KRAMER

Operator's manual

Wheel loader

5055e / 5055eL

Machine model	**357-00S/357-00L**
From serial no.	**357 00 0001**
Version	**3.0**
Document number	**1000363191**
Language	**[en]**

Additional documents	Language	Order no.
Service Booklet	[de]	1000371231
	[en]	1000371232
	[fr]	1000371233
Spare parts list, model 357-00	[de, en, fr]	1000368721

Legend	
Original Operator's Manual	**x**
Translation of original Operator's Manual	–
Version	3.0
Date	07/2017
Document	BA 357-00 *

KRAMER-WERKE GmbH keep abreast of the latest technical developments and constantly improve their products. For this reason, we may from time to time need to make changes to figures and descriptions in this documentation that do not reflect products that have already been delivered and that will not be implemented on these vehicles.

Technical data, dimensions and weights are only given as an indication. Responsibility for errors or omissions not accepted.

The cover features the machine with possible optional equipment.

Kramer-Werke GmbH

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EC Declaration of Conformity

according to Directive 2006/42/EC, appendix II, lit. A

Manufacturer

Kramer-Werke GmbH, Wacker-Neuson-Str. 1, D-88630 Pfullendorf

Product

Machine designation	Wheel loader	
Type	357	
Version	357-00S	357-00L
Trade name	5055e	5055eL
Serial number	357 00 _ _ _ _	357 00 _ _ _ _
Output in kW	15 + 22	
Measured sound power level dB (A)	80.9	
Guaranteed sound power level dB (A)	82	

Conformity assessment procedure

for noise emissions according to Directive 2000/14/EC appendix VIII

Notified body involved in procedure

DGUV Test Prüf- und Zertifizierungsstelle [DGUV testing and certification center]
(EU identification number: 0515)
Fachbereich Bauwesen [Civil Engineering Section]
Landsberger Str. 309
D-80687 Munich

Applied directives and standards

We hereby declare that this product corresponds to the relevant regulations and requirements of the following Directives and standards:
2006/42/EG, 2000/14/EG, 2014/30/EU, DIN EN ISO 12100: 2011-03,
DIN EN ISO 13849-1:2016-06, DIN EN 474-1: 2014-03 and DIN EN 474-3: 2010-02.*

*The operating weight for compact equipment is exceeded with some fitting states (max. 5000 kg). The production seat has no height adjuster.

Authorized representative for the compilation of technical documentation

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Original declaration of conformity
(only for EU member states)

Declaration of manufacturer

This vehicle is not approved for application within the European Union (EU).

Manufacturer

Kramer-Werke GmbH, Wacker-Neuson-Str. 1, D-88630 Pfullendorf

Product

Vehicle designation/model	Wheel loader 357	Wheel loader 357
Version	357-00S	357-00L
Trade name	5055e	5055eL
Serial number	357 00 _ _ _ _	357 00 _ _ _ _
Output in kW	15 + 22	15 + 22

The following standards and/or technical specifications have been used for the proper application of the requirements regarding safety and health stated in the EC Directives:
2006/42/EG, 2014/30/EU, DIN EN ISO 12100: 2011-03, DIN EN ISO 13849-1:2016-06, DIN EN 474-1: 2014-03 and DIN EN 474-3: 2010-02.

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Original declaration of manufacturer

1 Preface

1.1 Operator’s manual

Important information about operating personnel

This Operator's Manual is only valid for the machine types listed on the title page.

The Operator's Manual provides information on the use, settings, operation and maintenance of the machine and is only intended for the operator and the owner.

- You must always obey the safety regulations in this operator's manual and the safety rules applicable in each case for operating the working equipment. In the Federal Republic of Germany, this is inter alia the DGUV rule 100-500, section 2.12 (formerly BGR 500).
- The machine may only be operated by persons who are physically, mentally and professionally suited for this work.
- Persons under the influence of alcohol or drugs may **not** use the machine.
- The operator is the person performing machine operation and/or travel.
- Before performing machine travel and work operation for the first time, the ?user/operator must receive instructions on how to operate this machine.
- The operator must carefully read and understand this Operator's Manual, in particular the chapter on **"Safety instructions".**
- Before working with the machine, operators must familiarize themselves with all the control elements and their functions, and with the handling of the machine.
- Before putting the machine into operation, the operator of the machine must ensure that it is in a perfect condition, and during operation, the operator must observe the regulations regarding operation.
- The operator is responsible for ensuring that the machine and its use do not pose a risk.
- Work on the machine may only be performed by trained and instructed personnel that have been authorized by the operating company. Any person involved in operation, inspection, maintenance, servicing, repair work or transport of the machine must read, understand and follow the complete instructions in the Operator’s Manual and in particular the safety instructions.

Important information for the operating company

- The buyer/operating company is responsible for the operators' training in safe working on and with the machine. We recommend repeating training at regular intervals.
- The buyer/operating company is responsible for ensuring that any additional safety regulations applicable in the country of use of the machine are followed.
- In Germany, the buyer/operator is required under the Operational Safety Ordinance (BetrSichV § 10) and the Accident Prevention Regulations (DGUV regulation 1) to have the machine and the attachments checked regularly. The battery system and battery charger must be tested annually according to DGUV provision 3.
- Observe and comply with the legal regulations of your country.

Important information on this Operator's Manual

- The operator's manual and any amendments form part of the machine and must always be available at the place of use of the machine.
- Store this Operator's Manual in the storage compartment or net provided for this in the cabin.
- Immediately replace an incomplete or illegible operator's manual by a new one.
- In addition to the operator's manual, observe and instruct the operator in all other generally applicable, legal and other mandatory regulations relevant to accident prevention and environmental protection.
- Please contact your dealer if you require more information about the machine and the Operator's Manual.
- Kramer-Werke keeps abreast of the latest technical developments and constantly improves their products. For this reason, we may from time to time need to make changes to figures and descriptions in this documentation that do not reflect products that have already been delivered and that will not be implemented on these machines.
- Technical data, dimensions and weights are only given as an indication. Responsibility for errors or omissions not accepted.
- The certification in the EU member states as tractor engine (approval as agricultural and forestry tractor) is in preparation. At present, this option has not yet been implemented. The corresponding selected text passages concerning approval as agricultural and forestry tractors are not valid until further notice.

Explanation of symbols

The indication **left** or **right** in the descriptions always refers to the travel direction of the machine.

Symbols	Explanation
•	Identifies a general list
1	Identifies a list in a table (position numbers)
2	
1.	Identifies activities that must be performed in a certain order
2.	
➥	Identifies results
►	Identifies things to be avoided in the warning and safety instructions

Abbreviations

Abbreviation	Explanation
(opt)	Option
Fig.	Figure
National Type Approval	National Type Approval (Germany)
ATF	Automatic Transmission Fluid (lubricant)
BA	Operator's manual
BetrSichV	German Operational Safety Ordinance
Order no.	Order, item, or part number
BG	Employer's liability insurance association
BGR	Occupational Safety Regulations
BGG	Employer's liability insurance association principles
o/h	Operating hours
resp.	respectively
approx.	approximately (about, circa)
DGUV	German Social Accident Insurance
DIN	German Institute for Norming
Doc.	Document
DPLF	German Test- and Certification-Center for Agriculture and Forest Engineering
EBE	Authorization for stand-alone operation
ECU	Electronic Control Unit (controller)
EC	European Community
EN	European Norm
etc.	et cetera (from Latin), and so forth
EU	European Union
poss.	possibly
FOPS	Falling Object Protective Structure
FZV	Vehicle Admission Ordinance
if nec.	if necessary
HV	High voltage
hydr.	Hydraulic
ISO	International Organization for Norming
cpl.	complete

Abbreviation	Explanation
LED	Light Emitter Diode (light diode)
Trucks	Trucks
LoF	Agriculture and forestry
LWA	Sound power level
max./MAX.	maximum
min./MIN.	minimal, at least
MLS	Motion-Logic-Supply: control components of the power electronics
MVCU	Multi Variable Control Unit, control unit
No.	Number
o.s.	or similar
OK	okay, alright
ROPS	Roll Over Protective Structure
RZ	Ripper tooth
SAE	Society of Automotive Engineers, viscosity class for motor oil
StVZO (German traffic regulations)	German road traffic regulations
SW	Quickhitch (loader unit)
etc.	et cetera
VDE	Association of Electrical Engineers, Electronic and Information Technology
e.g.	for example
ZVEI	German Electrical and Electronic Manufacturers' Association

1.2 Warranty and liability

Warranty claims can be made only if the conditions of warranty have been observed.

They are included in the General Conditions of Sales and Delivery for new machines and spare parts sold by the dealers. Furthermore, the instructions in this Operator's Manual must be observed.

Information on maintenance, repairs and spare parts

The operational safety and the operational capability of the machine are not only dependent on the control but also on the maintenance of the machine. This is why regular maintenance and servicing is absolutely necessary.

Information

Repair, maintenance and modifications of the machine may only be performed by trained technical personnel or authorized specialist workshops!

Careful attention should be paid to the sections "Information on Maintenance" on page *7-1* and "Maintenance Overview" on page *7-6*.

Information

Insist on using original spare parts for repairs!

The machine's permits, certifications, registrations, etc. may be withdrawn if machine parts/components with a prescribed condition or quality, or machine parts/components that can put persons at risk during operation, are subsequently modified, complemented or exchanged!

Notes:

2 Safety

2.1 Safety symbols and signal words

Explanation

The following symbols and signal words indicate safety instructions. The corresponding signal word indicates the risk level.

DANGER

DANGER identifies a situation causing death or serious injury if it is not avoided.

Consequences in case of non-observance.

► Avoidance of injury or death.

WARNING

WARNING identifies a situation that can cause death or serious injury if it is not avoided.

Consequences in case of non-observance.

► Avoidance of injury or death.

CAUTION

CAUTION identifies a situation that can cause injury if it is not avoided.

Consequences in case of non-observance.

► Avoidance of injury.

NOTICE

IMPORTANT identifies a situation that causes damage to the machine if it is not observed.

► Avoidance of damage to property.

2.2 Qualification of operating and maintenance personnel

Owner's duties

- Only allow specifically authorized, trained and experienced persons to operate, drive and perform maintenance on the machine in accordance with electro-technical regulations.
- Do not allow persons to be trained or instructed by anyone other than an authorized and experienced person.
- Have persons to be trained or instructed practice under supervision until they are familiar with the machine and its behavior (for example, with the steering and braking behavior).
- Access to the vehicle or vehicle operation is prohibited for children and persons under the influence of alcohol, drugs or medicine.
- Clearly and unequivocally define the responsibilities of the operating and maintenance personnel.
- Clearly and unequivocally define the responsibilities on the job site, also in view of traffic regulations.
- Give the operator the authority to refuse instructions by other persons that are contrary to safety.
- Have the vehicle serviced and repaired only by an authorized service center.
- Repair or maintenance of the electrical components of the machine may only be performed by technical personnel that have been specially trained to work on HV systems or under the direction or supervision of technical personnel trained to work on HV system, in accordance with electro-technical regulations.

Required knowledge of operator

- The operator is responsible for other persons.
- Avoid any operational mode that might be prejudicial to safety.
- The specific national driving license is required.
- The vehicle may only be operated by authorized and safety-conscious persons who are fully aware of the risks involved in operating the vehicle.
- The operator must have received training about the location of the machine's HV components and the potential hazards from the machine's HV components. This training must be documented.
- The operator and owner are obligated to operate the vehicle only in a safe and working condition.
- All persons working on or with the vehicle must have read and understood the safety instructions in this Operator's Manual before starting work.
- Follow, and instruct the operator in, legal and other mandatory regulations relevant to accident prevention.
- Observe and instruct the operator in regulations regarding road traffic and environmental protection.
- Use only the defined accesses for getting on and off the vehicle.
- Be familiar with the emergency exit of the machine.

Preparatory measures for the operator

- Before starting, check the machine whether it can be driven and operated safely.
- Tie back long hair and remove all jewelry.
- Wear close-fitting work clothes that do not hinder movement.

2.3 Conduct

Prerequisites for operation

- The vehicle has been designed and built in accordance with state-of-the-art standards and the recognized safety regulations. Nevertheless its use can cause danger to the operator or other persons, or damage to the machine.
- Store this Operator's Manual in the place provided for this in or on the vehicle. Immediately replace a damaged or illegible Operator's Manual and any supplements to it.
- The vehicle must only be operated in accordance with its designated use and the instructions set forth in this Operator's Manual.
- The operator and owner are obligated not to put into operation or operate a damaged or malfunctioning vehicle.
  - If a damage or malfunction occurs during operation, put the vehicle out of operation immediately and secure it against restart.
  - Have all malfunctions jeopardizing the safety of the operator or other persons immediately repaired by an authorized service center.
- Do not put the machine into operation or operate it after an accident; have it inspected for damage by an authorized service center.
  - Have the seat belt replaced by an authorized service center after an accident, even if there is no visible damage.
  - Check the cabin and the protective structures.
- Remove all dirt, snow and ice from climbing aids (for example, handholds, footholds, handrails).
- The owner is responsible for requiring the operating and maintenance personnel to wear protective clothing and equipment as required by the circumstances.

2.4 Operation

Preparatory measures

- Operation is only allowed with correctly installed and intact protective structures.
- Keep the vehicle clean. This reduces injury, accident and fire hazards.
- Safely store objects you carry with you in the places provided for this (for example, in the storage compartment, drinks holder).
- Do not carry objects with you that protrude into the operator's work space. They can create another danger in case of an accident.
- Observe all safety, warning and information labels.
- Before starting up the machine, check to ensure the battery connector for secure connection.
- Start and operate the machine only with the seat belt fastened and only from the place provided for this.
- Check the condition and the fastening of the seat belt. Have malfunctioning seat belts and mounting hardware replaced by an authorized service center.
- Before starting work, adjust the seating position so that all control elements can be reached and fully operated.
- Only perform the personal adjustments at machine standstill (e.g. operator seat, steering column).
- Ensure that all safety devices are properly installed and functional before starting work.
- Before starting work or after interrupting work, ensure that the brake, steering, signaling and light systems are functional.
- Before putting the vehicle into operation, ensure that nobody is in the danger zone.

Job site

- The operator is responsible for other persons.
- Before starting work, familiarize yourself with the job site.
  This applies to, for example:
  - Obstacles in the job site and machine travel area,
  - any barriers separating the job site from public roads,
  - soil weight-bearing capacity,
  - existing overhead and underground lines,
  - special operating conditions (for example dust, steam, smoke, asbestos).
- The operator must know the maximum dimensions of the machine and the attachment – see chapter “Technical data”.
- Maintain a safe distance (for example, from buildings, edges of building pits).
- During work in buildings or in enclosed areas, look out for:
  - Height of the ceiling/clearances
  - Width of entries/passages
  - Maximum load of ceilings and floors
  - Sufficient room ventilation
- Use existing visual aids to stay aware of the danger zone.
- In conditions of darkness and poor visibility, switch on existing work lights and ensure that motorists are not blinded by these lights.
- If the existing lights of the vehicle are not sufficient for performing work safely, ensure additional lighting of the job site.
- Due to hot machine parts, maintain a safe distance from easily flammable material (for example, from hay, dry leaves).

Danger zone

- The danger zone is the area in which persons are in danger due to the movements of the machine, attachment and/or load.
- The danger zone also includes the area that can be affected by falling material, equipment or by parts that are thrown out.
- Extend the danger zone sufficiently in the immediate vicinity of buildings, scaffolds or other elements of construction.
- Seal off the danger zone should it not be possible to keep a sufficient safety distance.
- Stop vehicle operation immediately if persons do not stay clear of the danger zone.

Carrying passengers

- Carrying passengers with the machine is **NOT** allowed.
- Carrying passengers on/in attachments/tools is **NOT** allowed.
- Carrying passengers on/in trailers is **NOT** allowed.

Mechanical integrity

- The operator and owner are obligated to operate the vehicle only in a safe and working condition.
- Operate the machine only if all protective and safety-oriented equipment (for example protective structures such as a cabin or rollbar, removable safety devices) is installed and functional.
- Check the vehicle for visible damage and defects.
- In case of damage and/or unusual behavior, put the vehicle out of operation immediately and secure it against restart.
- Have all malfunctions jeopardizing the safety of the operator or other persons immediately repaired by an authorized service center.

Turn on the machine

- Start the machine only according to the Operator's Manual.
- Observe all warning lights and indicator lights.

Machine operation

- Start and operate the machine only with the seat belt fastened and only from the place provided for this.
- Put the vehicle into operation only if visibility is sufficient (have another person guide you if necessary).
- Operation on slopes:
  - Travel/work only uphill or downhill.
  - Avoid traveling across a slope. Observe the machine's permissible inclination (of the trailer if necessary).
  - Keep loads on the uphill side of the vehicle and as close as possible to it.
  - Keep attachments/work equipment close to the ground.
- Adapt the travel speed to the circumstances (for example, the ground conditions, weather conditions).
- There is increased danger during backward machine travel. Persons in the blind spot of the machine cannot be seen by the operator.
  - Ensure that nobody is in the danger zone when you change the travel direction.
- Never get on a moving vehicle and never jump off the vehicle.

Machine travel on public roads/sites

- The specific national driving license is required.
- Observe the national regulations
  (for example, the road traffic regulations) during machine travel on public roads/sites.
- Ensure that the vehicle is in compliance with the national regulations.
- In order not to blind other motorists, using the existing work lights during vehicle travel on public roads/site is prohibited.
- When crossing for example underpasses, bridges, tunnels, ensure that the clearance height and width is sufficient.
- The attachment fitted onto the machine must be certified for travel on public roads/sites (see for example, the registration documents).
- The attachment fitted onto the vehicle must be empty and in transport position.
- The mounted attachment must be equipped with the mandatory lighting and protective devices.
- Take measures against unintentional operation of the operating hydraulics.
- If the vehicle has different steering modes, ensure that the mandatory steering mode is selected.

Stopping and securing the machine

- Only turn off the machine according to the Operator's Manual.
- Before turning off the machine, lower the work equipment/attachment to the ground.
- Unbuckle the seat belt only after turning off the machine.
- Before leaving the machine, secure it to prevent it from rolling away (for example, with the parking brake, suitable wheel chocks).
- Remove the ignition key and secure the machine against unauthorized operation.
- If the machine will not be used for a longer period of time, remove the battery connector.

2.5 Lifting gear applications

Requirements

- The machine must be certified for lifting gear applications.
- Have loads fastened and the operator guided by a qualified person having specific knowledge of lifting gear applications and the usual hand signals.
- The person giving instructions to the operator must stay in visual contact with the operator when fastening, guiding or removing the load (maintain visual contact).
- If this not be possible, ask one more person with the same qualifications to guide.
- The operator may not leave his seat as long as the load is raised.

Fastening, guiding and removing loads

- Follow the applicable specific regulations for fastening, guiding and removing a load.
- Wear protective clothing and equipment when fastening, guiding and removing loads (for example a hard hat, safety glasses, protective gloves, safety boots).
- Do not place lifting and fastening gear over sharp edges or rotating parts. Loads must be fastened so as to prevent them from slipping or falling.
- Move loads only on horizontal, level and firm ground.
- Move loads close to the ground.
- In order to avoid oscillating movements of loads:
  - Perform smooth, slow movements with the vehicle.
  - Use cables to guide the load (do not use hands to guide).
  - Bear in mind the weather conditions (for example, the wind force).
  - Keep a minimum safety distance from objects.
- The operator may allow the load to be fastened and removed only if the vehicle and its work equipment are not being moved.
- Danger zones must not overlap with the work zones of other vehicles.

Lifting gear applications

- The machine and the attachment must be certified for lifting gear applications.
- Observe the national regulations for lifting gear applications.
- Lifting gear applications are procedures involving raising, transporting and lowering loads with the help of lifting and fastening gear.
- The help of an accompanying person is necessary for fastening, guiding and removing the load.
- There must be nobody under the load.
- Stop the machine immediately if persons enter the danger zone.
- Use the machine for lifting gear applications ONLY if the mandatory lifting gear (for example, a joint rod and load hook) and safety equipment (for example, optical and acoustic warning devices, hose burst valve, stability table) is installed and functional.
- Use only lifting and fastening gear certified by a test/certification body, observe the inspection intervals (Use only chains and shackles. No belts, slings or cables).
- Do not use any lifting and fastening gear that is dirty, damaged or not of sufficient size.
- Do not interrupt the work process with a load attached.

2.6 Trailer operation

Trailer operation

- The vehicle must be certified for trailer operation.
- Observe the national regulations for trailer operation.
- The specific national driving license is required.
- Carrying passengers on/in trailers is PROHIBITED.
- Observe the maximum permissible vertical and trailer load.
- Do not exceed the permissible trailer speed.
- Trailer operation with the towing gear of the machine is prohibited.
- Trailer operation changes the machine's operating behavior, the operator must be familiar with this and act accordingly.
- Bear in mind the machine's steering mode and the trailer's turning circle.
- Before hitching/unhitching the trailer, secure it to prevent it from rolling away (for example, with the parking brake, suitable wheel chocks).
- There must be nobody between the vehicle and the trailer when hitching a trailer.
- Hitch the trailer onto the vehicle correctly.
- Ensure that all equipment works correctly (for example, the brakes, lights).
- Before starting vehicle travel, ensure that nobody is between the vehicle and the trailer.

2.7 Attachment operation

Attachments

- Use only attachments that are certified for the vehicle or its protective device (for example a shatter protection).
- All other attachments require the vehicle manufacturer’s release.
- The danger zone and the work zone depend on the attachment used – see the Operator’s Manual of the attachment.
- Secure the load.
- Do not overload attachments.
- Check the correct position of the lock.

Operation

- Carrying persons on/in an attachment is prohibited.
- Installing a work platform is prohibited.
  - Exception: The machine is equipped with the necessary safety equipment and certified for operation.
- Attachments and counterweights modify handling, as well as the steering and braking capability of the machine.
- The operator must be familiar with these modifications and act accordingly.
- Before starting work, operate the attachment to check that it works correctly.
- Before putting the attachment into operation, ensure that nobody is in danger.
- Lower the attachment to the ground before leaving the operator's seat.

Removing and fitting attachments

- Before uncoupling or coupling hydraulic connections:
  - Turn off the machine.
  - Release the pressure of the work hydraulics.
- Picking up and lowering attachments to the ground requires special care:
  - Pick up and safely lock the attachment in accordance with the Operator’s Manual.
  - Lower the attachment only to firm, level ground and secure it to prevent it from tipping over or rolling away.
- Put the vehicle and the attachment into operation only if:
  - The protective equipment has been installed and is functional.
  - The connections for the lights and the hydraulic system have been established and are functional.
- Perform a visual check of the lock after locking the attachment.
- There must be nobody between the vehicle and the equipment when picking up or lowering an attachment to the ground.

2.8 Towing, loading and transporting

Towing

- Seal off the danger zone.
- Ensure that no one is near the towing bar or cable. The safety distance is equal to 1.5 times the length of the towing equipment.
- Observe the mandatory transport position, permissible speed and itinerary.
- A tractor vehicle of the same weight category must be used as a minimum. Furthermore, the tractor vehicle must be equipped with a safe braking system and sufficient tractive power.
- Use only towing bars or cables certified by a test/certification body, observe the inspection intervals.
- Do not use any towing bars or cables that are dirty, damaged or not of sufficient size.
- Fasten towing bars or cables only at the defined points.
- Tow away only in accordance with this Operator's Manual to avoid damage to the vehicle.
- Observe the national regulations (for example, the light regulations) when towing on public roads/sites.

Crane-lifting

- Seal off the danger zone.
- The crane and the lifting gear must have suitable dimensions.
- Observe the machine's overall weight – see "Technical data".
- Wear protective clothing and equipment when fastening, guiding and removing the machine (for example a hard hat, safety glasses, safety boots).
- Use only lifting and fastening gear certified by a test/certification body (for example, cables, belts, hooks, shackles), observe the inspection intervals.
- Do not use any lifting and fastening gear that is dirty, damaged or not of sufficient size.
- Perform a visual check to ensure that all slinging points are neither damaged nor worn (no widening, no sharp edges, no cracks).
- Have loads fastened and crane operators only guided by experienced persons.
- The person guiding the crane operator must be within sight or sound of him.
- Observe all movements of the machine and lifting gear.
- Secure the vehicle against unintentional movement.
- Raise the vehicle only after it is safely attached and the person attaching the vehicle has given his approval.
- Use only the slinging points provided for fastening the lifting gear (for example, cables, belts).
- Do not attach the machine by twining the lifting gear (for example, cables, belts) around it.
- Ensure an even load distribution (center of gravity!) when fastening the lifting gear.
- Ensure that no one is in, on or under the vehicle when loading the vehicle.
- Observe the national regulations (for example, "Merkheft Erdbaumaschinen", leaflet on earth moving machines of the German employers' liability insurance association for construction engineering).
- Load the vehicle only in accordance with this Operator's Manual to avoid damage to the vehicle.
- Do not raise a machine that is for example, stuck or frozen onto the ground.
- Bear in mind the weather conditions (for example, the wind force, visibility conditions).

Transportation

- For the safe transportation of the machine:
  - The transport vehicle must have a sufficient load capacity and platform – see “specifications.”
  - The maximum weight rating of the transport vehicle must not be exceeded.
- Use only lifting and fastening gear certified by a test/certification body, observe the inspection intervals.
- Do not use any lifting and fastening gear that is dirty, damaged or not of sufficient size.
- In order to secure the machine on the platform, use only the fastening points provided for this purpose.
- Ensure that nobody is in or on the vehicle during transportation.
- Observe the national regulations
  (for example, “Merkheft Erdbaumaschinen”, leaflet on earth moving machines of the German employers’ liability insurance association for construction engineering).
- Bear in mind the weather conditions (for example, ice, snow).
- Ensure the minimum load on the steering axle(s) of the transport vehicle, and ensure an even load distribution.

2.9 Maintenance

Maintenance

- Observe the intervals prescribed by law and those specified in this Operator's Manual for routine checks/inspections and maintenance.
- For inspection and maintenance, ensure that all tools and service center equipment are adapted to the performance of the task described in this Operator's Manual.
- Do not use any damaged or malfunctioning tools.
- Have hydraulic hoses replaced within stipulated intervals even if no visual defects can be detected.
- The vehicle and the engine must be stopped during maintenance.
- Once maintenance is over, correctly install safety equipment again that has been removed.
- Wait for the vehicle to cool down before touching components.
- Maintenance that does not involve HV components (e.g. replacing oil), where the maintenance personnel must work near HV components and, in the event of an error, could trigger an electrical hazard, must be performed by "electrically trained persons". The training must include the following factual information:
  - the hazard sources on the machine,
  - safety measures and
  - the corresponding rules of conduct.
- In order to be permitted to perform maintenance on HV systems of the machine, further training as "Expert for Work on HV Intrinsically Safe Machines" (DGUV Information 200-005) is mandated in Germany.

Personal safety measures

- Avoid any operational mode that might be prejudicial to safety.
- Wear protective clothing and equipment (for example a hard hat, protective gloves, safety boots).
- Tie back long hair and remove all jewelry.
- If maintenance on a running drive cannot be avoided:
  - Only work in groups of two.
  - Both persons must be authorized and trained for the operation of the machine.
  - One person must be seated on the operator seat and stay in contact with the second person.
  - Keep a safe distance from rotating parts (for example from fan blades, belts).
  - Keep a safe distance from hot parts.
  - Only perform maintenance in well-ventilated areas.
- Safely lock/support vehicle components before starting work.

Preparatory measures

- Attach a warning label to the control elements (for example “Machine being serviced, do not turn on”).
- Before performing assembly work on the vehicle, support the areas to be serviced and use suitable lifting and supporting equipment for the replacement of parts over 9 kg (20 lbs.).
- Perform maintenance only if:
  - the machine is positioned on firm and level ground.
  - the machine is secured to prevent it from rolling away (for example with the parking brake, wheel chocks), and if all attachments/the work equipment is lowered to the ground.
  - the machine is turned off.
  - the ignition key has been removed.
  - the pressure in the operating hydraulics has been released.
- If maintenance has to be performed under a raised machine/ attachment, support the machine/attachment (for example, with a lift platform, trestles) ensuring safety and stability.
- Hydraulic cylinders or jacks alone do not sufficiently secure a raised vehicle/attachment.
- Do not work on parts that are energized. Before starting work establish that the machine is de-energized, check it and ensure it is maintained for the entire time work is being performed.

Measures for performing maintenance

- Perform only the maintenance described in this Operator's Manual.
- All work that is not described in this operator's manual must be performed by qualified and authorized, technically trained personnel.
- Follow the maintenance plan – see "Maintenance plan".
- Always use specially designed or otherwise safety-oriented ladders and working platforms to perform overhead maintenance.
  Do not use vehicle parts or attachments as a climbing aid.
- Do not use attachments/work equipment as a lift platform for persons.
- Remove all dirt, snow and ice from climbing aids
  (for example, handholds, footholds, handrails).
- Disconnect the battery connector from the machine connection before working on the electrical system.

Modifications and spare parts

- Do not modify the machine and the work equipment/attachment (for example, the safety devices, lighting, tires, straightening and welding work).
- Modifications must be approved by the manufacturer and performed by an authorized service center.
- Use only original spare parts.

Protective structures

- The cabin, rollbar and protective screen are tested protective structures and may not be modified (for example no drilling, bending, welding).
- Perform a visual check according to the maintenance plan
  (for example, check the fastenings for damage).
- If damage or defects are detected, have them immediately checked and repaired by an authorized service center.
- Have retrofitting work only performed by an authorized service center.
- Replace self-locking fasteners (for example self-locking nuts) by new ones after removing them.

2.10 Measures for avoiding risks

Tires

- Have repair work on the tires only performed by trained technical personnel.
- Check the tires for correct pressure and visible damage (for example, cracks, cuts).
- Check the wheel nuts for tightness.
- Use only approved tires.
- The machine must have identical tires (for example, profile, revolutions per mile).

Electrical system

- High-voltage components (HV components) of the machine (e.g. the power electronics and converter) are subject to life-threatening voltages (high-voltage = 60 V to 1500 V DC or 30 V to 1000 V AC). Do not touch any parts that are under voltage.
- Only persons who have received additional training as an "Expert for Work on HV Intrinsically Safe Machines" (DGUV Information 200-005) are permitted to work on HV intrinsically safe machines in Germany. HV systems are systems whose conductive components have been secured against contact by means of suitable materials, e.g. via firmly bolted covers or insulation.
- The machine must be de-energized when work is being performed on HV components.
- Use only fuses with the specified current rating.
- In case of damage or malfunction in the electrical system:
  - Put the machine out of operation immediately and secure it against restart.
  - Disconnect the battery connector.
  - Have the malfunction repaired.
- Ensure that work on the electrical system is only performed by trained technical personnel.
- Regularly check the electrical system. Have any malfunctions repaired immediately (e.g. loose connections, defective insulation, scorched cables).
- The operating voltage of the machine and the attachment must be the same (for example 12 V).

Battery

- The charging, maintenance and changing of the battery may only be carried out by persons who are trained to do so.
- Always observe the information provided in this Operator's Manual and the instructions provided by the battery manufacturer.
- Batteries contain poisonous and caustic substances (e.g. sulfuric acid). When handling the battery observe the specific safety instructions and regulations relevant to accident prevention.
- Do not smoke or use an unprotected light or open flame when working around batteries.
- When charging or maintaining the battery, no flammable substances or operating materials that create sparks may be in the area of the vehicle.
- A volatile oxyhydrogen mixture forms in batteries during normal operation and especially during charging. Always wear gloves and eye protection when working with batteries.
- Perform battery maintenance only in well-ventilated areas (e.g., due to explosive vapors, explosion hazard).
- Keep flame retardants (e.g. fire extinguisher) near at hand.
- Keep the cell lid of the battery clean and dry.
- Keep the terminals and cable lugs clean and lightly grease with terminal grease.
- Take care that the terminals and cable lugs are firmly seated.
- Before closing the battery cover plate, make certain that no cable can be damaged.
- Measures to be taken in case of contact with battery acid.
  - Battery acid on the skin:
    remove wet clothes. Dab wet parts of skin with cotton or paper towel and flush them thoroughly under running water.
    Then wash thoroughly with soap.
  - Battery acid in eyes:
    wash eyes under running water.
    Consult an ophthalmologist immediately.

Working near electric supply lines

- Before performing any work, the operator must check whether there are any electric supply lines in the job site.
- If there are electric supply lines, only a vehicle with cabin may be used (Faraday cage).
- Keep a safe distance from existing electric supply lines.
- If this is not possible, the operator must take other safety measures (for example, switching off the current) in agreement with the operating company or owner of the supply lines.
- If supply lines are exposed, they must be fastened, supported and secured accordingly.
- If live supply lines are touched nevertheless:
  - Do not leave/touch the cabin (Faraday cage).
  - If possible, drive the machine out of the danger zone.
  - Warn others against approaching and touching the machine.
  - Have the live wire de-energized.
  - Do not leave the vehicle until the supply lines that have been touched or damaged have been safely de-energized.

Working near non-electric supply lines

- Before performing any work, the operator must check whether there are any non-electric supply lines in the job site.
- If there are non-electric supply lines, the operator must take safety measures (for example, switching off the supply line) in agreement with the operating company or owner of the supply lines.
- If supply lines are exposed, they must be fastened, supported and secured accordingly.

Behavior during thunderstorm

- Stop machine operation if a thunderstorm is gathering, stop the machine, secure and leave it, and avoid being near it.

Hydraulic system

- Check all lines, hoses and screw connections regularly for leaks and visible damage.
- Splashed oil can cause injury and fire.
- Leaking hydraulic lines can result in loss of brake effect.
- Have damage and leaks immediately repaired by an authorized service center.
- Have hydraulic hoses replaced by an authorized service center within stipulated intervals even if no visual defects can be detected.

Handling oil, grease and other substances

- When handling oil, grease and other chemical substances (for example the battery acid, coolant), observe the safety data sheets.
- Avoid skin and eye contact with oil and grease. Wear appropriate protective equipment (for example protective gloves, safety glasses).
- Be careful when handling hot consumables – burn hazard.
- In polluted environment (dust, vapors, smoke, asbestos), work only with appropriate personal protective equipment (for example with a breathing mask).
- Do not allow the oil and oily wastes to get into the ground or stretches of water.
- Absorb the escaping oil immediately with a binding agent, and dispose of it in an environmentally friendly manner and separately from other waste.
- Even biodegradable, “environmentally friendly” oil must be disposed of separately, just like every other type of oil.

Fire hazard

- Operating supplies, lubricants and coolants are flammable.
- Do not put the vehicle into operation if there is a fire hazard.
- Do not use flammable detergents.
- Due to hot machine parts, maintain a safe distance from easily flammable material (for example, from hay, dry leaves).
  - Stop and park the machine only in fire-protected areas.
- If the vehicle is equipped with a fire extinguisher (optional), have it installed in its specific location.
- Keep the vehicle clean. This reduces the fire hazard.
- Always call the fire department in the event of a fire.
- Do not use water to extinguish fires on the machine or burning liquids. Use suitable extinguishing agents, such as powder, carbon dioxide or foam extinguishers.

Noise

- Observe the noise regulations
  (for example, during applications in enclosed premises).
- Bear in mind external sources of noise
  (compressed-air hammer, concrete saw).
- Do not remove the sound baffles of the machine/attachment.
- Have damaged sound baffles immediately replaced
  (for example, an insulating mat, muffler).
- Before starting work, get informed on the noise level of the machine/
  attachment (for example on the adhesive label) – wear ear protectors.
- Do not wear ear protectors during machine travel on public roads/sites.

Cleaning

- When using compressed air or a high-pressure cleaner,
  there is a risk of injury from splashing parts.
  - Wear appropriate protective clothes.
- Do not use any dangerous and aggressive detergents.
  - Wear appropriate protective clothes.
- Operate the machine only in a clean condition.
  - Remove all dirt, snow and ice from climbing aids
    (for example, handholds, footholds, handrails).
  - Keep the cabin glazing and visual aids clean.
  - Keep the light system and reflectors clean.
  - Keep the control elements and indicators clean.
  - Keep the safety, warning and information labels clean, and replace
    damaged and missing labels by new ones.
- Perform cleaning work only if the machine is
  stopped and cooled down.
- Bear in mind sensitive components and protect them accordingly
  (for example electronic control units, relays).
- Keep batteries clean and dry at all times in order
  to avoid leakage currents.

Notes:

3 Introduction

3.1 Machine outside view

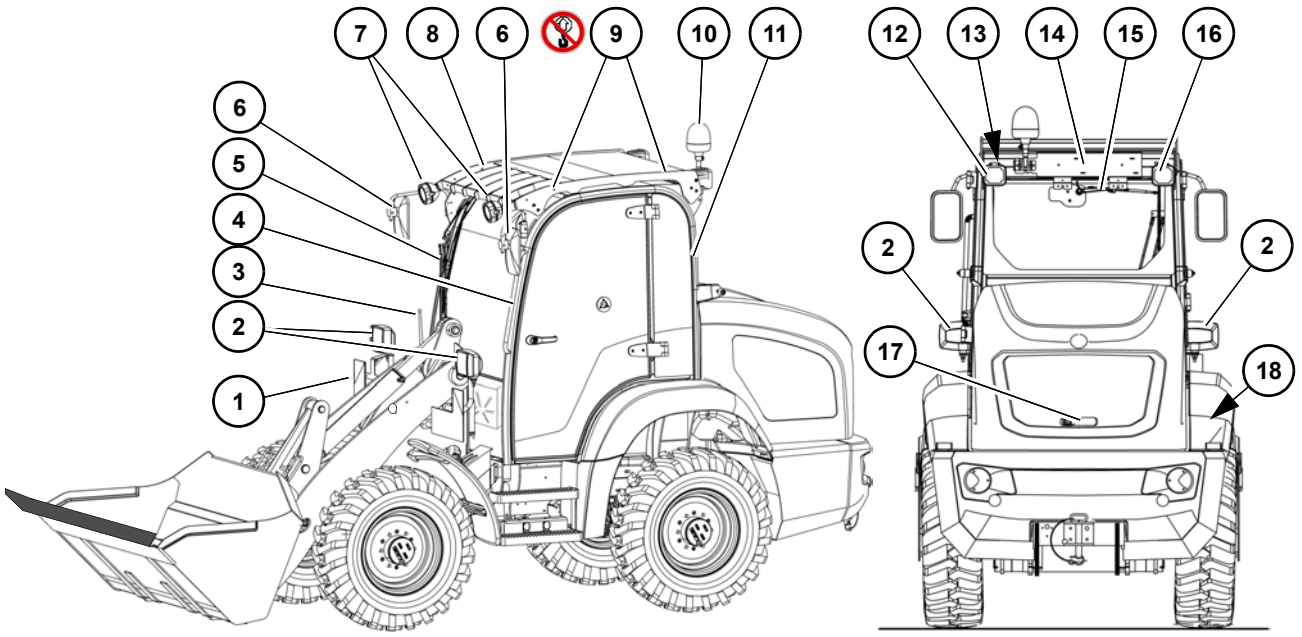

Fig. 1

Designation	
1	Bracket for warning stripe (option)
2	Headlight reflectors left/right with turn indicators
3	Radio preparation – antennae (option)
4	Handle for access
5	Window wiper (front window)[1]
6	Left/right rearview mirrors
7	Front working lights (option)
8	FOPS guard grid (category I => series, category II => option)
9	4 eye hooks (cabin disassembly)[2]
10	Rotating beacon (option)
11	Cabin open (canopy)/cabin cpl.[3]
12	Rear left working light (standard)
13	Backup warning system (option)
14	Numberplate bracket with lighting in rear (option)
15	Windshield wiper (rear window)[1]
16	Rear right working light (option)
17	Battery cover plate locking device
18	Filler inlet hydraulic oil reservoir

1. Included in cabin cpl.
2. Eye hooks are for removing the cabin only, and may **not** be used for lifting the machine.
3. Cabin cpl. => Option

Machine outside view (continuation)

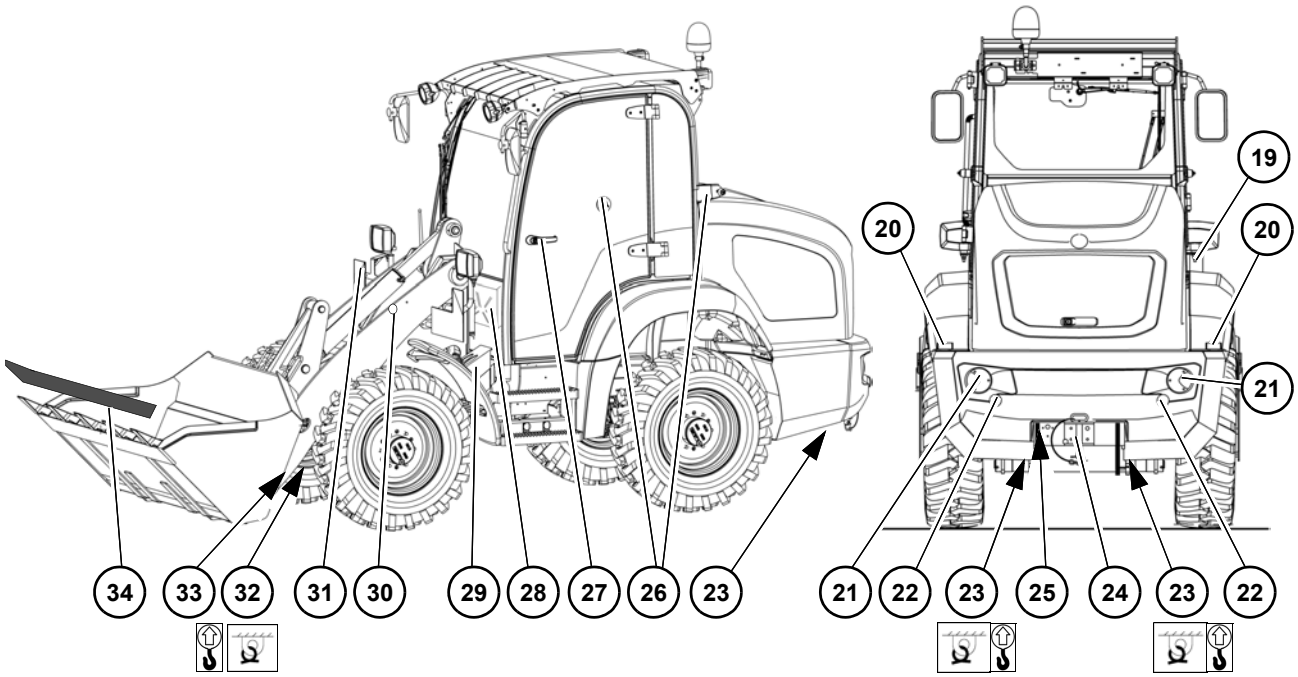

Fig. 1

Designation	
19	Safety prop for loader unit (option)
20	Additional reflectors (required for attachments larger than 1710 mm (67.3 in) width) (option)
21	Brake, rear and turn indicator lights
22	Reflectors
23	Rear hooks for loading/tying down the machine (left/right)
24	Towing device[1]
25	Rear power socket for rear attachments (option)
26	Door arrester[2]
27	Door handle with lock (door) [2]
28	Hydraulic oil radiator (option)
29	Wheel chock
30	7-pole front socket (option)
31	Number plate bracket in front (optional)
32	Front hooks for loading/tying down the machine (left/right)
33	Front right towing device[1]
34	Protective guard (blade and front-edge protection) (option)

1. **Not** certified as a trailer coupling or for loading or tying down the machine.
2. Included in cabin cpl.

Models and trade names (overview)

The machine is identified by the following designations:

- **"Model designation",** on the type label (field 5) on the machine, front right– *see "Type labels" on page 3-26*.
- **"Trade name"** “, glued to the machine on the outside.

The letter **S** or **L** in the designation indicates the version of the loader unit:

- **S** = standard loader unit
- **L** = extended loader unit

Model designation	Trade name
357-00S	5055e
357-00L	5055eL

3.2 Brief description of the machine

Main components of the machine

- Stable sheet steel frame accepting main components
- ROPS/FOPS tested cabin (roll-over/falling object protection); Category I Series, Category II option)
  – see chapter 4 “Cabin/control stand” on page 4-1
  - ROPS is the abbreviation for the English concept "Roll Over Protective Structure"
  - FOPS is the abbreviation for the English concept "Falling Object Protective Structure"
- Travelling drive:
  - Alternating current electric motor (hydraulic motor), asynchronous; flange-mounted to the transfer gearbox; supported on oscillating element
  - Single-stage transfer gearbox
  - Maximum speed 17 km/h (10.6 mph)
- Work hydraulics:
  - Alternating current electric motor (operating motor), asynchronous; supported on oscillating element
  - Hydraulic pump (gear pump); Speed-controlled volumetric flow
- Hydraulic four-wheel power steering with emergency steering features
- Planetary steering axles front and rear; rear oscillating design, front with differential lock
- Operating brake (brake-disc on front axle drive shaft); Braking effect is transferred via the cardan shaft to the rear axle)
- Parking brake (spring-applied brake; acting on motor shaft (hydraulic motor))

Information

The machine is equipped with an operator presence switch to protect the operator. In this case:

- The machine can only be switched on if the operator has taken his place in the operator seat.
- If the operator seat is relinquished for more than 3 seconds during machine travel, the machine is braked until it comes to a standstill and the parking brake engaged once in standstill.

Information

The machine can be equipped with the **“Telematics”** option (transmission of operational data, location, etc. via satellite)!

Please contact your dealer if you require information on the “Telematics” option.

Travel drive

The drive is delivered through a 3-phase alternating current electric motor (hydraulic motor). The speed of the hydraulic motor is transferred via the single stage transfer gearbox and the cardan shaft to the front and rear axle.

The machine has two speed ranges: Turtle and Hare. After selecting the travel direction, as soon as the accelerator pedal is pressed, the machine will start moving. Travel speed depends on the speed of rotation of the electric motor. The infinitely variable adjustment control is performed within the selected speed range via the accelerator pedal.

A change in the travel direction is possible at any time, even while moving. If the accelerator pedal is being pressed when changing the travel direction, the machine brakes and then accelerates immediately thereafter in the new direction.

If the machine is braked by easing off the accelerator pedal or stepping on the brake, or if the machine is rolling downhill without pressing on the accelerator pedal, then electricity is fed back into the battery.

Indicator lights on the instrument panel illuminate in case the fixed temperature is exceeded in the hydraulic motor.

Information

In order to reach maximum speed, the axles and the gearbox must be run for at least 10 operating hours and the lube oil in the axles must have reached a temperature of approx. 50°C (122°F)!

Furthermore, maximum speed is only reached on level, asphalted ground, and when the attachment is empty!

Work hydraulics

The machine is equipped with a hydraulic system that is supplied from the hydraulic oil reservoir.

A gear pump supplies both the work hydraulics and the steering hydraulics with the required pressure. The gear pump is driven by a 3-phase alternating current electric motor (operating motor). The operating motor is installed on the machine's left side, in the access area between the axles.

The oil flow of the pump depends on the speed of the operating motor.

The operating motor runs at base speed as soon as the operator has taken his seat in the operator's seat, the ignition key is in position **II** and the motor isolating switch has been unlocked. The base speed is sufficient for supplying the hydraulic steering and providing the boost pressure.

To safeguard the work hydraulics, temperature monitors have been integrated in the machine. If a temperature monitor reacts, the performance of the operating motor is reduced in dependence on the temperature.

If the joystick is used to call up hydraulic work functions, the speed of the operating motor is increased via a controller, to make a corresponding volume flow available.

The hydraulic system is equipped with pressure control valves and filters.

Indicator lights on the instrument panel show if the temperature specified on the operating motor has been exceeded.

Cooling system

A hydraulic oil radiator (optional), which cools down the hydraulic oil, is (optionally) located on the left side of the machine.

Indicator lights on the instrument panel illuminate in case of overheating of the hydraulic oil temperature, even if no hydraulic oil radiator (optional) is installed on the machine.

Steering system

The standard machine is equipped with 4-wheel steering.
Front axle steering is optionally available.

Brakes

The service brake consists of a brake disc, which is located on the input shaft of the front axle. Through the cardan shaft, it also works on the rear axle. The service brake is activated via the braking pedal. In addition, the machine is braked electromagnetically by the hydraulic motor when the accelerator pedal is released.

The parking brake is designed as a spring-applied brake.
The spring-applied brake can be activated either automatically or manually.

The automatic activation of the spring-applied brake is carried out in two steps: hold function (active standstill control) and park function.
The hold function prevents the machine from rolling backwards on the slope. The park function applies if no machine travel occurs for more than 3 seconds, the operator presence switch is triggered or the machine is switched off.
The hold function retains the machine at an incline of up to 18%.

In addition, the spring-applied brake can be activated manually by means of a switch.

Loader unit

The loader unit consists of the lift frame with an integrated hydraulic quickhitch for the attachments, lift and tilt cylinders and the corresponding attachments.

Electrical system

The machine is operated electrically. The electric current is supplied by an 80 V-battery as direct current. A frequency converter converts the direct current in 3-phase alternating current for the electric motors. The electric traveling drive has an operating voltage of 48 volts, the electrical drive of the hydraulic systems as an operating voltage of 43 volts.

The power electronics is the central control component. All the basic functions (machine computer, backup computer, drive control, I/O interface) are integrated into the power electronics that are required for the operation of the machine. In addition, the power electronics are equipped with a power supply.

The StVZO module is an additional component. The StVZO module contains all the functions (control, DC/DC voltage transformer, I/O interface) needed for implementing StVZO requirements.

To protect the HV system, optional equipment for monitoring the insulation is installed in the machine. The insulation monitor enables you to discover insulation faults during machine operation.

To protect the battery, a discharge monitory is installed in the machine. The discharge monitor reduces performance hydraulic motor in dependence on the battery charging level, thereby preventing a deep discharge of the battery– *see chapter 4 “Indicator display – battery charge condition” on page 4-36*.

The battery has to be connected to a specific charger at regular intervals for recharging.

The exterior lighting of the machine has a voltage of 24 volts, the electrical system of the machine has a voltage of 12 volts. Voltage converters convert the 80-volt operating voltage into 24 volts for the lighting or 12 volts for the electrical system.

Consumers and their supply circuits are protected with fuses.

The traveling drive, work hydraulics and steering system should be disconnected using the motor isolating switch *– see chapter 4 “Motor isolating switch” on page 4-22*.

The power electronics are not switched off circuit via the motor isolating switch. In order to switch the vehicle off circuit, the battery connector must be disconnected from the vehicle connection *– see chapter 4 “Battery connector” on page 4-20*.

3.3 Information and regulations on use

General information on the machine

This machine is a versatile and powerful aid on construction sites, in agriculture and for recycling applications. The wide range of attachments allows you to use the machine as a snow plow or construction vehicle, a fork lift for work with palletized goods, or as a tractor for transport applications in agriculture (agricultural or forestry license[1]).

Possible applications – *see "Use of attachments" on page 3-16*.

Information

The machine can be equipped with the “Telematic” option (transmission of operational data, location, etc. via satellite)!

Please contact your dealer if you require more information on the “Telematic” option.

Safe machine operation

Your own safety, as well as the safety of others, depends to a great extent on how the machine is moved and operated.

Read this Operator’s Manual carefully prior to the first drive.

Basic rule: careful and prudent working is the best way to avoid accidents!

The operational safety and readiness of the machine also depends on regular maintenance and servicing. This is why regular maintenance and servicing is absolutely necessary
– *see chapter 7 “Maintenance overview” on page 7-6*.

Information

Repair, maintenance and modifications of the machine may only be performed by trained technical personnel or authorized specialist workshops!

Insist on using original spare parts for repairs.

The machine’s permits, certifications, registrations, etc., may be withdrawn if machine parts/components with a prescribed condition or quality, or machine parts/components that can put persons at risk during operation, are subsequently modified or exchanged.

1. Agricultural or forestry license not currently obtained.

Designated use

- The vehicle can be used as a self-propelled work machine or as a tractor if registered accordingly (**LoF** = Land- oder Forstwirtschaftliche Zulassung [i.e. agricultural or forestry license] [1])
  (EC check number– *see "Filter category of the cab" on page 3-27*).
- The available and authorized attachments will decide in the first place how the machine is used.

NOTICE

In order to avoid damage to the machine, only the attachments listed in the tables on pages *3-18*, *3-21*, and *3-23* may be installed on the corresponding quickhitch.

- Note that **not all** specified attachments are allowed for machine travel on public roads in the Germany.
- If the machine is licensed as a “self-propelled work machine”, please refer to the German ABE (Allgemeine Betriebserlaubnis = operating license) or Data Confirmation for "setup modes"
  (approved attachments) and specific requirements.
- If the machine is licensed as a forestry tractor[1] (agricultural or forestry license), no attachments are listed in the license certificate. Only the authorized attachments (in connection with the specific requirements) listed in this operator's manual are authorized for use on public roads
  – see "Attachments for KRAMER quickhitch facility" on page 3-18, *Attachments for SKID STEER quickhitch (currently not available) on page 3-21* or
  Attachments for EURO quickhitch on page 3-23!
- Attachments that are **not** listed in the ABE or Data Confirmation require special approval made from the competent authorities; these attachments must also satisfy the special conditions stated in “Merkblätter für Anbaugeräte” (leaflet with specific instructions for attachments) §30 para. 10/11/12 StVZO
  – see "Use of attachments" on page 3-16!

Information

Get informed on and follow the legal regulations of your country.

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1. Agricultural or forestry license not currently obtained.

Improper use

Not using the machine according to its designated use means that it is used for an application that is not specified by the manufacturer. Therefore, this is misuse in the terms of the Machine Guideline.

Alone the user/operating company shall be liable for damage resulting from this.

Misapplications with the machine are, for example:

- Use of surfaces and spaces that are not described as work or maintenance spaces in the Operator's Manual.
- Machine and attachment modifications without proper authority.
- Fastening/installation of additional equipment that has not been certified or released.
- Use for spraying applications.
- Use for forestry applications.
- Use in potentially explosive areas.
- Use in contaminated areas.
- Use as a carrier machine for equipment that has not been certified/released by the manufacturer.
- Use in stretches of water or flood areas.
- Lifting and transporting people.
- Machine travel with liquid material in the bucket.
- Transport of goods on public roads.
- Installation and operation of work platforms.
- Raising heavy loads (overload).
- Machine operation although the machine operator is not on the operator seat.
- Adjustment, cleaning and maintenance contrary to the instructions given in the Operator's Manual.
- Performing troubleshooting and maintenance while drives are running.
- Failure to follow warning instructions on the machine and in the operator's manual.
- Maintenance and repair work by untrained personnel.
- Use of non-original spare parts.

Information

The vehicle is not approved for being lifted by hoists. No hooks, eyelets, etc., may be installed on the attachments or loader unit!

Failure to observe this results in loss of warranty, liability and certification for the machine.

Driving license

The machine may only be driven by persons who are trained in how to operate it, have proven their driving and load-handling abilities to the operating company or its representative and have been expressly assigned by the company to do the driving.

Machines may only be driven on public roads only if the operator has a driving license as defined by national traffic regulations.

In the Germany, in accordance with **the driving permission ordinance (FeV) § 6**, one of the following driving licenses is required for driving the machine.

- **Driving licence category L**
  - Self-propelled work machines up to 25 kph
  - Agricultural or forestry tractors up to 40 kph (with trailer 25 kph)
- **Driving licence category C**
  - Motor vehicles with over 3500 kg gross weight rating (with trailers up to 750 kg)
- **Driving licence category C1**
  - Motor vehicles between 3500 and 7500 kg gross weight rating (with trailers up to 750 kg)
- **Driving licence category CE**
  - Motor vehicles with over 3500 kg gross weight rating (with trailers over 750 kg)
- **Driving licence category T**
  - Self-propelled work machines for agriculture and forestry up to 40 kph
  - Tractors and agricultural or forestry machinery up to 60 kph

Information

Get informed on and follow the legal regulations of your country.

Vehicle license

The machine may be registered in EU member states as "self-propelled work machine" or as agricultural or forestry tractor[1] (LoF).

- Possible applications – *see "Designated use" on page 3-10*.

National regulations must be observed for licence certificates for machine travel on public roads (licence certificate, operation licence).

Information

Get informed on and follow the legal regulations of your country.

Identification

In the Germany, self-propelled work machines capable of speeds **of more than 20 km/h** (>12.44 mph) are required, pursuant to § 3 FZV (German vehicle licensing ordinance), to be fitted with their own registration plates in accordance with § 8 FZV.

In the case of self-propelled work machines capable **of less than 20 km/h** (<12.44 mph), the operating company is required, pursuant to § 4b FZV, to affix their first name, surname and place of residence (company and registered office) in indelible print on the left-hand side of their machines.

Information

Get informed on and follow the legal regulations of your country.

Warning identification

In the Germany, according to § 52 clause 4.1 of StVZO, machines that are used on public roads for the construction and maintenance of roads, and for the cleaning of roads or facilities, must be fitted with the red and white warning identification as per DIN 30710, in connection with a yellow rotating beacon (option).

Failure to observe this can lead to machine travel on public roads being prohibited.

Information

Get informed on and follow the legal regulations of your country.

1. Agricultural or forestry license not currently obtained.

On-board documents

German traffic regulations (StVZO) require to have the following documentation on board:

- German ABE (Allgemeine Betriebserlaubnis = general operating license) or data confirmation
- Driving license
- Test report according to DGUV regulation 70 § 57 clause 2 of the accident prevention regulation "Vehicles“
- Operator’s manual

Information

Get informed on and follow the legal regulations of your country.

On-board equipment

In Germany, § 53 StVZO requires that the following equipment be supplied by the operating company and fitted on the machine:

- 1 warning triangle with design certification
- 1 warning light with design certification
- 1 wheel chock that matches the wheels of the machine
- 1 safety vest made of yellow or orange fluorescent material with reflecting strips
- 1 first-aid kit in compliance with DIN 13 164 sheet. 1

Information

Get informed on and follow the legal regulations of your country.

Permissible operating temperature range

The operating temperature range for a machine serviced in compliance with the maintenance instructions is
between -15 and +45°C (+5 and +113°F) during normal operation with short intervals of operation at maximum output.

Operating temperatures below -15°C (+5°F) or over +45°C (+113°F) require special equipment and/or material (hydraulic oil).

Please contact your dealer if you require more information on operation in extreme areas.

Machine inspections

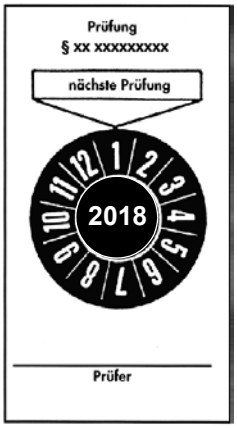


Fig. 2

When operating the machines, the national safety regulations must be followed as well, for example in Germany, the regulations for accident prevention “Deutsche Prüfstelle für Land- und Forsttechnik” (German Test- and Certification-Center for Agriculture and Forest Engineering – DPLF) and the Accident Prevention Regulations on “vehicles” (DGUV [German Statutory Accident Insurance] 70 § 57 clause 1).

In Germany, legislation, supplemented by the technical rules for operational safety (TRBS) 1201 and the accident prevention regulations (DGUV regulation 1), requires all machine operators to have all machines and equipment inspected regularly (BetrSichV § 10).

- Inspections must be performed as required, but at least once a year, by an expert or skilled person competent in HV systems and must be documented in written form.
- Subsequent inspections of detected defects must be performed, too.
- The competent inspection authority may require the inspection report to be available at the place where the machine is used.
- As evidence of the inspection, affix an inspection label on the machine for evidence (see example on the left).
  The inspection tag can be acquired from the relevant inspection authorities.

Bear in mind that all work equipment is inspected, not only the machine but also all technical auxiliary means, tools and attachments. (Work equipment is defined as all tools, attachments, machines or systems.)

This requirement is fulfilled, for instance, when the results are logged in a test booklet, file or report; Also see the professional association principle "Testing vehicles by an expert" (BGG 916).

Failure to observe this results in loss of warranty, liability and certification for the machine.

Information

Get informed on and follow the legal regulations of your country.

Use of attachments

General instructions

The attachments will decide in the first place how the machine is used.

- Different quickhitches are available for the machine. Refer to the following tables for the certified attachments and the specific requirements:
  Attachments for KRAMER quickhitch facility on page 3-18,
  Attachments for SKID STEER quickhitch (currently not available) on page 3-21 or
  Attachments for EURO quickhitch on page 3-23.
- Attachments certified for travel on public roads of Germany must also be additionally listed in the German ABE/Data Confirmation or in the license certificate of self-propelled work machines.
- For attachments that are not listed in the National Type Approval (Germany), the Data Confirmation (Germany), the registration documents or the following lists for the specific quickhitch, get in touch with a dealer for authorization (warranty claims)! A Separate Certification for Vehicles (Germany) made out by the appropriate national authorities is required!
- This operator's manual only describes how to install, use and remove the standard bucket, multipurpose bucket and pallet forks
  – see chapter 5 “Attachments” on page 5-48.
- Refer to the operator's manuals of the attachments for information on installing, removing and using other attachments.

Information

Get informed on and follow the legal regulations of your country.

Important Information

Information

If other attachments are installed and used, conformity (stability test) in accordance with the EC machinery directive or the DIN EN 474-3 standard must be checked and documented by an authorized service center – *see chapter 5 "Fitting attachments from other manufacturers (opt)" on page 5-95*.
In the case of non-EU countries, follow and comply with the national regulations of these countries.

Information

Machine travel on public roads with a full bucket is prohibited in Germany!

Get informed on and follow the legal regulations of your country.

Information

Please contact your dealer if you require more information on the quickhitch and the specific attachments.

Attachments for KRAMER quickhitch facility

Important information on the quickhitch facility and attachments

The machine can be equipped with a standard or an extended loader unit (option).

The type of loader unit installed on the machine is specified in the machine's model designation – *see "Type labels" on page 3-26*.

e.g. 357-00**S** = standard loader unit.

357-00**L** = extended loader unit.

Use only attachments that are certified for the respective loader unit – *see "Overview: Attachments for KRAMER quickhitch" on page 3-19*.

NOTICE

In order to ensure machine stability, and to avoid damage to the loader unit:

- ► Use only attachments that are certified for the existing quickhitch and loader unit, and that are fitted with a load diagram certified for the specific attachment.
- ► If uncertified attachments are installed, or if parts of the quickhitch or attachment are subsequently modified or replaced, the operation licence and the warranty become void.
- ► In addition to the Operator's Manual, observe and instruct the operator in all other generally applicable, legal and other mandatory regulations relevant to accident prevention and environmental protection.
- ► Please contact your dealer if you require more information on the quickhitch and the specific attachments.

Information

If other attachments are installed and used, conformity (stability test) in accordance with the EC machinery directive or the EN 474-3 standard must be checked and documented by an authorized service center – *see chapter 5 "Fitting attachments from other manufacturers (opt)" on page 5-95*.

Information

Remove attachments that are **not** certified for machine travel on public roads in Germany, load them on a separate transport vehicle and transport them to the job site.

Overview: Attachments for KRAMER quickhitch

Description of attachment	Vehicle	Part no. (model)	Width and length mm (in)	Capacity[1] m³ (ft³)	Application material density
Approved attachments for machine travel on public roads (Germany)					
Bucket (normal material)	357-00S	1000260472	1650 (64.96) with ripper teeth	0.5/0.65 (17.6)/(22.9)	Loosening, picking up, transporting and loading loose or solid material ≤ p = 1.8 t/m³ (≤p = 112 lb/ft³)
		1000261357[2]	1650 (64.96) without ripper teeth		
	357-00L	1000275101	1650 (64.96) with ripper teeth	0.4/0.55 (14.1)/(19.4)	
		1000275244[2]	1650 (64.96) without ripper teeth		
Bucket[3] (lightweight material)	357-00S 357-00L	1000266449	1850 (72.83) without ripper teeth	0.65 / 0.8 (22.9) / (28.2)	Picking up, transporting and loading light material ≤ p = 1.3 t/m³(≤p = 81 lb/ft³)
Bucket[3] (superlightweight material)	357-00S 357-00L	1000266582	1850 (72.83) without ripper teeth	0.9 / 1.1 (31.7) / (38.8)	Picking up, transporting and loading very lightweight material ≤ p = 0.9 t/m³ (≤p = 56 lb/ft³)
Multi-purpose bucket[4]	357-00S	1000275259	1650 (64.96) with ripper teeth	0.45 / 0.6 (15.8) / (21.1)	Grading, skimming, stripping, grabbing bulky material ≤ p = 1.8 t/m³ (≤p = 112 lb/ft³)
		1000275273	1650 (64.96) without ripper teeth		
	357-00L	1000260700	1650 (64.96) with ripper teeth	0.35 / 0.5 (12.3) / (17.6)	
		1000260527	1650 (64.96) without ripper teeth		
Side swing bucket[3, 4]	357-00S	1000277127	1850 (72.83)	0.4/0.55 (14.1)/(19.4)	Standard bucket, however with benefits for filling and backfilling ≤ p = 1.8 t/m³ (≤p = 112 lb/ft³)
Pallet forks with foldable fork tines[4, 5]	357-00S 357-00L	1000277151	1200 (47.24)	–	Picking up and transporting pallets and stacked material
Snow plow[3, 4, 6, 7]	357-00S 357-00L	1000277153	2000 (78.74)	–	Winter service
Snow plough[3, 4, 6, 7] (Vario)	357-00S 357-00L	1000277152	2000 (78.74)		

Additional attachments for KRAMER quickhitch see next page

Description of attachment	Vehicle	Part no. (model)	Width and length mm (in)	Capacity[1] m³ (ft³)	Application material density
Non-approved attachments for machine travel on public roads (Germany)					
Pallet forks	357-00S 357-00L	1000237357	1000 (39.37)	–	Picking up and transporting pallets and stacked material
	357-00S 357-00L	1000237358	1200 (47.24)	–	
Pallet forks[4] (hydraulic lateral displacement)	357-00S 357-00L	1000247565	1200 (47.24)	–	
Bale spike[4]	357-00S 357-00L	1000290452	Tines 1000 (39.37) Width 1200 (47.24)	Payload 900 kg (1984.1 lb)	Picking up and transporting silage, manure or recycling material
Manure forks[4]	357-00S 357-00L	1000292255	1700 (66.92)	–	
Round bale clamp[4]	357-00S 357-00L	1000177701	Clamping width 800 (31.50) – 1800 (70.86)	Payload 1200 kg (2645.5 lb)	
Silage bucket with hydraulic clamp [4]	357-00S	1000292250	1600 (62.99)		
Multipurpose forks with grab[4]	357-00S 357-00L	1000292215	–	–	

1. Capacity struck according to ISO 7546/capacity heaped.
2. With screwed-on blade.
3. When using this attachment, install additional reflectors at the rear of the machine (see – *see "Machine outside view" on page 3-1* pos. no. 19).
4. See the operator's manual of the attachment for putting the attachment into operation and using it.
5. Fork arms must be folded up and secured during machine travel on public roads.
6. Clearance lights must be installed and functional on the left and right of the attachment during machine travel on public roads.
7. In connection with the rotating beacon and red and white warning identification.

For more information about attaching devices, see:
data sheet for attachments §30 para. 10/11/12 StVZO (Germany)
Leaflet with specific instructions for hitching agricultural or forestry equipment onto the machine according to German legislation
Leaflet with specific instructions for hitching winter service equipment onto the machine according to German legislation

Attachments for SKID STEER quickhitch (currently not available)

Important information on the quickhitch facility and attachments

The SKID STEER quickhitch can only be installed in connection with the standard loader unit.

The machine manufacturer has only certified and released the attachments listed on page *3-22* for this quickhitch!

NOTICE

In order to ensure machine stability, and to avoid damage to the loader unit:

- ► Use only attachments that are certified for the existing quickhitch and loader unit, and that are fitted with a load diagram certified for the specific attachment.
- ► If uncertified attachments are installed, or if parts of the quickhitch or attachment are subsequently modified or replaced, the operation licence and the warranty become void.
- ► In addition to the Operator's Manual, observe and instruct the operator in all other generally applicable, legal and other mandatory regulations relevant to accident prevention and environmental protection.
- ► Please contact your dealer if you require more information on the quickhitch and the specific attachments.

Information

If other attachments are installed and used, conformity (stability test) in accordance with the EC machinery directive or the EN 474-3 standard must be checked and documented by an authorized service center
– see chapter 5 "Fitting attachments from other manufacturers (opt)" on page 5-95.

Information

Remove attachments that are **not** certified for machine travel on public roads in Germany, load them on a separate transport vehicle and transport them to the job site.

Information

Get informed on and follow the legal regulations of your country.

Overview of attachments for SKID STEER quickhitch (currently not available)

Description of attachment	Vehicle	Part no. (model)	Width mm (in)	Capacity[1] m³ (ft³)	Application material density
Approved attachments for machine travel on public roads (Germany)					
Bucket (normal material)	357-00S	1000335701	1650 (64.96) without ripper teeth	0.5 / 0.65 (17.6) / (22.9)	Loosening, picking up, transporting and loading loose or solid material ≤ p = 1.8 t/m³ (≤p = 112 lb/ft³)
		1000288406[2]	1650 (64.96) without ripper teeth		
Bucket (lightweight material)[3]	357-00S	1000288421	1850 (72.83)	0.6 / 0.9 (21.1) / (31.7)	Picking up, transporting and loading very lightweight material ≤ p = 1.3 t/m³ (≤ p = 81 lb/ft³)
Bucket (Super lightweight material)[3]	357-00S	1000288606	1850 (72.83)	1.0 (35.3) (heaped)	Picking up, transporting and loading very lightweight material ≤ p = 0.9 t/m³ (≤ p = 56 lb/ft³)
Non-approved attachments for machine travel on public roads (Germany)					
Pallet forks	357-00S	Werk-Brau Co. Inc. WBPF2-48 WBPF3-48		–	Picking up and transporting pallets and stacked material

1. Capacity struck according to ISO 7546/capacity heaped.
2. With screwed-blade.
3. When using this attachment, install additional reflectors at the rear of the machine (see – *see "Machine outside view" on page 3-1* pos. no. 19).

For more information about attaching devices, see:
data sheet for attachments §30 para. 10/11/12 StVZO (Germany)
Leaflet with specific instructions for hitching agricultural or forestry equipment onto the machine according to German legislation
Leaflet with specific instructions for hitching winter service equipment onto the machine according to German legislation

Attachments for EURO quickhitch

Important information on the quickhitch and attachments

The machine can be equipped with a standard or an extended loader unit (option).

The type of loader unit installed on the machine is specified in the machine's model designation – *see "Type labels" on page 3-26*.

e.g. 357-00**S** = standard loader unit.

357-00**L** = extended loader unit.

Use only attachments that are certified for the respective loader unit – *see "Overview: Attachments for EURO quickhitch facility" on page 3-24*.

NOTICE

In order to ensure machine stability, and to avoid damage to the loader unit:

- ► Use only attachments that are certified for the existing quickhitch and loader unit, and that are fitted with a load diagram certified for the specific attachment.
- ► If uncertified attachments are installed, or if parts of the quickhitch or attachment are subsequently modified or replaced, the operation licence and the warranty become void.
- ► In addition to the Operator's Manual, observe and instruct the operator in all other generally applicable, legal and other mandatory regulations relevant to accident prevention and environmental protection.
- ► Please contact your dealer if you require more information on the quickhitch and the specific attachments.

Information

If other attachments are installed and used, conformity (stability test) in accordance with the EC machinery directive or the EN 474-3 standard must be checked and documented by an authorized service center – *see chapter 5 "Fitting attachments from other manufacturers (opt)" on page 5-95*.

Information

Remove attachments that are **not** certified for machine travel on public roads in Germany, load them on a separate transport vehicle and transport them to the job site.

Overview: Attachments for EURO quickhitch facility

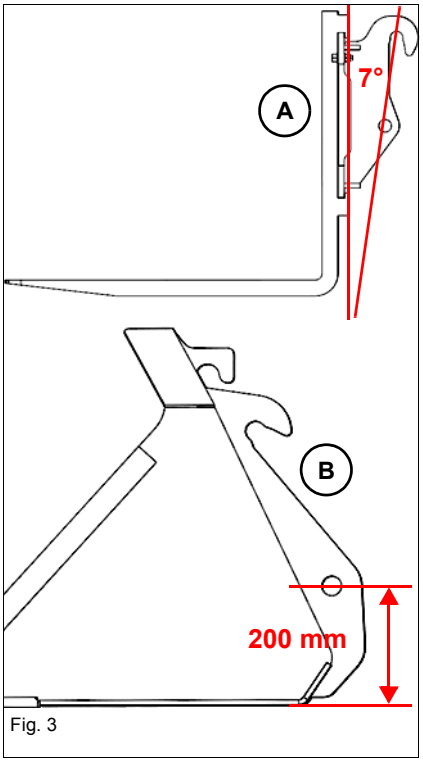


Fig. 3

Information

In order to ensure the parallel lift of the pallet forks and the correct scraping depth of the bucket, observe the following points before installing EURO attachments.

- ► Angle **A** – formed by rear of pallet forks and line between catch hooks and lock bores: **7°**
- ► Distance **B** – between lock bores and lower edge of bucket: **200 mm (0.86 in) minimum.**

Description of attachment	Vehicle	Part no. (model)	mm (in)	Capacity[1] m³ (ft³)	Application material density
Non-approved attachments for machine travel on public roads (Germany)					
Pallet forks	357-00S 357-00L	1000241148	1200 (47.24)	–	Picking up and transporting pallets and stacked material

1. Capacity struck according to ISO 7546/capacity heaped

For more information about attaching devices, see:
data sheet for attachments §30 para. 10/11/12 StVZO (Germany)
Leaflet with specific instructions for hitching agricultural or forestry equipment onto the machine according to German legislation
Leaflet with specific instructions for hitching winter service equipment onto the machine according to German legislation

3.4 Labels

Labels (overview)

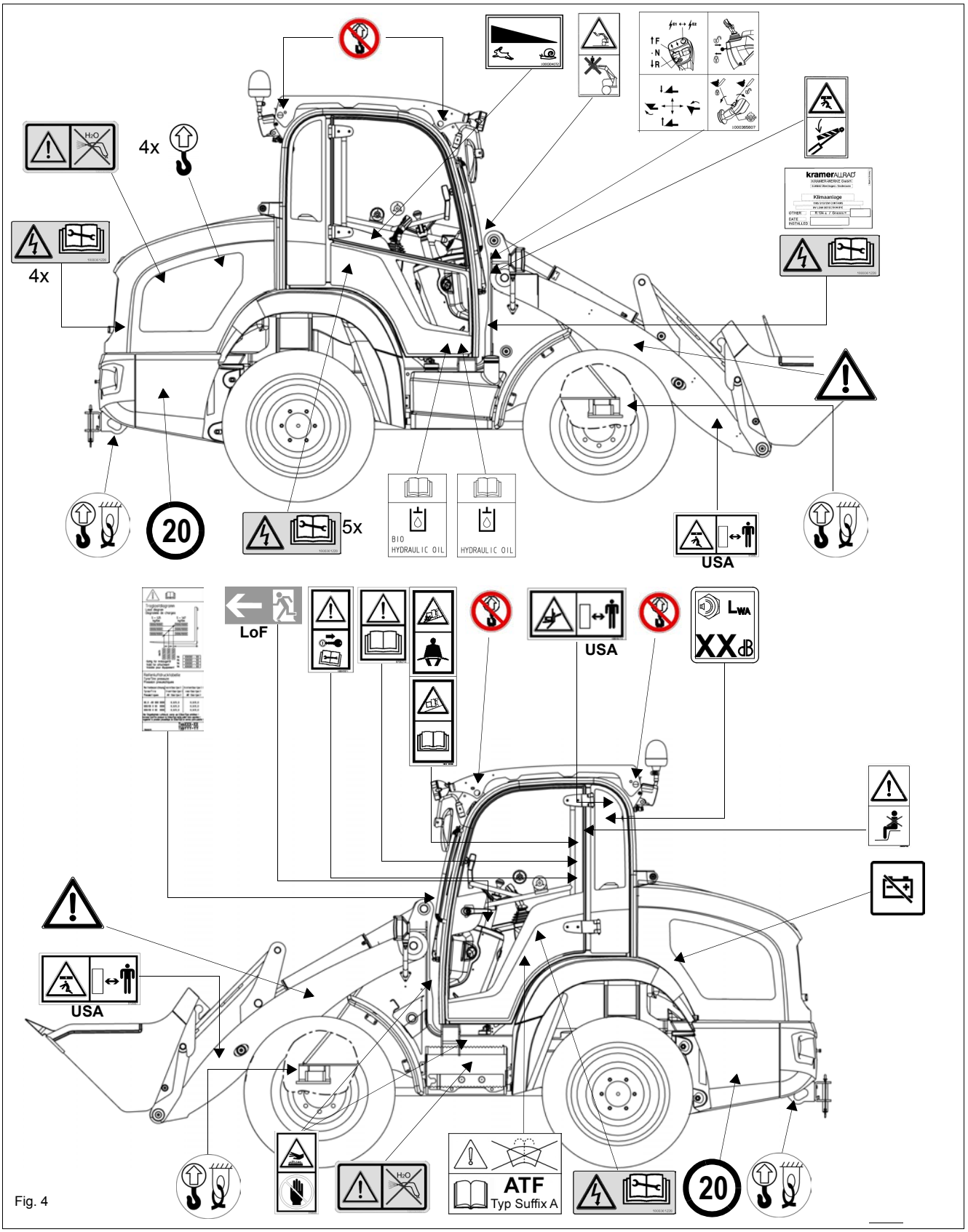


Fig. 4

Symbols

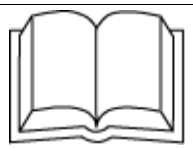


Fig. 5

The **"Book" symbol** on a label means that the indications and explanations are provided in further detail in this operator's manual.

Type labels

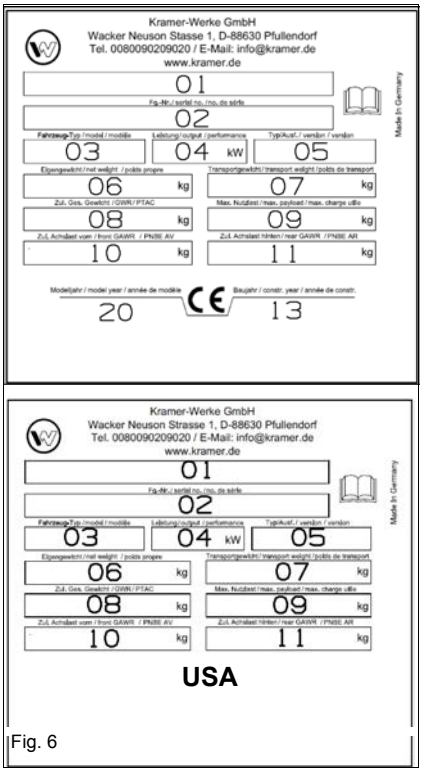


Fig. 6

Machine

The type label is located at the front right of the machine frame (on one side of the loader unit bulkhead).

The **CE** mark on type label **A** means that the machine meets the requirements of the Machine Directive 2006/42 EC within the European Community and that the conformity procedure has been performed.

Example: type label indications

1. Machine designation	Wheel loader
2. Serial no.	35700xxxx
3. Machine model	357
4. Output (kW)	15 + 22 (20 + 30 hp)
5. Version	357-00S
6. Dead weight (kg)	3900 (8598 lb)
7. Transport weight (kg)	–
8. Maximum permissible weight (kg)	5000 (11,023 lb)
9. Maximum payload (kg)	–
10.Front axle weight rating (kg)	3200 (7055 lb)
11.Rear gross axle weight rating (kg)	3200 (7055 lb)
20th Model year	xxxx
13th Model year	xxxx

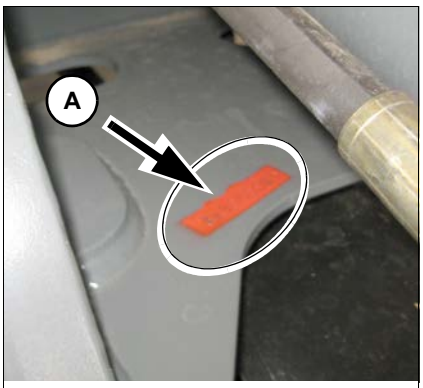


Fig. 7

Serial number

The chassis number **A** is stamped on the machine frame (next to the mudguard attachment, at the front right).
It is also located on the type label.

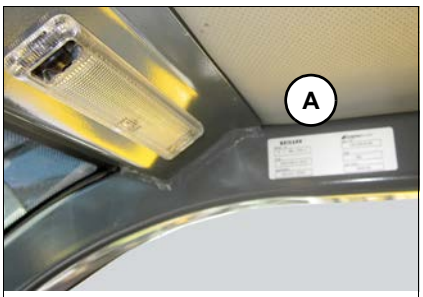


Fig. 8

Cabin

The type label (**A**) of the cab with the cab number is located on the upper right in travel direction on the beam.

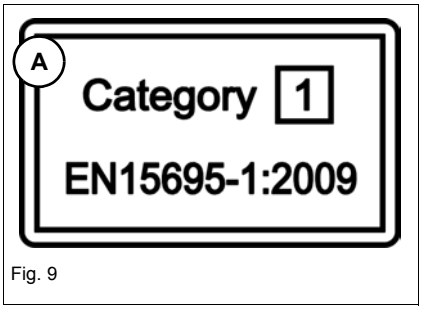


Fig. 9

Filter category of the cab

The information label (**A**) specifies that the cab does not protect against substances that pose a risk to health and that therefore the machine is not authorized for work operation with sprays.

The label is installed inside the cab at the upper right.

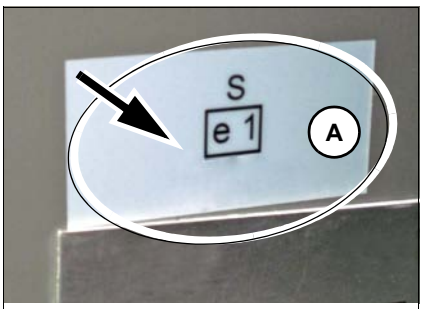


Fig. 10

EC approval number (only for agricultural or forestry license (LoF)[1])

Machines with agricultural or forestry certification for use in the European Community have an EC approval number **A**.

➥ e1 = EC approval mark.

➥ xxxx = approval number.

The label is installed inside the cab at the upper right.

1. Agricultural or forestry license not currently obtained.

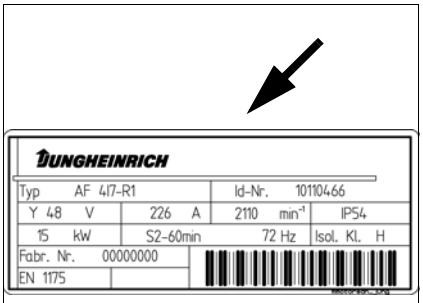


Fig. 11

Hydraulic motor

The type label of the hydraulic motor is located on the engine.

Fig. 12

Gearbox

View; vehicle underside

The type label (arrow) is located on the gearbox housing.

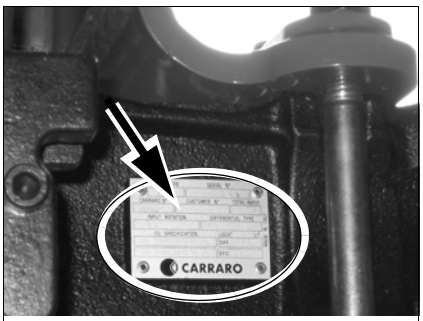


Fig. 13

Front and rear axles

View of lower side of machine.

- The type label with the serial number of the axle is located on the axle carrier (arrow).
  - Rear axle, on the left in travel direction
  - Front axle, on the right in travel direction

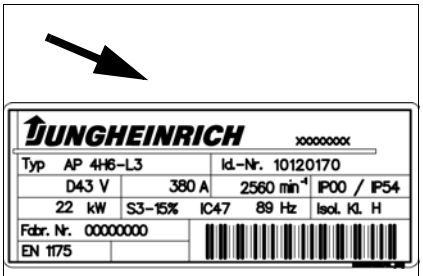


Fig. 14

Operating motor

The type label of the operating motor is located on the engine.

Fig. 15

Gear pump of work hydraulics

View of lower side of machine.

The serial number of the gear pump is located on the pump (arrow).

Warning labels

WARNING

Accident hazard due to damaged or missing warning labels!

Can cause serious injury or death.

► Immediately replace damaged or missing warning labels by new ones.

Fig. 16

High-voltage system

Caution! Machine components can result in life-threatening voltages. Covers that carry these warning labels may only be removed by someone with expertise in HV systems.

- Read and understand the Operator's Manual.

Located on all components of the high-voltage system.

Fig. 17

General indication of danger

Caution! All persons must stay clear of the danger zone of the machine.

Located at front left and right of vehicle frame, and at rear of machine.

Fig. 18

Caution! Read the operator's manual!

Caution! The operator's manual must be read prior to commissioning, as well as before maintenance or repair of the machine.

Located on the pillar on the left inside of the cab.

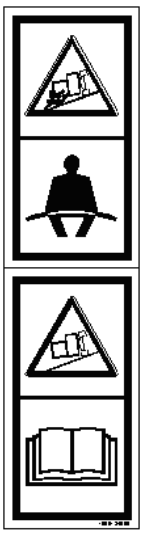


Fig. 19

Fasten the seat belt and ensure machine stability!

Caution! Before starting up the machine, the safety belt must be fastened and machine stability must be ensured throughout operation.

- Operate the machine only from the operator seat.
- Read and understand the Operator's Manual.

Located on the pillar on the left inside of the cab.

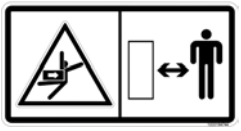


Fig. 20

No persons are allowed within the swiveling range of the machine!

Caution! During operation, all persons must stay clear of the swiveling range of the machine!

Located inside the cabin, above the rear window.

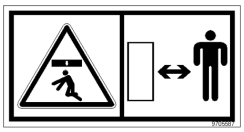


Fig. 21

No persons allowed in the working area of the loader unit!

Caution! During operation, no one is allowed to loiter in the working area of the loader unit! Persons in the vicinity of the loader unit must keep a sufficient distance!

Located externally on the left and right of the loader unit.

Fig. 22

No transport of persons!

Warning! Lifting or transporting persons on the machine, in the bucket or on the pallet forks is prohibited.

Located on the front left pillar in the cab.

Fig. 23

No passengers!

Warning! Nobody can be carried as a passenger in the operator's cabin.

Located on the front left pillar in the cab.

Fig. 24

Burn hazard!

Caution! Do not touch. Machine components can be very hot.

- Wear protective gloves and clothing during maintenance work.

Located in the access area near the operating motor and hydraulic oil radiator (optional).

Fig. 25

No lifting eyes for machine loading

Caution! The lifting eyes on the cab are for removing the cab only and may **not** be used for loading of the machine.
– see chapter 6 “Crane-lifting the machine” on page 6-8

Fixed above on the cabin (4x).

Fig. 26

Remove the ignition key!

Caution! The ignition key must be removed before performing inspection and maintenance on the machine.

- Also read the service manual before performing maintenance.
- Have repair work performed only by trained technical personnel.

Located on the pillar on the left inside the cabin.

Fig. 27

Prop for the lift cylinder of the loader unit

Caution! Install the prop before performing maintenance on the loader unit!

Located on the prop.

Fig. 28

No naked flames

Caution! A mixture of oxygen and hydrogen (oxyhydrogen) is released by the battery during charging. Explosion hazard!

Located on the battery.

Fig. 29

Warning against explosive substances

Caution! A mixture of oxygen and hydrogen (oxyhydrogen) is released by the battery during charging. Explosion hazard!

Located on the battery.

Fig. 30

Warning against corrosive substances

Caution! The battery contains acids that are poisonous and corrosive. Avoid contact of the battery acid with the skin, eyes and mouth.

Located on the battery.

Information labels

WARNING

Accident hazard due to damaged or missing information labels!

Can cause serious injury or death.

- ► Immediately replace damaged or missing information labels by new ones.
- ► This particularly applies to information labels referring to hazards (e.g. load diagrams)!

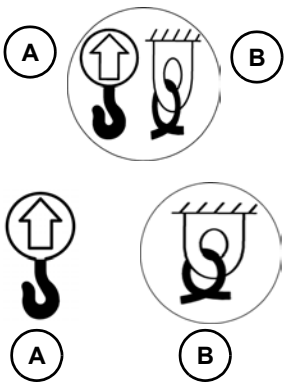


Fig. 31

Slinging points and tie-down points

The label identifies the slinging points **A** and the tie-down points **B** on the machine and the battery.
Slinging points **A** are used for loading with a crane.

Tie-down points **B** are used for securing the transport.

Information

The symbols for the slinging points **A** and tie-down points **B** may also appear separately on their own labels.

Located on left and right of machine frame above the front axle attachment and at the rear and on the battery.

Fig. 32

Design-specific max. machine speed!

The label indicated the design-specific, permitted maximum machine speed.

Located at the rear of the machine and left / right on the battery holder.

Information

The maximum speed of the machine is approx. 17 km/h (10.56 mph). In this regard, the machine falls with the category of vehicles with a maximum permitted max. speed in Germany of 20 km/h (12.44 mph). This is the fact that is documented by the label and not the maximum achievable speed of the machine.

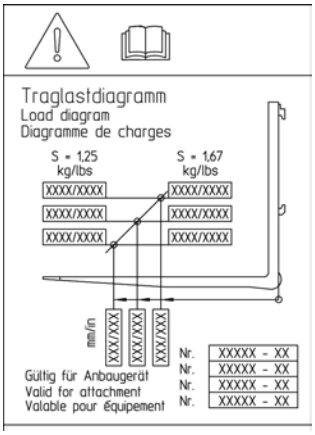


Fig. 33

Load diagram

The load diagram indicates the maximum payload for the attachment
– *see chapter 9 “Payload/lift capacity/stability” on page 9-18*.

Located inside the cabin, on left side of front window.

Information

The load diagram is valid only for applications with the released pallet forks and corresponding tire size. Pay attention to the specific load diagrams of other attachments used
– *see chapter 5 “Load diagram for pallet forks” on page 5-90*.

Fig. 34

Tire pressure table

The label contains a list of certified types of tires with mandatory tire inflation pressures – *see chapter 9 “” on page 9-6*.

Located inside the cabin, on left side of front window.

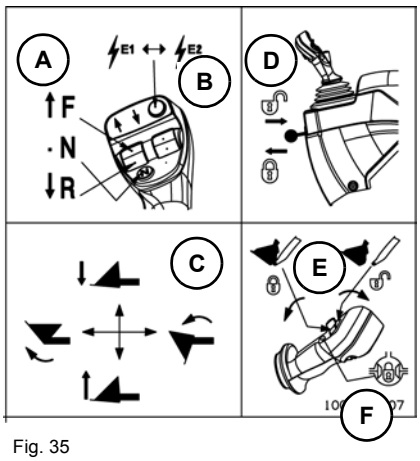


Fig. 35

Operation of control level (joystick) with switch for 3rd control circuit

The label indicates the functions of the joystick control elements.

A Travel direction: (F) forward, (R) reverse and (N) neutral position
B Push button ON/OFF – power supply front power outlet (option)
C Joystick – raise, lower, and tilt in/out loader unit
D Mechanical control lever lock (joystick) for road travel
E Switch – 3rd control circuit: unlocking and locking the attachments on the quickhitch and hydraulic control circuit for attachments
F Differential lock (option)

For more information on loader unit operation
– *see chapter 5 “Operating hydraulics” on page 5-30*.

Located on the right on the side window.

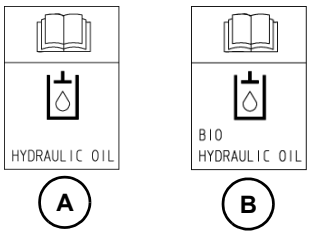


Fig. 36

Hydraulic oil

The label provides information about the fluids, lubricants and material being used.

A Hydraulic oil

B Biodegradable hydraulic oil

Located near the filler opening on the hydraulic oil reservoir.

Other data *– see chapter 7 "Important information on operation with biodegradable oils" on page 7-16*.

Fig. 37

Noise levels

The label indicates the noise level generated by the machine.

LWA = Sound output level

Other data *– see chapter 9 "Noise emissions" on page 9-15*.

Located on the rear window.

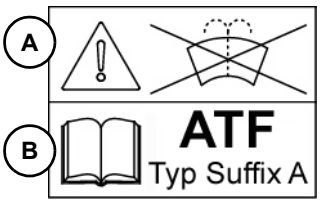


Fig. 38

Brake fluid

The label contains important information concerning the brake fluid.

A = Caution! Do not add any water!

B = Use only **ATF Suffix A brake fluids***– see chapter 7 "Braking system" on page 7-74* and *Overview: Fluids and lubricants (part 1) on page 7-14*.

Located near the brake fluid tank.

Fig. 39

Battery disconnection!

The label indicates where the disconnection can be made between battery and machine *– see chapter 4 "Battery connector" on page 4-20*.

Attached near the battery connector under the battery cover plate.

Fig. 40

Use protective clothing and goggles

Caution! The batteries contain acids, which are poisonous and corrosive. Avoid contact of the battery acid with the skin, eyes and mouth. Use protective clothing and goggles.

Located on the battery.

Fig. 41

Observe instructions

Caution! Before working with the identified component, read and observe the instructions for the relevant component.

Located on the battery.

Fig. 42

Emergency exit!

The label indicates the exit in case of an emergency
– see chapter 4 “Emergency exit” on page 4-5.

Located on the rear window (on machines with agricultural or forestry license[1]).

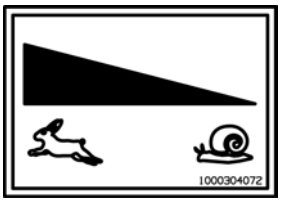


Fig. 43

Information label Low-speed control operation!

Indicates when the low-speed control can be operated
– see chapter 5 “Low-speed control with regulated travel speed (opt)” on page 5-103.

Located on the window on the right near the joystick.

Fig. 44

Notice sign Clean!

Indicates that conductive components cannot be cleaned with a high-pressure cleaner
– see chapter 7 “Cleaning and maintenance” on page 7-19.

Located on the battery tray underneath the battery cover-plate.

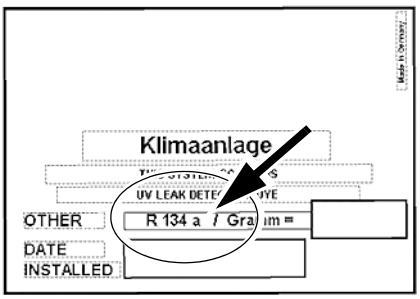


Fig. 45

Filling the air conditioning system (option)

The refrigerant used is indicated on the type label of the air-conditioning (see arrow).

Caution! Use only the refrigerants for refilling the air-conditioning that are indicated on the label.

Located near the air-conditioning.

1. Agricultural or forestry license not currently obtained.

4 Putting into operation

4.1 Cabin/control stand

Important information on the cabin

Fig. 46

- An open cab (canopy) is standard in the series-produced machine. A closed cab (cabin cpl.) is available as an option.
- The machine should only be operated if all windows in the cabin are free of dirt, snow and ice.
- The cabin of the machine does not protect against harmful substances according to the standard EN 15695-1:2009. Therefore, the machine can therefore not be used for spraying agents.
- The standard production series cabin does not offer sufficient protection against falling trees or branches or against penetrating objects. Therefore, the machine is not approved for forestry applications.
- An operator's cabin damaged in an accident (deformation) may not be repaired. It must be replaced by an authorized service center.
- Perforating, welding or separating elements from the cabin is prohibited, since this sort of work modifies the cabin and the cabin then no longer conforms with the certification (loss of possible warranty claims).

Information

The machine is equipped with an operator presence switch to protect the operator. In this case:

- The machine can only be switched on if the operator has taken his place in the operator seat.
- If the operator seat is relinquished for more than 3 seconds during machine travel, the machine is braked until it comes to a standstill and the parking brake engaged once in standstill.

Information

Cabin access on the left is the main access and exit! Use the window on the right only in an emergency
– see "Emergency exit" on page 4-5.

Safety instructions on entering and exiting

CAUTION

Falling hazard when entering or exiting!

Entering or exiting incorrectly can cause injury.

- ► Keep the mandatory climbing aids clean.
- ► Use the mandatory climbing aids for entering and exiting the machine.
- ► Face the vehicle as you enter and leave it.
- ► Have damaged climbing aids replaced.

Opening / closing the cabin door

CAUTION

Crushing hazard due to incorrectly locked door!

Failure to observe this can cause injuries to arms and hands.

- ► Before starting machine travel, lock the door or secure it in the door arrester.

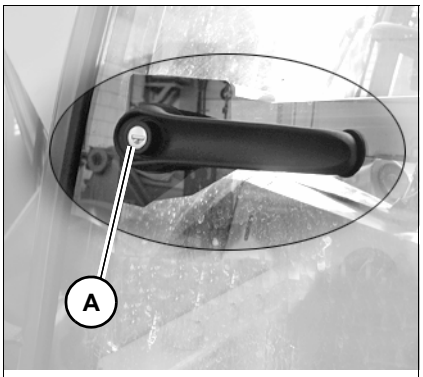


Fig. 47

Opening the door from outside

1. Unlock door lock with the ignition key (turn to the right).
2. Press door button **A**.

Close door from the outside

1. Lock door lock with the ignition key (turn to the left).

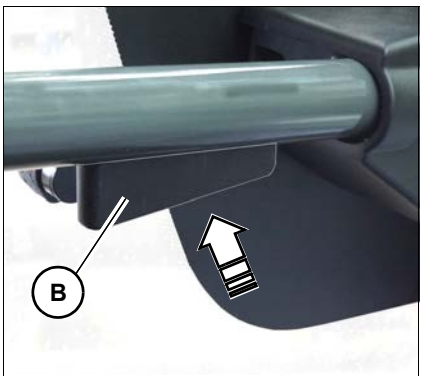


Fig. 48

Opening the door from inside

1. Push handle **B** up.

Information

The machine has a one-key system. All locks (e.g. cabin, ignition lock and battery cover) are opened or closed with the ignition key.

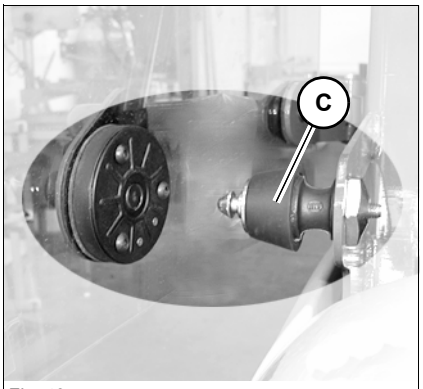


Fig. 49

Securing door in the door arrester

1. Open the door completely and let it lock into place in arrester **C**.

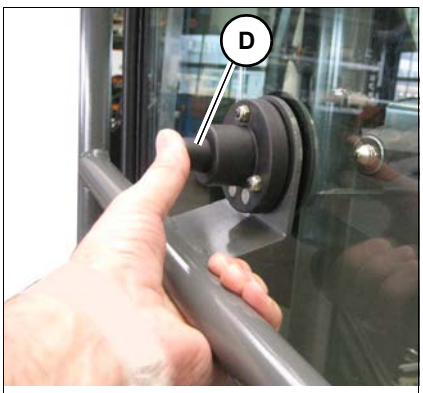


Fig. 50

Release the door out of the arrester

1. Press the button **D**.
   ➥ The door is released from the lock by spring action.
2. Close the door.

Information

Lubricate the door arrester regularly

– see chapter 7 “Lubricating the door arrester” on page 7-29!

Opening and closing the window on the right

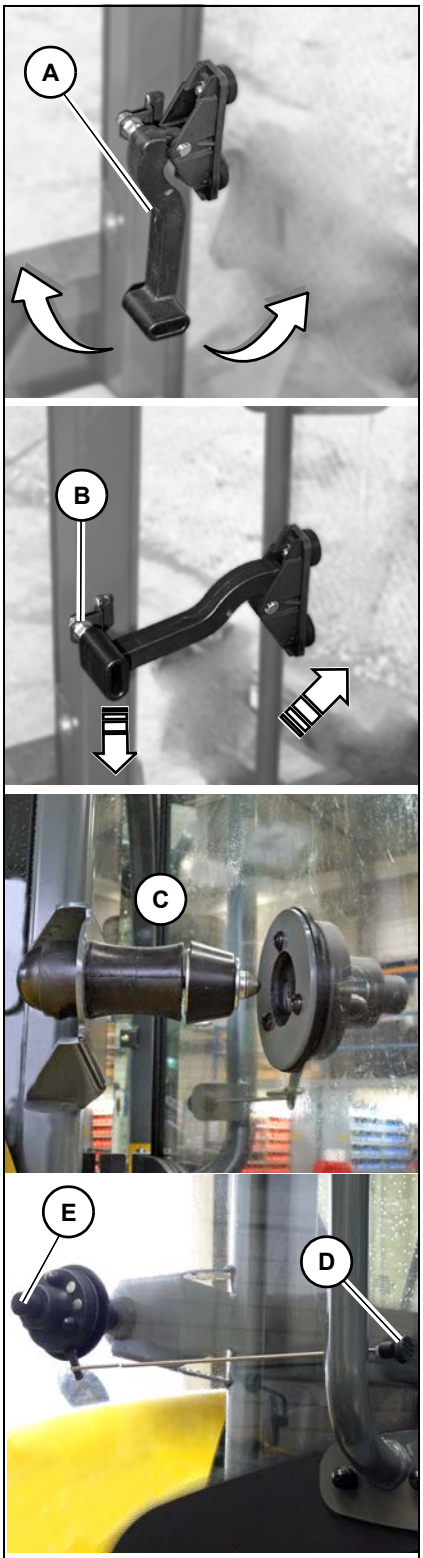


Fig. 51

CAUTION

Crushing hazard to arms and hands due to unlocked side window!

The side window can cause injury by crushing arms and hands when it is being closed.

- ► Lock the side window before moving off.
- ► Only exit from, open or close the side window when the machine is at a standstill.
- ► Ensure that the open side window is safely locked in the handle of the window adjuster.
- ► Ensure that the fully open side window is engaged in the arrester.

Opening the side window

1. Slide lever **A** upward.
2. Press the side window outward and press the end of the lever downward in pin **B**.

Fully opening the side window

1. Slide lever **A** upward and pull it out of pin **B**.
2. Open the side window completely to the outside and lock into place in the arrester **C**.

Closing the side window

1. If the side window is completely open: pull on button **D** or press on button **E** and swivel back the side window.
2. Insert lever **A** in pin **B**.
3. Push down lever **A**.

Information

Lubricate the arrester regularly

– see chapter 7 “Lubricate the window lock” on page 7-29!

Emergency exit

Fig. 52

WARNING

Injury hazard due to being caught up or falling down!

The right side of the machine does not have footholds or handholds that ensure a safe exit. Serious injury can occur when exiting the machine.

► Use special care when exiting.

CAUTION

Danger of injury from flying glass splinters if a windowpane is smashed!

► If possible, ask for help before smashing a windowpane.

► Protect face and eyes before smashing a windowpane.

In case of an emergency the side window on the right may be used as an exit – refer to the information label.

Information

The information label is only attached in the cab to machines with agricultural or forestry license.

Using the emergency exit

1. Turn the machine off and remove the ignition key.
2. If possible, ask for help.
3. Open the right side window completely
   – see "Opening and closing the window on the right" on page 4-4 or, if an emergency hammer is available, smash a pane with the emergency hammer.
4. Carefully exit the cabin.

Information

On machines with an agricultural or forestry license[1], an emergency hammer is available and the rear window is designated as an additional emergency exit.

Information

If a pane has been smashed with the emergency hammer:
Before the machine can be brought back into service again, secure the emergency hammer at the place provided for it and lead-seal it.
Have the damaged window replaced by an authorized service center.

1. Agricultural or forestry license not currently obtained.

Operator seat

Safety instructions

DANGER

Risk of electric shock from defective components or contact with the parts of the high-voltage system!

Causes serious injury or death.

- ► The operator seat may only be folded forwards by specially trained personnel.
- ► Before folding up the operator seat, turn off the machine, remove the ignition key and disconnect the battery connector.
- ► Do not touch damaged components or high-voltage system parts.

WARNING

Accident hazard when adjusting the operator seat during machine travel!

Can cause serious injury or death.

- ► Adjust the operator seat only at machine standstill.
- ► Lock the seat adjustment lever safely into place.

CAUTION

Health damages from incorrectly adjusted or defective operator seat!

Can cause injury to spinal column!

- ► Adjust the operator seat to the operator's weight before putting the machine into operation or when changing operators.
- ► Do not store any objects in the suspension travel range of the operator seat.
- ► Do not modify the operator seat (for example by retrofitting parts other than original).
- ► Contact an authorized service center immediately if the seat does not function as usual (for example the seat suspension).

General instructions

Information

Electronic components such as power electronics and the StVZO module are located under the operator seat. The operator seat can be folded to make these components accessible for maintenance and repair work.

- Before folding up the operator seat, the safety instructions for the operator seat must be observed.
  – see "Safety instructions" on page 4-7.

Information

The machine is equipped with an operator presence switch to protect the operator. In this case:

- The machine can only be switched on if the operator has taken his place in the operator seat.
- If the operator seat is relinquished for more than 3 seconds during machine travel, the machine is braked until it comes to a standstill and the parking brake engaged once in standstill.
- A warning signal sounds if the operator seat is relinquished for more than 3 seconds without engaging the parking.
  ➥ The buzzer stops if the operator seat is occupied or the parking brake applied.

Always adjust the operator seat to match the individual needs of the operator, e.g. body size and body posture. This prevents muscle tensions and fatigue during work.

Adjust the operator seat ensuring that the control levers and pedals are within easy reach with your back against the backrest.

Folding the operator seat forwards

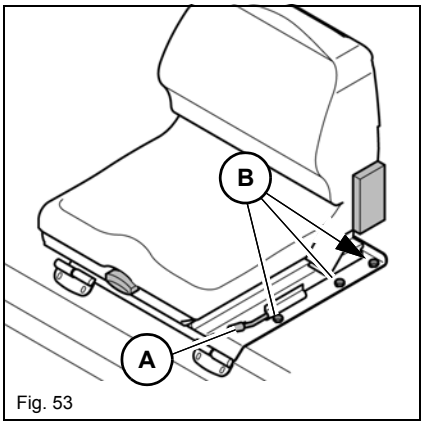


Fig. 53

1. Pull handle **A** and push operator seat fully backwards.
2. Unscrew the 3 hexagon screws **B** on each side of the operator seat.
3. Fold the operator seat forwards and secure it against falling back.

Seat adjustment (overview)

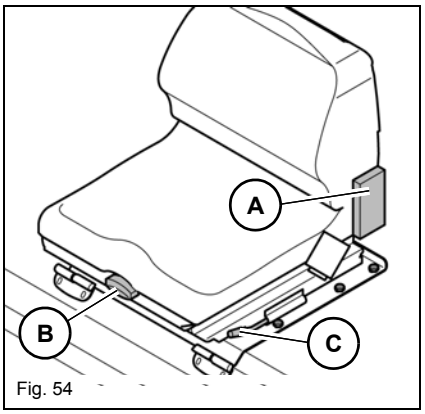


Fig. 54

The operator seat can be set to the following positions:

A Weight adjustment
B Backrest adjustment
C Horizontal seat adjustment

Weight adjustment

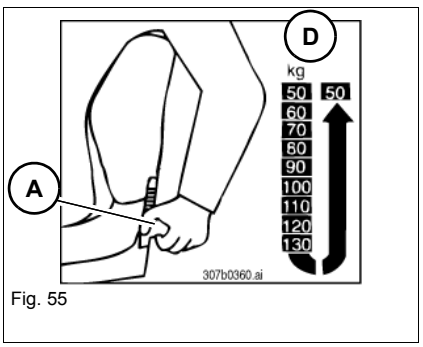


Fig. 55

1. Sit down on the operator seat.
2. Adjust the weight.

Weight	Adjustment
Higher operator weight	Press handle **A** downward until the weight of the operators is reached in display **D** (10 kg / 22 lb per notch)
Lower operator weight	1. Press handle **A** downward as far as it will go. ➥ The weight adjustment automatically returns to the upper 50 kg (110 lb) position. 2. Press handle A downward until reaching the weight in indicator **D**.

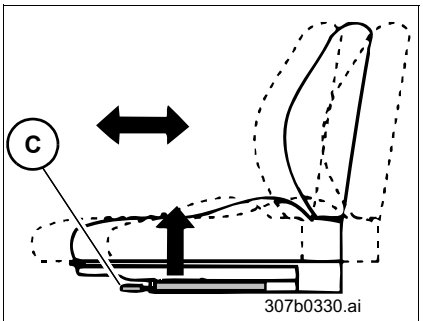


Fig. 56

Horizontal adjustment

1. Sit down on the operator seat.
2. Pull lever **C** up and at the same time, move the operator seat forward or backward.
3. Release the lever on reaching the required position.
   ➥ Once the operator seat is adjusted, engage the lever in the required position. It must not be possible to move the operator seat to another position.

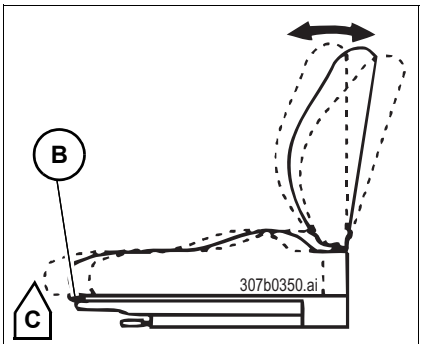


Fig. 57

Backrest adjustment

1. Sit down on the operator seat.
2. Pull handle **B** up and at the same time, move the operator seat forward or backward. The backrest is angled into the desired position:
   ➥ Operator seat moved forward – flatter backrest inclination.
   ➥ Operator seat moved backward – steeper backrest inclination.
3. Release the handle if the adjustment is correct.

Air-suspension operator seat (option only available for cabin cpl.)

Safety instructions

This operator seat must be used for machines with an agricultural and forestry license (only applicable in EU member states)!

Please contact your dealer if you require more information on retrofitting.

Get informed on and follow the legal regulations of your country.

WARNING

Accident hazard when adjusting the operator seat during machine travel!

Can cause serious injury or death.

- ► Adjust the operator seat only at machine standstill.
- ► Lock the seat adjustment lever safely into place.

CAUTION

Health damages from incorrectly adjusted or defective operator seat!

Can cause injury to spinal column!

- ► Adjust the operator seat to the operator's weight before putting the machine into operation or when changing operators.
- ► Do not store any objects in the suspension travel range of the operator seat.
- ► Do not modify the operator seat (for example by retrofitting parts other than original).
- ► Contact an authorized service center immediately if the seat does not function as usual (for example the seat suspension).

Information

The machine is equipped with an operator presence switch to protect the operator. In this case:

- The machine can only be switched on if the operator has taken his place in the operator seat.
- If the operator seat is relinquished for more than 3 seconds during machine travel, the machine is braked until it comes to a standstill and the parking brake engaged once in standstill.

Adjust the operator seat to individual requirements, for example to body size and posture. This prevents muscle tensions and fatigue during work.

Adjust the operator seat so that the control levers and pedals are within easy reach with your back against the backrest.

Weight adjustment

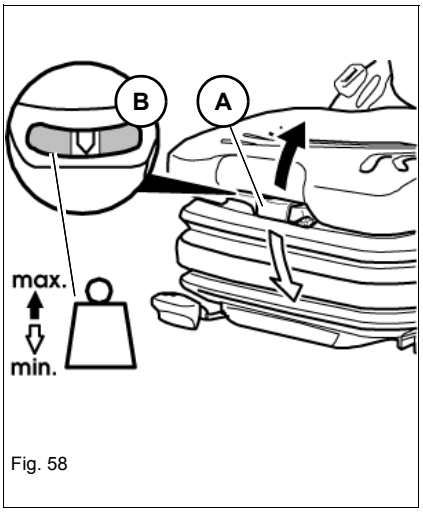


Fig. 58

NOTICE

Do not run the air compressor for more than 1 minute to avoid damage to it!

1. Sit down on the operator seat.
2. Pull handle **A** upward or press it downward until the arrow is in the middle of window **B**.
   - ➥ Within this visible range, the individual height can be adjusted up to the minimum suspension travel.
   - ➥ The minimum or maximum weight adjustment is indicated with the audible upper and lower limits.

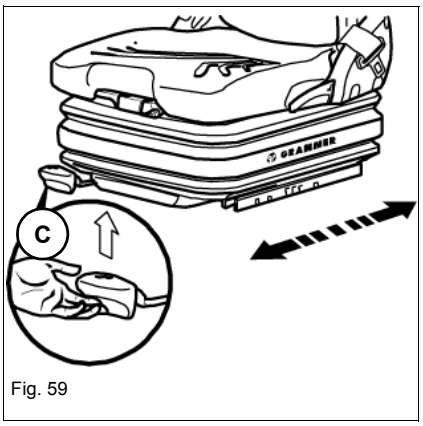


Fig. 59

Horizontal adjustment

1. Sit down on the operator seat.
2. Pull lever **C** up and at the same time, move the operator seat forward or backward.
3. Release the handle when reaching the required position.
   - ➥ Once the operator seat is adjusted, engage the lever in the required position. It must not be possible to move the operator seat to another position.

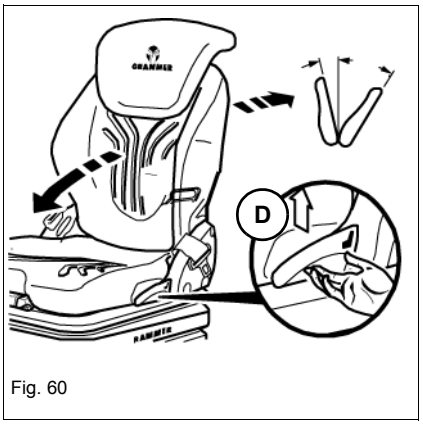


Fig. 60

Backrest adjustment

1. Sit down on the operator seat.
2. Pull handle **C** upward and at the same time, move your back against or away from the backrest.
3. Release the handle when reaching the required position.

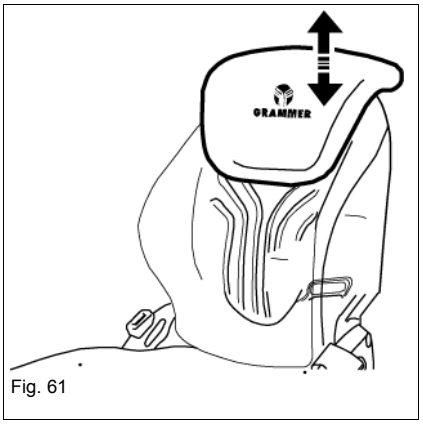


Fig. 61

Extension to backrest

- Pull in or push out the backrest extension over the perceptible notches.
  - ➥ The backrest extension can be individually adjusted up to the end stop.
- To remove: pull the backrest extension upward sharply beyond the end stop.

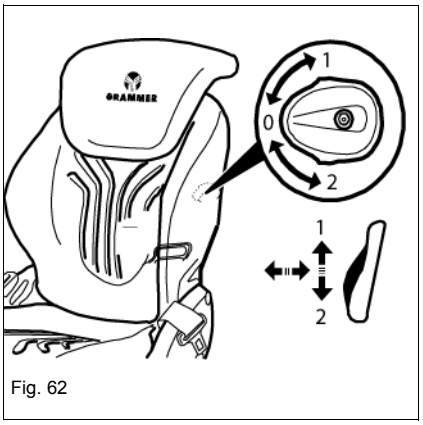


Fig. 62

Lumbar support (option)

The curvature in the upper and lower part of the backrest cushioning can be adjusted individually by turning the handwheel.

- ➥ 0 = no curvature
- ➥ 1 = maximum curvature in upper part
- ➥ 2 = maximum curvature in lower part

Seat belt (lap belt)

Safety instructions

WARNING

Injury hazard if the seat belt is not fastened correctly or not at all!

Can cause serious injury or death in the event of an accident.

- ► Fasten the seat belt before machine operation.
- ► Do not fasten a twisted seat belt.
- ► Seat belt must run over the hips – not over the stomach – and must always be applied tightly.
- ► Do not place the seat belt over hard, edged or fragile items in your clothes.

WARNING

Accident hazard due to damaged or dirty seat belt!

Can cause serious injury or death in the event of an accident.

- ► Keep the seat belt and buckle clean.
- ► Check the seat belt and buckle for damage.
- ► Have a damaged seat belt and buckle replaced by an authorized service center.
- ► Have the seat belt immediately replaced after every accident and the load-bearing capacity of the fastening points and seat fixtures checked by a Wacker Neuson service center.

WARNING

Accident hazard when adjusting the seat belt during machine operation!

Can cause serious injury or death.

- ► Adjust the seat belt before putting the machine into operation.
- ► Ensure that the buckle is inserted.

Information

When pulled slowly, the automatic seat belt offers full freedom of movement. It locks however during abrupt braking.
The automatic seat belt may also lock when passing through potholes or uneven terrain.

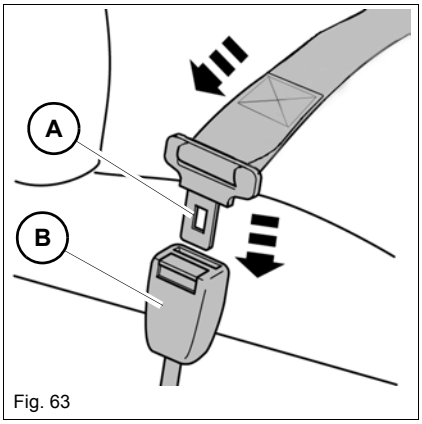


Fig. 63

Fastening the seat belt

1. Sit down on the operator seat.
2. Hold seat belt **24** at buckle latch **A** and run it steadily over the hips to buckle **B**.
3. Insert buckle latch **A** into buckle **B** until it locks into place audibly.
   ➥ The seat belt must not be twisted and must run tightly over the hips!

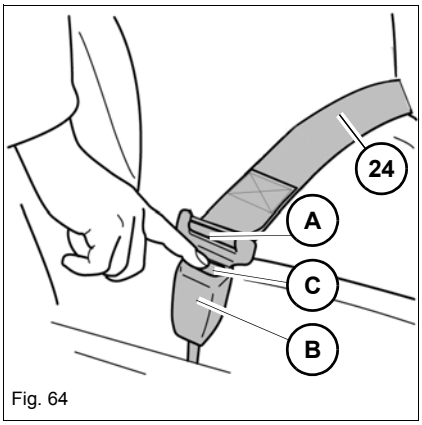


Fig. 64

Unfastening the seat belt

1. Hold seat belt **24**.
2. Press red button **C** on buckle **B**.
   ➥ Latch **A** is released from buckle **B.**
3. Slowly return the seat belt to the retractor.

Adjusting the mirrors

Limited field of vision

The line-of-sight is the area the operator can see from the operator seat. Rearview mirrors or camera systems can be installed on the machine to support the operator.

WARNING

Accident hazard due to restricted field of vision!

Failure to observe this can cause serious injury or death.

- ► Before putting the machine into operation, check the visible area from the operator seat and adjust the mirrors so that the visible areas behind and beside the machine are seen as close as possible to the machine.
- ► Additional equipment or attachments must not be installed if they impair visibility.
- ► Remove obstacles within the job site.
- ► Move material only in transport position.
- ► If the field of vision cannot be safely adjusted with the mirrors, the operator must take appropriate measures (e.g. person guiding the operator).
  The operator of the machine always has the sole responsibility for this.
- ► Before performing machine travel on public roads, remove any attachments not approved for transport on public roads
  – see chapter 3 “Use of attachments” on page 3-16.

WARNING

Accident hazard due to persons in the danger zone!

Failure to observe this can cause serious injury or death.

- ► Always ensure that nobody is in the danger zone.
- ► Seal off the danger zone.
- ► Stop all work movements with the machine immediately if persons enter the danger zone.

Information

The field of view was checked and assessed in accordance with ISO 5006. The instructions in the standard are met in all areas with attachments that are licensed for use on public roads.

Adjusting the mirror on the left

Fig. 65

1. Turn the mirror on the **left** outward with the long side.
   When making preliminary adjustments, ensure that the mirror bracket is turned far enough to the front (about 45°) to avoid touching the door window.

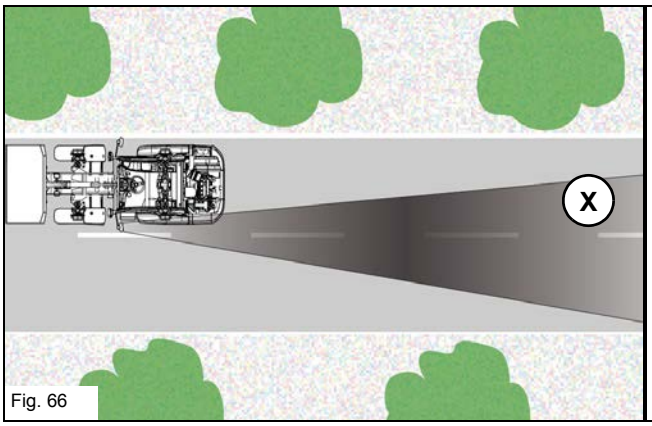
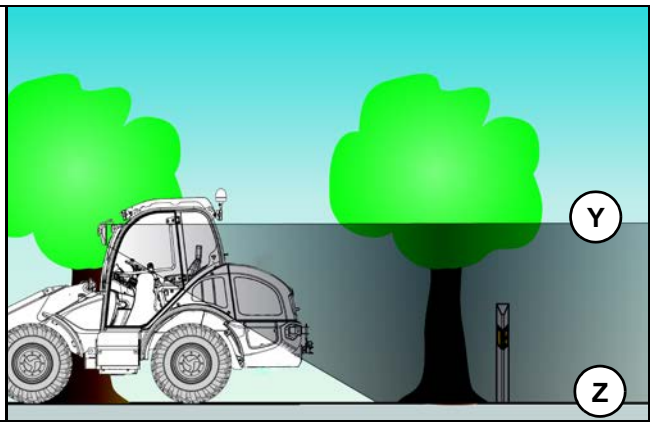


Fig. 66



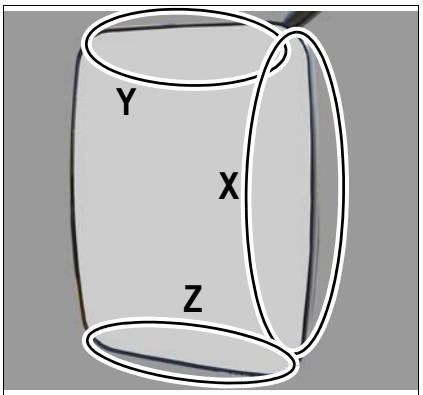


Fig. 67

2. Adjust the **left** rearview mirror:
   - The outer edge of the machine must be visible on the inside **X** of the mirror.
   - The horizon must be visible at the upper edge **Y**.
   - At the lower edge **Z**, the visible area of the road must be as close as possible to the machine.

Adjusting the mirror on the right

Fig. 68

1. Turn the mirror on the **right** outward with the long side.
   When making preliminary adjustments, ensure that the mirror bracket is turned far enough to the front (about 45°) to avoid touching the door window.

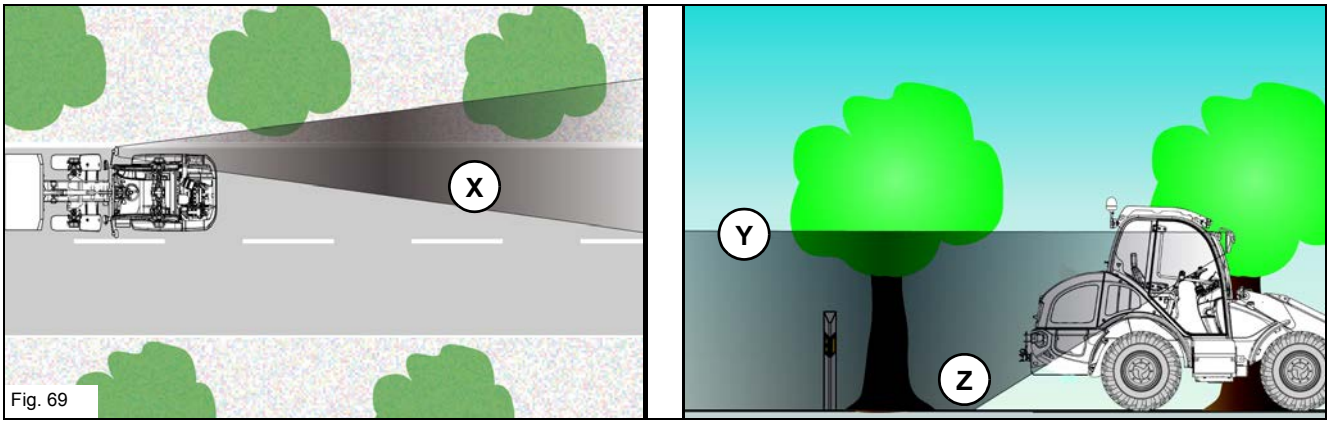


Fig. 69

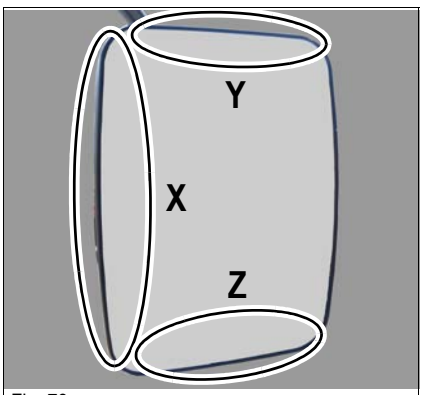


Fig. 70

2. Adjust the rearview mirror on the **right**:
   - The outer edge of the machine must be visible on the inside **X** of the mirror.
   - The horizon must be visible at the upper edge **Y**.
   - At the lower edge **Z**, the visible area of the road must be as close as possible to the machine.

Locking the-battery cover plate

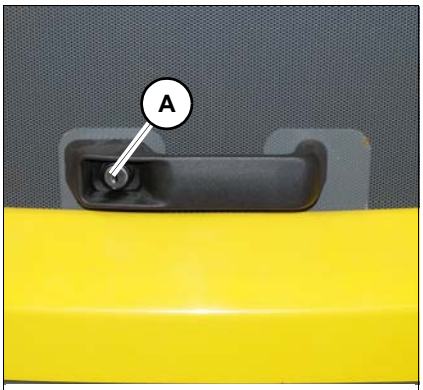


Fig. 71

Opening the battery cover plate

DANGER

Risk of electric shock from defective components or contact with the high-voltage system!

Causes serious injury or death.

- ► Before opening the battery cover plate, actuate the motor isolating switch and remove the ignition key.
- ► The battery cover plate may only be opened by specially trained personnel.
- ► Do not touch damaged high-voltage system components or cables (orange-labeled).

1. Stop and park the vehicle.
2. Apply the parking brake.
3. Switch off motor isolating switch.
4. Turn the machine off and remove the ignition key.
5. Lock the lock with the ignition key **A**.
6. Press lock **A**.
   - ➥ The battery cover plate is raised upwards over a gas pressure absorber.

Closing the battery cover plate

WARNING

Danger of electric shock from damaged cable!

Can cause serious injury or death.

- ► Before closing the battery cover plate, make certain that no cable can be damaged.
- ► Do not touch damaged cables.

1. Firmly press down the battery cover plate, until the lock engages with an audible click.
2. Lock the lock **A**.with the ignition key.

Battery connector

DANGER

Risk of electric shock from defective components or contact with the high-voltage system!

Causes serious injury or death.

- ► Before opening the battery cover plate, actuate the motor isolating switch and remove the ignition key.
- ► The battery cover plate may only be opened by specially trained personnel.
- ► Do not touch damaged high-voltage system components or cables (orange-labeled).

The battery connector connects or disconnects the entire electrical system from the battery.

If the battery and electrical system have been disconnected from each other, the machine cannot be turned on by unauthorized persons.

The battery connector is located under the battery cover plate in the vicinity of the battery.

Information

The following illustrations of the battery connector are only intended to serve as an example. The location and surroundings of the battery connector may deviate from the representation shown.

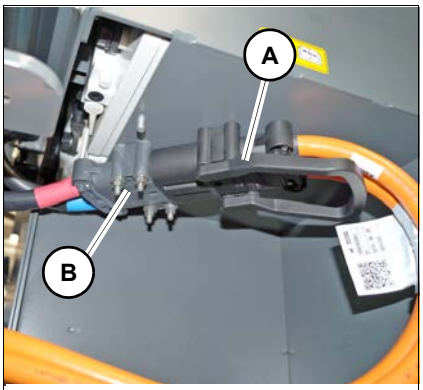


Fig. 72

Disconnecting the battery connector

1. Check to see that the machine has been turned off and the ignition key removed.
2. Opening the battery cover
   – see "Opening the battery cover plate" on page 4-19.
3. Grasp the plug part **A** of the battery connector on the handle and pull out of the socket part **B** of the battery connector horizontally.

Information

The socket part is firmly installed on the battery.

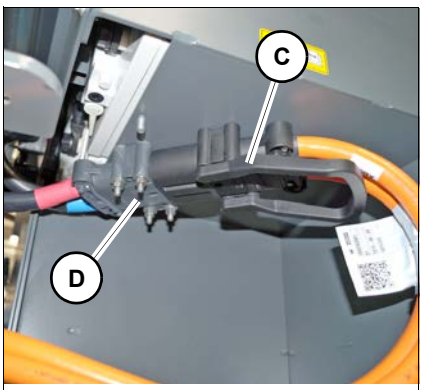


Fig. 73

Connect the battery connector

4. Insert the plug part **C** of the battery connector in the socket part **D** of the battery connector.
5. Close the battery cover plate
   – see "Closing the battery cover plate" on page 4-19.

Motor isolating switch

The entire traction and works electronics can be disconnected or connected with the supply voltage using the motor isolating switch.

The parking brake is applied at the same time when the traction and works electronics is disconnected from the supply voltage.

CAUTION

Accident hazard when turning off the motor isolating switch during machine travel.

This can result in injuries since the machine sharply brakes when the parking brake is applied.

► Only switch off the motor isolating switch when the machine is in standstill.

Fig. 74

The motor isolating switch **A** is located in the cab to the left next to the operator seat.

Switch off motor isolating switch

1. Push down button **A**.
   ➥ The entire traction and works electronics are out of operation.
   ➥ The parking brake is applied.

Switch on motor isolating switch

1. Pull button **A** upwards.
   ➥ If the battery connector is connected, then the entire traction and working electronics are in operation.

Fire extinguisher (option)

Fig. 75

The fire extinguisher is **not** supplied with the machine.

- It is installed on the right on the seat pan, below the control lever base.
- Operate the fire extinguisher according to the instructions printed on the fire extinguisher.

Information

In order to ensure the full serviceability of the fire extinguisher:

► Have the fire extinguisher checked at regular intervals and refilled, see inspection tag.

► Only remove the fire extinguisher from the cab in an emergency.

► After the fire extinguisher has been used: have it filled by an authorized service center or replace it with a new one.

Immobilizer (option)

Important Information

The immobilizer is integrated in the ignition lock and can only be disabled with the supplied **blue** ignition keys!

Scope of delivery:

- Immobilizer installed in the machine
- 2x ignition keys **blue** (coded)
- 1x master key **red** (for coding the blue ignition keys)

Information

The immobilizer has only **one** master key!

► The immobilizer must be replaced by an authorized service center if the master key is lost.

Information

Master key (red) after coding the new ignition key, store carefully somewhere outside of the machine.
(Do not attach to the key ring of the coded ignition key).

Information

The parking lights must be switched on first for coding or deleting coded ignition keys.

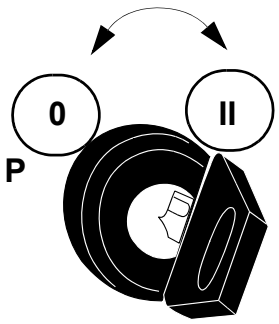


Fig. 76

Coding the ignition key

The coding of the new ignition key (blue) is performed using the master key (red).

The master key can only be used for coding the new ignition key and not for disabling the immobilizer.

1. Switch on the parking lights
   – see chapter 5 “Parking lights/low beam” on page 5-19.
2. Insert the master key (red) in the ignition lock and turn to position "**II**".
3. Turn the master key (red) within 5 seconds to position "**0**" and remove.
4. Insert the ignition key (blue) that is to be coded into the ignition lock, turn to position "**II**" and leave it in place for at least 1 second.
   ➥ The key will be registered as a valid ignition key.
5. Turn the ignition key (blue) back and remove.
   ➥ Step 4 can now be repeated for other keys to be coded.
   ➥ Coding can be performed for a maximum 10 keys.
   ➥ Coding is automatically stopped if no other key is detected within 15 seconds.

Enabling the immobilizer

1. Turn off the machine
   – see chapter 5 “Machine stopping/securing” on page 5-18.
2. Remove the ignition key (blue).

➥ Immobilizer will be enabled in 30 seconds.

Information

If the ignition key (blue) is **not** removed from the ignition lock, the immobilizer will remain disabled!

Disabling the immobilizer

- Insert the ignition key into the ignition lock.
  ➥ The immobilizer will be disabled after 5 seconds.
- Turn on the machine*– see "Turn on the machine" on page 4-54*.
  ➥ The immobilizer remains disabled so long as the ignition key is not removed.

Delete coded ignition key

It becomes necessary to delete an ignition key when an ignition key has been lost.

1. Switch on the parking lights
   – *see chapter 5 “Parking lights/low beam” on page 5-19*.
2. Insert the master key (red) into the ignition lock, turn to position "**II**" and leave it in place for at least 20 seconds.

➥ All coded ignition keys (blue) are deleted and can be coded again
– *see "Coding the ignition key" on page 4-24*.

Information

All coded keys (blue) are deleted.
The code of the master key (red) is retained.

Safety functions

- If more than 5 keys with different invalid codes are inserted and turned in the ignition lock within 1 minute, then the immobilizer remains enabled for 15 minutes and does not accept any valid keys.
  - ➥ This function avoids "testing out" different keys in the hopes of accidentally discovering the correct ignition key.
  - ➥ Valid ignition keys are accepted only after 15 minutes and after the position **0** of the ignition lock has been detected. This prevents testing keys without actuating the mechanical ignition lock, for example by moving the ignition lock by force to position **II**.
- Interruptions of the supply line or other control lines do not disable the immobilizer or delete data (for example data codes).
- All important data is saved in a non-volatile memory.

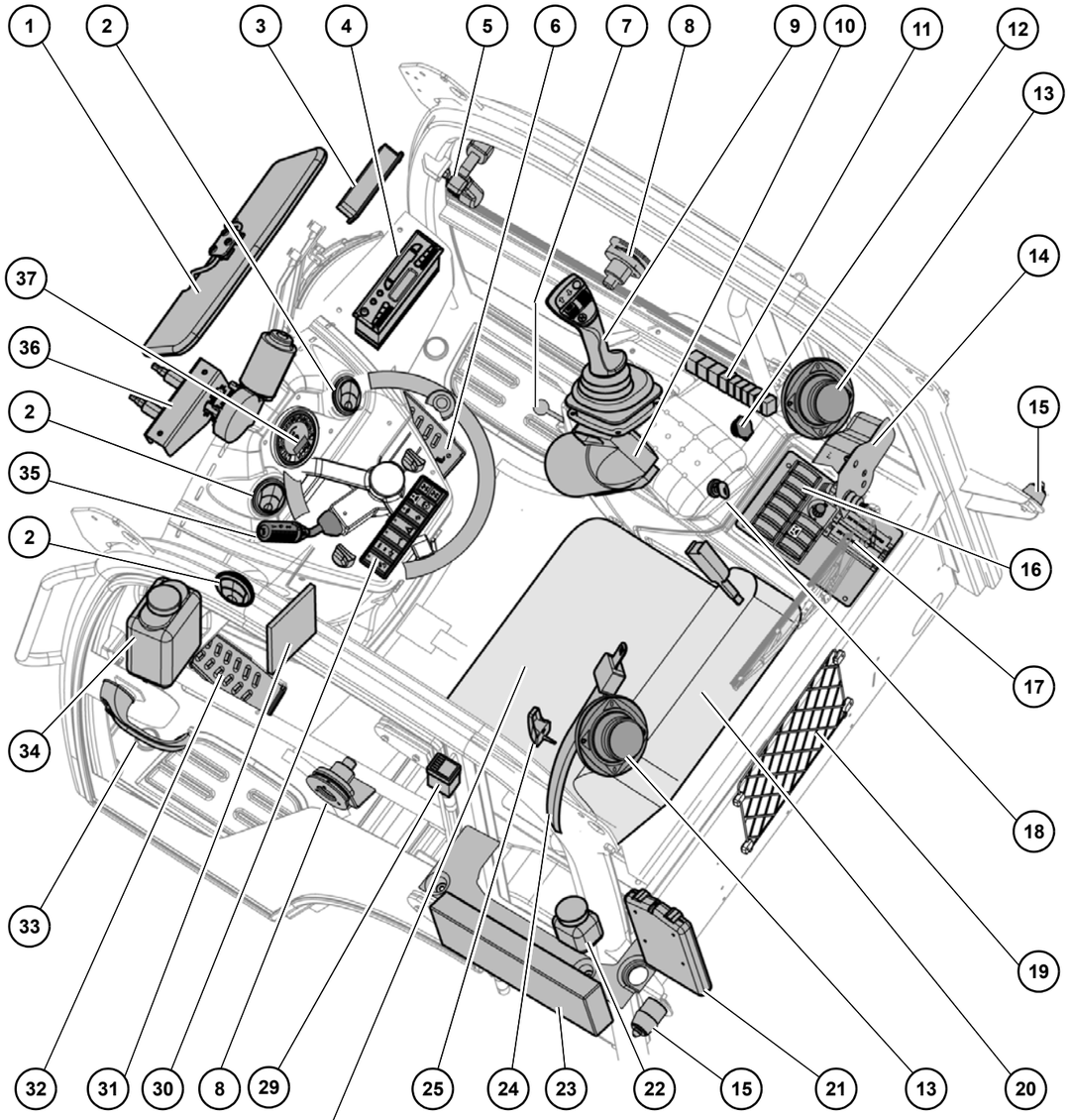
4.2 Overview of control elements

Description of control elements

You can unfold the pages for a better overview.

This chapter describes the controls, and contains information on the function and the handling of the indicator lights and controls in the cabin.

The pages stated in the overview table refer to the operation of the corresponding control elements.



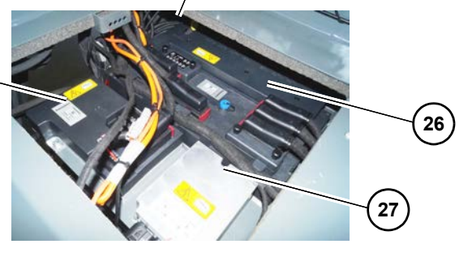


Fig. 77

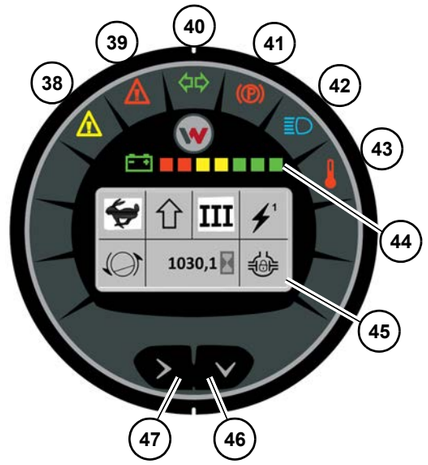
Inside the cabin

Inside of cabin (overview)		For more information see page
1	Sun visor	
2	Front window air vents (left/right)	
3	Interior light	*5-24*
4	Radio (opt) see the Operator's Manual of the radio for information on operation	
5	Locking – side window[1]	*4-4*
6	Accelerator pedal	*5-4*
7	Loader unit lock for road travel	*4-51*
8	Locking for opened side window / door[1]	*4-4*
9	Control lever/joystick (loader unit)	*5-32*
10	Fire extinguisher (optional)	*4-22*
11	Bracket with relays	*9-13*
12	12 V socket	
13	Radio preparation – loudspeakers (opt)	
14	Wiper motor – rear window[1]	*5-26*
15	Arrester for open side window/door[1]	*4-4*
16	Switch bar in the control lever console	*4-32*
17	Fuses	*7-65*, *9-11*
18	Ignition lock	*4-54*
19	Storage net for documents	
20	Operator seat, foldable	*4-7*
21	Document box (opt)[1]	
22	ATF brake fluid reservoir	*7-75*
23	Storage – first-aid kit, warning triangle, tool bag, etc.(opt)	
24	Seat belt	*4-14*
25	Hook	
26	Power electronics/machine controller	
27	Voltage converter 80 V => 12 V	
28	StVZO module (machine control)	
29	Motor isolating switch	*4-22*
30	Switch panel on front instrument panel	*4-32*
31	Fresh-air filter – heating and ventilation[1]	*5-27*
32	Brake pedal	*5-5*
33	Door handle with lock	[1]*4-2*
34	Washer system reservoir[1]	*7-72*
35	Multifunctional lever – turn indicators, wipers[1], horn	*5-21*
36	Wiper motor – front window[1]	*5-26*
37	Display instrument	*4-30*

1. only in the cabin cpl. (opt)

Indicating instrument, joystick, multifunctional lever

Indicating instrument,
joystick, multifunctional lever



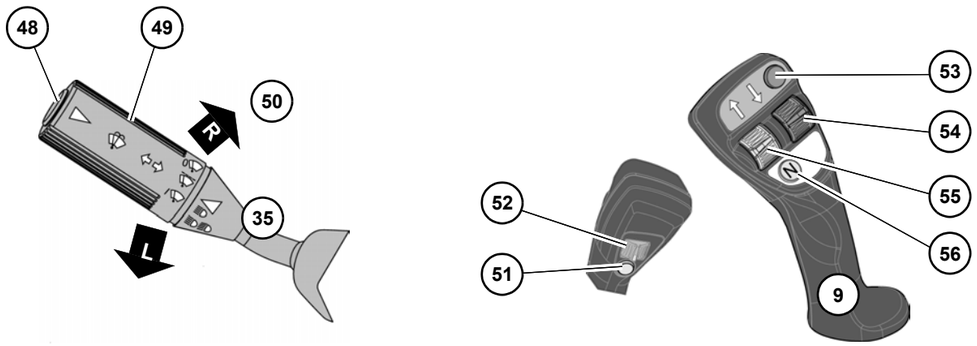


Fig. 78

Indicating instrument, joystick, multifunctional lever

Display instrument	For more information see page
38 Warning light (yellow) – error warning ECU	4-34
39 Warning light (red) – error "STOP"	4-34
40 Indicator light (green) – right/left-hand turn indicators	5-21
41 Warning light (red) – parking brake	5-6
42 Indicator light (blue) – high beam	5-20
43 Warning light (red) – temperature	4-35
44 Indicator display battery charge condition	4-36
45 Digital display	4-37
46 Push button for menu navigation in the digital display	4-37
47 Push button for menu navigation in the digital display	4-37
Multifunctional lever turn indicators, windshield wipers, horn.	**For more information see page.**
48 Push button – (signal horn)	5-25
49 Rotary switch and push button – front wiper, washer pump[1]	5-26
50 Control lever – turn indicator	5-21
Control lever (joystick)	**For more information see page**
51 Push button – differential lock	5-16
52 Switch – operation of 3rd control circuit, for example locking and unlocking the quickhitch	5-42
53 ON/OFF push button – power supply front socket	5-106
54 Switch – without function (included for future development stages)	
55 Switch – forward/reverse travel direction	5-13
56 Push button – travel direction in neutral	5-13

1. only in the cabin cpl. (opt)

Switch panels

Switch panels

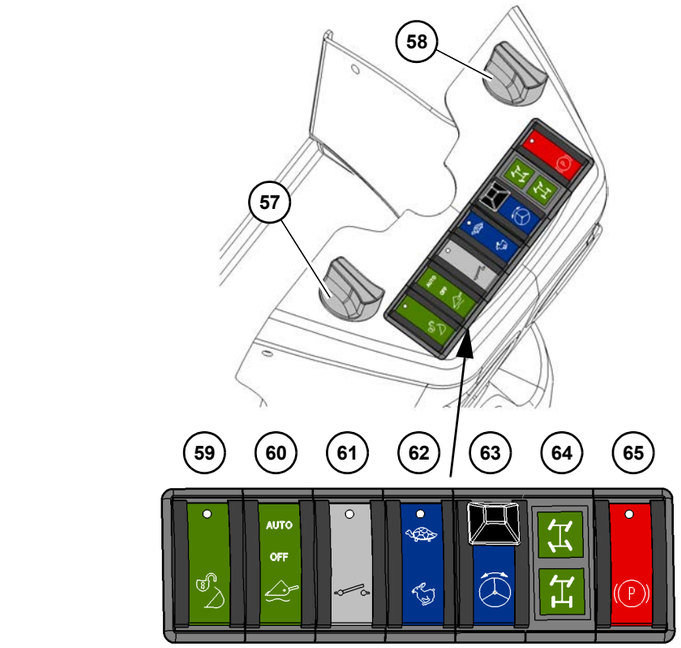


Fig. 79

Switch panels

Heating/ventilation switch console - Ventilation (optional cabin coupling)	For more information see page
57 Rotary switch – heating temperature control	5-27
58 Rotary switch – warm air fan (heating, ventilation)	5-27
Switch panel on front instrument panel	**For more information see page**
59 Rocker switch (green) – release quickhitch unlocking mechanism	5-42
60 Rocker switch (green) – load stabilizer (optional)	5-108
61 Rocker switch (gray) – 7-pole front socket	5-106
62 Rocker switch (blue) – speed range selection	5-12
63 Toggle switch with lock (blue) – 4-wheel front axle steering (opt)	5-2
64 Indicator light (green) – 4-wheel steering/front axle steering (opt)	5-2
65 Toggle switch (red) – parking brake	5-6
Front switch panel (A) in the console – control lever.	**For more information see page**
66 Rocker switch (gray) – machine headlights (parking light / low beam)	5-19
67 Rocker switch (gray) – front working light (option)	5-23
68 Rocker switch (gray) – rotating beacon (option)	5-24
69 Rocker switch (gray) – rear working light (standard on left, option on right)	5-23
70 Rocker switch (gray) – air conditioning (option)	5-29
71 Not assigned	
Rear switch panel (B) on console – control lever	**For more information see page**
72 Rocker switch with lock (green) – locking/unlocking the 3rd control circuit	5-42
73 Rocker switch with lock (green) – continuous operation of 3rd control circuit	5-44
74 Rocker switch (red) – hazard warning system	5-22
75 Rotary switch – oil volume adjustment	5-36
76 Joystick (blue) – low-speed control (option)	5-103

4.3 Overview indicator and warning lights

Information

The indicator lights provide information to the operator.
The warning lights warn the operator of damage to the machine.

► If a warning light illuminates during operation, stop the machine immediately and get in touch with an authorized service center.

Indicator and warning lights

When ignition is switched on, all warning and indicator lights on the gauge illuminate briefly for a check and then go out after a few seconds.

- Indicator light **41**stays on.

Information

For your own safety and in order to avoid consequential damage to the individual components of the machine, have malfunctioning indicator and warning lights immediately checked or replaced by an authorized service center!

Description of the indicator and warning lights in the gauge

Warning light (yellow) – error

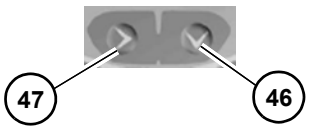
The warning light **38** illuminates if the machine electronics report an error during operation.

- ➥ An uninterrupted warning signal sounds for approx. 3 seconds.
- ➥ An error message is displayed for 3 seconds in the digital display **45** in area **F** as error code. The error can be queried, immediately or later on, in the display *– see chapter 8 "Error display of machine electronics in gauge" on page 8-3*.
- ➥ Turn off the machine and then turn it on again. If no error code is displayed any more in the display, the machine can continue to be operated.

Warning light (red) – error "STOP"

The warning light **39** illuminates if the machine electronics report a critical error during operation.

- ➥ A steady warning signal sounds.
- ➥ In the digital display, **45**in areas **B** and **C**, the symbol **5** appears.
- ➥ An error message is displayed in the digital display **45** in area **F** as error code. The error can be queried, immediately or later on, in the display.*– see chapter 8 "Error display of machine electronics in gauge" on page 8-3*
- ➥ If the error is displayed, contact an authorized service center.



► The error message must be confirmed. The means the warning signal, the warning light and the display symbol only go out if one of both buttons **46** or **47** are pressed in the gauge.

Indicator light (green) – right/left-hand turn indicators

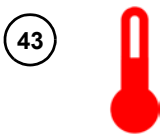
The indicator light **40** flashes periodically if the turn indicator is actuated *– see "Turn indicators" on page 5-21*.

Warning light (red) – parking brake

The warning light **41** flashes if the parking brake was enabled automatically and illuminates if the parking brake is enabled manually *– see chapter 5 "Parking brake" on page 5-6*.

Indicator light (blue) – high beam

The indicator light **42** illuminates if the high beam is switched on or if the headlight flasher is actuated
– see "High beam/headlight flasher" on page 5-20.



Warning light (red) – temperature

A warning signal sounds and the warning light **43** illuminates if the allowable temperature of one of the following components has been exceeded:

- Hydraulic oil
- Electric motor of travel drive (hydraulic motor)
- Electric motor of work hydraulics (operating motor)
- Power electronics/machine controller

The warning light **43** flashes if the maximum allowable temperature from one of the mentioned components is exceeded.

In the digital display **45**in area **G** there is a display of which component is affected *– see "Main display" on page 4-38*.

Information

If the power electronics are overheated, the warning light **43** illuminates. An additional symbol appears in the digital display.

Information

Depending on the temperature measured, the performance of the overheated component is reduced, in order to protect the machine against damage.

➥ If the warning light lights up during operation, turn off the machine and let it cool down. If the error occurs again, contact an authorized service center.

Indicator display – battery charge condition

The indicator display shows the battery charge condition. The battery charge condition is displayed via 7 LEDs. The indicator lights go out from right to left the more the battery is discharged.

NOTICE

Battery damage!

The battery can be damaged if it is over-discharged.

► Pay attention to the “Battery charge condition” indication. Charge the battery in time.

Information

The performance of the hydraulic motor is reduced in dependence on the battery charging level.

Indication	Meaning	Measure
All LEDs illuminate.	Good battery charge condition.	The machine can be operated without any restrictions.
The green indicator lights have gone out/the yellow and red indicator lights illuminate.	The battery charge condition has decreased.	The machine can continue to be operated.
The yellow indicator lights have gone out/the red indicator lights illuminate.	Low battery charge condition.	Operate the machine only for a short time. Charge the battery.
Second to last LED is extinguished/last red LED flashes/battery symbol changes from green to red. A warning signal sounds for approx. 10 seconds.	Very low battery charge condition.	Do not operate the machine anymore. Immediately charge the battery.

Information

To charge the battery, see *– see chapter 7 “Charging the battery” on page 7-34* and *Charging the battery on page 7-34*.

Description of the digital display on gauge

The gauge is equipped with a warning sound display as well as a digital display **45**. The digital display provides information on active functions, current operating states, service information, machine status and error codes.

WARNING

Accident hazard when operating the digital display during machine travel!

Can cause serious injury or death.

► Stop the machine before operating the digital display.

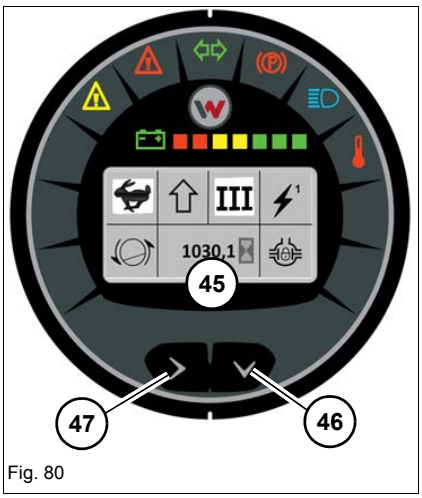


Fig. 80

Operation of digital display

The following table gives an overview of the structure of the digital display.

When the machine is turned on, the main indicator appears on the display **45**.

Use the buttons **46** and **47** to request and show additional information in the display.

By pushing on the button **47**, the digital display changes from the **main indication** to the **service indication** and vice-versa.

By pushing button **46**, the digital display scrolls down one level within the main indication.

Information

It is possible to change between both indications at any time, even while scrolling within the display levels.

If the last level of a display has been reached, the digital display will then automatically jump back to the first level of the display.

Main display

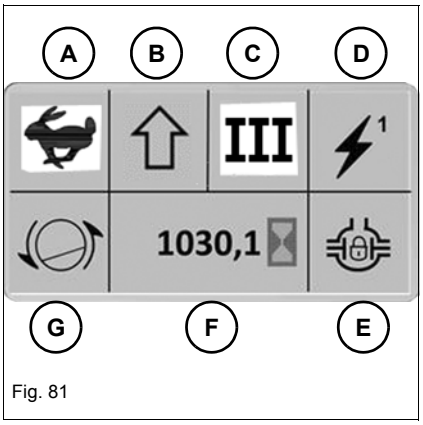
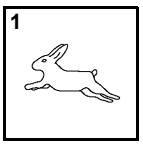
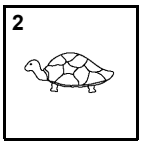


Fig. 81

Indication		Meaning
A	1 	**Indicator display – high speed range (hare)** Illuminates if high speed is enabled with switch **62** *– see chapter 5 "Overview of speed ranges" on page 5-11*.
	2 	**Indicator display – work speed range (turtle)** Illuminates if the working speed range is enabled with switch **62** *– see chapter 5 "Overview of speed ranges" on page 5-11*.

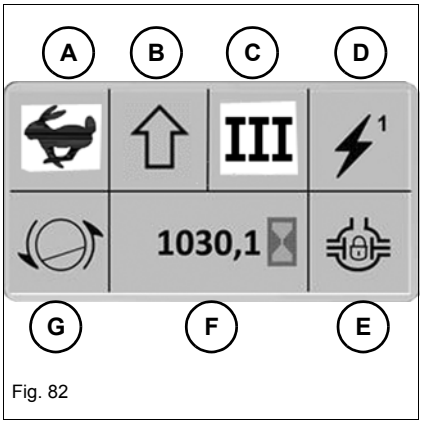


Fig. 82

Indication		Meaning
B	1	**Indicator display – forward travel direction** Illuminates if the forward travel direction is enabled. *– see chapter 5 "Selecting a travel direction and starting machine travel" on page 5-13*
	2	**Indicator display – reverse travel direction** Illuminates if the reverse travel direction is enabled. *– see chapter 5 "Selecting a travel direction and starting machine travel" on page 5-13*
	3	**Indicator display – neutral check** Illuminates after the machine is turned on and electronics check whether all the control elements of the machine are in neutral. ➥ During the neutral check, both turn indicators flash in the display. ➥ The indicator display extinguishes when the machine is ready for travel operation.
	4 N	**Indicator display – neutral travel direction** Illuminates when the travel direction has been disabled and the machine is in neutral *– see chapter 5 "Slowing the machine and stopping" on page 5-15*.
	5	**Warning indicator– Error "STOP"** Illuminates if the machine electronics report a critical error during operation. ➥ An error message is displayed in the digital display **45** in area **F** as error code. ➥ Warning light **39** illuminates.
	6	**Warning indicator – CAN-Bus outage** Illuminates if the CAN-Bus has failed and no more warnings can be issued. ➥ A warning signal sounds for approx. 10 seconds. ➥ The warning light **39** illuminates.

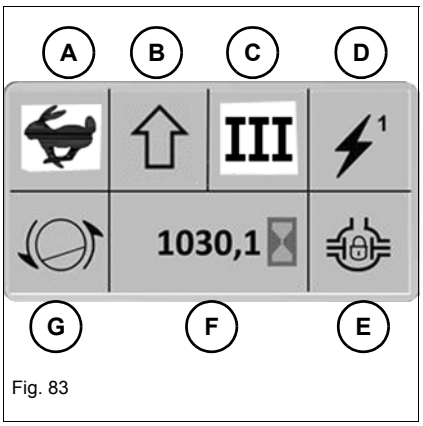
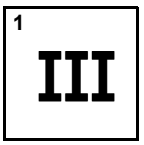
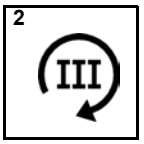
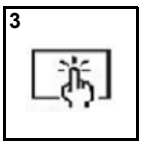
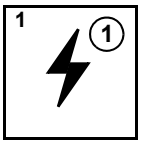
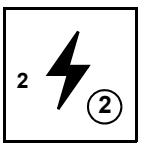


Fig. 83

Indication		Meaning
C		**Indicator display – 3rd control circuit in jog mode** Illuminates if the 3rd control circuit is enabled *– see chapter 5 "Operation of 3rd control circuit" on page 5-42*.
		**Indicator display – 3rd control circuit in continuous operation** Illuminates if the 3rd control circuit is enabled in continuous operation *– see chapter 5 "Continuous operation of 3rd control circuit" on page 5-44*.
		**Warning indicator– Error "STOP"** Illuminates if the machine electronics report a critical error during operation. ➥ An error message is displayed in the digital display **45** in area **F** as error code. ➥ The warning light **39** illuminates.
D		**Indicator display – front socket (opt)** Illuminates if the 1st control circuit of the front socket was enabled *– see chapter 5 "Electric connection – 7-pole front socket (opt)" on page 5-106*.
		**Indicator display – front socket (opt)** Illuminates if the 2nd control circuit of the front socket was enabled *– see chapter 5 "Electric connection – 7-pole front socket (opt)" on page 5-106*.

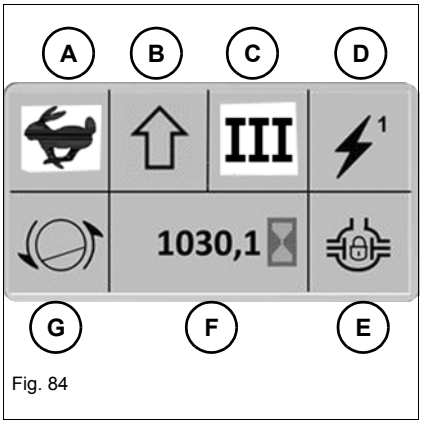
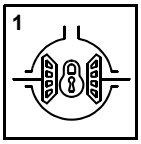
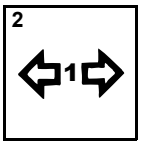
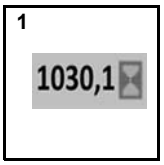
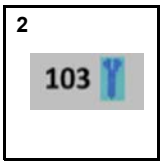
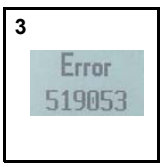


Fig. 84

Indication		Meaning
E	1 	**Indicator display – differential lock** Illuminates if the differential lock is enabled *– see chapter 5 “Lighting /signaling system” on page 5-19*.
E	2 	**Indicator display – turn indicator right/left for rear attachment/trailer** The indicator light flashes periodically if the turn indicator is actuated *– see "Turn indicators" on page 5-21*.
F	1 	**indicator display – operating hours** The indicator display displays the operating hours of the machine by default. As soon as the operating hours have been counted, the operating hour symbol flashes. The operating hour symbol will illuminate permanently when the hours are not being counted. Inspection work can be planned in accordance with the operating hours.
F	2 	**indicator display – maintenance** If less than 20 operating hours remain before the next inspection is due, the remaining number of hours until inspection is displayed here for 10 seconds when the starter is engaged. The remaining number of hours up to the next inspection can be queried in the display at any time *– see chapter 7 “Service indication” on page 7-11*.
F	3 	**Warning indicator – error code** If an error occurs that is not displayed via its own indicator light, then an error message will be displayed for approximately 3 seconds in the form of an error code. If several errors occur simultaneously while operating the machine, then these will be displayed one after the other in the display. Errors as saves and can be called up again at any time *– see chapter 7 “Error code display” on page 7-11*. ➥ Ignoring error messages can cause technical damage.

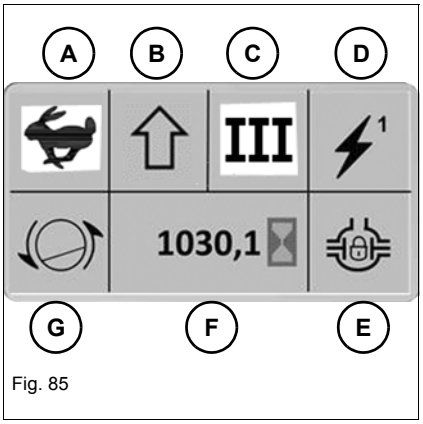


Fig. 85

Indication		Meaning
G	1	**Indicator display – holding function (active standstill control)** Illuminates when the holding function is enabled *– see chapter 5 “Parking brake” on page 5-6*.
	2	**Warning indicator – hydraulic oil filter contamination** Illuminates if the resistance of the oil flow in the return filter is too high *– see chapter 7 “Monitoring the hydraulic oil filter” on page 7-54*.
	3	**Warning indicator – hydraulic motor temperature** Illuminates if the temperature in the hydraulic motor is too high *– see "Warning light (red) – temperature" on page 4-35*.
	4	**Warning indicator – operating motor temperature** Illuminates if the temperature in the operating motor is too high *– see "Warning light (red) – temperature" on page 4-35*.
	5	**Warning indicator – hydraulic oil temperature** Illuminates if the temperature of the hydraulic oil in the return filter is too high *– see chapter 7 “Monitoring the hydraulic oil filter” on page 7-54*.

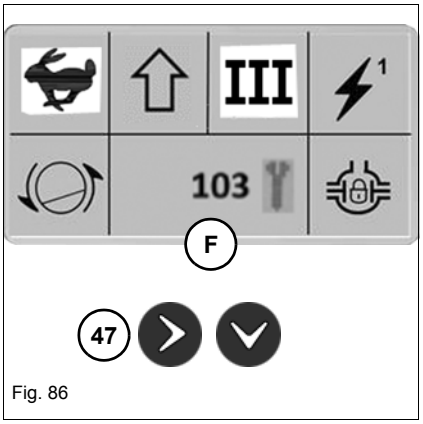


Fig. 86

Service indication

In order to call the contents of the service indication,
press push button **47**.

➥ The startup screen displaying the number of hours until the next inspection **F** is displayed in the display.

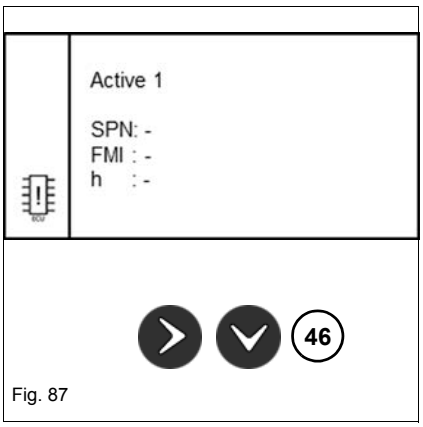


Fig. 87

By pressing on the push button **46**, the digital display will scroll down one level in the service indication.

➥ If error messages are present, these can be called up one after the other in the display.

Information

For more information concerning the error messages
– see chapter 8 “Description of indications in display” on page 8-4.

4.4 Preparatory work

Important information before putting the machine into operation

WARNING

Risk of injury when working with the machine!

Can cause injury or death.

- ► Ensure that nobody is in the danger zone.
- ► Operate the machine only from the operator seat.
- ► Read and understand the Operator's Manual before putting the machine into operation.
- ► Pay attention to all safety instructions.

CAUTION

Falling hazard when entering or exiting!

Entering or exiting incorrectly can cause injury.

- ► Keep the mandatory climbing aids clean.
- ► Use the mandatory climbing aids for entering and exiting the machine.
- ► Face the vehicle as you enter and leave it.
- ► Have damaged climbing aids replaced.

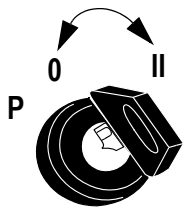


Fig. 88

Information

As soon as the ignition key is in position **II**, the machine consumes power and the operating hours are counted regardless of whether work is performed or not with the machine.

- ► Always turn the ignition key to position " **0** " when no work is performed with the machine.

Requirements and information for the operating personnel

- The operating personnel (operator) must have read and understood this Operator's Manual before putting the machine into operation.
- The machine may only be put into operation by **authorized personnel that have been instructed**.
- The machine may only be put into operation when the operator is seated.
- Never get on a moving machine. Never jump off the machine.
- Before leaving the machine, lower the loading unit to the ground, turn off the machine and remove the ignition key.
- Carrying or transporting accompanying persons in the cabin and/or on the machine is prohibited.
- Tell persons to leave the danger zone.
- The machine may only be used in technically perfect condition in accordance with its designated use and the instructions set forth in the operation license, the Data Confirmation (Germany) and in the Operator's Manual, and only by persons who are fully aware of the risks involved in operating the machine.
- Always observe the warning and information labels.
- Fasten the seat belt (lap belt).
- Always observe the warning and information labels, and the load diagrams (for example pallet forks) of the loader unit.
- Immediately replace (or have replaced) damaged or illegible warning and information labels with new ones.
- Adjust the rearview mirrors on the left and right.
- Pay attention to the checklist
  – see "Information on the checklists" on page 4-47.

Notes about low and high external temperatures

- Caution during machine travel on snow and ice. Adjust travel speed to the conditions on the road.
- At low external temperatures, the available capacity of the battery decreases and the battery charge time extends.
- Since the available battery capacity in continuous operation depends on the battery temperature at the start of the discharge, we recommend charging the battery in areas with plus temperatures at temperatures of less than 0 °C (32 °F) and first driving to the site of application after charging.
- At battery temperatures of under -20 °C (-4 °F), there is the danger that the electrolyte in the battery will freeze and battery cells will be destroyed. Therefore note the discharge depth of the battery at these temperatures. Always take care the note the battery charge condition and recharge the battery in a timely fashion.
- Always immediately charge the battery after working when in low external temperatures.
- Battery temperatures above 40 °C (104 °F) shorten the service life of the battery. The battery should therefore not be exposed to direct sunlight or other sources of heat.

Information on the checklists

These checklists are not intended to be exhaustive. They are only intended to help you to fulfill your obligation to exercise due care.

The checking and monitoring work listed below is described in greater detail in the following chapters of the Operator's Manual.

If questions are answered with NO, first rectify the cause of the malfunction before starting or continuing work.

"Preparing Machine for Operation" checklist

	Designation	X
1	Batteries sufficiently loaded?	
2	Oil level in hydraulic reservoir OK?	
3	Water level in washer reservoir OK?	
4	Loader unit lubricated?	
5	Brake system (including Parking brake) OK?	
6	Brake fluid level (ATF) OK?	
7	Tire condition and inflation pressure OK?	
8	Wheel nuts safely tightened (especially after a wheel change)?	
9	Pedal area clean?	
10	Lights, signals, indicators, warning lights and indicator lights OK?	
11	Windows, mirrors, lights and steps clean?	
12	Attachment on the loader unit safely locked?	
13	Battery cover plate securely locked?	
14	Especially after cleaning, maintenance or repair work: Rags, tools and other loose objects removed?	
15	Approved warning triangle, hazard warning light and first aid kit in the machine?	

"Machine Operation" checklist

Designation		X
1	Engine oil pressure indicator light extinguished?	
2	Braking effect sufficient?	
3	Steering system working properly?	
4	Anyone in the danger zone of the machine?	
5	Attachment locked in quickhitch?	
During machine travel on public roads, particular attention should be paid to the following points:		
6	Bucket or attachments in transport position?	
7	Transport locks installed?	
8	Joystick for lift and tilt hydraulics of the loader unit locked?	
9	Front-edge protection fitted to bucket?	
10	Compliance with requirements of machine documentation (Data Confirmation [Germany]/National Type Approval [Germany])?	

“Parking” checklist

Designation		X
1	Attachments on the loader unit lowered to the ground?	
2	All additional control circuits disabled?	
3	Parking brake applied?	
4	Machine turned off and ignition key removed?	
5	Motor isolating switch actuated?	
6	Cabin and battery cover plate closed?	
Parking on public roads:		
7	Machine appropriately secured?	
Parking on slopes:		
8	Machine additionally secured with chocks under the wheels to prevent it from rolling away?	

Preparations for driving on public roads

Instructions for machine travel on public roads

Information

When driving on public roads in Germany, equip the machine only with attachments that are certified for this machine!

Attachments that are not certified for machine travel on public roads must be removed and transported with a suitable means of transportation – *see chapter 3 “Attachments for KRAMER quickhitch facility” on page 3-18*,
Attachments for SKID STEER quickhitch (currently not available) on page 3-21 or *Attachments for EURO quickhitch on page 3-23*.

Information

In Germany, transporting material on public roads with a loaded attachment is prohibited!

Information

Observe the legal regulations of your country.

- Carrying or transporting **accompanying persons** in the cabin or on the machine is prohibited.
- The machine is subject to the applicable national legal regulations (e.g. StVZO road traffic regulations in Germany) and to the provisions laid down in the **National Type Approval (ABE in Germany)** or the **Data Confirmation** or the **Machine Certification Papers**.
- Only the attachments that are specified in the national operation licence are authorized for use on public roads.
- Machine travel on public roads with a loaded attachment is prohibited.
- Bear in mind the mandatory national regulations for accident prevention of the employers’ liability insurance associations.

Preparatory measures

- Remove **attachments that are not authorized** for travel on public roads *– see chapter 3 “Use of attachments” on page 3-16*.
- Empty the attachment completely and secure it (front-edge protection, fold up fork arms).
- Set the loader unit to transport position (ground clearance about 250 mm/9.84 in) *– see "Raising the attachment to transport position" on page 4-52*.
- Switch on the load stabilizer (opt) *– see chapter 5 “Load stabilizer for loader unit (opt)” on page 5-108*.
- Lock the joystick (loader unit) and 3rd control circuit *– see chapter 5 “Operation of 3rd control circuit” on page 5-42*.
- Switch off the working lights during machine travel on public roads *– see chapter 5 “Working lights” on page 5-23*.
- Check all signaling and light systems for correct function *– see chapter 5 “Lighting /signaling system” on page 5-19*.
- Lock the cabin door and the hinged window *– see "Opening / closing the cabin door" on page 4-2*.
- Adjust the correct seat position *– see "Operator seat" on page 4-7*
- Fasten the seat belt *– see "Seat belt (lap belt)" on page 4-14*.

CAUTION

Accident hazard due to malfunctioning or incorrectly adjusted rearview mirrors!

Can cause injury.

► Adjust the rearview mirrors ensuring good visibility to the rear (left, right and rear of machine).

► Replace malfunctioning rearview mirrors with new ones (or have them replaced).

- Check and if necessary adjust the rearview mirrors *– see "Adjusting the mirrors" on page 4-16*.

Locking/unlocking the control lever (joystick)

WARNING

Accident hazard due to unintentional loader unit operation!

Uncontrolled movements of the loader unit can cause serious injury or death during machine travel on public roads.

► Secure the joystick against unintentional actuation before performing machine travel on public roads.

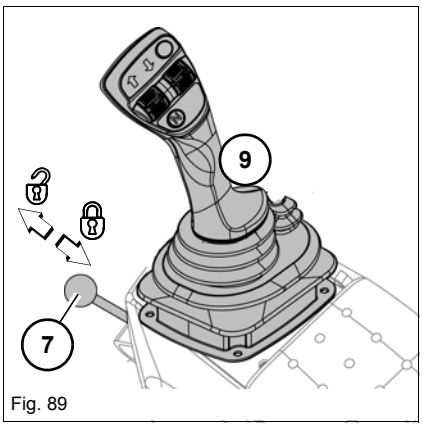


Fig. 89

Secure

1. Set the control lever (joystick) **9** to neutral (middle position).
2. Pull the lock lever **7** forwards out of the control lever console as far as possible.
   ➥ Control lever (joystick) **9** is secured and can no longer be moved.

Unlocking

1. Push the lock lever **7** backwards as far as it will go into the control lever console.
   ➥ Joystick (loader unit) **9** can be operated.

Locking/unlocking the 3rd control circuit

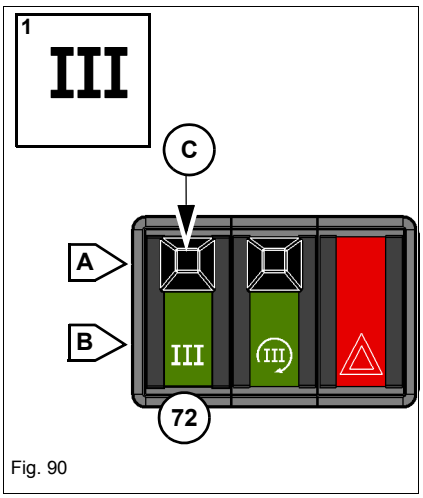


Fig. 90

Secure

1. Slide lock **C** in the toggle switch **72** downward and at the same time press the toggle switch to position **A**.
   ➥ Indicator display **C/1** in the digital display extinguishes in the gauge.
   ➥ The 3rd control circuit is locked.

Unlocking

1. Slide lock **C** on switch **72** downward and at the same time press the switch to position **B**.
   ➥ Indicator display **C/1** in the digital display illuminates in the indicating instrument.
   ➥ 3rd control circuit is unlocked.

Functional check of all control elements

- *– see chapter 5 “Checking the steering system” on page 5-1*
- *– see chapter 5 “Service brake” on page 5-5*
- *– see chapter 5 “Lighting /signaling system” on page 5-19*
- *– see chapter 5 “Operating hydraulics” on page 5-30*

Raising the attachment to transport position

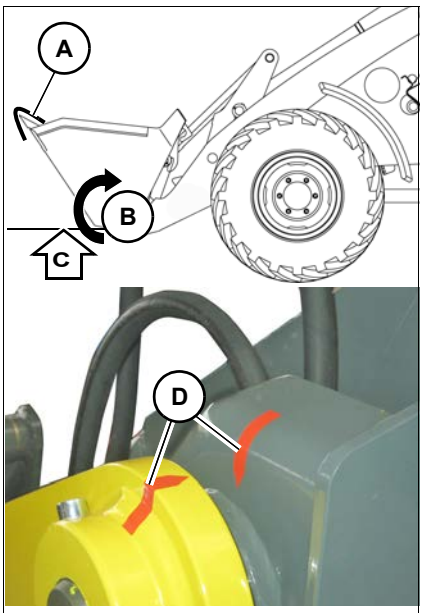


Fig. 91

Information

Remove buckets/attachments that are **not** certified for machine travel on public roads, and move or transport them with a suitable means of transportation
– see "Attachments for KRAMER quickhitch facility" on page 3-18, *Attachments for SKID STEER quickhitch (currently not available) on page 3-21* or
Attachments for EURO quickhitch on page 3-23.

Loader unit operation
– see chapter 5 “Operating hydraulics” on page 5-30.

Example of certified bucket:

1. Empty and tilt back the bucket **B**.
2. Raise the loader unit until both red marks **D** on the lift frame and the bulkhead are aligned.
   ➥ Ground clearance **C** about 250 mm (9.84 in).
3. Cover the blade or teeth of the bucket across their entire width with the tooth guard **A** provided.
4. Secure the joystick
   – see "Locking/unlocking the control lever (joystick)" on page 4-51.
5. Lock the 3rd control circuit
   – see "Locking/unlocking the 3rd control circuit" on page 4-51.

4.5 Putting the machine into operation

Important information before putting the machine into operation

WARNING

Accident hazard due to persons in the danger zone!

Serious injury or death can be caused by not staying clear of the danger zone of the machine.

- ► Ensure that no one is in the danger zone.
- ► Stop all work movements immediately if persons enter the danger zone.
- ► Seal off the danger zone with barriers.

Preparations for putting into operation

1. Review *"Preparing Machine for Operation" checklist on page 4-47*.
2. Check to see that the motor isolating switch is turned off *– see "Motor isolating switch" on page 4-22*.
3. Check that the parking brake is actuated *– see chapter 5 “Parking brake” on page 5-6*.
4. As required, open the battery cover plate and connect the battery connector (training required).
5. As required, close the battery cover plate and lock it *– see "Locking the-battery cover plate" on page 4-19*.
6. Adjust the operator seat to the operator seating position and weight *– see "Operator seat" on page 4-7*.
   - ➥ All controls must be within easy reach.
   - ➥ It must be possible to move the brake and accelerator pedals to their limit positions.
7. Adjust the rearview mirrors *– see chapter 4 “Adjusting the mirrors” on page 4-16*.
8. Sit down on the operator seat.
9. Fasten your seat belt.
10. Check whether all additional control circuits are switched off *– see chapter 5 “Continuous operation of 3rd control circuit” on page 5-44*.
11. Place switchable functions on the joystick into neutral *– see chapter 5 “Control lever (joystick) overview” on page 5-32*.
12. Set the low-speed control (opt) to “Maximum” *– see chapter 5 “Low-speed control with regulated travel speed (opt)” on page 5-103*.

Turn on the machine

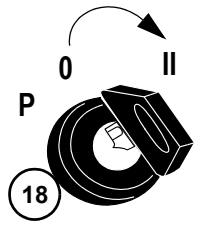


Fig. 92

1. Switch on the motor isolating switch
   – see "Motor isolating switch" on page 4-22.
2. Insert the ignition key.
   ➥ In position **0** – no operating voltage.
3. Turn the ignition lock **18** to position "**II**" and wait.
   ➥ The battery charge condition and the operating hours are displayed.
   ➥ After the audible clicking of the safety devices of the travel drive and the operating drive, the machine is ready for operation.
4. Release the parking brake.
   – see chapter 5 “Parking brake” on page 5-6
5. Select the travel direction*– see chapter 5 “Selecting a travel direction and starting machine travel” on page 5-13.*
   ➥ The machine is ready for travel operation.

NOTICE

To avoid wear-and-tear on the mechanical components, do not immediately begin driving after starting up the machine!

► Wait at least 5 seconds.

Information

The machine is equipped with an operator presence switch to protect the operator. In this case:

- The machine can only be switched on if the operator has taken his place in the operator seat.

5 Operation

5.1 Steering system

Checking the steering system

WARNING

Accident hazard due to leaking steering system not working correctly!

Can cause serious injury or death.

► A leaking steering system that leaks or does not work correctly must be immediately repaired by an authorized service center.

1. Turn the steering wheel to the left and right with the engine running and at walking speed.
2. Check and if necessary, synchronize the track (synchronization) of the wheels of the front and rear axles
– see "Synchronizing the steering system" on page 5-3.

Information

The steering system is only operational when the machine is turned on. The machine can still be steered if the electric motor or the hydraulic pump breaks down – **emergency steering features**!

Turning the steering wheel requires greater effort. Take this into account especially when towing the machine.

4-wheel steering (standard)

4-wheel steering is used for fast loading operations in confined spaces where only small turning circles are possible.

Front axle steering (opt)

Front axle steering is used for fast transport and road travel.

WARNING

Accident hazard when changing steering mode during machine travel!

Can cause serious injury or death.

- ► Change steering mode only at machine standstill.
- ► Changing the steering mode during machine travel on public roads is prohibited.

The switch panel with the press switch is located in the instrument panel underneath the steering wheel.

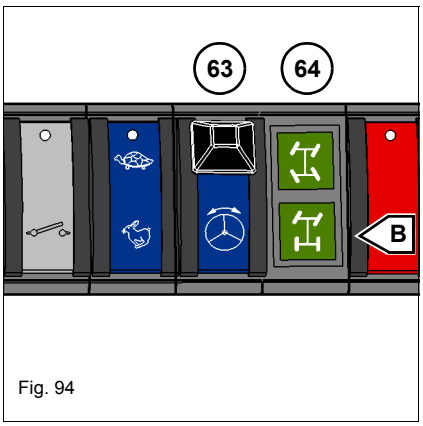


Fig. 94

Changing over from 4-wheel steering to front axle steering

1. Align the rear and front axle wheels parallel during straight-ahead machine travel.
2. Stop the vehicle.
3. Slide the lock on switch **63** downward and press the switch to position **B**.
   - ➥ Rear axle steering is locked, front axle steering is in operation.
   - ➥ The front axle steering symbol **B** illuminates in the indicator light **64**.

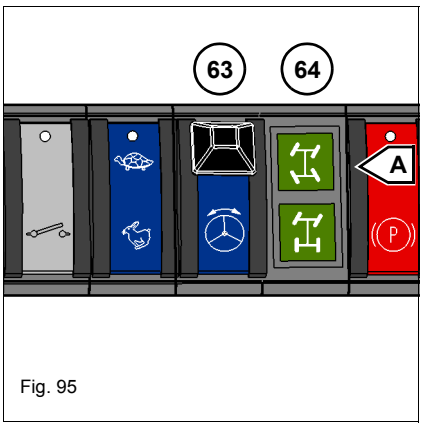


Fig. 95

Changing over from front axle steering to 4-wheel steering

1. Align the wheels of the front axle parallel to the wheels of the rear axle during straight-ahead machine travel.
2. Stop the vehicle.
3. Slide the lock in switch **63** downward and press the switch to position **A**.
   - ➥ 4-wheel steering is in operation.
   - ➥ The 4-wheel steering symbol **A** illuminates in the indicator light **64**.
4. Synchronize the wheels if necessary
   – see "Synchronizing the steering system" on page 5-3.

Synchronizing the steering system

Due to internal leakage in the steering hydraulics, the front and rear axle wheels of the machine no longer follow the same track during straight-ahead machine travel after extended operation. The steering system must be synchronized from time to time.

WARNING

Accident hazard when synchronizing the steering system during machine travel!

Can cause serious injury or death. Possible loss of machine control.

- ► Synchronize the steering system only at a standstill machine or at walking speed.
- ► Do not synchronize during machine travel on public roads.

1. If the front axle steering (optional) is switched on, change the steering to all-wheel steering – *see "Changing over from front axle steering to 4-wheel steering" on page 5-2*.
2. At walking speed, slowly turn the steering wheel to the left **or** right as far as it will go.
3. Continue turning the steering wheel briefly past the end position.
4. Turn the steering wheel rapidly back to straight-ahead position.
   ➥ Synchronization is over.
5. Check that the wheels of the front and rear axles are in the same track when traveling straight ahead.

Information

Have the cause immediately repaired by an authorized service center if this does not synchronize the wheels!

5.2 Drive operation

Accelerator pedal

WARNING

Accident hazard due to blocked or dirty pedal!

Can cause serious injury or death.

► Keep the accelerator pedal clean and do not deposit any objects in the area of the pedal.

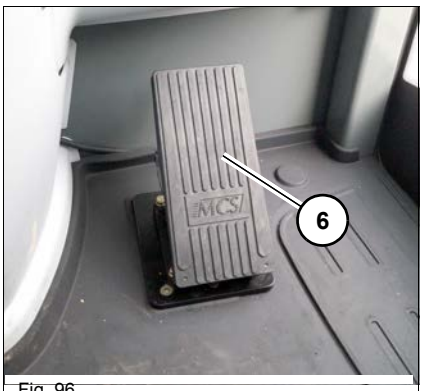


Fig. 96

Accelerator pedal **6** is located on the right in the cabin.

Engine and machine speed is continuously adjusted with accelerator pedal.

Maximum speed depends on the preselected speed range – *see "Overview of speed ranges" on page 5-11*.

Information

The machine reaches maximum speed only on a level and asphalted ground conditions, without a trailer and with an empty standard bucket!

5.3 Brake

Service brake

DANGER

Accident hazard due to blocked or dirty pedal!

Can cause serious injury or death.

► Keep the brake pedal clean and do not deposit any objects in the area of the pedal.

WARNING

Accident hazard when moving down a slope too fast!

Can cause serious injury or death. Excessive speed can damage the travel drive, brakes and electric motor.

► Select the next lower speed range before performing downhill machine travel.

► Reduce engine speed: remove your foot from the accelerator pedal.

► Reduce the travel speed with the brake pedal (intermittent braking).

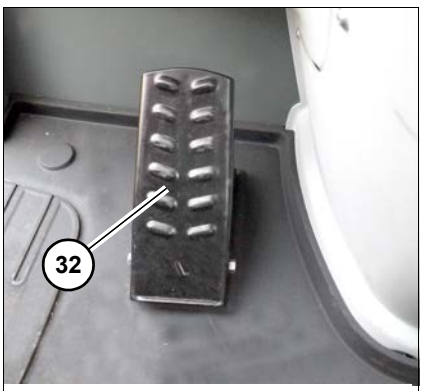


Fig. 97

Brake pedal **32** is located on the left in the cabin.

Check brake

1. After looking in the rear-view mirror and at low speed, press down the brake pedal and check the braking effect.
   ➥ The brake lights must illuminate.

Braking with the brake pedal

1. Actuate the brake pedal.
   ➥ The brake lights illuminate.

Parking brake

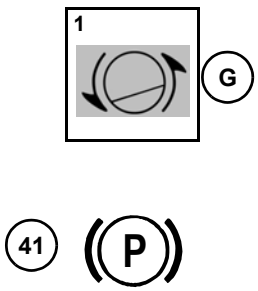


Fig. 98

Automatic parking brake

An automatic parking brake is installed in the machine, which is activated as soon as the machine comes to a standstill or the operator presence switch has been relinquished for 3 seconds.

If the machine comes to a standstill, a holding function "active standstill control" is immediately enabled. The indicator display **G/1** in the digital display in the gauge briefly illuminates.

After about 3 seconds, the park function automatically applies and the indicator light **41** in the indicating instrument blinks.

Information

The machine drive is not switched off if the parking brake is automatically applied. This is displayed by flashing **41** in the gauge.

As long as the indicator light flashes, machine travel can be immediately resumed any time by pressing the accelerator pedal. The travel direction can be changed. The indicator light **41** extinguishes as soon as machine travel resumes.

Manual parking brake

CAUTION

Accident hazard if the parking brake is applied during machine travel. The machine is braked abruptly!

Can cause injury.

- ► Apply the parking brake only at machine standstill.
- ► In machine travel operation use only the brake pedal to brake.
- ► Only use the parking brake in machine travel operation if the service brake has broken down.

Information

The manual parking brake can also be used as a secondary brake in the meaning of StVZO. Applying the parking brake during machine travel abruptly brakes the machine. For this reason, carefully observe the corresponding safety instructions.

Information

The drive of the machine is switched off if the parking brake is applied (drive interlock). This is displayed by the illumination of the indicator light **41**.

After releasing the parking brake, the indicator light extinguishes and the travel drive can be enabled again. Machine travel is possible only now.

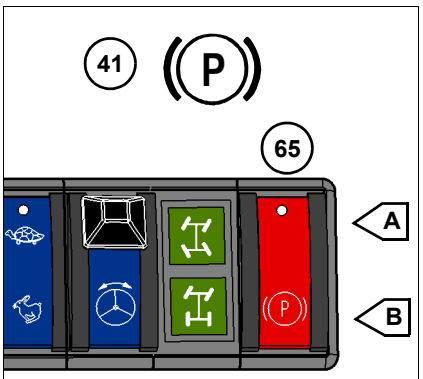


Fig. 99

Applying the parking brake prevents the machine from rolling away unintentionally. The travel direction cannot be selected if the parking brake is applied. The indicator light **41** illuminates continuously.

The switch panel with the press switch is located in the instrument panel underneath the steering wheel.

Applying the parking brake manually

1. Press switch to position **B**.
   - ➥ Indicator light **41** on the gauge illuminates.
   - ➥ The parking brake is applied.

Releasing the parking brake manually

1. Press switch to position **A**.
   - ➥ Indicator light **41** on the indicating instrument extinguishes.
   - ➥ The parking brake is released.

5.4 Machine travel operation

Important safety instructions for machine travel operation

WARNING

Accident hazard due to persons in the danger zone!

Serious injury or death can be caused by not staying clear of the danger zone of the machine.

- ► Ensure that no one is in the danger zone.
- ► Stop all work movements immediately if persons enter the danger zone.
- ► Seal off the danger zone with barriers.

WARNING

Accident hazard when moving down a slope too fast!

Can cause serious injury or death.
Excessive speed can additionally damage the travel drive, brakes and electric motor.
Overloading the hydraulic motor in overrun and exceeding the maximum achievable torque of the hydraulic motor (acceleration due to grade resistance) result in an emergency shutdown of the machine.

- ► Select the next lower speed range before performing downhill machine travel.
- ► Reduce engine speed: remove your foot from the accelerator pedal.
- ► Reduce the travel speed with the brake pedal (intermittent braking).

WARNING

Crushing hazard due to tipping over of vehicle!

A tipping vehicle can cause serious injury or death.

- ► Keep the loading unit lowered during machine travel.
- ► Adapt the travel speed to the prevailing conditions.
- ► Observe tilting limit of the machine.
- ► Ensure that no parts of the body protrude outside the vehicle.
- ► Do not exceed the permissible payloads.

WARNING

Accident hazard due to jamming or slipping!

Loose objects in the cab or a dirty machine can cause accidents with serious injuries or death.

- ► Fasten or remove all loose objects in the cab.
- ► Keep the control elements clean.
- ► Perform maintenance daily
  – *see chapter 7 “Maintenance plan” on page 7-6*.

WARNING

Accident hazard from impaired visibility!

Frozen and/or dirty windows can cause impaired visibility, which can lead to accidents with serious injury and death.

- ► Clean window surfaces before starting work.

CAUTION

Accident hazard during machine travel on snow and ice!

Inappropriate speed on snowy and/or icy roads can cause accidents and injury.

- ► Adapt your travel speed to the road conditions.

NOTICE

Damage to machine due to technical malfunctions.

- ► Stop machine operation immediately if a malfunction of the travel drive, steering and/or brakes is detected.
- ► Put the machine back into operation only after correcting the malfunction.

NOTICE

Battery damage!

The battery can be damaged if it is over-discharged.

- ► Pay attention to the “Battery charge condition” indication.
- ► Charge the battery in time.
- ► Only store the battery if it is fully charged.
- ► Observe charging instructions for new batteries
  – *see chapter 4 “Notes about low and high external temperatures” on page 4-46*.

Important safety instructions for machine travel operation

Information

The operating time of the battery depends on the battery charge condition, the respective operating conditions, the application and on how machine travel is performed.

– *see "Operating time of battery" on page 5-69*.

Information

The machine is equipped with an operator presence switch to protect the operator. In this case:

- The machine can only be switched on if the operator has taken his place in the operator seat.
- If the operator seat is relinquished for more than 3 seconds during machine travel, the machine is braked until it comes to a standstill and the parking brake engaged once in standstill.

Limp home mode

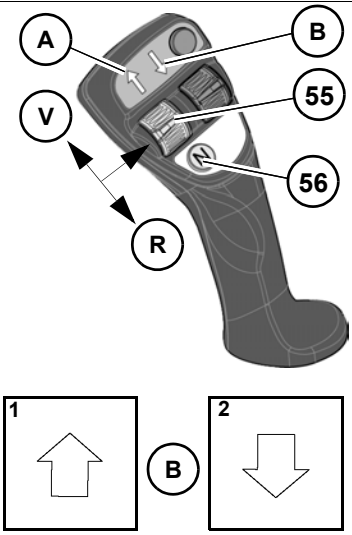


Fig. 100

Information

If the accelerator pedal failed due to a defect and the vehicle is in emergency shutdown, it is still possible to get the vehicle out of a danger area.

For this purpose, move the switch **55** in the joystick into the desired travel direction.

- **V** = forward – arrow **A** and indicator display **B/1** illuminate in the digital display of the gauge.
- **R** = reverse – arrow **B** and indicator display **B/2** illuminate in the digital display of the gauge.

➥ The vehicle accelerates in the select direction at about 3 km/h (1.86 mph).

To shut down this emergency driving aid, actuate the service brake, the button **56** (drive – neutral position) or the motor isolating switch.

Overview of speed ranges

The machine has two speed ranges (see table).

Speed range	Travel speed	Recommended
	0-7 km/h (0-4.35 m/h)	Used for work involving short loading cycles; in other words, a rapid succession of loading and unloading operations, for example onto a truck, and for work requiring precise speed adjustment, for example rotary broom applications
	0-17 km/h (0-10.56 m/h)	For long distances

Information

In order to reach maximum speed, the axles and the gearbox must be run in at least 10 operating hours.

Furthermore, the machine reaches maximum speed only on level, asphalted ground, with an empty bucket and without a trailer!

Selecting a speed range

WARNING

Accident hazard during downhill travel!

Serious injury or death can be caused by travelling too fast.
Excessive engine speed can cause damage to the travel drive.

- ► Select the next lower speed range “Turtle” before performing downhill machine travel.
- ► Reduce engine speed: remove your foot from the accelerator pedal.
- ► Reduce the travel speed with the brake pedal (intermittent braking).

The switch panel with the press switch is located in the instrument panel underneath the steering wheel.

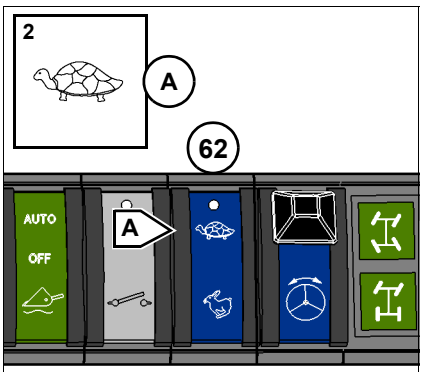


Fig. 101

Select low speed range

1. Press rocker switch **62** to position **A** (“Turtle”).
   - ➥ Indicator display **A/2** in the digital display in the indicating instrument illuminates.
   - ➥ If the symbol **A/2** flashes, then the speed for the selected speed range is too high.
2. Slow down the machine with the brake pedal.
   - ➥ If the speed has been reduced in accordance with the speed range selected, the indicator display **A/2** illuminates continuously.

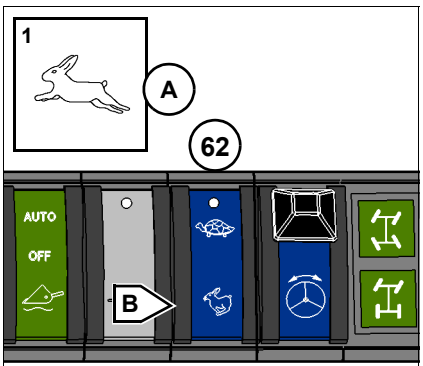


Fig. 102

Select high speed range

1. Press rocker switch **62** to position **B** (“Hare”).
   - ➥ Indicator display **A/1** in the digital display in the indicating instrument illuminates.

Selecting a travel direction and starting machine travel

WARNING

Risk of injury to persons in the danger zone of the machine!

Persons in the danger zone can be overlooked and seriously injured or killed during backward machine travel.

- ► Adjust and use the existing visual aids (rearview mirrors, for example) correctly.
- ► Work particularly carefully when reversing the machine.
- ► Interrupt work immediately if persons enter the danger zone.

Information

If the machine is equipped with a reverse warning system (opt), a warning signal will sound after selecting "Reverse" travel direction. This tone warns persons near the machine during reverse travel.

Information

The travel drive must be in neutral position before the machine can be put into operation.

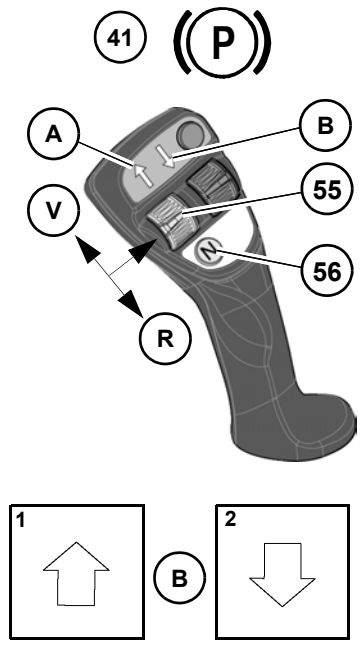


Fig. 103

1. Release the parking brake.
   ➥ Indicator light **41** on the indicating instrument extinguishes.
2. Select the travel direction with switch **55** on joystick.
   - **V** = forward – arrow **A** and indicator display **B/1** illuminate in the digital display of the gauge.
   - **R** = reverse – arrow **B** and indicator display **B/2** illuminate in the digital display of the gauge.
3. Press the accelerator pedal slowly.
   ➥ Machine travel starts.
4. Test the brakes at low speed.

Information

If the selection of the travel direction is not accepted (no function), this means that push button **56** (travel drive – neutral position) has been pressed unintentionally!

- ► Select the travel direction again.

Machine travel

The travel speed of the machine is proportional to the setting of the accelerator pedal. The more the pedal is pressed, the higher the travel speed. The adjustment control performed within the selected speed range is infinitely variable.

Changing travel direction

WARNING

Accident hazard when changing travel direction during machine travel!

Changing the travel direction during machine travel can cause serious injury or death.

- ► Do not operate the forward-reverse control during machine travel, since the machine brakes abruptly and moves in the opposite direction immediately.
- ► Only select the other travel direction when the machine is at a standstill.
- ► Press the accelerator pedal carefully.

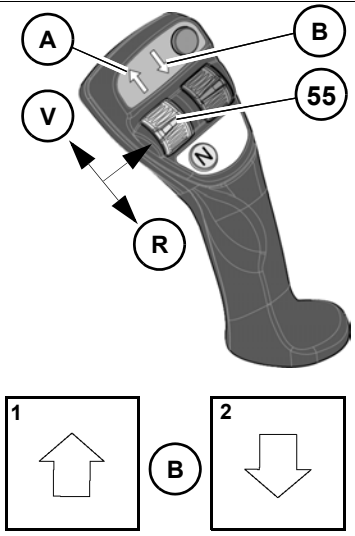


Fig. 104

1. Reduce the engine speed. Remove your foot from the accelerator pedal.
2. Reduce the travel speed until the machine comes to a standstill.
3. If necessary, for example on a mountain or slope, brake and hold the vehicle with the service brake.
4. Select the new travel direction with switch **55** on the joystick.
   - ➥ The arrow for the old travel direction **A** or **B** and the indicator display **B/1** or **B/2** in the digital display in the gauge go out.
   - ➥ The arrow for the new travel direction **A** or **B** and the indicator display **B/1** or **B/2** in the digital display in the gauge illuminate.
5. Press the accelerator pedal slowly.
   - ➥ The machine travels in the opposite direction.

Slowing the machine and stopping

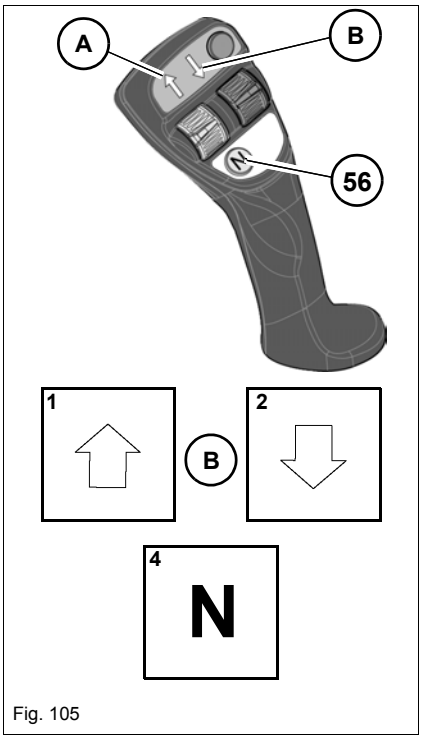


Fig. 105

1. Reduce the engine speed of the hydraulic motor. Remove your foot from the accelerator pedal.
2. If necessary, slow the vehicle using the service brake and stop.
3. Press button **56** on the joystick
   - ➥ Indicator light **A** or **B** (arrow) and the indicator display **B/1** or **B/2** go out in the digital display in the gauge.
   - ➥ Indicator display **B/4** illuminates in the digital display on the gauge.
   - ➥ The travel direction is in the neutral position.
4. Apply the parking brake – *see "Manual parking brake" on page 5-7*.

Switching on the differential lock

The 100% front axle differential lock neutralizes the compensating effect of the differential; i.e. traction is distributed evenly to both front wheels.

NOTICE

In order to avoid damage to the differential:

- ► Switch on the differential lock only if you expect a wheel to spin, when working on slopes or on slippery ground, for example.
- ► Switch on the differential lock only at machine standstill.
- ► Switch off the differential lock when cornering.

Switching on the differential lock

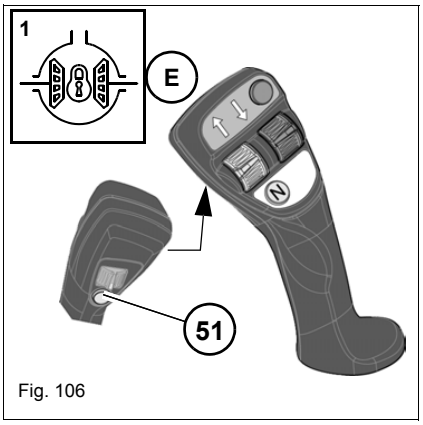


Fig. 106

Information

The differential lock can only be enabled by pressing push button **51** in the joystick **and** the brake pedal in combination!

1. Stop the vehicle.
2. Press and hold push button **51** on the joystick.
3. Press the brake pedal firmly (approx. 3 seconds) until indicator display **E/1** illuminates in the digital display in the gauge.
   ➥ The differential lock is enabled.
4. Release brake pedal.
5. Carefully move off the machine with push button **51** pressed.

Switching off the differential lock

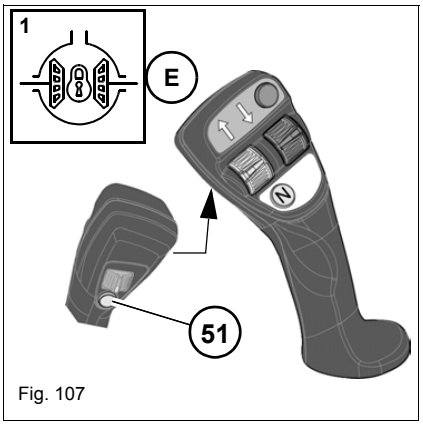


Fig. 107

Information

The differential lock cannot be disabled immediately when under pressure!

1. First reduce the travel speed and possibly briefly brake the machine with the brake pedal.
2. Release push button **51** on the joystick.
   ➥ Indicator display **E/1** extinguishes in the digital display in the gauge.
   ➥ The differential lock is disabled.

Switch off the machine

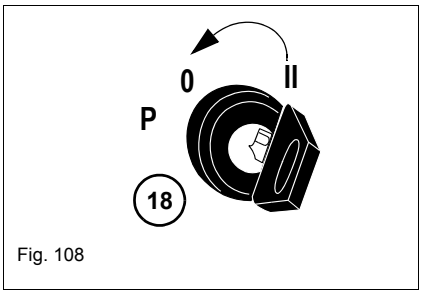


Fig. 108

1. Bring the machine to a standstill. To accomplish this, remove your foot from the accelerator pedal and step on the brake pedal.
2. Apply the parking brake.
3. Press the motor isolating switch downwards
   – see "Motor isolating switch" on page 4-22.
4. Turn the latch **18** in place "**0“** and pull out the ignition key.

5.5 Stopping and securing the machine

Important notice on stopping/securing

WARNING

Accident hazard from machine tipping over or rolling away!

Serious injury or death can be caused by an unsecured machine.

- ► Stop the machine on firm, level, and horizontal ground.
- ► Apply the parking brake before leaving the cabin.
- ► Lower the loader unit to the ground.
- ► Actuate the motor isolating switch.
- ► Turn the machine off and remove the ignition key.
- ► Secure the machine accordingly (chocks, for example).

NOTICE

Battery damage!

Ammonia gases cause damage to the battery cells.

- ► Do not park the machine in cowsheds, near manure storage sites or other places with ammonia gases.

NOTICE

Battery damage!

The battery can be damaged if the machine is parked several days with a discharged battery.

- ► Do not park the machine with a discharged battery.
- ► Fully charge the battery before parking the machine and leave hooked up to the battery recharger if possible.

Information

The instructions mentioned below apply to stopping and parking the machine after daily operation, transporting the machine and all maintenance and inspection work.

Machine stopping/securing

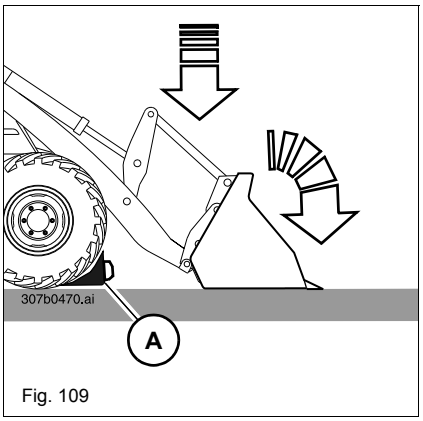


Fig. 109

1. Remove dirt from the machine.
2. Stop the machine smoothly by releasing the accelerator pedal and pressing the brake pedal.
3. Apply the parking brake *– see "Parking brake" on page 5-6*.
4. Move the travel direction lever to neutral.
5. Switch off all additional control circuits.
6. Set all switches and control levers to the zero position.
7. Lower the loader unit completely, extend the attachment horizontally with the ground, and lower it. Operation *– see "Control lever (joystick) overview" on page 5-32*.
8. Release the pressure in the hydraulic system *– see "Pressure relief – plug couplings" on page 5-33*.
9. Actuate motor isolating switch *– see chapter 4 "Motor isolating switch" on page 4-22*.
10. Turn the machine off and remove the ignition key.
    ➥ The immobilizer (opt) is enabled.
11. Perform a visual check for leaks and damage.
12. Close and lock the door and the windows.

Additionally on slopes:

13. Take additional measures to secure the machine by placing chocks **A** under the downhill sides of the wheels.
    ➥ The wheel chock is located on the left on the frame in front of the cabin.
14. Review *"Parking" checklist on page 4-48*.

5.6 Lighting /signaling system

Parking lights/low beam

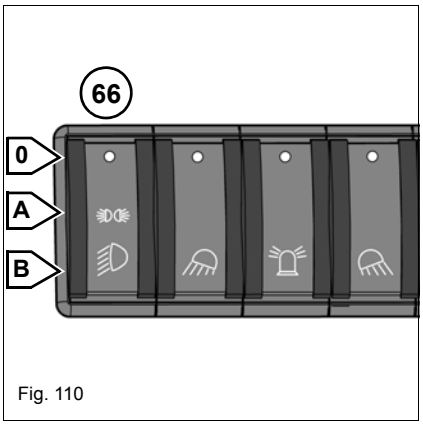


Fig. 110

The press switch for the machine lights are located on the front switch panel to the right, next to the operator seat.

Side marker light operation		Function
ON	Press switch **66** to position **A**.	➥ Indicator light in the press switch illuminates.
AUS	Press switch **66** to position **0**.	➥ The indicator light in the press switch extinguishes.

Low beam operation		Function
ON	Press switch **66** to position **B**.	➥ The indicator light in the switch illuminates
AUS	Press switch **66** to position **0**.	➥ The indicator light in the switch extinguishes

Information

The side marker lights stay lit if the machine is switched off while low beam is still switched on (parking lights)!

High beam/headlight flasher

WARNING

Accident hazard due to blinded motorists!

During machine travel on public roads, the enabled high beam or flashing headlights can blind other motorists. This can cause serious injury or death.

► Dim the headlights in time when oncoming traffic approaches.

► Observe the national regulations.

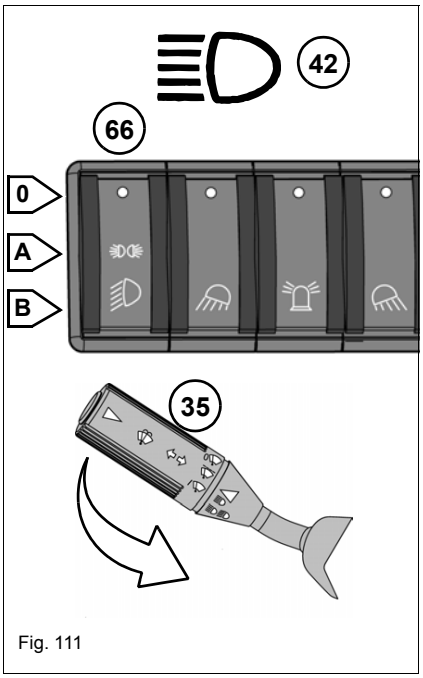


Fig. 111

High beam and the headlight flasher are operated with multifunctional lever **35**. The multifunctional lever is located on the left of the steering wheel.

High beam operation		Function
ON	1. Press switch **66** to position **B**. 2. Pull the multifunction lever **35** toward the steering wheel and release it.	➥ High beam and indicator light **42** illuminate.
AUS	Pull the multifunction lever **35** again toward the steering wheel and release it.	➥ High beam and indicator light **42** go out.

Headlight flasher operation		Function
ON	Pull the multifunction lever **35** at short intervals toward the steering wheel.	➥ High beam and indicator light **42** illuminate.

Turn indicators

NOTICE

If the indicator light **40** or indicator display **E/2** in the digital display in the indicating instrument flashes approx. twice as fast as normal, the turn indicator system is faulty!

► Have the turn indicator system repaired.

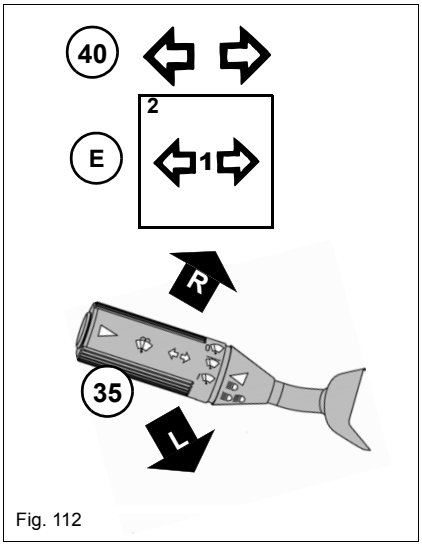


Fig. 112

Operating the turn indicators		Function
Right	Press the multifunctional lever **35** in the direction **R**.	➥ Indicator light **40** in gauge flashes. ➥ If a rear attachment/trailer is installed, the indicator display also blinks **E/2** in the digital display in the indicating instrument.
Left	Press the multifunctional lever **35** in the direction **L**.	

Hazard warning system

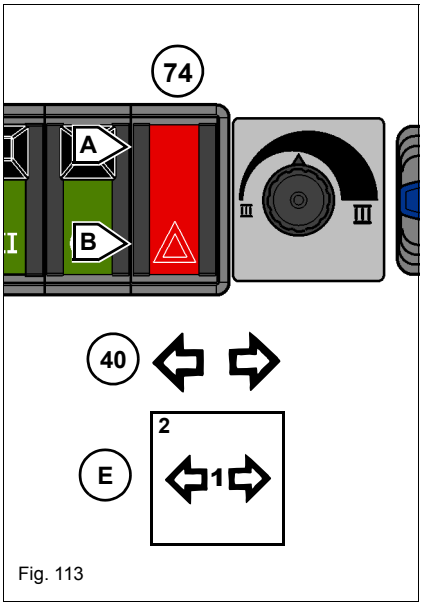


Fig. 113

The hazard warning switch is located on the rear switch console on the right, next to the seat.

Hazard warning system operation		Function
ON	Press the rocker switch **74** to position **B**.	➥ The indicator light in the press switch flashes. ➥ Indicator light **40** in indicating instrument flashes. ➥ If a rear attachment/trailer is installed, the indicator display also blinks **E/2** in the digital display in the indicating instrument.
AUS	Press switch **74** to position **A**.	➥ The indicator light in the switch extinguishes. ➥ Indicator light **40** on the indicating instrument extinguishes. ➥ If a rear attachment/trailer is installed, the indicator display also extinguishes **E/2** in the digital display in the indicating instrument.

Working lights

The machine is equipped with working lights in different versions to ensure optimal light conditions of the work area:

- 1x rear working light (standard)
- 2x front and/or 2x rear working lights (opt)

The press switches for operating the working lights are located on the right in the control lever console beside the operator seat.

WARNING

Accident hazard due to blinded motorists!

During machine travel on public roads, the enabled work lights can blind other motorists. This can cause serious injury or death.

► Always switch off the working lights during machine travel on public roads.

► When operating the machine, only switch on the working lights when no one can be blinded by them.

► Pay attention to national regulations on construction site lighting.

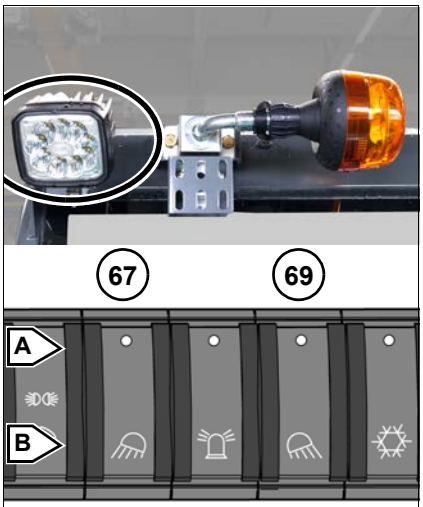


Fig. 114

The press switches for the working lights are located on the front switch panel to the right, next to the operator seat.

Working lights operation		Function
ON	Press the toggle switch **67 (front)** and/or toggle switch **69 (rear)** in position **B**.	➥ The indicator light in the switch illuminates.
AUS	Press switch **67 (front)** and/or switch **69 (rear)** to position **A**.	➥ The indicator light in the switch extinguishes.

Rotating beacon (option)

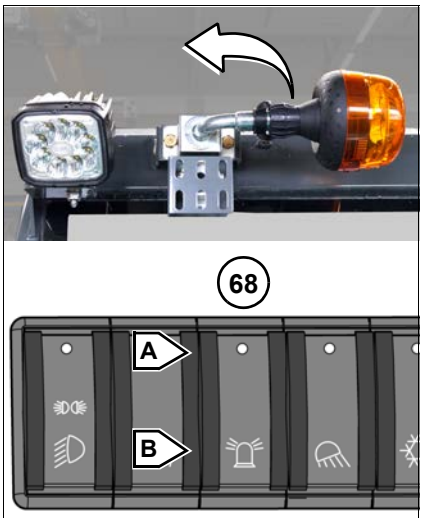


Fig. 115

The press rocker switch **68** for the rotating beacon (opt) is located on the front switch panel to the right, next to the operator seat.

Rotating beacon operation		Function
ON	Press switch **68** to position **A**	➥ The indicator light in the switch illuminates.
AUS	Press switch **68** to position **B**	➥ Indicator light in switch extinguishes.

Information

Fold up and lock the rotating beacon before using it.
Fold down and lock the rotating beacon again after use.

Information

In Germany, the rotating beacon may only be switched on public roads if,

- ► the road is within the machine's working range,
- ► the machine is an obstruction to the normal flow of traffic during work operation,
- ► the machine is equipped with a warning identification at the front and rear according to DIN 30710 (opt).
- ► Get informed on and follow the legal regulations of your country.

Interior light (only in cabin cpl.)

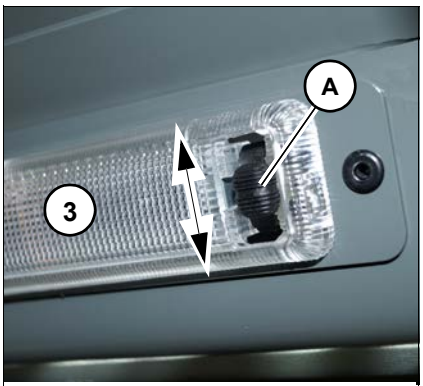


Fig. 116

The interior light **3** is located at the top right of the cabin roof.

Interior light operation	
ON	Press switch **A** upward or downward.
AUS	Move switch **A** to centre position.

Horn

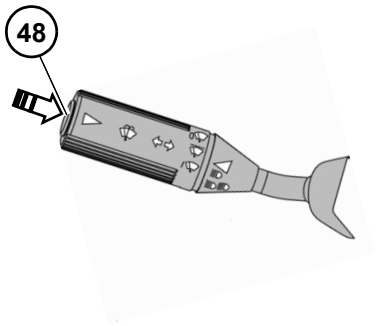


Fig. 117

Operating the horn		Function
ON	Press push button **48**.	➥ The horn sounds.

Backup warning system (opt)

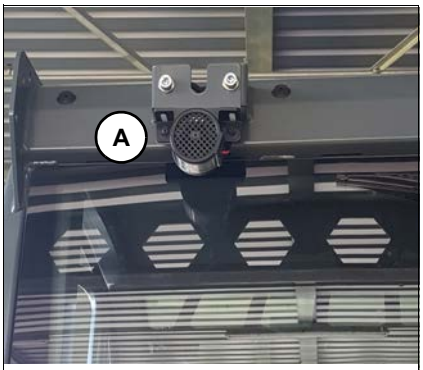


Fig. 118

The backup warning system (opt) consists of signal transmitter **A** fitted at the rear top left of the cabin.

Signal transmitter **A** generates a clearly audible warning signal when shifting into reverse.

WARNING

Accident hazard due to persons in the danger zone when reversing the machine!

Persons can be overlooked and injured during backward machine travel.

- ► Do not rely on the backup warning system.
- ► Adjust the existing visual aids (for example the rearview mirrors) correctly.
- ► Work particularly carefully when reversing the machine.
- ► Interrupt work immediately if persons enter the danger zone.

5.7 Wiper/wash system (only in cabin cpl.)

Washer system operation

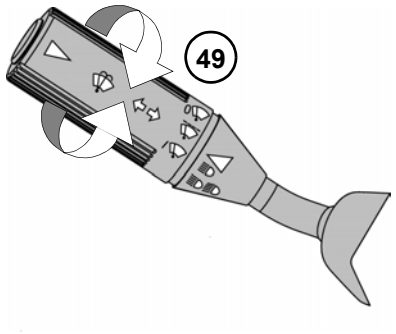


Fig. 119

Front wiper		Function
ON	Turn rotary switch **49** on the multifunctional lever counter-clockwise to the **1st** position.	➥ Intermittent wipe.
ON	Turn rotary switch **49** on the multifunctional lever counter-clockwise to the **2nd** position.	➥ Continuous wiping.
AUS	Turn rotary switch **49** clockwise fully back.	➥ Window wipers return to starting position.

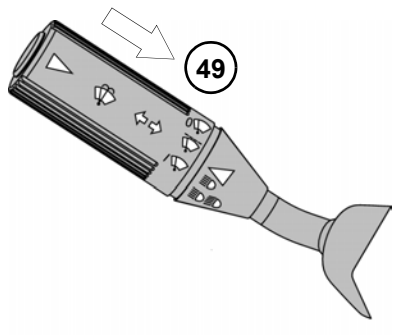


Fig. 120

Wash water (front/rear window)		Function
ON	Press and hold rotary switch **49** toward the steering column.	➥ Washer fluid is sprayed at the front and rear. ➥ The front wiper wipes 3 times.
AUS	Release rotary switch **49**.	➥ Front wiper returns to base position.

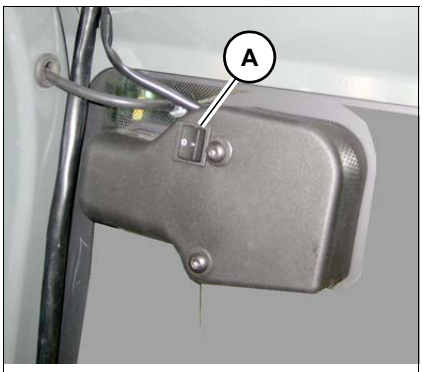


Fig. 121

Rear wiper		Function
ON	Press switch **A** on the rear wiper housing to position **1**.	➥ Rear wiper is on.
AUS	Press switch **A** on the rear wiper housing to position **0**.	➥ Rear wiper returns to base position.

5.8 Heating, ventilation and air conditioning (only in cabin cpl.)

Heater and ventilation

Information

The heating and ventilation system is an electrical air-heating. The system is supplied with power by the battery. The higher the performance of the heating and ventilation system, the higher the energy consumption. This means that with increasing system output, the operating time of the battery diminishes accordingly. Therefore, the performance of the heating and ventilation system is limited.
When exterior temperatures are cold, we recommend
– to park the machine free-of-frost, in an enclosed space and
– if necessary, to de-ice the windows using some suitable foreign substances.

The air that is accelerated by the fan is guided by two nozzles to the front window, into the footwell area and towards the rear window
– see chapter 4 "Inside the cabin" on page 4-28.

Each nozzle can be directed and/or closed.

2 operating modes can be selected:

- Ventilation, fresh air
- Heating

The rotary switches **57** and **58** for adjusting the heating and ventilation are located on the switch console below the steering wheel.

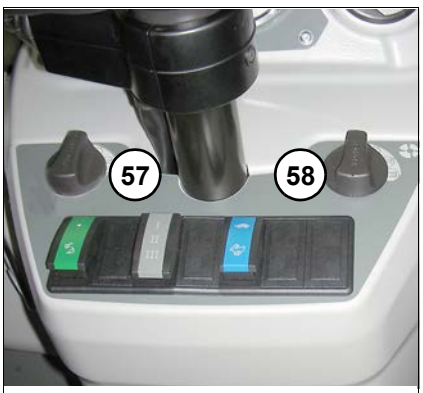


Fig. 122

Ventilation, fresh air

1. Adjust the fan speed with rotary switch **58**: positions **1–3**.

Turning on the heating

1. Adjust the fan speed with rotary switch **58**: positions **1–3**.
2. Adjust the heating with the rotary switch **57**: setting **0–2.**

Turning off the heating

1. Turn rotary switch **57** to position **0**.

Air conditioning (optional) (currently not available)

Information on putting the air conditioning into operation

When cooling, as well as when heating, the air conditioning system supplies dehumidified and purified air to the cabin.

In order to achieve best air conditioning results:

- Before putting into operation, ventilate the cabin thoroughly.
- Close the windows and doors.
- Set the fan to maximum output first, and then adjust it to your needs.
- In order to prevent condensation water from forming on the condenser, switch off the air conditioning system in due time before the end of work.

NOTICE

Observe the following points in order to avoid malfunctions, loss of refrigerant and drying-out of the seals:

► Run the air conditioning system at least once a month.

► Clean the heat exchanger (condenser) regularly. Daily in dusty or dirty work conditions
– see chapter 7 “Air conditioning (opt) (currently not available)” on page 7-81.

► Have the air conditioning checked at least once a year by an authorized service center.

► Repair, maintenance and filling with refrigerant must be performed by trained personnel and an authorized service center.

Information

The air conditioning system runs on electricity and is supplied with power by the battery. The higher the performance of the air conditioning system, the higher the energy consumption. This means that with increasing system output, the operating time of the battery diminishes accordingly. The performance of the air conditioning system is therefore limited.
When outside temperatures are very high, we recommend:
– parking the machine when it is not being used out of the sun and
– to observe the instructions for how to operate the air conditioning.

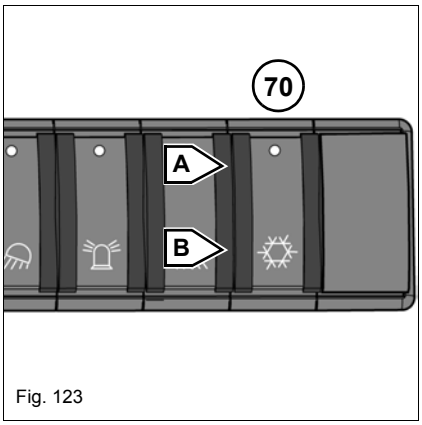


Fig. 123

Air conditioning operation

The rocker switch **70** for switching on the air conditioning is located on the front switch console on the right, next to the operator seat.

Air conditioning operation		Function
ON	Press switch **70** to position **B**.	➥ The indicator light in the switch illuminates. ➥ Air conditioning system in operation.
AUS	Press switch **70** to position **A**.	➥ Air conditioning system OFF.

Information

The air conditioning system allows you to select the same operating modes as with the heating and ventilation system!

The heating output is reduced if the air conditioning is used as well!

5.9 Operating hydraulics

Important safety instructions on loader unit operation

DANGER

Electric shock due to overhead electric lines!

Caution, danger! Electric arcs can form when approaching overhead electrical lines.

- ► Keep away from overhead electric lines.
- ► Contact the energy supplier before working under overhead electric lines.

WARNING

Danger of accident due to uncontrolled movements of the joystick!

Uncontrolled movements of the joystick can cause serious injury or death.

- ► Operate the machine only from the operator seat.
- ► Work calmly and carefully.
- ► Avoid fast and sudden movements of the joystick.
- ► Lower the loader unit to the ground during work interruptions or when finishing work.
- ► Secure the joystick before performing machine travel on public roads.
- ► Secure the joystick before leaving the machine.

WARNING

Crushing hazard due to tipping over of machine!

A tipping vehicle can cause serious injury or death.

- ► Lower the loader unit to transport position during machine travel.
- ► Adapt the travel speed to the prevailing conditions.
- ► Adapt the driving speed to the material loaded.
- ► Pay attention to persons and obstacles.
- ► Reduce travel speed before performing downhill machine travel.
- ► Always fasten your seat belt.
- ► Ensure that no parts of the body protrude outside the vehicle.
- ► Carefully steer the machine if the loader unit is raised.
- ► Do not exceed the permissible payloads.

WARNING

Risk of injury due to material falling from a raised loader unit!

Falling loads (for example, large bales or stacks of bales) can cause serious or fatal injury.

Never transport several large bales or boxes at the same time.

Only work with a raised loader unit when the machine is at a standstill or at very low speeds.

Do not tilt in the attachment to the limit with a raised loader unit.

Information

The machine is equipped with an operator presence switch to protect the operator. In this case:

- The machine can only be switched on if the operator has taken his place in the operator seat.
- If the operator seat is relinquished for more than 3 seconds during machine travel, the machine is braked until it comes to a standstill and the parking brake engaged once in standstill.

Control lever (joystick) overview

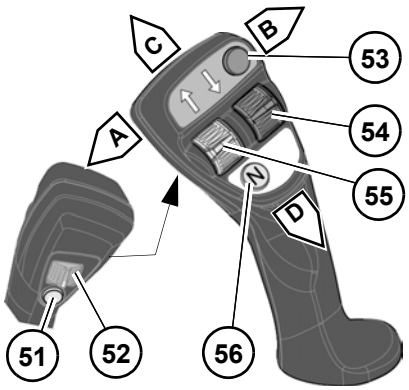


Fig. 124

Operation		Function
A	To the left	➥ Tilts in the attachment
B	To the right	➥ Tilts out the attachment
C	Forwards	➥ Lowering the loader unit
D	Backward	➥ Raises the loader unit
53	Push button (opt)	➥ Extended function front socket
54	Switch (opt)	➥ No function
55	Switch	➥ Forwards/reverse driving direction
56	Push button	➥ Neutral driving direction
52	Switch	➥ 3rd control circuit for locking/unlocking the quickhitch
51	Push button	➥ Differential lock activation/ deactivation

Information

For safety reasons, lowering the loader unit with a host burst valve (opt) is not possible when the machine is turned off
– see "Hose burst valve (partly opt)" on page 5-102!

Pressure relief – plug couplings

Information

The hydraulic system of the machine is still pressurized even when the machine is switched off!

The hydraulic plug couplings can be released, however they cannot be re-attached because the pressure in the hydraulic lines has not been released. Release the pressure in the sections of the system and hydraulic lines that are to be opened before installing and removing an attachment.

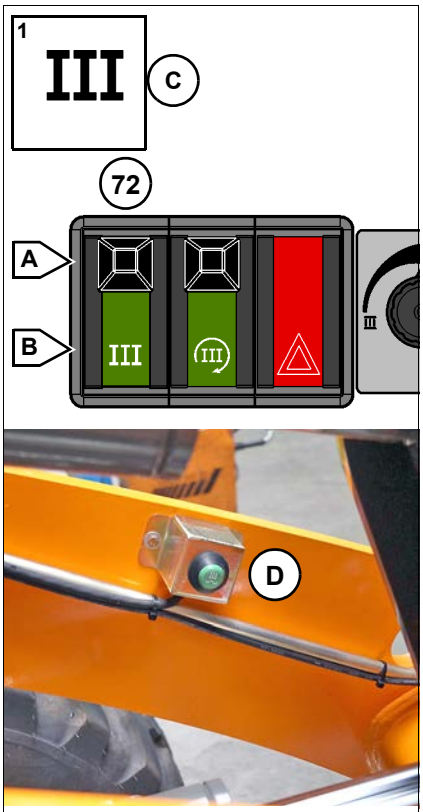


Fig. 125

Releasing the pressure in the 3rd control circuit with the push button on the left on the loader unit

Push button **C** is located on the left inside the loader unit.

1. If necessary, turn the ignition key in the ignition lock to setting **II**. The motor isolating switch **cannot** be switched on.
2. Lower the loader unit.
3. Apply the parking brake.
4. Disable the road-travel lock for the 3rd control circuit if it is still enabled. To do this, slide the lock in the toggle switch **72** downward and press the switch to position **B** at the same time.
   ➥ Indicator display **C/1** in the digital display illuminates in the indicating instrument.
5. Press and hold push button **D** about 5 seconds.
   ➥ The pressure in flexible lines is released.
6. Change over the plug couplings – *see "Connecting hydraulic lines between machine and attachment" on page 5-40*.

Hydraulic control circuits/plug couplings (overview)

The machine has several hydraulic connections depending on the equipment.

The operation of the hydraulic connections can be found in the following pages.

NOTICE

In order to avoid leaks on the plug couplings and dirt in the hydraulic oil:

- ► carefully clean the plug couplings and flexible lines before connecting them.
- ► Before connecting the flexible lines, turn off the machine.

Information

The hydraulic system of the machine is still pressurized even when the machine is switched off. This is why the hydraulic plug couplings can be released; however, they cannot be re-attached if the pressure in the hydraulic lines has not been released.

- ► Release the pressure in the quick coupler
  – see "Pressure relief – plug couplings" on page 5-33.
- ► See the Operator's Manuals of the attachment manufacturers.

KRAMER quickhitch plug couplings

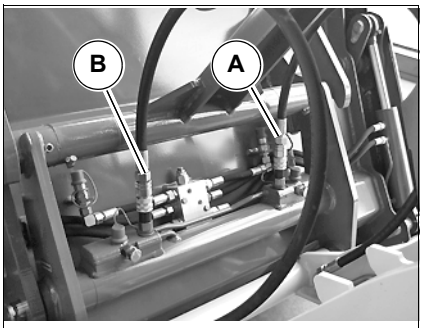


Fig. 126

Control circuits:	Hydraulic connections:	Operation, see page:
3rd control circuit	A + B	*5-42*
Continuous operation of 3rd control circuit		*5-44*

Plug coupling for leak oil line and return without pressure to the reservoir (installed laterally on the loader unit [opt])

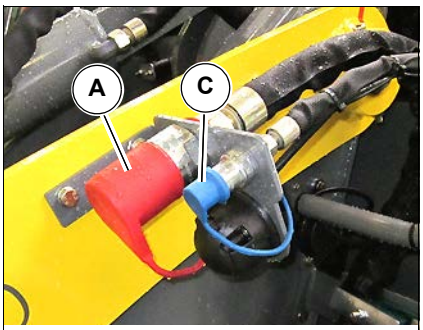


Fig. 127

Control circuits:	Hydraulic connections:
Front plug coupling (return without pressure to reservoir)	A
plug coupling (leak oil line)	C

Plug couplings of 3rd control circuit (FASTER block) laterally on loader unit (option)

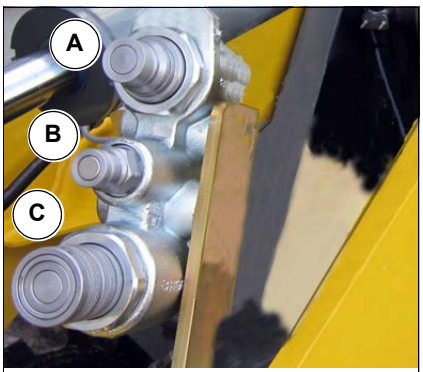


Fig. 128

Information

The 3rd control circuit (Faster block) (option)
is only possible in connection with the SKID STEER quickhitch!

Control circuits:	Hydraulic connections:	Operation, see page:
Plug coupling (3rd control circuit, permanent operation, return without pressure)	A	*5-46*
plug coupling (leak oil line)	B	–
Plug coupling (3rd control circuit, permanent operation – pressure)	C	*5-46*

Oil volume setting

Using the oil volume setting during continuous operation of the 3rd control circuit (– see "Continuous operation of 3rd control circuit" on page 5-44) to set the rpm of the operating motor and thus indirectly the flow rate of the hydraulic pump. The flow rate, in turn, has an impact on the hydraulic function of the attachments.

Information

If an additional speed is required because other hydraulic functions are being used at the same time (e.g. raising/lowering the loader unit) that is above the speed set with the oil volume setting, the speed will be raised to the needed value for as long as the requirement persists.

The oil volume setting requires the following conditions to be fulfilled:

- Machine is turned on and ready to operate
  – see chapter 4 “Turn on the machine” on page 4-54.
- Operator is sitting in position.
- Joystick lock for road travel is unlocked
  – see chapter 4 “Locking/unlocking the control lever (joystick)” on page 4-51.

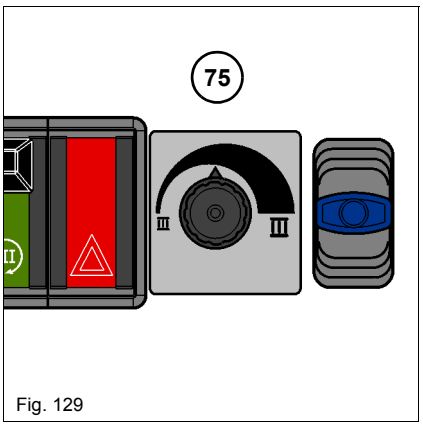


Fig. 129

The rotary switch for the oil volume adjustment **75** is located on the rear switch panel to the right of the operator seat.

Information

The oil volume can be set variably between 0 % (700 min^{-1}) and 100 % (3000 min^{-1}). Ex works, the oil volume is set to 100%.

Information

The selected oil volume is set permanently until it is changed manually.

Information

The oil volume settings can only be increased / reduced during machine operation, e.g. the number of revolutions a rotary broom makes.

Modifying the oil volume

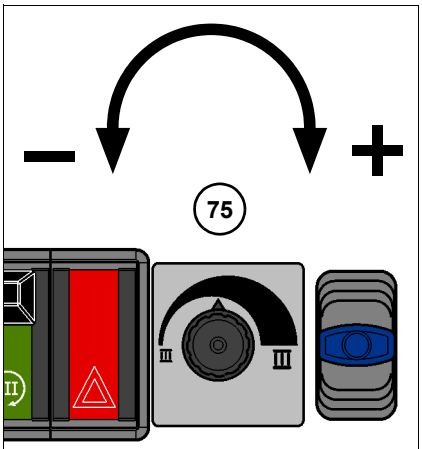


Fig. 130

1. Switch on 3rd control circuit continuous operation
   – *see "Continuous operation of 3rd control circuit" on page 5-44*.
2. Set the oil volume.
   To do this, turn the rotary switch **75** counterclockwise (**-**) or clockwise (**+**) until you have reached the desired setting.
   ➥ The oil volume is adjusted variably.

Important information on connecting and operating the hydraulic control circuits

WARNING

Connecting the flexible lines incorrectly results in malfunctions and/ or uncontrolled movements of the attachment!

Failure to observe this can cause serious injury or death.

- ► Ensure that the flexible lines of the attachment are correctly connected to the machine.
- ► Follow the instructions in the Operator's Manual of the attachment manufacturer.
- ► Check the response direction of the control elements before using the attachment.

CAUTION

Risk of injury due to pressure!

A fine jet of hydraulic oil under high pressure can penetrate through the skin.

- ► Seek medical attention immediately if hydraulic oil penetrates the skin or eyes.
- ► Only open sections of the hydraulic system after the pressure in them has been released.
- ► Wear protective clothes.

NOTICE

In order to avoid damage, do not connect the hydraulic lines crosswise, otherwise the attachment functions are inverted and the hydraulic lines are squeezed by tilting the attachment in and out.

- ► Check the attachment for correct function after connecting.

NOTICE

In order to avoid leaks on the plug coupling:

- ► carefully clean the plug couplings and flexible lines before connecting them.
- ► Before connecting the flexible lines, release the pressure from the lines *– see "Pressure relief – plug couplings" on page 5-33*.
- ► When removing an attachment, always ensure that all hydraulic lines are removed.

NOTICE

In order to avoid hydraulic damage to the machine and/or attachment, check the flow rate of the attachment before putting it into operation.

► Flow rate indications and consumer pressure on the plug couplings of the machine
– see chapter 9 “Usable consumer pressure at 3rd control circuit” on page 9-8.

Important information on connecting the hydraulic control circuits

Information

The hydraulic system of the machine is still pressurized even when the machine is switched off. This is why the hydraulic plug couplings can be released; however, they cannot be re-attached if the pressure in the hydraulic lines has not been released.

► Release the pressure in the system sections before installing or removing an attachment
– see "Pressure relief – plug couplings" on page 5-33.

Information

See also the Operator’s Manuals of the attachment manufacturers for installing and operating the attachments.

Environment

Hydraulic oil is harmful to the environment!

► When connecting or disconnecting, place a container under the hydraulic plug couplings.

► Dispose of escaping hydraulic oil by an ecologically safe method.

Connecting hydraulic lines between machine and attachment

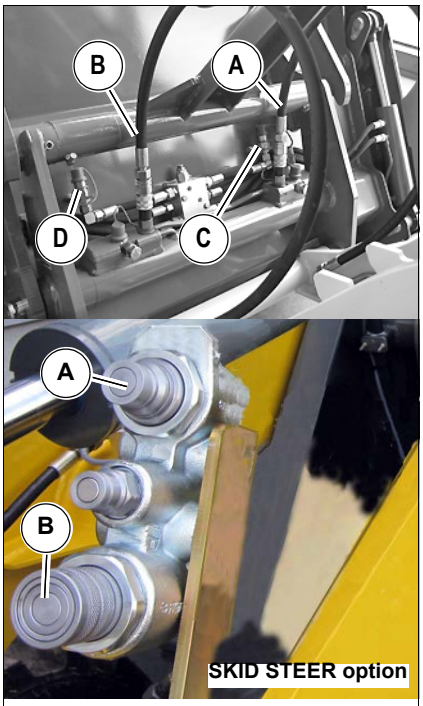


Fig. 131

1. Pick up the attachment and safely lock it
   – see "Attachments" on page 5-48.
2. Release the pressure in the hydraulic lines
   – see "Pressure relief – plug couplings" on page 5-33.
3. Clean the hydraulic plug-and-socket connections.
4. Take the protective caps off the connections.
5. Couple the flexible lines.
   To do this, with the Kramer quickhitch, the flexible lines **A**+**B** from the 3rd control circuit are connected to the plug couplings **C**+**D** of the attachment.
   With other quickhitches, flexible lines from the attachments are connected to the plug couplings on the machine (e.g., with SKID STEER attachments to the plug couplings **A** + **B** of the FASTER block)
   – see "Hydraulic control circuits/plug couplings (overview)" on page 5-34.
6. Check whether the hydraulic connections are engaged correctly. To do this, pull on the hydraulic hoses.
   ➥ The hydraulic connections must not be released as you do so.
7. Close exposed connections with protective caps.
8. Check that the hydraulic system of the attachment and the hydraulic connections are free of leaks. To do this, carefully move the attachment.
9. Check the attachment for correct function and response direction:
   ➥ *– see "Operation of 3rd control circuit" on page 5-42*,
   ➥ *– see "Continuous operation of 3rd control circuit" on page 5-44*.

Important information on operation of the 3rd control circuit

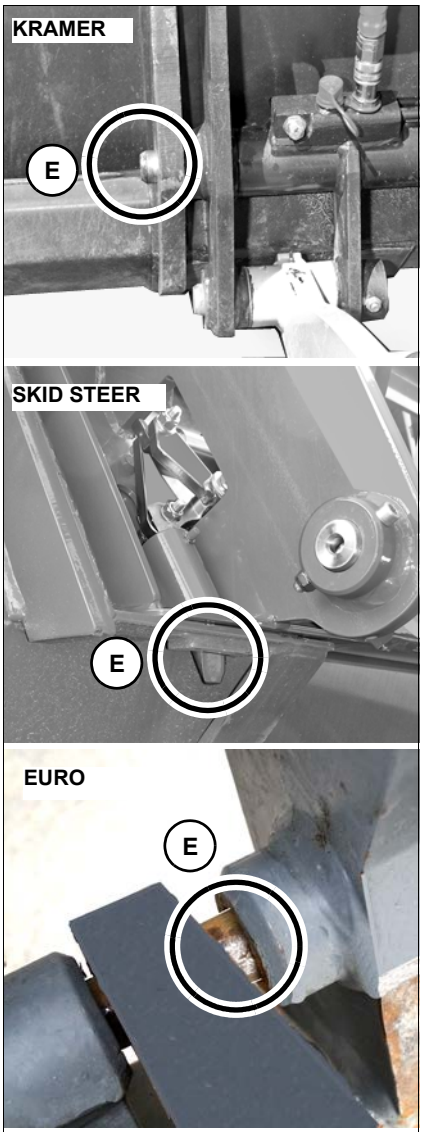


Fig. 132

The 3rd control circuit hydraulically locks the attachment in the quickhitch and secures it against unintentional unlocking.

By changing over the flexible lines on the hydraulic attachment (for example a multipurpose bucket), it can be operated with the 3rd control circuit *– see "Control lever (joystick) overview" on page 5-32*.

The 3rd control circuit can also be operated with the “Continuous operation“ option
– see "Continuous operation of 3rd control circuit" on page 5-44.

WARNING

Accident hazard due to unlocked attachment on the quickhitch!

The attachment can come off the quickhitch unexpectedly and cause serious injury or death.

► Ensure that the attachment is visibly locked on either side with the lock pins **E** of the quickhitch.

Information

To lock attachments to the quickhitch
– see "Locking the attachment" on page 5-42!

Operation of 3rd control circuit

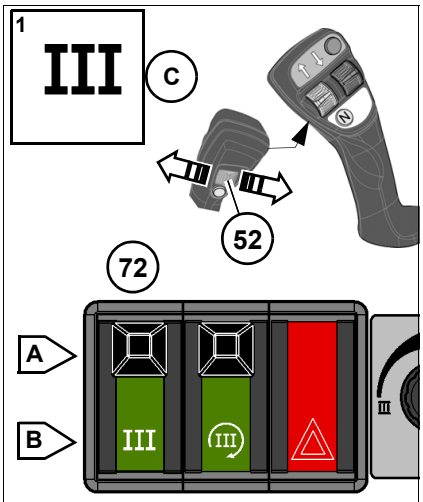


Fig. 133

Locking the attachment

1. Pick up the attachment – *see "Attachment on KRAMER quickhitch" on page 5-56*, *Attachment on SKID STEER quickhitch (opt) on page 5-61* or *Attachments for EURO quickhitch (optional) on page 5-65*.
2. Lock the attachment. Press the rocker switch **52** on the joystick to the left.
   - ➥ The attachment is locked in the quickhitch.
   - ➥ Attachment is secured against unintentional unlocking.
3. During machine travel on public roads, lock the 3rd control circuit. To do this: slide the lock in toggle switch **72** downward and press the toggle switch to position **A**.
   - ➥ Indicator display **C/1** in the digital display in the gauge extinguishes.
   - ➥ The 3rd control circuit is locked.
   - ➥ Switch on the joystick is not functional.

Unlocking the attachment

Information

The attachment locked in the quickhitch is secured against unintentional unlocking for safety reasons.
You can only unlock the attachment with both hands.

Information

In order to avoid damage to the mounting bore and attachment lock during unlocking, follow the operation sequence exactly.

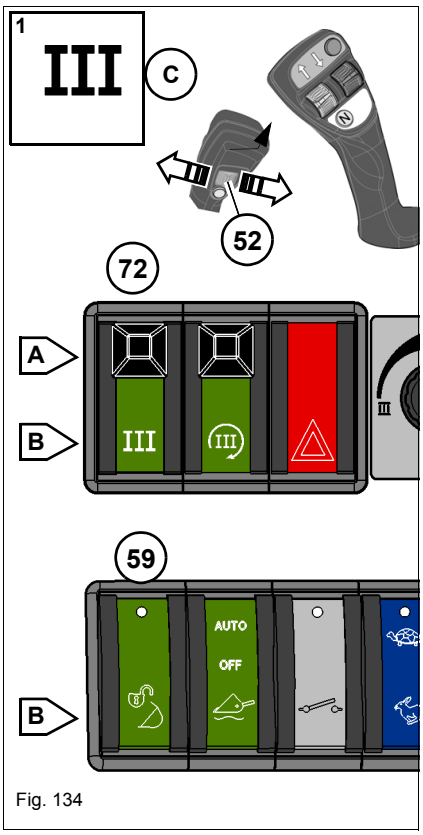


Fig. 134

1. Disable the road-travel lock for the 3rd control circuit if it is still enabled. To do this: slide the lock in rocker switch **72** downward and press the rocker switch to position **B**.
   - ➥ Indicator display **C/1** in the digital display illuminates in the indicating instrument.
   - ➥ The 3rd control circuit is ready for operation.
2. Press and hold the touch button **59** in position **B**
3. Press switch **52** on the joystick to the right in travel direction at the same time until the lock pins fully come out of the mounting bores of the attachment.
4. First release switch **52** on the joystick, then release push button **59**.
5. Lower the attachment to level ground *– see "Attachment on KRAMER quickhitch" on page 5-56*, *Attachment on SKID STEER quickhitch (opt) on page 5-61* or *Attachments for EURO quickhitch (optional) on page 5-65*.

Continuous operation of 3rd control circuit

Using the 3rd control circuit in continuous operation

Continuous operation is used for movements/procedures over a long period of time or operation of hydraulic motors (for example a rotary broom) or for operation of attachments with an integrated control valve adjusted to maximum oil flow, with an unpressurized return.

NOTICE

Danger of damage to the attachment and machine!

- ► Check the flow rate of the attachment before putting it into operation – see the Operator's Manual of the attachment.
- ► After connecting the hydraulic lines and electric cables, check the function and response direction before putting into operation.
- ► Flow rate indications and consumer pressure on the plug couplings of the machine *– see chapter 9 "Usable consumer pressure at 3rd control circuit" on page 9-8.*

Switching on the 3rd control circuit in continuous operation – KRAMER attachments

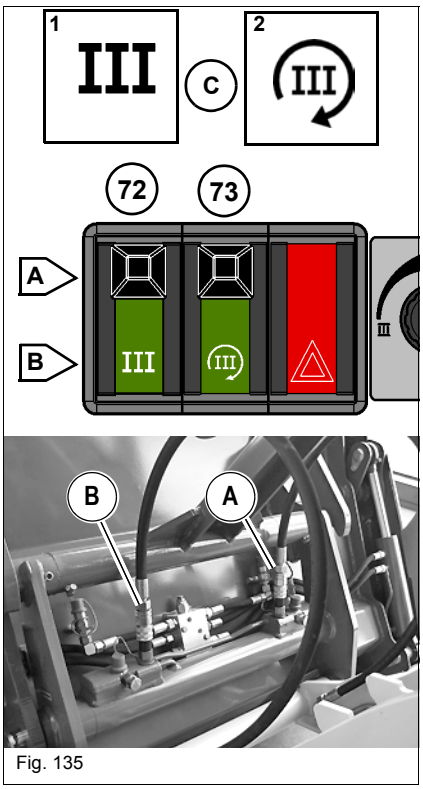


Fig. 135

Activity	Function
1. Connect flexible lines **A** and **B**. 2. Enabling the 3rd control circuit To do this: slide the lock in rocker switch **72** downward and press the rocker switch to position **B**.	➥ Indicator display - **C/1** in the digital display illuminates in the indicating instrument.
3. Switch on continuous operation of the 3rd control circuit. To do this: slide the lock in rocker switch **73** downward and press the rocker switch to position **B**.	➥ Indicator display **C/1** in the digital display in the gauge extinguishes. ➥ Indicator display - **C/2** in the digital display illuminates in the indicating instrument. ➥ The plug couplings **A + B** are operational.

Switching off the 3rd control circuit in continuous operation – KRAMER attachments

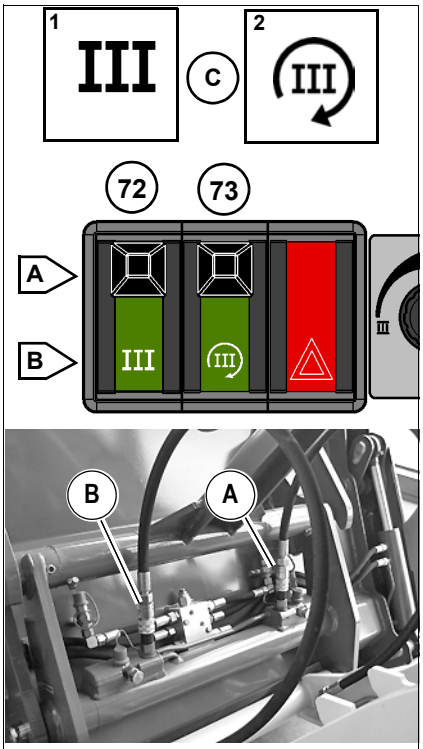


Fig. 136

Activity	Function
1. Switch off continuous operation of the 3rd control circuit. To do this, push the rocker switch **73** into position **A**.	➥ Indicator display - **C/2** in the digital display in the indicating instrument extinguishes. ➥ Indicator display - **C/1** in the digital display illuminates in the indicating instrument. ➥ The plug couplings **A + B** are not operational.
2. Disable the 3rd control circuit. To do this: slide the lock in rocker switch **72** downward and press the rocker switch to position **A**.	➥ Indicator display - **C/1** in the digital display in the indicating instrument extinguishes.

Information

For safety reasons, the machine cannot be switched on if continuous operation is on (switch lock)!

► Switch off continuous operation before putting the machine into operation.

Switching on the 3rd control circuit in continuous operation – SKID STEER attachments

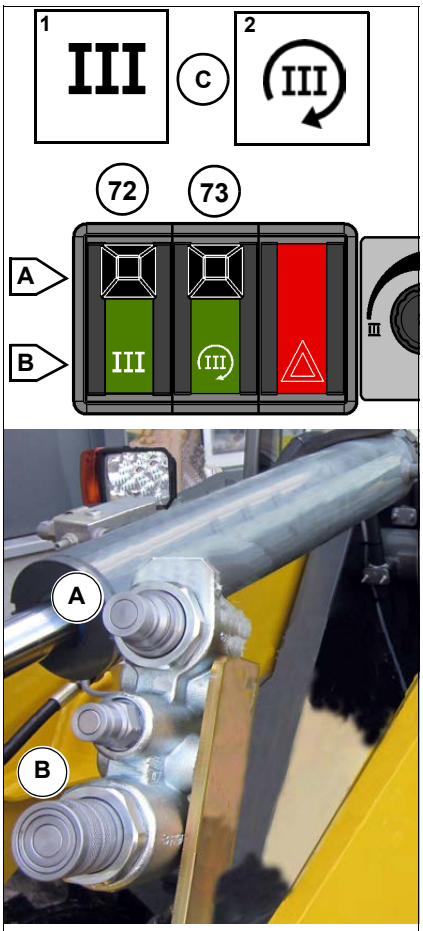


Fig. 137

Activity	Function
1. Connect the flexible lines of the attachment to plug couplings **A + B** of the distributing block. 2. Enabling the 3rd control circuit To do this: slide the lock in rocker switch **72** downward and press the rocker switch to position **B**.	➥ Indicator display - **C/1** in the digital display illuminates in the indicating instrument.
3. Switch on continuous operation of the 3rd control circuit. To do this: slide the lock in rocker switch **73** downward and press the rocker switch to position **B**.	➥ Indicator display **C/1** in the digital display in the gauge extinguishes. ➥ Indicator display - **C/2** in the digital display illuminates in the indicating instrument. ➥ Pressure is applied to coupling connection **B**. ➥ Coupling connection **A** for return.

Switching off the 3rd control circuit in continuous operation – SKID STEER attachments

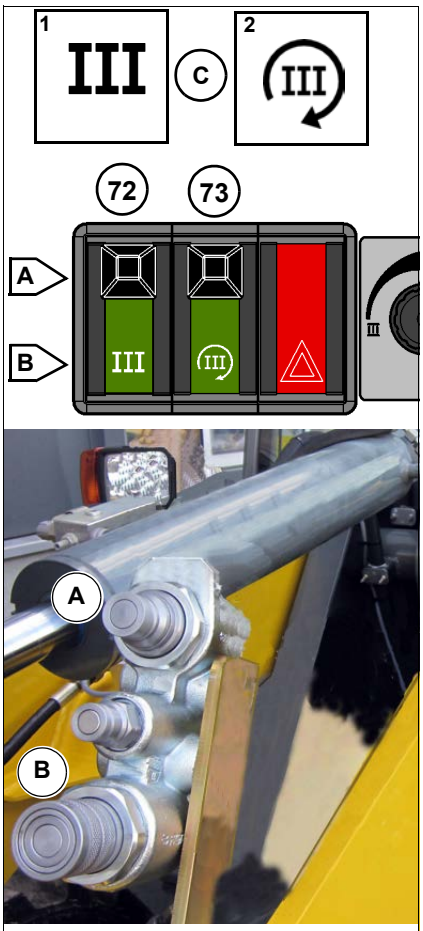


Fig. 138

Activity	Function
1. Switch off continuous operation of the 3rd control circuit. To do this, push the rocker switch **73** into position **A**.	➥ Indicator display - **C/2** in the digital display in the indicating instrument extinguishes. ➥ Indicator display - **C/1** in the digital display illuminates in the indicating instrument. ➥ The plug couplings **A + B** are not operational.
2. Disable the 3rd control circuit. To do this: slide the lock in rocker switch **72** downward and press the rocker switch to position **A**.	➥ Indicator display **C/1** in the digital display in the gauge extinguishes.

Information

For safety reasons, the machine cannot be switched on if continuous operation is on (switch lock)!

► Switch off continuous operation before putting the machine into operation.

5.10 Attachments

Only the following attachments are described in this Operator's Manual.

- Standard bucket
- Multipurpose bucket
- Pallet forks

Refer to the respective operation manuals for the function and fitting of further attachments.

Information on attachments

WARNING

Accident hazard due to incorrect attachments!

Using wrong or unauthorized attachments can cause accidents or death.

► Only use approved attachments.

WARNING

Accident hazard due to tipping over of vehicle!

The weight ratios of the machine change with a loaded attachment. There is a tipping hazard, in particular in curves. Can cause serious injury or death.

► Travel with loader unit lowered.

► Do not exceed the permissible payloads.

► Adapt the travel speed to the prevailing conditions and the material loaded.

WARNING

Accident hazard due to damaged attachments!

Damaged attachments can have negative effects on the use of the machine. Damaged attachments can cause serious injury or death.

► Do not put damaged attachments into operation.

► Before starting work, always check the attachments for damage, correct locking and firm installation.

► Uncouple attachments before working on them.

Notes on conversion

WARNING

Risk of injury to persons in the danger zone!

Persons in the danger zone are possibly not seen when reversing the machine. Can cause serious injury or death.

- ► Adjust the existing visual aids (for example the rearview mirrors) correctly.
- ► Be particularly carefully when reversing the machine.
- ► Interrupt work immediately if persons enter the danger zone.

WARNING

Risk of injury due to unintentional release of the hydraulic lock!

Incorrectly locked attachments can be unintentionally released and cause accidents. Can cause serious injury or death.

- ► Always check the attachments for correct locking.

CAUTION

Risk of injury due to pressure!

A fine jet of hydraulic oil under high pressure can penetrate through the skin.

- ► Seek medical attention immediately if hydraulic oil penetrates the skin or eyes.
- ► Only open sections of the hydraulic system after the pressure in them has been released.
- ► Wear protective clothes.

CAUTION

Risk of injury due to uncoupled attachments tipping over!

Attachments that tip over can cause injury to persons.

- ► Ensure that no one is in the danger zone.
- ► Only park the machine on firm and level ground.
- ► Only close attachments with movable parts (for example, multipurpose bucket).
- ► Ensure the safe and stable position of the attachment, if necessary use supports provided for this purpose.

Fields of application of the standard bucket

Important notice on standard bucket applications

WARNING

Danger of accident due to installing lifting gear on the attachment without proper authorization!

Can cause serious injury or death.

► The attachment is not certified for lifting gear applications.

► Hitching hooks, eyelets or other lifting gear onto the attachment is prohibited as well.

Information

The load diagram (windscreen or front trim left) is only valid for use with the approved pallet forks. The correct tire types with the correct tire pressures must be used.

The load diagram also applies to released buckets if the specified capacities and material densities are observed.

- *– see chapter 3 “Attachments for KRAMER quickhitch facility” on page 3-18*,
- *– see chapter 3 “Attachments for SKID STEER quickhitch (currently not available)” on page 3-21*,
- *– see chapter 3 “Attachments for EURO quickhitch” on page 3-23*.

Pay attention to the specific load diagrams of other attachments used *– see "Fitting attachments from other manufacturers (opt)" on page 5-95*!

Information

Refer to the following pages for information on work operation with an attachment *– see "Work operation" on page 5-67*.

Use of standard bucket

- The standard bucket is mainly used for digging earth, and for loosening, picking up, transporting and loading loose or solid materials.
- Machine travel on public roads with a full standard bucket is prohibited in Germany!
- In other countries, observe and comply with their national regulations *– see chapter 3 “Designated use” on page 3-10*.
- Also observe the applicable regulations for accident prevention of your country.

Field of application of multipurpose bucket

Important notice on multipurpose bucket applications

WARNING

Danger of accident due to installing lifting gear on the attachment without proper authorization!

Can cause serious injury or death.

► The attachment is not certified for lifting gear applications.

► Hitching hooks, eyelets or other lifting gear onto the attachment is prohibited as well.

Information

The load diagram (windscreen or front trim left) is only valid for use with the approved pallet forks. The correct tire types with the correct tire pressures must be used.

The load diagram also applies to released buckets if the specified capacities and material densities are observed:

- *– see chapter 3 “Attachments for KRAMER quickhitch facility” on page 3-18*,
- *– see chapter 3 “Attachments for SKID STEER quickhitch (currently not available)” on page 3-21*,
- *– see chapter 3 “Attachments for EURO quickhitch” on page 3-23*.

Pay attention to the specific load diagrams of other attachments used *– see "Fitting attachments from other manufacturers (opt)" on page 5-95*!

Information

Refer to the following pages for information on work operation with an attachment *– see "Work operation" on page 5-67*.

Use of multipurpose bucket

- The multipurpose bucket is mainly used for digging earth, and for loosening, picking up, transporting and loading loose or solid materials.
- Machine travel on public roads with a full standard bucket is prohibited in Germany!
- In other countries, observe and comply with their national regulations *– see chapter 3 “Designated use” on page 3-10*.
- Also observe the applicable regulations for accident prevention of your country.

Fields of application of pallet forks

Important notice on pallet fork applications

WARNING

Danger of accident due to installing lifting gear on the attachment without proper authorization!

Can cause serious injury or death.

- ► The attachment is not certified for lifting gear applications.
- ► Hitching hooks, eyelets or other lifting gear onto the attachment is prohibited as well.

Information

The load diagram (windscreen or front trim left) is only valid for use with the approved pallet forks. The correct tire types with the correct tire pressures must be used:

- *– see chapter 3 “Attachments for KRAMER quickhitch facility” on page 3-18*,
- *– see chapter 3 “Attachments for SKID STEER quickhitch (currently not available)” on page 3-21*,
- *– see chapter 3 “Attachments for EURO quickhitch” on page 3-23*.

Pay attention to the specific load diagrams of other attachments used *– see "Fitting attachments from other manufacturers (opt)" on page 5-95*!

Information

Refer to the following pages for information on work operation with an attachment *– see "Work operation" on page 5-67*.

Use of pallet forks

- The pallet forks are mainly used for picking up, transporting and loading palletized material, pallets and other stacked material.
- Pallet forks with fixed fork arms are not certified for travel on public roads in Germany.
- Pallet forks with foldable fork arms are authorized for transport on public roads in Germany! The fork arms must be raised and safely locked.
- In other countries, observe and comply with their national regulations *– see chapter 3 “Designated use” on page 3-10*.
- Also observe the applicable regulations for accident prevention of your country.

Attachment on KRAMER quickhitch

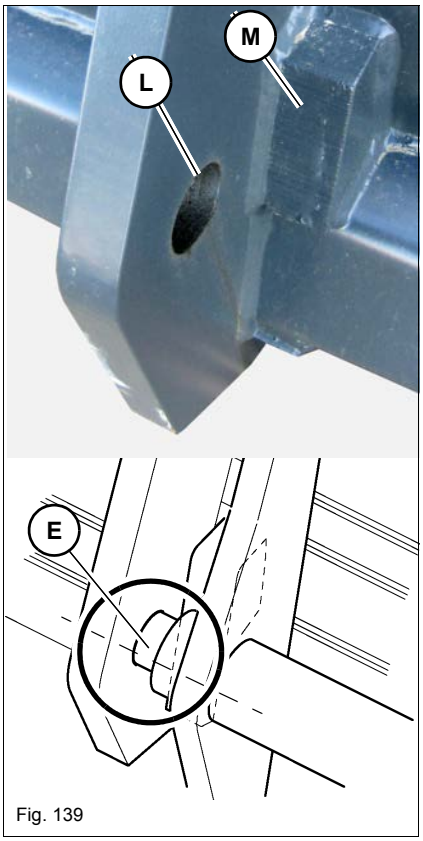


Fig. 139

Important information on locking the attachment

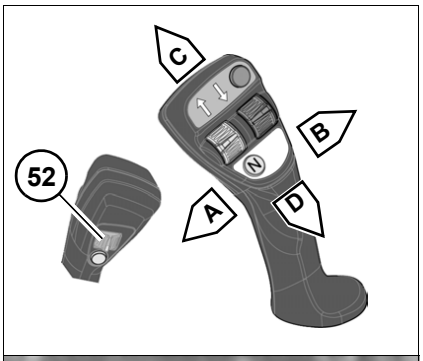
The attachment locked onto the quickhitch is secured against unintentional operation of switch on the joystick. The attachment can only be unlocked from the quickhitch by means of the two-hand controls *– see "Removing an attachment from a SKID STEER quickhitch" on page 5-64*.

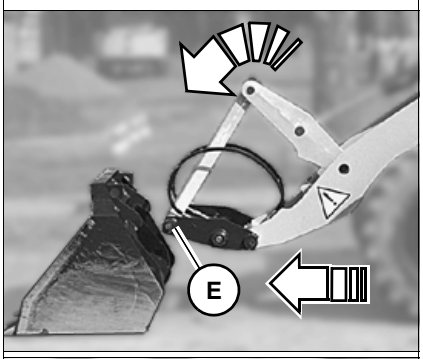
WARNING

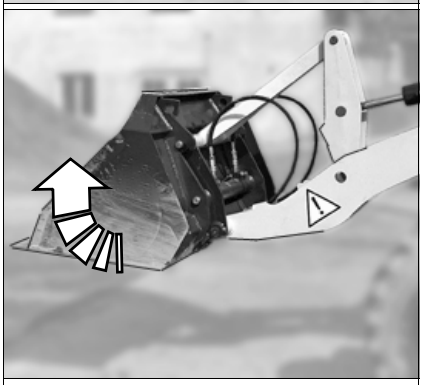
Accident hazard due to attachments incorrectly locked in the quickhitch!

Can cause serious injury or death.

- ► Regularly check lock pin **G,** mounting bore **L** and limit **M** of the attachment for damage.
- ► Have damaged parts immediately replaced by an authorized service center.
- ► Only lock and unlock empty attachments without any load.
- ► Ensure that the attachment is visibly locked on either side with lock pins **E**.







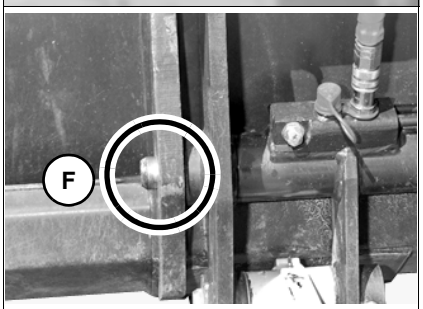


Fig. 140

Fit and lock attachments without any hydraulic function to KRAMER quickhitch

1. Approach the machine to the attachment.
2. Lower the loader unit. To do this: push the joystick forward **C**.
3. Tilt the quickhitch forward. To do this, press the joystick to the right **B.**
4. Drive the machine forward until mounts **E** of the quickhitch are directly beneath the catch hooks of the attachment.
5. Raise the loader unit until the quickhitch facility engages in the lifting points of the attachment. To do this, pull the joystick to the rear **D**.
6. Tilt in the quickhitch completely. To do this, press the joystick to the left **A.**
7. Lock the attachment. To do this, press switch **52** in the joystick to the left in travel direction.
8. Ensure that the attachment is visibly locked on either side with lock pins **F**.

Information

Once it is locked, the attachment is secured against unintentional unlocking. It can only be unlocked from the quickhitch by means of the two-hand controls– *see "Removing an attachment from a SKID STEER quickhitch" on page 5-64*.

Remove the attachment without any hydraulic function from the KRAMER quickhitch

WARNING

The attachment can tip over after lowering it to the ground!

Can cause serious injury or death.

► Lower the attachment to the ground and ensure it cannot tip over.

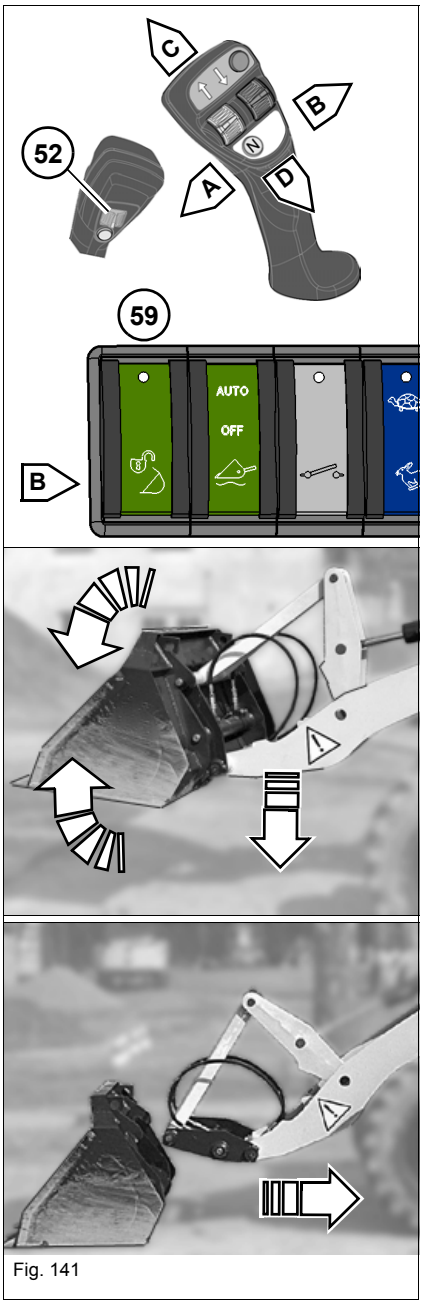


Fig. 141

1. Empty the attachment and drive it to the drop-off position.
2. Align the attachment parallel with the ground. To do this: push the joystick to the left **A.**
3. Lower the loader unit until attachment is approx. 5 – 10 cm (2 – 3.9 in) above the ground. To do this, push the joystick forward **C.**

Information

Once it is locked, the attachment is secured against unintentional unlocking. It can only be unlocked from the quickhitch by means of the two-hand controls.

Information

In order to avoid damage to the attachment lock, follow the order of unlocking.

4. Unlock the attachment. To do this, press and hold the touch button **59** in the position **B**.
5. Press the rocker switch **52** on the joystick to the right at the same time until the lock pins fully come out of the center bores of the attachment.
6. Release switch **52** on the joystick.
7. Release button **59**.
8. Slightly tilt the attachment forward.
   To do this, press the joystick to the right **B.**
9. Lower the loader unit. To do this: push the joystick forward **C** until the attachment is on the ground without risk of falling over.
10. Reverse the machine away from the attachment.

Fitting attachments with hydraulic function to KRAMER quickhitch

A hydraulic attachment (for example a multipurpose bucket) can be operated with the 3rd control circuit.

To do this, connect the flexible lines.

NOTICE

In order to avoid damage, do not connect the hydraulic lines crosswise, otherwise the attachment functions are inverted and the hydraulic lines are squeezed by tilting the attachment in and out.

► Check the attachment for correct function after connecting.

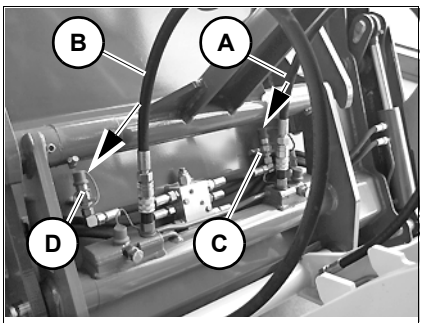


Fig. 142

1. Fitting attachments similar to those without hydraulic function
   – see "Fit and lock attachments without any hydraulic function to KRAMER quickhitch" on page 5-57.
2. Connecting hydraulic lines to the machine
   – see "Connecting hydraulic lines between machine and attachment" on page 5-40.

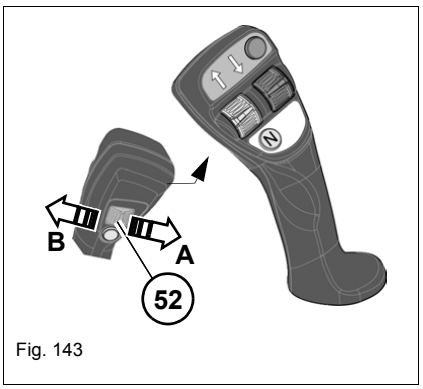


Fig. 143

Check the functioning of the attachment

The function of switch **52** on the joystick is described as seen in travel direction!

Operation via 3rd control circuit	Result
Press switch **52** on the joystick to the right **B.**	This applies pressure to the hydraulic line (blue) on the right and **opens** the multipurpose bucket, for example.
Press switch **52** on the joystick to the left **A.**	This applies pressure to the hydraulic line (red) on the left and **closes** the multipurpose bucket.

Remove the attachment with hydraulic function from the KRAMER quickhitch

NOTICE

Damage hazard to the machine and/or the attachment!

► When removing the attachment, always ensure that all hydraulic lines are disconnected.

Information

If the attachment is placed in direct sunlight after having been taken off, the oil in the hydraulic cylinders will warm up. This leads to a pressure increase in the hydraulic cylinders that will make it difficult to attach the hydraulic lines to the hydraulic connections.

► Set down the attachment out of the sun.

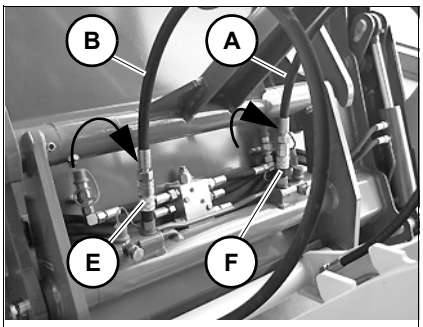


Fig. 144

1. Empty the attachment and, if need be, close the multi-purpose bucket, having released the pressure.
2. Apply the parking brake.
3. Release the pressure in the hydraulic lines of the 3rd control circuit *– see "Pressure relief – plug couplings" on page 5-33*.
4. Remove the protective caps from the connections on the quickhitch.
5. Remove the flexible lines **A** and **B** from the plug couplings **E** and **F** of the attachment and insert them into the plug couplings of the quickhitch.
6. Close the plug couplings on the attachment with protective caps.
7. Lower attachments analogously to those without hydraulic function *– see "Remove the attachment without any hydraulic function from the KRAMER quickhitch" on page 5-58*

NOTICE

In order to avoid damage if the attachment tips over, place it on the ground ensuring stability!

Attachment on SKID STEER quickhitch (opt)

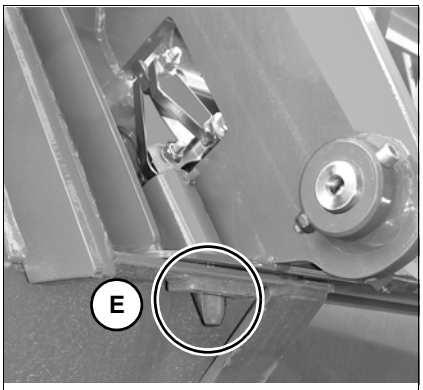


Fig. 145

Important information on locking the attachment

The attachment locked onto the quickhitch is secured against unintentional operation of switch on the joystick. The attachment can only be unlocked from the quickhitch by means of the two-hand controls
– see "Unlocking the attachment" on page 5-43.

WARNING

Accident hazard due to incorrect locking of attachment!

Can cause serious injury or death.

- ► Check the lock pins **E** and center bores of the attachment regularly for damage.
- ► Have damaged parts immediately replaced by an authorized service center.
- ► Only lock and unlock empty attachments without any load.
- ► Ensure that the attachment is visibly locked on either side with lock pins **E**.

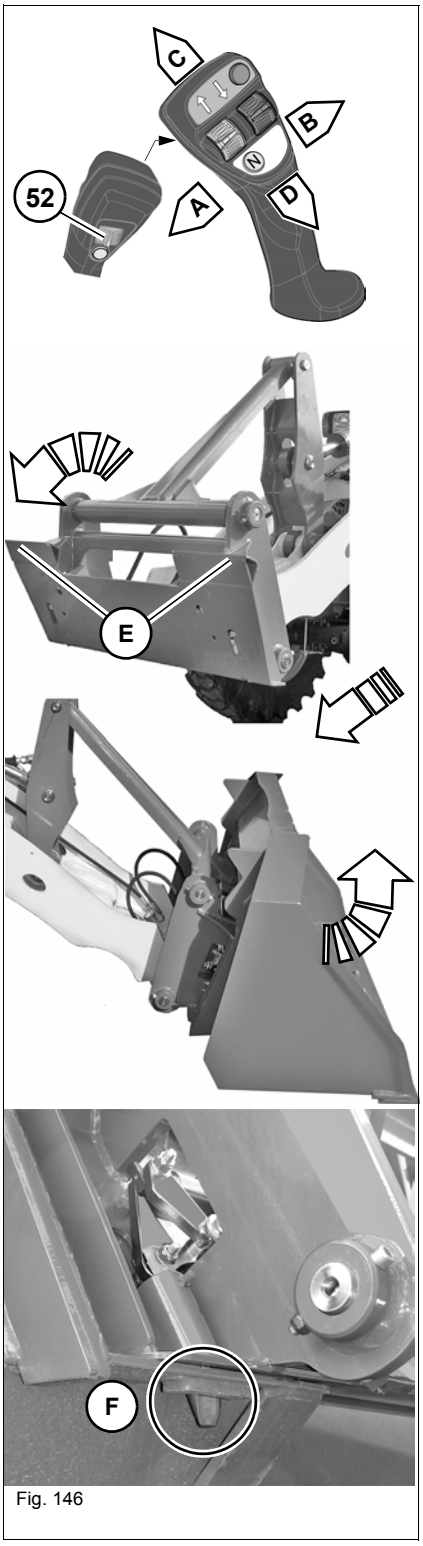


Fig. 146

Pick up and lock the attachment to the SKID STEER quickhitch

1. Approach the machine to the attachment.
2. Lower the loader unit. To do this, push the joystick forward **C.**
3. Tilt the quickhitch facility forward. To do this, press the joystick to the right **B.**
4. Drive the machine forward until the supports **E** of the quickhitch are directly beneath the catch hooks of the attachment.
5. Raise the loader unit until the quickhitch facility engages in the lifting points of the attachment. To do this, pull the joystick downward **D.**
6. Tilt in the quickhitch completely.
   To do this, press the joystick to the left **A.**
7. Lock the attachment. To do this, press the rocker switch **52** in the joystick to the left in the travel direction
   – see "Locking the attachment" on page 5-42.
8. Ensure that the attachment is visibly locked on either side with lock pins **F**.

Information

Once it is locked, the attachment is secured against unintentional unlocking. It can only be unlocked from the quickhitch by means of the two-hand controls *– see "Removing an attachment from a SKID STEER quickhitch" on page 5-64*.

Important information on removing attachments

WARNING

The attachment can tip over after lowering it to the ground!

Can cause serious injury or death.

► Uncouple all flexible lines from the attachment.

► Lower the attachment to the ground and ensure it cannot tip over.

Information

If the attachment is placed in direct sunlight after having been taken off, the oil in the hydraulic cylinders will warm up. This leads to a pressure increase in the hydraulic cylinders that will make it difficult to attach the hydraulic lines to the hydraulic connections.

► Set down the attachment out of the sun.

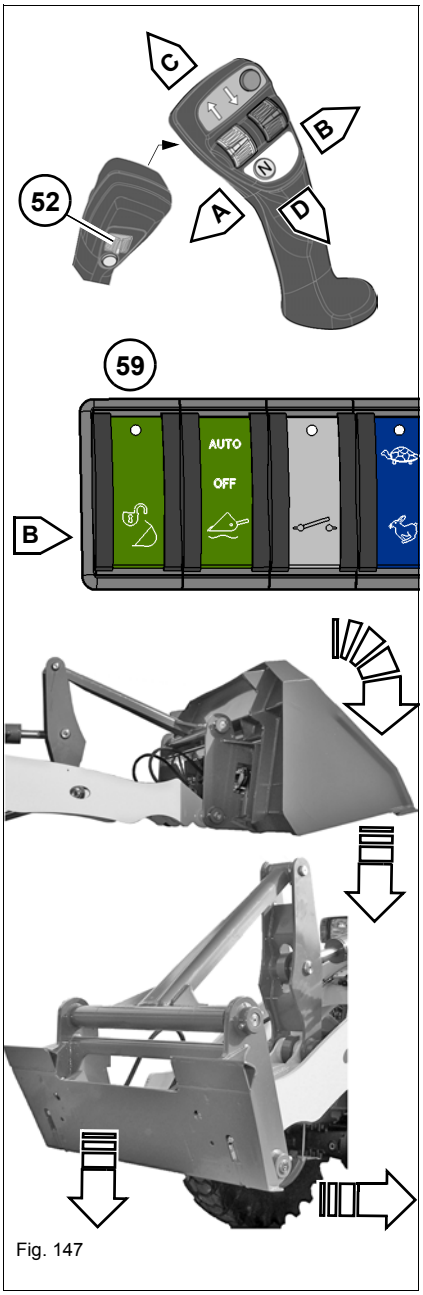


Fig. 147

Removing an attachment from a SKID STEER quickhitch

1. Empty the attachment and drive it to the drop-off position.
2. Set the attachment parallel to the ground. To do this, press the joystick to the left **A.**
3. Lower the loader unit until attachment is approx. 5 – 10 cm (2 – 3.9 in) above the ground. To do this, push the joystick forward **C.**
4. Release the pressure in the hydraulic lines of the 3rd control circuit *– see "Pressure relief – plug couplings" on page 5-33*.
5. Take the protective caps off the connections on the attachments.
6. Remove the flexible lines from the plug couplings of the quickhitch and insert them into the plug couplings of the attachment.
7. Close the plug couplings on the quickhitch with protective caps.

Information

Once it is locked, the attachment is secured against unintentional unlocking. It can only be unlocked from the quickhitch by means of the two-hand controls.

Information

In order to avoid damage to the attachment lock, follow the order of unlocking.

8. Unlock the attachment. To do this, press and hold the touch button **59** in the position **B**.
9. Press the rocker switch **52** on the joystick to the right at the same time until the lock pins fully come out of the center bores of the attachment.
10. Release switch **52** on the joystick.
11. Release button **59**.
12. Slightly tilt the attachment forward.
    To do this, press the joystick to the right **B.**
13. Lower the loader unit. To do this: push the joystick forward **C** until the attachment is on the ground without risk of falling over.
14. Reverse the machine away from the attachment.

Attachments for EURO quickhitch (optional)

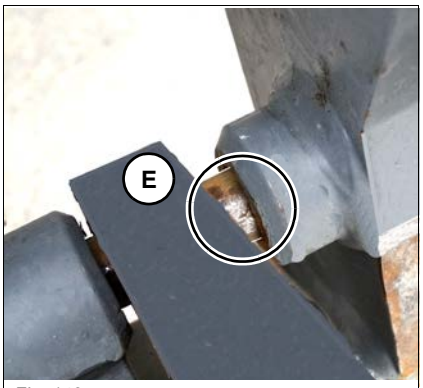


Fig. 148

Important information on locking the attachment

The attachment locked onto the quickhitch is secured against unintentional operation of switch on the joystick. The attachment can only be unlocked from the quickhitch by means of the two-hand controls *– see "Unlocking the attachment" on page 5-43*.

WARNING

Accident hazard due to incorrect locking of attachment!

Can cause serious injury or death.

- ► Check the lock pins **E** and center bores of the attachment regularly for damage.
- ► Have damaged parts immediately replaced by an authorized service center.
- ► Only lock and unlock empty attachments without any load.
- ► Ensure that the attachment is visibly locked on either side with lock pins **E**.

Fitting an attachment onto a EURO quickhitch facility

Information

The attachment is done in the same way as with the KRAMER quickhitch *– see "Attachment on KRAMER quickhitch" on page 5-56*.

Information

Once it is locked, the attachment is secured against unintentional unlocking. It can only be unlocked from the quickhitch by means of the two-hand controls *– see "Removing an attachment from a EURO quickhitch facility" on page 5-66*.

Removing an attachment from a EURO quickhitch facility

WARNING

The attachment can tip over after lowering it to the ground!

Can cause serious injury or death.

► Uncouple all flexible lines from the attachment.

► Lower the attachment on level ground and ensure it cannot tip over.

Information

It is removed in the same way as with the KRAMER quickhitch
– see "Attachment on KRAMER quickhitch" on page 5-56.

Information

If the attachment is placed in direct sunlight after having been taken off, the oil in the hydraulic cylinders will warm up. This leads to a pressure increase in the hydraulic cylinders that will make it difficult to attach the hydraulic lines to the hydraulic connections.

► Set down the attachment out of the sun.

5.11 Work operation

Important safety instructions for work operations

WARNING

The machine risks tipping over if sinks or falls into a pit!

Can cause serious injury or death.

- ► Never drive up to the edge of a pit from outside.
- ► Never undermine the foundations of walls.

WARNING

Risk of death due to electric high-voltage cables, underground cables, gas and water pipes!

Can cause serious injury or death.

- ► Keep a safe distance from supply lines.
- ► Contact the energy supplier before starting work and clarify details.

WARNING

Crushing hazard due to tipping over of vehicle!

A tipping vehicle can cause serious injury or death. There is a tipping hazard, in particular in curves.

- ► Lower the loader unit to transport position before starting machine travel.
- ► Adapt the travel speed to the prevailing conditions.
- ► Adapt the driving speed to the material loaded.
- ► Pay attention to persons and obstacles.
- ► Reduce speed before downhill travel.
- ► Ensure good visibility of the material you want to pick up and of the work and travel range.
- ► Do not perform any U-turns on steep slopes.
- ► Whenever possible, perform machine travel in reverse when transporting material on a steep slope.
- ► Always fasten your seat belt.
- ► Do not hold body parts outside of the machine.
- ► Carefully steer the machine if the loader unit is raised.
- ► Do not exceed the permissible payloads -- see load diagram.

WARNING

Accident hazard if machine is not parked safely!

Can cause serious injury or death.

► Before leaving the machine, lower the attachment to the ground, turn off the machine and remove the ignition key.

WARNING

Accident hazard due to unlocked attachment!

The attachment can come off unexpectedly and cause serious injury or death.

► Before starting work, check that the attachment is safely locked onto the quickhitch by means of the lock ram!

CAUTION

Accident hazard due to overload and sudden movements!

Overload and sudden movements can cause accidents and injury.

► Take into account the machine's payloads.

► Actuate the joystick carefully.

Information

When driving into the material to be loaded, adapt the travel speed to the nature of the material and the given conditions.
Avoid too much wheel spin. Tire wear is unnecessarily increased, and machine output cannot be fully used.

Hose burst valve (partly opt)

The hose burst valve prevents the loader unit from being lowered or tilted out without being braked, in the event of a bursting hose or pipe!

The lift or tilt cylinders are locked and can no longer be operated.
– *see "Hose burst valve (partly opt)" on page 5-102*

Operating time of battery

NOTICE

The battery can be damaged both by charging it too frequently as well as by charging new batteries it too late (deep discharge)!

- ► Observe the notes on charging batteries on page *4-46*.
- ► Recharge the battery in timely fashion. Pay attention to the “Battery charge condition” indication.

Operating conditions	Battery 416 Ah (AGM)
Heavy jobs	min. 3 h
Light jobs	min. 5 h

Information

The operating time of the battery depends on the operating conditions, the application and on how machine travel is performed.

Machine travel on public roads

Instructions for machine travel on public roads

Information

When driving on public roads in Germany, equip the machine only with attachments that are certified for this machine!

Attachments that are not certified for machine travel on public roads must be removed and transported with a suitable means of transportation
– *see chapter 3 “Attachments for KRAMER quickhitch facility” on page 3-18*,
Attachments for SKID STEER quickhitch (currently not available) on page 3-21 or *Attachments for EURO quickhitch on page 3-23*.

Information

In Germany, transporting material on public roads with a loaded attachment is prohibited!

Information

Observe the legal regulations of your country.

1. Prepare the machine for travel on public roads
– *see chapter 4 “Preparations for driving on public roads” on page 4-49*.

Example: travel with certified bucket:

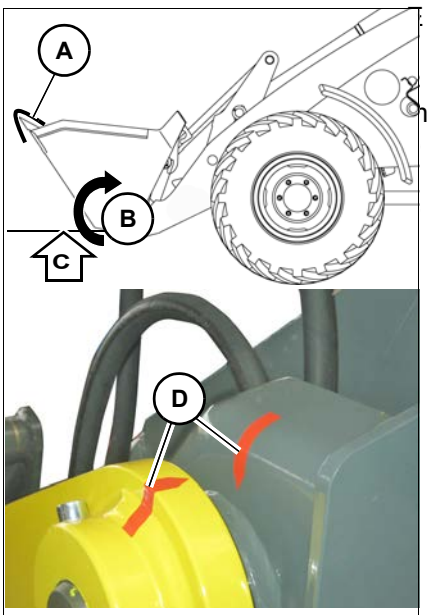


Fig. 149

2. Empty and tilt back the bucket **B**.
3. Raise the loader unit until both red marks **D** on the lift frame and the bulkhead are aligned.
   ➥ Ground clearance **C** about 250 mm (9.84 in).
4. Cover the blade or teeth of the bucket across their entire width with the tooth guard **A** provided.

Information

Loader unit operation
– *see chapter 5 “Operating hydraulics” on page 5-30*.

Working with the bucket

Safety instructions regarding work with a bucket

WARNING

Crushing hazard due to tipping over of machine!

Can cause serious injury or death.

- ► If the bucket is full, lower the loader unit to transport position and fully tilt before starting machine travel.
- ► Do not exceed the permissible payloads. – pay attention to the load diagram and act accordingly.

CAUTION

Danger of falling material when transporting loads with a raised loader unit!

Can cause injury.

- ► Always tilt in the attachment slightly towards the machine and carry it as close as possible to the ground; bear in mind the required ground clearance!
- ► Raise a full bucket only at the tilt-out position, and only when the machine is at a standstill.
- ► In case of bulky loads:

Safety instructions regarding work with a bucket

Information

Use only the released buckets with the certified material densities
– *see chapter 3 “Use of attachments” on page 3-16*.

Information

If the material is supposed to be picked up, turn off the load stabilizer, since the loader unit otherwise yields very easily, making it difficult to perform any precise lifting movement.
– *see "Load stabilizer for loader unit (opt)" on page 5-108*.

Information

Machine travel on public roads with a full bucket is prohibited in Germany!

Observe the legal regulations of your country.

Information

Observe the following chronological order for emptying the bucket:

1. Raise the loader unit.
2. Tilt out the bucket.

Information

Observe the following chronological order after emptying the bucket:

1. Tilt in the bucket.
2. Lower the loader unit.

Information

When picking up and loading, two work movements can be executed simultaneously if necessary, e.g. "Raise" and "Tilt" or "Lower" and "Empty". To do this, the movements must be "blended" the on joystick.

Failure to observe the instructions specified above can cause serious damage to the machine. The manufacturer does not give any warranty for any such damage.

Check before starting work

Fig. 150

WARNING

Accident hazard due to unlocked attachment

The attachment can come off unexpectedly and cause serious injury or death.

► Ensure that the attachment is visibly locked on either side with lock pins **E**.

Information

Observe the safety instructions before loading operations and act accordingly!

► – *see "Use of attachments" on page 3-16*.
► – *see "Attachment operation" on page 2-12*.

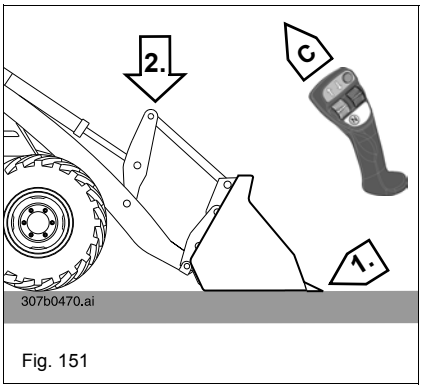


Fig. 151

Loading loose material

1. Align the blade parallel with the ground.
2. Lower the loader unit to the ground. To do this, push the joystick forward **C**.

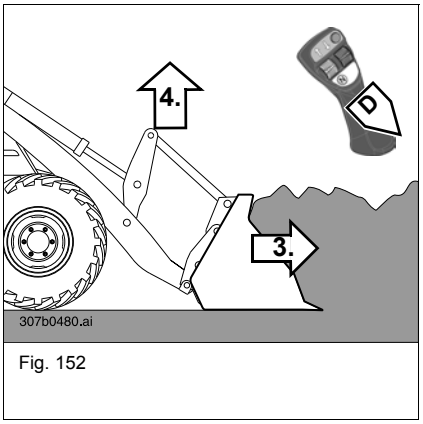


Fig. 152

3. Drive forward into the material.

When machine output is reduced due to too much material:

4. Raise the loader unit a little. To do this, pull the joystick backward **D**.

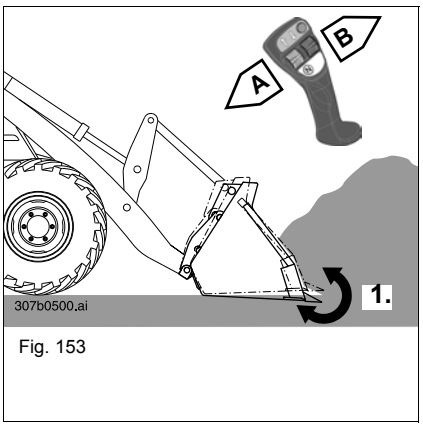


Fig. 153

Loading if the material is hard to penetrate

Load as for loading loose material, but in addition:

1. Slightly tilt the bucket in and out. To do this, move the joystick to the left **A** and right **B**.

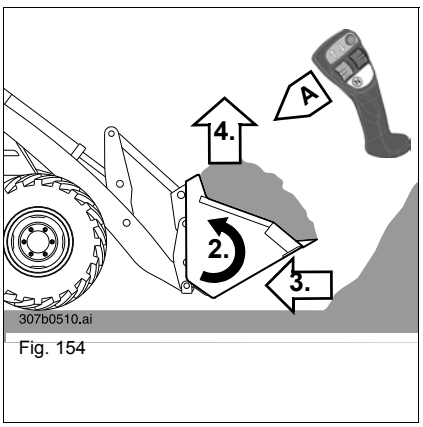


Fig. 154

When the bucket is full:

2. Tilt in the bucket. To do this, press the joystick to the left **A**.
3. Reverse out of the material.
4. Raise the bucket to transport position.

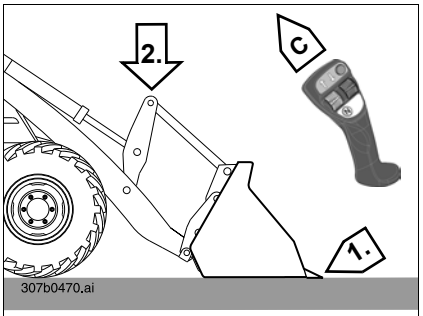


Fig. 155

Removing material/digging in soft soil

1. Align the blade parallel with the ground.
2. Lower the loader unit to the ground. To do this, push the joystick forward **C**.

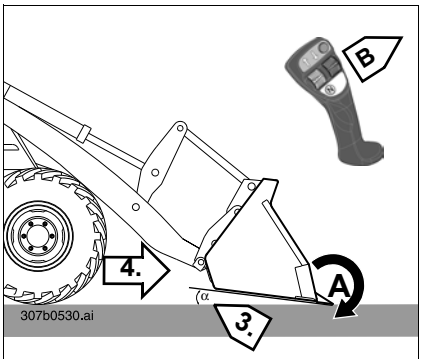


Fig. 156

3. Setting the digging angle. To do this, press the joystick to the right **B**.
4. Travel forward.

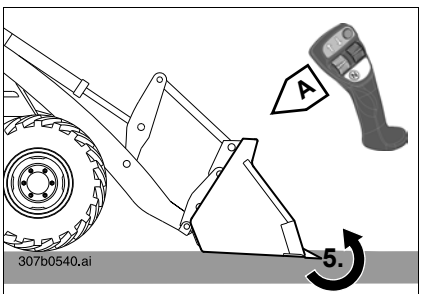


Fig. 157

Once the bucket has penetrated the soil:

5. Set the digging angle slightly flatter. To do this, push the joystick to the left **A** so that the layer being removed is as even as possible and so that the wheel spin is reduced.
6. Proceed as for loading loose material.

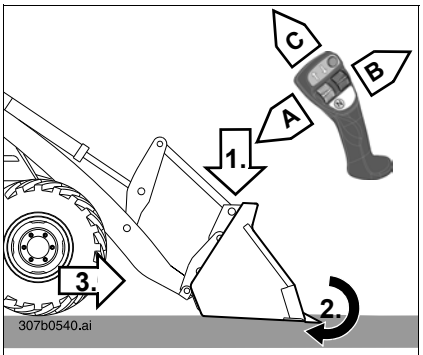


Fig. 158

Removing material/digging in hard soil

1. Place the bucket horizontally on the ground. To do this, push the joystick forward **C**.
2. Set a slightly flatter digging angle than for digging in soft soil. To do this, press the joystick to the left **A**.
3. Drive forward and push the bucket down slightly. To do this, push the joystick forward slightly **C**.

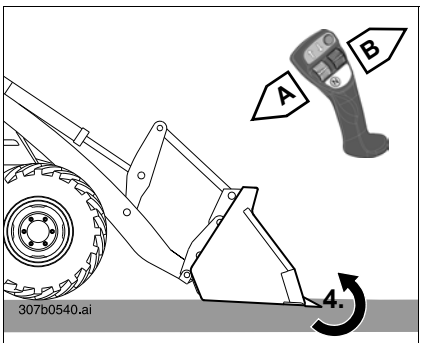


Fig. 159

Once the bucket has penetrated the soil:

4. Set the digging angle slightly flatter. To do this, push the joystick to the left **A** so that the layer being removed is as even as possible and so that the wheel spin is reduced.
5. Move the joystick to the left **A** and right **B** to loosen the material.
6. Proceed as for loading material hard to penetrate.

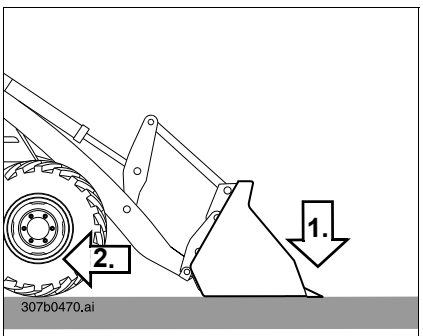


Fig. 160

Grading

1. Lower the loader unit horizontally to the ground.
2. Reverse across the surface to be graded.

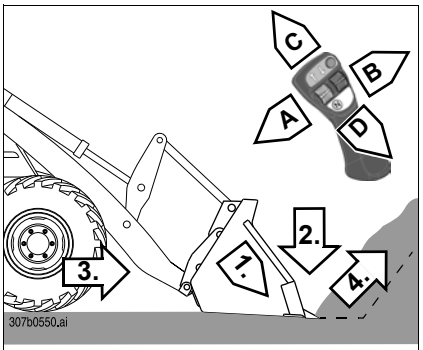


Fig. 161

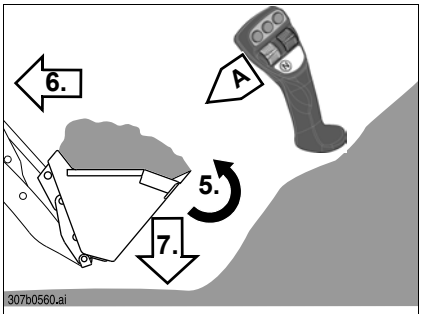


Fig. 162

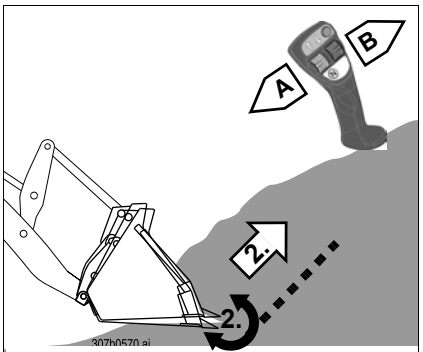


Fig. 163

Loading heaped material (non-compacted material)

1. Align the blade parallel with the ground. To do this, move the joystick to the left **A** or right **B**.
2. Place the bucket horizontally on the ground. To do this, push the joystick forward **C**.
3. Travel forward.

After penetrating the heaped material:

4. Raise the loader unit evenly. To do this, pull the joystick backward **D**.
5. Tilt in the bucket. To do this, press the joystick to the left **A**.
6. Reverse out of the material.
7. Lower the loader unit to the transport position.

Loading heaped material (compacted material)

1. Proceed as for non-compacted material
2. Slightly tilt the bucket in and out when raising the loader unit in the excavated material. To do this, move the joystick alternately to the left **A** and right **B**
   ➥ The material is loosened

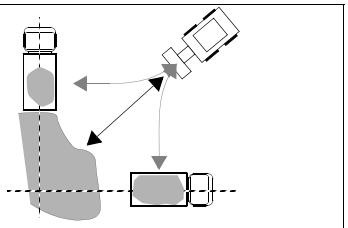


Fig. 164

Loading vehicles

1. If possible, the truck and the working direction of the machine should form an angle of 45°.
2. Only raise the full bucket to the tilt-out height when the vehicle travels in a straight line toward the truck.

Information

If possible load material with the wind behind you to keep the dust away from your eyes, air filters and fans.

Freeing the machine

Proceed as follows if the machine should get stuck when picking up material:

1. Tilt out the bucket until the blade is vertical above the ground.
2. Lower the loader unit all the way.
3. Gradually tilt in the bucket.
   ➥ The vehicle is pushed backward.
4. Reverse slowly.
5. Repeat this procedure until the wheels reach firm ground.
6. Reverse the vehicle away.

Working with the multipurpose bucket

Safety instructions for working with the multipurpose bucket

WARNING

Crushing hazard due to tipping over of machine!

Can cause serious injury or death.

- ► If the bucket is full, lower the loader unit to transport position and fully tilt before starting machine travel.
- ► Do not exceed the permissible payloads. – pay attention to the load diagram and act accordingly.

CAUTION

Danger of falling material when transporting loads with a raised loader unit!

Can cause injury.

- ► Always tilt in the attachment slightly towards the machine and carry it as close as possible to the ground; bear in mind the required ground clearance!
- ► Raise a full bucket only at the tilt-out position, and only when the machine is at a standstill.
- ► In case of bulky loads:

Safety instructions for working with the multipurpose bucket

Information

Use only the released buckets with the certified material densities
– *see chapter 3 “Use of attachments” on page 3-16*.

Information

If the material is supposed to be picked up, turn off the load stabilizer, since the loader unit otherwise yields very easily, making it difficult to perform any precise lifting movement.
– *see "Load stabilizer for loader unit (opt)" on page 5-108*.

Information

Machine travel on public roads with a full bucket is prohibited in Germany!

Observe the legal regulations of your country.

Information

Observe the following chronological order for emptying the bucket:

1. Raise the loader unit.
2. Tilt out the bucket.

Information

Observe the following chronological order after emptying the bucket:

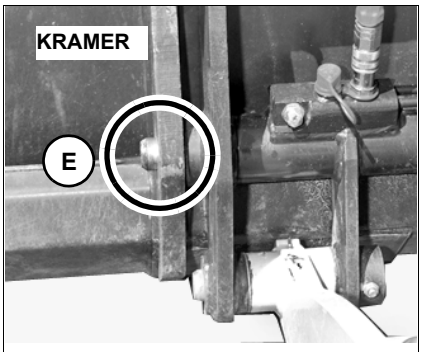
1. Tilt in the bucket.
2. Lower the loader unit.

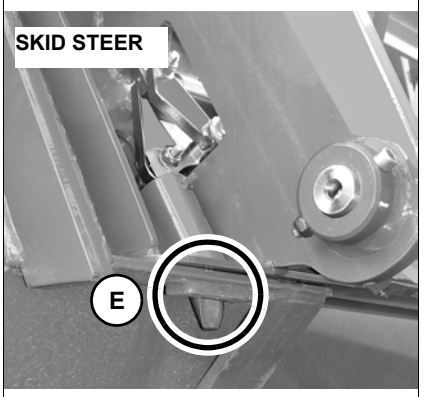
Information

When picking up and loading, two work movements can be executed simultaneously if necessary, e.g. "Raise" and "Tilt" or "Lower" and "Empty". To do this, the movements must be "blended" the on joystick.

Failure to observe the instructions specified above can cause serious damage to the machine. The manufacturer does not give any warranty for any such damage.

Check before starting work





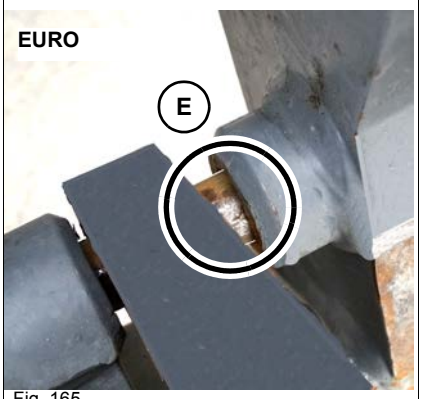


Fig. 165

WARNING

Accident hazard due to unlocked attachment

The attachment can come off unexpectedly and cause serious injury or death.

► Ensure that the attachment is visibly locked on either side with lock pins **E**.

Information

Observe the safety instructions before loading operations and act accordingly!

► *– see "Use of attachments" on page 3-16*.

► *– see "Attachment operation" on page 2-12*.

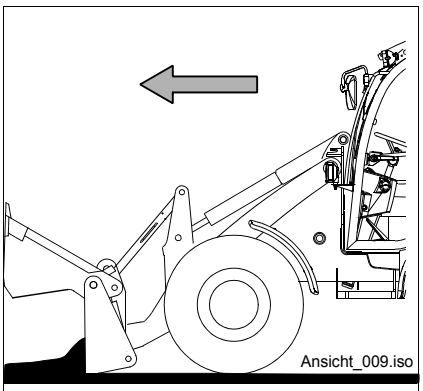


Fig. 166

Grading

1. Fold up the front half of the bucket.
2. Set the depth of the layer you want to remove with the lift hydraulics.
3. Set the angle of the rear cutting edge.
4. Grade the surface performing forward machine travel.

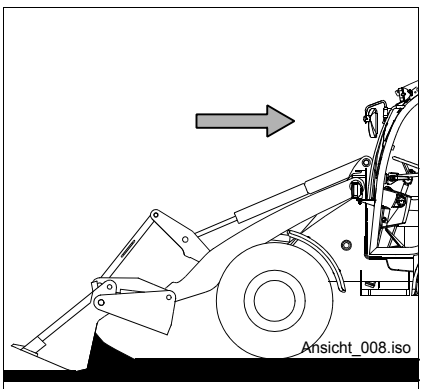


Fig. 167

Drawing material backward

1. Tilt out the multipurpose bucket.
2. Raise the bucket with the lift hydraulics.
3. Fold up the front half of the bucket.
4. Lower the multipurpose bucket to the ground.
5. Set the angle of the bucket.
6. Draw the material driving backward on the surface.

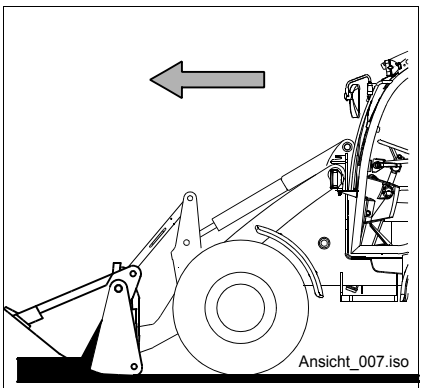


Fig. 168

Scraping material

1. Set a flat digging angle.
2. Fold up the front half of the bucket by about 10 to 15 cm (3.9 to 5.9 in).
3. Move off the machine.
   ➥ The material rolls into the bucket and is picked up at the same time.

Information

This position allows to strip grass turf, for example, down to a thickness of about 8 cm (3.1 in).

Spreading material

1. Set the rear cutting edge parallel to the ground.
2. Fold up the front half of the bucket until the required quantity of material is emptied onto the ground.
3. Move off the machine.
4. Lower the multipurpose bucket to the ground.
   ➥ The rear cutting edge grades the material as it is emptied by opening the front half of the bucket.

Information

This position allows to spread material without performing machine travel on the lower layer.

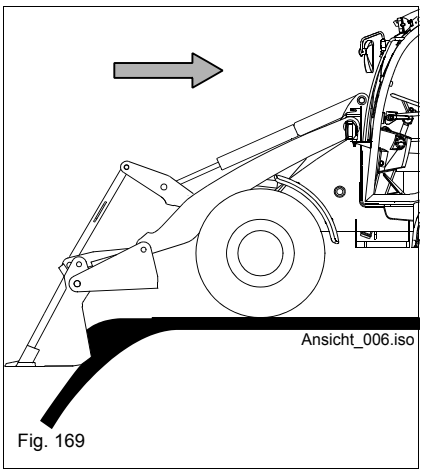


Fig. 169

Pulling out material from slopes

Information
This position allows to pull material out of slopes or roadside ditches with maximum safety and to spread it as required.

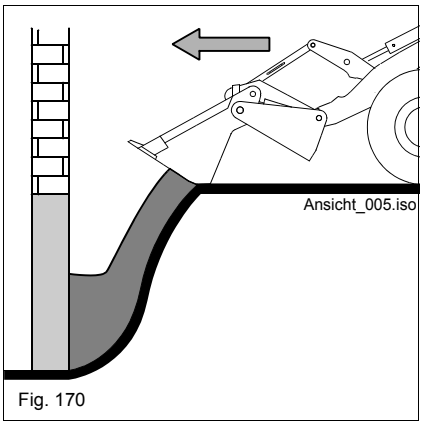


Fig. 170

Moving material with longer reach

Information
This position allows to move material without damaging slopes or structures.

➥ Backfilling with maximum safety and without damaging slopes.

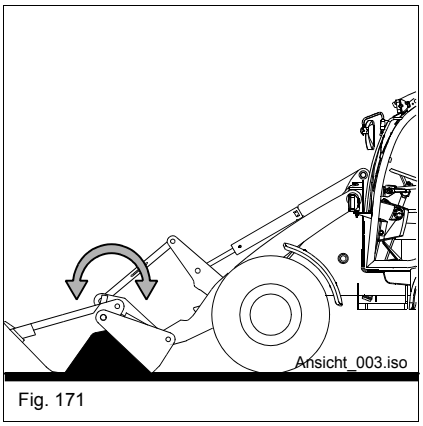


Fig. 171

Picking up remaining material

1. Fold up the front half of the bucket (multipurpose bucket).
2. Tilt out the bucket.
3. Lower the bucket to the ground. Ensure that both bucket halves touch the ground.
4. Close and tilt in the multipurpose bucket at the same time.
5. Raise the bucket with the lift hydraulics.

Information
Both bucket halves must touch the ground so that all the material is picked up.

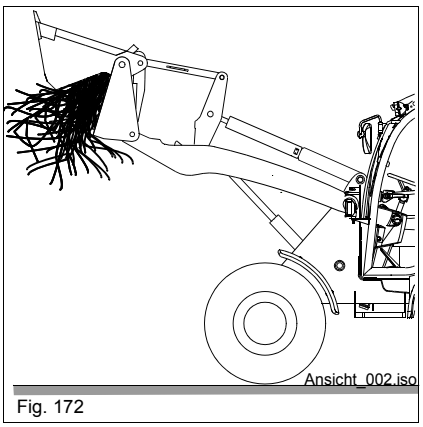


Fig. 172

Grabbing bulky material

- The multipurpose bucket can be used to grab building timber, reinforcement bars, packaging bands, wire, etc. This ensures safe loading and transport.

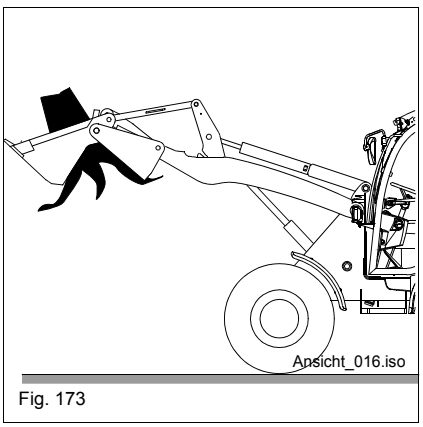


Fig. 173

- The multipurpose bucket allows to grab large objects. This ensures safe loading and transport.

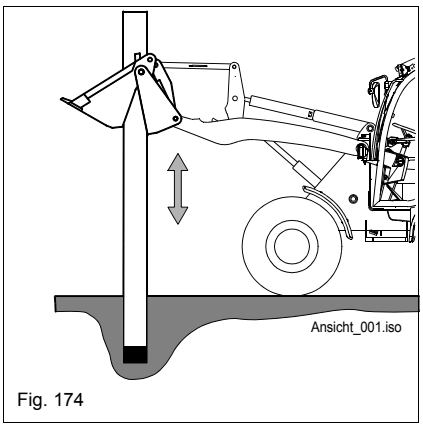


Fig. 174

Pulling out and setting posts

1. Open the multipurpose bucket from above and lower it over the post; close the bucket to grip the post firmly.
2. Loosen the post with careful up-and-down movements.

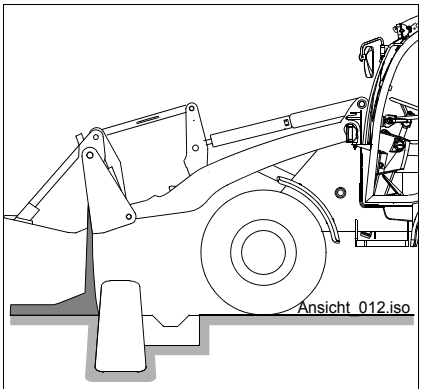


Fig. 175

Backfilling round gravel and precise unloading

- Precise dosing and placement of pourable material.

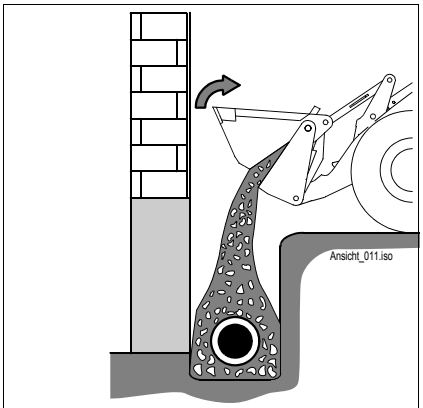


Fig. 176

Advantage of working method:

- Teeth move back from the wall as the bucket opens.

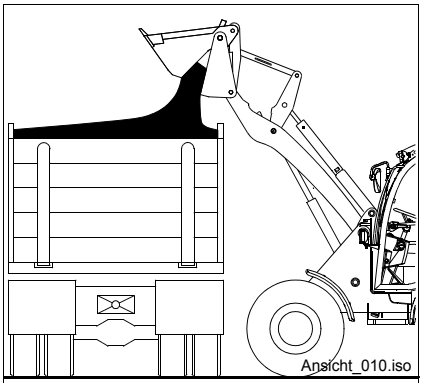


Fig. 177

Unloading from the bottom of the bucket for increased tilt-out heights

Advantage of working method:

- The dumping height can be increased by at least 55 cm (21.6 in) (depending on bucket size), as compared to tilting out with a standard bucket.

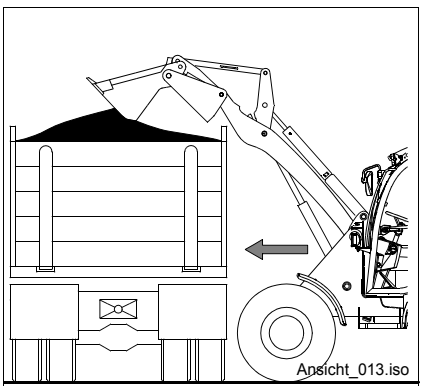


Fig. 178

- Material can be pushed with the open multipurpose bucket.

Working with the pallet forks

Important safety instructions for working with the pallet forks

WARNING

Accident hazard from the pallet fork arms!

Pallet fork arms can cause serious injury or death during machine travel on public roads.

- ► Remove fork arms from the pallet forks before machine travel on public roads and transport them separately.
- ► Fold up (opt) the foldable fork arms from pallet forks before travelling on public roads.
- ► Do not transport the pallet forks in a bucket.
- ► Before leaving the machine, lower the pallet forks to the ground, turn off the machine and remove the ignition key.
- ► Never use bent, cracked or otherwise damaged fork arms/pallet forks!
- ► Before starting work, ensure that the fork arms on the fork frame are safely locked!

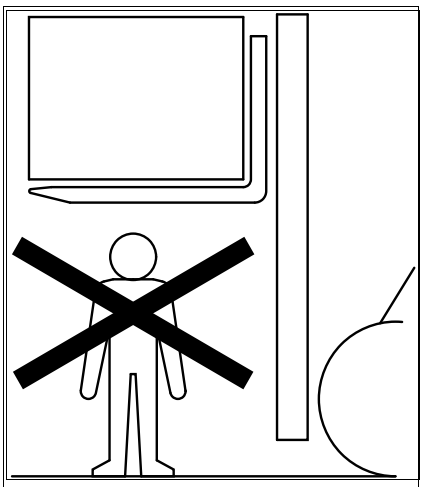


Fig. 179

WARNING

Accident hazard and tilting hazard due to incorrect use of attachment!

Failure to observe this can cause serious injury or death.

- ► Transporting persons is prohibited.
- ► Stay clear of suspended loads!
- ► Lower the loader unit to transport position before starting machine travel.
- ► Adapt the travel speed to the prevailing conditions.
- ► Pay attention to persons and obstacles.
- ► Carefully steer the machine if the loader unit is raised.
- ► Do not perform any jerky movements with the joystick.
- ► The attachment is not certified for lifting gear applications.
- ► Do not fasten any hooks, eyelets or other lifting gear on the attachment.
- ► Do not exceed permitted payloads (refer to the load diagram affixed on the front window or on the left on the front trim in the cabin).

Important safety instructions for machine travel on public roads with the pallet forks

In Germany, machine travel on public roads with attached pallet forks that do not have foldable fork arms is **prohibited**!

Do not transport the pallet forks in a bucket fitted onto the machine!

- For machine travel on public roads, remove the pallet forks without foldable fork arms and transport them with a suitable means of transport (trailer).

Get informed on and follow the legal regulations of your country.

Pallet forks with foldable fork arms (opt)

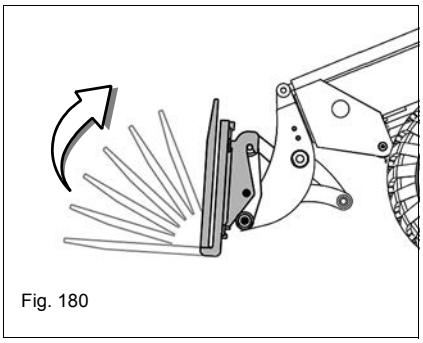


Fig. 180

Preparing road travel:

1. Remove the safety pin on the fork arms (2 x).
2. Fold up the fork arms.
3. Install the safety pin on the fork arms (2 x).

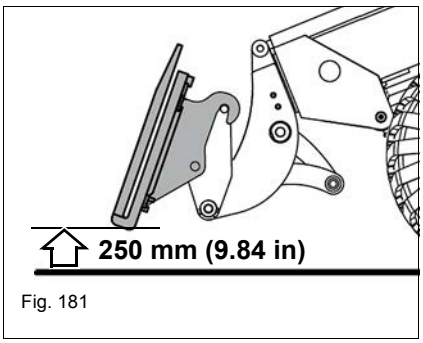


Fig. 181

4. Lower the loader unit to transport position (ground clearance about 250 mm/9.84 in).

Get informed on and follow the legal regulations of your country!

Important information on picking up loads

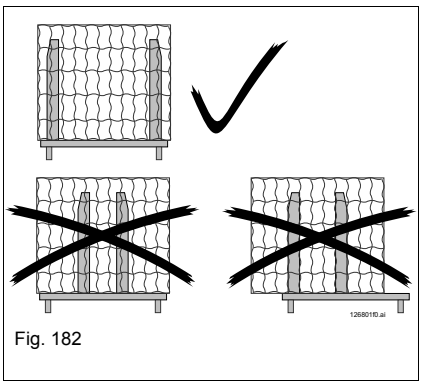


Fig. 182

- Approach the material as closely as possible!
- Always approach the material with the machine wheels in straight-ahead position!
- Always load on firm and level ground with sufficient load-bearing capacity only!
- Never raise a load with only one fork arm!
- Move the fork arms all the way through under the pallets, as far as they will go, so that the load is picked up the nearest possible to the fork frame!
- Move under the load with the straight fork arms as far apart as possible and at an equal distance from the left and right side of the load!

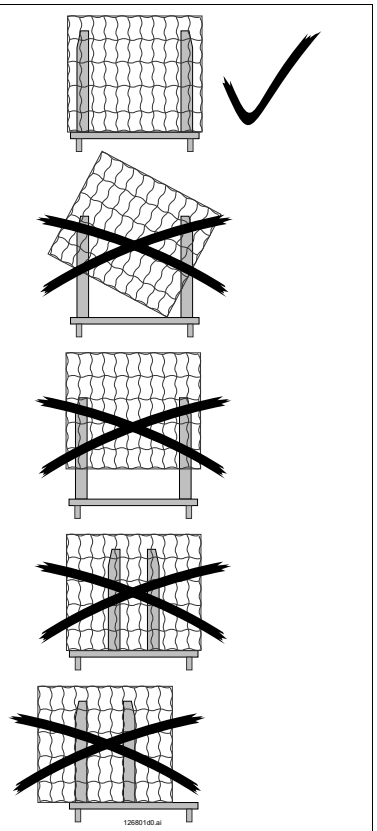


Fig. 183

Important information on load transport

- Always tilt in the attachment a little (toward the machine) for transport!
- Always transport the load close to the ground!
- Always adapt the transport speed to the load you are transporting and to the ground conditions!
- Never leave the machine with the load raised!
- On slopes, the load must be on the uphill side of the machine/ attachment. Drive the machine backward on sloping terrain to prevent the load from falling off and the machine from tilting forward when braking.
- When transporting large bulk loads perform backward machine travel for improved visibility!
- Observe the load-bearing capacity of bridges, basement ceilings, vaults, etc., before moving the machine on them!
- Bear in mind the clearances of underpasses, tunnels, gates, etc. before machine travel through or under them!

Important information on setting down loads

- Loads must only be set down on a suitable base with sufficient stability and load-bearing capacity.
- Do not stack or set down in higher places loads which are not properly packaged or which have shifted, or load units with damaged pallets/ stacking containers.
- Set down loads only in places where they will stand safely without tilting, falling down or sliding! Affix appropriate marks to loads which have been set down, especially in the area of public and private traffic!
- Observe the load-bearing capacity of the set-down area (for example truck platforms, storage area in high-bay warehouses, etc.).
- Load the loading area of vehicles or trailers evenly and distribute the load evenly on the axles. Distribute the load evenly on the axles.
- Stack loads only up to the authorized maximum pallet height
- Do not set down loads too near to slopes, construction pits, etc.
- Do not set down loads in transit or escape routes, and not in front of safety facilities or works equipment which must be accessible at any time.

Brief instructions for fork arms

The following brief instructions are based on the “Guidelines for testing and repairing fork arms” (© by VETTER Umformtechnik GmbH):

- Use fork arms only according to their designated use.
- Do not exceed the load center and the load-bearing capacity.
- Keep the fork arms clean at all times.
- Load both fork arms evenly.
- Do not use standard fork arms as reverse forks.
- Do not push, pull or shove the fork arms, or move them in at a slanting angle (risk of damaging them due to lateral forces).
- Do not pull off loads, or allow them to fall onto the fork arms.
- Tie down loads, if necessary, to avoid losing them.
- Do not raise with the tilt ram (tilt device).
- Observe the application limits of the fork lift, and its Operator’s Manuals.
- Perform frequent visual checks.
- Have regular checks performed according to the Operator’s Manual and the legal regulations of your country.
- Do not modify the fork arms, or attach any additional device.
- Only the manufacturer is authorized to perform repair work on the fork arms.
- No transport of persons on the fork arms.
- Transporting flammable, liquid material is prohibited.
- Observe the legal regulations of your country during machine travel on public roads.
- The operating company/operator must check at regular intervals:
  - Lock: functional check
  - Hooks: visual check for cracks and deformations
  - Articulation range: visual check for indents, nicks and cracks
  - Articulation range and blade: do not use any longer if worn over 10%
  - Blade and tip: check for deformations
- In case of damage or if you are unsure:
  ➥ Immediately stop using the fork arms!

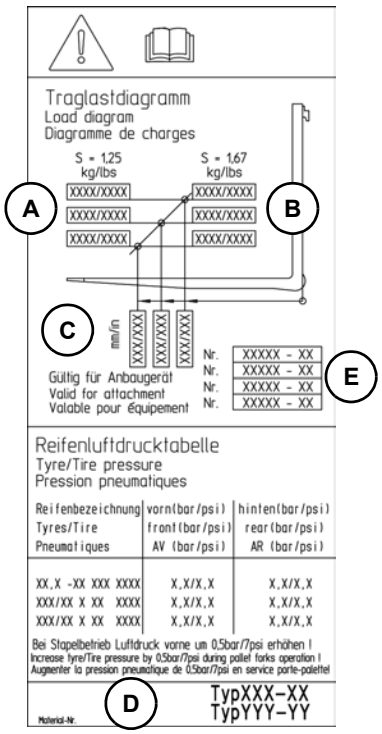


Fig. 184

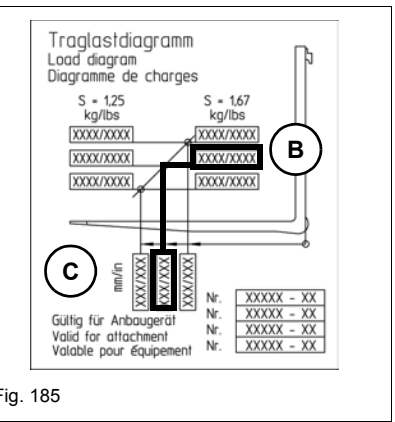


Fig. 185

Load diagram for pallet forks

The load diagram in the cabin is only valid for applications with the released pallet forks
– see chapter 9 "Payload/lift capacity/stability" on page 9-18!

The load diagram is located inside the cabin on the left of the front window or on the front trim.

Observe the load diagrams of other attachments (attachments from other manufacturers) used, or calculate them
– see "Fitting attachments from other manufacturers (opt)" on page 5-95!

WARNING

Tipping hazard of machine due to failure to pay attention to the load diagram!

Can cause serious injury or death.

► Do not exceed the maximum loads stated, otherwise machine stability is no longer ensured.

- To determine which vehicle the attached load diagram applies, see specifications in area **D**.
- To determine which attachment the attached load diagram applies, see specifications in area **E**.
- Area **A** shows the maximum loads for applications on level ground (stability S = 1.25).
- Area **B** shows the maximum loads for off-road applications (stability S = 1.67).
- The maximum load is a function of the distance between (area **C**) to the fork frame.
  Important! Also take the maximum load into account when using fork arm extensions!

Example:

- At a load distance **C** of 600 mm (23.62 in), the maximum load **B** for off-road applications is 1200 kg (2646 lbs)!

Adjusting the fork arms of the pallet forks

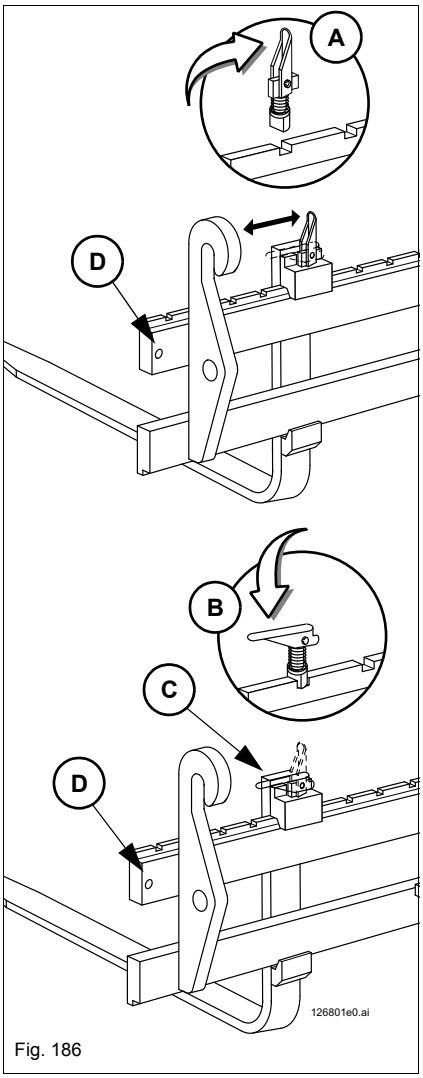


Fig. 186

WARNING

Accident hazard if the fork arms are not correctly locked on the fork frame!

The fork arms can come off and cause serious injury or death.

- ► Check before working whether locking levers **A** on both fork arms are folded down and safely engaged in the fork frame!
- ► Adjust the fork arms centrally with regard to the fork frame.
- ► Check whether safety screws **D** on either side on the upper slide rail of the fork frame are not damaged and whether they are firmly screwed.

CAUTION

Crushing hazard when shifting the fork arms!

Fingers and hands can be crushed and injured between the fork frame and fork arms.

- ► Do not touch the sliding surface of the fork frame when shifting the fork arms.
- ► Wear protective gloves.

1. Set the locking lever to the vertical position (position **A**).
2. Slide the fork arms to the required distance until the locking pin engages in a slot on the fork frame.
3. Fold down the locking lever (pos. **B**).
   - ➥ The upper edge of the locking lever must be flush with the edge **C**.
   - ➥ Also refer to the Operator's Manual of the pallet forks.

Picking up a load

WARNING

Tipping hazard of machine due to failure to pay attention to the load diagram!

Can cause serious injury or death.

► Observe the payloads specified in the load diagram.

Information

To guarantee that the load can be picked up with precision, switch off the load stabilizer (opt)!

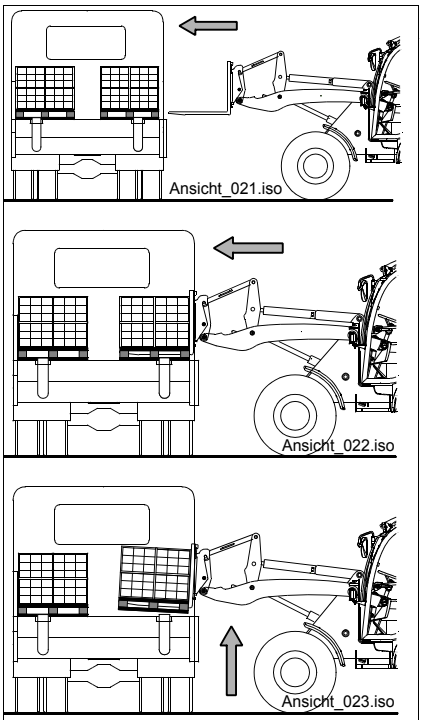


Fig. 187

1. Move the machine up to the load so that the pallet forks or the fork arms are at a right angle to the load.
   ➥ The fork arms must be the furthest possible apart, and at an equal distance from the left and right side of the load.
2. Drive the vehicle forward. Drive the machine forward and move the fork arms as far as possible underneath the pallet until the material touches the fork frame.
3. Raise the load carefully and tilt it in slightly.
4. Reverse carefully until the loader unit can be lowered to transport position.
5. In transport position, lower the loader unit as far as possible.
6. Reverse slowly from the material.

Safety instructions on transporting material

WARNING

The load can tip backward if it is not secured and if the loader unit is raised!

Can cause serious injury or death.

- ► Do not transport loads with a raised loader unit.
- ► During machine travel, always tilt in the attachment a little (towards the machine) for transport.
- ► After picking up the load, lower the loader unit to transport position. Bear in mind the ground clearance!
- ► Unload material only at machine standstill and do not tilt back the pallet forks to the limit.
- ► Secure a bulky load before transporting it.
- ► Fit the rear of the pallet forks with a protective device.
- ► Ensure good visibility of the material you want to pick up and of the work and travel range.

WARNING

The machine can tip over during machine travel or maneuvers on slopes with a load on the pallet forks!

Can cause serious injury or death.

- ► Lower the loader unit to the transport position.
- ► If possible, travel in reverse with a load on the pallet forks.

WARNING

The machine can tip over and the load can fall down in conditions of strong wind and poor visibility with a raised loader unit or fully loaded pallet forks!

Can cause serious injury or death.

- ► Avoid high storage positions for material that should not be exposed to wind.
- ► Stop fork lift work in conditions of strong wind and poor visibility.

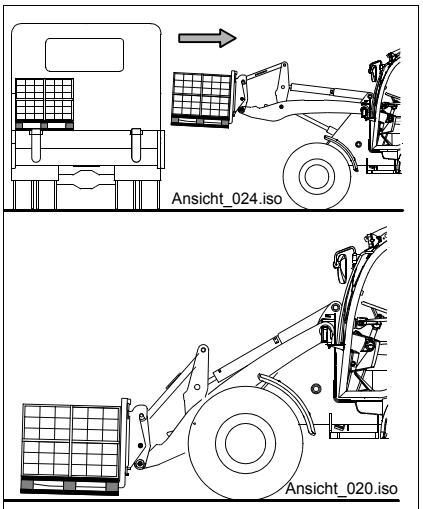


Fig. 188

Transporting material

- Move the load only when it is safely placed on the fork arms.
- Start, turn and stop smoothly.
- Concentrate on your work, avoid distractions.
- When moving and transporting loads, always tilt it slightly back toward the machine and raise or lower it to transport position (bear in mind the ground clearance).
- Always perform machine travel slowly in off-road applications, to avoid strong swinging movements of the load.
- On slopes, the load must be on the uphill side of the machine/attachment.
- Drive the machine backward on sloping terrain to prevent the load from falling off and the machine from tilting forward when braking.
- When transporting large bulk loads drive the machine backward for improved visibility.

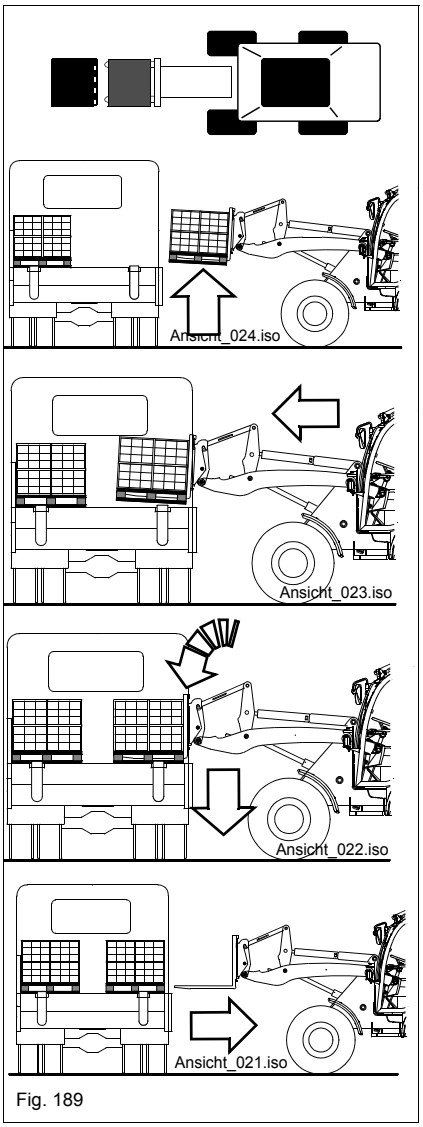


Fig. 189

Setting down a load

1. With the material in transport position, approach the deposit location from the front (e.g. stack or loading area) so that the material is in the middle of the deposit location.
2. Raise the loader unit until the load is located over the deposit location.
3. Drive the machine **slowly** forward until the load is located exactly over the deposit location.
4. Raise the inclination of the fork arms.
5. Lower the loader unit **slowly**.

Ensure that the fork arms are no longer under load:

6. Ensure that the area behind the machine is clear.
7. Carefully reverse from the deposit location until the loader unit can be lowered to transport position.
8. Lower the attachment to the transport position.
9. Tilt the fork frame slightly backwards.

Fitting attachments from other manufacturers (opt)

Quickhitches for attachments from other manufacturers

- The following quickhitches can be purchased from your dealer and installed by an authorized service center:
  - Quickhitch for EURO attachments
  - Quickhitch for SKID STEER attachments
- **Important!**
  Only attachments that have been approved for this use and that have an approved load diagram may be used with the quickhitch *– see chapter 3 “Attachments for SKID STEER quickhitch (currently not available)” on page 3-21 Attachments for EURO quickhitch on page 3-23*.
- If other attachments are used, conformity (stability test) in accordance with the EC machine guideline or the DIN EN 474-3 standard must be checked and documented by an authorized service center.
  In the case of non-EU countries, follow and apply the national regulations of these countries.
- Refer to the following information sheets *on page 5-97 "Stability calculations for attachments from other manufacturers"* for the stability test.
- Warranty and the operation license become void if non-approved attachments are installed, or if parts of the quickhitch or attachment (with a prescribed condition or quality, or the operation of which can put persons at risk) are subsequently modified or replaced.
- In addition to the Operator’s Manual, observe and instruct the operator in all other generally applicable, legal and other mandatory regulations relevant to accident prevention and environmental protection.

Fig. 190

Important information on fitting attachments from other manufacturers

WARNING

Accident hazard if the attachments are not locked!

Can cause serious injury or death.

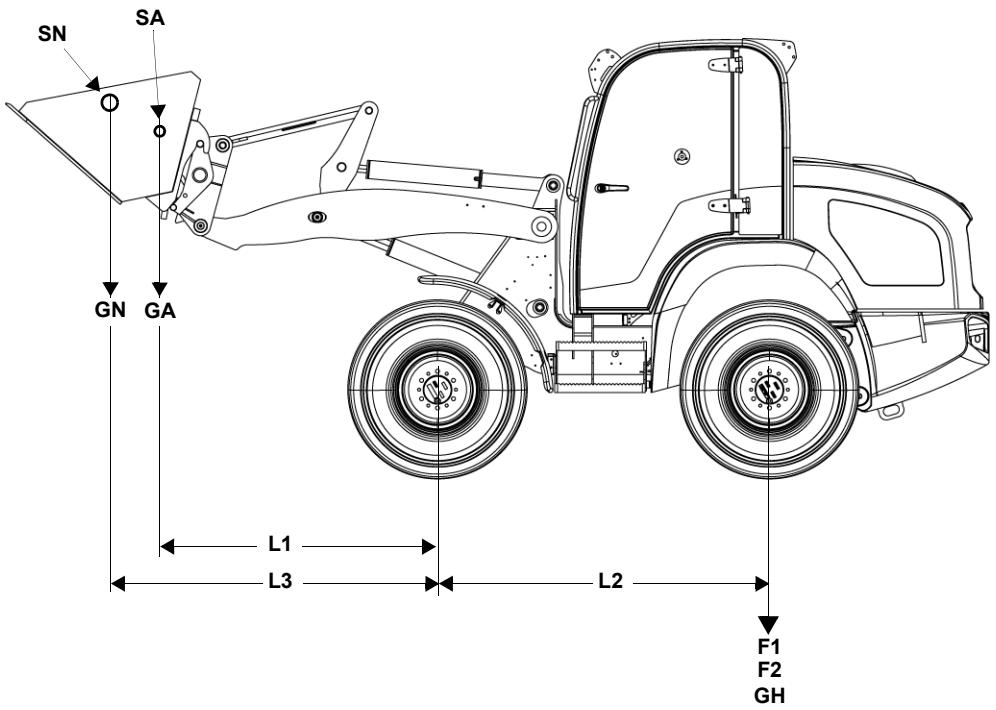
► After locking an attachment, check whether catch bolts **E** of the quickhitch can be seen on either side in the mounting bores of the attachment.

Information

Before connecting the hydraulics of the attachment from another manufacturer to the 3rd control circuit, ensure that the pressure in the plug couplings is released
– see "Pressure relief – plug couplings" on page 5-33!

Stability calculations for attachments from other manufacturers

Overview with bucket according to ISO 14397-1



Overview with pallet forks according to ISO 14397-1

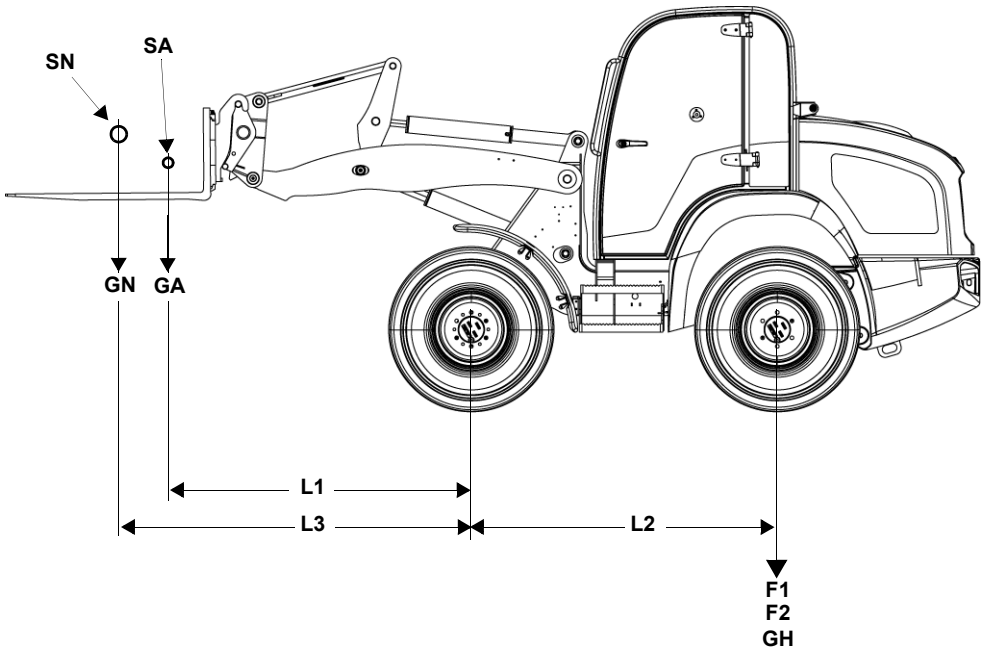


Fig. 191

Table for values that have been determined

Enter the values that have been determined in the column “Entry”.

Designation		Measure/determine	Entry	
GN	Maximum authorized payload	**Enter the calculated values in the load diagram** *– see "Calculation formula for stability (load diagram)" on page 5-99*.		kg/lbs
SN	Position of load center: pallet forks	**Values entered in load diagram according to ISO 14397-1.**	500 600 700	mm (in)
SN	Position of the load centre: bucket or other attachments			mm (in)
S	Stability factor	Refer to table *Required safety factors (S) on page 5-99* for the values.		–
L1	Distance: between center of front axle and center of gravity of attachment	Measurement.		mm (in)
L2	Axle base: between center of front axle and center of rear axle			mm (in)
L3	Distance: between load center (payload) and center of front axle			mm (in)
GH	Load on rear axle (without load on loader unit)	Calculated.		kg/lbs
F1	Measured load on rear axle (without attachment, with extended loader unit)	Determine the weight on scales without attachment.		kg/lbs
F2	Load reduction on rear axle due to installed pallet forks/attachment	Calculated, or measured if scales and an attachment are available.		kg/lbs
GA	Weight of pallet forks/attachment	Ask attachment manufacturer.		kg/lbs
SA	Center of gravity of pallet forks/ attachment			–
p_{max}	Material density of load	Calculated: depends on material picked up with the bucket.		t/m³
V	Bucket capacity (heaped)	Attachment type label, or ask attachment manufacturer.		m³
M	Payload mass	Calculated.		kg/lbs

Required safety factors (S)

Pallet forks	DIN EN 474-3	
Rough terrain	60 %	S = 0.6
Firm and level ground	80%	S = 0.8

Bucket	ISO 14397-1	
–	50 %	S = 0.5

Calculation formula for stability (load diagram)

$$F2 = \frac{GA \times L1}{L2}$$

$$GH = F1 - F2$$

$$GN = S \times \frac{GH \times L2}{L3}$$

$$p_{max} = \frac{GN}{V}$$

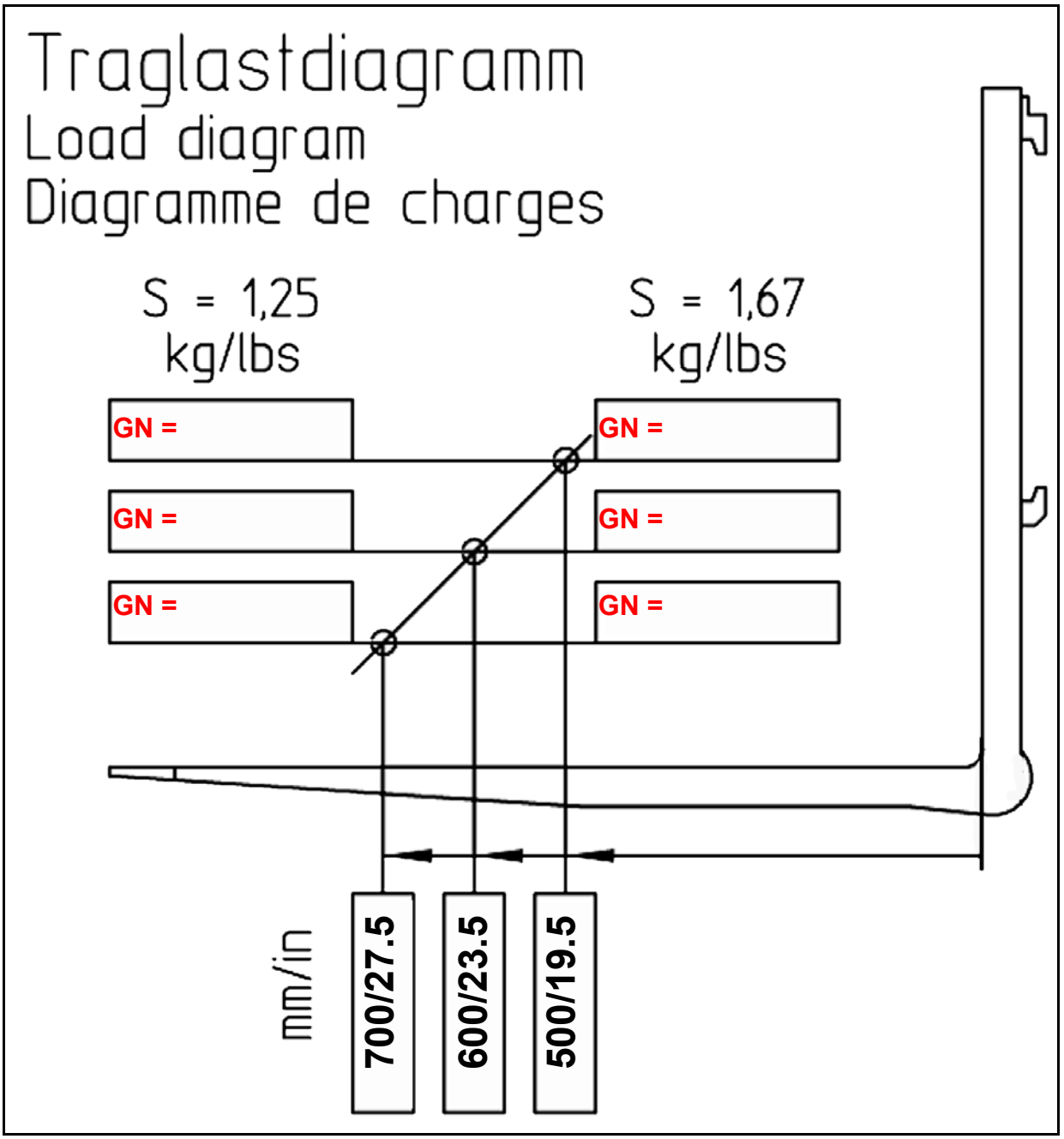
Affix the maximum authorized material density in a clearly visible position on the bucket, and enter it in the Operator's Manual of the attachment.

Load diagram (sample)

Enter the calculated values “**GN**” in the load diagram.

Information

Affix the completed load diagram in the cabin in a water-proof position that is easily visible for the user/operator.



5.12 Emergency lowering

Emergency lowering of loader unit in case of operating motor breakdown

WARNING

Imminent accident hazard when lowering the loader unit in an emergency!

Can cause serious injury or death!

- ► Secure the danger zone.
- ► Do not try to repair the machine under a raised load.
- ► Immediately ask a service center for assistance.

Information

If the machine is equipped with the hose burst valve option, then when the operating motor breaks down, emergency lowering of the loader unit is only possible if the machine is turned on!

Fig. 192

Emergency lowering

1. Stop the machine immediately.
2. Turn the vehicle off and remove the ignition key
3. Apply the parking brake.
4. Ensure that no one is in the danger zone of the machine.
5. Disable the road-travel lock for the joystick if it is enabled – *see chapter 4 “Locking/unlocking the control lever (joystick)” on page 4-51*.
6. If necessary, turn the vehicle back on in the case of machines with a "hose burst valve" option.
7. Push joystick **slowly** forward **C** until the loading unit is lowered completely.
8. Return the joystick to neutral.
9. Turn the machine off and remove the ignition key.
10. Have the machine immediately repaired by an authorized service center.

5.13 Options

Hose burst valve (partly opt)

Important safety instructions

The hose burst valve prevents the loader unit from being lowered or tilted out without being braked, in the event of a bursting hose or pipe!

The lift or tilt rams are locked and can no longer be operated.

WARNING

Accident hazard when lowering the loader unit in an emergency!

Can cause serious injury or death!

- ► Secure the danger zone.
- ► Do not try to repair the machine under a raised load.
- ► Perform emergency lowering with extreme care.

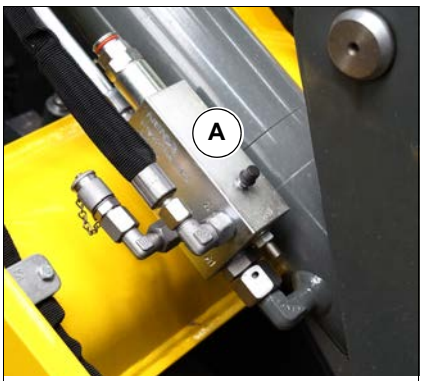


Fig. 193

Proceed as follows in case of a bursting hose or pipe:

1. Stop the machine immediately.
2. Apply the parking brake.
3. Secure the danger zone.
4. Disable the road-travel lock for the joystick if it is enabled – *see chapter 4 “Locking/unlocking the control lever (joystick)” on page 4-51*.
5. Push joystick **slowly** forward **C** until the loading unit is lowered completely.
6. Return the joystick to neutral.
7. Turn the machine off and remove the ignition key.
8. Have immediately repaired by an authorized service center in case of damage to the hydraulic system or hose burst valve **A**.

Environment

Collect the hydraulic oil as it drains with a suitable container (**if this can be done without any danger**) and dispose of it in an environmentally friendly manner.

Low-speed control with regulated travel speed (opt)

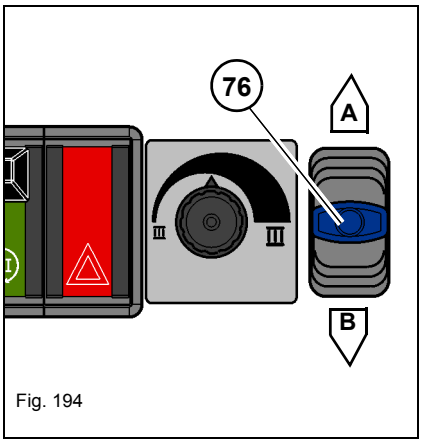


Fig. 194

Important information on the low-speed control with regulated travel speed (CSD = Constant Speed Drive)

Using this function, an even driving speed can be achieved. The selected driving speed is largely self-contained of the driving resistance.

When operating hydraulically enabled attachments (e.g. sweepers or ground mills), the function of the low-speed control ensures an even driving speed or starting from a standstill with a high engine speed.

With the slide control **76** the driving speed can be variably set.

Information

The low-speed control can be used in connection with the option oil volume adjustment – *see "Oil volume setting" on page 5-36*.

Information

To achieve maximum travel speed in normal operation the slide switch **76** must be pushed forward to the limit (**A**).

Information

The travel speed that was chosen with the low-speed control, can be briefly increased using the accelerator pedal. To do this, push the accelerator pedal all the way down. After releasing the accelerator pedal, the machine will brake to the chosen driving speed again.

Information

As soon as the service brake is actuated,

- the low-speed control feature in speed range "turtle" is briefly deactivated, but is activated again with the same setting as soon as the service brake is released.
- the low-speed control is always deactivated in speed range "hare" and must be activated again.

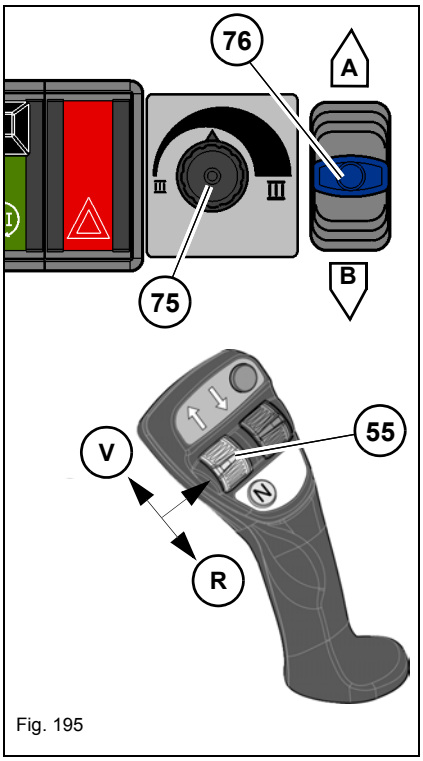


Fig. 195

Operation of low-speed control

Operating	Lever position	Result
Select a speed range.	*– see "Selecting a speed range" on page 5-12.*	
Activate the low-speed control function.	1. Pull the sliding heater control **76** all the way to the rear **B**.	➥ Driving speed = 0 km/h (0 mph).
	2. As required, set the oil volume via the rotary switch **75** to the volume of oil needed for the attachment *– see "Oil volume setting" on page 5-36.*	
	3. Use rocker switch **55** to set the travel direction.	➥ Driving speed = 0 km/h (0 mph).
Select the driving speed.	Push the slide control **76** forward **A** until the desired speed is achieved.	➥ The speed is maintained independent of the acceleration brake setting and largely independent of the driving resistance.

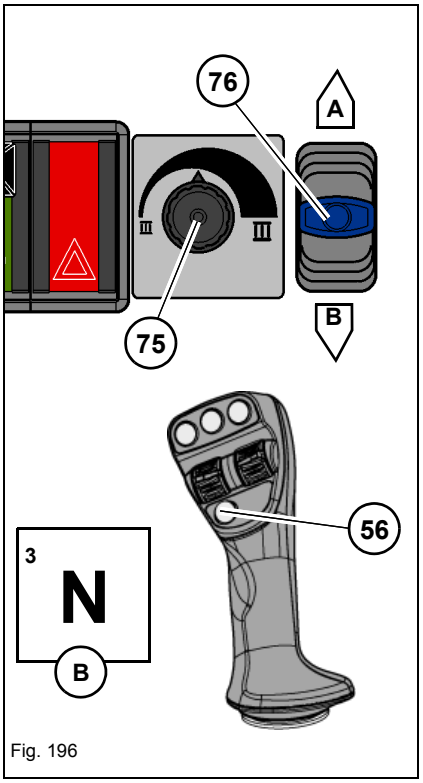


Fig. 196

Operating	Lever position	Result
Disabling the low-speed control.	1. Push the slide control **76** all the way to the rear **B**.	➥ Speed is reduced to 0 km/h (0 mph).
	2. Once the work operation is completed, press the touch button **56** "Neutral travel direction."	➥ Symbol **B/3** appears on the digital display.
	3. For normal work operation, push the sliding control **76** all the way forward **A** and if necessary reset the oil quantity via the rotary switch **75** to full power.	➥ Speed is controlled via the accelerator pedal.

Information

For safety reasons, the low-speed control is also disabled when:

- ► the service brake is activated in speed range "hare",
- ► the machine is turned on again
- ► the operator presence switch is triggered,
- ► the parking brake is applied,
- ► The "neutral" speed range is selected or
- ► the speed range is changed.

If the low-speed control was disabled,
the function must be re-enabled and set.

Electric connection – 7-pole front socket (opt)

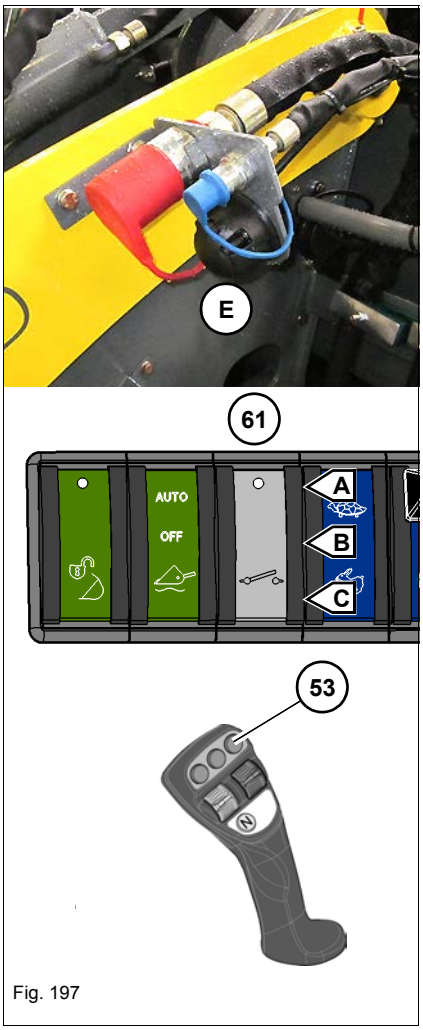


Fig. 197

Putting the front socket into operation

The machine can be equipped with a 7-pole socket **E** (at the front left on the loader unit).

Two separate electrical circuits can be switched on via the 7-pole socket, e.g. to operate the electro-hydraulic control valves on the attachment.

NOTICE

In order to avoid damage to the attachment as well as to the machine, check the function and response direction after connecting the electric cables before putting into operation!

The switch panel with the press rocker switch **61** is located in the instrument panel underneath the steering wheel. The three circuit states can be selected by using the toggle switch:

- OFF (**A**)
- ON push-button operation (**B**)
- ON continuous operation (**C**).

Changing to the desired circuit is performed via push button **53** in the joystick.

Information

The electrical circuits can only be operated separately!

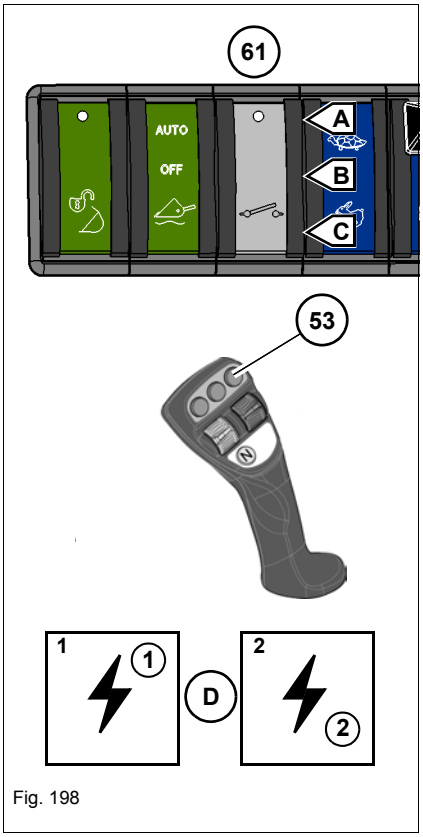


Fig. 198

Operation		Function
Push-button operation	Press rocker switch **61** to position **B**.	➥ Indicator display **D/2** illuminates in the digital display in the indicating instrument. ➥ Circuit **2** (standard) is enabled.
	Press and hold push button **53**.	➥ Indicator display **D/2** extinguishes in the digital display in the indicator display **D/1** illuminates. ➥ The electrical circuit **1** is enabled for as long as the push button is pressed.
AUS	Press rocker switch **61** to position **A**.	➥ The power supply is switched off.

Operation		Function
Continuous operation	Press rocker switch **61** to position **C**.	➥ Indicator display **D/2** illuminates in the digital display. ➥ Circuit **2** (standard) is enabled.
	Press push button **53**.	➥ The electrical circuit is continuously changed. ➥ Indicator display **D/2** or **D/1** in the digital display in the gauge extinguishes and the indicator display **D/1** or **D/2** illuminates.
AUS	Press rocker switch **61** to position **A**.	➥ The power supply is switched off.

Load stabilizer for loader unit (opt)

During machine travel over longer distances, off-road or on public roads, the load stabilizer dampens the movements of the loader unit and avoids pitching movements of the machine.
This increases drive comfort and safety.

WARNING

Accident hazard due to pitching movements of the machine during machine travel on public roads.

Can cause serious injury or death.

- ► Always switch on the load stabilizer during machine travel on public roads.
- ► Lower the loader unit to the transport position.

NOTICE

The loader unit yields easily with the load stabilizer switched on (continuous operation), making it difficult to perform any precise lifting movements.

- ► Only put the load stabilizer into operation during longer machine travel.
- ► Always switch off the load stabilizer for heavier duty loading work.

Information

In order not to restrict the functions of the load stabilizer, do not tilt in the tilt ram to the limit, or briefly release the hydraulic pressure in the tilt ram after tilting in the bucket.

Switching the load stabilizer ON and OFF

Information

When switching the load stabilizer on or off, the loader unit is subject to compensation movements from pressure or loading balancing!

► We therefore recommend always turning off the load stabilizer before working with pallet forks.

The load stabilizer can be used in automatic and continuous mode.

- The load stabilizer in **automatic mode** is suitable for machine travel on public roads, for lighter work with the loader unit and for light off-road transport.
  It is switched on and off by means of a travel speed control
  ➥ Travel speed over 7 km/h => **ON**
  ➥ Travel speed below 6 km/h => **OFF**
- The **continuous operation** is suitable for longer trips off-road or on public roads.

The tilt switch **60** for load stabilizer operation is located on the switch console below the steering wheel.

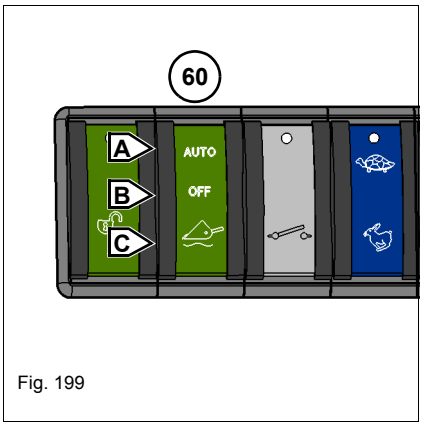


Fig. 199

Operation		Function
Continuous operation ON	Press switch **60** to position **C**.	➥ Load stabilizer switched on. ➥ The LED in the switch illuminates.
AUTO	Press switch **60** to position **A**.	➥ Load stabilizer switched on in continuous operation: load stabilizer is operation at speeds over 7 km/h Below 6 km/h and the load stabilizer is out of operation. ➥ The LED in the switch illuminates.
AUS	Press switch **60** to position **B**.	➥ Load stabilizer switched off. ➥ The LED in the switch extinguishes.

5.14 Decommissioning//recommissioning

Notes for decommissioning the machine

WARNING

Accident hazard if machine tips over or rolls away after parking it!

Can cause serious injury or death.

- ► Stop the machine on firm, level, and horizontal ground.
- ► Secure the machine accordingly (chocks, for example).

NOTICE

To avoid engine damage or damaging the electronics, allow the machine to run for a while after operation under full load, so that the temperature can stabilize and until the fan has turned off the power electronics!

NOTICE

The machine storage site must be dry and well-ventilated.
The storage temperature should be
between -15 °C (5 °F) and +50 °C (122 °F).

Information

The specified measures refer to decommissioning and recommissioning the machine for longer periods of time.

Environment

Before putting out of operation, have all leaks on the machine repaired by an authorized service center!

Activities in preparation for decommissioning

1. Charge the battery.
2. Clean the machine thoroughly.
3. Lower the loader unit completely and set the attachment horizontally with the ground.
4. Set the drive to a neutral position
   – see "Slowing the machine and stopping" on page 5-15.
5. Apply the parking brake *– see "Parking brake" on page 5-6*.
6. Actuate the motor isolating switch.
7. Park the machine and remove the ignition key.
   ➥ The immobilizer (opt) is enabled.
8. Close and safely lock the cabin doors and windows.
9. Disconnect the battery connector from the vehicle connection only when parked for over 2 weeks
   – see chapter 4 "Disconnecting the battery connector" on page 4-21.
10. Take additional measures to secure the machine by placing chocks under the downhill sides of the wheels.

Activities during decommissioning

1. During decommissioning, depending on the storage temperature, the battery must be regularly controlled.

Storage temperature	Measure
-15 to 0 °C (5 to 32 °F)	➥ Connect the battery for trickle charging permanently to the battery charger.
Over 0 °C (32 °F)	➥ Measure the off-load voltage of the battery every three months. If the value falls below 84 V, then the battery must be recharged.[1]

1. At storage temperature above 30 °C, the intervals of time between measurements must be cut in half.

NOTICE

The battery may be charged a maximum of 4 times in a period of 24 months.

2. Keep the surface of the battery clean, to avoid leakage currents.

Undertaking decommissioning for longer periods of time

1. Perform all the measures related to decommissioning
   – see "Activities in preparation for decommissioning" on page 5-111.
2. If possible, retract the piston rods of the hydraulic rams to protect them against damage. If this is not possible, apply grease to the piston rods and to the bare parts of the hydraulic rams that are not paint-coated.
3. Remove the battery and store in a well-ventilated and cool and frost-free space.

Putting the machine back into operation

1. If necessary, have the battery checked and installed.
2. Check tire inflation pressure.
3. Clean the piston rods. However, when doing this, do not use grease solvents or a high-pressure cleaner.
   ➥ The scraper bar is not water resistant.
   ➥ Water in the guide bushing causes corrosion and damage to the piston rod.
4. Connect the battery connector.
5. Check the operation of the electrical system.
6. Check the operation of the steering and brakes.

5.15 Final decommissioning

Notes for finally decommissioning the machine

If the machine is no longer used according to its designated use, ensure that it is put out of operation and disposed of according to applicable regulations.

Environment

Avoid environmental damage!
Do not allow the oil and oily wastes to get into the ground or stretches of water! Dispose of different materials and consumables separately and in an environmentally friendly manner!

Prior to disposal

- Observe all applicable safety regulations regarding putting the machine out of operation!
- Ensure that the machine cannot be operated between putting it out of operation and disposing of it!
- Ensure that there is no leakage of environmentally hazardous fluids and consumables, and that the machine presents no other hazards at its storage place!
- Make certain that the loader unit is completely lowered and that the attachment is horizontal to the ground! Install all protective devices!
- Make sure that the parking brake is engaged to secure the machine permanently against rolling away and that the machine is additionally secured by placing chocks under the downhill sides of the wheels!
- Secure the machine against unauthorized use! Safely lock all openings (doors, windows, battery cover plate) of the machine!
- Repair leaks on the reservoirs and on the hydraulic and gearbox system or have all oil drained by an authorized disposal company!
- Remove the battery!
- Store the machine in a place that is secured against access by unauthorized persons!

Disposal

Further recycling of the loader must be made in accordance with state-of-the-art standards applicable at the time of recycling, and in compliance with the safety regulations regarding accident prevention!

Get informed and follow the legal regulations of your country.

- All parts must be disposed of in the correct waste disposal sites for the different materials.
- Separate the material as you recycle parts!
- Ensure environmentally compatible disposal of consumables as well!

Information

Always observe the national environmental-protection guidelines or waste disposal laws when disposing of used batteries. Follow the manufacturer's indications on disposal.
In Germany, you can find the relevant information via the Zentralverband Elektredechnik- und Elektronikindustrie (ZVEI).

6 Transport

6.1 Towing the machine

Information on towing

WARNING

Accident hazard due to towing!

Towing the machine can cause accidents in certain situations, and serious injury or death.

- ► Only tow the machine if the steering and braking systems are functional. When towing, be careful to note the increased steering forces (emergency steering features).
- ► The machine may only be towed using suitable towing equipment (towing bar or cable) in connection with suitable towing facilities, such as a towing coupling, hooks and eyes.
- ► Ensure that no one is between the vehicles during towing.
- ► The max. towing distance is 300 m (328 yards). The hydraulic system can overheat as the result of towing.
- ► The max. towing speed is walking speed (5 kph/3.1 mph).
- ► Have a recovery service or an authorized service center tow the machine away if necessary.

WARNING

Accident hazard when pulling trailer loads with the towing gear!

Pulling trailer loads with the towing gear can cause accidents, and serious injury or death.

- ► Do not use the towing gear to tow trailer loads.
- ► Only hitch trailer loads if the machine is equipped with special towing gear.

Before towing away

In case of power failure, the automatic parking brake must be released manually. To do this, two cheese-head M 6x60 mm screws are needed (DIN EN ISO 4762). The screws are included in the scope of delivery of the vehicle. Keep these screws in the vehicle for emergencies.

General instructions

WARNING

Accident hazard due to released parking brake!

The machine can roll away unintentionally if the parking brake is released manually. Serious injuries and death can result.

- ► Before releasing the parking brake, secure the machine against unintentional movement (for example by placing chocks under the wheels).
- ► Do not release the brake on slopes.
- ► Do not park the machine with a released brake.
- ► Enable the brake again once towing is over.

NOTICE

The brake can jam when screwing in the hexagon socket protrude screw.

- ► Screw in both hexagon socket protrude screws at the same time. To do this, alternately screw in each screw a maximum of one turn at a time.

Information

Once towing is over, immediately put the parking brake back to the original setting.

Release the parking brake

1. Turn the machine off and remove the ignition key.
2. Disconnect the battery connector.
3. Secure the machine to prevent it from rolling away, e.g. with wheel chocks.
4. Insert two M6x60 screws in the threads **A** on the parking brake **B** and screw in clockwise, alternating between one and the other, about 1.5 turns.
   ➥ The machine can be towed.

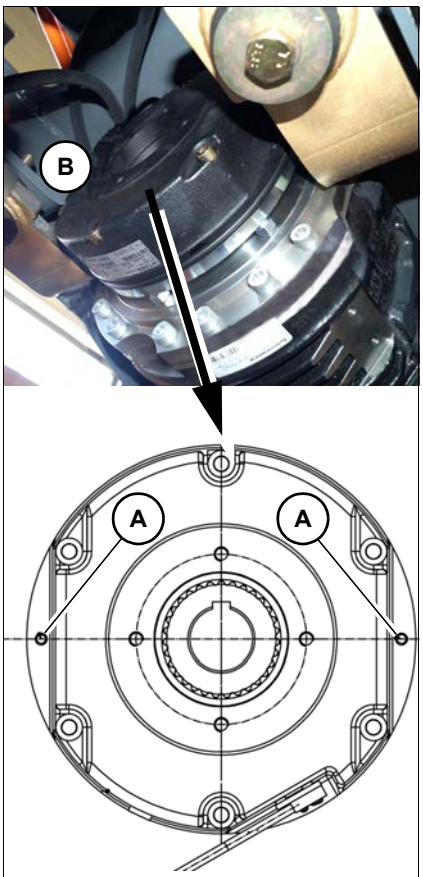


Fig. 200

Towing

Safety instructions for towing away
– *see chapter 2 “Towing” on page 2-13*.

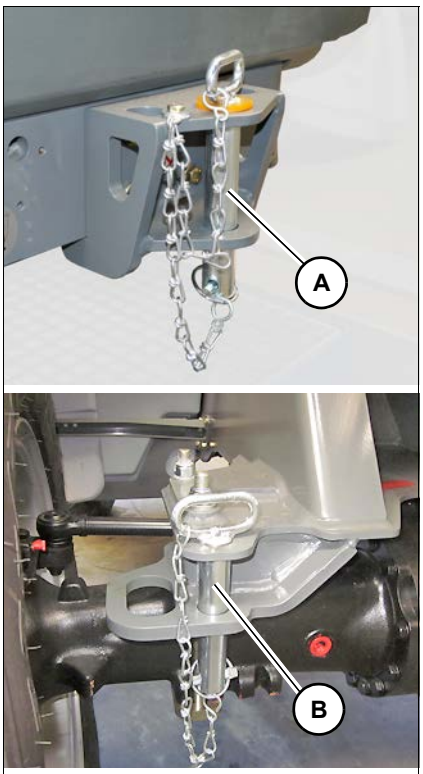


Fig. 201

Information

The towing device at the rear **A** and front **B** of the vehicle is certified only for holding and towing the machine. They are **not** certified as a trailer coupling, for fitting attachments or for raising, loading and tying down the machine.

1. Put the towing vehicle (with sufficient traction force and a safe braking system) in the towing position.
2. Attach suitable towing equipment (tow bar) to the towing devices **A** or **B** (eyelets) on the vehicle.
   ➥ Bear in mind the machine’s dimensions and weights.
3. Tow the machine out of the danger zone at walking speed.
4. Park the machine at a secure location and secure it
   – *see chapter 5 “Machine stopping/securing” on page 5-18*.

Once towing is over

Put the machine back into operation only after correct repairs have been performed.

NOTICE

The brake can jam when unscrewing the hexagon socket protrude screw.

► Unscrew both hexagon socket protrude screws at the same time. To do this, alternately unscrew each screw a maximum of one turn at a time.

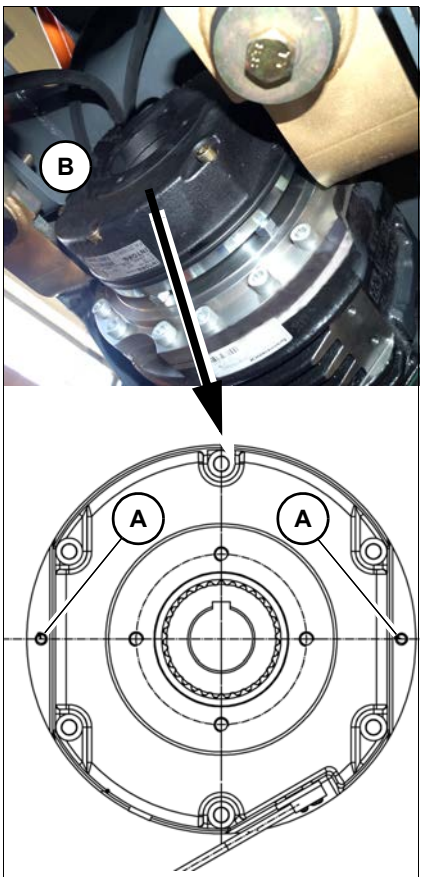


Fig. 202

1. Alternating between one and the other, unscrew both M6x60 screws counterclockwise out of the threads **A** on the parking brake **B**.
2. Safely store the two screws in the machine where they won't be lost.
3. Check the drive and parking brake for correct operation.

6.2 Loading the vehicle

Loading the machine on a transport vehicle

Safety instructions regarding loading

WARNING

Accident hazard due to incorrect loading!

Incorrect loading can cause accidents and serious injury or death.

- ► The transport vehicle must be of appropriate size – refer to chapter *Technical data on page 9-1* for the dimensions and weights of the machine to be loaded.
- ► Clean the machine before loading.
- ► Remove mud, snow or ice from the loading area and from the tires of the machine to be loaded.
- ► Secure the transport vehicle against unintentional movement.
- ► When positioning the machine on the platform, ensure that the center of gravity of the load is as low as possible and in the longitudinal center line of the transport vehicle if possible (load distribution plan).
- ► Do not exceed the permissible maximum weight and the gross axle weight rating of the transport vehicle.
- ► Ensure that the load does not fall short of the minimum axle load of the steering axle of the transport vehicle. Otherwise the steering behavior of the vehicle is seriously affected.
- ► Place partial loads so as to ensure an even load on all axles of the transport vehicle.
- ► Store or secure the load (machine) with suitable auxiliary means so that it cannot slip, slide, roll, tip over or fall, or cause the vehicle to tip over under usual transport conditions.
  - ➥ Usual transportation conditions are conditions in the which the brakes are slammed on, evasive maneuvers are performed with the vehicle or in which uneven roadways are traveled on.
  - ➥ Auxiliary means are, for example, anti-slip bases and linings, load-securing straps and chains, clamping beams, protective paddings, nets, edge protectors and many others.
- ► Always use the existing tie-down points when using belts and chains *– see chapter 3 “Machine outside view” on page 3-1*.
- ► Use only tested ropes, belts, hooks and Shackles (lockable brackets with screws or socket pins) for tying down!
- ► Loading and transportation of the machine may only be performed by experienced and trained personnel. The transporter always is responsible for the loading.

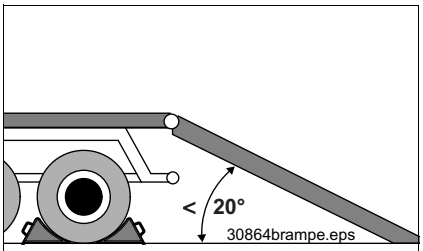


Fig. 203

Loading the machine

1. Secure the transport vehicle with chocks to prevent it from rolling.
2. Place the access ramps at the smallest possible angle.
   ➥ Do not exceed an **angle of 20°**.
   ➥ Use access ramps only with an antiskid surface.
3. Ensure that the loading area is clear and access to it is not obstructed, by superstructures for example.
4. Ensure that the access ramps and the wheels of the machine are free of oil, grease and ice.
5. Turn on the machine.
6. Raise the loader unit enough so that it will not touch the access ramps.
7. Carefully drive the vehicle onto the middle of the transport vehicle.
8. Set the drive to a neutral position – *see chapter 5 “Slowing the machine and stopping” on page 5-15*.
9. Lower the loader unit to the loading area.
10. Apply the parking brake – *see chapter 5 “Parking brake” on page 5-6*.
11. Actuate the motor isolating switch.
12. Turn the machine off and remove the ignition key.
13. Leave the cabin.
14. Disconnect the battery connector.
15. Close the cabin door and battery cover plate securely.
16. Ensure that the authorized maximum height of the transport vehicle is not exceeded.

Crane-lifting the machine

Safety instructions regarding crane-lifting

WARNING

Accident hazard due to incorrect loading!

Incorrect loading can cause accidents and serious injury or death.

- ► Ensure that **no one remains in the machine that is to be loaded**!
- ► Seal off the danger zone.
- ► The crane and the lifting gear must have suitable dimensions.
- ► Take into account the machine's overall weight *– see chapter 9 "Weight" on page 9-17*.
- ► Use only tested ropes, belts, hooks and Shackles (lockable brackets with screws or socket pins) for tying down!
- ► In the USA, only use lifting gear tested and certified by the Occupational Safety and Health Administration (OSHA).
- ► Only use the designated slinging points on the machine *– see "Crane-lifting the machine" on page 6-8*.
- ► Have loads fastened and crane operators only instructed by experienced persons.
- ► The person guiding the crane operator must be within sight or sound of him.
- ► The crane operator must observe all movements of the load and the lifting gear! Secure the machine against unintentional movement!
- ► The crane operator may move a load only after making sure that the load is safely fastened and nobody is within the danger zone, or after receiving a signal from the persons attaching or securing loads.
- ► The load must not be fastened by winding the lifting rope or lifting chain around it!
- ► Bear in mind the load distribution (center of gravity) when fastening the lifting gear.
- ► Load the machine only with the standard bucket empty and in transport position!
- ► Stay clear of suspended loads!
- ► Follow the safety instructions in this Operator's Manual on page *2-1* under all circumstances!

Loading process

WARNING

Risk of injury due to falling machine or parts of it!

Falling objects can cause serious or fatal injury.

- ► Use tested, intact lifting gear of sufficient dimensions.
- ► Check that the lifting gear is safely fastened.
- ► Ensure that nobody remains under the raised machine.

NOTICE

The crane chains can damage the machine when it is raised.

- ► Before raising the machine, protect it against damage with a suitable protection between the crane chains and the machine.

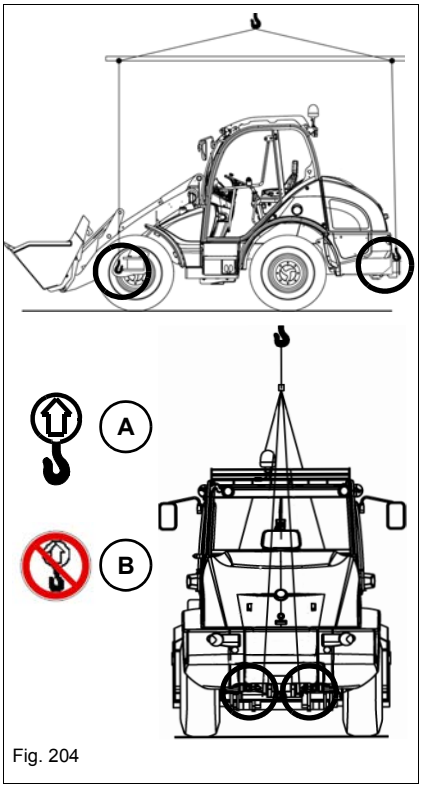


Fig. 204

1. If necessary, install standard bucket.
2. Empty and tilt in the standard bucket, and lower it to transport position *– see chapter 4 “Raising the attachment to transport position” on page 4-52*.
3. Set the drive to a neutral position *– see chapter 5 “Slowing the machine and stopping” on page 5-15*.
4. Apply the parking brake *– see chapter 5 “Parking brake” on page 5-6*.
5. Turn the machine off and remove the ignition key.
6. Disconnect the battery connector.
7. Close the cabin and battery cover plate securely.
8. Fasten sufficiently sized lifting gear to the 4 slinging points (symbol **A** on the frame) of the vehicle.
9. Carefully raise the machine with the crane.

NOTICE

The slinging points **B** on the cabin may only be provided for the disassembly of the cabin and may **not** be used for loading the vehicle.

6.3 Transporting the vehicle

Safety instructions on tying down the machine

- Match the travel speed of the transport vehicle to the load, road and traffic conditions and to the driving characteristics.
- The transport vehicle must be of sufficient size
  – see chapter 2 “Transportation” on page 2-15.
  See chapter “Technical data”, Weight on page 9-17 for the machine’s dimensions and weights.
- Ensure that the authorized maximum height of the transport vehicle is not exceeded.
- Remove any mud, snow or ice from the tires so that the machine can be safely driven onto the ramps.
- When positioning the load on the platform of the transport vehicle, ensure that the center of gravity of the load is as low as possible and in the longitudinal center line of the vehicle if possible (load distribution plan).
- Do not exceed the gross weight rating and the gross axle weight rating of the transport vehicle when loading and transporting the machine.
- Ensure that the load does not fall short of the minimum axle load of the steering axle of the transport vehicle. Failure to meet the minimum rated capacity will cause a hazardous loss of steering control.
- Place partial loads so as to ensure an even load on all axles of the transport vehicle.
- Store or secure the load with suitable auxiliary means so that it cannot slip, slide, roll, tip over or fall, or cause the vehicle to tip over under usual transport conditions.
  - ➥ Usual transportation conditions are conditions in the which the brakes are slammed on, evasive maneuvers are performed with the vehicle or in which uneven roadways are traveled on.
  - ➥ Auxiliary means are, for example, anti-slip bases and linings, load-securing straps and chains, clamping beams, protective paddings, nets, edge protectors and many others.
- Always use the existing tie-down points of the machine when using belts and chains – see "Tying down the machine" on page 6-11.
- When tying down the machine with belts, do not place and tighten them in sharp-edged eyelets.
- Use plastic sheets to protect electric motors and DC/AC converters against the weather.
- Do not exceed a transport period of 24 hours if a battery is installed in the machine and temperatures have fallen below 0 °C (32 °F).

Tying down the machine

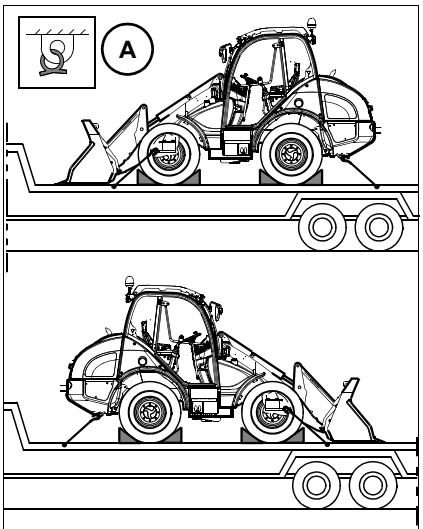


Fig. 205

Tie down as follows

1. Secure all tires of the machine with chocks in front of and behind each wheel.
2. Firmly tie down the machine at the eye hooks (symbol **A**) *– see chapter 3 “Machine outside view” on page 3-1* – with ratchet straps or chains of sufficient size onto the platform.
   - ➥ Do not place cables, belts, etc. over sharp-edged objects.
   - ➥ Use only tested ropes, belts, hooks, shackles (with screw and socket pins with lockable frames) for tying down the machine.
3. Before moving off, ensure that the operator of the transport vehicle knows the overall height, width and weight (including the loaded machine) and the legal transport regulations of the country or countries in which transport will take place!

Notes:

7 Maintenance

7.1 Information on maintenance

Responsibilities and prerequisites

- Operational readiness and the service life of the machine are heavily dependent on maintenance.
- **The "daily maintenance" and "work every 20 hours of operation" indicated in the maintenance schedule have to be performed by a specially trained operator.**
- **All other work listed in the maintenance plan (delivery inspection and inspections A, B and C) may only be carried out by an authorized service center in order to be recognized for warranty claims.**
  - ➥ The respective intervals for the inspection can be found in the service manual.
  - ➥ The maintenance and service personnel must have specialized knowledge about the maintenance and inspection work on the machine. The necessary expertise can be obtained at training sessions from KRAMER WERKE Service.
- The parts numbers of the plant materials and consumables required for the maintenance work as well as the numbers of the maintenance sets "A," "B," or "C" can be found in the spare parts list.
- The manufacturer shall not be liable for damage or personal injury caused by failure to observe instructions!
- Please contact your dealer if you require more information on maintenance.
- Insist on using original spare parts for repairs.
  The machine's permits, certifications, registrations, etc., may be withdrawn if machine parts/components with a prescribed condition or quality, or machine parts/components that can put persons at risk during operation, are subsequently modified or exchanged!
- Basic safety instructions and all informational and warning labels attached to the machine must be observed.
- Appropriate protective clothing must be worn when performing maintenance work.
- Only use functional and suitable tools.
- Only perform maintenance work if the machine has been secured *– see chapter 5 "Machine stopping/securing" on page 5-18*.
- If working under the raised loader unit is unavoidable, then the loader unit must be secured by a suitable support.

Important safety instructions regarding maintenance

WARNING

Accident hazard due to electric current!

Only work on the machine when it is in a de-energized state.

► Before starting maintenance:
- Park the machine securely
– see chapter 5 “Stopping and securing the machine” on page 5-17.
- Disconnect the battery connector
– see chapter 4 “Battery connector” on page 4-20.

WARNING

Accident hazard due to high electrical voltages!

Performing maintenance improperly can cause serious injury or death.

► Maintenance that does not involve HV components (e.g. replacing fuses), where the maintenance personnel must work near HV components and, in the event of an error, could trigger an electrical hazard, must be performed by "electrically trained persons". The training must include the following factual information:
- the hazard sources on the machine,
- safety measures and
- the corresponding rules of conduct.

► In order to be permitted to perform maintenance on HV systems of the machine, further training as "Expert for Work on HV Intrinsically Safe Machines" (DGUV Information 200-005) is mandated in Germany. Be aware of, observe and comply with the corresponding legal regulations of other countries.

WARNING

Risk of injury due to chemicals!

Batteries can release explosive gases that can explode if they ignite. The squirting battery acid can then cause serious burns.

- ► Do not smoke, avoid fire and open flames.
- ► Do not put any tools or other metallic objects on the battery that could cause a short circuit.
- ► Avoid contact of the battery acid with the skin, eyes and mouth.
- ► In case of contact with battery acid, immediately flush the affected parts of the body with plenty of clear water and seek medical attention at once.
- ► Wear protective equipment.

CAUTION

Risk of injury from maintenance work!

Failure to observe the following points could result in injury!

- ► Apply the parking brake.
- ► Turn the machine off and remove the ignition key.
- ► Disconnect the battery connector.
- ► Observe the danger indications and safety instructions during maintenance.
- ► Always park the machine on firm and level ground and secure it to prevent it from rolling away.
- ► Clean the work area before beginning work in order to ensure you can work safely.
- ► Do not use solvents that give off harmful or flammable vapors.
- ► If the loader unit must be raised during maintenance work, secure it against unintended lowering.
- ► Follow the maintenance and safety instructions given in the operator's manuals of the attachments.
- ► Once maintenance and inspection work is over, properly reinstall any safety devices that may have been removed.
- ► After maintenance, only start the machine if no more work is performed on the machine and there are no more persons in the danger zone.
- ► After completing the maintenance, run through a functional check.

CAUTION

Risk of injury due to hot parts!

The power electronics and the electric motors can become hot during operation.

- ► Before folding up the operator seat, allow the components to cool down.
- ► Wear protective equipment.

NOTICE

Damage from loose parts in the battery compartment.

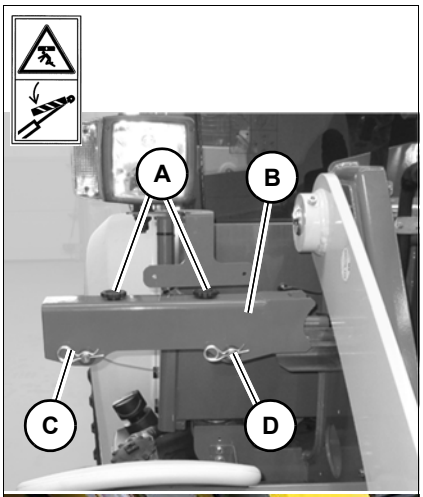
- ► Remove all tools and objects from the battery compartment before closing the battery cover plate.

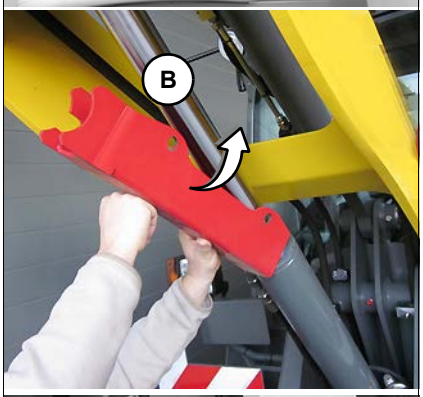
NOTICE

Damage from using incorrect cleaning agents.

- ► Select cleaning agents depending on the material of the parts that need to be cleaned.
- ► Rubber parts and electrical components must not be cleaned with solvents or steam. Water can cause short circuits in the electrical system and damage.

Safety prop for loader unit (opt)





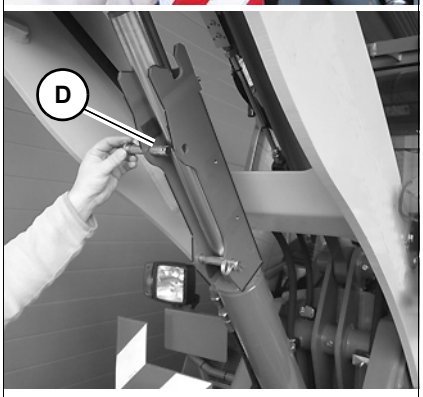


Fig. 206

WARNING

Danger of crushing during maintenance work on a raised loader unit that is not secured!

Can cause serious injury or death.

- ► Lower the loader unit to the ground during maintenance.
- ► If a safety prop (opt) is available, install it on the extended lift ram and secure it with lock pin.

Install safety prop on the lift ram

The safety prop is screwed onto a bracket on the front side of the cabin on the right side of the vehicle with two screws.

1. Remove the attachment (e.g. loader bucket).
2. Park the machine on firm and level ground.
3. Apply the parking brake.
4. Raise the loader unit high enough so that the safety prop can be safely installed.
5. Turn the machine off and remove the ignition key.
6. Unscrew the retaining screw **A** and remove the safety prop **B** from the bracket.
7. Pull the plug fuses **C** from the lock pins **D** and remove the lock pins from the safety prop.
8. Slide safety prop **B** from below over the piston rod of the extended lifting cylinder and turn it 180°.
9. Install lock pin **D** and secure it with a safety pin.
10. Carefully lower the loader unit (without pressure) onto the safety prop.

NOTICE

Install the safety support as shown in *Fig. 206* in order to avoid damage to the piston rod and the safety support!

- ► Opening showing downward!

Information

Before Start the vehicle, remove the safety prop from the lift cylinder and fasten it in its storage place again!

7.2 Maintenance overview

Maintenance plan

Important information on the maintenance plan

For warranty claims to be acknowledged, the maintenance, "delivery inspection" and inspection "**A**" 1st inspection after 100 o/h, "**B**" 2nd inspection subsequently every 500 o/h and "**C**" every 1500 o/h (annually) must be performed by an authorized service center.

For service and maintenance on the attachment, please refer to the operation and maintenance manual of the attachment manufacturer as well.

Work description[1]	Service center	User/operator		Service center		
Oil and filter changes (⇄)	Delivery inspection	Every 10 o/h (once a day)	Every 20 o/h	Inspection "A"	Inspection "B"	Inspection 'C"
Replace the gearbox ail in the gearbox on the hydraulic motor				●		●
Change the gearbox oil in the differential (front and rear axles)				●		●
Change the gearbox oil in the planetary drives on the left and right (front and rear axles)				●		●
Replace the hydraulic oil						●
Replace the hydraulic oil filter insert (return)				●		●
Replace the breather filter – Hydraulic oil reservoir						●

1. Have maintenance and repairs only performed by an authorized service center (acknowledgement of warranty claims)

Work description[1]	Service center	User/operator		Service center		
Inspection work (👁)	Delivery inspection	Every 10 o/h (once a day)	Every 20 o/h	Inspection "A"	Inspection "B"	Inspection "C"
Check hydraulic oil level	●	●		●	●	●
Check gearbox oil level in front and rear axle differential	●			●	●	●
Check gearbox oil level in front and rear axle, left and right planetary drives	●			●	●	●
Check gearbox oil level in gearbox at the hydraulic motor	●			●	●	●
Check the brake fluid (ATF) level [2, 3]	●	●		●	●	●
Check all pressure accumulators (load stabilizer), correct the pressure level if necessary[4]					●	●
Check hydraulic oil radiator (optional) for dirt, clean if necessary[5]		●		●	●	●
Clean the high pressure filter – pump/priority valve						●
When using biodegradable oil: drain the condensation water in the hydraulic oil reservoir[6]					●	●
Check the electric motors, clean if necessary		●		●	●	●
Check the pedals. Clean them and apply grease or oil if necessary		●		●	●	●
Check the locks/door arrester. Clean them and apply grease or oil if necessary		●		●	●	●
Check the battery and battery compartment, clean if necessary		●		●	●	●
Clean the fine-dust filter of the heating system (replace every 500 o/h)			●	●	●	●

1. Have maintenance and repairs only performed by an authorized service center (acknowledgement of warranty claims)
2. Replace every 2 years.
3. Do not mix the brake fluid with other brake fluids for safety reasons.
   Use only **ATF** brake fluids for adding fluid.
4. Have the pressure accumulators checked only by an authorized service center (acknowledgment of warranty claims).
5. Clean radiator more frequently depending on operation and dust conditions, in particular if the machine is used for mowing and mulching applications
6. When using biodegradable oil in the hydraulic oil reservoir: drain the condensation water every 500 o/h, in any case before the cold season.

See next page for additional inspection work.

Work description[1]	Service center	User/operator		Service center		
Inspection work (👁)	Delivery inspection	Every 10 o/h (once a day)	Every 20 o/h	Inspection "A"	Inspection "B"	Inspection "C"
Check the brake lining[2] of the service brake and renew if necessary				●	●	●
Check parking brake and renew parts if necessary[2]				every 2 years		
Tire check (damage, inflation pressure, tread depth)	●		●	●	●	●
Electrical system: check electric and ground connections, chafing on wiring harnesses, battery terminals			●	●	●	●
Check the battery, cable and battery connector for damage and to determine it is securely seated[3]		●	●	●	●	●
Battery: check charging level; and charge if necessary	●	●		●	●	●
Clean and check the battery terminals					●	●
Measure the insulation resistance of the HV components[4]				●	●	●
Measure the insulation resistance of the battery[4]						●
Measure potential equalization[4]				●	●	●
Measure battery off-load voltage[4]				●	●	●
Check the insulation monitor function[4]				●	●	●
Check drive shut-off				●	●	●

1. Have maintenance and repairs only performed by an authorized service center (acknowledgement of warranty claims)
2. Safety part! Have maintenance and repairs performed only by an authorized service center
3. The operation/driver may not remove covers with high voltage markings for inspection
4. Have checked by an electrician in accordance with IEC 62485-3 and EN 1987-1.

Work description[1]	Service center	User/operator		Service center		
Lubrication[2]( ) (Note: lubricate more frequently when in heavy-duty operation!)	**Delivery inspection**	**Every 10 o/h (once a day)**	**Every 20 o/h**	**Inspection "A"**	**Inspection "B"**	**Inspection "C"**
Hinges, joints (for example door arresters)			●	●	●	●
Rear axle oscillating bearing	●		●	●	●	●
Front and rear axle planetary drive bearings (left and right)	●		●	●	●	●
Loader unit – *see "Lubricating the loader unit" on page 7-30*						
Lift chassis bearing	●	●		●	●	●
Tilt rod bearing	●	●		●	●	●
Rocker arm bearing	●		●	●	●	●
Lift ram bearing	●	●		●	●	●
Tilt ram bearing	●	●		●	●	●

1. Have maintenance and repairs only performed by an authorized service center (acknowledgement of warranty claims)
2. Observe the manufacturer's indications for the lubrication of attachments!

Work description[1]	Service center	User/operator		Service center		
Leakage check ( )	**Delivery inspection**	**Every 10 o/h (once a day)**	**Every 20 o/h**	**Inspection "A"**	**Inspection "B"**	**Inspection "C"**
Cooling system (hydraulic oil) (option)	●	●		●	●	●
Steering system[2] (hose pipes and steering cylinders)	●	●		●	●	●
Hydraulic system (hose pipes[3] and cylinders)	●	●		●	●	●
Braking system[2] (flexible lines and cylinders)	●	●		●	●	●
Air conditioning system (opt) – hose pipes, condenser, dehumidifier	●	●		●	●	●

1. Have maintenance and repairs only performed by an authorized service center (acknowledgement of warranty claims)
2. Safety part! Have repair work performed only by an authorized service center
3. Replace hose pipes every 6 years (DIN 20066 T5)

Work description	Service center	User/operator		Service center		
Check bolts and nuts for tightness, re-tighten them if necessary:	Delivery inspection	Every 10 o/h (once a day)	Every 20 o/h	Inspection "A"	Inspection "B"	Inspection "C"
Engine and engine bearing			●	●	●	●
Steering system[1]			●	●	●	●
Hydraulic system			●	●	●	●
Loader unit (pin locking)			●	●	●	●
Axle mounting, axle suspension			●	●	●	●
Battery bolting			●	●	●	●
Fastening screws of cardan shafts			●	●	●	●
Fastening screws of cabin			●	●	●	●
Wheel nuts	●		●	●	●	●

1. Safety part! Have maintenance and repairs performed only by an authorized service center

Work description[1]	Service center	User/operator		Service center		
Functional check (👁)	Delivery inspection	Every 10 o/h (once a day)	Every 20 o/h	Inspection "A"	Inspection "B"	Inspection "C"
Service and parking brake[2, 3]	●	●		●	●	●
Steering system[2] synchronous position of wheels	●	●		●	●	●
Electrical system – lights, indicator lights, signaling system, washer system	●	●		●	●	●
Heating and air conditioning system (opt)	●	●		●	●	●
Drive interlock (opt)	●	●		●	●	●
Seat adjustment, seat belt	●	●		●	●	●
Lock – control lever (joystick) and 3rd control circuit (road travel)	●	●		●	●	●
Loader unit load stabilizer (opt)	●	●		●	●	●

1. Have maintenance and repairs only performed by an authorized service center (acknowledgement of warranty claims)
2. Safety part! Have maintenance and repairs performed only by an authorized service center.
3. In order to ensure a safe braking system, perform maintenance and servicing regularly when the machine is used in an aggressive environment (salt applications)

Service indication

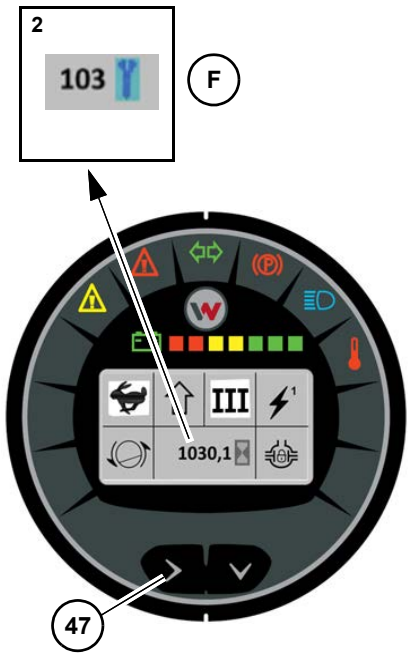


Fig. 207

Maintenance intervals indication

The maintenance intervals are displayed by the maintenance indicator display **F/2** in the gauge on the instrument panel.

If less than 20 operating hours remain before the next inspection is due, the remaining number of hours until inspection is displayed here for 10 seconds when the starter is engaged.

The remaining number of hours up to the next inspection can be queried in the display at any time. Press button **47** to call up the remaining number of hours. In the startup screen, the display of the operating hours switches to a display of the number of hours until the next inspection **F/2**.

Information

Maintenance intervals – *see "Maintenance plan" on page 7-6*.

Error code display

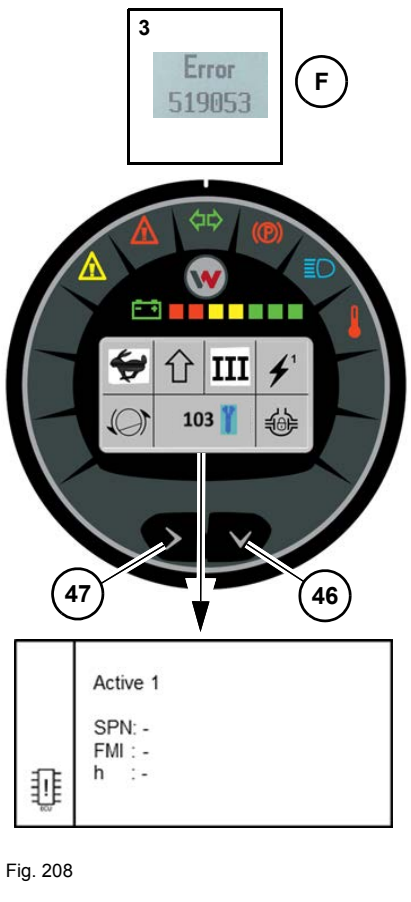


Fig. 208

Error code indicator travel drive and work hydraulics

If an error occurs in the electronics of the travel drive or work hydraulics, which is not displayed via its own indicator light, then an error message is displayed for 3 seconds as an error code in field **F/3** of the gauge on the instrument panel.

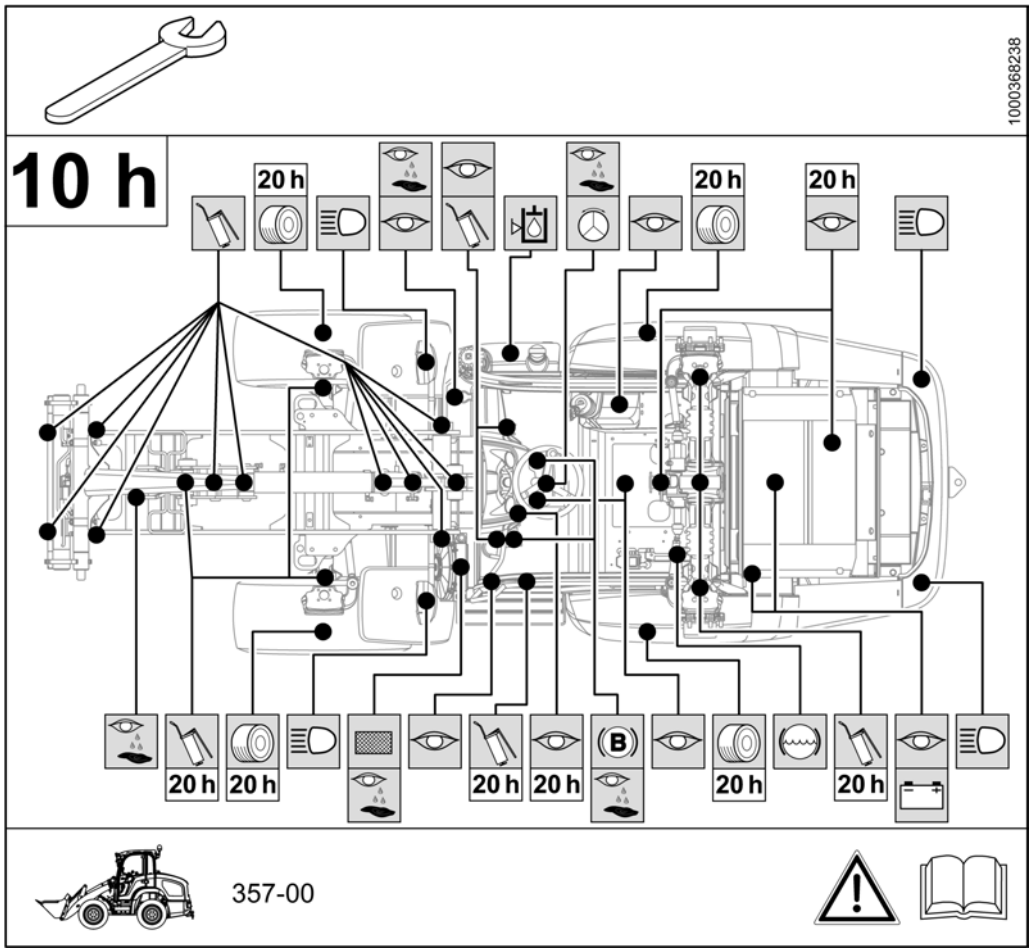
Errors are saved and can be recalled at any time. To do this, after calling up the service display by using button **47**, press button **46**. Each time that button **46** is pressed, the digital display scrolls one more page within the service display.

➥ If multiple error messages are present, these can be called up one after the other in the display.

Description – *see chapter 8 “Displays” on page 8-5*.

Maintenance label

Affixed on the cabin



Explanation of symbols on the maintenance label

Symbol	Explanation
	Before starting maintenance, follow the safety instructions in the Operator's Manual!
	Before starting maintenance, read the "Maintenance" chapter in the Operator's Manual!
	Perform a functional check of the light system!
	Check tires for damage, inflation pressure and tread depth!
	Check the brake fluid. Add fluid if necessary!
	Perform a functional check and synchronize the steering system!
	Perform a functional check of the braking system!
	Check hydraulic oil level. Add oil if necessary!
	Check hydraulic oil radiator for dirt. Clean if necessary!
	Check the battery voltage and recharge if necessary!
	Visual check! Check! Check the condition, wear, firm or contact-preserving seat of components, threaded fittings, plug-and-socket connections, ground connections, cable ties and check hose pipes for chafe marks. Re-tighten loose connections and replace damaged parts immediately!
	Leakage check:
	Lubrication service! Lubricate the assemblies concerned!

7.3 Fluids and lubricants

Overview: Fluids and lubricants (part 1)

Component/ application	Capacities[1]	Fluid/lubricant[2]	SAE grade Specification	Season/ temperature
Gearbox	0.8 l (0.21 gal)	Universal gearbox oil	SAE 80 – 90 GL5	Year-round
Front or rear axle differentials[3]	3.0 l (0.8 gal) each	Gearbox oil[4]	SAE 90 LS (Eurolub Gear LS 80W – 90 GL5)	Year-round
Planetary drives front or rear axle[3]	0.5 l (0.13 gal) each			
Hydraulic system/ hydraulic oil reservoir	approx. 52/40 l (11.44/10.57 gal)	Hydraulic oil[5]	HVLPD 32[6]	−30 °C (−22 °F)
			HVLPD 46	Year-round
		Biodegradable oil	AVILUB Syntofluid 46	Year-round
			PANOLIN HLP Synth 46	
Grease zerks loader unit/axles	As required	High pressure multi-purpose grease	Lithium soap branded grease AVIALITH EP 2 KP 2 K-30[7], Fuchs "gleitmo" 800[8]	Year-round
Battery terminals		Acid-proof grease	SP-B	
Attaching[9] pins, shafts	–	–	–	–

1. The capacities indicated are approximate values; the oil level check alone is relevant for the correct oil level.
2. Bear in mind the safety data sheet of the engine/machine fluids.
3. Capacity indications for each axle or planetary drive.
4. Specification: API GL 5 MIL-L-2105 D.
5. DIN 51 524/ISO 11158-HM.
6. Used in Scandinavian countries only.
7. Under normal stress
8. Under heavy stress (e.g. for bolts)
9. Notice! Pins and shafts are hard chromium plated and are used dry. After assembly: lubricate pins and shafts using grease zerks.

See next page for more fluids and lubricants.

Overview: Fluids and lubricants (part 2)

Component/ application	Capacities[1]	Fluid/lubricant[2]	SAE grade Specification	Season/ temperature
Braking system	0.5 l (0.13 gal)	Brake fluid[3]	**ATF** Suffix type A	–
Washer system	Water 0.5 l (0.13 gal) Antifreeze 1.0 l (0.26 gal)	Cleaning agent	Water + antifreeze	Year-round −20 °C (−4 °F)
Air conditioning (option)[4]	About 0.85 kg (1.87 lb)	Refrigerant	R 134a	–
Aggressive media [5] (option)	As required	Anti-corrosion protection	ELASKON 2000 ML, ELASKON UBS light, ELASKON Aero 46 special, ELASKON Multi 80	Year-round

1. The capacities indicated are approximate values; the oil level check alone is relevant for the correct oil level.
2. Bear in mind the safety data sheet of the engine/machine fluids.
3. In order to avoid braking system failure, use only **ATF** brake fluids.
4. Maintenance may only be performed by the trained technical personnel of an authorized service center.
5. Have the sealing checked and repaired at least once a year by ELASKON – see the Elaskon servicing pass supplied with the machine.

Coolant

Only use the coolant additives specified in table “Overview of lubricants” – see page *7-14*.

Environment

Dispose of throwaway containers according to national regulations.

Important information on operation with biodegradable oils

- Use only the tested and approved biodegradable hydraulic fluids – see "Fluids and lubricants" on page 7-14. Always contact the manufacturer for the use of products other than those that have been recommended. In addition, ask the oil supplier for a written declaration of guarantee. This guarantee is applicable to damage occurring on the hydraulic components that can be proved to be due to the hydraulic fluid.
- When biodegradable oil is being refilled, use the same type of biodegradable oil. In order to avoid misunderstandings, a label providing clear information is located on the hydraulic oil reservoir (next to the filler inlet) regarding the type of oil currently used! Replace missing labels!
  Mixing two different biodegradable oils can worsen the quality of one of the oil types. Therefore, when changing biodegradable oil, ensure that the remaining amount of the original hydraulic fluid in the hydraulic system does not exceed 8% (manufacturer indications).
- Do not add mineral oil – the content of mineral oil should not exceed 2 % by weight in order to avoid foaming problems and to ensure biodegradability.
- When running the machine with biodegradable oil, the same oil and filter replacement intervals are valid as for mineral oil – see "Maintenance plan" on page 7-6.
- The condensate in the hydraulic oil tank has to be drained by an authorized specialist workshop every 500 hours of operation, and in any case before the cold season starts.
  The water content must not exceed 0.1% by weight.
- The instructions in this Operator's Manual concerning environmental protection are also valid for the use of biodegradable oil.
- If additional hydraulic attachments are installed or operated, use the same type of biodegradable oil for these attachments to avoid mixtures in the hydraulic system.

Information

Subsequent change from mineral oil to biodegradable oil must be performed by an authorized service center or by a dealer.

7.4 Maintenance accesses

Battery cover plate

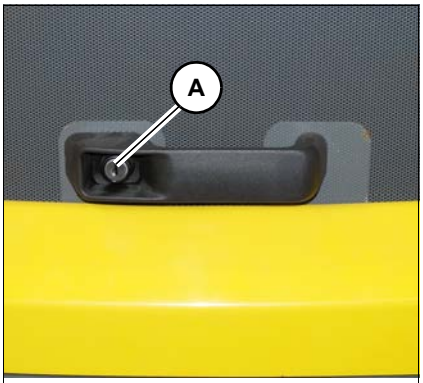


Fig. 209

Opening the battery cover plate

DANGER

Risk of electric shock from defective components or contact with the high-voltage system!

Causes serious injury or death.

- ► Before opening the battery cover plate, actuate the motor isolating switch and remove the ignition key.
- ► The battery cover plate may only be opened by specially trained personnel.
- ► Do not touch damaged high-voltage system components or cables (orange-labeled).

1. Switch off motor isolating switch.
2. Turn the machine off and remove the ignition key.
3. Lock the lock with the ignition key **A**.
4. Press lock **A**.
   - ➥ The battery cover plate is raised upwards over a gas pressure absorber.

Closing the battery cover plate

WARNING

Danger of electric shock from damaged cable!

Can cause serious injury or death.

- ► Before closing the battery cover plate, make certain that no cable can be damaged.
- ► Do not touch damaged cables.

1. Firmly press down the battery cover plate, until the lock engages with an audible click.
2. Lock the lock **A**.with the ignition key.

Operator seat

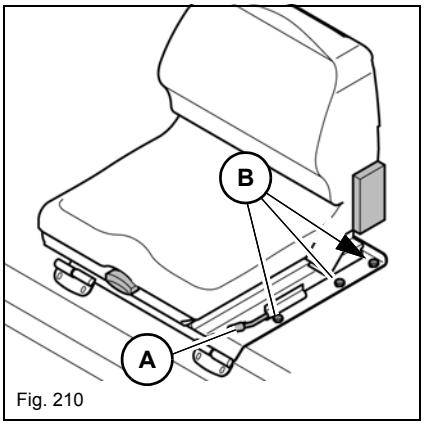


Fig. 210


Fig. 211

Folding the operator seat forwards

1. Pull handle **A** and push operator seat fully backwards.
2. Unscrew the 3 hexagon screws **B** on each side of the operator seat.
3. Fold the operator seat forward and secure against falling back, e.g. with a seat belt on the steering column (see fig.).

7.5 Cleaning and maintenance

Important information on cleaning and maintenance

The wrong choice of cleaning equipment and agents can impair the operating safety of the machine on the one hand, and on the other put the health of the persons in charge of cleaning the machine at risk. Therefore always observe the following instructions.

WARNING

Danger of electric shock from water in the vehicle electronics!

Water under high pressure may penetrate into the vehicle electronics and may lead to severe injuries or death due to a short circuit.

► Do not clean electrical components (motors, power electronics, instrument panels, connectors etc.) using a high-pressure cleaner.

NOTICE

Damage to machine due to cleaning work.

► Pay attention to the lower side in particular when cleaning the machine. Do not allow dirt to collect on the motors or gearbox.

► Ensure that the hydraulic oil radiator fins (opt) are clean throughout and not blocked.

► Do not damage the radiator fins when cleaning with a high-pressure cleaner.

► Do not point the water jet of the high-pressure cleaner at the seals of the piston rods of the hydraulic cylinders.

Information

Machines with anti-corrosion protection (“aggressive media”) must be cleaned separately *– see "Machine preservation" on page 7-84*!

Environment

In order to avoid damage to the environment, clean the machine only in wash bays and places provided to this effect.

Cleaning with washing solvents

- Ensure sufficient room ventilation.
- Wear appropriate protective equipment.
- Do not use flammable liquids, such as gasoline or diesel.

Cleaning with compressed air

- Work carefully.
- Wear safety glasses and protective clothing.
- Do not aim the compressed air at the skin or at other people.
- Do not use compressed air for cleaning your clothing.

Cleaning with a high-pressure cleaner or steam jet

- Do **not** clean inside the cabin.
- Electrical components and damping material must be covered and **not** directly exposed to the water jet.
- Cover the breather filter on the hydraulic oil reservoir and cover of the hydraulic oil reservoir etc.
- Cover the piston rods of the hydraulic cylinders (the scraper is not watertight, and water in the guide bushing causes corrosion and damage to the piston rod).
- Cover electric parts, such as motors, power electronics, fuses, ignition lock, indicator and light switches, relays, etc.
- Cover the controls and seals.

Cleaning with flammable anticorrosion protection

- Ensure sufficient room ventilation.
- Do not use unprotected lights or open flames.
- Do not smoke.

Cleaning inside the cabin

NOTICE

In order to avoid damage to the machine's electrical system, never use high-pressure cleaners, steam jets or high-pressure water to clean inside the operator's cabin.

► Water under high pressure can penetrate into the electrical system and cause short circuits.

► Seals are damaged and control elements are disabled!

The following aids are recommended for cleaning:

- Broom
- Vacuum cleaner
- Damp cloth
- Bristle brush
- Water with mild soap solution

Cleaning the seat belt (lap belt)

⚠ CAUTION

Risk of injury! Dirty or malfunctioning automatic safety belts can prevent them from rolling up properly and impair the operator's safety!

Can cause injury.

► Clean the seat belt with water and a mild soap solution.

► Only wind the seat belt when it is dry!

► Have a malfunctioning belt immediately replaced by a qualified service center.

- Clean the seat belt (which remains fitted in the machine) with a mild soap solution only.
- Do not use chemical agents since they destroy the fabric.

Cleaning the pedals

WARNING

Accident hazard due to dirt or malfunction of the pedals.

Can cause serious injury or death.

- ► Keep the floor under the pedals clean.
- ► Do not place any objects in the leg room.
- ► Clean the pedal plates.

1. Park the machine on firm and level ground.
2. Apply the parking brake.
3. Lower the loader unit and the attachment to the ground without applying any pressure to it.
4. Turn the machine off and remove the ignition key.
5. Thoroughly clean the pedals and the leg room.

Cleaning the exterior of the machine

NOTICE

Damage to machine due to cleaning work.

- ► Pay attention to the lower side in particular when cleaning the machine.
  - ➥ The cooling of components is impaired by a strong accumulation of dirt on the engines and on the transmission. This can lead to overheating.
- ► Do not damage the radiator fins when cleaning with a high-pressure cleaner.
- ► Do not point the water jet of the high-pressure cleaner at the seals of hydraulic cylinders.
- ► Do not clean sensitive electrical components (motors, power electronics, instrument panels, connectors etc.) using a high-pressure cleaner – *see "Cleaning the engines" on page 7-24*.

NOTICE

Damage to paint coating, articulations, threaded fittings, etc., due to corrosion can occur if the machine is used in a saline environment.

- ► Clean the machine thoroughly with water after any travel on saline ground conditions or roads and going to a different site!

The following aids are recommended for cleaning:

- High-pressure cleaner
- Steam jet
- Compressed air
- Broom

Cleaning the engines

CAUTION

Risk of injury due to hot and moving engine parts!

Hot and moving engine parts can cause injury.

► Let the engine cool down.

► Wear protective equipment.

NOTICE

The humidity penetrating while cleaning the motors causes the electronics to fail and leads to engine damage!

► The engine must be cold.

► If water should unintentionally penetrate into the motors, clean the motors with compressed air and spray with contact spray.

The following aids are recommended for cleaning:

- Broom
- Water hose
- Bristle brush

Cleaning the battery

Cleaning the cell array, battery tray and insulators is necessary in order to maintain the required insulation of the cells against each other, against ground or foreign, conductive objects. In addition, damages and accidents from corrosion and leakage currents are avoided.
Leakage currents can arise if the dust deposits on the battery combine into a conductive layer with small amounts of electro-particles, which may leak when charging the battery. Leakage currents then flow through this layer.
Weak leakage currents can result in the self-discharge of individual cells or of the battery (reduced capacity).
Electrical sparking cannot be ruled out if higher leakage currents flow. This sparking can cause explosive gas, which issues from cells when charging the battery, to explode.

Safety instructions

WARNING

Risk of injury due to chemicals!

The batteries contain acids, which are poisonous and corrosive. This is why batteries can release explosive gases that can explode if they ignite. The squirting battery acid can then cause serious burns.

- ► Read and observe the Operator's Manual of the battery.
- ► Observe the manufacturer's cleaning instructions.
- ► Do not smoke, avoid fire and open flames.
- ► Do not use any heating devices with open flames.
- ► Avoid contact of the battery acid with the skin, eyes and mouth. In case of contact with battery acid, immediately flush the contaminated parts of the body with plenty of clear water and seek medical attention at once.
- ► It is essential to wear protective clothing and goggles when working on batteries.
- ► When cleaning, use a dry cleaning cloth.
- ► Do not remove or open cell plugs.

WARNING

Accident hazard from dirty battery!

A dirty battery can lead to short-circuits or leakage currents and thus to serious injury or even death.

- ► Keep the battery clean.

WARNING

Risk of explosion from static charging!

Cleaning with a feather duster or dry cloths made of synthetic fibers can lead to static charging and thus to a gas explosion.
Serious injuries and death can result.

► Only clean the battery surfaces with cotton or paper towels moistened with water.

NOTICE

It is possible to clean the battery with a high-pressure cleaner. Cleaning with a high-pressure cleaner can damage the battery's plastic parts, cell lids, cell connector insulation or cell plugs. The following must be observed if the battery is cleaned with a high-pressure cleaner:

► Before cleaning, check whether the cell connectors are firmly tightened and inserted.
► Before cleaning, check whether the cell plugs are shut.
► Maintain a distance of at least 30 cm (12 in) between the nozzle and the battery.
► Do not exceed an operating pressure of 50 bar (725 psi).
► Only spray broadly across the battery.
► Do not continue to spray on any single location for more than 3 seconds.

NOTICE

Cleaning can damage the battery!

► Only clean the battery with water.
► Do not use any cleaning additives.
► Do not exceed a maximum cleaning temperature of 60 °C (140 °).
► Dry the battery surface after cleaning with appropriate means.

The following aids are recommended for cleaning:

- Water
- Moist cloths (made of cotton or paper)

Cleaning

1. Place a suitable container below to catch possible resulting flush water that may contain electrolytes; dispose of this water in an environmentally friendly manner.
2. Clean the plastic parts of the battery with water-soaked cleaning cloths that do not contain any additives.
3. Dry the battery surface appropriately, e.g. with compressed air or anti-static linen cloths.

Checking threaded fittings

- Check all threaded fittings regularly, even if they are not listed in the maintenance plans.
- Immediately tighten loose connections. See chapter "*Technical data*" for the tightening torques.

Information

Maintenance intervals *– see "Check bolts and nuts for tightness, re-tighten them if necessary:" on page 7-10*.

Checking pivots and hinges

- Lubricate all mechanical pivot points on the machine (for example door hinges, joints) and fittings (for example door arresters) regularly, even if they are not listed in the lubrication plan.
- Check the accelerator and brake pedals for dirt, clean them if necessary, apply spray oil to the joints.

Information

Maintenance intervals *– see "Maintenance plan" on page 7-6*.

7.6 Lubrication work

Lubricating the rear axle oscillation-type bearing

Information

Maintenance intervals – *see "Maintenance plan" on page 7-6*.
Lubricant – *see chapter 7 "Fluids and lubricants" on page 7-14*.

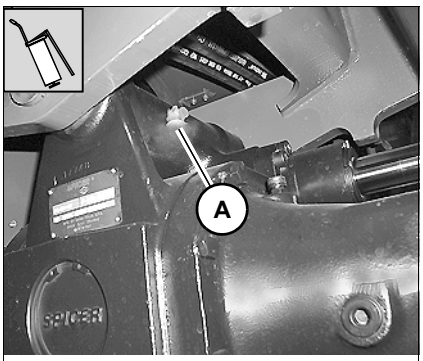


Fig. 212

1. Park the machine on level ground.
2. Apply the parking brake.
3. Secure the machine with a wheel chock.
4. Only raise the loader unit until all zerk fittings can be accessed without any risk.
5. Switch off motor isolating switch.
6. Turn the machine off and remove the ignition key.
7. Lubricate grease zerk **A** of the oscillation-type bearing.

Lubricating the planetary drive bearing (front and rear axles)

Information

Maintenance intervals – *see "Maintenance plan" on page 7-6*.
Lubricant – *see chapter 7 "Fluids and lubricants" on page 7-14*.

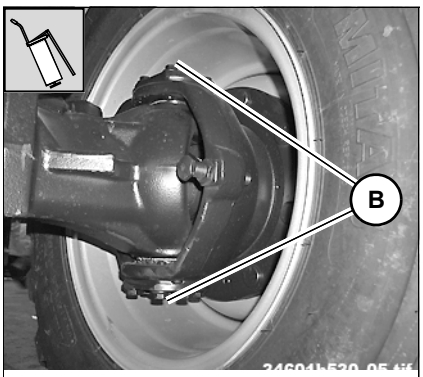


Fig. 213

1. Park the machine on level ground.
2. Apply the parking brake.
3. Secure the machine with a wheel chock.
4. Only raise the loader unit until all zerk fittings can be accessed without any risk.
5. Turn the steering wheel for better access.
6. Switch off motor isolating switch.
7. Turn the machine off and remove the ignition key.
8. Lubricate grease zerks **B** (2 x) on each planetary drive bearing.

Lubricating the door arrester

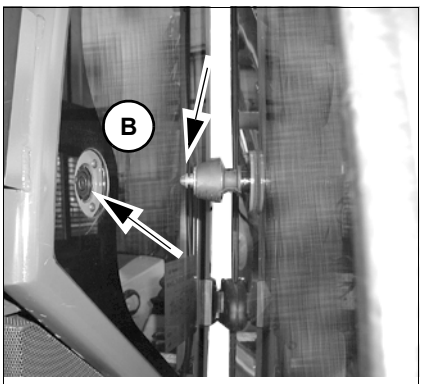


Fig. 214

Information
Maintenance intervals – *see "Maintenance plan" on page 7-6*.
Lubricant – *see chapter 7 "Fluids and lubricants" on page 7-14*.

1. Apply a thin coat of grease to door arrester **B**.

Lubricate the window lock

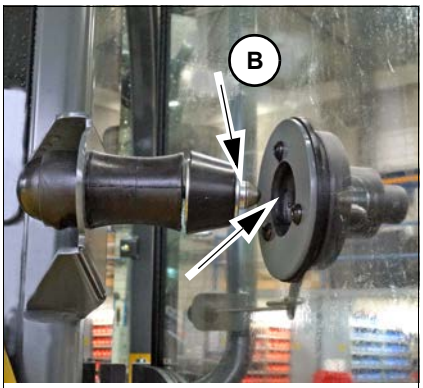


Fig. 215

Information
Maintenance intervals – *see "Maintenance plan" on page 7-6*.
Lubricant – *see chapter 7 "Fluids and lubricants" on page 7-14*.

1. Apply a thin coat of grease to window lock **B**.

Lubricating the loader unit

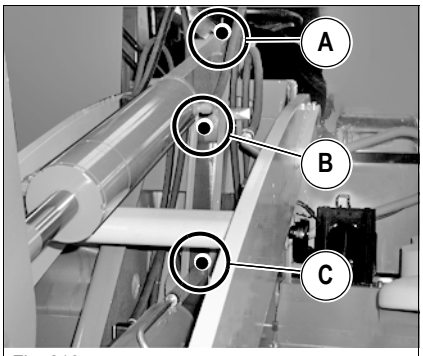


Fig. 216

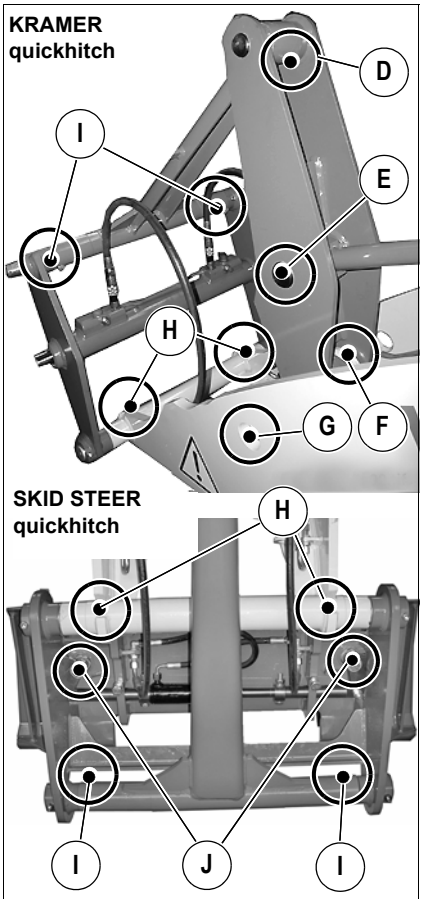


Fig. 217

Loader unit lubrication points (overview)

A Lubricate the grease zerk of the tilt cylinder bearing on the frame every 10 operating hours. Lubricate more frequently when in heavy-duty operation.

B Lubricate the grease zerk of the loader unit bearing every 10 operating hours. Lubricate more frequently when in heavy-duty operation.

C Lubricate the grease nipple on the lift ram bearing on the frame every 20 operating hours.

D Lubricate the grease zerk of the tilt rod bearing every 10 operating hours. Lubricate more frequently when in heavy-duty operation

E Lubricate the grease zerk of the tilt ram bearing every 20 operating hours

F Lubricate the grease zerk of the lift ram bearing every 20 operating hours. Lubricate more frequently when in heavy-duty operation

G Lubricate grease zerks of the tilt lever bearing every 10 operating hours. Lubricate more frequently when in heavy-duty operation

H Lubricate the grease zerks of the quickhitch bearing every 10 operating hours. Lubricate more frequently when in heavy-duty operation

I Lubricate grease zerks of the tilt lever bearing every 10 operating hours. Lubricate more frequently when in heavy-duty operation

J Lubricate grease zerks of the tilt lever bearing of the SKID STEER quickhitch (opt) every 10 operating hours; lubricate more frequently when in heavy-duty operation

K Lubricate grease nipples of the lock pins every 10 operating hours; lubricate more frequently when in heavy-duty operation

Lubrication

1. Set the quickhitch to a horizontal position.
2. Only raise the loader unit until all zerk fittings can be accessed without any risk.
3. Apply the parking brake.
4. Turn the machine off and remove the ignition key.
5. Apply grease to the lubrication points with a grease gun.

Information

Maintenance intervals – *see "Maintenance plan" on page 7-6*.
Lubricant – *see chapter 7 "Fluids and lubricants" on page 7-14*.

7.7 Battery

The battery is located in the battery compartment in the rear section of the machine.

The battery is firmly installed in a battery tray and is low-maintenance.

The battery weight (in the battery tray) is specified on the type label of the battery.

Safety instructions for handling the battery

WARNING

Risk of injury due to chemicals!

The batteries contain acids, which are poisonous and corrosive. This is why batteries can release explosive gases that can explode if they ignite. The squirting battery acid can then cause serious burns.

- ► Read and observe the Operator's Manual of the battery.
- ► Only use batteries with a closed battery tray.
- ► Do not smoke, avoid fire and open flames.
- ► Do not put any tools or other metallic objects on the battery that could cause a short circuit.
- ► There must be no flammable or sparking material, fluids and lubricants in the area of the machine parked for charging.
- ► The space for charging must be well-ventilated.
- ► Have flame retardants ready.
- ► Immediately neutralize spilled battery acid with plenty of water.
- ► Avoid contact of the battery acid with the skin, eyes and mouth. In case of contact with battery acid, immediately flush the contaminated parts of the body with plenty of clear water and seek medical attention at once.
- ► It is essential to wear protective clothing and goggles when working on batteries.

WARNING

Risk of injury from touching live parts!

Touching live parts while charging the battery can result in serious injury or death.

► While charging, do not touch any live parts of the machine.

WARNING

Accident hazard from using unsuitable batteries!

The use of unsuitable batteries can result in serious injury or death.

► The weight and measurements of the battery significantly influence the stability and load carrying capacity of the machine. Only change the battery equipment with the understanding of the manufacturer, as balancing weights may be needed if a smaller battery is used, for example.

► Only use batteries that are approved by the vehicle manufacturer *– see chapter 9 “Battery” on page 9-9*.

CAUTION

Risk of injury from incorrect handling of the battery!

The incorrect handling of the battery can result in injury.

► The charging, maintenance and changing of the batteries may only be carried out by persons who are trained to do so.

► Observe the Operator's Manual and the manufacturer's instructions and regulations concerning the battery and battery charger when handling the battery.

► Keep the cell lid of the battery clean and dry.

► Keep the terminals and cable lugs clean; lightly greased with terminal grease and screwed on firmly.

► Cover batteries that do not have insulated terminals with a non-slip insulating mat.

► Take care when changing or installing the battery to ensure it is firmly seated in the battery compartment of the machine.

► Before closing the battery cover plate, make certain that the battery cable is not damaged. There is a risk of short circuit in the case of damaged cables.

► Observe the legal regulations.

General instructions on handling the battery

Environment

Always observe the national environmental-protection guidelines or waste disposal laws when disposing of used batteries. Always follow the manufacturer's indications on disposal.

Information

The battery weight is specified on the type label of the battery.

Charging the battery

Safety instructions when loading the battery

WARNING

Risk of explosion from resulting gases during charging!

A mixture of oxygen and hydrogen (oxyhydrogen) is released by the battery during charging. This gas mixture is highly explosive. Serious injuries or even death can result if the gas ignites.

- ► The voltage and charging capacity of the battery charger must match the battery. Use only battery chargers integrated by the machine manufacturer into the machine.
- ► Check the cable and plug-and-socket connections for visible damage before charging.
- ► Extension cables may be a maximum of 10 m (32.8 ft) long and must be approved for a continuous operation with 16 A.
- ► Ventilate the room in which the battery is being charged.
- ► The surfaces of the battery cells must be free during the charging process, in order to ensure sufficient ventilation.
- ► Do not smoke or use an open flame when working around the battery.
- ► There must be no flammable or sparking material, fluids and lubricants within a distance of at least 2 m within the area of the machine parked for charging.
- ► Do not perform any welding or grinding work in the area of the machine parked for charging.
- ► Have flame retardants ready. In case of fire, extinguishing with water can cause a reaction with the battery acid. Therefore, only use power a powder extinguisher. Never extinguish burning batteries with water.
- ► Do not place any metallic objects on the battery.
- ► When charging, observe the notes for low temperatures *– see chapter 4 “Notes about low and high external temperatures” on page 4-46*.
- ► Follow the safety instructions of the battery and battery charger manufacturer under all circumstances.

WARNING

Hazard due to electric current!

The battery charger works with electric current and voltages that are dangerous for human beings.

- ► The battery charger may be opened and repaired only by qualified electricians.
- ► Do not perform any modifications on the battery charger.
- ► Only connect the battery charger to a power source secured with 16 A.
- ► Only use the accompanying power cable (power cable length of the battery charger of 5 m) to connect to the power supply.
- ► Do not lengthen or shorten the battery charger's mains cable.
- ► Use battery chargers only in a technically perfect condition.

WARNING

Explosion hazard due to separation of charging cable during charging!

If the mains cable becomes disconnected from the power source during the charging process, this can cause sparking, which can ignite the gas mixture caused by the charging process. Serious injuries and death can result.

- ► Route the mains cable so that no one is caught on it or can trip over it.
- ► Do not pull on the battery charger plugs while charging.

NOTICE

Battery damage from ammonia gases!

Ammonia gases cause damage to the battery cells.

- ► There must be no ammonia gases in the area of the machine parked for charging. Do not park the machine in cowsheds, near manure storage sites or other places where there may be ammonia gases.

NOTICE

Battery damage due to wrong battery chargers!

If the battery is charged with the wrong battery charger, the battery may possibly not be fully charged. This can cause overheating and short circuits in the battery cells.

- ► The voltage and charging capacity of the battery charger must match the battery. Use only battery chargers integrated by the machine manufacturer into the machine.

NOTICE

Battery damage from discharge!

The battery can be damaged if the machine is parked several days with a discharged battery.

► Do not park the machine with a discharged battery.

► Always hook up the battery charger to a suitable power source when the machine is parked.

NOTICE

Damage to the battery charger from the wrong location!

► Park the vehicle so that the battery charger is protected against rain and snow.

Environment

Avoid environmental damage!

► Immediately neutralize released battery acid with plenty of water.

► Observe the legal regulations.

Information

The Operator's Manual of the battery charger is an essential component of the battery charger.

► Read and pay attention to the operating instructions of the battery charger.

► Keep the operating instructions of the battery charger at hand near the battery charger.

► Use battery charger only in accordance with its designated use (see the operating instructions of the battery charger).

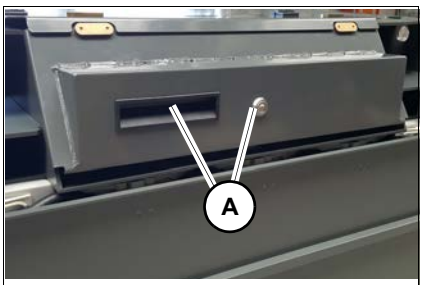
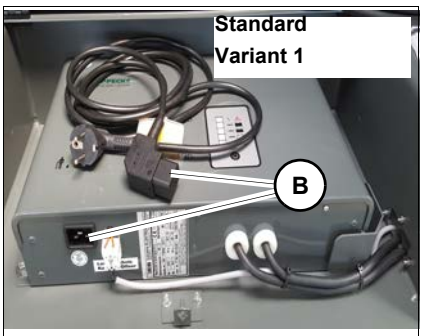


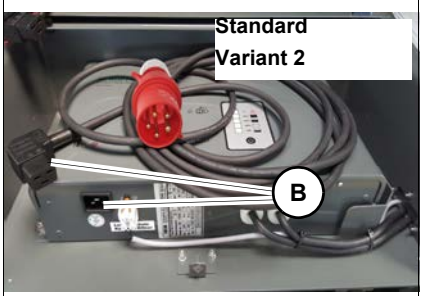
Fig. 218

Charging preparation

The battery must be charged if the control display of the battery charge condition indicates a weak charge state or if the battery performance decreases.

1. Check whether the plug receptacle provided for connecting the battery charger is designed for 16 A and the supply line is secured with 16 A.
2. Park the vehicle near a tested plug receptacle (power cable length of the battery charger of 5 meters) on a load-bearing, flat and dry surface.
3. Apply the parking brake.
4. Lower the loader unit to the ground.
5. Switch off motor isolating switch.
6. Turn the machine off and remove the ignition key.
7. Open the battery cover plate.
8. Only disconnect the battery connector up to serial number 357 00 0049 (After serial number 357 00 0050 the start-up protection in the vehicle is activated and it is no longer necessary to disconnect the battery connector)
9. Close and open the cover **A** of the battery charger.





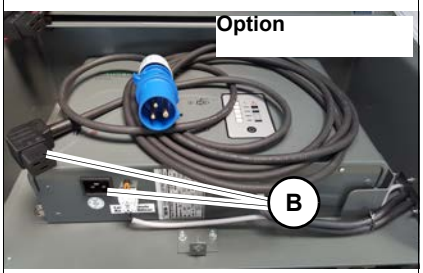


Fig. 219

Check the battery charger before connection

1. If the power cable **B** is not yet plugged into the battery charger, connect the power cable with the battery charger.
2. Check the power cable for damage and a firm seat.
3. Check the housing and switch for damage.
4. Check the insulation of the cables for damage.
5. If damages are discovered, have the damage removed prior to use by an authorized service center.

Information

Power cable version 1 phasing out starting in 2017.

Connecting the battery charger

NOTICE

If the battery cover plate is closed during charging, the power cable can be damaged.

► When closing the battery cover plate, ensure that the power cable is not damaged.

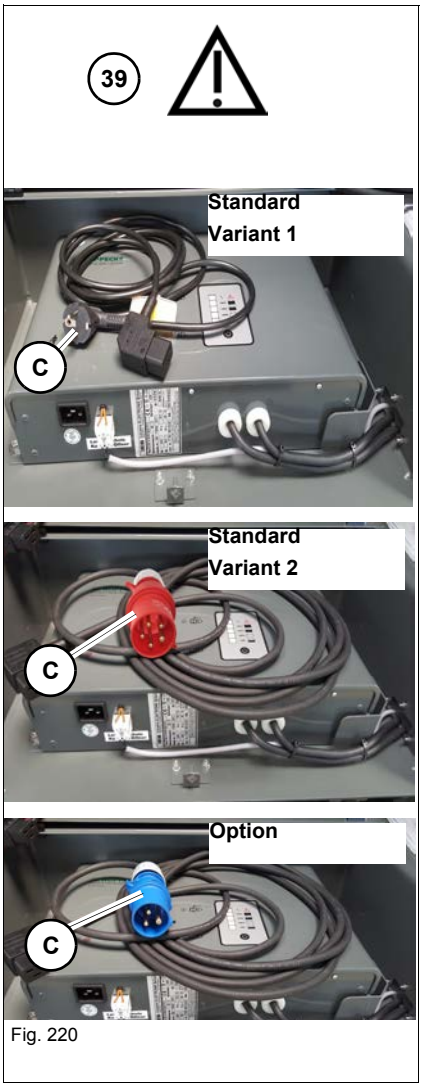


Fig. 220

1. If the machine was not used prior to charging the battery, run a test of the insulation.
   Turn on the machine.
   ➥ If the red warning light**39** in the gauge does **not** illuminate (no error message), then the battery charger can be connected.
   ➥ If the red warning light **39** in the gauge does illuminate (error message), do not connect the battery charger and have it checked out by an authorized service center
2. If the insulation has been checked, switch the motor isolating switch off again, turn the ignition key to position „**0**“ and remove the ignition key.
3. Connect the power plug **C** of the battery charger with the power source (power cable length of the battery charger 5 m).
   ➥ The battery starts charging automatically.
   ➥ The battery is being charged.
   ➥ The start-up protection in the vehicle is activated (from serial number 357 00 0050)

Charging is automatically terminated as soon as the battery is fully charged.

Information

As long as the battery charger is not disconnected from the mains, a specified charge retention will occur and the start-up protection in the vehicle will remain activated.

Information

Power cable version 1 phasing out starting in 2017.

Removing the battery charger

As soon as charging is finished and the machine is to be used again, the battery charger must be separated from the power source.

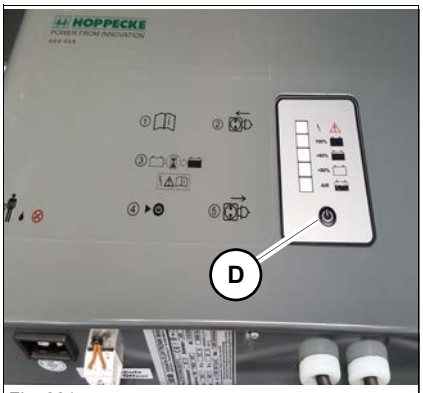


Fig. 221

1. If the battery cover plate was closed, carefully open the battery cover plate.
2. Briefly press the pause button **D** on the battery charger.
   ➥ The charging is interrupted for a minute.

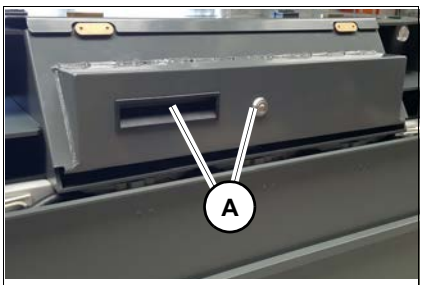


Fig. 222

3. Disconnect the mains cable connector from the power source.
4. Wind up the mains cable and stow it securely on the battery charger.
5. Close and lock cover **A** of the battery charger.

Information

If the cover of the battery charger is not closed, the start-up protection is not disabled and the vehicle can be put into operation.

6. Close the battery cover plate.

The machine can be used again when the battery charger is disconnected from the power source.

Battery installation and removal with pallet forks

Safety instructions for installation and removal

The battery may only be replaced by people who are trained on the vehicle.

The battery is firmly installed in a battery tray. The entire battery tray is replaced when replacing the battery.

For lifts, pallet stackers or crane forks can be used to install and remove the battery tray.

WARNING

Accident hazard when installing and removing the battery!

Risk of bruising, pinching or crushing when installing and removing the battery because of weight of the battery, as well as chemical burns from battery acids are a hazard.

- ► See section "*Safety instructions for handling the battery on page 7-31*".
- ► Wear protective clothing when installing and removing the battery.
- ► Only use batteries with insulated cells and insulated end-posts that have been approved by the manufacturer.
- ► Park the machine in a horizontal position to prevent the battery from slipping out.
- ► Perform any battery change using pallet forks able to bear the load.
- ► Do not damage the battery when installing or removing it.
- ► Take care to ensure the battery is firmly seated in the battery compartment of the machine.

CAUTION

Crushing hazard!

There is a risk of crushing when replacing the battery.

- ► When replacing the battery, to not reach between the battery and the frame.
- ► Wear safety glasses and protective clothing.

NOTICE

In order to avoid damage to the vehicle electronics, only use batteries approved by the vehicle manufacturer
– see chapter 9 “Battery” on page 9-9!

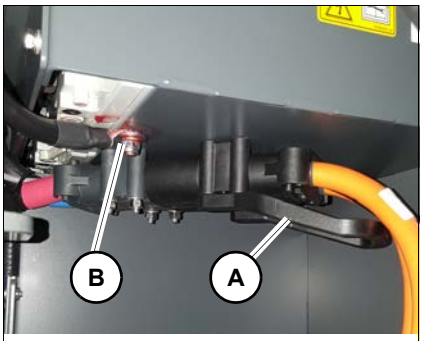


Fig. 223

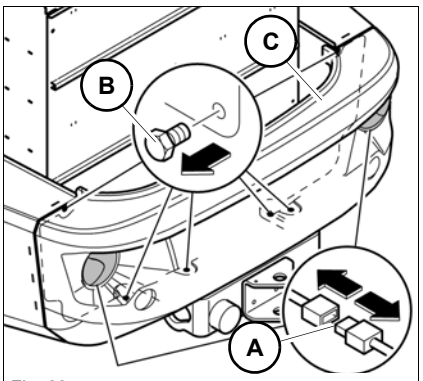


Fig. 224

Preliminary work

1. Park the machine on firm, level and dry ground.
2. Apply the parking brake.
3. Lower the loader unit to the ground.
4. Switch off motor isolating switch.
5. Turn the machine off and remove the ignition key.
6. Open the battery cover plate.
7. Pull the battery connector **A** on the strap horizontally out of the bushing.
8. Loosen the connection **B** (M8).

Removing the rear part

1. Per side, disconnect one plug-and-socket connection **A** to the rear lights.
2. On each side 3, unscrew the screws **B**.
3. Remove the rear part **C** from the centering bolts backwards.

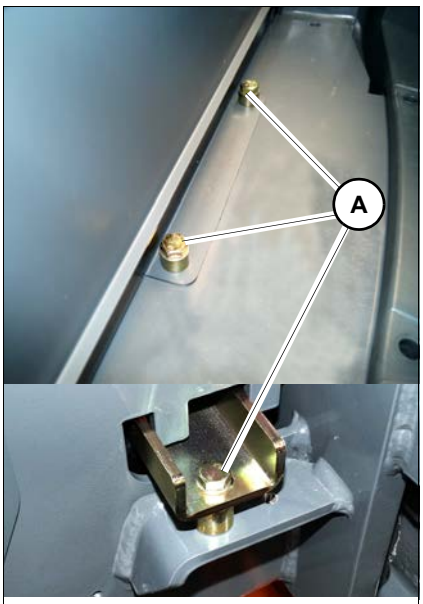


Fig. 225

Removal

1. Unscrew the retaining screws **A** (M16) to the right, left and front on the battery tray and remove with sleeves.

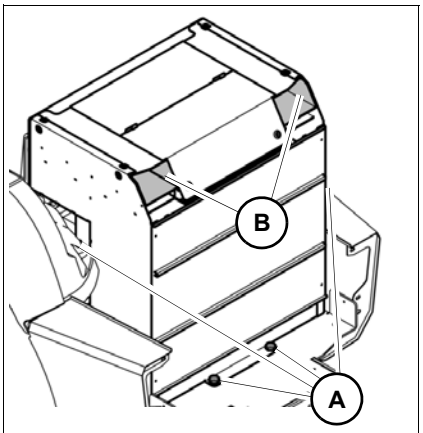


Fig. 226

2. Approach the battery with pallet fork from the rear of the machine.
3. Move the fork tines as far as possible carefully into the supports **B** on the battery tray.
4. Slightly raise the fork arms and pull the battery tray in reverse out of the front clamp.
5. Lift the battery tray and carefully pull it straight in reverse out of the rear of the machine.

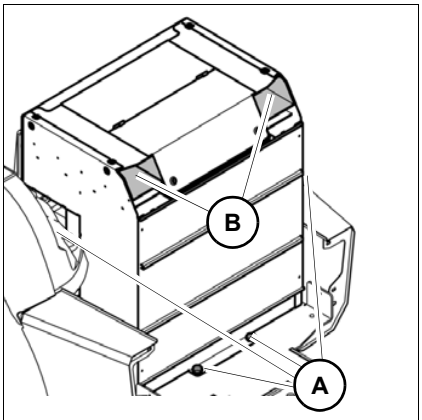


Fig. 227

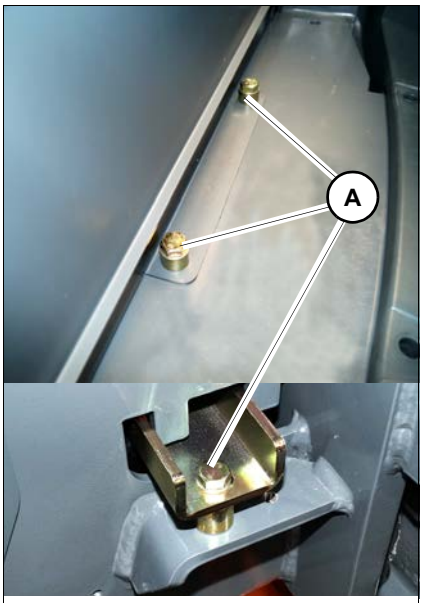


Fig. 228

Installation

1. Carefully approach the battery tray with pallet forks from behind as far as possible until stopped on the rear of the machine. Pay attention that the battery tray engages in the front clamp.
2. Driving in reverse, carefully draw the pallet forks backwards out of the supports **B** on the battery tray.
3. Align the battery tray.
4. Insert the retaining bolts **A** with sleeves and screw them in.
5. Tighten hexagon nuts to 195 Nm (144 ft lb).

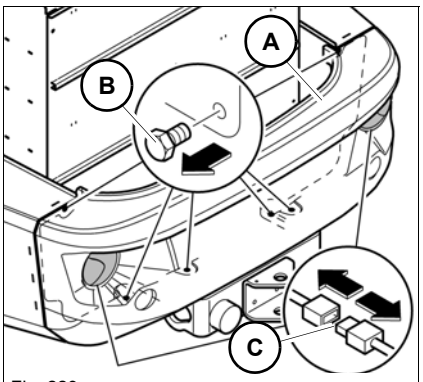


Fig. 229

Installing the rear part

1. Place the rear part **A** from behind onto the centering bolts.
2. On each side 3, screw in the screws **B** and tighten them hand-tight.
3. Align the rear part.
4. Tighten the fastening screws.
5. Per side, connect one plug-and-socket connection **A** to the rear lights.

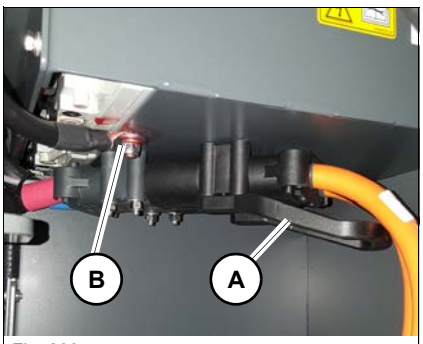


Fig. 230

Rectification

1. Tighten the connection **B** (M8).
2. Connect the battery connector **A**.
3. Close the battery cover plate.
4. Turn on the machine and test the lighting and machine functions.

Battery installation and removal with crane

Safety instructions for installation and removal

The battery may only be replaced by people who are trained on the vehicle.

The battery is firmly installed in a battery tray. The entire battery tray is replaced when replacing the battery.

WARNING

Accident hazard when installing and removing the battery!

Risk of bruising, pinching or crushing when installing and removing the battery because of weight, as well as chemical burns from battery acids are a hazard.

- ► See section "*Safety instructions for handling the battery on page 7-31*".
- ► Wear protective clothing when installing and removing the battery.
- ► Only use batteries with insulated cells and insulated end-posts that have been approved by the manufacturer.
- ► Park the machine in a horizontal position to prevent the battery from slipping out.
- ► Only change the battery using crane gear that has been tested and is sufficiently able to carry the load.
- ► Do not damage the battery when installing or removing it.
- ► Take care to ensure the battery is firmly seated in the battery compartment of the machine.

CAUTION

Crushing hazard!

There is a risk of crushing when replacing the battery.

- ► When replacing the battery, to not reach between the battery and the frame.
- ► Wear safety glasses and protective clothing.

NOTICE

In order to avoid damage to the vehicle electronics, only use batteries approved by the vehicle manufacturer
– see chapter 9 “Light bulbs” on page 9-9!

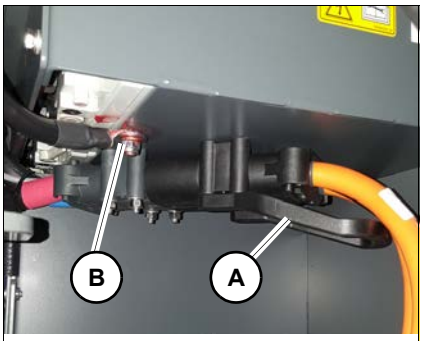


Fig. 231

Preliminary work

1. Park the machine on firm, level and dry ground.
2. Apply the parking brake.
3. Lower the loader unit to the ground.
4. Switch off motor isolating switch.
5. Turn the machine off and remove the ignition key.
6. Open the battery cover plate.
7. Pull the battery connector **A** on the strap horizontally out of the bushing.
8. Loosen the connection **B** (M8).

Removing the battery cover plate

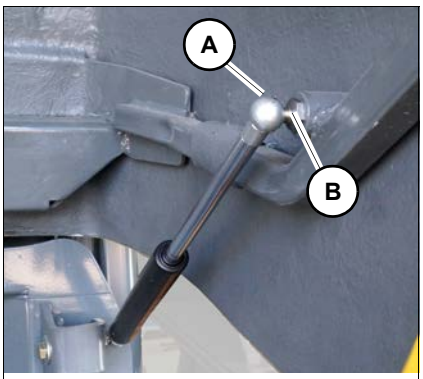


Fig. 232

CAUTION

Risk of injury from loosened battery cover plate.

Persons can be injured by the loosened battery cover plate falling off.

► Secure the battery cover plate against falling off before loosening the hinges.

1. Secure the battery cover plate against falling off.
2. On the left and right gas struts, remove the safety pin **A** and remove the gas strut **B** on the battery cover plate.
3. On the hinges of the battery cover plate, unscrew two screws **D** each from the cab.
4. Remove the battery cover plate.

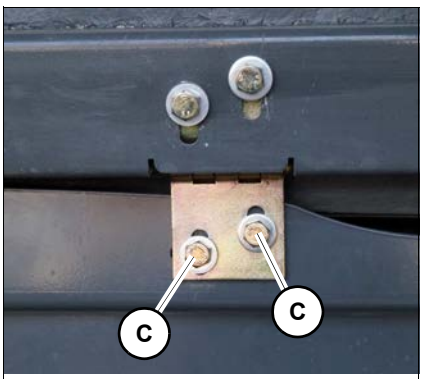


Fig. 233

Removing the rear part

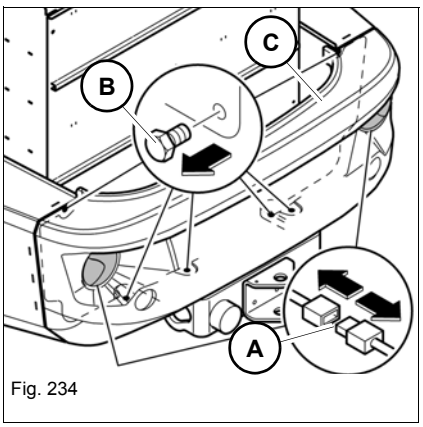


Fig. 234

1. Per side, disconnect one plug-and-socket connection **A** to the rear lights.
2. On each side 3, unscrew the screws **B**.
3. Remove the rear part **C** from the centering bolts backwards.

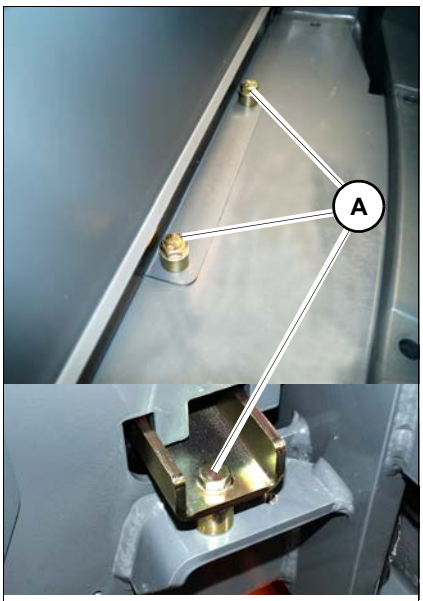


Fig. 235

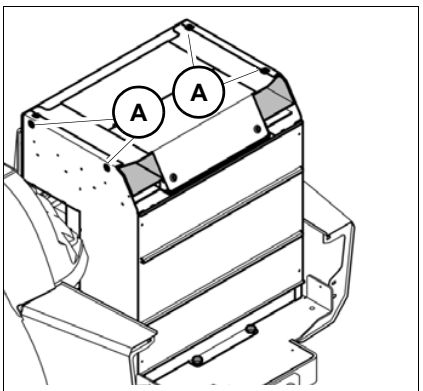


Fig. 236

Removal

1. Unscrew all of the retaining bolts **A** (M16) on the battery tray and remove them with the sleeves.
2. Knock the crane gear perpendicular onto the supports **A** on the battery tray. To do this: attach the hooks so they cannot fall on battery cells when the crane gear is loosened.
3. Lift the battery tray in reverse upwards and swing out of the machine.

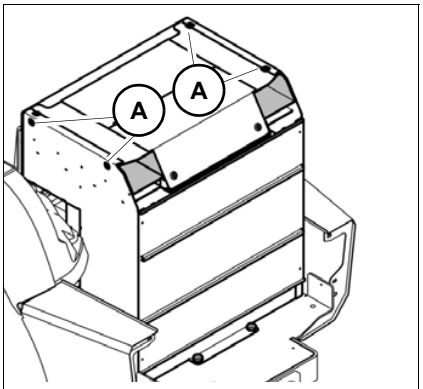


Fig. 237

Installation

1. Knock the crane gear perpendicular onto the supports **A** on the battery tray. To do this: attach the hooks so they cannot fall on battery cells when the crane gear is loosened.
2. Carefully drive the battery from the rear as far as possible into the machine. Pay attention that the battery tray engages in the front clamp.
3. Knock the crane gear off the battery tray. To do this deposit the hooks so they cannot fall on battery cells when the crane gear is loosened.
4. Align the battery tray.

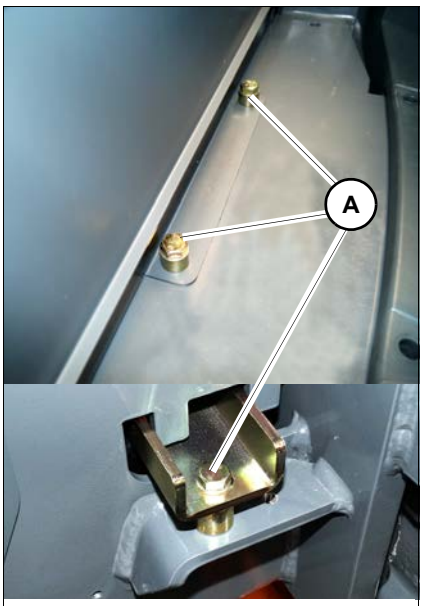


Fig. 238

5. Insert the retaining bolts **A** with sleeves and screw them in.
6. Tighten hexagon nuts to 195 Nm (144 ft lb).

Installing the rear part

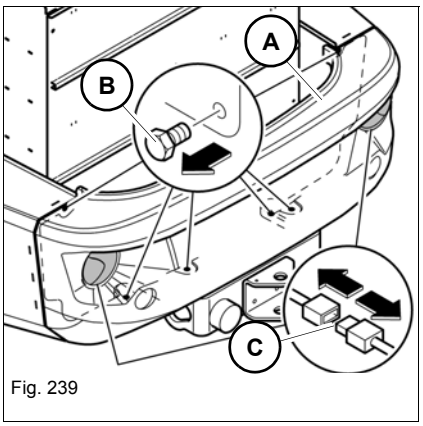


Fig. 239

1. Place the rear part **A** from behind onto the centering bolts.
2. On each side 3, screw in the screws **B** and tighten them hand-tight.
3. Align the rear part.
4. Tighten the fastening screws.
5. Per side, connect one plug-and-socket connection **A** to the rear lights.

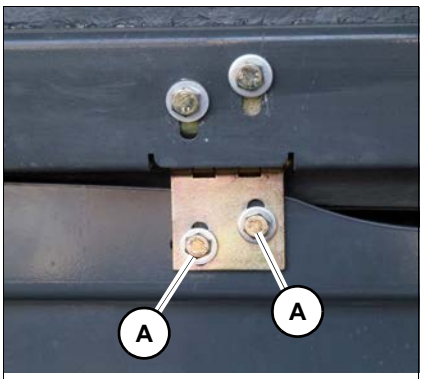


Fig. 240

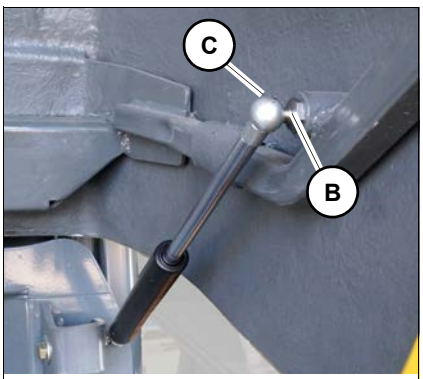


Fig. 241

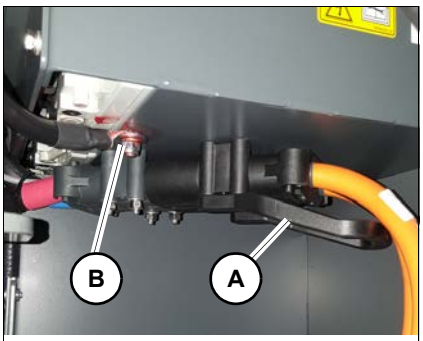


Fig. 242

Installing the battery cover plate

CAUTION

Risk of injury from loosened battery cover plate.

Persons can be injured by the loosened battery cover plate falling off.

► Secure the battery cover plate against falling off, until the hinges have again been screwed to the frame.

1. Secure the battery cover plate against falling off.
2. Place the battery cover plate onto the machine.
3. On the hinges of the battery cover plate, manually screw in two screws **A** each in the threads in the rear wall of the cabin.
4. Place gas struts on the left and right on the supports **B** on the battery cover plate and secure with safety pin **C**.
5. Align the battery cover plate.
6. Firmly tighten the screws **A** on the hinges.

Rectification

1. Tighten the connection **B** (M8).
2. Connect the battery connector **A**.
3. Close the battery cover plate.
4. Turn on the machine and test the lighting and machine functions.

7.8 Cooling system

Safety instructions regarding the cooling system

The hydraulic oil radiator (option) is located in the cabin on the left. It cools the hydraulic oil of the steering and operating hydraulics.

WARNING

Caustic injury hazard! Risk of swallowing when handling hydraulic oil!

Can cause serious injury or death

► Seek medical attention immediately if antifreeze has been swallowed.

► Keep hydraulic oil out of reach of children.

CAUTION

Burn hazard from hot hydraulic lines!

Hot hydraulic lines can cause skin burns.

► Allow hydraulic lines to cool down.

► Wear protective equipment.

Information on cleaning work on the cooling system

Dirt on the radiator fins reduces the radiator's cooling capacity!
To avoid this:

- Clean the outside of the radiator at regular intervals. Refer to the servicing schedule on page *7-6* for the cleaning intervals.
- In dusty or dirty work conditions, clean more frequently than indicated in the maintenance plans.
- If the hydraulic oil must be replaced frequently, have the hydraulic system checked for leaks by an authorized service center!

Environment

Use a suitable container to collect the hydraulic oil as it drains and dispose of it in an environmentally friendly manner!

Clean the hydraulic oil radiator (optional)

CAUTION

Burn hazard during maintenance on a hot engine and radiator!

Failure to observe this can cause serious injury.

- ► Wear protective gloves and eye protection.
- ► Let the radiator cool down at least 10 minutes after stopping the machine.

NOTICE

Dirt on the radiator fins reduces the radiator's heat dissipation capacity and can cause damage to the engine and the hydraulic system!

- ► Check and clean the outside of the radiator once a day.
- ► Clean the radiator more frequently in dusty or dirty work conditions.

Information

Observe the maintenance intervals
– see "Maintenance plan" on page 7-6.

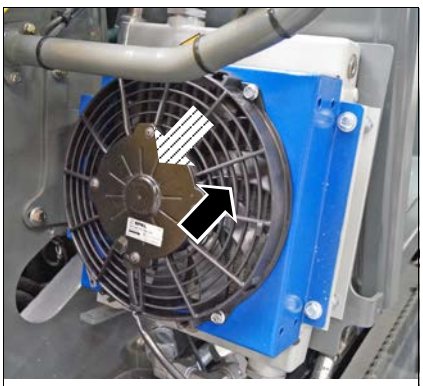


Fig. 243

1. Park the machine on level ground.
2. Lower the loader unit fully.
3. Apply the parking brake.
4. Turn the machine off and remove the ignition key.
5. Allow the hydraulic system to cool down.
6. Clean the radiator fins by blowing compressed air from either side of the radiator.
7. Remove dirt in the intake area of the radiator.

Information

In order to ensure the radiator's cooling capacity, do not damage the radiator fins as you clean them with a compressed-air gun!

7.9 Hydraulic system

Important information on the hydraulic system

CAUTION

Burn hazard due to hot hydraulic oil!

Hot hydraulic oil can cause burns to the skin.

- ► Release the residual pressure in the hydraulic system.
- ► Allow the hydraulic system to cool down.
- ► Wear protective equipment.

CAUTION

Risk of injury when handling hydraulic oil!

During operation, the hydraulic oil is under pressure and could cause damage to health.

- ► Do not touch hydraulic lines that are under pressure.
- ► Wear protective equipment when handling hydraulic oil.
- ► Do not allow hydraulic oil to reach hot machine parts.
- ► Do not smoke when handling hydraulic oil.
- ► Avoid contact with hydraulic oil or swallowing of hydraulic oil. If hydraulic oil has been swallowed, do not induce vomiting, but immediately seek medical attention.
- ► If oil mist and vapors were breathed in, supply fresh air.
- ► If hydraulic oil has come into contact with skin, thoroughly flush the skin with water.
- ► If hydraulic oil has come into contact with an eye, flush the eye immediately with water and seek medical attention.
- ► Immediately change clothing shoes that have been soaked with hydraulic oil.

NOTICE

Contaminated hydraulic oil, lack of oil or wrong hydraulic oil poses a risk of serious damage to the hydraulic system!

- ► Ensure utmost cleanliness during maintenance work on the hydraulic system!
- ► Always add hydraulic oil using the filling screen!
- ► Only use authorized oils of the same type *– see "Fluids and lubricants" on page 7-14*.
- ► Always add hydraulic oil in time using the filling screen *– see "Adding hydraulic oil" on page 7-56*.
- ► If the hydraulic system is filled with biodegradable oil, then only use biodegradable oil of the same type for adding oil – observe the label.
- ► Have the hydraulic oil only changed by an authorized service center.
- ► Immediately contact an authorized service center if the filter insert is contaminated with metal chippings, otherwise follow-on damage can result.

Environment

Hydraulic oil is harmful to the environment!

- ► Dispose of old oil and contaminated hydraulic oil in accordance with instructions and regulations.
- ► Do not spill hydraulic oil.
- ► Immediately wipe up and dispose of spilled and/or escaped hydraulic oil.

Observe the following before starting maintenance

- Lower the loader unit to the ground.
- Lower all hydraulically controlled attachments to the ground.
- Use the parking brake to park the machine safely and to prevent it rolling away.
- Switch off motor isolating switch.
- Turn the machine off and remove the ignition key.
- Release the pressure in the hydraulic system.
- Wear protective equipment.
- Collect drained hydraulic oil and biodegradable oil in a suitable container, and dispose of it in an environmentally friendly manner.

Monitoring the hydraulic oil filter

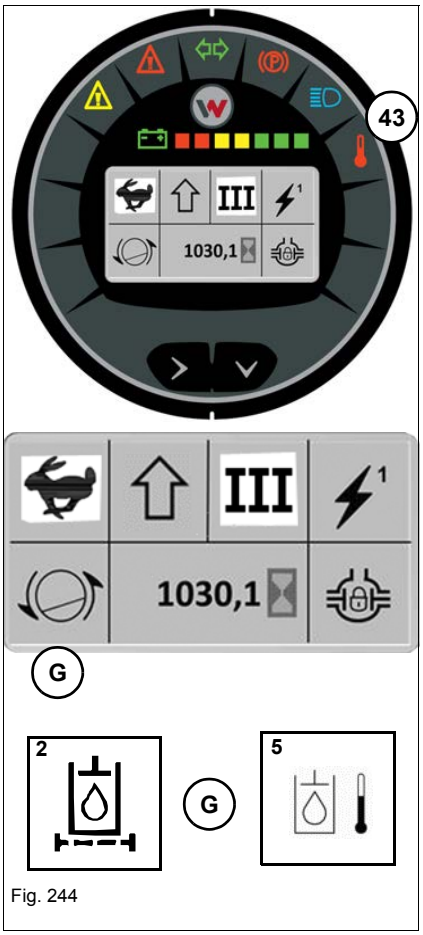


Fig. 244

The following indicator lights and indicators are located on the gauge and monitor contamination of the hydraulic oil filter and the oil temperature:

- Warning light **43** temperature
- Warning indicator **G/2** – dirt in hydraulic oil filter
- Warning indicator **G/5** – hydraulic oil temperature

NOTICE

If the warning light **43** (in the gauge) lights up in connection with the warning indicator **G/5** in the digital display of the gauge, then the operating temperature of the hydraulic oil is too high
– see chapter 4 "Warning light (red) – temperature" on page 4-35.

► Check the hydraulic oil level (too little oil in the hydraulic oil reservoir).

► The filter element or the hydraulic oil is dirty and must be replaced by an authorized service center.

NOTICE

If the warning indicator **G/2** lights up in the digital display in the gauge, the oil-flow resistance in the return filter is too high.

► The filter element is dirty and must be replaced by an authorized service center.

Information

When the weather is cold, the warning indicator **G/2** may light up immediately after turning on the machine. This is caused by increased oil viscosity. In this case, set engine speed so that the indicator does not illuminate.

Checking the hydraulic oil level

The oil level glass is integrated into the hydraulic oil reservoir.

CAUTION

Burn hazard due to hot hydraulic oil!

Hot hydraulic oil can cause burns to the skin.

- ► Release the residual pressure in the hydraulic system.
- ► Allow the hydraulic system to cool down.
- ► Wear protective equipment.

NOTICE

Damage to hydraulic system due to a low hydraulic oil level.

- ► The hydraulic-oil level must not drop below the oil level sight glass.
- ► In case of frequent oil loss: check or have the hydraulic system checked for leaks.
- ► Have leaks repaired by an authorized service center.

Information

Observe the maintenance intervals
– *see "Maintenance plan" on page 7-6*.
Specifications and fill quantities
– *see "Fluids and lubricants" on page 7-14*.

Information

Hot hydraulic oil expands considerably. Therefore, check the oil only when the hydraulic system is cold.

Fig. 245

1. Park the machine on level ground.
2. Retract all hydraulic cylinders.
3. Apply the parking brake.
4. Turn the machine off and remove the ignition key.
5. Clean oil level sight glass **A** and check the oil level:
   - If the oil level is visible in the lower half of the oil level sight glass: oil level is OK.
   - If the oil level is no longer visible in the lower half of the oil level sight glass: **not enough oil!**
6. If the hydraulic oil level in the low: add hydraulic oil
   – *see "Adding hydraulic oil" on page 7-56*.

Adding hydraulic oil

Important information

CAUTION

Burn hazard due to hot hydraulic oil!

Hot hydraulic oil can cause burns to the skin.

- ► Release the residual pressure in the hydraulic system.
- ► Allow the hydraulic system to cool down.
- ► Wear protective equipment.

NOTICE

Damage to hydraulic system due to incorrect or contaminated hydraulic oil.

- ► Cloudy oil means that water or air is in the hydraulic system. This can cause damage to the hydraulic oil pump. Have an authorized service center perform a check of the hydraulic system if necessary. Do not use the machine unless the problem has been rectified.
- ► Do not add hydraulic oil unless the machine is stopped.
- ► Add oil with a screen to avoid dirt.
- ► If the hydraulic system is filled with biodegradable oil, then only use biodegradable oil of the same type can be used for adding oil – observe the label.

Information

Maintenance intervals – *see "Maintenance plan" on page 7-6*.
Specifications and fill quantities
– *see chapter 7 “Fluids and lubricants” on page 7-14*.

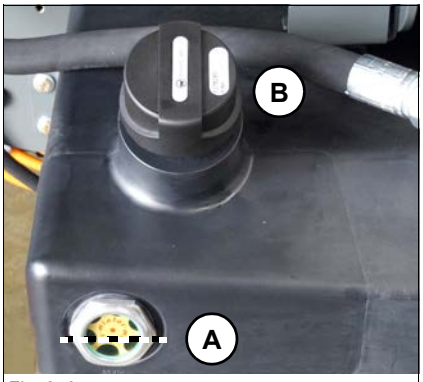


Fig. 246

1. Park the machine on level ground.
2. Retract all hydraulic cylinders.
3. Apply the parking brake.
4. Turn the machine off and remove the ignition key.
5. Clean the area around breather filter **B**.
6. Place a container under the hydraulic oil reservoir to collect the oil.
7. Open breather filter **B** by hand.
8. Add hydraulic oil with the filter insert in place.
9. Check the hydraulic oil level in sight glass **A**.
   - If the oil level is visible in the lower half of the oil level sight glass: oil level is OK.
10. Add if necessary and check again.
11. Firmly close breather filter **B** by hand.

Information

Excess hydraulic oil is released via the breather filter during loader unit operation.

► Drain the oil into a suitable collecting container until the oil level can be seen in the oil level glass **A**.

Hydraulic System – Checking pressure lines for leaks

Important safety instructions regarding pressure line checks

WARNING

Burn and injury hazard due to hot hydraulic oil escaping under high pressure!

Hydraulic oil escaping under high pressure can catch fire, damage property, penetrate the skin, and cause serious burns.

- ► Do not operate the machine with leaking or damaged hydraulic system components.
- ► Never search for leaks with your bare hands, wear protective gloves and clothes.
- ► Wear safety glasses to protect the eyes. If oil contacts the eye, flush immediately with clean water and seek emergency medical treatment.
- ► Seek immediate medical attention if oil penetrates the skin. Oil can cause serious infections.
- ► Never weld or solder defective or leaky pressure hoses.
- ► Re-tighten leaking screw connections and hose connections only when the hydraulic system is not under pressure. In other words, release the pressure before working on pressurized lines.
- ► Do not check for leaks with an open flame due to explosive fire risk from vaporized oil mist.

Information

Maintenance intervals – *see "Maintenance plan" on page 7-6*.

Hydraulic system – checking membrane accumulators

Important safety instructions for checking the membrane accumulators

WARNING

Risk of suffocation through uncontrolled release of large quantities of gas and risk of injury due to entrained components.

Failure to observe this can cause serious injury or death.

- ► Immediately put machine out of operation in case of leaking or damaged membrane accumulators.
- ► Never search for leaks with your bare hands.
- ► Have the membrane accumulator checked only by an authorized service center in accordance with the maintenance plan intervals.
- ► Never weld or solder defective or leaky membrane accumulators.
- ► Damaged membrane accumulators cannot be repaired and must be replaced by an authorized service center.

WARNING

Danger of explosions by filling the membrane accumulator with non-permitted gas!

Failure to observe this can cause serious injury or death.

- ► Have work on the membrane accumulator performed only by an authorized service center.

Information

Maintenance intervals – *see "Maintenance plan" on page 7-6*.

Checking hydraulic hoses for damage and aging

Important information for the owner of the machine

Information

Observe the maintenance intervals
– *see "Maintenance plan" on page 7-6*.

The entrepreneur/owner of the machine must ensure that hose pipes are replaced in appropriate intervals, even if no safety-relevant malfunctions can been detected on the hose pipe.

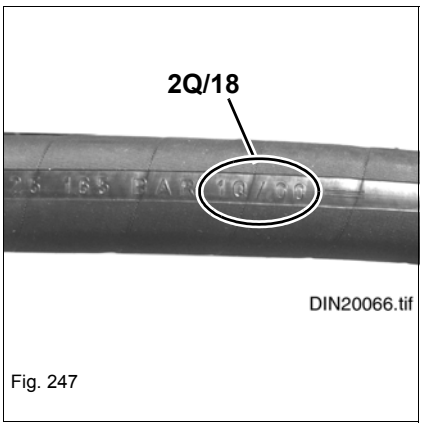


Fig. 247

- Have hose pipes checked by an authorized service center at least once a year to ensure a safe working condition.
- Leaks and damaged pressure lines must be immediately repaired or replaced by an authorized service center.
- Have hydraulic hoses replaced by an authorized service center every 6 years from the date of manufacture, even if they do not seem to be damaged.
  The date of manufacture (month or quarter and year) is indicated on the hose pipe.
  Example: The indication “**2 Q/18**” means manufactured in the 2nd quarter of 2018.

Information

In the Federal Republic of Germany, reference is made in this connection to the “Safety regulations for hydraulic lines” issued by the Central Office for Accident Prevention and Occupational Medicine. Reference is also made to DIN 20066, part 5.

7.10 Electrical system

Qualification of maintenance personnel

Replacement and repair work on the electrical system may be performed only by an authorized service center!

Checks and service work, as well as the replacement of light bulbs or fuses must be performed by a specifically trained operator.

Information on the electrical system

WARNING

Accident hazard due to electric current!

Touching live parts can cause serious injury or death.

- ► Only work on the machine when it is in a de-energized state.
- ► Before starting maintenance work on the electrical system:
  - Park the machine securely
    – see chapter 5 “Stopping and securing the machine” on page 5-17.
  - Disconnect the battery connector
    – see chapter 4 “Battery connector” on page 4-20.
  - Check the insulation for damage.

WARNING

Accident hazard due to high electrical voltages!

Improper performance of work on the electrical system can result in serious injury or death.

- ► Maintenance that does not involve HV components (e.g. replacing fuses), where the maintenance personnel must work near HV components and, in the event of an error, could trigger an electrical hazard, must be performed by "electrically trained persons". The training must include the following factual information:
  - the hazard sources on the machine,
  - safety measures and
  - the corresponding rules of conduct.
- ► In order to be permitted to perform maintenance on HV systems of the machine, further training as "Expert for Work on HV Intrinsically Safe Machines" (DGUV Information 200-005) is mandated in Germany. Be aware of, observe and comply with the corresponding legal regulations of other countries.

NOTICE

Damage to the electrical system due to short circuit.

- ► Always disconnect the battery before performing work on the electrical system in which tools, spare parts, etc. can touch electrical components or contacts.
- ► Take off and set aside any rings, metal bracelets, etc. before working on electrical components.
- ► Do not clean very sensitive electrical components with a high-pressure cleaner.
- ► Do not touch light bulbs or headlight reflectors with your fingers.

Information

Safety instructions regarding the battery *– see "Battery" on page 7-31*.

Regular checks and service work on the electrical system

CAUTION

Fire hazard! Blown fuses indicate overloading or short circuits of an electrical component.

Can cause injury.

► Have the electrical system checked by an authorized service center before inserting new fuses.

► In order to avoid damage to the electrical system, use only fuses of the specified load capacity (amperage).

Information

Observe the maintenance intervals
– see "Maintenance plan" on page 7-6.

Daily checks before operating the machine

- Is the light system OK?
- Is the signaling and warning system OK?

Weekly checks

- Electric fuses: only replace malfunctioning fuses with fuses with the specified amperage.
- Check the electric lines for tightness and chafing and have them repaired by an **authorized service center** if necessary.

Machine fuses

NOTICE

Blown fuses indicate overloading or short circuits of an electrical component.

- ► If a fuse blows out again shortly after replacement, have the electrical system checked by an authorized service center before installing a new fuse.
- ► In order to avoid damage to the electrical system, use only fuses of the specified load capacity (amperage).

NOTICE

The use of incorrect fuses is a fire hazard and risks damaging components!

The use of incorrect fuses can damage the electrical system and result in fires. The safety and functionality of the machine is no longer guaranteed if incorrect fuses are used.

- ➥ Only use fuses with the specified rated value *– see chapter 9 “Fuse panel” on page 9-11*.

Master fuse

The master fuse **A** is located on the motor isolating switch.

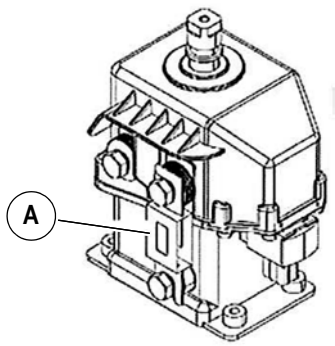


Fig. 248

⚠ WARNING

Accident hazard due to high electrical voltages!

Improper performance of work on the electrical system can result in serious injury or death.

- ► Only persons who have received additional training as an "Expert for Work on HV Machines" (DGUV Information 200-005) are permitted to work on the master fuse in Germany. Be aware of, observe and comply with the corresponding legal regulations of other countries.

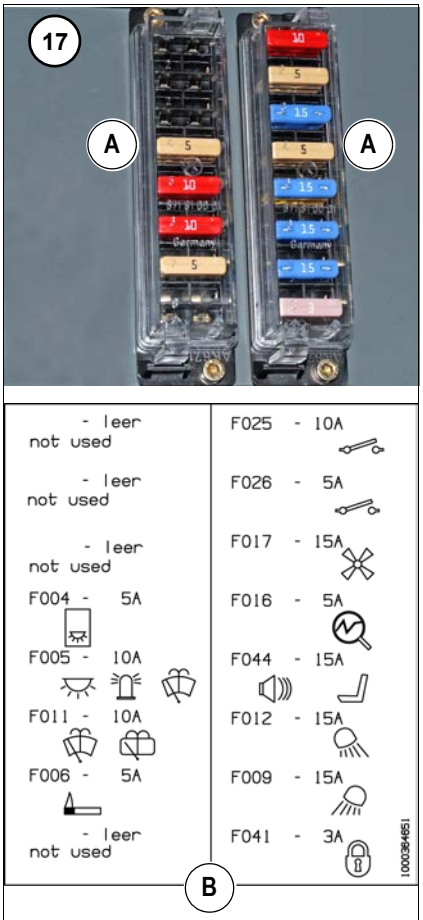


Fig. 249

Checking/replacing fuses on the fuse panel

The fuses **17** are located under the cover **A** on the right in the control lever console.

Fuse assignment: see label **B** on the side in the cabin.

1. Lower the loader unit.
2. Apply the parking brake.
3. Actuate the motor isolating switch.
4. Turn the machine off and remove the ignition key.
5. Remove the relevant cover **A** of the fuse panel.
6. Replace defective fuses by new ones.
   ➥ Descriptions and output indications
   – see chapter 9 “Fuses” on page 9-11.
7. Check the electrical system for correct function.

Checking/replacing fuses on the power electronics

WARNING

Accident hazard due to high electrical voltages!

Improper performance of work on the electrical system can result in serious injury or death.

- ► Maintenance that does not involve HV components (e.g. replacing fuses), where the maintenance personnel must work near HV components and, in the event of an error, could trigger an electrical hazard, must be performed by "electrically trained persons".
  The training must include the following factual information:
  - the hazard sources on the machine,
  - safety measures and
  - the corresponding rules of conduct.
- ► In order to be permitted to perform maintenance on HV systems of the machine, further training as "Expert for Work on HV Intrinsically Safe Machines" (DGUV Information 200-005) is mandated in Germany. Be aware of, observe and comply with the corresponding legal regulations of other countries.

Information

Defective fuses of the fuse box **A** are indicated by the diagnostic LED **H3**, whereas defective fuses of the fuse box **B** are indicated by the diagnostic LED **H7** by a flash code
– see chapter 8 “Fault indications in the power electronics” on page 8-35.

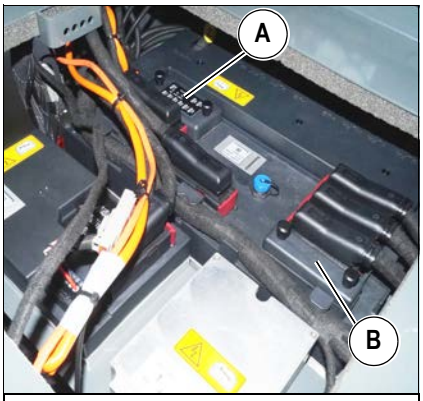


Fig. 250

The power electronics is installed under the operator seat.

The fuses are located in the fuse boxes **A** and **B** of the power electronics under the covers.

Fuse assignments – *see chapter 9 “Power electronics” on page 9-12*.

Removing a fuse

1. Lower the loader unit.
2. Apply the parking brake.
3. Actuate the motor isolating switch
4. Turn the machine off and remove the ignition key.
5. Open the battery cover plate.
6. Disconnect the battery connector.
7. Folding the operator seat forwards.
8. Unscrew the fastening screws of the cover.
9. Pull cover **B** with the fuse board out of the connector strip or take off cover **A** from the fuse box.
10. Remove the defective fuse.

Installing a fuse

1. Insert the new fuse.
   ➥ Descriptions and output indications *– see chapter 9 “Fuses” on page 9-11*.
2. Close the fuse box again. When the fuse board was been pulled out, take care to note that the fuse board is inserted correctly into the connector strip.
3. Fold back the operator seat and re-secure it.
4. Connect the battery connector.
5. Close the battery cover plate.
6. Turn on the machine.
7. Check the electrical system for correct function.

Checking/replacing the fuses on the road traffic module

WARNING

Accident hazard due to high electrical voltages!

Improper performance of work on the electrical system can result in serious injury or death.

- ► Maintenance that does not involve HV components (e.g. replacing fuses), where the maintenance personnel must work near HV components and, in the event of an error, could trigger an electrical hazard, must be performed by "electrically trained persons". The training must include the following factual information:
  - the hazard sources on the machine,
  - safety measures and
  - the corresponding rules of conduct.
- ► In order to be permitted to perform maintenance on HV systems of the machine, further training as "Expert for Work on HV Intrinsically Safe Machines" (DGUV Information 200-005) is mandated in Germany. Be aware of, observe and comply with the corresponding legal regulations of other countries.

Information

Defective fuses of the fuse box **A** are indicated by the diagnostic LED **5H18** by a flash code

– see chapter 8 “Fault indications in the StVZO module” on page 8-38.

Fig. 251

The road traffic module is installed under the operator seat.
The fuses are located under the cover **A** of the road traffic module.
Fuse assignments *– see chapter 9 "Road traffic module" on page 9-13*.

Removing a fuse

1. Lower the loader unit.
2. Apply the parking brake.
3. Actuate the motor isolating switch.
4. Turn the machine off and remove the ignition key.
5. Open the battery cover plate.
6. Disconnect the battery connector.
7. Folding the operator seat forwards.
8. Unscrew the fastening screws of the cover.
9. Take off cover **A** from the fuse box.
10. Remove the defective fuse.

Installing a fuse

1. Insert the new fuse.
   ➥ Descriptions and output indications
   – see chapter 9 "Fuses" on page 9-11.
2. Close the fuse box again.
3. Fold back the operator seat and re-secure it.
4. Connect the battery connector.
5. Close the battery cover plate.
6. Turn on the machine.
7. Check the electrical system for correct function.

7.11 Heating and ventilation

Important information on cabin ventilation

The cabin is equipped with a fine-dust filter.

CAUTION

Risk to health if fine-dust filter is not correctly mounted or damaged!

An incorrectly mounted or damaged fine-dust filter can cause health damage to respiratory tracts.

- ► Replace damaged or dirty fine-dust filter with a new one!
- ► Clean the fine-dust filter every 20 operating hours, however replace it every 500 operating hours at the latest.
- ► The machine may not be used in an environment requiring protection against aerosols and vapors!
- ► The fine-dust filter does not protect against substances that could damage health and is therefore not approved for spray work.

Cleaning/replacing the fine-dust filter of the cabin ventilation

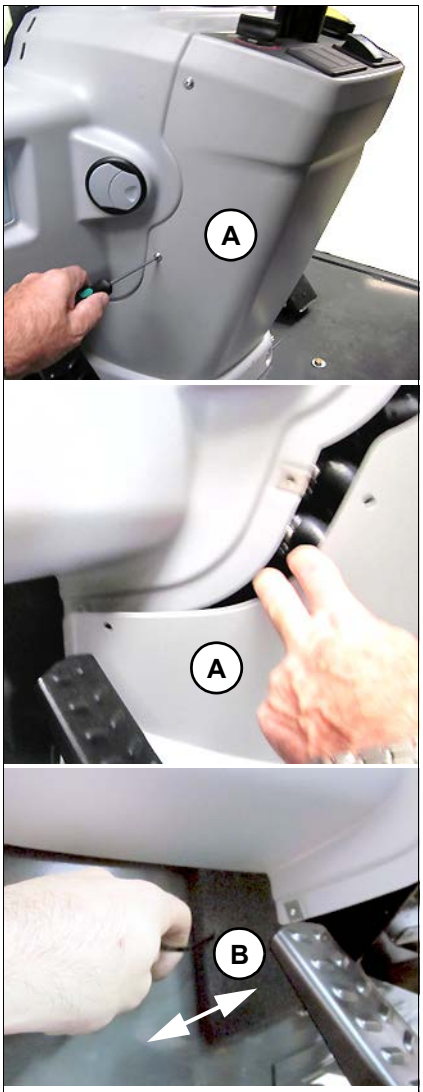


Fig. 252

Information

Observe the maintenance intervals
– *see "Maintenance plan" on page 7-6*.

Replace the fine-dust filter every 500 o/h (operating hours) by a new one.

The fine=dust filter is located in the leg room on the left in travel direction behind trim **A**.

1. Remove fastening screws on the trim **A** to the left and right (Allen key 3 mm / 0.1 in).
2. Pull away trim **A** a little.
3. Remove fine-dust filter **B** and check it for damage.
4. Knock dust filter **B** on either side on a plate, or clean it with compressed air, or wash it with water and allow it to dry.
   ➥ Replace or clean the filter more frequently if the machine is used in severe dust conditions.
5. Insert fine-dust filter **B**
6. Install trim **A**.

Information

In order to ensure dust-free air inside the cabin, pay attention to the correct position of filter **B** as you insert it.

7.12 Window washer system (only in the cabin cpl.)

Washer system reservoir

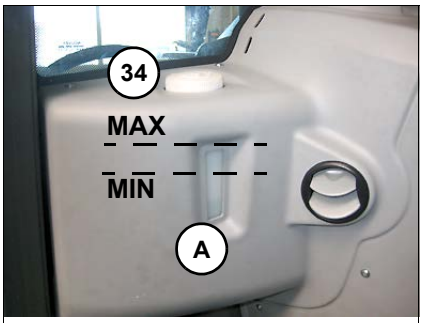


Fig. 253

Filler inlet **34** of the reservoir is located on the left in the cabin.

The level in the reservoir is visible in inspection window **A**.

Information

Add only clean tap water!
Add a suitable cleaning agent if required.
At temperatures around or below the freezing point: add antifreeze for washer systems to the water.

► Refer to the antifreeze instructions for further information on concentrations.

Information

Maintenance intervals *– see "Maintenance plan" on page 7-6*.
Specifications and fill quantities
– see chapter 7 “Fluids and lubricants” on page 7-14.

7.13 Axles / drive

Maintenance on axles/drive

Information

Maintenance on the axles and drive may only be performed by an authorized service center for reasons of safety, warranty and liability.

Observe the maintenance intervals
– *see "Maintenance plan" on page 7-6*.
Specifications and fill quantities
– *see chapter 7 “Fluids and lubricants” on page 7-14*.

7.14 Braking system

Important safety instructions regarding the brake system

WARNING

Accident hazard due to malfunctioning brakes!

Damaged brakes can result in serious injury or death.

- ► Damaged brake lines or hoses must immediately be replaced by an authorized service center.
- ► Have the defective functions of the brakes immediately checked by an authorized service center.
- ► If the brake fluid levels sink from inspection to inspection, have the brake system looked at by an authorized service center.

Brakes are crucial to safety. Incorrect maintenance can cause brake failure.
For safety and technical reasons, as well as for reasons of warranty and liability, maintenance on the brakes may only be performed by an authorized service center.
An exception to this is the following work that may be performed by the operator:

- ► Daily check of the brake lines.
- ► Daily inspection of the brake functions.
- ► Daily check of the level in the brake fluid reservoir
  – see "Checking/adding brake fluid" on page 7-75.

Information

Observe the maintenance intervals
– see "Maintenance plan" on page 7-6.
Specifications and fill quantities
– see chapter 7 “Fluids and lubricants” on page 7-14.

Checking/adding brake fluid

The brake-fluid reservoir is located inside the cabin to the left of the operator seat.

The check marks “MAX” and “MIN” are located on the side of the reservoir.

WARNING

An incorrect brake fluid grade or an insufficient brake fluid level can impair the safety of the braking system.

Failure to observe this can cause serious injury or death.

- ► Check the brake fluid in the reservoir at regular intervals.
- ► Do not operate the machine any more if the brake fluid has dropped below the mark “MIN”.
- ► Only add brake fluid up to the “MAX” mark of the sight glass.
- ► If the braking system loses too much brake fluid, have the braking system checked by an authorized service center.
- ► The brake fluid must comply with the specification **(ATF)**.
- ► The brake fluid must be replaced every 2 years by an authorized service center.

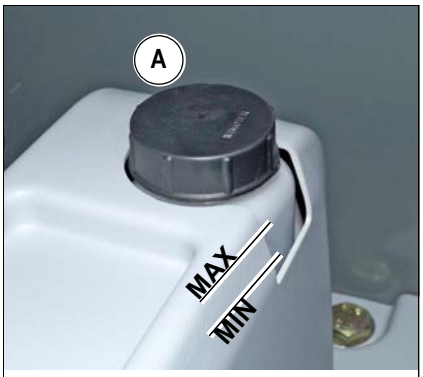


Fig. 254

Check

1. The brake fluid level must be between the check marks MIN and MAX.
   ➥ If the brake fluid level falls below the "MIN" check mark, add brake fluid.

Top off

1. Clean the area around the opening with a clean cloth.
2. Open reservoir cover **A**.
3. Add brake fluid up to the **MAX** range on the sight glass.
   ➥ Use only ATF brake fluid
   – see chapter 7 “Fluids and lubricants” on page 7-14.
4. Close reservoir cover **A**.
5. Immediately wipe away brake fluid spills.

7.15 Tires

Important information on the tires

WARNING

Accident hazard from improper attaching tires or repair work on the rims!

Improper mounting or repair work can cause serious injury or death.

- ► Only allow assembly work to be performed by an authorized service center.
- ► Welding and cutting the rims is prohibited. Replace damaged rims by new ones.

WARNING

Accident hazard due to use of tires other than certified!

Can cause serious injury or death.

- ► Install only approved tires/wheels *– see chapter 9 “” on page 9-6*.
- ► Have wheels changed by an authorized service center if possible.

WARNING

Risk of tires bursting during inflation!

A bursting tire can cause serious injury or death.

- ► Wear gloves and safety glasses.
- ► Check the tires and rims for damage before inflating the tires.
- ► Use only filling devices with calibrated pressure gages to inflate the tires.
- ► Pay attention to ensure that when checking the tire pressure and/or when inflating the tires, no persons remain within the danger zone.
- ► Observe the mandatory tire inflation pressure (see label on front window).

Tire and compressed air check

Information

Observe the maintenance intervals
– *see "Maintenance plan" on page 7-6*.

Regular checks for damage and of the tire pressure increase operational safety and the service life of the tires, and reduce the machine's downtimes.

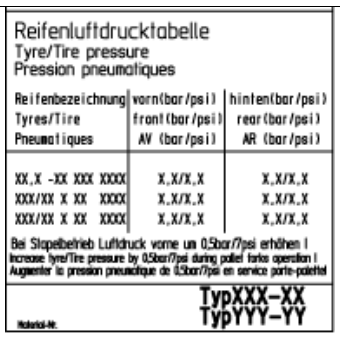


Fig. 255

1. Park the machine on firm, level and dry ground.
2. Apply the parking brake.
3. Lower the loader unit to the ground.
4. Actuate the motor isolating switch.
5. Turn the machine off and remove the ignition key.
6. Check the tires and the rims – also on the inside – for cracks, aging and tread thickness.
7. Remove foreign bodies from the tire tread.
8. Remove traces of oil and grease from the tires.
9. Check the wheel nuts for correct seating and retighten them if necessary
   – *see chapter 9 "Specific tightening torques" on page 9-14*.
10. Unscrew the protective cap from the tire valve.
11. Connect the measuring instrument.
12. Check the tire pressure with a measuring instrument.
    ➥ Refer to the notice sign on the front window or *Tires on page 9-6* in this Operator's Manual.
13. If necessary, inflate the tire to the prescribed pressure.
14. Take off the measuring instrument.
15. Screw the protective cap onto the tire valve.

Installing/removing wheels

Important safety instructions

WARNING

Crushing hazard due to tipping over of machine!

Serious injury or death can be caused by the raised machine tipping over.

- ► Park the machine on level and firm ground.
- ► Seal off the job site and ensure constant supervision of the machine.
- ► To raise the machine, use only certified lifting gear with the required lifting capacity.
- ► Use jack stands to secure and stabilize the machine.
  Do not use the jack as a jack stand.
- ► Do not turn on the machine if it is jacked up.
- ► Have wheels changed by an authorized service center if possible.

WARNING

Accident hazard due to wrong tires!

Can cause serious injury or death

- ► Use only tires that have been certified for the machine.

WARNING

Accident hazard due to loose wheel nuts!

Can cause serious injury or death

- ► Check the wheel nuts for tightness after every wheel or tire change.

NOTICE

The threads on the wheel bolts can be damaged when fitting the heavy wheels.

- ► Use suitable auxiliary assembly tools, such as lifting devices or protective sheaths for the wheel bolts.
- ► Have wheels changed by an authorized service center.

Removing the wheel

1. Park the machine on level and firm ground.
2. Lower the loader unit to the ground.
3. Apply the parking brake.
4. Turn the machine off and remove the ignition key.
5. Prevent the machine from rolling away (wheel chocks).
6. Loosen the wheel nuts a little of the wheel you want to remove.
7. Place the jack on the axle next to the wheel to be changed so that the jack cannot slide down.
8. Raise the machine with the jack only until the wheel can be moved freely.
9. Put a jack stand under the axle tube ensuring stability.
10. Lower the machine onto the jack stand.
11. Completely remove the wheel nuts.
12. Remove the wheel.

Mount the wheel

1. Clean the flange surfaces of the wheels and axles.
2. Place the covering sleeves onto the wheel bolts.
3. Place the wheel onto the wheel bolts with a suitable means.
4. Remove the covering sleeves.
5. Fit all the wheel nuts and tighten them part-way.
6. Lower the raised axle.
7. Tighten all of wheel nuts crosswise with the specified torque *– see chapter 9 “Tightening torques” on page 9-14*.

Information

Re-tighten the wheel nuts after 10 operating hours to the specified torque.

7.16 Maintenance and care of attachment devices

Correct maintenance and servicing is absolutely necessary for smooth and continuous operation, and for an increased service life of the attachments.

Observe the lubrication and maintenance instructions in the Operator's Manuals of the attachments!

Clean attachments after using them and check them for damage. Repair or have repaired any potential damages.

➥ Do not work with damaged attachments.

Lubricate the lubrication points on the attachment devices every 20 operating hours with water resistant multipurpose grease. Lubricate all other moving parts with an oil can.

Information

Observe the maintenance intervals
– see "Maintenance plan" on page 7-6.
Specification of lubricants
– see chapter 7 "Fluids and lubricants" on page 7-14.

7.17 Maintenance of options

Air conditioning (opt) (currently not available)

Responsibilities and prerequisites

- Functional and visual checks must be performed by the operator/user.
- All maintenance and repair work may only be performed by the trained personnel of an authorized service center.

Important safety instructions regarding the air conditioning system

CAUTION

Risk of injury due to damaged hoses and lines!

Escaping refrigerant can cause serious injury.

► Do not open tubes, hoses or other components.
► Avoid all contact with the refrigerant.
► Wear protective equipment.

CAUTION

Injury hazard during control work on the heat exchanger (sharp fins) as well as on the hot lines and hoses!

Failure to observe this can cause injury.

► Wear protective equipment (protective gloves, safety glasses).
► Do not perform maintenance unless the heating and air conditioning systems are switched off.
► Allow the parts of the air conditioning system to cool down.
► Observe the national regulations relevant to accident prevention, other generally acknowledged regulations regarding safety and occupational medicine.

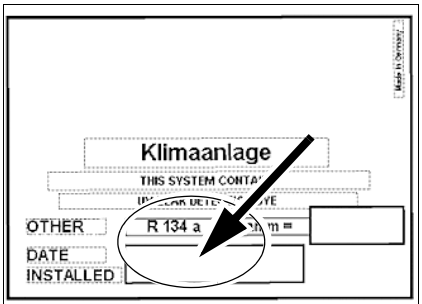


Fig. 256

Filling the air conditioning system by an authorized service center

Only have the air conditioning system filled and serviced by trained personnel in an authorized service center!

- Information for the initial filling of the air conditioning system is entered on the type label, which is located in the vicinity of the air conditioning system.
- Have the air conditioning system checked twice a year by trained personnel in an authorized service center.
- Have the dehumidifier replaced every 2 years.

Information

To avoid damage, only refill with the refrigerants indicated on the type label (see *Fig. 256* /arrow).

Daily visual check by the user/operator

CAUTION

Risk of injury due to hot parts!

Touching hot components can result in injury.

► Allow the machine to cool down.

► Wear protective equipment.

1. Apply the parking brake.
2. Turn the machine off and remove the ignition key.
3. Clean the protective screen and fins of the heat exchanger *– see "Cleaning the heat exchanger (condenser)" on page 7-83*.
4. Check the heating and coolant lines for damage.
5. Check the coolant lines for tightness, leaks and chafing.
6. Check the electric connections for correct condition and tightness.

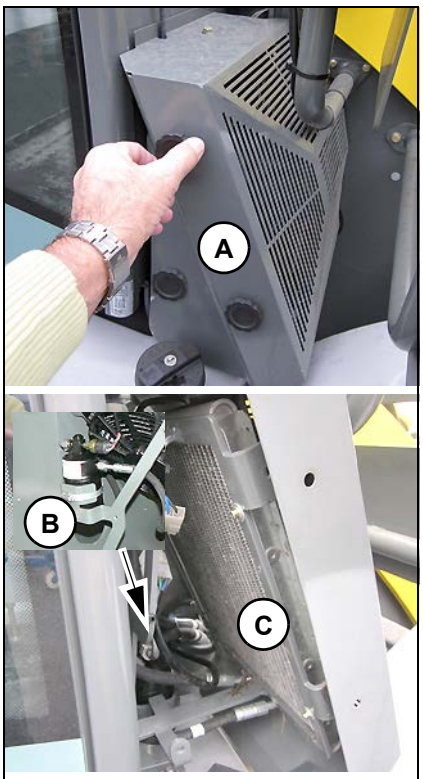


Fig. 257

Cleaning the heat exchanger (condenser)

CAUTION

Risk of injury due to hot parts!

Touching hot components can result in injury.

► Allow the machine to cool down.
► Wear protective equipment.

1. Apply the parking brake.
2. Turn the machine off and remove the ignition key.
3. Remove cover **A** from the protective screen.
4. Clean heat exchanger **C** with a water jet
   (do not use a high-pressure cleaner or compressed air).
5. Clean the air-intake area at the protective screen.
6. Install the cover **A**.

Information

Dehumidifier **B** has to be replaced
every 2 years by an authorized service center.

7.18 Machine preservation

Anti-corrosion protection (opt)

NOTICE

Corrosion on electric connections or components can cause hazardous operating malfunctions.

- ► Check the machine regularly for corrosion.
- ► If you replace elements, check whether they are classified as in the table "*Components coated with anti-corrosive wax on page 7-85*" and whether they are subject to special treatment before assembly.
- ► Have the sealing checked and repaired at least once a year by ELASKON – see the Elaskon servicing pass supplied with the machine.

The machine can be specially protected ex works against corrosion for work with "aggressive media" (for example in a saline environment).

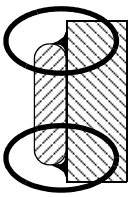
However, this anti-corrosion protection is affected by external factors, for example dirt, cleaning, etc. This is why it only has ongoing effect if checked at regular intervals and renewed or reapplied as required.

If no anti-corrosion protection is applied to the machine, for example for work in a saline environment, we recommend retrofitting your machine with this option by a sales partner.

The following anti-corrosion protection is used at the factory and is also recommended for later use:

Designation:	Elaskon 2000 ML, Elaskon UBS light Elaskon Aero 46 spezial, Elaskon Multi 80
Manufacturer:	ELASKON Sachsen GmbH & Co. KG, Dresden (Germany)

Components coated with anti-corrosive wax

Component	Remarks
All electric plug connections, ground contacts and crimp connections	**Before applying the wax:** • Disconnect the plug-and-socket connection, apply contact spray to contact surfaces and reconnect the plug-and-socket connections.
All parts of the machine, for example Axles, gearbox, trim panels, servicing lids, loader unit, quickhitch	**with the exception of:** • Piston rods (chromium coating) • Cabin, cabin bearings • Battery cover plate • Battery • Fastening surfaces for installing parts on frame • Hydraulic oil radiator (optional) and insulating mats • Mudguards, rubber and plastic parts • Light elements
Flange surfaces 	**e.g. axles and cabin bearing:** • Seal gaps with an anti-corrosion protection after assembly.

Measures for maintaining anticorrosive protection

WARNING

Special hazards during anti-corrosion protection!

Handling chemical substances can cause serious injury or death.

- ► When handling chemical substances of any kind, such as solvents, wax, etc., observe the specific product-related safety regulations (safety data sheet).
- ► Ensure sufficient room ventilation.
- ► Do not use unprotected lights or open flames.
- ► Do not smoke.
- ► Only work on the electrical system if the battery connector has been disconnected!

Information

Maintenance intervals – *see "Maintenance plan" on page 7-6*.

Cleaning

NOTICE

Contrary to the instructions in section„*Cleaning and maintenance*“ on page *7-19*, do not clean machines with anticorrosion protection with a bristle brush nor with a steam jet or a high-pressure cleaner!

- ► If cleaning the machine with these means cannot be avoided, check the wax coating very carefully and have it renewed or reapplied as required.

- If the machine is used in corrosive environment over a longer period of time, remove the floor mat in the cabin. This will avoid a collection of corrosive moisture.
- Thoroughly clean machines that are put out of operation over a longer period of time.
- Clean the machine at least once a week. In particular, remove corrosive deposits (such as salt crusts) as fast as possible.
- Clean the machine with cold running water preferably.

Applying the anti-corrosion protection

Bear in mind the following instructions as you apply the anti-corrosion protection:

- Carefully cover all fastening surfaces and components to which the anti-corrosion protection may not be applied
  – see "Components coated with anti-corrosive wax" on page 7-85.
- Apply Elaskon products with a brush or commercially available spray equipment.
- The protective ELASKON coating can be removed with an ELASKON cleanser as required.
- Spots are difficult to remove from clothing.
- Affix a “Wet paint!” or a similar sign to newly coated machines.

Treatment of oxidized surfaces

If in spite of all precautionary measures some components should be affected by corrosion (oxidized), treat the oxidized area follows:

Electric connections

- Remove the remaining protective wax at the oxidized area with an Elaskon cleanser.
- Treat the affected areas with an oxide cleanser, for example with Elaskon Multi 80.
- Disconnect plug-and-socket connection A.
- Apply Elaskon Multi 80 to the contact surfaces of the plug-and-socket connection.
- Establish the connection.
- Apply/spray the anti-corrosion protection onto the electric connection from all sides.

For sheet metal parts

- Remove the remaining protective wax at the oxidized area with an Elaskon cleanser.
- Make all affected areas "blank", i.e. remove all remaining corrosion and paint coating from the affected area down to the bare material. otherwise the protective coating will not adhere properly.
- Clean the affected area with a cleaning solvent, and then apply a 2-component prime coating.
- Paint affected areas with a 2-component paint coating.
- Then preserve the area with the anti-corrosion protection.

Notes:

8 Malfunctions

The information given in this chapter is provided for the fast and reliable detection of malfunctions.

Please contact an authorized service center if the malfunction cannot be remedied.

Repairs may only be carried out by an authorized service center and only by trained personnel.

8.1 Malfunctions of the travel drive

Errors/malfunctions	Possible causes	Remedy/avoidance	See
Machine cannot be turned on	Battery connector disconnected	Connect the battery connector.	*4-20*
	Malfunctioning or empty battery	Charge battery or replace it with a new one.	*7-31*
	Malfunctioning fuse	Check the fuses. Contact an authorized service center if necessary.	*9-11*
	Loose or oxidized cable connections in starter circuit	Contact an authorized service center.	–
Machine can be turned on but does not start driving	Parking brake is applied	Release the parking brake.	*5-6*
	Operator presence switch not actuated	Sit down on the operator seat.	*4-7*
	Motor isolating switch actuated	Loosen motor isolating switch.	*4-22*
	Accelerator pedal not actuated	Press accelerator pedal downward.	–
	Forward-reverse control in position "neutral"	Select a travel direction.	*5-13*
	Error(s) detected in the system	Turn off the machine and turn it on again, select the travel direction again. If the error occurs again, find an authorized service center.	–

See next page for additional malfunctions on the travel drive.

Errors/malfunctions	Possible causes	Remedy/avoidance	See
Hydraulic motor overheats. Temperature warning system responds. Hydraulic motor has insufficient engine power	Temperature sensor responded	Allow the machine to cool down. Contact an authorized service center if necessary.	–
Hydraulic motor overheats. Emergency stop	Overload when pushing material	Allow the machine to cool down. Reduce speed when traveling downhill.	–
Hydraulic motor has insufficient engine power	Battery charge too low	Charge the battery.	*7-34*
	Malfunctioning battery	Contact an authorized service center.	–

8.2 Malfunctions of the hydraulic system

Malfunctions	Possible causes	Remedy/avoidance	See
Loader unit does not react / does not react correctly	Machine is turned off	Turn on the machine	*4-54*
	Battery charge too low	Charge the battery.	*7-34*
	Operator presence switch not actuated	Sit down on the operator seat.	*4-7*
	Joystick is locked	Unlock the joystick	*4-51*
	Malfunctioning fuse	Check the fuses. Contact an authorized service center if necessary.	*9-11*
	Incorrect hydraulic oil level	Check the hydraulic oil level.	*7-55*
	Error(s) detected in the system	Contact an authorized service center.	–
Hydraulic system overheats. Temperature warning system responds. Operating motor has insufficient engine power	Continuous operation of the hydraulic connections is switched on and operates against pressure	Switch off continuous operation of hydraulic connections	*5-44*
	Incorrect hydraulic oil level	Check the hydraulic oil level.	*7-55*
	Temperature sensor for the operating motor or the hydraulic motor responded	Load too high. Allow the hydraulic system to cool down. Contact an authorized service center if necessary.	–
	Hydraulic oil radiator fins (option) are dirty	Clean the radiator.	*7-51*
	Hydraulic oil radiator (opt) defective	Contact an authorized service center.	–
Operating motor has insufficient engine power	Battery charge too low	Charging the battery	*7-34*

8.3 Malfunctions of the electrical system

Important information

Repairs on the electrical system may only be performed by an authorized service center.

See also *Electrical system on page 7-61*.

Error display of machine electronics in gauge

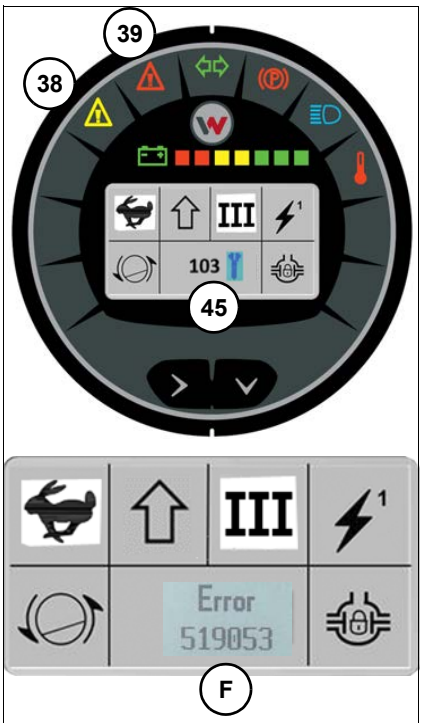


Fig. 258

The warning lights **38** and **39** indicating errors that are recorded by the machine electronics.

If an error occurs in the electronics of the travel drive or work hydraulics, which is not displayed **45** via its own indicator light, then an error message is displayed for 3 seconds as an error code in field **F** in the indicating instrument.

Make a note of the error code!

The error code is saved and can be recalled at any time
– see chapter 7 "Error code display" on page 7-11.

NOTICE

Ignoring error messages can cause technical damage!

► Proceed as specified in the error code table
– see "Error code tables" on page 8-8.

► If the error is not removed by the described measure, get in touch with and authorized service center.

NOTICE

Critical error: red warning light **39** illuminates continuously!
To avoid further damage to the travel drive and/or the work hydraulics:

► If possible, drive the machine out of the danger zone.

► Lower the loader unit to the transport position.

► Turn the machine off and remove the ignition key.

► Get in touch with an authorized service center and have the error rectified.

Possible causes of an error code

- Open wiring, interruption.
- Overvoltage, undervoltage.
- Grounding contact error.
- Malfunctioning component.
- Allowed values exceeded/not reached (temperature, pressure, velocity, sensor error due to dirt deposits etc.).

Description of indications in display

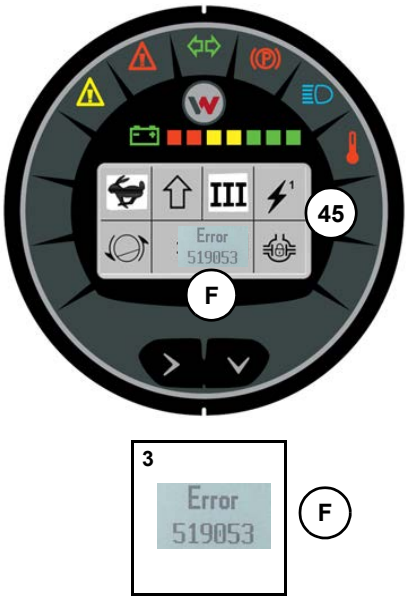


Fig. 259

The machine electronics save the active and passive errors.

- Active errors are immediately displayed in the gauge display in **field 45** F/3 when the error occurs.
- Passive errors are not displayed when the error occurs. Passive errors are only displayed during queries of the error memory in the service display.

The error code is saved in the error memory as a passive error if it is no longer displayed after turning the machine off and on again.

When calling up the error messages, first the active and then the passive errors are displayed. If multiple error messages in a category are present, these can be called up one after the other in the display. The error messages are displayed in the order of their occurrence.

Calling up error messages

The following conditions must be fulfilled for querying the error memory:

- The machine must be at a standstill.
- The ignition key in position 1.
- Forward-reverse control in position "neutral".

If a travel direction is selected when querying an error, the display returns to the main display.

1. Press the push button **47** in order to call up the service display.
   ➥ The startup screen displaying the number of hours until the next inspection is displayed in the display.
2. Press the push button Taster **46** in order to call up the saved error message or the scroll one page down in the digital display within the error display.
   ➥ If no error messages are present, no numbers will be shown on the first page that is called up.

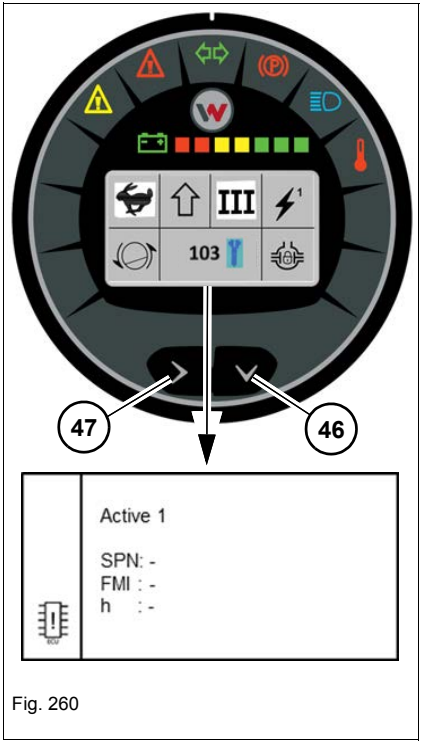


Fig. 260

Displays

Information

The numbers in the presented illustrations are offered as examples. Other figures are displayed in reality.

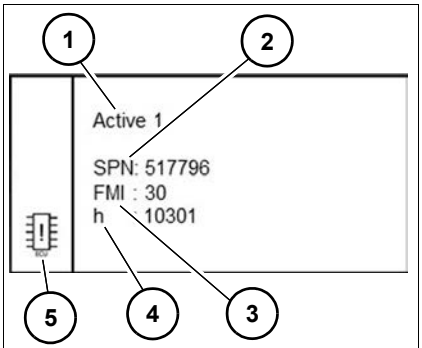


Fig. 261

Error display

1. Error type active / passive with running number
2. SPN error code (component)
3. FMI error code (error type)
4. Operating hours at occurrence of error
5. ECU symbol (means that errors are displayed that are saved in the machine's control unit)

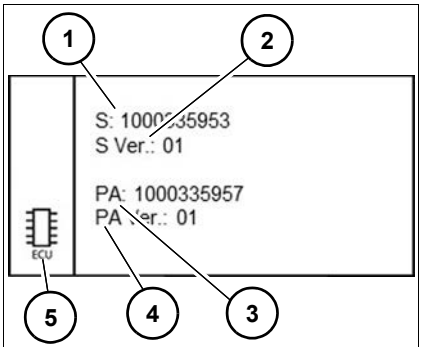


Fig. 262

Machine electronics display (ECU)

1. Machine electronics number
2. Machine electronics version
3. Parameter data number
4. Parameter data version
5. ECU symbol (means that data of machine control unit is displayed)

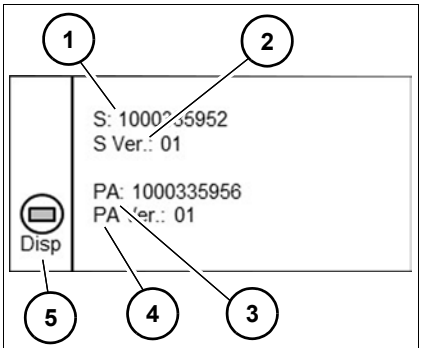


Fig. 263

Display electronics indication (DISP)

1. Display electronics number
2. Display electronics version
3. Parameter data number
4. Parameter data version
5. DISP symbol (means that display data is displayed)

Information

Retain the following data if you want to report an error to an authorized service center:

- SPN error code (*Fig. 261*)
- FMI error code (*Fig. 261*)
- ECU data of machine electronics display (*Fig. 262*)
- DISP data of display electronics indication (*Fig. 263*)

Navigation in the display screen

If the error menu is completely gone through with the push button **46**, the display will return to the service display **B** again.

By using push button **47**, one can return to the main display **A** at any time during the error query.

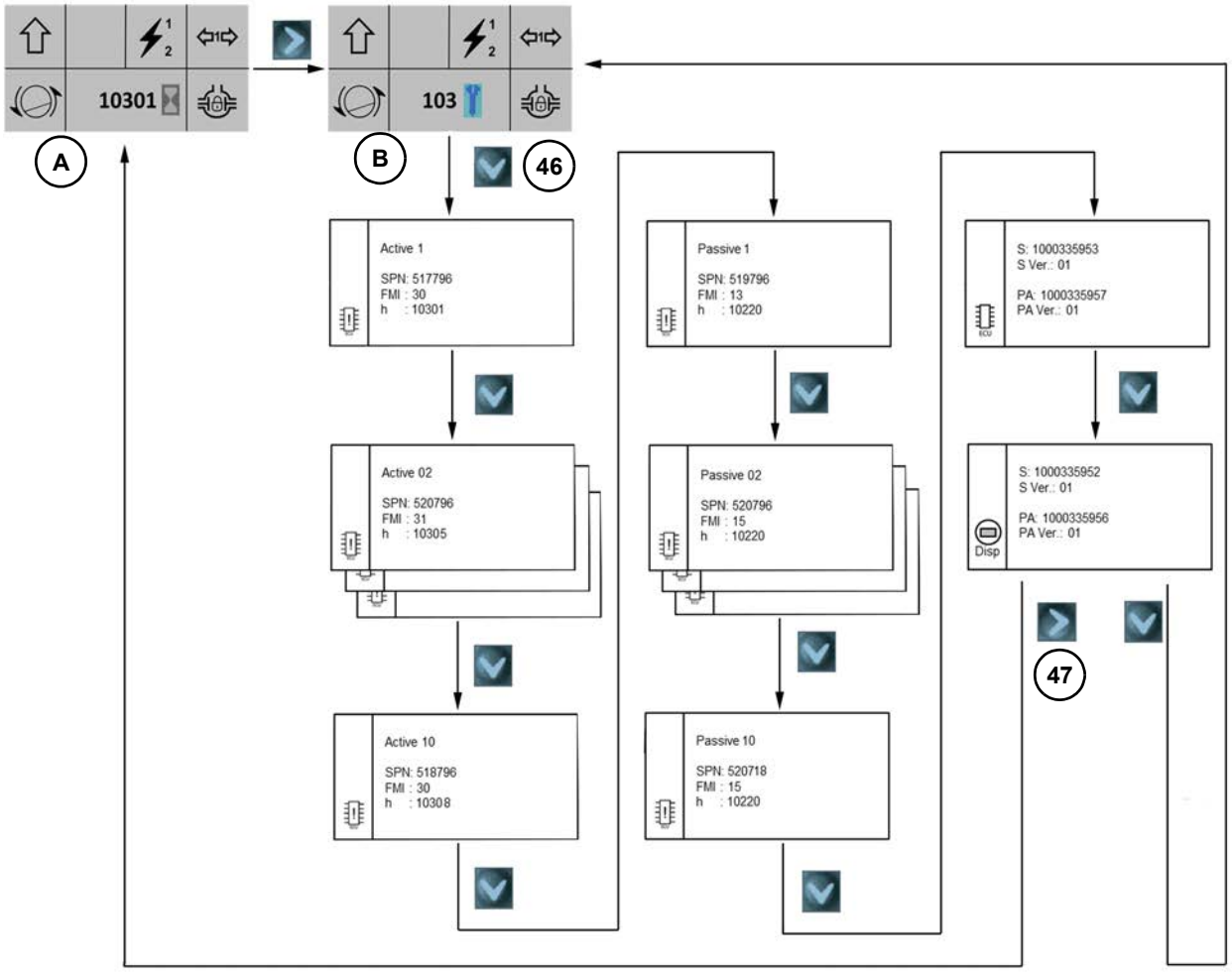


Fig. 264

Error codes

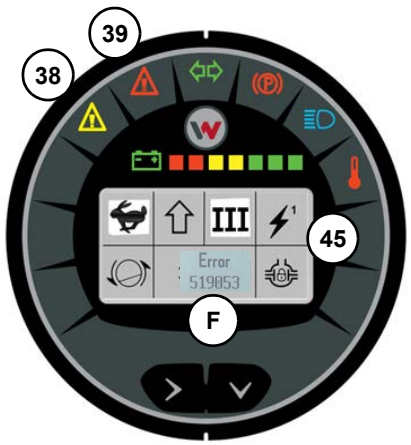


Fig. 265

If the machine electronics report an error, a warning light **38** or **39** illuminates in the gauge and an error code is displayed for 3 seconds in the display of the gauge 45 in field F.t.

Error code tables

Main controls

Error code	FMI	Warning light	Error description	Remedy
518400	9	Yellow	N004 – MLS Master (main controller): Missing signal – Both electric engines go via ramp into emergency shutdown	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.
	11	Red	N004 – MLS Master (main controller): Error description not identifiable – Machine goes into emergency shutdown	**Critical error** 1. Unlock motor isolating switch. 2. Repeat startup process. 3. If the error occurs again: have the error corrected by an authorized service center.
	12	Red	N004 – MLS Master (main controller): control error (controller) – Machine goes into emergency shutdown	
	19	Yellow	N004 – MLS Master (main controller): Missing communication between components – Both electric motors go via ramp into emergency shutdown	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.
518401	12	Yellow	N004 – MLS Master (main controller): control error (controller) – Machine goes into emergency shutdown – Machine able to travel in limp home mode	
518402	12	Red	N004 – MLS Master (main controller): control error (controller) – Machine goes into emergency shutdown	**Critical error** 1. Unlock motor isolating switch. 2. Repeat startup process. 3. If the error occurs again: have the error corrected by an authorized service center.

Main controls (continuation)

Error code	FMI	Warning light	Error description	Remedy
518420	9	Yellow	N004 – MLS Interface A/B (I/O controller): Missing signal – Both electric engines go via ramp into emergency shutdown	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.
	11	Yellow	N004 – MLS Interface A/B (I/O controller): Error description not identifiable – Both electric engines go via ramp into emergency shutdown	
	12	Yellow	N004 – MLS Interface A/B (I/O controller): Control error (controller) – Both electric engines go via ramp into emergency shutdown	
	19	Yellow	N004 – MLS Interface A/B (I/O controller): Missing communication between components – Both electric engines go via ramp into emergency shutdown	
518421	12	Yellow	N004 – MLS Interface A/B (I/O controller): Control error (controller) – Both electric engines immediately go into emergency shutdown	
518430	9	Yellow	N004 MLS Drive 1 (operating engine controller): Missing signal – Operating engine immediately goes into emergency shutdown	
	11	Yellow	N004 – MLS Drive 1 (hydraulic engine controller): Error description not identifiable – Operating engine immediately goes into emergency shutdown	
	12	Yellow	N004 MLS Drive 1 (hydraulic engine controller): Control error (controller) – Operating engine immediately goes into emergency shutdown	
	19	Yellow	N004 MLS Drive 1 (hydraulic engine controller): Missing communication between components – Machine immediately goes into emergency shutdown	

Main controls (continuation)

Error code	FMI	Warning light	Error description	Remedy
518440	9	Yellow	N004 – MLS Drive 2 (controller): Missing signal – Both electric engines go via ramp into emergency shutdown	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.
	11	Red	N004 – MLS Drive 2 (hydraulic engine controller): Error description not identifiable – Operating engine immediately goes into emergency shutdown	**Critical error** 1. Repeat startup process. 2. If the error occurs again: have the error corrected by an authorized service center.
	12	Red	N004 – MLS Drive 2 (operating engine controller): Control error (controller) – Machine immediately goes into emergency shutdown	
	19	Yellow	N004 – MLS Drive 2 (operating engine controller): Missing communication between components – Both electric engines go via ramp into emergency shutdown	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.

Main controls (continuation)

Error code	FMI	Warning light	Error description	Remedy
518450	9	Yellow	N004 – MLS Safe A/B (safety controller): Missing signal – Both electric engines go via ramp into emergency shutdown	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.
	11	Red	N004 – MLS Safe A/B (safety controller): Error description not identifiable – Machine goes into emergency shutdown	**Critical error** 1. Repeat startup process. 2. If the error occurs again: have the error corrected by an authorized service center.
	12	Red	N004 – MLS Safe A/B (safety controller): control error (controller) – Machine goes into emergency shutdown – Machine able to travel with reduced output	
	19	Yellow	N004 – MLS Safe A/B (safety controller): Missing communication between components – Both electric engines go via ramp into emergency shutdown	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.
518451	12	Red	N004 – MLS Safe A/B (safety controller): control error (controller) – Machine goes into emergency shutdown	**Critical error** 1. Unlock motor isolating switch. 2. Repeat startup process. 3. If the error occurs again: have the error corrected by an authorized service center.

Main controls (continuation)

Error code	FMI	Warning light	Error description	Remedy
518460	9	Yellow	N004 – ICE_PIO (controller StVZO module): Missing signal – Both electric motors go via ramp into emergency shutdown	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.
	11	Yellow	N004 – ICE_PIO (controller StVZO module): Error description not identifiable – Both electric motors go via ramp into emergency shutdown	
	12	Yellow	N004 – ICE_PIO (controller StVZO module): Control error (controller) – Both electric motors go via ramp into emergency shutdown	
	19	Yellow	N004 – ICE_PIO (controller StVZO module): Missing communication between components – Both electric motors go via ramp into emergency shutdown	

Insulation monitoring (opt)

Error code	FMI	Warning light	Error description	Remedy
518360	3	Red	N039: Signal range exceeded or short circuit to positive supply voltage – Machine can continue to be operated	**Critical error** 1. Acknowledge error. 2. Turn off the machine and then turn it on again. 3. If the error occurs again: have the error corrected by an authorized service center.
	4	Red	N039: Signal range exceeded or short circuit to machine ground/sensor ground – Machine can continue to be operated	
	12	Red	N039: Control error (controller) – Machine can continue to be operated	
	14	Red	N039: Special error – Machine can continue to be operated	
518361	17	Red	N039: Slightly below threshold – Machine can be still be moved	

Main contactor

Error code	FMI	Warning light	Error description	Remedy
519866	2	Red	K117 – Contact battery voltage Signal is faulty or irregular – Machine goes into emergency shutdown	**Critical error** 1. Unlock motor isolating switch 2. Turn off the machine and then turn it on again. 3. If the error occurs again: have the error corrected by an authorized service center.
	7	Red	K117 – Contact battery voltage Missing response of mechanical system or incorrect setting – Machine goes into emergency shutdown	
	12	Red	K117 – Contact battery voltage Control error (controller) – Machine goes into emergency shutdown	

Operator presence switch

Error code	FMI	Warning light	Error description	Remedy
519053	4	Yellow	S104: Signal range exceeded or short circuit to machine ground/sensor ground – Machine travel function is blocked	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.
	26	Yellow	S104: Signal outside of the valid range – Machine travel function is blocked	
	28	Yellow	S104: Open circuit or short circuit to positive supply voltage – Machine travel function is blocked	

Steering system

Error code	FMI	Warning light	Error description	Remedy
518971	3	Yellow	S022 – Switch (steering mode changeover): Signal range exceeded or short circuit to positive supply voltage – only all-wheel drive possible	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.
	26	Yellow	S022 – Switch (steering mode changeover): Signal outside of the valid range – only all-wheel drive possible	
	27	Yellow	S022 – Switch (steering mode changeover): Open circuit or short circuit to ground – only all-wheel drive possible	
519355	5	Yellow	Y006 – Magnetic valve (front axle steering): Power too low or open wiring – only all-wheel drive possible	
	6	Yellow	Y006 – Magnetic valve (front axle steering): Power too high or short circuit against vehicle ground – only all-wheel drive possible	
519356	5	Yellow	Y007 – Magnetic valve (all-wheel drive): Power too low or open wiring – only front axle steering possible	
	6	Yellow	Y007 – Magnetic valve (all-wheel drive): Power too high or short circuit to vehicle ground – only front axle steering possible	

Hydraulic motor

Error code	FMI	Warning light	Error description	Remedy
518431	12	Red	N004: Control error (controller) – Machine immediately goes into emergency shutdown	**Critical error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.
518432	0	Yellow	N004 – Threshold exceeded by far – Machine immediately goes into emergency shutdown	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.
	1	Yellow	N004 – Threshold exceeded by far – Machine immediately goes into emergency shutdown	
	12	Yellow	N004: Control error (controller) – Temperature on the heat sinks is faulty – Machine can continue to be operated without loss of output. The output loss is temperature-dependent and occurs in three stages. If the temperature is not lowered: – Machine immediately goes into emergency shutdown	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: **Critical error** Have the error rectified by an authorized service center.
	16	Yellow	N004 – Threshold exceeded – Vehicle can still be operated in emergency operation	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.
	18	Yellow	N004 – Slightly below threshold – Vehicle can still be operated in emergency operation	

Hydraulic engine (continuation)

Error code	FMI	Warning light	Error description	Remedy
	0	Yellow	N004 – Threshold exceeded by far – Machine immediately goes into emergency shutdown	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.
518433	12	Yellow	N004: Control error (controller) – Temperature on the heat sinks is faulty – Machine can continue to be operated with loss of output. The output loss is temperature-dependent and occurs in three stages. If the temperature is not lowered: – Machine immediately goes into emergency shutdown	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: **Critical error** Have the error rectified by an authorized service center.
	16	Yellow	N004 – Threshold exceeded – Vehicle can still be operated in emergency operation	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.
518434	0	Yellow	N004 – Threshold exceeded by far – Machine immediately goes into emergency shutdown	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.
518436	2	Yellow	N004 – Signal faulty or irregular – Hydraulic motor immediately goes into emergency shutdown	
518435	12	Yellow	N004: Control error (controller) – Interim voltage temporarily exceeded	**Error** 1. Select the “Turtle” speed range 2. Reducing engine speed

Travel drive

Error code	FMI	Warning light	Error description	Remedy
517041	2	Red	B042 – Potentiometer (joystick): Signal 1: Signal is faulty or irregular – Machine travel function is blocked	**Critical error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.
	3	Yellow	B042 – Potentiometer (joystick): Signal 1: Signal range exceeded or short circuit to positive supply voltage	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.
	4	Yellow	B042 – Potentiometer (joystick): Signal 1: Signal range fallen below or short circuit to vehicle ground / sensor ground	
	28	Yellow	B042 – Potentiometer (joystick): Signal 1: Open control circuit or short circuit to positive supply voltage.	
517121	3	Yellow	B042 – Potentiometer (joystick): Signal 2: Signal range exceeded or short circuit to positive supply voltage	
	4	Yellow	B042 – Potentiometer (joystick): Signal 2: Signal range fallen below or short circuit to vehicle ground / sensor ground	
	28	Yellow	B042 – Potentiometer (joystick): Signal 2: Open control circuit or short circuit to positive supply voltage.	
519015	3	Yellow	S066 – Switch neutral (joystick): Signal range exceeded or short circuit to positive supply voltage – Neutral travel direction push button without function	
	26	Yellow	S066 – Switch neutral (joystick): Signal outside of the valid range – Neutral travel direction push button without function	
	27	Yellow	S066 – Switch neutral (joystick); Open circuit or short circuit to ground – Neutral travel direction push button without function	

Speed ranges (switch speed ranges)

Error code	FMI	Warning light	Error description	Remedy
518970	3	Yellow	S021 – Signal range exceeded or short circuit to positive supply voltage – only speed range "turtle" possible	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.
	26	Yellow	S021 – Signal outside of the valid range – only speed range "turtle" possible	
	27	Yellow	S021 – Open circuit or short circuit to ground – only speed range "turtle" possible	

Accelerator pedal

Error code	FMI	Warning light	Error description	Remedy
519911	2	Red	R011 – Potentiometer: Signal 1: Signal is faulty or irregular – Machine able to travel in limp home mode	**Critical error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.
	3	Yellow	R011 – Potentiometer: Signal 1: Signal range exceeded or short circuit to positive supply voltage	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.
	4	Yellow	R011 – Potentiometer: Signal 1: Signal range fallen below or short circuit to vehicle ground / sensor ground	
	28	Yellow	R011 – Potentiometer: Signal 1: Open control circuit or short circuit to positive supply voltage.	
519939	3	Yellow	R011 – Potentiometer: Signal 2: Signal range exceeded or short circuit to positive supply voltage	
	4	Yellow	R011 – Potentiometer: Signal 2: Signal range fallen below or short circuit to vehicle ground / sensor ground	
	28	Yellow	R011 – Potentiometer: Signal 2: Open control circuit or short circuit to positive supply voltage.	

Service brake (brake pressure switch)

Error code	FMI	Warning light	Error description	Remedy
518958	3	Yellow	S009: Signal range exceeded or short circuit to positive supply voltage – Differential lock without function	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.
	26	Yellow	S009: Signal outside of the valid range – Differential lock without function	
	27	Yellow	S009: Open circuit or short circuit to ground – Differential lock without function	

Parking brake

Error code	FMI	Warning light	Error description	Remedy
518148	2		S199 – Switch spring-applied brake: Signal is faulty or irregular – Machine travel function is blocked	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.
	3		S199 – Switch spring-applied brake: Signal range exceeded or short circuit to positive supply voltage	
	26		S199 – Switch spring-applied brake: Signal outside of the valid range	
	27		S199 – Switch spring-applied brake: Open circuit or short circuit to ground	
518960	2	Yellow	S065 – Switch parking brake: Signal 1: Signal is faulty or irregular – Travel drive goes into neutral position	
519487	5	Yellow	Y139 – Solenoid coil spring-applied brake: Power too low or open wiring – Parking brake without function	
	6	Yellow	Y139 – Solenoid coil spring-applied brake: Power too high or short circuit to vehicle ground – Parking brake without function	

Differential lock

Error code	FMI	Warning light	Error description	Remedy
518972	3	Yellow	S025 – Push button (joystick): Signal range exceeded or short circuit to positive supply voltage – Differential lock without function	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.
	27	Yellow	S025 – Push button (joystick): Open circuit or short circuit to ground –Differential lock without function	
	28	Yellow	S025 – Button (joystick): Open control circuit or short circuit to positive supply voltage. – Differential lock without function	
519357	5	Yellow	Y009 – Magnetic valve: Power too low or open wiring – Differential lock without function	
	6	Yellow	Y009 – Magnetic valve quickhitch lock: Power too high or short circuit to vehicle ground – Differential lock without function	

Operating motor

Error code	FMI	Warning light	Error description	Remedy
518441	12	Red	N004: Control error (controller) – Machine immediately goes into emergency shutdown	**Critical error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.
518442	0	Yellow	N004 – Threshold exceeded by far – Operating engine immediately goes into emergency shutdown – Drive engine goes via ramp into emergency shutdown	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.
	1	Yellow	N004 – Threshold exceeded by far – Operating engine immediately goes into emergency shutdown – Drive engine goes via ramp into emergency shutdown	
	12	Yellow	N004: Control error (controller) – Temperature on the heat sinks is faulty – Machine can continue to be operated with loss of output. The output loss is temperature-dependent and occurs in three stages. If the temperature is not lowered: – Machine immediately goes into emergency shutdown	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: **Critical error** Have the error rectified by an authorized service center.
	16		N004 – Threshold exceeded – Vehicle can still be operated in emergency operation	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.

Operating engine (continuation)

Error code	FMI	Warning light	Error description	Remedy
518443	0	Yellow	N004 – Threshold exceeded by far – Operating engine immediately goes into emergency shutdown – Drive engine goes via ramp into emergency shutdown	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.
	12	Yellow	N004: Control error (controller) – Temperature on the heat sinks is faulty – Machine can continue to be operated with loss of output. The output loss is temperature-dependent and occurs in three stages. If the temperature is not lowered: – Machine immediately goes into emergency shutdown	
	16	Yellow	N004 – Threshold exceeded – Vehicle can still be operated in emergency operation	
518444	0	Yellow	N004 – Threshold exceeded by far – Operating engine immediately goes into emergency shutdown – Drive engine goes via ramp into emergency shutdown	
	12	Yellow	N004: Control error (controller) – Temperature on the heat sinks is faulty – Machine can continue to be operated with loss of output. The output loss is temperature-dependent and occurs in three stages. If the temperature is not lowered: – Machine immediately goes into emergency shutdown	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: **Critical error** Have the error rectified by an authorized service center.
518446	2	Yellow	N004 – Signal faulty or irregular – Operating engine immediately goes into emergency shutdown – Hydraulic motor goes via ramp into emergency shutdown	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.

Hydraulic oil temperature monitoring (temperature sensor)

Error code	FMI	Warning light	Error description	Remedy
517006	4	Yellow	B007: Signal range exceeded or short circuit to machine ground/sensor ground – Gear pump hydraulics only runs at minimum revolutions	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.
	28	Yellow	B007: Open circuit or short circuit to positive supply voltage – Gear pump hydraulics only runs at minimum revolutions	

Loader unit

Error code	FMI	Warning light	Error description	Remedy
517042	3	Yellow	B043 – Position sensor boom Signal range exceeded or short circuit to positive supply voltage – Raising/lowering: no speed control possible	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.
	4	Yellow	B043 – Position sensor boom Signal range fallen below or short circuit to vehicle ground / sensor ground – Raising/lowering: no speed control possible	
	28	Yellow	B043 – Position sensor of the boom Open control circuit or short circuit to positive supply voltage – Raising/lowering: no speed control possible	
517043	3	Yellow	B044 – Position sensor tilt ram: Signal range exceeded or short circuit to positive supply voltage – Tilt in/tilt out: no speed control possible	
	4	Yellow	B044 – Position sensor tilt cylinder: Signal range fallen below or short circuit to vehicle ground/sensor ground – Tilt in/tilt out: no speed control possible	
	28	Yellow	B044 – Position sensor tilt cylinder: Open control circuits= or short circuit to positive supply voltage – Tilt in/tilt out: no speed control possible	

Quickhitch unlocking mechanism

Error code	FMI	Warning light	Error description	Remedy
518989	3		S040 – Switch release unlocking: Signal range exceeded or short circuit to positive supply voltage – Quick unlocking without function	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.
	26		S040 – Switch release unlocking: Signal outside of the valid range – Quick unlocking without function	
	27		S040 – Switch release unlocking: Open circuit or short circuit to ground – Quick unlocking without function	
519374	5	Yellow	Y025 – Magnetic valve: Power too low or open wiring – Quick unlocking without function	
	6	Yellow	Y025 – Magnetic valve quickhitch lock: Power too high or short circuit to vehicle ground – Quick unlocking without function	

3rd control circuit

Error code	FMI	Warning light	Error description	Remedy
517040	2	Red	B041 – Potentiometer rocker switch (joystick): Signal is faulty or irregular – 3rd control circuit and quickhitch unlocking mechanism without function	**Critical error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.
	3	Yellow	B041 – Potentiometer rocker switch (joystick): Signal range exceeded or short circuit to positive supply voltage	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.
	4	Yellow	B041 – Potentiometer switch (joystick): Signal range fallen below or short circuit to positive vehicle ground / sensor ground	
	28	Yellow	B041 – Potentiometer switch (joystick): Open control circuit or short circuit to positive supply voltage	
517122	3	Yellow	D002 – Potentiometer rocker switch (joystick): Signal range exceeded or short circuit to positive supply voltage	
	4	Yellow	D002 – Potentiometer switch (joystick): Signal range fallen below or short circuit to positive vehicle ground / sensor ground	
	28	Yellow	D002 – Potentiometer switch (joystick): Open control circuit or short circuit to positive supply voltage	
518981	3	Yellow	S033 – Switch continuous operation: Signal range exceeded or short circuit to positive supply voltage – Continuous functioning of 3rd control circuit without function	
	26	Yellow	S033 – Switch continuous operation: Signal outside of the valid range – Continuous functioning of 3rd control circuit without function	
	27	Yellow	S033 – Switch continuous operation: Open circuit or short circuit to ground – Continuous functioning of 3rd control circuit without function	
519919	3		R019-Potentiometer: signal range exceeded or short circuit to positive supply voltage	
	27		R019-Potentiometer: open circuit or short circuit to ground	

3rd control circuit (continuation)

Error code	FMI	Warning light	Error description	Remedy
518982	3	Yellow	S032 – Switch operation: Signal range exceeded or short circuit to positive supply voltage – 3rd control circuit and quick unlocking without function	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.
	26	Yellow	S032 – Switch operation: Signal outside of the valid range – 3rd control circuit and quick unlocking without function	
	27	Yellow	S032 – Switch operation: Open circuit or short circuit to ground – 3rd control circuit and quick unlocking without function	
519365	5	Yellow	Y016 – Lock magnetic valve: Power too low or open wiring – 3rd control circuit without function	
	6	Yellow	Y016 – Locking magnetic valve: Power too high or short circuit to vehicle ground – 3rd control circuit without function	
519366	5	Yellow	Y017 – Unlock magnetic valve: Power too low or open wiring – 3rd control circuit and quick release without function	
	6	Yellow	Y017 – Unlocking magnetic valve: Power too high or short circuit to vehicle ground –3rd control circuit and quick release without function	

Pressure relief of 3rd control circuit (button)

Error code	FMI	Warning light	Error description	Remedy
519076	3	Yellow	S127: Signal range exceeded or short circuit to positive supply voltage – Pressure relief without function	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.
	26	Yellow	S127: Signal outside of the valid range –Pressure relief without function	
	27	Yellow	S127: Open circuit or short circuit to ground –Pressure relief without function	

Load stabilizer

Error code	FMI	Warning light	Error description	Remedy
518993	3	Yellow	S044 – Button: Signal range exceeded or short circuit to positive supply voltage – Load stabilizer without function	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.
	26	Yellow	S044 – Button: Signal outside of the valid range – Load stabilizer without function	
	27	Yellow	S044 – Button: Open circuit or short circuit to ground – Load stabilizer without function	
519369	5	Yellow	Y020 – Magnetic valve: Power too low or open wiring – Load stabilizer without function – Work operation not possible	
	6	Yellow	Y020 – Magnetic valve: Power too high or short circuit to vehicle ground – Load stabilizer without function – Work operation not possible	
519370	5	Yellow	Y021 – Magnetic valve: Power too low or open wiring – Load stabilizer without function – Work operation not possible	
	6	Yellow	Y021 – Magnetic valve: Power too high or short circuit to vehicle ground – Load stabilizer without function – Work operation not possible	

Hose burst valve

Error code	FMI	Warning light	Error description	Remedy
519371	5	Yellow	Y022 – Bypass valve: Power too low or open wiring – Hose burst re-routing without function – Hose burst safety keeps functioning – Work operation not possible	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.
	6	Yellow	Y022 – Bypass valve: Power too high or short circuit against ground – Hose burst re-routing without function – Hose burst safety keeps functioning – Work operation not possible	

Low-speed control

Error code	FMI	Warning light	Error description	Remedy
519903	3	Yellow	R003 – Potentiometer: Signal 2: Signal range exceeded or short circuit to positive supply voltage	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.
	4	Yellow	R003 – Potentiometer: Signal 2: Signal range fallen below or short circuit to vehicle ground / sensor ground	
	28	Yellow	R003 – Potentiometer: Signal 2: Open control circuit or short circuit to positive supply voltage.	
519950	2	Yellow	R003 – Potentiometer: Signal 1: Signal is faulty or irregular – Low-speed control without function	
	3	Yellow	R003 – Potentiometer: Signal 1: Signal range exceeded or short circuit to positive supply voltage	
	4	Yellow	R003 – Potentiometer: Signal 1: Signal range fallen below or short circuit to vehicle ground / sensor ground	
	28	Yellow	R003 – Potentiometer: Signal 1: Open control circuit or short circuit to positive supply voltage.	

7-pole front power outlet

Error code	FMI	Warning light	Error description	Remedy
518976	26	Yellow	S027 – Rocker switch: Signal outside of the valid range – Front power outlet without function	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.
519016	3	Yellow	S067 – Button joystick: Signal range exceeded or short circuit to positive supply voltage – Front power outlet without function	
	26	Yellow	S067 – Button joystick: Signal outside of the valid range – Front power outlet without function	
	27	Yellow	S067 – Button joystick: Open circuit or short circuit to ground – Front power outlet without function	
519765	24	Yellow	K016 – Relays: Logical error/software – Front power outlet without function	

Drive interlock

Error code	FMI	Warning light	Error description	Remedy
518080	9	Yellow	N021 – CAN error: time-out or missing signal	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.
518081	2	–	N021 – Antenna status: error (open circuit or short circuit)	
	12	–	N021 – Transponder status: No key recognized	Check if the right key was used. If necessary, code key.
	13	–	N021 – Transponder status: Code exists but not valid	Check if the right key was used.

Immobilizer (continuation)

Error code	FMI	Warning light	Error description	Remedy
518082	26	–	N021 – Relays 1 Status: short circuit (voltage if relays contacts are open)	**Error** 1. Turn off the machine and then turn it on again. 2. If the error occurs again: have the error corrected by an authorized service center.
	27	–	N021 – Relays 1 Status: open circuit (no voltage if relays contacts are closed)	
518083	26	–	N021 – Relays 2 Status: short circuit (voltage if relays contacts are open)	
	27	–	N021 – Relays 2 Status: open circuit (no voltage if relays contacts are closed)	
518084	26	–	N021 – Relays 3 Status: short circuit (voltage if relays contacts are open)	
	27	–	N021 – Relays 3 Status: open circuit (no voltage if relays contacts are closed)	
518085	10	–	N021 – CAN-Bus-Status: receiver error	
518086	16	–	N021 – Battery status: Overvoltage (29.8 V)	
	18	–	N021 – Battery status: Undervoltage (7.7 V)	
518087	13	–	N021 – Immobilizer active	Check if the right key was used.
518089	02	–	N021 – Reservoir full	Reduce number of keys.

Fault indications in the power electronics

Safety instructions

WARNING

Accident hazard due to high electrical voltages!

Improper performance of work on the electrical system can result in serious injury or death.

- ► Maintenance on the electrical system that does not involve HV components (e.g. replacing fuses), where the maintenance personnel must work near HV components and, in the event of an error, could trigger an electrical hazard, must be performed by "electrically trained persons". The training must include the following factual information:
  - the hazard sources on the machine,
  - safety measures and
  - the corresponding rules of conduct.
- ► In order to be permitted to perform work on the HV systems of the machine, further training as "Expert for Work on HV Intrinsically Safe Machines" (DGUV Information 200-005) is mandated in Germany. Be aware of, observe and comply with the corresponding legal regulations of other countries.

WARNING

Accident hazard due to electric current!

Only work on the machine when it is in a de-energized state.

- ► Before working on the electrical system:
  - Park the machine securely
    – see chapter 5 “Stopping and securing the machine” on page 5-17.
  - Disconnect the battery connector
    – see chapter 4 “Battery connector” on page 4-20.

Displays

There are 7 LED indicator lights in total located under the operator seat on the front side of the control. The indicator lights act as a minimal diagnosis.

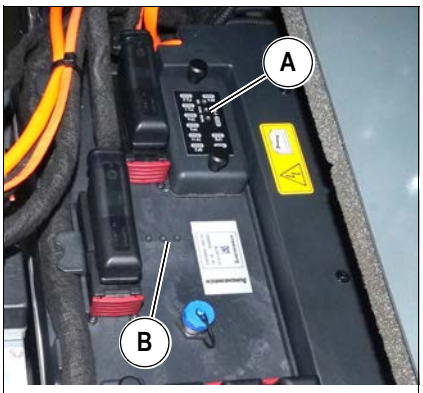


Fig. 266

Area	Designation LED	Function
A	1H10	Indicator display travel drive
	1H11	Indicator display hydraulic system
	H3	Diagnosis indicator fuse box 1
B	H4	Indicator display control
	H5	Indicator display interface – part system A
	H6	Indicator display interface – part system B
	H7	Diagnosis indicator fuse box 2

Burned out or missing fuses are indicated by means of flash codes via the diagnosis indicators for fuses **H3** and **H7**.

The flash code is composed as follows: the LED is repeatedly switched briefly on (approx. 0.2 sec) and off (ca. 0.4 sec). Lastly, a longer pause follows (approx. 2 sec), indicating the end of the start of the flash code. The number of times the LED is repeatedly switched off (e.g. 4 times consecutively off = flash code 4).

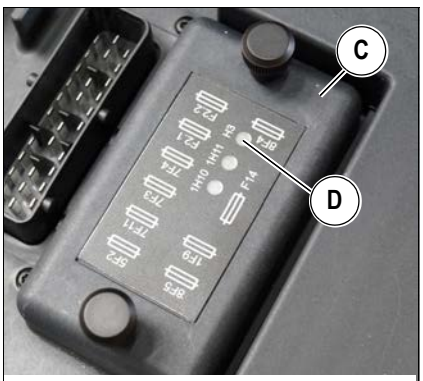


Fig. 267

Fuse box 1 (C)	
Flash code LED H3 (D)	**Defective fuse**
2	5F2
3	7F11
4	7F3
5	7F4
6	F2.1
7	F2.2
8	8F4
9	8F5
10	1F9
11	F14

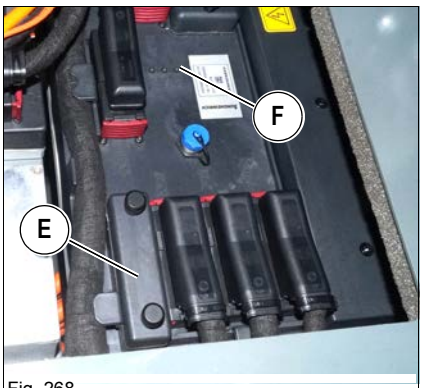


Fig. 268

Fuse box 2 (E)	
Flash code LED H7 (F)	**Defective fuse**
2	F29
3	9F14
4	F4
5	2F14
6	9F33
7	4F4
8	5F11.2
9	9F1
10	F30
11	5F11
12	F31
13	4F8
14	5F11.3
15	5F11.1
16	4F1

Fault indications in the StVZO module

Safety instructions

WARNING

Accident hazard due to high electrical voltages!

Improper performance of work on the electrical system can result in serious injury or death.

► Maintenance on the electrical system that does not involve HV components (e.g. replacing fuses), where the maintenance personnel must work near HV components and, in the event of an error, could trigger an electrical hazard, must be performed by "electrically trained persons". The training must include the following factual information:
- the hazard sources on the machine,
- safety measures and
- the corresponding rules of conduct.

► In order to be permitted to perform work on the HV systems of the machine, further training as "Expert for Work on HV Intrinsically Safe Machines" (DGUV Information 200-005) is mandated in Germany. Be aware of, observe and comply with the corresponding legal regulations of other countries.

WARNING

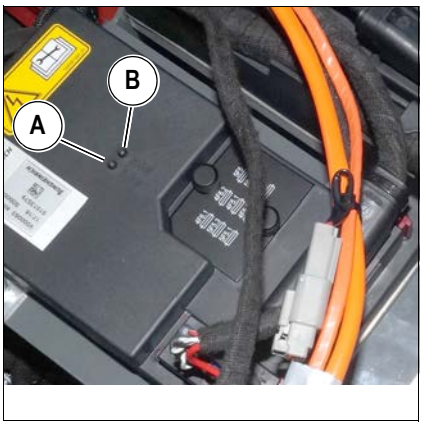
Accident hazard due to electric current!

Only work on the machine when it is in a de-energized state.

► Before working on the electrical system:
- Park the machine securely
  – see chapter 5 “Stopping and securing the machine” on page 5-17.
- Disconnect the battery connector
  – see chapter 4 “Battery connector” on page 4-20.

Displays

There are 2 LED indicator lights in total located under the operator seat on the front side of the StVZO module. The indicator lights act as a minimal diagnosis.



Designation LED	Function
5H18	Diagnosis indicator fuse box **A**
5H19	Indicator display control **B**

Burned out or missing fuses are indicated by means of flash codes via the diagnosis indicator for fuses **5H18**.

The flash code is composed as follows: the LED is repeatedly switched briefly on (approx. 0.2 sec) and off (ca. 0.4 sec). Lastly, a longer pause follows (approx. 2 sec), indicating the end of the start of the flash code. The number of times the LED is repeatedly switched off (e.g. 4 times consecutively off = flash code 4).

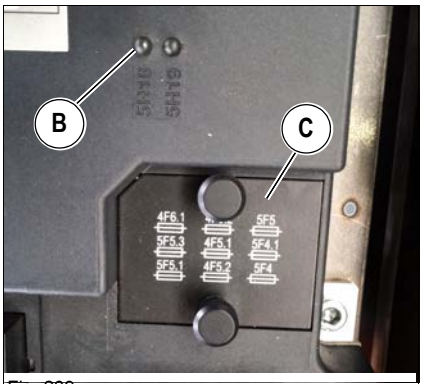


Fig. 269

Fuse box (C)	
Flash code LED 5H18 (A)	**Defective fuse**
2	4F6.1
3	5F5.3
4	5F5.1
5	4F6.2
6	4F5.1
7	4F5.2
8	5F5
9	5F4.1
10	5F4

8.4 Malfunctions in the air conditioning system (opt)

Only authorized service centers and trained personnel may perform repairs, and fill up and empty the air conditioning system!

Malfunctions in the air conditioning system	Possible causes	Remedy	See page
Fan does not run	Malfunctioning or loose fuse	Replace fuses	*7-64*
	Interrupted line	Contact an authorized service center	–
	Malfunctioning fan motor		–
	Malfunctioning fan switch		–
Fan cannot be switched off	Short circuit in cable or fan switch		–
Reduced fan output	Dirty contacts		–
	Undersized electric lines		–
	Condenser very dirty	Cleaning the condenser	*7-81*
Insufficient heating output or none at all	Condenser fins dirty	Cleaning the condenser	*7-81*
	Dirty filter	Clean the filter	*7-71*
Loss of refrigerant on equipment	Loose hose connection	Contact an authorized service center	–
	Damaged hose		–
	Condenser damaged		–
Compressor does not run	Malfunctioning controls		–
	Loose connection on compressor		–
Condenser overflow	Expansion valve is stuck in open position	Contact an authorized service center	–
Clogged condenser	Dirty radiator fins	Clean the condenser	*7-81*

Malfunctions in the air conditioning system	Possible causes	Remedy	See page
Loss of refrigerant	Interruption of refrigerant line	Contact an authorized service center	–
	System leak		–
Insufficient refrigerating output	Clogged fan duct		–
	Refrigerant level too low		–
	Humidity in system		–
System cools with interruptions	Line interruption, insufficient ground connections		–
	Malfunctioning fan motor	Contact an authorized service center	–
Very loud system	Loose compressor bracket or worn inside parts of the compressor		–
	Excessive wear of fan motor		–
	System overfill		–
	Not enough refrigerant in the system		–

9 Technical data

Information
The measurements in the brackets (...) are standard units of US measurement.

DIN/EN – American measures

Torques	
1 Nm (Newton meter)	0.737 ft lb (Foot-pound-force)
Pressure	
1 bar (Bar)	14.29 psi (Pound per square inch)
Speed	
1 km/h (Kilometers per hour)	0.62 mph (Miles per hour)
Force/output	
1 W (Watt)	0.00136 hp (Horse Power)
1 kW (kilowatts)	1.36 hp (Horse Power)
1 kN (Kilo newton)	224.8 lbf (Pound-force)
Length indications	
1 mm (Millimeter)	0.03937 in (inches)
1 m (meter)	3.281 ft (Foot)
1 m (meter)	1.0936 yards
1 km (kilometer)	0.622 mile
1 mile (mile)	1.607 km (kilometer)
Mass (weights)	
1 kp/cm² (kilopond/cm²)	2.2 lb
1 kg (kilogram)	2.205 lb (Pound)
1 g (gram)	0.035 oz (ounces)
Temperature	
1 °C (Grad Celsius)	33.8 °F (Grad Fahrenheit)
Volume	
1 l (Liter)	2.1 pt (Pint)
1 l (Liter)	1.06 qt (Quart)
1 l (Liter)	0.26 gal (Gallon)
1 cm^3 (Cubic centimeter)	0.0611 in^3 (Cubic inch)
Volumetric flow	
1 l/min (Liter per Minute)	0.26 gpm (Gallon per minute)

9.1 Models and trade names

Information

The letter **S** or **L** in the designation indicates the version of the loader unit:

- **S** = standard loader unit
- **L** = extended loader unit

Model designation	Trade name
357-00S	5055e
357-00L	5055eL

9.2 Engine

Information

Tow electrical motors are installed in the machine. The technical specifications of the motors are listed in the respective sections *Travel drive/axles on page 9-3* or *Operating hydraulics on page 9-7*.

9.3 Travel drive/axles

Hydraulic motor

Designation	
Product	Juli Motorenwerk
Type	AF 4/7-R1
Design	3-phase alternating current asynchronous motor
Housing protection	IP 54
max. operating voltage / current rating	48 V/226 A
Power	15 kW S 2-60 minn (20.4 hp) at 2110 min^{-1} (maximal 34 kW (46.2 hp))
Max. torque	220 Nm (162.3 ft lb)
Max. engine speed without load	6000 rpm^{-1}

Transfer gearbox

Designation	
Product	Schmahl ZSB I2
Design	Single-stage

Travel drive

Designation	
“Turtle” speed range	7 km/h (4.3 mph)
"Hare" speed range	17 km/h (10.6 mph)
Traction force[1]	26 kN (5845 lbf)

1. Standard tires 12.0-18

Front axle

Designation	
Design	Planetary steering and drive axle, rigid screw connection with chassis
Differential lock (100 %)	Traction is evenly distributed to all 4-wheels by means of the cardan shaft
King-pin inclination	7°
Camber	1.5°
Steering angle	Max. 38°
Toe-in	0 mm (0 in)
Track width[1]	1262 mm (49.7 in)

1. Standard tires 12.0-18

Rear axle

Designation	
Design	Oscillating axle carrier suspension on chassis
Differential lock	None
King-pin inclination	7°
Camber	1.5°
Oscillation angle	± 8°
Steering angle	Max. 38°
Toe-in	0 mm (0 in)
Track width[1]	1262 mm (49.7 in)

1. Standard tires 12.0-18

9.4 Brakes

Service brake

Designation	
Design	Foot-operated hydrostatic disc brake
Location	Input shaft – front axle input
Effect	On both axles via cardan shaft
Active standstill control	In stand still the motor is regulated so that it works against the transmission of external torques (e.g. the downslide force).

Parking brake

Designation	
Design	Dry multi-disc brake with electro-magnetic release function. Installation location: flange-mounted on the hydraulic motor

9.5 Steering system

Steering system	
Design	Hydrostatic 4-wheel steering with emergency steering features
Steering mode	4-wheel steering/front axle steering (opt)
Assemblies	Hydraulic pump, steering unit with priority valve, one steering ram per axle, automatic synchronization in final positions (left and right)
Displacement (servostat)	60 cm³/U (3.66 in^3/U) / steering wheel revolution
Steering pressure	180 bar (2572.2 psi)
Hydraulic pump displacement	19 cm^3/rev (1.16 in ^{3}/rev)

9.6 Tires

Tire size[1]	Tire pressure (bar/psi)		Wheel rims	
	Front	Rear	Size	Wheel offset (mm/in)
12.0-18[2] NHS 12PR 145A6 A317	3.0 (43 psi)	2.5 (36 psi)	9x18	38 (0.15 in)
325/70 R18 MPT AC70G TL125G	3.5 (50 psi)	3.0 (43 psi)	11x18	25 (0.1 in)
365/70 R18 135B/146A2 EM-01	3.0 (43 psi)	2.5 (36 psi)	11x18	25 (0.1 in)
340/80 R 18 550 143A8/138D				
340/80 R18 143 A8/B BIBLOAD				
340/80 R18 80 TRI2 138D Nokian				

1. Increase front tire pressure by 0.5 bar (7.15 psi) during pallet forks operation!
2. Standard tires

9.7 Operating hydraulics

Operating motor

Designation	
Product	Jungheinrich
Type	AP4H6-L3
Design	3-phase alternating current asynchronous motor
Housing protection	IP 54
max. operating voltage / current rating	43 V/380 A
Power	22 kW S3-15% (29.9 hp) at 2560 min^{-1}
Max. torque	200 Nm (147.5 ft lb) LS 1200 min^{-1}
Max. engine speed without load	3000 rpm

Hydraulic oil reservoir

Designation	
Volume	About 40 l (8.8 gal)
Return suction filter	0.5 bar (7.15 psi) pre-tension

Hydraulic pump

Designation	
Hydraulic pump	Gear pump
Displacement	19 cm^3/rev. ≡ 54 l/min (1.16 in^3/rev. ≡ 14.26 gpm) 3000 min^{-1}
Max. operating pressure[1]	235 ± 5 bar (3408 ± 72.5 psi)

1. Measured on the pump

Pilot control

Designation	
Operating principle	Mechanical
Control valve (3-fold)	Operation: raise/lower with joystick, Operation: 3rd control circuit with control lever or rocker switch on joystick (option)
Return suction filter	0.5 bar (7.15 psi) pre-tension

Hydraulic protection on control valve

Designation	
Hydraulic pump	19 cm³/U ≡ 54 l/min (1.16 in^3/U ≡ 14.26 gpm) 3000 min^{-1}
Max. operating pressure[1]	235 bar (3408 psi)
Tilt cylinder Secondary protection:	Rod side 260 bar (3715 psi) Base side 120 bar (1715 psi)
Lifting cylinder Secondary protection:	None on rod side Base side 260 bar (3715 psi)
Quickhitch cylinder Secondary protection:	260 bar (3715 psi)

1. Measured at control valve test connection

Lift and tilt cylinder speed

Designation		
Hydraulic pump	19 cm^3/U ≡ 54 l/min (1.16 in³/U ≡ 14.26 gpm) 3000 min^{-1}	
Lifting cylinder	Raise	5.2 s
	Lower	3.3 s
Tilt cylinder	Tilt in	2.8 s
	Tilt out	3.2 s

Usable consumer pressure at 3rd control circuit

Designation		
Hydraulic pump	Function	Rpm / l/min / bar (rpm^{-1}/ gal/min / psi)
Quick couplers Front 3rd control circuit[1] (without pressureless return)	3rd control circuit control valve	3000 / **37** / 170 (3000 / **9.78 /** 2175)
At coupling block 3rd control circuit quick couplers (without pressureless return)	3rd control circuit control valve	3000 / **44** /170 (3000 / **11.62 /** 2175)

1. In case of higher motor temperatures, the oil flow is automatically reduced.

9.8 Electrical system

Battery

Designation	Type AGM
Manufacturer	Hoppecke
Designation	trak \ systemize
Rated voltage	80 V
Nominal capacity	416 Ah / 40 cell blocks
Weight	1240 kg (2734 lb)
Operating temperature	-15 to +45° (5 to 113 °F)
Storage temperature[1]	-15 to +45 °C[2, 3] (5 to 113 °F)
Service life earthworks[4]	min. 3 h
Service life light work[4]	min. 5 h
Charge temperature	-5 to +45 °C (23 to 113 °F)
Charge duration	5 to 8.5 hours[5]
Angle of inclination[6]	45°[7]
Battery charger	Integrated

1. With fully charged battery
2. Storage at -15 °C to 0 °C when the battery is connected for trickle charging is permissible.
3. When storing at above 0° C without trickle charging, then perform an open-load voltage measurement every 3 months.
4. During continuous operation without pause and the environmental temperature is above 20 °C.
5. Depending on the discharge state of the battery
6. Not critical in operation. Only park on level ground.
7. Observe the tilting limit of the machine: 20° lateral inclination

Light bulbs

Designation	Power
Light bulb – high beam (left/right)	24 V, 55 W/H3
Light bulb – low beam (left/right)	24 V, 55 W / H7
Light bulb – parking light (left/right)	24 V 4 W
Light bulb – front and rear turn indicators (left/right)	24 V 21 W
Light bulb – brake/rear lights (left/right)	24 V, 21/5 W
Light bulb – working light	24 V, 55 W/H3
Light bulb – rotating beacon	24 V, 55 W / H1
Light bulb – interior light	24 V 10 W

HV components

Power electronics	
Designation	
Housing protection	IP 64
Fan protection	IP 55
Operating temperature	-10 to +45 °C[1] (14 to 113 °F)
Storage temperature	-40 to +85 °C (-40 to 185 °F)
Weight	12 kg (26.45 lb)
Input voltage	80 V DC
Max. input current on +UB(B)	100 A
Max. input current on +UB	450 A
Standby current	40 mA
Output voltages	80 V DC and 24 V DC
Output power	500 W continuous 700 W p
Output power hydraulic motor control	32 kVA
Output power operating motor control	20 kVA

1. When temperature on heats sink rise above 70 °C, drive control output is reduced in three stages, depending on the temperature.

StVZO module	
Designation	
Housing protection	IP 64
Operating temperature	-10 to +45 °C (14 to 113 °F)
Storage temperature	-40 to +85 °C (-40 to 185 °F)
Weight	2 kg (4,4 lb)
Input voltage	80 V DC
Max. input current	15 A1
Standby current	50 mA
Output voltage	24 V DC
Output power	400 W

Fuses

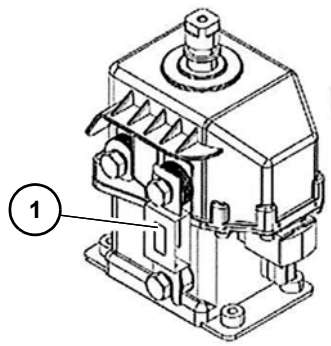
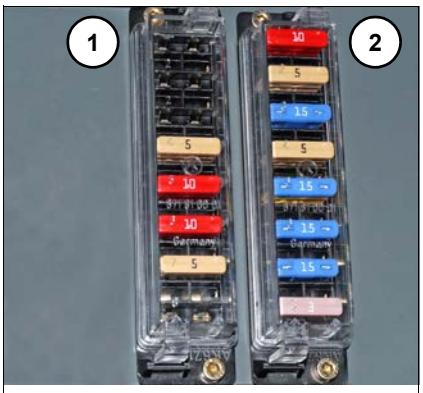


Fig. 270

Master fuse

The master fuse is located on the motor isolating switch.

Item	Fuse	Rated current (A)	Protected circuit
1	F001	425	Main fuse (cabin supply)



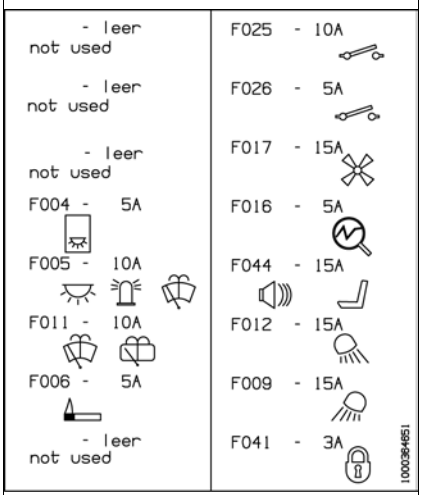


Fig. 271

Fuse panel

The fuse panel is located on the right on the control lever console.

Item	Fuse	Rated current (A)	Protected circuit
1			Not assigned
			Not assigned
			Not assigned
	F004	5	Search lighting switch, radio
	F005	10	Interior light, rotating beacon, window wiper interval relay
	F011	10	Front window wiper rear window wiper
	F006	5	12 V socket (cigarette lighter)
			Not assigned
2	F025	10	Front power outlet
	F026	5	Front power outlet
	F017	15	Heating fan
	F016	5	Diagnosis connector supply
	F044	15	Radio / operator seat
	F012	15	Rear working light
	F009	15	Front working light
	F041	3	Drive interlock

Power electronics

The fuses are located in both fuse boxes **A** and **B** of the power electronics under the covers.

Fig. 272

Item	Fuse	Rated current (A)	Protected circuit
A1	5F2	10	DC/DC-converter (iCE-PIO)
	7F11	–	Not assigned
	7F3	10	Voltage converter (80V/12V)
	7F4	–	Not assigned
	F2.1	–	Not assigned
	F2.2	–	Not assigned
A2	8F5	3	Internal charging connection / (charging connection on the drive control and battery discharging monitoring)
	1F9	3	Electronics control (control and control elements of the drive control)
	F14	30	Heating
	8F4	10	DC/DC-converter
B1	F29	2	Standby consumer
	9F14	–	Not assigned
	F4	4	Main contactor, valve timing, load stabilizer, front axle steering
	2F14	5	Spring-loaded brake, valve timing: SWP, 3rd control circuit, hose burst valve, load stabilizer, differential lock, 4-wheel drive
B2	9F33	–	Not assigned
	4F4	4	Reversing alarm, indicator lights: front axle steering, forward machine travel, reverse machine travel
	5F11.2	4	High beam (left)
	9F1	4	Brake light (right)
B3	F30	2	Internal control
	5F11	–	Not assigned
	F31	2	Sensory mechanism
	4F8	2	Speed range lighting switch, indicator light 4-wheel drive, front socket relay, buzzer control
B4	5F11.3	4	High beam (right)
	5F11.1	4	Brake light (left)
	4F1	4	Hydraulic fan

Road traffic module

The fuses are located in the fuse box under the cover.

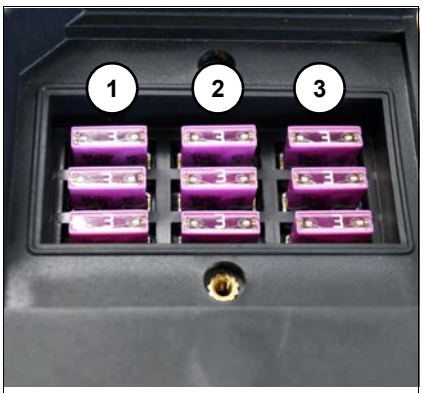


Fig. 273

Item	Fuse	Rated current (A)	Protected circuit
1	4F6.1	3	Brake light (left)
	5F5.3	3	Low beam (right)
	5F5.1	3	Low beam (left)
2	4F6.2	3	Brake light (right)
	4F5.1	3	Turn indicators (left)
	4F5.2	3	Turn indicator (right), indicator light hazard warning lights
3	5F5	3	Sensory mechanism
	5F4.1	3	Parking and rear light (right)
	5F4	3	Parking and rear light (left) search-light switch

Relays

The relays are located under the trim of the control lever console on the right.

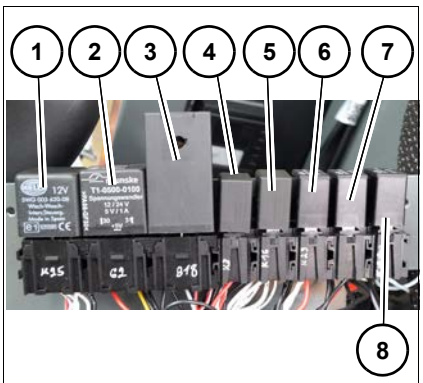


Fig. 274

Item	Switching relay no.	Protected circuit
1	K025	Switching relay washer-system interval
2	G002	Voltage transformer
3	B018	Buzzer
4	K003	Switching relay for backup warning system
5	K016	Lock switching relay (3rd control circuit)
6	K023	Wiper switching relay (1st speed)
7	K005	Switching relay buzzer
8	K014	Switching relay search light / parking light
–	K117	Main contactor (in the motor isolating switch)

9.9 Tightening torques

General tightening torques

Screw dimensions	Tightening torques[1]		
	8.8	10.9	12.9
M4	3 Nm (2.2 ft lb)	4 Nm (2.9 ft lb)	5 Nm (3.7 ft lb)
M5	5.5 Nm (4.1 ft lb)	8 Nm (5.9 ft lb)	10 Nm (7.4 ft lb)
M6	10 Nm (7.4 ft lb)	14 Nm (10.3 ft lb)	16 Nm (11.8 ft lb)
M8	23 Nm (17 ft lb)	34 Nm (25.1 ft lb)	40 Nm (29.5 ft lb)
M10	46 Nm (33.9 ft lb)	67 Nm (49.4 ft lb)	79 Nm (58.2 ft lb)
M12	79 Nm (58.2 ft lb)	115 Nm (84.8 ft lb)	135 Nm (99.5 ft lb)
M14	125 Nm (92.1 ft lb)	185 Nm (136 ft lb)	220 Nm (162 ft lb)
M16	195 Nm (144 ft lb)	290 Nm (214 ft lb)	340 Nm (251 ft lb)
M18	280 Nm (206 ft lb)	400 Nm (295 ft lb)	470 Nm (346 ft lb)
M20	395 Nm (291 ft lb)	560 Nm (413 ft lb)	660 Nm (486 ft lb)
M22	540 Nm (398 ft lb)	760 Nm (560 ft lb)	890 Nm (656 ft lb)
M24	680 Nm (501 ft lb)	970 Nm (715 ft lb)	1150 Nm (848 ft lb)
M27	1000 Nm (737 ft lb)	1450 Nm (1069 ft lb)	1700 Nm (1253 ft lb)
M30	1350 Nm (995 ft lb)	1950 Nm (1437 ft lb)	2300 Nm (1695 ft lb)

1. These values are valid for screws with untreated, non-lubricated surfaces.

Specific tightening torques

Designation	Tightening torque
Wheel nut	390 ±10 Nm (287±7 ft lb)

9.10 Coolant

Outside temperature	Water[1]	Antifreeze[2]
Up to °C (°F)	% by volume	% by volume
4 (39)	99	–
-10 (14)	79	20
-20 (-4)	65	34
-25 (-13)	59	40
-29 (-20)	**55**	**45**
-30 (-22)	50	50

1. Water quality at 20 °C = 6.5 – 8.5 ph/total hardness 3 – 20 °dGH
(do not use salt, lake, river, brackish or industrial water)
2. (Antifreeze concentrate −60 °C (−76 °F) *– see chapter 7 "Fluids and lubricants" on page 7-14*

9.11 Noise emissions

Noise level (self-propelled work machine)

Outside noise level		
Machine model	**Sound power level**	**dB_A**
with cabin	Measured value	80.9
	Guaranteed value	82
with canopy	Measured value	80.9
	Guaranteed value	82

Operator-perceived noise level		
Machine model	**Sound pressure level (LPA)**	**dB_A**
with cabin	Guaranteed value	69
with canopy	Guaranteed value	69

Information

The measurement is performed in accordance with the requirements of DIN EN 474-1 and the Directive 2000/14 EC!
Measurements performed on asphalted surface.

Noise levels (agricultural and forestry tractors)[1]

Applies only to EU member states.

Observe and follow the legal regulations of your country.

Outside noise level		
Machine model	**Sound pressure level (LPA)**	**dB_A**
with cabin	Stationary	80.9
	Moving	82
with canopy	Stationary	
	Moving	

Operator-perceived noise level		
Machine model	**Sound pressure level (LPA)**	**dB_A**
with cabin	Moving	69
with canopy	Moving	

Information

The measurement is performed in accordance with the requirements of Directives
2009/76/EC and 2009/63/EC
!
Measurements performed on asphalted surface.

1. Agricultural or forestry license not currently obtained.

9.12 Vibration

Vibration[1, 2]	
Overall vibration value for upper extremities of the body	< 2.5 $\frac{m}{s^2}$ (< 8.2 feet/s²)
Maximum effective value of weighted acceleration for body	< 0.5 $\frac{m}{s^2}$ (< 1.64 feet/s²)

1. Instruct or inform the operator of dangers arising from vibrations
2. Uncertainty of measurements in accordance with the requirements of DIN EN 474-1 and EN 12096

9.13 Weight

Weight	S = standard loader unit	L = extended loader unit
Kerb weight[1]	4150 kg (9149 lb)	4350 kg (9590 lb)
Kerb weight[1] with canopy	3900 kg (8598 lb)	–
Permissible total mass	5000 kg (11,023 lb)	
Front axle weight rating	3200 kg (7054 lb)	
Rear gross axle weight rating		

1. With standard bucket, without operator. Depends on the selected outfitting, the curb weight may deviate from this specification.

9.14 Payload/lift capacity/stability

Tilting limit of the vehicle

Designation	Value
Lateral tilting limit	20°

Machine with bucket (KRAMER quickhitch)

Description[1]	S = standard loader unit	L = extended loader unit
Bucket capacity[2]: **m³ (ft³)**	0.5 / 0.65 (17.6) / (22.9)	0.4 / 0.55 (14.1) / (19.4)
Tipping load: **kg (lb)**[3]	2340 / 3250 (5159 / 7165)	1980 / 2600 (4366 / 5732)
Payload: **kg (lb)**	1170 (2579)	990 (2182)
Breakout force: **kN (lbf)**[4] lifting cylinder	30.4 / 32.3 (6834.2 / 7261.3)	24.4 / 33.0 (5485.3 / 7418.7)
Breakout force: **kN (lbf)** tilt ram	28.1 (6317.1)	30.5 (6856.7)
Scraping depth: **mm (in)**[5]	- 80 (- 3.15)	- 80 (- 3.15)

1. With standard bucket 1000260472 (S) or 1000275101 (L)
2. Capacity struck according to ISO 7546/capacity heaped
3. Required/actual tilt load
4. Breakout force (kN): mechanical/hydraulic
5. With tires 12.0-18

Vehicle with bucket (SKID STEER quickhitch)[1] (currently not available)

Description[1]	S = standard loader unit
Bucket capacity[2]: **m³ (ft³)**	0.5 / 0.65 (17.6) / (22.9)
Tipping load: **kg (lb)**[3]	2500 (5512)
Payload: **kg (lb)**	1250 (2755)
Breakout force: **kN (lbf)**[4] lifting cylinder	30.4 / 32.5 (6834.2 / 7306.3)
Breakout force: **kN (lbf)** tilt ram	25 (5620.2)
Scraping depth: **mm (in)**[5]	- 70 (- 2.8)

1. With standard bucket 1000335701
2. Capacity struck according to ISO 7546/capacity heaped
3. Required/actual tilt load
4. Breakout force (kN): mechanical/hydraulic
5. With tires 12.0-18

1. Currently not yet released.

Machine with pallet fork (KRAMER quickhitch)

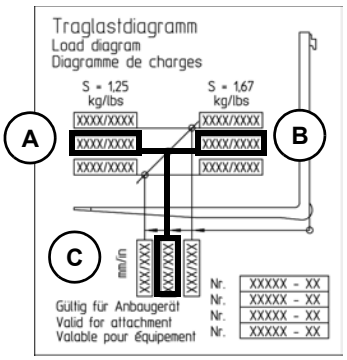


Fig. 275

Designation[1,2]	S = standard loader unit	L = extended loader unit
Payload **safety factor 1.25 (A)**	1750 kg (3858 lb)	1600 kg (3528 lb)
Payload **safety factor 1.67 (B)**	1310 kg (2889 lb)	1200 kg (2646 lb)
Movable payload[3] Transport position: **Safety factor 1.25 (A)**	2000 kg (4409 lb)	1850 kg (4078 lb)
Movable payload[3] Transport position: **Safety factor 1.67 (B)**	1500 kg (3307 lb)	1400 kg (3087 lb)

1. Applies to pallet forks 1000237357 (see load diagram)
2. Loader unit in horizontal position, 500 mm (19.68 in) load distance
3. The movable payload is only authorized in transport position of the loader unit, and is not specified in the load diagram.

Machine with pallet fork (EURO quickhitch)

Designation[1,2]	S = standard loader unit	L = extended loader unit
Payload **safety factor 1.25 (A)**	1750 kg (3858 lb)	1600 kg (3528 lb)
Payload **safety factor 1.67 (B)**	1310 kg (2889 lb)	1200 kg (2646 lb)
Movable payload[3] Transport position: **safety factor 1.25 (A)**	2000 kg (4409 lb)	1850 kg (4078 lb)
Movable payload[3] Transport position: **Safety factor 1.67 (B)**	1500 kg (3307 lb)	1400 kg (3087 lb)

1. Applies to pallet forks 1000241148 (see load diagram)
2. Loader unit in horizontal position, 500 mm (19.68 in) load distance
3. The movable payload is only authorized in transport position of the loader unit, and is not specified in the load diagram.

Vehicle with pallet forks with foldable fork tines (Kramer quickhitch facility)

Designation[1,2]	S = standard loader unit	L = extended loader unit
Payload **safety factor 1.25 (A)**	1650 kg (3630 lb)	1500 kg (3308 lb)
Payload **safety factor 1.67 (B)**	1200 kg (2640 lb)	1100 kg (2525 lb)
Movable payload[3] Transport position: **safety factor 1.25 (A)**	1950 kg (4299 lb)	1700 kg (3748 lb)
Movable payload[3] Transport position: **Safety factor 1.67 (B)**	1400 kg (3086 lb)	1250 kg (2755 lb)

1. Applies to pallet forks 1000241148 (see load diagram)
2. Loader unit in horizontal position, 500 mm (19.68 in) load distance
3. The movable payload is only authorized in transport position of the loader unit, and is not specified in the load diagram.

9.15 Dimensions

Dimensions with KRAMER bucket

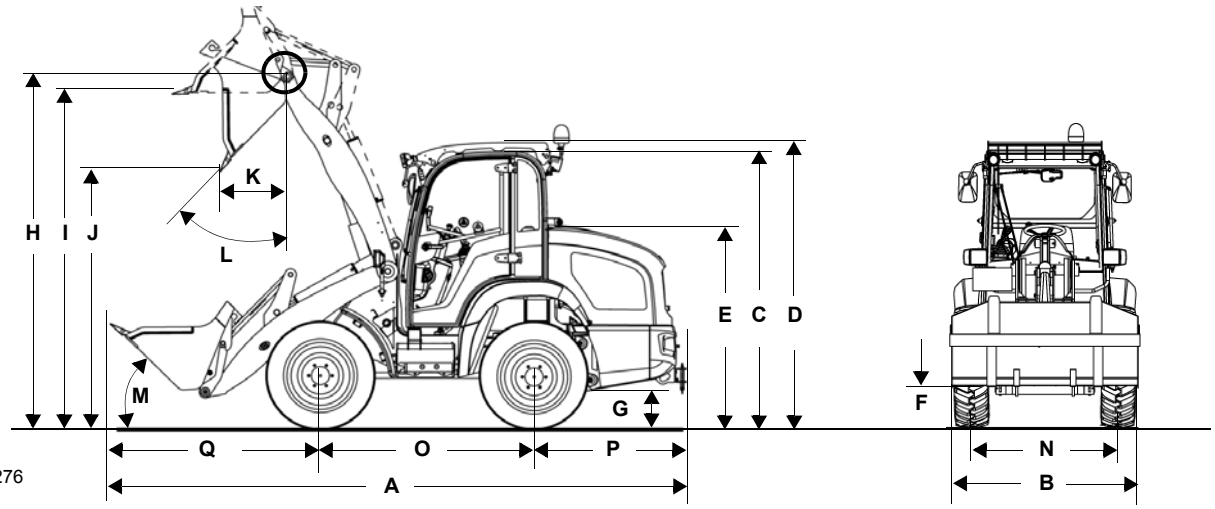


Fig. 276

Dimensions with bucket		S = standard loader unit	L = extended loader unit
A	Overall length[1, 2]	4950 mm (194.9 in)	5140 mm (202.3 in)
B	Overall width[1]	1650 mm (64.9 in)	
C	Overall height with cabin[3, 4, 5]	2390 mm (94 in)	
D	Overall height with protective FOPS screen[3, 5]	2470 mm (97.24 in)	
E	Overall height, upper edge of engine cover[3, 5]	1700 mm (67 in)	
F	Ground clearance in transport position of loader unit	250 mm (9.85 in)	
G	Ground clearance[3, 5]	280 mm (11 in)	
H	Pin height[3, 5]	3050 mm (121 in)	3300 mm (130 in)
I	Load-over height[3, 5]	2880 mm (113.4 in)	3280 mm (129.1 in)
J	Tilt-out height[3, 5]	2350 mm (92.5 in)	2620 mm (103.2 in)
K	Tilt reach[1]	320 mm (12.6 in)	410 mm (16.1 in)
L	Tilt-out angle[1]	42°	42°
M	Tilt-in angle[1]	48°	51°
N	Front/rear track[3]	1262 mm (49.7 in)	
O	Wheelbase (centre of front/rear axle)	1850 mm (72.8 in)	
P	Distance centre of rear axle to rear end	1320 mm (52 in)	
Q	Distance between centre of front axle and front edge of bucket	1780 mm (70 in)	1970 mm (77.5 in)
–	Turning radius: Between curbs[3] Between walls[1]	2700 mm (106.3 in) 3550 mm (139.7 in)	2700 mm (106.3 in) 3780 mm (148.8 in)

1. with standard bucket 1000260472 (S) or 1000275101 (L)
2. With towing device
3. with tires 12.0-18
4. With rotating beacon + 200 mm (+7.9 in)
5. With tires 325/70 R18 (−10 mm) (−0.39 in), with tires 365/70 R18 (+10 mm) (+0.39 in)/ With tires 335/80 R18 (+30 mm) (+1.81 in), with tires 340/80 R 18 (+25 mm) (+0.98 in)

Dimensions with KRAMER pallet forks

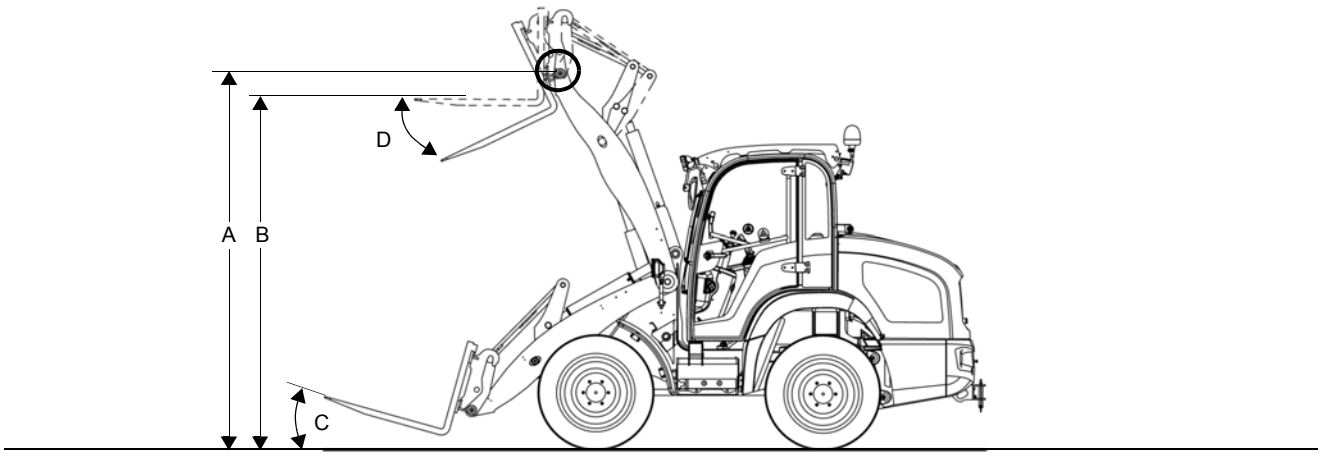


Fig. 277

Dimensions with pallet forks		S = standard loader unit	L = extended loader unit
A	Pin height[1, 2]	3050 mm (120.8 in)	3300 mm (129.9 in)
B	Pallet height[1, 2]	2830 mm (111.4 in)	3050 mm (120.1 in)
C	Tilt-in angle in transport position	19 °	21 °
D	Tilt-out angle	25 °	25 °
–	Turning radius with pallet forks (horizontal fork arms in transport position)	3820 mm (150.4 in)	4050 mm (159.5 in)

1. Measured with pallet forks 1000237357 and tires 12.0-18
2. With tires 325/70 R18 (−10 mm) (−0.39 in), with tires 365/70 R18 (+10 mm) (+0.39 in)/ With tires 335/80 R18 (+30 mm) (+1.81 in), with tires 340/80 R 18 (+25 mm) (+0.98 in)

Other information – *see "Dimensions with KRAMER bucket" on page 9-21*

Dimensions with SKID-STEER bucket (opt) (currently not available)

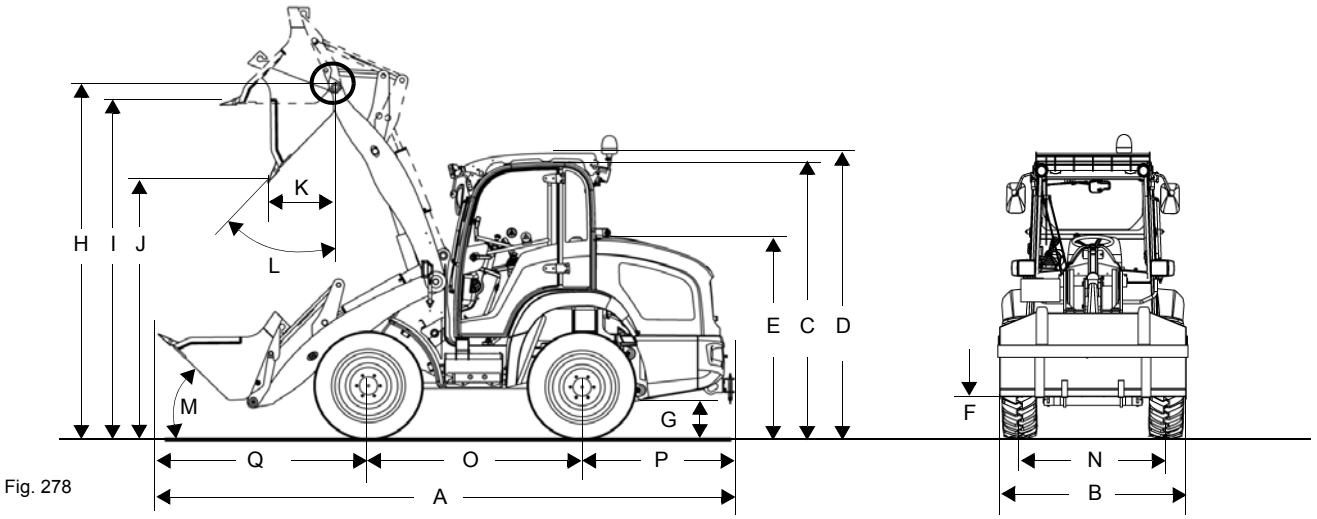


Fig. 278

Dimensions with bucket		S = standard loader unit
A	Overall length[1, 2]	4950 mm (194.9 in)
B	Overall width[1]	1650 mm (64.9 in)
C	Overall height with cabin[3, 4, 5]	2380 mm (93.7 in)
D	Overall height with protective FOPS screen[3, 5]	2450 mm (96.46 in)
E	Overall height, upper edge of engine cover[3, 5]	1700 mm (67 in)
F	Ground clearance in transport position of loader unit	250 mm (9.8 in)
G	Ground clearance[3, 5]	280 mm (11 in)
H	Pin height[3, 5]	3050 mm (121 in)
I	Load-over height[3, 5]	2750 mm (108.2 in)
J	Tilt-out height[3, 5]	2310 mm (90.9 in)
K	Tilt reach[1]	315 mm (12.4 in)
L	Tilt-out angle[1]	45 °
M	Tilt-in angle[1]	43 °
N	Front/rear track[3]	1262 mm (49.7 in)
O	Wheelbase (centre of front/rear axle)	1850 mm (72.8 in)
P	Distance centre of rear axle to rear end	1320 mm (52 in)
Q	Distance between centre of front axle and front edge of bucket	1850 mm (72.8 in)
–	Turning radius: Between curbs[3] Between walls[1]	2700 mm (106.3 in) 3550 mm (139.7 in)

1. With standard bucket order no. 1000335701
2. With towing gear
3. With tires 12.0-18
4. With rotating beacon + 200 mm (+7.9 in)
5. With tires 325/70 R18 (−10 mm) (−0.39 in), with tires 365/70 R18 (+10 mm) (+0.39 in)/ With tires 335/80 R18 (+30 mm) (+1.81 in), with tires 340/80 R 18 (+25 mm) (+0.98 in)

Dimensions with SKID-STEER pallet forks (opt) (currently not available)

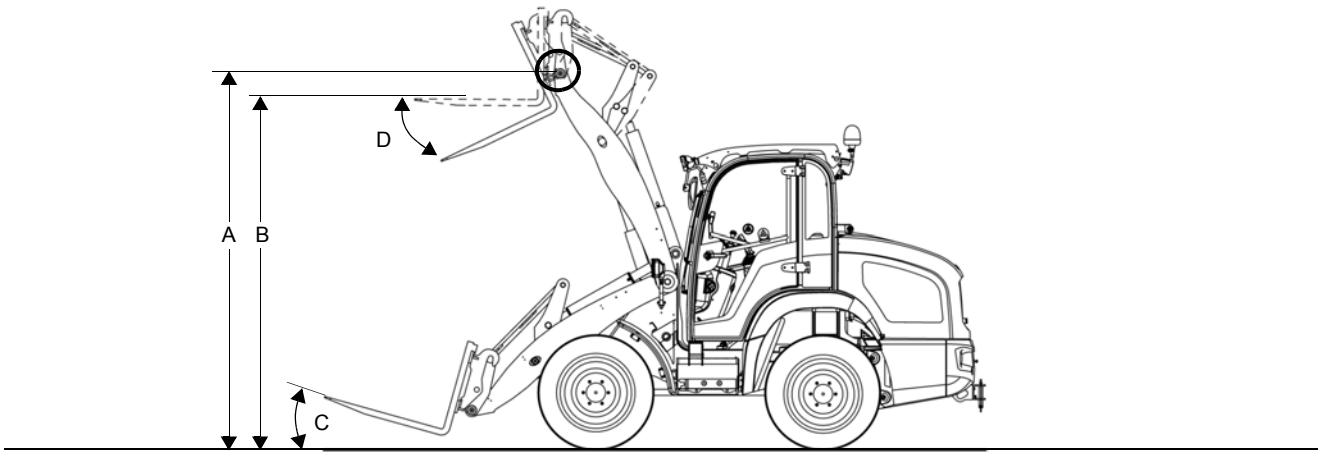


Fig. 279

Dimensions with pallet forks		S = standard loader unit
A	Pin height[1, 2]	3050 mm (120.8 in)
B	Pallet height[1, 2]	2830 mm (111.4 in)
C	Tilt-in angle in transport position	15 °
D	Tilt-out angle	30 °
–	Turning radius with pallet forks (horizontal fork arms in transport position)	3820 mm (150.4 in)

1. Measured with pallet forks 1000260255 and tires 12.0-18
2. With tires 325/70 R18 (−10 mm) (−0.39 in), with tires 365/70 R18 (+10 mm) (+0.39 in)/ With tires 335/80 R18 (+30 mm) (+1.81 in), with tires 340/80 R 18 (+25 mm) (+0.98 in)

Other information – *see "Dimensions with SKID-STEER bucket (opt) (currently not available)" on page 9-23*

Dimensions with EURO pallet forks (opt)

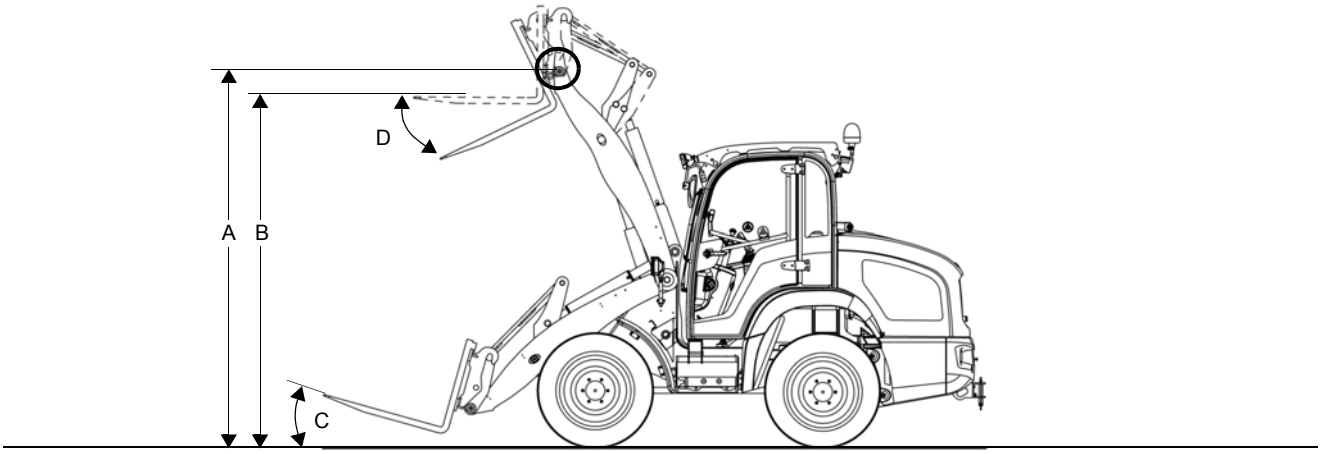


Fig. 280

Dimensions with bucket (EURO)		S = standard loader unit	L = extended loader unit
A	Pin height[1, 2]	3050 mm (120 in)	3300 mm (130 in)
B	Pallet height[1, 2]	2950 mm (116.1 in)	3200 mm (126 in)
C	Tilt-in angle in transport position	15 °	15 °
D	Tilt-out angle	68°	68°
–	Turning radius with pallet forks (horizontal fork arms in transport position)	3820 mm (150.4 in)	4050 mm (159.5 in)

1. Measured with pallet forks 1000241148 and tires 12.0-18
2. With tires 325/70 R18 (−10 mm) (−0.39 in), with tires 365/70 R18 (+10 mm) (+0.39 in)/ With tires 335/80 R18 (+30 mm) (+1.81 in), with tires 340/80 R 18 (+25 mm) (+0.98 in)

Other information – *see "Dimensions with KRAMER bucket" on page 9-21*.

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KRAMER-WERKE GmbH keep abreast of the latest technical developments and constantly improve their products. For this reason, we may from time to time need to make changes to figures and descriptions in this documentation that do not reflect products that have already been delivered and that will not be implemented on these vehicles.

Technical data, dimensions and weights are only given as an indication. Responsibility for errors or omissions not accepted.

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