Original Instruction Manual
Bergmann Dumper
C804e

14.07.2022
1.0 | 50-020-2281-900

Content

Preamble

This manual includes a description of the product but no guarantees of specific qualities or results of use. Unless otherwise stated, the relevant state of engineering is that at the time of the joint delivery of the product and operating instructions by Sample GmbH.

The design and circuitry are subject to ongoing development and improvement. Subject to technical changes.

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1 Basic data

1.1 Manufacturer

Bergmann Maschinenbau GmbH
Essener Strasse 7
49716 Meppen-Hüntel
Germany

Telephone: +49 5932 7292-0
Fax: +49 5932 7292-92
E-mail: info@bergmann-mb.de
Internet: www.bergmann-dumper.de

1.2 Validity of the documentation

Designation:	Bergmann Dumper
Model:	C804e

Validity of the documentation

This documentation is valid for machines with serial number(s):

Serial number	5814 -

1.3 Scope of the documentation

This documentation is part of the machine and includes the following items:

- Operating Instructions
- Supplier documentation

2 General

2.1 Foreword

The Bergmann Dumper is in accordance with the generally accepted rules of technology and the technical safety regulations applicable at the time of delivery. Relevant laws and regulations have been consistently applied.

The purpose of these operating instructions is to make it easier to get to know the Bergmann Dumper and to use it within the possibilities of its designated use.

The operating instructions contain important information for operating the Bergmann Dumper safely, proficiently and efficiently. Complying with them helps to avoid dangers, reduce repair costs and downtimes as well as to increase the reliability and service life of the Bergmann Dumper.

2.2 Liability and warranty

The “General terms of delivery and business” of Bergmann Maschinenbau GmbH & Co. KG apply generally.

Bergmann Maschinenbau GmbH & Co. KG excludes warranty and liability claims for personal and property damage if and when they are the result of one or more of the following causes:

- Use of the machine for a purpose not intended
- Failure to observe the instructions, precepts and prohibitions in this documentation
- Unauthorized constructional changes to the machine; improper operation of the machine
- Incorrect or unprofessional connection of electrical/hydraulic/pneumatic components
- Use of accessories or spare parts not approved or supplied by Bergmann Maschinenbau GmbH & Co. KG
- Use of the wrong/unapproved operating materials; poor monitoring of parts that are subject to wear
- Maintenance work performed incorrectly or too late
- Accidents due to outside influences and force majeure

2.2.1 Warranty

The “General terms of delivery and business” of Bergmann Maschinenbau GmbH & Co. KG apply generally.

2.2.2 Copyright

This documentation is a document in the sense of the law on unfair competition.

The copyright is held by:

Bergmann Maschinenbau & Co. KG

Essener Strasse 7

49716 Meppen-Hüntel

Germany

This documentation is intended for the machine owner and their personnel. The documentation contains texts and drawings which, without the express permission of the manufacturer, may be neither fully or partly

- reproduced,
- distributed or
- otherwise disclosed

.

Violations will be liable to damage prosecution.

2.3 About this documentation

The following terms are used in this documentation for simplification purposes:

Operating instructions will be referred to hereinafter as **documentation**.

Bergmann Dumper will be referred to hereinafter as **machine**.

Any add-on parts such as round tipper body, rear tipper body, tipper bed etc. will be referred to hereinafter as **body**.

The illustrations in this documentation do not necessarily represent the actual scope of supply. If features for special series or scopes of supply are to be considered, this will be given special reference.

2.3.1 Target group

The documentation is intended exclusively for use by specialized personnel and instructed personnel.

The documentation must be read and applied by all individuals involved in at least one of the following activities:

- transport
- assembly and installation
- initial commissioning and function test
- operation
- maintenance and care
- troubleshooting
- repairs
- dismantling
- disposal

2.3.2 Explanation of terms

Owner

The owner refers to the entrepreneur/company who operates the machine and uses it for the intended purpose or has it operated by specialized and instructed personnel.

Instructed personnel

Instructed personnel are individuals who have been provably trained by Bergmann Maschinenbau GmbH & Co. KG or in accordance with the technical documentation of Bergmann Maschinenbau GmbH & Co. KG. Instructed personnel are able to perform the work assigned to them and to avoid familiar hazards.

Operators

Operators are individuals who have been instructed and authorized to operate the machine by the machine owner.

Specialized personnel

Specialized personnel are individuals who, due to their training, skills and experience and knowledge of the pertinent standards and regulations, are able to perform the work assigned to them and to independently recognize possible dangers and avoid hazards.

The specialized personnel are individuals employed by the owner or authorized by them to perform the work.

Electrical specialist

An electrical specialist is an individual whose technical training has given them knowledge and experience in electrical systems. In addition, the electrical specialist must have knowledge of the pertinent standards and regulations and must be able to assess the work assigned to them and to recognize and avoid possible hazards.

2.3.3 Use and storage

The documentation must be kept at the machine's application site at all times.

The documentation must be handed over with the machine in the event that it is resold.

2.3.4 Text formats

The following symbols/numbers are used for specific text passages in the documentation:

Symbol	Explanation
•	Identification of lists
–	Identification of sub-lists
1. …2.	Identification of work steps
Fig. 1	Numbering of figures (consecutive)
Tab. 1	Numbering of tables (consecutive)
1	Identification of item numbers in figures
(1)	Identification of item numbers in the text
(→ Chap. 1.1)	Identification of cross-references
Italics	Identification of the function name in the text and in figure legends

Tab. 1: Text formats

2.4 Type plate

The type plate contains the following data:

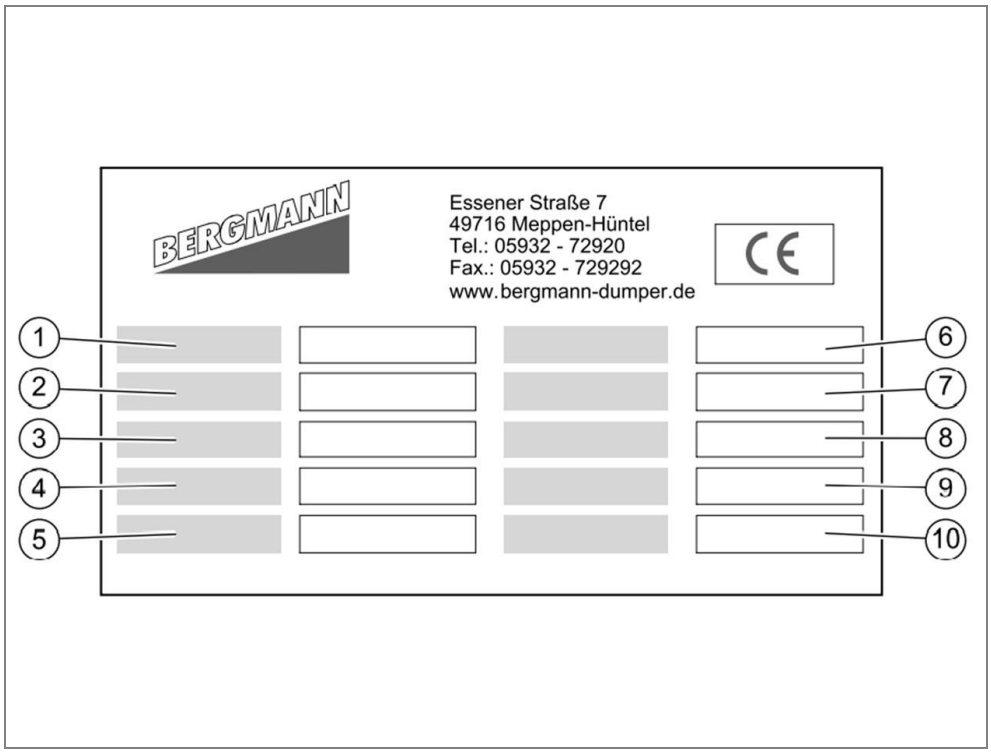


Fig. 1: Type plate

1	Type	2	Year of manufacture
3	Chassis number	4	Total weight (kg)
5	Dead weight (kg)	6	Useful load (kg)
7	Motor power (kW)	8	Permissible axle load front (kg)
9	Permissible axle load rear (kg)	10	–

Please state the type, year of manufacture and chassis number for spare parts orders and technical support.

2.4.1 Position of the signs

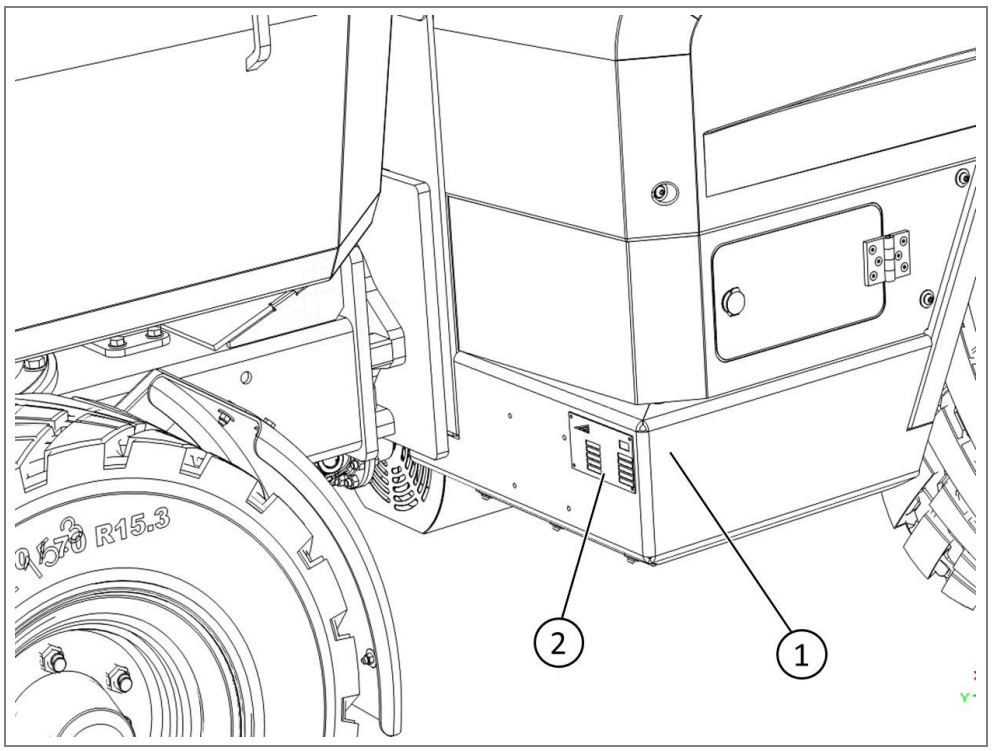


Abb. 2: Position of the signs

1	Chassis number	2	Type plate

The type plate (2) is attached to the right of the front frame in the pendulum area, as seen in the direction of travel (rear trough), and contains all important vehicle data.

The chassis number (1) is located to the right of the type plate.

2.5 CE declaration of conformity

The CE declaration of conformity can be found in the annex to the documentation See Annex, page 136.

2.6 Spare parts

The following applies when ordering and using spare parts:

- Defective parts must be replaced only by genuine parts from Bergmann Maschinenbau GmbH & Co. KG.
- The warranty will be voided if third-party products are used.
- Spare part numbers should be taken from the spare parts catalog.
- Contact data for spare parts orders See Customer Service, page 134

2.7 Data storages

Many of the machine's electronic components contain data storages which store technical information about the machine status, events and errors temporarily or permanently. This technical information documents the general condition of a component, module, system or the environment such as

- operating states of system components (e.g. filling levels),
- status messages of the machine and its individual components (e.g. wheel revs, wheel speed, movement delay, lateral acceleration)
- malfunctions and defects in important system components (e.g. lights and brakes)
- reactions of the machine is special situations (e.g. display of an overload, by overloading of the dumper box)
- ambient conditions (e.g. temperature).

These data are of an exclusively technical nature and serve for detection and elimination of faults as well as for the optimization of machine functions. Movement profiles over covered distances cannot be created from these data.

When services are called upon (e.g. repair services, service processes, warranty cases, quality assurance), this technical information can be read out of the event and error data storages with special diagnostic equipment by service network staff (including the manufacturer). They can acquire further information there as required. The information in the error memory is erased or continuously overwritten after elimination of an error.

3 Safety

3.1 General

Personnel in charge of carrying out work on the unit or system must have read and understood this manual and in particular the section on safety.

If necessary, in-house instruction should be provided, taking into account the technical qualifications of the personnel concerned.

Certain components have additional warning plates or labels to ensure safe operation. Plates or labels must not be covered or removed.

Observe all of the safety instructions. Compliance with these instructions is in the interest of your safety.

The relevant accident prevention regulations and other generally recognized health and safety regulations must be observed.

The manual must be stored so that it is easily accessible at any time. It must be complete, remain with the machine, and must be available to all authorized persons.

Avoid any working practice that:

- endangers the health and safety of the user or third parties,
- is detrimental to the unit or system or other material assets,
- impairs the safety or functionality of the unit or system,
- does not comply with the safety instructions.

Maintenance and service work may only be carried out by suitably qualified persons who are familiar with the dangers involved and who have the necessary qualifications.

⚠ WARNING

There is an increased risk of injury if the safety devices are dismantled. Never dismantle or put any safety device out of operation.

Please observe the following:

- Check the function of safety devices on a daily basis.
- Report all malfunctions and defects of safety devices to the after-sales service immediately.
- Keep housings closed during operation and only open to rectify function breakdowns or perform maintenance work.
- Perform repairs of the pipe systems and tanks only when they are depressurized.
- Observe the respective manufacturer's safety data sheets and disposal instructions as well as all of the local safety regulations when using chemicals. Wear protective clothing!

If the removal of safety devices is necessary for set-up, repair or maintenance purposes, please replace and check the functions of these immediately upon completion of the maintenance and repair work.

Pay particular attention to the general accident prevention and safety regulations in this case.

3.2 Personnel qualification

The table below shows the prescribed qualifications for the various activities.

Activity	Personnel
Transport	Instructed personnel
Assembly	Specialized personnel
Initial commissioning	Specialized personnel
Operation	Instructed personnel
Daily maintenance work	Instructed personnel
Maintenance	Specialized personnel
Troubleshooting	Specialized personnel
Repairs	Specialized personnel
Decommissioning	Instructed personnel
Disassembly	Specialized personnel
Disposal	Specialized personnel

Tab. 2: Required personnel qualifications

- Deploy only specialized personnel or instructed personnel.
- Do not allow persons to work on the machine whose powers of response are impaired by drugs, alcohol, medicines or similar. Observe specific local age restrictions.
- Observe other nationally applicable regulations of the respective country of the owner.

3.3 Intended use

The machine may be used for transport trips with the mounted dumper box under observance of the following conditions:

Transport materials may only be carried in the dumper box.

The materials may be tipped out by an hydraulically actuated tipping device.

The round dumper box may be swiveled continuously by the hydraulic slewing mechanics at 180° angle of rotation for the dumping process.

Bulk materials (up to 60 mm grain) are approved as materials for the standard dumper; a special dumper box must be used by the manufacturer for liquid media.

The machine is operated by instructed personnel (only with suitable anthropometric data[1][2] by operating the control elements from the driver seat. The operator is responsible for ensuring that no other persons within the radius of action of the vehicle are injured.

The machine is designed for the "manual operation" mode and is intended for use in trade and industry. The intended area of application (area of movement) is open land (e.g. an enclosed construction site or factory premises) on surfaced and unsurfaced ground. The vehicle may be used on public highways with the appropriate license.

The maximum permissible ascent, descent and transverse tilt according to the technical data for maintaining the stability may not be exceeded.

Maintenance work up to the weekly interval may be performed by instructed personnel; other service work may only be performed by specialist personnel.

The operator is responsible for ensuring that no other persons within the radius of action of the vehicle are injured.

The intended use also includes observance of the documentation and compliance with the inspection and maintenance conditions.

Any other use above and beyond this constitutes a misuse. The manufacturer will not be liable within his warranty for resulting damages.

Use of the couplings mounted at the front and rear of the vehicle frame for suitable trailers is allowed additionally according to the technical data.

NOTE

A risk remains even when using as intended. Therefore,
dangers for life and limb and/or impairments
of the machine or other property values cannot be ruled out.

[1] DIN EN ISO 7250-1:2010-06 | Basic human body measurements for technological design - Part 1: Body measurement definitions and landmarks

[2] DIN CEN ISO/TR 7250-2:2013-08 (DIN SPEC 91279:2013-08) | Basic human body measurements for technological design - Part 2: Anthropometric databases of individual national populations

3.4 Foreseeable misuse

- Do not perform any work that could lead to dangerous situations.
- Do not operate without safety devices.
- Do no manipulate or bypass existing safety devices.
- Do not perform work on the machine without personal protective equipment.
- Do not make changes to the machine which alter the as-delivered state of the machine.

Misuses are:

- Use of the machine in closed rooms
- Use of the machine underground
- Modification of the vehicle superstructure
- Transporting or carrying persons additionally to the driver
- Towing of trailers with weights above the values specified in the technical data as well as disregard of further restrictions in the field of trailer operation
- Driving through water depths > 0.25 m
- Operation of the machine outside the permissible application limits
- Use with equipment and in combinations not described in the documentation
- Transport of bulk materials with a grain size > 60 mm
- Transport of liquid concrete
- Use of the dumper box as a bulldozer blade
- Driving with tilted dumper box

Claims for all kinds of damages resulting from improper use are excluded. The owner is solely liable for all damages due to improper use.

3.5 Safety notices in the documentation

3.5.1 General safety notices

General safety notices cover instructions that serve basically for safe use or maintenance of the safe condition of the machine.

3.5.2 Action-related warning notices

Necessary action-related warning notices in the documentation are introduced by signal words which express the degree of damage to be expected.

The warning notices are structured as follows:

⚠ DANGER

Type and source of danger

Possible consequences of failure to heed as well as an explanation of the source of danger.

- Measures/handling instructions to be performed to avoid dangers and damages

3.5.3 Hazard classes

⚠ DANGER

This symbol in connection with the signal word "Danger" identifies an imminent hazard. Non-observance of the safety information will result in death or extremely serious injuries.

⚠ WARNING

The symbol in connection with the signal word "Warning" identifies a possible dangerous situation. Non-observance of the safety information can result in death or extremely serious injuries.

⚠ CAUTION

The symbol in connection with the signal word "Caution" identifies a possible dangerous situation. Non-observance of the safety information can result in minor or slight injuries. It may also be used as a warning against property damage.

NOTICE

The symbol identifies a potentially harmful situation.

Non-observance of the safety information can result in damage or destruction of the product and/or of other system components.

NOTE

Information or notes can be found here.

3.6 Pictograms

The used pictograms are divided into 3 groups:

Warning signs

Warning signs warn the user of a possible hazard.

The information details are shown graphically in the pictogram or described in the text.

Prohibition signs

Prohibition signs prohibit concrete actions.

The information details are shown graphically in the pictogram or described in the text.

Mandatory signs

Mandatory signs prescribe concrete actions.

The information details are shown graphically in the pictograms or described in the text.

3.7 General safety notices

NOTE

- Safety notices of the manufacturer for safe use of the machine
- Safety regulations of the owner
- Regional specifications and regulations for safety at work and for the avoidance of environmental damages.

The owner is responsible for safe and intended use.

The following safety and warning notices have been developed in accordance with the knowledge of the manufacturer. They make no claim to being complete. Local or national safety regulations as well as special specifications on accident prevention complete this list.

The machine owner/user must add the respective local specifications of the application region to the following general safety notices.

3.7.1 Working under noise and vibrations

The machine generates a high noise level in normal operation.

Therefore, hearing protection must be worn permanently in the immediate vicinity of the machine.

Hearing protection is recommended in the driver's cab.

Conversations and communication are heavily restricted in the vicinity of the machine. The operating personnel must communicate largely by sign language.

The working movements of the machine cause vibrations in the whole machine environment.

3.7.2 Working on mechanical systems

Even though the machine is designed and built safely and equipped with safety precautions, the machine can nevertheless present hazards. Especially when specified sequences of action and safety regulations are ignored. Regular work will protect the personnel from these hazards.

Some machine components present an increased risk of injury from being struck by protruding parts, cut by sharp metal edges and possible product residues in corners. The danger points are marked by warning signs/pictograms.

Cleaning or maintenance work must never be performed whilst the machine is running.

- Unless specified otherwise in this documentation, protective devices must never be removed, bypassed or deactivated.
- Only start the machine if you know how to switch it off again!
- Only operate the machine or work on it if you have been appropriately trained, authorized and instructed in the function of the machine.
- The space on and around the machine as well as escape routes must be kept free from objects to avoid risks of stumbling and tripping and to guarantee fast evacuation.
- Listen out for unusual noises during operation of the machine because these could indicate a beginning malfunction which could develop into a potentially dangerous situation.
- Use suitable lifting gear for working with heavy sub-assemblies to avoid injuries, especially to the spine.
- Pick up heavy objects with bended knees and a straight back.
- Always wear suitable protective equipment for assembly, maintenance and process work.
- Cleaning and maintenance work must be performed properly.
- Only use suitable and intact tools and suitable aids when working with and on the machine. Defective tools can cause injuries.
- Do not leave any tools lying on or in the machine during work. Tools could become dangerous objects and damage the machine.
- Screw connections must be fastened properly with the prescribed tightening torques.

- Do not make any unauthorized changes to the machine settings other than those procedures described in the machine documentation. This could lead to dangerous, unwanted movements.

3.7.3 Working on hydraulic systems

Leakages on the hydraulic system can influence the safe functioning of the machine and present a serious hazard for the operating personnel.

Hydraulic fluid can ignite when exposed to great heat.

- The hydraulic system must be switched off and secured against switching back on during work inside the machine or in the range of movement of hydraulically controlled components.
- Check the tightness of the hydraulic system, especially lines, pumps, cylinders, screw connections, pressure-bearing and pressure-holding components and pressurized vessels regularly according to the manufacturer's specifications.
- Report leakages at once and seal immediately if possible.
- Hydraulic fluid is harmful to health. Never swallow, inhale or allow hydraulic fluid to penetrate the unprotected skin.
- In case of contact of the body or clothing with hydraulic fluid, take off clothing immediately and take the protective or aid measures according to the safety data sheet of the hydraulic fluid and/or according to the employer's/owner's directives.
- Hydraulic fluid gets very hot during operation of the machine. There is a risk of burns when making checks. Let the machine components cool down before possible contact.
- Always wear suitable protective clothing or the personal protective equipment.
- Leakages in the hydraulic system, e.g. cracks/holes in hydraulic lines may on no account be plugged with parts of the body. This can lead to severe or fatal injury. Leaks must be fixed immediately and professionally.

Observe the age of hydraulic hoses

Even if a visual inspection reveals no visible damage to hydraulic hoses, the bond between the inner and outer layers may be damaged. Hydraulic hoses are subjected to an aging process during use even with proper storage and permissible stress levels.

The maximum period of use for pre-assembled hydraulic hoses is 6 years and includes a maximum storage time of 2 years.

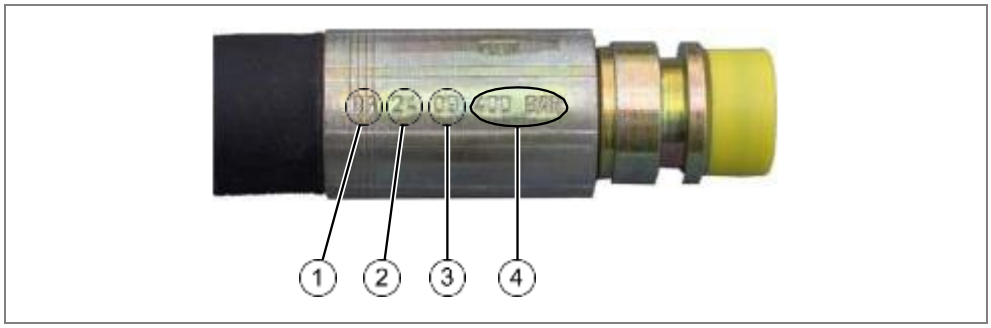


Fig. 3: Labeling of hydraulic hoses

1	Manufacturer	2	Calendar week
3	Year	4	Maximum operating pressure

Observe the embossed manufacture date (2) (3) of the hydraulic hose fittings. No hydraulic hoses may be fitted which have been stored for longer than 2 years.

Make sure that hydraulic hoses of the same type are used. Compare the hydraulic hose type labeling with the internal diameter and the maximum permissible operating pressure (4). Ask Bergmann Maschinenbau GmbH & Co. KG for information if necessary.

Only new hydraulic hoses may be used as replacements.

3.7.4 Working on electrical systems

Electrical voltages occur on the machine that can cause severe injuries if the safety regulations are ignored.

The following must be observed when working on electrical systems:

- Do not bridge or bypass electrical switching elements because resulting malfunctions could have fatal effects.
- There is always a possibility of residual voltages on parts of the electrical system.
- Before working on the electrical system, please bear in mind that capacitances need a certain time to discharge.
- Only use suitable, sufficiently insulated, demagnetized or anti-static tools for work on the electrical system.
- Only use suitable measuring instruments/test equipment for work on the electrical system.
- Do not damage line marks and labels when loosening connections because these are needed again for assembly.
- Only use parts with the same specification when replacing electrical components.
- The specifications of the appropriate standard apply for the electrical system (→ EN 60204-1 Safety of machinery - Electrical equipment of machines - Part 1: General requirements).
- Never open battery boxes. Contact customer service in the event of a defect. See Customer Service, page 134.

3.7.5 Working during operation

- Only start and operate the machine from the driver seat. Do not short-circuit the engine.
- Ensure that the machine is safe to operate before every use. Familiarize yourself with the environment before starting work.
- If faults or changes in the operating behavior occur during work, stop all work with the machine immediately, switch off the machine and inform the supervisor.
- If control lamps or waring messages light up during operation, shut down the machine and inform the supervisor.
- Ensure stability of the machine.
  - Do not exceed the permissible longitudinal and transverse tilting of the machine. Adapt the travel speed to the loading process and nature of the ground (bend radius, downhill/uphill gradient and road surface).
  - The nature of the ground must be such that it is suitable to take the floor load exerted by the machine.
  - Keep a safe distance from excavations and embankments.
  - Only operate superstructures on flat/level ground.
  - Observe the material properties of the materials to be transported. Sticky materials, for example, can adhere to the machine and cause the weight to shift.
- Observe longer braking distances at higher travel speed, on slippery surfaces and downhill driving.
- Adapt operation of the machine to external influences (gravity, wind, precipitation, soiling, etc.).
- Always stop and leave the machine as described in the documentation.

3.7.6 Working near to electric cables

When working near to open and overhead cables, safety distances must be kept between the cables and the machine. The safety distances depend on the rated voltage of the cable.

Rated voltage	Safety distance
up to 1000 V (1 kV)	1.0 meters
above 1 kV to 110 kV	3.0 meters
above 110 kV to 220 kV	4.0 meters
above 220 kV to 380 kV	5.0 meters
at unknown rated voltage	5.0 meters

Tab. 3: Safety distances

If a flashover/electric arc should still occur:

- Move the machine or add-on parts out of the electrical danger area. For example, by:
  - Lowering superstructures.
  - Swinging away booms.
  - Driving out the machine.

If this is not possible:

- Stay in the driver's cab.
- Warn bystanders from approaching and touching the machine.
- Have the power switched off.

3.8 Machine-specific danger notices

The manufacturer, Bergmann Maschinenbau GmbH & Co. KG, cannot foresee all possible situations that could harbor potential risks under the actual application and operating conditions. For this reason, the warnings listed in this documentation might not cover all potentially hazardous situations.

If procedures, equipment and methods are used for the various work that are not expressly recommended by

Bergmann Maschinenbau GmbH & Co. KG, it must be ensured that the work is performed under observation of the personal safety of the individual performing the work and all other persons involved in the work.

It must be ensured that the machine does not suffer any damage or become unsafe due to operating, maintenance or repair procedures prescribed by the owner.

3.8.1 Danger areas on the machine

The machine is operated from the driver's cab.

There are areas on the machine that are not constantly visible to the operator, e.g. the area below the machine.

The operator must ensure by suitable measures that no persons are standing in these areas. Work with the machine must be stopped immediately if persons enter the danger area.

3.8.2 Danger area in operation

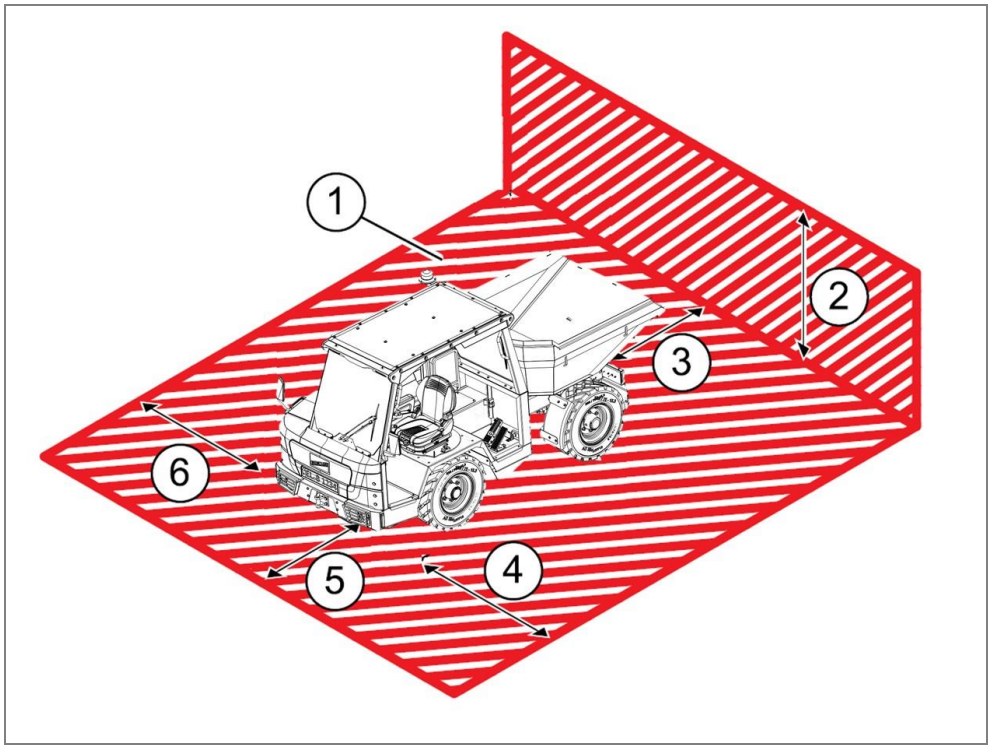


Fig. 4: Danger area in operation

1	Danger area	2	Minimum distance 5 m
3	Minimum distance 5 m	4	Minimum distance 3 m
5	Minimum distance 5 m	6	Minimum distance 3 m

The danger area (1) around the machine may not be entered when the machine is in operation. The danger area is given by the range of movement of the machine and the superstructures.

3.8.3 Danger area/space requirements for maintenance/repair work

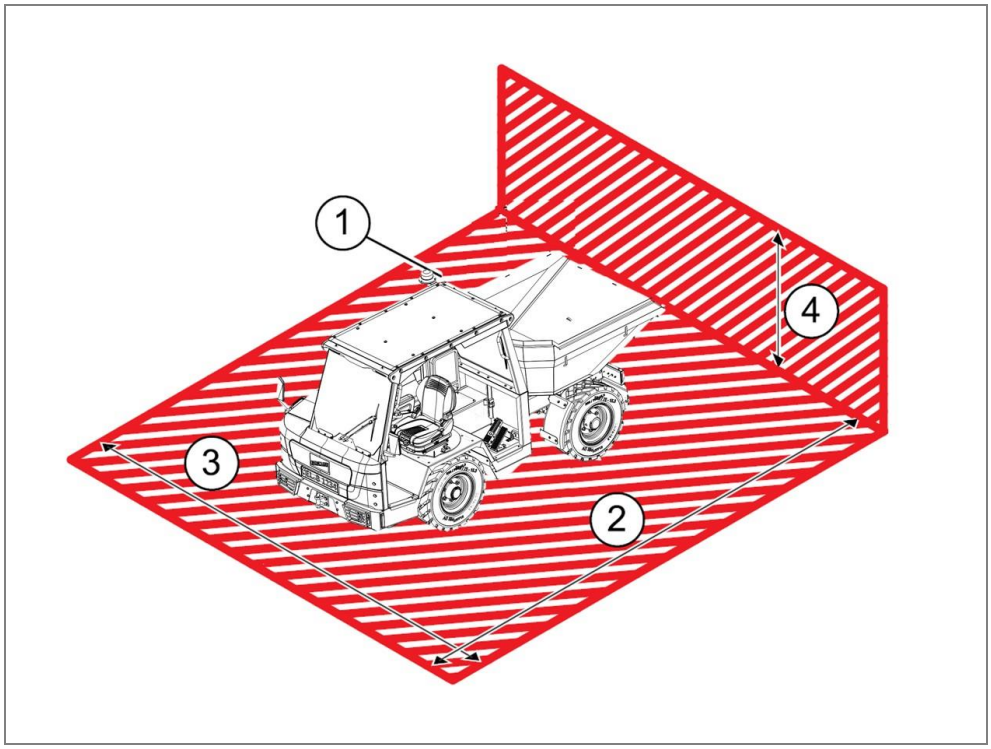


Fig. 5: Danger area for maintenance/repair work

1	Danger area	2	Minimum distance 6 m
3	Minimum distance 3.5 m	4	Minimum distance 4.1 m

A minimum space is required for maintenance and repair work in order to be able to perform the service work properly. Failure to provide this space could put personnel who work on the machine in danger.

3.8.4 Danger area of the rotary dumper box

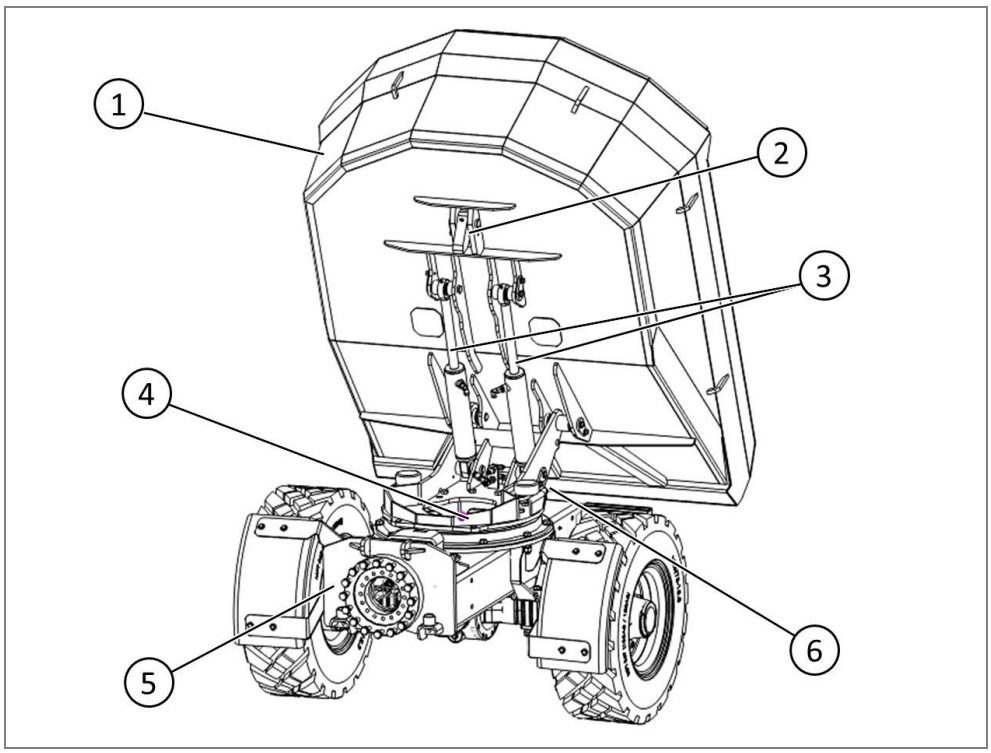


Fig. 6: Danger area of the rotary dumper box

1	Dumper box	2	Lock *Dumper box*
3	Lifting cylinder *Dumper box*	4	Slewing ring
5	Machine frame	6	Lifting cylinder support *Dumper box*

The danger area of the tilted rotary dumper box is between the dumper box (1) and the machine frame (5). The danger area may only be entered when the dumper box is secured against unintentional movements by the lifting cylinder support of the dumper box (6).

Securing the rotary dumper box:

1. Mount the dumper box lifting cylinder support on a piston rod of the lifting cylinder (2) and secure with cotter pins.

NOTE

Only move the support into position from the outside.

3.8.5 Danger of area of the tipper bed

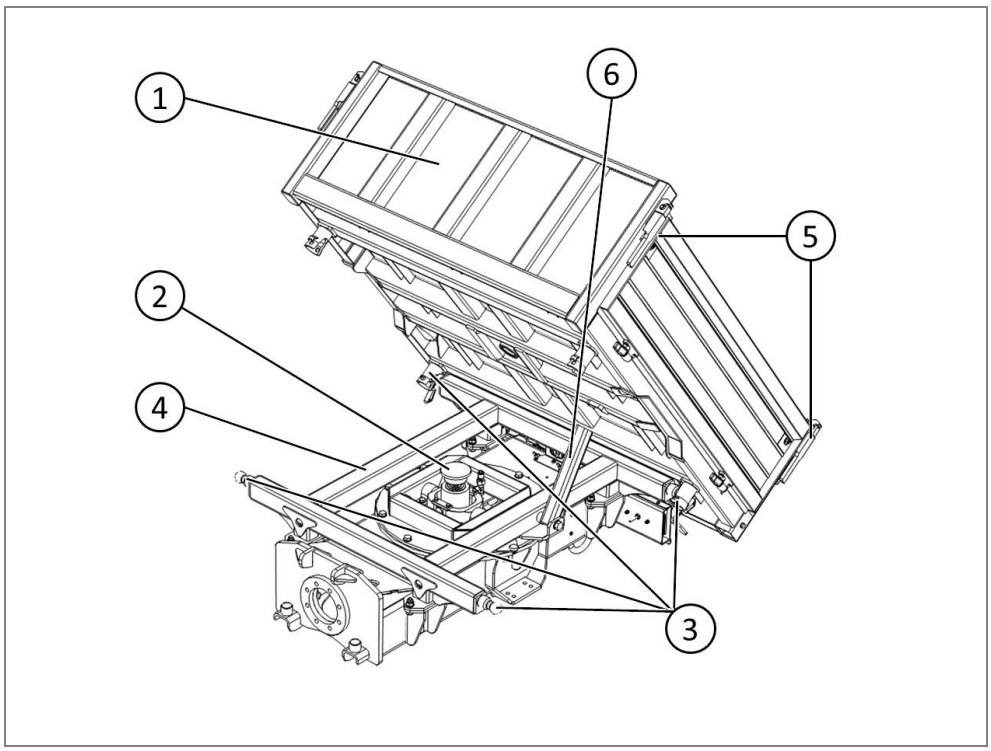


Fig. 7: Danger area tipper bed

1	Tipper bed	2	Telescopic cylinder
3	Tipper bearings	4	Frame
5	Board wall lock	6	Telescopic cylinder support bed

The danger area of the tilted tipper bed is between the tipper bed (1) and the machine frame (4). The danger area may only be entered when the bed is secured against unintentional movements by the telescopic cylinder support of the bed (6).

Securing the tipper bed:

1. Swing the lifting cylinder support of the bed (6) completely up against the rubber buffer with the dumper box lifted. Then lower the dumper box slightly against the support.

NOTE

Only move the support into position from the outside.

3.9 Safety devices

- Check the safety devices of the machine constantly for proper functioning.
- The machine must not be operated if they are not working or not working properly.

Important instructions regarding the technical safety and operating protection are specially highlighted and described in this chapter.

3.9.1 Emergency Stop switch

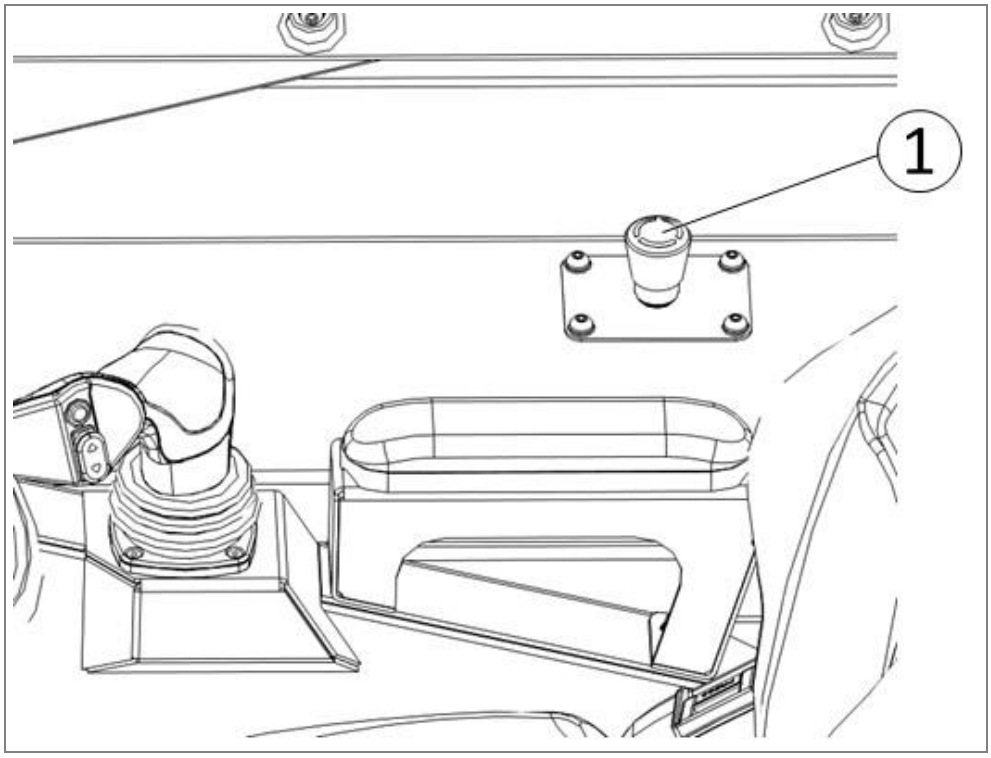


Fig. 8: Emergency stop switch

3.10 Safety and information signs

Several safety and information signs are affixed to the machine which, if unheeded, could result in severe injuries or death as well as damages to the machine.

- Check the safety and information signs constantly for completeness and legibility.
- Clean dirty pictograms immediately.
- Replace missing or illegible/damaged signs immediately.

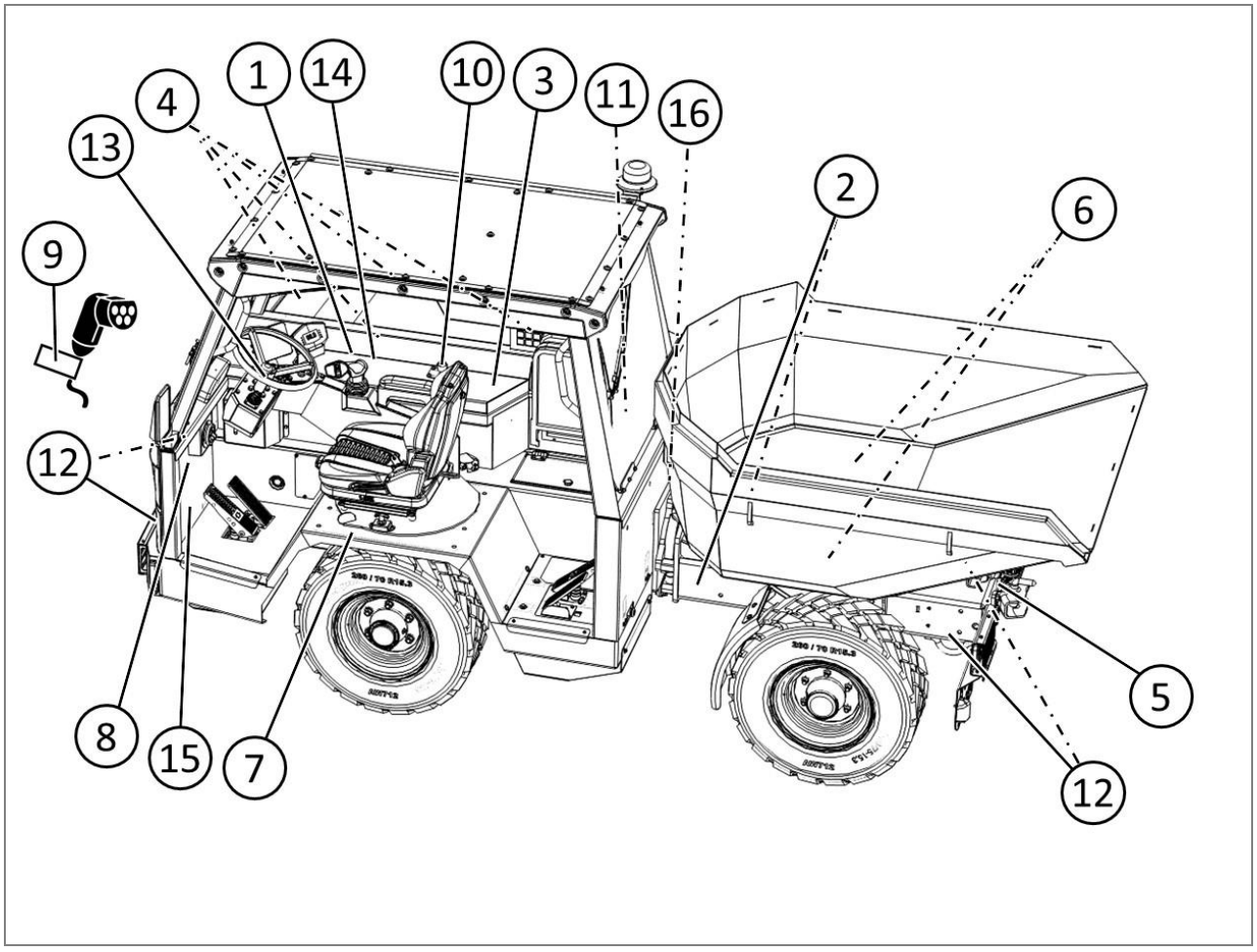
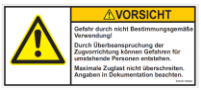
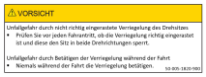
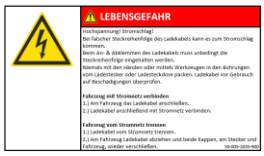


Fig. 9: Position of the information and safety signs

Safety signs

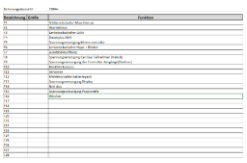
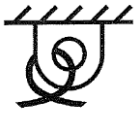
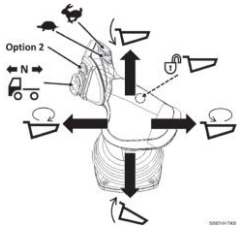
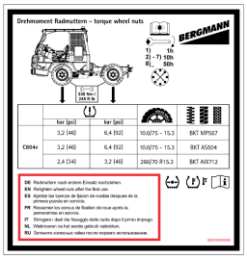
Item	Sign	Number	Description
1		1	Danger: Information sign with safety pictograms and text notices • Mounted visibly in the cab next to the display
2		2	Off limits • On the left and right-hand sides of the rear frame

Item	Sign	Number	Description
3		1	Emergency seat – fold up and cover pedals • Inside the cab near to the emergency seat **Caution: Risk of accident!** The passenger on the emergency seat could accidentally operate the service brake. When carrying persons on the emergency seat, the rear pedals must first be folded in and then protected by the cover.
4		5	Danger high voltage! • 1x on each of the three battery packs, 1x on the lid of the power electronics and 1x on the terminal box **Caution: Danger electric shock!**
5		1	Caution – overstressing of towing device • Rear center directly over the towing device **Caution: Danger due to misuse!** Overstressing of the towing device can present a danger for persons standing in the vicinity. Do not exceed the maximum towing load. See the specifications in the documentation.
6		Round dumper box: 2	Only stand in the danger zone when the safety support is inserted • On the left and right of the slewing frame
		Bed: 3	• At the left, right and rear on the support frame
			Warning: Risk of accident due to incorrectly inserted safety support!
7		1	Caution: Risk of accident due to incorrectly engaged lock of the revolving seat! • In the area of the revolving seat **Risk of accident due to actuation of the lock during travel!** Check every time before setting off that the lock is correctly engaged and locks the seat in both directions of rotation. Never actuate the lock during travel.

Item	Sign	Number	Description
8		1	High voltage! Electric shock! Charging cable plugging order. • In the area of the charging socket **Caution: Mortal danger due to high voltage and electric shock!** Plugging the charging cable in the wrong order can cause an electric shock. The charging cable must be plugged and unplugged in the right order. Never insert hands or tools into the charging plug holes or the charging socket. Check the charging cable for damage before using.
9	 	1	High voltage! Electric shock! Charging cable plugging order. • Per included charging cable, underneath the plug on the vehicle side **Caution: Mortal danger due to high voltage and electric shock!** Plugging the charging cable in the wrong order can cause an electric shock. The charging cable must be plugged and unplugged in the right order.
10		1	Emergency Stop switch • Directly underneath the emergency stop switch **Caution: Risk of accident!** Activation of the emergency stop switch during travel leads to immediate stopping of the machine.

Tab. 4: Safety signs on the machine

Information signs

11		1	Fuse box assignment • Directly inside the door of the fuse box
12		4	Lashing point white • On the left and right at the front and rear
13		1	Rotary switch adhesive label • On the left next to the rotary switch
14		1	Joystick adhesive label • On the right next to the joystick
15		1	Tire pressure • Directly at the front in the foot well
16		1	Sound power level specification • On the front frame, rear right-hand side

Tab. 5: Information signs on the machine

3.11 Owner obligations

The owners must convince themselves that the operator has read and understood the documentation before operating for the first time.

The owner must conduct a risk analysis of the workplace and derive suitable protective measures as well as work/operating instructions from it. The risk analysis must be repeated at reasonable intervals.

The pertinent safety/accident prevention regulations and occupational health rules as well as the safety recommendations of the professional associations and employers' liability insurance associations which may differ according to country and/or professional association, must be observed for operation of the machine.

3.12 Condition of the machine

Only operate the machine in a technically perfect and safe condition. Check whether all protection and safety devices are fully available and functional every time before starting operation.

Do not make modifications or make additions or conversions to the machine without the manufacturer's consent.

Observe the prescribed intervals for maintenance work in the appropriate documentations.

Observe fire alarm and fire fighting possibilities.

Check the machine for external signs of damage and defects at least once per shift. This includes, for example, checking the hydraulic system for leaks as well as general cleanliness of the machine.

Report any detected changes (including those in the operating behavior) to the supervisor immediately. Shut down and secure the machine immediately if necessary. Eliminate faults immediately.

3.13 Selection of personnel

Obligations in the selection and qualification of operating personnel:

- Only professionally trained, qualified, experienced and reliable operators who are familiar with the appropriate technical terminology and work procedures may work with the machine.
- The legally prescribed minimum age according to local regulations must be observed.
- The owner must define the areas of responsibility of the operators for transport, assembly/disassembly, operation, maintenance and disposal.
- The delegated, qualified specialized personnel must be trained or instructed for the activities concerned. Operators undergoing training or instruction may only work on the machine under constant supervision by an experienced individual.
- The owner must ensure that the appropriate activities are only performed by authorized and trained specialist personnel.

3.14 Expert inspection

The machine must be inspected by an expert before initial commissioning and at least once a year.

Experts are individuals who, based on their technical qualification and experience, have sufficient knowledge of the machines, equipment and systems and are familiar with the pertinent legal work safety regulations, rules for the prevention of accidents, directives and generally recognized rules of technology to an extent that they are able to judge the safe working order of machines, equipment and systems.

The inspection results must be documented and kept until the next inspection. A copy must be kept at the machine.

3.15 Fire protection

Important prerequisites for proper fire protection:

- Keep all objects clean and tidy.
- Make sure that all devices and equipment are in perfect working order.
- Prohibition of fire and naked lights. Prohibition of activities with a fire risk.
- No inflammable liquids and objects may be placed on hot machine parts.
- Briefing of personnel in behavior in case of fire and the use of small fire extinguishers (first extinguishing aid).
- The operator must supervise the machine constantly during operation and watch out for signs of fire or smoldering.
- All operators must ensure that no highly inflammable materials are touching hot machine parts.

3.16 Environmental protection

The following information must always be observed for protection of the environment:

- The respective national regulations for environmental protection must be observed generally.
- Collect escaping oils/hydraulic fluids during assembly and disassembly.
- Dispose of oils/hydraulic fluids as well as all auxiliary and operating materials used according to local regulations and in an environmentally friendly way.
- Ensure that the parts are disposed of in an environmentally friendly way after finally taking the machine or individual components out of operation.
- Recycle metal and plastic parts.

4 Technical data

4.1 Machine

Weights and dimensions	
Length	approx. 4,059 mm (with round dumper box) approx. 3,967 mm (with tipper bed)
Width	approx. 1,500 mm
Height	approx. 2,117 mm (with rotating beacon) approx. 2024 mm (without rotating beacon but with flat roof variant)
Ground clearance	approx. 238 mm
Dead weight (depending on equipment)	from approx. 2,550 kg
Payload in industrial traffic	3,000 kg
Payload on public highways	depending on license
Max. permissible front axle load	2,600 kg
Max. permissible rear axle load	3,300 kg
Permissible total weight	5,800 kg
Loading height (front)	Round dumper 1,411 mm Bed 1,302 mm
Dumper box content (level)	1.14 m^3
Bed content (level)	0.93 m^3
Dumper box content (heaped)	1.47 m^3
Bed content (heaped)	1.24 m^3
Slewing angle dumper box	180° (90° each to left/right)
Tipping angle dumper box	approx. 70°
Dumper box height tipped out	2,411 mm
Tipping angle tipper bed	approx. 55° rear approx. 47° side
Bed height tipped out	2,200 mm

Ambient conditions	
Application temperature range	-20 °C to +35 °C
Application site	• open country • operation in buildings, pits, tunnels and similar only permitted with adequate extraction or fresh air supply
Max. permissible water depth	< 0.25 m
Maximum permissible transverse tilt	< 20 % (11°)
Maximum permissible longitudinal tilt	< 20 % (11°)

Tab. 6: Ambient conditions

Shunting coupling

NOTE

Only use on level ground.

Towing capacity (braked)	max. 500 kg
Bearing load	max. 100 kg

Tab. 7: Shunting coupling

Trailer hitch (option)

NOTE

The vehicle/trailer combination weight must not exceed the permissible total weight of the vehicle. The vehicle/trailer combination may only be used up to 12 % longitudinal tilt (climbs/descents).

Towing capacity (braked)	max. 3000 kg
Bearing load	max. 150 kg

Tab. 8: Trailer hitch

Noise emissions[3]	
Sound power level	101 dB/1pW
Continuous sound power level at the workplace	88 dB/20 mPa

Tab. 9: Noise emissions during travel

4.2 Electric motor

Drive unit	
Type	Asynchronous motor
Drive unit motor output	25 kW/34 hp
Drive battery	Lithium-Ferrous-Phosphate battery modules (LFP): 16 kWh/24 kWh
Operating voltage	80 V DC
Cooling system	air-cooled
Pollutant class	emission-free

Tab. 10: Electric drive

NOTE

See the supplier documentation for further information on the technical data of the electric motor.

[3] Testing according to DIN EN ISO 3744 and 2000/14/EC

4.3 Drive unit

Travel stages	
Travel stage 1 (tortoise)	0 - 10 km/h
Travel stage 2 (hare)	0 - 23 km/h

Tab. 11: Travel stages

Axles	
Front axle	Steering axle
Rear axle	Steering axle
Drive type	Electric all-wheel drive with automotive control

Tab. 12: Axles

4.4 Tires

Standard tires	
Tire size	10.0/75–15.3
Tire type	BKT MP567
Tire pressure front	3.2 bar
Tire pressure rear	6.4 bar
Optional tires	
Tire size	10.0/75–15.3
Tire type	BKT AS504
Tire pressure front	3.2 bar
Tire pressure rear	6.4 bar
Tire size	260/70 R15.3
Tire type	BKT AW712
Tire pressure front	2.4 bar
Tire pressure rear	3.2 bar

Tab. 13: Tires

4.5 Steering

Steering	
Hydraulic articulated steering	All-wheel wheel steering
Drive unit	Hydraulic power-assisted steering with Orbitrol valve acting on two double-action working cylinders One working cylinder per steering axle
Oil supply	Own hydraulic pump
Steering lock	31° (inside wheel) 29° (outside wheel)
Steering types	All-wheel and front steering

Tab. 14: Steering

4.6 Electrical system

Vehicle lighting and control	
Operating voltage	12 V
Number of batteries	1
Battery voltage	12 V
Battery capacity	19 Ah

Tab. 15: Lighting and control electrical system

Battery system for drive unit	
Number of battery boxes	min. 2 max. 3
Storage capacity per battery box	8 kWh
Total battery system storage	16 kWh or 24 kWh
Operating voltage	80 V
On-board charging system	230 V or 400 V

Tab. 16: Battery system for drive unit

4.7 Hydraulic system

NOTE

To determine which oil to use, see the label near the hydraulic oil filling nozzle or contact the Bergmann after-sales service.

Hydraulic fluid	
mineral	HLP 46
biological	HLP SYNTH 46 (bio-hydraulic oil)
Tank capacity	23 l
Return filter	See spare parts list

Tab. 17: Hydraulic fluid

Hydraulic pump	
Feed pump	Tandem gear pump
Consumption volume of the tandem gear pump	10.8 cm^3 & 8.4 cm^3 (working & steering hydraulics)
Dumper box working pressure	200 bar
Steering working pressure	140 bar
Control block	Electrically controlled proportional valve

Tab. 18: Hydraulic pump

5 Structure and function

5.1 General

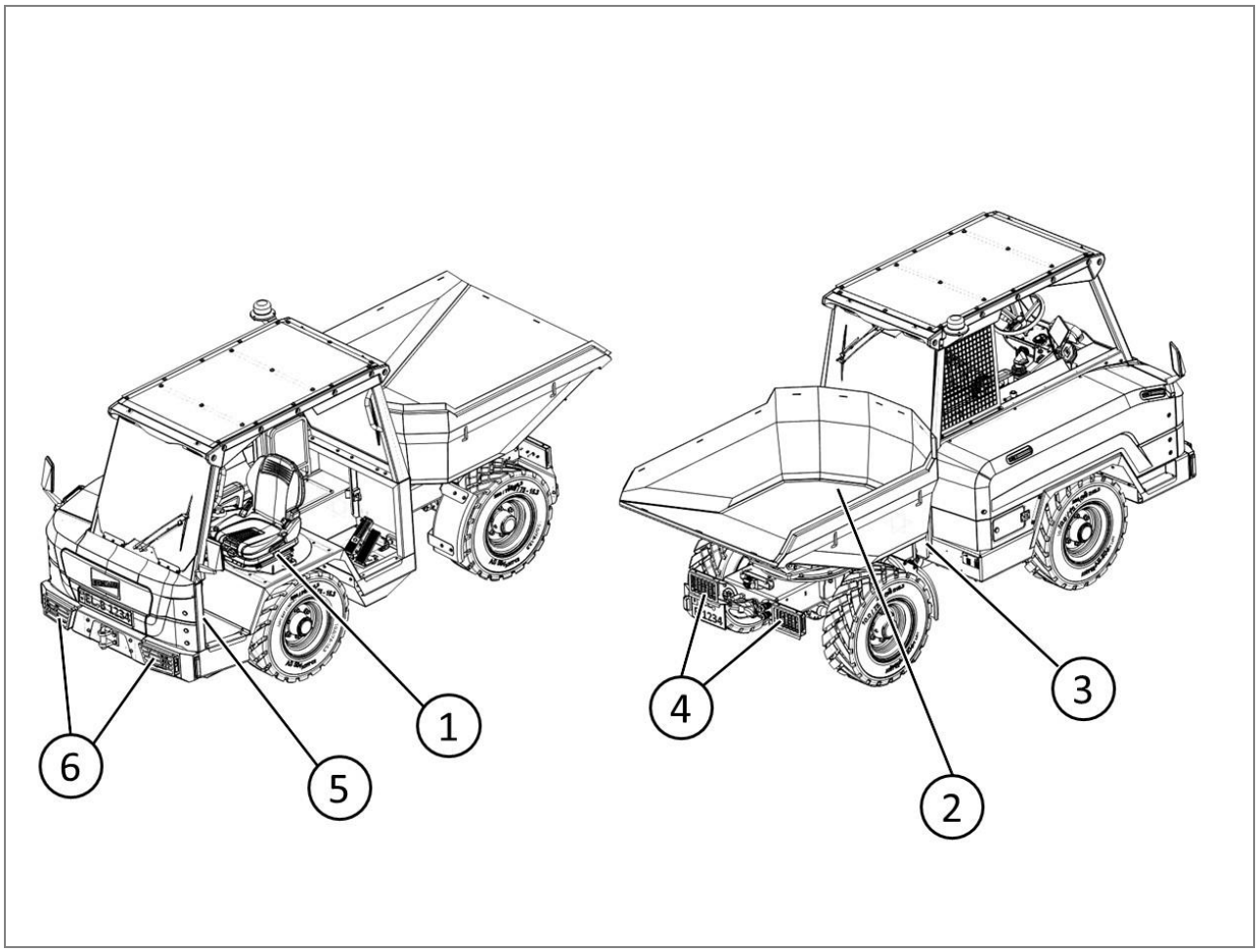


Fig. 10: Structure of the machine#

1	Driver's cab	2	Rotary dumper box
3	Swing joint	4	Rear lighting
5	Charging connection	6	Front lighting

The machine serves fr transport trips and working on surfaces and unsurfaced roads and is equipped with a rotary dumper box or tipper bed.

The front and rear frames are connected by a swing joint.

The rotary dumper box or tipper bed serves for picking up, transporting and tipping out loose bulk materials.

The machine is operated from the driver's cab (1).

The machine is equipped with lighting at the front and rear.

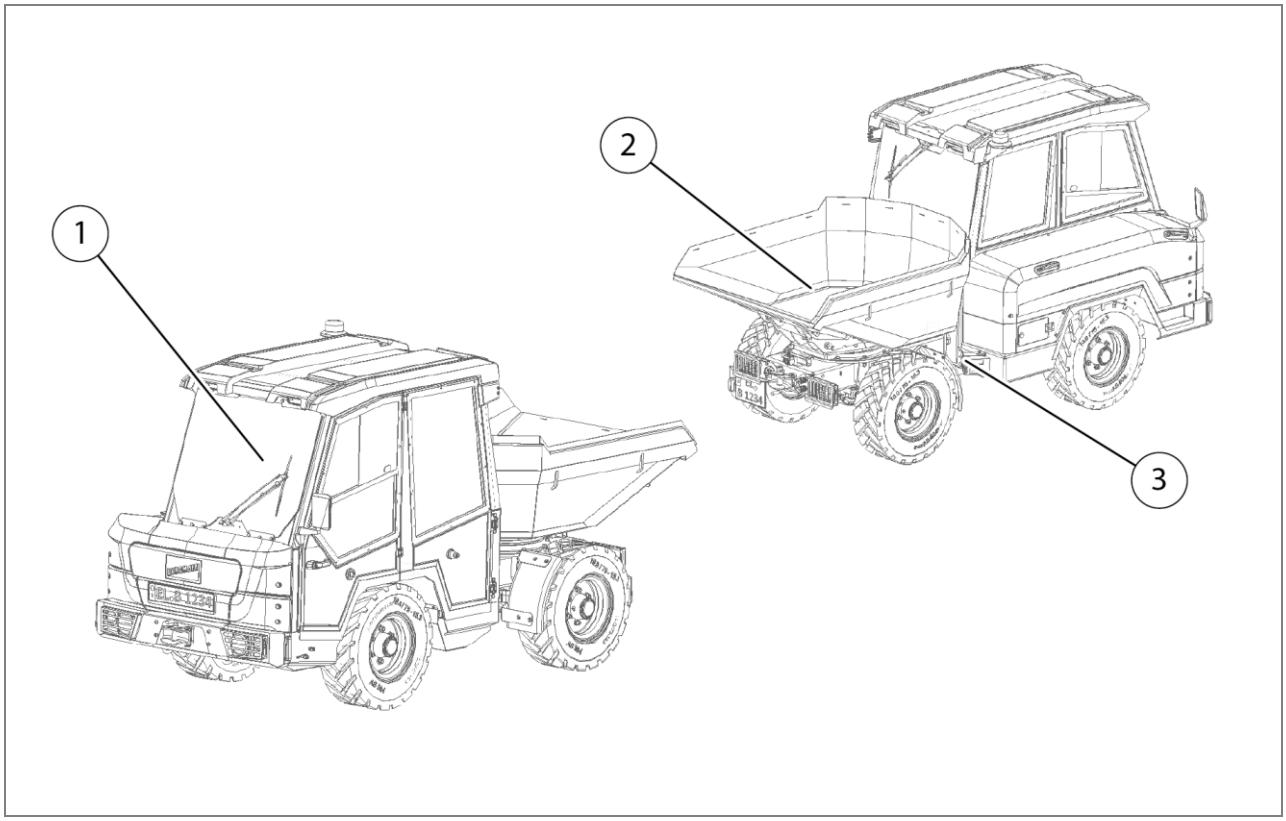


Fig. 11: Structure of the machine

1	Driver's stand with full cabin	2	Rotary dumper box or tipper bed (not illustrated)
3	Swing joint		

The machine is intended for transport and work on paved and unpaved roadways and is equipped with a rotary dumper box or tipper bed (1).

The front and read frames are connected by a swing joint (3).

The rotary dumper box or tipper bed (1) serves for picking up, transporting and tipping out loose bulk materials.

The machine is operated from the driver's cab (1).

The machine is equipped with lighting at the front and rear.

5.2 Drive unit

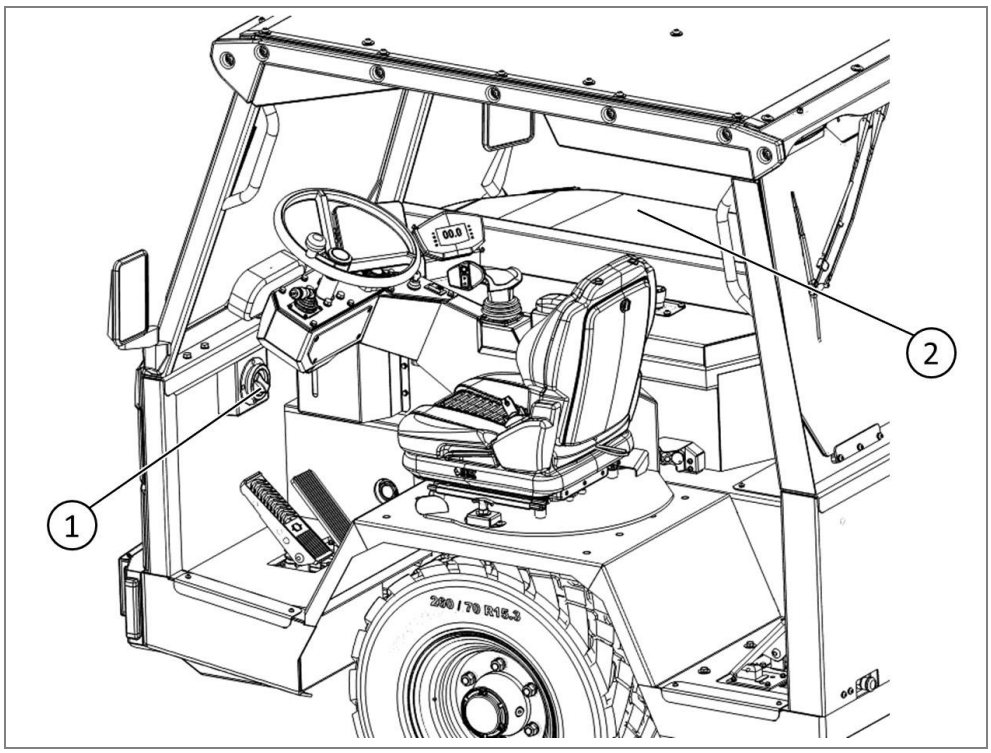


Fig. 12: Drive unit structure

The electric drive motor is on the front axle. The electric motor for driving the hydraulic motors (steering and working hydraulics) is underneath the driver's cab in the front section.

The battery system for the drive unit is located in the front, right-hand section of the vehicle where the regulation of the three motors is also located in a switch cabinet. The vehicle side charger is also located there. The batteries are charged via the charging connection.

5.3 Chassis

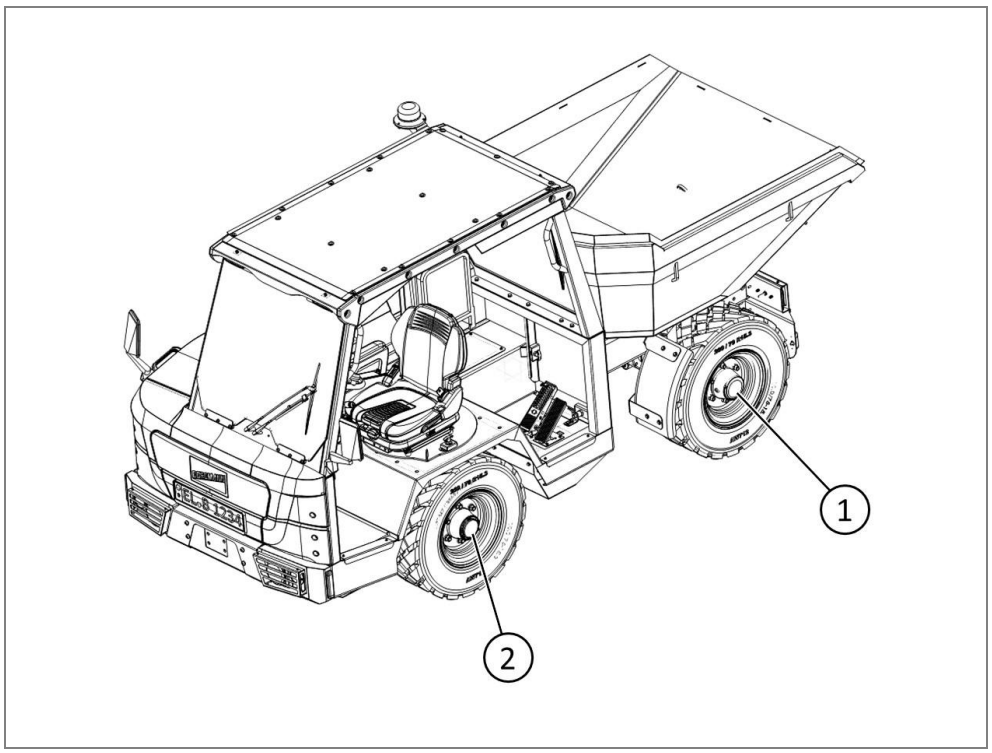


Fig. 13: Chassis structure

1	Rear axle	2	Front axle

The front axle and the rear axle are rigidly connected to the frame.

Both axles are equipped with planetary gears. The electric drive motor is flanged to the front axle. The rear axle is connected to the electric drive motor by a prop shaft.

Steering

The steering is controlled hydraulically. It can be switched between two steering types by an axle switching valve.

- front axle steering
- all-wheel steering (opposed)

Brake system

The service brake is integrated into the front axle. On pressing the brake pedal, the front axle brake is actuated hydraulically.

The parking brake acts on the whole powertrain. The parking brake is engaged automatically when the vehicle has been at a standstill for a define time. The integrated spring-loaded brake is then activated. The parking brake is on the main drive motor.

The electric drive unit generates a braking effect by relaxing the accelerator. This drive condition is also known as recuperation and charges the battery system. Due to this braking effect, pressing the service brake during travel can often be dispensed with. It therefore acts as a wear-free additional brake.

5.4 Rotary dumper box

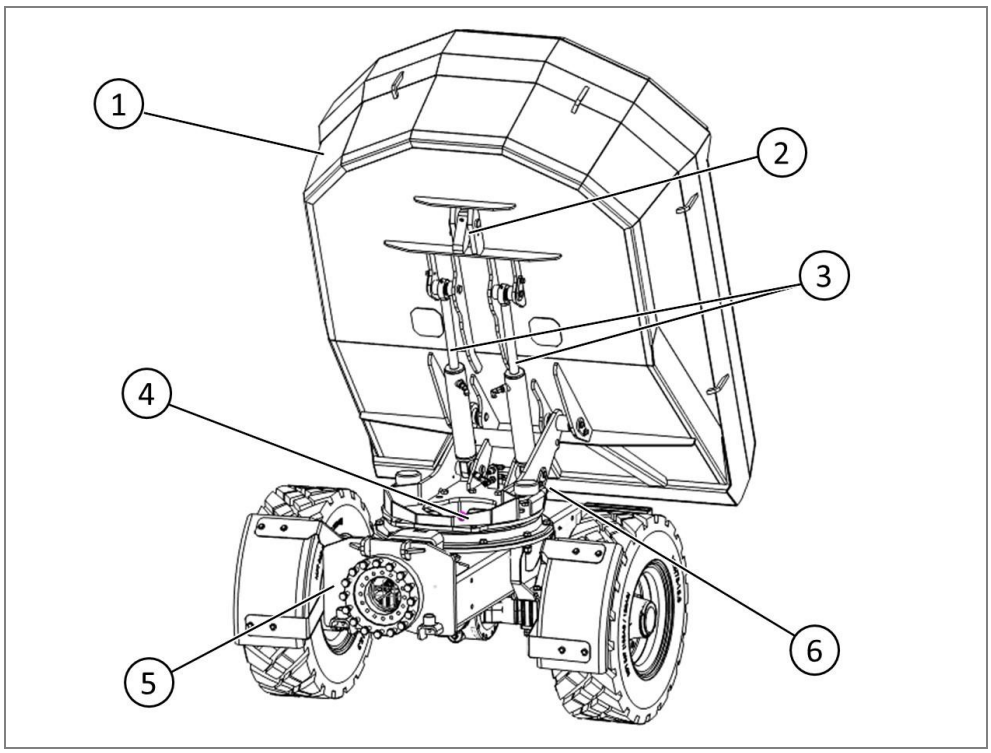


Fig. 14: Chassis structure

1	Dumper box	2	Lock *Dumper box*
3	Lifting cylinder *Dumper box*	4	Slewing ring
5	Machine frame	6	Lifting cylinder support *Dumper box*

The rotary dumper box serves for picking up, transporting and tipping out loose bulk materials. The rotary dumper box can be swiveled to the left or to the right by up to 90° from travel direction.

The dumper box (1) is connected to the slewing ring (4) by pivot points. The tipping movement is made by the lifting cylinder *Dumper box* (3). The hydraulic cylinder is bolted to the dumper box and slewing ring.

The dumper box is connected to the machine frame (5) by the slewing ring. The swiveling movement is made by swivel cylinders in the frame which are connected to the swivel console underneath the slewing ring.

The lock *Dumper box* (2) locks the dumper box in its lowered state.

In its tipped state, the dumper box can be secured against unintentional lowering by the support (6).

5.5 Tipper bed

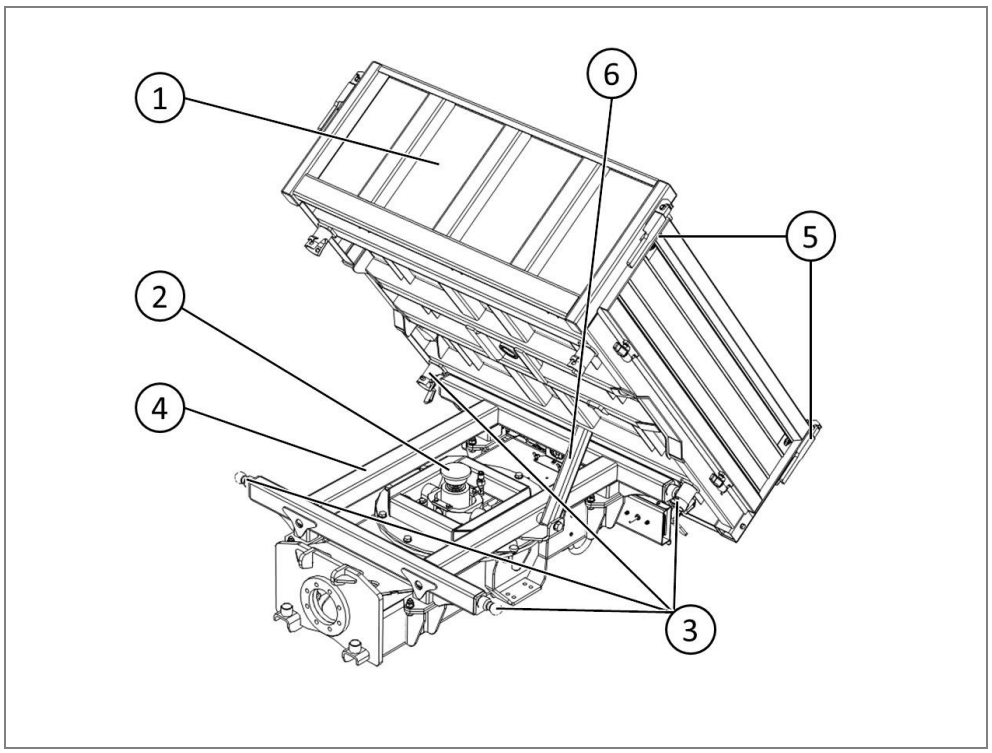


Fig. 15: Tipper bed structure

1	Tipper bed	2	Telescopic cylinder
3	Tipper bearings	4	Frame
5	Board wall lock	6	Lifting cylinder support *Bed*

The tipper bed (1) serves for picking up, transporting and tipping out loose bulk materials as well as for the transport of piece goods.

The tipper bed can be emptied either to the rear, left or right in relation to travel direction.

The board wall must be opened in tipping direction by the board wall lock (5) before tipping out.

Tipping out piece goods is prohibited!

The tipper bed is connected to frame (4) by tipper bearings (3). The tipping movement is made by the telescopic cylinder (2).

The rotary movement when tipping out is made by the tipper bearings (3).

In its lifted state, the tipper bed can be secured against unintentional lowering by fitting a safety catch (6).

The tipping direction of the bed can be changed by replugging the safety bolts.

The rear board wall can be opened at either the top or bottom. The board walls complete with corner stanchions can be removed.

Setting the tipping direction

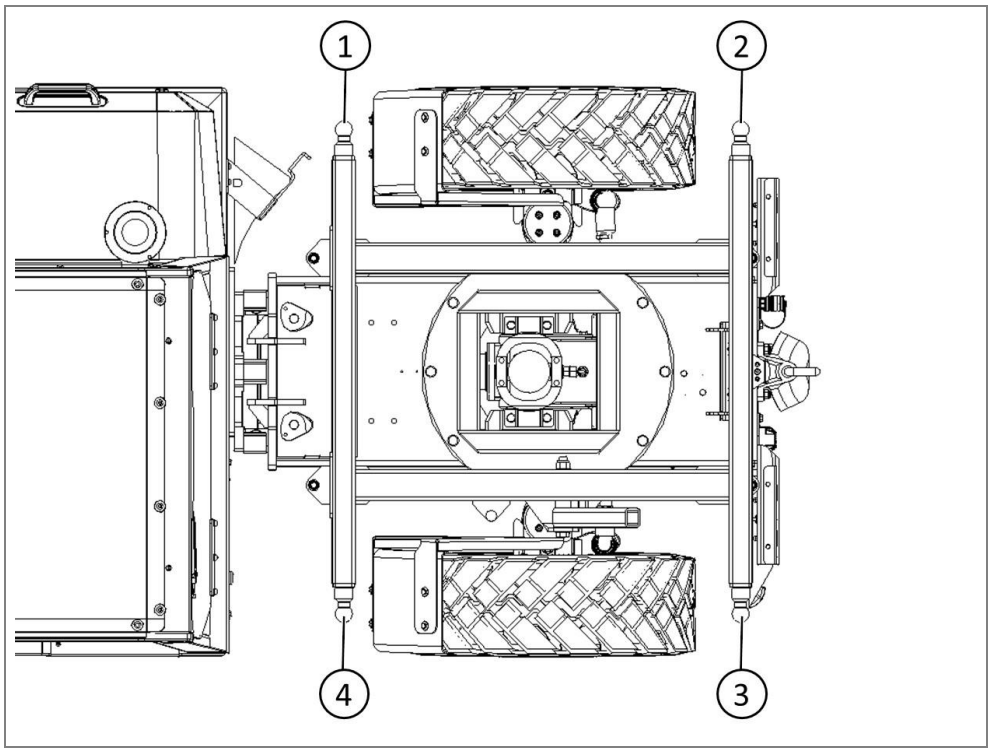


Fig. 16: Setting the tipping direction

- Insert safety bolt in pivot point (1 and 2) - dumper box tips to the right
- Insert safety bolt in pivot point (2 and 3) - dumper box tips to the rear
- Insert safety bolt in pivot point (3 and 4) - dumper box tips to the left

ATTENTION – Danger of machine damage due to diagonally but not fully inserted bolts!

The safety bolts may only be inserted respectively on one machine side of the lateral or the rear pivot points.

5.6 Shunting coupling

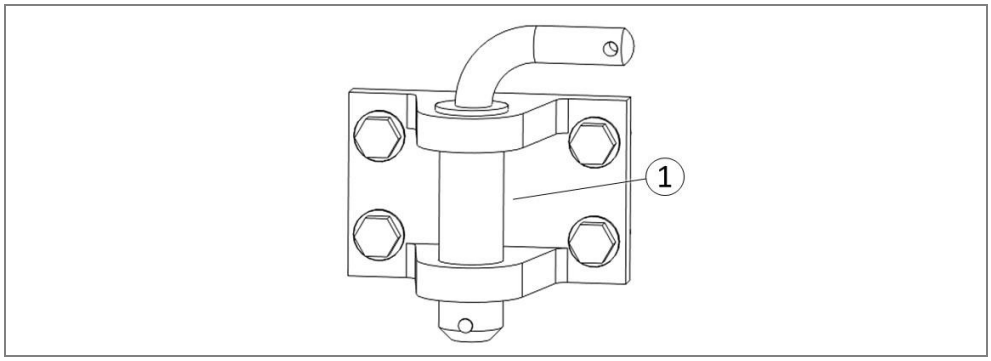


Fig. 17: Shunting coupling with locking bolt

The machine is equipped at the front (optional) and rear with a shunting coupling (1) with locking bolt. This may only be used for shunting a trailer on construction sites and for towing according to the specifications in the technical data.

5.7 Hydraulic system

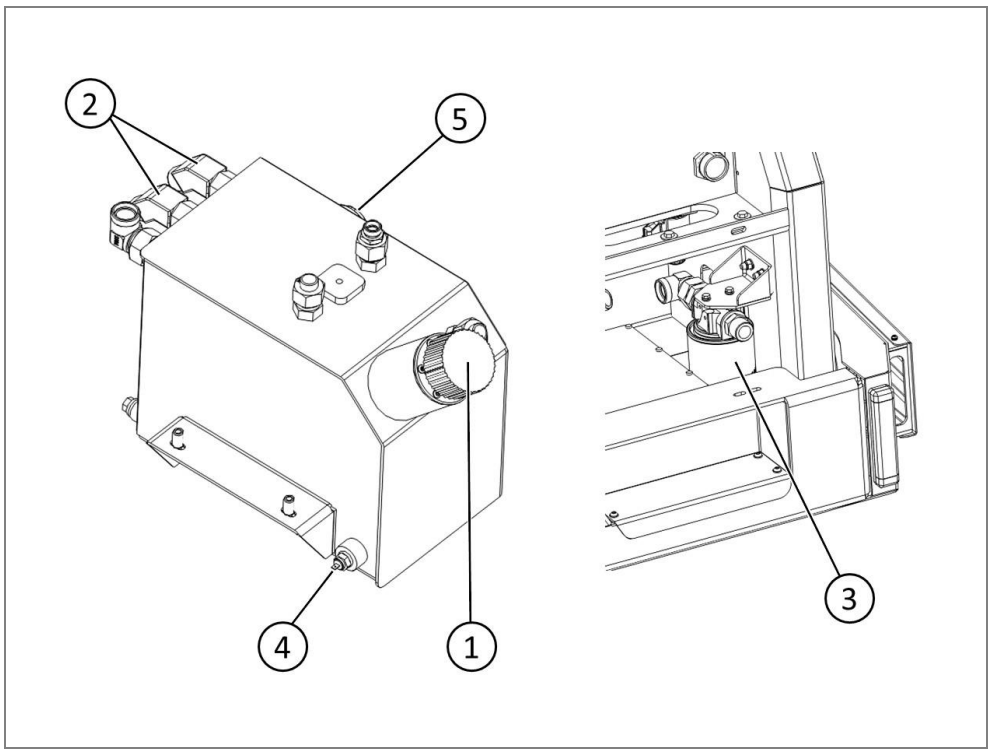


Fig. 18: Hydraulic system structure

1	Venting filter	2	Suction connections
3	Return filter	4	Temperature sensor
5	Sight glass		

The hydraulic tank serves as a collection and suction vessel for hydraulic fluid and is located under the driver's cab in the front section. The hydraulic pumps are connected to the suction connections (2) on the suction side. Flowing back hydraulic fluid flows through the return filter (3) back into the hydraulic tank and is cleaned in the process. The hydraulic oil temperature is determined by the temperature sensor (4).

The sight glass (5) serves to check the hydraulic fluid level.

The venting filter (1) serves to vent the hydraulic tank and as a filling nozzle.

5.8 Electrical system

The electrical system is powered by a 12 V battery. The battery is under the side engine cover on the right-hand side of the machine. The battery is charged in the same charging procedure as the drive unit batteries.

Overview of electrical consumers on the machine

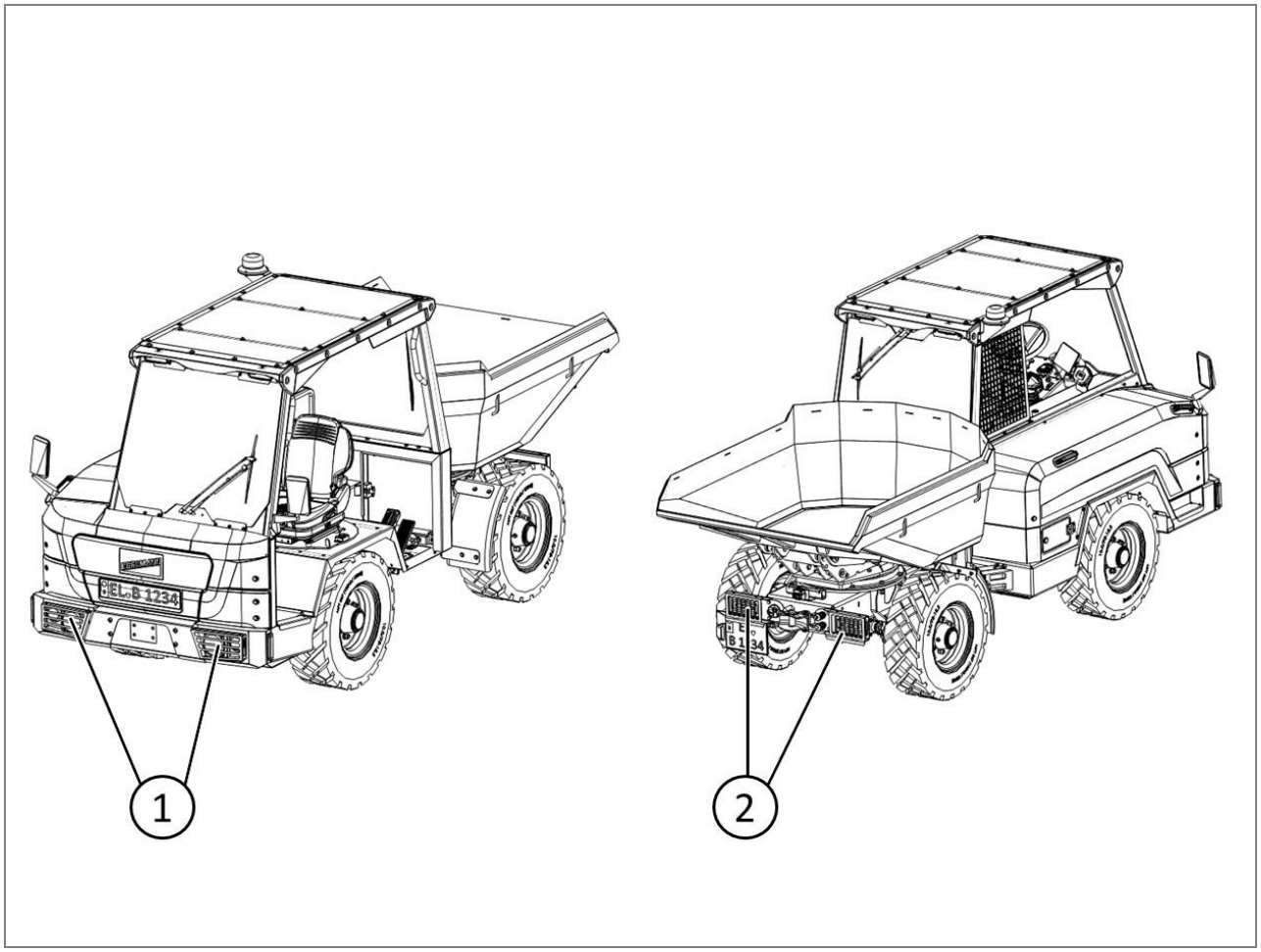


Fig. 19: Electrical consumers on the machine

1 Headlights

2 Combined brake/tail lights

The headlights (1) consist of one headlight each for low and high beam. The machine has two combined brake/tail lights (2). The turn signals are in the forward section on the front and side of the frame and integrated into the brake/tail lights at the rear.

NOTE

Other electrical consumers of the machine are described in the operating and display elements chapter.

5.9 Optional equipment

NOTE

The optional equipment described in this section is not necessarily a part of the machine.

The optional equipment described here can be purchased together with the machine. The scope of optional equipment purchased with the machine is listed in the respective purchase contract documents.

Contact the after-sales service for information about retrofitting optional equipment.

5.9.1 Reversing camera

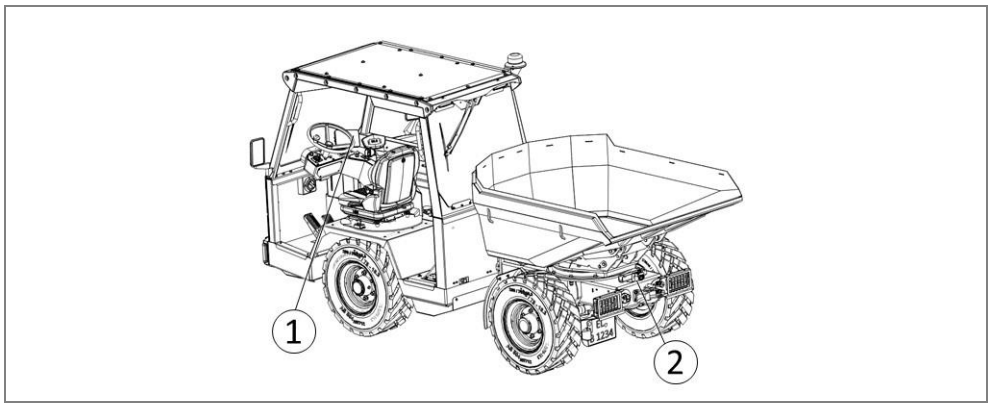


Fig. 20: Reversing camera

The machine can be equipped with an optional reversing camera.

The area behind the machine is scanned by the camera (2) and shown on the monitor (1). Camera and monitor are connected by a cable.

The monitor is located to the right of the steering wheel in the driver's cab. The camera is mounted between the reversing lights on the frame at the rear.

5.9.2 Overview of optional equipment:

Optional equipment	Description
Rotating beacon	
230 V socket	300 W power output
Front add-on plate	Size: F3
Double-action hydraulic connections	Number: 2
Ball-head plug bolt front	
Rotating trailer hitch	• Only for towing a trailer on construction sites on firm ground • Do not exceed the permissible loads (see technical data)
Emergency seat	behind the driver
Work floodlights	at front and rear
Telematic unit	B.connect

Special tires	Tire size	Tire model
	10.0/75 - 15.3	BKT AS504
	260/70 R15.3	BKT AW712

6 Transport, packing and storage

6.1 Safety instructions

The requirements of the regulations for the prevention accidents, environmental protection and national safety regulations, where applicable, must be observed during packing, transport and unpacking of the machine.

6.2 Transport and installation

The owner or the personnel contracted for the transport must ensure that the machine is transported as intended and consciously of the necessary safety and potential hazards.

Before beginning transport

- all the necessary information about first aid and rescue possibilities (emergency doctor, fire brigade, etc.) must be familiar,
- the personnel contracted for the transport must familiarize themselves with the working environment (e.g. obstructions in the working area),
- the personnel contracted for the transport must convince themselves that no-one is standing in the danger zone.

The danger zone is the area in which persons are within reach of work-related movements of the machine and its equipment or swinging and falling parts.

6.3 Packing

NOTE

Disposing of packing material

All packing materials must be disposed of properly and in an environmentally friendly way after installation of the machine.

6.4 Transport inspection

NOTE

Damages, shortages or wrong deliveries can only be reported directly on receipt of goods to the owner.

Later complaints are not possible.

- Compare incoming goods directly with the shipping documents.
- Report damages, shortages or wrong deliveries immediately to Bergmann Maschinenbau GmbH & Co. KG.

The scope of delivery must be checked against the shipping documents on delivery of the machine to the application site.

- Scope of delivery
  - Completeness of the scope of delivery, comparison of the scope of delivery with the scope of order
  - Shortages
- Condition of the transported components
  - Transport damages

Check sub-assemblies and parts for visible signs of damage and defects. Report any changes immediately to the supervisor. If necessary, stop work immediately and cordon off the workplace.

6.5 Storage

Unless specified otherwise in the order, the parts are prepared for short-term installation.

Storage conditions of the machine:

- protected against weather influences
- covered
- dry
- dust-protected
- well-ventilated

NOTE

See the respective supplier documentation for further information about storage conditions of optional accessories and equipment.

6.6 Transport of the sub-assemblies

Before attaching a load, check whether the lashing eyes and slings have sufficient load capacity.

Check lashing eyes before use for damage such as deformed eyes and cracked welding seams.

Damaged lashing eyes must not be used until they have been repaired.

Agree working procedure for lifting and assign the responsibilities.

Wear gloves for handling ropes. Do not uses twisted, frayed, kinked or otherwise damaged ropes.

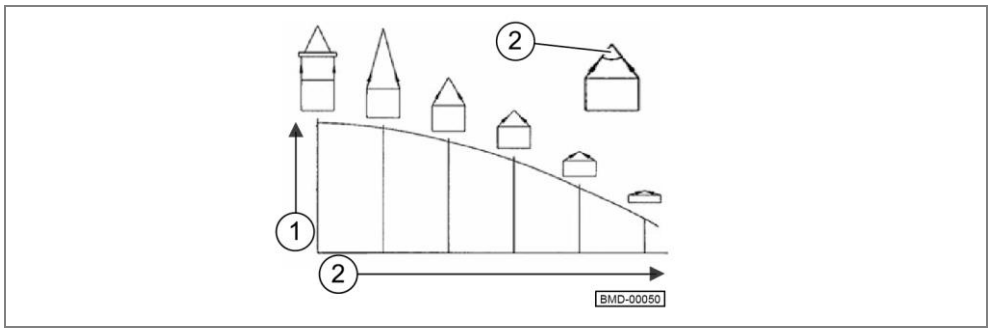


Fig. 21: Transport of the sub-assemblies

Attach ropes so that the splaying angle (2) between the lengths of rope is as small as possible. The smaller the splaying angle, the greater the permissible load capacity (1) of the ropes.

Before lifting sub-assemblies, parts or the whole machine, make sure that the ropes have uniform tension.

Before lifting sub-assemblies, parts or the whole machine, check that accessories and other parts are attached safe from accident.

6.7 Transport by flatbed truck and rail

NOTE

Select the transport vehicle under consideration of the weight and loading dimensions of the machine.

If the machine has to be loaded onto a transport vehicle, contact customer service.

Flatbed trucks and rail are prescribed for transporting the machine over long distances. If such a transport is necessary, the loading and transport must be agreed with a company with experience in the field of heavy goods transport.

The transport company or their representative bears the responsibility for loading and transport.

The appropriate safety regulations must be observed for transport and loading.

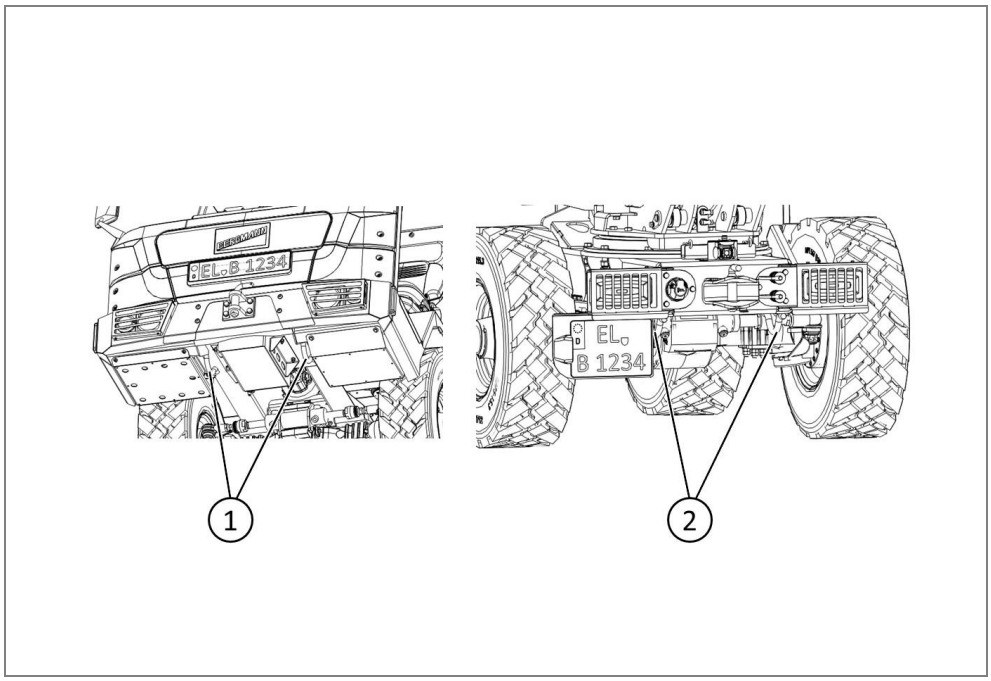


Fig. 22: Lashing points

1. Lash the machine onto the transport vehicle at the marked lashing points at the front (1) and rear (2).

6.8 Lifting the machine

DANGER

Danger from suspended loads!

Severe or fatal injuries if suspended loads should fall.

- No persons may stand under suspended loads.
- Keep a sufficiently safe distance.
- Cordon off the area of movement of the loads widely.
- Do not lift loads over and above persons.
- Follow the instructions of the crane driver.

DANGER

Danger of crushing!

Severe to fatal injuries are possible if the machine falls due to incorrect lifting.

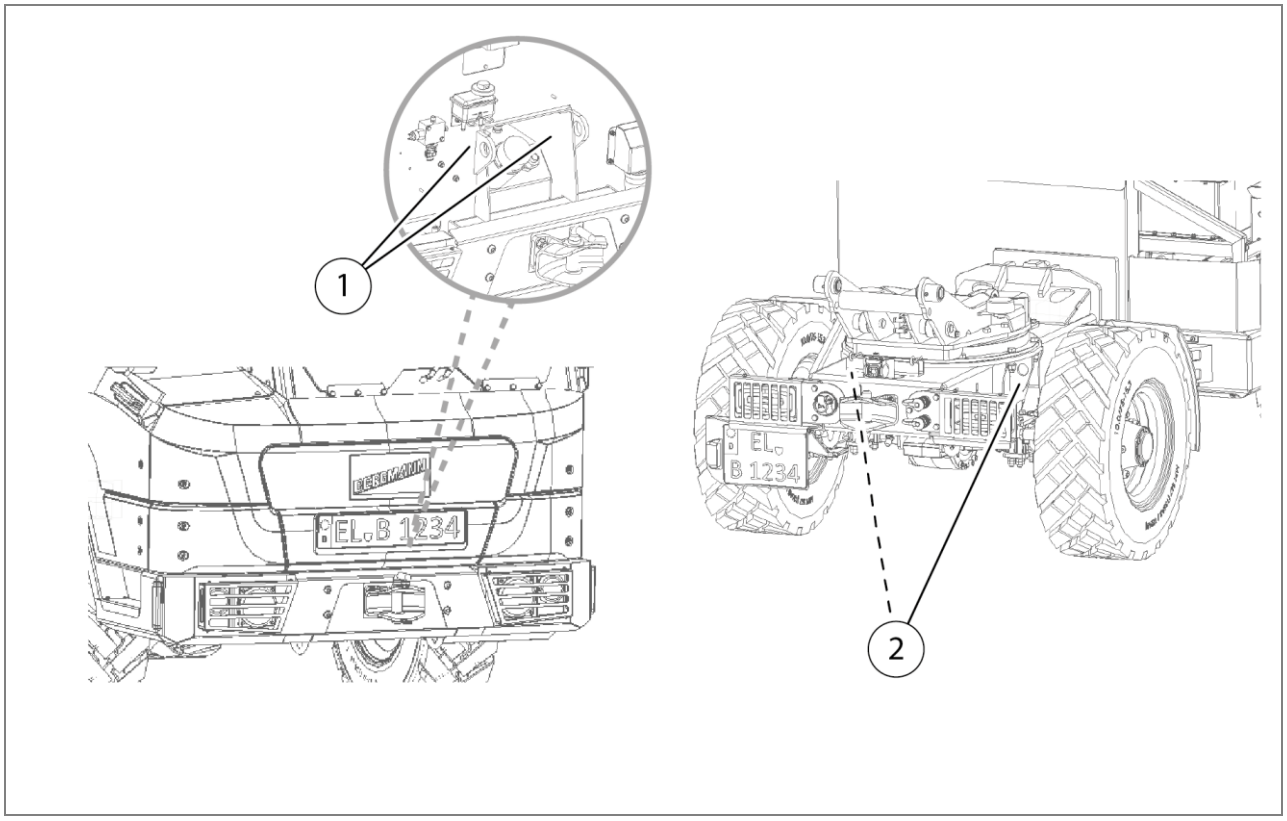


Fig. 23: Lifting points

The machine can be lifted and loaded with a crane and suitable slings at the lifting points at the front (1) and rear (2).

The slings must have a sufficient minimum load capacity of 2,800 kg.

No add-on devices may be fitted.

1. Remove the front hood.
2. Fasten slings to the lifting points (1) (2).

The dumper box is lowered and secured.

3. Lift the machine carefully.

ATTENTION

Danger of machine damage!

There is a danger of machine damage if the machine is attached by the roll-over bar, the lashing eyes or points on the frame.

6.9 Hand signals for directions

If the operator does not have a sufficient overview of the working area, the respective area must be cordoned off by fixed barriers. If this is not possible, another person must give the necessary instructions for safe transport by hand signals.

The most important hand signals are described in the annex.

7 Commissioning

7.1 Safety instructions

⚠ DANGER

Mortal danger due to liquids escaping under pressure!

Severe to fatal injuries possible if hydraulic fluid spurts out due to bursting or leakages.

- Have hydraulic lines older than 6 years replaced.

⚠ DANGER

Mortal danger due to liquids escaping under pressure!

Severe to fatal injuries possible if hydraulic fluid escapes when changing an add-on device by loosening the plug coupling.

- Only change the add-on device with the control switched off.

⚠ DANGER

Risk of injury due to fire!

Severe to fatal injuries possible if batteries ignite due to a short-circuit in the electrical system, internal/external heat or accident.

- Leave the danger zone around the vehicle immediately in case of fire.

⚠ DANGER

Risk of accident!

Severe to fatal injuries possible if dangers are not recognized due to missing, damage or dirty safety signs.

Check safety signs regularly for completeness and legibility.

⚠ CAUTION

Risk of injury from falling!

There is a risk of injury when persons stumble when climbing into the dumper box/tipper bed and injure themselves when falling.

Climbing into the dumper box/tipper bed is prohibited.

7.2 Assembly

The machine is delivered fully assembled. No assembly is necessary.

7.3 Initial commissioning

7.3.1 Preparatory activities

Refrain from working in any way that is detrimental to the safety. Commission the machine as intended, consciously of safety and dangers and under consideration of the documentation. The rules for the prevention of accidents and environmental protection must be observed.

- Obtain information about first aid and rescue possibilities (emergency doctor, fire brigade, etc.).
- Familiarize yourself with the working environment including all obstructions in the working area.
- Check completeness of operating signs.
- Check the hydraulic fluid level.
- Check the battery capacity and recharge if necessary.

⚠ **WARNING** – Danger from inhaling health hazardous gases! There is a risk of injury when the drive unit batteries overheat due to short-circuiting or overloading and emit toxic gases.

  - Only use the included charger.
  - If toxic gases are emitted, air the room thoroughly and leave as quickly as possible.

- Check the tire pressure.
- Check the electrical system.

⚠ **WARNING** – Risk of injury due to short-circuiting of the battery!

A short-circuit can lead to explosion of the battery.

  - Do not remove any protective covers when the battery is on.

- Check steering for smooth action.
- Check joystick for smooth action.
- Check that the revolving driver's cab is locked.
- Check steering orbitrol and rotary joint for leaks.
- Check machine for visible signs of damage.

  If missing or loose screws, missing covers, oil puddles, defective, torn off or bent lines are detected, commissioning is prohibited until the defects have been eliminated.
- Prepare optional accessories and equipment according to the specifications of the respective manufacturer for initial commissioning, see the respective supplier documentation.

7.3.2 Function test

⚠ DANGER

Risk of accident when standing in danger zones!

There is a risk of accident when persons are standing in the danger zones during operation of the machine.

- The operator must ensure that no persons are standing in the danger zones during operation of the machine.
- If the operator does not have a clear view of all danger zones, a second person must be recruited to give directions.

⚠ DANGER

Danger of being trapped or pulled in!

Severe to fatal injuries possible if persons get caught in the wheels.

- The operator must ensure that no persons are standing in the danger zones during operation of the machine.

⚠ DANGER

Risk of injury when reversing!

When reversing, the field of vision might be obstructed to such an extent that persons are overlooked and run over.

- The machine driver must ensure that no persons are standing in the danger zone.
- Have another person give hand signals if necessary.
- Use the optional equipment such as reversing hazard warning signal and reversing camera if available.
- Honk the horn briefly before reversing.

⚠ WARNING

Danger of impact!

There is a risk of injury if the driver stretches arms or other parts of the body out of the driver's cab.

- Never hold the arms or other parts of the body outside the driver's cab during travel.

⚠ WARNING

Danger of impact!

There is a risk of injury when parts fall off the bed during transport of piece goods and injure bystanders.

- Always lash piece goods securely and observe other properties of piece goods.

⚠ WARNING

Danger of impact!

There is a risk of injury when the passenger accidentally presses the accelerator or brake pedal and accelerates or decelerates the machine.

Always fold in the additional pedals and protect with the cover when carrying a passenger.

⚠ CAUTION

Risk of injury!

There is a risk of injury when the operator gets near the turning wheels during travel.

- Do not hang an arm down out of the driver's cab.

- Watch out for unusual noises and increased surface temperatures during the function test which could indicates a defect.
- In case of malfunctions during the function test, shut down the machine immediately, secure it and repair the faults.
- Observe control and warning indicators according to the documentation.

Operate the machine according to the documentation.

When the machine is in operation, no other persons apart from the operator and the persons necessary to the technical proceedings may stand near the machine.

- Carry out the preparatory activities.
- Switch on the machine.
- Check the perfect function of the control and warning lamps.
- Check the perfect function of the signaling and lighting equipment.
- Check the chassis and the braking effect on a level stretch of ground if possible and check the correct function of the movements according to the operating signs for forward and reverse driving.
- Switch on all consumers singly and check the correct function and movements according to the operating signs.
  - Run through the hydraulic functions several times beginning at low speed. Check the hydraulic system for leaks.
  - Drive to the end positions of all hydraulic cylinders once. Then, stop the hydraulic cylinders at the intermediate points and make sure that the hydraulic cylinders comes to an immediate standstill and hold this position.

⚠ **DANGER** – Danger of impact! Severe to fatal injuries possible if persons are standing in the danger zone during rotating/tipping of the dumper box/tipper bed.

- Make sure that no persons are standing in the danger zone during rotating/tipping of the dumper box/tipper bed.
- Perform function test/initial commissioning of optional accessories and equipment according to the respective manufacturer's specifications.
- Switch off the machine.

7.3.3 Inspections after initial commissioning/function test

- Check hydraulic system for leaks. Retighten loose screw connections. Defects on the bindings, damp, torn off or bent hydraulic lines must be replaced immediately.
- Check filling level in the hydraulic tank.
- Check machine for external damages.
- Check all screw connections for tight fit and retighten if necessary. Observe the permissible tightening torques.

8 Operating and display elements

8.1 Drive and operating elements

8.1.1 Driver's cab

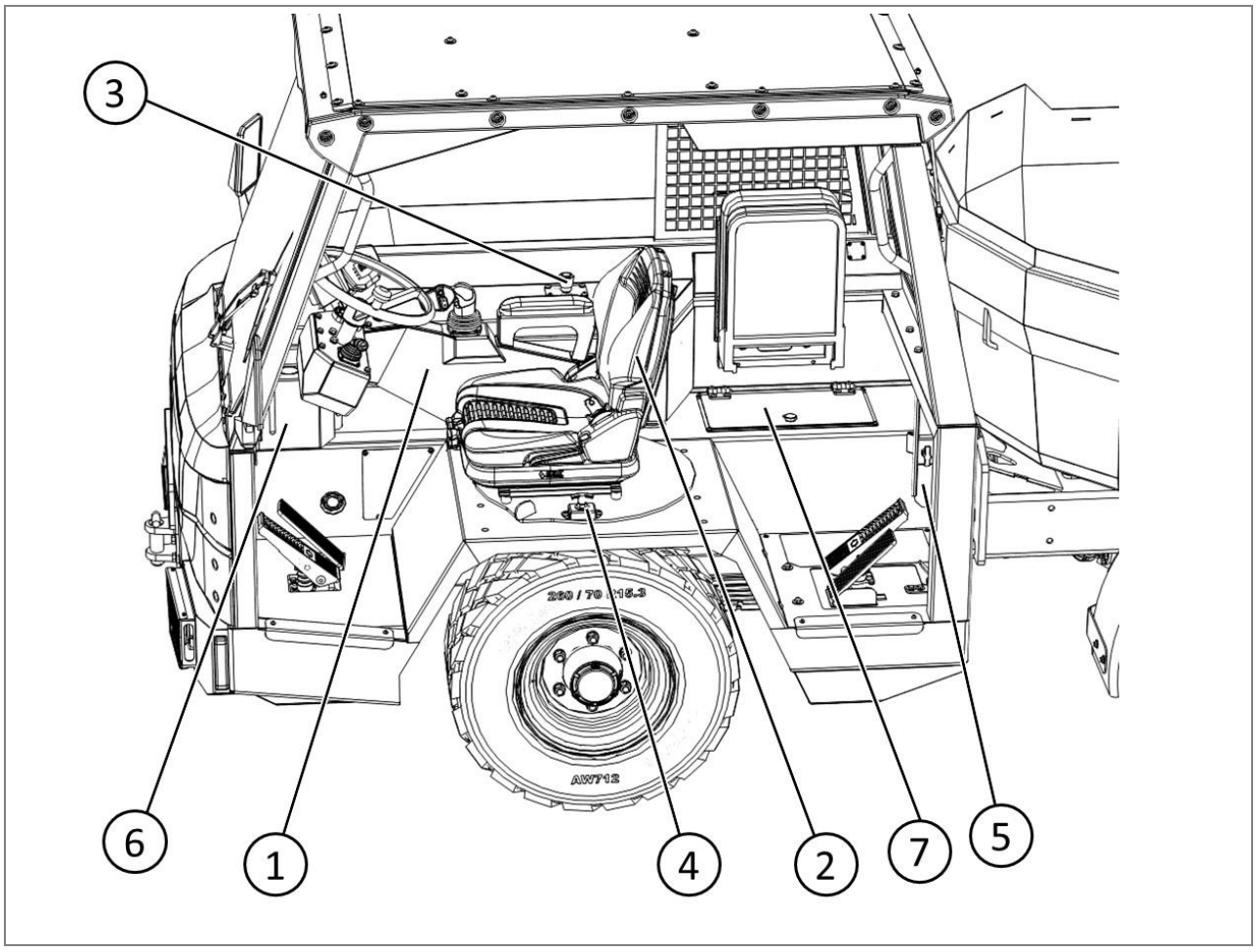


Fig. 24:

1	Driver's cab	2	Driver seat
3	Emergency stop switch	4	Locking lever driver's cab
5	Cover for rear pedals	6	Window washer system container
7	Stowing compartment for charging cable		

All functions of the machine are controlled from the driver seat (2) in the driver's cab (1).

The driver's cab (1) can be rotated 180° by actuating the locking lever *Driver's cab* (4). Additional pedals are located under the cover for rear pedals (5).

The emergency stop switch (3) disconnects the drive battery system from the other electrical sub-assemblies.

In addition, actuation during driving will activate the parking brake.

Driver's cab front

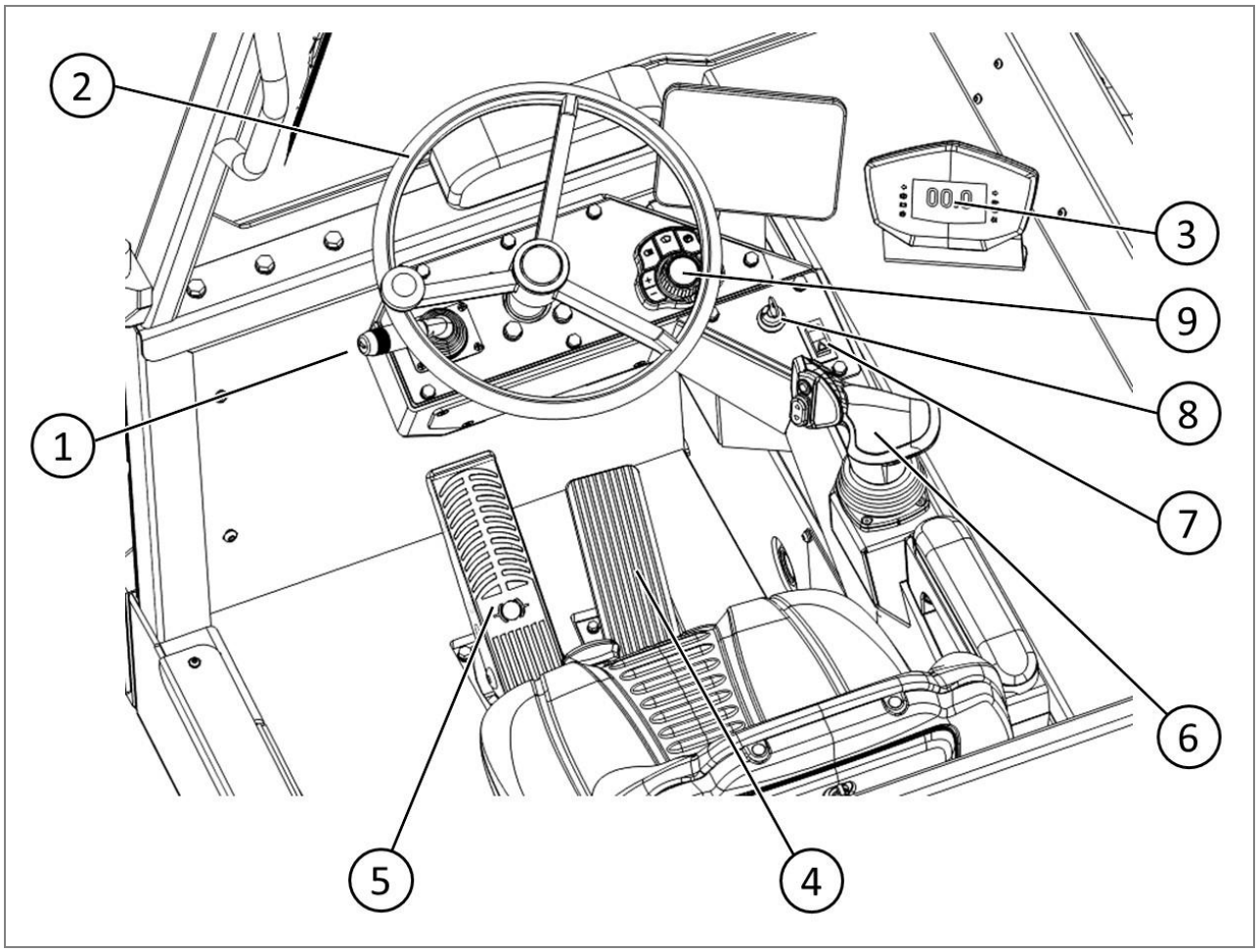


Fig. 25: Driver's cab front

1	Steering column stalk switch	2	Steering wheel with steering knob
3	Instrument panel	4	Accelerator
5	Brake pedal	6	Joystick
7	Switch *hazard warning lights*	8	Key-operated switch
9	Operator panel with rotary knob		

The travel movements of the machine are controlled by the steering wheel with steering knob (2), the accelerator (4) and the brake pedal (5). The instrument panel (3) displays information/warning messages regarding operation of the machine. The lights, direction indicators and horn are controlled by the steering column stalk switch (1). The operator panel with rotary knob (9) controls the windscreen wipers and switching between steering and other machine functions. The windscreen wiper and rear window wiper are equipped with a window washer system. The machine is switched on and off with the key-operated switch (8).

Driver's cab rear

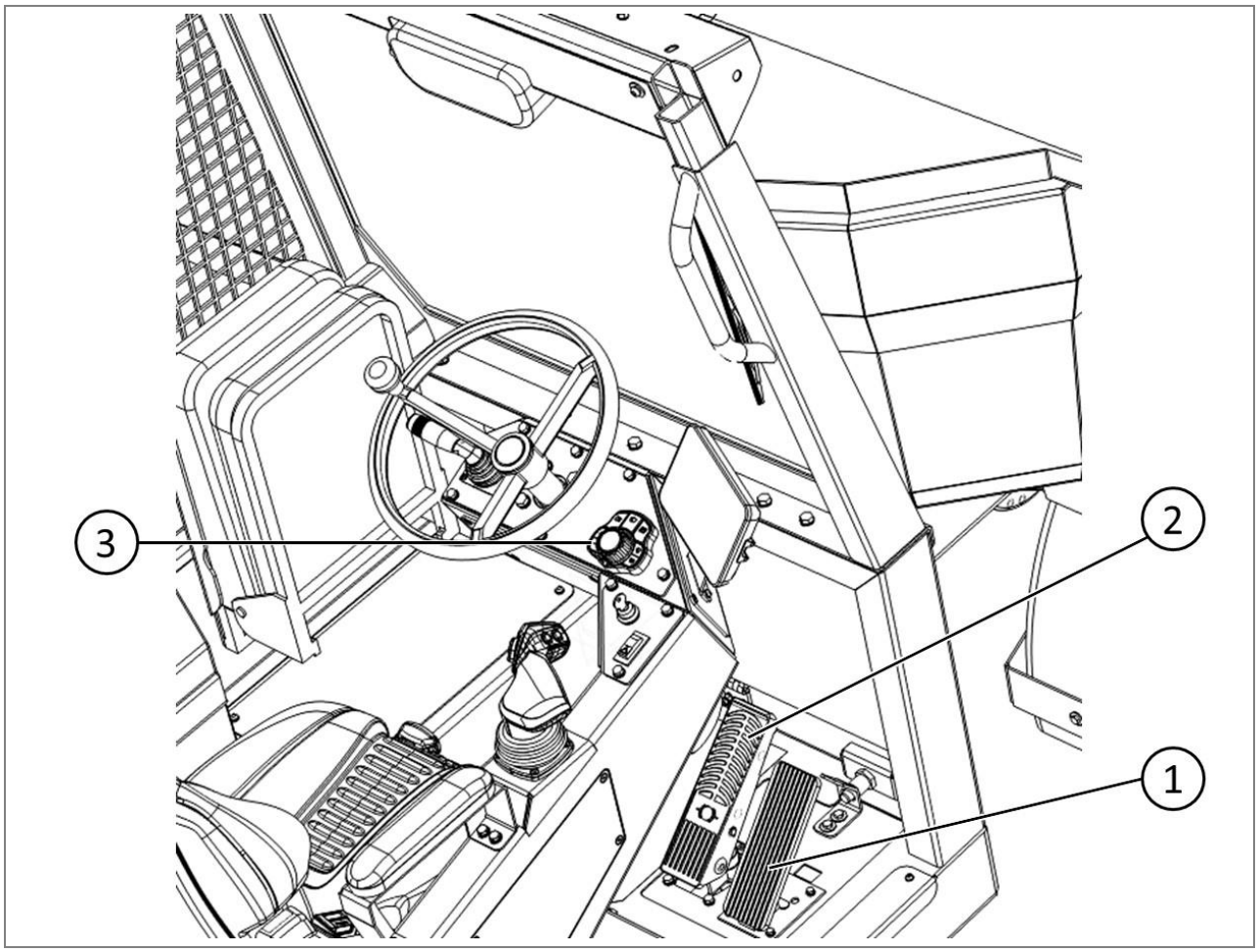


Fig. 26: Driver's cab rear

1 Accelerator

2 Brake pedal

3 Operator panel with rotary knob

If the driver's cab is turned to the rear, the accelerator and brake pedal must first be lifted up and secured.

The rear window wiper is operated by the operator panel with knob.

8.1.2 Key-operated switch

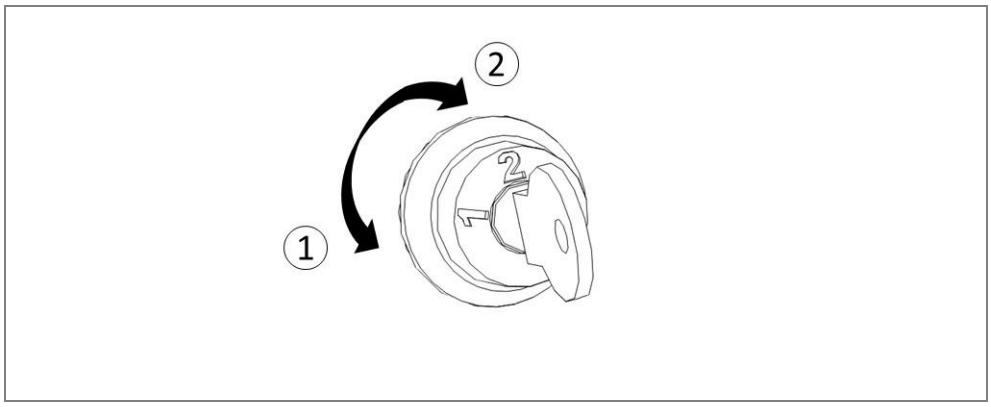


Fig. 27: Key-operated switch

Position 1 - vehicle off

Position 2 - vehicle on

8.1.3 Foot pedals

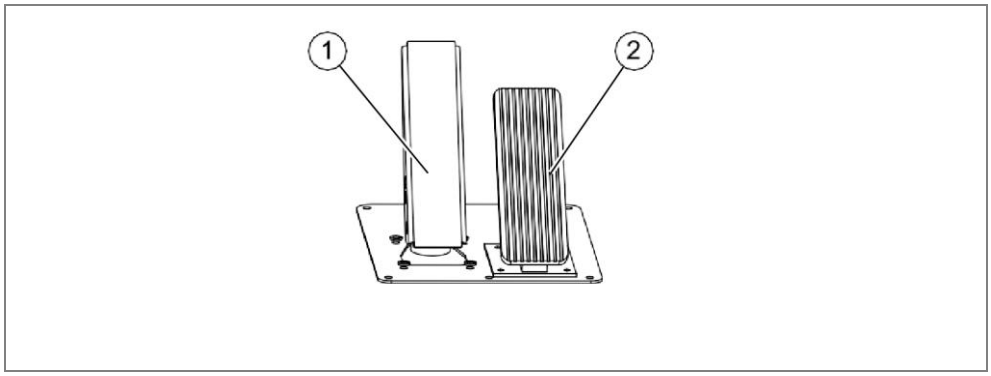


Fig. 28: Foot pedals

Foot pedals front/rear

The travel speed is regulated by the accelerator (2).

By pressing the brake pedal (1) and relaxing the accelerator (recuperation), the travel movement of the machine is delayed.

8.1.4 Joystick

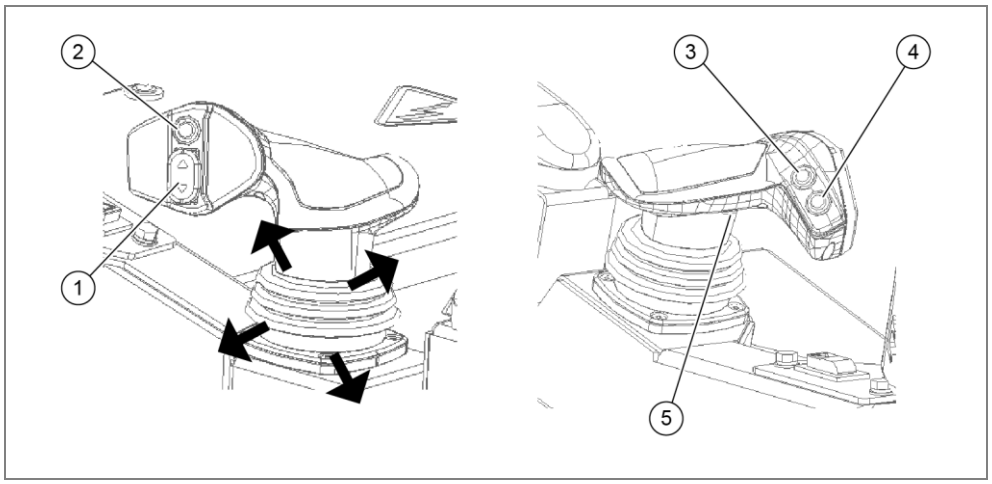


Fig. 29: Joystick

1	Switch *Travel direction*	2	Switch *Option*
3	Switch *Travel stage 1 (tortoise)*	4	Switch *Travel stage 2 (hare)*
5	Switch *Release dumper box*		

The travel direction is selected with the switch (1).

- Switch forward - forward travel direction
- Switch back - backward travel direction
- Switch center - neutral

Travel stage 1 (tortoise) is selected with the switch (3).

Travel stage 2 (hare) is selected with the switch (4).

Joystick operation

Joystick back - lift dumper box

Joystick forward - lower dumper box

Joystick to the right - turn dumper box to the left (only for round dumper box)

Joystick to the left - turn dumper box to the right (only for round dumper box)

At the same time, the switch (5) Release dumper box must be pressed for every intentional dumper box movement (joystick operation).

8.1.5 Operator panel

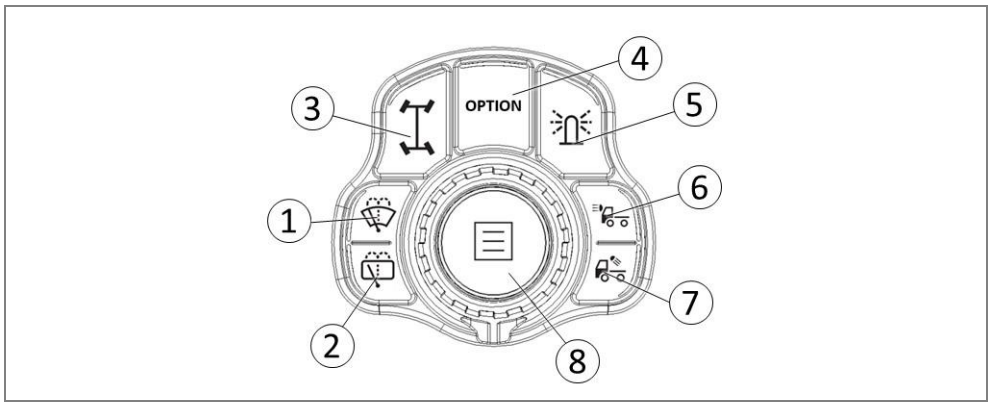


Fig. 30: Operator panel with rotary knob

1	Button *Front windscreen wiper*	2	Button *Rear window wiper*
3	Button *Steering switch*	4	Button *Option 1*
5	Button *Rotating beacon* (optional)	6	Button *Work floodlight front* (optional)
7	Button *Work floodlight rear* (optional)	8	Rotary knob

The front windscreen wiper is selected with button (1).
Press the button - front windscreen wiper is activated.
Keep the button pressed - front window washing system is activated.
The rear window wiper is selected with button (2).
Press the button - rear window wiper is activated.
Keep the button pressed - rear window washing system is activated.
The rotating beacon is controlled with the button (5).
The front work floodlight is controlled with the button (6) and the rear work floodlight with the button (7).

The rotary knob (8) serves to navigate through menus and selected
Functions on the main screen display.

8.2 Instrument panel

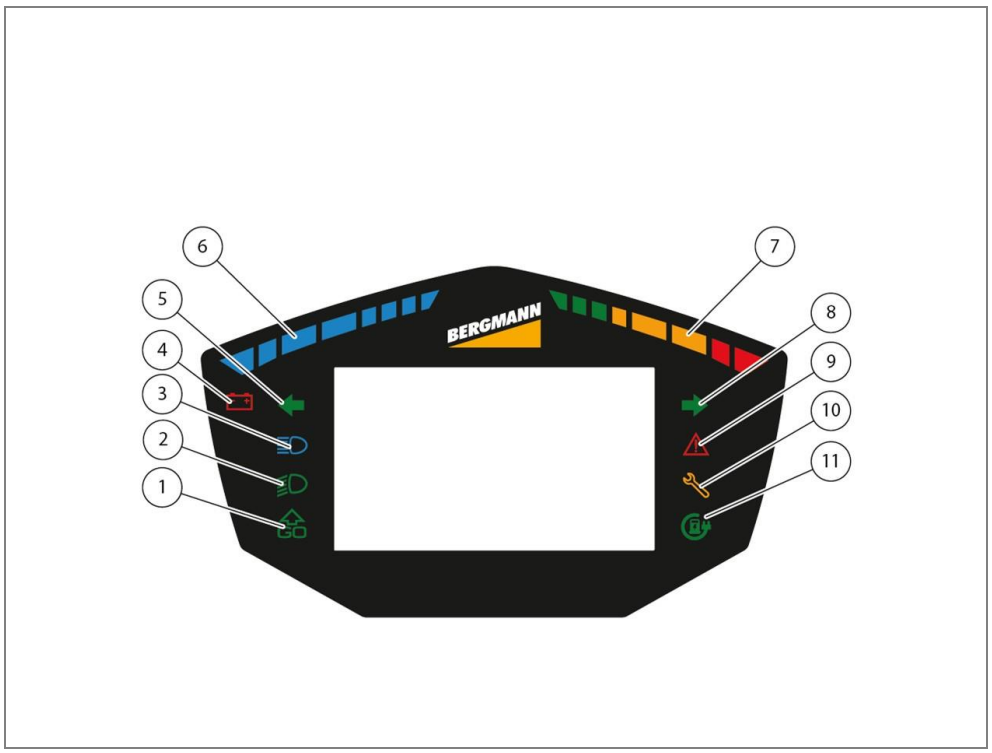


Fig. 31: Instrument panel

Item	Control lamp	Description
1	Lamp “Go”	Indicates ready to drive
2	Low beam	
3	High beam	
4	Drive mode battery	Battery capacity ≤ 75 V • Indicator lights red
5	Turn signal left	
6	Recuperation	Recovery of energy
7	Power output	Presently required current in Ampere
8	Turn signal right	
9	Fault	Lights when there is a fault
10	Service	Lights when service is in progress
11	Battery charging	Lights when battery is on charge

Tab. 19: Instrument panel

8.3 Display

8.3.1 Main screen

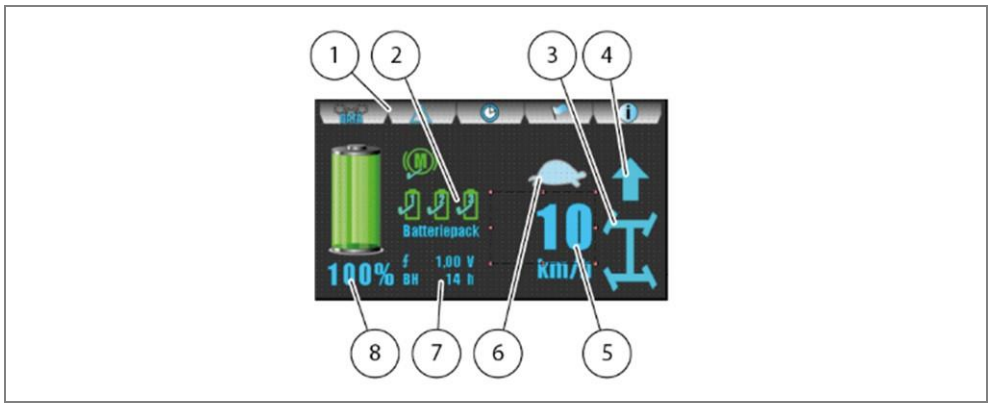


Fig. 32: Display

Item	Control lamp	Description
1	Side selection	Selection of the different sides with the rotary knob
2	Battery pack status	Display status switched on battery packs (green = on, black = off)
3	Steering	Display of active steering type: All-wheel steering or front-wheel steering
4	Travel direction display	Forward, reverse and neutral position
5	Speed	Current speed in km/h
6	Speed mode	Display of active travel stage: Travel stage 1 (tortoise) & travel stage 2 (hare)
7	Battery system for drive unit	Display of current battery voltage of the drive unit and number of operating hours
8	Capacity	Current battery capacity in %

Tab. 20: Display - main screen

The main display screen shows information such as display status of the switched on battery pack (2), travel direction forward/reverse (4), current speed in km/h (5), speed mode selection between tortoise and hare, the current battery capacity and the current battery voltage of the drive unit (7).

The different menu items are selected by turning the rotary knob on the operator panel.

Pressing the rotary knob switches to the respective sub-menu if a selection can be made here.

8.3.2 Measured values

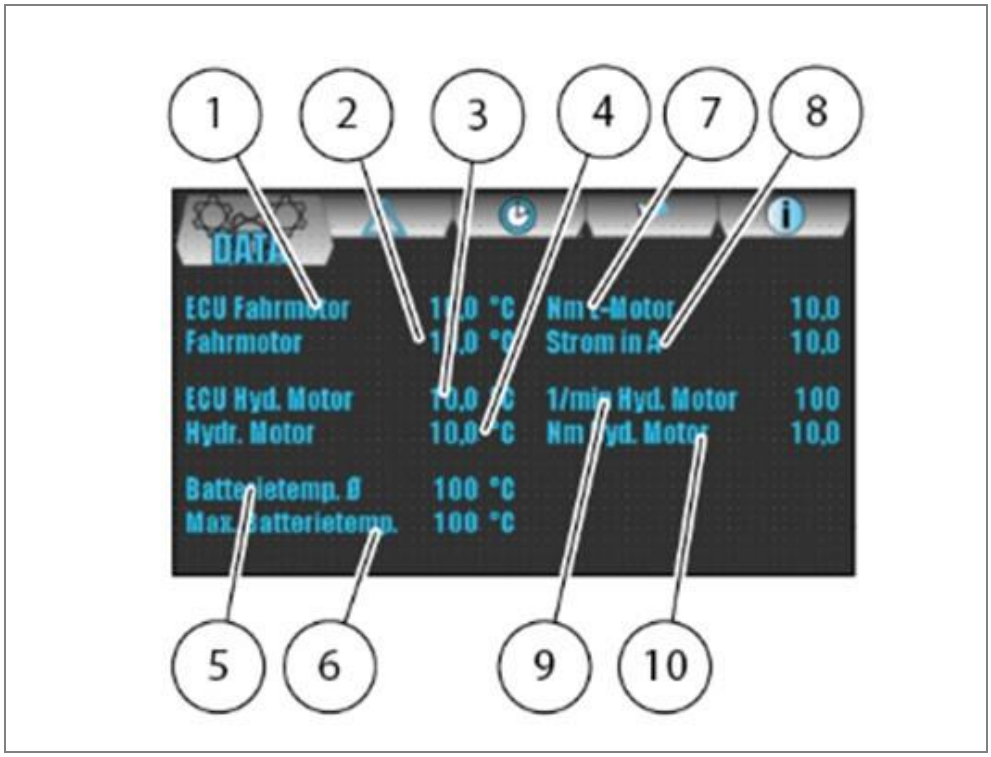


Fig. 33: Measured values

Item	Control lamp	Description
1	Drive motor control unit	Drive motor control unit temperature
2	Drive motor	Drive motor temperature
3	Hydraulic motor control unit	Hydraulic motor control unit temperature
4	Hydraulic motor	Hydraulic motor temperature
5	Battery temperature Ø	Average temperature of the batteries
6	Max. battery temperature	Maximum temperature of the batteries
7	Nm E-motor	Current torque of the drive motor
8	Current in A	Momentary current consumption of the drive motor
9	Hydr. motor rpm	Current speed of the hydraulic motor
10	Nm hydr. motor	Current speed of the hydraulic motor

Tab. 21: Measured values

8.3.3 Error motor

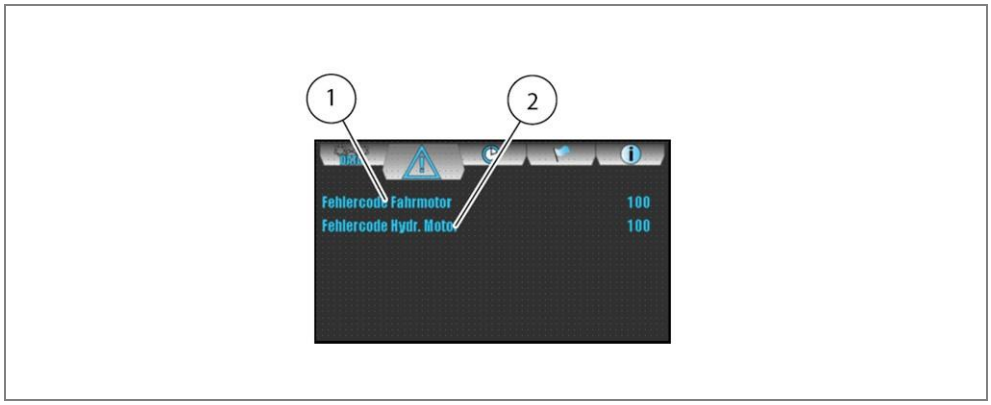


Fig. 34: Error motor

Item	Control lamp	Description
1	Error drive motor	Error output as error code
2	Error hydraulic motor	Error output as error code

Tab. 22: Error motor

8.3.4 Service

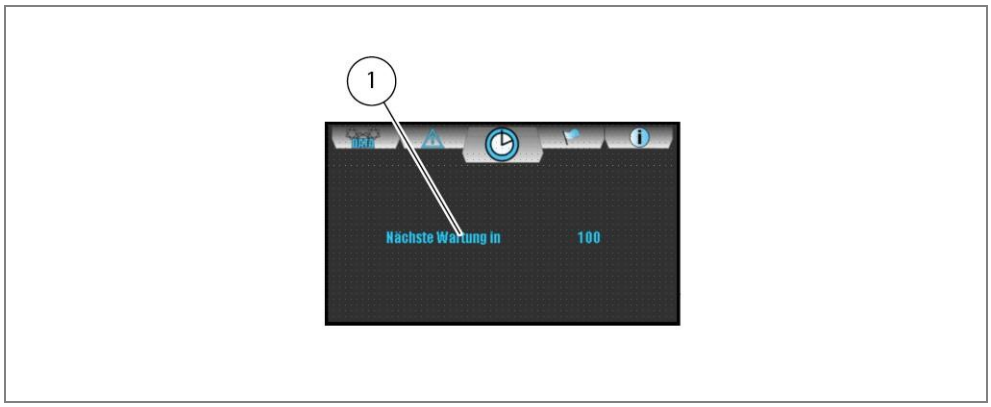


Fig. 35: Service

Item	Control lamp	Description
1	Maintenance counter	Display of remaining operating hours until next maintenance

Tab. 23: Service

8.3.5 Language selection

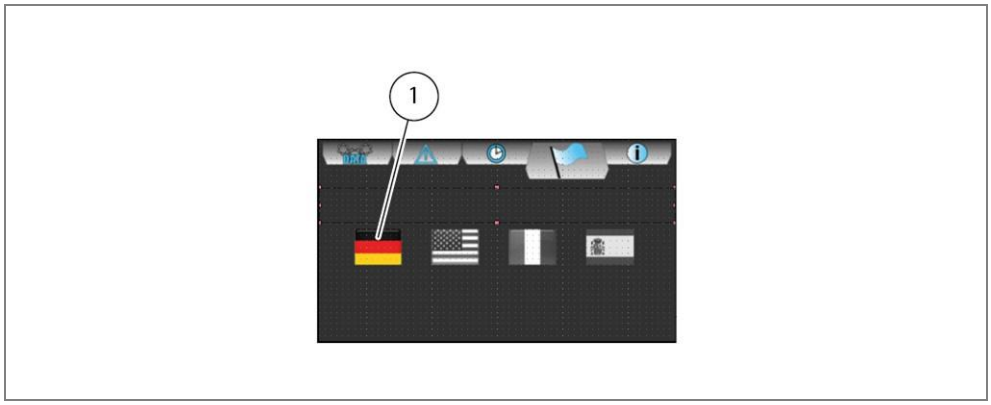


Fig. 36: Language selection

Item	Control lamp	Description
1	Language selection	Language selection in German, English, French, Spanish

Tab. 24: Language selection

The system language is set in the language selection sub-menu.

The language selection is opened by pressing the rotary knob.

The respective language can be selected by turning the rotary knob.

The respective languages are displayed by the corresponding national flags in the fields (1).

The following languages can be set depending on the programming:

- German
- English
- French
- Spanish

8.3.6 Software versions

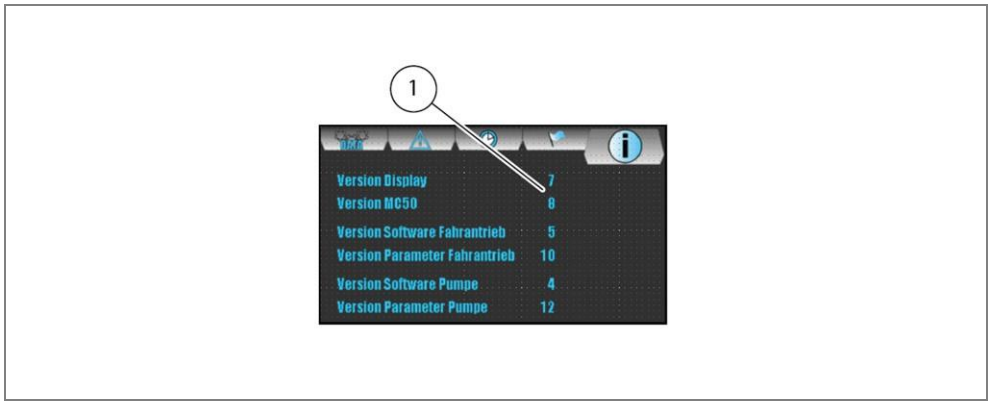


Fig. 37: Software versions

Item	Control lamp	Description
1	Software version	Current software version of the display and the MC50 Controller

Tab. 25: Software versions

9 Operation

9.1 Safety instructions

The requirements of the regulations for the prevention accidents, environmental protection and national safety regulations, where applicable, must be observed when operating the machine.

⚠ DANGER

Risk of accident due to operation on ascents, descents or tilted position!

There is a risk of accident by tipping of the machine during operation on ascents, descents (e.g. slopes, trenches, hills), in a tilted position as well as abrupt steering and drive movements.

- Determine maximum permissible ascent, descent and titled position under examination of the ground, weather conditions and consideration of the loading condition.
- Only operate the machine on very slight ascents/descents and tilted at very slight angles.
- Only tip out the dumper box with the machine in a level position on firm ground.
- The safety belt on the driver seat (optionally also on the passenger seat) must be worn.

⚠ DANGER

Risk of accident on downhill slopes!

Severe to fatal injury possible if the permissible towing load or the permissible weight of the vehicle/trailer combination is exceeded with a hitched trailer.

- Do not exceed the permissible towing load or the permissible vehicle/trailer combination weight.
- Only hitch and unhitch the trailer on level ground.

⚠ DANGER

Mortal danger due to liquids escaping under pressure!

Severe to fatal injuries possible if hydraulic fluid spurts out due to bursting or leakages.

- Have hydraulic lines older than 6 years replaced.

⚠ DANGER

Mortal danger due to liquids escaping under pressure!

Severe to fatal injuries possible if hydraulic fluid escapes when changing an add-on device by loosening the plug coupling.

- Only change the add-on device with the control switched off.

⚠ DANGER

Risk of injury due to fire!

Severe to fatal injuries possible if batteries ignite due to a short-circuit in the electrical system, internal/external heat or accident.

- Leave the danger zone around the vehicle immediately in case of fire.

⚠ DANGER

Risk of injury due to damaged tires!

There is a risk of injury if the machine is operated with damaged tires.

- Check tires for signs of wear and foreign bodies before starting operation.
- Change tires if necessary or take machine out of operation until they have been repaired.

⚠ DANGER

Risk of accident!

Severe to fatal injuries possible if dangers are not recognized due to missing, damage or dirty safety signs.

Check safety signs regularly for completeness and legibility.

⚠ WARNING

Risk of injury due to short-circuiting of the battery!

A short-circuit can lead to explosion of the battery.

- Do not remove any protective covers when the battery is on.

⚠ CAUTION

Risk of injury due to loose wheel nuts!

There is a risk of injury if the wheel nuts are not checked or retightened after a wheel change.

- Check wheel nuts after 10 operating hours and retighten if necessary.

⚠ CAUTION

Risk of injury from falling!

There is a risk of injury when persons stumble when climbing into the dumper box/tipper bed and injure themselves when falling.

Climbing into the dumper box/tipper bed is prohibited.

9.2 Operation

9.2.1 Driver seat

Adjusting the seat and putting on the belt

The driver seat must be adjusted for the operator every time before starting and every time the driver changes.

No objects may be kept in the range of movement of the driver seat.

The seat belt must be put on every time before driving off.

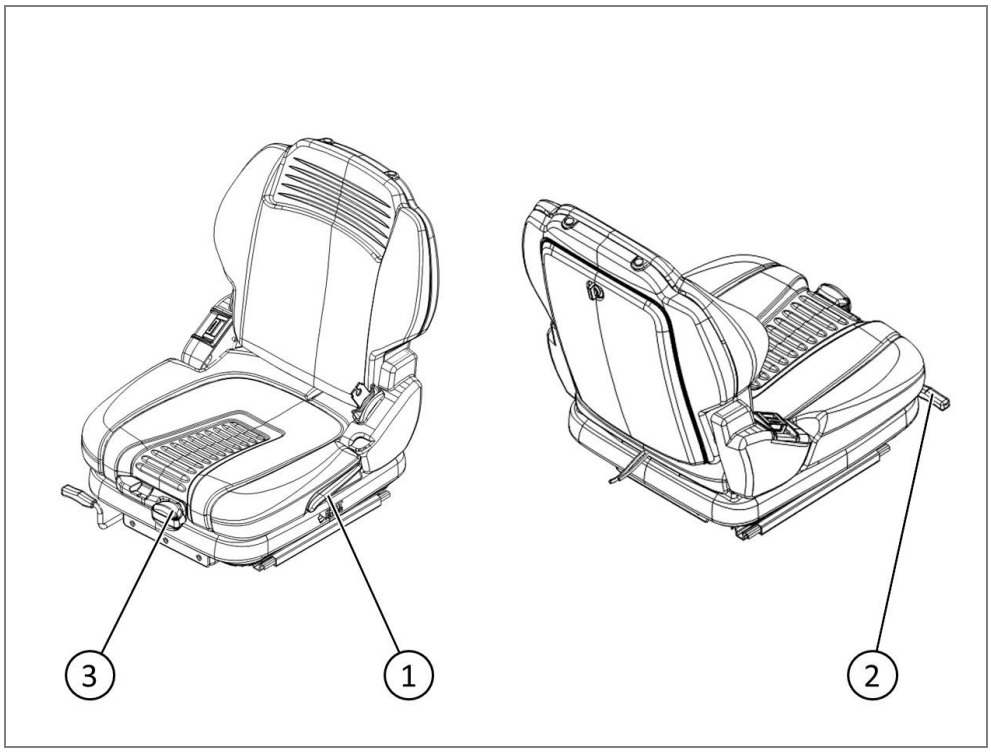


Fig. 38: Driver seat operation

1	Lever *Backrest adjustment*	2	Lever *Longitudinal adjustment*
3	Knob *Weight adjustment*		

- Adjust the backrest with the backrest adjustment lever (1).
  - – Pull the backrest adjustment lever (1) up and keep it pulled.
  - – Move the backrest into position.
  - – Release the lever.

  The handle must snap in.
  - Make the longitudinal setting.
  - – Pull the longitudinal adjustment lever (2) up and keep it pulled.
  - – Move the driver seat into position.
  - – Release the lever.

  The handle must snap in.

- Adjust the weight with the weight adjustment knob (3).
  Turn the knob clockwise: The suspension becomes harder.
  Turn the knob counterclockwise: The suspension becomes softer.

9.2.2 Lights

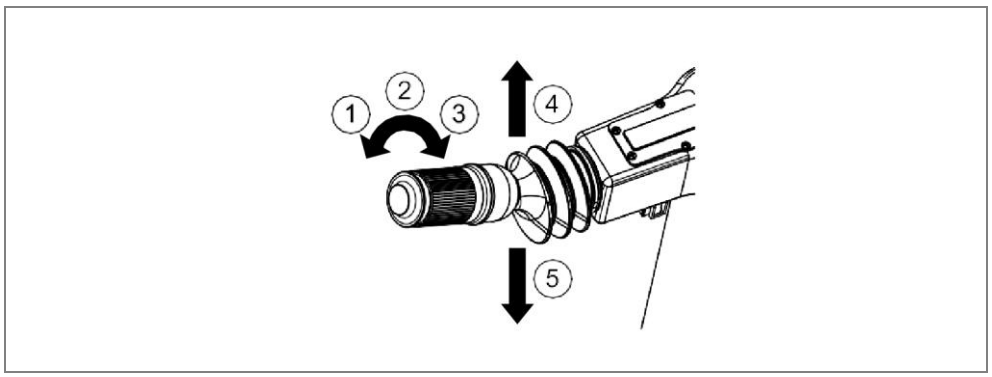


Fig. 39: Driving lights

- Position 1 - low beam
- Position 2 - parking light
- Position 3 - lights off
- Position 4 - headlight flasher
- Position 5 - high beam

9.2.3 Horn

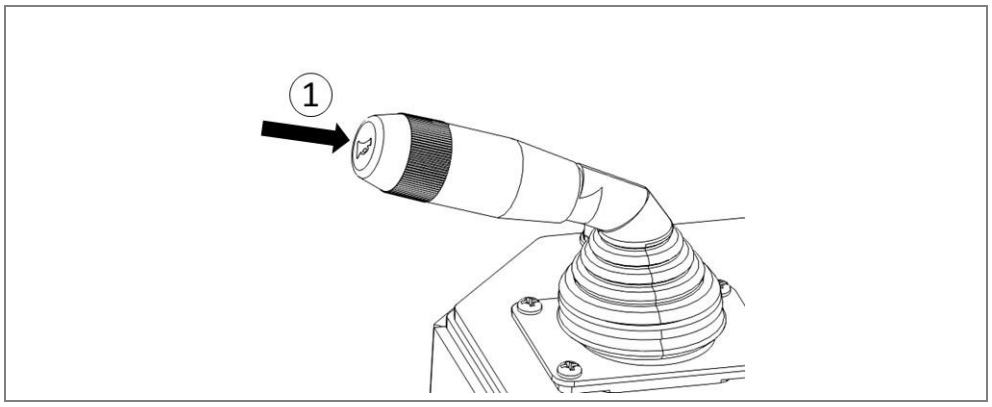


Fig. 40: Horn

1. Press button (1) to honk the horn.

9.2.4 Turn signals

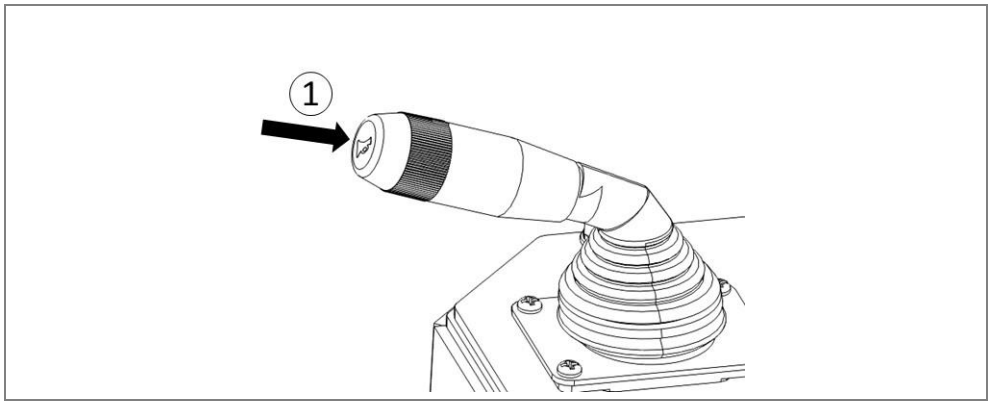


Fig. 41: Turn signals

Position 1 - right turn
Position 2 - left turn

9.2.5 Travel speed

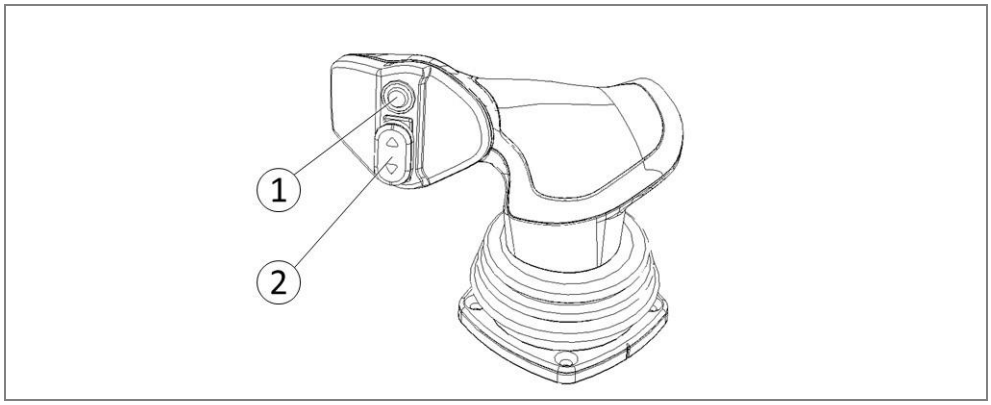


Fig. 42: Travel speed

Position 1 - switch between travel stages 1 & 2 (tortoise & hare)
Position 2 - travel directions

9.2.6 Hazard warning lights

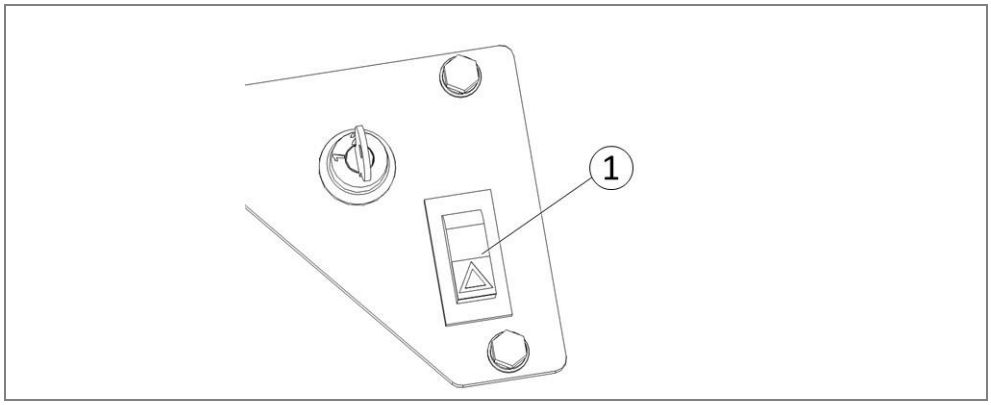


Fig. 43: Hazard warning lights

Pressing the hazard warning lights button (1) switches these on or off.

NOTE

The hazard warning lights button is on the right in the driver's cab.

9.3 Tests prior to starting work

1. Check the machine for completeness, damages and safe operating condition.
2. Check the dumper box for large accumulations of water, empty if necessary.
3. Check the machine environment to enable unhindered operation.
4. Check operating signs for completeness and legibility.
5. Check whether all operating levers have a smooth action and return to neutral position automatically.
6. Check steering orbitrol and rotary joint for leaks.
7. Check that the revolving driver's cab is locked.
8. Check the hydraulic fluid level (→ 9.3.3).
9. Check the battery capacity (→ 8.2.8.2) and recharge if necessary.
10. Check tire pressure.
11. Check the function of the electrical system.

9.4 Switching on the machine

Prerequisites for starting the machine:

- Tests are carried out before starting work.
- All control elements are in neutral position.

1. Switch on key switch.

The instrument panel runs a lamp function test. The control lamps light up briefly.

The machine is ready to drive.

9.5 Drive mode

⚠ DANGER

Risk of accident when standing in danger zones!

There is a risk of accident when persons are standing in the danger zones during operation of the machine.

- The operator must ensure that no persons are standing in the danger zones during operation of the machine.
- If the operator does not have a clear view of all danger zones, a second person must be recruited to give directions.

⚠ DANGER

Risk of accident due to rolling away of machine!

Severe to fatal injuries possible if the machine starts moving by itself.

- Apply the brake and switch off the machine at standstill to activate the parking brake automatically.
- Place chocks in front of the wheels before leaving the machine.

⚠ DANGER

Danger of being trapped or pulled in!

Severe to fatal injuries possible if persons get caught in the wheels.

- The operator must ensure that no persons are standing in the danger zones during operation of the machine.

⚠ DANGER

Danger in case of a machine fire!

In case of a machine fire, inflammable materials can quickly burst into flames and injure persons.

- Leave the cab immediately and move away from the machine in case of fire.
- Carry out fire fighting measures from the outside only with suitable fire extinguishers.

⚠ DANGER

Risk of injury when reversing!

When reversing, the field of vision might be obstructed to such an extent that persons are overlooked and run over.

- The machine driver must ensure that no persons are standing in the danger zone.
- Have another person give hand signals if necessary.
- Use the optional equipment such as reversing hazard warning signal and reversing camera if available.
- Honk the horn briefly before reversing.

⚠ DANGER

Risk of accident due to obstructed view!

When reversing with the seat turned, the load or superstructures could obstruct the field of vision to such an extent that persons are overlooked and run over.

- The seat must not be turned against the main direction of travel when the field of vision is obstructed by the load or by superstructures.

⚠ WARNING

Danger of impact!

There is a risk of injury when parts fall off the bed during transport of piece goods and injure bystanders.

- Always lash piece goods securely and observe other properties of piece goods.

⚠ WARNING

Risk of accident when driving with the dumper box railed!

There is a risk of injury to persons and damage to material when driving with the dumper box raised.

- Driving with the dumper box railed is only allowed for short distances for tipping processes at low speed.
- Take the extended danger zone into account when the dumper box is raised.

⚠ WARNING

Risk of accident!

There is a risk of injury of the machine should get stuck or sink during travel on insufficiently firm ground.

- Only drive in areas with sufficiently firm ground.

⚠ WARNING

Danger of impact!

There is a risk of injury if the driver stretches arms or other parts of the body out of the driver's cab.

- Never hold the arms or other parts of the body outside the driver's cab during travel.

⚠ WARNING

Danger of impact!

There is a risk of injury when the motor fails and the parking brake is activated.

- The safety belt on the driver seat (optionally also on the passenger seat) must be worn.

⚠ WARNING

Danger of impact!

There is a risk of injury when the passenger accidentally presses the accelerator or brake pedal and accelerates or decelerates the machine.

Always fold in the additional pedals and protect with the cover when carrying a passenger.

⚠ CAUTION

Risk of injury!

There is a risk of injury when the operator gets near the turning wheels during travel.

- Do not hang an arm down out of the driver's cab.

⚠ CAUTION

Risk of accident due to foreign bodies in the tires!

There is a risk of injury due to foreign bodies in the tires or due to dirty tires.

- If foreign bodies in the tires are suspected, stop the machine immediately and remove the foreign bodies, go to a specialized workshop if necessary.
- Clean dirty tires and check for foreign bodies daily and every time before driving on public highways.

Transport position

The superstructures must be moved into the transport position before transporting the machine.

⚠ WARNING – There is a risk of injury if the round dumper box should turn during travel.

- Make sure that the round dumper box is secured before driving off.

1. Mover the dumper box into the center position.
2. Lower the dumper box completely.
   The dumper box is resting on the rotation lock.
3. Check that the round dumper box is locked.

9.5.1 Driving on public highways

NOTE

Only persons with the appropriate driver's license may move the machine on public highways provided that the machine is licensed for public traffic.

The machine is not licensed for public traffic. However, the machine can be licensed optionally for public traffic with an official expertise. Consult Customer Service for further information. See Customer Service, page 134

The permissible total weight for driving on public highways is the value specified on the type plate.

Preparations for driving on private roads

1. Move the superstructures into the transport position.
2. Switch on the road lights.

3. Switch off the work floodlights.
4. Switch on the rotating beacon, if available.
5. Clean dirty tires and check for foreign bodies before driving on public highways.

9.5.2 Travel direction and driving

Changing the travel direction

NOTE

The travel direction should be changed at standstill or at low travel speed to avoid abrupt jolting of the machine.

Select the travel direction with the travel direction switch.

Decelerating the machine

1. Press the brake pedal to decelerate the machine.
   If the machine is only to be decelerated slightly, take your foot off the accelerator and use recuperation.
   The parking brake is applied automatically at standstill.

Driving

1. Select the travel direction.
2. Regulate the travel speed with the accelerator.
   The parking brake is released automatically.

9.5.3 Turning the driver's cab

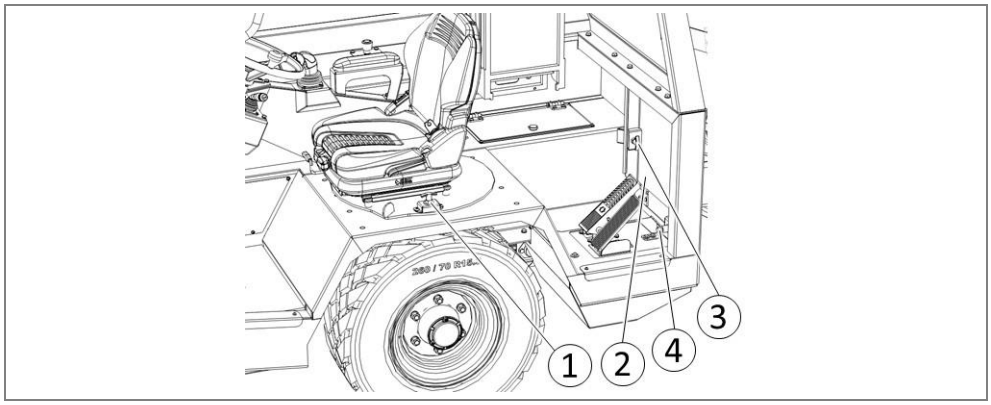


Fig. 44: Turning the driver's cab in the direction of the rear axle

1	Locking lever driver's cab	2	Cover for rear pedals
3	Locking lever for pedal cover	4	Locking pin for rear pedals

The machine has a revolving driver's cab. It can be turned 180° by operating the lever (1).

⚠ **CAUTION –** Risk of accident due to revolving driver's cab!

There is a risk of accident if the driver's cab is not locked correctly or the lock is actuated during travel.

- Check whether the lock is correctly engaged and the driver's cab is locked every time before driving off.
- Never actuate the lock during travel.

1. Bring the machine to a standstill and switch it off with the key switch.
2. Fold up the emergency seat if necessary.
3. Fold up the cover (2) of the rear pedals and lock with the lever (3).
4. Fold up the rear pedals until these snap in securely with the locking pin (4).
5. Actuate the lever (1) and turn the driver's cab 180°.
6. Make sure that the lever is correctly engaged again and the driver's cab cannot rotate unintentionally.

9.5.4 Trailer operation

Shunting coupling

NOTE

When towing on public highways, the legal regulations of the respective country of the owner must be observed.

- Use only on level ground.
- Use only for shunting a trailer on constructions sites and for towing.
- Do not exceed permissible loads. See Technical data, page 37

  The vehicle/trailer combination weight must not exceed the permissible total weight of the solo towing vehicle.

Trailer hitch (option)

Use only for shunting a trailer on constructions sites and for towing.

Do not exceed permissible loads. Further infomation in chapter Technical data on page 37

The vehicle/trailer combination weight must not exceed the permissible total weight of the solo towing vehicle.

The machine may only be used up to 12 % longitudinal tilt (climbs/descents).

9.6 Tipping operation

⚠ DANGER

Danger of crushing!

Accidental lifting/lowering of the dumper box/tipper bed by the operator can lead to severe crushing of persons in the danger zone or the bulk material by the dumper box/tipper bed.

- Make sure that no persons are standing in the danger zone during tipping operation.
- The dumper box/tipper bed must be in the transport position when not in use.

⚠ DANGER

Danger of crushing!

Severe to fatal injury possible if the machine tips when dumping frozen material in the dumper box/tipper bed.

- Only tip out the dumper box/tipper bed on horizontal level and firm ground.
- Check whether the contents of the dumper box/tipper bed have frozen before tipping at temperatures around freezing point.

⚠ DANGER

Danger of crushing!

There is a risk of accident by tipping over when lifting the dumper box on ascents or descents (e.g. slopes, trenches , hills) or in a tilted position.

- Only operate the machine within its application limits.
- Only lift the dumper box on a level surface and firm ground.

⚠ DANGER

Danger of crushing by the tipper bed!

The machine can tip over if the appropriate board wall is not opened before tipping out piece goods or bulk materials.

- Tipping out piece goods is prohibited.
- The appropriate board wall must be opened before tipping out bulk materials.

⚠ DANGER

Danger of impact!

Severe to fatal injuries possible if persons are standing in the danger zone during rotating/tipping of the dumper box/tipper bed.

- Make sure that no persons are standing in the danger zone during rotating/tipping of the dumper box/tipper bed.

⚠ WARNING

Danger due to uncontrolled machine movements!

There is a risk of uncontrolled machine movements of the three-sided dumper if the safety bolts are not inserted correctly.

- Do not insert safety bolts vertically opposite.
- Only tip the dumper box when two safety bolts are inserted according to the respectively selected tipping direction.
- Insert safety bolts according to the specifications in the chapter Structure and function.

Round dumper box

1. Drive the machine to the unloading site and line it up.
2. When the machine is at a standstill, unload it by actuating the joystick.
3. Lower the dumper box again.

Tipper bed

1. Drive the machine to the unloading site and line it up.
2. Switch off the machine and take out the ignition key.
3. Open the board wall in tipping direction, adapt the tipping direction by reinserting the safety bolts if necessary.
4. Sit in the driver seat, put on the seat belt and restart the machine.
5. When the machine is at a standstill, unload it by actuating the joystick.
6. Lower the dumper box again.
7. Switch off the machine and take out the ignition key.
8. Close the board wall of the tipping direction again.
9. Sit in the driver seat, put on the seat belt and restart the machine.

Manual lowering of the dumper box

The dumper box may have be lowered manually in the event of a malfunction.
Further infomation in chapter Faults on page 111

9.7 Inspections during operation

1. Monitor the machine for unusual movements and noises.
2. Observe control and warning indicators.
3. Check the machine continuously for fluid leakages.
4. If foreign bodies in the tires are suspected, stop the machine immediately and remove the foreign bodies, go to a specialized workshop if necessary.

9.8 Charging the drive motor battery

Connecting the vehicle to the electrical mains

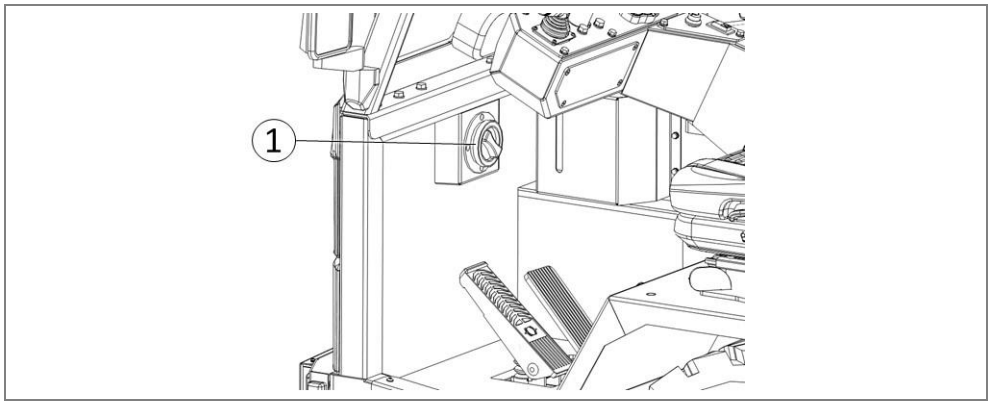


Fig. 45: Charging socket

1. Lower the dumper box (superstructures).
2. Switch off the machine with the key switch and remove the key.
3. Remove the cap of the charging plug (1) by turning.
4. Plug the charging cable into the vehicle first, then connect to the mains outlet.
5. The current charging state is shown in the display. The battery is fully charged when the capacity shows 100 %.

Disconnecting the vehicle from the electrical mains

1. Disconnect the charging cable from the mains first.
2. Then unplug the charging cable from the vehicle and close both caps on the plug and vehicle again.

9.9 Switching off the machine

1. Turn the travel direction switch to the center position.Further infomation in chapter Joystick on page 70
2. Switch off the ignition and remove the key.

Parking the machine

⚠ DANGER

Risk of accident due to rolling away of machine!

Severe to fatal injuries possible if the machine starts moving by itself.

- Apply the brake and switch off the machine at standstill to activate the parking brake automatically.
- Place chocks in front of the wheels before leaving the machine.

⚠ DANGER

Risk of accident due to rolling away of machine!

Severe to fatal injuries are possible if the drive lever is still i.n the drive position when leaving the machine and the machine starts moving of its own accord.

- When leaving the driver's cab, activate the parking brake, switch off the ignition and remove the key.

Procedure for parking the machine, e.g. at the end of a shift:

1. Move the dumper box into the transport position.
2. Switch off the drive motor.
3. Remove the key.
4. Place chocks in front of the wheels when parking the machine on a hill or when parking for a longer period of time.

It also applies for longer parking times:

1. Disconnect the power supply with the emergency stop switch.
2. Place chocks in front of the wheels.

9.10 Salvaging the machine

If the machine cannot be towed away after damage, it must be salvaged and transported away.

Contact Customer Service. Further infomation in chapter Transport, packing and storage on page 55

Contact a specialist company to have the machine salvaged.

Lift the machine onto a suitable transport vehicle by crane. Further infomation in chapter Customer Service on page 134

10 Maintenance

10.1 Safety instructions

The demands of the accident prevention regulations, environmental protection and, where necessary, national safety regulations must be observed during maintenance of the machine.

⚠ DANGER

Risk of accident due to missing safeguards during maintenance and repair work!

There is a risk of accident when carrying out maintenance and repair work without suitable safety measures against switching back on.

- Always remove the ignition key and keep it on your person when the machine is switched off.

⚠ DANGER

Risk of accident when standing in danger zones!

There is a risk of accident when persons are standing in the danger zones during operation of the machine.

- The operator must ensure that no persons are standing in the danger zones during operation of the machine.
- If the operator does not have a clear view of all danger zones, a second person must be recruited to give directions.

⚠ DANGER

Mortal danger due to liquids escaping under pressure!

Severe to fatal injuries possible if hydraulic fluid spurts out due to bursting or leakages.

- Have hydraulic lines older than 6 years replaced.

⚠ DANGER

Mortal danger due to liquids escaping under pressure!

Severe to fatal injuries possible if hydraulic fluid escapes when changing an add-on device by loosening the plug coupling.

- Only change the add-on device with the control switched off.

ATTENTION

Machine damage due to penetration by water!

- Clean without water in the area of the electrical system.

⚠ DANGER

Risk of injury when reversing!

When reversing, the field of vision might be obstructed to such an extent that persons are overlooked and run over.

- The machine driver must ensure that no persons are standing in the danger zone.
- Have another person give hand signals if necessary.
- Use the optional equipment such as reversing hazard warning signal and reversing camera if available.
- Honk the horn briefly before reversing.

⚠ DANGER

Risk of injury due to fire!

Severe to fatal injuries possible if batteries ignite due to a short-circuit in the electrical system, internal/external heat or accident.

- Leave the danger zone around the vehicle immediately in case of fire.

⚠ DANGER

Risk of accident!

Severe to fatal injuries possible if dangers are not recognized due to missing, damage or dirty safety signs.

Check safety signs regularly for completeness and legibility.

⚠ WARNING

Danger of impact!

There is a risk of injury when the motor fails and the parking brake is activated.

- The safety belt on the driver seat (optionally also on the passenger seat) must be worn.

⚠ WARNING

Danger of impact!

There is a risk of injury when parts fall off the bed during transport of piece goods and injure bystanders.

- Always lash piece goods securely and observe other properties of piece goods.

⚠ WARNING

Risk of accident due to inadequate protective devices!

There is a risk of accident due to missing, defective or incorrectly fitted protective devices.

- Equip all areas where protective devices are prescribed with the protective devices intended for this purpose.
- Always check protective devices for defects before use.
- Only fit protective devices as prescribed.

⚠ WARNING

Risk of injury due to short-circuiting of the battery!

A short-circuit can lead to explosion of the battery.

- Do not remove any protective covers when the battery is on.

⚠ WARNING

Risk of electric shock!

Severe to fatal injuries possible when carrying out maintenance work improperly on batteries or electrical cabinets.

- Have work performed only by trained specialists.

⚠ WARNING

Danger from inhaling health hazardous gases!

There is a risk of injury when the drive unit batteries overheat due to short-circuiting or overloading and emit toxic gases.

- Only use the included charger.
- If toxic gases are emitted, air the room thoroughly and leave as quickly as possible.

⚠ WARNING

Danger of impact!

There is a risk of injury when the passenger accidentally presses the accelerator or brake pedal and accelerates or decelerates the machine.

Always fold in the additional pedals and protect with the cover when carrying a passenger.

⚠ CAUTION

Risk of cutting injuries!

There is an increased risk of cutting injuries on sharp corners and parts during servicing work.

- Always wear the personal protective equipment.
- Only perform servicing work on the machine after it has been switched off and secured against switching back on.

⚠ CAUTION

Risk of injury!

There is a risk of injury when the operator gets near the turning wheels during travel.

- Do not hang an arm down out of the driver's cab.

⚠ CAUTION

Risk of injury from falling!

There is a risk of injury when persons stumble when climbing into the dumper box/tipper bed and injure themselves when falling.

Climbing into the dumper box/tipper bed is prohibited.

10.2 Performing the maintenance work

If defects or faults which endanger safe handling of the machine are detected during maintenance, starting the machine is prohibited until this defect/fault has been eliminated! The detected defects must be reported to the owner immediately so that they can take suitable countermeasures.

The work listed in the following chapters must be performed once in the period of time specified there.

Daily maintenance, for example, must be carried out once a day at a favorable time from an operational point of view.

Maintenance work according to operating hours must be performed after the appropriate number of operating hours.

Maintenance activities must be recorded in the machine's maintenance log. The maintenance log must be provided by the owner and is the prerequisite for any warranty claims.

Lubricants must be kept in clean, sealed containers in a dry and cool place until being used.

See the maintenance/repair instructions for maintenance work that is not listed below.

NOTE

In multiple shift operation, it must be determined which person carries out the necessary maintenance.

NOTE

The specified time periods apply for normal operating conditions. Shorter intervals may be advisable under extreme application and operating conditions. Please consult us in such cases.

10.3 Maintenance schedule

NOTE

Daily maintenance work and lubrication specifications are listed separately in this documentation.

Maintenance activity	Interval (in operating hours)			Remark
	200	500	1000	
Change axle and gear oil – front steering axle		X	X	5.4 liters
Change axle and gear oil – rear steering axle		X	X	6.4 liters
Check hydraulic oil level at the sight glass	X	X	X	See Checking filling levels, page 110
Check brake fluid level	X	X	X	See Checking filling levels, page 110
Lubricate the machine	X	X	X	Further infomation in chapter Lubricating the machine on page 102
Measure through the machine	X	X	X	
Change hydraulic filter element			X	

Tab. 26: Maintenance plan

Lubricants

Axle and gear oil	LS85W90

10.4 Visual inspection (daily)

- Check that all machine covers are available and secured in place.
- Check machine for externally visible signs of damage.
- Check machine for oil leaks. If leakage occurs, the leaks must b e fixed.
- Check steering for tightness.
- Check that all machine hoods/covers are available and secured in place.
- Check tires for damage and foreign bodies.
- Check chassis for damage and leaks.
- Check steering orbitrol and rotary joint for leaks.
- Check hydraulic lines for aging and damage.

10.5 Lubricating the machine

⚠ DANGER

Danger of crushing!

When working under the raised dumper box/tipper bed, there is a risk of accident by crushing when, for example, the dumper box/tipper bed suddenly drops due to a pressure drop in the hydraulic system.

- The color-coded safety supports must be inserted into the tipping device before any work under the raised dumper box/tipper bed.
- Before inserting the safety supports, make sure that the dumper box/tipper bed is resting stably in the upper end position.
- The safety supports must always be inserted from the outside so that there is no activity underneath the railed dumper box/tipper bed.

⚠ DANGER

Danger of impact!

Severe to fatal injuries possible if persons are standing in the danger zone during rotating/tipping of the dumper box/tipper bed.

- Make sure that no persons are standing in the danger zone during rotating/tipping of the dumper box/tipper bed.

10.5.1 Flaps/locks

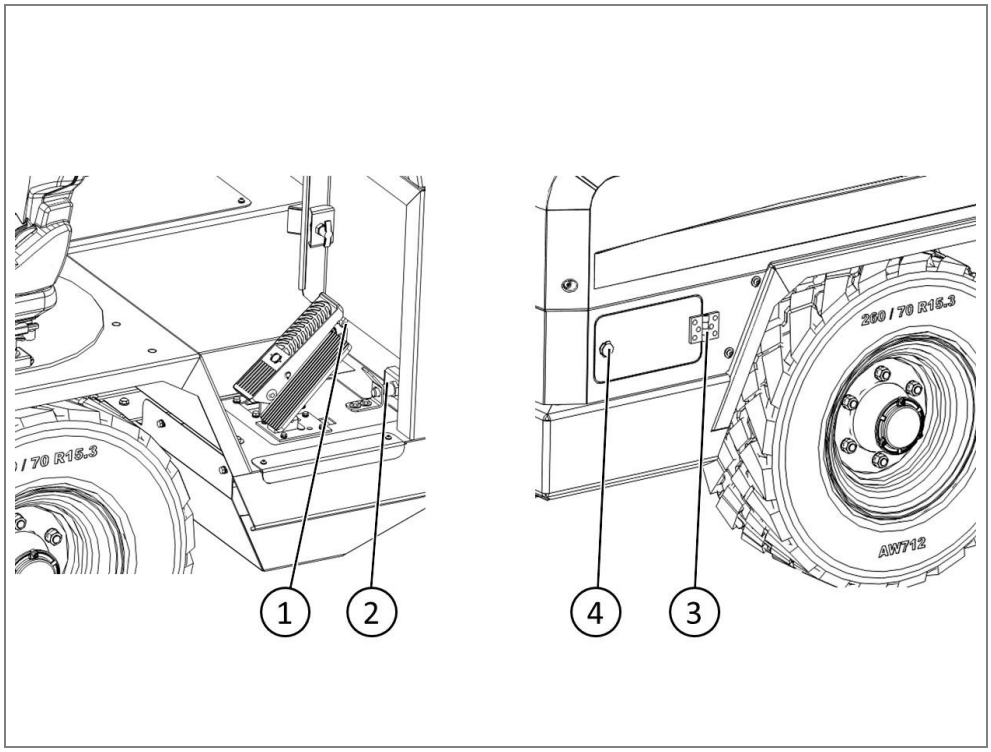


Fig. 46: Lubricating points of flaps/locks

Item	Maintenance point	Interval	Lubricant specification	Quantity	Remark
1	Hinges rear pedals cover	weekly	KP2K-30 DIN 51825	until grease emerges	2 grease nipples
2	Lock rear pedals cover	weekly	Grease spray	as required	Lubrication of lock
3	Hinges maintenance flap fuse box	weekly	Grease spray	as required	1 hinge
4	Lock maintenance flap fuse box	weekly	Grease spray	as required	Lubrication of lock

Tab. 27: Lubricating points of flaps/locks

10.5.2 Prop shaft

Fig. 47: Lubricating points of prop shaft

Item	Maintenance point	Interval	Lubricant specification	Quantity	Remark
1	Universal joint	weekly	KP2K-30 DIN 51825	until grease emerges	1 grease nipple per universal joint

Tab. 28: Lubricating points of prop shaft

10.5.3 Chassis

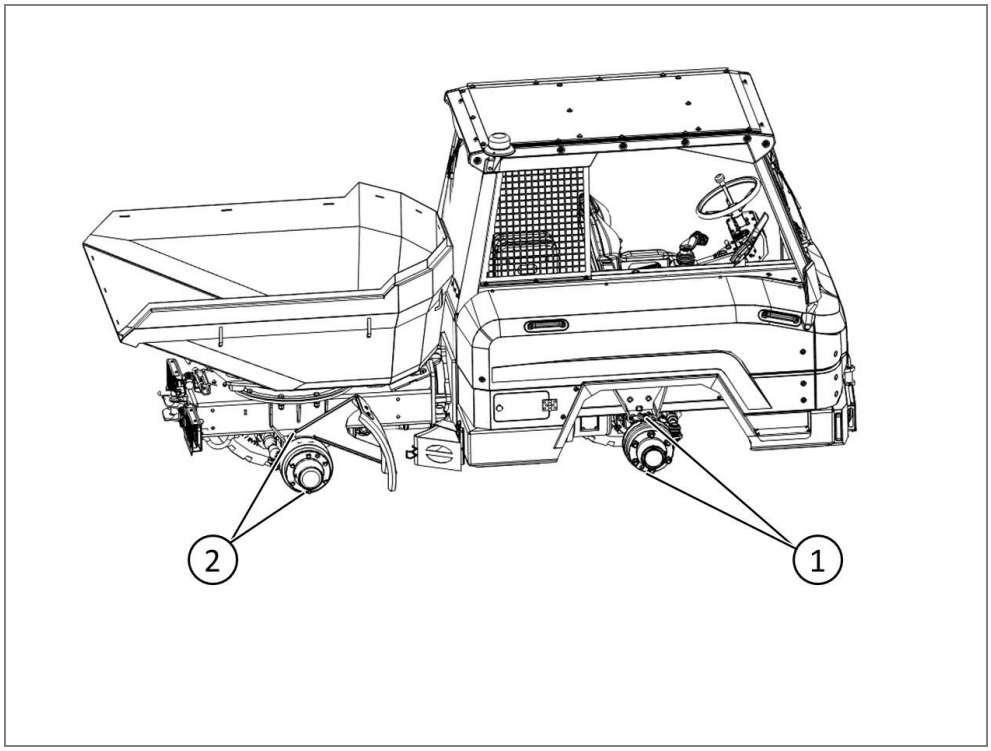


Fig. 48: Lubricating points of chassis

Item	Maintenance point	Interval	Lubricant specification	Quantity	Remark
1	Front axle joint	weekly	KP2K-30 DIN 51825	until grease emerges	4 grease nipples
2	Rear axle joint	weekly	KP2K-30 DIN 51825	until grease emerges	4 grease nipples

Tab. 29: Lubricating points of chassis

10.5.4 Driver's cab

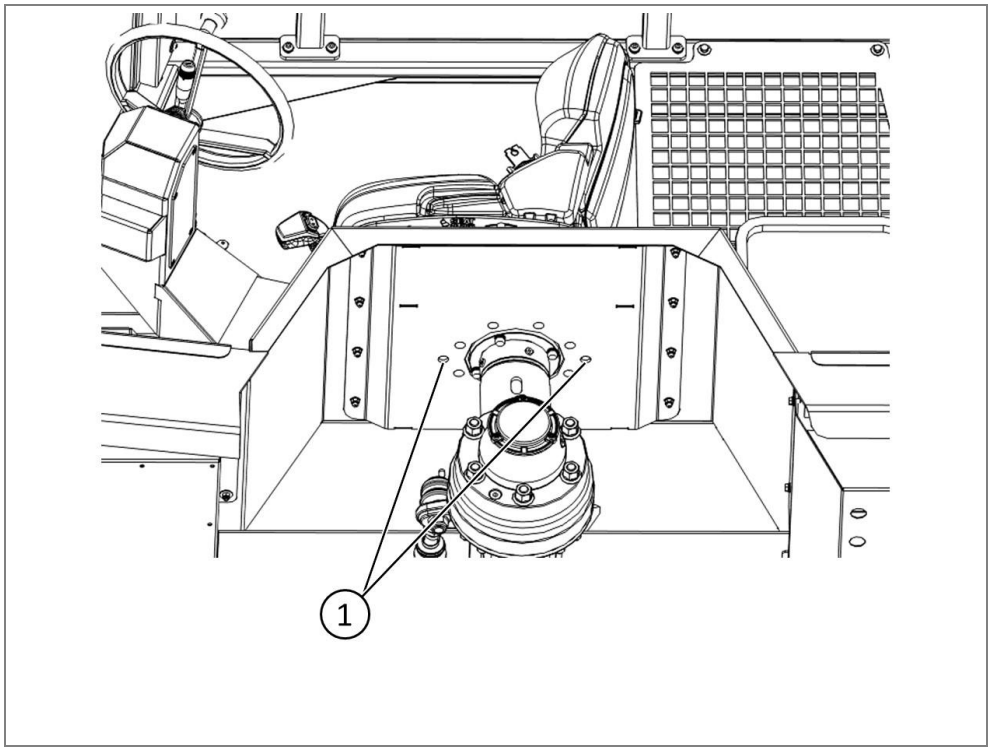


Fig. 49: Driver's cab lubricating points

Item	Maintenance point	Interval	Lubricant specification	Quantity	Remark
1	Driver's cab ball ring	weekly	KP2K-30 DIN 51825	until grease emerges	2 grease nipples

Tab. 30: Driver's cab lubricating points

10.5.5 Swing joint

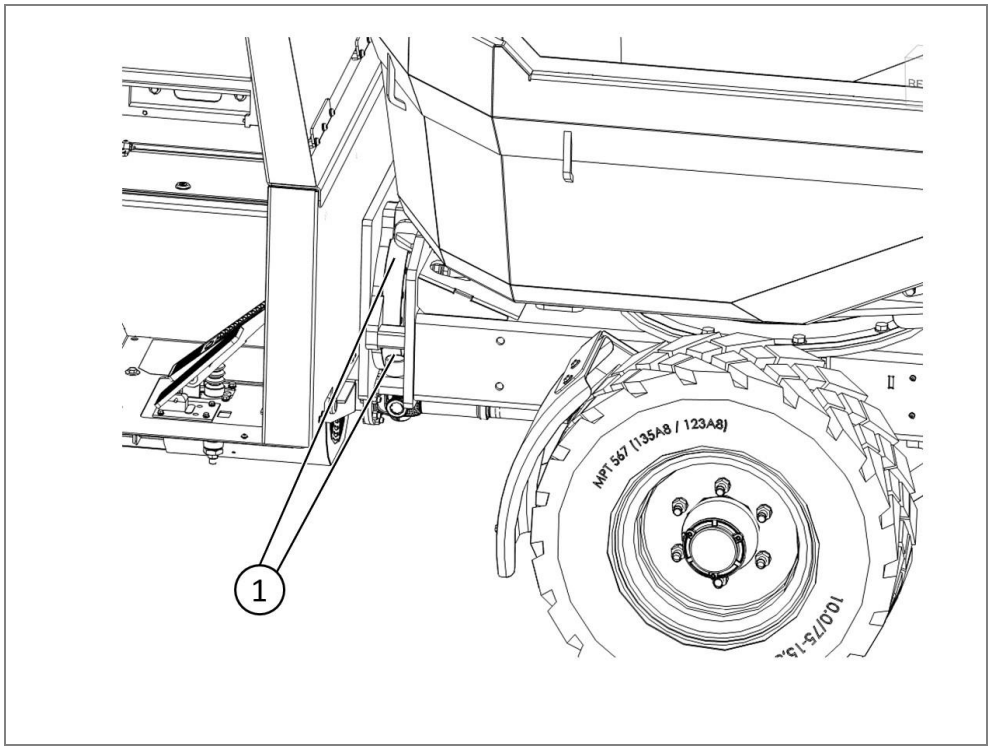


Fig. 50: Swing joint lubricating points

Item	Maintenance point	Interval	Lubricant specification	Quantity	Remark
1	Swing joint	weekly	KP2K-30 DIN 51825	until grease emerges	2 grease nipples

Tab. 31: Swing joint lubricating points

10.5.6 Rotary dumper box

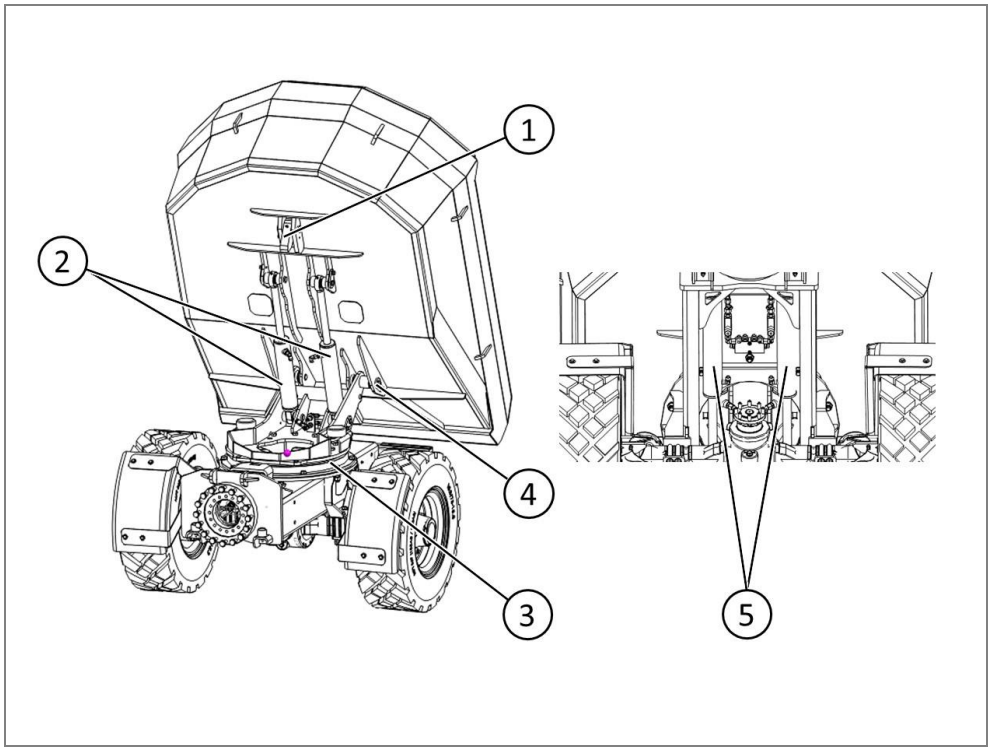


Fig. 51: Rotary dumper box lubricating points

Item	Maintenance point	Interval	Lubricant specification	Quantity	Remark
1	Locking lever *Dumper box*	daily	KP2K-30 DIN 51825	until grease emerges	1 grease nipples
2	Hydraulic cylinder *Dumper box*	daily	KP2K-30 DIN 51825	until grease emerges	4 grease nipples
3	Slewing ring	daily	KP2K-30 DIN 51825	until grease emerges	4 grease nipples
4	Pivot points *Dumper box*	daily	KP2K-30 DIN 51825	until grease emerges	2 grease nipples
5	Hydraulic cylinder *Swivel device*	daily	KP2K-30 DIN 51825	until grease emerges	4 grease nipples

Tab. 32: Rotary dumper box lubricating points

10.5.7 Tipper bed

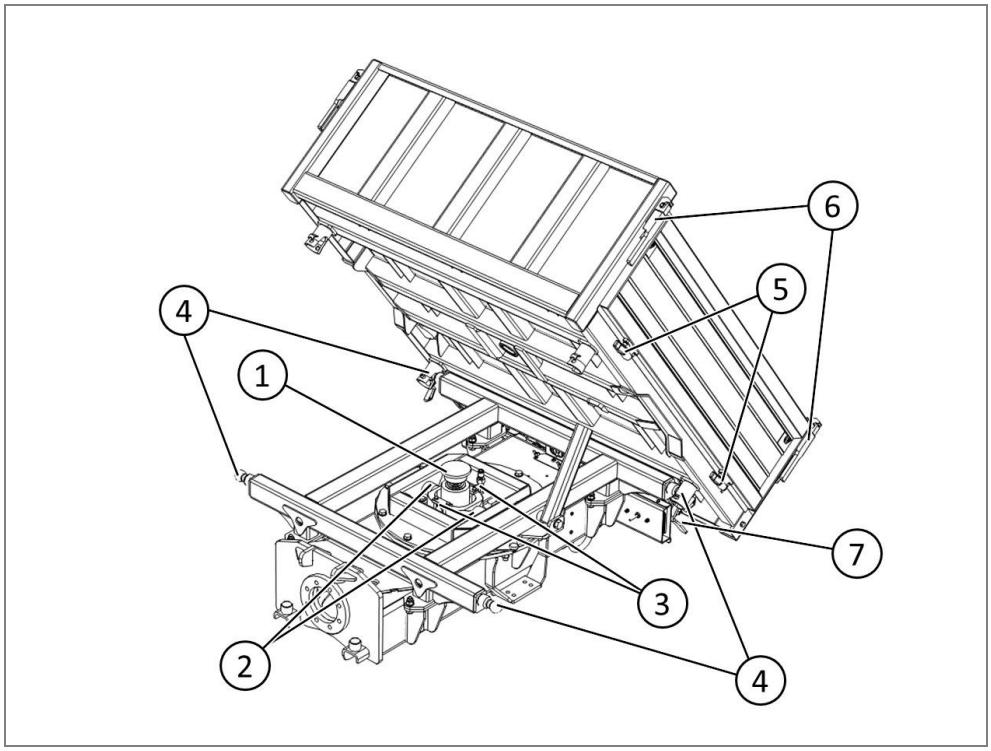


Fig. 52: Tipper bed lubricating points

Item	Maintenance point	Interval	Lubricant specification	Quantity	Remark
1	Telescopic cylinder top	daily	KP2K-30 DIN 51825	until grease emerges	1 grease nipples
2	Pedestal bearing	daily	KP2K-30 DIN 51825	until grease emerges	2 grease nipples
3	Telescopic cylinder pin bearing	daily	KP2K-30 DIN 51825	as required	2 pins
4	Tipper bearings	daily	KP2K-30 DIN 51825	as required	4 pieces
5	Board wall hinges	daily	KP2K-30 DIN 51825	as required	6 pieces
6	Board wall lock	daily	KP2K-30 DIN 51825	as required	6 pieces
7	Rear board wall lock	daily	KP2K-30 DIN 51825	as required	All pivot points

Tab. 33: Tipper bed lubricating points

10.6 Checking filling levels

NOTE

The hydraulic fluid level must be checked at operating temperature.

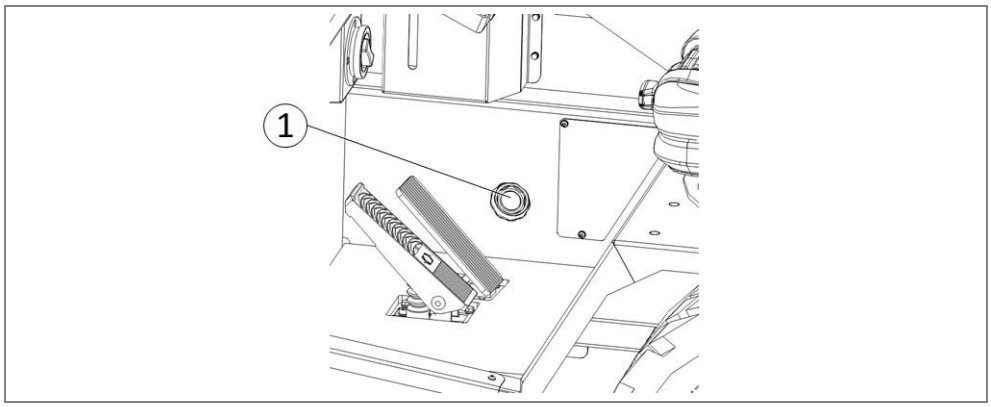


Fig. 53: Hydraulic fluid filling level indicator

1. Switch off the drive motor.
2. Read the filling level of the hydraulic fluid at the level indicator (1).
   The filling level is correct when the sight glass is filled to at least the center when the operating cylinders are fully retracted.

10.7 Checking the tire pressure

NOTE

Check the tightening torque of the wheel nuts after 10 operating hours after changing the wheels.

Tire size	Tire type	Front tire pressure	Rear tire pressure	Wheel nuts tightening torque
10.0/75 - 15.3	BKT MP567	3.2 bar	6.4 bar	330 Nm
10.0/75 - 15.3 (option)	BKT AS504			
260/70 R15.3 (option)	BKT AW712	2.4 bar	3.2 bar	

Tab. 34: Tire pressure

11 Faults

11.1 Safety instructions

⚠ DANGER

Risk of accident due to missing safeguards during maintenance and repair work!

There is a risk of accident when carrying out maintenance and repair work without suitable safety measures against switching back on.

- Always remove the ignition key and keep it on your person when the machine is switched off.

⚠ WARNING

Risk of accident due to inadequate protective devices!

There is a risk of accident due to missing, defective or incorrectly fitted protective devices.

- Equip all areas where protective devices are prescribed with the protective devices intended for this purpose.
- Always check protective devices for defects before use.
- Only fit protective devices as prescribed.

Unusual noises, faults or changes in the operating behavior of the machine indicate a machine defect. In such cases, the causes of the fault must be determined by consulting the fault table.

Work may only be continued after the fault has been completely eliminated.

When repairing faults, remember that there may still be residual mechanical, hydraulic and electrical/electronic energy.

NOTE

Consult the electrical circuit diagrams and hydraulic plans for troubleshooting. See annex.

11.2 General faults

Fault	Cause	Note
Consumers not working correctly	Dirty hydraulic fluid filter	Restricted flow through the hydraulic fluid filter 1. Replace hydraulic filter element.
	Hydraulic fluid gets too hot.	• Check hydraulic fluid heat exchanger for soiling and clean with air if necessary.
	Heavy leakage at hydraulic connections or defective hydraulic line	• Check hydraulic system for leaks and repair if necessary.
	Incorrect hydraulic settings	• Check set values and correct if necessary.

Tab. 35: General faults

11.3 Faults on the electrical system

NOTE

Work on the electrical system may only be performed by qualified electricians.

Fault	Cause	Note
Electrical components not working	Defective electric fuse	• Check electric fuses and replace if necessary.
Headlights not working	Defective fuse or lamp	• Check position of the respective switch. • Check electric fuses and replace if necessary.

Tab. 36: Faults on the electrical system

11.4 Troubleshooting Chart

Code	Programmer LCD Display Effect of fault	Possible Cause	Set/clear conditions
12	**Controller Overcurrent** *ShutdownMotor;* *ShutdownMainContactor;* *ShutdownEMBrake;* *ShutdownThrottle;* *FullBrake.*	1. External short of phase U,V, or W motor connections. 2. Motor parameters are mistuned. 3. Controller defective. 4. Speed encoder noise problems	*Set:* Phase current exceeded the current measurement limit. *Clear:* Cycle KSI.

13	**Current Sensor Fault** *ShutdownMotor;* *ShutdownMainContactor;* *ShutdownEMBrake;* *ShutdownThrottle;* *FullBrake.*	1. Leakage to vehicle frame from phase U, V, or W (short in motor stator). 2. Controller defective	*Set:* Controller current sensors have invalid offset reading. *Clear:* Cycle KSI.
14	**Precharge Failed** *ShutdownMotor;* *ShutdownMainContactor;* *ShutdownEMBrake;* *ShutdownThrottle;* *FullBrake.*	1. See Monitor menu » Battery: Capacitor Voltage. 2. Open circuit in external precharge relay, external precharge resistor, or associated wiring. 3. External load on capacitor bank (B+ connection terminal) that prevents the capacitor bank from charging	*Set:* Precharge failed to charge the capacitor bank from the external precharge resistor. *Clear:* Cycle Interlock input or use VCL function *Enable_Precharge()*.
15	**Controller Severe Undertemp** *ShutdownMotor;* *ShutdownMainContactor;* *ShutdownEMBrake;* *ShutdownThrottle;* *FullBrake.*	1. See Monitor menu » Controller: Temperature. 2. Controller is operating in an extreme environment.	*Set:* Heatsink temperature below –40°C. *Clear:* Bring heatsink temperature above –40°C, and cycle interlock or KSI.
16	**Controller Severe Overtemp** *ShutdownMotor;* *ShutdownMainContactor;* *ShutdownEMBrake;* *ShutdownThrottle;* *FullBrake.*	1. See Monitor menu » Controller: Temperature. 2. Controller is operating in an extreme environment. 3. Excessive load on vehicle. 4. Improper mounting of controller.	*Set:* Heatsink temperature above +95°C. *Clear:* Bring heatsink temperature below +95°C, and cycle interlock or KSI.
17	**Severe B+ Undervoltage** *No drive torque.*	1. Battery parameters are misadjusted. 2. Non-controller system drain on battery. 3. Battery resistance too high. 4. Battery disconnected while driving. 5. See Monitor menu » Battery: Capacitor Voltage. 6. Blown B+ fuse or main contactor did not close	*Set:* Capacitor bank voltage dropped below the Severe Undervoltage limit (see pages 23 and 61) with FET bridge enabled. *Clear:* Bring capacitor voltage above Severe Undervoltage limit.
17	**Severe KSI Undervoltage** *If below brownout voltage, motor current is switched off and reset may occur.*	1. See Monitor menu » Battery: Keyswitch Voltage. 2. Non-controller system drain on low power circuit voltage. 3. Resistance in low power circuit too high. 4. Low power circuit power source disconnected while driving. 5. Blown fuse.	*Set:* KSI voltage dropped below 8.4 V (Brownout occurs at 8.0 V.) *Clear:* Bring KSI voltage above 8.4 V.

18	**Severe B+ Overvoltage** *ShutdownMotor;* *ShutdownMainContactor;* *ShutdownEMBrake;* *ShutdownThrottle;* *FullBrake.*	1. See Monitor menu » Battery: Capacitor Voltage. 2. Battery parameters are misadjusted. 3. Battery resistance too high for given regen current. 4. Battery disconnected while regen braking.	*Set:* Capacitor bank voltage exceeded the Severe Overvoltage limit (see pages 23 and 61) with FET bridge enabled. *Clear:* Bring capacitor voltage below Severe Overvoltage limit, and then cycle KSI.
18	**Severe KSI Overvoltage** *ShutdownMotor;* *ShutdownMainContactor;* *ShutdownEMBrake;* *ShutdownThrottle;* *FullBrake.*	1. See Monitor menu » Battery: Keyswitch Voltage. 2. Incorrect low power circuit voltage applied. 3. Low power circuit voltage spike caused by inductive load switching, etc.	*Set:* KSI voltage exceeded 20 V. *Clear:* Bring KSI voltage below 20 V, and then cycle KSI.
22	**Controller Overtemp Cutback** *Reduced drive and brake torque.*	1. See Monitor menu » Controller: Temperature. 2. Controller is performance-limited at this temperature. 3. Controller is operating in an extreme environment. 4. Excessive load on vehicle. 5. Improper mounting of controller.	*Set:* Heatsink temperature exceeded 85°C. *Clear:* Bring heatsink temperature below 85°C.
23	**B+ Undervoltage Cutback** *Reduced drive torque.*	1. Normal operation. Fault indicates the batteries need recharging. Controller is performance limited at this voltage. 2. Battery parameters are misadjusted. 3. Non-controller system drain on battery. 4. Battery resistance too high. 5. Battery disconnected while driving. 6. See Monitor menu » Battery: Capacitor Voltage. 7. Blown B+ fuse or main contactor did not close.	*Set:* Capacitor bank voltage dropped below the Undervoltage limit with the FET bridge enabled. *Clear:* Bring capacitor voltage above the Undervoltage limit.
24	**B+ Overvoltage Cutback** *Reduced brake torque. Note: This fault is declared only when the controller is running in regen.*	1. Normal operation. Fault shows that regen braking currents elevated the battery voltage during regen braking. Controller is performance limited at this voltage. 2. Battery parameters are misadjusted. 3. Battery resistance too high for given regen current. 4. Battery disconnected while regen braking. 5. See Monitor menu » Battery: Capacitor Voltage.	*Set:* Capacitor bank voltage exceeded the Overvoltage limit with the FET bridge enabled. *Clear:* Bring capacitor voltage below the Overvoltage limit.
25	**+5V Supply Failure**	1. External load impedance on the +5V supply (pin 26) is too low.	*Set:* +5V supply (pin 26) outside the 5 V±10% range.

	None, unless a fault action is programmed in VCL.	2. See Monitor menu » outputs: 5 Volts and Ext Supply Current.	*Clear:* Bring voltage within range.
26	**Digital Out 6 Open/Short** *Digital Output 6 driver will not turn on.*	1. External load impedance on Digital Output 6 driver (pin 19) is too low.	*Set:* Digital Output 6 (pin 19) current exceeded 1 Amp. *Clear:* Remedy the overcurrent cause and use the VCL function *Set_DigOut()* to turn the driver on again.
27	**Digital Out 7 Open/Short** *Digital Output 7 driver will not turn on.*	1. External load impedance on Digital Output 7 driver (pin 20) is too low.	*Set:* Digital Output 7 (pin 20) current exceeded 1 Amp. *Clear:* Remedy the overcurrent cause and use the VCL function *Set_DigOut()* to turn the driver on again.
28	**Motor Temp Hot Cutback** *Reduced drive torque.*	1. Motor temperature is at or above the programmed Temperature Hot setting, and the current is being cut back. 2. Motor Temperature Control Menu parameters are mistuned. 3. See Monitor menu » Motor: Temperature and » Inputs: Analog2. 4. If the application doesn't use a motor thermistor, Temp Compensation and Temp Cutback should be programmed Off.	*Set:* Motor temperature is at or above the Temperature Hot parameter setting. *Clear:* Bring the motor temperature within range.
29	**Motor Temp Sensor Fault** *MaxSpeed reduced (LOS, Limited Operating Strategy), and motor temperature cutback disabled.*	1. Motor thermistor is not connected properly. 2. If the application doesn't use a motor thermistor, Motor Temp Sensor Enable should be programmed Off. 3. See Monitor menu » Motor: Temperature and » Inputs: Analog2.	*Set:* Motor thermistor input (pin 8) is at the voltage rail (0 V or 10 V). *Clear:* Bring the motor thermistor input voltage within range.
31	**Coil1 Driver Open/Short** *ShutdownDriver1*	1. Open or short on driver load. 2. Dirty connector pins. 3. Bad crimps or faulty wiring	*Set:* Driver 1 (pin 6) is either open or shorted. This fault can be set only when Main Enable = Off. *Clear:* Correct open or short, and cycle driver.
31	**Main Open/Short** *ShutdownMotor;* *ShutdownMainContactor;* *ShutdownEMBrake;* *ShutdownThrottle;* *FullBrake.*	1. Open or short on driver load. 2. Dirty connector pins. 3. Bad crimps or faulty wiring.	*Set:* Main contactor driver (pin 6) is either open or shorted. This fault can be set only when Main Enable = On. *Clear:* Correct open or short, and cycle driver
32	**Coil2 Driver Open/Short** *ShutdownDriver2.*	1. Open or short on driver load. 2. Dirty connector pins. 3. Bad crimps or faulty wiring.	*Set:* Driver 2 (pin 5) is either open or shorted. This fault can be set only when EM Brake Type = 0. *Clear:* Correct open or short, and cycle driver.

32	**EMBrake Open/Short** *ShutdownEMBrake;* *ShutdownThrottle;* *FullBrake.*	1. Open or short on driver load. 2. Dirty connector pins. 3. Bad crimps or faulty wiring.	*Set:* Electromagnetic brake driver (pin 5) is either open or shorted. This fault can be set only when EM Brake Type >0. *Clear:* Correct open or short, and cycle driver.
33	**Coil3 Driver Open/Short** *ShutdownDriver3*	1. Open or short on driver load. 2. Dirty connector pins. 3. Bad crimps or faulty wiring.	*Set:* Driver 3 (pin 4) is either open or shorted. *Clear:* Correct open or short, and cycle driver.
34	**Coil4 Driver Open/Short** *ShutdownDriver4*	1. Open or short on driver load. 2. Dirty connector pins. 3. Bad crimps or faulty wiring.	*Set:* Driver 4 (pin 3) is either open or shorted. *Clear:* Correct open or short, and cycle driver.
35	**PD Open/Short** *ShutdownPD.*	1. Open or short on driver load. 2. Dirty connector pins. 3. Bad crimps or faulty wiring.	*Set:* Proportional driver (pin 2) is either open or shorted. *Clear:* Correct open or short, and cycle driver.
36	**Encoder Fault** *ShutdownEMBrake;* Motor disabled.	1. Motor encoder failure. 2. Bad crimps or faulty wiring. 3. See Monitor menu » Motor: Motor RPM.	*Set:* Motor encoder phase failure detected. *Clear:* Either cycle KSI, or if parameter LOS Upon Encoder Fault= On and Interlock has been cycled, then the Encoder Fault is cleared and Encoder LOS fault (code 93) is set, allowing limited motor control.
36	**Sin/Cos Sensor Fault** *ShutdownEMBrake;* Motor disabled.	1. Sin/Cos sensor failure. 2. Bad crimps or faulty wiring. 3. See Monitor menu » Motor: Motor RPM	*Set:* Greater than Sin_Cos_Fault_Threshold % difference from expected value between two phases seen 5 times within one second. *Clear:* Cycle KSI, or VCL reset, or Entry into LOS mode if enabled, (or entry into an ACIM autocharacterization).
37	**Motor Open** *ShutdownMotor;* *ShutdownMainContactor;* *ShutdownEMBrake;* *ShutdownThrottle;* *FullBrake.*	1. Motor phase is open. 2. Bad crimps or faulty wiring.	*Set:* Motor phase U, V, or W detected open. *Clear:* Cycle KSI.
38	**Main Contactor Welded** *ShutdownMotor;* *ShutdownMainContactor;* *ShutdownEMBrake;* *ShutdownThrottle;* *FullBrake.*	1. Main contactor tips are welded closed. 2. Motor phase U or V is disconnected or open. 3. An alternate voltage path (such as an external precharge resistor) is providing a current to the capacitor bank (B+ connection terminal).	*Set:* Just prior to the main contactor closing, the capacitor bank voltage (B+ connection terminal) was loaded for a short time and the voltage did not discharge. *Clear:* Cycle KSI

39	**Main Contactor Did Not Close** *ShutdownMotor;* *ShutdownMainContactor;* *ShutdownEMBrake;* *ShutdownThrottle;* *FullBrake.*	1. Main contactor did not close. 2. Main contactor tips are oxidized, burned, or not making good contact.* 3. External load on capacitor bank (B+ connection terminal) that prevents capacitor bank from charging. 4. Blown B+ fuse.	*Set:* With the main contactor commanded closed, the capacitor bank voltage (B+ connection terminal) did not charge to B+. *Clear:* Cycle KSI. *New contactors may need to be cycled electrically & mechanically to remove any non-conductive material on the tips. Use reduced voltage (e.g., 12V) to prevent tip damage through excessive arcing.
41	**Throttle Wiper High** *ShutdownThrottle*	1. See Monitor menu » Inputs: Throttle Pot. 2. Throttle pot wiper voltage too high.	*Set:* Throttle pot wiper (pin 16) voltage is higher than the high fault threshold (can be changed with the VCL function *Setup_Pot_Faults()*). *Clear:* Bring throttle pot wiper voltage below the fault threshold.
42	**Throttle Wiper Low** *ShutdownThrottle.*	1. See Monitor menu » Inputs: Throttle Pot. 2. Throttle pot wiper voltage too low.	*Set:* Throttle pot wiper (pin 16) voltage is lower than the low fault threshold (can be changed with the VCL function *Setup_Pot_Faults()*). *Clear:* Bring throttle pot wiper voltage above the fault threshold.
43	**Pot2 Wiper High** *FullBrake.*	1. See Monitor menu » Inputs: Pot2 Raw. 2. Pot2 wiper voltage too high.	*Set:* Pot2 wiper (pin 17) voltage is higher than the high fault threshold (can be changed with the VCL function *Setup_Pot_Faults()*). *Clear:* Bring Pot2 wiper voltage below the fault threshold.
44	**Pot2 Wiper Low** *FullBrake.*	1. See Monitor menu » Inputs: Pot2 Raw. 2. Pot2 wiper voltage too low.	*Set:* Pot2 wiper (pin 17) voltage is lower than the low fault threshold (can be changed with the VCL function *Setup_Pot_Faults()*). *Clear:* Bring Pot2 wiper voltage above the fault threshold.
45	**Pot Low OverCurrent** *ShutdownThrottle;* *FullBrake.*	1. See Monitor menu » Outputs: Pot Low. 2. Combined pot resistance connected to pot low is too low.	*Set:* Pot low (pin 18) current exceeds 10 mA. *Clear:* Clear pot low overcurrent condition and cycle KSI.
46	**EEPROM Failure** *ShutdownMotor;* *ShutdownMainContactor;* *ShutdownEMBrake;* *ShutdownThrottle;* *ShutdownInterlock;* *ShutdownDriver1;* *ShutdownDriver2;* *ShutdownDriver3;* *ShutdownDriver4;* *ShutdownPD;* *FullBrake.*	1. Failure to write to EEPROM memory. This can be caused by EEPROM memory writes initiated by VCL, by the CAN bus, by adjusting parameters with the programmer, or by loading new software into the controller.	*Set:* Controller operating system tried to write to EEPROM memory and failed. *Clear:* Download the correct software (OS) and matching parameter default settings into the controller and cycle KSI.
47	**HPD/Sequencing Fault** *ShutdownThrottle.*	1. KSI, interlock, direction, and throttle inputs applied in incorrect sequence.	*Set:* HPD (High Pedal Disable) or sequencing fault caused by incorrect sequence of KSI, interlock, direction, and throttle inputs.

		2. Faulty wiring, crimps, or switches at KSI, interlock, direction, or throttle inputs. 3. See Monitor menu » Inputs.	*Clear:* Reapply inputs in correct sequence.
49	**Parameter Change Fault** *ShutdownMotor;* *ShutdownMainContactor;* *ShutdownEMBrake;* *ShutdownThrottle;* *FullBrake.*	1. This is a safety fault caused by a change in certain parameter settings so that the vehicle will not operate until KSI is cycled. For example, if a user changes the Throttle Type this fault will appear and require cycling KSI before the vehicle can operate.	*Set:* Adjustment of a parameter setting that requires cycling of KSI. *Clear:* Cycle KSI.
51-67	**OEM Faults** *(See OEM documentation.)*	1. These faults can be defined by the OEM and are implemented in the application-specific VCL code. See OEM documentation.	*Set:* See OEM documentation. *Clear:* See OEM documentation.
68	**VCL Run Time Error** *ShutdownMotor;* *ShutdownMainContactor;* *ShutdownEMBrake;* *ShutdownThrottle;* *ShutdownInterlock;* *ShutdownDriver1;* *ShutdownDriver2;* *ShutdownDriver3;* *ShutdownDriver4;* *ShutdownPD;* *FullBrake.*	1. VCL code encountered a runtime VCL error. 2. See Monitor menu » Controller: VCL Error Module and VCL Error. This error can then be compared to the runtime VCL module ID and error code definitions found in the specific OS system information file.	*Set:* Runtime VCL code error condition. *Clear:* Edit VCL application software to fix this error condition; flash the new compiled software and matching parameter defaults; cycle KSI.
69	**External Supply Out of Range** *None, unless a fault action is programmed in VCL.*	1. External load on the 5V and 12V supplies draws either too much or too little current. 2. Fault Checking Menu parameters Ext Supply Max and Ext Supply Min are mistuned. 3. See Monitor menu » Outputs: Ext Supply Current.	*Set:* The external supply current (combined current used by the 5V supply [pin 26] and 12V supply [pin 25]) is either greater than the upper current threshold or lower than the lower current threshold. The two thresholds are defined by the External Supply Max and External Supply Min parameter settings (page 51). *Clear:* Bring the external supply current within range.
71	**OS General** *ShutdownMotor;* *ShutdownMainContactor;* *ShutdownEMBrake;* *ShutdownThrottle;* *ShutdownInterlock;* *ShutdownDriver1;* *ShutdownDriver2;* *ShutdownDriver3;*	1. Internal controller fault.	*Set:* Internal controller fault detected. *Clear:* Cycle KSI.

	ShutdownDriver4; *ShutdownPD;* *FullBrake.*		
72	**PDO Timeout** *ShutdownThrottle;* CAN NMT State set to Pre-operational.	1. Time between CAN PDO messages received exceeded the PDO Timeout Period.	*Set:* Time between CAN PDO messages received exceeded the PDO Timeout Period. *Clear:* Cycle KSI or receive CAN NMT message.
73	**Stall Detected** *ShutdownEMBrake;* Motor disabled; Control Mode changed to LOS (Limited Operating Strategy).	1. Stalled motor. 2. Motor encoder failure. 3. Bad crimps or faulty wiring. 4. Problems with power supply for the motor encoder. 5. See Monitor menu » Motor: Motor RPM.	*Set:* No motor encoder movement detected. *Clear:* Either cycle KSI, or if parameter LOS Upon Encoder Fault = On and Interlock has been cycled, then the Stall Detected fault is cleared and Encoder LOS fault (code 93) is set, allowing limited motor control.
74	**Fault On Other Traction Controller**	1. Dual Drive fault: see Dual Drive manual.	
75	**Dual Severe Fault**	1. Dual Drive fault: see Dual Drive manual.	
76	**Insulation Resistance Low** *Isolation monitor will open circuit its connection between the high power circuit and the vehicle chassis. Driving is still allowed.*	1. See Monitor menu » Battery: Insulation Resistance. 2. Insulation Resistance Fault threshold set too high. 3. Electrical fault path between high power battery terminals and chassis. 4. Insulation breakdown in motor. 5. Short circuit to chassis fault in high power system wiring. 6. Internal 1239E controller failure.	*Set:* Insulation Resistance dropped below Insulation Resistance Fault threshold. *Clear:* Remove insulation fault; cycle KSI.
77	**Supervisor Fault** *ShutdownMotor;* *ShutdownMainContactor;* *ShutdownEMBrake;* *ShutdownThrottle;* *ShutdownInterlock;* *ShutdownDriver1;* *ShutdownDriver2;* *ShutdownDriver3;* *ShutdownDriver4;* *ShutdownPD;* *FullBrake.*	1. The Supervisor has detected a mismatch in redundant readings. 2. Internal damage to Supervisor microprocessor. 3. Switch inputs allowed to be within upper and lower thresholds for over 100 milliseconds (for recurring errors, check the switches for moisture).	*Set:* Mismatched redundant readings; damaged Supervisor; illegal switch inputs. *Clear:* Check for noise or voltage drift in all switch inputs; check connections; cycle KSI.
78	**Supervisor Incompatible** *ShutdownMotor;* *ShutdownMainContactor;* *ShutdownEMBrake;* *ShutdownThrottle;* *ShutdownInterlock;* *ShutdownDriver1;*	1.The main OS is not compatible with the Supervisor OS.	*Set:* Incompatible software. *Clear:* Load properly matched OS code or update the Supervisor code; cycle KSI.

	ShutdownDriver2; *ShutdownDriver3;* *ShutdownDriver4;* *ShutdownPD;* *FullBrake.*		
82	**Bad Calibrations** *ShutdownMotor;* *ShutdownMainContactor;* *ShutdownEMBrake;* *ShutdownThrottle;* *FullBrake.*	1. Internal controller fault.	*Set:* Internal controller fault detection. *Clear:* Cycle KSI.
83	**Driver Supply** *ShutdownMotor;* *ShutdownMainContactor;* *ShutdownEMBrake;* *ShutdownThrottle;* *FullBrake.*	1. Internal controller fault in the voltage supply for the driver circuits.	*Set:* Internal controller fault detection. *Clear:* Cycle KSI.
87	**Motor Characterization Fault** *ShutdownMotor;* *ShutdownMainContactor;* *ShutdownEMBrake;* *ShutdownThrottle;* *FullBrake.*	1. Motor characterization failed during characterization process. See Monitor menu » Controller: Motor Characterization Error for cause: 0 = sequencing error. Normally caused by turning off Motor Characterization Test Enable before running the test. 1 = encoder signal seen but step size not auto-detected; set up Encoder Steps manually 2 = motor temp sensor fault 3 = motor temp hot cutback fault 4 = controller overtemp cutback fault 5 = controller undertemp cutback fault 6 = undervoltage cutback fault 7 = severe overvoltage fault 8 = encoder signal not seen, or one or both channels missing 9 = motor parameters out of characterization range 20 = Sin/Cos sensor not found 21 = phasing not detected 22 = Sin/Cos sensor characterization failure 23 = started characterization procedure while motor rotating.	*Set:* Motor characterization failed during the motor characterization process. Normally caused by turning off Motor_Characterization_Test_Enable before running test. Needs controller reset. *Clear:* Correct fault; cycle KSI, or VCL reset.
88	**Encoder Pulse Count Fault** *ShutdownMotor;*	1. Encoder Steps parameter does not match the actual motor encoder.	*Set:* Motor lost IFO control and accelerated without throttle command.

	ShutdownMainContactor; *ShutdownEMBrake;* *ShutdownThrottle;* *ShutdownInterlock;* *ShutdownDriver1;* *ShutdownDriver2;* *ShutdownDriver3;* *ShutdownDriver4;* *ShutdownPD;* *FullBrake.*		*Clear:* Ensure the Encoder Steps parameter matches the actual encoder; cycle KSI.
89	**Motor Type Fault** *ShutdownMotor;* *ShutdownMainContactor;* *ShutdownEMBrake;* *ShutdownThrottle;* *FullBrake.*	1. The Motor_Type parameter value is out of range.	*Set:* Motor_Type parameter is set to an illegal value. *Clear:* Set Motor_Type to correct value and cycle KSI.
91	**VCL/OS Mismatch** *ShutdownMotor;* *ShutdownMainContactor;* *ShutdownEMBrake;* *ShutdownThrottle;* *ShutdownInterlock;* *ShutdownDriver1;* *ShutdownDriver2;* *ShutdownDriver3;* *ShutdownDriver4;* *ShutdownPD;* *FullBrake.*	1. The VCL software in the controller does not match the OS software in the controller.	*Set:* VCL and OS software do not match; when KSI cycles, a check is made to verify that they match and a fault is issued when they do not. *Clear:* Download the correct VCL and OS software into the controller.
92	**EM Brake Failed to Set** *ShutdownEMBrake;* *ShutdownThrottle.* *Position Hold is engaged when Interlock = On.*	1. Vehicle movement sensed after the EM Brake has been commanded to set. 2. EM Brake will not hold the motor from rotating.	*Set:* After the EM Brake was commanded to set and time has elapsed to allow the brake to fully engage, vehicle movement has been sensed. *Clear:* 1. Activate the Throttle (EM Brake type 2). 2. Activate the Interlock (EM Brake type 1).
93	**Encoder LOS (Limited Operating Strategy)** *Enter LOS control mode.*	1. Limited Operating Strategy (LOS) control mode has been activated, as a result of either an Encoder Fault (Code 36) or a Stall Detected fault (Code 73). 2. Motor encoder failure. 3. Bad crimps or faulty wiring. 4. Vehicle is stalled.	*Set:* Encoder Fault (code 36) or Stall Detected (code 73) was activated, if parameter LOS Upon Encoder Fault = On and Interlock has been cycled, then the Encoder LOS (code 93) control mode is activated, allowing limited motor control. *Clear:* Cycle KSI or, if LOS mode was activated by the Stall Detected fault, clear by ensuring encoder senses proper operation, Motor RPM = 0, and Throttle Command = 0.

98	**Illegal Model Number** *ShutdownMotor;* *ShutdownMainContactor;* *ShutdownEMBrake;* *ShutdownThrottle;* *FullBrake.*	1. Model_Number variable contains illegal value. Any value other than 1239 is illegal. 2. Software and hardware do not match. 3. Controller defective.	*Set:* Illegal Model_Number variable; when KSI cycles, a check is made to confirm a legal Model_Number, and a fault is issued if one is not found. *Clear:* Download appropriate software for your controller model.
99	**Parameter Mismatch** *ShutdownMotor;* *ShutdownMainContactor;* *ShutdownEMBrake;* *ShutdownThrottle;* *FullBrake.*	1. Dual drive enabled on only one controller. 2. Incorrect position feedback type chosen for motor technology in use. 3. Dual drive is enabled in torque mode.	*Set:* When the Dual Drive software is enabled, the controller must be set to either Speed Mode Express or Speed Mode; otherwise this fault is set. Motor Technology=0 must be paired with Feedback Type=1, and Motor Technology=1 must be paired with Feedback Type=2; otherwise this fault is set. *Clear:* Adjust parameters to appropriate values and cycle KSI.

Tab. 37: Troubleshooting Chart

11.5 Faults on the hydraulic system

Fault	Cause	Note
Unusual noises in the hydraulic system	Hydraulic fluid level too low	• Find the cause for the low hydraulic fluid level. Eliminate the cause if necessary. • Top up the hydraulic fluid.
	Dirty hydraulic fluid filter	• Replace the hydraulic filter element.
Consumers not working correctly	Hydraulic fluid gets too hot.	• Check hydraulic fluid heat exchanger for soiling and clean with air if necessary.
	Heavy leakage at hydraulic connections or defective hydraulic line	• Check hydraulic system for leaks and repair if necessary.
	Incorrect hydraulic settings	• Check set values and correct if necessary.

Tab. 38: Faults on the hydraulic system

11.6 Axle faults

Fault	Cause	Note
Unusual noises of the axles or reduced braking effect	Mechanical damage due to overheating of the axles	• Shut down the machine immediately. • Contact the customer service.

Tab. 39: Axle faults

11.7 Towing

NOTE

If the requirements for towing the machine are not met, the machine must be loaded and transported.

Machines until 2022/07

Requirements:

- Battery voltage is at least 12 volts

1. Turn off ignition
2. Remove right hood.

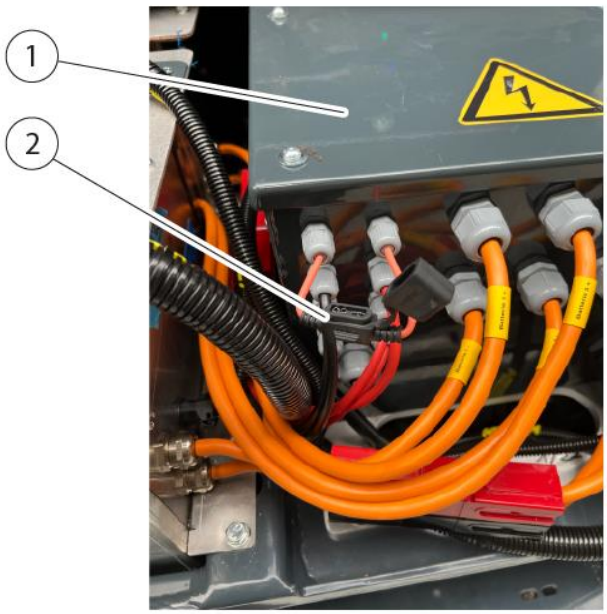


Abb. 54: Fuse holder

3. Locate and open fuse holder (2) on right side of control box (1).

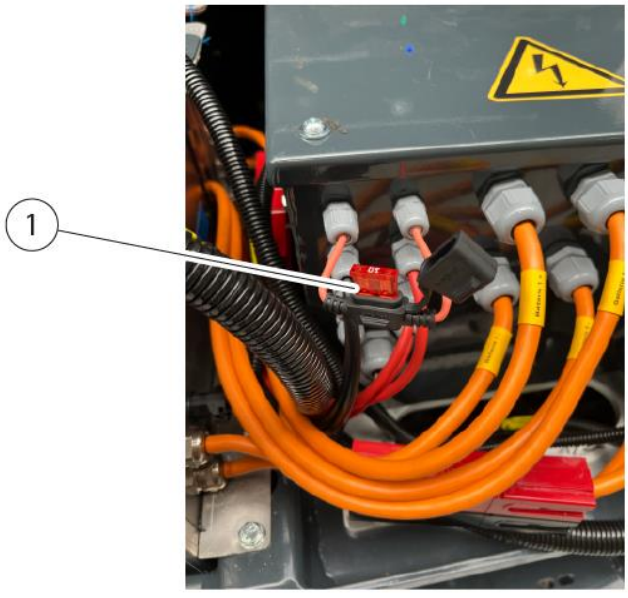


Abb. 55: Insert fuse

4. Insert fuse 10A (1) into the fuse holder and close the fuse holder.
5. Turn on ignition.
   Brake unlocks audibly after a few seconds.

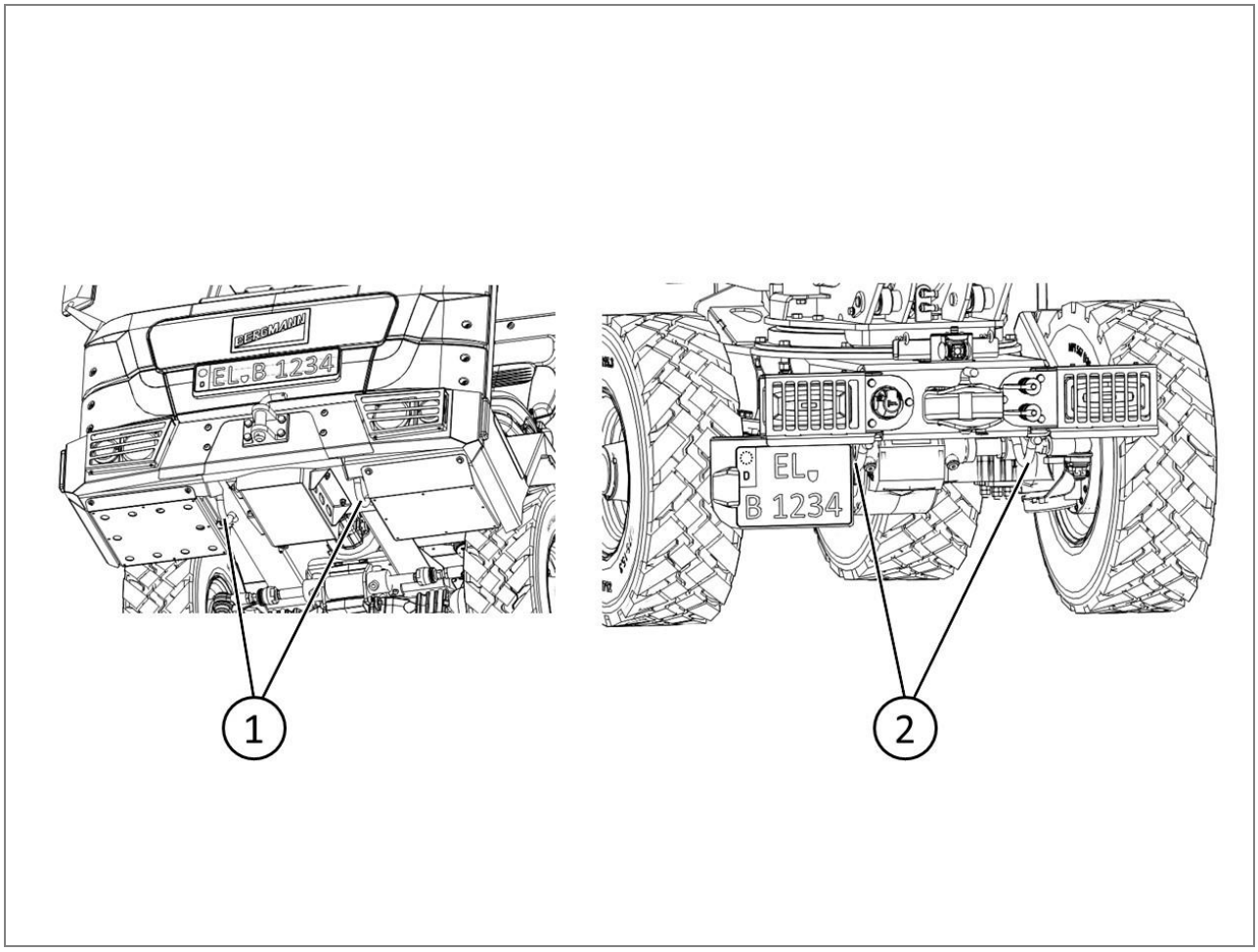


Abb. 56: Lashing points

NOTICE

Risk of machine damage

Tow the machine a maximum distance of 1 km at a maximum speed of 10 km/h.

6. Tow the vehicle out of the danger zone using the lashing points at the front (1) or rear (2) and release it for repair.

NOTICE

Risk of machine damage

Remove the fuse after towing, otherwise the braking effect is limited and the electric motors may be damaged.

Machines after 2022/07

Requirements:

- Battery voltage is at least 12 volts

1. Turn off ignition

Abb. 57: Maintenance flap

2. Open maintenance flap on the right (1) with a key.

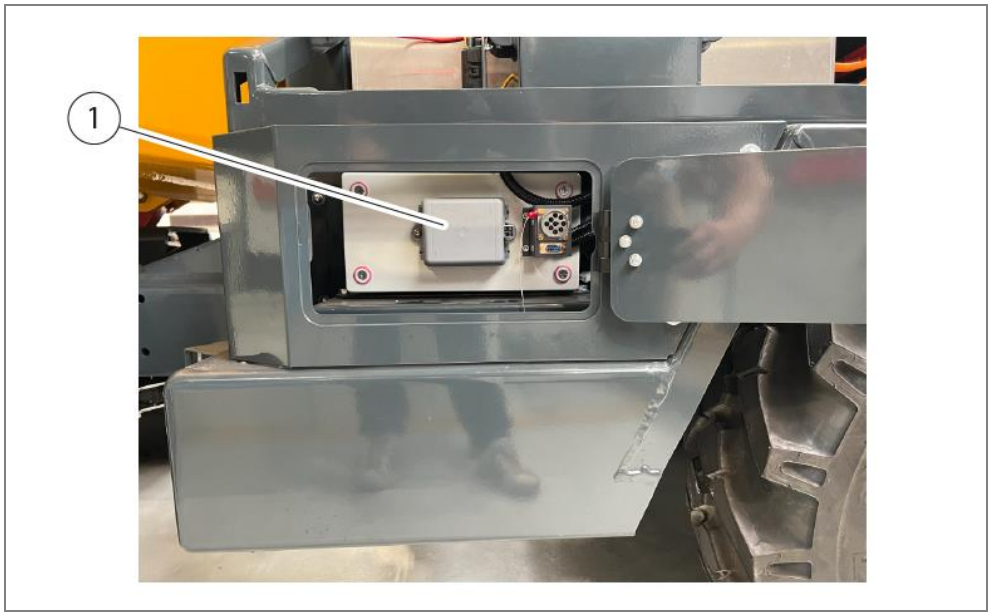


Abb. 58: Remove the cover

3. Remove cover (1) from fuse holder on the left.

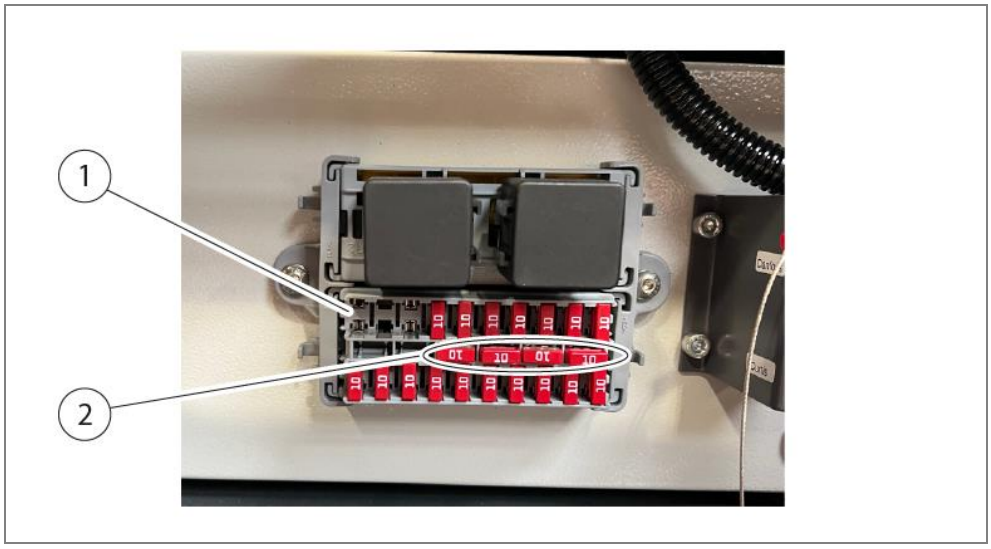


Abb. 59: Reconnect fuse

4. Remove the spare fuse (2) and plug it into the top left slot (F1) (1).
5. Turn on ignition.
   Brake unlocks audibly after a few seconds.

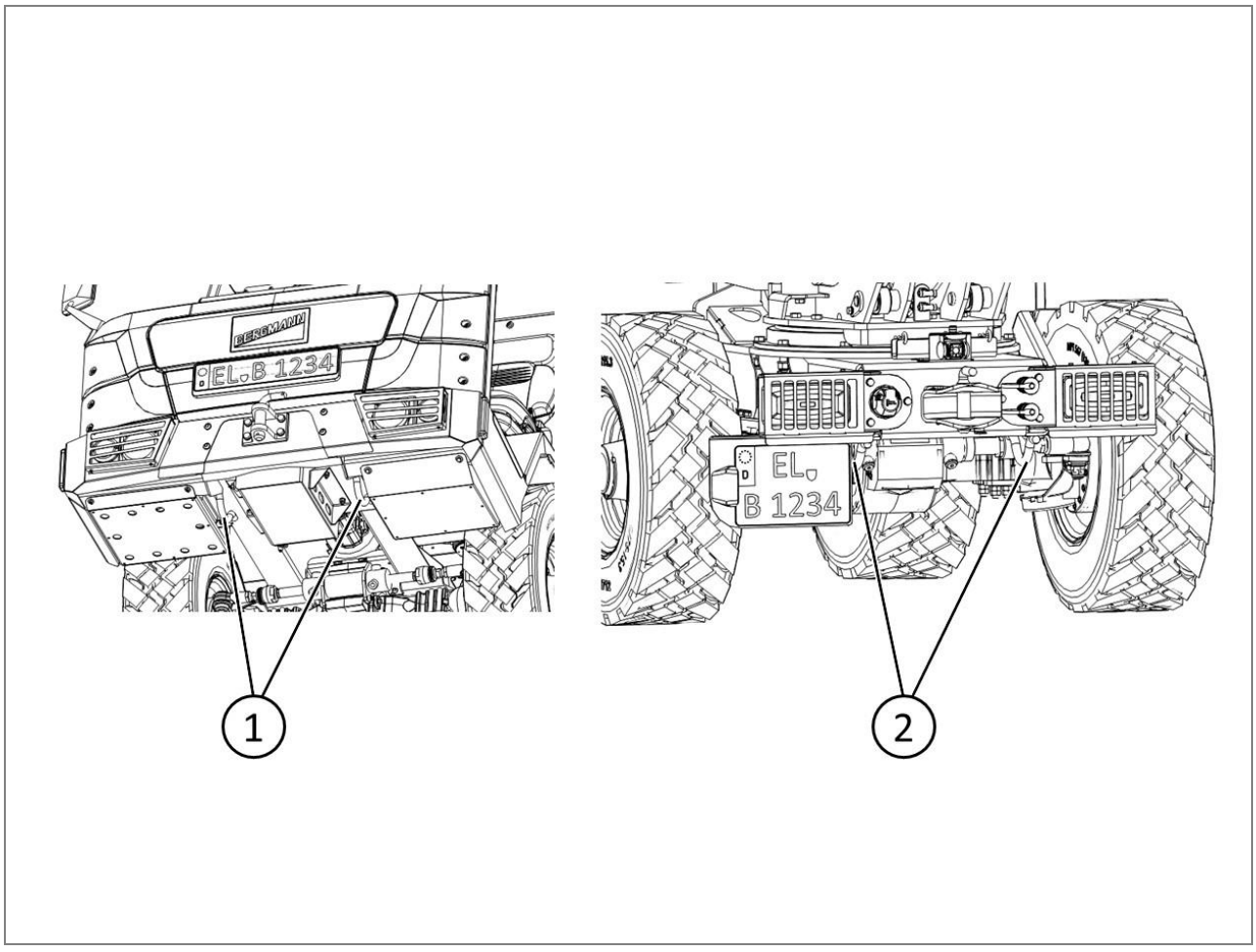


Abb. 60: Lashing points

NOTICE

Risk of machine damage

Tow the machine a maximum distance of 1 km at a maximum speed of 10 km/h.

6. Tow the vehicle out of the danger zone using the lashing points at the front (1) or rear (2) and release it for repair.

NOTICE

Risk of machine damage

Remove the fuse after towing, otherwise the braking effect is limited and the electric motors may be damaged.

11.8 Salvaging the machine

11.9 Manual lowering of the dumper box

If the electrical system or drive motor fails, the lifted dumper box must be lowered to salvage the machine.

1. Secure the machine against unintentional movements.

⚠ **DANGER** – Danger of crushing! There is a risk of injury by crushing if persons walk underneath the descending load when lowering the superstructures manually.

- Make sure that no persons are standing in the danger zone during manual lowering of the superstructures.

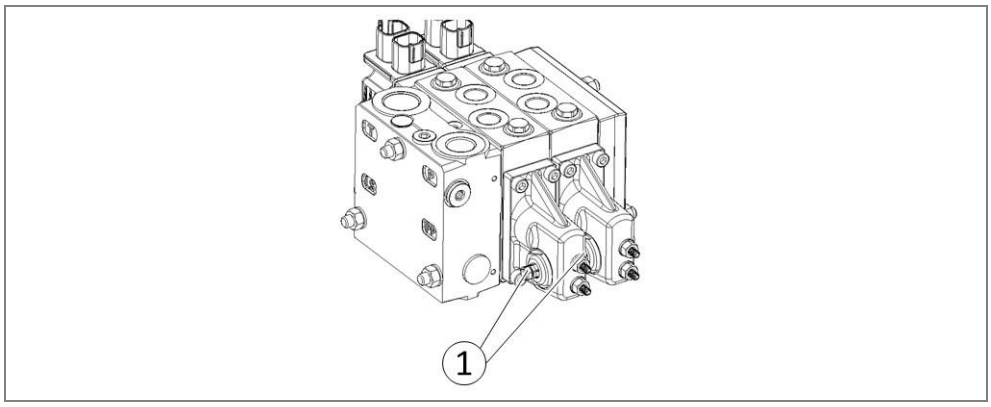


Fig. 61: Emergency actuation on the valve block

2. Lower the dumper box using the emergency actuation on the valve block (1).

   The dumper box is lowered under its dead weight.

NOTE

If the dumper box is not lowered into the center position, it must be secured by suitable lashing straps for transport or towing.

12 Dismantling

The requirements of the regulations for the prevention accidents, environmental protection and national safety regulations, where applicable, must be observed when dismantling the machine.

NOTE

- The machine should be dismantled with the assistance of the Bergmann Maschinenbau GmbH & Co. KG customer service.
- Contact the customer service in the case of dismantling. Further infomation in chapter Customer Service on page 134

Before dismantling the machine:

1. Clean the machine roughly.
2. Drive/transport the machine to a suitable site for dismantling.

NOTE

- Collect the operating media in a suitable vessel.
- Dispose of operating media properly according to regulations; observe regional regulations for the disposal of oils and lubricants, for example.

3. Drain operating media.
4. Provide assembly aids (e.g. tools, chain hoists).

13 Shutting down, recommissioning and disposal

14 Shutting down, recommissioning and disposal

14.1 Shutting down

1. Clean the machine thoroughly.
2. Drive/transport the machine to the site for shutting down.
3. Check the tire pressure and inflate if necessary.
4. Check the tightening torque of the wheel nuts.
5. Jack up the machine to avoid damage to the tires (stand plates).
6. Completely degrease the machine.
7. Fill the transmissions of the drive unit completely with oil.
8. Fill the hydraulic tank completely with hydraulic fluid and seal air-tight.
9. Charge up the batteries to about 80 % capacity.
10. Preserve machined (unpainted) surfaces.

NOTE

See the appropriate supplier documentations in the annex for further information.

14.2 Recommissioning

The owners must convince themselves of the proper condition of the machine prior to recommissioning.

1. Completely degrease the machine.
2. Check the oil level in the drive unit transmission.
3. Check the hydraulic fluid level.
4. Check the tire pressure.
5. Check the connections of cables and lines.
6. Check the effectiveness of safety devices.
7. After longer periods of standstill, it is advisable to carry out a trial run or perform the procedure according to commissioning.

NOTE

See the appropriate supplier documentations in the annex for further information.

14.3 Disposal

⚠ DANGER

Danger from suspended loads!

Severe or fatal injuries if suspended loads should fall.

- No persons may stand under suspended loads.
- Keep a sufficiently safe distance.
- Cordon off the area of movement of the loads widely.
- Do not lift loads over and above persons.
- Follow the instructions of the crane driver.

⚠ CAUTION

Health hazard due to liquids, gases or vapors!

There is a hazard to health when the batteries leak during handling and disposal/recycling.

- Servicing and disposal may only be performed by qualified electrical personnel.
- Contract the supplier to dispose of the battery cells.

If the machine is to be scrapped and dismantled, there are different ways to do this:

- Contract a specialist company.
- This can also be done by your own personnel if they have the appropriate knowledge and tools.

In both cases, the applicable rules and regulations for scrapping and disposal in the respective countries must be observed.

If the scrapping is performed by your own personnel, it is necessary to separate the different parts according to type/material.

The sale of the different parts/materials should be left to specialized and licensed companies.

The most important materials are:

- steels
- cables
- plastic materials
- operating media such as oils, fuel, greases, lubricants

NOTE

Collect the operating media in a suitable vessel and dispose of properly.

If the machine is not scrapped soon after being dismantled, the parts must stored in a protected area.

Make sure that remaining operating materials on and in the parts cannot get into the ground.

15 Customer Service

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49716 Meppen-Hüntel
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Spare parts	+49 5932 7292-77 +49 5932 7292-43	parts@bergmann-mb.de
Warehouse/Store	+49 5932 7292-19	versand@bergmann-mb.de

Tab. 40: Contact spare parts and customer service

16 Index

17 Annex

17.1 Hand signals for directions

The most important signals are shown below. Additional signals for understanding between the operator and the individual giving directions must be agreed if necessary.

Hand signal	Meaning and execution
	**Attention** Hold up outstretched arm with open hand
	**Stop** Both arms stretched out horizontally
	**Stop! Danger** Stretch out both arms horizontally alternately and bend at the elbow
	**Drive off** Move outstretched arm with open hand to and fro
	**Drive forward slowly** Bend both elbows and wave on with both palms facing inwards
	**Drive back slowly** Bend both elbows and wave away with both palms facing outwards
	**Drive to right** Left thumb to the left away from you
	**Drive to left** Right thumb to the right away from you
	**Swing crane to the right** Left thumb to the left away from you, describe circles with right index finger
	**Swing crane to the left** Right thumb to the right away from you, describe circles with left index finger
	**Lift load**

Hand signal	Meaning and execution
	Extended right index finger pointing up, left hand up and down
	**Lower load** Extended right index finger pointing down, left hand up and down
	**Extend radius** Both thumbs pointing outwards
	**Reduce radius** Both thumbs pointing inwards

Tab. 41: Hand signals

17.2 CE declaration of conformity

NOTE

The CE declaration of conformity is attached to the documentation. This should be taken from the appropriate register of the complete documentation.

17.3 Tightening torques

General tightening torques

Recommended tightening torques for screwed connections are listed below. In justified individual cases, different tightening torques may be necessary which are then specified in the respective sub-assembly drawings and must be observed under all circumstances, see plans in original size.

NOTE

The tightening torques specified here apply for unlubricated steel setscrews with head contact dimensions such as DIN 912, 931, 933, 934/ISO 4762, 4014, 4017, 4032, etc.

Setscrews, metric standard thread DIN 13, Part 13

Dimension	Wrench width (mm)	Screw tightening torque M_A (Nm)		
		Strength class 8.8	Strength class 10.9	Strength class 12.9
M4	7	3.0	4.4	5.1
M5	8	5.9	8.7	10
M6	10	10	15	18
M8	13	25	36	43
M10	17	49	72	84
M12	19	85	125	145
M14	22	135	200	235
M16	24	210	310	365
M18	27	300	430	500
M20	30	425	610	710
M22	32	580	820	960
M24	36	730	1050	1220
M27	41	1100	1550	1800
M30	46	1450	2100	2450

Tab. 42: General tightening torques - metric standard thread

Setscrews, metric fine thread DIN 13, Part 13

Dimension	Wrench width (mm)	Screw tightening torque M_A (Nm)		
		Strength class 8.8	Strength class 10.9	Strength class 12.9
M8 x 1	13	27	39	46
M10 x 1.25	17	52	76	90
M12 x 1.25	19	93	135	160
M12 x 1.5	19	89	130	155
M14 x 1.5	22	145	215	255
M16 x 1.5	24	225	330	390
M18 x 1.5	27	340	485	570
M20 x 1.5	30	475	680	790
M22 x 1.5	32	630	900	1050
M24 x 2	36	800	1150	1350
M27 x 2	41	1150	1650	1950
M30 x 2	46	1650	2350	2750

Tab. 43: General tightening torques - metric fine thread

17.4 Plans in original size

NOTE

The plans in original size are obtainable on request from Aftersales or Service.