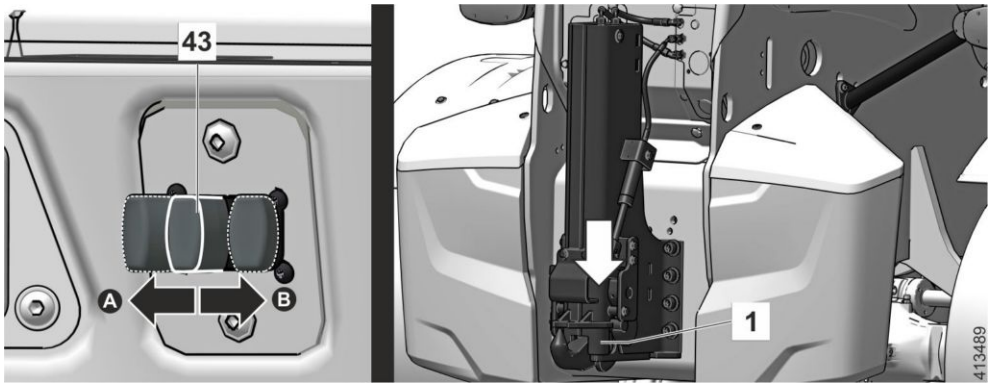


G2047850_1

Unlocking hitch trailer coupling

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

► Press bottom part of «Auto-hitch» switch **47** and hold it.



G2042343_1

Lowering hitch trailer coupling

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

► Move «Rear hydraulics» control lever **43** to **A**.
✔ Hitch trailer coupling **1** is lowered.

NOTICE

Improper lowering of the hitch trailer coupling!

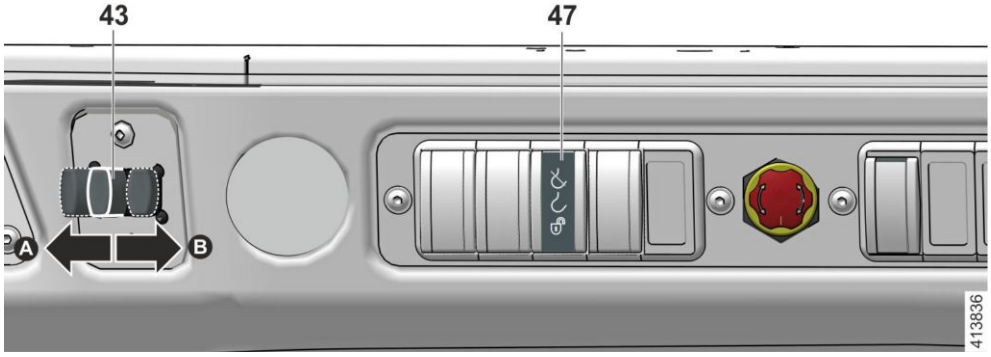
Damage to the hitch trailer coupling.

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

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

Raising and locking hitch trailer coupling

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

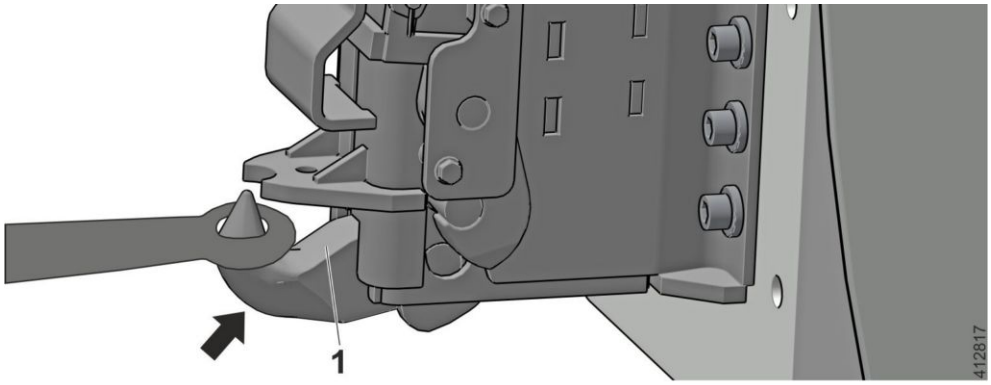


G2047850_1

Locking the hitch trailer coupling

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

► Move «Rear hydraulics» control lever **43** to **B**.
✔ Hitch trailer coupling is raised.



G2028245_1

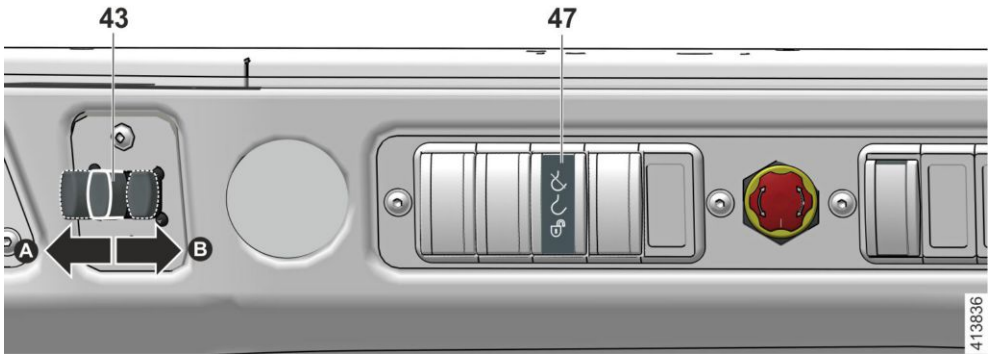
Raising hitch trailer coupling

1	Hitch trailer coupling

► Move «Rear hydraulics» control lever **43** to **A**.
✔ Hitch trailer coupling **1** is locked.
✔ «Auto-hitch locked» symbol is shown on the display.
► Turn diesel engine off.
► Engage parking brake.
► Check whether the pull device of trailer is securely locked in the trailer coupling.
► Connect hydraulic connections, compressed air connections and electrical connections.

LWT/93517630/09/01/12/2023/en

Disconnecting the trailer from the hitch trailer coupling



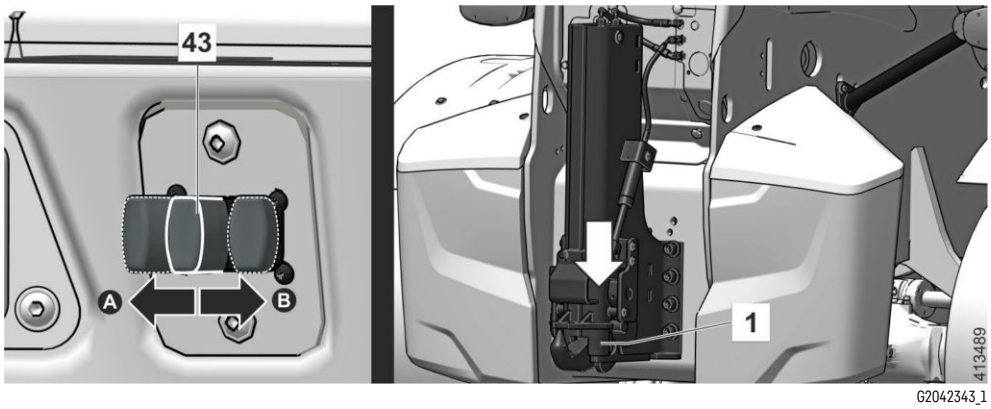
G2047850_1

Unlocking hitch trailer coupling

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

- ► Press bottom part of «Auto-hitch» switch **47**.
- ► Move «Rear hydraulics» control lever **43** to **B**.
  - ✔ Hitch trailer coupling is unlocked.
  - ✔ «Auto-hitch unlocked» symbol is shown on the display.

Note
When hitch trailer coupling is unlocked, the travel speed is reduced to 5 km/h (3.1 mph).



G2042343_1

Lowering hitch trailer coupling

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

- ► Move «Rear hydraulics» control lever **43** to **A**.
  - ✔ Hitch trailer coupling **1** is lowered.

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.

LWT/93517630/09/01/12/2023/en

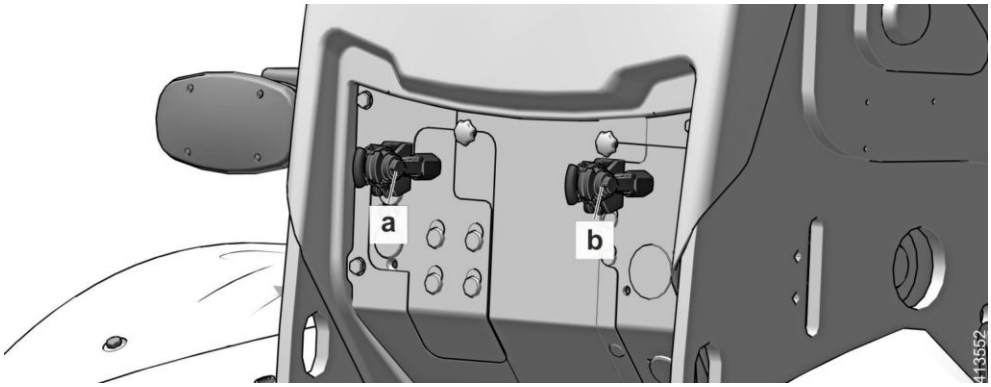
- ► Slowly move machine forward.
- ► Move «Rear hydraulics» control lever **38** to **B**.
  - ✔ Hitch trailer coupling **1** is raised.
- ► Raise hitch trailer coupling **1** to stop.
- ► Press «Rear hydraulics» control lever **38** to **A**.
  - ✔ Hitch trailer coupling **1** is locked.
  - ✔ «Auto-hitch locked» symbol is shown on the display.
- ► Turn diesel engine off.
- ► Engage parking brake.

3.3.10 Air brake system for trailers (option)

Observe the safety instructions for trailer air brake system. Page 101

3.3.10.1 Connecting compressed air hoses

- ► Attach trailer to trailer coupling Page 245.



G2042781_1

Coupling heads of air brake system

a	Yellow coupling head	**b**	Red coupling head

- ► Clean coupling heads on compressed air hoses and compressed air connections.

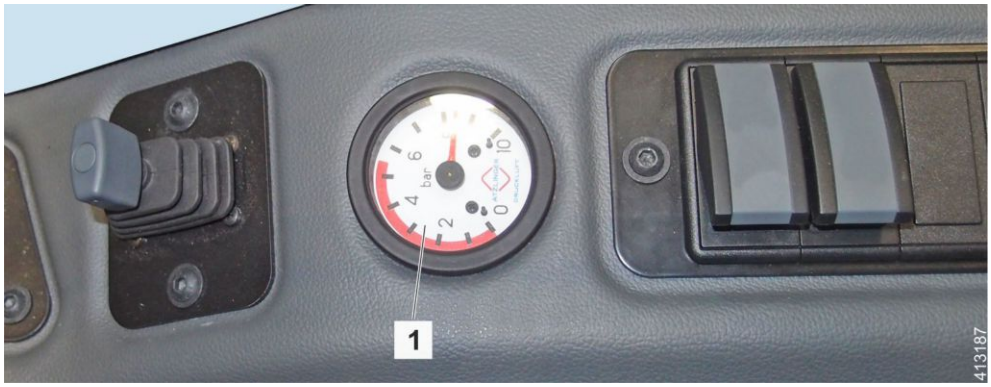
DANGER
Improperly connecting and disconnecting the compressed air hoses!
Danger to life.
- ► Observe the sequence when connecting and disconnecting.

- ► Connect compressed air hose to yellow coupling head **a**.
- ► Connect compressed air hose to red coupling head **b**.

LWT/93517630/09/01/12/2023/en

3.3.10.2 Pressure gauge of air brake system

Air brake system is not ready for use until an air pressure of between 6.5 (94.3) and 8.3 bar (120.4 psi) is displayed.



G2036228_2

Pressure gauge of air brake system

1	Pressure gauge

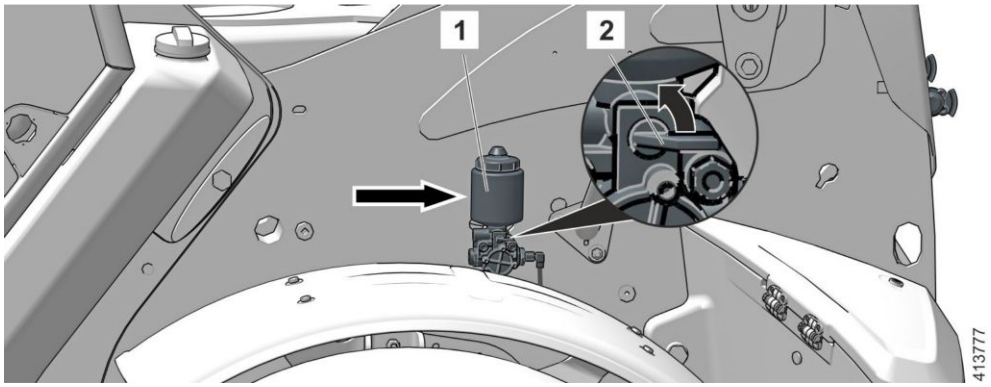
- ► Allow diesel engine to run at a standstill until air brake system is filled.
- ► Read air pressure off of pressure gauge **1**.

When necessary air pressure is reached:

- ► Put air brake system into service.

3.3.10.3 Anti-freeze pump for air brake system

Anti-freeze pump must always be switched on at temperatures below 0 °C (32.0 °F).



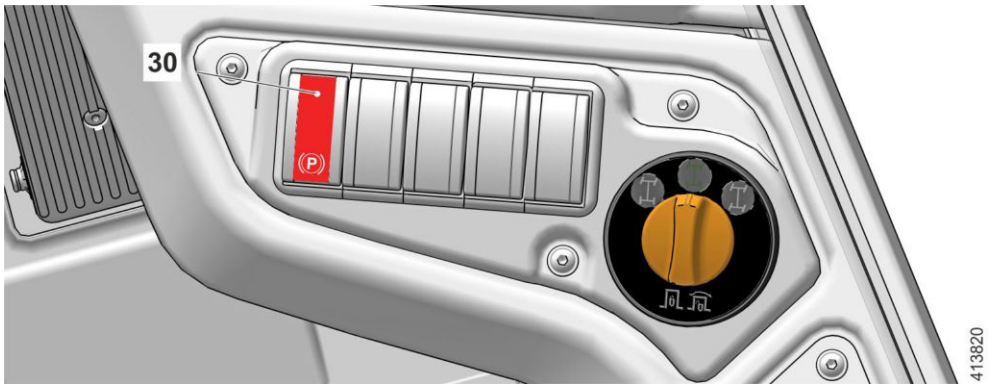
G2046738_1

Anti-freeze pump for air brake system

1	Anti-freeze pump	**2**	Lever

- ► Push lever **2** on anti-freeze pump **1** upward.
  ✔ Anti-freeze pump **1** is turned on.

3.3.10.4 Travelling with air brake system



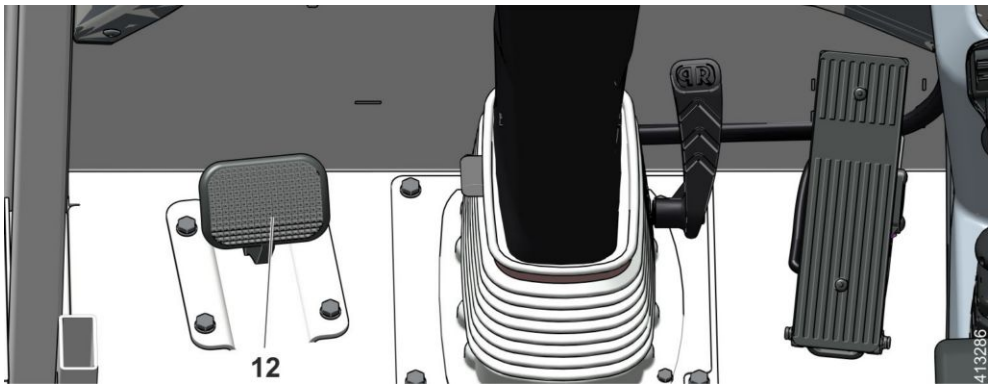
G2047791_1

Releasing parking brake

30 «Parking brake» switch

- ► Press top part of «Parking brake» switch **30**.
  - ✔ Machine's parking brake is released.
  - ✔ Trailer's parking brake is released.

DANGER
Overheating of brake system when travelling downhill!
Danger to life.
- ► Select „slow" travel stage.
- ► Brake machine with hydrostat when travelling downhill and prior to cornering.
- ► Only press inching brake pedal fully in hazardous situations.



G2040544_1

Inching brake pedal

12 Inching brake pedal

When braking the machine with the inching brake pedal **12** , air pressure is supplied to the air brake system and the trailer is braked.

- ► Actuate inching brake pedal **12**.
  - ✔ The trailer is braked.

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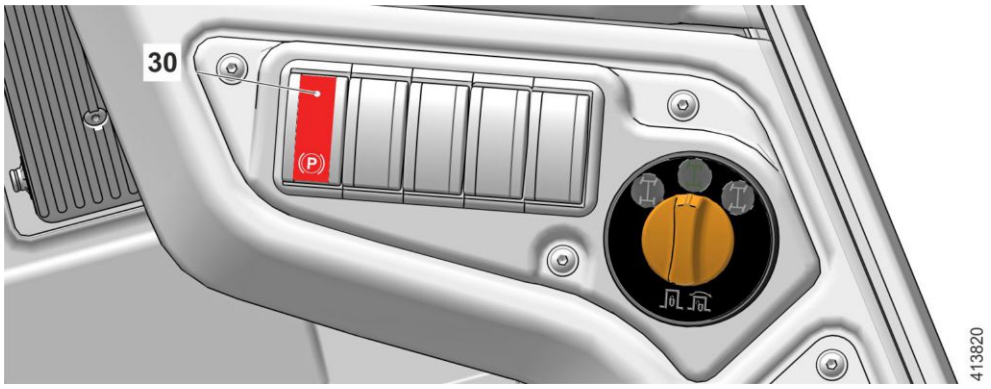
3.3.10.5 Disconnecting the compressed air hoses

Make sure the following preconditions are met:

☑ Machine is on horizontal and solid ground.



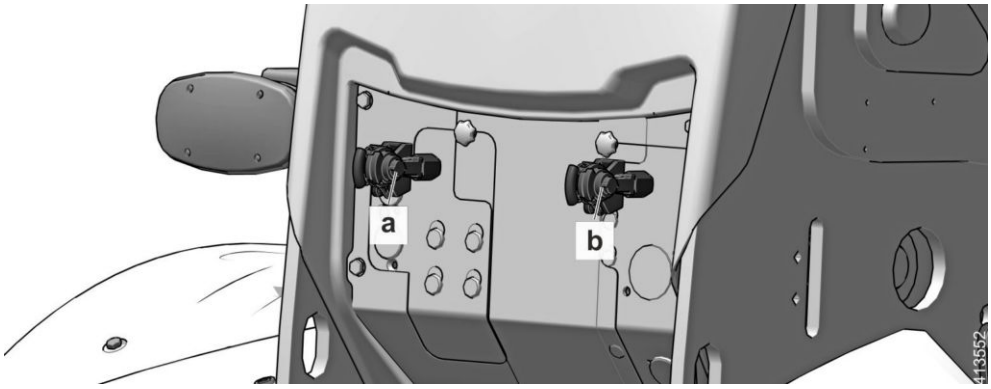
G2047791_1

Applying the parking brake

30 «Parking brake» switch

- ► Press bottom part of «Parking brake» switch **30**.
  - ✔ Machine's parking brake is activated.
  - ✔ Trailer's parking brake is activated.
- ► Turn diesel engine off.
- ► Pull key out.
- ► Secure trailer with chocks.

DANGER
Improperly connecting and disconnecting the compressed air hoses!
Danger to life.
- ► Observe the sequence when connecting and disconnecting.



G2042781_1

Coupling heads of air brake system

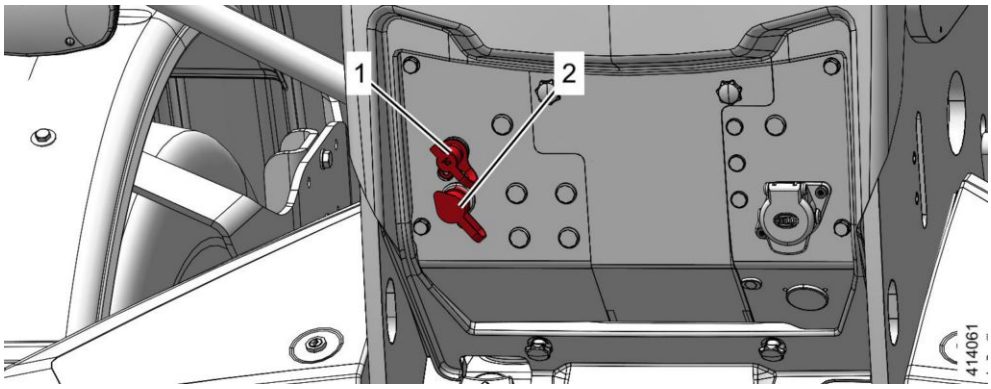
- ► Disconnect compressed air hose from red coupling head **b**.
- ► Disconnect compressed air hose from yellow coupling head **a**.

3.3.11 Hydraulic trailer brake (option)

Observe the safety instructions for trailer operation. Page 101

3.3.11.1 Connecting trailer brake hose

► Attach trailer to trailer coupling Page 245.

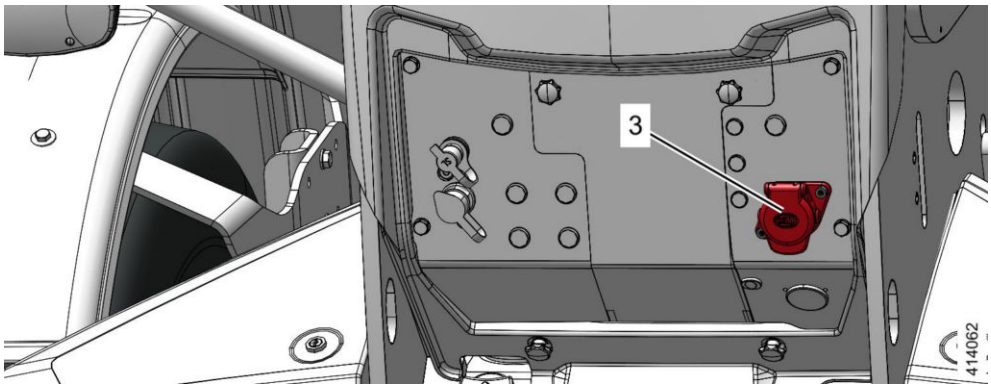


G2057967_1

Brake lines

1	Supply line coupling	**2**	Brake line coupling

► Clean the supply line coupling **1** , brake line coupling **2** and trailer brake hoses.
► Connect the trailer brake hose to the brake line coupling **2**.
► Connect the trailer supply line to the supply line coupling **1**.



G2057968_1

Socket

3	Socket

► Establish the plug connection between the trailer and the socket **3**.

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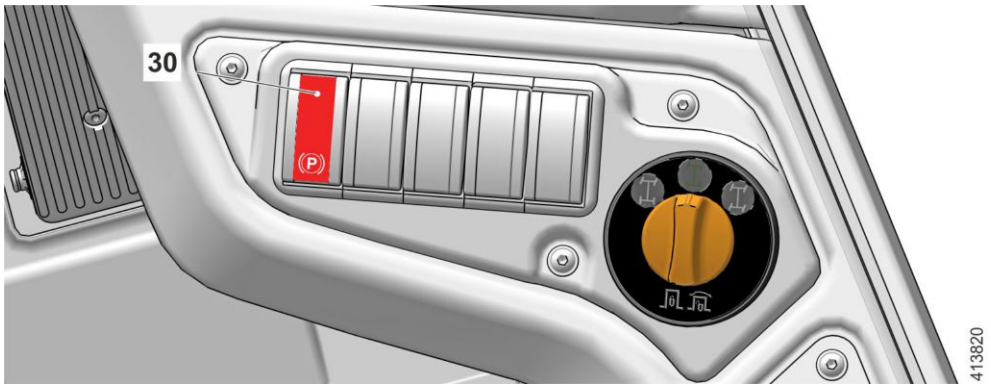
3.3.11.2 Travelling with hydraulic trailer brake



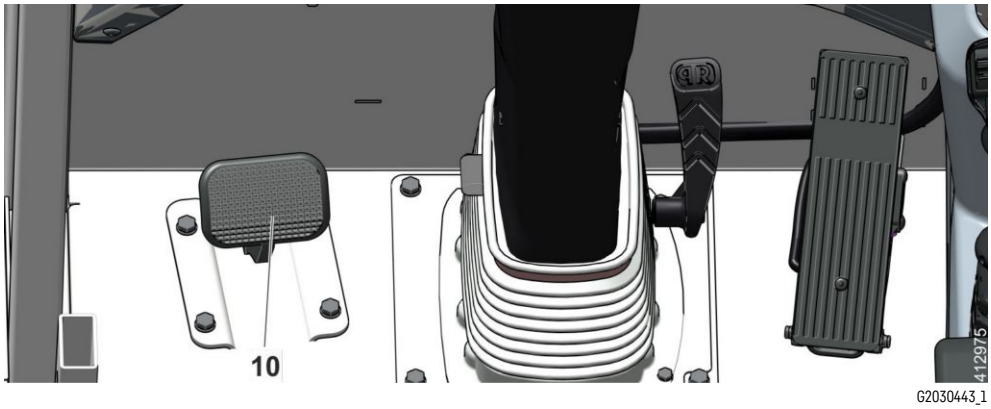
G2047791_1

Releasing parking brake

30 «Parking brake» switch

- ► Press top part of «Parking brake» switch **30**.
  - ✔ After machine starts to travel, «Parking brake» symbol is hidden on the display.
  - ✔ Machine's parking brake is released.
  - ✔ Trailer's parking brake is released.

DANGER
Overheating of brake system when travelling downhill!
Danger to life.
- ► Select „slow" travel stage.
- ► Brake machine with hydrostat when travelling downhill and prior to cornering.
- ► Only press inching brake pedal fully in hazardous situations.



G2030443_1

Inching brake pedal

10 Inching brake pedal

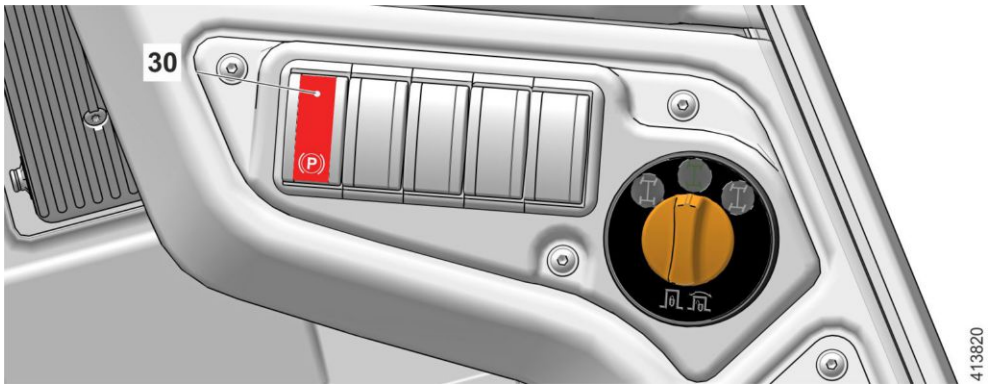
When braking the machine with the inching brake pedal **10** , oil pressure is supplied to the hydraulic trailer brake and the trailer is braked.

- ► Actuate inching brake pedal **10**.
  - ✔ The trailer is braked.

3.3.11.3 Disconnecting trailer brake hose

Make sure the following preconditions are met:

☑ Machine is on horizontal and solid ground.

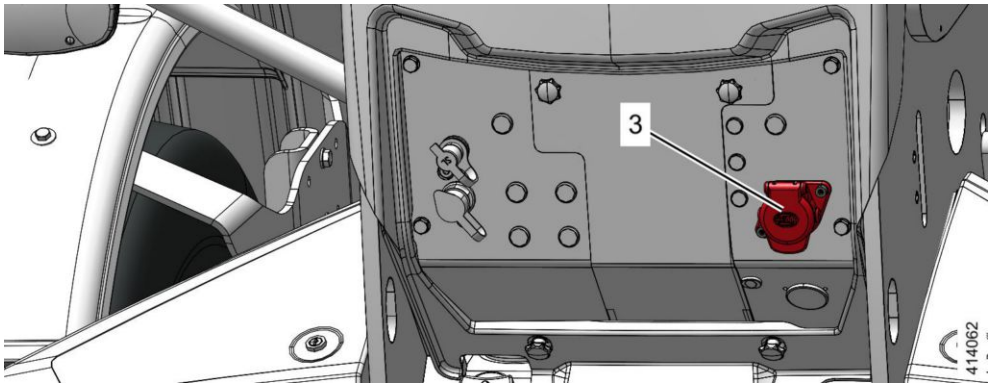


G2047791_1

Applying the parking brake

30 «Parking brake» switch

- ► Press bottom part of «Parking brake» switch **30**.
  - ✔ «Parking brake» symbol is shown on the display.
  - ✔ Machine's parking brake is activated.
  - ✔ Trailer's parking brake is activated.
- ► Turn diesel engine off.
- ► Pull key out.
- ► Secure trailer with chocks.



G2057968_1

Socket

3 Socket

- ► Undo the plug connection between the trailer and the socket **3**.

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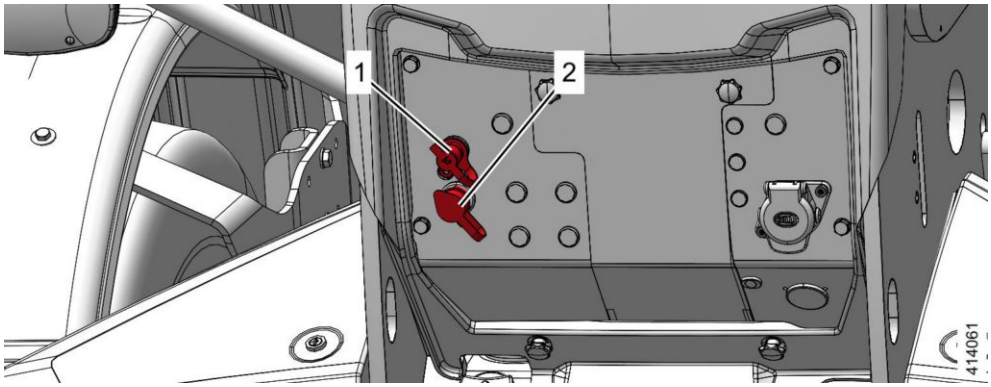

G2057967_1

Brake lines

1	Supply line coupling	**2**	Brake line coupling

- ► Disconnect trailer supply line from supply line coupling **1**.
- ► Disconnect the trailer brake hose from the brake line coupling **2**.
- ► Disconnect trailer. Page 245

3.3.12 Exhaust treatment system[19)]

The exhaust gas treatment system (selective catalytic reduction) is a technology for changing or reducing nitrogen oxides (NO_x) in the exhaust via the addition of a diesel exhaust fluid (water-urea solution), into nitrogen (N_2) and water (H_2O).

[19)] For emission stage V

3.3.12.1 Warning and malfunction strategies

The exhaust treatment system is monitored by a diagnostics system. If the diagnostics system detects an error - for example the fill level of the diesel exhaust fluid tank is not OK, the diesel exhaust fluid quality is bad, malfunction of an exhaust treatment system component or a manipulation on the exhaust treatment system - then a warning or malfunction strategy is activated and the machine enters output reduction.

Output reduction stages	Description
Output reduction Stage 1	Torque reduction (25%) Output reduction bypass is possible Page 274
Output reduction Stage 2	Torque reduction and the diesel engine switches to idling. Output reduction bypass **not** possible; Contact Liebherr customer service.

Various statuses of exhaust treatment system are displayed to operator via illumination of respective symbols in display unit.

Diesel exhaust content symbols

Fuel level display	Symbol	Limitation
 412589 Fill level > 15%		No limitation
 412590 Fill level < 15%	 412288 Lights up	No limitation

Fuel level display	Symbol	Limitation
 412591 Fill level < 10%	 412288 Flashes	No limitation
 412592 Fill level < 5%	 412288 Flashes  412229 Lights up  410769 Signal sound	No limitation
 412592 10 min after fill level < 5%	 412288 Flashes  412229 Lights up  410769 Signal sound	Output reduction stage 1; Move machine out of hazard zone.
 412593 15 min after fill level < 5%	 412288 Flashes  412229 Flashes  410769 Signal sound	Output reduction stage 1; Move machine out of hazard zone.
 412593 20 min after fill level < 5%	 412288 Flashes  412229 Flashes  410769 Signal sound	Output reduction stage 2; Contact Liebherr customer service.

Exhaust treatment system symbols

Symbol	Meaning	Notes
 412250 G2020315_1	Display for request to carry out „manual“ regeneration.	Execute „manual“ regeneration at the next opportunity. No limitation

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Symbol	Meaning	Notes
 412277 G2020343_1	High exhaust temperature; display if regeneration is active	If possible, do not shut down the diesel engine.
 412275 G2020340_1	Display if exhaust treatment system is contaminated; perform „manual“ regeneration.	Output reduction stage 1; Move machine out of hazard zone.
 412274 G2020339_1  412229 G2095767_1  410769 G108163_1	Display if exhaust treatment system is heavily contaminated; regeneration of exhaust treatment system is **not** permitted; Regeneration must be performed by Liebherr customer service.	Output reduction stage 2; Danger of engine damage; turn off diesel engine. Contact Liebherr customer service.

Diesel particle filter symbols

Symbol	Meaning	Notes
 412277 G2020343_1	High exhaust temperature; display if regeneration is active	If possible, do not shut down the diesel engine.
 412275 G2020340_1	Display in the event of increased soot from of diesel particle filter; perform „manual“ regeneration.	Execute „manual“ regeneration at next opportunity. No limitation
 412275 G2020340_1  412229 G2095767_1  410769 G108163_1	Display in the event of strongly increased soot loading of the diesel particle filter; perform „manual“ regeneration immediately.	Output reduction stage 1; Move machine out of hazard zone.

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Symbol	Meaning	Notes
 412274 G2020339_1  412267 G2020332_1  410769 G108163_1	Display if diesel particle filter is overloaded; regeneration of diesel particle filter is **not** permitted; Regeneration must be performed by Liebherr customer service.	Output reduction stage 2; Danger of engine damage; turn off diesel engine. Contact Liebherr customer service.
 414000 G2054433_1	Display in the event of increased ash loading; Diesel particle filter needs to be replaced.	Contact Liebherr customer service. Operation of the machine can resume.

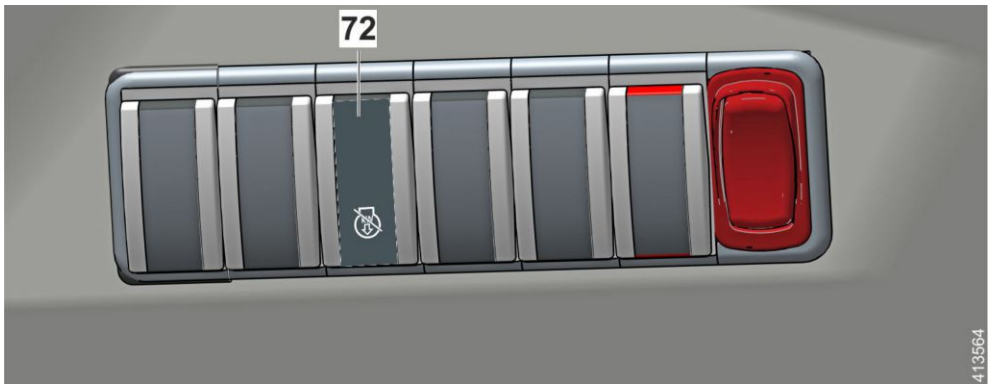
Note
The limitations do not occur suddenly, but on a gradual basis.

Note
If the diagnostics system detects poor diesel exhaust fluid quality or a manipulation of the exhaust treatment system within 40 operating hours of taking care of the problem, the torque limitations will run through within a shorter time period.
► Output reduction stage 2 takes place within 30 minutes.

3.3.12.2 Bypassing output reduction

In order to put the machine in a secure area, the output reduction stage 1 can be bypassed for approx. 30 min.

Only bypass the output reduction in order to put the machine in a secured area.



G2043050_1

«Bypass output reduction» button

72 «Bypass output reduction» button

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► Press bottom part of «Bypass output reduction» button **72**.
✔ Output reduction is suppressed.

3.3.12.3 Regenerating exhaust treatment system

DANGER
Hot exhaust gases!
Danger to life, fire.
► Only carry out regeneration in a fireproof environment.

Regeneration mode: automatic

Regeneration mode for fireproof and protected environments.

Regeneration occurs independently during operation.

Regeneration mode: manual

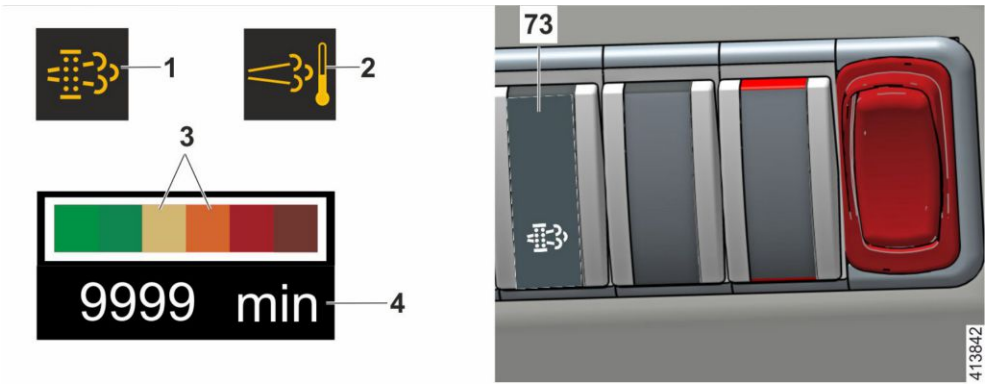
This mode is selected in environments that are fireproof and protected. The operator determines when regeneration starts.

Regeneration takes approx. 40 min.

Make sure the following preconditions are met:

☑ Diesel engine is at operating temperature.
☑ Diesel engine is idling.
☑ Machine is parked on level ground.
☑ There is sufficient fuel.
☑ Parking brake is activated.
☑ Working hydraulics are locked.

Note
During regeneration, shut down diesel engine exclusively in an emergency!



G2047869_2

Regeneration mode: manual

1	«Exhaust gas treatment contaminated» symbol	**4**	Remaining time for manual regeneration
2	«Exhaust gas treatment active regeneration» symbol	**73**	«Exhaust gas treatment regeneration» button
3	Medium load: regeneration possible in manual mode		

NOTICE

Combustible deposits on the exhaust system!

Fire.

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

- ► Press «Exhaust gas treatment regeneration» button **73**.
  - ✔ Regeneration of diesel particle filter is active.
  - ✔ Engine speed is increased automatically following the regeneration release.
  - ✔ «Exhaust gas treatment contaminated» symbol **1** and «Exhaust gas treatment active regeneration» symbol **2** are shown on the display unit.
  - ✔ Remaining time for manual regeneration **4** is shown on the display.
  - ✔ Regeneration is complete if «Exhaust gas treatment contaminated» symbol **1** and «Exhaust gas treatment active regeneration» symbol **2** are hidden on the display and the Remaining time for manual regeneration **4** has elapsed.

Cancelling regeneration mode

Only cancel regeneration mode in an emergency.

- ► Press «Exhaust gas treatment regeneration» button **73** if regeneration is active.
  - ✔ Regeneration of the exhaust treatment system is cancelled.
  - ✔ Remaining time for manual regeneration **4** is hidden on the display.
  - ✔ «Exhaust gas treatment contaminated» symbol **1** is shown on the display.

3.3.12.4 Diesel particle filter

The diesel particle filter reduces the output of carbon particles. The exhaust back pressure (load status) increases in the filter as a result of this and it needs to be regenerated. The carbon particles in filter are combusted during regeneration.

DANGER

Hot exhaust gases!

Danger to life, fire.

- ► Only carry out regeneration in a fireproof environment.

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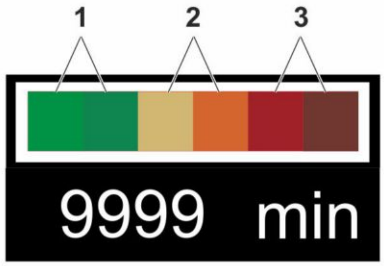
Regenerating diesel particle filter



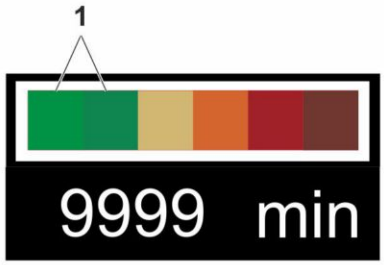
413839
G2047867_1

Loading status of the diesel particle filter

1	Low load : automatic regeneration	**3**	High load : contact Liebherr customer service
2	Medium load : regeneration possible in manual mode		

Regeneration mode: automatic

Regeneration occurs independently during operation.



413841
G2047868_1

Regeneration mode: automatic

1	Low load

Automatic regeneration occurs in the low load **1** range.

Regeneration mode: manual

This mode is selected in environments that are fireproof and protected. The operator determines when regeneration starts.

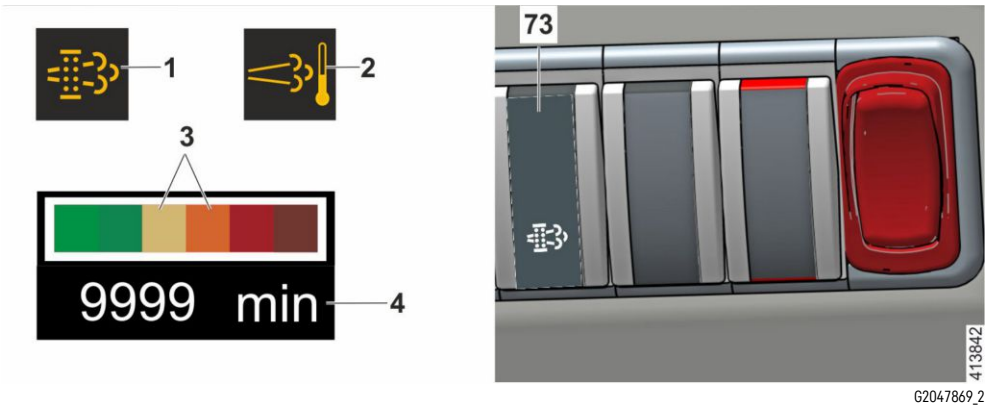
Regeneration takes approx. 40 min.

Make sure the following preconditions are met:

- ☑ Diesel engine is at operating temperature.
- ☑ Diesel engine is idling.
- ☑ Machine is parked on level ground.
- ☑ There is sufficient fuel.
- ☑ Parking brake is activated.
- ☑ Working hydraulics are locked.

Note

During regeneration, shut down diesel engine exclusively in an emergency!



Regeneration mode: manual

1	«Exhaust gas treatment contaminated» symbol	**4**	Remaining time for manual regeneration
2	«Exhaust gas treatment active regeneration» symbol	**73**	«Exhaust gas treatment regeneration» button
3	Medium load: regeneration possible in manual mode		

NOTICE

Combustible deposits on the exhaust system!

Fire.

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

- ► Press «Exhaust gas treatment regeneration» button **73**.
  - ✔ Regeneration of diesel particle filter is active.
  - ✔ Engine speed increases automatically.
  - ✔ «Exhaust gas treatment contaminated» symbol **1** and «Exhaust gas treatment active regeneration» symbol **2** are shown on the display unit.
  - ✔ Remaining time for manual regeneration **4** is shown on the display.
  - ✔ Regeneration is complete if «Exhaust gas treatment contaminated» symbol **1** and «Exhaust gas treatment active regeneration» symbol **2** are hidden on the display unit and the Remaining time for manual regeneration **4** has elapsed.

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Cancelling regeneration mode

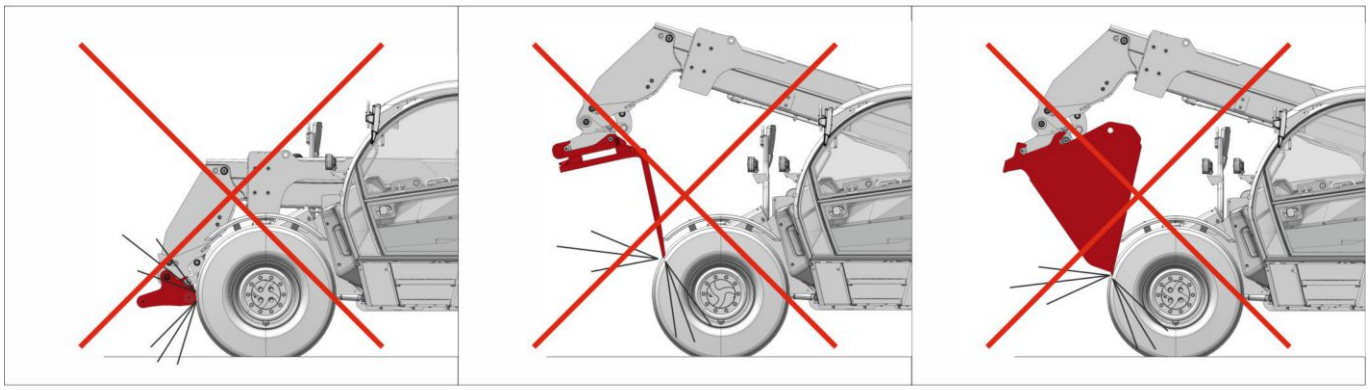
Only cancel regeneration mode in an emergency.

► Press «Exhaust gas treatment regeneration» button **73** if regeneration is active.
✔ Regeneration of the exhaust treatment system is cancelled.
✔ Remaining time for manual regeneration **4** is hidden on the display.
✔ «Exhaust gas treatment contaminated» symbol **1** is shown on the display.

3.4 Work methods

The routine working methods are described in this section.

3.4.1 Collision between quick coupler and working attachment



414385

G2064384_1

Collision between quick coupler and working attachment

NOTICE

Working attachment collision!

Damage to tyres.

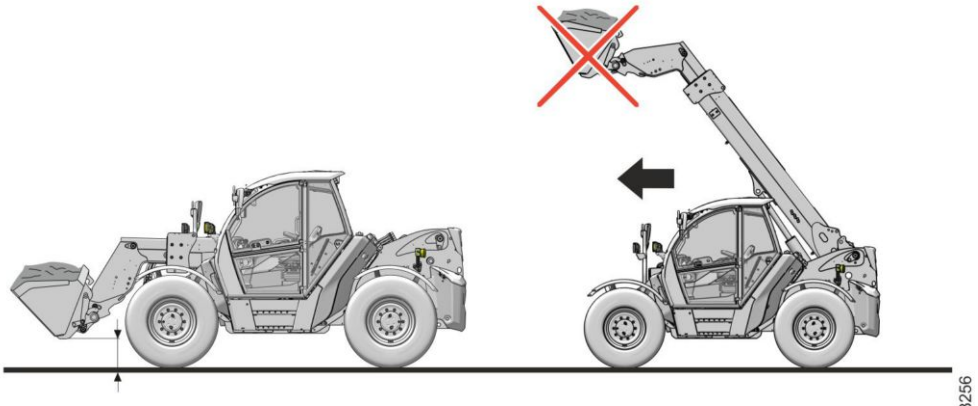
► When driving, tilt the working attachment in and lower it to the transport position.

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

3.4.2 Transport position

Transport loaded bucket and forklift exclusively in transport position.

The maximum permissible travel speed at rated load is 10 km/h (6.2 mph).

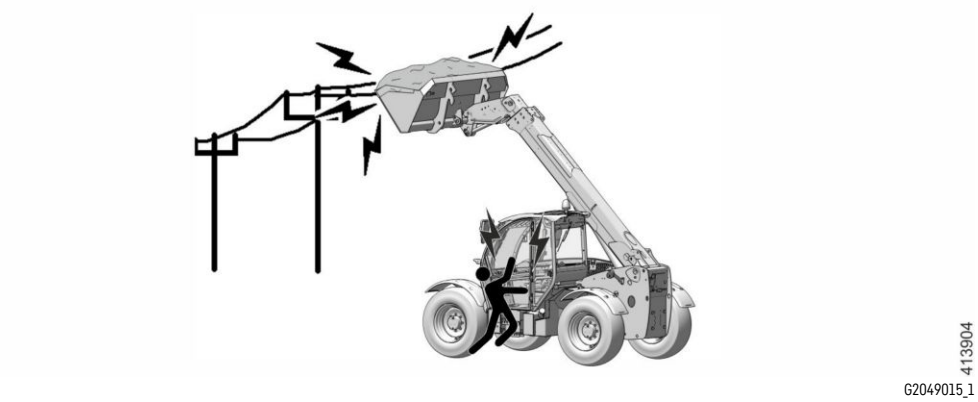


Transport position

- ► Lower loaded bucket and forklift 30 (11.8) to 40 cm (15.7 in) above ground.
- ► Fully retract telescopic boom.

3.4.3 Working in vicinity of overhead power lines

Note safety instructions for tasks carried out in the vicinity of overhead power lines. Page 88



Working in vicinity of overhead power lines

- ► Keep machine and working attachment a safe distance from overhead power lines.

If it is not possible to keep a safe distance from overhead power lines:

- ► De-energise overhead power lines.

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3.4.4 Working with bucket

Make sure the following preconditions are met:

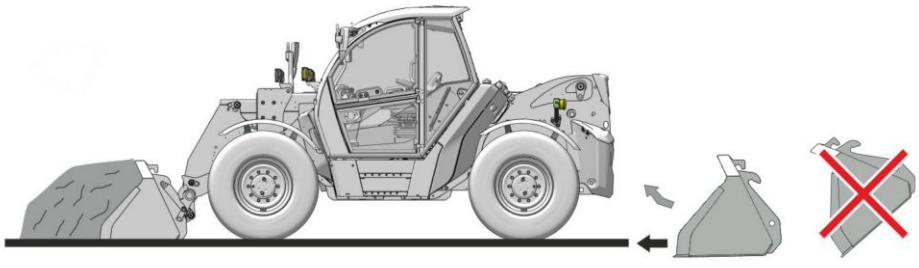
☑ Bucket is correctly locked on the quick coupler.
☑ Observe the associated load chart for the bucket.

DANGER
Machine tipping!
Danger to life.
► Observe load chart.
► Observe load torque display.
► Reduce forward reach.

3.4.4.1 Loading piles

NOTICE
Fill bucket with extended telescopic boom!
Damage to the telescopic boom.
► Fill bucket exclusively when telescopic boom is retracted and lowered.

NOTICE
Steering in the material!
Danger of damage to telescopic boom.
► Only steer the machine if the bucket is free.



Taking up material

► Lower bucket horizontally to ground.
► Drive forward into material.

► Tilt bucket in.

Troubleshooting
Bucket does not penetrate the material?
► Tilt bucket in slightly when driving into material.

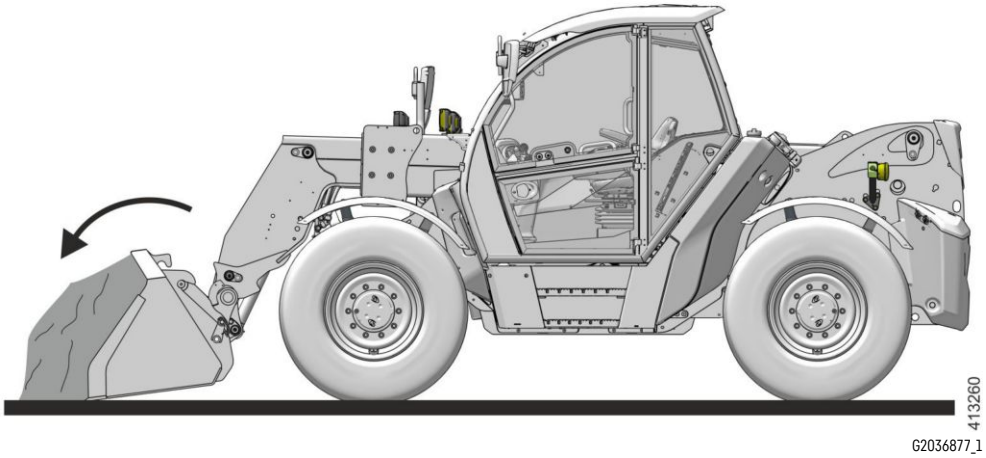
Make sure that the centre of gravity of load is in the middle.

► Tilt loaded bucket in completely.

If load needs to be transported:

► Put machine in transport position.

Do not lift the bucket to the required dumping height until after reaching the unloading site.



Emptying bucket

► Tilt bucket out.

Troubleshooting
If material sticks to the inside of bucket:
► Tilt bucket in and out quickly and retract and extend tilt cylinder completely while doing so.
► Activate shake/vibrate function.

3.4.4.2 Grading work

During grading, hold the bottom of the bucket horizontally.

NOTICE
Incorrect use of working attachment!
Damage to machine.
► Do not grade in forward travel direction with working attachment tilted out.

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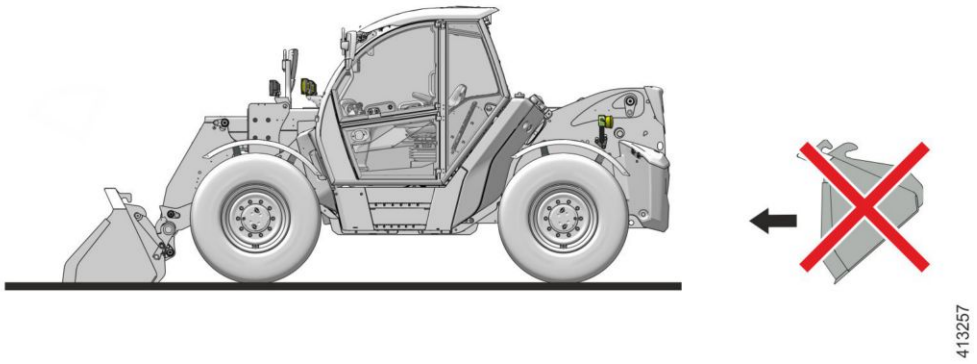

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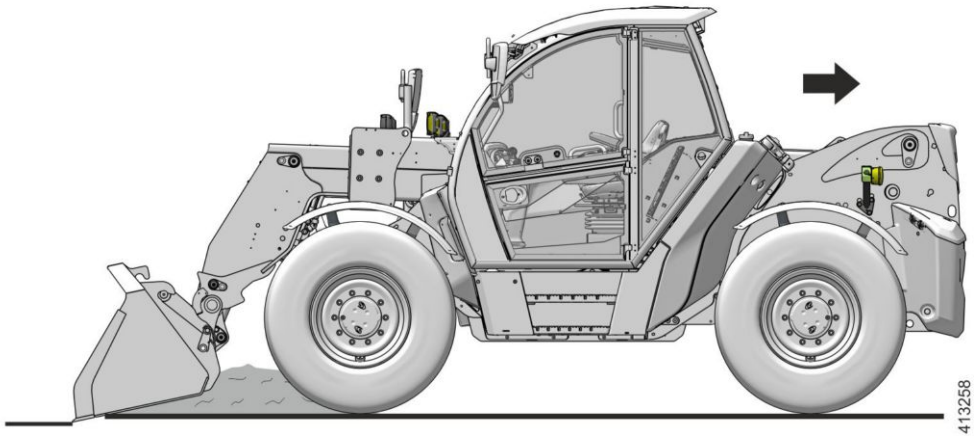
Grading

- ► Align bottom of bucket again so that it is parallel to the ground.
- ► Drive forward.



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Remove material

- ► Tip bucket out slightly.
- ► Reverse travel.

3.4.4.3 Loading of transport vehicles

G2036878_2

Loading of transport vehicles

- ► Raise bucket to required dumping height at unloading site.

- ► Dump load in the centre of the bed of the transport vehicle.
- ► Load longer transport vehicles from front to rear.

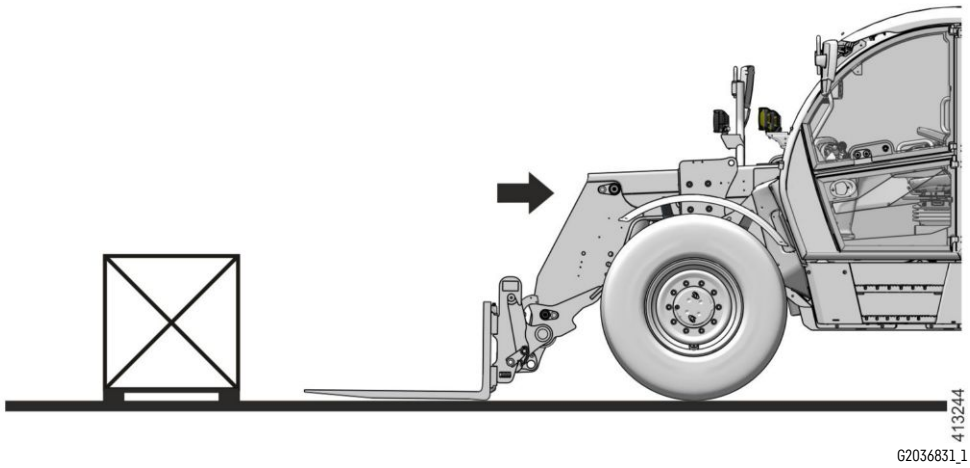
3.4.5 Working with forklift

Make sure the following preconditions are met:

- ☑ Forklift is correctly locked on quick coupler.
- ☑ Observe associated load chart for forklift.

DANGER
Machine tipping!
Danger to life.
- ► Observe load chart.
- ► Observe load torque display.
- ► Reduce forward reach.

3.4.5.1 Picking a load up from ground

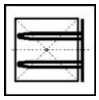


Picking a load up from ground

- ► Move machine at a right angle onto load to be picked up.
- ► Fully retract telescopic boom.
- ► Lower forklift horizontally to ground.

DANGER
Machine tipping!
Danger to life.
- ► Align fork arms symmetrically.
- ► Position load centred on the fork arms.
- ► Move carefully and slowly.

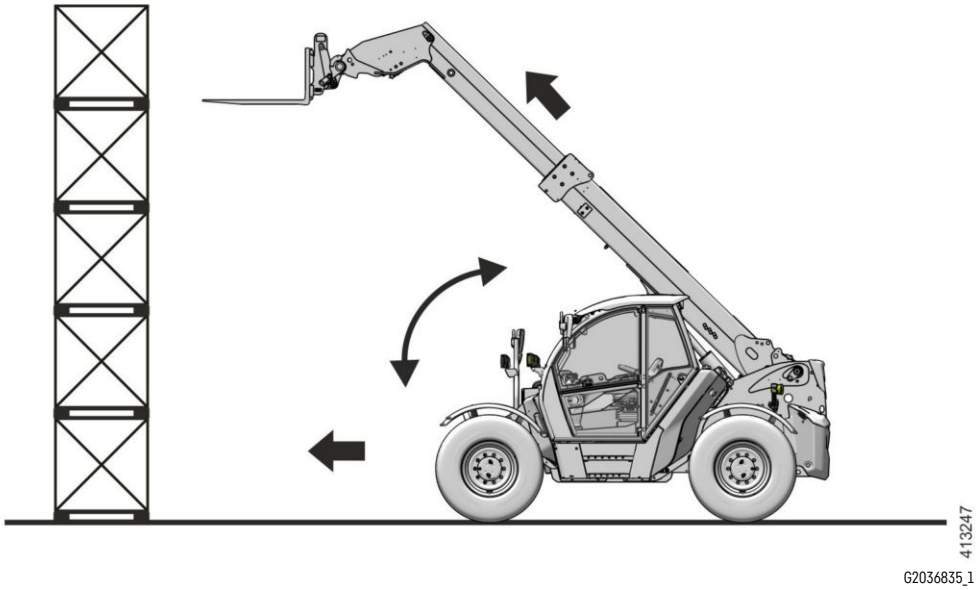
LWT/93517630/09/01/12/2023/en



Position fork arms symmetrically.

► Position load centred on both fork arms.

3.4.5.2 Picking up a high load

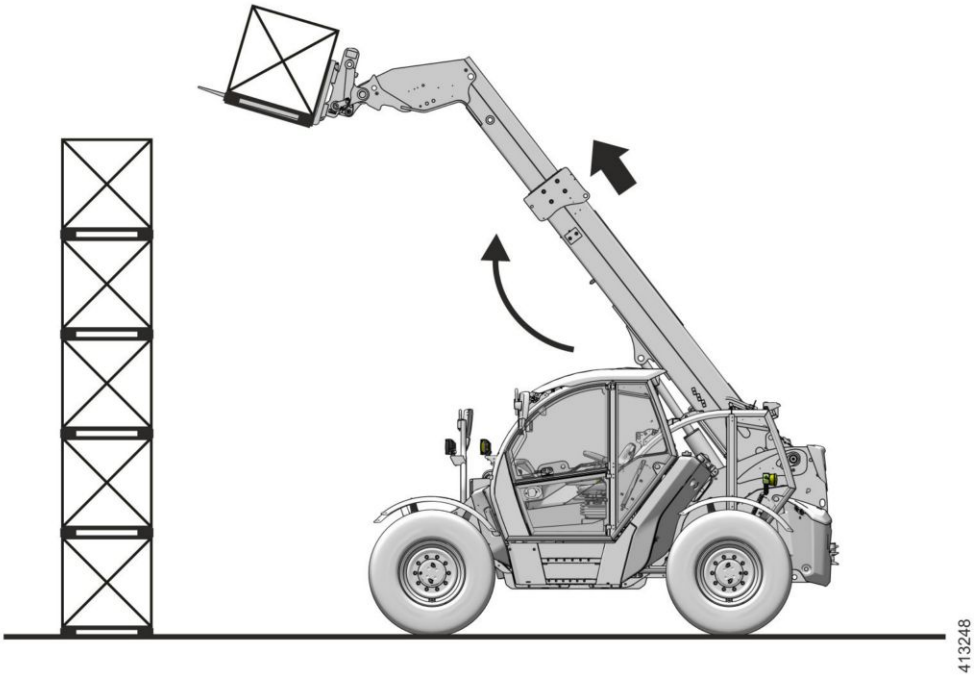


Picking up a high load

► Move machine at a right angle onto load to be picked up.

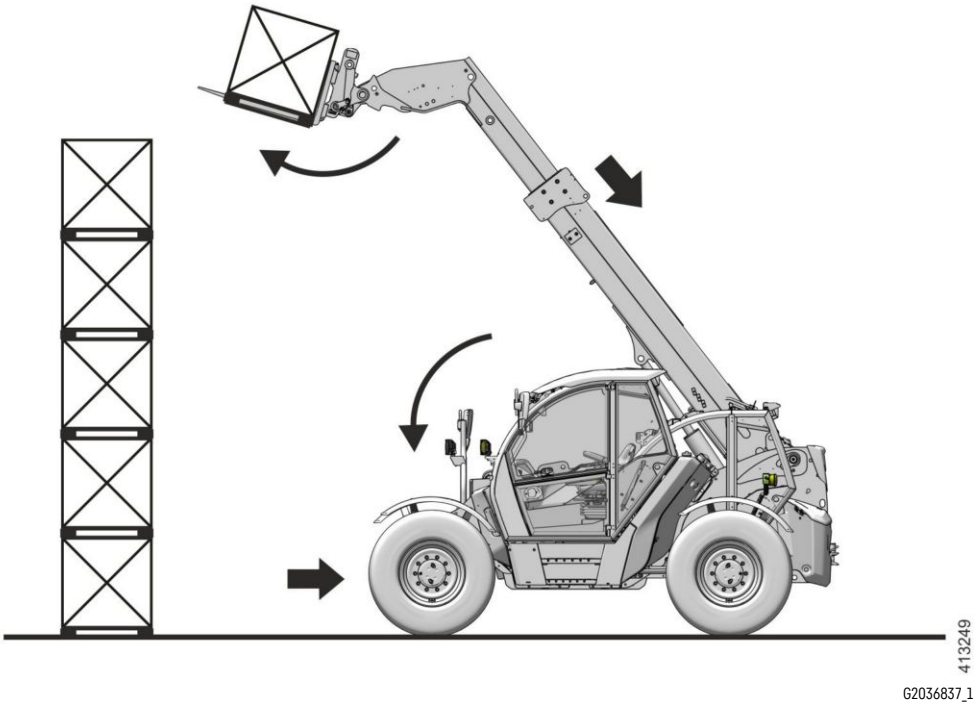
Note
When guiding the forklift into the stack, pay attention to the required distance between machine and load.

► Extend telescopic boom slowly.
► Take up load.



Lifting a high load

► Slowly raise telescopic boom.
✔ Load is released.



Bring load into transport position

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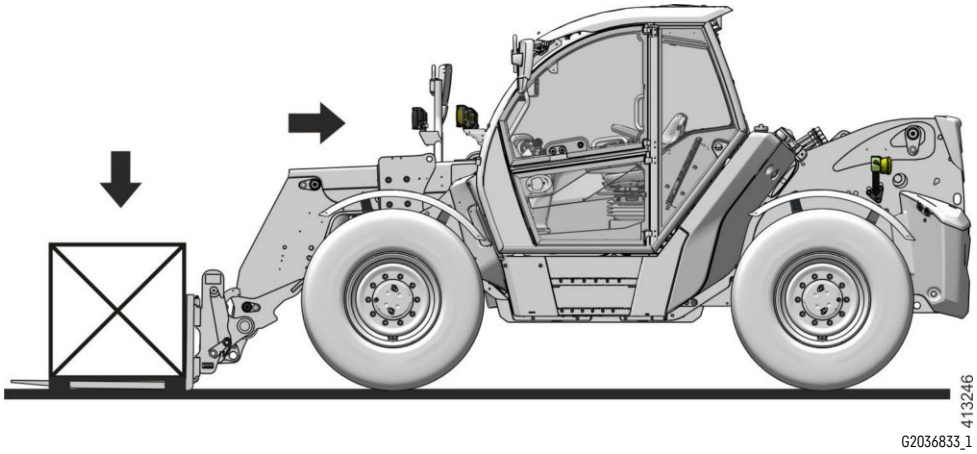
DANGER
Beware of falling loads!
Danger to life.
- ► Make sure that no persons are within the danger zone.
- ► Only tilt in the forklift to the extent necessary for the load to rest securely on it.

- ► Slightly tilt in forklift.
- ► Drive machine back.
- ► Slowly retract telescopic boom.
- ► Lower telescopic boom slowly.

If load needs to be transported:

- ► Put machine in transport position.

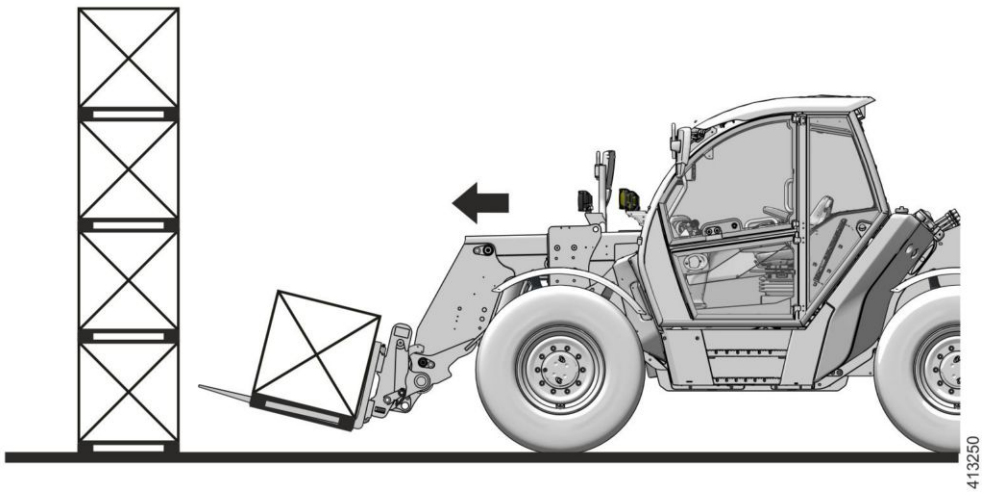
3.4.5.3 Setting load down on ground



Setting load down on ground

- ► Lower forklift horizontally to ground.
- ► Set load down on ground carefully until forklift is relieved.
- ► Drive machine back slowly.

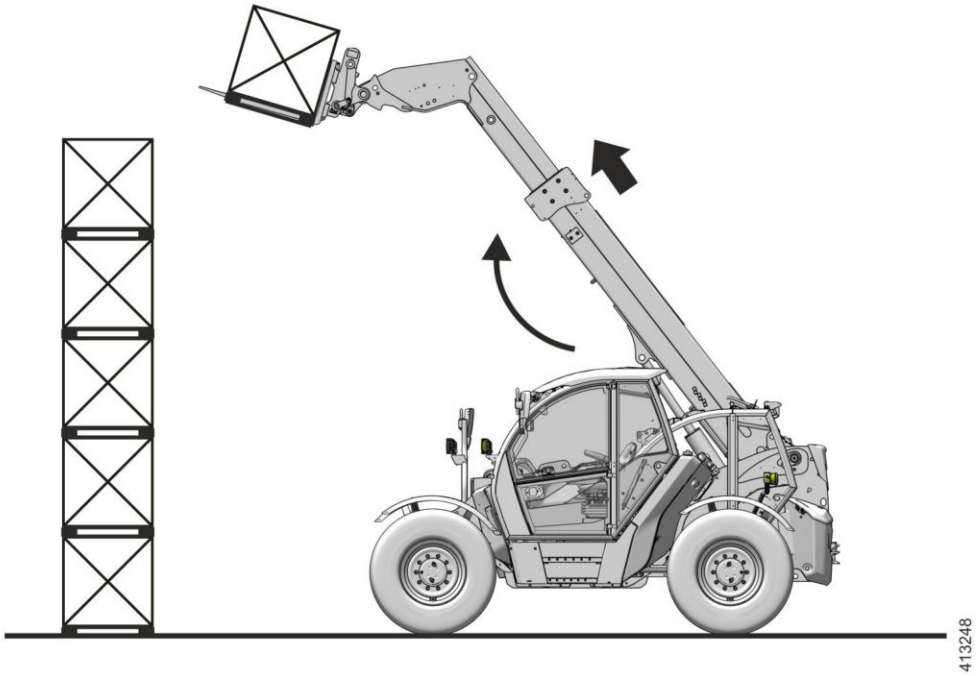
3.4.5.4 Setting load down at height



G2036838_1

Approaching stack

► Move machine at a right angle onto stack.



G2036836_1

Raising and extending telescopic boom

► Raise telescopic boom.
► Extend telescopic boom.

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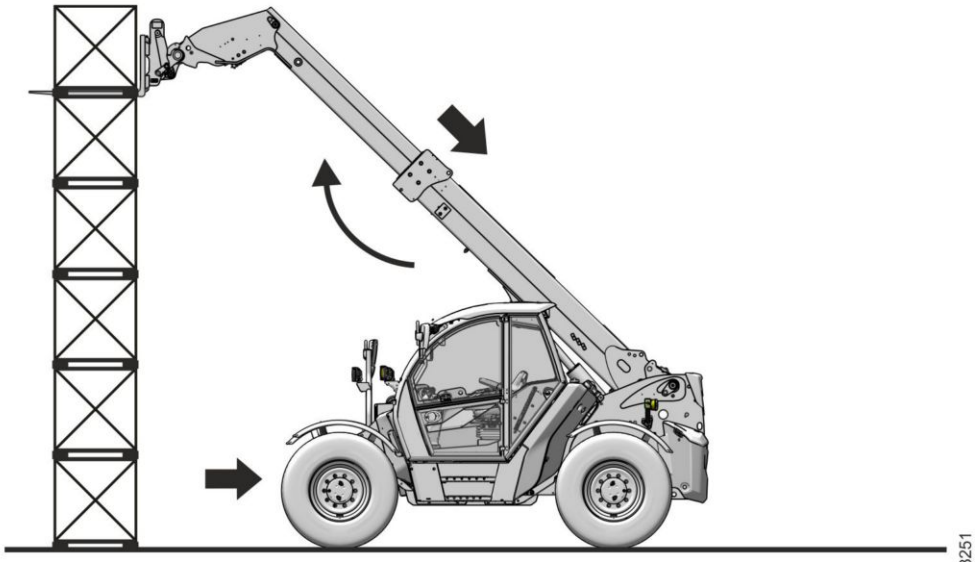


Set load on stack

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

3.5 Install and remove the attachment

3.5.1 Mechanical quick coupler

3.5.1.1 Relieving pressure in hydraulic system

Before attaching or removing the working attachment, the hydraulic system must be depressurised.

Ensure that following requirements are met:

- ☑ Telescopic boom is completely retracted.
- ☑ Telescopic boom is lowered and close to ground.
- ☑ Cylinders of the working attachment are in the home position.

Control circuit III pressure relief

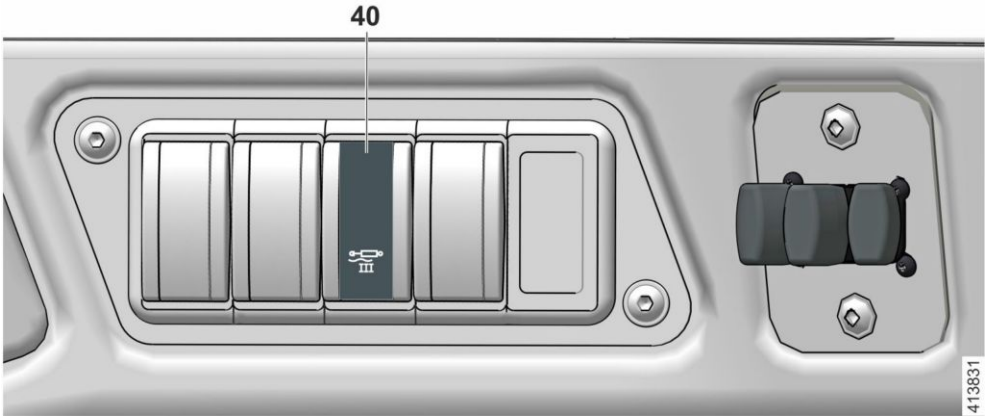
Valid for: T60-9 05S & 3AS: 20156-26734;

Ensure that following requirements are met:

- ☑ The diesel engine is running.

Pressure relief in operator's cab (option)

The pressure relief is for quickly removing pressure in the control circuit III hydraulic lines and control circuit III high flow.



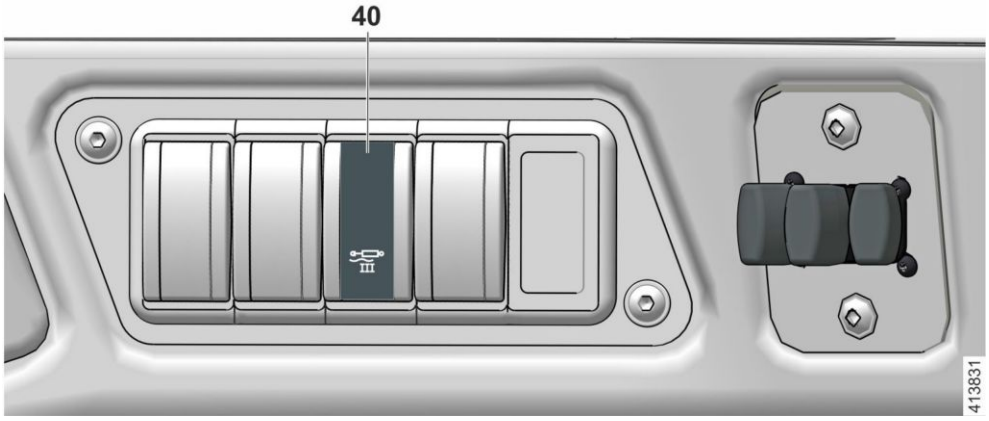
G2047831_1

«Control circuit III pressure relief» switch

40 «Control circuit III pressure relief» switch

► Press bottom part of «Control circuit III pressure relief» switch **40**.

or



G2047831_1

«Control circuit III pressure relief» button

40 «Control circuit III pressure relief» button

Press «Control circuit III pressure relief» button **40** down for 5 to 10 seconds.

✔ «Control circuit III pressure relief» symbol is shown on the display.

✔ The pressure in the hydraulic lines is reduced.

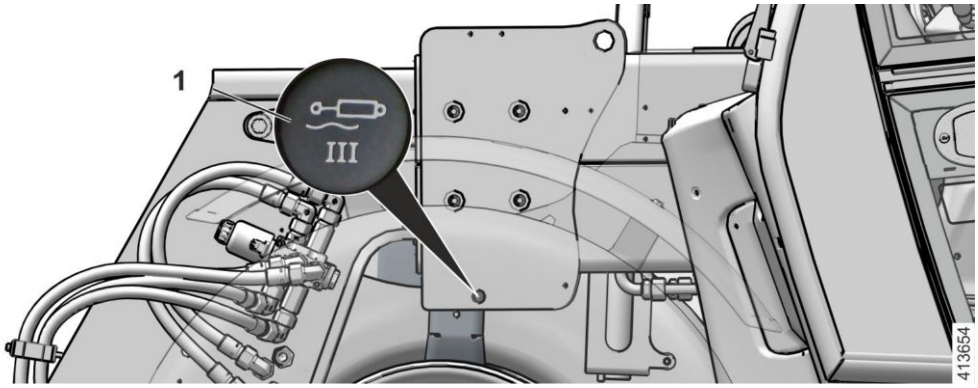
If «Control circuit III pressure relief» switch is installed:

► Press upper part of «Control circuit III pressure relief» switch after 60 seconds.

LWT/93517630/09/01/12/2023/en

Pressure relief on telescopic boom (option)

The pressure relief is for quickly removing pressure in the control circuit III hydraulic lines and control circuit III high flow.



G2044587_1

«Control circuit III pressure relief» button

1 «Control circuit III pressure relief» button

► Press «control circuit III pressure relief» button **1** on front left of telescopic boom for 5 to 10 seconds.
✔ «Control circuit III pressure relief» symbol is shown on the display.
✔ The pressure in the hydraulic lines is reduced.

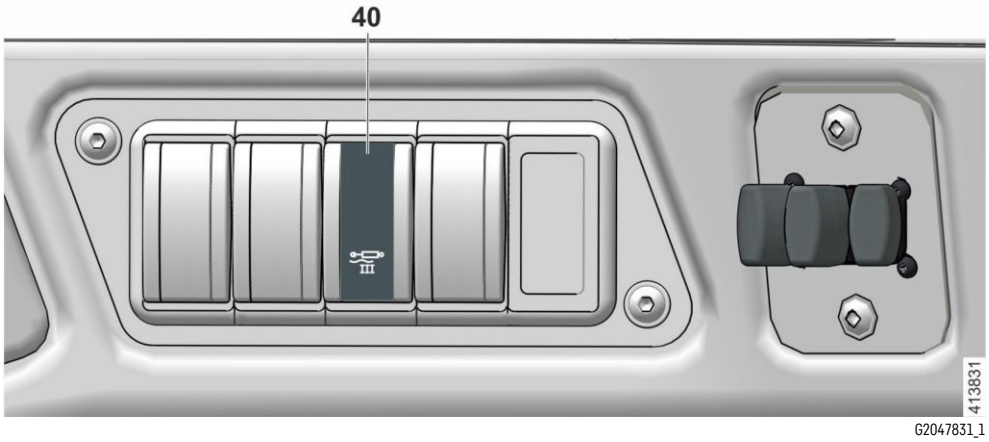
Control circuit III pressure relief

Valid for: T60-9 05S & 3AS: 26735-

Pressure relief (option)

The pressure relief is for quickly removing pressure in the control circuit III hydraulic lines and control circuit III high flow.

► Switch on ignition.



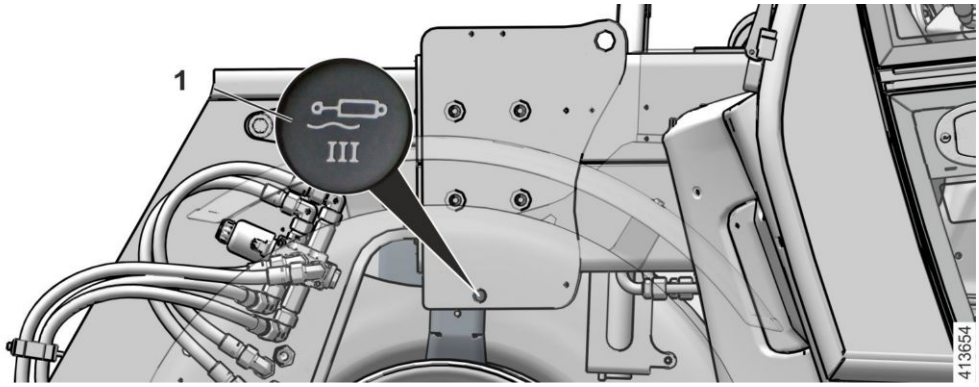
G2047831_1

«Control circuit III pressure relief» button

40 «Control circuit III pressure relief» button

► Press «Control circuit III pressure relief» button **40** down for 5 to 10 seconds.

or



G2044587_1

«Control circuit III pressure relief» button

1 «Control circuit III pressure relief» button

Press «control circuit III pressure relief» button **1** on front left of telescopic boom for 5 to 10 seconds.

✔ Control circuit III pressure relief symbol is shown on the display.

✔ The pressure in the hydraulic lines is reduced.

3.5.1.2 Installing the working attachment to the mechanical quick coupler

WARNING

Persons in hazard zone!

Injury.

► Make sure there is nobody in hazard zone.

Ensure that following requirements are met:

☑ Machine is parked on horizontal and solid ground.

☑ Telescopic boom is completely retracted.

☑ The working attachment lies flat on ground.

Installing the working attachment

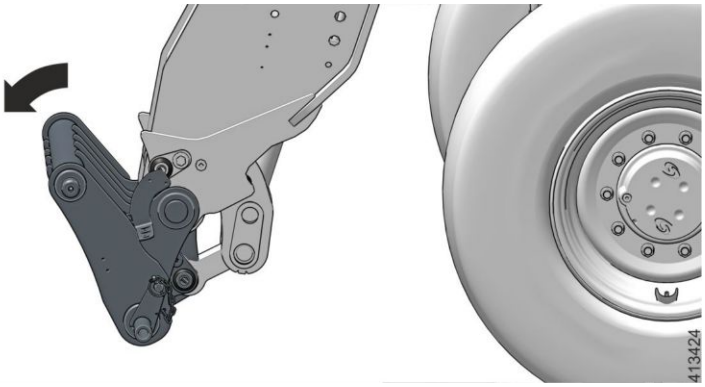
WARNING

Working attachment falling over!

Injury.

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

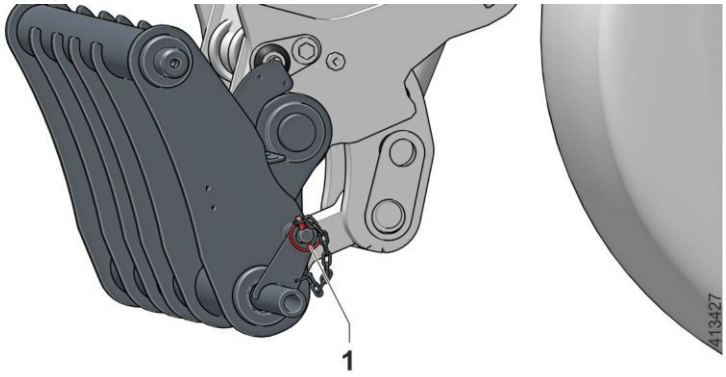
LWT/93517630/09/01/12/2023/en



G2041710_1

Tilting mechanical quick coupler

► Tilt the mechanical quick coupler to the front.

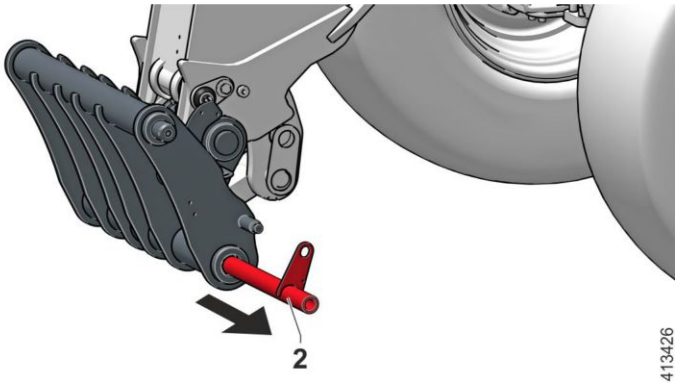


G2041711_1

Linchpin

1 Linchpin

► Pull linch pin **1** out of locking mechanism.

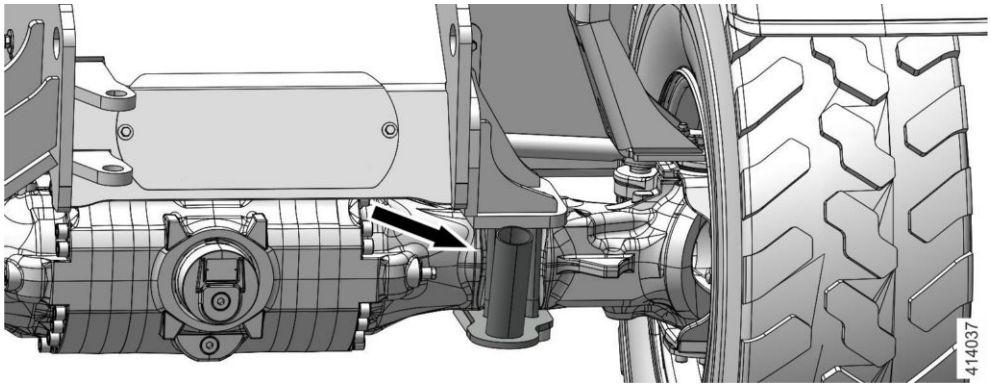


G2041712_1

Unpinning the locking pin

2 Locking pin

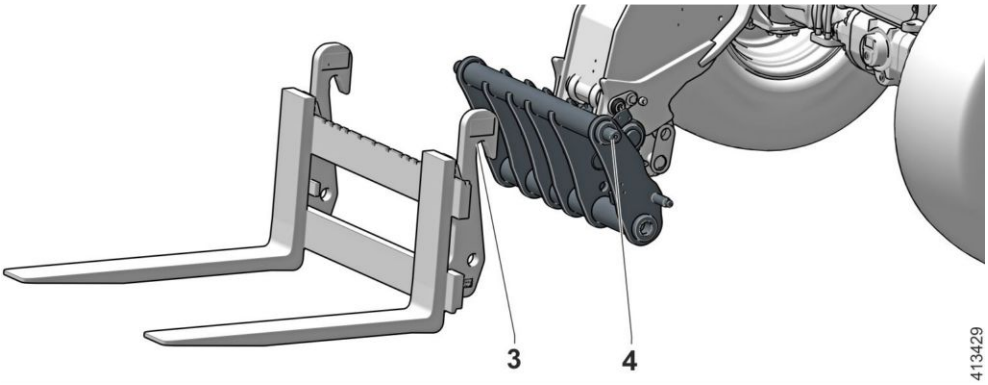
► Unpin locking pin **2** from mechanical quick coupler.



G2056723_2

Retainer for locking pin

► Deposit locking pin in the holder intended.

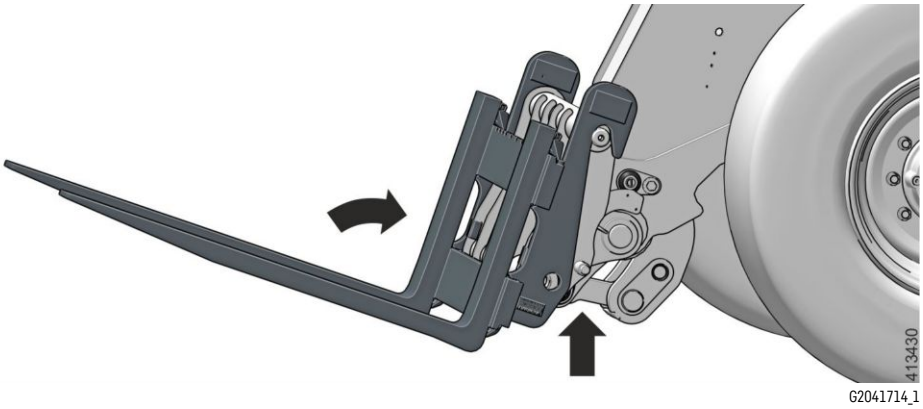


G2041713_1

Picking up working attachment

3	Holder	**4**	Mechanical quick coupler

► Carefully move mechanical quick coupler **4** into holder **3** on top on working attachment.



G2041714_1

Tilting working attachment in

► Lift the working attachment slightly and tilt it in completely.

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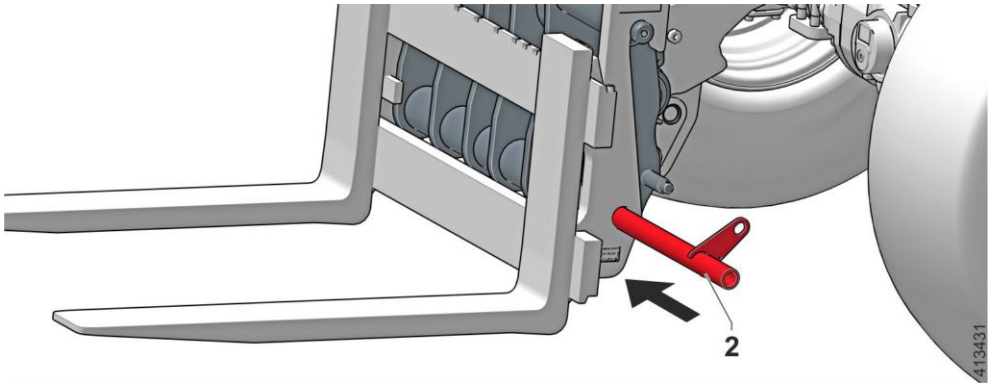
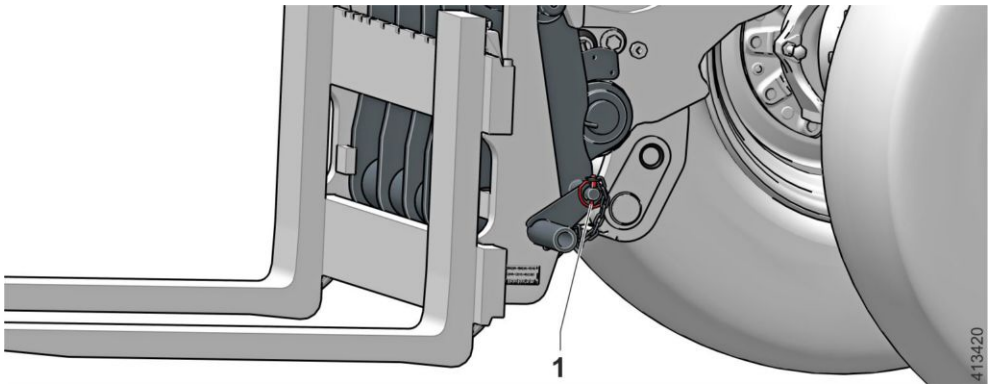


G2041715_1

Pinning the locking pin

2 Locking pin

► Pin locking pin **2** completely in mechanical quick coupler.



G2041638_1

Linchpin

1 Linchpin

► Secure locking pin with linch pin **1**.

DANGER
Falling working attachment!
Danger to life.
► Do not carry out any working movements using the working attachment before checking the locking mechanism.

► Check that locking pin is correctly locked into working attachment.

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Connecting the connections

If a working attachment with its own hydraulic supply or power supply is attached, the connections must be connected to the working attachment.

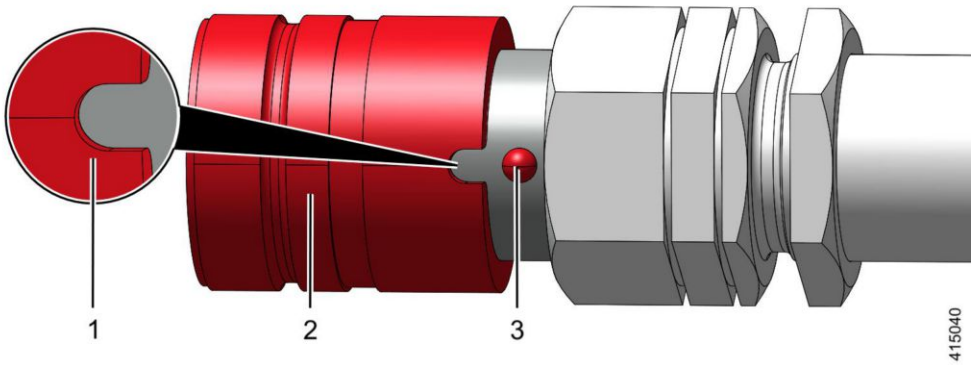
CAUTION
Pressurised hydraulic lines!
Injuries.
► Depressurise hydraulic system before connecting and disconnecting.

WARNING
Incorrectly connected hydraulic lines!
Crushing injuries.
► Before start of operations, check all functions in a safe operating area.
► Make sure that the hydraulic lines are properly connected.
► Observe the third-party manufacturer documentation for the working attachment.
► Check the operating direction of control elements prior to using the working attachment.

Ensure that following requirements are met:
☑ The hydraulic system has been depressurised.
☑ The hydraulic lines have been cleaned.

Aligning connections correctly

To prevent damage to the connections, they must be correctly aligned before connection.
► Remove protective cap from connection.



G2072429_1

Connection

1	Groove	**3**	Locking ball
2	Sleeve		

► Check whether locking ball **3** is positioned in groove **1** on sleeve **2**.

If locking ball **3** is not positioned in groove **1**:
► Position locking ball **3** in groove **1**.

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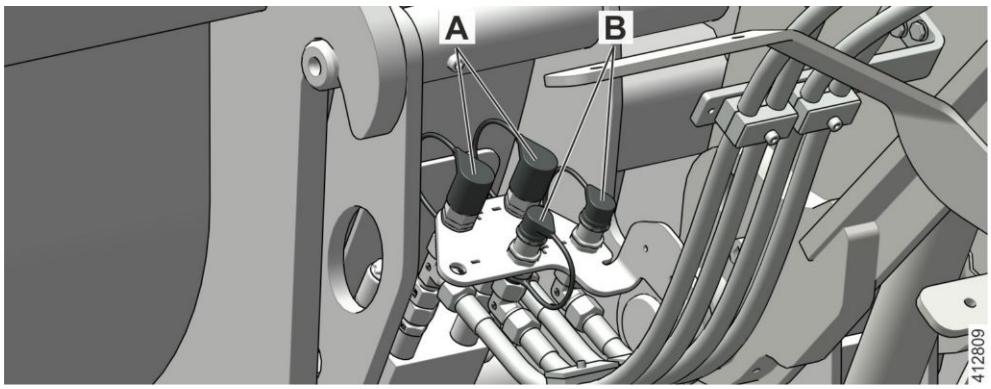
► Connect hydraulic line.

Connecting the control circuit III connections

The connections are attached on the front left of the change holder.



G2027872_1

Connecting hydraulic lines

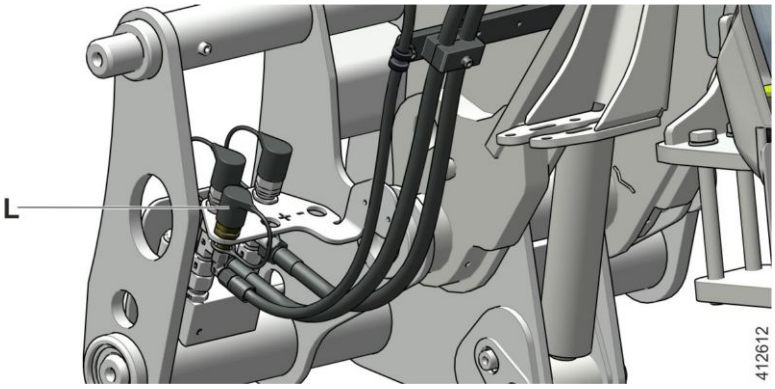
A Control circuit III connections

B Control circuit III changeover connections (option)

► Remove protective caps from control circuit III connections **A**.
► Connect hydraulic lines for the attached working attachment to control circuit III connections **A**.
► Route the hydraulic lines in such a way that they are not pinched when working with the working attachment.

Leak oil port (option)

The leak oil port is attached on the front left of the change holder.



G2024171_1

Arrangement of the leak oil line

L Leak oil port

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

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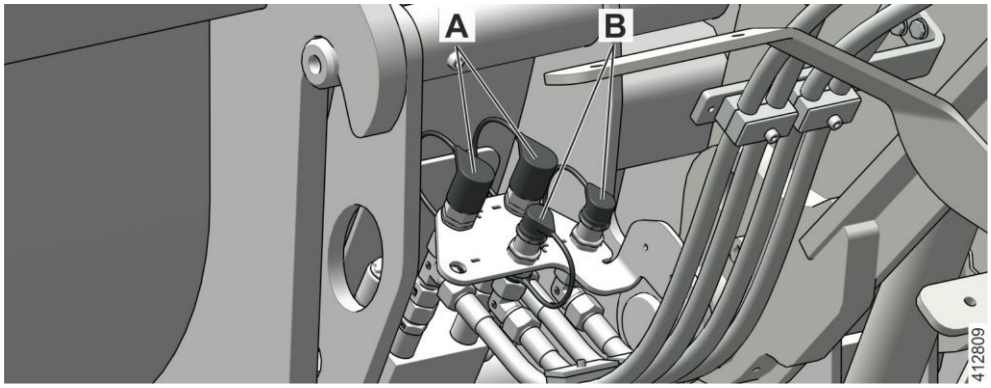
Control circuit III changeover (option)

The control circuit III changeover is attached on the front left of the change holder.



G2027872_1

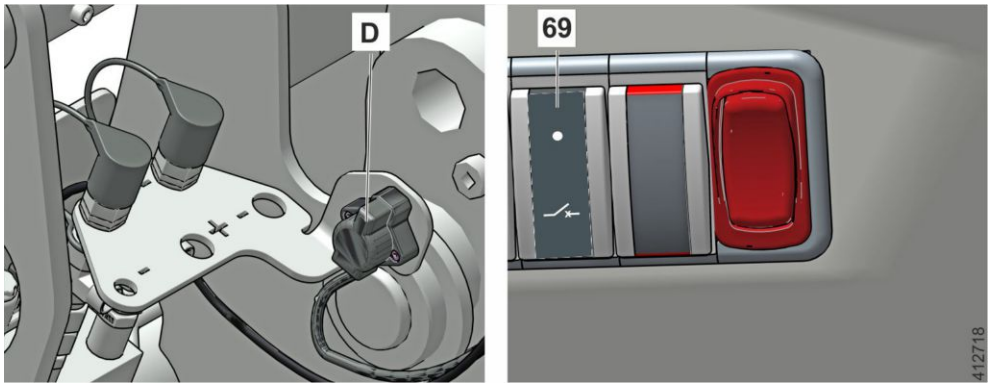
Connecting hydraulic lines

A	Control circuit III connections	**B**	Control circuit III changeover connections (option)

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

Front socket (option)

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



G2025537_5

Location of front socket

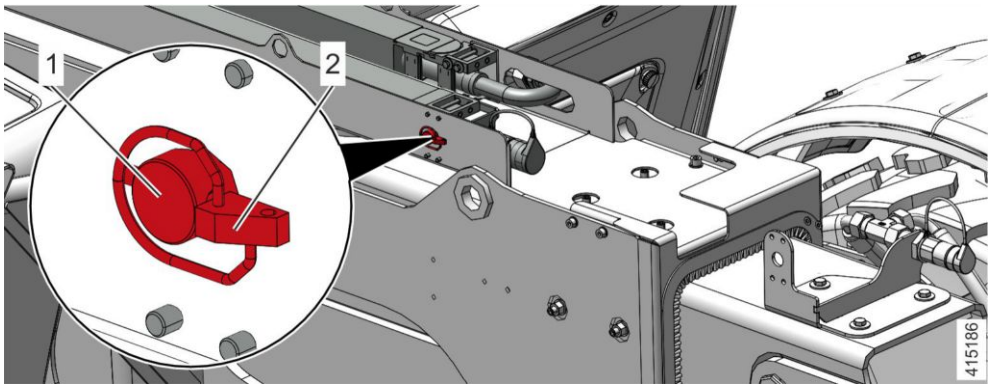
D	Front socket	**69**	«Front socket» switch

- ► Connect cables for working attachment to front socket **D**.

LWT/93517630/09/01/12/2023/en

Connecting high flow control circuit III connections (option)

The connections for the high flow control circuit III are located at the front on the telescope.

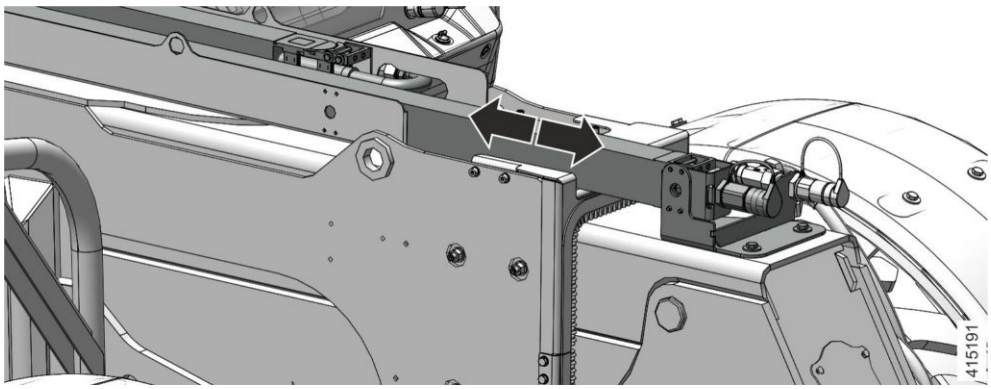


G2074793_1

Pin

1	Pin	**2**	Linchpin

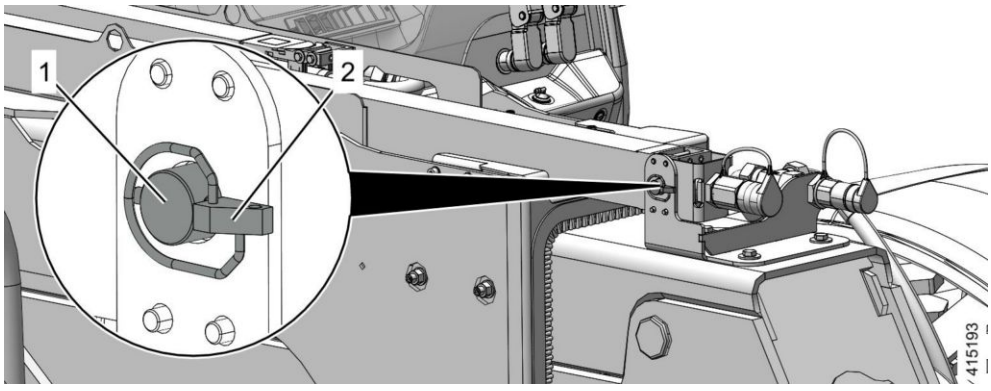
- ► Remove linch pin **2**.
- ► Unpin pin **1**.



G2074795_1

Moving connection

- ► Move connection forward.

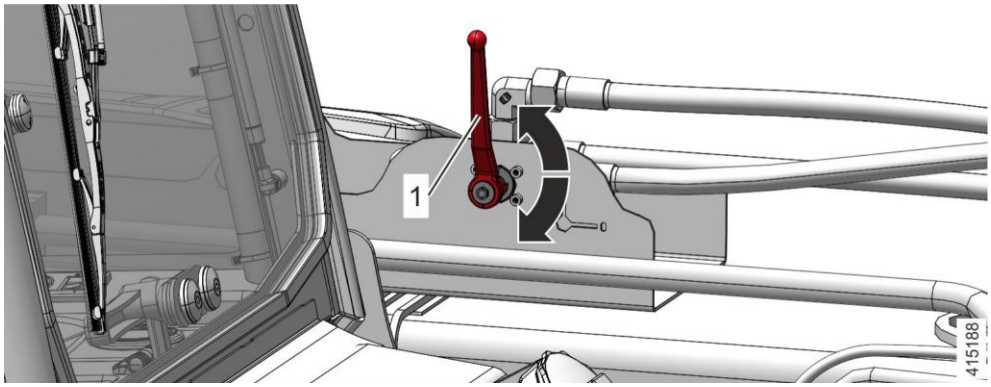


G2074797_1

Pin

1	Pin	**2**	Linchpin

- ► Insert pin **1**.
- ► Secure pin **1** with linchpin **2**.

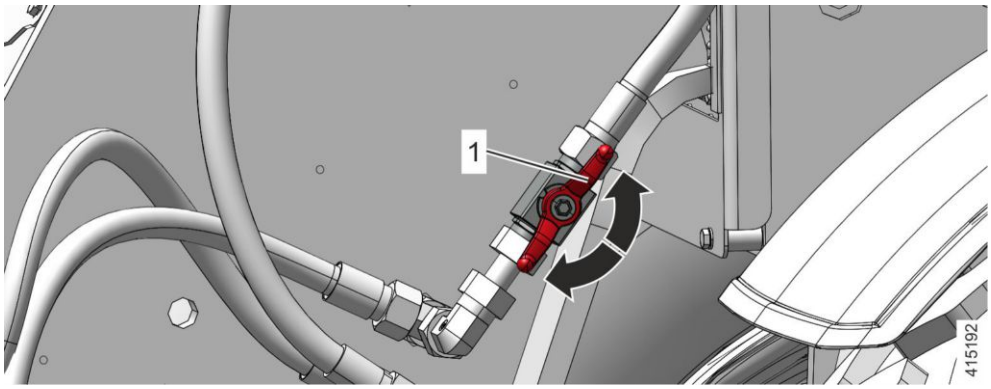


G2074799_1

Rear ball valve

1 Ball valve

- ► Turn ball valve **1** at rear of machine in an anti-clockwise direction.
  ✔ Tank return is released.

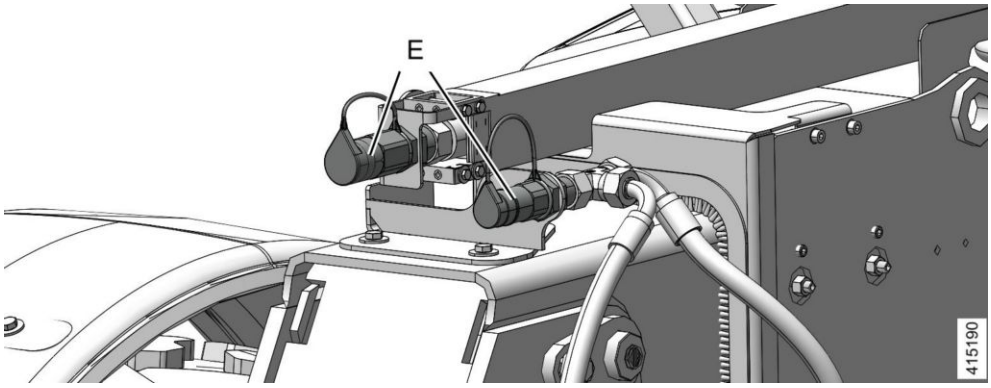


G2074801_1

Front ball valve

1 Ball valve

- ► Turn ball valve **1** at front of telescope in an anti-clockwise direction.
  ✔ Oil line is released.



G2074924_1

High flow control circuit III connections

E High flow control circuit III connections

- ► Remove protective caps from high flow control circuit III connections **E**.
- ► Connect hydraulic lines of working attachment to the high flow control circuit III connections **E**.
- ► Route the hydraulic lines in such a way that they are not pinched when working with the working attachment.

3.5.1.3 Removing working attachment from mechanical quick coupler

Ensure that following requirements are met:

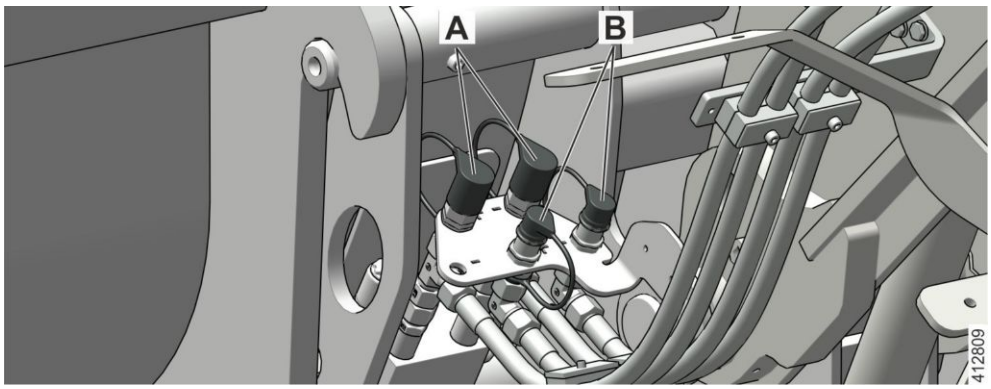
- ☑ Machine is parked on horizontal and solid ground.
- ☑ Telescopic boom is completely retracted.
- ☑ The working attachment lies flat on ground.

Disconnecting connections

Ensure that following requirements are met:

- ☑ The hydraulic system has been depressurised.

Disconnecting the control circuit III connections



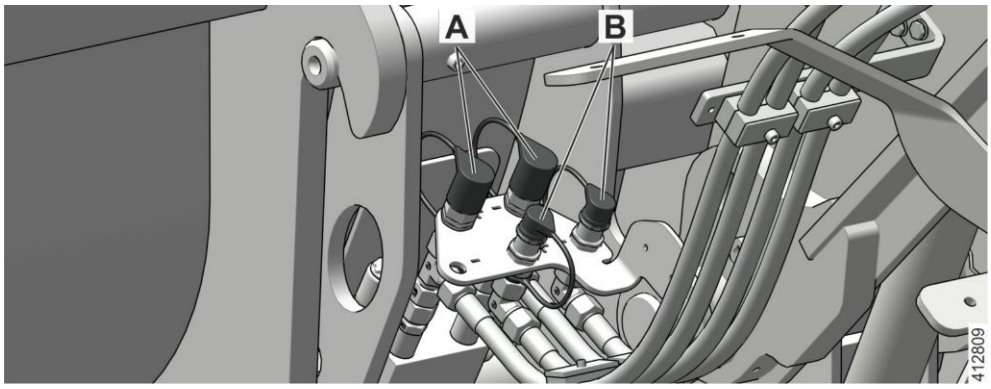
G2027872_1

Disconnecting the hydraulic lines

A Control circuit III connections **B** Control circuit III changeover connections (option)

- ► Disconnect hydraulic lines for the attached working attachment from control circuit III connections **A**.
- ► Attach protective caps to control circuit III connections **A**.

Control circuit III changeover (option)



G2027872_1

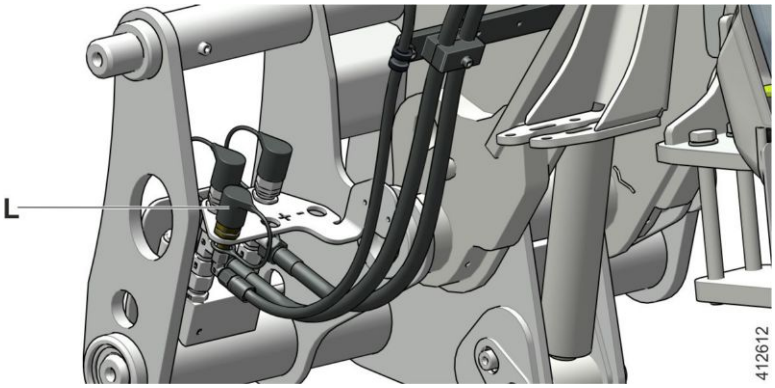
Disconnecting the hydraulic lines

A Control circuit III connections **B** Control circuit III changeover connections (option)

LWT/93517630/09/01/12/2023/en

- ► Disconnect hydraulic lines for the attached working attachment from control circuit III changeover connections **B**.
- ► Attach protective caps to control circuit III changeover connections **B**.

Leak oil port (option)



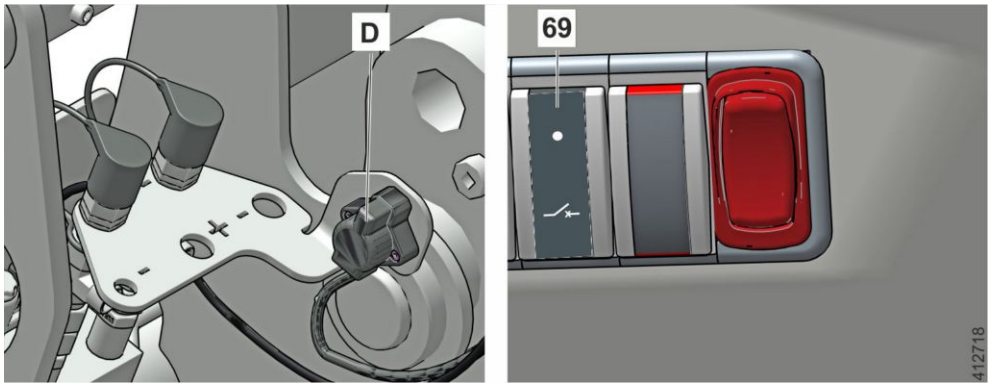
G2024171_1

Arrangement of leak oil line

L	Leak oil port

- ► Disconnect the leak oil lines for the attached working attachment from leak oil port **L**.
- ► Attach the protective cap to leak oil port **L**.

Front socket (option)



G2025537_5

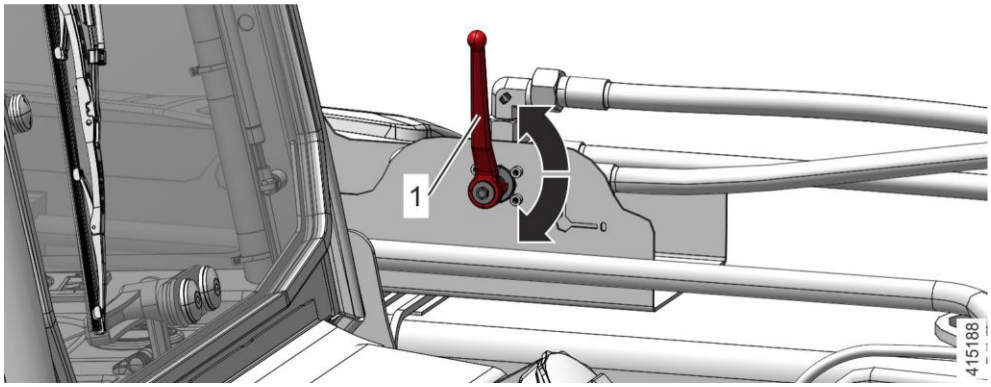
Location of front socket

D	Front socket	**69**	«Front socket» switch

- ► Press top part of «Front socket» switch **69**.
  - ✔ The front socket **D** is without current.
- ► Disconnect cables for working attachment from front socket **D**.

LWT/93517630/09/01/12/2023/en

Disconnecting high flow control circuit III connections (option)

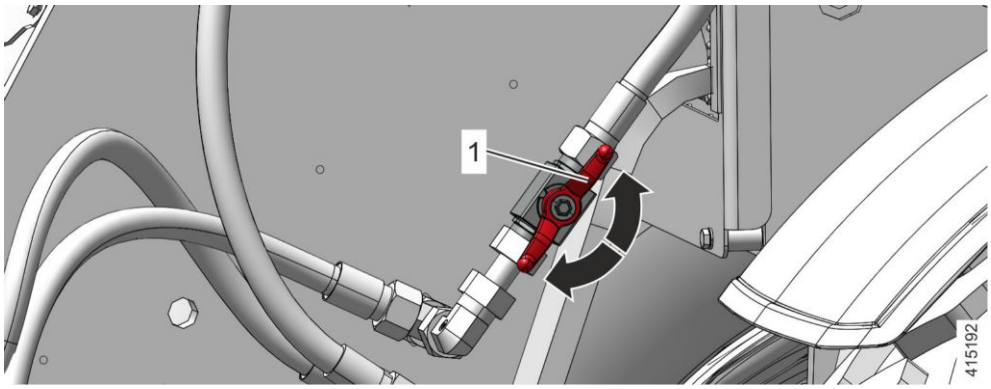


G2074799_1

Rear ball valve

1 Ball valve

► Turn ball valve **1** at rear of machine in a clockwise direction.
✔ Tank return is blocked.

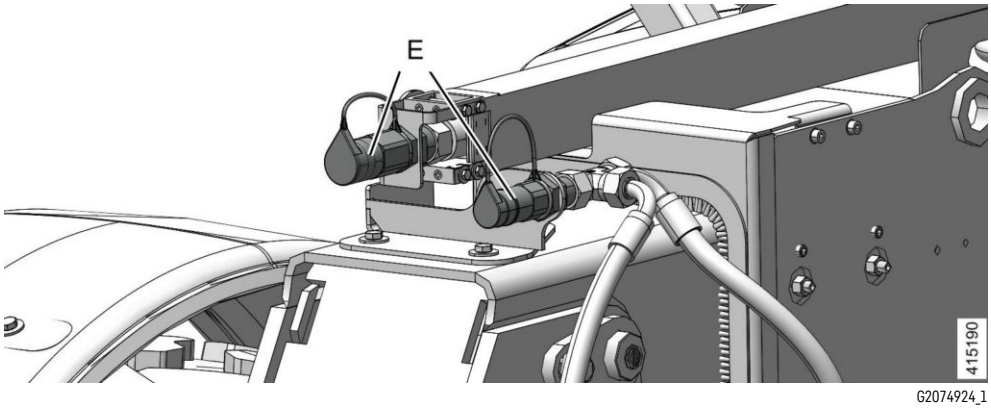


G2074801_1

Front ball valve

1 Ball valve

► Turn ball valve **1** at front of telescope in a clockwise direction.
✔ Oil line is blocked.



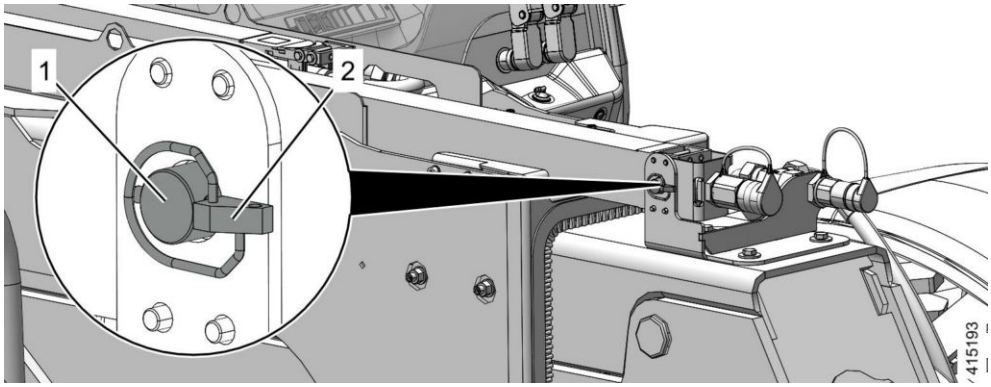
G2074924_1

High flow control circuit III connections

E High flow control circuit III connections

LWT/93517630/09/01/12/2023/en

► Disconnect hydraulic lines of the attached working attachment from high flow control circuit III connections **E**.
► Attach protective caps to high flow control circuit III connections **E**.

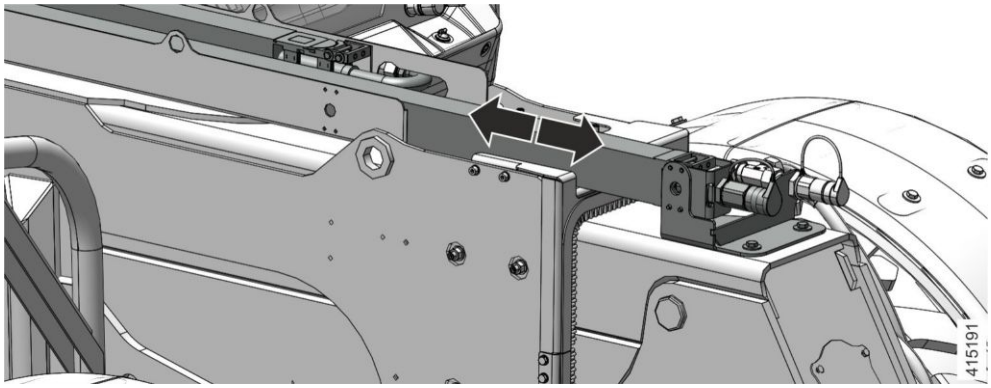


G2074797_1

Pin

1	Pin	**2**	Linchpin

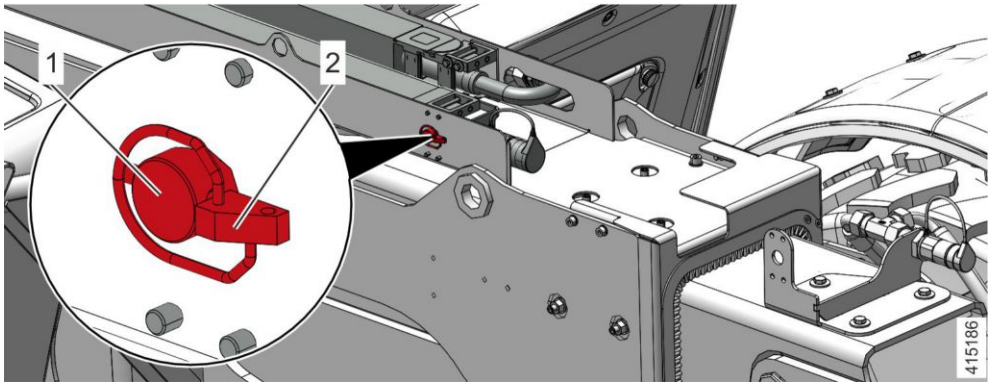
► Remove linch pin **2**.
► Unpin pin **1**.



G2074795_1

Moving connection

► Move connection backward.



G2074793_1

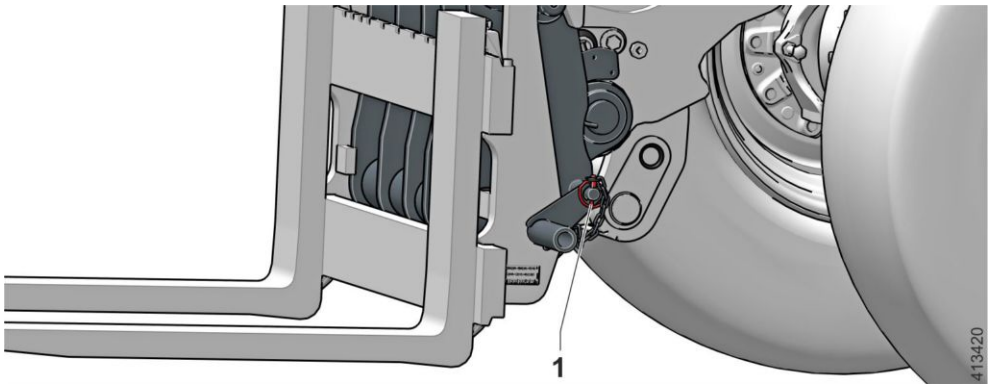
Pin

1	Pin	**2**	Linchpin

- ► Insert pin **1**.
- ► Secure pin **1** with linchpin **2**.

Removing working attachment

WARNING
Working attachment falling over!
Injury.
- ► Make sure the working attachment is secured against falling over or rolling away.

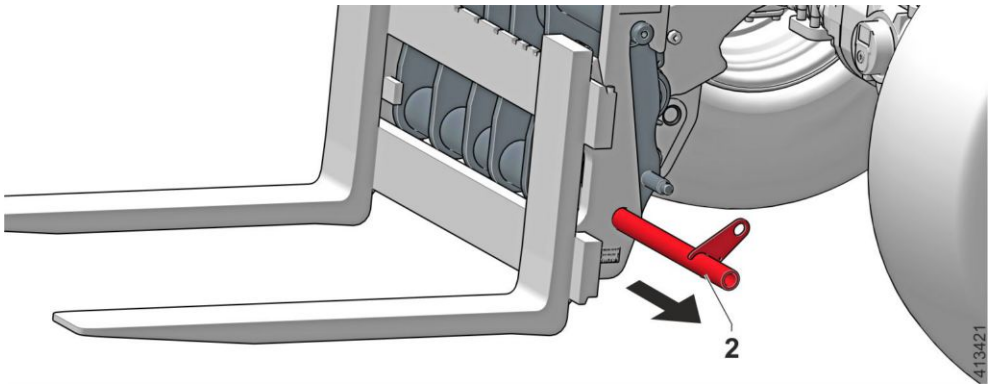


G2041638_1

Linchpin

1 Linchpin

- ► Remove linch pin **1**.

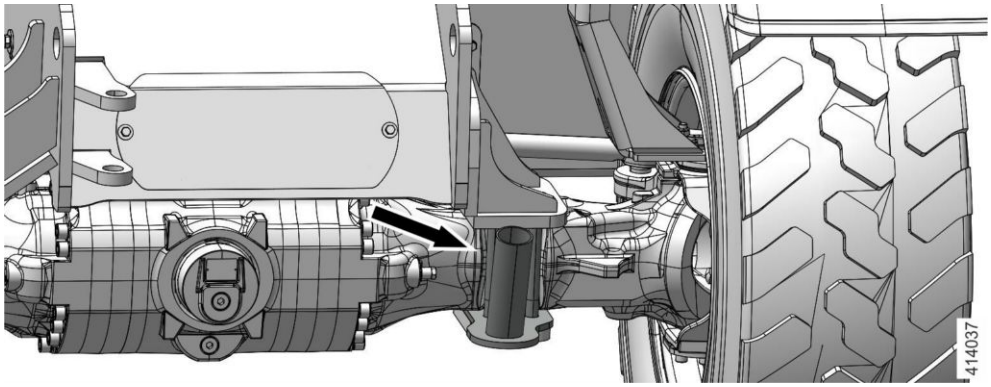


G2041639_1

Unpinning the locking pin

2 Locking pin

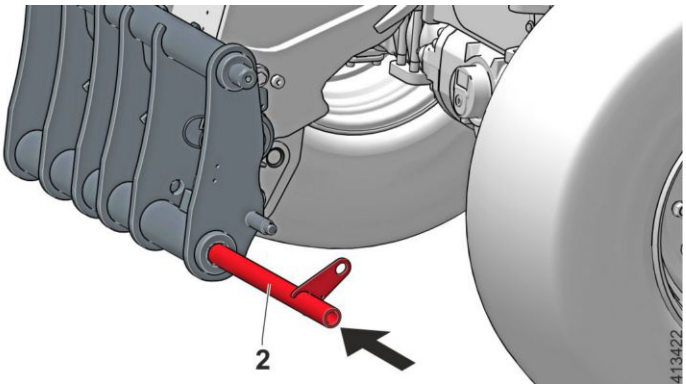
- ► Unpin locking pin **2** from mechanical quick coupler.
  ✔ Working attachment is unlocked.



G2056723_2

Retainer for locking pin

- ► Deposit locking pin in the holder intended.
- ► Tilt out the mechanical quick coupler to the front.
- ► Move slowly backward with machine.
  ✔ The working attachment is uncoupled.

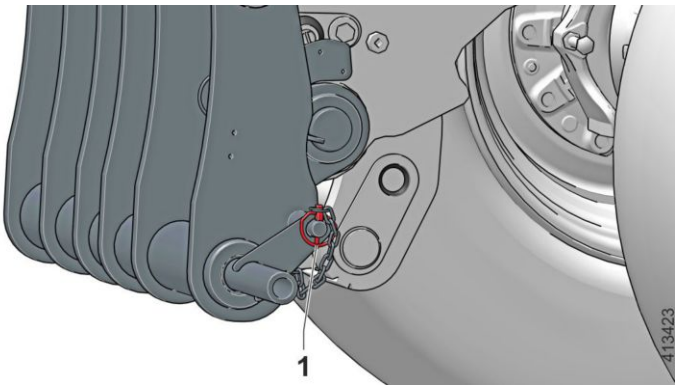


G2041642_1

Pinning the locking pin

2 Locking pin

- ► Pin locking pin **2** completely in mechanical quick coupler.



G2041644_1

Linchpin

1 Linchpin

- ► Secure lock with linch pin **1**.

LWT/93517630/09/01/12/2023/en

► Park machine properly.

3.5.2 Hydraulic quick coupler (option)

3.5.2.1 Relieving pressure in hydraulic system

Before attaching or removing the working attachment, the hydraulic system must be depressurised.

Ensure that following requirements are met:

☑ Telescopic boom is completely retracted.
☑ Telescopic boom is lowered and close to ground.
☑ Cylinders of the working attachment are in the home position.

Control circuit III pressure relief

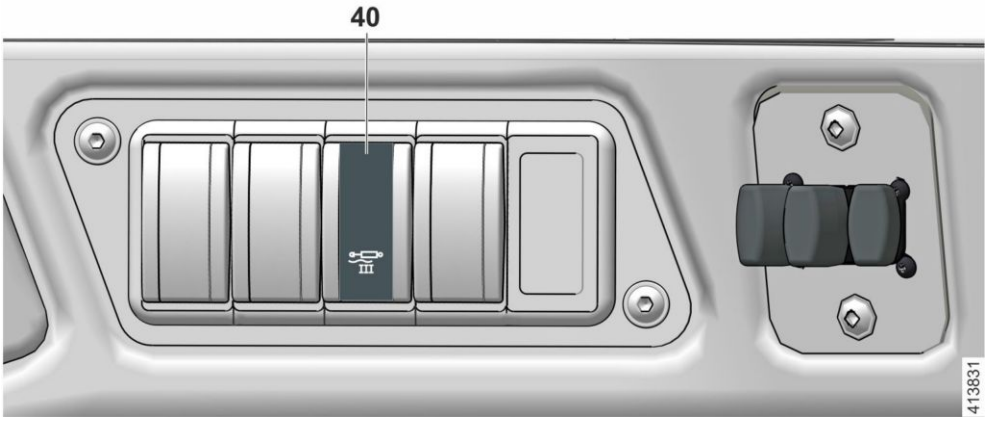
Valid for: T60-9 05S & 3AS: 20156-26734;

Ensure that following requirements are met:

☑ The diesel engine is running.

Pressure relief in operator's cab (option)

The pressure relief is for quickly removing pressure in the control circuit III hydraulic lines and control circuit III high flow.



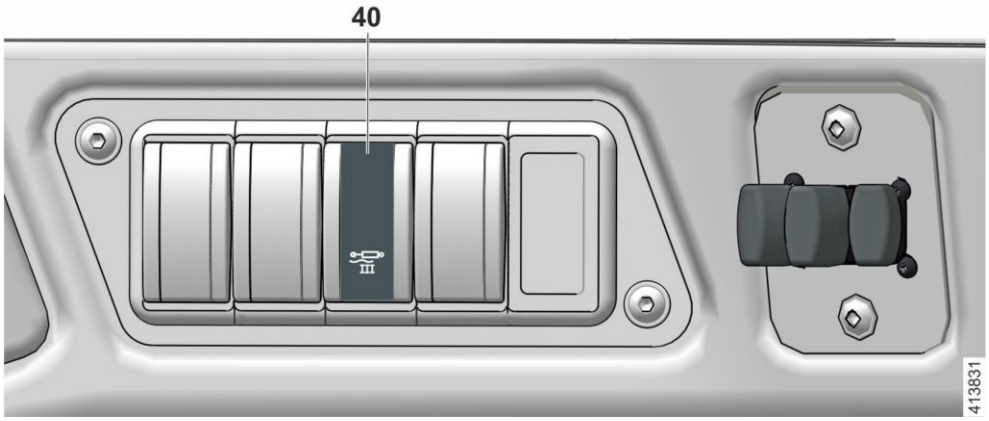
G2047831_1

«Control circuit III pressure relief» switch

40 «Control circuit III pressure relief» switch

► Press bottom part of «Control circuit III pressure relief» switch **40**.

or



G2047831_1

«Control circuit III pressure relief» button

40 «Control circuit III pressure relief» button

Press «Control circuit III pressure relief» button **40** for 5 to 10 seconds.

✔ «Control circuit III pressure relief» symbol is shown on the display.

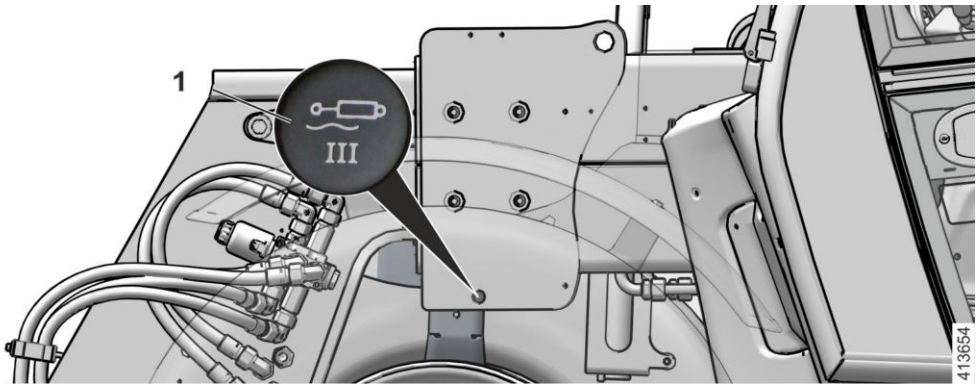
✔ The pressure in the hydraulic lines is reduced.

If «Control circuit III pressure relief» switch is installed:

► Press upper part of «Control circuit III pressure relief» switch after 60 seconds.

Pressure relief on telescopic boom (option)

The pressure relief is for quickly removing pressure in the control circuit III hydraulic lines and control circuit III high flow.



G2044587_1

«Control circuit III pressure relief» button

1 «Control circuit III pressure relief» button

► Press «Control circuit III pressure relief» button **1** on front left of telescopic boom for 5 to 10 seconds.

✔ «Control circuit III pressure relief» symbol is shown on the display.

✔ The pressure in the hydraulic lines is reduced.

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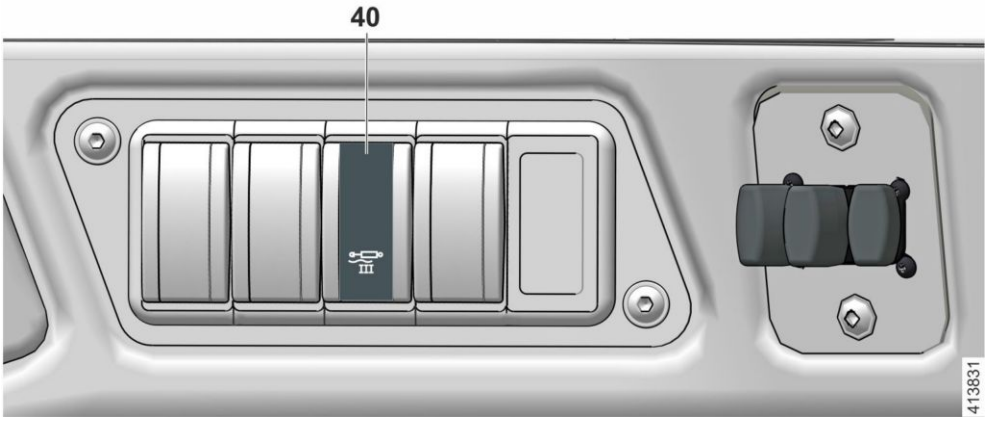
Control circuit III pressure relief

Valid for: T60-9 05S & 3AS: 26735-

Pressure relief (option)

The pressure relief is for quickly removing pressure in the control circuit III hydraulic lines and control circuit III high flow.

► Switch on ignition.



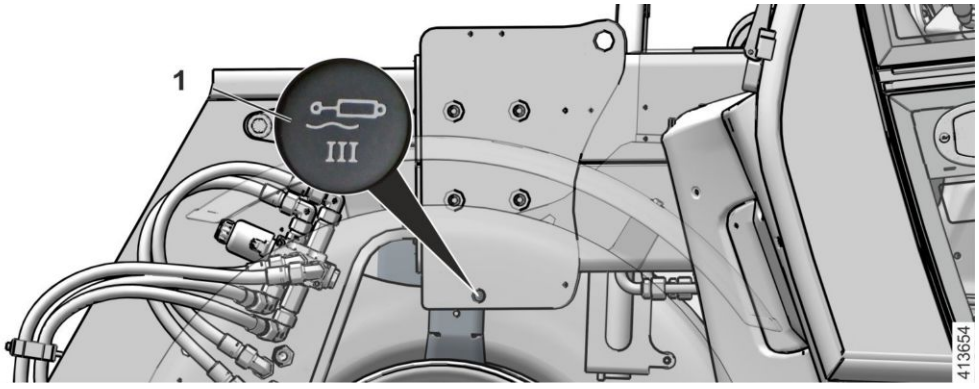
G2047831_1

«Control circuit III pressure relief» button

40 «Control circuit III pressure relief» button

► Press «Control circuit III pressure relief» button **40** down for 5 to 10 seconds.

or



G2044587_1

«Control circuit III pressure relief» button

1 «Control circuit III pressure relief» button

Press «control circuit III pressure relief» button **1** on front left of telescopic boom for 5 to 10 seconds.

✔ «Control circuit III pressure relief» symbol is shown on the display.

✔ The pressure in the hydraulic lines is reduced.

3.5.2.2 Installing working attachment on hydraulic quick coupler

The hydraulic quick coupler is integrated on front on tool holder of machine. This is used to change the working attachment without needing to leave the operator's cab. Page 97

WARNING
Persons in hazard zone!
Injury.
► Make sure there is nobody in hazard zone.

Ensure that following requirements are met:

☑ Machine is parked on horizontal and solid ground.
☑ Telescopic boom is completely retracted.
☑ The working attachment lies flat on ground.
☑ «Control circuit III» switch is in manual operation position.

Connecting and locking working attachment

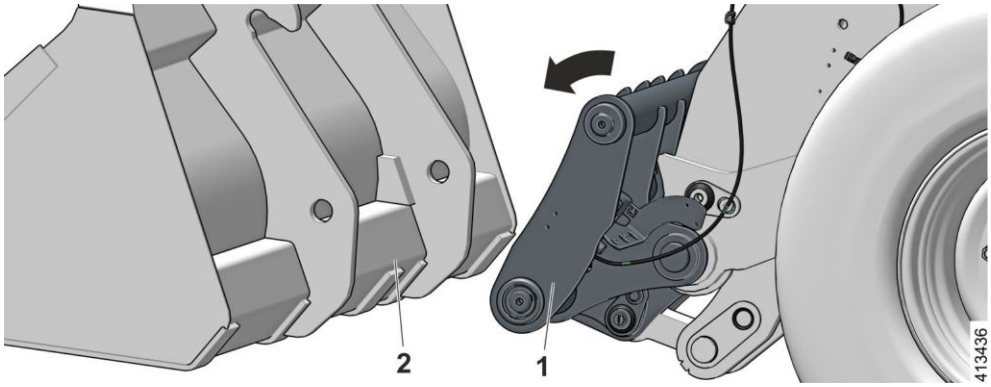
WARNING
Working attachment falling over!
Injury.
► Make sure the working attachment is secured against falling over or rolling away.

Ensure that following requirements are met:

☑ The hydraulic quick coupler is completely unlocked.

Tilting out hydraulic quick coupler

► Move control lever to **A**.

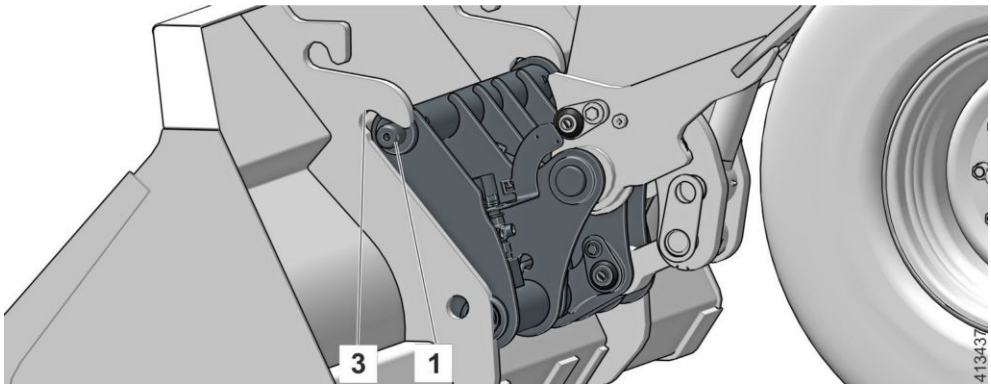


G2041812_1

Picking up working attachment

1	Hydraulic quick coupler	**2**	Working attachment

► Tilt hydraulic quick coupler **1** slightly to front.

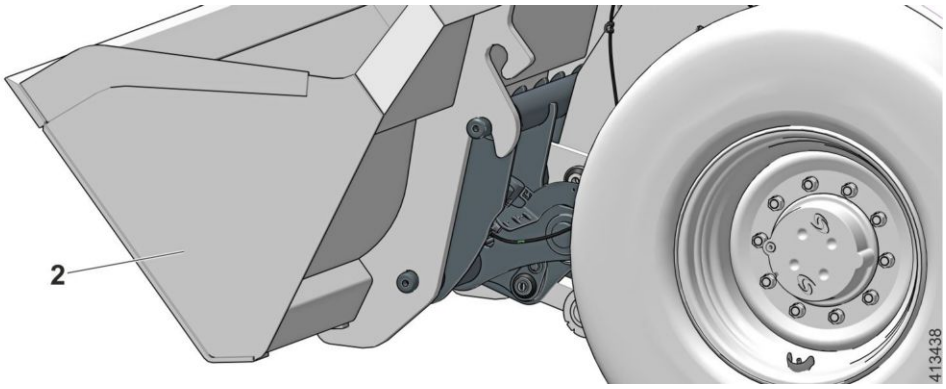


G2041813_1

Locking hydraulic quick coupler

1	Hydraulic quick coupler	**3**	Retaining fixture

► Carefully move hydraulic quick coupler **1** into retaining fixture **3** on top on working attachment.

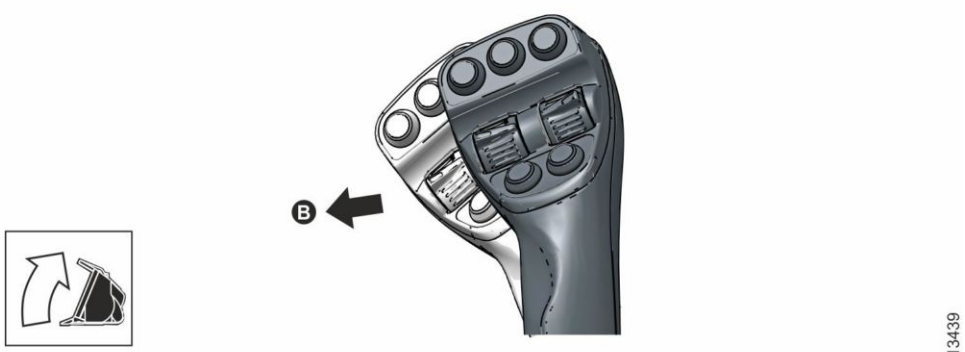


G2041814_1

Tilting working attachment in

2	Working attachment

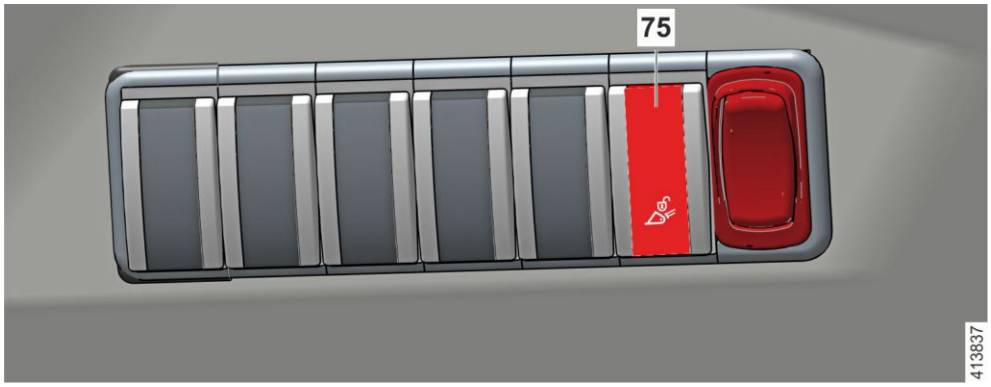
► Lift the telescopic boom slightly and tilt the working attachment **2** in completely.



G2041815_1

Tilting working attachment in

► Move control lever to **B**.



G2047856_1

«Hydraulic quick coupler» button

75 «Hydraulic quick coupler» button

► Press and hold «Hydraulic quick coupler» button **75**.
✔ «Hydraulic quick coupler» indicator light is shown on the display.

G2023546_2

Control lever rocker switch

10 «Control circuit III» rocker switch

► At same time, push «Control circuit III» rocker switch **10** on control lever to left in travel direction as viewed by operator (two hand operation).
✔ Hydraulic quick coupler's locking pins extend.

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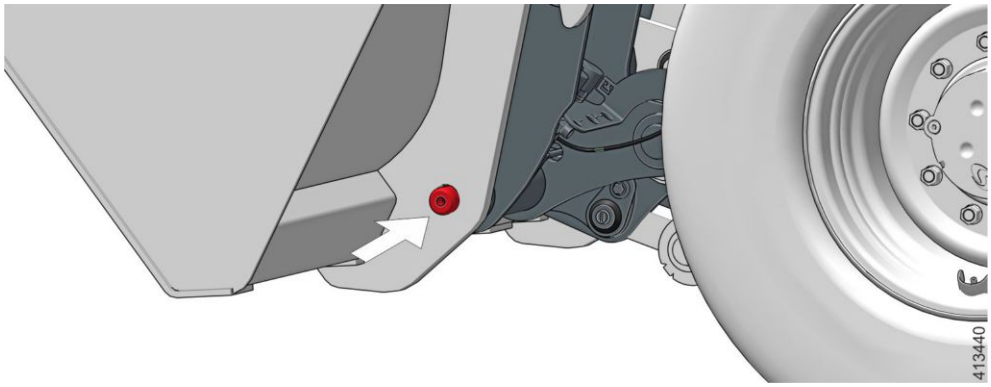


G2041816_1

Extending the locking pins

✔ The working attachment is locked.

► Release «Hydraulic quick coupler» button.

► Release «Control circuit III» rocker switch on control lever.

✔ «Hydraulic quick coupler» indicator light goes out on display unit.

Lock inspection, working attachment

The option to carry out a tool change from the operator's cab does not relieve the operator of his duty of inspection!

After every tool change, carry out a «Visual inspection» and a «Mechanical inspection» to ensure that the working attachment is properly locked.

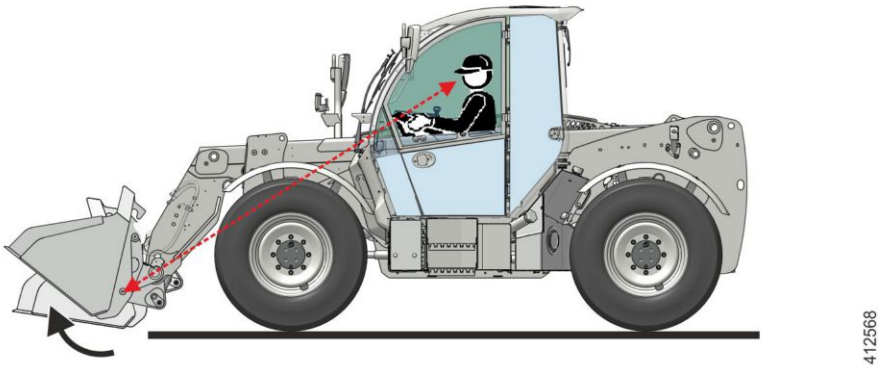
DANGER

Falling working attachment!

Danger to life.

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

Visual inspection



G2023586_1

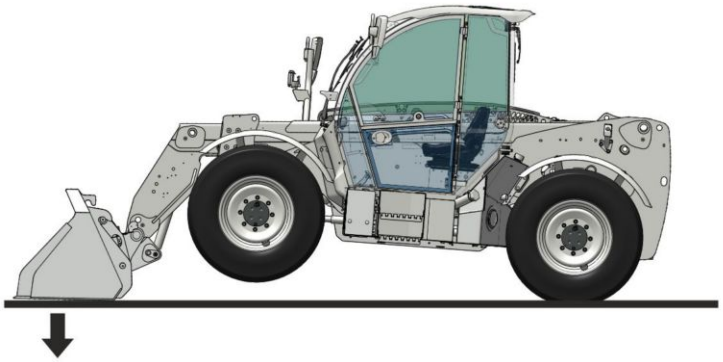
Visual inspection

► Use telescopic boom to move up until hydraulic quick coupler is visible from operator's cab.

► Carry out the visual inspection on both sides.

✔ Locking pins must be extended into the outer hole on the working attachment.

Mechanical inspection



Mechanical inspection

- ► Push front edge of the bucket (working attachment) against ground so that machine's front axle is slightly raised.
  - ✔ Bucket must remain connected to hydraulic quick coupler.

Connecting the connections

If a working attachment with its own hydraulic supply or power supply is attached, the connections must be connected to the working attachment.

CAUTION
Pressurised hydraulic lines!
Injuries.
- ► Depressurise hydraulic system before connecting and disconnecting.

WARNING
Incorrectly connected hydraulic lines!
Crushing injuries.
- ► Before start of operations, check all functions in a safe operating area.
- ► Make sure that the hydraulic lines are properly connected.
- ► Observe the third-party manufacturer documentation for the working attachment.
- ► Check the operating direction of control elements prior to using the working attachment.

Ensure that following requirements are met:

- ☑ The hydraulic system has been depressurised.
- ☑ The hydraulic lines have been cleaned.

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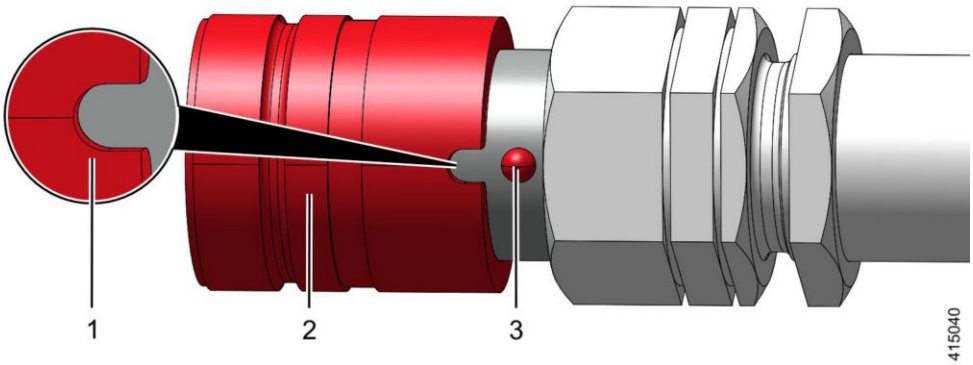
Aligning connections correctly

To prevent damage to the connections, they must be correctly aligned before connection.

► Remove protective cap from connection.



G2072429_1

Connection

1	Groove	**3**	Locking ball
2	Sleeve		

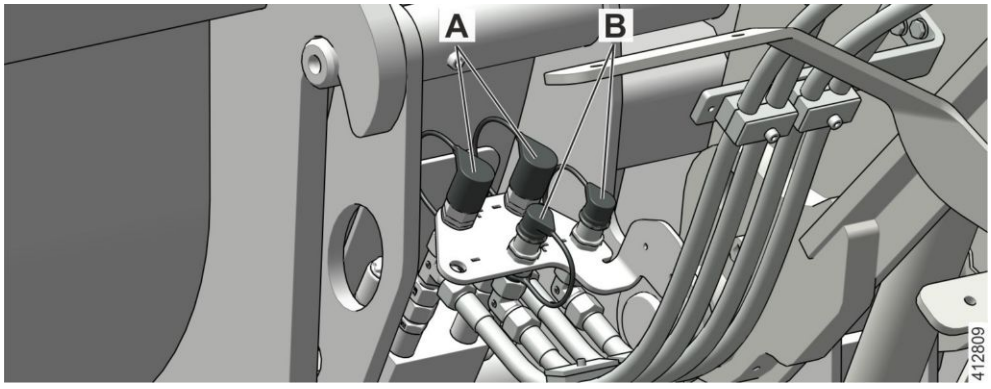
► Check whether locking ball **3** is positioned in groove **1** on sleeve **2**.

If locking ball **3** is not positioned in groove **1**:

► Position locking ball **3** in groove **1**.
► Connect hydraulic line.

Connecting the control circuit III connections

The connections are attached on the front left of the change holder.



G2027872_1

Connecting hydraulic lines

A	Control circuit III connections	**B**	Control circuit III changeover connections (option)

► Remove protective caps from hydraulic lines.
► Connect hydraulic lines for the attached working attachment to control circuit III connections **A**.
► Route the hydraulic lines in such a way that they are not pinched when working with the working attachment.

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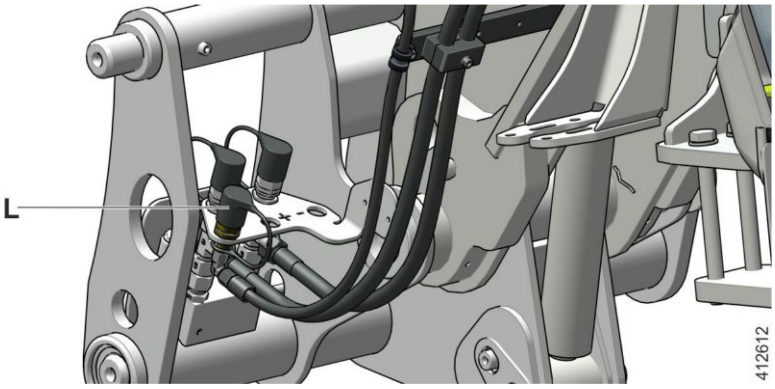
Leak oil port (option)

The leak oil port is attached on the front left of the change holder.



G2024171_1

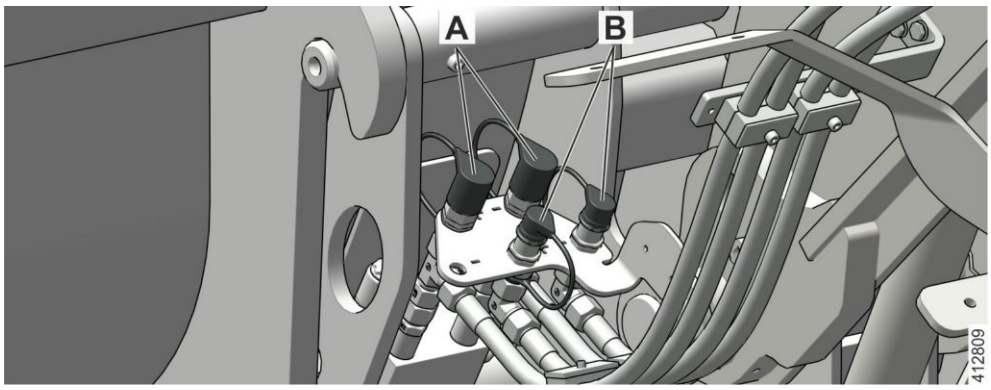
Arrangement of leak oil line

L Leak oil port

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

Control circuit III changeover (option)

The control circuit III changeover is attached on the front left of the change holder.



G2027872_1

Connecting hydraulic lines

A Control circuit III connections

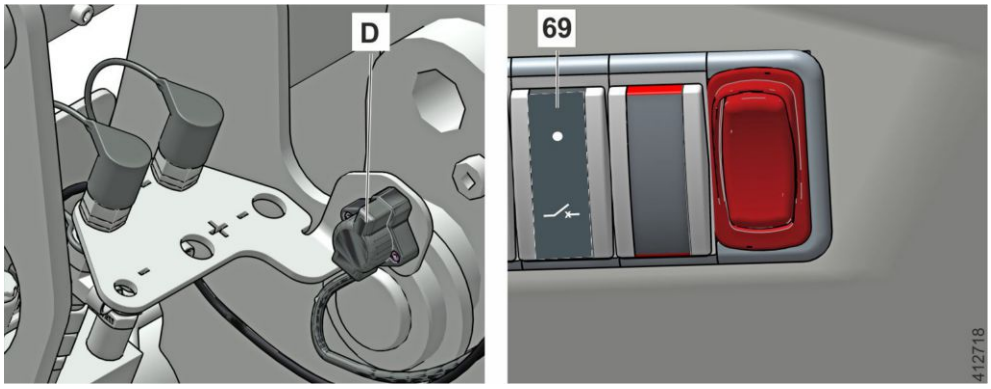
B Control circuit III changeover connections (option)

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

LWT/93517630/09/01/12/2023/en

Front socket (option)

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



G2025537_5

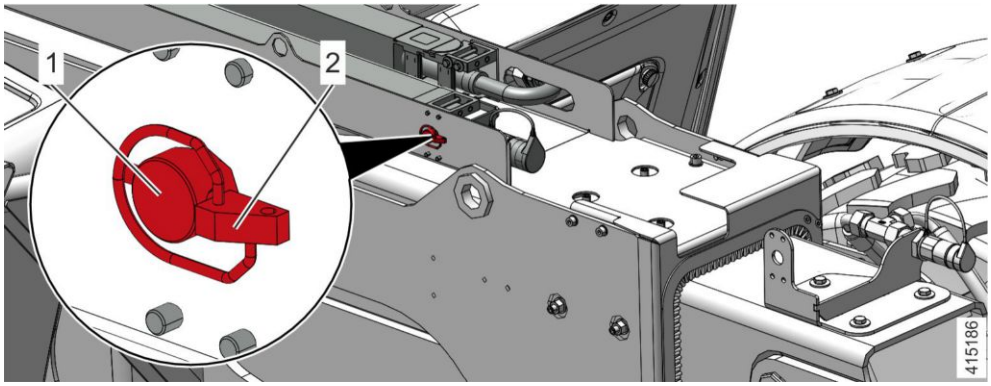
Location of front socket

D	Front socket	**69**	«Front socket» switch

► Connect cables for working attachment to front socket **D**.

Connecting high flow control circuit III connections (option)

The connections for the high flow control circuit III are located at the front on the telescope.

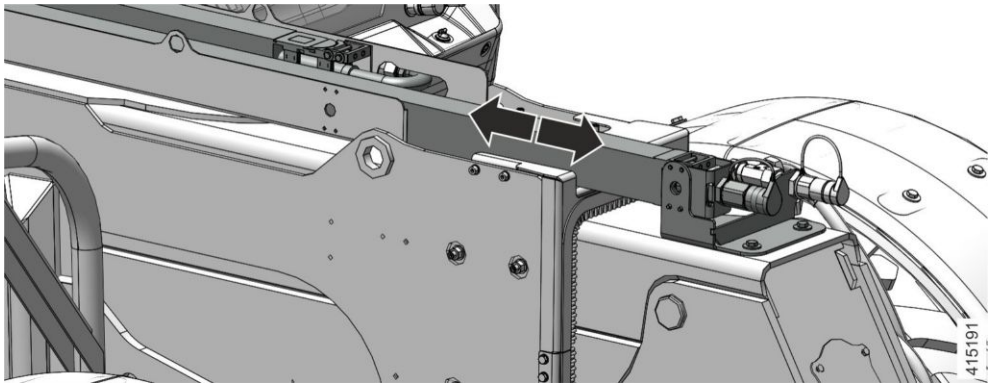


G2074793_1

Pin

1	Pin	**2**	Cotter pin

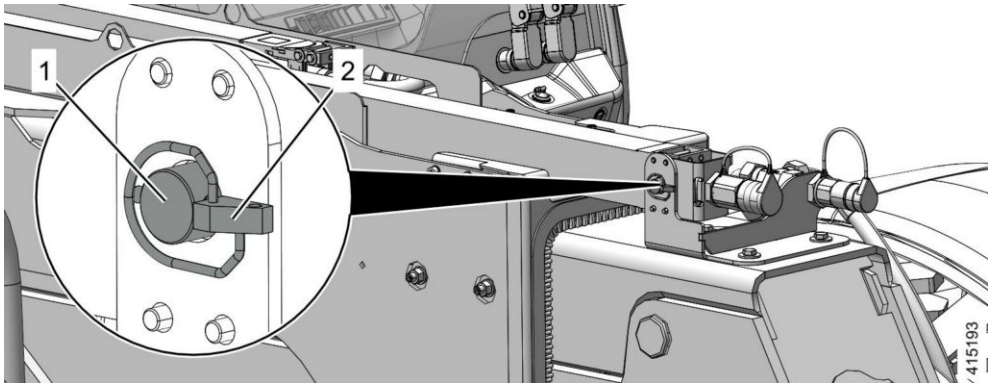
► Remove cotter pin **2**.
► Unpin pin **1**.



G2074795_1

Moving connection

► Move connection forward.

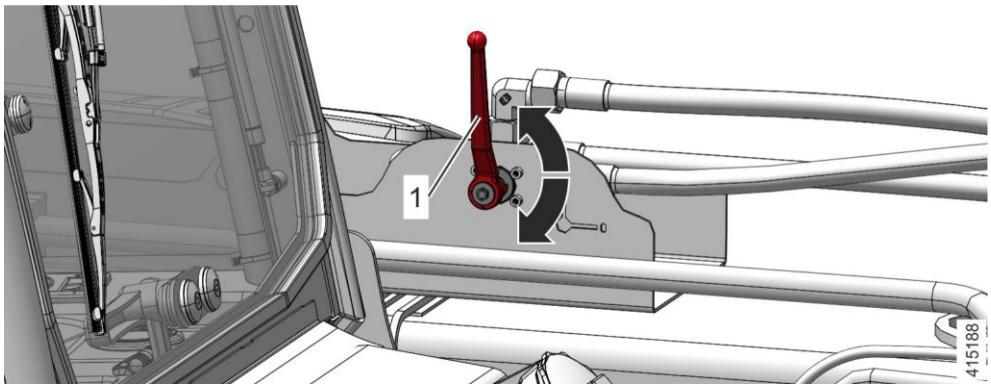


G2074797_1

Pin

1	Pin	**2**	Cotter pin

► Insert pin **1**.
► Secure pin **1** with a cotter pin **2**.



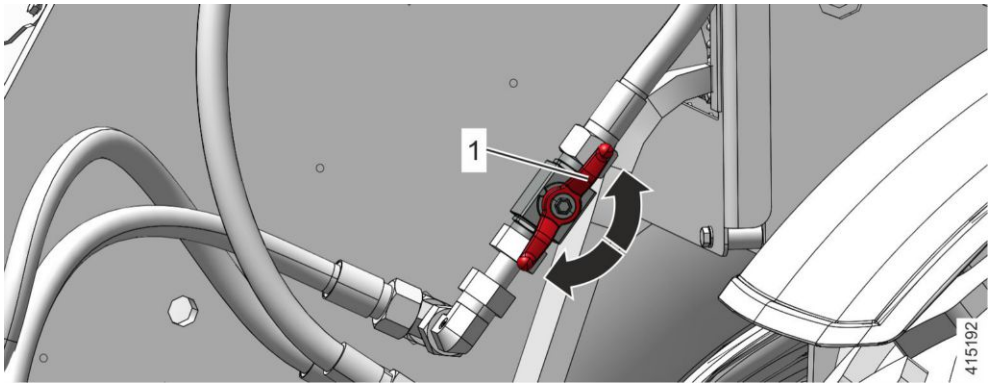
G2074799_1

Rear ball valve

1	Ball valve

► Turn ball valve **1** at rear of machine in an anti-clockwise direction.
✔ Tank return is released.

LWT/93517630/09/01/12/2023/en

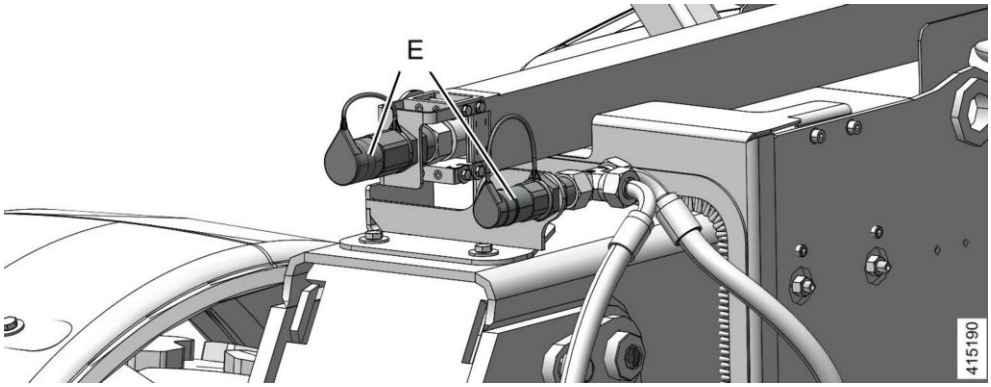


G2074801_1

Front ball valve

1 Ball valve

► Turn ball valve **1** at front of telescope in an anti-clockwise direction.
✔ Oil line is released.



G2074924_1

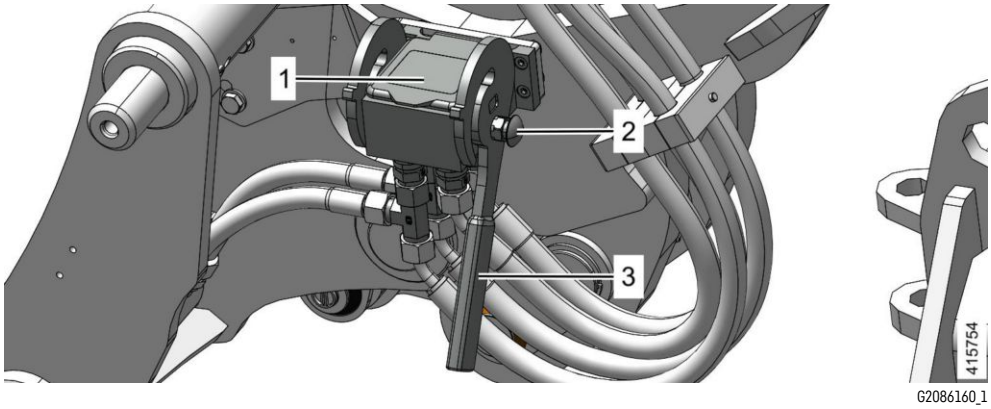
High flow control circuit III connections

E High flow control circuit III connections

► Remove protective caps from high flow control circuit III connections **E**.
► Connect hydraulic lines of working attachment to the high flow control circuit III connections **E**.
► Route the hydraulic lines in such a way that they are not pinched when working with the working attachment.

Multicoupler (option)

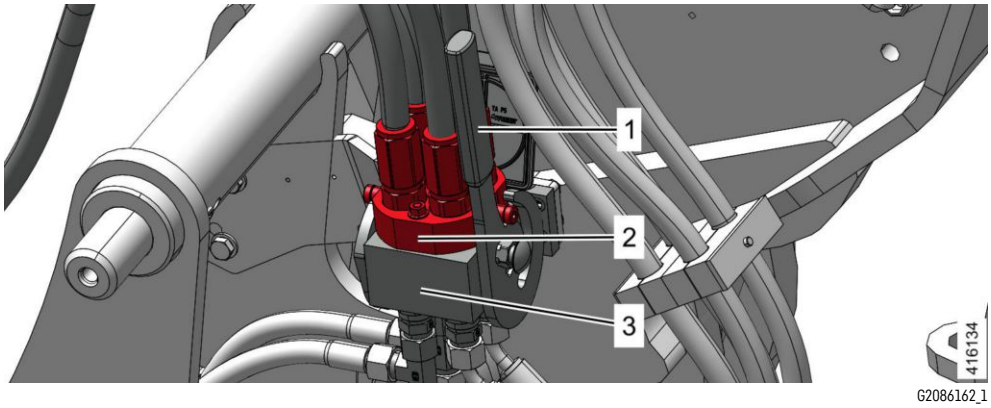
The multicoupler is attached on the front left of the change holder.



Multicoupler

1	Flap	**3**	Lever
2	Locking button		

- ► Press locking button **2** and at the same time move lever **3** upwards.
- ► Open flap **1**.



Counterpiece

1	Lever	**3**	Multicoupler
2	Counterpiece		

- ► Connect counterpiece **2** to multicoupler **3**.
- ► Move the lever **1** down.
  ✔ Multicoupler closes.

3.5.2.3 Removing working attachment from hydraulic quick coupler

Ensure that following requirements are met:

- ☑ Machine is parked on horizontal and solid ground.
- ☑ Telescopic boom is completely retracted.
- ☑ The working attachment lies flat on ground.
- ☑ «Control circuit III» switch is in manual operation position.

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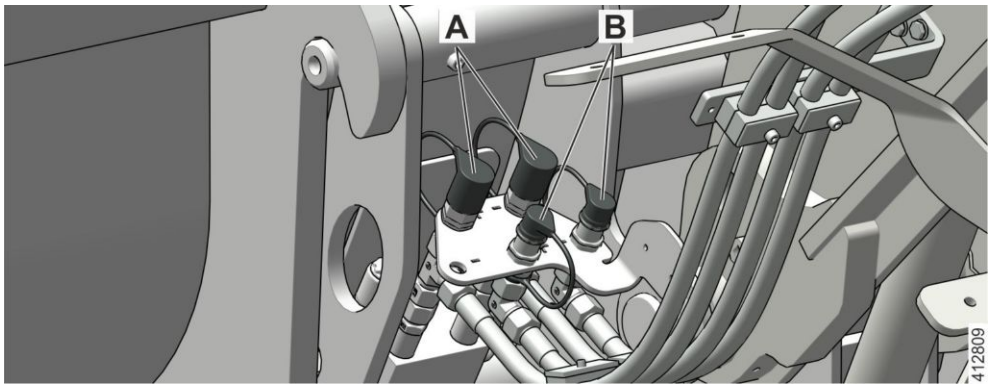
Disconnecting connections

CAUTION
Pressurised hydraulic lines!
Injuries.
► Depressurise hydraulic system before connecting and disconnecting.

Ensure that following requirements are met:
☑ The hydraulic system has been depressurised.

Disconnecting the control circuit III connections



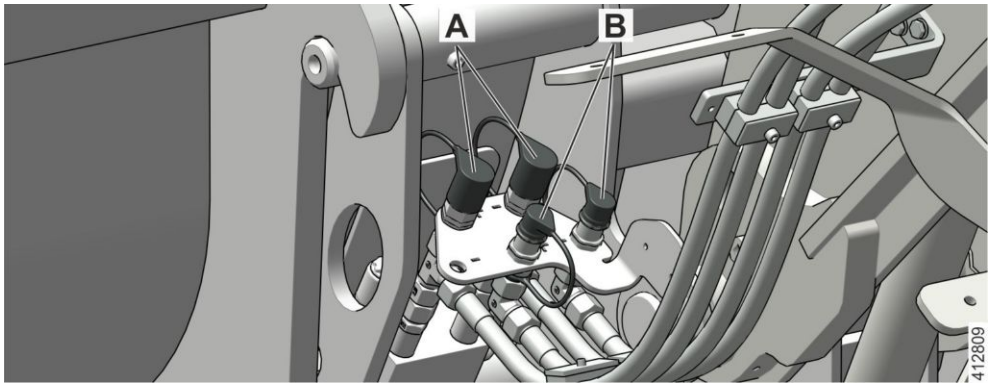
G2027872_1

Disconnecting the hydraulic lines

A Control circuit III connections **B** Control circuit III changeover connections (option)

► Disconnect hydraulic lines for the attached working attachment from control circuit III connections **A**.
► Attach protective caps to control circuit III connections **A**.

Control circuit III changeover (option)



G2027872_1

Disconnecting the hydraulic lines

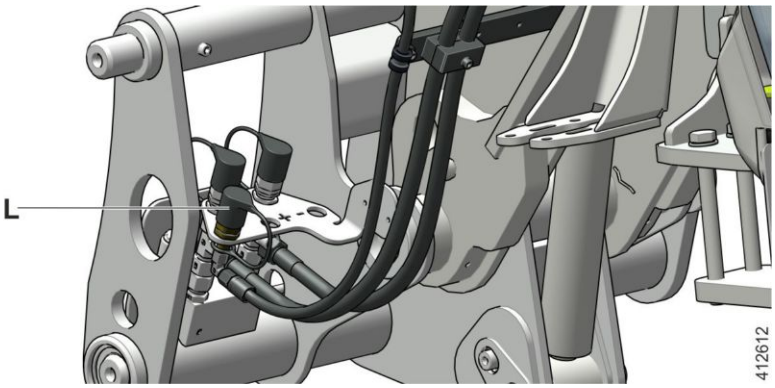
A Control circuit III connections **B** Control circuit III changeover connections (option)

► Disconnect hydraulic lines for the attached working attachment from control circuit III changeover connections **B**.

LWT/93517630/09/01/12/2023/en

► Attach protective caps to control circuit III changeover connections **B**.

Leak oil port (option)



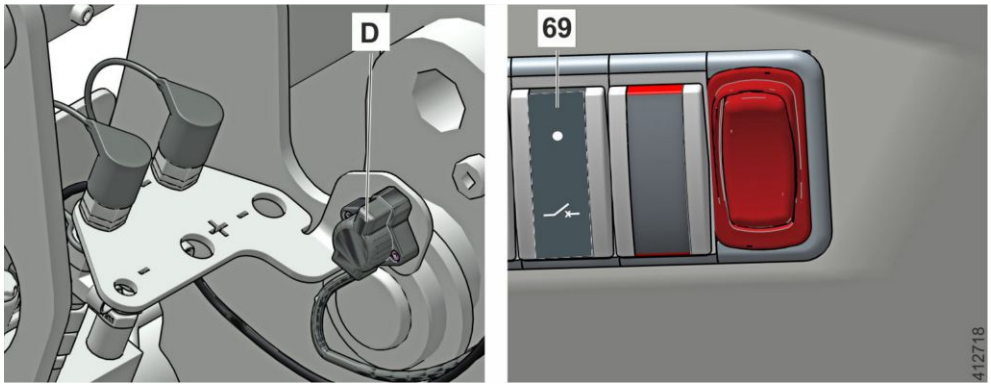
G2024171_1

Arrangement of leak oil line

L	Leak oil port

► Disconnect the leak oil lines for the attached working attachment from leak oil port **L**.
► Attach the protective cap to leak oil port **L**.

Front socket (option)



G2025537_5

Location of front socket

D	Front socket	**69**	«Front socket» switch

► Press top part of «Front socket» switch **69**.
✔ The front socket **D** is without current.
► Disconnect cables for working attachment from front socket **D**.

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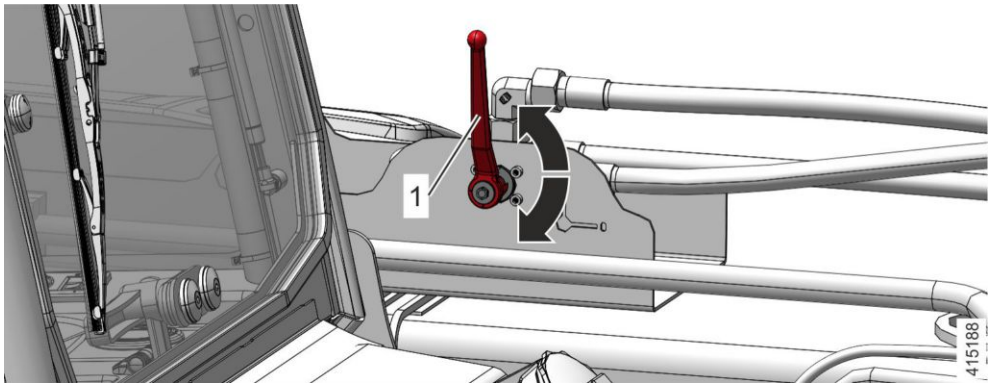
Disconnecting high flow control circuit III connections (option)

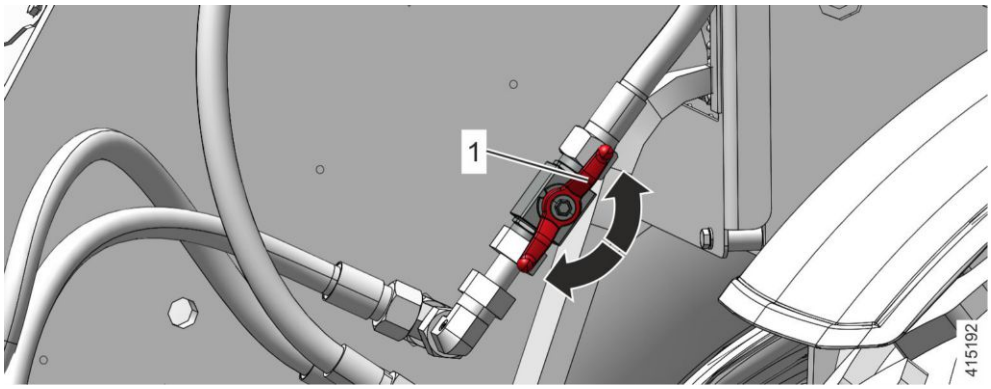


G2074799_1

Rear ball valve

1 Ball valve

► Turn ball valve **1** at rear of machine in a clockwise direction.
✔ Tank return is blocked.

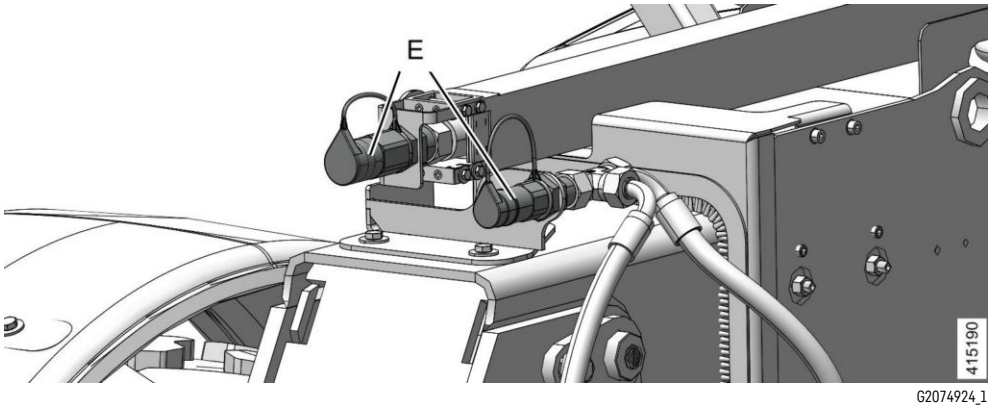


G2074801_1

Front ball valve

1 Ball valve

► Turn ball valve **1** at front of telescope in a clockwise direction.
✔ Oil line is blocked.



G2074924_1

High flow control circuit III connections

E High flow control circuit III connections

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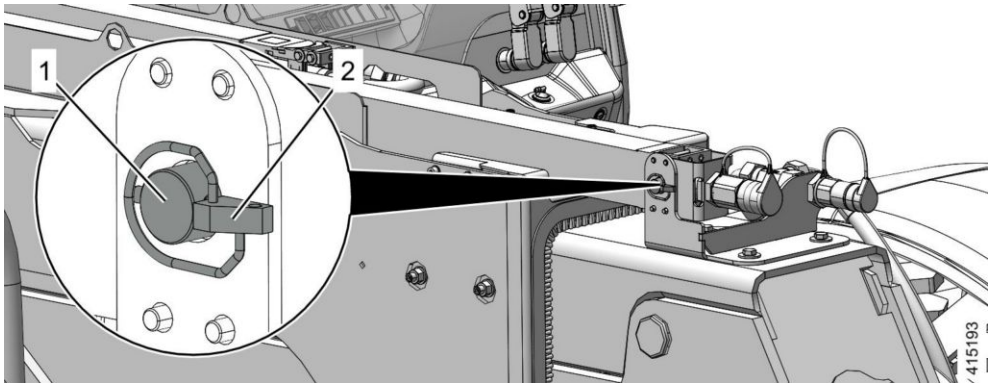
- ► Disconnect hydraulic lines of the attached working attachment from high flow control circuit III connections **E**.
- ► Attach protective caps to high flow control circuit III connections **E**.

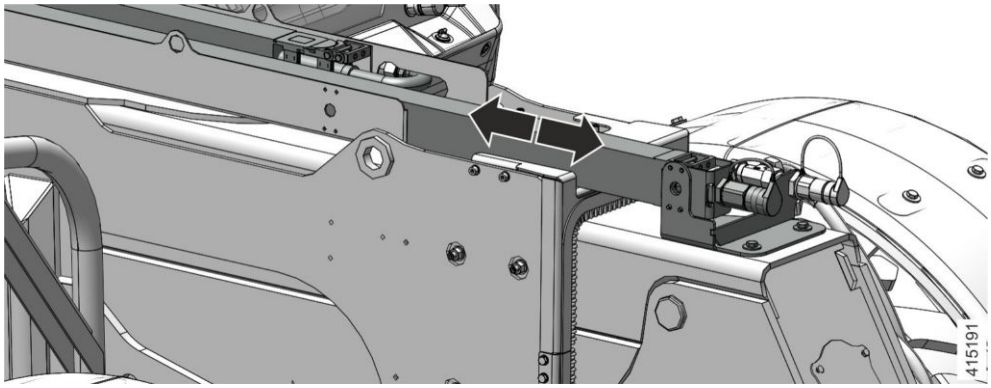


G2074797_1

Pin

1	Pin	**2**	Cotter pin

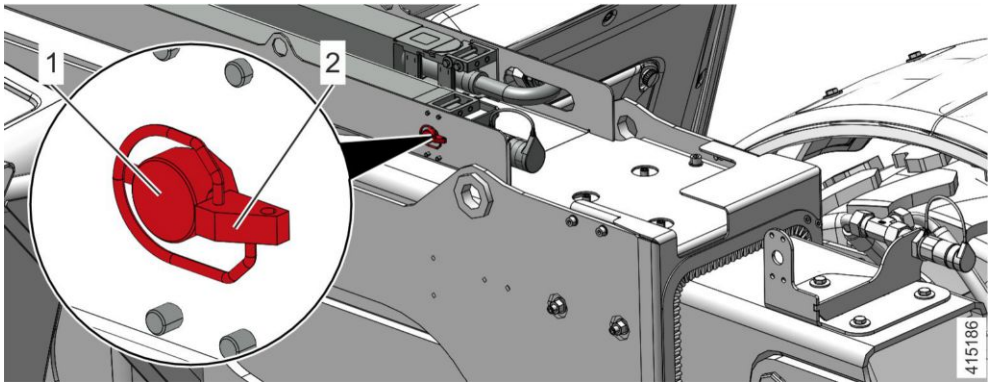
- ► Remove cotter pin **2**.
- ► Unpin pin **1**.



G2074795_1

Moving connection

- ► Move connection backward.



G2074793_1

Pin

1	Pin	**2**	Cotter pin

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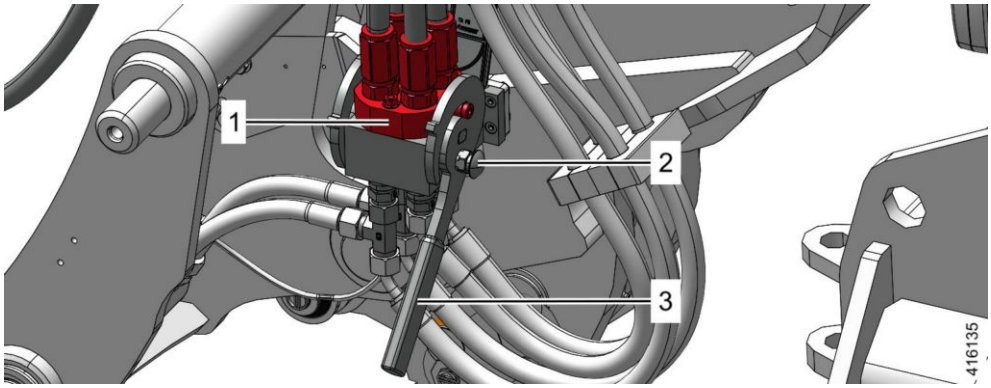
- ► Insert pin **1**.
- ► Secure pin **1** with a cotter pin **2**.

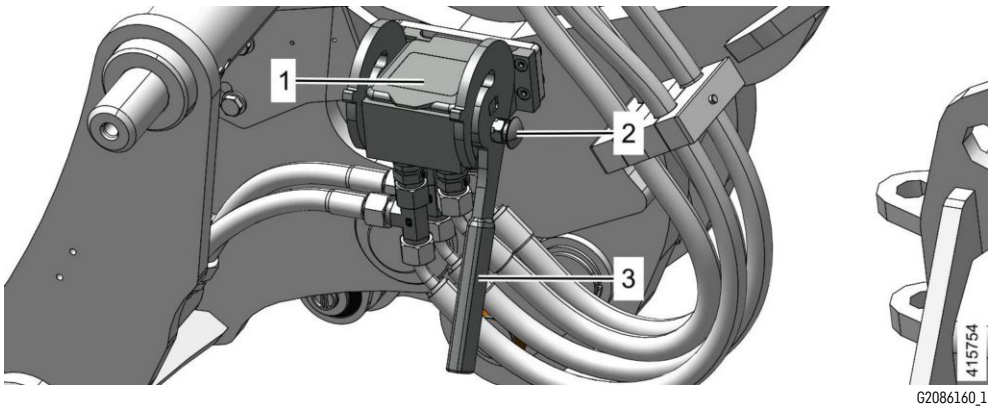
Multicoupler (option)



Multicoupler

1	Counterpiece	**3**	Lever
2	Locking button		

- ► Press locking button **2** and at the same time move lever **3** upwards.
  ✔ Multicoupler is opened.
- ► Disconnect counterpiece **1** from multicoupler.
- ► Move the lever **3** down.



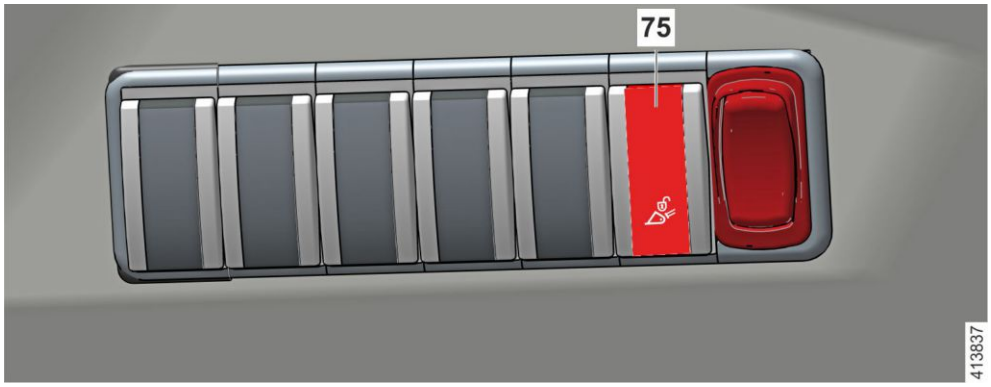
Multicoupler

1	Flap	**3**	Lever
2	Locking button		

- ► Close flap **1**.

Unlocking and disconnecting working attachment

WARNING
Working attachment falling over!
Injury.
► Make sure the working attachment is secured against falling over or rolling away.



G2047856_1

«Hydraulic quick coupler» button

75 «Hydraulic quick coupler» button

► Press and hold «Hydraulic quick coupler» button **75**.
✔ «Hydraulic quick coupler» indicator light lights up on display unit.

G2023545_2

Control lever rocker switch

10 «Control circuit III» rocker switch

► At same time, push «Control circuit III» rocker switch **10** on control lever to right in travel direction as viewed by operator (two hand operation).
✔ Hydraulic quick coupler's locking pins retract.

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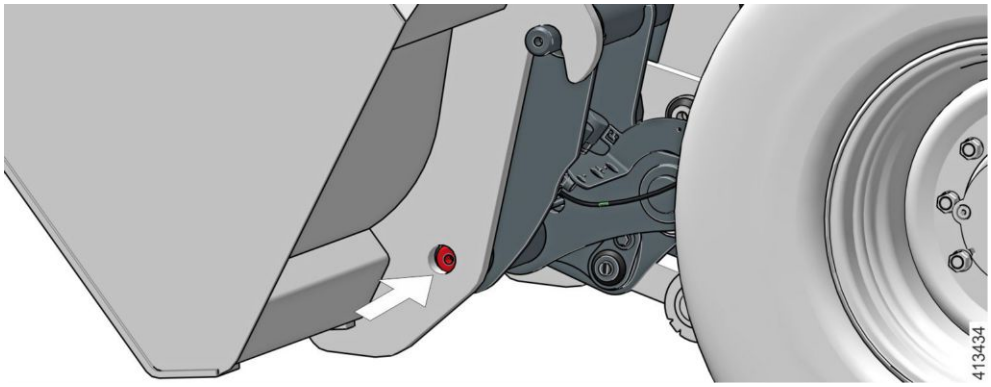


G2041809_1

Unlocking the working attachment

✔ Working attachment is unlocked.

- ► Release «Control circuit III» rocker switch on control lever.
- ► Release «Hydraulic quick coupler» button.

✔ «Hydraulic quick coupler» indicator light goes out on display unit.

G2041810_1

Tilting working attachment out

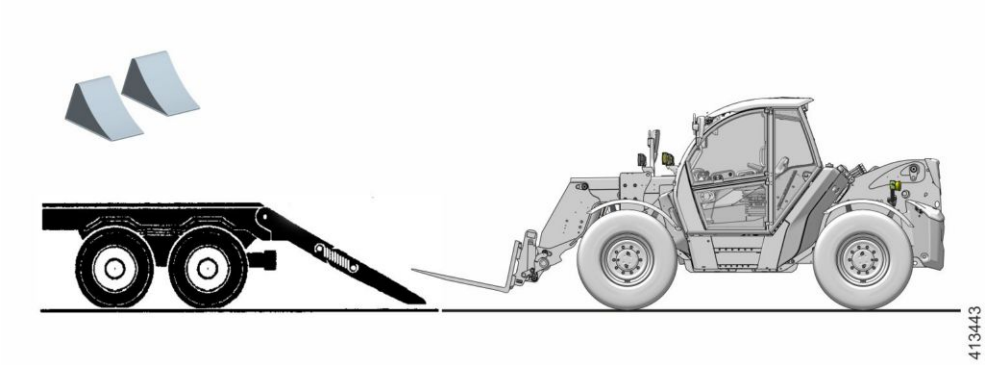
- ► Move control lever to **A**.
- ► Tilt hydraulic quick coupler slightly to front.
- ► Fully lower telescopic boom.
- ► Carefully travel away from working attachment with machine.

LWT/93517630/09/01/12/2023/en

3.6 Transport

3.6.1 Transporting machine by truck or rail

3.6.1.1 Preparing for transport

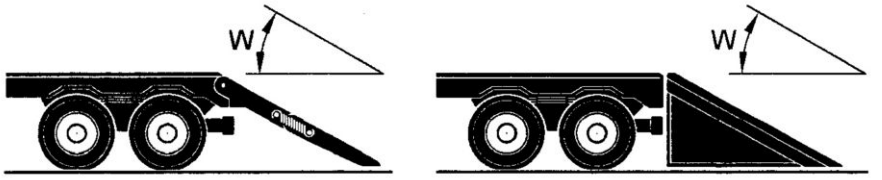


G2041842_1

Prepare the machine for transport

If necessary:

- ► Remove working attachment of the machine for duration of transport.
- ► Have suitable tension ropes or chains ready for rigging.
- ► Have chocks ready.



403048
G058974_1

Ramp incline

The ramp incline angle **W** must not exceed 30°.

- ► Have a suitable ramp ready for travelling onto loading surface.

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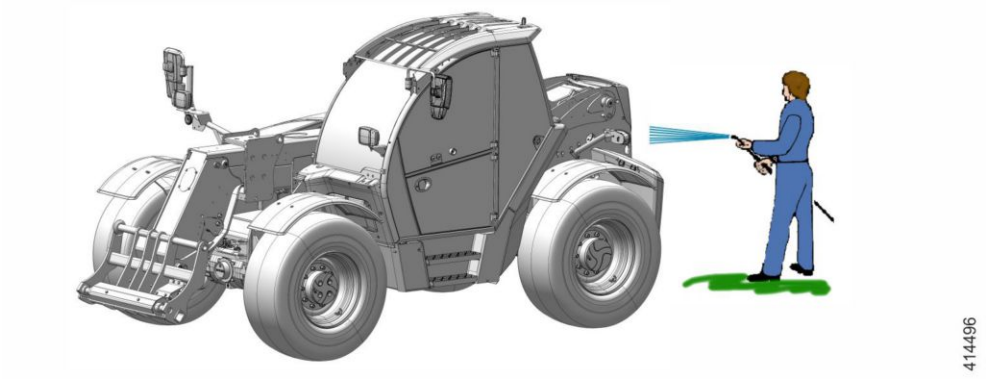


414496
G2036478_2

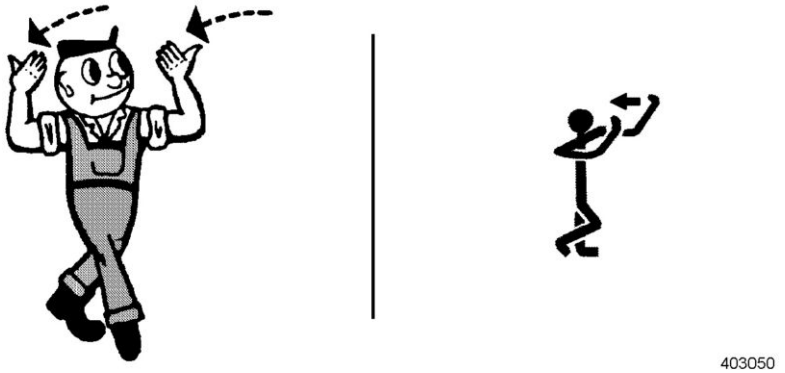
Wet cleaning

► Clean tyres before travelling onto the ramp.

3.6.1.2 Travelling onto the loading area

For detailed descriptions, see section. Page 181

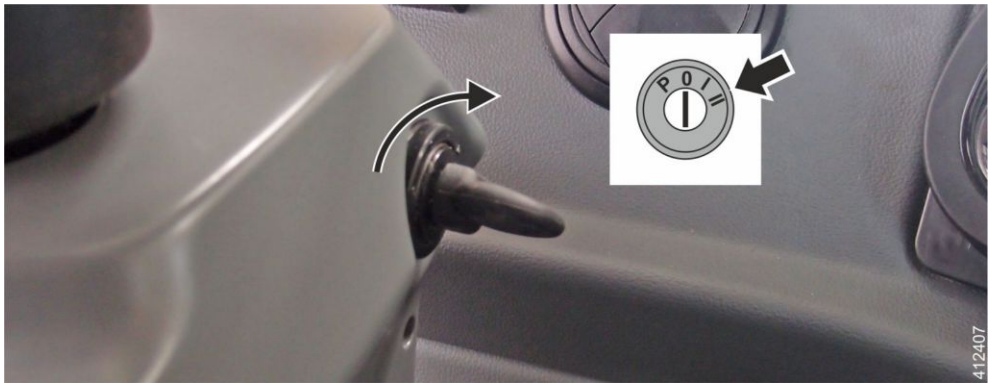
Make sure that a guide is on hand to give the operator the necessary signs.



403050
G058976_1

Guide

► Make sure that guide persons are at the side of the machine!



412407
G2021926_1

Starting procedure

► Start the diesel engine. Page 187 Page 195

Releasing the parking brake

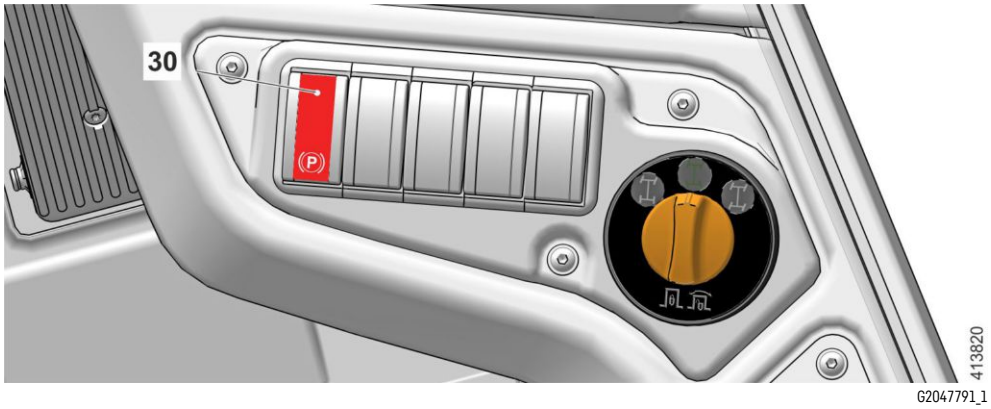
- ► Press top part of «Parking brake» switch **30**.
  ✔ After machine starts to travel, the «Parking brake» symbol goes out on the display.

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.

- ► Travel slowly onto loading surface.

3.6.1.3 After travelling onto loading surface

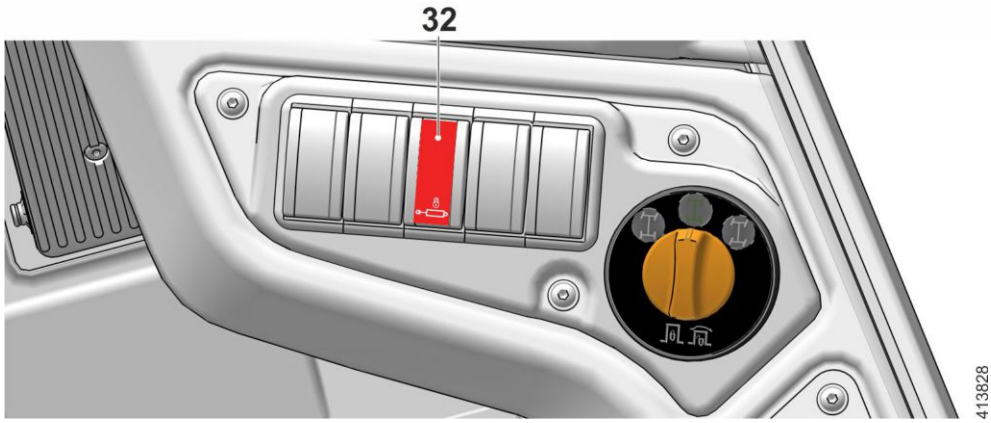
- ► Stop the machine.
- ► Lower telescopic boom and set working attachment down on loading surface so it is level.



Activating the parking brake

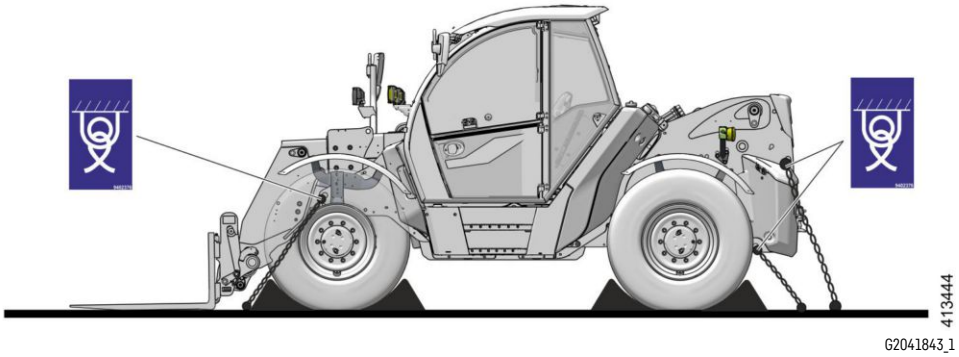
- ► Press bottom part of «Parking brake» switch **30**.
  ✔ «Parking brake» symbol lights up on the display.

LWT/93517630/09/01/12/2023/en



Locking working hydraulics

- ► Press bottom part of «Working hydraulics off» switch **32**.
  ✔ «Working hydraulics off» symbol lights up on the display.
- ► Turn diesel engine off.
- ► Close and lock all doors and hoods on the machine.
- ► Fold exterior mirrors in.



Rigging points

- ► Always use chocks, tension ropes or tension chains to keep the machine from slipping.
- ► Fasten tension ropes or chains to the marked rigging points on machine.

3.6.2 Loading the machine with a crane

For loading, observe the accident prevention guidelines! Page 94

Make sure that following requirements are met:

- ☑ Telescopic boom is completely retracted and lowered.
- ☑ Working attachment is completely tilted in.
- ☑ Joystick is in neutral position.
- ☑ Parking brake is activated.
- ☑ Working hydraulics are locked.
- ☑ Diesel engine is turned off.
- ☑ All doors and hoods on the machine are closed and locked.

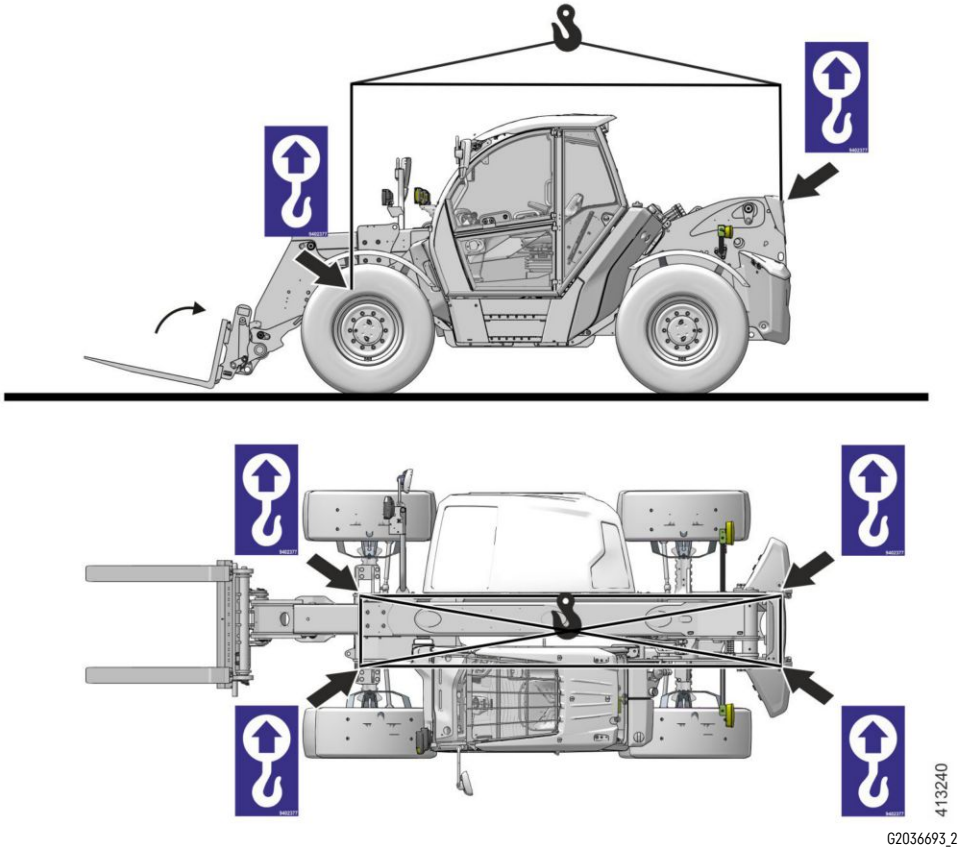
LWT/93517630/09/01/12/2023/en

☑ Exterior mirrors are folded in.

3.6.2.1 Preparing for transport

WARNING
Suspended and falling loads!
Danger to life, serious injuries.
► Make sure there is nobody in the hazard zone around the machine.

► If necessary, remove a part of the working attachment before loading the machine with the crane.
► Pay attention to the weight and cargo dimensions of the machine. For additional information, see section „Technical Data“.
► Pay attention to load bearing capacity and the length of slinging gear: for additional information, see section „Technical Data“.



Slinging / lifting points

► Install or hang the suspension on the designated slinging / lifting points on the machine.

Note
► The slinging / lifting points are marked with a corresponding sign.

► Carefully lift and load the machine.

LWT/93517630/09/01/12/2023/en

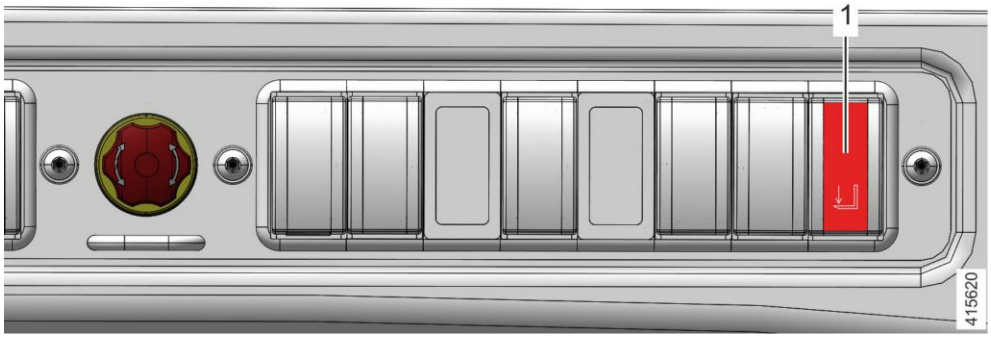
3.7 Emergency operations

3.7.1 Emergency down (option)

The emergency down can be used to lower the telescopic boom in event of a diesel engine failure. The load torque limitation remains active in this context and prevents machine from tipping over at front.

Ensure that following requirements are met:

- ☑ Diesel engine is turned off.
- ☑ Starting switch is in contact position **I**.
- ☑ Working hydraulics are not locked.
- ☑ Tipping cylinder lock is deactivated.



G2081005_1

«Emergency down» button

1 «Emergency down» button

► Press and hold «Emergency down» button **1**.
  ✔ «Emergency down» symbol is shown on the display.
  ✔ An acoustic signal sounds.

Troubleshooting
Is «Emergency down» symbol flashing on the display?
Requirements for emergency down are not met.
► Ensure that all requirements are met.

► After pressing for 5 seconds, move control lever to left and to front as well.
  ✔ Telescopic boom is lowered.

If the machine exceeds the stability limit to front during the emergency down, the load torque limitation prevents any further lowering of telescopic boom.

If load torque limitation prevents complete lowering:

► Engage parking brake.
► Lock the working hydraulics.
► Set the starting switch to zero position **0**.
► Disconnect battery.

LWT/93517630/09/01/12/2023/en

- ► Lock machine.
- ► Secure machine against rolling away if necessary.
- ► Secure hazard zone.
- ► Contact Liebherr customer service.

3.7.2 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.

3.7.2.1 Restricted operation

Emergency mode, travel hydraulics:

- – Service code is displayed on the monitor.
- – A maximum travel speed of up to 7 km/h (4.3 mph) 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.

3.7.2.2 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.

3.7.3 Emergency steering

Preconditions:

☑ «Emergency steering» symbol is shown.

Procedure

1. ► Move the machine out of the hazard zone.
2. ► Park machine properly.
3. ► Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

3.7.4 Towing and recovering the machine

The following instructions are valid exclusively for exceptional situations and apply when bringing a disabled machine to a location where it can be repaired or loaded. Always use a transport vehicle to convey the machine over long distances.

Towing or recovering the machine is always carried out at the owner's risk.

Towing speed and towing distance

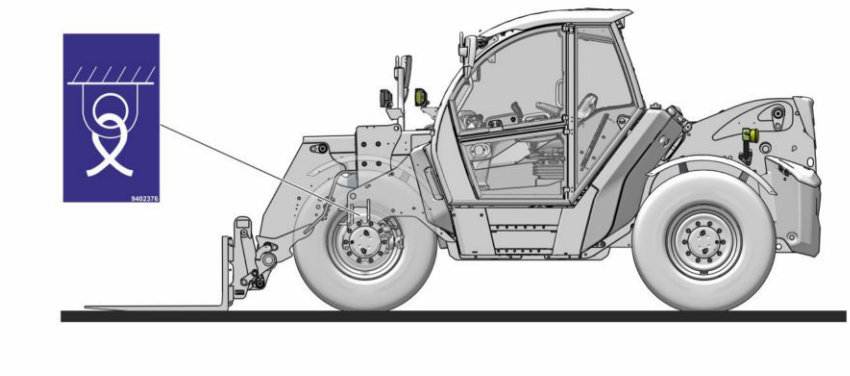
Name	Value
Maximum towing speed	2 km/h (1.2 mph)
Maximum towing distance	200 m (656.2 ft)

3.7.4.1 Safety when towing and recovering

When towing and recovering, observe all specified safety regulations and the following recommendations:

- Observe safety instructions for towing and recovering the machine. Page 91
- Observe the statutory provisions applicable on site.
- Tow exclusively using a towing bar of a suitable tensile strength.
- Recover exclusively using a suitable recovery device.
- Approach and move the machine slowly and evenly. If the machine is moved unevenly, the towing bar may be overloaded and break off.
- When towing on slopes, the towing machine must be at least the same size as the machine being towed. Power, weight and brake force of the towing machine must be adequate to keep both machines under control. If necessary, add a machine of the same size to the rear for braking purposes.
- Ensure even load distribution at the attachment points.
- Avoid inclined loads. Pull machine to the rear or to the front in as level a position as possible.

3.7.4.2 Towing points and recovery points on the machine

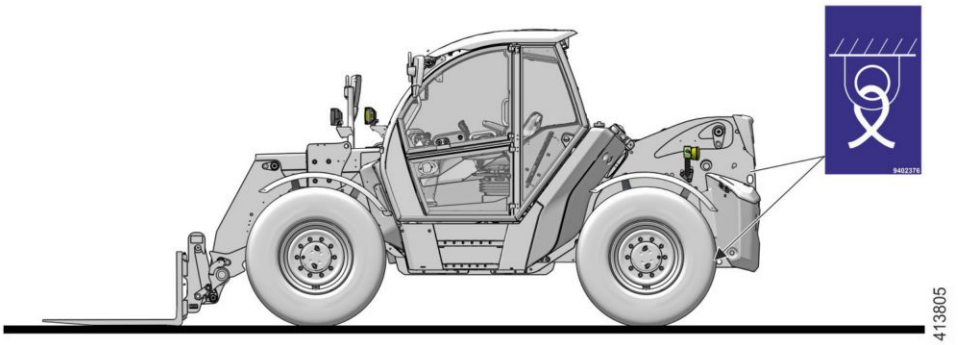


413804

G2047548_2

Front rigging points

Front rigging points are the attachment points for towing forward.

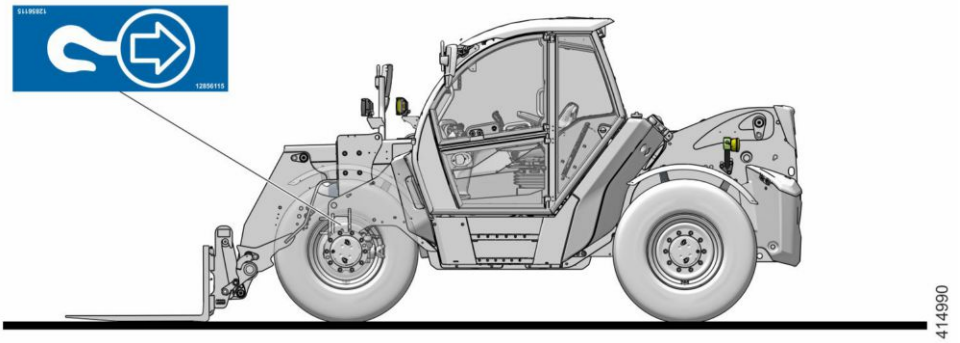


G2047549_2

Rear rigging points

Rear rigging points are the attachment points for towing backward.

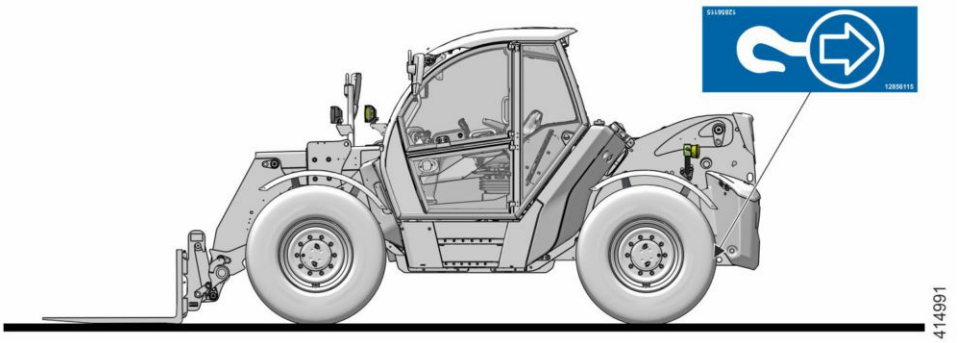
The rigging points are marked with the «Rigging point» information sign.



G2071352_1

Front recovery points

The front recovery points are marked with the appropriate «Recovery point» information sign.



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Rear recovery points

The rear recovery points are marked with the appropriate «Recovery point» information sign.

The maximum permissible pulling force at the recovery points is 55 kN (12,360 lb_f). The maximum permissible pulling force may only be applied in longitudinal direction of the machine (± 20°).

LWT/93517630/09/01/12/2023/en

3.7.4.3 Preparing machine for towing

The machine is equipped with a parking brake which is vented by hydraulic pressure. The hydrostat acts as a service brake. If the machine is disabled, the parking brake is applied and the machine cannot be moved.

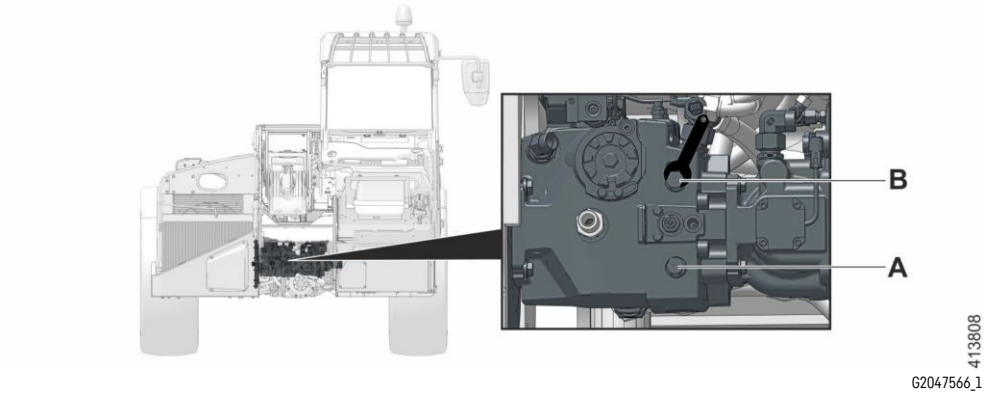
The machine can be towed away by short circuiting the hydrostat and releasing the parking brake.

Make sure the following preconditions are met:

☑ Chocks to secure the machine are present.
☑ A suitable towing machine as well as a tow rod with sufficient tensile strength are available.
☑ Required tool for towing the machine is available.

► Fasten tow rod to front attachment point or rear attachment point.

3.7.4.4 Short circuiting the hydrostat



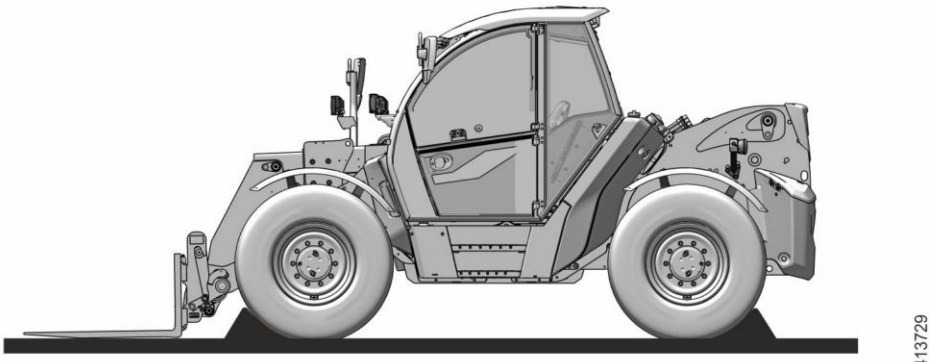
Travel pump high pressure valves

A	High pressure valve	**B**	High pressure valve

► Unscrew high pressure valve **A** and high pressure valve **B** by three full turns.
✔ High pressure valve **A** and high pressure valve **B** are open.
✔ Hydrostat is short circuited.

3.7.4.5 Releasing parking brake

DANGER
Brakes released!
Danger to life.
► Secure the machine to prevent it from rolling off.



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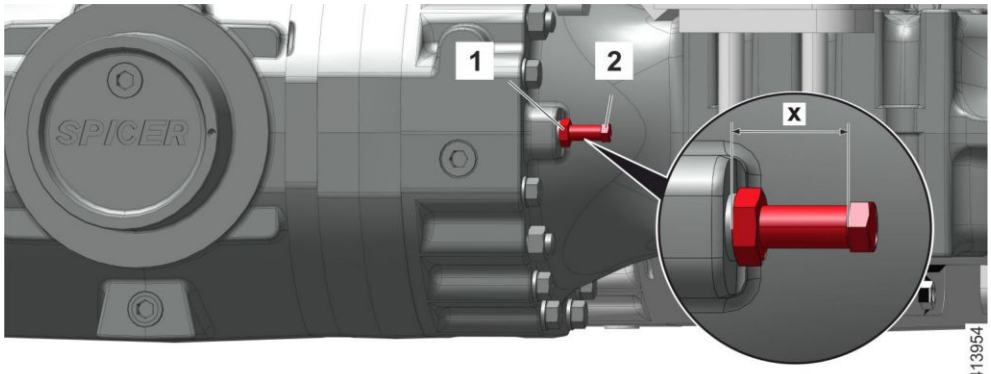
Securing machine

► Secure machine with chocks to prevent it rolling away.



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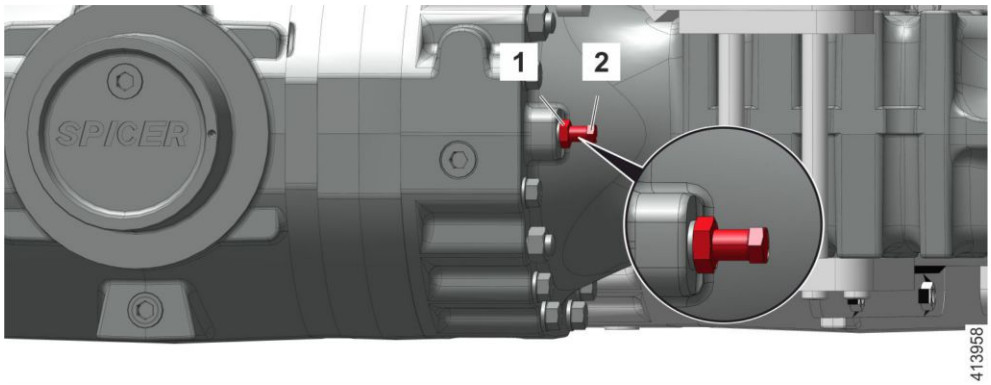
Loosening counter nut

1	Counter nut	**2**	Screw

► Loosen counter nut **1**.
► Screw in counter nut **1** 8 mm (0.31 in) in the direction of screw head.



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Releasing parking brake

1	Counter nut	**2**	Screw

► Screw in screw **2** until counter nut **1** touches attachment point.
► Do not tighten counter nut **1** by more than one turn.

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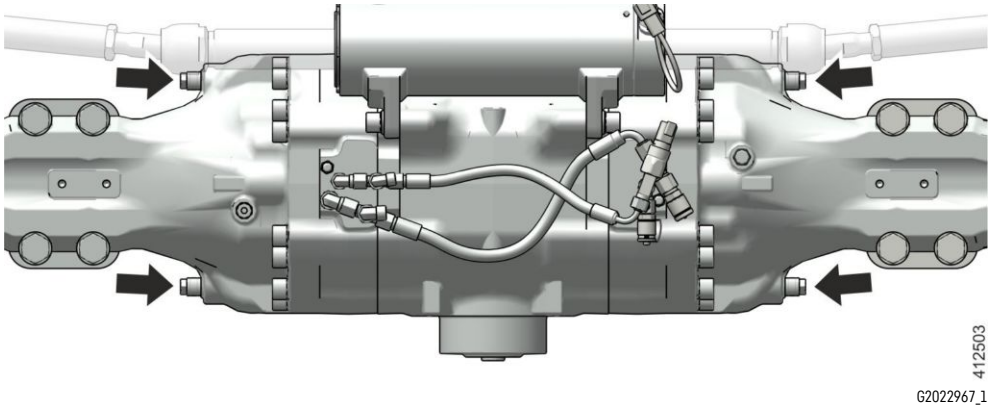


Hexagon head screw on front axle

- ► Carry out procedure for all four hexagon head screws on the front axle.
  - ✔ The parking brake is released.
  - ✔ The machine is unbraked.

3.7.4.6 Towing machine

DANGER

Machine may roll away when brakes are released!

Danger to life.

- ► Carry out towing procedure taking the specified safety instructions into account.

NOTICE

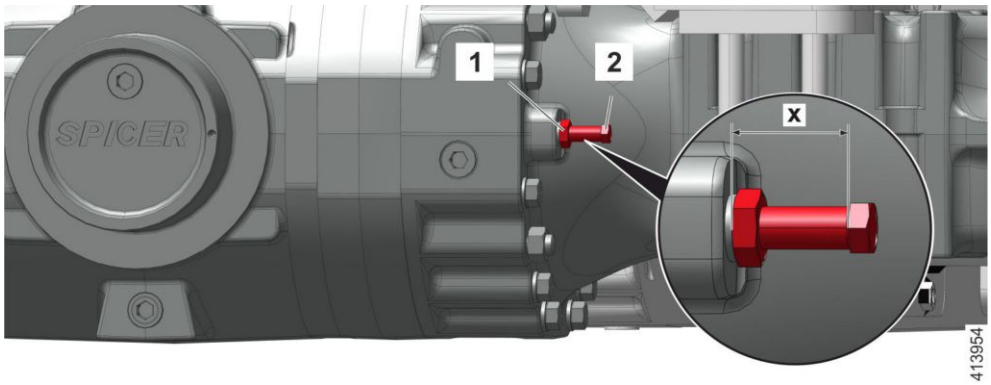
Insufficient lubrication!

Damage to the diesel engine.

- ► Adhere to maximum towing speed and maximum towing distance.

- ► Tow machine out of hazard zone carefully.

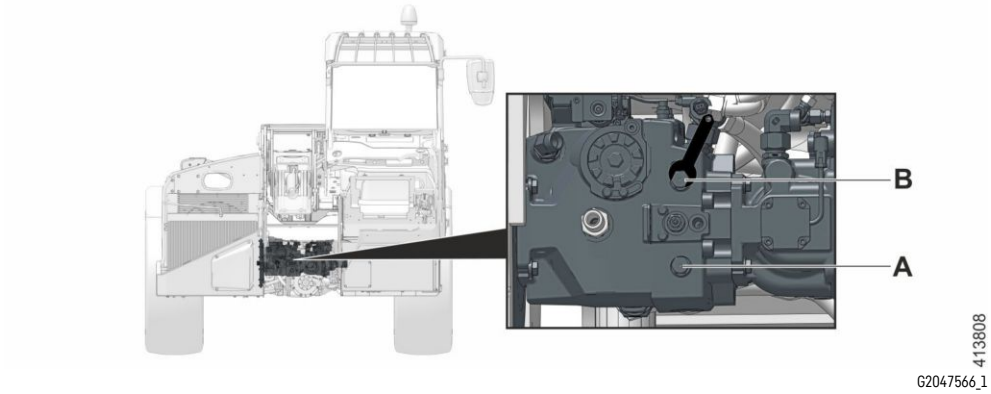
3.7.4.7 After the towing procedure



Loosening counter nut

1	Counter nut	**2**	Screw

- ► Unscrew screw **2** 8 mm (0.31 in).
- ► Do not tighten counter nut **1** by more than one turn.
  - ✔ Distance **x** must be 34 mm (1.34 in).
- ► Carry out procedure for all four hexagon head screws on the front axle.
  - ✔ Parking brake applied.



High pressure valves, travel pump

A	High pressure valve	**B**	High pressure valve

- ► Screw in high pressure valve **A** and high pressure valve **B** and tighten (tightening torque = 110 N·m (81.1 ft·lb$_f$)).
- ► Check travel drive function.

3.7.5 Auxiliary starting procedure

In case of starting difficulties, the machine can be started with the help of an external battery.

WARNING
Gas forming in the batteries!
Explosion.
- ► Avoid naked lights and fire.
- ► Wear safety glasses and protective gloves.

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NOTICE

Flat battery and donor battery with different voltages!

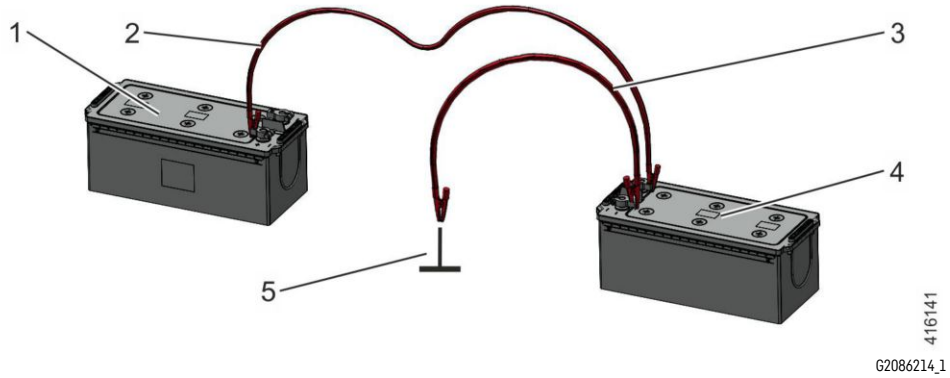
Damage.

► Use batteries of the same voltage.

Ensure that following requirements are met:

☑ The battery compartment is open.
☑ A suitable auxiliary battery is on hand.
☑ Two external jumper cables with sufficient cross section are on hand.

3.7.5.1 Connecting the auxiliary battery



Connecting jump start cables

1	Discharged battery	**4**	Auxiliary battery
2	Jump start cable	**5**	Engine console earthing point
3	Jump start cable		

► Connect jump start cable **2** to positive pole of the auxiliary battery **4**.
► Connect jump start cable **2** to positive pole of the discharged battery **1**.
► Connect jump start cable **3** to negative pole of the auxiliary battery **4**.
► Connect jump start cable **3** to engine console earthing point **5**.
► Start diesel engine.

3.7.5.2 Disconnecting the auxiliary battery

If applicable, switch on large consumers, such as the headlights, to avoid overvoltage.

► Bring the diesel engine of the machine to a low idle.
► To avoid overvoltage: Switch on large consumers such as headlights.

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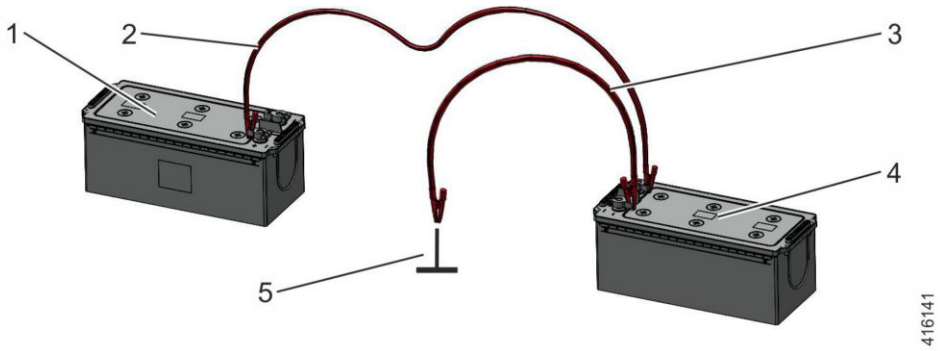

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Disconnecting jump start cables

1	Battery	**4**	Auxiliary battery
2	Jump start cable	**5**	Engine console earthing point
3	Jump start cable		

- ► Disconnect jump start cable **3** from engine console earthing point **5**.
- ► Disconnect jump start cable **3** from negative pole of the auxiliary battery **4**.
- ► Disconnect jump start cable **2** from positive pole of the battery **1**.
- ► Disconnect jump start cable **2** from positive pole of the auxiliary battery **4**.

LWT/93517630/09/01/12/2023/en

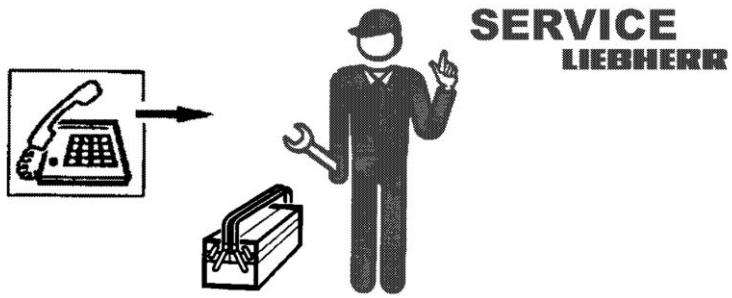
4 Operating problems

Warning messages and fault messages

- Various malfunctions are shown optically via the respective indicator lights or via the display instruments on the instrument panel.
- Warning functions are also acoustically supported.

Identifying and rectifying faults and errors

- Malfunctions can very often be traced back to incorrect operation or maintenance of machine.
  For that reason, read the relevant chapter in the operator's manual again carefully for each malfunction.
- Analyse the cause of the malfunction and rectify it immediately!
- Describe the malfunction and all accompanying circumstances as accurately as possible when you contact **Liebherr customer service**.
  Precise information makes it possible to find and rectify the cause of the fault quickly. Additionally, precise information on the type and serial number of the machine is also required.
- Do not carry out any work which you have not been trained or instructed to do.



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Liebherr customer service

Note
Taking care of problems using the „Service code charts“?
► Contact Liebherr customer service.

4.1 Service codes

4.1.1 Service code list

All service codes are shown on the display.

For service codes not noted in the list, contact Liebherr customer service.

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4.1.1.1 Explanation of terms for service code list

Abbreviations

Abbreviation	Meaning
CAN	Serial bus system (Controller Area Network)
SPN	Suspect Parameter Number
FMI	Failure Mode Identifier

Machine responses

Standard machine responses (effect)	Description
Limited mode	Machine is slowed to a standstill and can then be driven at limited speed. Drivable again after a restart. Maximum speed: 11 km/h (6.8 mph)
Travel drive blocked, until...	Driving off is not possible. Driving off becomes possible again as soon as the stated condition is changed.
Safe state	Machine is slowed to a standstill and driving off is no longer possible. Drivable again after a restart.
Joystick safe state	Affects the entire joystick; no further standard signals are sent, only error messages. A restart is required in order to leave.
Joystick safe signal state	The signals in question are marked as incorrect. This state is left as soon as the error is no longer detected.

4.1.1.2 Service codes

Equipment variant:

- Machine software 12938828.108
- Machine software 12938829.108

SPN	FMI	Component	Problem detected	Possible cause	Effect	Remedy
000091	00	Accelerator pedal angle sensor	Measured voltage too high: less than 95% of sensor supply but at least 50% "of difference between taught maximum value and 95% of sensor supply" greater than taught maximum value.	Taught maximum value incorrect; taught value too low	Machine response: limited mode; accelerator pedal cannot be used	Contact Liebherr customer service.
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 0V 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.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Component	Problem detected	Possible cause	Effect	Remedy
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 500mV, longer than 200ms	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?)	Cable break	Fuel display remains at minimum/empty	Contact Liebherr customer service.
000116	16	Power brake pressure sensor	Measured voltage greater than 4.9V	Short circuit to supply	No machine response; brake pressure can no longer be checked; danger, stop machine!	Contact Liebherr customer service.
000116	18	Power brake pressure sensor	Measured voltage less than 0.05V	Broken cable, short circuit to ground	No machine response; brake pressure can no longer be checked; danger, stop machine!	Contact Liebherr customer service.
000190	09	CAN 1 / communication I	CAN timeout of the diesel engine speed	CAN line to engine control unit disconnected; engine control unit not supplied	Diesel engine can stall more easily	Contact Liebherr customer service.
000246	13	Display	Internal memory error	-	Display no longer operational	Contact Liebherr customer service.
000521	00	Inching brake pedal angle sensor	Measured voltage too high: less than 96% of sensor supply but at least 100% "of difference between taught maximum value and 96% of sensor supply" greater than taught maximum value.	Taught maximum value incorrect; taught value too low	Machine response: safe state	Contact Liebherr customer service.
000521	01	Inching brake 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: safe state	Contact Liebherr customer service.
000521	02	Inching brake pedal angle sensor	Measured voltage not within a range of 0V to sensor supply, but greater	Short circuit to supply	Machine response: safe state	Contact Liebherr customer service.
000521	03	Inching brake pedal angle sensor	Measured voltage too high: greater than 96% of sensor supply but less than sensor supply	Short circuit to sensor supply	Machine response: safe state	Contact Liebherr customer service.
000521	04	Inching brake pedal angle sensor	Measured voltage too low: less than 5% of sensor supply	Broken cable, short circuit to ground	Machine response: safe state	Contact Liebherr customer service.
000521	07	Inching brake pedal angle sensor	Measured redundancy difference too high: greater than 500mV, longer than 200ms	Cable break of the redundant signal	Machine response: safe state	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Component	Problem detected	Possible cause	Effect	Remedy
000521	11	Inching brake pedal angle sensor / service brake pressure switch	PF2: Brake pressure monitoring – brake pressure present, although inching brake pedal not stepped on for more than 6000ms	Short circuit at service brake pressure switch; neutral position of inching brake pedal not calibrated	Machine response: safe state	Contact Liebherr customer service.
000521	13	Inching brake pedal angle sensor	Taught values outside the permitted range	Inching brake pedal is not calibrated	Machine response: travel drive blocked until inching brake pedal is taught correctly	Contact Liebherr customer service.
000521	14	Inching brake pedal angle sensor / service brake pressure switch	PF2: Brake pressure monitoring – brake pressure not present, although inching brake pedal stepped on sufficiently for more than 6000ms	Cable break at service brake pressure switch; service brake pressure too low; 100% inch point not calibrated	Machine response: limited mode	Contact Liebherr customer service.
000619	05	Parking brake solenoid valve	Measured current too low	Cable break	Machine response: safe state; parking brake cannot be controlled	Contact Liebherr customer service.
000619	06	Parking brake solenoid valve	Measured current too high	Short circuit to ground	Machine response: safe state; parking brake cannot be controlled	Contact Liebherr customer service.
000619	11	Parking brake solenoid valve; parking brake pressure switch	Parking brake monitoring: parking brake does not respond to the command that is sent or responds too slowly (not within 10s)	Hydraulic error; cable break at the pressure switch; very low ambient temperature	Machine response: limited mode	Contact Liebherr customer service.
000630	14	Display	Internal memory error	-	Display no longer operational	Contact Liebherr customer service.
000898	09	CAN 1 / communication I	CAN timeout of the diesel engine speed request	CAN line to engine control unit disconnected; engine control unit not supplied	Diesel engine can stall more easily	Contact Liebherr customer service.
001058	14	Hydraulic trailer brake socket	Status signal for "Trailer brake error" active	Trailer brake defective	No machine response; hydraulic trailer brake defective; cannot be used again until the error is corrected!	Contact Liebherr customer service.
001619	02	Joystick travel direction switch	Value: measured travel direction signals are implausible (two directions simultaneously); Prof: redundant CAN signal faulty	Value: travel direction switch defective; Prof: faulty CAN communication	Machine response: limited mode	Contact Liebherr customer service.
001619	11	Travel stage adjustment joystick / CAN 1 - communication I	Error in corresponding CAN signal reported or redundant CAN signal faulty	Error detected on the joystick (joystick also sends error code); or communication error on CAN	Travel stage cannot be adjusted	Contact Liebherr customer service.
001638	00	Hydraulic oil temperature sensor	Calculated hydraulic oil temperature higher than safety threshold (95°C) for 4000ms	Hydraulic oil cooling defective; heat sink contaminated; excessive use of all sections simultaneously;	No machine response	Contact Liebherr customer service.
001638	03	Hydraulic oil temperature sensor	Measured resistance too high (>2420?)	Cable break; temperature higher than 200°C	Temperature measurement not functioning; 214°C is assumed; fan rotates at maximum speed	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Component	Problem detected	Possible cause	Effect	Remedy
001638	04	Hydraulic oil temperature sensor	Measured resistance too low (<730?)	Short circuit to ground; temperature lower than -50°C	Temperature measurement not functioning; 214°C is assumed; fan rotates at maximum speed	Contact Liebherr customer service.
001638	16	Hydraulic oil temperature sensor	Calculated hydraulic oil temperature higher than warning threshold (90°C) for 4000ms	Hydraulic oil cooling defective; heat sink contaminated; excessive use of all sections simultaneously;	No machine response	Contact Liebherr customer service.
001815	02	Brake light relay	Measured output signal does not correspond to the command	Short circuit or broken cable	Brake light cannot be controlled	Contact Liebherr customer service.
002003	02	CAN 1 / communication I	Communication problems	CAN bus OFF, Overrun, Timeout, Address not Claimed	Machine response: limited mode	Contact Liebherr customer service.
002595	00	Manual inching, minijoystick	Measured voltage too high: less than 97% of sensor supply but at least 50% "of difference between taught maximum value and 97% of sensor supply" greater than taught maximum value.	Taught maximum value incorrect; taught value too low	Manual inching cannot be used	Contact Liebherr customer service.
002595	01	Manual inching, minijoystick	Measured voltage too low: greater than 4% of sensor supply but at least 50% "of difference between taught minimum value and 4% of sensor supply" less than taught minimum value.	Taught minimum value incorrect; taught value too high	Manual inching cannot be used	Contact Liebherr customer service.
002595	02	Manual inching, minijoystick	Measured voltage not within a range of 0V to sensor supply, but greater	Short circuit to supply	Manual inching cannot be used	Contact Liebherr customer service.
002595	03	Manual inching, minijoystick	Measured voltage too high: greater than 97% of sensor supply but less than sensor supply	Short circuit to sensor supply	Manual inching cannot be used	Contact Liebherr customer service.
002595	04	Manual inching, minijoystick	Measured voltage too low: less than 4% of sensor supply	Broken cable, short circuit to ground	Manual inching cannot be used	Contact Liebherr customer service.
002595	07	Manual inching, minijoystick	Measured redundancy difference too high: greater than 500mV, longer than 200ms	Cable break of the redundant signal	Manual inching cannot be used	Contact Liebherr customer service.
002595	13	Manual inching, minijoystick	Taught values outside the permitted range	Manual inching is not calibrated	Machine response: travel drive blocked until manual inching is taught correctly	Contact Liebherr customer service.
002602	14	Oil level monitoring sensor	Status signal for “Hydraulic oil level low” active	Hydraulic oil level too low	No machine response	Contact Liebherr customer service.
002604	02	Pneumatic trailer brake inching function solenoid valve	Measured output signal does not correspond to the command	Short circuit or broken cable	Pneumatic trailer brake inching function cannot be controlled; machine response: limited mode	Contact Liebherr customer service.
002660	00	Joystick	Measured signal of the tilt axle too high or too low	-	Joystick safe signal state	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Component	Problem detected	Possible cause	Effect	Remedy
002661	00	Joystick	Measured signal of the lift/lower axle too high or too low	-	Joystick safe signal state	Contact Liebherr customer service.
002662	00	Joystick	Measured signal of the “travel direction” thumbwheel too high or too low	-	Joystick safe signal state	Contact Liebherr customer service.
002662	04	Joystick, roller control circuit	Measured voltage too low: <300mV longer than 200ms	Broken cable; short circuit to ground	Control circuit not available	Contact Liebherr customer service.
002662	03	Joystick, roller control circuit	Measured voltage too high: >4700mV longer than 200ms	Short circuit to supply	Control circuit not available	Contact Liebherr customer service.
002662	02	Joystick, roller control circuit	Measured redundancy difference too high: greater than 200mV, longer than 200ms	Broken cable/short circuit at redundant signal	Control circuit not available	Contact Liebherr customer service.
002663	00	Joystick	Measured signal of the “telescoping” thumbwheel too high or too low	-	Joystick safe signal state	Contact Liebherr customer service.
002663	04	Joystick, telescope roller	Measured voltage too low: <300mV longer than 200ms	Broken cable; short circuit to ground	Telescoping not available	Contact Liebherr customer service.
002663	03	Joystick, telescope roller	Measured voltage too high: >4700mV longer than 200ms	Short circuit to supply	Telescoping not available	Contact Liebherr customer service.
002663	02	Joystick, telescope roller	Measured redundancy difference too high: greater than 200mV, longer than 200ms	Broken cable/short circuit at redundant signal	Telescoping not available	Contact Liebherr customer service.
002664	00	Joystick	Measured signal of the “control circuit 3” thumbwheel too high or too low	-	Joystick safe signal state	Contact Liebherr customer service.
002685	00	Joystick	Measured signal of the “decrease travel mode” button too high or too low	-	Joystick safe signal state	Contact Liebherr customer service.
002686	00	Joystick	Measured signal of the “increase travel mode” button too high or too low	-	Joystick safe signal state	Contact Liebherr customer service.
002687	00	Joystick	Measured signal of the “control circuit 3 change over” button too high or too low	-	Joystick safe signal state	Contact Liebherr customer service.
002688	00	Joystick	Measured signal of the “neutral travel direction” button too high or too low	-	Joystick safe signal state	Contact Liebherr customer service.
002689	00	Joystick	Measured signal of the “bucket repositioning” button too high or too low	-	Joystick safe signal state	Contact Liebherr customer service.
002690	00	Joystick	Measured signal of the “differential lock” button too high or too low	-	Joystick safe signal state	Contact Liebherr customer service.
002691	00	Joystick	-	-	Joystick safe signal state	Contact Liebherr customer service.
002692	00	Joystick	-	-	Joystick safe signal state	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Component	Problem detected	Possible cause	Effect	Remedy
002693	00	Joystick	-	-	Joystick safe signal state	Contact Liebherr customer service.
002694	00	Joystick	-	-	Joystick safe signal state	Contact Liebherr customer service.
002931	14	Brake oil level switch	Status signal for “Brake oil level low” active	Brake oil level too low; air / leak in the brake system	No machine response; braking effect unreliable!	Contact Liebherr customer service.
004212	02	Hydrostatic fan proportional valve	Measured current too high or too low: by 200mA (by 10mA in idle state) too high/too low for 2000ms	Broken cable; short circuit to ground	Fan control not available; fan rotates at maximum speed	Contact Liebherr customer service.
004212	06	Hydrostatic fan proportional valve	Measured overload at the control unit output: greater than 5A	Current load at the output too high	Fan control not available; fan rotates at maximum speed	Contact Liebherr customer service.
004212	14	Hydrostatic fan proportional valve	Shut off detected in the 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	Fan control not available; fan rotates at maximum speed	Contact Liebherr customer service.
520192	14	Display	Internal memory error	-	Display no longer operational	Contact Liebherr customer service.
520193	14	CAN 1 / communication I	Interference signal on CAN bus, communication not possible	CAN bus OFF; short circuit to supply; loose contact of ground pin to control unit	No machine response; machine not operational	Contact Liebherr customer service.
520195	14	Display	Unknown platform coding	Either signal at pin 1+2 or signal neither at pin 1 nor at pin 2	Machine response: power brake braking pressure can no longer be correctly evaluated; danger, stop the machine!	Contact Liebherr customer service.
520200	09	CAN 1 / communication I	No communication between the display and engine control unit	CAN line to engine control unit disconnected; engine control unit not supplied	No machine response; various displays not available	Contact Liebherr customer service.
520201	09	CAN 5 / communication V	Error on the display bus CAN5 from Tera 7, no communication between A47.X1 and A47.X2	CAN line between X1 and X2 disconnected or damaged	Machine response: power brake braking pressure can no longer be correctly evaluated; danger, stop the machine!	Contact Liebherr customer service.
520214	05	Working pump and control valve block overspeed safety valves	Measured current lower than 220mA / overload detected at the control unit output for more than 2000ms	Cable break / current load at the output too high	Overspeed safety not available; braking path is longer in certain situations	Contact Liebherr customer service.
520214	06	Working pump and control valve block overspeed safety valves	Measured output signal does not correspond to the command for more than 2000ms	Short circuit to supply	Overspeed safety not available; braking path is longer in certain situations	Contact Liebherr customer service.
520214	14	Working pump and control valve block overspeed safety valves	Shut off detected in the 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	Overspeed safety not available; braking path is longer in certain situations	Contact Liebherr customer service.
520215	05	Working hydraulics emergency shut-off solenoid valve	Measured current lower than 220mA / overload detected at the control unit output for more than 500ms	Cable break / current load at the output too high	Working hydraulics not available	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Component	Problem detected	Possible cause	Effect	Remedy
520215	06	Working hydraulics emergency shut-off solenoid valve	Measured output signal does not correspond to the command for more than 500ms	Short circuit to supply	Working hydraulics not available	Contact Liebherr customer service.
520215	14	Working hydraulics emergency shut-off solenoid valve	Shut off detected in the 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	Working hydraulics not available	Contact Liebherr customer service.
520216	05	Crab steering solenoid valve	Measured current lower than 220mA / overload detected at the control unit output for more than 2000ms	Cable break / current load at the output too high	Crab steering not available	Contact Liebherr customer service.
520216	06	Crab steering solenoid valve	Measured output signal does not correspond to the command for more than 2000ms	Short circuit to supply	Crab steering not available	Contact Liebherr customer service.
520216	14	Crab steering solenoid valve	Shut off detected in the 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 220mA / overload detected at the control unit output for more than 2000ms	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 2000ms	Short circuit to supply	All-wheel steering not available	Contact Liebherr customer service.
520217	14	All-wheel steering solenoid valve	Shut off detected in the 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 220mA / overload detected at the control unit output for more than 120ms	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 120ms	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 the 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.
520220	09	CAN 1 / communication I	No communication between the display and travel control	CAN line to travel control disconnected; travel control not supplied	No machine response; various displays not available	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Component	Problem detected	Possible cause	Effect	Remedy
520221	02	Load reduction proportional valve	Measured current too high or too low: by 100mA (by 10mA in idle state) too high/too low for 2000ms	Broken cable; short circuit to ground	Lower telescopic arm not available	Contact Liebherr customer service.
520221	06	Load reduction proportional valve	Measured overload at the control unit output: greater than 5A	Current load at the output too high	Lower telescopic arm not available	Contact Liebherr customer service.
520221	14	Load reduction proportional valve	Shut off detected in the 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	Lower telescopic arm not available	Contact Liebherr customer service.
520232	02	Hoist angle sensor	Measured redundancy difference too high: greater than 200mV, longer than 200ms	Broken cable/short circuit at redundant signal	Load torque limitation blocked; telescopic arm end position damper not available; hoist angle assumed to be maximum	Contact Liebherr customer service.
520232	03	Hoist angle sensor	Measured voltage too high: at least 80% "of the difference between the taught maximum value and 96% of the sensor supply" greater than the taught maximum value for more than 2000ms	Taught maximum value incorrect, taught value too low; short circuit to supply / sensor supply;	Load torque limitation blocked; telescopic arm end position damper not available; hoist angle assumed to be maximum	Contact Liebherr customer service.
520232	04	Hoist angle sensor	Measured voltage too low: at least 50% "of the difference between the taught minimum value and 4% of the sensor supply" less than the taught minimum value for more than 2000ms	Taught minimum value incorrect, taught value too high; cable break; short circuit to ground;	Load torque limitation blocked; telescopic arm end position damper not available; hoist angle assumed to be maximum	Contact Liebherr customer service.
520233	02	Working pump swivel angle sensor	Measured voltage too high or too low	Broken cable; short circuit to ground or supply	Diesel engine can stall more easily	Contact Liebherr customer service.
520233	03	Working pump swivel angle sensor	Measured voltage too high: >95% of the sensor supply for 1000ms	Short circuit to sensor supply; short circuit to supply	Diesel engine can stall more easily	Contact Liebherr customer service.
520233	04	Working pump swivel angle sensor	Measured voltage too low: <5% of the sensor supply for 1000ms or <150mV for 1000ms	Broken cable; short circuit to ground	Diesel engine can stall more easily	Contact Liebherr customer service.
520233	09	CAN 1 / communication I	CAN timeout of the working pump swivel angle signal between work control “Frame1” and pump control	CAN line to pump control disconnected; pump control not supplied; non-compatible software version on pump control	Auto inch not available	Contact Liebherr customer service.
520234	05	Accumulator charge valve, pilot pressure	Measured current too low for more than 2000ms	Broken cable / short circuit to supply	Emergency down not available	Contact Liebherr customer service.
520234	06	Accumulator charge valve, pilot pressure	Measured overload at the control unit output: greater than 5A	Current load at the output too high	Emergency down not available	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Component	Problem detected	Possible cause	Effect	Remedy
520234	14	Accumulator charge valve, pilot pressure	Shut off detected in the 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	Emergency down not available	Contact Liebherr customer service.
520235	02	Overload off switch	Measured input signals are not suitable for the logic of the switch for more than 500ms	Broken cable; short circuit to ground/supply	Load torque limitation always active	Contact Liebherr customer service.
520236	03	DMS evaluation electronics	Measured current too high: >20.6mA	Short circuit to supply	Load torque limitation: a load of 100% is assumed	Contact Liebherr customer service.
520236	04	DMS evaluation electronics	Measured current too low: <3.8mA	Broken cable; short circuit to ground	Load torque limitation: a load of 100% is assumed	Contact Liebherr customer service.
520237	02	Steering mode switch	Measured input signals are not suitable for the logic of the switch for more than 200ms or improper operation for 3000ms	Cable break, short circuit to ground/supply or improperly long switching operations	Steering mode change over not available	Contact Liebherr customer service.
520238	02	Tilt angle sensor	Measured redundancy difference too high: greater than 200mV, longer than 200ms	Broken cable/short circuit at redundant signal	Bucket repositioning not available; a certain tilt angle is assumed	Contact Liebherr customer service.
520238	03	Tilt angle sensor	Measured voltage too high: at least 80% "of the difference between the taught maximum value and 96% of the sensor supply" greater than the taught maximum value for more than 2000ms	Taught maximum value incorrect, taught value too low; short circuit to supply / sensor supply;	Bucket repositioning not available; a certain tilt angle is assumed	Contact Liebherr customer service.
520238	04	Tilt angle sensor	Measured voltage too low: at least 50% "of the difference between the taught minimum value and 4% of the sensor supply" less than the taught minimum value for more than 2000ms	Taught minimum value incorrect, taught value too high; cable break; short circuit to ground;	Bucket repositioning not available; a certain tilt angle is assumed	Contact Liebherr customer service.
520239	02	Manual throttle, mini-joystick	Measured redundancy difference too high: greater than 200mV, longer than 200ms	Broken cable/short circuit at redundant signal	Manual throttle not available	Contact Liebherr customer service.
520239	03	Manual throttle, mini-joystick	Measured voltage too high: >4700mV	Short circuit to supply	Manual throttle not available	Contact Liebherr customer service.
520239	04	Manual throttle, mini-joystick	Measured voltage too low: <300mV	Broken cable; short circuit to ground	Manual throttle not available	Contact Liebherr customer service.
520240	09	CAN 1 / communication I	No communication between the display and work control	CAN line to work control disconnected; work control not supplied	No machine response; various displays not available	Contact Liebherr customer service.
520241	02	Resistance circuit	Resistance value not in defined range for more than 500ms; defined ranges: 1.4 to 1.6; 2.81 to 3.2; 6 to 6.42; 7.4 to 8.02 kOhm	One of the resistors faulty; temperature of the resistors outside of range -40 °C to +80 °C;	Continuous function working circuit not available	Contact Liebherr customer service.
520241	04	Resistance circuit	Resistance value lower than 1400 Ohm for more than 500ms	Short circuit to ground	Continuous function working circuit not available	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Component	Problem detected	Possible cause	Effect	Remedy
520241	03	Resistance circuit	Resistance value higher than 8020 Ohm for more than 500ms	Cable break	Continuous function working circuit not available	Contact Liebherr customer service.
520242	05	Rear axle floating blocking solenoid valves	Measured current lower than 220mA / overload detected at the control unit output for more than 2000ms	Cable break / current load at the output too high	Rear axle floating blocking permanently active!	Contact Liebherr customer service.
520242	06	Rear axle floating blocking solenoid valves	Measured output signal does not correspond to the command for more than 2000ms	Short circuit to supply	Rear axle floating blocking permanently active!	Contact Liebherr customer service.
520242	14	Rear axle floating blocking solenoid valves	Shut off detected in the 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	Rear axle floating blocking permanently active!	Contact Liebherr customer service.
520243	05	Tipping cylinder lock solenoid valve	Measured current lower than 220mA / overload detected at the control unit output for more than 2000ms	Cable break / current load at the output too high	Tipping cylinder lock not available	Contact Liebherr customer service.
520243	06	Tipping cylinder lock solenoid valve	Measured output signal does not correspond to the command for more than 2000ms	Short circuit to supply	Tipping cylinder lock not available	Contact Liebherr customer service.
520243	14	Tipping cylinder lock solenoid valve	Shut off detected in the 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	Tipping cylinder lock not available	Contact Liebherr customer service.
520244	05	Hoist gear suspension 1	Measured current lower than 220mA / overload detected at the control unit output for more than 2000ms	Cable break / current load at the output too high	Hoist gear suspension not available	Contact Liebherr customer service.
520244	06	Hoist gear suspension 1	Measured output signal does not correspond to the command for more than 2000ms	Short circuit to supply	Hoist gear suspension not available	Contact Liebherr customer service.
520244	14	Hoist gear suspension 1	Shut off detected in the 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	Hoist gear suspension not available	Contact Liebherr customer service.
520245	05	Hoist gear suspension 2	Measured current lower than 220mA / overload detected at the control unit output for more than 2000ms	Cable break / current load at the output too high	Hoist gear suspension not available	Contact Liebherr customer service.
520245	05	Hoist gear suspension 2	Measured current too low for more than 2000ms	Broken cable / short circuit to supply	Hoist gear suspension not available	Contact Liebherr customer service.
520245	06	Hoist gear suspension 2	Measured output signal does not correspond to the command for more than 2000ms	Short circuit to supply	Hoist gear suspension not available	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Component	Problem detected	Possible cause	Effect	Remedy
520245	06	Hoist gear suspension 2	Measured current too low for more than 2000ms	Broken cable / short circuit to supply	Hoist gear suspension not available	Contact Liebherr customer service.
520245	14	Hoist gear suspension 2	Shut off detected in the 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	Hoist gear suspension not available	Contact Liebherr customer service.
520246	05	4x4 shut-off solenoid valve	Measured current lower than 220mA / overload detected at the control unit output for more than 2000ms	Cable break / current load at the output too high	4x4 shut-off not available	Contact Liebherr customer service.
520246	06	4x4 shut-off solenoid valve	Measured output signal does not correspond to the command for more than 2000ms	Short circuit to supply	4x4 shut-off not available	Contact Liebherr customer service.
520246	14	4x4 shut-off solenoid valve	Shut off detected in the 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	4x4 shut-off not available	Contact Liebherr customer service.
520247	05	Differential lock solenoid valve	Measured current lower than 220mA / overload detected at the control unit output for more than 2000ms	Cable break / current load at the output too high	Differential gear not available	Contact Liebherr customer service.
520247	06	Differential gear solenoid valve	Measured output signal does not correspond to the command for more than 2000ms	Short circuit to supply	Differential lock not available	Contact Liebherr customer service.
520247	14	Differential gear solenoid valve	Shut off detected in the 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	Differential lock not available	Contact Liebherr customer service.
520248	02	Auxiliary hydraulic motor proportional valve	Measured current too high or too low: by 384mA (by 10mA in idle state) too high/too low for 400ms	Broken cable; short circuit to ground	Auxiliary motor not available; maximum speed is not reached	Contact Liebherr customer service.
520248	06	Auxiliary hydraulic motor proportional valve	Measured overload at the control unit output: greater than 5A	Current load at the output too high	Auxiliary motor not available; maximum speed is not reached	Contact Liebherr customer service.
520248	14	Auxiliary hydraulic motor proportional valve	Shut off detected in the 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	Auxiliary motor not available; potentially reduced pulling force	Contact Liebherr customer service.
520249	06	Level adjustment A	Measured output signal does not correspond to the command for more than 2000ms	Short circuit to supply	Level adjustment A not available	Contact Liebherr customer service.
520249	05	Level adjustment A	Measured current too low for more than 2000ms	Broken cable / short circuit to supply	Level adjustment A not available	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Component	Problem detected	Possible cause	Effect	Remedy
520249	05	Level adjustment A	Measured current lower than 220mA / overload detected at the control unit output for more than 2000ms	Cable break / current load at the output too high	Level adjustment A not available	Contact Liebherr customer service.
520249	06	Level adjustment A	Measured overload at the control unit output: greater than 5A	Current load at the output too high	Level adjustment A not available	Contact Liebherr customer service.
520249	14	Level adjustment A	Shut off detected in the 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	Level adjustment A not available	Contact Liebherr customer service.
520250	06	Level adjustment B	Measured output signal does not correspond to the command for more than 2000ms	Short circuit to supply	Level adjustment B not available	Contact Liebherr customer service.
520250	05	Level adjustment B	Measured current too low for more than 2000ms	Broken cable / short circuit to supply	Level adjustment B not available	Contact Liebherr customer service.
520250	05	Level adjustment B	Measured current lower than 220mA / overload detected at the control unit output for more than 2000ms	Cable break / current load at the output too high	Level adjustment B not available	Contact Liebherr customer service.
520250	06	Level adjustment B	Measured overload at the control unit output: greater than 5A	Current load at the output too high	Level adjustment B not available	Contact Liebherr customer service.
520250	14	Level adjustment B	Shut off detected in the 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	Level adjustment B not available	Contact Liebherr customer service.
520251	02	Lift telescopic arm A proportional valve	Measured current too high or too low: by 200mA (by 10mA in idle state) too high/too low for 2000ms	Broken cable; short circuit to ground	Lift telescopic arm not available	Contact Liebherr customer service.
520251	06	Lift telescopic arm A proportional valve	Measured overload at the control unit output: greater than 5A	Current load at the output too high	Lift telescopic arm not available	Contact Liebherr customer service.
520251	14	Lift telescopic arm A proportional valve	Shut off detected in the 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	Lift telescopic arm not available	Contact Liebherr customer service.
520252	02	Lower telescopic arm B proportional valve	Measured current too high or too low: by 200mA (by 10mA in idle state) too high/too low for 2000ms	Broken cable; short circuit to ground	Lower telescopic arm not available	Contact Liebherr customer service.
520252	06	Lower telescopic arm B proportional valve	Measured overload at the control unit output: greater than 5A	Current load at the output too high	Lower telescopic arm not available	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Component	Problem detected	Possible cause	Effect	Remedy
520252	14	Lower telescopic arm B proportional valve	Shut off detected in the 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	Lower telescopic arm not available	Contact Liebherr customer service.
520253	02	PF3: Tilt direction A proportional valve; PF2: Bucket repositioning A proportional valve; tilt in	Measured current too high or too low: by 100mA (by 10mA in idle state) too high/too low for 2000ms	Broken cable; short circuit to ground	PF3: Tilting in not available in general; PF2: Tilting in during bucket repositioning not available	Contact Liebherr customer service.
520253	06	PF3: Tilt direction A proportional valve; PF2: Bucket repositioning A proportional valve; tilt in	Measured overload at the control unit output: greater than 5A	Current load at the output too high	PF3: Tilting in not available in general; PF2: Tilting in during bucket repositioning not available	Contact Liebherr customer service.
520253	14	PF3: Tilt direction A proportional valve; PF2: Bucket repositioning A proportional valve; tilt in	Shut off detected in the 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	PF3: Tilting in not available in general; PF2: Tilting in during bucket repositioning not available	Contact Liebherr customer service.
520254	02	PF3: Tilt direction B proportional valve; PF2: Bucket repositioning B proportional valve; tilt out	Measured current too high or too low: by 100mA (by 10mA in idle state) too high/too low for 2000ms	Broken cable; short circuit to ground	PF3: Tilting out not available in general; PF2: Tilting out during bucket repositioning not available	Contact Liebherr customer service.
520254	06	PF3: Tilt direction B proportional valve; PF2: Bucket repositioning B proportional valve; tilt out	Measured overload at the control unit output: greater than 5A	Current load at the output too high	PF3: Tilting out not available in general; PF2: Tilting out during bucket repositioning not available	Contact Liebherr customer service.
520254	14	PF3: Tilt direction B proportional valve; PF2: Bucket repositioning B proportional valve; tilt out	Shut off detected in the 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	PF3: Tilting out not available in general; PF2: Tilting out during bucket repositioning not available	Contact Liebherr customer service.
520255	02	Minijoystick additional control circuits	Measured redundancy difference too high: greater than 200mV, longer than 200ms	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: greater than 4920mV for more than 1000ms	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 80mV for more than 1000ms	Broken cable; short circuit to ground;	Additional control circuits not available	Contact Liebherr customer service.
520256	05	Quick coupler valve	Measured current lower than 220mA / overload detected at the control unit output for more than 2000ms	Cable break / current load at the output too high	Quick coupler not available	Contact Liebherr customer service.
520256	06	Quick coupler valve	Measured output signal does not correspond to the command for more than 2000ms	Short circuit to supply	Quick coupler not available	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Component	Problem detected	Possible cause	Effect	Remedy
520256	14	Quick coupler valve	Shut off detected in the 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	Quick coupler not available	Contact Liebherr customer service.
520257	05	Control circuit 3 change over solenoid valve	Measured current lower than 220mA / overload detected at the control unit output for more than 2000ms	Cable break / current load at the output too high	Control circuit 3 change over not available	Contact Liebherr customer service.
520257	06	Control circuit 3 change over solenoid valve	Measured output signal does not correspond to the command for more than 2000ms	Short circuit to supply	Control circuit 3 change over not available	Contact Liebherr customer service.
520257	14	Control circuit 3 change over solenoid valve	Shut off detected in the 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	Control circuit 3 change over not available	Contact Liebherr customer service.
520258	05	Control circuit 3 pressure relief solenoid valve	Measured current lower than 220mA / overload detected at the control unit output for more than 2000ms	Cable break / current load at the output too high	Control circuit 3 pressure relief not available	Contact Liebherr customer service.
520258	06	Control circuit 3 pressure relief solenoid valve	Measured output signal does not correspond to the command for more than 2000ms	Short circuit to supply	Control circuit 3 pressure relief not available	Contact Liebherr customer service.
520258	14	Control circuit 3 pressure relief solenoid valve	Shut off detected in the 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	Control circuit 3 pressure relief not available	Contact Liebherr customer service.
520259	05	Control circuit 4 change over solenoid valve	Measured current lower than 220mA / overload detected at the control unit output for more than 2000ms	Cable break / current load at the output too high	Additional control circuit 4 single action and auto hitch not available	Contact Liebherr customer service.
520259	06	Control circuit 4 change over solenoid valve	Measured output signal does not correspond to the command for more than 2000ms	Short circuit to supply	Additional control circuit 4 single action and auto hitch not available	Contact Liebherr customer service.
520259	14	Control circuit 4 change over solenoid valve	Shut off detected in the 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	Additional control circuit 4 single action and auto hitch not available	Contact Liebherr customer service.
520260	05	Auto hitch solenoid valve	Measured current lower than 220mA / overload detected at the control unit output for more than 2000ms	Cable break / current load at the output too high	Additional control circuit 4 auto hitch not available	Contact Liebherr customer service.
520260	06	Auto hitch solenoid valve	Measured output signal does not correspond to the command for more than 2000ms	Short circuit to supply	Additional control circuit 4 auto hitch not available	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Component	Problem detected	Possible cause	Effect	Remedy
520260	14	Auto hitch solenoid valve	Shut off detected in the 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	Additional control circuit 4 auto hitch not available	Contact Liebherr customer service.
520261	05	Auto hitch lock solenoid valve	Measured current lower than 220mA / overload detected at the control unit output for more than 2000ms	Cable break / current load at the output too high	Additional control circuit 4 auto hitch cannot be unlocked	Contact Liebherr customer service.
520261	06	Auto hitch lock solenoid valve	Measured output signal does not correspond to the command for more than 2000ms	Short circuit to supply	Additional control circuit 4 auto hitch cannot be unlocked	Contact Liebherr customer service.
520261	14	Auto hitch lock solenoid valve	Shut off detected in the 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	Additional control circuit 4 auto hitch cannot be unlocked	Contact Liebherr customer service.
520262	02	Hydraulic trailer brake proportional valve	Measured current too high or too low: by 100mA (by 10mA in idle state) too high/too low for 2000ms	Broken cable; short circuit to ground	Hydraulic trailer brake not available	Contact Liebherr customer service.
520262	06	Hydraulic trailer brake proportional valve	Measured overload at the control unit output: greater than 5A	Current load at the output too high	Hydraulic trailer brake not available	Contact Liebherr customer service.
520262	14	Hydraulic trailer brake proportional valve	Shut off detected in the 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	Hydraulic trailer brake not available	Contact Liebherr customer service.
520263	06	Fan reversing valve	Measured output signal does not correspond to the command for more than 2000ms	Short circuit to supply	Reverse fan not available	Contact Liebherr customer service.
520263	05	Fan reversing valve	Measured current too low for more than 2000ms	Broken cable / short circuit to supply	Reverse fan not available	Contact Liebherr customer service.
520263	05	Fan reversing valve	Measured current lower than 220mA / overload detected at the control unit output for more than 2000ms	Cable break / current load at the output too high	Reverse fan not available	Contact Liebherr customer service.
520263	06	Fan reversing valve	Measured overload at the control unit output: greater than 5A	Current load at the output too high	Reverse fan not available	Contact Liebherr customer service.
520263	14	Fan reversing valve	Shut off detected in the 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	Reverse fan not available	Contact Liebherr customer service.
520264	02	Additional control circuit 5 A proportional valve	Measured current too high or too low: by 100mA (by 10mA in idle state) too high/too low for 2000ms	Broken cable; short circuit to ground	Additional control circuit 5 side A not available	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Component	Problem detected	Possible cause	Effect	Remedy
520264	06	Additional control circuit 5 A proportional valve	Measured overload at the control unit output: greater than 5A	Current load at the output too high	Additional control circuit 5 side A not available	Contact Liebherr customer service.
520264	14	Additional control circuit 5 A proportional valve	Shut off detected in the 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	Additional control circuit 5 side A not available	Contact Liebherr customer service.
520265	02	Additional control circuit 5 B proportional valve	Measured current too high or too low: by 100mA (by 10mA in idle state) too high/too low for 2000ms	Broken cable; short circuit to ground	Additional control circuit 5 side B not available	Contact Liebherr customer service.
520265	06	Additional control circuit 5 B proportional valve	Measured overload at the control unit output: greater than 5A	Current load at the output too high	Additional control circuit 5 side B not available	Contact Liebherr customer service.
520265	14	Additional control circuit 5 B proportional valve	Shut off detected in the 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	Additional control circuit 5 side B not available	Contact Liebherr customer service.
520266	02	Additional control circuit 4 A proportional valve	Measured current too high or too low: by 200 mA (by 10 mA in idle state) too high/too low for 2000ms	Broken cable; short circuit to ground	Additional control circuit 4 side A not available; lower auto hitch and additional control circuit 4 double acting coupling A not available	Contact Liebherr customer service.
520266	06	Additional control circuit 4 A proportional valve	Measured overload at the control unit output: greater than 5A	Current load at the output too high	Additional control circuit 4 side A not available; lower auto hitch and additional control circuit 4 double acting coupling A not available	Contact Liebherr customer service.
520266	14	Additional control circuit 4 A proportional valve	Shut off detected in the 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	Additional control circuit 4 side A not available; additional control circuit 4 lower auto hitch and additional control circuit 4 double acting coupling A not available	Contact Liebherr customer service.
520267	02	Additional control circuit 4 B proportional valve	Measured current too high or too low: by 200mA (by 10mA in idle state) too high/too low for 2000ms	Broken cable; short circuit to ground	Additional control circuit 4 side B not available; additional control circuit 4 single acting coupling A, additional control circuit 4 lift auto hitch and additional control circuit 4 double acting coupling B not available	Contact Liebherr customer service.
520267	06	Additional control circuit 4 B proportional valve	Measured overload at the control unit output: greater than 5A	Current load at the output too high	Additional control circuit 4 side B not available; additional control circuit 4 single acting coupling A, additional control circuit 4 lift auto hitch and additional control circuit 4 double acting coupling B not available	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Component	Problem detected	Possible cause	Effect	Remedy
520267	14	Additional control circuit 4 B proportional valve	Shut off detected in the 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	Additional control circuit 4 side B not available; additional control circuit 4 single acting coupling A, additional control circuit 4 lift auto hitch and additional control circuit 4 double acting coupling B not available	Contact Liebherr customer service.
520268	02	CAN 1 / communication I	CAN timeout of telescoping signal or defective signal is received for more than 250ms	CAN line to joystick disconnected; joystick not supplied; joystick has detected an error	Telescoping not available	Contact Liebherr customer service.
520269	02	CAN 1 / communication I	CAN timeout of control circuit 3 signal or defective signal is received for more than 250ms	CAN line to joystick disconnected; joystick not supplied; joystick has detected an error	Control circuit 3 not available	Contact Liebherr customer service.
520270	02	CAN 1 / communication I	CAN timeout of tilt signal or defective signal is received for more than 250ms	CAN line to joystick disconnected; joystick not supplied; joystick has detected an error	PF3: Tilt in and tilt out not available	Contact Liebherr customer service.
520271	02	Hoist gear suspension rocker switch	Measured input signals are not suitable for the logic of the switch for more than 2000ms	Short circuit to supply	Hoist gear suspension not available	Contact Liebherr customer service.
520272	03	Battery + control box, working hydraulics	Measured voltage too high: >36V for 2000ms	Alternator faulty	Failures of any nature possible; inputs are being ignored, outputs not available	Contact Liebherr customer service.
520272	04	Battery + control box, working hydraulics	Measured voltage too low: <7V for 2000ms	Battery weak	Control unit A30 cannot work properly; proportional outputs not available	Contact Liebherr customer service.
520273	02	Working hydraulics control box sensor supply	Measured voltage at sensor supply too high or too low: <3.5 or >7.5V for 2000ms	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.
520274	03	Battery + control box, working hydraulics	Measured voltage too high: >36V for 2000ms	Alternator faulty	Failures of any nature possible; inputs are being ignored, outputs not available	Contact Liebherr customer service.
520274	04	Battery + control box, working hydraulics	Measured voltage too low: <7V for 2000ms	Battery weak	Control unit A40 cannot work properly; proportional outputs not available	Contact Liebherr customer service.
520275	02	Extend telescope proportional valve	Measured current too high or too low: by 100mA (by 10mA in idle state) too high/too low for 2000ms	Broken cable; short circuit to ground	Telescoping out not available	Contact Liebherr customer service.
520275	06	Extend telescope proportional valve	Measured overload at the control unit output: greater than 5A	Current load at the output too high	Telescoping out not available	Contact Liebherr customer service.
520275	14	Extend telescope proportional valve	Shut off detected in the 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	Telescoping out not available	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Component	Problem detected	Possible cause	Effect	Remedy
520276	02	Retract telescope proportional valve	Measured current too high or too low: by 100mA (by 10mA in idle state) too high/too low for 2000ms	Broken cable; short circuit to ground	Telescoping in not available	Contact Liebherr customer service.
520276	06	Retract telescope proportional valve	Measured overload at the control unit output: greater than 5A	Current load at the output too high	Telescoping in not available	Contact Liebherr customer service.
520276	14	Retract telescope proportional valve	Shut off detected in the 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	Telescoping in not available	Contact Liebherr customer service.
520277	02	Control circuit 3 A proportional valve	Measured current too high or too low: by 200mA (by 10mA in idle state) too high/too low for 2000ms	Broken cable; short circuit to ground	Control circuit 3 side A not available	Contact Liebherr customer service.
520277	06	Control circuit 3 A proportional valve	Measured overload at the control unit output: greater than 5A	Current load at the output too high	Control circuit 3 side A not available	Contact Liebherr customer service.
520277	14	Control circuit 3 A proportional valve	Shut off detected in the 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	Control circuit 3 side A not available	Contact Liebherr customer service.
520278	02	Control circuit 3 B proportional valve	Measured current too high or too low: by 200 mA (by 10 mA in idle state) too high/too low for 2000ms	Broken cable; short circuit to ground	Control circuit 3 side B not available	Contact Liebherr customer service.
520278	06	Control circuit 3 B proportional valve	Measured overload at the control unit output: greater than 5A	Current load at the output too high	Control circuit 3 side B not available	Contact Liebherr customer service.
520278	14	Control circuit 3 B proportional valve	Shut off detected in the 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	Control circuit 3 side B not available	Contact Liebherr customer service.
520279	02	Torque limitation proportional valve	Measured current too high or too low: by 100mA too high/too low for 2000ms	Broken cable; short circuit to ground	Diesel engine can stall more easily	Contact Liebherr customer service.
520279	05	Torque limitation proportional valve	Measured current too low	Cable break	Diesel engine can stall more easily	Contact Liebherr customer service.
520279	06	Torque limitation proportional valve	Measured overload at the control unit output: greater than 5A	Current load at the output too high	Diesel engine can stall more easily	Contact Liebherr customer service.
520279	06	Torque limitation proportional valve	Measured current too high	Short circuit to associated ground	Diesel engine can stall more easily	Contact Liebherr customer service.
520279	14	Torque limitation proportional valve	Shut off detected in the 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	Diesel engine can stall more easily	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Component	Problem detected	Possible cause	Effect	Remedy
520280	02	Level adjustment rocker switch	Measured input signals are not suitable for the logic of the switch for more than 500ms	Broken cable; short circuit to ground/supply	Level adjustment not available	Contact Liebherr customer service.
520281	02	Working hydraulics control box sensor supply	Measured voltage at sensor supply too high or too low: <3.5 or >7.5V for 2000ms	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.
520282	03	Battery + control box, working hydraulics	Measured voltage too high: >36V for 2000ms	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: <7V for 2000ms	Battery weak	Control unit A50 cannot work properly; proportional outputs not available	Contact Liebherr customer service.
520283	02	Working hydraulics control box sensor supply	Measured voltage at sensor supply too high or too low: <3.5 or >7.5V for 2000ms	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 or internal defect	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.
520290	02	Telescope length tape extension sensor	Measured redundancy difference too high: greater than 200mV, longer than 200ms	Broken cable/short circuit at redundant signal	Electronic telescope end damping not available; automatic telescope retraction not available	Contact Liebherr customer service.
520290	03	Telescope length tape extension sensor	Measured voltage too high: at least 80% "of the difference between the taught maximum value and 96% of the voltage 5V" greater than the taught maximum value for more than 2000ms	Taught maximum value incorrect, taught value too low; short circuit to supply / sensor supply;	Electronic telescope end damping not available; automatic telescope retraction not available	Contact Liebherr customer service.
520290	04	Telescope length tape extension sensor	Measured voltage too low: at least 30% "of the difference between the taught minimum value and 4% of the voltage 5V" less than the taught minimum value for more than 2000ms	Taught minimum value incorrect, taught value too high; cable break; short circuit to ground;	Electronic telescope end damping not available; automatic telescope retraction not available	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Component	Problem detected	Possible cause	Effect	Remedy
520301	05	Travel pump C1 proportional solenoid valve	Measured current too low: <75% of the command for 500ms; or measured voltage too high;	Broken cable, short circuit to supply	Machine response: limited mode; C1 not controllable	Contact Liebherr customer service.
520301	06	Travel pump C1 proportional solenoid valve	Measured current too high: >125% of the command for 500ms; or measured connection to ground;	Short circuit to ground	Machine response: limited mode; C1 not controllable	Contact Liebherr customer service.
520302	05	Travel pump C2 proportional solenoid valve	Measured current too low: <75% of the command for 500ms; or measured voltage too high;	Broken cable, short circuit to supply	Machine response: limited mode; C2 not controllable	Contact Liebherr customer service.
520302	06	Travel pump C2 proportional solenoid valve	Measured current too high: >125% of the command for 500ms; or measured connection to ground;	Short circuit to ground	Machine response: limited mode; C2 not controllable	Contact Liebherr customer service.
520303	00	Travel pump speed sensor	Calculated speed of the travel pump too high: greater than 8032 rpm	-	Machine response: limited mode	Contact Liebherr customer service.
520303	01	Travel pump speed sensor	Speed of the travel pump too low: less than 400 rpm	Diesel engine stall	Machine response: limited mode	Contact Liebherr customer service.
520303	02	Travel pump speed sensor	Redundancy monitoring: deviation between the speed signal of travel pump and diesel engine	Output shaft defective; error in CAN communication	Machine response: limited mode	Contact Liebherr customer service.
520303	08	Travel pump speed sensor	Calculated frequency too high (> Hz) or no frequency	Cable break	Machine response: limited mode	Contact Liebherr customer service.
520305	05	Hydraulic motor proportional valve	Measured current too low: <75% of the command for 500ms; or measured voltage too high;	Broken cable, short circuit to supply	Machine response: limited mode; Y27 not controllable	Contact Liebherr customer service.
520305	06	Hydraulic motor proportional valve	Measured current too high: >125% of the command for 500ms; or measured connection to ground;	Short circuit to ground	Machine response: limited mode; Y27 not controllable	Contact Liebherr customer service.
520306	00	Hydraulic motor rpm sensor	Measured voltage between 11% and 89% of the assumed sensor supply (approx. 5V)	A1.X10/1 Pin 5 contact problem; broken cable	Machine response: limited mode	Contact Liebherr customer service.
520306	03	Hydraulic motor rpm sensor	Measured voltage greater than 97% of the assumed sensor supply (approx. 5V)	A1.X10/1 Pin 5 contact problem; short circuit to supply	Machine response: limited mode	Contact Liebherr customer service.
520306	04	Hydraulic motor rpm sensor	Measured voltage less than 5% of the assumed sensor supply (approx. 5V)	A1.X10/1 Pin 5 contact problem; short circuit to ground	Machine response: limited mode	Contact Liebherr customer service.
520306	08	Hydraulic motor rpm sensor	Calculated frequency too high (> Hz) or no frequency	A1.X10/1 Pin 5 contact problem; no frequency: error in mechanics	Machine response: limited mode	Contact Liebherr customer service.
520310	14	Internal travel control	Message from "Watchdog Monitoring" or "AD Reference Voltage Monitoring" or "Analog Injection Channel Monitoring"	Control unit damaged	Machine response: safe state	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Component	Problem detected	Possible cause	Effect	Remedy
520311	02	Battery	Measured supply voltage too high (> for 200ms) or too low (9V for 500ms)	Too high: alternator faulty; too low: battery weak;	Machine response: limited mode (> <36V; safe state (>36V, <9V)	Contact Liebherr customer service.
520312	02	Travel control: sensor supply voltage output	Measured voltage for sensor supply too high or too low: <4.825V or >5.075V	Short circuit to ground; short circuit to supply	Machine response: safe state	Contact Liebherr customer service.
521289	00	Joystick	Measured redundant signal of the tilt axle too high or too low	-	Joystick safe signal state	Contact Liebherr customer service.
521290	00	Joystick	Measured redundant signal of the lift/lower axle too high or too low	-	Joystick safe signal state	Contact Liebherr customer service.
521291	00	Joystick	Measured redundant signal of the “travel direction” thumbwheel too high or too low	-	Joystick safe signal state	Contact Liebherr customer service.
521292	00	Joystick	Measured redundant signal of the “telescoping” thumbwheel too high or too low	-	Joystick safe signal state	Contact Liebherr customer service.
521293	00	Joystick	Measured redundant signal of the “control circuit 3” thumbwheel too high or too low	-	Joystick safe signal state	Contact Liebherr customer service.
521299	00	Joystick	Redundancy error at the signals of the tilt axle detected	-	Joystick safe signal state	Contact Liebherr customer service.
521300	00	Joystick	Redundancy error at the signals of the lift/lower axle detected	-	Joystick safe signal state	Contact Liebherr customer service.
521301	00	Joystick	Redundancy error at the signals of the “travel direction” thumbwheel detected	-	Joystick safe signal state	Contact Liebherr customer service.
521302	00	Joystick	Redundancy error at the signals of the “telescoping” thumbwheel detected	-	Joystick safe signal state	Contact Liebherr customer service.
521303	00	Joystick	Redundancy error at the signals of the “control circuit 3” thumbwheel detected	-	Joystick safe signal state	Contact Liebherr customer service.
521308	00	CAN 1 / communication	CAN timeout of all joystick signals	CAN line to joystick disconnected; joystick not supplied	All functions associated with the joystick not available	Contact Liebherr customer service.
521309	00	Joystick	CAN (BJM) data plausibility error detected	-	Joystick safe state	Contact Liebherr customer service.
521310	00	Joystick	CAN (EJM) data plausibility error detected	-	Joystick safe state	Contact Liebherr customer service.
521311	00	Joystick	CAN (BJM) timeout error detected	-	Joystick safe state	Contact Liebherr customer service.
521312	00	Joystick	CAN (EJM) timeout error detected	-	Joystick safe state	Contact Liebherr customer service.
521317	00	Joystick	Stack overflow error detected	-	Joystick safe state	Contact Liebherr customer service.
521318	00	Joystick	Logic program flow monitoring error detected	-	Joystick safe state	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Component	Problem detected	Possible cause	Effect	Remedy
521319	00	Joystick	Temporal program flow monitoring error detected	-	Joystick safe state	Contact Liebherr customer service.
521320	00	Joystick	Measured supply voltage 1 (5V) too high or too low	-	Joystick safe state	Contact Liebherr customer service.
521322	00	Joystick	Measured supply voltage 2 (5V) too high or too low	-	Joystick safe state	Contact Liebherr customer service.

4.1.1.3 Service code list

Equipment variant:

- Machine software 13557239.203
- Machine software 13557240.203

SPN	FMI	Control unit	Component	Problem detected	Possible cause	Effect	Remedy
000091	00	“AC” / “SC” travel control	Accelerator pedal angle sensor	Measured voltage too high: less than 95% of sensor supply but at least 50% "of difference between taught maximum value and 95% of sensor supply" greater than taught maximum value.	Taught maximum value incorrect; taught value too low	Machine response: limited mode; accelerator pedal cannot be used	Contact Liebherr customer service.
000091	01	“AC” / “SC” travel control	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	“AC” / “SC” travel control	Accelerator pedal angle sensor	Measured voltage not within a range of 0V to sensor supply, but greater	Short circuit to supply	Machine response: limited mode; accelerator pedal cannot be used	Contact Liebherr customer service.
000091	03	“AC” / “SC” travel control	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	“AC” / “SC” travel control	Accelerator pedal angle sensor	Measured voltage too low: less than 5% of sensor supply	Cable break, short circuit to ground	Machine response: limited mode; accelerator pedal cannot be used	Contact Liebherr customer service.
000091	07	“AC” / “SC” travel control	Accelerator pedal angle sensor	Measured redundancy difference too high: greater than 500mV, longer than 200ms	Cable break of the redundant signal	Machine response: limited mode; accelerator pedal cannot be used	Contact Liebherr customer service.
000091	13	“AC” / “SC” travel control	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.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Control unit	Component	Problem detected	Possible cause	Effect	Remedy
000096	16	Display	Fuel tank immersion tube sensor	Measured resistance too high (>3000?)	Cable break	Fuel display remains at minimum/empty	Contact Liebherr customer service.
000116	16	Display	Power brake pressure sensor	Measured voltage greater than 4.9V	Short circuit to supply	No machine response; brake pressure can no longer be checked; danger, stop machine!	Contact Liebherr customer service.
000116	18	Display	Power brake pressure sensor	Measured voltage less than 0.05V	Cable break, short circuit to ground	No machine response; brake pressure can no longer be checked; danger, stop machine!	Contact Liebherr customer service.
000190	09	Pump controller	CAN 1 / communication I	CAN timeout of the diesel engine speed	CAN line to engine control unit disconnected; engine control unit not supplied	Diesel engine can stall more easily	Contact Liebherr customer service.
000246	13	Display	Display	Internal memory error	-	Display no longer operational	Contact Liebherr customer service.
000521	00	“AC” / “SC” travel control	Inching brake pedal angle sensor	Measured voltage too high: less than 96% of sensor supply but at least 100% "of difference between taught maximum value and 96% of sensor supply" greater than taught maximum value.	Taught maximum value incorrect; taught value too low	Machine response: safe state	Contact Liebherr customer service.
000521	01	“AC” / “SC” travel control	Inching brake 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: safe state	Contact Liebherr customer service.
000521	02	“AC” / “SC” travel control	Inching brake pedal angle sensor	Measured voltage not within a range of 0V to sensor supply, but greater	Short circuit to supply	Machine response: safe state	Contact Liebherr customer service.
000521	03	“AC” / “SC” travel control	Inching brake pedal angle sensor	Measured voltage too high: greater than 96% of sensor supply but less than sensor supply	Short circuit to sensor supply	Machine response: safe state	Contact Liebherr customer service.
000521	04	“AC” / “SC” travel control	Inching brake pedal angle sensor	Measured voltage too low: less than 5% of sensor supply	Cable break, short circuit to ground	Machine response: safe state	Contact Liebherr customer service.
000521	07	“AC” / “SC” travel control	Inching brake pedal angle sensor	Measured redundancy difference too high: greater than 500mV, longer than 200ms	Cable break of the redundant signal	Machine response: safe state	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Control unit	Component	Problem detected	Possible cause	Effect	Remedy
000521	11	“AC” travel control	Inching brake pedal angle sensor / service brake pressure switch	PF2: Brake pressure monitoring – brake pressure present, although inching brake pedal not stepped on for more than 6000 ms	Short circuit at service brake pressure switch; neutral position of inching brake pedal not calibrated	Machine response: safe state	Contact Liebherr customer service.
000521	13	“AC” / “SC” travel control	Inching brake pedal angle sensor	taught values outside the permitted range	Inching pedal is not calibrated	Machine response: travel drive blocked until the inching pedal is taught correctly	Contact Liebherr customer service.
000521	14	“AC” travel control	Inching brake pedal angle sensor / service brake pressure switch	PF2: Brake pressure monitoring – brake pressure not present, although inching brake pedal stepped on sufficiently for more than 6000 ms	Cable break at service brake pressure switch; service brake pressure too low; 100% inch point not calibrated	Machine response: limited mode	Contact Liebherr customer service.
000619	02	“SC” travel control	Parking brake solenoid valve	Measured output signal does not correspond to the command	Short circuit or cable break	Machine response: safe state; parking brake cannot be controlled	Contact Liebherr customer service.
000619	05	“AC” travel control	Parking brake solenoid valve	Measured current too low	Cable break	Machine response: safe state; parking brake cannot be controlled	Contact Liebherr customer service.
000619	05	“SC” travel control	Parking brake solenoid valve	Measured current lower than 220mA / overload detected at the control unit output	Cable break/current load at the output too high	Machine response: safe state; parking brake cannot be controlled	Contact Liebherr customer service.
000619	06	“AC” / “SC” travel control	Parking brake solenoid valve	Measured current too high	Short circuit to ground	Machine response: safe state; parking brake cannot be controlled	Contact Liebherr customer service.
000619	10	“SC” travel control	Parking brake solenoid valve	Shut off detected in the control unit safety circuit	Short circuit to supply or ground; error in the control unit safety circuit; error in the output end stage; internal supply to the control unit output defective	Machine response: safe state; parking brake cannot be controlled	Contact Liebherr customer service.
000619	11	“AC” / “SC” travel control	Parking brake solenoid valve, parking brake pressure switch	Parking brake monitoring: parking brake does not respond to the command that is sent or responds too slowly (not within 10 s)	Hydraulic error; cable break at the pressure switch; very low ambient temperature	Machine response: limited mode	Contact Liebherr customer service.
000619	14	“SC” travel control	Parking brake solenoid valve	Shut off detected in the 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	Machine response: safe state; parking brake cannot be controlled	Contact Liebherr customer service.
000630	14	Display	Display	Internal memory error	-	Display no longer operational	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Control unit	Component	Problem detected	Possible cause	Effect	Remedy
000898	09	Pump controller	CAN 1 / communication I	CAN timeout of the diesel engine speed prompt	CAN line to engine control unit disconnected; engine control unit not supplied	Diesel engine can stall more easily	Contact Liebherr customer service.
001058	14	Display	Hydraulic trailer brake socket	Status signal for "Trailer brake error" active	Trailer brake defective	No machine response; hydraulic trailer brake defective; cannot be used again until the error is corrected!	Contact Liebherr customer service.
001619	02	“AC” / “SC” travel control	Joystick travel direction switch	Value: measured travel direction signals are implausible (two directions simultaneously); Prof: redundant CAN signal faulty	Value: travel direction switch defective; Prof: faulty CAN communication	Machine response: limited mode	Contact Liebherr customer service.
001619	11	“AC” / “SC” travel control	Travel stage adjustment joystick / CAN 1 - communication I	Error in corresponding CAN signal reported or redundant CAN signal faulty	Error detected on the joystick (joystick also sends error code); or communication error on CAN	Travel stage cannot be adjusted	Contact Liebherr customer service.
001638	00	"Cabin" / "SC" work control	Hydraulic oil temperature sensor	Calculated hydraulic oil temperature higher than safety threshold (95°C) for 4000 ms	Hydraulic oil cooling defective; heat sink contaminated; excessive use of all sections simultaneously;	no machine response	Contact Liebherr customer service.
001638	03	"Cabin" / "SC" work control	Hydraulic oil temperature sensor	Measured resistance too high (>2420?)	Cable break; temperature higher than 200°C	Temperature measurement not functioning; 214°C is assumed; fan rotates at maximum speed	Contact Liebherr customer service.
001638	04	"Cabin" / "SC" work control	Hydraulic oil temperature sensor	Measured resistance too low (<730?)	Short circuit to ground; temperature lower than -50°C	Temperature measurement not functioning; 214°C is assumed; fan rotates at maximum speed	Contact Liebherr customer service.
001638	16	"Cabin" / "SC" work control	Hydraulic oil temperature sensor	Calculated hydraulic oil temperature higher than warning threshold (90°C) for 4000ms	Hydraulic oil cooling defective; heat sink contaminated; excessive use of all sections simultaneously;	no machine response	Contact Liebherr customer service.
001815	02	“AC” travel control	Brake light relay	Measured output signal does not correspond to the command	Short circuit or cable break	Brake light cannot be controlled	Contact Liebherr customer service.
001815	05	“SC” travel control	Brake light relay	Measured current lower than 220mA / overload detected at the control unit output	Cable break/current load at the output too high	Brake light cannot be controlled	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Control unit	Component	Problem detected	Possible cause	Effect	Remedy
001815	11	“SC” travel control	Reversing warning device relay	Shut off detected in the control unit safety circuit	Short circuit to supply or ground; error in the control unit safety circuit; error in the output end stage; internal supply to the control unit output defective	Reversing warning device not controllable	Contact Liebherr customer service.
001815	14	“SC” travel control	Brake light relay	Shut off detected in the 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	Brake light cannot be controlled	Contact Liebherr customer service.
002003	02	“AC” / “SC” travel control	CAN 1 / communication I	Communication problems	CAN bus OFF, Overrun, Timeout, Address not Claimed	Machine response: limited mode	Contact Liebherr customer service.
002003	09	“SC” travel control	CAN 3 / communication III	Communication problems; CAN timeout of different signals	Drive control inappropriately configured	Machine response: limited mode	Contact Liebherr customer service.
002595	00	“AC” / “SC” travel control	Manual inching, minijoystick	Measured voltage too high: less than 97% of sensor supply but at least 50% "of difference between taught maximum value and 97% of sensor supply" greater than taught maximum value.	Taught maximum value incorrect; taught value too low	Manual inching cannot be used	Contact Liebherr customer service.
002595	01	“AC” / “SC” travel control	Manual inching, minijoystick	Measured voltage too low: greater than 4% of sensor supply but at least 50% "of difference between taught minimum value and 4% of sensor supply" less than taught minimum value.	Taught minimum value incorrect; taught value too high	Manual inching cannot be used	Contact Liebherr customer service.
002595	02	“AC” / “SC” travel control	Manual inching, minijoystick	Measured voltage not within a range of 0V to sensor supply, but greater	Short circuit to supply	Manual inching cannot be used	Contact Liebherr customer service.
002595	03	“AC” / “SC” travel control	Manual inching, minijoystick	Measured voltage too high: greater than 97% of sensor supply but less than sensor supply	Short circuit to sensor supply	Manual inching cannot be used	Contact Liebherr customer service.
002595	04	“AC” / “SC” travel control	Manual inching, minijoystick	Measured voltage too low: less than 4% of sensor supply	Cable break, short circuit to ground	Manual inching cannot be used	Contact Liebherr customer service.
002595	07	“AC” / “SC” travel control	Manual inching, minijoystick	Measured redundancy difference too high: greater than 500mV, longer than 200ms	Cable break of the redundant signal	Manual inching cannot be used	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Control unit	Component	Problem detected	Possible cause	Effect	Remedy
002595	13	“AC” / “SC” travel control	Manual inching, minijoystick	taught values outside the permitted range	Manual inching is not calibrated	Machine response: travel drive blocked until manual inching is taught correctly	Contact Liebherr customer service.
002602	14	Display	Oil level monitoring sensor	Status signal for "Hydraulic oil level low" active	Hydraulic oil level too low	no machine response	Contact Liebherr customer service.
002604	02	“AC” travel control	Pneumatic trailer brake inching function solenoid valve	Measured output signal does not correspond to the command	Short circuit or cable break	Pneumatic trailer brake inching function cannot be controlled; machine response: limited mode	Contact Liebherr customer service.
002604	05	“SC” travel control	Pneumatic trailer brake inching function solenoid valve	Measured current lower than 220mA / overload detected at the control unit output	Cable break/current load at the output too high	Pneumatic trailer brake inching function cannot be controlled; machine response: limited mode	Contact Liebherr customer service.
002604	14	“SC” travel control	Pneumatic trailer brake inching function solenoid valve	Shut off detected in the 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	Pneumatic trailer brake inching function cannot be controlled; machine response: limited mode	Contact Liebherr customer service.
002660	00	Joystick	Joystick	Measured signal of the tilt axle too high or too low	-	Joystick safe signal state	Contact Liebherr customer service.
002661	00	Joystick	Joystick	Measured signal of the lift/lower axle too high or too low	-	Joystick safe signal state	Contact Liebherr customer service.
002662	00	Joystick	Joystick	Measured signal of the "travel direction" thumbwheel too high or too low	-	Joystick safe signal state	Contact Liebherr customer service.
002663	00	Joystick	Joystick	Measured signal of the "telescoping" thumbwheel too high or too low	-	Joystick safe signal state	Contact Liebherr customer service.
002664	00	Joystick	Joystick	Measured signal of the "control circuit 3" thumbwheel too high or too low	-	Joystick safe signal state	Contact Liebherr customer service.
002685	00	Joystick	Joystick	Measured signal of the "decrease travel mode" button too high or too low	-	Joystick safe signal state	Contact Liebherr customer service.
002686	00	Joystick	Joystick	Measured signal of the "increase travel mode" button too high or too low	-	Joystick safe signal state	Contact Liebherr customer service.
002687	00	Joystick	Joystick	Measured signal of the "control circuit 3 change over" button too high or too low	-	Joystick safe signal state	Contact Liebherr customer service.
002688	00	Joystick	Joystick	Measured signal of the "neutral travel direction" button too high or too low	-	Joystick safe signal state	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Control unit	Component	Problem detected	Possible cause	Effect	Remedy
002689	00	Joystick	Joystick	Measured signal of the "bucket repositioning" button too high or too low	-	Joystick safe signal state	Contact Liebherr customer service.
002690	00	Joystick	Joystick	Measured signal of the "differential lock" button too high or too low	-	Joystick safe signal state	Contact Liebherr customer service.
002691	00	Joystick	Joystick	-	-	Joystick safe signal state	Contact Liebherr customer service.
002692	00	Joystick	Joystick	-	-	Joystick safe signal state	Contact Liebherr customer service.
002693	00	Joystick	Joystick	-	-	Joystick safe signal state	Contact Liebherr customer service.
002694	00	Joystick	Joystick	-	-	Joystick safe signal state	Contact Liebherr customer service.
002931	14	Display	Brake oil level switch	Status signal for "Brake oil level low" active	Brake oil level too low; air / leak in the brake system	No machine response; braking effect unreliable!	Contact Liebherr customer service.
004212	02	"Cabin" / "SC" work control	Hydrostatic fan proportional valve	Measured current too high or too low: by 10 mA (by 10 mA also in idle state) too high/too low for 2000 ms	Cable break/short circuit to ground	Fan control not available; fan rotates at maximum speed	Contact Liebherr customer service.
004212	06	"Cabin" / "SC" work control	Hydrostatic fan proportional valve	Measured overload at the control unit output: greater than 5A	Current load at the output too high	Fan control not available; fan rotates at maximum speed	Contact Liebherr customer service.
004212	14	"Cabin" / "SC" work control	Hydrostatic fan proportional valve	Shut off detected in the 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	Fan control not available; fan rotates at maximum speed	Contact Liebherr customer service.
520192	14	Display	Display	Internal memory error	-	Display no longer operational	Contact Liebherr customer service.
520193	14	Display	CAN 1 / communication I	Interference signal on CAN bus, communication not possible	CAN bus OFF; short circuit to supply; loose contact of ground pin to control unit	No machine response; machine not operational	Contact Liebherr customer service.
520195	14	Display	Display	Unknown platform coding	Either signal at pin 1+2 or signal neither at pin 1 nor at pin 2	Machine response: power brake braking pressure can no longer be correctly evaluated; danger, stop the machine!	Contact Liebherr customer service.
520200	09	Display	CAN 1 / communication I	No communication between the display and engine control unit	CAN line to engine control unit disconnected; engine control unit not supplied	No machine response; various displays not available	Contact Liebherr customer service.
520201	09	Display	CAN 5 / communication V	Error on the display bus CAN5 from Tera 7, no communication between A47.X1 and A47.X2	CAN line between X1 and X2 disconnected or damaged	Machine response: power brake braking pressure can no longer be correctly evaluated; danger, stop the machine!	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Control unit	Component	Problem detected	Possible cause	Effect	Remedy
520214	05	"Cabin" work control	Working pump and control valve block overspeed safety valves	Measured current lower than 220mA / overload detected at the control unit output for more than 2000ms	Cable break/current load at the output too high	Overspeed safety not available; braking path is longer in certain situations	Contact Liebherr customer service.
520214	06	"Cabin" work control	Working pump and control valve block overspeed safety valves	Measured output signal does not correspond to the command for more than 2000ms	Short circuit to supply	Overspeed safety not available; braking path is longer in certain situations	Contact Liebherr customer service.
520214	14	"Cabin" work control	Working pump and control valve block overspeed safety valves	Shut off detected in the 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	Overspeed safety not available; braking path is longer in certain situations	Contact Liebherr customer service.
520215	05	"Cabin" / "SC" work control	Working hydraulics emergency shut-off solenoid valve	Measured current lower than 220mA / overload detected at the control unit output for more than 500ms	Cable break/current load at the output too high	Working hydraulics not available	Contact Liebherr customer service.
520215	06	"Cabin" / "SC" work control	Working hydraulics emergency shut-off solenoid valve	Measured output signal does not correspond to the command for more than 500ms	Short circuit to supply	Working hydraulics not available	Contact Liebherr customer service.
520215	14	"Cabin" / "SC" work control	Working hydraulics emergency shut-off solenoid valve	Shut off detected in the 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	Working hydraulics not available	Contact Liebherr customer service.
520216	05	"Cabin" work control	Crab steering solenoid valve	Measured current lower than 220mA / overload detected at the control unit output for more than 2000ms	Cable break/current load at the output too high	Crab steering not available	Contact Liebherr customer service.
520216	06	"Cabin" work control	Crab steering solenoid valve	Measured output signal does not correspond to the command for more than 2000ms	Short circuit to supply	Crab steering not available	Contact Liebherr customer service.
520216	14	"Cabin" work control	Crab steering solenoid valve	Shut off detected in the 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	"Cabin" work control	All-wheel steering solenoid valve	Measured current lower than 220mA / overload detected at the control unit output for more than 2000ms	Cable break/current load at the output too high	All-wheel steering not available	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Control unit	Component	Problem detected	Possible cause	Effect	Remedy
520217	06	"Cabin" work control	All-wheel steering solenoid valve	Measured output signal does not correspond to the command for more than 2000ms	Short circuit to supply	All-wheel steering not available	Contact Liebherr customer service.
520217	14	"Cabin" work control	All-wheel steering solenoid valve	Shut off detected in the 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	"Cabin" work control	Steering mode valve locking spool	Measured current lower than 220mA / overload detected at the control unit output for more than 120ms	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	"Cabin" work control	Steering mode valve locking spool	Measured output signal does not correspond to the command for more than 120ms	Short circuit to supply	Lock in the steering mode valve cannot be opened; steering mode cannot be switched	Contact Liebherr customer service.
520218	14	"Cabin" work control	Steering mode valve locking spool	Shut off detected in the 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.
520220	09	Display	CAN 1 / communication I	No communication between the display and travel control	CAN line to travel control disconnected; travel control not supplied	No machine response; various displays not available	Contact Liebherr customer service.
520221	02	"Cabin" / "SC" work control	Load reduction 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	Cable break/short circuit to ground	Lower telescopic arm not available	Contact Liebherr customer service.
520221	06	"Cabin" / "SC" work control	Load reduction proportional valve	Measured overload at the control unit output: greater than 5A	Current load at the output too high	Lower telescopic arm not available	Contact Liebherr customer service.
520221	14	"Cabin" / "SC" work control	Load reduction proportional valve	Shut off detected in the 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	Lower telescopic arm not available	Contact Liebherr customer service.
520232	02	"Cabin" / "SC" work control	Hoist angle sensor	Measured redundancy difference too high: greater than 200mV, longer than 200ms	Cable break/short circuit at redundant signal	Load torque limitation blocked; telescopic arm end position damper not available; hoist angle assumed to be maximum	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Control unit	Component	Problem detected	Possible cause	Effect	Remedy
520232	03	"Cabin" / "SC" work control	Hoist angle sensor	Measured voltage too high: at least 80% "of the difference between the taught maximum value and 96% of the sensor supply" greater than the taught maximum value for more than 2000ms	Taught maximum value incorrect, taught value too low; short circuit to supply/sensor supply;	Load torque limitation blocked; telescopic arm end position damper not available; hoist angle assumed to be maximum	Contact Liebherr customer service.
520232	04	"Cabin" / "SC" work control	Hoist angle sensor	Measured voltage too low: at least 50% "of the difference between the taught minimum value and 4% of the sensor supply" less than the taught minimum value for more than 2000ms	Taught minimum value incorrect, taught value too high; cable break; short circuit to ground;	Load torque limitation blocked; telescopic arm end position damper not available; hoist angle assumed to be maximum	Contact Liebherr customer service.
520233	02	Pump controller	Working pump swivel angle sensor	Measured voltage too high or too low	Cable break/short circuit to ground or supply	Diesel engine can stall more easily	Contact Liebherr customer service.
520233	03	"Frame1" work control	Working pump swivel angle sensor	Measured voltage too high: >95% of the sensor supply for 1000ms	Incorrect parametrisation for work control	none	Contact Liebherr customer service.
520233	04	"Frame1" work control	Working pump swivel angle sensor	Measured voltage too low: <5% of the sensor supply for 1000ms or <150mV for 1000ms	Incorrect parametrisation for work control	none	Contact Liebherr customer service.
520233	09	"Frame1" work control	CAN 1 / communication I	CAN timeout of the working pump swivel angle signal between work control "Frame1" and pump control	CAN line to pump control disconnected; pump control not supplied; non-compatible software version on pump control	Auto inch not available	Contact Liebherr customer service.
520234	05	"Frame2" work control	Accumulator charge valve, pilot pressure	Measured current too low for more than 2000 ms	Cable break/short circuit to supply	Emergency down not available	Contact Liebherr customer service.
520234	06	"Frame2" work control	Accumulator charge valve, pilot pressure	Measured overload at the control unit output: greater than 5A	Current load at the output too high	Emergency down not available	Contact Liebherr customer service.
520234	14	"Frame2" work control	Accumulator charge valve, pilot pressure	Shut off detected in the 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	Emergency down not available	Contact Liebherr customer service.
520235	02	"Cabin" / "SC" work control	Overload off switch	Measured input signals are not suitable for the logic of the switch for more than 500ms	Cable break/short circuit to ground/supply	Load torque limitation always active	Contact Liebherr customer service.
520236	03	"Cabin" / "SC" work control	DMS evaluation electronics	Measured current too high: >20.6mA	Short circuit to supply	Load torque limitation: a load of 100% is assumed	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

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520236	04	"Cabin" / "SC" work control	DMS evaluation electronics	Measured current too low: <3.8mA	Cable break/short circuit to ground	Load torque limitation: a load of 100% is assumed	Contact Liebherr customer service.
520237	02	"Cabin" work control	Steering mode switch	Measured input signals are not suitable for the logic of the switch for more than 200ms or improper operation for 3000ms	Cable break, short circuit to ground/supply or improperly long switching operations	Steering mode change over not available	Contact Liebherr customer service.
520238	02	"Frame1" work control	Tilt angle sensor	Measured redundancy difference too high: greater than 200mV, longer than 200ms	Cable break/short circuit at redundant signal	Bucket repositioning not available; a certain tilt angle is assumed	Contact Liebherr customer service.
520238	03	"Frame1" work control	Tilt angle sensor	Measured voltage too high: at least 80% "of the difference between the taught maximum value and 96% of the sensor supply" greater than the taught maximum value for more than 2000ms	Taught maximum value incorrect, taught value too low; short circuit to supply/sensor supply;	Bucket repositioning not available; a certain tilt angle is assumed	Contact Liebherr customer service.
520238	04	"Frame1" work control	Tilt angle sensor	Measured voltage too low: at least 50% "of the difference between the taught minimum value and 4% of the sensor supply" less than the taught minimum value for more than 2000ms	Taught minimum value incorrect, taught value too high; cable break; short circuit to ground;	Bucket repositioning not available; a certain tilt angle is assumed	Contact Liebherr customer service.
520239	02	"Frame1" work control	Manual throttle, minijoystick	Measured redundancy difference too high: greater than 200mV, longer than 200ms	Cable break/short circuit at redundant signal	Manual throttle not available	Contact Liebherr customer service.
520239	03	"Frame1" work control	Manual throttle, minijoystick	Measured voltage too high: >4700mV	Short circuit to supply	Manual throttle not available	Contact Liebherr customer service.
520239	04	"Frame1" work control	Manual throttle, minijoystick	Measured voltage too low: <300mV	Cable break/short circuit to ground	Manual throttle not available	Contact Liebherr customer service.
520240	09	Display	CAN 1 / communication I	No communication between the display and work control	CAN line to work control disconnected; work control not supplied	No machine response; various displays not available	Contact Liebherr customer service.
520242	05	"Frame1" work control	Rear axle floating blocking solenoid valves	Measured current lower than 220mA / overload detected at the control unit output for more than 2000ms	Cable break/current load at the output too high	Rear axle floating blocking permanently active!	Contact Liebherr customer service.
520242	06	"Frame1" work control	Rear axle floating blocking solenoid valves	Measured output signal does not correspond to the command for more than 2000ms	Short circuit to supply	Rear axle floating blocking permanently active!	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Control unit	Component	Problem detected	Possible cause	Effect	Remedy
520242	14	"Frame1" work control	Rear axle floating blocking solenoid valves	Shut off detected in the 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	Rear axle floating blocking permanently active!	Contact Liebherr customer service.
520243	05	"Frame1" work control	Tipping cylinder lock solenoid valve	Measured current lower than 220mA / overload detected at the control unit output for more than 2000ms	Cable break/current load at the output too high	Tipping cylinder lock not available	Contact Liebherr customer service.
520243	06	"Frame1" work control	Tipping cylinder lock solenoid valve	Measured output signal does not correspond to the command for more than 2000ms	Short circuit to supply	Tipping cylinder lock not available	Contact Liebherr customer service.
520243	14	"Frame1" work control	Tipping cylinder lock solenoid valve	Shut off detected in the 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	Tipping cylinder lock not available	Contact Liebherr customer service.
520244	05	"Frame1" / "SC" work control	Hoist gear suspension 1	Measured current lower than 220mA / overload detected at the control unit output for more than 2000ms	Cable break/current load at the output too high	Hoist gear suspension not available	Contact Liebherr customer service.
520244	06	"Frame1" / "SC" work control	Hoist gear suspension 1	Measured output signal does not correspond to the command for more than 2000ms	Short circuit to supply	Hoist gear suspension not available	Contact Liebherr customer service.
520244	14	"Frame1" / "SC" work control	Hoist gear suspension 1	Shut off detected in the 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	Hoist gear suspension not available	Contact Liebherr customer service.
520245	05	"Frame1" work control	Hoist gear suspension 2	Measured current lower than 220mA / overload detected at the control unit output for more than 2000ms	Cable break/current load at the output too high	Hoist gear suspension not available	Contact Liebherr customer service.
520245	06	"Frame1" work control	Hoist gear suspension 2	Measured output signal does not correspond to the command for more than 2000ms	Short circuit to supply	Hoist gear suspension not available	Contact Liebherr customer service.
520245	14	"Frame1" / "SC" work control	Hoist gear suspension 2	Shut off detected in the 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	Hoist gear suspension not available	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

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520246	05	"Framel" work control	4x4 shut-off solenoid valve	Measured current lower than 220mA / overload detected at the control unit output for more than 2000ms	Cable break/current load at the output too high	4x4 shut-off not available	Contact Liebherr customer service.
520246	06	"Framel" work control	4x4 shut-off solenoid valve	Measured output signal does not correspond to the command for more than 2000ms	Short circuit to supply	4x4 shut-off not available	Contact Liebherr customer service.
520246	14	"Framel" work control	4x4 shut-off solenoid valve	Shut off detected in the 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	4x4 shut-off not available	Contact Liebherr customer service.
520247	05	"Framel" work control	Differential lock solenoid valve	Measured current lower than 220mA / overload detected at the control unit output for more than 2000ms	Cable break/current load at the output too high	Differential lock not available	Contact Liebherr customer service.
520247	06	"Framel" work control	Differential lock solenoid valve	Measured output signal does not correspond to the command for more than 2000ms	Short circuit to supply	Differential lock not available	Contact Liebherr customer service.
520247	14	"Framel" work control	Differential lock solenoid valve	Shut off detected in the 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	Differential lock not available	Contact Liebherr customer service.
520248	02	"Framel" work control	Auxiliary hydraulic motor proportional valve	Measured current too high or too low: by 384 mA (by 10 mA in idle state) too high/too low for 400 ms	Cable break/short circuit to ground	Auxiliary motor not available; maximum speed is not reached	Contact Liebherr customer service.
520248	06	"Framel" work control	Auxiliary hydraulic motor proportional valve	Measured overload at the control unit output: greater than 5A	Current load at the output too high	Auxiliary motor not available; maximum speed is not reached	Contact Liebherr customer service.
520248	14	"Framel" work control	Auxiliary hydraulic motor proportional valve	Shut off detected in the 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	Auxiliary motor not available; potentially reduced pulling force	Contact Liebherr customer service.
520249	05	"Framel" work control	Level adjustment A	Measured current too low for more than 2000 ms	Cable break/short circuit to supply	Level adjustment A not available	Contact Liebherr customer service.
520249	06	"Framel" work control	Level adjustment A	Measured overload at the control unit output: greater than 5A	Current load at the output too high	Level adjustment A not available	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

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520249	14	"Frame1" / "SC" work control	Level adjustment A	Shut off detected in the 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	Level adjustment A not available	Contact Liebherr customer service.
520250	05	"Frame1" work control	Level adjustment B	Measured current too low for more than 2000 ms	Cable break/short circuit to supply	Level adjustment B not available	Contact Liebherr customer service.
520250	06	"Frame1" work control	Level adjustment B	Measured overload at the control unit output: greater than 5A	Current load at the output too high	Level adjustment B not available	Contact Liebherr customer service.
520250	14	"Frame1" / "SC" work control	Level adjustment B	Shut off detected in the 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	Level adjustment B not available	Contact Liebherr customer service.
520251	02	"Frame1" work control	Lift telescopic arm A proportional valve	Measured current too high or too low: by 200 mA (by 10 mA in idle state) too high/too low for 2000 ms	Cable break/short circuit to ground	Lift telescopic arm not available	Contact Liebherr customer service.
520251	06	"Frame1" work control	Lift telescopic arm A proportional valve	Measured overload at the control unit output: greater than 5A	Current load at the output too high	Lift telescopic arm not available	Contact Liebherr customer service.
520251	14	"Frame1" work control	Lift telescopic arm A proportional valve	Shut off detected in the 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	Lift telescopic arm not available	Contact Liebherr customer service.
520252	02	"Frame1" work control	Lower telescopic arm B proportional valve	Measured current too high or too low: by 200 mA (by 10 mA in idle state) too high/too low for 2000 ms	Cable break/short circuit to ground	Lower telescopic arm not available	Contact Liebherr customer service.
520252	06	"Frame1" work control	Lower telescopic arm B proportional valve	Measured overload at the control unit output: greater than 5A	Current load at the output too high	Lower telescopic arm not available	Contact Liebherr customer service.
520252	14	"Frame1" work control	Lower telescopic arm B proportional valve	Shut off detected in the 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	Lower telescopic arm not available	Contact Liebherr customer service.
520253	02	"Frame1" work control	PF3: Tilt direction A proportional valve; PF2: Bucket repositioning A proportional valve; tilt in	Measured current too high or too low: by 100 mA (by 10 mA in idle state) too high/too low for 2000 ms	Cable break/short circuit to ground	PF3: Tilting in not available in general; PF2: Tilting in during bucket repositioning not available	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

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520253	06	"Frame1" work control	PF3: Tilt direction A proportional valve; PF2: Bucket repositioning A proportional valve; tilt in	Measured overload at the control unit output: greater than 5A	Current load at the output too high	PF3: Tilting in not available in general; PF2: Tilting in during bucket repositioning not available	Contact Liebherr customer service.
520253	14	"Frame1" work control	PF3: Tilt direction A proportional valve; PF2: Bucket repositioning A proportional valve; tilt in	Shut off detected in the 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	PF3: Tilting in not available in general; PF2: Tilting in during bucket repositioning not available	Contact Liebherr customer service.
520254	02	"Frame1" work control	PF3: Tilt direction B proportional valve; PF2: Bucket repositioning B proportional valve; tilt out	Measured current too high or too low: by 100 mA (by 10 mA in idle state) too high/too low for 2000 ms	Cable break/short circuit to ground	PF3: Tilting out not available in general; PF2: Tilting out during bucket repositioning not available	Contact Liebherr customer service.
520254	06	"Frame1" work control	PF3: Tilt direction B proportional valve; PF2: Bucket repositioning B proportional valve; tilt out	Measured overload at the control unit output: greater than 5A	Current load at the output too high	PF3: Tilting out not available in general; PF2: Tilting out during bucket repositioning not available	Contact Liebherr customer service.
520254	14	"Frame1" work control	PF3: Tilt direction B proportional valve; PF2: Bucket repositioning B proportional valve; tilt out	Shut off detected in the 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	PF3: Tilting out not available in general; PF2: Tilting out during bucket repositioning not available	Contact Liebherr customer service.
520255	02	"Frame2" work control	Minijoystick additional control circuits	Measured redundancy difference too high: greater than 200mV, longer than 200ms	Cable break/short circuit at redundant signal	Additional control circuits not available	Contact Liebherr customer service.
520255	03	"Frame2" work control	Minijoystick additional control circuits	Measured voltage too high: greater than 4920mV for more than 1000ms	Short circuit to supply / sensor supply;	Additional control circuits not available	Contact Liebherr customer service.
520255	04	"Frame2" work control	Minijoystick additional control circuits	Measured voltage too low: lower than 80mV for more than 1000ms	Cable break/short circuit to ground;	Additional control circuits not available	Contact Liebherr customer service.
520256	05	"Frame2" / "SC" work control	Quick coupler valve	Measured current lower than 220mA / overload detected at the control unit output for more than 2000ms	Cable break/current load at the output too high	Quick coupler not available	Contact Liebherr customer service.
520256	06	"Frame2" / "SC" work control	Quick coupler valve	Measured output signal does not correspond to the command for more than 2000ms	Short circuit to supply	Quick coupler not available	Contact Liebherr customer service.
520256	14	"Frame2" / "SC" work control	Quick coupler valve	Shut off detected in the 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	Quick coupler not available	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Control unit	Component	Problem detected	Possible cause	Effect	Remedy
520257	05	"Frame2" work control	Control circuit 3 change over solenoid valve	Measured current lower than 220mA / overload detected at the control unit output for more than 2000ms	Cable break/current load at the output too high	Control circuit 3 change over not available	Contact Liebherr customer service.
520257	06	"Frame2" work control	Control circuit 3 change over solenoid valve	Measured output signal does not correspond to the command for more than 2000ms	Short circuit to supply	Control circuit 3 change over not available	Contact Liebherr customer service.
520257	14	"Frame2" work control	Control circuit 3 change over solenoid valve	Shut off detected in the 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	Control circuit 3 change over not available	Contact Liebherr customer service.
520258	05	"Frame2" work control	Control circuit 3 pressure relief solenoid valve	Measured current lower than 220mA / overload detected at the control unit output for more than 2000ms	Cable break/current load at the output too high	Control circuit 3 pressure relief not available	Contact Liebherr customer service.
520258	06	"Frame2" work control	Control circuit 3 pressure relief solenoid valve	Measured output signal does not correspond to the command for more than 2000ms	Short circuit to supply	Control circuit 3 pressure relief not available	Contact Liebherr customer service.
520258	14	"Frame2" work control	Control circuit 3 pressure relief solenoid valve	Shut off detected in the 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	Control circuit 3 pressure relief not available	Contact Liebherr customer service.
520259	05	"Frame2" work control	Control circuit 4 change over solenoid valve	Measured current lower than 220mA / overload detected at the control unit output for more than 2000ms	Cable break/current load at the output too high	Additional control circuit 4 single action and auto hitch not available	Contact Liebherr customer service.
520259	06	"Frame2" work control	Control circuit 4 change over solenoid valve	Measured output signal does not correspond to the command for more than 2000ms	Short circuit to supply	Additional control circuit 4 single action and auto hitch not available	Contact Liebherr customer service.
520259	14	"Frame2" work control	Control circuit 4 change over solenoid valve	Shut off detected in the 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	Additional control circuit 4 single action and auto hitch not available	Contact Liebherr customer service.
520260	05	"Frame2" work control	Auto hitch solenoid valve	Measured current lower than 220mA / overload detected at the control unit output for more than 2000ms	Cable break/current load at the output too high	Additional control circuit 4 auto hitch not available	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Control unit	Component	Problem detected	Possible cause	Effect	Remedy
520260	06	"Frame2" work control	Auto hitch solenoid valve	Measured output signal does not correspond to the command for more than 2000ms	Short circuit to supply	Additional control circuit 4 auto hitch not available	Contact Liebherr customer service.
520260	14	"Frame2" work control	Auto hitch solenoid valve	Shut off detected in the 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	Additional control circuit 4 auto hitch not available	Contact Liebherr customer service.
520261	05	"Frame2" work control	Auto hitch lock solenoid valve	Measured current lower than 220mA / overload detec-ted at the control unit output for more than 2000ms	Cable break/current load at the output too high	Additional control circuit 4 auto hitch cannot be unlocked	Contact Liebherr customer service.
520261	06	"Frame2" work control	Auto hitch lock solenoid valve	Measured output signal does not correspond to the command for more than 2000ms	Short circuit to supply	Additional control circuit 4 auto hitch cannot be unlocked	Contact Liebherr customer service.
520261	14	"Frame2" work control	Auto hitch lock solenoid valve	Shut off detected in the 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	Additional control circuit 4 auto hitch cannot be unlocked	Contact Liebherr customer service.
520262	02	"Frame2" / "SC" work control	Hydraulic trailer brake 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	Cable break/short circuit to ground	Hydraulic trailer brake not available	Contact Liebherr customer service.
520262	06	"Frame2" / "SC" work control	Hydraulic trailer brake proportional valve	Measured overload at the control unit output: greater than 5A	Current load at the output too high	Hydraulic trailer brake not available	Contact Liebherr customer service.
520262	14	"Frame2" / "SC" work control	Hydraulic trailer brake proportional valve	Shut off detected in the 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	Hydraulic trailer brake not available	Contact Liebherr customer service.
520263	05	"Frame2" work control	Fan reversing valve	Measured current too low for more than 2000 ms	Cable break/short circuit to supply	Reverse fan not available	Contact Liebherr customer service.
520263	06	"Frame2" work control	Fan reversing valve	Measured overload at the control unit output: greater than 5A	Current load at the output too high	Reverse fan not available	Contact Liebherr customer service.
520263	14	"Frame2" / "SC" work control	Fan reversing valve	Shut off detected in the 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	Reverse fan not available	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Control unit	Component	Problem detected	Possible cause	Effect	Remedy
520264	02	"Frame2" work control	Additional control circuit 5 A 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	Cable break/short circuit to ground	Additional control circuit 5 side A not available	Contact Liebherr customer service.
520264	06	"Frame2" work control	Additional control circuit 5 A proportional valve	Measured overload at the control unit output: greater than 5A	Current load at the output too high	Additional control circuit 5 side A not available	Contact Liebherr customer service.
520264	14	"Frame2" work control	Additional control circuit 5 A proportional valve	Shut off detected in the 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	Additional control circuit 5 side A not available	Contact Liebherr customer service.
520265	02	"Frame2" work control	Additional control circuit 5 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	Cable break/short circuit to ground	Additional control circuit 5 side B not available	Contact Liebherr customer service.
520265	06	"Frame2" work control	Additional control circuit 5 B proportional valve	Measured overload at the control unit output: greater than 5A	Current load at the output too high	Additional control circuit 5 side B not available	Contact Liebherr customer service.
520265	14	"Frame2" work control	Additional control circuit 5 B proportional valve	Shut off detected in the 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	Additional control circuit 5 side B not available	Contact Liebherr customer service.
520266	02	"Frame2" work control	Additional control circuit 4 A proportional valve	Measured current too high or too low: by 200 mA (by 10 mA in idle state) too high/too low for 2000 ms	Cable break/short circuit to ground	Additional control circuit 4 side A not available; lower auto hitch and additional control circuit 4 double acting coupling A not available	Contact Liebherr customer service.
520266	06	"Frame2" work control	Additional control circuit 4 A proportional valve	Measured overload at the control unit output: greater than 5A	Current load at the output too high	Additional control circuit 4 side A not available; lower auto hitch and additional control circuit 4 double acting coupling A not available	Contact Liebherr customer service.
520266	14	"Frame2" work control	Additional control circuit 4 A proportional valve	Shut off detected in the 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	Additional control circuit 4 side A not available; additional control circuit 4 lower auto hitch and additional control circuit 4 double acting coupling A not available	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Control unit	Component	Problem detected	Possible cause	Effect	Remedy
520267	02	"Frame2" work control	Additional control circuit 4 B proportional valve	Measured current too high or too low: by 200 mA (by 10 mA in idle state) too high/too low for 2000 ms	Cable break/short circuit to ground	Additional control circuit 4 side B not available; additional control circuit 4 single acting coupling A, additional control circuit 4 lift auto hitch and additional control circuit 4 double acting coupling B not available	Contact Liebherr customer service.
520267	06	"Frame2" work control	Additional control circuit 4 B proportional valve	Measured overload at the control unit output: greater than 5A	Current load at the output too high	Additional control circuit 4 side B not available; additional control circuit 4 single acting coupling A, additional control circuit 4 lift auto hitch and additional control circuit 4 double acting coupling B not available	Contact Liebherr customer service.
520267	14	"Frame2" work control	Additional control circuit 4 B proportional valve	Shut off detected in the 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	Additional control circuit 4 side B not available; additional control circuit 4 single acting coupling A, additional control circuit 4 lift auto hitch and additional control circuit 4 double acting coupling B not available	Contact Liebherr customer service.
520268	02	"Cabin" work control	CAN 1 / communication I	CAN timeout of telescoping signal or defective signal is received for more than 250 ms	CAN line to joystick disconnected; joystick not supplied; joystick has detected an error	Telescoping not available	Contact Liebherr customer service.
520269	02	"Cabin" work control	CAN 1 / communication I	CAN timeout of control circuit 3 signal or defective signal is received for more than 250 ms	CAN line to joystick disconnected; joystick not supplied; joystick has detected an error	Control circuit 3 not available	Contact Liebherr customer service.
520270	02	"Frame1" work control	CAN 1 / communication I	CAN timeout of tilt signal or defective signal is received for more than 250 ms	CAN line to joystick disconnected; joystick not supplied; joystick has detected an error	PF3: Tilt in and tilt out not available	Contact Liebherr customer service.
520271	02	"Frame1" / "SC" work control	Hoist gear suspension rocker switch	Measured input signals are not suitable for the logic of the switch for more than 2000ms	Short circuit to supply	Hoist gear suspension not available	Contact Liebherr customer service.
520272	03	"Cabin" / "SC" work control	Battery + control box, working hydraulics	Measured voltage too high: >36V for 2000ms	Alternator faulty	Failures of any nature possible; inputs are being ignored, outputs not available	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Control unit	Component	Problem detected	Possible cause	Effect	Remedy
520272	04	"Cabin" / "SC" work control	Battery + control box, working hydraulics	Measured voltage too low: <7V for 2000ms	Battery weak	Control unit A30 cannot work properly; proportional outputs not available	Contact Liebherr customer service.
520273	02	"Cabin" / "SC" work control	Working hydraulics control box sensor supply	Measured voltage at sensor supply too high or too low: <3.5 or >7.5V for 2000ms	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.
520274	03	"Frame1" work control	Battery + control box, working hydraulics	Measured voltage too high: >36V for 2000ms	Alternator faulty	Failures of any nature possible; inputs are being ignored, outputs not available	Contact Liebherr customer service.
520274	04	"Frame1" work control	Battery + control box, working hydraulics	Measured voltage too low: <7V for 2000ms	Battery weak	Control unit A40 cannot work properly; proportional outputs not available	Contact Liebherr customer service.
520275	02	"Cabin" / "SC" work control	Extend telescope 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	Cable break/short circuit to ground	Telescoping out not available	Contact Liebherr customer service.
520275	06	"Cabin" / "SC" work control	Extend telescope proportional valve	Measured overload at the control unit output: greater than 5A	Current load at the output too high	Telescoping out not available	Contact Liebherr customer service.
520275	14	"Cabin" / "SC" work control	Extend telescope proportional valve	Shut off detected in the 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	Telescoping out not available	Contact Liebherr customer service.
520276	02	"Cabin" / "SC" work control	Retract telescope 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	Cable break/short circuit to ground	Telescoping in not available	Contact Liebherr customer service.
520276	06	"Cabin" / "SC" work control	Retract telescope proportional valve	Measured overload at the control unit output: greater than 5A	Current load at the output too high	Telescoping in not available	Contact Liebherr customer service.
520276	14	"Cabin" / "SC" work control	Retract telescope proportional valve	Shut off detected in the 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	Telescoping in not available	Contact Liebherr customer service.
520277	02	"Cabin" / "SC" work control	Control circuit 3 A proportional valve	Measured current too high or too low: by 200 mA (by 10 mA in idle state) too high/too low for 2000 ms	Cable break/short circuit to ground	Control circuit 3 side A not available	Contact Liebherr customer service.
520277	06	"Cabin" / "SC" work control	Control circuit 3 A proportional valve	Measured overload at the control unit output: greater than 5A	Current load at the output too high	Control circuit 3 side A not available	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Control unit	Component	Problem detected	Possible cause	Effect	Remedy
520277	14	"Cabin" / "SC" work control	Control circuit 3 A proportional valve	Shut off detected in the 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	Control circuit 3 side A not available	Contact Liebherr customer service.
520278	02	"Cabin" / "SC" work control	Control circuit 3 B proportional valve	Measured current too high or too low: by 200 mA (by 10 mA in idle state) too high/too low for 2000 ms	Cable break/short circuit to ground	Control circuit 3 side B not available	Contact Liebherr customer service.
520278	06	"Cabin" / "SC" work control	Control circuit 3 B proportional valve	Measured overload at the control unit output: greater than 5A	Current load at the output too high	Control circuit 3 side B not available	Contact Liebherr customer service.
520278	14	"Cabin" / "SC" work control	Control circuit 3 B proportional valve	Shut off detected in the 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	Control circuit 3 side B not available	Contact Liebherr customer service.
520279	02	"Frame1" work control	Torque limitation proportional valve	Measured current too high or too low: by 100mA too high/too low for 2000ms	Incorrect paramet-risation for work control	none	Contact Liebherr customer service.
520279	05	Pump controller	Torque limitation proportional valve	Measured current too low	Cable break	Diesel engine can stall more easily	Contact Liebherr customer service.
520279	06	"Frame1" work control	Torque limitation proportional valve	Measured overload at the control unit output: greater than 5A	Incorrect paramet-risation for work control	none	Contact Liebherr customer service.
520279	06	Pump controller	Torque limitation proportional valve	Measured current too high	Short circuit to associated ground	Diesel engine can stall more easily	Contact Liebherr customer service.
520279	14	"Frame1" work control	Torque limitation proportional valve	Shut off detected in the control unit safety circuit	Incorrect paramet-risation for work control	none	Contact Liebherr customer service.
520280	02	"Frame1" / "SC" work control	Level adjustment rocker switch	Measured input signals are not suitable for the logic of the switch for more than 500ms	Cable break/short circuit to ground/supply	Level adjustment not available	Contact Liebherr customer service.
520281	02	"Frame1" work control	Working hydraulics control box sensor supply	Measured voltage at sensor supply too high or too low: <3.5 or >7.5V for 2000ms	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.
520282	03	"Frame2" work control	Battery + control box, working hydraulics	Measured voltage too high: >36V for 2000ms	Alternator faulty	Failures of any nature possible; inputs are being ignored, outputs not available	Contact Liebherr customer service.
520282	04	"Frame2" work control	Battery + control box, working hydraulics	Measured voltage too low: <7V for 2000ms	Battery weak	Control unit A50 cannot work prop-erly; proportional outputs not avail-able	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Control unit	Component	Problem detected	Possible cause	Effect	Remedy
520283	02	"Frame2" work control	Working hydraulics control box sensor supply	Measured voltage at sensor supply too high or too low: <3.5 or >7.5V for 2000ms	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	"Cabin" / "SC" work control	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	"Frame1" work control	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	"Frame2" work control	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.
520287	09	"Cabin" work control	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	"Frame1" work control	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	"Frame2" work control	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.
520290	02	"Frame2" work control	Telescope length tape extension sensor	Measured redundancy difference too high: greater than 200mV, longer than 200ms	Cable break/short circuit at redundant signal	Electronic telescope end damping not available; automatic telescope retraction not available	Contact Liebherr customer service.
520290	03	"Frame2" work control	Telescope length tape extension sensor	Measured voltage too high: at least 80% "of the difference between the taught maximum value and 96% of the voltage 5V" greater than the taught maximum value for more than 2000ms	Taught maximum value incorrect, taught value too low; short circuit to supply/sensor supply;	Electronic telescope end damping not available; automatic telescope retraction not available	Contact Liebherr customer service.
520290	04	"Frame2" work control	Telescope length tape extension sensor	Measured voltage too low: at least 30% "of the difference between the taught minimum value and 4% of the voltage 5V" less than the taught minimum value for more than 2000ms	Taught minimum value incorrect, taught value too high; cable break; short circuit to ground;	Electronic telescope end damping not available; automatic telescope retraction not available	Contact Liebherr customer service.
520301	02	“SC” travel control	Travel pump C1 proportional solenoid valve	Difference between measured current of source(+) and sink(-) too high: by 500mA for 200ms	Creeping currents, defective insulation; short circuit to ground/supply	Machine response: limited mode; C1 not controllable	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Control unit	Component	Problem detected	Possible cause	Effect	Remedy
520301	05	“AC” travel control	Travel pump C1 proportional solenoid valve	Measured current too low: <75% of the command for 500ms; or measured voltage too high;	Cable break/short circuit to supply	Machine response: limited mode; C1 not controllable	Contact Liebherr customer service.
520301	05	“SC” travel control	Travel pump C1 proportional solenoid valve	Measured current too low: <75% of the command for 500ms;	Cable break	Machine response: limited mode; C1 not controllable	Contact Liebherr customer service.
520301	06	“AC” travel control	Travel pump C1 proportional solenoid valve	Measured current too high: >125% of the command for 500ms; or measured connection to ground;	Short circuit to ground	Machine response: limited mode; C1 not controllable	Contact Liebherr customer service.
520301	06	“SC” travel control	Travel pump C1 proportional solenoid valve	Measured current too high: >125% of the command for 500ms; or measured overload at the control unit output: greater than 5A;	Short circuit to ground, current load at the output too high	Machine response: limited mode; C1 not controllable	Contact Liebherr customer service.
520301	11	“SC” travel control	Travel pump C1 proportional solenoid valve	Shut off detected in the control unit safety circuit	Short circuit to supply or ground; error in the control unit safety circuit; error in the output end stage; internal supply to the control unit output defective	Machine response: limited mode; C1 not controllable	Contact Liebherr customer service.
520301	14	“SC” travel control	Travel pump C1 proportional solenoid valve	Shut off detected in the 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	Machine response: limited mode; C1 not controllable	Contact Liebherr customer service.
520302	02	“SC” travel control	Travel pump C2 proportional solenoid valve	Difference between measured current of source(+) and sink(-) too high: by 500mA for 200ms	Creeping currents, defective insulation; short circuit to ground/supply	Machine response: limited mode; C2 not controllable	Contact Liebherr customer service.
520302	05	“AC” travel control	Travel pump C2 proportional solenoid valve	Measured current too low: <75% of the command for 500ms; or measured voltage too high;	Cable break/short circuit to supply	Machine response: limited mode; C2 not controllable	Contact Liebherr customer service.
520302	05	“SC” travel control	Travel pump C2 proportional solenoid valve	Measured current too low: <75% of the command for 500ms;	Cable break	Machine response: limited mode; C2 not controllable	Contact Liebherr customer service.
520302	06	“AC” travel control	Travel pump C2 proportional solenoid valve	Measured current too high: >125% of the command for 500ms; or measured connection to ground;	Short circuit to ground	Machine response: limited mode; C2 not controllable	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Control unit	Component	Problem detected	Possible cause	Effect	Remedy
520302	06	“SC” travel control	Travel pump C2 proportional solenoid valve	Measured current too high: >125% of the command for 500ms; or measured overload at the control unit output: greater than 5A;	Short circuit to ground, current load at the output too high	Machine response: limited mode; C2 not controllable	Contact Liebherr customer service.
520302	11	“SC” travel control	Travel pump C2 proportional solenoid valve	Shut off detected in the control unit safety circuit	Short circuit to supply or ground; error in the control unit safety circuit; error in the output end stage; internal supply to the control unit output defective	Machine response: limited mode; C2 not controllable	Contact Liebherr customer service.
520302	14	“SC” travel control	Travel pump C2 proportional solenoid valve	Shut off detected in the 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	Machine response: limited mode; C2 not controllable	Contact Liebherr customer service.
520303	00	“AC” / “SC” travel control	Travel pump speed sensor	calculated speed of the travel pump too high: upper limit exceeded	-	Machine response: limited mode	Contact Liebherr customer service.
520303	01	“AC” / “SC” travel control	Travel pump speed sensor	Speed of the travel pump too low: less than 400 rpm	Diesel engine stall	Machine response: limited mode	Contact Liebherr customer service.
520303	02	“AC” / “SC” travel control	Travel pump speed sensor	Redundancy monitoring: deviation between the speed signal of travel pump and diesel engine	Output shaft defective; error in CAN communication	Machine response: limited mode	Contact Liebherr customer service.
520303	08	“AC” / “SC” travel control	Travel pump speed sensor	calculated frequency too high (>10000Hz) or no frequency	Cable break	Machine response: limited mode	Contact Liebherr customer service.
520305	05	“AC” travel control	Hydraulic motor proportional valve	Measured current too low: <75% of the command for 500ms; or measured voltage too high;	Cable break/short circuit to supply	Machine response: limited mode; Y27 not controllable	Contact Liebherr customer service.
520305	05	“SC” travel control	Hydraulic motor proportional valve	Measured current too low: <75% of the command for 500ms;	Cable break/short circuit to supply	Machine response: limited mode; Y27 not controllable	Contact Liebherr customer service.
520305	06	“AC” travel control	Hydraulic motor proportional valve	Measured current too high: >125% of the command for 500ms; or measured connection to ground;	Short circuit to ground	Machine response: limited mode; Y27 not controllable	Contact Liebherr customer service.
520305	06	“SC” travel control	Hydraulic motor proportional valve	Measured current too high: >125% of the command for 500ms; or measured overload at the control unit output: greater than 5A;	Short circuit to ground, current load at the output too high	Machine response: limited mode; Y27 not controllable	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Control unit	Component	Problem detected	Possible cause	Effect	Remedy
520305	14	“SC” travel control	Hydraulic motor proportional valve	Shut off detected in the 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	Machine response: limited mode; Y27 not controllable	Contact Liebherr customer service.
520306	00	“AC” / “SC” travel control	Hydraulic motor speed sensor	Measured voltage between 11% and 89% of the assumed sensor supply (approx. 5V)	AC: A1.X10/1 Pin 5SC contact problem: A1.X10 Pin 25 contact problem; broken cable	Machine response: limited mode	Contact Liebherr customer service.
520306	03	“AC” / “SC” travel control	Hydraulic motor speed sensor	Measured voltage greater than 97% of the assumed sensor supply (approx. 5V)	AC: A1.X10/1 Pin 5SC contact problem: A1.X10 Pin 25 contact problem; short circuit to supply	Machine response: limited mode	Contact Liebherr customer service.
520306	04	“AC” / “SC” travel control	Hydraulic motor speed sensor	Measured voltage less than 5% of the assumed sensor supply (approx. 5V)	AC: A1.X10/1 Pin 5SC contact problem: A1.X10 Pin 25 contact problem; short circuit to ground	Machine response: limited mode	Contact Liebherr customer service.
520306	08	“AC” / “SC” travel control	Hydraulic motor speed sensor	calculated frequency too high (>10000Hz) or no frequency	AC: A1.X10/1 Pin 5SC contact problem: A1.X10 Pin 25 contact problem; no frequency: error in mechanics	Machine response: limited mode	Contact Liebherr customer service.
520310	14	“AC” travel control	Internal travel control	Message from "Watchdog Monitoring" or "AD Reference Voltage Monitoring" or "Analog Injection Channel Monitoring"	Control unit damaged	Machine response: safe state	Contact Liebherr customer service.
520310	14	“SC” travel control	Travel 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.
520311	02	“AC” / “SC” travel control	Battery	Measured supply voltage too high (>16V for 200ms) or too low (<9V for 500ms)	Too high: alternator faulty; too low: battery weak;	Machine response: limited mode (>16V, <36V); safe state (>36V, <9V)	Contact Liebherr customer service.
520312	02	“AC” travel control	Travel control: sensor supply voltage output	Measured voltage for sensor supply too high or too low: <4.825V or >5.075V	Short circuit to ground; short circuit to supply	Machine response: safe state	Contact Liebherr customer service.
520312	02	“SC” travel control	Travel control: sensor supply voltage output	Measured voltage for sensor supply too high or too low: <4.8V or >5.2V	Short circuit to ground; short circuit to supply	Machine response: safe state	Contact Liebherr customer service.
521289	00	Joystick	Joystick	Measured redundant signal of the tilt axle too high or too low	-	Joystick safe signal state	Contact Liebherr customer service.
521290	00	Joystick	Joystick	Measured redundant signal of the lift/lower axle too high or too low	-	Joystick safe signal state	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Control unit	Component	Problem detected	Possible cause	Effect	Remedy
521291	00	Joystick	Joystick	Measured redundant signal of the "travel direction" thumbwheel too high or too low	-	Joystick safe signal state	Contact Liebherr customer service.
521292	00	Joystick	Joystick	Measured redundant signal of the "telescoping" thumbwheel too high or too low	-	Joystick safe signal state	Contact Liebherr customer service.
521293	00	Joystick	Joystick	Measured redundant signal of the "control circuit 3" thumbwheel too high or too low	-	Joystick safe signal state	Contact Liebherr customer service.
521299	00	Joystick	Joystick	Redundancy error at the signals of the tilt axle detected	-	Joystick safe signal state	Contact Liebherr customer service.
521300	00	Joystick	Joystick	Redundancy error at the signals of the lift/lower axle detected	-	Joystick safe signal state	Contact Liebherr customer service.
521301	00	Joystick	Joystick	Redundancy error at the signals of the "travel direction" thumbwheel detected	-	Joystick safe signal state	Contact Liebherr customer service.
521302	00	Joystick	Joystick	Redundancy error at the signals of the "telescoping" thumbwheel detected	-	Joystick safe signal state	Contact Liebherr customer service.
521303	00	Joystick	Joystick	Redundancy error at the signals of the "control circuit 3" thumbwheel detected	-	Joystick safe signal state	Contact Liebherr customer service.
521308	00	"Cabin" work control	CAN 1 / communication I	CAN timeout of all joystick signals	CAN line to joystick disconnected; joystick not supplied	all functions associated with the joystick not available	Contact Liebherr customer service.
521309	00	Joystick	Joystick	CAN (BJM) data plausibility error detected	-	Joystick safe state	Contact Liebherr customer service.
521310	00	Joystick	Joystick	CAN (EJM) data plausibility error detected	-	Joystick safe state	Contact Liebherr customer service.
521311	00	Joystick	Joystick	CAN (BJM) timeout error detected	-	Joystick safe state	Contact Liebherr customer service.
521312	00	Joystick	Joystick	CAN (EJM) timeout error detected	-	Joystick safe state	Contact Liebherr customer service.
521317	00	Joystick	Joystick	Stack overflow error detected	-	Joystick safe state	Contact Liebherr customer service.
521318	00	Joystick	Joystick	Logic program flow monitoring error detected	-	Joystick safe state	Contact Liebherr customer service.
521319	00	Joystick	Joystick	Temporal program flow monitoring error detected	-	Joystick safe state	Contact Liebherr customer service.
521320	00	Joystick	Joystick	Measured supply voltage 1 (5V) too high or too low	-	Joystick safe state	Contact Liebherr customer service.

LWT/93517630/09/01/12/2023/en

SPN	FMI	Control unit	Component	Problem detected	Possible cause	Effect	Remedy
521322	00	Joystick	Joystick	Measured supply voltage 2 (5V) too high or too low	-	Joystick safe state	Contact Liebherr customer service.

4.2 Problems - Cause - Remedy

4.2.1 Diesel engine

[20] For emission stage V

Malfunction / error	Cause	Remedy
The diesel engine does not start or is hard to start	Not uncoupled (if possible)	Check the clutch
	Fuel tank empty	Refuel
	Fuel suction line is blocked	Check
	Below starting limit temperature	Check
	Cold start device	Check or change
	Incorrect SAE viscosity class of engine oil	Change engine oil
	Fuel quality does not correspond to operator's manual	Change the fuel
	Battery defective or not charged	Check the battery
	Cable connections to starter loose or oxidized	Check cable connections
	Starter defective or pinion does not track	Check the starter
	Air filter dirty / exhaust turbo charger defective	Check or change
	Air in fuel system	Vent fuel system
	Compression pressure too low	Check compression pressure
	Exhaust counter pressure too high	Check
	Injection line leaks	Check injection line
	High pressure pump defective	Check or change
Diesel engine does not start and diagnostics light flashes	Engine electronics prevent start	Check error according to error code and remedy the error
Diesel engine starts, but runs irregularly or stalls	V-belt (fuel pump in belt drive)	Check if broken or loose
	Compression pressure too low	Check compression pressure
	Cold start device	Check or change
	Air in fuel system	Bleed
	Fuel preliminary filter dirty	Exchange
	Fuel quality does not correspond to operator's manual	Change the fuel
	Injector defective	Exchange
	Injection line leaks	Check injection line
	Engine wiring harness defective	Check or change
	Exhaust counter pressure too high	Check
Rpm changes are possible and diagnostics light lights up	Engine electronics have detected a system error and activate a replacement rpm	Check error according to error code and remedy the error
Diesel engine gets too hot, temperature warning system does not respond	Vent line to expansion tank for coolant clogged up	Clean
	Injector defective	Exchange
	Coolant heat exchanger contaminated	Clean
	Coolant pump defective (V-belt broken or loose)	Check if broken or loose
	Lack of coolant	Add
	Resistance in cooling system too high/flow quantity too low	Check the cooling system

Malfunction / error	Cause	Remedy
Diesel engine gets too hot, temperature warning system does not respond	Fan or viscous coupling defective, V-belt broken or loose	Check or change or tension
	Intercooler dirty	Check or clean
	Air filter dirty / exhaust turbo charger defective	Check or change
	Restrictor flap defective	Check or change
	Coolant temperature sensor	Check or change
	Coolant thermostat defective	Check or change
	Coolant cover defective	Check or change
	Oil cooler defective	Check or change
	Oil filter contaminated on air and/or oil side	Exchange
	Engine oil level too high	Check engine oil level and drain if necessary
	Engine oil level too low	Add engine oil
	Charge air line leaks	Check charge air line
	Air filter maintenance switch/maintenance indicator defective	Check or change
	Fan defective / V-belt broken or loose	Check fan / V-belt and replace if necessary
	Exhaust counter pressure too high	Check
Diesel engine has insufficient power	Engine oil level too high	Check engine oil level and drain if necessary
	Restrictor flap defective	Check or change
	Exhaust return, controller defective	Check or change
	Fuel intake temperature too high	Check system
	Fuel quality does not correspond to operator's manual	Change the fuel
	Air filter dirty / exhaust turbo charger defective	Check or change
	Air filter maintenance switch / air filter maintenance indicator defective	Check or change
	Fan defective / V-belt broken or loose	Check fan / V-belt and change if necessary
	Charge air line leaks	Check charge air line
	Intercooler dirty	Clean
	Exhaust counter pressure too high	Check or clean
	Injection line leaks	Check injection line
	Injector defective	Exchange
	Exhaust turbo charger defective	Exchange
Diesel engine has insufficient power and diagnostics light lights up	Engine electronics reduce the power	Contact Liebherr customer service
Diesel engine does not work on all cylinders	Injection line leaks	Check injection line
	Injector defective	Exchange
	Compression pressure too low	Check compression pressure
	Diesel engine wiring harness defective	Check or change
Diesel engine has no or insufficient engine oil pressure	Engine oil level too low	Add engine oil
	Diesel engine incline too large	Check engine mount / lower incline position
	Incorrect SAE viscosity class of engine oil	Change engine oil
	Engine oil pressure sensor defective	Check or change
	Engine oil control valve stuck	Check or clean
	Engine oil suction pipe clogged	Check or clean
Incorrect SAE viscosity class of engine oil	Engine oil suction pipe clogged	Check or clean
Diesel engine uses too much oil	Engine oil level too high	Check engine oil level and drain if necessary
	Diesel engine incline too large	Check engine mount / lower incline position
	Crankcase vent	Check or change
	Incorrect SAE viscosity class of engine oil	Change engine oil
	Valve stem seals defective	Check or change

LWT/93517630/09/01/12/2023/en

Malfunction / error	Cause	Remedy
Diesel engine uses too much oil	Piston rings worn	Check or change
	Exhaust turbo charger defective	Check or change
Engine oil in exhaust system	Diesel engine is operated continuously at too low a load (<20 to 30%)	Check load factor
	Valve stem seals defective	Check or change
	Exhaust turbo charger defective	Check or change
Diesel engine exhaust is blue	Engine oil level too high	Check engine oil level and drain if necessary
	Diesel engine incline too large	Check engine mount / lower incline position
	Crankcase vent	Check or change
	Incorrect SAE viscosity class of engine oil	Change engine oil
	Valve stem seals defective	Check or change
	Piston rings worn	Check or change
	Exhaust turbo charger defective	Check or change
Diesel engine exhaust is white	Coolant in the exhaust gas	Check
	Cold start device	Check or change
	Condensate	Let diesel engine warm up to vaporise condensate residues
	Fuel quality does not correspond to operator's manual	Change the fuel
Diesel engine emits black smoke	Diesel particle filter defective	Check or change
Error in the SCR system [20]	Diesel exhaust fluid tank empty/display full	Check tank sensor
	SCR not working	Check the plug connections and lines at delivery pump and injector. Check plug connections and lines from delivery pump, NO_x sensor and exhaust gas temperature sensor
	SCR not working (cold)	Lines frozen, clean lines, check heating
	Diesel exhaust fluid tank frozen	Check heating
	Diesel exhaust fluid quality problem (error code 2014 or SPN 3520)	Move machine. Set starting switch to zero position. Set starting switch to contact position. Switch off large consumers. Wait 15 minutes. Set starting switch to zero position. Set starting switch to contact position. If error code remains active or reoccurs: contact Liebherr customer service.
Frequent standstill regeneration	Air filter dirty / exhaust turbo charger defective	Check or change
	Charge air line leaks	Check charge air line
	Injector defective	Exchange
	Differential pressure flow meter defective	Exchange
	NO_x sensor defective	Exchange
	Differential pressure sensor of diesel particle filter provides implausible signal	Exchange
	Differential pressure line clogged	Clean

4.2.2 Hydraulic system

Malfunction / error	Cause	Remedy
Cannot drive	No travel direction preselected	Determine travel direction via joystick
	Parking brake is activated	Release parking brake via switch
	Fuse defective	Check fuse, replace if necessary
	Joystick defective	Contact Liebherr customer service
	Inching brake pedal stuck	Contact Liebherr customer service
Parking brake is released, indicator light for parking brake does not turn off	Switch for parking brake is defective	Contact Liebherr customer service

LWT/93517630/09/01/12/2023/en

Malfunction / error	Cause	Remedy
Abnormal noises of hydraulic pumps. Turn the diesel engine off immediately.	Hydraulic pumps taking in air	Check oil level in hydraulic oil tank, check intake lines for leaks
Indicator light for replenishing pressure does not turn off after starting the diesel engine. Turn the diesel engine off immediately.	Excessive leakage	Contact Liebherr customer service

4.2.3 Steering system

Malfunction / error	Cause	Remedy
Steering function is not possible	Hydraulic oil missing	Check the oil level in the hydraulic tank and add oil if necessary

4.2.4 Brake system

Malfunction / error	Cause	Remedy
Service brake has no or only insufficient braking effect	Insufficient brake oil in brake system	Check the brake system for leaks
	Air in brake system	Check level in brake oil reservoir (refill if necessary), contact Liebherr customer service
	Brake pads too worn	Contact Liebherr customer service

4.2.5 Electrical system

Malfunction / error	Cause	Remedy
Charge indicator light does not turn off	V-belt damaged	Tension or replace V-belt
	Alternator defective	Change alternator
Battery is not charged or charged poorly	Battery defective	Replace battery
	Battery connections dirty or oxidized	Clean battery connections
	Cable loose or damaged	Fasten or replace cable
Indicator light or display instrument not functioning or functioning incorrectly	Bulb burnt out, display instrument defective	Replace damaged part
Some or all functions on instrument panel fail	Plug connector separated or damaged, ground line interrupted, short circuit - fuse defective	Attach plug connector correctly or replace, fix short circuit, replace fuse

4.2.6 Heating system

Heat output:

Malfunction / error	Cause	Remedy
Blower does not work	Fuse defective or loose	Check seating of fuse, insert correctly if necessary. Replace faulty fuse. If defect repeated within a short time, then there is probably a short circuit or blockage. Check blower for blockage or other defect, remedy problem.
	Line interruption	Check lines for loose contacts or breaks
	Blower motor defective	Replace blower
	Blower switch defective	Check switch and replace if necessary
Blower does not run in all stages	Mikro-Temperatur-Sicherung (MTS) - (micro temperature fuse) has triggered	Replace resistor and check the blower motor for causes of function impairments
	Blower switch of CBM defective	Replace blower switch

LWT/93517630/09/01/12/2023/en

Malfunction / error	Cause	Remedy
Blower does not run in all stages	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 the device
Blower runs exclusively in highest stage	Preresistor on blower defective	Replace preresistor
Blower does not run in highest stage	Customer back up fuse defective	Change the fuse
Heating cannot be turned off	Short circuit in cable or blower switch	Fix short circuit and replace cable and/or switch 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	Replace 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:

Malfunction / error	Cause	Remedy
Compressor does not work	Interruption in magnetic spool of compressor	Check current flow to coupling
	V-belt loose or broken	Adjust V-belt tension, replace V-belt
	V-belt pulley does not turn even though magnetic coupling is on	Check compressor and replace if necessary
	Compressor coupling slips	Fix coupling or replace compressor
	A/C switch of control element defective	Check control element and replace if necessary
Evaporator flows over	Expansion valve stuck in open position or is hanging	Replace expansion valve
Evaporator iced up	Temperature sensor on incorrect position	Reposition sensor
	Expansion valve or thermostat defective	Replace expansion valve or thermostat
Evaporator clogged	Cooling fins dirty	Clean evaporator
Coolant loss	Interruption of coolant line	Check all lines for breakage due to external influences or chafing
	Leak in system	Evacuate, fill, check for leaks and repair
Cooling output insufficient	Blower passage restricted	Check air ducts for restrictions. Remedy problem
	Air intake filter dirty	Replace the filter
	Fill level of refrigerant too low	Add refrigerant (service technician)
	Moisture in system	Empty air conditioning, change collector drier, evacuate and fill (service technician)
System cools with interruption	Line interruption, ground connection defective or loose contacts in magnetic spool of compressor	Check lines, fix or replace

LWT/93517630/09/01/12/2023/en

Malfunction / error	Cause	Remedy
System cools with interruption	Blower motor defective	Replace blower

System very loud:

Malfunction / error	Cause	Remedy
System very loud	V-belt loose or excessively worn	Retension or replace V-belt
	Coupling loud	Fix coupling
	Retainer of compressor loose or parts in compressor worn out	Fix retainer, replace compressor
	Excessive wear of blower motor	Replace blower
	System overfilled	Draw off refrigerant until high pressure display is normal again
	Not enough refrigerant in system	Check for leaks, fill system

4.2.7 Air filter system

Malfunction / error	Cause	Remedy
Service life of main filter element unusually brief	Cyclone cells clogged or damaged	Clean cyclone block and replace, if necessary
	Ejector hose leaky or kinked	Seal ejector hose, lay it as short as possible without any tight bends
	Too little underpressure on the intake nozzle or inconvenient installation position	Check ejector layout and installation position and change, if necessary
Dust on clean side after the filter	Lines and/or connections on the clean side after filter are leaky	Remove dust immediately, seal lines and connections
Dust on clean air side in or after the filter	Main filter element defective	Remove dust carefully, check main filter element, if necessary, replace together with safety filter element
	Improper maintenance	Remove dust carefully Page 438
	Housing not sealed correctly	Remove dust carefully; check main filter element, housing and seals for damage and, if necessary, replace and seal housing correctly
	Incorrect main filter element and/or safety filter element inserted	Remove dust carefully; insert original filter elements
Maintenance indicator/maintenance switch (option) is not activated despite filter element being very heavily contaminated	Maintenance indicator/maintenance switch defective	Check maintenance indicator/maintenance switch and, if necessary, replace and check again
	Lines, housing and/or main filter element leaky or damaged	Clean clean side carefully, rectify any leaks, replace damaged parts
Maintenance indicator/maintenance switch (option) is always activated	Main filter element used up	Change main filter element Page 438
	Safety filter element used up	Replace safety filter element Page 438
	Maintenance indicator/maintenance switch defective	Replace maintenance indicator/maintenance switch

4.2.8 Working attachment

Malfunction / error	Cause	Remedy
When the joystick is actuated, the working attachment does not move	Switch for working hydraulic lock is turned on	Turn switch for working hydraulic lock off
Hydraulic cylinder gives under load	Piston seal in hydraulic cylinder defective	Recondition hydraulic cylinder
Excessive bearing play on working attachment	Glide elements worn	Readjust or replace glide elements

LWT/93517630/09/01/12/2023/en

4.2.9 Central lubrication system (option)

Malfunction / error	Cause	Remedy
Pump is not working	Device fuse is burnt out	Change the fuse
	Integrated electronic control defective	Replace integrated control system
	Electric line interrupted	Replace electric line
	Pump defective	Replace pump
	Pump element is not mounted	Replace pump element
Pump operates, but does not deliver	Air cushion in supply piston	Bleed the pump
	Minimum fill level not reached	Refill storage container
	Pump element defective	Replace pump element
No grease collar on all lube points	Pump is not working	See „Pump is not working“
	Cycle time too high	Reduce the cycle time
	Lube time too low	Increase lube time
	System blocked	See „Grease escapes at pressure relief valve“
No grease collar on several lube points	Supply line to auxiliary distributors has burst or it leaks	Change line
	Screwed connection leaks	Retighten or change screwed connection
No grease collar on one lubricating point	Associated lube line has burst or leaks	Change line
	Screwed connection leaks	Retighten or change screwed connection
Pump speed reduced	High system pressure or low ambient temperature	Check system and bearing points/no damage (if necessary, lubricate one or two times in between)
Grease escapes at the pressure relief valve	System pressure too high	Check system
	Progressive distributor blocked	Replace distributor
	System blocked	Repair blocked and stuck bearing points
	Valve spring broken	Replace pressure relief valve
The LEDs in the protective window of the control system flash	The pump lubricates	No error (see signal displays)
	Grease level error exists	Fill up the store reservoir
	Excess pressure error exists	Check system and repair if necessary
	Rpm error exists	Check system and repair if necessary
	CPU/memory error present	Replace control system
Fill level error exists although there is no fill level control installed in the pump	Fill level control is activated in the control system	Deactivate the fill level control in the control system using the system diagnostics software BEKA-DiSys
The function of the pump (pump operating time or cycle time) does not correspond to the values set in the protective window of the control system	The operating mode or adjustment range of the control system was changed but the sticker in the protective window was not replaced	Create a diagnostic analysis using the BEKA-DiSys diagnostics software

4.3 Problem remedy

4.3.1 Changing fuses

NOTICE

Incorrect fuse rating!

Damage.

► Use a fuse of the correct rating.

LWT/93517630/09/01/12/2023/en

Ensure that following requirements are met:

☑ The circuit in question has been checked.
☑ The machine's electrical system is turned off.

4.3.1.1 Fuses in engine compartment

The fuses on the left in the engine compartment can be changed after removing the cover.

G2022765_1

Fuses in engine compartment

Overview of fuses in engine compartment

Fuse	Value	Unit	Name / Function
F03	100	A	Glow main fuse
F05	20	A	Fuel pump[21)]
F42	30	A	Exhaust system heating[22)]
F43	15	A	NO_x sensors[22)]
F44	5	A	Quality, level and temperature sensors[22)]
F45	5	A	Restrictor flap[21)22)]
F46	10	A	Exhaust gas return[23)]

[21)] For engine version 3.6l

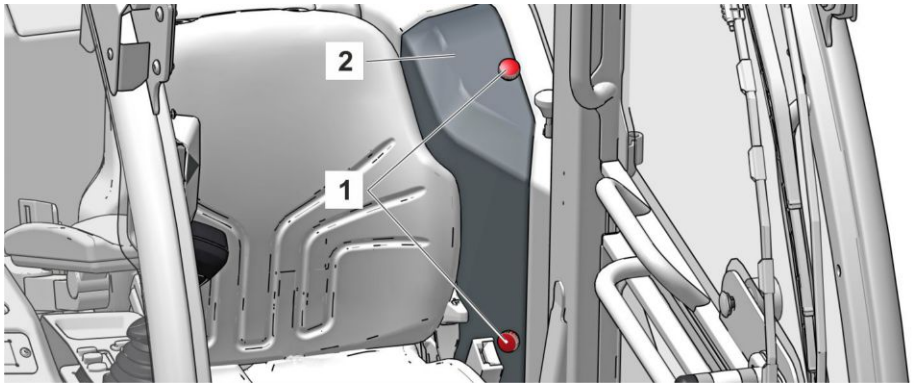
[22)] For emission stage IV and V

[23)] For engine version 4.1l

4.3.1.2 Fuses in operator's cab

The circuit board with the fuses is located to the left of the operator's seat behind the cover.

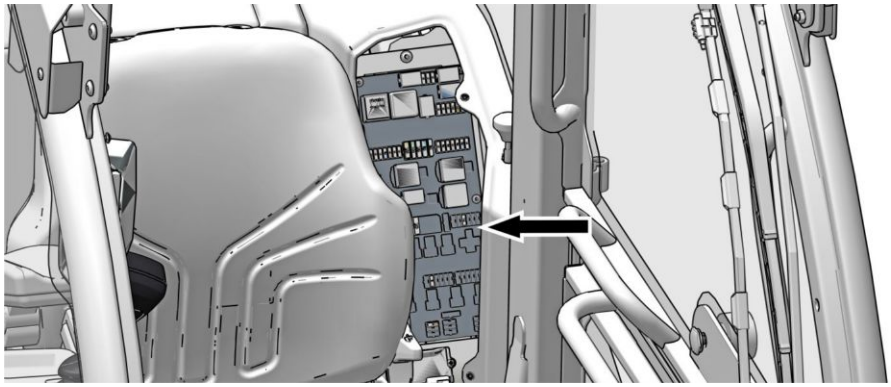
LWT/93517630/09/01/12/2023/en



Arrangement of fuses

1	Knurled screw (2x)	**2**	Cover

- ► Unscrew knurled screws **1** on cover **2**.
- ► Remove the cover **2**.



Board with fuses

- ► Identify fuse relating to the electrical failure using following table.
- ► Replace faulty fuse.

Overview of fuses in operator's cab

Fuse	Value	Unit	Name / Function
F01	100	A	Main fuse
F02	60	A	Main fuse
F1	30	A	Engine control unit
F2	1	A	Start signal
F3	5	A	Joystick and display
F4	20	A	Working hydraulics
F5	2	A	Overload warning device
F6	15	A	Travel hydraulics
F7	5	A	Parking brake, engine speed sensor and seat contact switch
F8	5	A	Brake light
	10	A	Brake light with trailer brake light[24)]
F9	15	A	Warning system
F10	10	A	Radio[24)]
F11	15	A	Light and cab light
F12	5	A	Starting switch

Fuse	Value	Unit	Name / Function
F13	5	A	Return filter pressure switch, battery charge indicator light, brake pressure sensor
F14	25	A	Fan, heating, air conditioning
F15	15	A	Windscreen washer system front and back
F16	15	A	Warning system
F17	5	A	Light
F18	15	A	Socket 12 V
F19	5	A	Side marker light, left
F20	7.5	A	Low beam, left
F21	7.5	A	Low beam, right
F22	15	A	High beam left and right
F23	5	A	USB socket[24]
F24	15	A	Telescope working headlight[24]
F26	7.5	A	LiDAT[24]
F27	7.5 / 5	A	LiDAT (7.5) / Telematic (5)[24]
F28	5	A	Hydraulic trailer brake; valid from serial number 20156 to serial number 21354[24]
	7.5	A	Hydraulic trailer brake socket; valid from serial number 21355[24]
F29	5	A	Central lubrication system[24]
F32	2	A	Reversible fan[24]
F33	5	A	Control circuit 3 memory, pressure relief, quick coupler and working hydraulics fine control[24]
F47	20	A	LED working headlight, front[24]
	15	A	Halogen working headlight, front[24]
F48	20	A	LED working headlight, rear[24]
	15	A	Halogen working headlight, rear[24]
F49	20	A	Working headlight, side[24]
F50	5	A	Side marker light, right
F51	10	A	Reversing light and reversing warning device
F52	5	A	Steering mode adjustment and proximity switch for axles
F53	2	A	Level adjustment
F54	2	A	Fuel preheating[24]
F55	15	A	Fuel preheating[24]
F56	5	A	Diagnostic plug
F57	10	A	Radio[24]
F58	5	A	Horn[25]
F59	2	A	Working hydraulics off and pump control
F60	20	A	Seat heater and compressor seat[24]
F61	7.5	A	Halogen beacon[24]
	2	A	LED beacon[24]
F62	7.5	A	Right-hand side window windscreen washer system[24]
F63	2	A	Immobilizer[24]
F64	2	A	Immobilizer[24]
F65	5	A	Control circuit 4 memory, rear pressure relief, tipper and automatic trailer coupling[24]
F67	2	A	Tipping cylinder lock and floating axle lock
F68	15	A	Telescopic boom socket[24]
F69	2	A	Camera[24]
F70	30	A	Window heater[24]
F72	2	A	Ride control and differential lock[24]

LWT/93517630/09/01/12/2023/en

Fuse	Value	Unit	Name / Function
F73	7.5	A	Rear working headlight[24]
F74	5	A	Control circuit 5; valid from serial number 20156 to serial number 21354[24]
F75	2	A	4X4 shut-off and Auto Power[24]
F76	15	A	Control unit option package 1[24]
F77	20	A	Control unit option package 2[24]
F78	5	A	Trailer brake[24]
F79	2	A	Oil level sensor[24]
F80	5	A	Display and joystick (continuous signal)
F81	1	A	Water valve and potentiometer
F83	5	A	Control circuit 4 changeover
F84	5	A	Weighing device[24]
F85	15	A	Cab air pre-filter[24]
F86	2	A	Automatic retraction of telescope and emergency down[24]
F87	7.5	A	Hydraulic trailer brake socket; valid from serial number 21355[24]
F89	5	A	Distance warning[24]
F101	5	A	Exit lighting[24]
F102	10	A	Reeving winch/assembly arm[24]
F106	2	A	Tyre pressure control system[24]
F107	2	A	Tyre pressure control system[24]

[24] Option

[25] Valid for T46-7 05S 3AS up to serial number 26369

- ► Attach cover.
- ► Screw in knurled screws on cover.

4.3.2 Changing the relays

4.3.2.1 Relays in engine compartment

The relays on left in the engine compartment can be changed after removing the cover.

G2022765_1

Relays in engine compartment

Relays in engine compartment

Relay	Name / Function
K4	Relay, glow[26]
K5	Relay, fuel pump[26]
K47	Relay, diesel exhaust fluid delivery module heating[27]

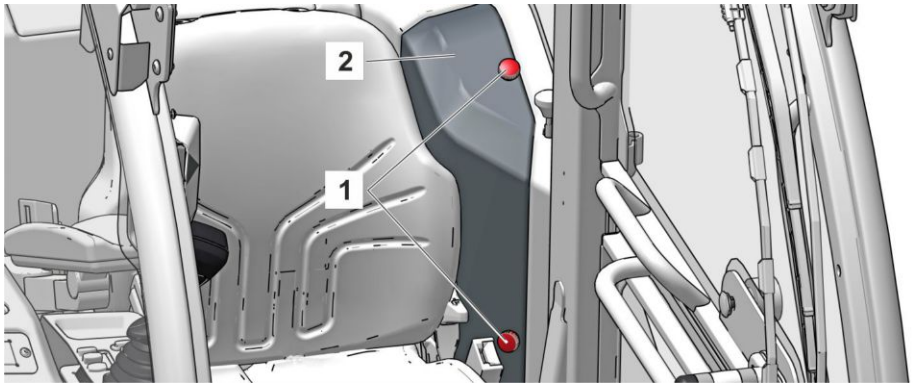
Relay	Name / Function
K48	Relay, diesel exhaust fluid suction line heating[27]
K49	Relay, diesel exhaust fluid return line heating[27]
K50	Relay, diesel exhaust fluid pressure line heating[27]
K51	Relay, exhaust system heating elements[27]
K60	Relay neutral signal; valid up to serial number 99999[26]

[26] Only for engine version 3.6 l

[27] Only for emission stage IV and V

4.3.2.2 Relays in operator's cab

The circuit board with the relays is located to the left of the operator's seat behind the cover.



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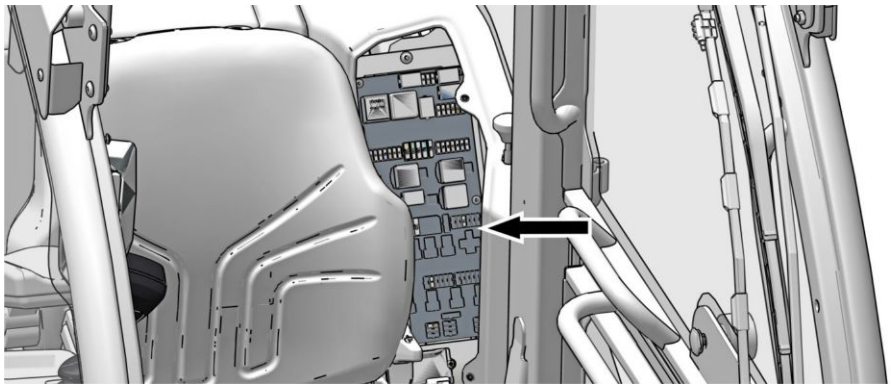
Location of the relays in operator's cab

1	Knurled screw (2x)	**2**	Cover

- ► Unscrew knurled screws **1** on cover **2**.
- ► Remove the cover **2**.



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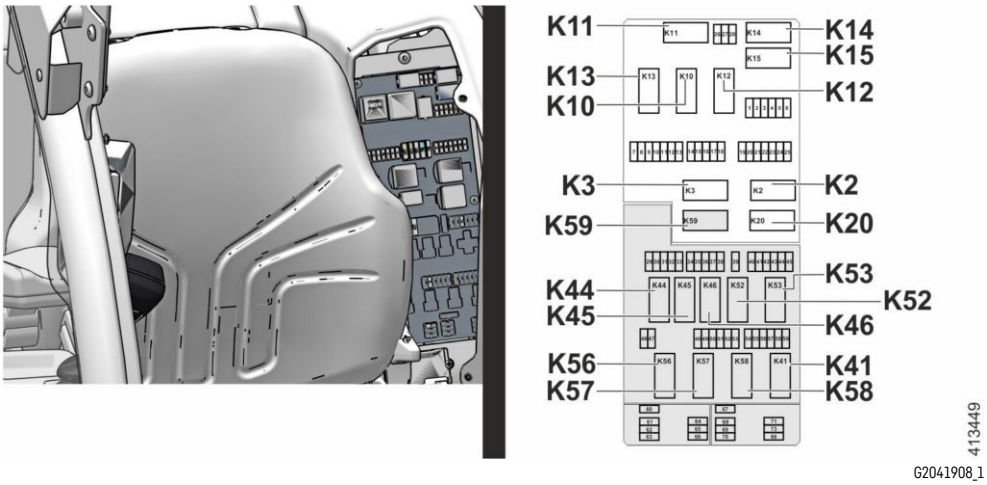
Circuit board with relays



Location of the relays in operator's cab

- ► Identify defective relay using the following table.
- ► Take out defective relay and change it.

Relay

Relay	Name / Function
K2	High-current relay (70A)
K3	Relay, Emergency Off / electronics power supply
K10	Interval relay, windscreen washer system
K11	Relay, brake light
K12	Relay, reversing lights
K13	Relay, indicators
K14	Relay, low beam
K15	Relay, high beam
K20	High-current relay (70A)
K41	Relay, trailer brake[28)]
K44	Relay, front working headlight[28)]
K45	Relay, rear working headlight[28)]
K46	Relay, side working headlight[28)]
K52	Relay, telescopic boom socket[28)]
K53	Relay, window heater[28)]
K56	Relay, cab air pre-filter[28)]
K57	Relay, reserve
K58	Relay, fuel preheating
K59	Relay, seat contact

[28)] Option

- ► Attach cover.
- ► Screw in knurled screws on cover.

5 Maintenance

5.1 General information on the maintenance and inspection schedule

The maintenance activities carried out can be recorded in the maintenance and inspection schedule.

5.2 Maintenance and inspection schedule

Abbreviations used in this section: Bh or h = operating hours

Various marks (circle, box, star - filled and circle, box, star - empty) divide the maintenance work into two groups.

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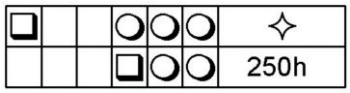
The marks mean:

Chart with circle, box, star - filled

In this case, the machine operator or its maintenance staff are solely responsible for carrying out the maintenance work.

Affects maintenance intervals: every 10 and 50 operating hours (h) and special intervals.



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The marks mean:

Chart with circle, box, star - empty

In this case, authorised Liebherr personnel or their contracted dealers must carry out or supervise the maintenance and inspection work.

Affects maintenance intervals: At handover, then every 500, 1000 and 2000 operating hours (h) and special intervals.

A list of spare parts, which is required for the maintenance and inspection work, is included in the „SERVICE PACKAGE“ of the spare parts list.

5.2.1 Maintenance and inspection schedule

Customer . . . . . Type/type no. . . . . Serial no. . . . . Operating hours . . . . . Date . . . . . .

Maintenance / inspection after operating hours							Activity to be performed		
On handover	Every 8 - 10 h	Every 50 h	Every 500 h	Every 1,000 h	Every 2,000 h	Other intervals	**By maintenance staff** ■ Once-only activity ● Repeat interval ✦ If necessary ❄ Annually before the winter **By authorised specialist staff** □ Once-only activity ○ Repeat interval ✧ If necessary	Confirm task	see page
Complete machine									
□			○	○	○		Checking the machine for external damage, correct maintenance and proper condition	□	
□		●	○	○	○		Lubricate all lubricating points of machine (shorten interval, if necessary)	□	426

LWT/93517630/09/01/12/2023/en

Maintenance / inspection after operating hours							Activity to be performed		
On handover	Every 8 - 10 h	Every 50 h	Every 500 h	Every 1,000 h	Every 2,000 h	Other intervals	**By maintenance staff** ■ Once-only activity ● Repeat interval ✦ If necessary ❄ Annually before the winter **By authorised specialist staff** □ Once-only activity ○ Repeat interval ✧ If necessary	Confirm task	see page
☐	●	●	○	○	○		Determine and carry out maintenance and inspection requirements for the optional equipment in the scope of delivery according to the manufacturer's operator's manual or manufacturer's data	☐	
☐							Explain the machine documentation to the operating personnel, especially the operator's manual and safety instructions	☐	
Diesel engine									
☐	●	●	○	○	○		Diesel engine: checking oil level	☐	↘ 431
			○	○	○		**Diesel engine emission stage V or IV/Tier 4f:** changing engine oil (at least once a year or depending on the engine oil quality and aggravating factor).	☐	
						✧	**Diesel engine ECE-R.96H (analogous to emission stage IIIA):** changing engine oil (at least once a year). **Diesel engine without emission type approval:** changing engine oil (at least once a year or depending on engine oil quality and aggravating factor).	☐	
						✧	Changing oil filter (at every oil change).	☐	
	●	●	○	○	○		Check engine compartment for contamination and clean if necessary	☐	↘ 433
			○	○	○		Diesel engine: checking ribbed V-belt	☐	
				○	○		Diesel engine: changing ribbed V-belt	☐	
☐			○	○	○		Checking diesel engine for leaks	☐	
☐			○	○	○		Diesel engine: checking air intake system and exhaust system for condition, mounting and leaks	☐	
			○	○	○		Diesel engine: checking cable connections of sensors	☐	
					○		Diesel engine: checking the valve clearance	☐	
			□	○	○		Diesel engine: check mounting tightness of engine brackets	☐	
				○	○		For emission stage V: diesel exhaust fluid pump - change filter.	☐	
Cooling system									
☐	●	●	○	○	○		Cooling system: checking coolant level	☐	↘ 433
	●	●	○	○	○		Cooling system: checking the radiator and the condenser for contamination and cleaning them, if necessary	☐	↘ 435
☐			○	○	○		Checking cooling system for leaks and damage	☐	
			○	○	○	❄	Cooling system: check antifreeze concentration in the coolant	☐	
						○ 6,000 h	Cooling system: changing coolant	☐	
Fuel system									
			○	○	○	✦	Fuel pre-filter: draining condensation (as indicator light lights up)	☐	↘ 436
			○	○	○	✧	Fuel: changing filter cartridges	☐	
						✦	Fuel tank: drain condensation and sediment	☐	↘ 437
			○	○	○		Checking fuel system for leaks and condition	☐	
Air filter system									
			○	○	○	✦	Changing air filter main filter element (when the indicator light lights up, at least once a year)	☐	↘ 438
						✦	Changing air filter safety element (after 3 exchanges of main element)	☐	↘ 438
	●	●	○	○	○		Air filter: cleaning the service cover and dust discharge valve	☐	↘ 441
Diesel particle filter									
						✧	For emission stage V – diesel particle filter: changing filter module (if «diesel particle filter ash loading» symbol lights up in display).	☐	
Hydraulic system									
☐	●	●	○	○	○		Check the oil level in the hydraulic tank and top up oil.	☐	↘ 443
					○		Change tank vent filter on hydraulic tank.	☐	
			□	○	○		Change return filter cartridge (or when «return filter contamination» symbol lights up with hydraulic oil at operating temperature).	☐	
			○	○	○		Hydraulic system: change supply circuit filter	☐	
☐			□	○	○		Check the hydraulic system for leaks	☐	

LWT/93517630/09/01/12/2023/en

Maintenance / inspection after operating hours							Activity to be performed		
On handover	Every 8 - 10 h	Every 50 h	Every 500 h	Every 1,000 h	Every 2,000 h	Other intervals	**By maintenance staff** ■ Once-only activity ● Repeat interval ✦ If necessary ❄ Annually before the winter **By authorised specialist staff** □ Once-only activity ○ Repeat interval ✧ If necessary	Confirm task	see page
						○ 3,000 h	Hydraulic tank - Change Liebherr hydraulic oil. Pay attention to the notes for oil analysis and dust intensive application. Page 414	□	
					○		Hydraulic tank - Change hydraulic oil of third party manufacturers. Pay attention to the notes for oil analysis and dust intensive application. Page 414	□	
			□	○	○		Hydraulic system: check and adjust hydraulic pressures according to adjustment check list	□	
Electrical system									
□	●	●	○	○	○		Check lighting	□	444
				○	○		Check the battery connections for tight seating	□	
				○	○	✧	Check battery fluid level (at least 1 x a year)	□	
			○	○	○		Battery: check the condition and correct routing of the degassing hose	□	
□	●	●	○	○	○		Electrical system: check function of load torque limitation	□	445
			□	○	○		Check control system of travel hydraulics and working hydraulic according to adjustment check list	□	
Operator's cab, heating and air conditioning									
			○	○	○		Check drier unit	□	
□			○	○	○		Heating and air conditioning: check function	□	
			○	○	○		Clean the heating - fresh air filter and change it, if necessary (in dust intensive applications, shorten interval)	□	
						✦	Clean the cab air pre-filter and change it if necessary.	□	451
			○	○	○		Checking drive belt of air conditioning compressor	□	
				○	○		Air conditioning: changing belt	□	
			○	○	○		Check drain valves for the air conditioning and clean if necessary	□	
Steering system									
□	●	●	○	○	○		Steering: check for correct function	□	452
Brake system									
□	●	●	○	○	○		Service brake and parking brake: Check function and effectiveness	□	453
				○	○		Brake system: checking brake linings for wear	□	
Axles and tyres									
□		■	○	○	○		Wheels: check mounting tightness of wheel lugs (first at 50, 100 and 250 h)	□	454
□	●	●	○	○	○		Tyres: check and adjust air pressure in tyres	□	455
□			○	○	○		Checking oil level of axles	□	
				○	○		Changing oil in the axles (once at 100 h)	□	
			□		○		Axles: Check tightening torques of axle mounting screws.	□	
Travel gearbox									
			□			○ 1,500 h	Travel gearbox: changing the oil (at least once a year)	□	
Telescopic boom									
□		●	○	○	○	● 250 h	Check front glide elements for wear and tight seating. Lubricate glide surfaces on telescopic boom (shorten interval if necessary)	□	456
			○	○	○	✧	Checking rear glide elements for wear and tight seating	□	
			○	○	○		Equipment variant: – Automatic retraction of telescope – Electronic end position damper Check tape extension sensor for contamination.	□	
Lubrication system									
□		●	○	○	○		Grease container: check the fill level	□	461

LWT/93517630/09/01/12/2023/en

Maintenance / inspection after operating hours							Activity to be performed		
On handover	Every 8 - 10 h	Every 50 h	Every 500 h	Every 1,000 h	Every 2,000 h	Other intervals	**By maintenance staff** ■ Once-only activity ● Repeat interval ✦ If necessary ❄ Annually before the winter **By authorised specialist staff** □ Once-only activity ○ Repeat interval ✧ If necessary	Confirm task	see page
Options									
			○	○	○		Air brake system: checking compressor for tight seating	□	
			○	○	○		Air brake system: cleaning external pressure tanks	□	
			○	○	○		Checking air brake system for leaks	□	
						✦	Air brake system: checking anti-freeze pump level and topping it up if necessary	□	
	●	●	○	○	○		Air brake system: drain pressure tank.	□	463

5.3 Fill quantities and lubrication chart

5.3.1 Recommended lubricants

Recommended lubricants

Name	Recommended lubricant	Symbol	Quantity
Diesel engine (with filter change)	Liebherr Motoroil 10W-40 low ash Liebherr Motoroil 5W-30 low ash		9.5 l (2.51 liq. gal_{US})
Hydraulic system	Liebherr Hydraulic Basic 68 Liebherr Hydraulic Basic 100 Liebherr Hydraulic HVI Liebherr Hydraulic Plus Liebherr Hydraulic Plus Arctic		
			System capacity: 260 l (68.7 liq. gal_{US})
			Tank capacity: 184 l (48.6 liq. gal_{US})
Front axle differential	Liebherr Gear MF 80W	2	12 l (3.2 liq. gal_{US})
Rear axle differential	Liebherr Gear MF 80W	2	13.5 l (3.57 liq. gal_{US})
Wheel heads	Liebherr Gear MF 80W	3	2 l (2.1 liq. qt_{US})
Travel gearbox 20/30 km/h (12.4/18.6 mph)	Liebherr Gear Basic 90 LS	4	3.5 l (3.70 liq. qt_{US})
Travel gearbox 40 km/h (24.9 mph)	Liebherr Gear Basic 90 LS	4	3.7 l (3.91 liq. qt_{US})
Travel gearbox 40 km/h (24.9 mph) with 4x4 shut-off	Liebherr Gear Basic 90 LS	4	4.4 l (1.16 liq. gal_{US})
Lubricating points on the machine	Liebherr Universal grease 9900	1 3	2,100 g (74.08 oz)

LWT/93517630/09/01/12/2023/en

5.3.2 Recommended fuel and operating fluids

Recommended fuel and operating fluids

Name	Recommended fuel and operating fluid	Symbol	Quantity
Fuel tank	Commercially available diesel fuel with a sulphur content of less or equal to 0.001%		190 l (50.2 liq. gal_{US})
Coolant	Liebherr Antifreeze OS Mix Liebherr Antifreeze OS Concentrate		23.5 l (6.21 liq. gal_{US})
Diesel exhaust fluid tank[29)]	Diesel exhaust fluid according to Standard ISO 22241 / DIN 70070		20 l (5.3 liq. gal_{US})
Windscreen washer system	Standard windscreen washer fluid or denatured alcohol		5 l (1.3 liq. gal_{US})
Air conditioning unit refrigerant	R134a		1,000 g (35.27 oz)
Refrigerant oil in the air conditioning compressor			175 cm^3 (10.68 in^3)
Anti-freeze for air brake system (option)	Wabcothyl anti-freeze		0.5 l (16.9 fl. oz_{US})

[29)] For emission stage V

5.3.3 Lubrication chart

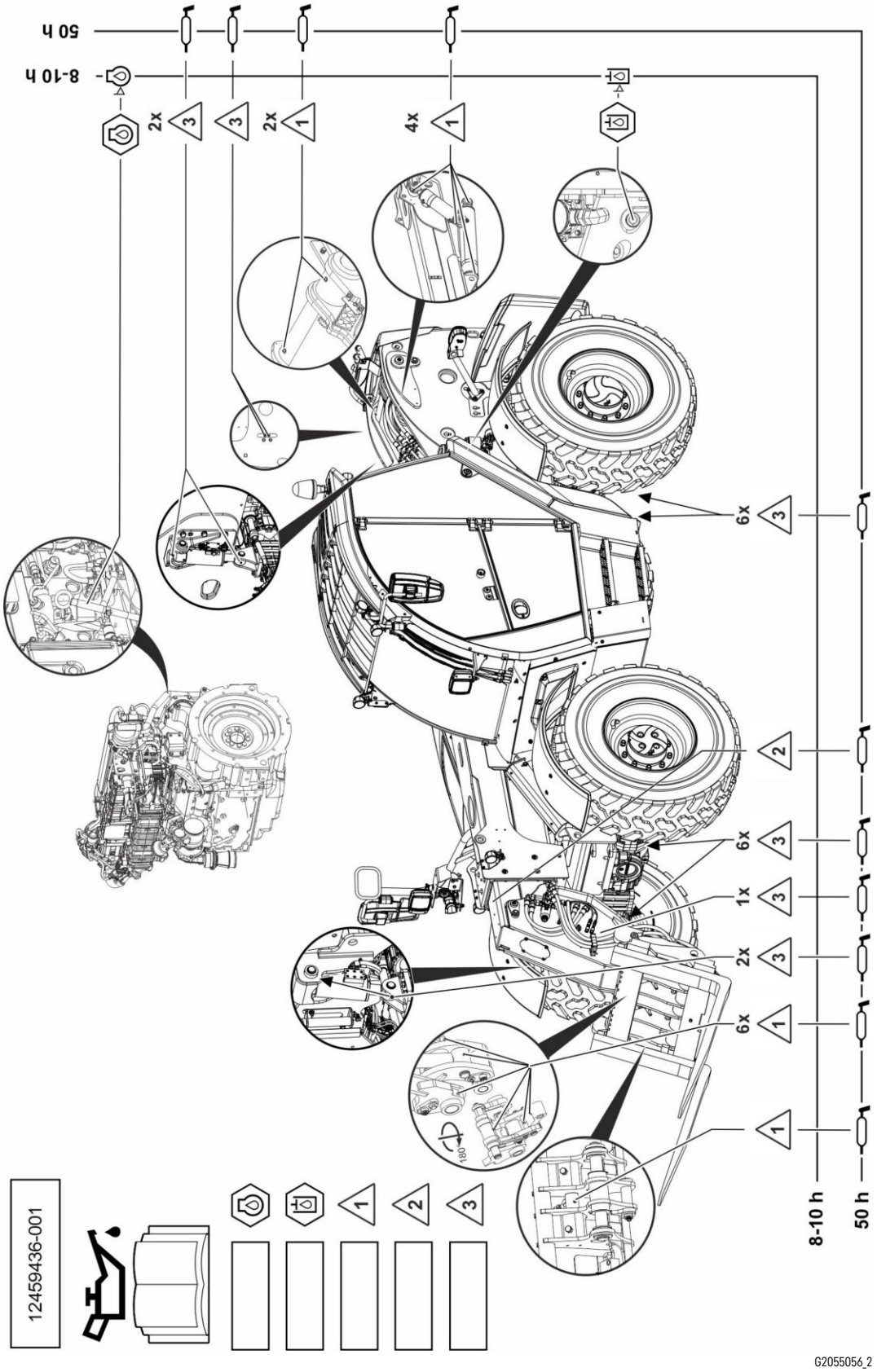
The lubrication chart is an overview of the location of maintenance positions on the machine and their maintenance intervals.

Detailed information about:

- Performing maintenance tasks Page 404
- Lubricants and fuels Page 410
- Filling quantities Page 407

LWT/93517630/09/01/12/2023/en

5.3.3.1 Lubrication chart image for T60-9



Lubrication chart image, parallel (large tilt angle)

5.3.4 Lubrication chart symbols

Legend to symbols in the lubrication chart

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.

5.4 Lubricants and fuels

5.4.1 General information about lubricants and fuels

5.4.1.1 General Information

Observe the information about lubricants and fuels. Lubricate the machine and change the oils within the specified time frames. For further information, see: „lubrication chart“ and „maintenance and inspection schedule“. Keep the work area clean for these tasks. This increases the reliability and service life of the machine.

- ► Carry out all work on the machine on level and solid ground.
- ► Turn off the diesel engine, remove the ignition key and disconnect the battery using the battery disconnecting switch.
- ► Clean the grease fitting before lubrication.
- ► Before any maintenance and repairs, clean machine, especially connections and fittings to remove oil, fuel or cleaning substances. Do not use any aggressive cleaning agents. Use lint-free cleaning cloths.
- ► Carry out the oil change when the oil is at operating temperature, if possible.
- ► Check after every oil change or adding to the fill quantity (level) of the corresponding aggregate (the specified fill quantities are reference values).
- ► Catch used lubricants and fuels in suitable containers and dispose of them in an environmentally friendly manner according to the valid guidelines.

5.4.1.2 General questions

The Liebherr Lubricant Hotline can be contacted by email should you have any general questions about lubricants and fuels.

Liebherr Lubricant Hotline (Email): lubricants@liebherr.com

LWT/93517630/09/01/12/2023/en

5.4.1.3 Safety data sheets

Safety data sheets for lubricants and fuels are available online via the Liebherr lubricant portal.

Liebherr lubricant portal: lubricants.liebherr.com

5.4.1.4 Technical data sheets and specific Liebherr standards

For technical data sheets and specific Liebherr standards: contact Liebherr customer service.

5.4.2 Diesel fuels

5.4.2.1 Liebherr recommendation

Minimum quality requirement

Approved diesel fuels in accordance with DIN EN 590, ASTM D 975 1-D/2-D	Diesel engine emission stage V	Diesel engine emission stage IV or tier 4f	Power Band I/H as per Directive ECE-R.96 (Stage 3A, TIER III, CHINA III equivalent)
Maximum sulphur content	Up to 10 ppm	Up to 15 ppm	Up to 5000 ppm[30]
Lubricity at 60 °C (140.0 °F)	400 µm (0.01575 in)	460 µm (0.01811 in)	
Minimum cetane number	45	45	

Do not mix diesel fuel with fuel additives.

Operating temperatures for diesel fuels[31]

Operating temperatures for diesel fuels

Approved diesel fuels as per DIN EN 590	Cloudpoint	Ambient temperature
Standard class	-7 °C (19.4 °F)	Down to -10 °C (14.0 °F)
Arctic class 0	-10 °C (14.0 °F)	Down to -13 °C (8.6 °F)
Arctic class 1	-16 °C (3.2 °F)	Down to -20 °C (-4.0 °F)

Minimum quality requirement

Minimum quality requirement

Specification
LH-00-FUEL

[30] The sulphur content in the fuel determines the change interval depending on the quality of the engine oil.

[31] Use preheating or Arctic diesel for applications below -10 °C (14.0 °F). See the table of operating temperatures and DIN EN 590 for further information about Arctic diesel qualities.

LWT/93517630/09/01/12/2023/en

5.4.3 Engine oils

5.4.3.1 Liebherr recommendation

Liebherr recommendation

Equipment variant:

– Emission stage V

-	Cold start temperature according to → SAE J300	Engine oil
Emission stage V	-30 °C (-22.0 °F)	Liebherr Motoroil 5W-30 low ash
	-25 °C (-13.0 °F)	Liebherr Motoroil 10W-40 low ash

Liebherr recommendation

Equipment variant:

– Emission stage ECE-R.96 (Stage IIIA derivative)

-	Cold start temperature according to → SAE J300	Engine oil
Emission stage IIIA	-30 °C (-22.0 °F)	Liebherr Motoroil 5W-30
	-25 °C (-13.0 °F)	Liebherr Motoroil 10W-40

5.4.3.2 Minimum quality requirement

Minimum quality requirements

Equipment variant:

– Emission stage V

Emission stage V
→ LH-00-ENG$_{LA}$
→ ACEA E6
→ API CJ-4

Minimum quality requirements

Equipment variant:

– Emission stage ECE-R.96 (Stage IIIA derivative)

Emission stage IIIA
→ LH-00-ENG
→ ACEA E4
→ API CH-4
→ API CI-4

In the case of lubricants and fuels from other manufacturers, it is possible that the permissible service life differs from the recommendation given by Liebherr. Get information on replacement intervals from manufacturers or suppliers.

LWT/93517630/09/01/12/2023/en

5.4.3.3 Difficulty factors

Difficulty factors have influence on the change interval of engine oil.

Engine oil change intervals must be adjusted.

Difficulty factors are:

- Frequent cold starts
- Sulphur content in fuel
- Environmental influences
  - Operating temperature
  - Dust
  - High humidity

5.4.4 Refrigerant

The air conditioning system contains fluorinated greenhouse gases.

Refrigerant

Refrigerant	Global warming potential	CO_2 equivalent
R134a	1430	1.43 t (1.576 ton_{US})

5.4.5 Coolant

5.4.5.1 Requirements for water used

Water used must comply with the Guidelines for drinking-water quality issued by the World Health Organization (WHO) from 2006.

5.4.5.2 Anti-freeze and corrosion protection agent

Liebherr recommendation

Type	Description
Concentrate	Liebherr-Antifreeze OS Concentrate
Mixture (ready-mixed product of 50% water and 50% anti-freeze and corrosion protection agent)	Liebherr-Antifreeze OS Mix

Mixing ratio

Ambient temperature	Mixing ratio
≥ -50 °C (≥ -58.0 °F)	40 % Water 60 % Anti-freeze and corrosion protection agent
≥ -37 °C (≥ -34.6 °F)	50 % Water 50 % Anti-freeze and corrosion protection agent

Minimum quality requirements

Specification
→ LH-01-COL

LWT/93517630/09/01/12/2023/en

With lubricants and fuels from third party manufacturers, it is possible that the permitted service life differs from the Liebherr recommendation. Request information on changing intervals from manufacturers or suppliers.

5.4.6 Diesel exhaust fluids[32)]

[32)] Not for emission stage 0 and IIIA

5.4.6.1 Liebherr recommendation

Liebherr recommendation

Name
AdBlue® in Europe
DEF (Diesel exhaust fluid) in USA
AUS32 (aqueous urea solution)

5.4.6.2 Minimum quality requirement

Minimum quality requirement

Specification
DIN 70 070
ISO 22241
LH-00-UREA

5.4.7 Hydraulic oils

5.4.7.1 Liebherr recommendation

Liebherr recommendation

Ambient temperature	Name
	Liebherr mineral oil
15 (59.0) to 55 °C (131.0 °F)	Liebherr Hydraulic Basic 100
10 (50.0) to 45 °C (113.0 °F)	Liebherr Hydraulic Basic 68
-20 (-4.0) to 40 °C (104.0 °F)	Liebherr Hydraulic HVI
	Liebherr-PAO[33)] biodegradable
-25 (-13.0) to 45 °C (113.0 °F)	Liebherr Hydraulic Plus
-40 (-40.0) to 30 °C (86.0 °F)	Liebherr Hydraulic Plus Arctic

[33)] PAO = Poly-alpha-olefin

LWT/93517630/09/01/12/2023/en

5.4.7.2 Minimum quality requirement

Minimum quality requirement

Specification
EMT LH-00-Minimum-HYE

When using hydraulic oils or filters of third party manufacturers, information about the change intervals is to be obtained from the respective manufacturer or supplier.

5.4.7.3 Oil analysis

Oil analysis

		Dust intensive use	Normal use
Normal use (oil analysis optional)	**Liebherr mineral oil**	Every 250 h, at least once a year	Every 1,000 h, at least once a year
	Liebherr Hydraulic Basic 68		
	Liebherr Hydraulic Basic 100		
	Liebherr Hydraulic HVI		
Bio use (oil analysis required)	**Liebherr PAO biodegradable**	At the time of transfer, then every 250 h thereafter, at least once a year	At the time of transfer, then every 1,000 h thereafter, at least once a year
	Liebherr Hydraulic Plus		
	Liebherr Hydraulic Plus Arctic		

5.4.7.4 Filter change

Filter change

	Dust intensive use	Normal use
Liebherr return filter	Every 250 h	Once after 500 h, then every 1,000 h thereafter
Liebherr breather filter	Every 500 h	Every 2,000 h

5.4.7.5 Oil change

Oil change

	Without oil analysis	With oil analysis[34)]
Liebherr mineral oil	Every 3,000 h	Every 6,000 h
Liebherr Hydraulic Basic 68		
Liebherr Hydraulic Basic 100		
Liebherr Hydraulic HVI		
Liebherr PAO biodegradable	Every 4,000 h[35)]	Every 10,000 h
Liebherr Hydraulic Plus		
Liebherr Hydraulic Plus Arctic		

[34)] Change the oil after a negative oil analysis.

[35)] An oil analysis is prescribed for bio use.

LWT/93517630/09/01/12/2023/en

5.4.8 Axle oils

Liebherr recommendation

Ambient temperature	Designation
-30 °C ... 50 °C (-22.0 °F ... 122.0 °F)	Liebherr Gear MF 80W
-30 °C ... 50 °C (-22.0 °F ... 122.0 °F)	Liebherr Gear Basic 90 LS

Minimum quality requirements

Specification
→ API GL-4
→ API GL-5
→ MIL-L 2105 D

Mixing various quality grades of oil is not permitted. If lubricants and fuels from other manufacturers are used, the permitted service life may differ from the Liebherr recommendation. Obtain information on the change intervals from manufacturers or suppliers.

Axle oils for telescopic handlers must have at least the following phosphorus content:

Phosphorus content of axle oil	≥ 1,900 mg/kg (≥ 1,900.0 ppm)

5.4.9 Oil for brake system

Quality

Lube oil specifications

Recommended lubricant	Specification
Liebherr Hydraulic HVI	HVLPD
	DIN 51524 / T3

5.4.10 Lube oils for travel gearbox

LWT/93517630/09/01/12/2023/en

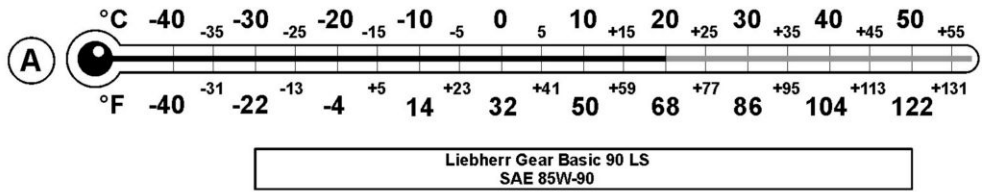
5.4.10.1 Quality

Lube oil specifications

Recommended lubricant	Specification
Liebherr Gear Basic 90 LS	API: GL5
	MIL-L: 2105 D

Note
Mixing different oil qualities is not permissible.

5.4.10.2 Viscosity



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Temperature dependent selection of SAE classification

A Ambient temperature

The lube oil viscosity is selected according to the SAE classification (Society of Automotive Engineers). The SAE classification provides no information about the quality of a lube oil. Correct selection of the SAE classification is determined by the ambient temperature. The function of axles and transmission can be adversely affected due to incorrect viscosity.

The temperature ranges given in the chart are reference values which temperatures may be above or below for short periods.

5.4.11 Grease and other lubricants

The grease is used for automatic or manual lubrication of the machine. The grease gets to the lube points via the central lubrication system or via grease fittings.

Examples:

- Pins, axles and screws
- Working tools

Note
The grease must be well deliverable within the entire ambient temperature range!

- ► Only use approved greases.
- ► For retrofit central lubrication systems, pay attention to the specifications for deliverability of grease products.

5.4.11.1 Minimum quality requirements

Grease products must meet the following minimum quality requirements.

Grease and other lubricants

Area of application	Specification	Identification
Standard	Soap based (Lithium complex)	KP 2 K (DIN 51502)
		NLGI class: 2 (DIN 51818)
		VKA welding force: ≥ 2300 N (DIN 51350 / 4 – ASTM D 2596)
Low temperature	Soap based (Lithium complex)	KP 1 K (DIN 51502)
		NLGI class: 1(DIN 51818 / ASTM D 2596)
		VKA welding force: ≥ 2300 N (DIN 51350 / 4 – ASTM D 2596)

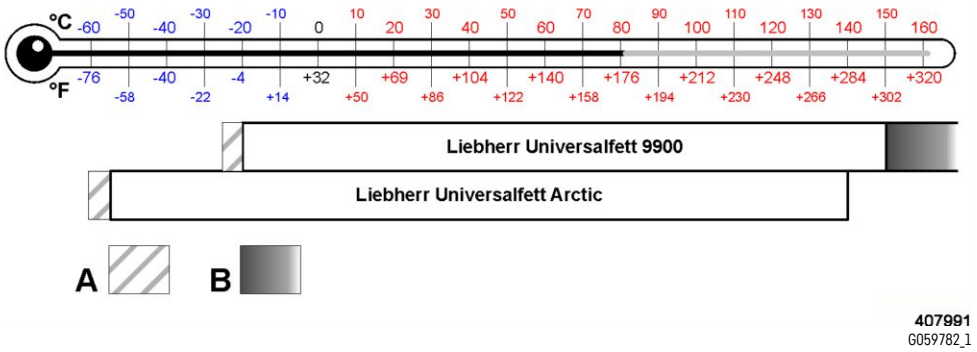
5.4.11.2 Liebherr grease

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

Grease and other lubricants

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)

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



Temperature application ranges for Liebherr greases

A Not used in central lubrication systems

B Short-term temperature peaks up to 200 °C (392.0 °F)

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5.4.11.3 Grease for central lubrication system

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

Use only grease with the same saponification type.

NOTICE

Unsuitable solid lubricants!

Solid lubricants (such as graphite) can block or damage the central lubrication system.

► Use greases according to table above.

5.4.12 Grease for telescopic boom

Grease for telescopic boom

Medium	Description/manufacturer
Telescope grease for gliding surfaces on telescopic boom	To lubricate the gliding surfaces of the telescopic boom, Liebherr recommends: Liebherr Teleskopfett 9613 Plus The grease must meet specification **KP2k-30**, consistency 2 or NLGI classification according to DIN 51818. The grease must consist of a calcium complex and have a VKA value of at least **2600** N according to DIN 51350 or ASTM D 2596. - Interflon Lube EP
Telescope grease for rear glide elements on telescopic boom	To lubricate the rear glide elements, Liebherr recommends: Liebherr Teleskopfett 9613 Plus The grease must meet specification **KP2k-30**, consistency 2 or NLGI classification according to DIN 51818. The grease must consist of a calcium complex and have a VKA value of at least **2600** N according to DIN 51350 or ASTM D 2596.

5.5 Preparatory maintenance tasks

5.5.1 Safety instructions

DANGER

Persons in hazard zone!

Danger to life.

► Make sure there are no unauthorised persons in hazard zone.

► Observe the relevant safety instructions when carrying out maintenance, inspection or repair work.

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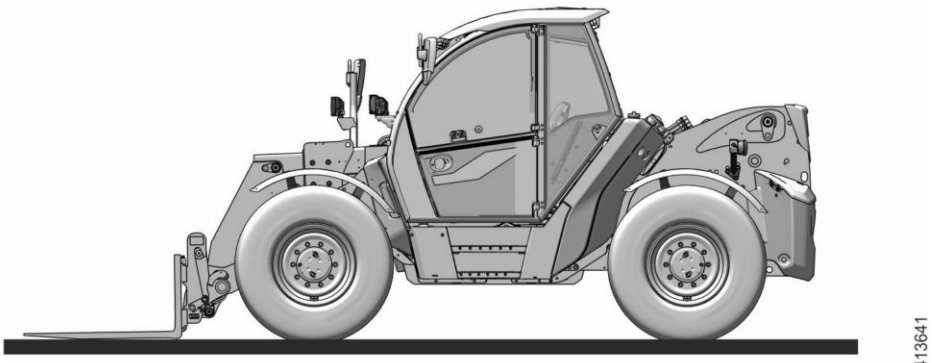
- ► Unless otherwise expressly specified in the machine documentation, place the machine in the maintenance position before carrying out any maintenance work.
- ► Observe regional work safety regulations, industrial accident prevention regulations and national legislation.
- ► Wear personal protective equipment.
- ► Ensure that there is visual contact between operator and maintenance staff at all times.

5.5.2 Maintenance position

The basic maintenance position is described below. The maintenance position allows access to the individual maintenance points.

5.5.2.1 Bringing the machine into maintenance position with lowered telescopic boom

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



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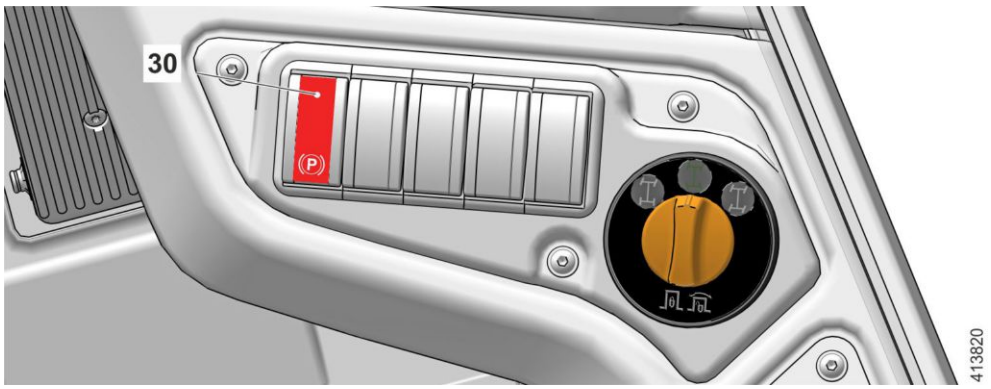
Maintenance position

- ► Park the machine on solid, level ground.
- ► Fully retract telescopic boom.
- ► Lower the telescopic boom completely.
- ► Lower the working attachment onto the ground without pressure.
- ► Put the control lever in neutral position.



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Activating the parking brake

30 «Parking brake» switch

- ► Press bottom part of «Parking brake» switch **30**.
  ✔ «Parking brake» symbol is shown on the display.

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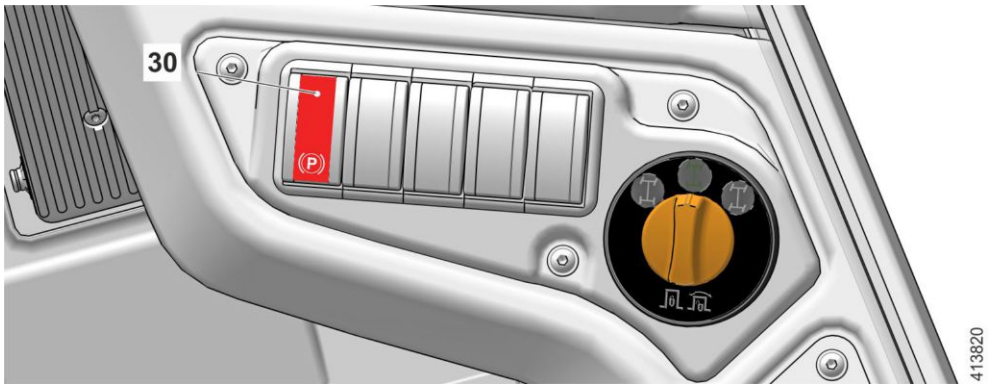
5.5.2.2 Putting the machine into maintenance position with raised telescopic boom (option)

To put the machine into maintenance position with raised telescopic boom, proceed as follows:

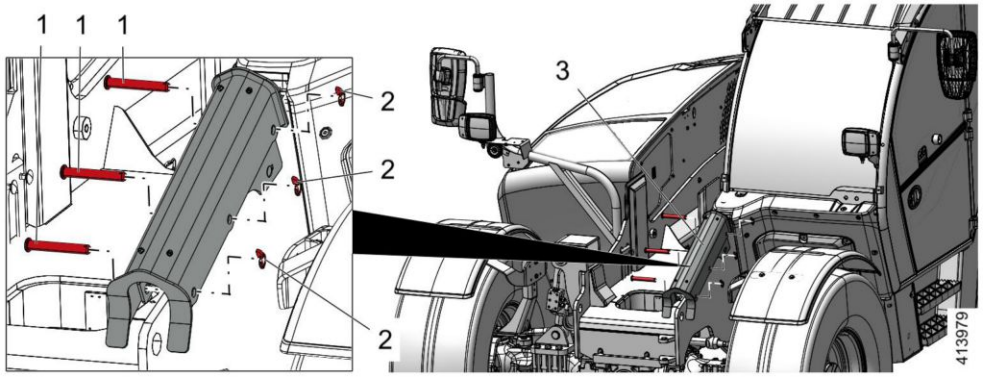
- ► Park the machine on solid, level ground.
- ► Fully retract telescopic boom.
- ► Lower the telescopic boom completely.
- ► Empty the working attachment (bucket).
- ► Tilt the working attachment in.
- ► Put the control lever in neutral position.



Activating the parking brake

30	«Parking brake» switch

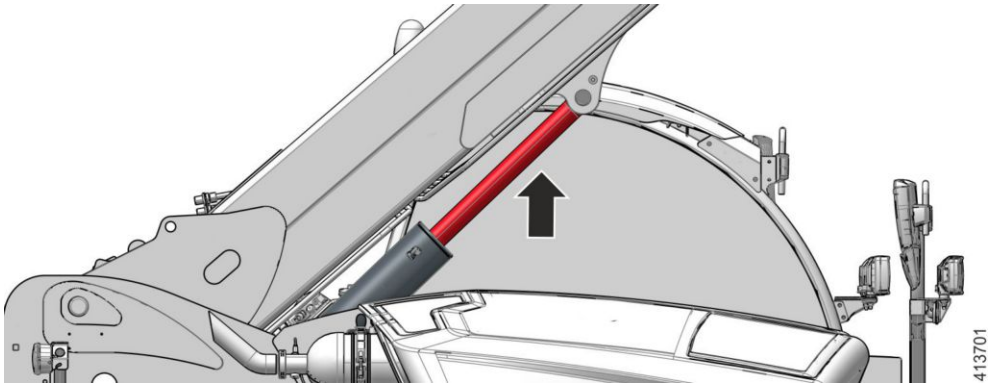
- ► Press bottom part of «Parking brake» switch **30**.
  ✔ «Parking brake» symbol is shown on the display.
- ► Switch off diesel engine.



Location of the lift cylinder support

1	Pin	**3**	Lift cylinder support
2	Linchpin		

- ► Remove linchpin **2** from pin **1**.
- ► Remove pin **1**.
- ► Take the lift cylinder support **3** out of the retainer.



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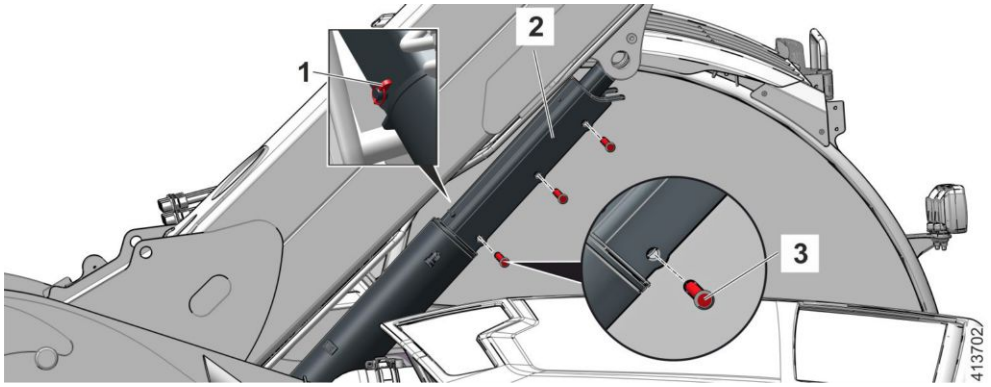
Raising the telescopic boom

- ► Start diesel engine.
- ► Raise telescopic boom to maximum extent. Page 218
- ► Switch off diesel engine.



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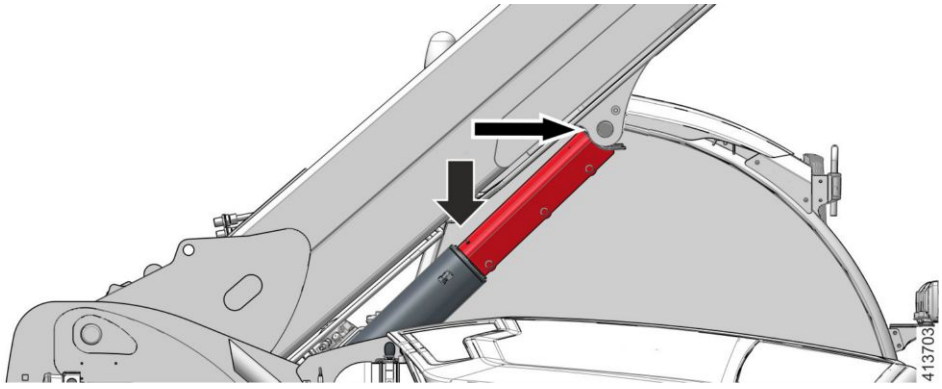
Installing the lift cylinder support

1	Linchpin	**3**	Pin
2	Lift cylinder support		

- ► Attach the lift cylinder support **2** to the lift cylinder.
- ► Insert pin **3**.
- ► Secure pin **3** with linchpin **1**.



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Lowering telescopic boom

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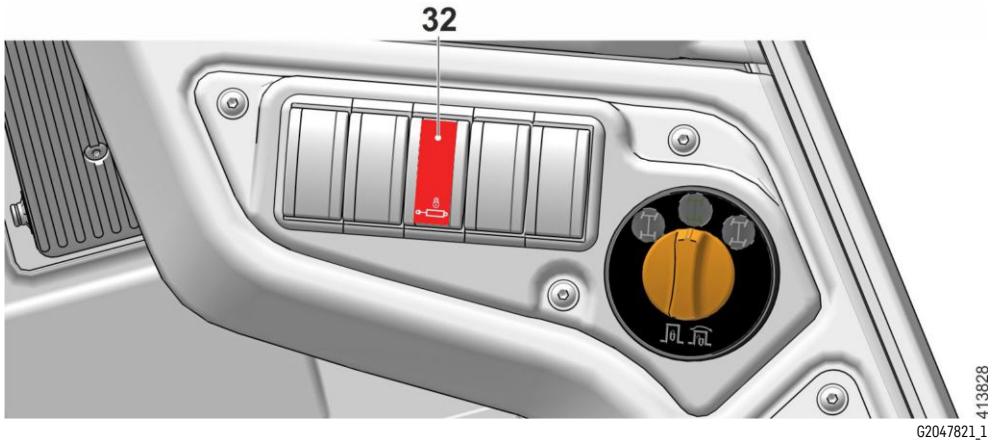
- ► Start diesel engine.
- ► Lower the telescopic boom slowly.
  - ✔ The telescopic boom is carried by the lift cylinder support.
- ► Put the control lever in neutral position.

Note
Following maintenance work, remove the lift cylinder support from the lift cylinder and put it in the retainer on the main frame.

5.5.2.3 Locking working hydraulics



Locking working hydraulics

32 «Working hydraulics off» switch

- ► Press bottom part of «Working hydraulics off» switch **32**.
  - ✔ «Working hydraulics off» symbol is shown on the display.
- ► Switch off diesel engine.
- ► Remove ignition key.

5.5.2.4 Opening engine bonnet

When engine bonnet is open, access is provided to following aggregates and components:

- Diesel engine
- Cooling system
- Air filter

Make sure the following preconditions are met:

☑ Diesel engine is turned off.

WARNING
Hot components!
Injury.
- ► Let components cool down.

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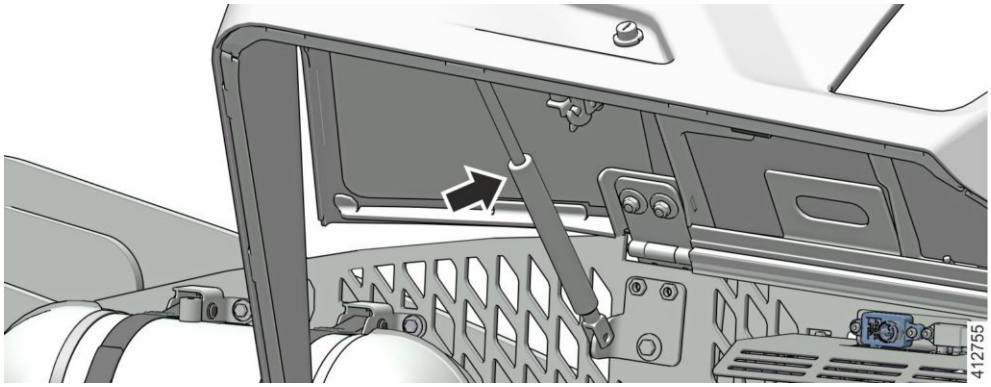
Opening engine bonnet

► Unlock the lock with the key.

WARNING
Faulty gas cylinders!
Injury.
► Ensure that the open position is maintained by the gas cylinders.



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Gas cylinder

► Open engine bonnet.
✔ Engine bonnet is held in this position by gas cylinder.

Troubleshooting
Engine bonnet is not held in position?
► Replace the faulty gas cylinders.

DANGER
Hot exhaust system!
Beware of burns.
► Let the exhaust system cool down.

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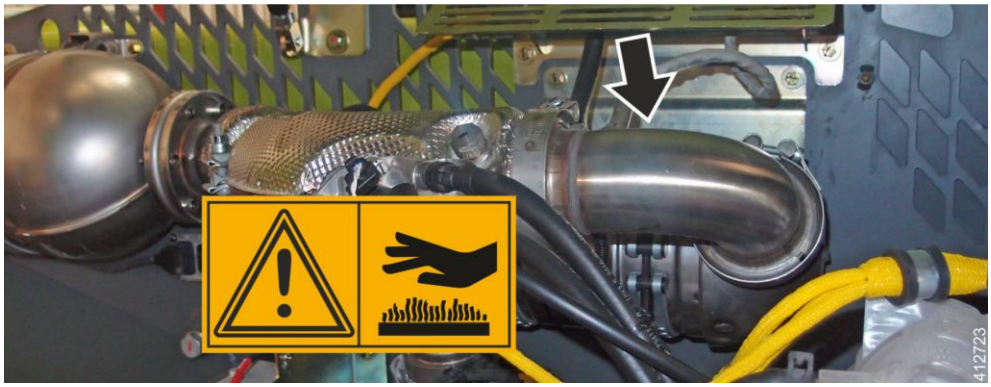

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Exhaust system

► Before maintenance work, always let the exhaust system cool down.

5.5.2.5 Axles

The axles of the machine get hot during prolonged travel mode.

CAUTION
Hot axles!
Beware of burns.
► Let the axles cool down.

► Before maintenance work, always let axles cool down.

5.5.2.6 Telescopic boom

The telescopic boom becomes hot during prolonged operation.

WARNING
Hot components!
Injury.
► Let components cool down.

► Before maintenance work, always let telescopic boom cool down.

5.5.3 Turn the electrical system off

Adhere to following procedure for welding work or work on the electrical system of machine:

► Switch off ignition.
► Disconnect battery. Page 212
► Attach earth of welding unit as close as possible to the welding location.
► Welding on the machine exclusively by authorised specialist staff.

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5.6 Complete machine

5.6.1 Lubricating machine

Ensure that following requirements are met:

☑ Machine is in maintenance position.
☑ A grease gun is on hand.

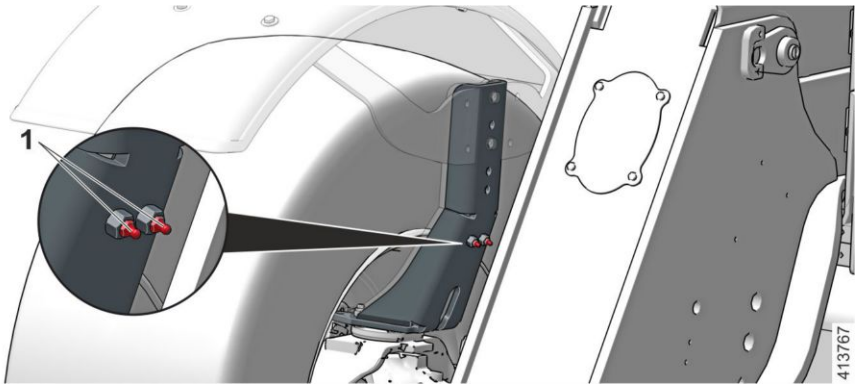
5.6.1.1 Lubricating the machine according to the lubrication chart

► Clean the grease fitting.
► Lubricate all lubricating points of machine according to lubrication chart.
► Remove excess grease and dispose of it in an environmentally friendly manner.

5.6.1.2 Lubricating machine using central lubricating points (equipment variant)

Lubricating the axle journal

The lubricating points at the top and bottom of axle journal are lubricated via the central lubricating points on the mudguard retainer.



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Lubricating the axle journal

1 Lubricating point

► Clean the grease fitting.
► Lubricate lubricating points **1**.
► Remove excess grease and dispose of it in an environmentally friendly manner.
► Carry out the procedure on all four axle journals.

Lubricating the lubrication bar

The following lubricating points are lubricated via the lubricating bar on the rear:

– Balancing cylinder at the top and bottom
– Lift cylinder at the top and bottom
– Telescopic boom on the left and right
– Floating axle bearing

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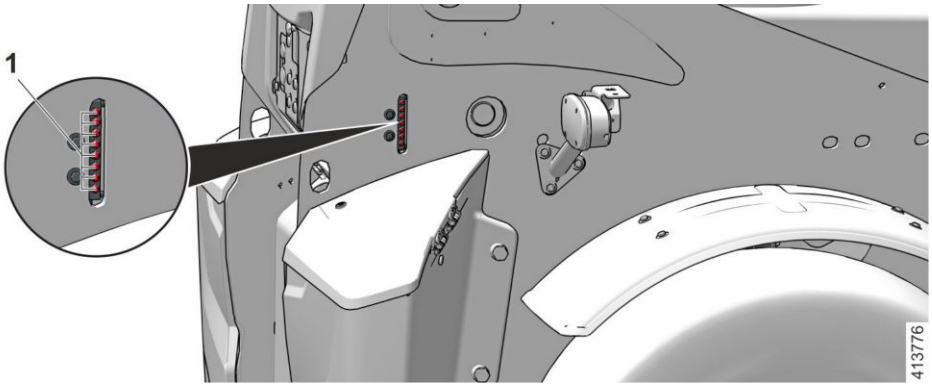

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Lubricating the lubrication bar

1 Lubricating point

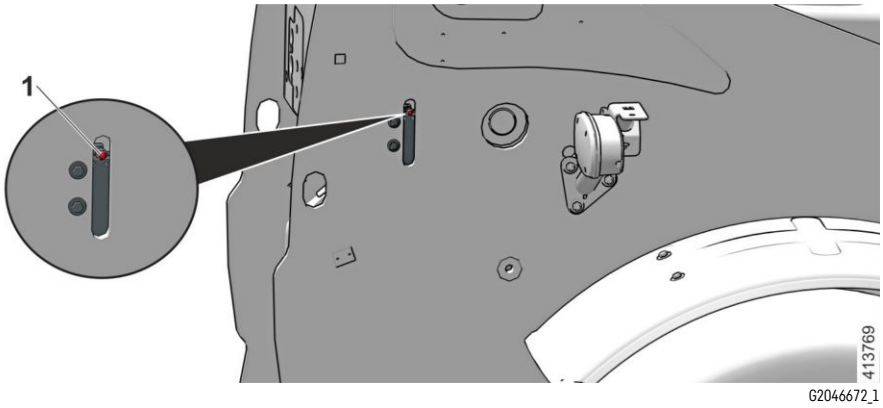
- ► Clean the grease fitting.
- ► Lubricate lubricating points **1**.
- ► Lubricate remaining lubricating points of machine according to lubrication chart.
- ► Remove excess grease and dispose of it in an environmentally friendly manner.

5.6.1.3 Lubricating machine using manual central lubricating system (equipment variant)

Lubricating point on rear

The following lubricating points are lubricated via the lubricating point on the rear:

- – Rear axle (axle journal at the top and bottom on both sides)
- – Floating axle bearing
- – Lift cylinder at the top and bottom
- – Balancing cylinder at the top and bottom
- – Telescopic boom on the left and right



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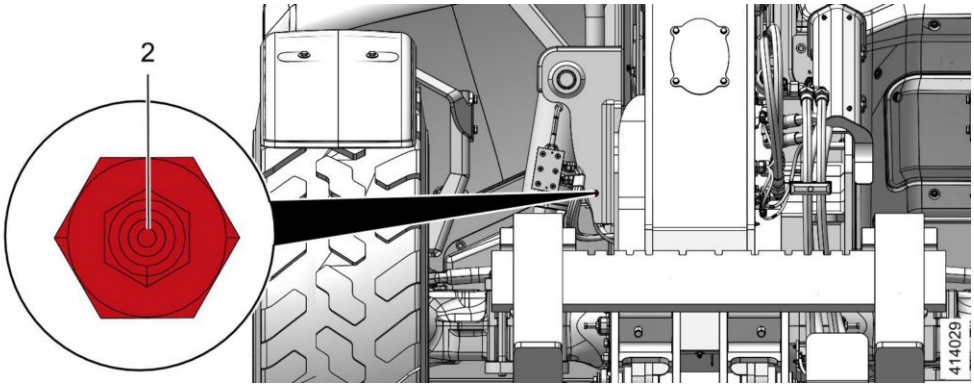
Lubricating point on rear

1 Lubricating point

- ► Clean the grease fitting.
- ► Lubricate lubricating point **1**.
- ► Remove excess grease and dispose of it in an environmentally friendly manner.

Lubricating point on front axle

The lubricating points at the top and bottom of axle journal on both sides are lubricated via the lubricating point on the front axle.



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Lubricating point on front axle

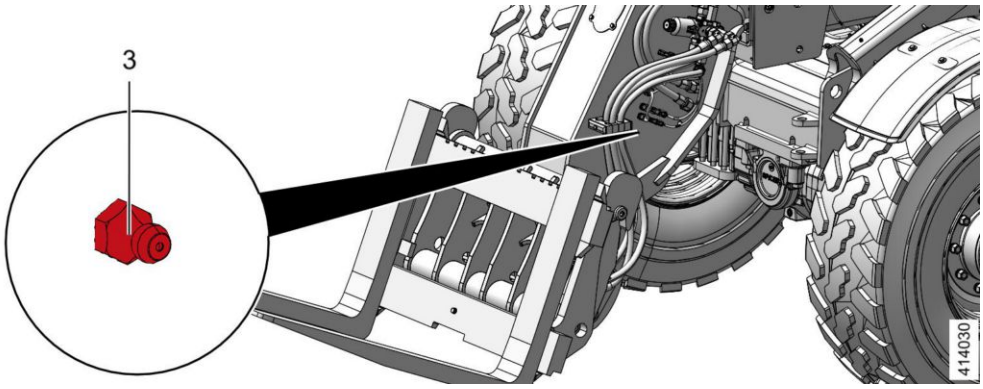
2 Lubricating point

- ► Clean the grease fitting.
- ► Lubricate lubricating point **2**.
- ► Remove excess grease and dispose of it in an environmentally friendly manner.

Lubricating point on telescope head

The following lubricating points are lubricated via the lubricating point on the telescope head:

- – Tilt cylinder at the top and bottom
- – Pin baring on the telescope head



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Lubricating point on telescope head

3 Lubricating point

- ► Clean the grease fitting.
- ► Lubricate lubricating point **3**.
- ► Remove excess grease and dispose of it in an environmentally friendly manner.

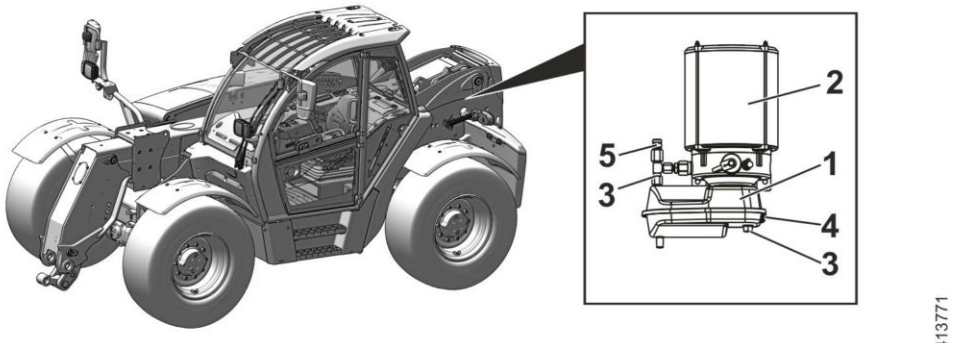
LWT/93517630/09/01/12/2023/en

5.6.1.4 Automatic central lubrication system (equipment variant)

The central lubrication system automatically supplies lubricant to all lubricating points of machine.

Layout

Reservoir, lubrication pump and electronic control unit of central lubrication system are located on rear left of machine.

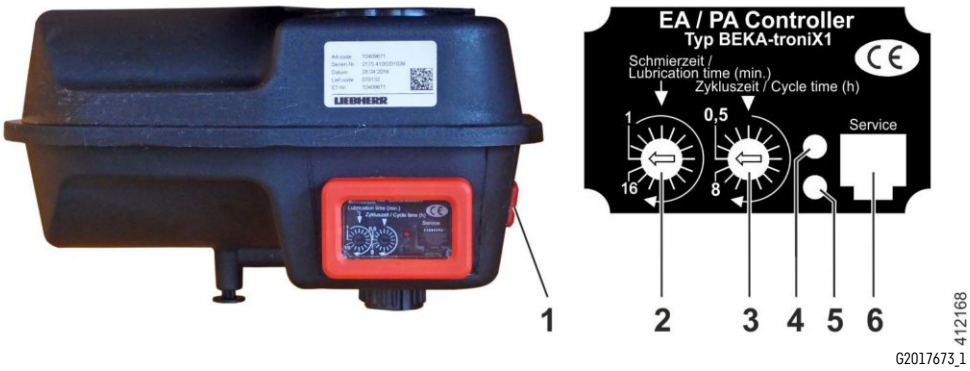


Layout of central lubrication system

1	Lubrication pump	**4**	«Intermediate lubrication» button
2	Reservoir	**5**	Pressure relief valve
3	Lubricant supply lines		

Functional description

The electronic control unit regulates the function of the lubrication pump, which supplies lubricant via the lubricant lines to all the connected lubricating points.



Control unit of central lubrication system

1	«Intermediate lubrication» button	**4**	Red LED (display for malfunctions)
2	Lubrication time display	**5**	Green LED (display for the function)
3	Cycle time display	**6**	Diagnostic connection

► Red LED **4** and green LED **5** light up for approx. 1.5 seconds once the ignition has been turned on.
✔ Central lubrication system is functional.
✔ Lubrication pump turns off after completion of the lubrication time.
✔ All additional lubrication occurs automatically following the set cycle time.

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Factory setting

Designation	Value	Unit
Factory setting of lubrication time	6	min
Factory setting of cycle time	60	min

► Switch off ignition.
✔ The lubrication time and cycle time are saved.
► Switch on ignition.
✔ The saved lubrication time and cycle time are continued.

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

► Lubricate the telescopic boom as described. Page 456

Turning the manual intermediate lubrication on

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 «Intermediate lubrication» button **1**.

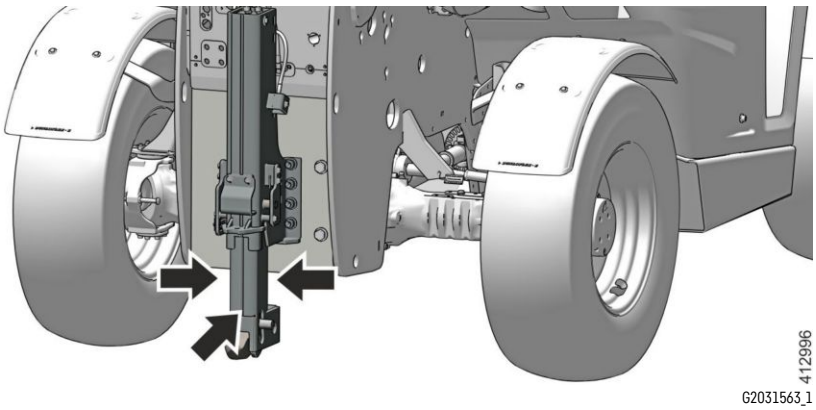
Signal displays

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

Signal displays

Signal display	Red LED	Green LED	Duration
Functional readiness	Lights up	Lights up	1.5 s
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 s cycles	Lights up	–
Rpm error on the pump motor	Flashes in 1 s cycles	Off	–
CPU/memory error	Flashes in 0.5 s cycles	Off	–
Test lubrication (Permanent lubrication)	Flash alternately in 1 s cycles		–

5.6.1.5 Lubricating gliding carriage of hitch trailer coupling (equipment variant)

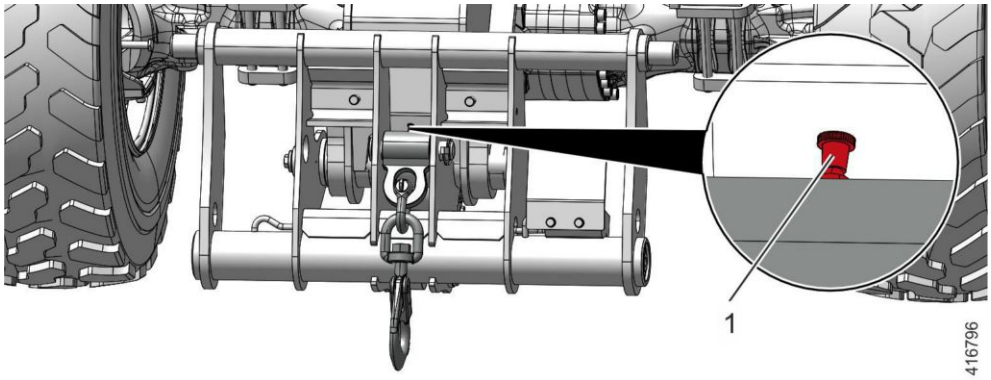


Lubricating the contact surfaces of gliding carriage

LWT/93517630/09/01/12/2023/en

- ► Lower hitch trailer coupling. Page 256
- ► Lubricate contact surfaces of gliding carriage.
- ► Remove excess grease and dispose of it in an environmentally friendly manner.
- ► Raise hitch trailer coupling. Page 256

5.6.1.6 Lubricating lifting eye (equipment variant)



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Lubricating point at lifting eye

1 Lubricating point

- ► Remove protective cap from lubricating point **1**.
- ► Lubricate lubricating point **1** according to lubrication chart.
- ► Remove excess grease and dispose of it in an environmentally friendly manner.
- ► Put protective cap on lubricating point **1**.

5.7 Diesel engine

5.7.1 Diesel engine: checking oil level

Make sure the following preconditions are met:

- ☑ Machine is in maintenance position.
- ☑ Engine oil is available as per the specification.
- ☑ Diesel engine has been switched off for 10 minutes.
- ☑ Diesel engine has cooled down.

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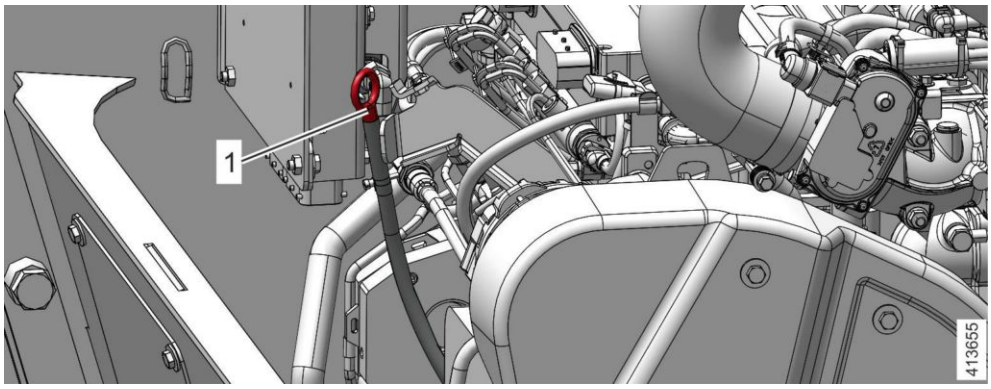
5.7.1.1 Checking oil level



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Dipstick

1 Dipstick

- ► Remove dipstick **1**.
- ► Wipe off dipstick **1** with a clean cloth.
- ► Insert dipstick **1** to the stop.
- ► Remove dipstick **1**.

The oil level must be between the maximum and minimum oil level.

- ► Determine the oil level.

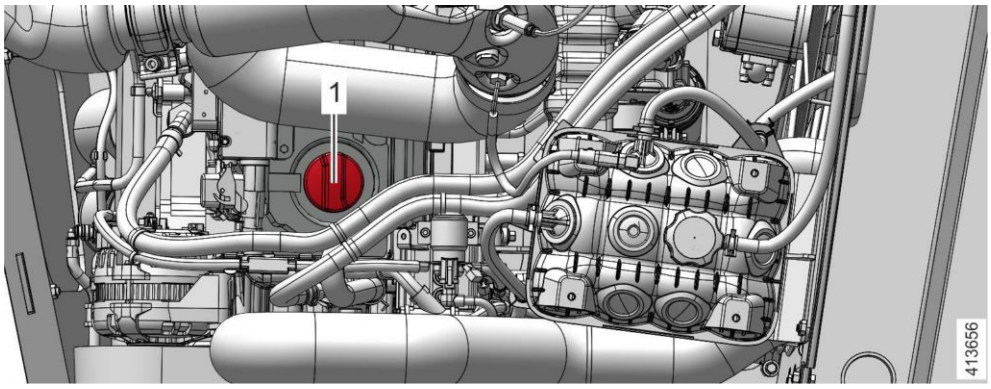
If oil level is below minimum oil level:

- ► Top up engine oil.

If oil level is above maximum oil level:

- ► Contact Liebherr customer service.

5.7.1.2 Topping up engine oil



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Filler pipe cover

1 Cover

- ► Remove cover **1**.

Do not fill the diesel engine with engine oil past the maximum oil level.

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- ► Top up engine oil via filler pipe.
- ► Check oil level.
- ► Clean cover **1**.
- ► Place cover **1** on filler pipe and tighten.

5.7.2 Checking engine compartment for contamination and cleaning it, if necessary

Make sure that the engine bonnet is open.

- ► Check entire engine compartment for contamination.
- ► In case it is very dirty, clean the engine compartment.

NOTICE

Improper cleaning with a high pressure cleaner or jet of steam!

Damage to electrical systems, cables and cable harnesses.

- ► Only clean electrical systems, cables and wiring harnesses with low-pressure equipment.
- ► Observe operator's manual of high-pressure cleaner.

- ► Clean the engine compartment carefully.

5.8 Cooling system

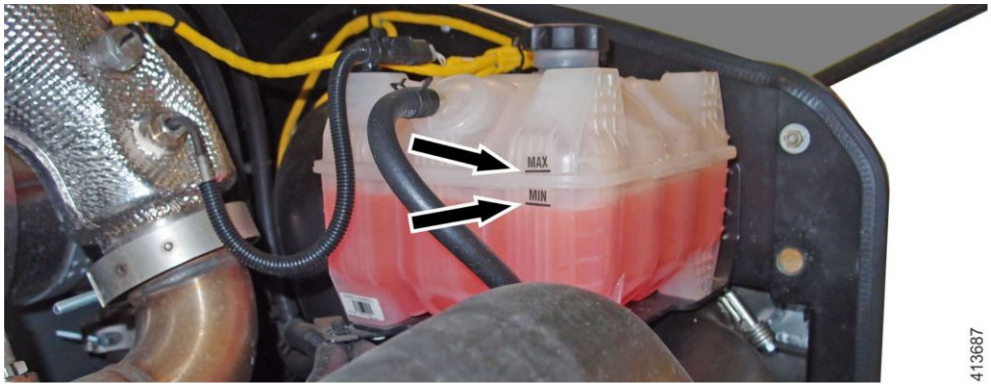
5.8.1 Cooling system: checking coolant level

5.8.1.1 Checking the coolant level

Expansion tank with filler pipe is located in the engine compartment.

Make sure the following preconditions are met:

- ☑ Engine bonnet is open.
- ☑ Diesel engine has cooled down.



Coolant container

When the coolant is below the mark:

► Top up the coolant.

5.8.1.2 Topping up coolant

The coolant to be added must have the correct anti-freeze concentration.

408741

G082455_1

Risk of scalding

CAUTION
Hot. pressurised liquid!
Beware of burns.
► Let the engine cool down.

► Open engine bonnet.
► Slightly turn the cap on the filler pipe in anticlockwise direction to relieve the excess pressure and then open.

CAUTION
Contact with coolant!
Allergic reactions.
► Wear safety gloves and safety glasses.
► Avoid direct contact with coolant.
► In case of direct contact with coolant, rinse thoroughly with water.

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Coolant marking

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- ► Add coolant to the upper mark of coolant container.
- ► Place the cap on the filler pipe and tighten.

5.8.2 Cooling system: checking the radiator and the condenser for contamination and cleaning them, if necessary

To ensure proper cooling, clean the radiator if necessary.

In dust intensive applications, check the radiator daily and clean, if necessary.

Dirty cooler units result in overheating. This automatically results in a visual warning.

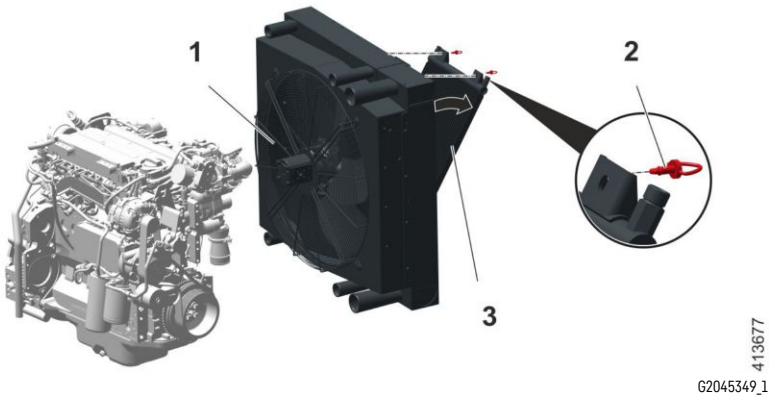
Dust and other dirt can be removed from the cooler fins with pressurized water jet, steam or compressed air. Use of compressed air is recommended.

NOTICE

Incorrect cleaning!

Damage to the cooling system.

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



Cleaning radiator and condenser

1	Radiator unit	**3**	Condenser unit
2	Plug		

- ► Loosen plugs **2** on the condenser unit **3**.
- ► Fold condenser unit **2** forward.
- ► Clean radiator unit **1** and condenser unit **3** with a high pressure cleaner or compressed air.
- ► Fold condenser unit **3** backward.
- ► Screw the plugs **2** back in.

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5.9 Fuel system

5.9.1 Notes for working on the fuel system

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Danger of fire

DANGER
Highly flammable consumables!
Explosion, fire.
► Avoid naked lights and fire.
► Only refuel when the engine is switched off.

5.9.2 Draining the fuel pre-filter condensation

The fuel pre-filter is located in bottom right of engine compartment.

Drain the condensation:

– The „water separator“ symbol appears on the monitor.
– According to the specified intervals in the „Maintenance and inspection schedule“.

Ensure that following requirements are met:

☑ Engine bonnet is open.
☑ A sufficiently sized receptacle is on hand.

WARNING
Highly flammable consumables!
Beware of burns.
► Avoid naked lights and fire.

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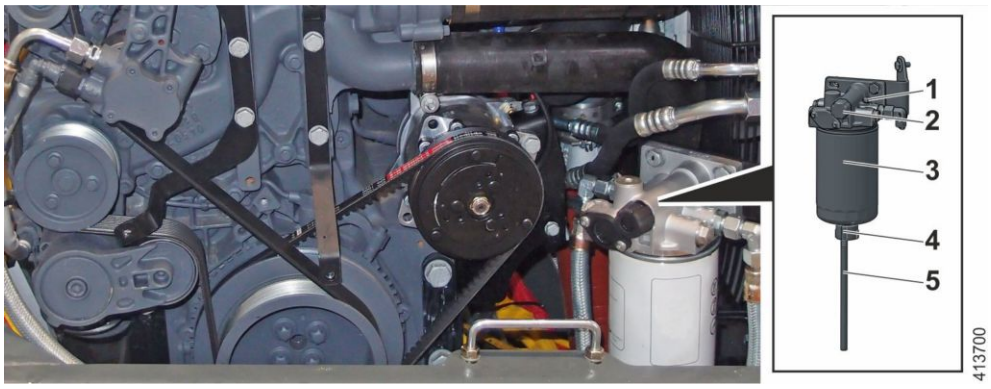
5.9.2.1 Draining the fuel pre-filter condensation



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Draining the fuel pre-filter condensation

1	Bleeder screw	**4**	Drain plug
2	Manual feed pump	**5**	Drain hose
3	Filter cartridge		

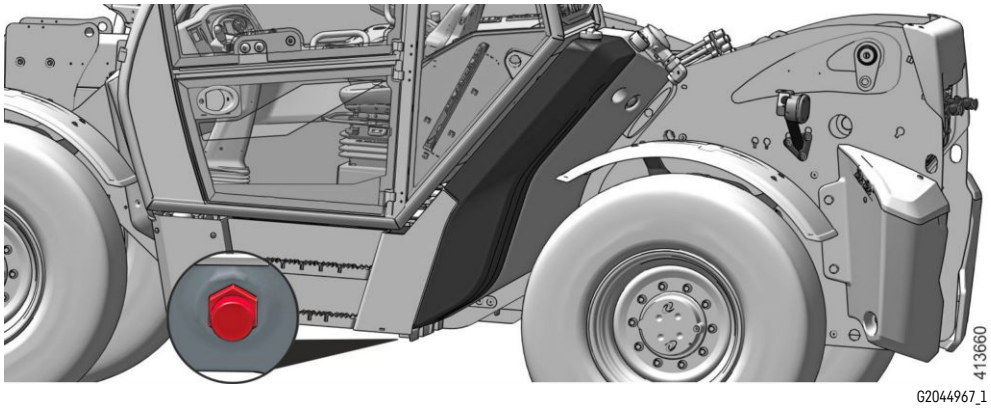
► Loosen drain plug **4**.
✔ Drain the condensation into a suitable receptacle via the drain hose **5** until clean fuel emerges.

When clean fuel emerges:

► Tighten drain plug **4** with a tightening torque of 1.6 ± 0.3 Nm.

5.9.3 Fuel tank: draining condensation and sediments

Make sure a receptacle with the necessary capacity is available.



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Fuel tank: draining condensation and sediments

► Open the tank filler cap.
► Place a receptacle under the drain plug.
► Unscrew sealing cover on the drain plug.
► Screw the drain hose onto the drain plug and drain condensation and sediments into a receptacle until clean fuel emerges.
► Unscrew the drain hose and screw the sealing cover onto the drain plug.
► Close the tank filler cap.

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5.10 Air filter system

5.10.1 Air filter system: changing air filter

Ensure that following requirements are met:

☑ Engine bonnet is open.

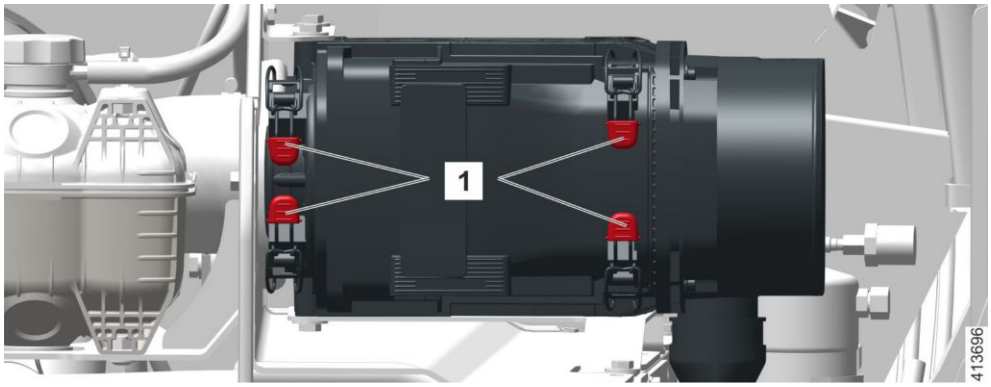
5.10.1.1 Removing main filter element

Clean main filter element or change it if:

- The „air filter contamination“ indicator light appears on the display.
- According to the specified intervals in the „maintenance and inspection schedule“.
- Main filter element must be changed every 500 hours.

If the „air filter contamination“ indicator light continues to appear on the display following maintenance of main filter element:

► Also replace the safety element.



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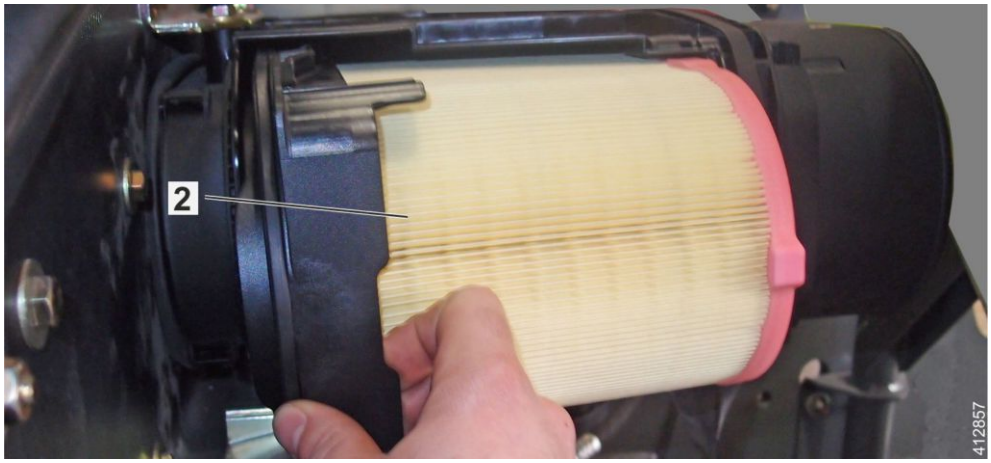
Opening the mounting clamps

► Open the mounting clamps **1** on the service cover and remove the cover.



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Main filter element

► Remove the main filter element **2** check it for damage prior to cleaning.

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

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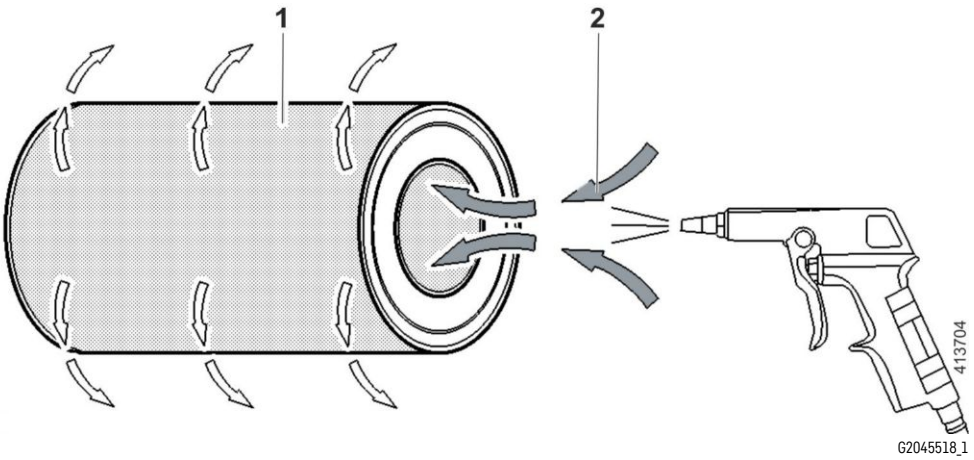
► Replace the damaged main filter element **2**.

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

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

5.10.1.2 Cleaning the main filter element



Blow out main filter element

1	Main filter element	**2**	Compressed air

NOTICE

Incorrect cleaning!

Damage to the main element.

► Use compressed air at a working pressure of no more than 2 bar (29 psi).
► 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**.

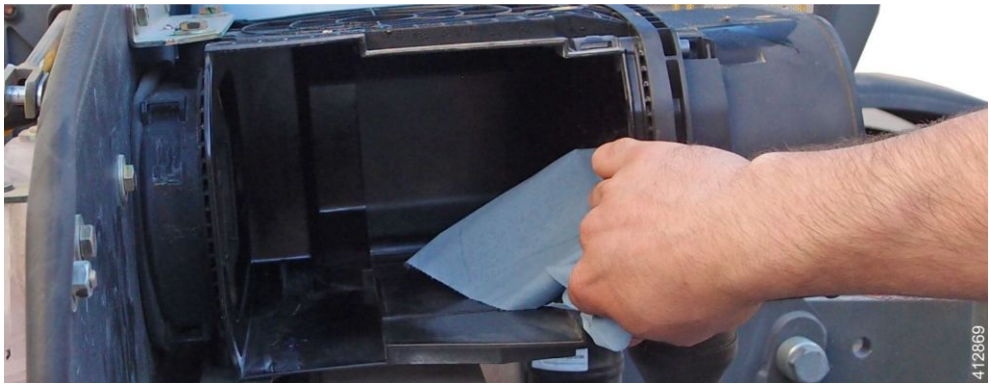
5.10.1.3 Cleaning the filter housing

NOTICE

Incorrect cleaning!

Damage to the engine.

► Clean the filter housing with compressed air.
► Wipe the filter housing with a clean cloth.



G2028667_1

Cleaning the filter housing

► Clean the filter housing with a clean cloth.

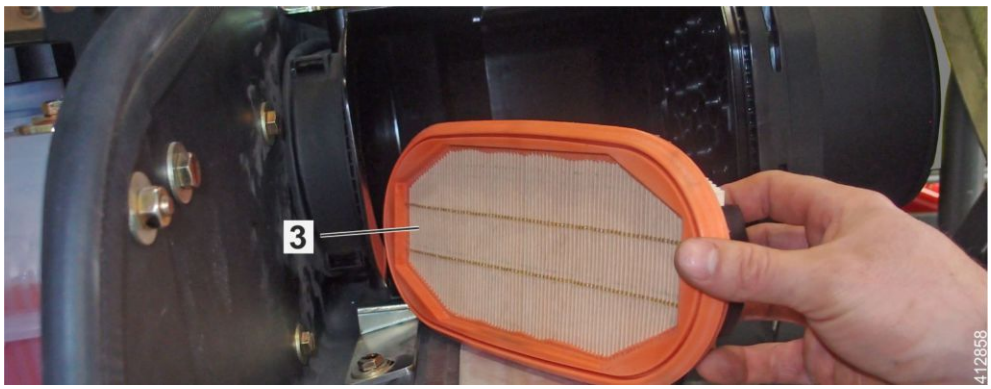
5.10.1.4 Replacing the safety element

NOTICE

Always carry out maintenance correctly.

Damage to the engine.

► Do not clean the safety element.
► Only replace the safety element.



G2028597_1

Safety element

Replace safety element **3** with every third change of main filter element. The safety element must not be cleaned!

Clean the filter housing before removing the safety element as described.

► Replace the safety element **3**.

NOTICE

Missing air filters!

Damage to the diesel engine.

► Ensure that the machine is not operated without air filters.

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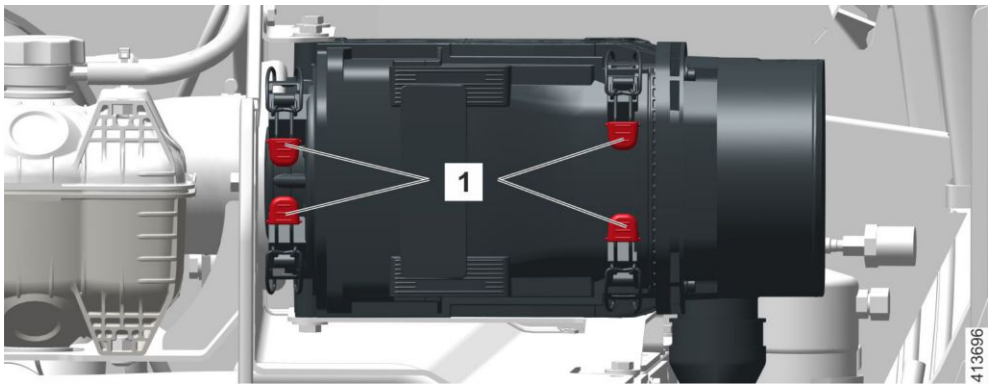
► Install the safety element and the main filter element. Ensure correct seating.



Closing the mounting clamps

► Clean the service cover and fit it on to the filter housing in the correct position.

The mounting clamps **1** can only be closed without force if the service cover is touching the filter housing all around the circumference.

► Close mounting clamps **1**.

Troubleshooting
Filter cover cannot be locked correctly?
Filter cover is not installed the correct way round.
► The recess on the filter cover must match the notch on the filter.

5.10.2 Air filter: cleaning service cover and dust discharge valve

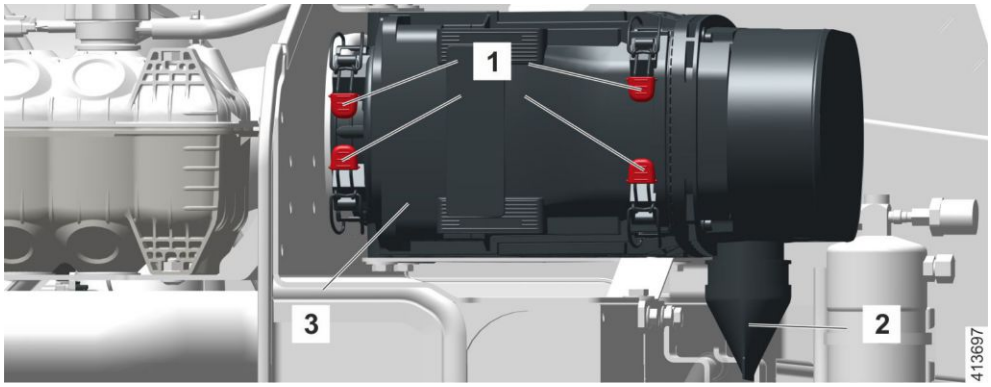
Make sure the following preconditions are met:

☑ Engine bonnet is open.

5.10.2.1 Cleaning the dust discharge valve

Clean the dust discharge valve and service cover if:

- The „air filter contamination“ symbol appears on the monitor.
- According to the specified intervals in the „maintenance and inspection schedule“. Page 404



G2045446_1

Clean the dust discharge valve

1	Mounting clamps	**3**	Service cover
2	Dust discharge valve		

- ► Push dust discharge valve **2** several times to empty dust from the air filter housing.
- ► Check and empty dust discharge valve **2** more often in dusty applications.

If the dust discharge valve **2** is damaged or remains open:

- ► Replace dust discharge valve **2**.

5.10.2.2 Cleaning the service cover

- ► Open mounting clamps **1** on the service cover **3** and remove the service cover **3**.
- ► Clean service cover **3** with a clean cloth.
- ► Put service cover **3** true to side on the filter housing.

The mounting clamps **1** can only be closed without force if the service cover **3** is touching the filter housing all around the circumference.

- ► Close mounting clamps **1**.

Troubleshooting

Filter cover cannot be locked correctly?

Filter cover is not installed the correct way round.

- ► The recess on the filter cover must match the notch on the filter.

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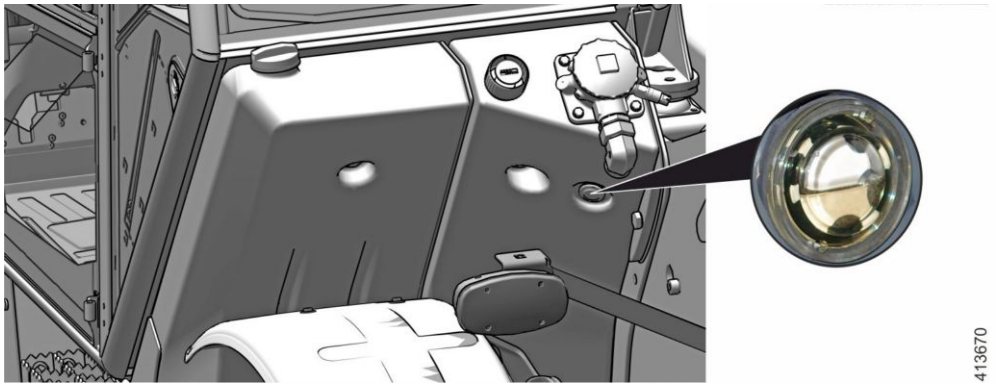
5.11 Hydraulic system

5.11.1 Checking oil level in hydraulic tank and topping up oil

5.11.1.1 Checking hydraulic oil level

Make sure the following preconditions are met:

☑ The hydraulic oil is cold.
☑ A suitable access aid is on hand.



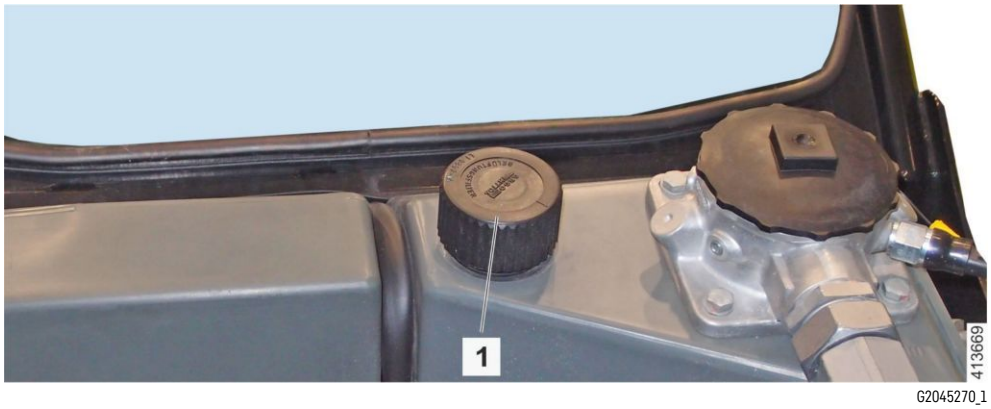
Sight gauge

► Check oil level.

If hydraulic oil is not visible in sight gauge:

► Top up hydraulic oil.

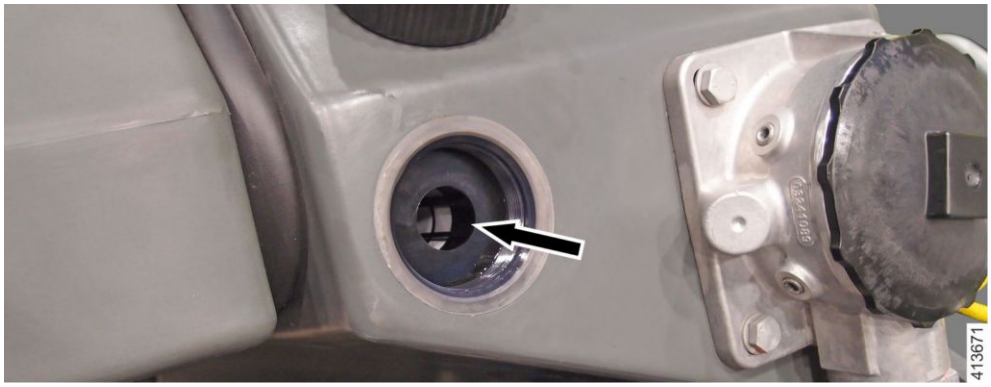
5.11.1.2 Topping up hydraulic oil



Tank vent filter

1 Tank vent filter

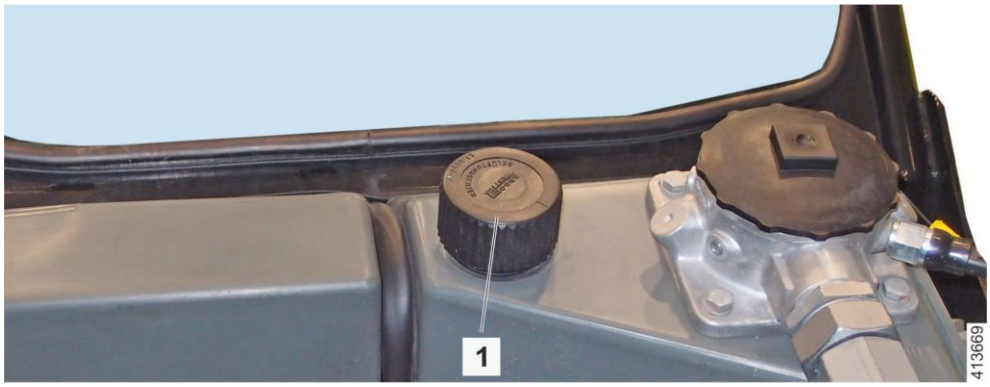
► Unscrew tank vent filter **1**.



G2045279_1

Topping up hydraulic oil

► Add hydraulic oil up to centre of sight gauge.



G2045270_1

Tank vent filter

1 Tank vent filter

► Tighten Tank vent filter **1** to 8 N·m (5.9 ft·lb$_f$).

5.12 Electrical system

5.12.1 Checking lighting

Make sure the following preconditions are met:

☑ Push „battery isolation“ button up. Page 212

► Turn ignition on.
► Check the function of all lights.

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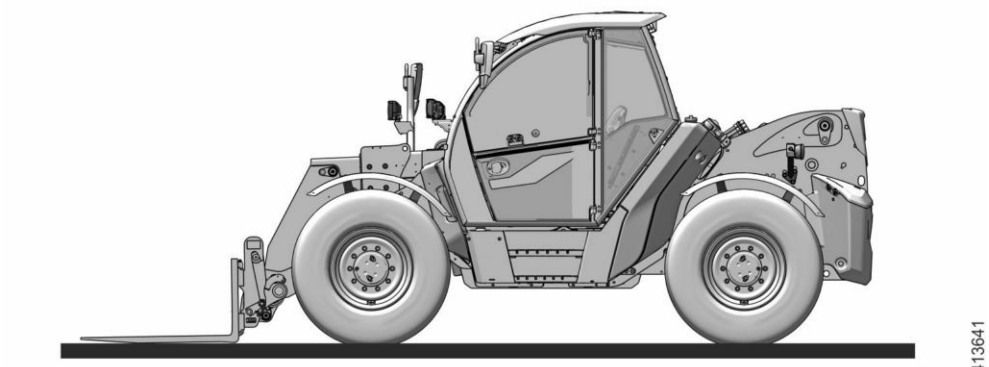
5.12.2 Electrical system: Checking function of load torque limitation

5.12.2.1 Preparation for checking function of load torque limitation

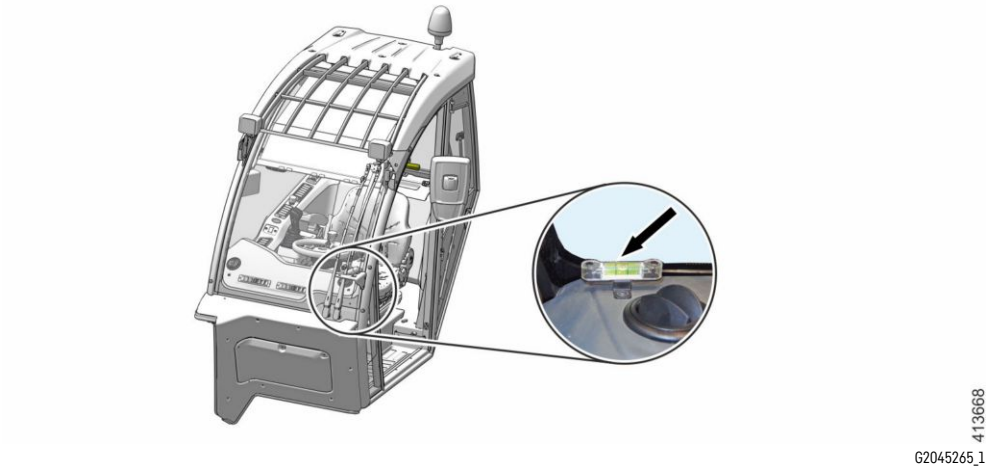
DANGER
Load torque display without function!
Danger to life.
- ► Do not operate the machine.
- ► Contact Liebherr customer service.

DANGER
Persons in danger area!
Injury.
- ► Make sure there is nobody in danger area.



Parking the machine

- ► Park the machine on horizontal ground.



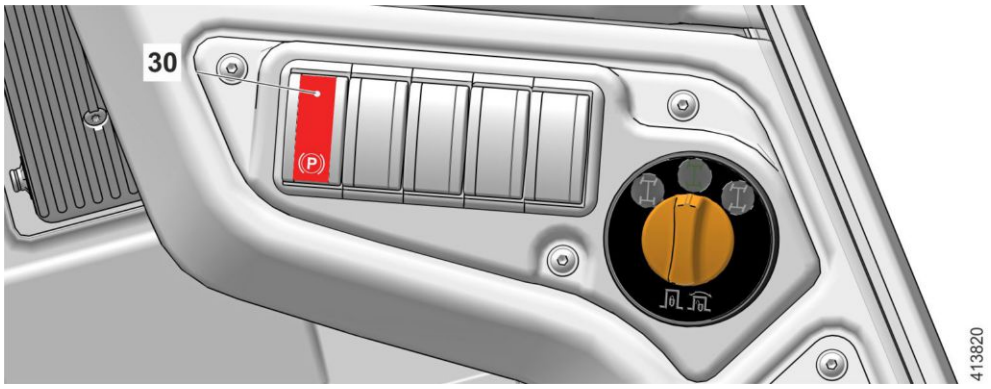
Align the machine horizontally

- ► Check horizontal alignment with level display.

► Align tyres parallel to the longitudinal axis of machine.

Note
Before lifting a load, always check that the tyres are in good condition and are filled to the prescribed pressure.

► Start diesel engine.
► Drive the machine a short distance.
► Stop the machine.

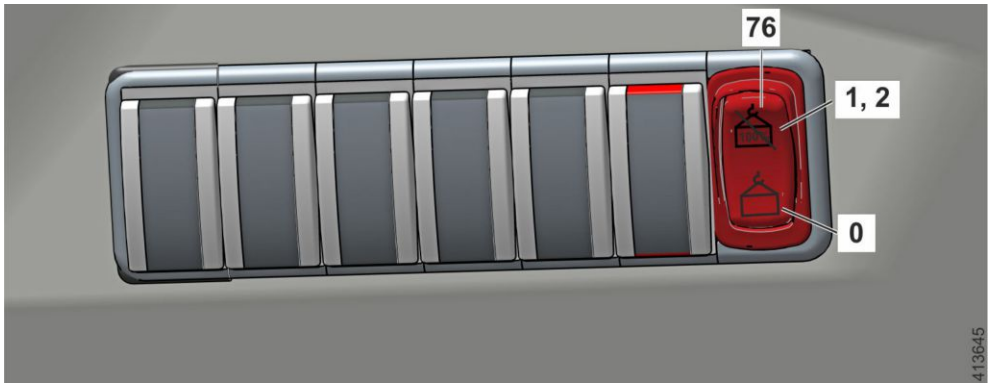


G2047791_1

Turning on parking brake

30 «Parking brake» switch

► Press bottom part of «Parking brake» switch **30**.
✔ «Parking brake» symbol is shown on the display.



G2044074_1

Load torque limitation switch

76 «Load torque limitation» switch

► Press bottom part of «Load torque limitation» switch **76**.

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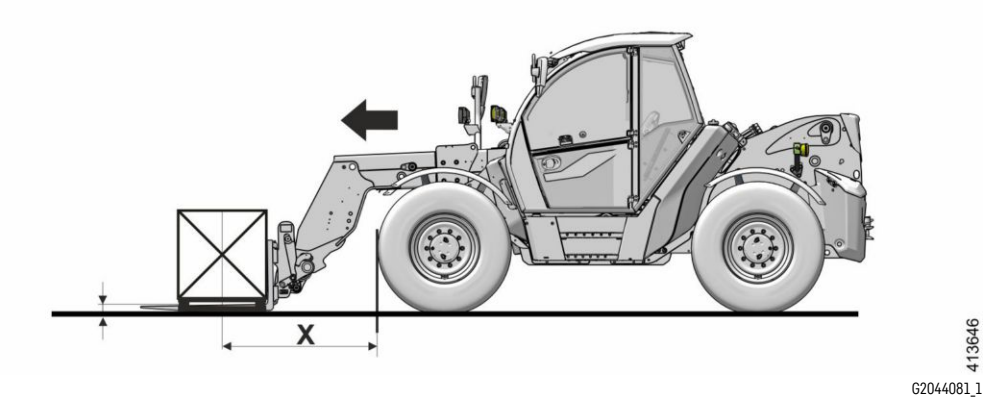
5.12.2.2 Checking the load torque limitation with a standard fork



Checking the load torque limitation

► Install a standard forklift.

Note

To check the load torque limitation, we recommend to use a load of at least 2/3 of nominal load.

► Make sure that the weight and centre of gravity of the load are known exactly.

Overview of rated load

Machine type	Rated load	2/3 of rated load
T 46-7	4.6 t (5.07 ton_{US})	3.1 t (3.42 ton_{US})
T 55-7	4.999 t (5.5105 ton_{US})	3.3 t (3.64 ton_{US})
T 60-9	6.0 t (6.6 ton_{US})	4.0 t (4.4 ton_{US})

► Lift prepared load with standard forklift.

► Position load in centre, so that it is balanced on the forks.

► Lift load 500 mm (19.69 in) off the ground.

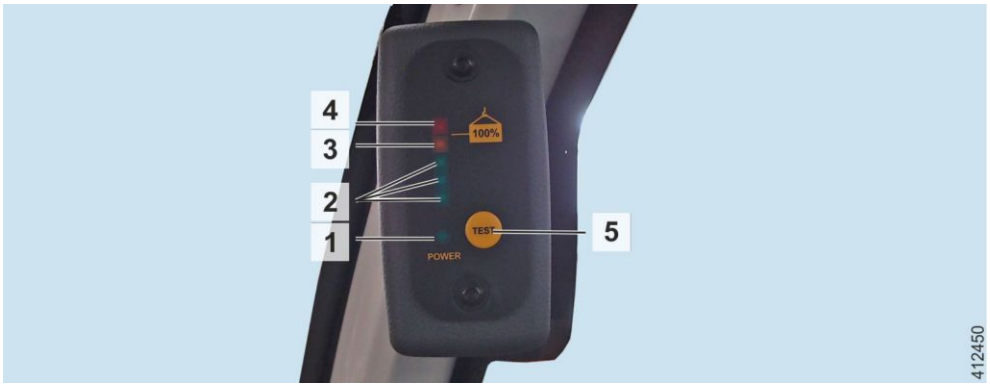
DANGER

Machine tipping!

Danger to life.

► Exclusively extend telescopic boom with load horizontally.

► Extend telescopic boom with load only to the point where machine is just before load limit and stability limit.



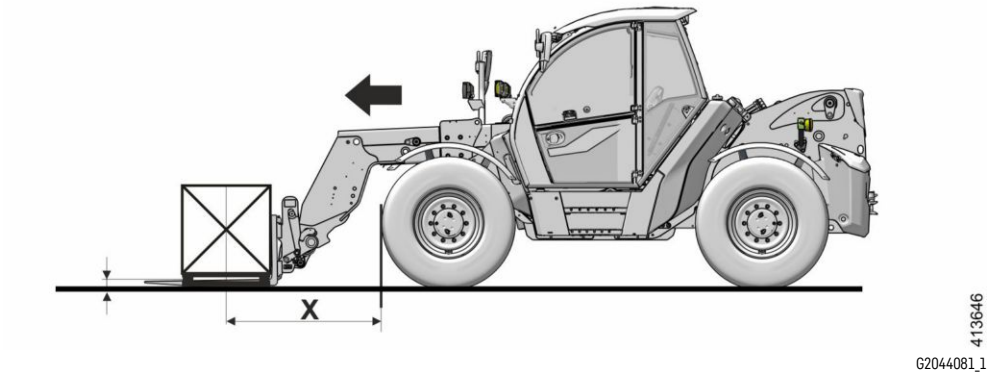
G2022492_5

Load torque display

Diodes **2, 3 und 4** light up:

– Stability limit of machine is reached.

► Turn diesel engine off.



G2044081_1

Checking the load torque limitation

► Measure distance **X**.
► Compare distance **X** with relevant load curve.

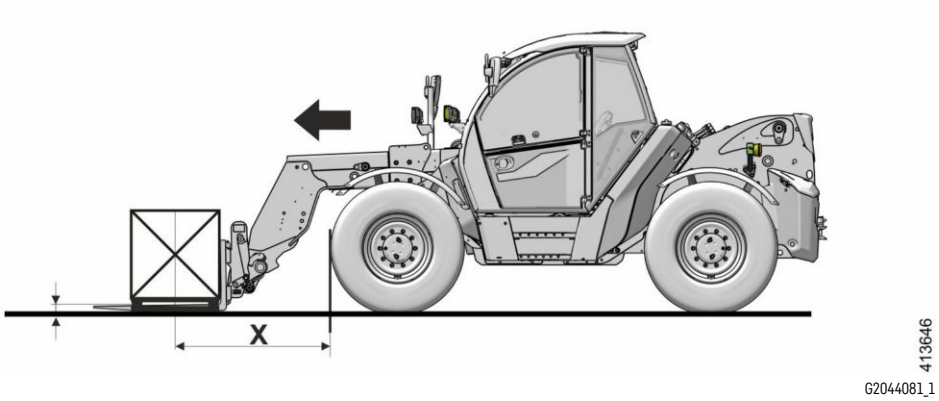
The tolerance between dimension **X** and the load curve must lie between + 100 mm (3.94 in) and - 300 mm (11.81 in).

If the distance is more than + 100 mm (3.94 in) or - 300 mm (11.81 in):

► Set down the machine.
► Contact Liebherr customer service.

Note
Calibration of the load torque limiter can only be performed by authorised specialist staff.

5.12.2.3 Checking the load torque limitation with a special fork



Checking the load torque limitation

► Attach the special fork.

Note

To check the load torque limitation, we recommend to use a load of at least 2/3 of nominal load.

► Make sure that the weight and the centre of gravity of load are known exactly.

Overview of rated load

Machine type	Rated load	2/3 of rated load
T 46-7	4.0 t (4.4 ton_{US})	2.7 t (2.98 ton_{US})
T 55-7	4.8 t (5.29 ton_{US})	3.2 t (3.53 ton_{US})
T 60-9	5.4 t (5.95 ton_{US})	3.6 t (3.97 ton_{US})

► Lift prepared load with special fork.

► Position load in centre, so that it is balanced on the forks.

► Lift load 500 mm (19.69 in) off the ground.

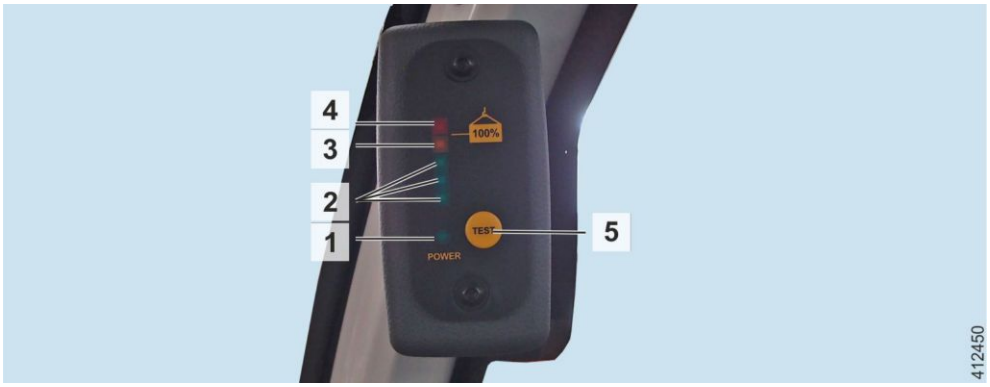
DANGER

Machine tipping!

Danger to life.

► Exclusively extend telescopic boom with load horizontally.

► Extend telescopic boom with load only to the point where machine is just before load limit and stability limit.



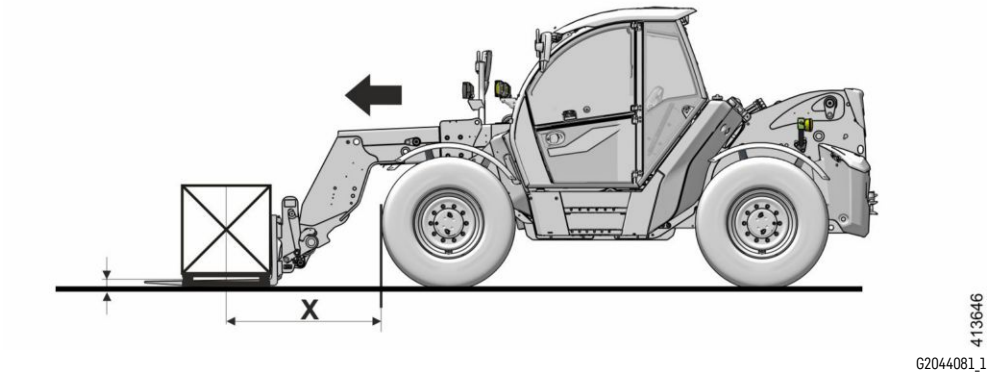
G2022492_5

Load torque display

Diodes **2, 3 und 4** light up:

– Stability limit of machine is reached.

► Turn diesel engine off.



G2044081_1

Checking the load torque limitation

► Measure distance **X**.
► Compare distance **X** with relevant load curve.

The tolerance between dimension **X** and the load curve must lie between + 100 mm (3.94 in) and - 300 mm (11.81 in).

If the distance is more than + 100 mm (3.94 in) or - 300 mm (11.81 in):

► Set down the machine.
► Contact Liebherr customer service.

Note
Calibration of the load torque limiter can only be performed by authorised specialist staff.

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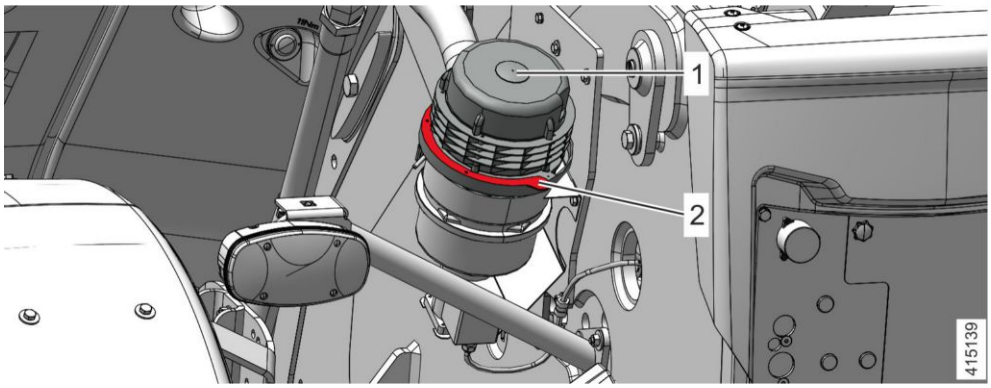
5.13 Operator's cab, heating and air conditioning

5.13.1 Cleaning the cab air pre-filter and changing it if necessary (option)

Ensure that following requirements are met:

☑ Machine is in maintenance position.

The cab air pre-filter is located on the left on the main frame behind the operator's cab.

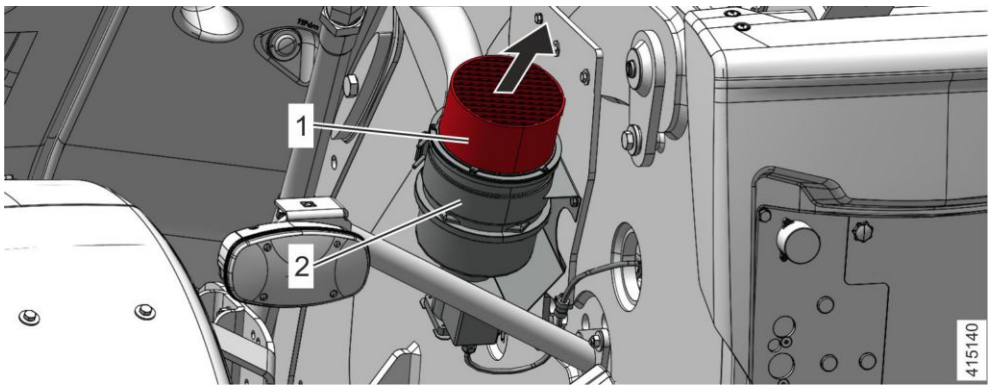


G2074081_1

Cab air pre-filter

1	Cover	**2**	Locking mechanism

► Push the locking mechanism **2** up and, at the same time, turn the cover **1** anti-clockwise.
► Remove cover **1**.



G2074083_1

Filter cartridge

1	Filter cartridge	**2**	Filter housing

► Remove the filter cartridge **1**.

NOTICE

Incorrect cleaning!

Damage to the filter cartridge.

► Use compressed air at low pressure.
► Do not knock out the filter cartridge.

- ► Clean the filter cartridge **1** with compressed air at low working pressure or change it.
- ► Clean the inside of the filter housing **2** with a clean cloth.
- ► Insert the cleaned or new filter cartridge **1**.
- ► Fit the cover on the filter housing **2**.
- ► Close the cover: push the locking mechanism up and turn the cover clockwise.

5.14 Steering system

5.14.1 Checking function of steering system

Ensure that following requirements are met:

- ☑ Machine is in „transport position“. Page 280
- ☑ Sufficient space to check the steering system is available.

WARNING
Persons in danger area!
Injury.
- ► Make sure there is nobody in danger area.
- ► Carry out inspection procedure on level and clear ground.

G2028561_1

Checking the steering system

- ► Start diesel engine.
- ► At a standstill, actuate steering in both directions and check for function.
- ► Check steering in all steering modes (front axle steering, crab steering, all-wheel steering and front axle steering with displaced rear axle).

LWT/93517630/09/01/12/2023/en

5.15 Brake system

5.15.1 Service brake and parking brake: Checking function and effectiveness

If repair work is carried out on the brake, a deceleration measurement must be carried out in accordance with the standard in order to prove proper brake function.

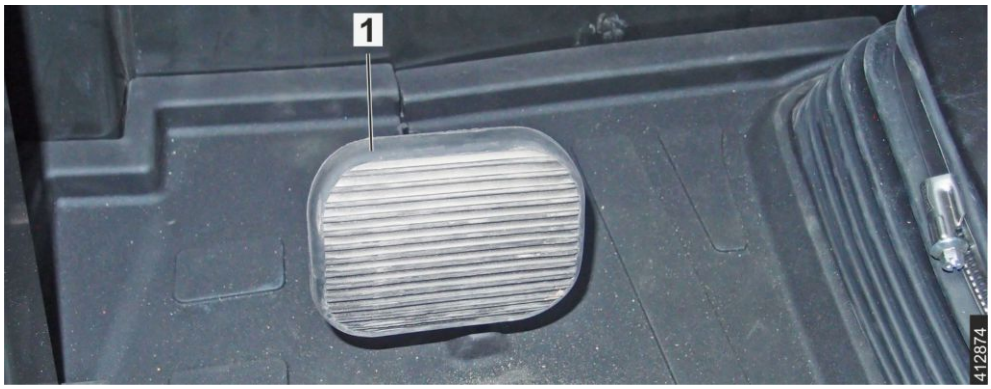
Ensure that following requirements are met:

☑ Sufficient space to check the service brake and parking brake is available.

WARNING
Persons in danger area!
Injury.
- ► Make sure there is nobody in danger area.
- ► Carry out inspection procedure on level and clear ground.

WARNING
Always wear a safety belt!
Injury.
- ► Always wear safety belt before putting machine into service.

5.15.1.1 Checking the service brake



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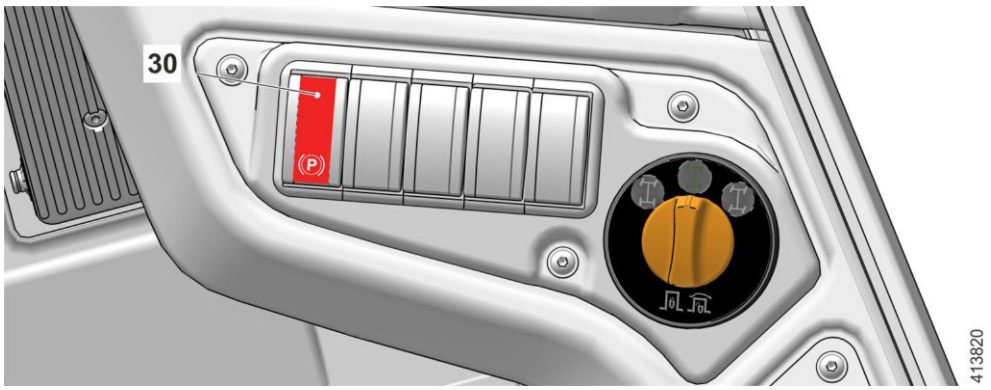
Inching brake pedal

1 Inching brake pedal

- ► Start the machine.
- ► Select forward travel direction.
- ► Travel at 8 km/h (5.0 mph).
- ► Fully depress the inching brake pedal **1** during travel.
  - ✔ Machine must come to a standstill abruptly.

Troubleshooting
Braking effect is too low or not present?
- ► Contact Liebherr customer service.
- ► Do not operate the machine in the meantime.

5.15.1.2 Check the parking brake



Check the parking brake

30 «Parking brake» switch

- ► Start the machine.
- ► Select forward travel direction.
- ► Travel at 3 km/h (1.9 mph).
- ► Press bottom part of «Parking brake» switch **30** during travel.
  - ✔ Machine comes to a standstill abruptly.
  - ✔ «Parking brake» symbol is shown on the display.

Troubleshooting
Braking effect is too low or not present?
- ► Contact Liebherr customer service.
- ► Do not operate the machine in the meantime.

5.16 Axles and tyres

5.16.1 Wheels: checking mounting tightness of wheel lugs

Make sure that a torque wrench for a measuring range in excess of 630 N·m (464.7 ft·lb$_f$) is to hand.

Note
- ► Carry out one-off intervals at 50, 100 and 250 operating hours after every wheel change as well!

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Check the wheel lugs

Tightening torque of wheel lugs = 630 N·m (464.7 ft·lb$_f$).

► Check all wheel lugs of all four wheels for the required tightening torque.

5.16.2 Tyres: checking and adjusting air pressure in tyres

The tyre pressure has a considerable influence on the overall operation of machine.

The air pressure of the tyres is dependent on the tyres, on how the machine is used and on the working attachment that is attached.

Make sure the following preconditions are met:

☑ Machine is parked on level and solid ground.

☑ The correct specified values for the tyre air pressure are available. Specified values can be found in the operator's manual Page 48.

☑ The tyres are cold.

5.16.2.1 Checking the air pressure

DANGER

Exploding tyres!

Danger to life.

► Do not reinflate depressurised tyres.

► Use a sufficiently long tyre inflation hose with a self-retaining valve.

► Stay to the side of tyre in the safe area.

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Checking and adjusting tyre pressure

► Check tyre pressure.

If tyre pressure does not correspond to the specified value:

► Correct tyre pressure.

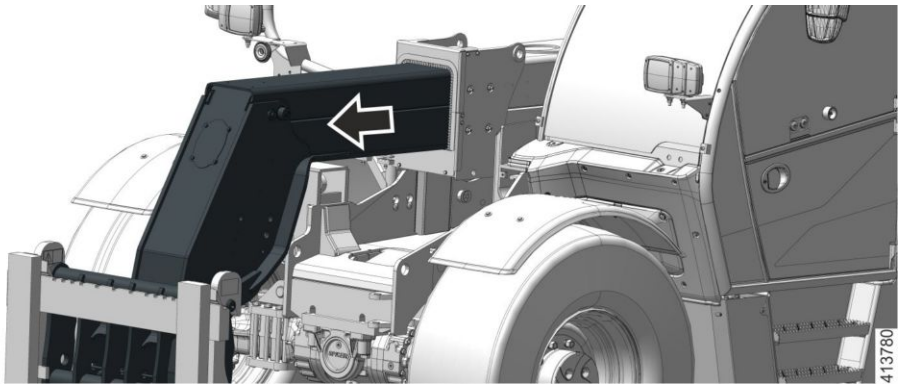
5.17 Telescopic boom

5.17.1 Checking front glide elements for wear and tight seating Lubricating glide surfaces on telescopic boom

5.17.1.1 Checking front glide elements for wear and tight seating

Preparing the machine

WARNING
Persons in danger area!
Injury.
► Make sure there is nobody in danger area.
► Carry out inspection procedure on level and clear ground.



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Extending the telescopic boom

► Start diesel engine.

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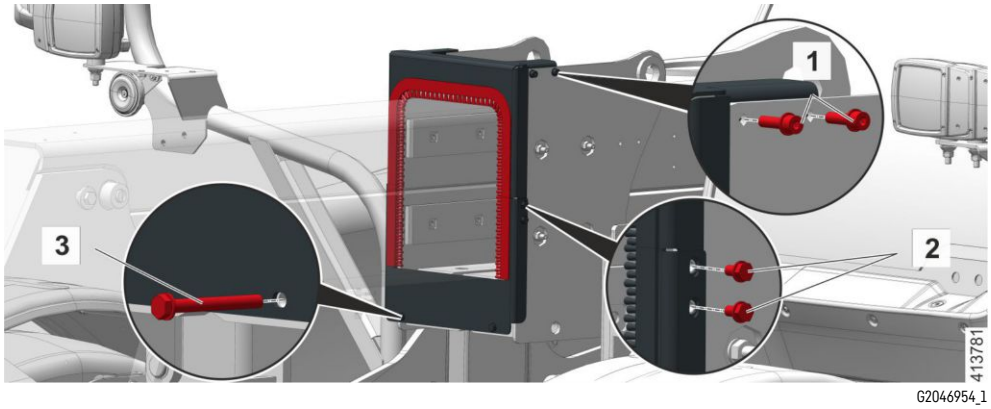
- ► Extend telescopic boom 50 cm (19.7 in).
- ► Lift telescopic boom 20 cm (7.9 in) off of ground.

Turning on parking brake

30	«Parking brake» switch

- ► Press bottom part of «Parking brake» switch **30**.
  ✔ «Parking brake» symbol is shown on the display.
- ► Park machine properly.
- ► Remove ignition key.

Removing wiping tool (option)

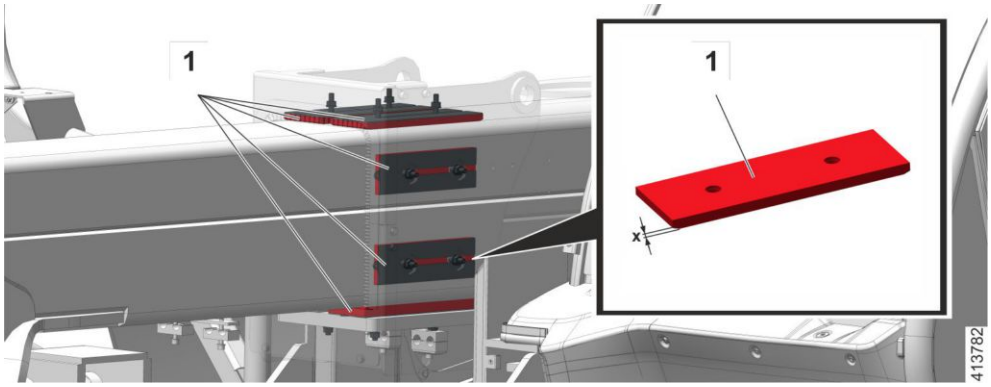


Wiping tool on telescopic boom

1	Screw	**3**	Screw
2	Screw		

- ► Unscrew screws **2** and screws **3**.
- ► Remove lower bracket with wiping tool.
- ► Remove screws **1**.
- ► Remove upper bracket with wiping tool.

Checking front glide elements



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Checking front glide elements

1 Glide element

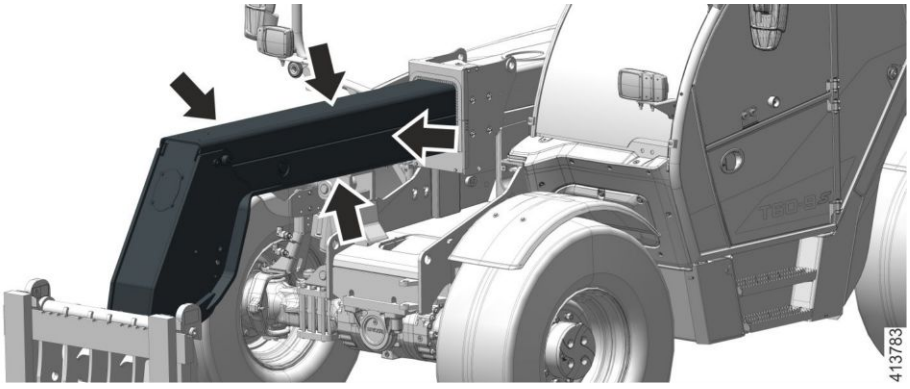
The glide elements **1** are bevelled on placement surface.

If bevel **x** on glide elements **1** is no longer visible:

- ► Replace glide elements **1**.
- ► Install brackets with wiping tool.

5.17.1.2 Lubricating glide surfaces on telescopic boom with Liebherr telescope grease 9613 Plus

DANGER
Persons in danger area!
Injury.
- ► Make sure there is nobody in danger area.



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Lubricating glide surfaces on telescopic boom

- ► Extend telescopic boom completely horizontally.
- ► Park machine properly.
- ► Approach the telescopic boom from side.
- ► Lubricate glide surfaces of telescopic boom using telescope grease. Page 419
- ► Retract telescopic boom.

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- ► Retract and extend telescopic boom until the telescope grease is distributed evenly across the glide surfaces.
- ► Remove excess grease and dispose of it in an environmentally friendly manner.

5.17.1.3 Lubricating glide surfaces on telescopic boom with Interflon Lube EP

DANGER
Persons in danger area!
Injury.
- ► Make sure there is nobody in danger area.

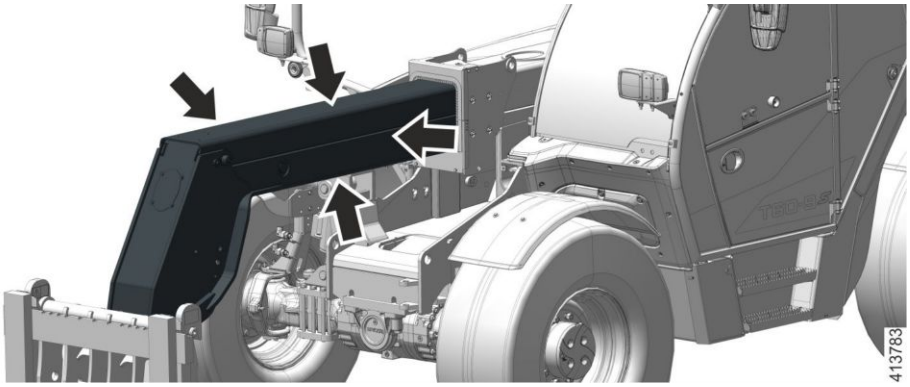
Checking lubrication film

- ► Extend telescopic boom completely horizontally.
- ► Park machine properly.
- ► Check whether lubrication film is present on glide surfaces of telescopic boom.

If there is no lubricating film:

- ► Lubricate glide surfaces on telescopic boom.

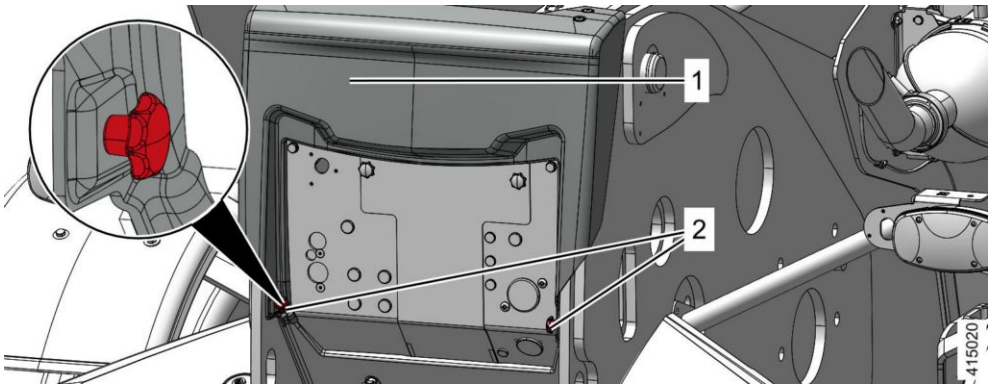
Lubricating glide surfaces on telescopic boom



Lubricating glide surfaces on telescopic boom

- ► Approach the telescopic boom from side.
- ► Apply a thin layer of telescope grease to glide surfaces of telescopic boom. Page 419
- ► Distribute telescope grease evenly on glide surfaces with a cloth.
- ► Apply a thin layer of telescope grease to glide surfaces of telescopic boom. Page 419
- ► Remove excess grease and dispose of it in an environmentally friendly manner.
- ► Let telescope grease dry for 30 min.
- ► Retract telescopic boom.

5.17.1.4 Lubricating rear glide elements



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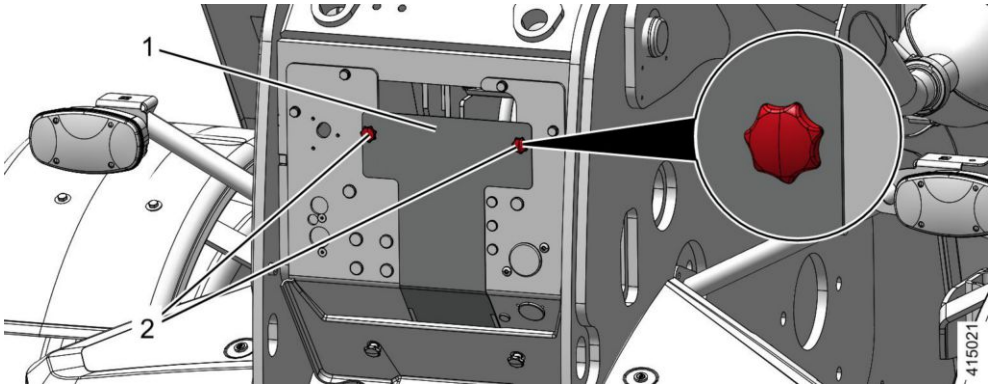
Cover plate on the rear

1	Cover plate	**2**	Screw

- ► Undo screws **2** on cover plate **1**.
- ► Remove cover plate **1**.



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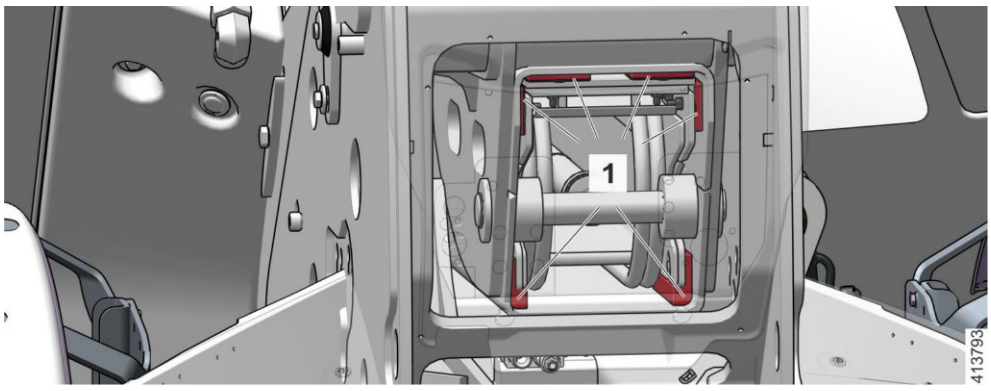
Cover plate on the rear

1	Cover plate	**2**	Screw

- ► Undo screws **2** on cover plate **1**.
- ► Remove cover plate **1**.



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Lubricating rear glide elements

1	Rear glide element

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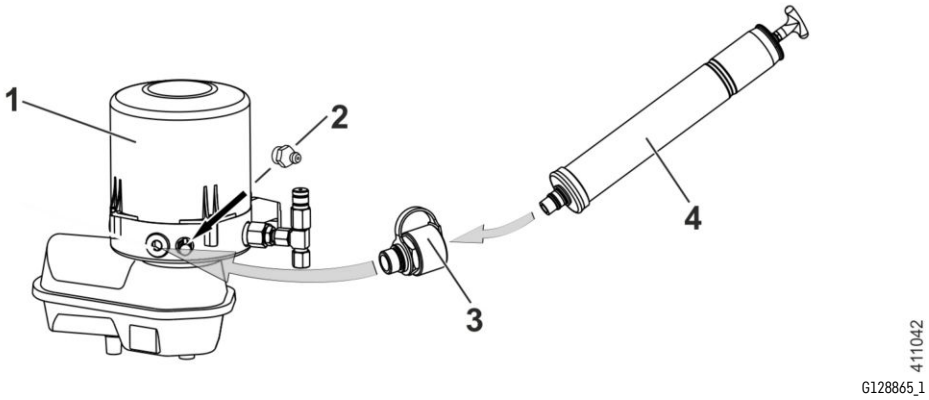
- ► Lubricate the rear glide elements **1** using an appropriate tool (a long brush for example).
- ► Lubricate the rear glide elements **1** according to the lubrication chart with telescope grease.
- ► Remove excess grease and dispose of it in an environmentally friendly manner.
- ► Fit the cover sheets.

5.18 Lubrication system

5.18.1 Grease container: checking the fill level

Make sure the following preconditions are met:

☑ Machine is in maintenance position.



Checking the fill level of grease reservoir

1	Grease container	**3**	Fill connection
2	Grease fitting	**4**	Filler gun

The fill level in the grease container **1** must be checked regularly to ensure that the central lubrication system functions properly.

NOTICE

Infiltration of dirt!

Damage to the central lubrication system.

- ► It is imperative that utmost cleanliness is observed and that only clean lubricant is used for filling.

- ► Fill the grease container **1** via the grease fitting **2** with a manually actuated or pneumatic grease pump
  or
  Fill grease container **1** via the fill connection **3** using a filler gun **4**.
- ► Remove excess grease and dispose of in an environmentally friendly manner.

5.19 Cleaning machine

5.19.1 Wet cleaning machine

5.19.1.1 Notes for cleaning

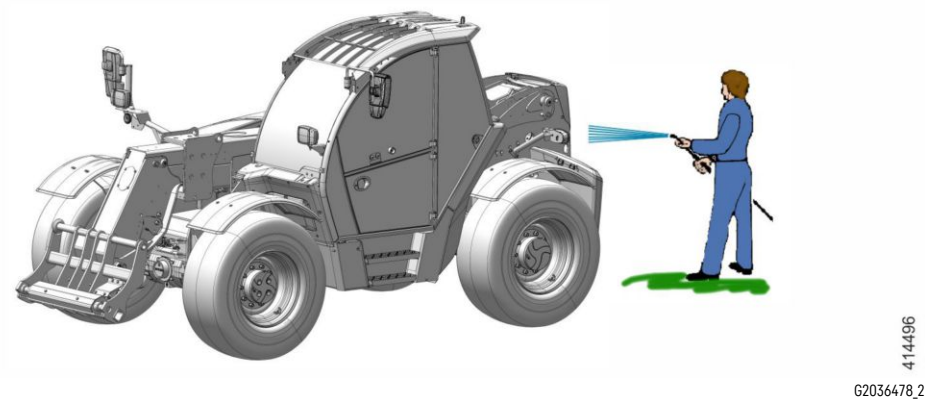
NOTICE

Incorrect cleaning!

Damage to machine.

- ► Exclusively clean electrical systems, cables and wiring harnesses with low-pressure equipment.
- ► When new (or after respraying), do not clean machine with a high-pressure cleaner for two months.
- ► Observe operator's manual of high-pressure cleaner.

Cleaning machine



Wet cleaning

- ► Wet clean the machine.
- ► Lubricate all lubricating points on the machine.
- ► Remove excess grease and dispose of in an environmentally friendly manner.

5.19.1.2 Cleaning diesel engine

NOTICE

Penetration by moisture!

Damage to diesel engine.

- ► Do not expose electrical components (such as the engine electronics or relays) to a direct jet of water or steam.

- ► Clean the diesel engine carefully.
- ► To dry diesel engine: bring diesel engine to operating temperature.

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5.20 Preservation

5.20.1 Protecting the piston rods

The preservation of the piston rods prevents corrosion.

Note
Liebherr recommends the corrosion inhibitor Liebherr Chrome Protect.

- ► Operate machine at least every 14 days in accordance with operator's manual until diesel engine and hydraulic system have reached operating temperature.
- ► Completely extend and retract piston rods several times.
- ► Park machine in such a way that all piston rods are retracted in cylinders as far as possible.
- ► Apply corrosion inhibitor to exposed piston rods.

When a conserved machine is moved for loading or transport, then the conservation protection on the piston rods of the cylinders will be removed by the scraper ring.

When machine is transported:

- ► Check conservation of piston rods after loading.

5.20.2 Taking the machine out of service

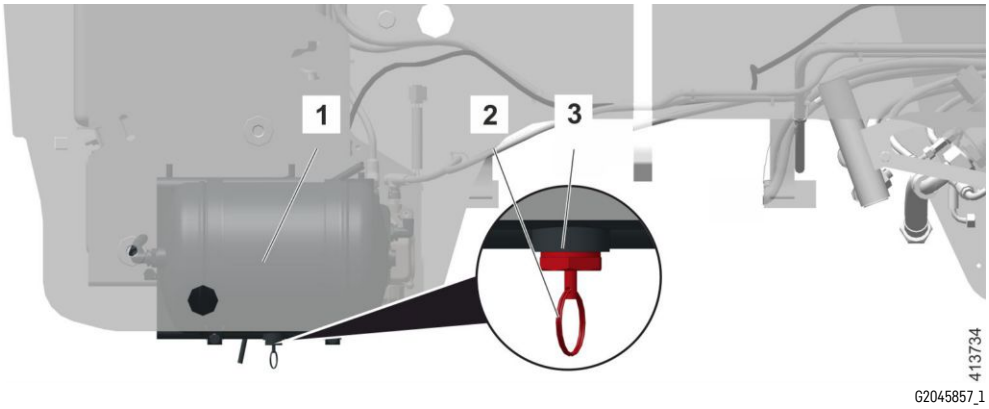
If the machine is scheduled to be taken out of service for an extended period of time:

- ► Contact Liebherr customer service.

5.21 Options

5.21.1 Air brake system

5.21.1.1 Air brake system (option): draining the pressure



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Compressed air tank

1	Compressed air tank	**3**	Drain valve
2	Ring		

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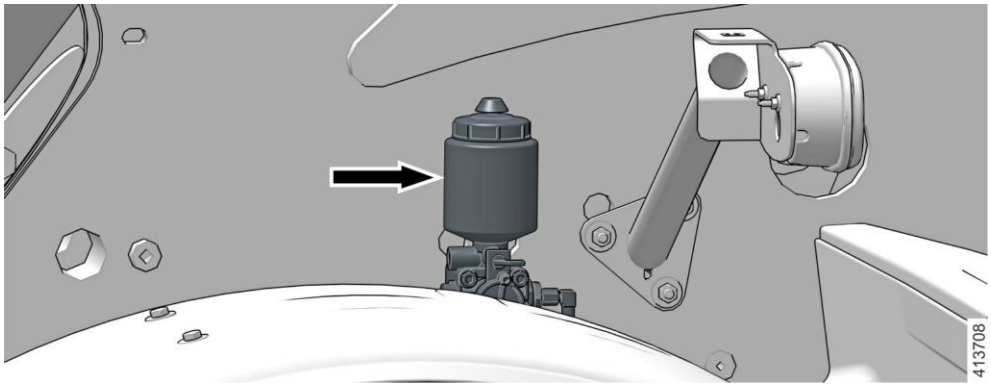
► Ring **2** of drain valve **3** is pressed upward.
✔ Water in pressure tank **1** is drained.

5.21.1.2 Air brake system (option): checking the anti-freeze pump level and topping it up if necessary



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Anti-freeze pump

► Check filling level of the anti-freeze pump.
► Top up anti-freeze if required.

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