

YANMAR

Operating Instructions

Mobile Excavator

B95W

Original - Operating Instructions

From Product Identification Number: **TW09540100>**



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2 Introduction

2.1 Concerning these operating instructions

Economical operation

These operating instructions contain important information for safe, proper and economical operation of the machine. Strict compliance with these instructions helps to avoid dangers, to reduce repair costs and downtimes and to enhance the reliability and service life of the machine.

Reading the operating instructions

Read these operating instructions thoroughly to become acquainted with correct handling and operation.

Site of operation

These operating instructions must always be available at the deployment location of the machine.

Technical modifications

Items described in these operating instructions are subject to change without prior notification.

Copyright

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Definition of target groups

The contents of these operating instructions are aimed at a diverse target audience. The target groups are as follows:

- Operating personnel
- Maintenance personnel
- Service personnel
- Carrier
- Guides
- Personnel responsible for attaching loads
- Apprentice staff
- Crane operators
- Waste disposal staff

The level of knowledge each target group must have is defined below.

Apprentice staff must

- have undergone an induction.

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Introduction

All other staff members referred to below must

- have read these operating instructions and understood their contents.
- be trained in and able to administer first aid.
- be physically and mentally fit for the purpose of carrying out their tasks.
- display knowledge and understanding of national safety regulations for slinging, moving, and storing the goods encountered at the deployment location.
- be fully familiar with the risks posed by machinery and loads.
- be of the legal minimum age.

Operating personnel must

- have been instructed in the use of the machine.
- have proven their ability to operate the machine to the operating company.
- have been appointed by the operating company to operate the machine.
- be familiar with the country-specific accident-prevention regulations.
- be in possession of the relevant national permit for operating the machine.
- be fully familiar with the risks that arise when working with machinery and display knowledge and understanding of all safety-related instructions, sources of danger and safety precautions.
- have received training and instruction concerning what to do in the event of a malfunction.
- have read through the entire documentation, in particular the operating instructions, and be capable of applying the information contained therein.
- be familiar with the hand signals for guiding machines.
- operate the machine in such away that they remain fully in control of it even in the face of dynamic forces.

Maintenance personnel must

- fulfill all the same qualification criteria as the operating personnel.
- know the maintenance points on the machine.
- have proven their ability to perform maintenance work on the machine to the operating company.
- have been appointed by the operating company to perform maintenance work on the machine.
- know the country-specific environmental regulations for the disposal of lubricants. See chapter "Environmental protection regulations".
- have been instructed in how to carry out the necessary maintenance work by completing machine and operations training provided by Yanmar or by someone that has been appointed by Yanmar.

Service personnel must

- fulfill all the same qualification criteria as the operating staff.
- be fully familiar with the risks that arise when using the machinery for repair work and display knowledge and understanding of all safety-related instructions, sources of danger, and safety precautions.
- have sound school education and professional training.
- have been trained by Yanmar for service work on the machine.
- have received training and instruction concerning what to do in the event of a malfunction.
- be qualified to carry out work on the mechanical, electrical, control, and hydraulic components of machines as demonstrated by a nationally recognized certificate.
- have read and understood the service information provided by the manufacturer and be capable of applying it.
- have been instructed in how to carry out the necessary service work by completing machine and operations training provided by Yanmar or by someone that has been appointed by Yanmar.
- remain within the machine operator's field of vision.

Carriers must

- possess the relevant national heavy goods vehicle license.
- possess the relevant national operating license for this machine (should they be required to drive it during loading).

Guides must

- be easily recognizable (e.g. by means of reflective clothing).
- remain in the operating staff's field of vision.
- only work in the capacity of a guide and may not be entrusted with any other tasks.
- have the necessary knowledge and understanding to be able to assess situations correctly while they are guiding machines and to be able to respond appropriately.
- know hand signals for guiding the machinery and have agreed on them with the machine operator.

Personnel responsible for attaching loads must

- be able to assess the weight and center of gravity of the loads being moved.
- know how to select sling gear as well as to attach/remove it safely and keep it properly maintained.
- remain in the operating staff's field of vision.
- have the requisite knowledge concerning the load capacity of sling gear within the context of the application (number of cables, slinging method, inclination angle, etc.).
- be familiar with the hand signals to be used when moving loads and clarify these with the operating personnel.
- (depending on the national regulations) hold the correct certificate of competence.

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Introduction

Crane operators must

- have all the qualifications required for attaching loads.
- have the necessary knowledge and relevant national license for the moving of heavy goods with a crane.

Waste disposal staff must

- be employed by an authorized waste disposal company, as per national regulations.
- have the necessary knowledge to dispose of materials safely and in an environmentally friendly manner.
- be informed about structural particularities (residual energy) by service staff who are authorized by the manufacturer.

2.2 Notes on using the operating instructions

Safety alert symbol



The safety symbol is used to warn you of potential personal injury. Obey all safety messages that follow this symbol to avoid possible injury or death.

Structure of safety notes

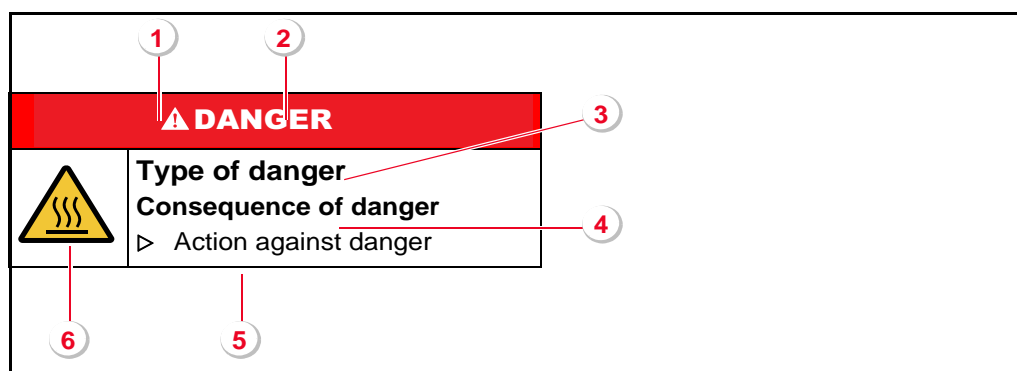


Fig. 2-1 Structure of safety notes

- 1 Safety Alert Symbol
- 2 Signal word for danger level
- 3 Type and source of danger
- 4 Possible consequence of danger
- 5 Measures for hazard prevention
- 6 Safety symbol

Notes



Notice

This symbol is employed for information containing important notes about correct use and/or how to proceed. Non-compliance may lead to malfunctions.

Abbreviations employed

Abbreviation	Meaning
B95W	B95W wheeled excavator standard
B95W AL	B95W wheeled excavator with all-wheel steering
B95W S	B95W wheeled excavator - high-speed version

2 Introduction

2.3 Proper use

The Yanmar machine with standard fittings is solely intended for the following type of work:

- Loosening, picking up, displacement and dumping of soil, rock or other materials.
- Loading of these materials on trucks, conveyor belts or other haulage means.

After mounting additional approved special work attachments, such as:

- Clamshell grabs
- Hydraulic hammer
- etc.

the vehicle can be used for corresponding working operations.

The machine can also be used for lifting, transporting, and lowering loads with the aid of sling gear.

The machine must be licensed for the road if it is to be used on public roads, in line with local traffic and vehicle regulations. In this case, it is subject to labeling as per § 58 of the StVZO (National Road Traffic Regulations) and, if required, as per § 4 paragraph 4 of the FZV (as above). Any changes made to the machine will invalidate the vehicle's road license.

The machine is only permitted on public roads with a specific or general operating permit to this end.

Strict compliance with the operating and maintenance instructions and the performance of maintenance work, as well as adherence to the maintenance intervals is also part of intended use. The operator must also follow the enclosed operating instructions for externally supplied components.

The permissible operation temperature is between -15 °C and +48 °C.

2.4 Improper use

Using the Yanmar machine for the following types of work is deemed to constitute unintended use:

- Transport of persons
- Lifting persons
- Using the machine at fording depth higher than the lower edge of the axle.
- Transporting cargo on public roads
- Use in water protection areas
- Operating on public roads
- Use in a contaminated area without a protective ventilation system in the cab or a breathing air supply for the machine operator

Also, all types of use other than those described in section "Proper use" are improper.

The supplier cannot be held responsible for any damage resulting from improper use. This risk is borne solely by the user.

2.5 Warranty

The warranty period covers 12 months, beginning with the day the machine is handed over or commissioned.

2.6 Declaration of conformity



The machine meets the general requirements of the applicable European directives.

Conformity has been proven. The respective documents and the original Declaration of Conformity are kept by the manufacturer.

A copy of the Declaration of Conformity is attached to the sales documents.

EC Declaration of Conformity according to Machinery Directive 2006/42/EC

1. We hereby declare that the excavator, type **B95W**:
Mobile excavator: B95W
Vehicle identification number: TW0954....
Effective output: 74.4 kW
2. complies with all the relevant requirements of the Machinery Directive 2006/42/EC.
3. The machine also complies with the relevant requirements of the following directives:
2014/30/EU (EMV), 2000/14/EC (noise emissions)
4. Representative sound power level:
98.0 dB (A)
5. Guaranteed sound power level:
100.0 dB (A)
6. Applied harmonized standards:
EN ISO 12100
EN 474-1
EN 474-5
7. Document editor who is authorized to compile technical documentation:
Ravindra Bachalli, Kraftwerkstraße 4, 74564 Crailsheim, Germany
8. Conformity evaluation process according to directive 2000/14/EC, as well as voluntary prototype testing by: DGUV (German Social Accident Insurance) Test and Certification Center
Fachbereich Bauwesen (Construction Division)
Landsberger Straße 309
D-80687 Munich
Notified body number: 0515

The EC Declaration of Conformity only applies if the earth-moving machine is used in accordance with the operating instructions. This includes using original Yanmar work attachments and other work attachments mentioned in the operating instructions or in other Yanmar documentation for use on this earth-moving machine.

Replaceable attachments manufactured by Yanmar or third-party manufacturers may only be installed and used if Yanmar deems these suitable for mounting on the earth-moving machine in question. In all other cases, special written approval is required from Yanmar.

2 Introduction

Read the operating instructions thoroughly and follow the notes on safe operation before putting the machine into operation.

National safety regulations - e.g. the Accident Prevention Regulations covering the "Machinery" (BGR 500) and "Vehicles" (BGV D29) in the Federal Republic of Germany - must also be complied with when operating the earth-moving machine.

In addition to the operating instructions, legal regulations governing road safety and accident prevention measures must also be observed. Such duties may also apply in respect of, e.g., handling hazardous materials or the wearing of personal protective equipment.

Furthermore, safety laws governing work in particular locations (tunnels, adits, quarries, pontoons, contaminated areas, etc.) must likewise be observed.

3 Safety

3.1 General safety notes

3.1.1 Safety alert symbol



The safety symbol is used to warn you of potential personal injury. Obey all safety messages that follow this symbol to avoid possible injury or death.

3.1.2 Hazard classification

Danger

Indicates an imminently hazardous situation which, if the safety regulations are not observed, will result in serious injury or death.



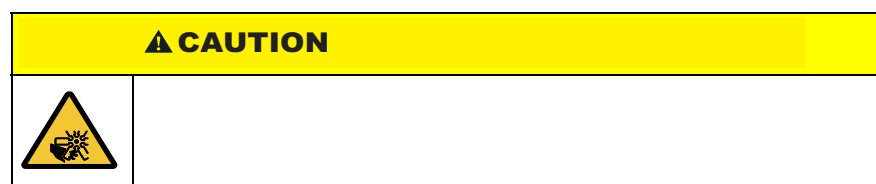
Warning

Indicates a potentially hazardous situation which, if the safety regulations are not observed, will result in serious injury or death.



Caution

Indicates a potentially hazardous situation which, if the safety regulations are not observed, may result in property or equipment damage, or minor or moderate personal injury.



3 Safety

**Caution –
without safety
symbol**

Indicates a potentially hazardous situation which, if the safety regulations are not observed, may result in property or equipment damage.



3.2 Description of symbols and danger signs

3.2.1 Hazard symbols

The symbols used in this manual and on the machine identify the following hazards:



Warning of a hazardous spot

If the required precautionary measures are not taken, substantial damage to property / equipment, personal injury, or even death may occur.



Warning of hazardous electric voltage

If the required precautionary measures are not taken, high electric voltages, high load currents (on terminals, capacitors, housing parts, and printed circuit boards) may lead to considerable property damage, physical injuries or death.



Warning of risk of explosion

If the required precautionary measures are not taken, explosive gases or contact with caustic acids may lead to substantial damage to property/equipment, personal injury, or even death.



Warning of risk of burns

If the required precautionary measures are not taken, personal injury may occur in the form of burns.



Warning of risk of crushing

If the required precautionary measures are not taken, personal injury due to crushing may occur.



Warning: risk of falling

If the required precautionary measures are not taken, personal injury may occur due to falling.



Warning of suspended load

If the required precautionary measures are not taken, suspended or falling loads may lead to substantial damage to property/equipment, personal injury, or even death.



Warning of hazardous dusts

If the required precautionary measures are not taken, personal injury may occur as a result of inhaling hazardous dusts.



Warning of environmentally hazardous substances

If the required precautionary measures are not taken, these substances may cause serious environmental damage.

3.2.2 Mandatory signs

The mandatory signs used in this manual and on the machine require the following safety measures:



Work with protective clothing

If the required protective clothing is not worn during work, personal injury may result.



Work with protective gloves

If the required protective gloves are not worn during work, hand injuries may result.



Work with protective goggles

If the required protective goggles are not worn during work, eye injuries or a total loss of sight may result.



Work with hearing protection

If the required hearing protection is not worn during work, hearing defects may result.



Work with respiratory protection

If the required respiratory protection is not worn during work, this can be harmful to health.

3

Safety



Work with a protective face shield

If the required protective face shield is not worn during work, facial injuries may result.



Work with a safety harness

If the required safety harness is not worn during work, serious personal injury may result.



Work with foot guards

If the required foot guards are not worn during work, injuries to the feet may result.



Work with a life jacket

If the required life jacket is not worn during work, serious personal injury may result.



Work with a safety belt

If the required safety belt is not worn during work, personal injury may result.



Work with protective headgear

If the required headgear is not worn during work, head injuries may result.

3.3 ⚠ Locations of safety signs

The safety signs are located in the following machine positions:

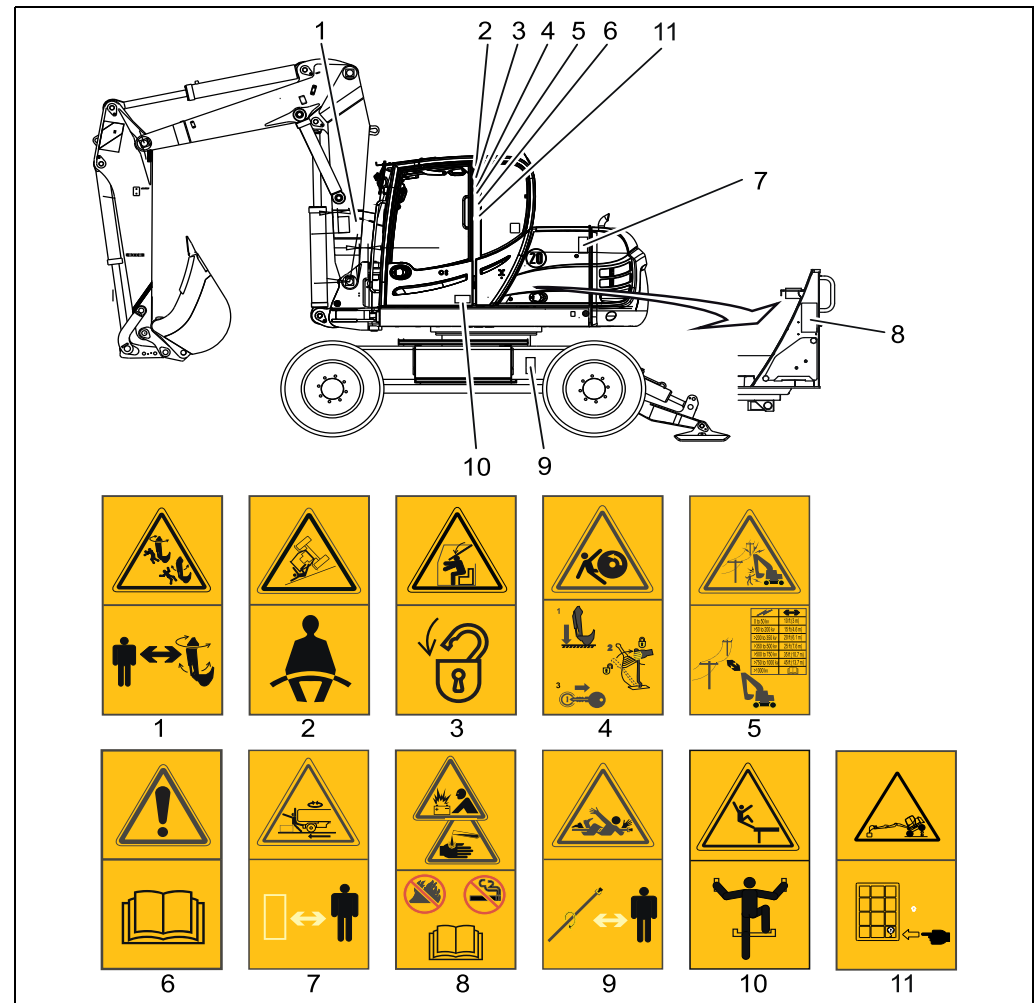


Fig. 3-1 Locations of safety signs – side view from left

- 1 Risk of injury from the excavator arm or the dipper
- 2 Wear the safety belt
- 3 Risk of injury from front window swinging open
- 4 Risk of injury from moving machines
- 5 Electric shock from contact with the power lines
- 6 Read and understand the operator's manual
- 7 Risk of fatal injury from the rotating uppercarriage
- 8 Risk of injury/burns from exploding battery or contact with battery acid (near battery)
- 9 Risk of arms and hands becoming entangled in rotating parts
- 10 Risk of injury by falling from the machine
- 11 Activate overload warning device

3 Safety

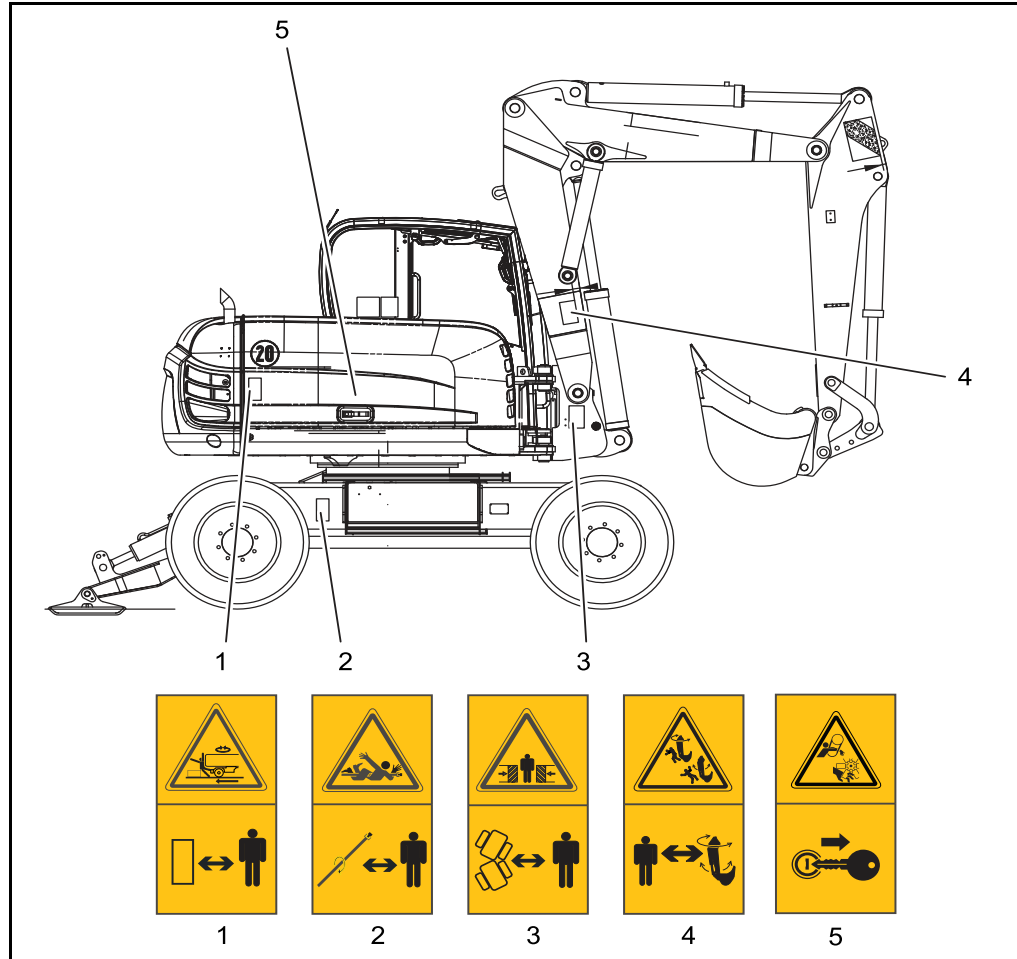


Fig. 3-2 Locations of safety signs – side view from right

- 1** Risk of fatal injury from the rotating uppercarriage
- 2** Risk of arms and hands becoming entangled in rotating parts
- 3** Risk of injury from the articulated area
- 4** Risk of injury from the excavator arm or the dipper
- 5** Risk of arms and hands becoming entangled in rotating parts

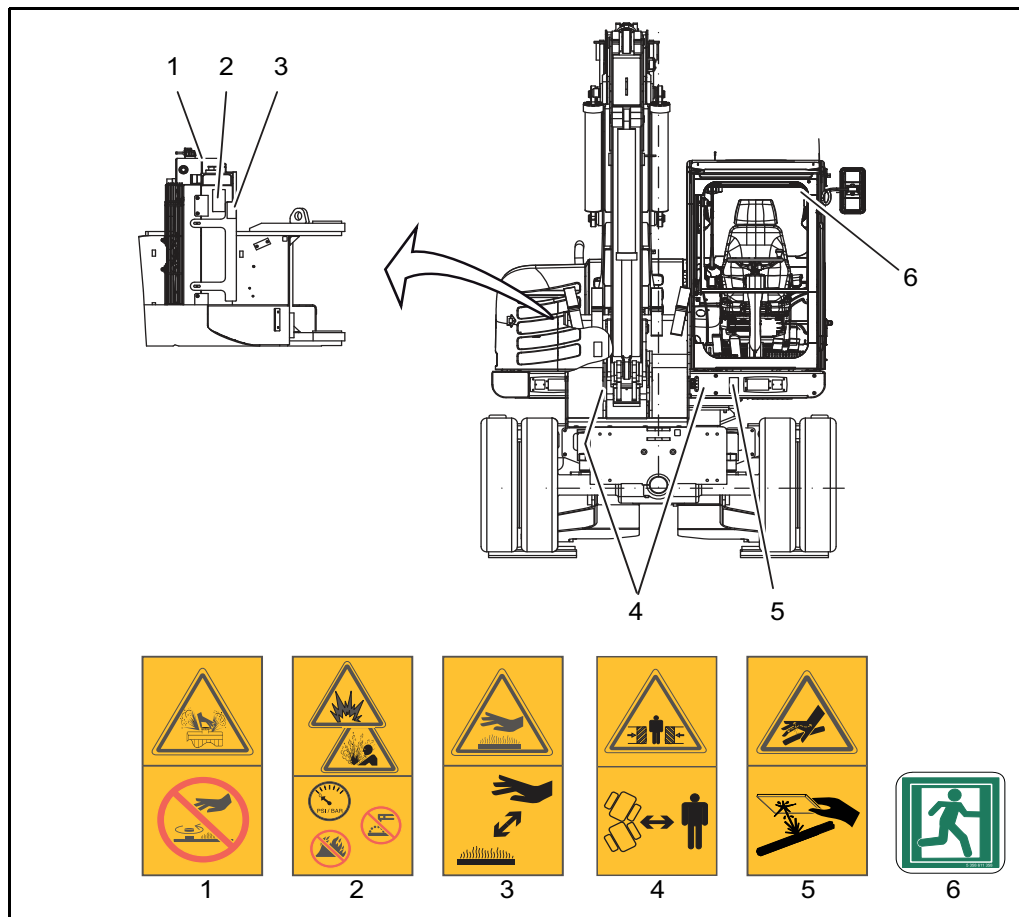
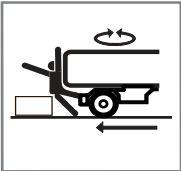
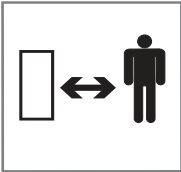

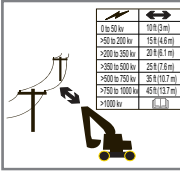

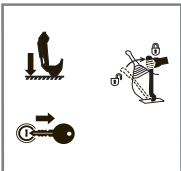

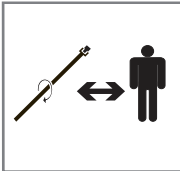

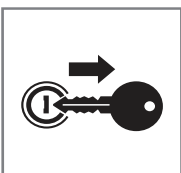




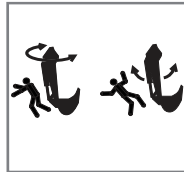
Fig. 3-3 Positioning of the safety signs - view from in front

- 1** Risk of scalding from hot, pressurized fluids
- 2** Risk of injury from pressurized containers
- 3** Risk of burning from hot surfaces
- 4** Risk of injury from the articulated area
- 5** Risk of injury from fluids spraying out, which may get underneath the skin
- 6** Emergency exit

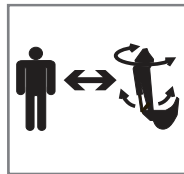
3 Safety

3.3.1 Safety sign

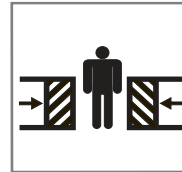
 <p>Risk of fatal injury from the rotating uppercarriage</p>  <p>Keep well clear of the machine.</p>	 <p>Risk of fatal injury from contact with the power lines</p>  <p>Keep well clear of the power lines</p> <table border="1"> <thead> <tr> <th>Line voltage (V)</th> <th>Minimum distance (m)</th> </tr> </thead> <tbody> <tr> <td>0 to 50</td> <td>10 (3.3)</td> </tr> <tr> <td>>50 to 250</td> <td>15 (4.6)</td> </tr> <tr> <td>>250 to 500</td> <td>20 (6.1)</td> </tr> <tr> <td>>500 to 750</td> <td>25 (7.6)</td> </tr> <tr> <td>>750 to 1000</td> <td>35 (10.7)</td> </tr> <tr> <td>>1000</td> <td>45 (13.7)</td> </tr> </tbody> </table>	Line voltage (V)	Minimum distance (m)	0 to 50	10 (3.3)	>50 to 250	15 (4.6)	>250 to 500	20 (6.1)	>500 to 750	25 (7.6)	>750 to 1000	35 (10.7)	>1000	45 (13.7)
Line voltage (V)	Minimum distance (m)														
0 to 50	10 (3.3)														
>50 to 250	15 (4.6)														
>250 to 500	20 (6.1)														
>500 to 750	25 (7.6)														
>750 to 1000	35 (10.7)														
>1000	45 (13.7)														
 <p>Risk of fatal injury due to unintended movements by the machine</p>  <p>Move attachment into resting position before leaving vehicle, turn off vehicle and remove key</p>	 <p>Danger of fatal injury caused by rotating parts</p>  <p>Maintain sufficient distance from rotating parts. Switch machine off prior to conducting maintenance work.</p>														
 <p>Risk of arms and hands becoming entangled in rotating parts</p>  <p>Turn the machine off and remove the key prior to maintenance work</p>	 <p>Risk of injury by falling from the machine</p>  <p>Use access steps and ladders provided</p>														



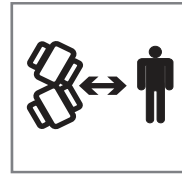
Risk of injury from the excavator arm or the dipper



Keep well clear of the excavator arm when it is moving



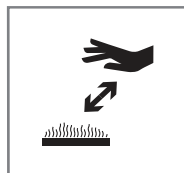
Risk of injury from the articulated area



Keep well clear of the machine when in operation



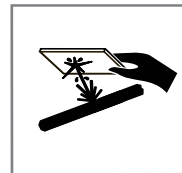
Risk of burning from hot surfaces



Do not touch hot surfaces. Allow the machine to cool before performing any maintenance work.




Risk of injury from fluids spraying out, which may get underneath the skin



Keep well clear of leaks and blowholes. Release the pressure before disconnecting hydraulic lines.

3 Safety

<div data-bbox="414 450 596 620"> </div> <div data-bbox="632 439 839 568"> <p>Risk of injury from pressurized containers</p> </div> <div data-bbox="414 674 596 844"> </div> <div data-bbox="632 663 839 1115"> <p>Release pressure prior to maintenance work. Do not weld or spot weld the tanks or battery. Keep flames and other hot sources away from the containers and the battery.</p> </div>	<div data-bbox="927 450 1109 620"> </div> <div data-bbox="1144 439 1351 636"> <p>Risk of injury / burning from exploding batteries or contact with battery acid</p> </div> <div data-bbox="927 674 1109 844"> </div> <div data-bbox="1144 663 1377 887"> <p>No naked flames or sparks. Wear protective gear. Adhere to the operating instructions.</p> </div>
<div data-bbox="414 1214 596 1384"> </div> <div data-bbox="632 1200 839 1335"> <p>Risk of scalding from hot, pressurized fluids</p> </div> <div data-bbox="414 1429 596 1599"> </div> <div data-bbox="632 1415 839 1576"> <p>Do not unscrew the cover of the combined cooler in a heated state</p> </div>	<div data-bbox="927 1214 1109 1384"> </div> <div data-bbox="1144 1200 1308 1240"> <p>Tipping risk</p> </div> <div data-bbox="927 1429 1109 1599"> </div> <div data-bbox="1144 1415 1382 1482"> <p>Always fasten the safety belt</p> </div>

 	<p>Risk of injury from falling window</p> <p>Secure window</p>	 	<p>Risk of injury caused by incorrect operations or maintenance</p> <p>Read and understand the operator's manual</p>
 	<p>Tipping risk</p> <p>Activate overload warning device. Read and understand the operating instructions</p>		<p>Emergency exit</p>

Servicing and replacing safety signs

The safety of the operator always has to come first.

- ◆ Safety signs must always be kept in good condition and legible.
- ◆ Replace any safety signs which have been damaged or have gone missing.
- ◆ Use mild detergents and water to clean the safety signs.
- ◆ Do not use any cleansers that contain solvents.















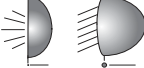








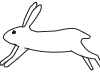


Always specify the machine serial number and language when ordering safety signs.

3

Safety

3.3.2 Pictograms

The following pictograms may be attached to the machine:

Pictogram	Description	Pictogram	Description
	Battery charge indicator		Monitoring pre-heating
	Engine oil pressure		Engine oil level
	Fuel		Fuel level
	Hydraulic oil		Hydraulic oil level
	Coolant temperature		Hydraulic oil filter clogging indicator
	Heating/ventilation blower		Windshield wiper wash/wipe system
	Operating hours counter		Potentiometer
	Working lights		Air filter indicator
	Rotating beacons		Hydraulic hammer
	Dozer blade		Working hydraulics shut-off
	Float position dozer blade		OFF switch overload warning device
	Travel speed SLOW		Travel speed FAST
	Hydraulic quick-attach system		Auto-idling system

Pictogram	Description	Pictogram	Description
	Bucket change-over		ISO to SAE change-over
	Boom height limitation		Grease gun
	Suspension points for loading by crane		Do not use for loading of cranes
	Lashing points		First-aid kit
	Signal horn		Fire extinguisher

Tab. 3-1 Pictograms

3

Safety

3.4 Personal safety

The operating instructions and the symbols described have to be read and understood by all persons working on and with the machine.

3.4.1 Personal safety gear

Personal protective equipment requirements:

Operating personnel:

- Protective clothing
- Safety footwear

Maintenance personnel:

- Protective gloves
- Safety glasses
- Hearing protectors
- Safety footwear
- Protective clothing

Service personnel:

- Protective gloves
- Safety glasses
- Hearing protectors
- Safety footwear
- Protective clothing

Carriers:

- Protective gloves
- Safety glasses
- Safety footwear
- Protective clothing

Guides:

- Reflective clothing

Personnel responsible for attaching loads:

- Protective gloves
- Safety glasses
- Safety footwear
- Protective clothing
- Protective helmet

Crane operators:

- Protective gloves
- Safety glasses
- Protective clothing
- Safety footwear

Apprentice staff:

- Protective clothing
- Safety footwear

3.5 **Workspace safety**

3.5.1 **General work zone regulations and safe work practices**

Read the operating instructions thoroughly and follow the notes on safe operation before putting the machine into operation.

In addition to the operating instructions, also observe the national legal and miscellaneous regulations applicable at the deployment location of the machine:

- Safety at work
- Accident prevention
- Health protection
- Environmental protection
- Traffic on public roads

Such duties may also apply in respect of, e.g., handling hazardous materials or the wearing of personal protective equipment.

Furthermore, safety laws governing work in particular locations (tunnels, adits, quarries, pontoons, contaminated areas, etc.) must likewise be observed.

The plant operator and the machine driver are responsible for ensuring that the safety regulations are upheld. The operator must always familiarize himself with the local regulations.

3.5.2 **Switching off the machine and securing it against restarting**

Ensure all the following safety instructions are read prior to using or performing maintenance on the machine, to avoid personal injury.

- ◆ Before breaks and the end of work, park the machine on a solid and level base.
- ◆ The machine is only to be parked in places where it does not obstruct, e.g., public or construction site traffic.
- ◆ Lower the loading equipment to the ground by supporting it on the dipper.
- ◆ Lower the dozer blade.
- ◆ Shut down the engine and pull out the ignition key.
- ◆ Close the vandalism guard (canopy). (option)
- ◆ Put the exit barrier (left-hand armrest) in the upright position.
- ◆ Lock the windows and the doors.

3 Safety

3.6 General safety notes

- ◆ Do not undertake any operations which impair or jeopardize safety.
- ◆ The machine may only be operated with a cab or canopy.
- ◆ The machine is only to be used if it is in a safe, operational condition.
- ◆ The manufacturer's operating instructions must be complied with for operation, maintenance, repair, assembly, and transportation.
- ◆ The plant operator must provide additional special safety instructions, wherever necessary, for specific local conditions.
- ◆ The operating instructions and any information pertaining to safety must be carefully kept in the driver's cab (behind the driver's seat).
- ◆ The operating instructions and safety notes must be complete and fully legible.

Before starting work

- ◆ Before starting work, become acquainted with the first aid and rescue possibilities (emergency doctor, fire brigade, rescue services).
- ◆ Check that the first aid kit is available and properly stocked.
- ◆ Become familiar with the location and the operation of fire extinguishers on the machine, as well as the local fire alarm and fire fighting facilities.
- ◆ Fasten any loose parts, e.g., tools and other accessories.
- ◆ Make sure that the engine hood is closed and never open it when the machine is running.
- ◆ Close all doors, windows, hoods, flaps or secure these while they are open to prevent unintended closing.

During work

- ◆ Never make any safety features ineffective and do not remove any safety features.
- ◆ Wear protective clothing for operation. Take off rings, scarves, open jackets. Protective goggles, safety boots, helmets, protective gloves, reflective jackets, hearing protection, etc. may be required for certain work.
- ◆ Do not allow any children or animals near the machine when the engine is running.

Environmental protection regulations

- ◆ Comply with the valid environmental regulations when working on or with the machine.
- ◆ Take special care to prevent any environmentally harmful substances, such as lubrication grease and oils, hydraulic oils, fuels, coolants, and cleaning fluids containing solvents, from seeping into the ground or the sewer when performing installation, repair, and maintenance work. These substances must be collected, transported, kept, and disposed of in suitable containers.
- ◆ If the substances listed above do enter into the soil, the leak or outlet must be stopped immediately and the fluid must be cleaned up with a suitable absorbent material. If necessary, the soil involved must be removed.
- ◆ Properly dispose of binding agent and excavated material and comply with valid environmental regulations.

3.7 Operation

Machines may only be operated or serviced by persons belonging to the target groups mentioned (See chapter “Definition of target groups”, page 7.) They must be designated by the operating company to operate or maintain the machine.

All such persons must be of the legal minimum age.

- ◆ Operate the control equipment only from the driver’s seat.
- ◆ When stepping up into or out of the vehicle, use the designated grips, railings, access steps and surfaces or suitable aids (such as ladders or platforms). The uppercarriage and undercarriage must be aligned. At least three of the machine’s supports must be in place whenever entering or exiting the vehicle.
- ◆ Close all doors or secure these while they are open to prevent them from slamming shut accidentally. The uppercarriage and undercarriage must be aligned.
- ◆ When opening or closing doors, windows, hoods and lids, use the fitted handles/grips.
- ◆ Make sure that the operator’s stand, handles, access steps, and other surfaces of the machine that have to be stepped on, are kept free of dirt, grease, oil, ice, and snow.
- ◆ Pay attention to sufficient access to the surroundings of the site of operation.
- ◆ When operating without a sufficient field of view, always ensure you do so with the assistance of a guide, who must remain in your field of view at all times.
- ◆ Fasten the safety belt when working and pay attention to sufficient distance from the surroundings.
- ◆ Open and lock the driver’s door only from the driver’s seat.
- ◆ Where necessary, take breaks to avoid tiredness.
- ◆ Switch off the engine before leaving the vehicle.

3 Safety

3.8 Hazard zone

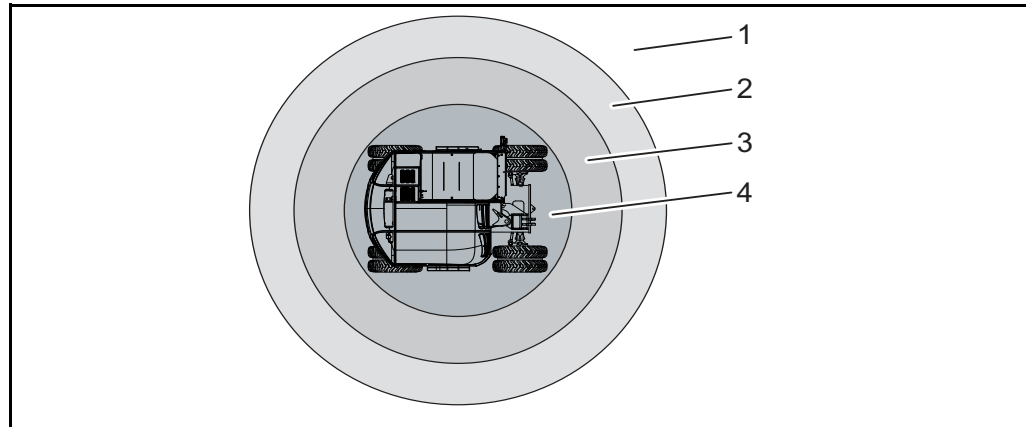


Fig. 3-4 Working and danger zones

- 1 Surrounding area
- 2 Hazard zone
- 3 Working zone
- 4 Close range where there is a high risk of collision

Nobody must be allowed to remain in the danger zone of machines. The plant operator is required to fence off the danger zone.

The danger zone encompasses the area around the machine in which persons may be injured by its movements during operation, its loading equipment and attachments, or by any loads that may fall or be flung out.

- ◆ The machine operator is only to work the machine if nobody is in the danger zone.
- ◆ The machine operator must give a warning signal to persons who may be in danger.
- ◆ Stop work with the machine, if persons remain in the danger zone despite the warning.
- ◆ To ensure no danger of crushing, a sufficient safety distance (min. 0.5 m) must be kept from solid objects, e.g., buildings, excavation slopes, scaffolding, other machines, etc.
- ◆ If the safety distance cannot be kept, fence off the area between solid construction elements and the working zone of the machine.
- ◆ If conditions are such that the machine operator's view of the driving and working zone is restricted, he must be guided or the driving and working zone must be secured by means of a solid barricade.
- ◆ The machine should only be operated if the site that is being driven and worked in is sufficiently lit.

Surrounding area

The machine can only reach this area by moving. While it is in motion, this area also becomes a danger zone.

Dangers arise if machines or parts of equipment protrude or move into the danger zone.

Danger zone

The work equipment does not yet encroach on this area.

However, dangers are constantly posed by flying parts, swinging loads, malfunctions or the risk of the machine tipping over.

Working zone

This area is within the range of motion of the work equipment.

Constant dangers are posed by the movements of the machine and the moving load. If the load protrudes out of the work equipment, there is a risk of this colliding with the cab.

Close range

This area is on the periphery of the range of motion of the work equipment.

There is a constant danger of collisions involving the work equipment and cab.

3.9 Transporting persons

- ◆ Never transport persons on or with the machine.

3.10 Stability

- ◆ The machine must be used, driven, and operated in such a manner that its stability against overturning is ensured at all times.
- ◆ Match the travel speed to the local conditions.
- ◆ Do not exceed the permissible load for the machine.
- ◆ Keep the machine away from the edges of quarries, pits, mounds, and slopes, to ensure there is no risk of falling. If this is not possible, the machine must be secured to prevent rolling or slipping.
- ◆ Never exceed the maximum inclination angle of the machine.
- ◆ If the uppercarriage and undercarriage are not aligned, the vehicle should be driven no faster than walking speed.
- ◆ Combined operations, namely driving and lifting at the same time, are not allowed.
- ◆ The machine may only be driven with 60% of its static tipping load.

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3.11 ⚠ Stability on sloping ground

There is a risk of the machine overturning when working on sloping bases.

The level of risk is especially high when working (digging and lifting) on soft bases if the blade is used to increase stability.

An increased degree of caution is required on slopes over 10° (17.6%).

There is a higher risk of the machine tipping over when driving over obstacles one-sided.

Maximum inclination

Machine Machine	Maximum allowable inclination angle
Laterally	15°
Uphill	15°
Downhill	15°

Tab. 3-2 Maximum inclination

- ◆ Test the stability of the machine before beginning work.
- ◆ Observe the stability specifications. The stability specifications are based on ground that is level, solid, and even.
All stability calculations must be made with a horizontally positioned machine on even and solid ground. If the machine is operated under conditions that do not meet this requirement (such as loose and uneven ground, no horizontal position, side loads, etc.), these conditions must be taken into consideration by the operator.
- ◆ Never exceed the maximum allowable inclination angle of the machine.
- ◆ Secure the machine against rolling or sliding.
- ◆ Begin work slowly.

3.11.1 ⚠ Working with a grab or log clamp

- ◆ Only move the machine at low speed and in the transport position.
- ◆ Avoid steering and swinging abruptly.
- ◆ Pick up the log at its center of gravity.

3.12 Drive operation

- ◆ Before putting the machine into operation, the driver's seat, mirrors, and control elements must be adjusted so as to ensure safe working.
- ◆ Always wear the seat belt.
- ◆ Keep windows clean and free of ice.
- ◆ Keep the driver's door closed.
- ◆ Face the uppercarriage forward and secure it from swaying by shutting off the working hydraulics.
- ◆ Combined operations, namely driving and lifting at the same time, are not allowed.

Driving tracks must be designed so as to ensure smooth, safe operation, i.e., they must be sufficiently wide, on ground which has as few slopes as possible and sufficient carrying capacity.

Downhill tracks must be set out in such a way that machines can be safely braked.

- ◆ Before driving downhill, the appropriate gear for the terrain must be selected and the gear lever must not be moved during downhill travel (road or off-road gear). On a strong downhill or uphill gradients, the load must be carried on the uphill side, if possible, in order to increase stability.
- ◆ Keep the load as close to the ground as possible and avoid swinging them about. Do not drive and apply brakes jerkily.
- ◆ The carrying capacity of bridges, cellar roofs, vaults, etc. must be verified before the earth-moving machine can drive over them.
- ◆ Check the clear dimensions of structures before entering into subways, tunnels, etc.
- ◆ Always ensure that your speed and manner of driving is appropriate to the circumstances. Machine operators have sole responsibility for the way they drive.
- ◆ Always maintain sufficient distance to the surroundings.
- ◆ If you want to move the machine in an inaccessible area, you must do this with the help of a guide.
- ◆ If the machine makes unintended movements, use the service break.
- ◆ Gradually reduce the travel speed by sounding the alarm buzzer.

It is the operator's responsibility to ensure that equipment such as a first-aid box, warning triangle, hazard lights are kept with the machine in accordance with the traffic regulations valid in the user's country and that the driver has the appropriate license as required by the national traffic laws of the country in question.

Outside areas covered by general traffic regulations, e.g., on factory premises or construction sites, the equipment operator is responsible for ensuring that traffic regulations are applied in the proper manner. The same principle applies with regard to driver's license requirements.

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Safety

3.13 Working operation

- ◆ Before commencing work each day and whenever work attachments are changed, a check must be carried out to ensure that the work attachment is correctly fastened and that the quick-attach system is properly locked. Move the working attachment carefully at a low height. Nobody must be allowed to remain in the danger zone during this check.
- ◆ Load the machine in such a manner, that it is not overloaded and no material is lost while the machine is driving.
- ◆ Make sure nobody is standing within the danger zone of the machine.
- ◆ At dumping points, the machine may only be operated if suitable measures have been taken to prevent rolling or falling.
- ◆ The machine's area of rotation must be fully visible to the driver.
- ◆ Ensure that you do not swing loading equipment back and forth.
- ◆ In case of danger, turn off the engine so that the load completely stops moving.
- ◆ The operator is responsible for ensuring that the cab is fitted with the protective grating, when conditions require it.
- ◆ Do not raise the outrigger when the machine is raising a load. Only raise the outrigger when the uppercarriage and the digging tool are in the driving position.

3.14 Operating under the risk of falling objects

- ◆ If dangers are posed by falling objects, only use the machine if the driver's seat is protected by a canopy roof (FOPS – Falling Object Protection Structure). A front guard must be employed if there is a risk of materials breaking through into the cab.
- ◆ When working in front of walls with stacks of materials, for example, position the machine in such a way that the driver's seat and access stairs face the other side (so they are not blocked).
- ◆ Only use the machine for demolition work if no persons are endangered and if the machine is equipped with a canopy (FOPS) and front protection has been mounted on the operator's stand. See regulations book "Demolition work" (BGI 665) published by the German Tiefbau-Berufsgenossenschaft (Civil Engineering Employer's Liability Insurance Association).
- ◆ Demolition work is only to be performed according to proper use by machines where there is no danger to persons and if the machine is equipped with canopy, cab-mounted windshield and the appropriate work attachment. See regulations book "Demolition work" (ZH 1/614) published by the Tiefbau-Berufsgenossenschaft (Civil Engineering Employer's Liability Insurance Association).
- ◆ Only use the machine with the log clamp if no persons are endangered and if the machine is equipped with a canopy (FOPS) and a front guard has been mounted on the operator's compartment.
- ◆ When using the hammer, close the windows and doors.

3.15 Working in the vicinity of underground power lines

- ◆ Before commencing excavation work using the machine, it must be determined whether any underground power lines are present in the intended working zone which may present a danger to persons.
- ◆ If underground power lines are present, their exact position and course must be determined in consultation with the proprietor or operator of the lines, and the necessary safety precautions decided and implemented.
- ◆ Before starting any earth work, clearly mark the route of lines in the construction site area while under supervision. If the position of lines cannot be determined, search ditches must be dug - manually, if need be.
- ◆ If any underground power lines or their protective coverings are encountered unexpectedly or damaged, stop work immediately and inform the supervisor.
- ◆ In case of arcing, adhere to BGR 500 K.2.12, 3.12.
- ◆ Maintain a safe distance from the power lines.

3.16 Working in the vicinity of overhead power lines

If the machine is being used in the vicinity of overhead power lines and trolley wires, a safety distance (which varies depending on the nominal voltage of the overhead line) must be maintained between the lines and the machine and its work equipment, to prevent current overspill. This also applies to the distance between these lines and attachments or loads.

Prescribed safety distance

The safe distance depends on the nominal voltage of the overhead power line.

Nominal voltage	Safety distance
0 to 50 kV	3 m
over 50 to 200 kV	4.6 m
over 200 to 350 kV	6.1 m
over 350 kV to 500 kV	7.6 m
over 500 kV to 750 kV	10.7 m
over 750 kV to 1,000 kV	13.7 m
Unknown	min. 13.7 m

Tab. 3-3 Prescribed safety distances

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- ◆ Also consider all working movements of the machine, e.g., positions of the work equipment and the dimensions of attached loads.
- ◆ Consider also uneven ground which could cause the machine to slant and thus bring it closer to the overhead power lines.
While working in windy conditions, note that both overhead lines and loading equipment may swing out, thus reducing the safety distance.

If it is impossible to maintain a sufficient distance from overhead power lines and trolley wires, the plant operator must consult the proprietor or operator of the overhead lines to identify other safety precautions that will prevent current overspill. Such measures could include:

- Switching off the current
- Re-routing the overhead line
- Wiring
- Limitation of the working range of the machine

3.17 Operating in enclosed spaces

If machines are to be used in enclosed spaces, these areas must be sufficiently ventilated and special regulations observed.

3.18 Working height restrictions

When operating the machine in

- enclosed spaces,
- under facades,
- and under high-voltage lines

the working height may be restricted. Avoid causing damage by maintaining sufficient distance.

3.19 Interruptions in work

- ◆ Before rest periods and the end of work, park the machine on a level base with sufficient load bearing capacity and secure it reliably to prevent unintentional movement.
- ◆ Put the machine into the parking position. Uppercarriage in the driving position.
- ◆ Before rest periods and the end of work, lower the working attachment to the ground to prevent it from moving.
- ◆ Do not leave the machine before you have lowered and secured the work equipment.

Machines are only to be parked in places where they do not obstruct, e.g., public or construction site traffic. Warning devices, e.g., warning triangles, warning cordons, flashing or hazard lights are to be used if necessary.

- ◆ Before leaving the operator's stand, return all control elements to the neutral position, apply the brakes and switch off the working hydraulics.
- ◆ Before exiting the machine, shut down the engine and secure it against unauthorized restarting (e.g., by pulling out the ignition key or disconnecting the battery if necessary). Disconnect the machine's power supply by flicking the battery isolator.
- ◆ For longer periods of work stoppage:
 - Relieve the residual pressures.
 - Switch off the battery isolator switch.
- ◆ Secure the machine against rolling away.

3.20 Hoisting operation

Hoisting involves the lifting, transporting, and lowering of loads with the aid of sling gear (rope, chain, etc.), whereby personnel are needed to assist with attaching and releasing the load. Such work covers, e.g., the lifting and lowering of pipes, tubbing rings or containers using earth-moving machines.

Earth-moving machines are only to be used for hoisting when the prescribed safety devices are present and in full working order. For earth-moving machines, these are:

- Secure attachment of a load-bearing medium
- Carrying capacity table
- Overload warning device
- Line break safeguard on boom cylinder and dipper stick cylinder

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Safety

- ◆ Before hoisting commences, the personnel providing assistance and the machine operator must agree a clear set of hand signals. They must then use these during the work.
- ◆ Loads must be attached in such a way that they cannot slip or fall out.
- ◆ The staff responsible for guiding the machine and attaching loads must always remain in the machine operator's field of vision.
- ◆ Keep loads as close to the ground as possible and avoid swinging them about.
- ◆ If the machine is used for hoisting, the staff responsible for attaching loads are only to approach the boom from the side and with the machine operator's permission. The machine operator is only to give his permission if the machine is standing still and the work equipment is not in motion.
- ◆ Do not use load-bearing equipment (ropes, chains, shackles) that is damaged or of inadequate dimensions.
- ◆ Always wear protective gloves when working with load-bearing equipment.
- ◆ Only attach loads which do not exceed the carrying capacity of the machine and the lifting equipment.
- ◆ Please note the overload warning device.
- ◆ Loads must only be attached to the designated load hooks in such a way that they cannot slip or fall out.
- ◆ Do not exceed the permissible load for the load hook.
- ◆ Do not carry loads over persons.
- ◆ Machines may only move with an attached load if the path of travel is fairly level and if the machine operator's view of the driving zone is guaranteed. Always maintain a safe distance from the surroundings and drive at an appropriate speed.
- ◆ Always maintain sufficient distance to the surroundings.
- ◆ Always ensure that your speed and manner of driving is appropriate to the circumstances. Never drive in a way that causes safety concerns.
- ◆ Move the load at an appropriate speed.
- ◆ After attaching the load, the person responsible for attaching loads must maintain an appropriate safety distance and observe the machine's behavior (direct the load using the rope).
- ◆ In case of danger, turn off the engine so that the load completely stops moving.
- ◆ The machine operator is responsible for deciding on the most suitable approach.

3.21 Changing work attachments, maintenance, and repairs

The machine must only be converted by the service personnel, or maintained and repaired by the maintenance personnel, under the guidance of a suitable person designated by the plant operator and in accordance with the manufacturer's operating instructions.

- ◆ After changing the work attachments, make absolutely certain that the work attachments have been fastened correctly.

Work on e. g.

- Braking system
- Steering system
- Hydraulic system
- Electrical system

of the machine may only be carried out by specialist staff trained in these areas.

Stability must be ensured during all types of work on the machine at all times.

- ◆ Unless expressly instructed otherwise, always switch off the engine during maintenance work. Secure the engine against restarting. (Isolate the machine from the power supply using the battery isolator or by removing the battery clamps.
- ◆ Put the machine into the parking position. Uppercarriage in the driving position.
- ◆ Allow the machine to cool.
- ◆ Always depressurize the system.
- ◆ Always depressurize the hydraulic system before starting maintenance and repair work on it. With the engine turned off, lower the loading equipment to the ground and actuate all hydraulic operating levers until there is no more pressure in the hydraulic system.
- ◆ Always secure the machine with wheel chocks to prevent rolling when working on or especially under the machine.
- ◆ Keep any third parties clear of the machine's danger zone.
- ◆ Secure the work equipment against movement by lowering it to the ground or by implementing equivalent measures, e.g., cylinder supports, trestles.
- ◆ As long as the engine is running, the unprotected working zone must not be entered.
- ◆ Attach the lifting gear for jacking up the machine so that it cannot slip off. Make sure that the jacks are placed exactly vertically.
- ◆ The raised machine must be supported with suitable structures, e.g., crosswise stacked planks, square timbers or steel trusses.
- ◆ Use a supporting structure to stabilize the machine that has been lifted with the work equipment. Do this immediately after lifting. Work under raised machines which are only supported by their hydraulics is forbidden.
- ◆ Shut down the engine before any maintenance and repair work. These requirements may only be ignored in the case of maintenance or repair work which cannot be performed without the engine/motor(s) running.

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- ◆ Only fold down the maintenance ladder when the uppercarriage is in the straight position.
- ◆ Before starting work on the electrical system or for welding work on the machine, disconnect the battery.
- ◆ When disconnecting the battery, disconnect the negative pole first and the positive pole after. Reconnect in reverse order.
- ◆ When performing maintenance work in the vicinity of the battery, cover the battery with insulating material. Do not lay any tools on the battery.
- ◆ Open or remove the protective devices for moving parts of the machine only after the machine has been shut down and the drive is properly secured against unauthorized restarting. Protective devices include, for example, engine/motor covers, doors, protective grating, guards.
- ◆ Upon completion of assembly, maintenance or repair work, all protective devices must be reattached in the proper manner.
- ◆ After carrying out this work, remove any tools from the machine.
- ◆ Welding work on load-bearing parts of the machine are only permitted after consultation with the manufacturer and in accordance with recognized welding principles.
- ◆ Unplug all control units prior to performing welding work.
- ◆ When carrying out electrical welding, ensure that the ground terminal of the welding equipment is connected directly to the part being welded.
- ◆ Never make any modifications to protective structures (ROPS, FOPS), e.g., by welding or drilling them.
- ◆ In the event of plastic deformations and/or cracks in the load-bearing elements of protective structures (ROPS, TOPS, FOPS), they must be replaced.
- ◆ Alterations, e.g., welding of the hydraulic system, are only to be undertaken with the manufacturer's permission.
- ◆ Before commencing work on the hydraulic system, the operating pressure, pilot pressure, back pressure, and pressure inside the tank must be relieved. To do this, with the engine turned off, lower the work equipment to the ground and actuate all hydraulic control levers until there is no more pressure in the hydraulic system.
- ◆ Keep at a distance to check for leaks to the hydraulic lines.
- ◆ Observe the safety data sheets issued by the mineral oil companies. Swallowing lubricants as well as prolonged and repeated skin contact can be hazardous to health and should, therefore, be avoided. When used properly, there is no particular danger to health.
- ◆ Only use hydraulic hoses specified by the manufacturer.
- ◆ Route and assemble hydraulic hoses correctly.
- ◆ In the vicinity of fuel or batteries, smoking and naked flames are prohibited.
- ◆ Put the machine into the park position before any work on the working floodlights.
- ◆ When stepping up into or out of the vehicle, use the designated steps, surfaces, and handles (such as ladders or platforms).

- ◆ When replacing electronic components only use those components which comply with the EMC Directive.
- ◆ When performing work on the steering, first unload the steering axle mechanically (raise the machine and prop it on supports).

Safe working conditions and good working order of the machine are prerequisites for efficient work. Your Yanmar machine fulfils these requirements when correctly handled and when serviced and maintained as specified.

- ◆ Avoid malfunctions by paying careful attention to the machine's functions and by using the specified fuels and lubricants.
- ◆ Trained specialist personnel are responsible for any servicing of the machine which requires expert knowledge. Inspections and repairs must therefore be carried out by your dealer's customer service.
- ◆ Within the warranty period, damage claims can only be lodged if the specified intervals for maintenance and inspection work have been complied with.
- ◆ Even after the end of the warranty period, regular maintenance must be performed to keep the machine in good working order at all times and to ensure that it enjoys a reasonable service life.
- ◆ Insist that only original Yanmar spare parts are used in the event of any repair work. In this way, you will have a lasting, high quality product and can keep your machine in its original condition.
- ◆ When stepping up into or out of the vehicle, use the designated steps and surfaces or suitable aids (such as ladders or platforms).
- ◆ Clean the floor immediately if fuels, lubricants, and coolants escape.
- ◆ When using torque wrenches with extension bars, avoid slippage by ensuring suitable support.
- ◆ Any supports used during maintenance must be marked red

3

Safety

3.22 Recovery, loading, and transporting

Machines are only to be loaded onto recovery vehicles when adequate towing equipment used.

- ◆ Keep the center of gravity of the machine as low as possible and mark it for the freight forwarder.
- ◆ Use the attachment points specified by the manufacturer.
- ◆ For loading and transportation, secure the machine and the required auxiliary devices against unintended movements.
- ◆ Use undamaged transport restraint corresponding to the loads.
- ◆ Clean the running gear and chassis of the machine to remove slurry, snow and ice, so that the loading ramp can be approached without the risk of slipping.
- ◆ When driving onto the transport equipment, guides are to be employed. Make sure there are no other persons in the machine's danger zone.
- ◆ For transport by truck, flat-bed trailer or railway, reliably secure all moving parts (place the dipper, support plates and dozer blade on the ground) as well as the machine with wedges and by fastening it at the lashing points.
- ◆ Before setting off, the route to be taken must be examined. The roads must be wide enough, entrances and passages under bridges must be large enough, and roads and bridges must have sufficient carrying capacity.
- ◆ Use and appropriate flat-bed trailer as per the machine data (dimensions, weight).
- ◆ Keep the loading equipment as low as possible.
- ◆ Only use those loading points identified in the operating instructions.
- ◆ Use the appropriate loading points on the transporter to match the expected forces.
- ◆ Ensure appropriate speed when moving/in transit.
- ◆ When driving onto the transport ramp, use guides. Make sure there are no other persons in the machine's danger zone.
- ◆ Ensure the uppercarriage is aligned with the undercarriage. Do not allow swaying during travel.
- ◆ Before transporting the machine, ensure that the uppercarriage and undercarriage are aligned.
Ensure the dozer blade and full floating axle are facing forwards before driving and steering.
Check the direction of travel by careful operation at a low engine speed.
- ◆ Keep any third parties clear of the machine's danger zone.

3.23 Monitoring and inspection

- ◆ Have the machine inspected by an expert (e.g., mechanical engineer or machine foreman) according to the regulations in force in the user's country (e.g., Accident Prevention Regulations in Germany):
 - Before the machine is put into operation for the first time and after significant modifications have been made
 - At least once a year
 - At between times, according to operating conditions and local environments
- ◆ Keep a record of the inspection report and file it until the next inspection.
- ◆ Before the beginning of the shift, check the machine according to the inspection plan.
- ◆ Replace hydraulic hoses as soon as the following damage is noticed:
 - Damage to the outer layer which reaches the intermediate layer.
 - Embrittled patches on the outer layer.
 - Deformations when under pressure or without pressure which differ from the original shape of the installed hose.
 - Leaks.
 - Damage to the hose fixtures or connectors between the fixtures and hose.
- ◆ Do not search for leaks on the hydraulic lines merely using your hands – use cardboard or wood to locate them.
- ◆ In the event of any liquids that are spat out getting under the skin, a doctor who is experienced with this kind of injury must be consulted within a matter of hours.
- ◆ Always wait until the engine has cooled before checking the coolant level. Carefully turn the cover to relieve overpressure.
- ◆ Check the function of the safety devices before using the machine.
- ◆ In the event of any faults, inform the supervisor immediately; at change of shifts, also inform the new operator.
- ◆ In the event of faults that could endanger the operating safety of the machine, stop operation until the fault is corrected.

3.24 Fire prevention

- ◆ Shut down the engine before refueling and take special care when the engine is hot.
- ◆ Never smoke or allow naked flames while refueling the tank of the machine.
- ◆ Keep the fire extinguisher near the operator's stand.
Its location must be identified by the fire extinguisher symbol.



3

Safety

3.25 Notes concerning residual dangers

3.25.1 Hydraulics failure

If the hydraulics fail because the engine or electric motor is not running, the hydraulic pump is damaged or hydraulic oil has been lost, only the EMERGENCY function "Lower loading equipment" can still be performed.

3.25.2 Lower loading equipment emergency function

- ◆ Shut down the engine.
- ◆ Fold the left console/armrest down.
- ◆ Turn the ignition key to position 1.
- ◆ Activate the working hydraulics on the keypad.
- ◆ Move the right and left joysticks to lower the loading equipment.



3.25.3 Releasing the residual pressure

- ◆ Shut down the engine.
- ◆ Fold the left console/armrest down.
- ◆ Turn the ignition key to position 1.
- ◆ Activate the working hydraulics on the keypad.
- ◆ Actuate all the hydraulic operating elements (right and left joysticks with dials, control pedals) until the pressure has been released.

3.26 Emergency exit

The front windshield serves as an emergency exit.

If the front protective grating is attached, use the right side window pane as an emergency exit. In case of an emergency, break the side window pane using the emergency hammer.

 WARNING	
	<p>Danger caused by glass fragments</p> <p>Glass fragments may get in your eyes.</p> <p>Danger of serious injuries.</p> <p>▷ Wear personal protective equipment (helmet and full face protection).</p>

4 Initial installation and settings

4.1 Initial instruction



Notice

An initial inspection must be carried out before commissioning.
See chapter 6.6.1 "Initial inspection (delivery inspection)".

The attaching of the attachable equipment and commission thereof should only be carried out by qualified technicians.

The machine must only be operated by properly trained and instructed personnel. For this purpose, appropriate instruction and training are provided when the machine is handed over.

4.1.1 Hand over the machine and instruct the operator.

The following checklist should be followed when handing over the machine to the operator:

Operating instructions

- ◆ Go through the operating instructions (page by page) and explain them in detail through practical training on the machine.
Items which are particularly important include:
 - Accident Prevention Regulations published by the employer's liability insurance associations in the user's country
 - Technical data
 - Control, indicating, and warning elements
 - Checks before commissioning the machine
 - Engine running-in instructions
 - Starting and shutting down the engine
 - Explanation of the hydrostatic travel drive
 - Driving
 - Recovery and transport of the machine
 - Operation of all functions
 - Explanation of maintenance and inspection intervals according to maintenance and inspection plan by demonstrating maintenance points on machine
 - Lubrication intervals and lubricating points according to overview of lubricating points and demonstration of these points on the machine
 - Handing over the engine operating instructions

4 Initial installation and settings

- Spare parts list**
- ◆ Explain the structure of the spare parts list, figures, and the associated texts. Explain that spare parts orders must always include details of the machine type, vehicle identification number ("Fz-Id.Nr."), parts designation, complete spare part number, quantity, delivery address, etc.
- Warranty**
- ◆ Explain the warranty conditions.
 - ◆ Explain the inspection cards with reference to the maintenance and inspection plan.
 - ◆ Fill in the warranty/handling over card correctly and send it back to us.

5 Description

5.1 Type plate

The vehicle type and vehicle identification number are stamped on the type plate.



Notice

Please state the vehicle type and vehicle identification number when making inquiries or placing orders, and in all written correspondence.

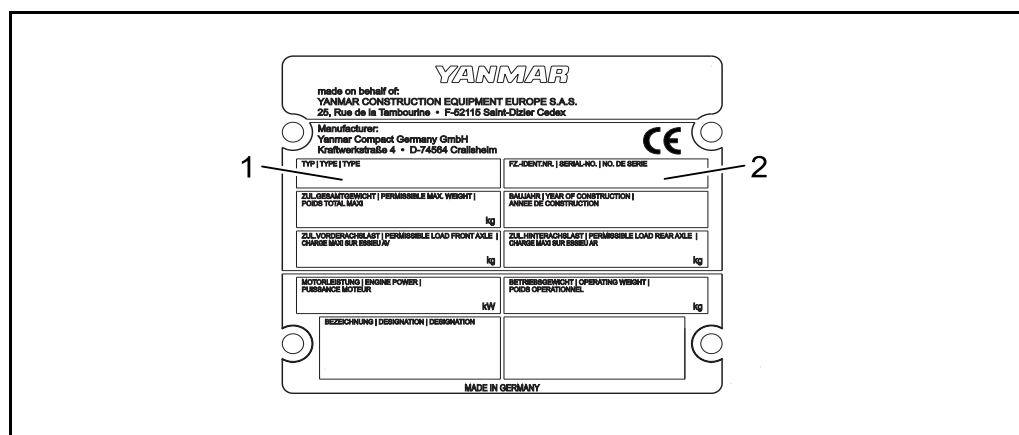


Fig. 5-1 Type plate

- 1 Vehicle type
- 2 Vehicle identification number



5

Description

5.2 Overview of machine

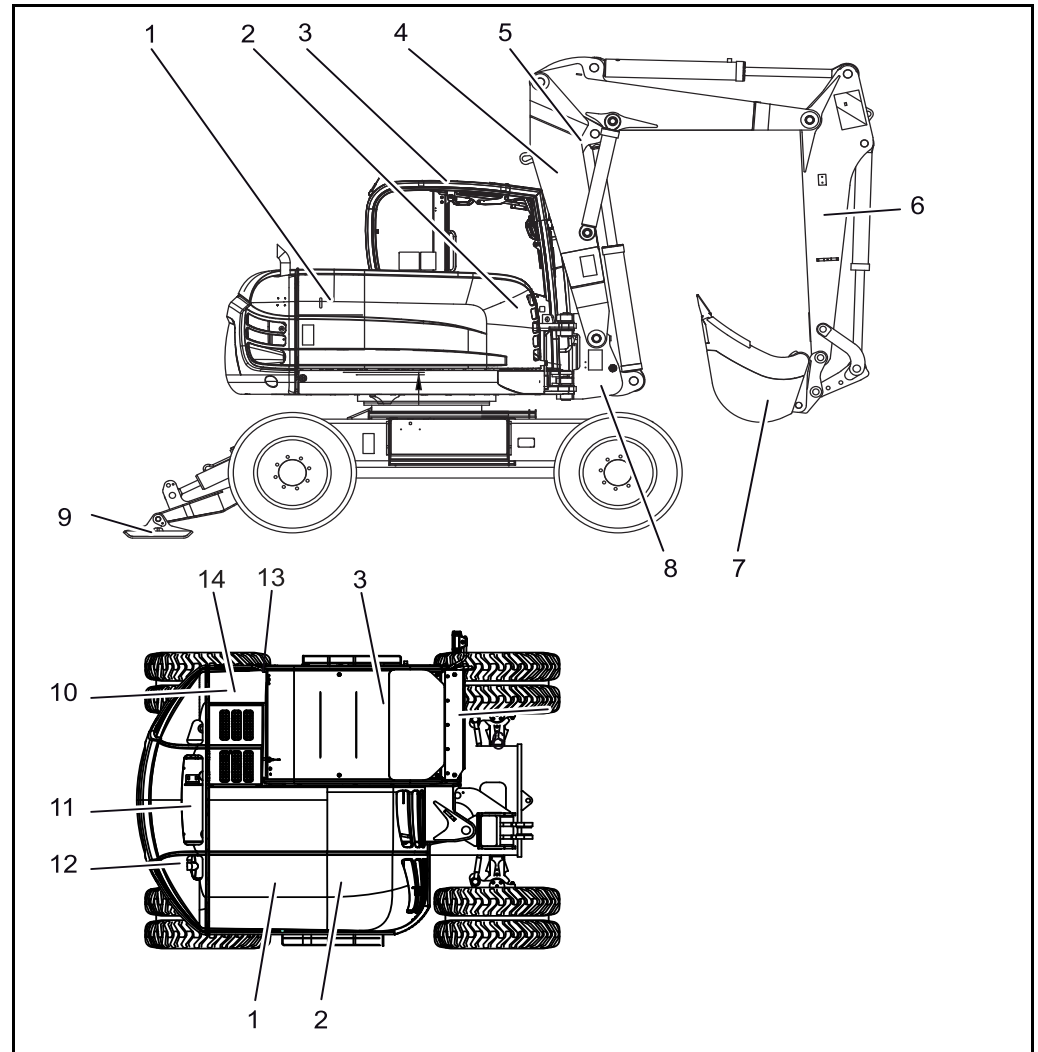


Fig. 5-2 Overview of machine

- 1 Shutdown
- 2 Water and hydraulic oil cooler
- 3 Cabin
- 4 Boom
- 5 Intermediate boom
- 6 Dipperstick
- 7 Bucket
- 8 Slewing column
- 9 Outrigger
- 10 Diesel Tank
- 11 Hydraulic fluid tank
- 12 Pumps
- 13 Battery
- 14 AdBlue® tank

5

Description

5.2.1 Guards

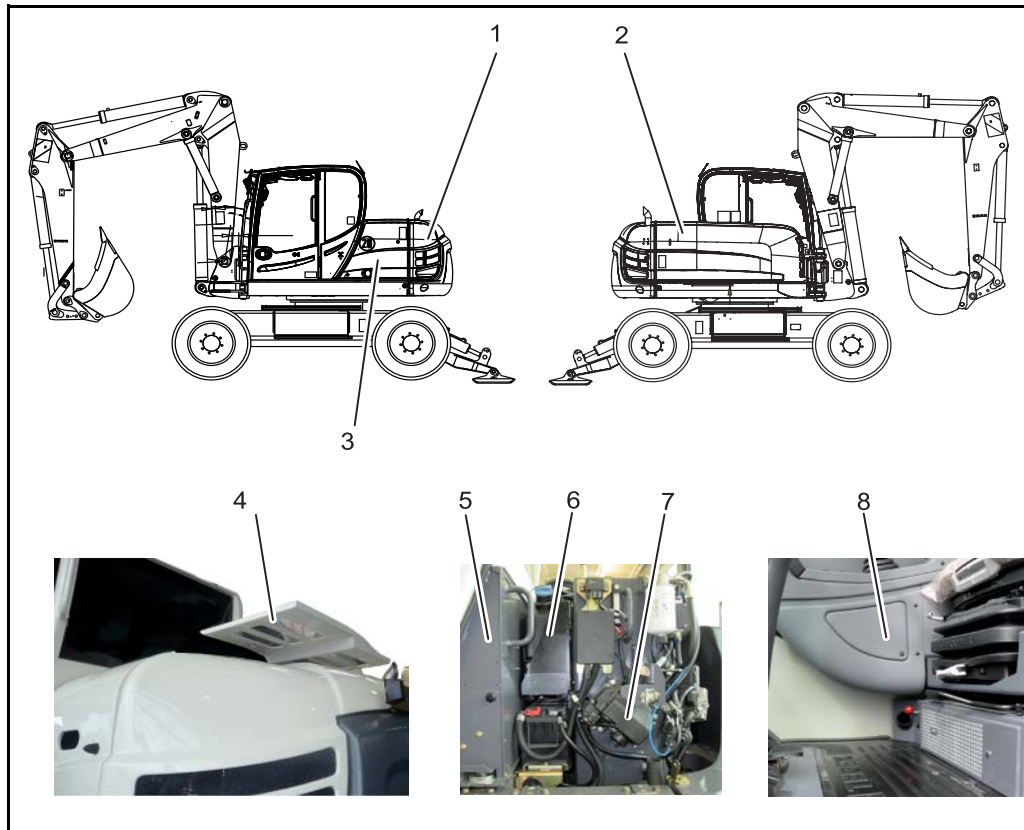


Fig. 5-3 Guards

- 1** Rear hood
- 2** Side hood/engine hood (folding)
- 3** Maintenance cover/maintenance ladder (folding)
- 4** Diesel tank/hydraulic system cover (folding)
- 5** Fuse and relay box cover
- 6** AdBlue[®] tank
- 7** AdBlue[®] filter element
- 8** Diagnostic interface cover

Guards provide protection against hazards such as noise, hot parts or rotating parts. During operation, guards must be kept closed at all times.

When carrying out maintenance and repair work, always open the guards far enough such that they stay open on their own.

Located under the side/maintenance cover:

- Battery
- Refueling pump
- AdBlue[®] tank

Located under the side cover:

- Engine
- Radiator, cooling system
- Pump gear
- Air intake system
- Alternator

The following is housed beneath the diesel tank/hydraulic unit:

- Fuel tank
- Hydraulic oil tank

Located under the rear hood:

- Pumps
- Exhaust system

5 Description

5.2.2 Engine

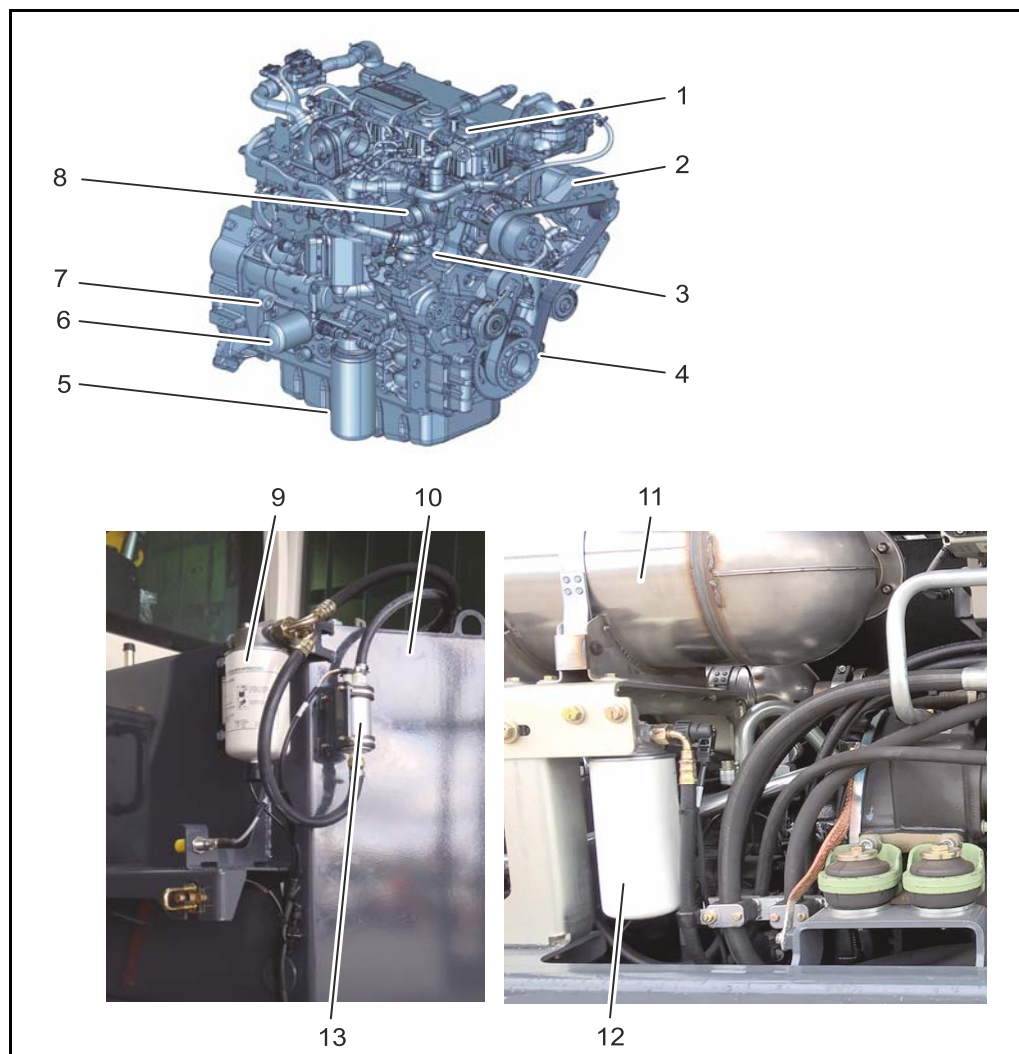


Fig. 5-4 Engine

- 1** Sealing cap
- 2** Generator
- 3** Engine
- 4** Engine cooling system (inlet)
- 5** Oil drain plug
- 6** Engine oil filters
- 7** Oil dip stick
- 8** Engine cooling system (outlet)
- 9** Fuel pre-cleaner
- 10** Fuel tank
- 11** Exhaust system
- 12** Fuel filter
- 13** Electric fuel pump

All parts of the engine are accessible when the side hood is open or the maintenance stairs/side hood are folded down.

**Automatic
engine
shutdown
(optional)**

The engine shuts down automatically if the following both occur for longer than 10 minutes

- the park brake is engaged and
- the machine is stationary.

The time can be set on the display.



5

Description

5.2.3 Hydraulic system

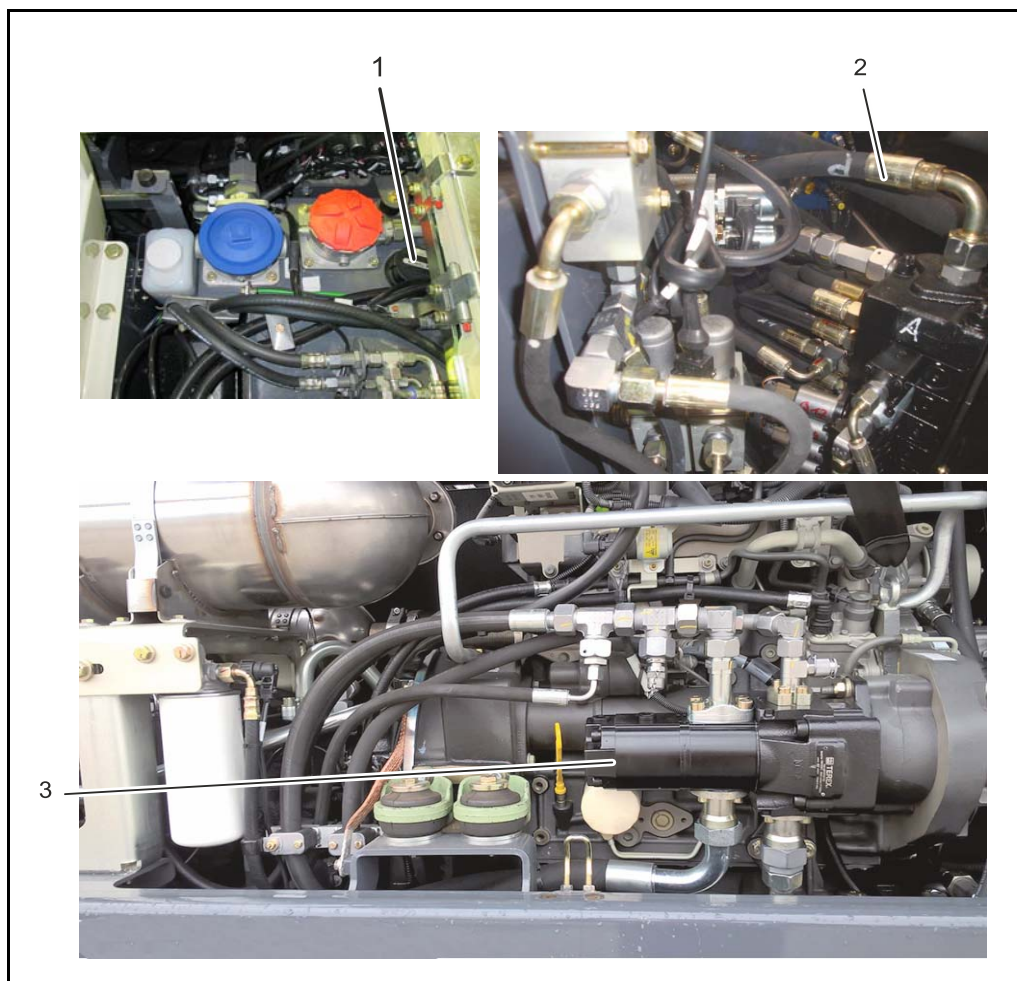


Fig. 5-5 Hydraulic system

- 1** Hydraulic fluid tank
- 2** Distribution
- 3** Pump auxiliary drive

The following are driven hydraulically:

- Drive transmission
- Boom movement
- Bucket movement
- Brakes
- Uppercarriage
- Dozer blade

5 Description

5.2.4 Electrical system

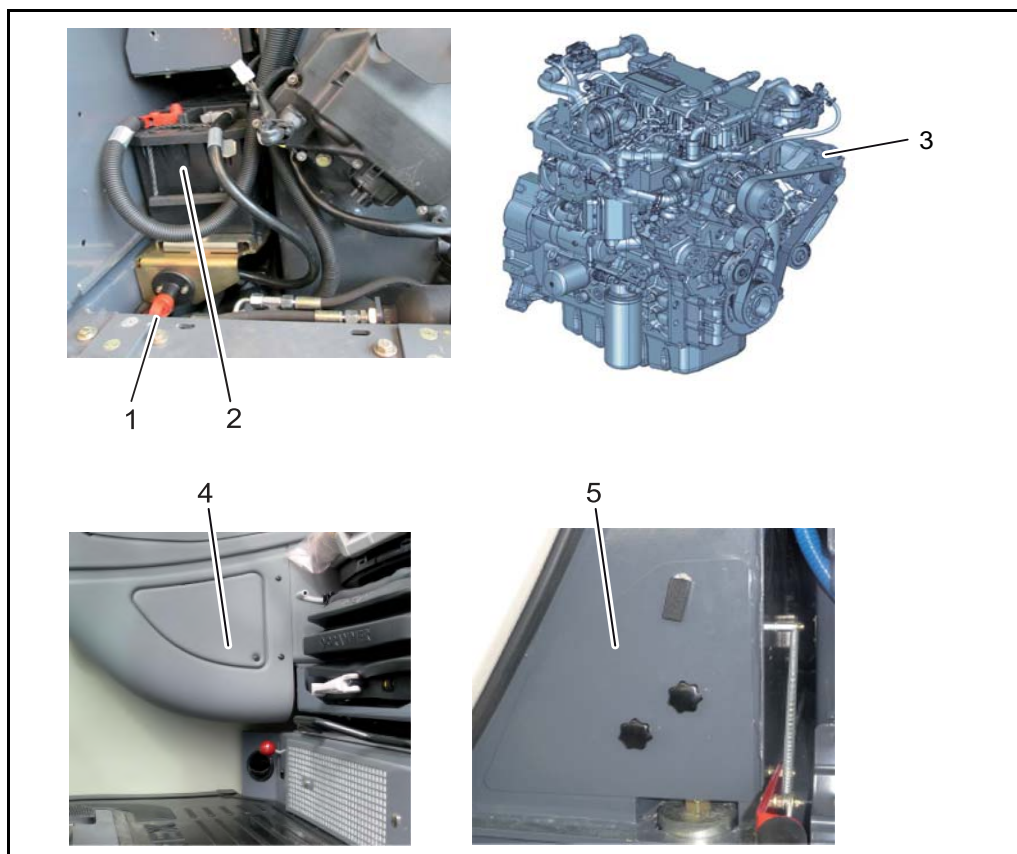


Fig. 5-6 Electrical system

- 1** Battery circuit breaker
- 2** Battery
- 3** Generator
- 4** Diagnostic interface
- 5** Fuses and relays

All electrical components are accessible by:

- Opening the maintenance cover on the diagnostic interface
- Opening the side/maintenance cover and folding out the maintenance steps and removing the maintenance cover on the fuses and relays
- Opening the engine hood

The generator supplies the onboard power supply system with a voltage of 12 V.

You can disconnect the entire machine from the power supply with the main battery switch, e. g. for maintenance work.



Notice

The control unit will remain active another 40 seconds or so to save the system data and then it will turn itself off.

This process can last up to 2 minutes for engines with an SCR system, given that the SCR lines need to be out in this time.

For this reason, the engine's power supply must not be suddenly interrupted via the isolator switch.

5 Description

5.2.5 Fuse and relay box

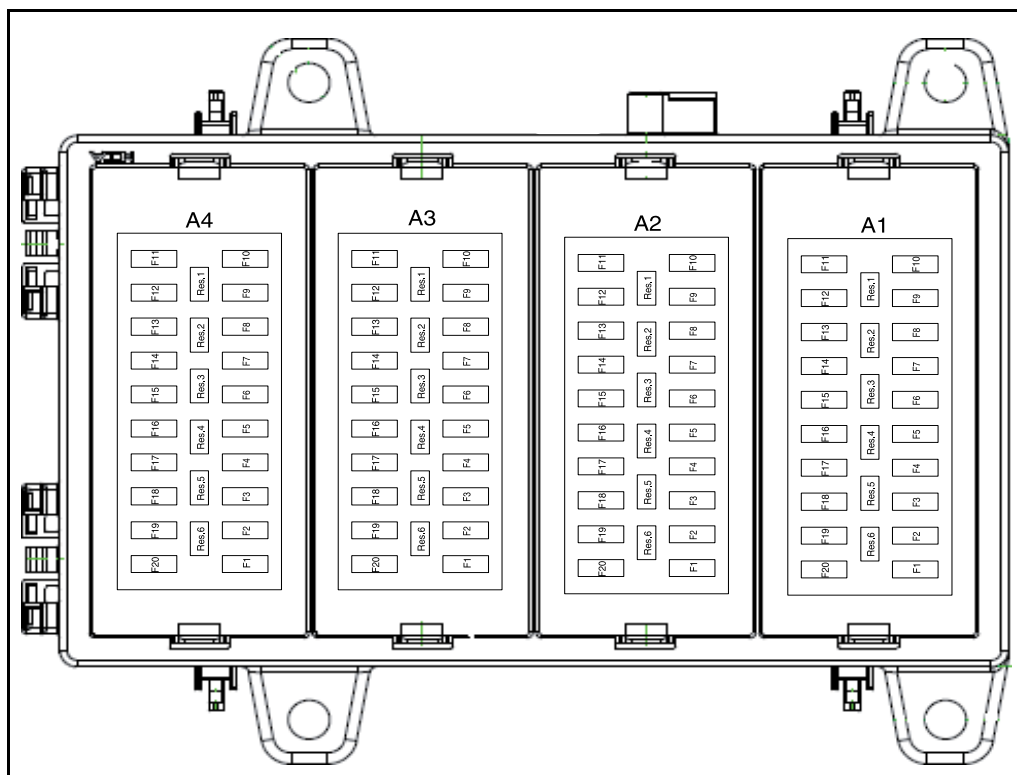


Fig. 5-7 Fuse box

Loc.	Amps	Assigned to	Pos.	Amps	Assigned to
Fuse block A1 (terminal 30)					
F1	10 A	Start switch	F11	15 A	Rear working floodlight
F2	5 A	Immobilizer	F12	15 A	Working floodlight boom
F3	20 A	Fuel pump engine	F13	10 A	Socket
F4	10 A	Display	F14	5 A	Interior light, radio
F5	5 A	Power supply SPU	F15	15 A	Heating control
F6	10 A	Hazard warning lights	F16	20 A	Heater fan
F7	20 A	Low beam light high beam light	F17	5 A	Supplementary heating timer
F8	15 A	High beam	F18	20 A	Supplementary heating
F9	15 A	Rotating beacons	F19	15 A	Telematic system
F10	15 A	Front working floodlight	F20	5 A	Spare
Fuse block A2 (terminal 15)					
F1	5 A	Fuel pump relay	F11	10 A	Power supply SPU
F2	5 A	Immobilizer	F12	10 A	Power supply SPU
F3	5 A	Power supply diagnostic plug	F13	10 A	Power supply SPU

Loc.	Amps	Assigned to	Pos.	Amps	Assigned to
F4	5 A	Display	F14	10 A	Power supply SPU
F5	10 A	Power supply SPU	F15	10 A	Power supply SPU
F6	10 A	Power supply SPU	F16	5 A	Key pad
F7	10 A	Power supply SPU	F17	5 A	Pressure switch brake
F8	10 A	Power supply SPU	F18	5 A	Pressure switch travel
F9	10 A	Power supply SPU	F19	5 A	Switch travel drive
F10	10 A	Power supply SPU	F20	5 A	Sensors four-wheel steering
Fuse block A3 (terminal 15)					
F1	10 A	Working hydraulics	F11	10 A	Windshield washing/wiping system
F2	5 A	Outrigger	F12	5 A	Radio
F3	5 A	Joystick right	F13	15 A	Heating control
F4	5 A	Joystick left	F14	5 A	Central lubrication system
F5	5 A	Switch console	F15	20 A	Central lubrication system
F6	15 A	Changeover ISO/SAE	F16	20 A	Refueling pump
F7	5 A	Load warning	F17	20 A	Comfort seat
F8	5 A	Hydraulic oil level	F18	10 A	Mirror heating
F9	5 A	Auto-idling system	F19	10 A	Telematic system
F10	10 A	Direction indicators	F20	5 A	Spare
Fuse block A4 (lighting system)					
F1	15 A	High beam	F14	5 A	Spare
F2	15 A	Dipped beam	F15	5 A	Reversing camera
F3	5 A	Side lights, left	F16	20 A	AdBlue® heating supply module
F4	5 A	Side lights, right	F17	5 A	Spare
F11	10 A	NOx sensor before the SCR catalytic converter	F18	5 A	Spare
F12	10 A	NOx sensor after the SCR catalytic converter	F19	5 A	Spare
F13	5 A	Spare	F20	5 A	Spare

Tab. 5-1 Fuse allocation A1 - A4

5 Description

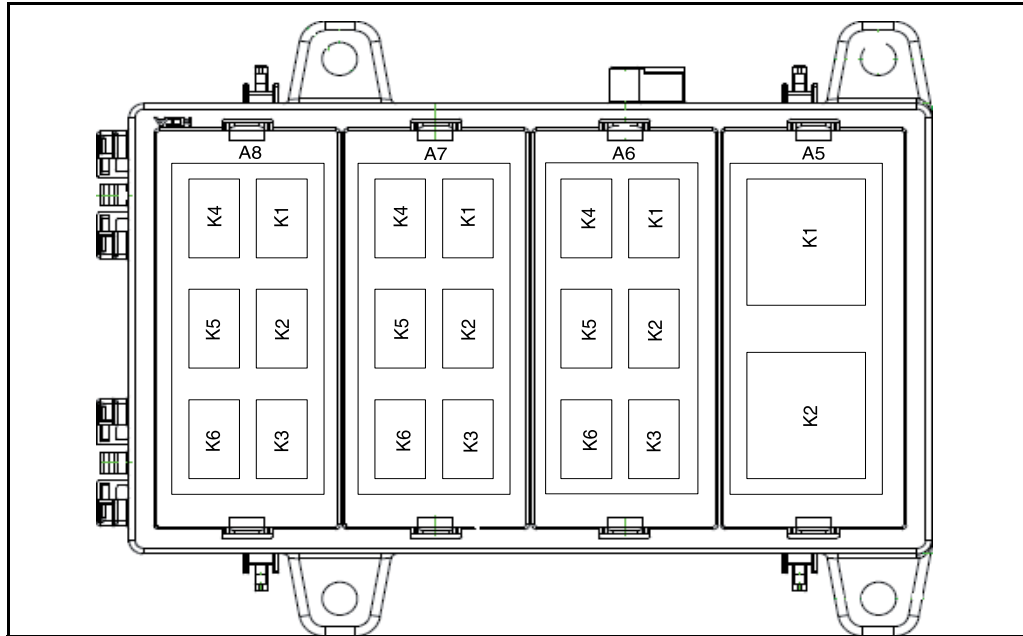


Fig. 5-8 Relay box

Location	Assigned with relay	Position	Assigned with relay
Relay block A5			
K1	Fuel Pump	K2	Hazard warning lights
Relay block A6			
K1	Rotating beacons	K4	Working floodlight boom
K2	Front working floodlight	K5	Changeover ISO/SAE
K3	Rear working floodlight	K6	Mirror heating
Relay block A7			
K1	Windscreen washer	K2	Heater fan
Relay block A8			
K1	--	K4	AdBlue® heating pressure line
K2	AdBlue® heating system	K5	AdBlue® heating return pipe
K3	AdBlue® heating supply module	K6	AdBlue® heating Suction Hose

Tab. 5-2 Assignment relay box

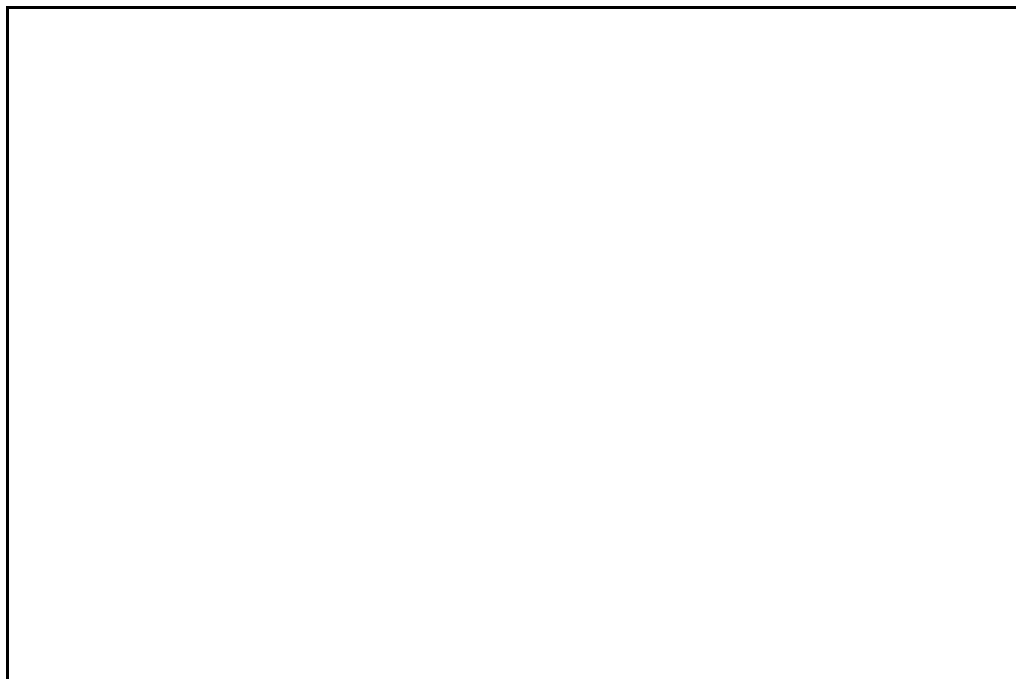


Fig. 5-9 Configuration of main fuses

Pos.	Amps	Assigned to	Pos.	Amps	Assigned to
Main fuses					
F01	80A	Main fuses			
F02	80A	Pre-heating			
F04	30A	Starter motor sensor			

Tab. 5-3 Configuration of main fuses

5

Description

5.2.6 Operator's seat

The driver's comfort seat is a mechanically sprung seat with hydraulic vibration dampening. The driver's comfort seat meets international quality and safety standards.

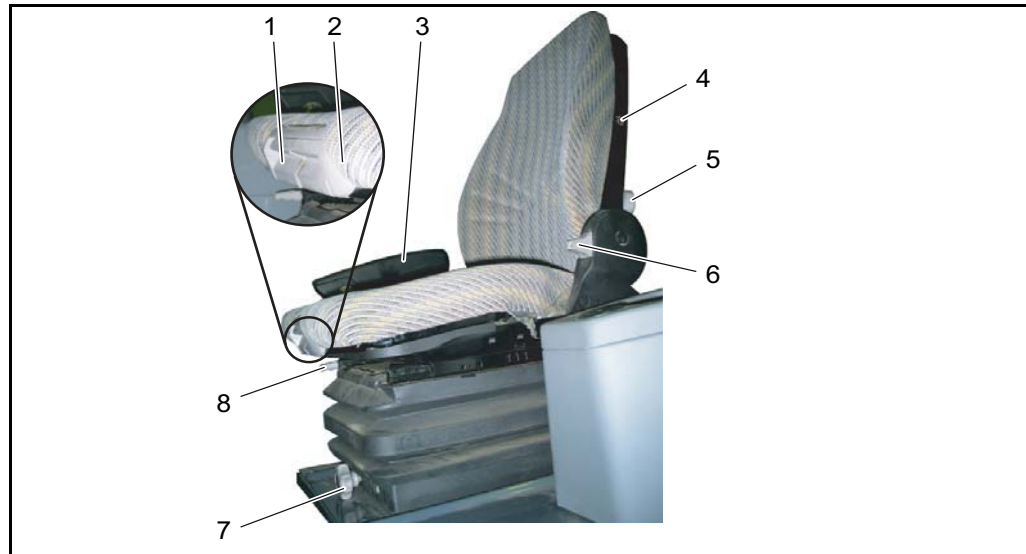


Fig. 5-10 Driver's seat

- 1** Handle for adjusting seat depth
- 2** Handle for adjustment of cushion angle
- 3** Right arm rest, left arm rest
- 4** Option: Switch for heated seat
- 5** Handwheel for lumbar support
- 6** Handle for tilting backrest
- 7** Handle for combined height and body weight adjustment
Optional: Lever for weight adjustment
- 8** Handle for longitudinal adjustment

5.3 Display and control elements in the operator's compartment

5.3.1 Controls

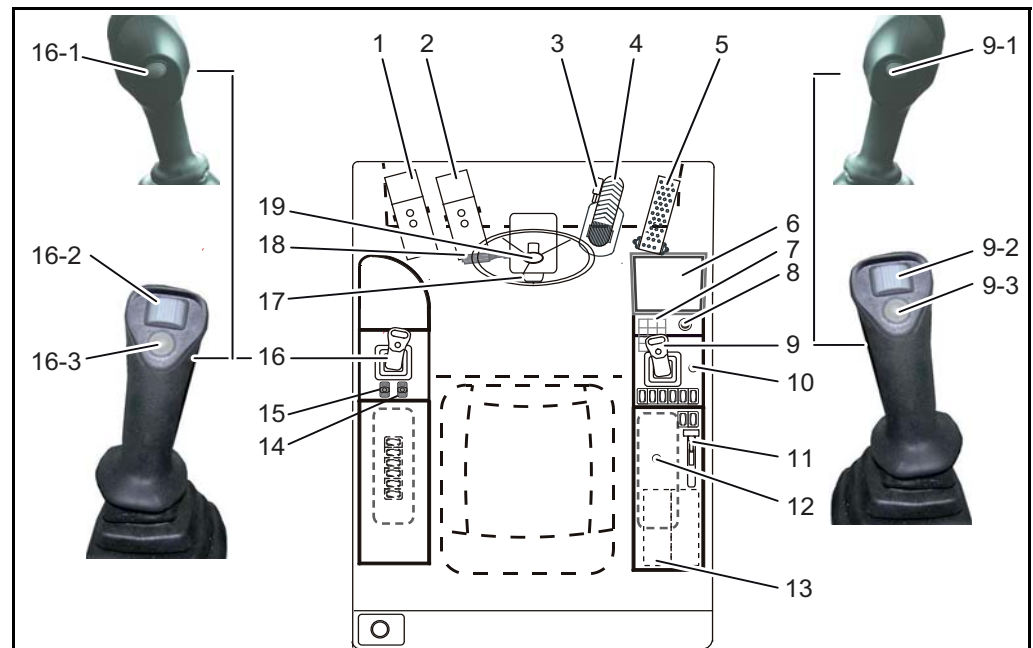


Fig. 5-11 Control elements

- 1** Apportionable driving
- 2** Actuation - intermediate boom/articulation
- 3** Excavator brake unlocking
- 4** Service brake/excavator brake
- 5** Accelerator pedal
- 6** Display
- 7** Keypad
- 8** Start switch
- 9** Joystick - excavator equipment right
 - 9-1 Continuous operation for additional control circuits
 - 9-2 Actuate dial for additional control circuit 1
 - 9-3 Articulated boom changeover
- 10** Move forward/backward
- 11** Engine speed setting (manual throttle)
- 12** Power socket 12 V
- 13** Optional - radio
- 14** Right-hand support
- 15** Left-hand support
- 16** Joystick, left
 - 16-1 Signal horn
 - 16-2 Actuate dial for auxiliary control circuit 2
 - 16-3 Slewing pressure switch
- 17** Steering wheel angle adjustment pedal
- 18** Signal horn, direction indicator and light switch
- 19** Button for steering wheel height adjustment

5

Description



Notice

The left arm rest also serves as the left control console and as exit barrier.

5.3.2 Control panel

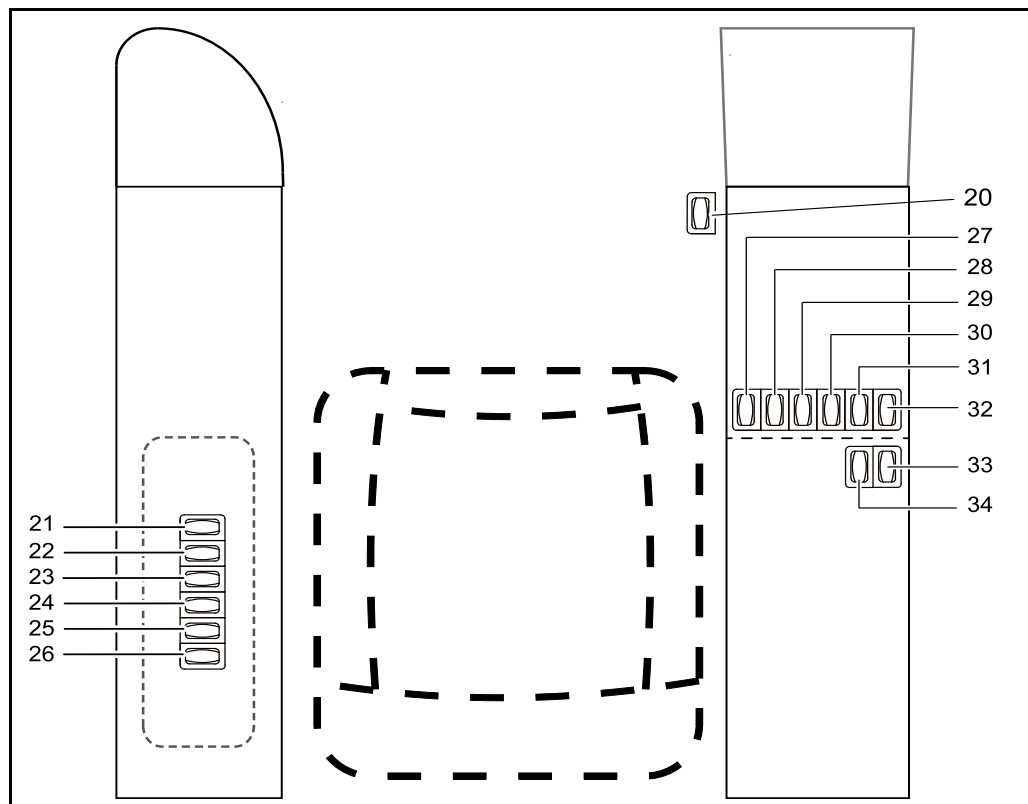


Fig. 5-12 Operator control panel

- 20** Engine bypass switch
- 21** Spare
- 22** Spare
- 23** Switch rear fog light (optional)
- 24** Rear fog-lamp switch (option)
- 25** Switch intermediate lubrication (optional)
- 26** Switch quick-attachment system (optional)
- 27** Switch hazard warning lights
- 28** Switch steering direction reversal (optional)
- 29** Switch manual transmission setting I + II (optional)
- 30** Switch axle lock
- 31** Switch travel pedal (optional)
- 32** Parking brake switch
- 33** Switch power tilt (optional)
- 34** Switch plate float position (optional)

Key to control panel					
20		Engine override	28		Invert steering direction (optional)
21		Spare	29		Gearbox ratios I + II (optional)
22		Spare	30		Pendulum axle lock
23		Float position front plate (optional)	31		Foot throttle (optional)
24		Rear fog light (optional)	32		Park Brake
25		Central lubrication (optional)	33		Power tilt (optional)
26		Quick-attachment system (optional)	34		Plate float position (optional)
27		Warning light			

5 Description

5.3.3 Keypad

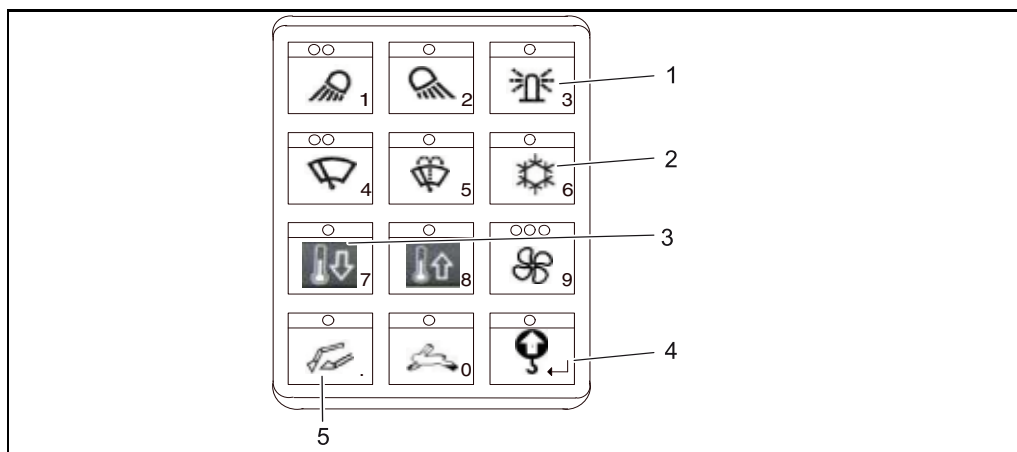














Fig. 5-13 Keypad

- 1** Function button with icon indicating function (see section "Icons")
- 2** LED (status indicator)
- 3** Keypad (see section "Submenu immobilizer")
- 4** ENTER (see section "Submenu immobilizer")
- 5** Point (see section "Submenu immobilizer")

 Front working floodlight	 Working floodlight, rear (optional)	 Rotating beacon (optional)
 Windshield wiper	 Washer wiper	 Automatic heating and air-conditioning *)
 Heater fan *)	 Increase inside cab temperature *)	 Lower inside cab temperature *)
 Activation working hydraulics	 Fast movement	 Activation of overload warning *)

The machine is mainly operated via the keypad by pressing the individual function buttons.

*) The corresponding display appears when these functions are operated.

Front working floodlight



The working floodlights are switched on as follows:

- Step 1 (press function button once): Front working floodlight is switched on.
→ *One LED is illuminated.*
- Step 2 (press function button twice): Working floodlight on boom (optional) is switched on.
→ *Two LEDs are illuminated.*

Windshield wiper



The windshield wiper has two switch positions:

- Step 1 (press function button once): Intermittent operation
→ *One LED is illuminated.*
- Step 2 (press function button twice): Continuous operation
→ *Two LEDs are illuminated.*

Heating and A/C system



The heating and air-conditioning system has two switch settings:

- Step 1 (press function button once): Activation of the heating and air-conditioning system
→ *One LED is illuminated.*
- Step 2 (press function button twice): Deactivation of the A/C system (optional). The temperature control remains active.
→ *No LED is illuminated.*

Heating fan



The heating fan has three switch settings:

- Step 1 (press function button once): 30 % output
→ *One LED is illuminated.*
- Step 2 (press function button twice): 60 % output
→ *Two LEDs are illuminated.*
- Step 3 (press function button three times): 100 % output
→ *Three LEDs are illuminated.*

5 Description

5.3.4 Display

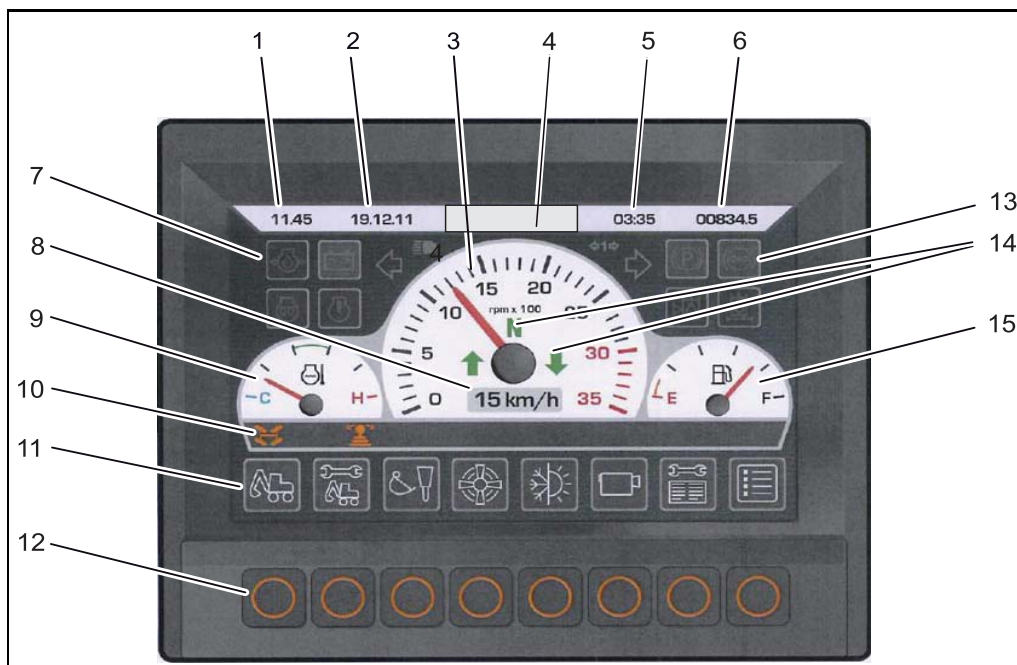


Fig. 5-14 Display main view

Pos.	Description	Pos.	Description
1	Time	9	Coolant temperature gauge
2	Date	10	Display bar for activated functions
3	Tachometer	11	Menu control icons
4	Company logo	12	Function buttons
5	Operating hour meter / daily counter	13	Icons Machine monitoring (see table below)
6	Operating hours total	14	Display direction of travel/neutral setting
7	Icons Engine monitoring (see table below)	15	Fuel level indicator
8	Speed indicator	15	AdBlue® level indicator (DEF) blue

Tab. 5-4 Assignment display

The monitoring icons may vary in the display in terms of position ("multi-icon".) and color (yellow, green or red illuminated or flashing).



Notice

If several pieces of information are being provided simultaneously, the display of the multi-icon error symbols changes every 5 seconds.

Engine monitoring icons

Sym-bol	Description	Sym-bol	Description
	Engine oil pressure		Battery charge indicator
	Pre-heating		
Multi-icons (bottom right)			
	Engine diagnostics		Condensed water in the fuel filter
	Coolant level		Air filter maintenance
	Particle-filter regeneration (optional)		Ash lamp (optional)
	AdBlue® particle filter		

Tab. 5-5 Engine monitoring pictograms

Machine monitoring icons

Sym-bol	Description	Sym-bol	Description
	Direction indicator		Trailer indicator light
	Travel direction forward/reverse		Neutral position direction of travel
	High beam		
	Park brake		Accumulator pressure
Multi-icons (bottom right)			
	Hydraulic oil level		Hydraulic filter
Multi-icons (bottom left)			
	Transmission neutral		Transmission travel speed 1
	Transmission travel speed 2		

Tab. 5-6 Machine monitoring icons

5 Description

Error indicator



The error symbol appears in the center of the main screen as soon as a machine error/engine error occurs.



Fig. 5-15 Display error message



When errors occur, please contact Yanmar customer service.

If an error is displayed, troubleshoot immediately. Ignoring error messages can lead to serious damage to the machine and its engine.

If the error message is ignored continually, the engine may switch off automatically after a certain period.

Engine override So that the machine can still be moved in a hazardous situation - e.g. to move it away from an intersection - there is a switch (right-hand armrest) on the diagnostic interface for deactivating the shut-off procedure.

CAUTION	
	<p>Danger as a result of existing error Risk of engine damage.</p> <ul style="list-style-type: none"> ▷ Only activate engine bypass in the event of danger. ▷ For normal operation, you must disable engine bypass again! ▷ Enabling of engine override is recorded in the engine control unit and will result in the loss of warranty claims for the engine.



Fig. 5-16 Engine override

1 Engine bypass switch

5 Description

Menu control



Fig. 5-17 Display function buttons

1 Function buttons

The buttons in the main menu and submenus have various functions:

- In the main menu, you can press a button to jump into the corresponding submenu.
- The submenus are used for navigation and to process figures.

User guidance is provided automatically via a change in color of the frame around the symbol or of the symbol itself.

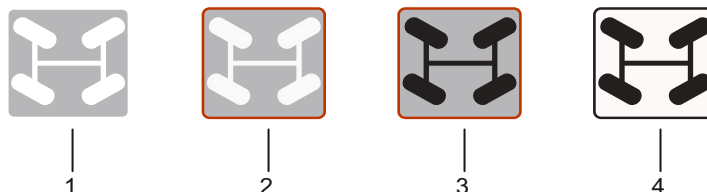


Fig. 5-18 Appearance of the function keys when activated

- 1 Function inactive
- 2 Function selected
- 3 Function confirmed
- 4 Function activated

Main menu

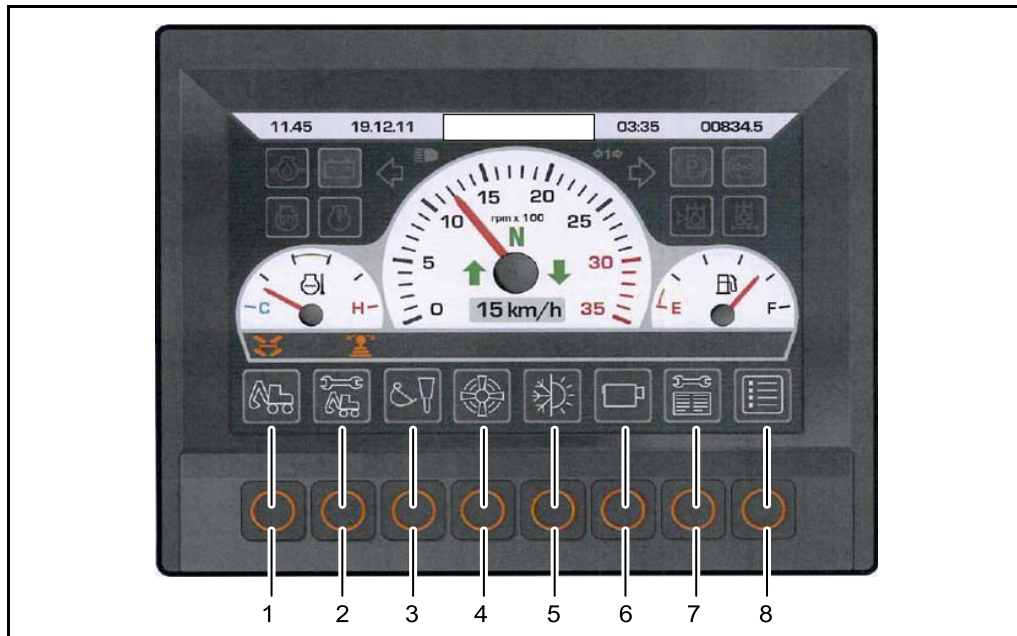










Fig. 5-19 Display main view

	1 Submenu, machine functions		2 Submenu, machine options
	3 Submenu, machine adjustments		4 Submenu, ventilator control (inactive)
	5 Submenu, air-conditioning control		6 Submenu, rear view camera
	7 Submenu, diagnosis		8 Submenu, display basic settings

5 Description

Submenu

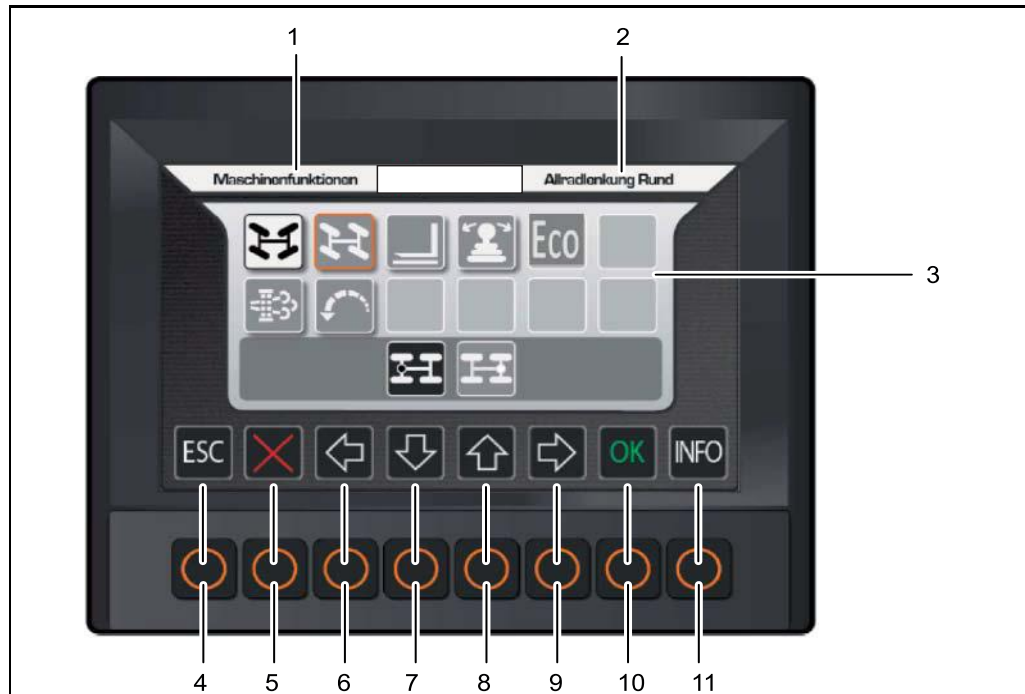


Fig. 5-20 Display view sub-menu

- 1** Name of the activated sub-menu
- 2** Description of the function activated
- 3** Sub-menu screen

Function buttons:

- 4** ESC (back)
- 5** Delete
- 6** Cursor to the left
- 7** Cursor to the bottom
or
Decrease value of variables
- 8** Cursor to the top
or
Increase value of variables
- 9** Cursor to the right
- 10** Saving
- 11** Information provided

When the submenu is opened, the cursor always appears at the top left.

- ◆ The function required is selected with the cursor keys and then confirmed by pressing **OK**.

Descriptions of the individual functions are as follows.

**Submenu,
Machine
functions**



Activate by selecting menu



Fig. 5-21 Submenu, machine functions

Sym- bol	Description	Sym- bol	Description
	Four-wheel mode (optional)		Four-wheel crab (optional)
	Bucket changeover (optional)		ISO - SAE changeover (optional)
	ECO mode (optional)		Particle filter regeneration (optional)
	Auto-idle (optional)		Ash lamp (optional)
	Display for position of front axle steering equipment position (optional)		Display for position of rear axle steering equipment position (optional)
			Period for automatic engine shutoff (optional)

Tab. 5-7 Pictograms of machine functions



Notice



When in inactive state, the submenu is locked.



Notice

These symbols are illuminated in orange on the symbol bar when they are activated.

5 Description

Icons of machine functions



Four-wheel steering mode

- In this mode, the front and rear wheels turn equally. This results in a small turning circle.
- ◆ Press **OK** to turn the mode on/off.



- The mode is only activated when the front axle is centered.
- The display will indicate at the bottom when the centering of the axle is detected.

Notice



The "All-wheel fast" option enables you to also activate the mode in "hare mode" or in second gear.



Four-wheel crab steering

- This mode turns the front and rear wheels in the same direction.
- This causes the front and rear axles to misalign, reducing soil damage.
- ◆ Press **OK** to turn the mode on/off.



- The mode is only activated when the front axle is centered.



- When turning off, the mode only deactivates once the rear axle is centered.
- The display will show when the centering of the axle is detected.

Notice



The "All-wheel fast" option enables you to also activate the mode in "hare mode" or in second gear.

Notice



Switching from 4WS "crab steering" to normal FWS steering and back is only activated if both the front and rear axles are in the neutral position (see display).

Icons of machine functions



Bucket change-over

For the mode to be active, the working hydraulics must be turned on.

- ◆ Press **OK** to turn the mode on/off.



Changeover ISO/SAE

For the mode to be active, the working hydraulics must be turned on.

- ◆ Press **OK** to turn the mode on/off.



Active icon = operation as per SAE



Inactive icon = operation as per ISO



ECO mode

For the mode to be active, the working hydraulics must be turned on.

- An icon in the main menu will show when the mode is activated. When the ECO mode is active, the auto-idle and automatic engine shutoff functions are turned on.
 - Equally, when the ECO mode is deactivated, the auto-idle and automatic engine shutoff functions are turned off.
- ◆ Press **OK** to turn the mode on/off.



Auto-idling system

When the function is active it is indicated on the display by an icon.

- If the pressure switches for the working hydraulics do not detect pressure for more than three seconds, the engine is switched to idle.
 - Only when any of the four pressure switches detect pressure is the idle command retracted.
- ◆ Press **OK** to turn the ECO mode on/off.

5 Description

Icons of machine functions



Auto-idle engine stop - time

Once the engine has idled for the full “auto-idle stop time”, due to the auto-idle function, the engine is shut off.

Notice



First, though, the ECO mode and the parking break need to be on.

- The time “0 minutes” will deactivate the engine shutoff.
- The setting “Time to automatic engine shutoff” is selected via a bar chart.
- By moving the cursor up or down, the value can be adjusted in increments of 3 minutes. The value is then saved permanently.
- ◆ Select **OK** to go to the settings menu where you can adjust the length of time for the automatic engine shutoff, between 0 to 30 minutes.

**Icons of
machine
functions**



Particle filter regeneration

Before starting the particle filter regeneration, the following requirements must first be met:

Diesel particle filter

- The diesel particle filter undergoes a continuous regeneration process, which is activated as soon as the required exhaust gas temperature is reached at the system inlet.
- The filter load is constantly monitored.

**Level 1:
Heat mode**

Activated if: relative carbon black load of more than around 63 %

- If the operating requirements of the machine do not permit passive regeneration, the filter load will increase. This can result from only very limited machine use or within a very short space of deployment time.
- In this case, the engine is run in a special 'heat mode' while the engine adjusts to ensure that the regeneration requirements are improved on.

**Level 2:
Stoppage
regeneration**



Active if: relative carbon black load at > 100 %

- If the heat mode fails to reduce the carbon black load sufficiently, the filter will keep accumulating carbon black and eventually stoppage regeneration will be required.
- When stoppage regeneration is requested, the control light "Particle filter regeneration" turns on.
- The stoppage regeneration is the last option for regenerating the filter, if all prior attempts to regenerate the filter have failed.
- For stoppage regeneration, the engine activates special operating conditions, so the machine may not be used during active stoppage regeneration.
- During active stoppage regeneration, high exhaust gas temperatures will be recorded.
- The engine is set to a specific speed, which cannot be changed by the operator.

Engine exhaust train protection system

- If the filter loads goes above its nominal value and it is not regenerated, it may lead to the destruction of the filter and even the engine. For this reason, the engine control unit includes protective functions for the diesel particle filter system.
- Not including the standard engine protection procedures, there are two warning stages that are activated depending on the relative carbon black load.

5 Description

Level 3: Warning

Active if: relative carbon black load is at approx. 110 %



- “Particle filter regeneration” control light flashes quickly.



- “Engine diagnosis” control light turns on.
- Engine protection (warning level active) with a power reduction of 30 %.

Level 4: Engine OFF

Active if: relative carbon black load is at approx. 125 %



- “Particle filter regeneration” control light flashes quickly.



- “Engine diagnosis” control light turns on.
- Engine protection (Engine OFF level is active) with power reduction of 30 %, engine speed is limited to 1200 rpm.



Notice

In this state, the stoppage regeneration cannot be enabled by the driver anymore.

At this point, the stoppage regeneration process can only be started using SERDIA (engine diagnosis software from engine manufacturer DEUTZ). Please contact Yanmar customer service.

Level 5: Filter change

Active if: relative carbon black load at > 156 %

Filter overload

- If, despite the engine OFF message, the engine is still in operation and the filter continues to accumulate load, regeneration is no longer possible.
- At this point, the filter must be replaced.
- The engine OFF level limits the engine speed to 1200 rpm.
- Now, the machine is limited to ‘Limp home’ functionality (limited driving).

Monitoring the warning stages:

	Engine exhaust train protection level	Filter load [%]	Requirement for starting regeneration	Regeneration mode	Control light		Engine/system reaction (when load is excessive)
					Particle filter regeneration	Engine diagnosis- tics	
0	Normal	< 63	-		OFF	OFF	none
1	Heat mode	63	-	Heat mode	OFF	OFF	none
2	Stoppage regeneration	100	- Park break locked - Direction switch in neutral - Select "Particle filter regeneration"	Stoppage	Slow flashing (2 second beat)	OFF	none
3	Warning	110	- Park break locked - Direction switch in neutral - Select "Particle filter regeneration"	Stoppage	Rapid flashing (1 second beat)	TO	Power reduction 30 %
4	Engine Off	125	- Park break locked - Direction switch in neutral - Start using SERDIA	Stoppage	Rapid flashing (1 second beat)	Flashing	Power reduction 30 % - Engine speed limited to 1200 rpm
5	Filter change	156	No regeneration possible (=filter change)	regeneration no longer possible	Rapid flashing (1 second beat)	Flashing	Power reduction 30 % - Engine speed limited to 1200 rpm

Tab. 5-8 Monitoring of warning stages

5

Description

Diesel particle filter - ash load (optional)

Notice



A maintenance concept has been created by DEUTZ to maintain the exhaust particle filter system.
Maintenance is only to be performed by a qualified DEUTZ service team.

- The diesel particle filter is in use throughout the entire cycle of the ash, which is not removed as part of a regeneration.
- Ash load leads to shorter regeneration intervals, which ultimately calls for replacement of the filter within the scope of maintenance.
- In the case of 100% ash load, replacement of the filter is required.

Filter replacement requirement

- If, despite the engine OFF message, the engine is still in operation and the filter continues to accumulate load - above 100 % ash load - regeneration is no longer possible.
- At this point, the filter must be replaced.



→ The 'Ash control light' icon (ash indicator) in the engine monitoring icon bar flashes yellow.

Filter replacement warning



- If the filter replacement request is ignored, then the "Ash lamp" icon starts to flash once 105 % of the ash load is reached.
- Additional loading of the filter with ash, leads to shorter regeneration intervals and increasing exhaust gas back pressure

Relative ash load	Level	"Ash lamp" icon
< nominal load (100%)	Loading	OFF
> nominal load (100%)	Filter replacement requirement	permanent
> warning level (105%)	Warning	flashing

Tab. 5-9 Icon meaning

Notice



Following replacement of the filter, the soot and ash load must be set to zero in the control unit using SERDIA.

Regenerate diesel particle filter (optional)

⚠ WARNING	
	<p>Danger from hot surfaces and exhaust gases</p> <p>During regeneration, exhaust gas temperatures of 650 °C and higher may arise at the exhaust pipe.</p> <p>The surface temperature of the diesel particulate filter module with insulating sheath reaches 200 °C on average.</p> <p>Risk of burns. Danger of setting fire to objects in the vicinity.</p> <ul style="list-style-type: none"> ▷ Do not regenerate the diesel particulate filter in enclosed spaces. ▷ Keep a sufficient clearance around the exhaust pipe. ▷ Do not perform regeneration in the vicinity of flammable objects. ▷ Do not touch hot surfaces. ▷ Wear personal protective clothing.

Notice



The operator can only execute a 'stoppage regeneration'.

Enabling stoppage regeneration

Requirements are as follows:



- ◆ Coolant temperature >75 °C.
- ◆ Operate the parking brake.
- ◆ Put direction switch in neutral.
- ◆ Put manual throttle into 'idle' position.

Starting stoppage regeneration

- ◆ Start stoppage regeneration by selecting "particle filter regeneration". via the ('engine monitoring icons') display.



- 'Particle filter regeneration light' glows continuously.
- *Warning buzzer sounds three times.*

The engine increases its speed to approx. 1700 rpm for the duration of the regeneration.

5

Description

Notice



In an emergency, the operator can cancel the regeneration using the “exhaust particle filter regeneration” function. If canceled, the request for regeneration will show again. The regeneration must then be reauthorized by selecting the ‘particle filter regeneration’ function.

During the stoppage generation:

- ◆ The working hydraulics are automatically deactivated.
- ◆ The engine must not be stressed further.
- ◆ The parking break must remain on.
- ◆ The direction switch must remain in neutral.
- ◆ The “exhaust particle filter regeneration” control light is on.



Notice



The full regeneration process takes an average of 30 minutes, depending on the filter load.

Canceling the stoppage regeneration

Once the stoppage regeneration process has been initiated, it must not be interrupted (except for in emergencies).

Notice



In an emergency, the operator can cancel the regeneration using the “exhaust particle filter regeneration” function.

The regeneration process will stop immediately if:

- ◆ the parking break is released,
- ◆ the direction switch is no longer in neutral,
- ◆ the ‘particle filter regeneration’ function is selected again.

End of stoppage regeneration



- ◆ Once the regeneration process has finished, the engine speed will automatically reduce to idling speed.
- ◆ If the regeneration has been successful, the warning buzzer sounds three times once more and the “particle filter regeneration” control light goes out.

**Submenu,
machine
options**



Activate by selecting menu



Fig. 5-22 Submenu, machine options

Sym- bol	Description	Sym- bol	Description
	Activation dozing blade (front) (optional)		Enable (rear) support plate (optional)
	Enable switching valve control circuit I (optional)		Enable switching valve control circuit II (optional)
	Turn off driving alarm (optional)		Backup camera automatically off (optional)

Tab. 5-10 Pictograms of machine options



Notice

You can reset all these machine options by turning off the ignition (terminal 15), except for the dozer blade and support blade.

5 Description

Submenu, machine adjustments



Activate by selecting menu



Fig. 5-23 Submenu, machine adjustments

- Adjustment 1 = set number of liters via bar chart
- Adjustment 2 = set number of liters via bar chart
- Adjustment 3 = set number of liters via bar chart

How to set the liter quantity for individual control circuits:

- ◆ Select the desired control circuit with the cursor.
- ◆ Change the number of liters by clicking on the up or down arrows, which changes the size of the bar in the chart.

**Submenu,
fan control**



Activate by selecting menu



Fig. 5-24 Submenu, fan control

Sym- bol	Description	Sym- bol	Description
	Activation reversible fan		Deactivation reversible fan
	Fan is turning at maximum speed		Reversible fan cycle time

Tab. 5-11 Fan control pictograms

How to set the cycle time for the reversible fan:

- ◆ Select the 'cycle time' icon with the cursor.
- ◆ Set the desired time by clicking on the up or down arrows, which changes the size of the bar in the chart



Notice

The cycle time for the reversible fan can be set in increments of 0.5 within a range from 0.5 to 5 hours.
When delivered, the reversible fan is switched on once an hour for the purpose of cleaning.
The reversible fan is used to blow leaves etc. from the air intake.

5 Description

Submenu, air-conditioning control



Activate by selecting menu



Fig. 5-25 Submenu, air-conditioning control

Sym-bol	Description	Sym-bol	Description
	Activating heating and air-conditioning (air-conditioning system - optional)		Defrost front windshield
	Mirror heating (optional)		Heated rear windshield (optional)
	Internal temperature pre-selection using bar chart ranging between 16-26 °C in two steps.		Pre-selection of fan speed

Tab. 5-12 Air-conditioning control pictograms

How to set the internal temperature and the fan speed:

- ◆ Select the desired function with the cursor.
- ◆ Change the temperature or fan speed by clicking on the up or down arrows, which changes the size of the bar in the chart.
- These functions can also be carried out on the keypad with the corresponding keys.
- The air-conditioning system (optional) can be switched off by pressing the appropriate key on the keypad a second time.

**Submenu,
rear view camera**



Activate by selecting menu



Fig. 5-26 Submenu, rear view camera

- ◆ Activate the rear view camera in the main view.
- ◆ Press the **OFF** button once.
→ After 30 seconds, the camera view changes back to the main view.
- ◆ Press the **OFF** button twice.
→ The camera image remains visible until the **OFF** button has been pressed again.

5 Description

Submenu diagnostics/ service



Activate by selecting menu



Fig. 5-27 Submenu diagnostics/service

- 1 DiagIDs display
- 2 Service display
- 3 Sensor quick information

The hardware and software status of the sensors is evaluated.

- ◆ Select **OK** in the 'diagIDs' (1) submenu to bring up the selected sensor.
- ◆ Select **OK** in the 'service display' (2) submenu to activate the corresponding sensors.
- ◆ Sensor (3) quick information.

Symbol	Description	Symbol	Description
	Hardware and software status of the engine sensor		Hardware and software status of the machine sensor
	Hardware and software status of the display		Hardware and software status of the A/C sensor
	Hardware and software status of the hydraulic pump sensor		Hardware and software status of the gear sensor
	Service display for the engine sensor		Service display for the machine sensor
	Service display for the display		Service display for the A/C sensor
	Service display for the hydraulic pump sensor		Service display for the gear sensor
	Quick information on the diesel particle filter		

Fig. 5-28 Submenu, diagnostics/service = pictograms

5 Description

Submenu, diagnostics/ service



Menu display - active icons

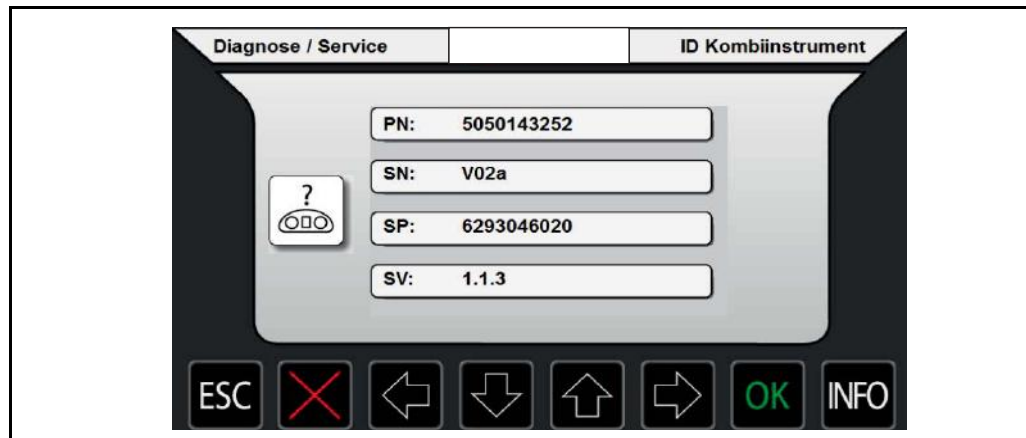


Fig. 5-29 Submenu, diagnostics/service instrument cluster

Display mode: ID instrument cluster

- **PN:** Hardware number
- **SN:** Hardware version number
- **SP:** Software part number
- **SV:** Software version

- ◆ Hit **ESC** to return to the menu.

**Submenu,
diagnostics/
service**



Menu display - active icons

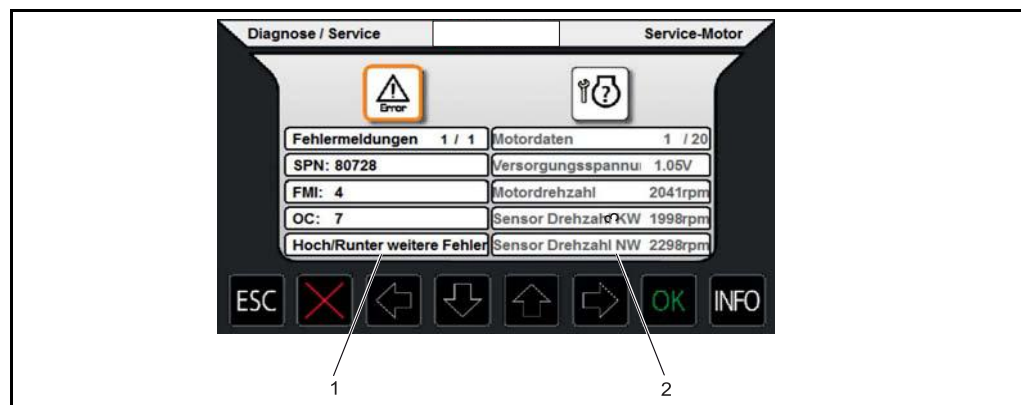


Fig. 5-30 Submenu, diagnostics/service of engine

- 1 Display - Current errors in selected sensor
- 2 Display - Sensor service data



Notice

Error messages and engine data are displayed in the menu in either German or English.

- ◆ Click the 'right' or 'left' arrows to activate the error or service data
- ◆ Click the 'up' or 'down' arrows to read the error messages and service data.
- ◆ Hit **ESC** to go back to the 'diagnostics/service' menu.

No.	Engine data	Units	No.	Engine data	Units
1	Supply voltage	V	11	Coolant level	%
2	Engine speed	rpm	12	Air filter warning	kPa
3	RPM sensor KW	rpm	13	Idling switch	OFF
4	RPM sensor NW	rpm	14	Foot throttle	%
5	Fuel pressure	kPa	15	Manual throttle	%
6	Fuel pressure rail	MPa	16	Preheating system	OFF
7	Engine oil pressure	kPa	17	Fuel contains water	OFF
8	Engine torque	%	18	Override switch	OFF
9	Starter motor	OFF	19	Fuel consumption	L/h
10	Coolant Temperature	°C	20	Operating hours	h

→ The units displayed are examples

5 Description

Submenu,
diagnostics/
service



Menu display - active icons

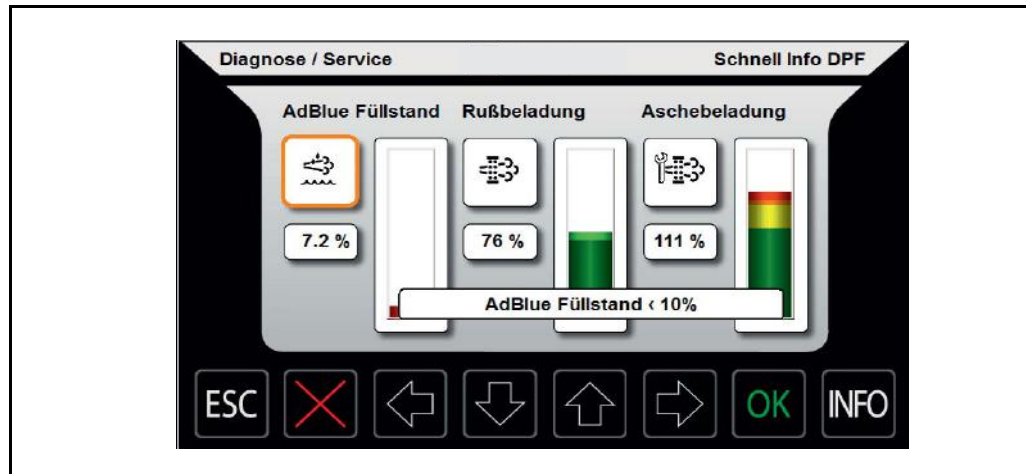


Fig. 5-31 Submenu, diagnostics/diesel particle filter quick information

This submenu shows the diesel particle filter's soot load.

- ◆ Press the **INFO** button to display the levels of restriction conditions.
- ◆ Use the 'right' and 'left' arrows to select the restriction condition.
- ◆ Press **ESC** to return to the main menu.

Submenu,
display basic
settings



Activate by selecting menu



Fig. 5-32 Submenu, display basic settings

Sym- bol	Description	Sym- bol	Description
	Set units		Set language
	Set date		Set time
	Set brightness		Set day - night
	Enable/disable immobilizer (optional)		Change owner PIN (optional)
	Change driver PIN (optional) Immobilizer (optional)		Change transport PIN (optional)
	Set immobilizer activation time (optional)		Reset day trip counter

Tab. 5-13 Pictograms display basic settings

5 Description

Units



Activate by selecting menu



Fig. 5-33 Set units

- ◆ Use the 'up' and 'down' arrows to select the desired units to display and select **OK** to confirm.

- Metric units: °C - km/h - liter - 24h - DMY
- British units: °F - mph - gal (UK) - 24h - DMY
- British and American units: °F - mph - gal (US) - 24 - MDY

Language



Activate by selecting menu



Fig. 5-34 Set language

- ◆ Use the 'up' and 'down' arrows to select the desire language and confirm by selecting **OK**.

Available languages:

- | | | |
|--------------------|-----------|--------------|
| • American English | • Dutch | • Danish |
| • German | • English | • French |
| • Italian | • Polish | • Portuguese |
| • Russian | • Swedish | • Spanish |

5 Description

Time and date



Activate via menu display



Fig. 5-35 Setting the time and date

- ◆ Use the right and left arrows to set the desired value and confirm by selecting **OK**.
- ◆ Use the up and down arrows to change the value and confirm by selecting **OK**.

Display brightness



Activate via menu display

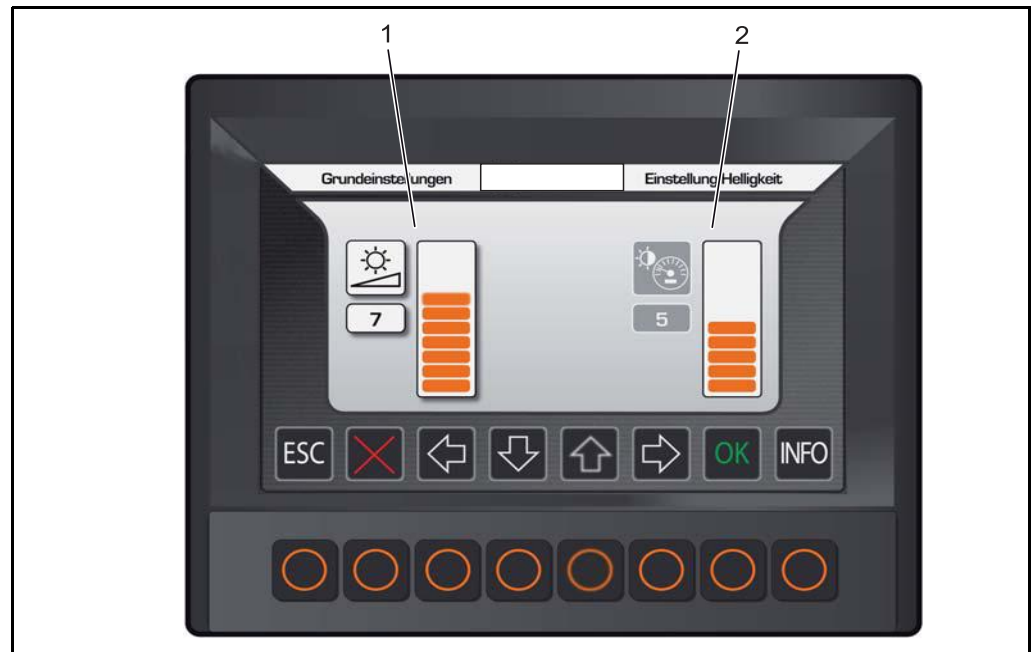


Fig. 5-36 Set brightness

- 1 Display brightness
- 2 Menu - set day or night

- ◆ First select the field you would like to change with the cursor and then use the 'up' and 'down' arrows to change the value, which changes the bar chart, confirm by selecting **OK**.

Brightness

Alternative day/night

- Set display brightness (1)
- When the sidelights are turned on (terminal 58), the brightness of the display and menu buttons is reduced by around 30%.
- You can also set the brightness and contrast manually in the 'day/night' menu (2).

Here, you can change the display brightness, which is affected by daylight (dimming).

5 Description

Activate/
deactivate the
immobilizer
after
authorizing
(optional)

Activate via menu display

	Immobilizer		Owner		Driver
	Carrier		Activation time		

Change owner
PIN after
authorizing



Once activated by menu display:



Fig. 5-37 Change owner PIN after authorizing

Notice



The owner PIN has the highest access clearance. This lets you manage the immobilizer.

The owner can activate/deactivate the immobilizer and also change the driver or transport PINs.

- ◆ After pressing **OK**, the owner PIN is requested in a submenu.
- ◆ If the correct PIN has been input, the user can change the owner PIN.

Notice



The first digit may **not** be 0 (zero).

- ◆ After pressing **OK** the new PIN is checked for compliance and either accepted or rejected.
- Same as authorization process.

Change the driver PIN after authorization



Once activated by menu display:



Fig. 5-38 Change the driver PIN after authorization

- ◆ After pressing **OK**, the owner PIN is requested in a submenu.
- ◆ If the correct PIN has been input, the user can change the owner PIN.



Notice

The first digit may **not** be 0 (zero).

- ◆ After pressing **OK** the new PIN is checked for compliance and either accepted or rejected.

→ Same as authorization process.

5 Description

Changing transport PIN after authorization



Once activated by menu display:

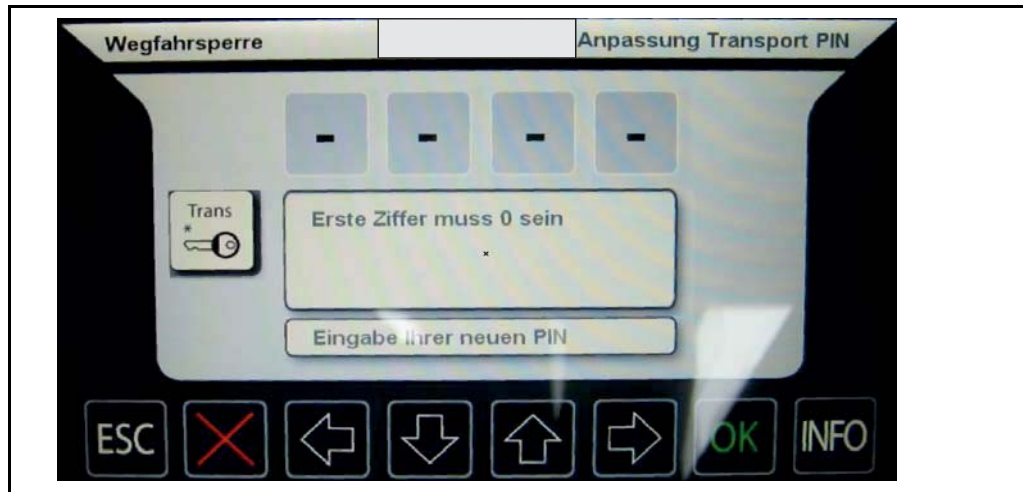


Fig. 5-39 Changing transport PIN after authorization

- ◆ After pressing **OK**, the owner PIN is requested in a submenu.
- ◆ If the correct PIN has been input, the user can change the owner PIN.

Notice



The first digit must be 0 (zero).

- ◆ After pressing **OK** the new PIN is checked for compliance and either accepted or rejected.

Notice



The transport PIN is now valid for starting the engine five times. Thereafter, the owner can choose to authorize another five engine starts.

→ Same as authorization process.

Changing activation time after authorization



Once activated by menu display:



Fig. 5-40 Changing activation time after authorization

- ◆ Use the up and down arrows to change the activation time of the immobilizer to between 0 and 60 minutes, which changes the bar in the chart.
- ◆ Press **OK** to confirm the selected activation time.

5 Description

**Immobilizer
with
transponder
key (blue)**



Activate immobilizer (option)



Notice

The immobilizer is self-activating; i.e. there is no need for any additional activation or other kind of action.
If the mechanical start switch is in position "0" (terminal 15 off), the immobilizer is generally activated.

- ◆ Set the start switch key to position "0".
- *The immobilizer is automatically activated after 5 seconds.*
- *The immobilizer becomes and remains activated even if the key remains inserted in position "0".*

Deactivating the immobilizer



Notice

The immobilizer is deactivated if a valid mechanical key and a valid electronic key (transponder) are present.

- ◆ Set the start switch key to position "1".
- *The transponder is not read until the mechanical key in the start switch has activated terminal 15. This means that the mechanical locking system has to be opened before the electronic key is checked. This makes it impossible to tamper with the immobilizer when the ignition is off.*

Setting up a new key

A new key is taught in with a master key that is identified with a red key pommel.
The master key must be stored carefully; only one master key is available for each immobilizer.

This master key can only be used to set up new keys; it cannot be used to deactivate the immobilizer. This prevents the master key from being used to operate the vehicle.

- ◆ Insert the master key into the ignition lock.
- ◆ Set the master key to position "1" (terminal 15 on) for max. of 5 seconds.
- ◆ Set the master key to position "0" (terminal 15 off).
- ◆ Pull out the master key.
- *The immobilizer system expects the new key to be inserted within 15 seconds.*
- ◆ Insert the new key into the ignition lock.
- ◆ Turn the key to position "1".
- *The key is registered as a valid key.*

If no key is recognized within 15 seconds, the new-key procedure ends automatically.

Setting up multiple new keys

- ◆ Insert the new keys into the ignition lock one after the other.
- ◆ Turn the key to position "1".
- ◆ Leave the individual keys in position "1" for at least 1 second.

Up to 10 keys can be set up.

With this technique, it is possible to add one key for several immobilizers, such as for a general fleet key.



Notice

This function is only available if the control unit relay is additionally connected to terminal 30.

Delete new keys

Deleting keys is necessary if the key has been lost.

5 Description

All keys are cleared during the deletion process. After clearing, all available keys can be set up again.

- ◆ Insert the master key into the ignition lock.
- ◆ Set the master key to position “1” (terminal 15 on) for minimum 20 seconds.
- ◆ All keys are cleared and all available keys can be set up again.
- ◆ The master key code is not deleted during the clearing process.



Notice

This function is only available if the control unit relay is additionally connected to terminal 30.

Security functions

If more than 5 keys are activated in the ignition lock within 1 minute with different invalid codes, the immobilizer remains active for 15 minutes and accepts no valid keys during this time.

This procedure prevents the “testing” of different keys so that the correct key cannot be identified through trial and error.

If different invalid keys are detected without the ignition lock being brought to position “0”, the immobilizer remains activated for 15 minutes and accepts no valid keys.

Valid keys are only accepted once the 15 minutes have elapsed and the start switch is detected in the “0” position. This prevents the key from being tested without the mechanical ignition lock being activated, e.g. by forcing the ignition lock into position “1”.

Malfunctioning

Information about malfunctions: See chapter 10.3.2 “Immobilizer Malfunctions”.

Reset day trip counter



Once activated by menu display:



Fig. 5-41 Reset day trip counter

- ◆ Press **OK** is activate the icon and reset the day trip counter.
- ◆ After confirming the MCU (icon lights up briefly), the icon becomes inactive again.

5 Description

Overload warning system



If the 'overload warning system' on the keypad is activated, the standard display changes as follows:



Fig. 5-42 Display when overload warning is active

- ◆ When the 'overload warning system' is on, the rev counter is switched to overload warning.

Notice



Display is central when the overload warning function is on

6 Maintenance



Notice

Strictly observe all safety notes.

See chapter 3.21 “Changing work attachments, maintenance, and repairs”.

6.1 General

The operating condition and life expectancy of machines are highly dependent on care and maintenance.

For this reason, it is in every machine owner's interest to perform the specified maintenance work and comply with the maintenance intervals. This chapter deals in detail with periodic maintenance, inspection, and lubricating tasks.

The type-specific maintenance and inspection plan lists all work to be performed on the machine at regular intervals. The relevant maintenance and inspection plans can be found in each set of operating instructions.

If there is evidence to show that the intervals have not been observed, this may restrict the scope of the warranty. See chapter 6.3.2 “Warranty”.

Only open the engine hood once the engine is switched off.

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Maintenance

6.2 Care and cleaning

⚠ WARNING	
	<p>Danger of small components spraying outwards Materials may spray out and get in your eyes. Risk of serious injury.</p> <p>▷ Wear personal protective equipment (helmet and full face protection).</p>

⚠ CAUTION	
	<p>Environmentally hazardous substances Environmental damage caused by environmentally hazardous substances.</p> <p>▷ Do not allow waste oil to seep into the ground. ▷ Always place a receptacle for the collection of waste oil under the working area (when draining oil or removing the filter element). ▷ Collect the waste oil and dispose of it according to regulations!</p>

Due to varying working conditions, the vehicle should also be cleaned if it becomes dirty.

- ◆ Neither a steam-jet appliance nor a high-pressure cleaning apparatus may be used for cleaning during the first two months after the machine has been used for the first time, or when newly painted, to ensure that the paint can harden sufficiently.
- ◆ For cleaning, stop the engine and turn off the battery isolator switch.
- ◆ Always wear a helmet with full face protection and suitable protective clothing when working with high-pressure cleaning devices.
- ◆ For cleaning purposes, park the machine on a washing area equipped with an oil separator.
- ◆ Place the loading equipment flat on the ground.
- ◆ Secure the loading equipment to prevent it moving.
- ◆ Put the machine into the parking position. Uppercarriage in the driving position.
- ◆ Do not use aggressive detergents to clean the machine. We recommend using commercially available cleaning agents for passenger cars.
- ◆ Clean the machine from the ground up with suitable cleaning tools (e.g., high-pressure cleaning device, telescopic scraper for glass).
- ◆ For cleaning purposes, park the machine on a washing area equipped with an oil separator.

- ◆ When cleaning with a steam-jet appliance, the hot water jet should not exceed 80 °C and a spray pressure of 70 bar. Stand clear by at least 1 m.
- ◆ Keep any third parties clear of the machine's danger zone.
- ◆ Linings (insulating materials, etc.) should not be exposed directly to water, steam or high-pressure jets.
- ◆ When cleaning with water or steam jets, do not direct the jet into exhaust and air filter openings.
- ◆ When cleaning the engine with water or steam jet, do not expose sensitive engine parts, such as generator, wiring, oil pressure switches, etc. directly to the jet.
- ◆ When cleaning, ensure that no components are damaged (e.g., bent radiator grilles).
- ◆ Cover any electrical/electronic components and connectors when cleaning the engine.
- ◆ Clean any mud, snow or ice from the machine.
- ◆ After wet cleaning, always lubricate the machine as specified in the lubrication plan and check all operating cycles and support and travel functions.
- ◆ Only clean the engine compartment when the engine is cool and do not let the high-pressure jet clean electrical components directly.
- ◆ Cold-cleaning the engine: Spray cold-cleaning agent on the engine and let it work for 10 minutes. Then spray the engine clean with a strong water jet.
- ◆ Finally, turn on the engine to let the heat evaporate any remaining water.
- ◆ Finally, clean the washing area.
- ◆ The operator is responsible for managing the cleaning area and ensuring that any waste water is disposed of in an environmentally friendly way.

6

Maintenance

6.3 Inspection intervals



Notice

The reading from the operating hour meter in the dashboard is decisive for the inspection intervals of the machine. See chapter 5.3.2 "Control panel".

Interval	Description	Page
Initial Inspection	Once before starting up for the first time	124
Daily tasks	Every 10 operating hours or every shift ¹⁾	125
Weekly tasks	Weekly or after 50 operating hours ¹⁾	127
100 operating hours	Once after first commissioning ²⁾	128
Every 500 operating hours	After every 500 operating hours	128
Every 1000 operating hours	After every 1000 operating hours	128
Every 2000 operating hours	After every 2000 operating hours	128
¹⁾ The first date always applies. ²⁾ Also applicable if new or overhauled engines are put into operation.		

Tab. 6-1 Inspection intervals

6.3.1 Regular oil analyses

Oil analyses are not intended as a substitute for the oil change intervals but – apart from helping to achieve a possible reduction in maintenance costs and acting as a form of preventive maintenance – they also take into account increasing environmental awareness.

Advantages of an oil analysis

- Extension of the oil change intervals under standard or light-duty operating conditions.
- Minimum wear on high-quality components with optimum use of the lubricants.
- Periodic laboratory analyses enable an early detection of imminent damage.
- Repairs performed before they actually become absolutely necessary help prevent serious and unexpected damage.
- Resulting damage will also be prevented.

Oil analysis intervals

Regular oil analysis will indicate any developing trends regarding the state of the oil and the machine.

Based on the results, the laboratory recommends the interval for the next sampling.

6.3.2 Warranty

During the warranty period, thorough inspections are stipulated for the machine. These are obligatory and must be carried out by trained specialist dealer personnel.

The engine inspections specified by the manufacturer must also be performed.



Notice

The inspections are obligatory and subject to a charge. Performance of the obligatory inspections as specified must be confirmed on the inspection cards in the warranty and handing-over certificate. Failure to do so may adversely affect our warranty coverage.

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Maintenance

6.4 Inspection material

6.4.1 Fuels, lubricants, and coolants

CAUTION	
	Risk posed by inferior oil mixtures Potential damage to machine. <ul style="list-style-type: none"> Do not mix biodegradable oils from different manufacturers. When changing from mineral to bio-degradable hydraulic oils, the tank and system must be completely drained, cleaned, and flushed several times. <p>Before changing the oil, please ask your Yanmar dealer for further details.</p>
CAUTION	
	Risk posed by incorrect coolant/mixture ratio Potential damage to machine. <ul style="list-style-type: none"> See the information on the cooling system given in the engine manufacturer's operating and maintenance manual.

Fuel specification

The use of high-quality fuel is a prerequisite for achieving the engine output specified.

	Notice Fuel with a sulfur content <15ppm (ultra-low-sulfur diesel (ULSD)) must always be used.
--	--

Recommended fuel specification

- Use diesel fuel with a sulfur content of less than 15ppm (ultra-low-sulfur diesel (ULSD)). Comply with standards.
- EN 590
- ASTM D975 1-D, 2-D, S15
- JIS K2204 Grade 2

	Notice Follow the engine manufacturer's instructions for the fuel specifications.
--	---

Lubrication oil specification

The use of high-quality lubrication oil and compliance with the prescribed replacement intervals are prerequisites for achieving the specified engine power.



Notice

Only use lubrication oils recommended by the engine manufacturer. In the case of engines with after-treatment system for exhaust gases, only lube oils labeled “low-ash” (LA) may be used.

6 Maintenance

Application	Designation	Specification, standards, quality	Remark
Shutdown	Diesel fuel	EN 590 (sulfur content < 10 mg/kg) ASTM D975 1-D S15 ASTM D975 2-D S15 (sulfur content < 15 mg/kg)	See also engine manufacturer's operating instructions
Engine	DEF, AdBlue®	Carbamide solution 32.5% DIN70070/ISO22241-1/ ASTM D 7821	See also engine manufacturer's operating instructions Do not dilute the carbamide solution with water or use a solution with a carbamide concentration of lower than 31.8 percent by weight.
Shutdown	Engine oil	DQC III LA DQC IV LA	See also engine manufacturer's operating instructions
Engine cooling system	Coolant	Antifreeze based on ethylene glycol	See also engine manufacturer's operating instructions
Hydraulics	Hydraulic oil or multi-grade engine oil	HVLP 46 or SAE 10W-40	The following viscosity limit values must be observed (according to ASTM 445): at 100 °C min 8 mm ² /s (cSt) at -10 °C approx. 1500 mm ² /s (cSt)
	Biodegradable hydraulic oil based on synthetic ester	Filling according to customer specifications. Brand label on machine. Do not mix biodegradable oils from different manufacturers.	The same viscosity values apply as for mineral hydraulic oils. When changing from mineral to biodegradable hydraulic oils, the tank and system must be completely drained, cleaned and flushed. Before changing, please ask your Yanmar dealer for further details.
Axles, Gearbox unit	Transmission oil	SAE 85W-90LS API-GL 5	Alternative recommendations SAE 90LS
Lubricating points	Multi-purpose, lithium soap-based grease	K2K-30 DIN 51825	

Tab. 6-2 Fuels, lubricants and coolants

Alternative recommendation for other temperature ranges

Engine oil,
hydraulic oil

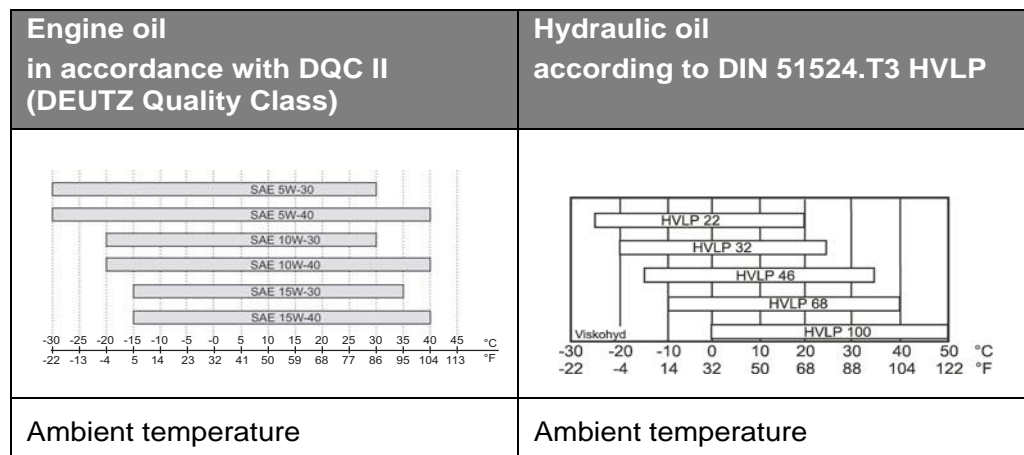


Fig. 6-1 Engine oil and hydraulic oil

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Maintenance

Fill quantities


Notice

When using other oils, consult Yanmar customer service.

Filling location		in litres	Medium
Fuel tank	circa	160.0	Diesel
Engine oil (change amount)	circa	8.0	HD-oil
Hydraulic oil, tank and system	circa	175.0	Hydraulic oil
Hydraulic oil tank (change amount)	circa	110.0	Hydraulic oil
Steering front axle, B95W, B95W AL center housing	circa	7.4	Gear oil
Steering front axle, B95W S center housing	circa	6.5	Gear oil
Steering front axle, B95W, B95W AL transmission	circa	0.9	Gear oil
Steering front axle, B95W S transmission, switchable	circa	1.9	Gear oil
Steering front axle, B95W, B95W AL, B95W S, wheel hub	circa	0.5	Gear oil
Rear axle, B95W, B95W S center housing	circa	8.0	Gear oil
Left rear axle, B95W AL middlehousing	circa	7.0	Gear oil
Rear axle B95W, B95W S wheel hub	circa	2.2	Gear oil
Steering rear axle, B95W AL wheel hub	circa	0.5	Gear oil
Slewing transmission	Circular lubrication through hydraulic system		
Service brake	Supply by hydraulic system		
Engine coolant	circa	15.0	Water with anti-corrosion agent and antifreeze
AdBlue® tank	circa	10.0	AdBlue®

Tab. 6-3 Fill quantities


Notice

All values stated are approximate. The level marking is always the decisive factor. See chapter 5.3.2 "Control panel".


Notice

Topping up AdBlue® and minimum top-up amount. See chapter 6.7.7 "AdBlue® system".

6.5 Lubrication

CAUTION	
	<p>Risk posed by dirt Dirt in the lubrication system may damage the machine.</p> <p>▷ Replace defective grease nipples immediately and check if grease passes through!</p>



Notice

The intervals stated apply for single-shift operation. In case of special operating conditions, e.g., when working on sandy soil, the lubrication intervals should be shortened, in order to achieve self-cleaning of bearing points.

Lubricant

The machine's life expectancy and operating condition are highly dependent on use of the specified lubricants and compliance with the maintenance intervals.

If lubricants which do not conform to our recommendations are used, consequential damage may occur for which we will not assume liability, even within the warranty period.



Notice

Lubricate all lubricating points with multi-purpose grease. Grease specification: See chapter 6.4.1 "Fuels, lubricants, and coolants".

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Maintenance

6.5.1 Lubrication schedule

Overview of lubricating points

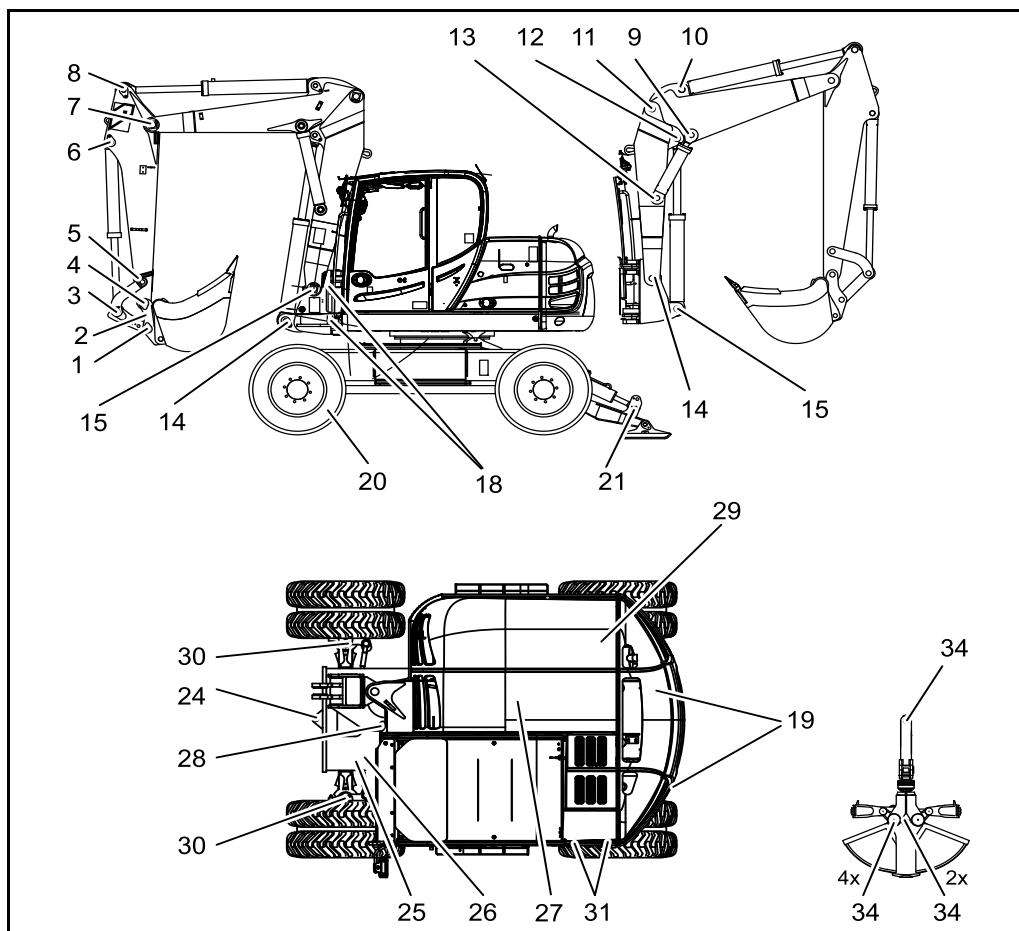


Fig. 6-2 Lubrication schedule

Grease all lubricating points with multi-purpose grease

⚠ WARNING	
	<p>Danger due to heavy load</p> <p>Machine parts may move unexpectedly.</p> <p>Risk of serious injuries with fatal consequences.</p> <p>➤ To lubricate the quick-attach system: Place the dipper on the ground, open the quick-attach system (the pins must be fully retracted), and apply lubricant. Then close the quick-attach system.</p>

⚠ WARNING	
	<p>Danger of slipping</p> <p>Floor may be slippery due to oil spillage</p> <p>▷ Finally, clean any oil from the floor.</p>

The intervals stated are valid for single-shift operation.

Loc.	Lubricating point	Quantity	Every day	Weekly	Page
1	Bucket rod - Quick-attach system	1		X	--
2	Quick-attach system	1		X	--
3	Bucket cylinder - bucket rod - tilt lever	3		X	--
4	Dipperstick - Quick-attach system	1		X	--
5	Dipperstick - tilt lever	1		X	--
6	Bucket cylinder - dipperstick	1		X	--
7	Intermediate boom - dipperstick	1		X	--
8	Dipperstick cylinder - dipperstick	1		X	--
9	Intermediate boom cylinder - intermediate boom	2		X	--
10	Dipperstick cylinder - intermediate boom	1		X	--
11	Intermediate boom - boom	1		X	--
12	Boom cylinder- boom	1		X	--
13	Intermediate boom cylinder - boom	2		X	--
14	Slewing column - boom	1		X	--
15	Boom cylinder - slewing column	1		X	--
18	Uppercarriage - Slewing column	2		X	--
19	Support leg - undercarriage	2		X	--
20	Support cylinder - undercarriage	2		X	--
21	Support cylinder - support leg	2		X	--
22	Support leg – rear support blades/pads	2		X	--
24	Pendulum bearing rear/front for front axle	2		X	--
25	Slewing ring – bearing races	1		X	188
26	Slewing ring – toothing	1		X	188
27	Articulated cylinder – uppercarriage (center wall at slewing column)	1		X	--
28	Articulated cylinder – slewing column	1		X	--
29	Hood hinges	2		X	--
30	Steering housing each	2		X	--
31	Hinges for maintenance cover/maintenance ladder	2		X	--
	Special equipment				
34	Clamshell grabs	11	X		--
35	Slew bucket	2	X		--
36	Hydraulic cylinders of swing bucket	2	X		--

Tab. 6-4 Lubrication schedule

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Maintenance

6.6 Checking, maintenance and inspection plan

The inspection plan lists all work that needs to be carried out on the machine at regular intervals.

Work to be carried out by trained dealer service personnel.

6.6.1 Initial inspection (delivery inspection)

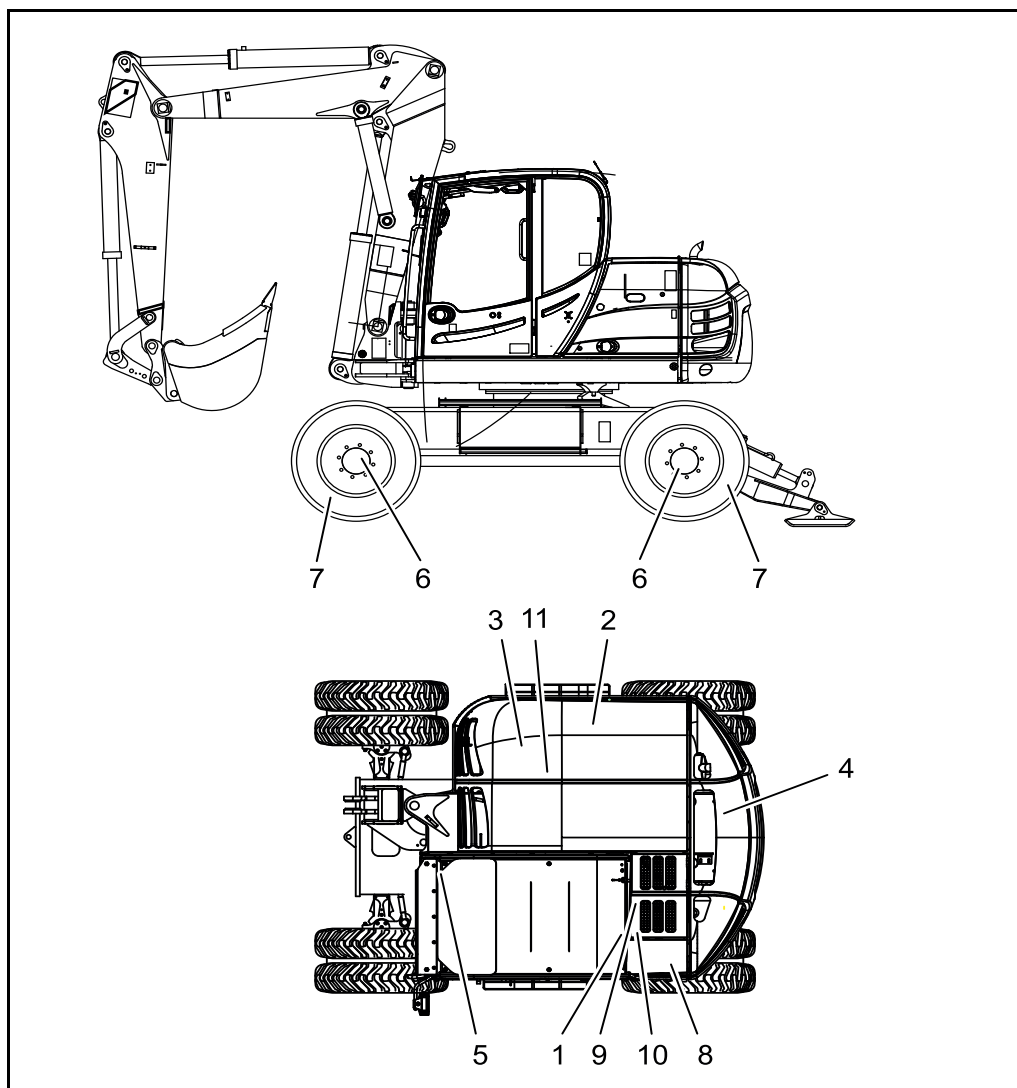


Fig. 6-3 Initial Inspection

Work to be carried out by trained dealer service personnel:

Pos.	Inspection	Page
1	Check machine for presence of machine-specific operating instructions	--
2	Check engine oil level	134
3	Check the coolant level	137
4	Checking the hydraulic oil level	166
5	Check the fuel level	148
6	Check the oil level in the axles	175
7	Check pressure and condition of tires Check the tightness of wheel nuts	182
8	Check the battery fluid level and charge condition Check battery and cable connectors and fit if necessary	187
9	Top up windshield washer system	200
10	Check AdBlue® level	162
11	Check v-ribbed belt tension	159
12	Check all hose connectors and brackets for correct fit	--
13	Check engine mounting	--
14	Ensure that authorized personnel check the engine monitoring/warning system	--
15	Remove any transport equipment from the vicinity	--
16	Remove the engine's corrosion protection	--
17	Perform a test run	
18	Lubricate the machine (all lubricating points)	122
19	Perform a test run, a functional test of the hydraulic system and a test job	--
20	Visual inspection of all hoses, pipes, cylinders, etc. for leak tightness	--
21	Check function of electrical indicating and warning elements, as well as the lighting	--
22	Fill in the warranty/hand-over card correctly and send it back to Yanmar	115

Tab. 6-5 Initial Inspection

6 Maintenance

6.6.2 Daily and weekly tasks

Inspection and maintenance work to be performed by operating personnel

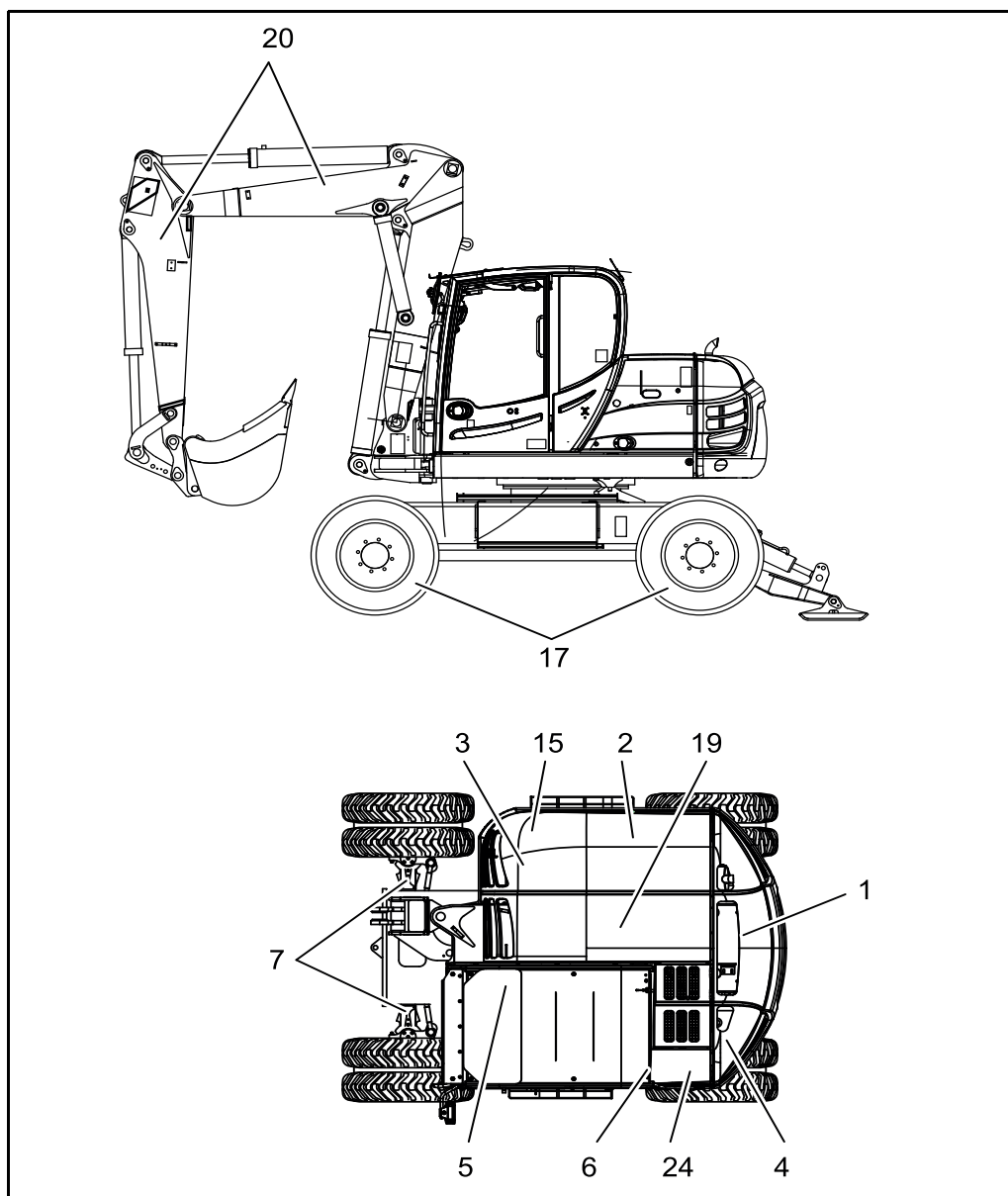


Fig. 6-4 Inspection and maintenance plan for daily and weekly tasks

Daily tasks

Pos.	Inspection	Page
1	Check hydraulic oil level	167
2	Check engine oil level	134
3	Check coolant level	137
4	Check fuel pre-filter for the accumulation of water, drain if necessary	158
5	Check the fuel level (fuel gauge on operator control panel) Check AdBlue® level	148
6	Check windshield washer fluid level	200
7	Visual inspection (general), e.g. for material cracks, external damage, loosened parts, completeness, etc.	--
8	Check for leaks in pipes, hoses, control unit, hydraulic pumps, cylinders, etc. The screw-in couplings must be locked when tightening hose or line connectors to prevent them from turning	--
9	Check function of electrical indicating and warning elements as well as the lighting system	187
10	Check all controls are working properly and adjust as necessary	--
11	Lubricate the machine according to the lubricating chart	122
12	Check electrics	--

Tab. 6-6 Daily tasks

Tasks to be carried out on a weekly basis

Pos.	Inspection	Page
15	Clean cooling fins of the combination cooler In case of visible dust, shorten the cleaning intervals	137
16	Check correct function of door latches	--
17	Check tire pressure and wheel nuts	182
18	Check fastening of axles and propeller shaft	175
19	Check mounting of slewing drive (hydraulic motor and transmission)	--
20	Check the bushings and pins of the work equipment	--
21	Check hydraulic axle locking	173
22	Check correct function of pneumatic springs of service covers and front windshield	--
23	Check function, condition and completeness of safety equipment	--
24	Check "working hydraulics shut-off via maintenance cover" function	--
25	Lubricate the machine according to the lubricating chart	122

Tab. 6-7 Tasks to be performed weekly

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Maintenance

6.6.3 Inspection plan

Notice



Perform all inspection work at operating temperature of the machine.

If the prescribed diesel fuel and engine oil are used, the following intervals apply.

Work to be carried out by trained dealer service personnel

No.	Inspection o = Check, maintenance x = Replace	Hours in operation						Page
		After 100	every 500	every 1000	every 3000	at least 2 x year	at least 1 x year	
1	Check machine for presence of machine-specific operating instructions	o	o					--
2	Changing engine oil		x ¹⁾²⁾				x	135
3	Change the engine oil filter.		x ¹⁾²⁾				x	136
4	Fuel pre-filter – empty the water collection tank. <i>If warning system starts, empty immediately.</i>		o				x	154
5	Replace the fuel pre-filter			x			x	154
6	Changing the fuel filter			x			x	156
7	Drain water from fuel tank.	o	o			o		158
8	Check suction pipes for damage <i>(if damaged, replace)</i>	o	o					143
9	Replace air filter main cartridge	according to the maintenance indicator					x	145
10	Replace air filter safety cartridge	as required ¹⁾⁶⁾						146
11	Clean cooling fins of the cooler In case of visible dust, shorten the cleaning intervals	o	o			o		139
12	Checking antifreeze level in coolant		o				o	138
13	Replace coolant	as required ⁶⁾						140
14	Check / replace belts alternator and tensioning roller			o	x			159
15	Check V-belt, replace if necessary <i>(only applies to AC option)</i>		o	x				--
16	Tighten engine mounting <i>(if required), (replace if damaged)</i>			o				--

No.	Inspection o = Check, maintenance x = Replace	Hours in operation						Page
		After 100	every 500	every 1000	every 3000	at least 2 x year	at least 1 x year	
17	Mounting parts, hose connectors / brackets (replace if damaged)			o				--
18	Engine speed - check upper and lower idle speeds	o	o					
19	Replace filter of the AdBlue® feed pump		x ⁶⁾					
20	Check pump attachment	o	o					--
21	Check acid level and battery connections	o	o					196
22	Replace the dust filter for cab ventilation		x				x	199
23	Check condition of tires, tire pressure and fastening of wheel nuts	o	o					182
24	Check fastening of axles and propeller shaft	o	o					--
25	Check bushings and pins of working equipment and replace if necessary	o	o					--
26	Check that door latches function perfectly, and replace if necessary	o	o					--
27	Check electrical indicating and warning elements as well as the lighting system	o	o					--
28	Check all controls are working properly and adjust as necessary	o	o					--
29	Check function of hydraulic axle locking and bleed plunger cylinders	o	o					173
30	Check the function of the steering.	o	o					--
31	Check function and condition of supports	o	o					--
32	Check hose-rupture safety valves of supports	o	o					174

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Maintenance

No.	Inspection o = Check, maintenance x = Replace	Hours in operation						Page
		After 100	every 500	every 1000	every 3000	at least 2 x year	at least 1 x year	
33	Check tightness of all pipes, hoses, control valves, hydraulic pumps, cylinders, etc. The screw-in couplings must be locked when tightening hose or line connectors to prevent them from turning	o	o					--
34	Check or change hydraulic oil	o	o	x 4)6)				166
35	Replace insert of hydraulic oil return suction filter	x	according to the maintenance indicator				x	171
36	Replace ventilation filter			x			x	199
37	Check that the slewing ring fastening screws are seated securely	o	o					188
38	Check that the swing-gear attachment (hydraulic motor and transmission) is secure	o	o					188
39	Check slew gear brake functioning	o	o					
40	Check function of brakes and brake disc play	o	o					183
41	Differential – rear axle oil: check or oil change resp.	x		x			x	177
42	Differential – front axle oil: check or oil change resp.	x		x			x	177
43	Transmission on front axle; check or change oil	x		x			x	179
44	Wheel hubs of front and rear axles; oil check or oil change	x		x			x	180
45	Lubricate the machine according to the lubricating chart	o	o					122
46	Check function, condition and completeness of safety equipment	o	o					--
47	Hydraulic function check with pressure test of functions	o	o					--



No.	Inspection o = Check, maintenance x = Replace	Hours in operation						Page
		After 100	every 500	every 1000	every 3000	at least 2 x year	at least 1 x year	
48	Test run and test work	o	o					--
49	Sign inspection card and return to manufacturer	o	o ⁵⁾					115
<p>1) Diesel engine: Depending on individual cases, the lubricating oil consumption may be too high. In this case and when the constant ambient temperature is below -10 °C or if the lubricant temperature is below 60 °C, the lubricant change interval should be halved.</p> <p>2) Diesel engine: Lubricating oil change interval specification, related to lubricating oil quality DQC III.</p> <p>3) Diesel engine: Complete overhaul after approx. 5000 operating hours. The optimal time for a complete overall is highly influenced by use, operating conditions of the environment and the care and maintenance the engine has received during its use. Your DEUTZ representative will advise you on when the best time for a complete overhaul might be.</p> <p>4) Extension of oil change intervals after an oil analysis and laboratory report. See chapter 6.3.1 "Regular oil analyses".</p> <p>5) Under warranty.</p> <p>6) At least every two years.</p>								


Tab. 6-8 Machine inspection plan

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Maintenance

6.7 Maintenance and inspection tasks

⚠ WARNING	
	Danger posed by dislodged parts Air cleaning with compressed air can dislodge parts and result in eye injuries. ▷ Wear personal protective equipment.
CAUTION	
	Environmentally hazardous substances Environmental damage caused by environmentally hazardous substances. ▷ Do not allow waste oil to seep into the ground. ▷ Always place a receptacle for the collection of waste oil under the working area (when draining oil or removing the filter element). ▷ Collect the waste oil and dispose of it according to regulations!

Notice
 All maintenance and inspection work must be performed acc. to the inspection plan.
 See chapter 6.6 “Checking, maintenance and inspection plan”.

6.7.1 Display

Notice
 All checks must be carried out with the machine standing on level ground and cooled down.

Checking the fluid levels

- ◆ Switch on the ignition



→ The “hydraulic oil level” symbol on the display flashes red when the minimum level is reached.



→ The “coolant level” symbol on the display flashes yellow when the minimum level is reached.

- ◆ If required, top up the missing fluid.

6.7.2 Engine

⚠ WARNING	
	<p>Danger posed by hot oil and machine parts</p> <p>Risk of burns.</p> <ul style="list-style-type: none"> ▷ Switch off the engine. ▷ Avoid skin contact with oil, grease, and hot machine parts. ▷ Wear personal protective equipment. ▷ No smoking, no open flames. ▷ In the event of injuries, seek medical attention.

CAUTION	
	<p>Danger posed by environmentally hazardous substances</p> <p>Waste oil can be discharged into the environment and cause considerable environmental damage.</p> <ul style="list-style-type: none"> ▷ Do not allow waste oil to seep into the ground. ▷ Always place a receptacle for the collection of waste oil under the working area (when draining oil or removing the filter element). ▷ Collect the waste oil and dispose of it according to regulations.

- Carefully clean around the components in question.
- Dry any wet spots using compressed air.
- When using lubrication oils, adhere to safety procedures and country-specific regulations.
- Dispose of any leaked lubrication oil and filter elements in accordance with regulations. Do not allow waste lubrication oil to seep into the ground.
- Carry out a test run after each maintenance task. When doing so, pay attention to the lubrication oil pressure and any leaks. Finally, check the engine oil level.
- Ensure that everything is spotless.



Notice

Pay attention to the information contained in the manufacturer's operating instructions!

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Maintenance

Check engine oil level

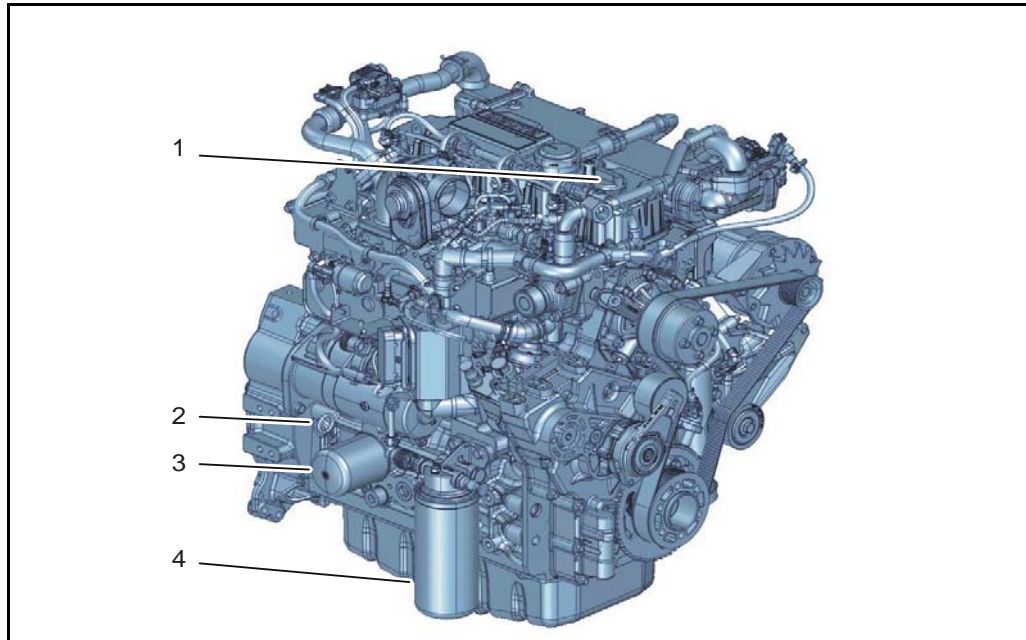


Fig. 6-5 Check engine oil level

- 1** Filler cap
- 2** Oil dip stick
- 3** Engine oil filter
- 4** Oil drain plug

- ◆ Check the oil level every day before starting, with the machine in a horizontal position.
- ◆ Clean the oil dipstick (2) and insert it as far as the stop.
→ *The notches on the oil dipstick (2) indicate the min. and max. oil levels.*
- ◆ Unscrew the sealing cover (1) and, if necessary, top up with engine oil from a clean vessel.
- ◆ Close the sealing cover.
- ◆ After adding engine oil, wait at least 5 minutes before checking the engine oil level again.

Changing engine oil

- ◆ Run the engine warm until the engine oil temperature reaches approx. 80 °C.
- ◆ Park the machine in horizontal position.
- ◆ Rotate the uppercarriage so that it is at an angle of 90° to the undercarriage.
- ◆ Shut down the engine.
- ◆ Place a suitable oil collecting vessel under the drain opening.
- ◆ Unscrew the oil drain plug (4).
- ◆ Screw an oil drain hose on to the oil drain plug (4).
- ◆ Drain the oil and catch it as it runs out.
- ◆ Remove the oil drain hose and screw the oil drain plug back on (4).
- ◆ Replace the engine oil filter (3).
- See chapter *“Changing engine oil filter”*.
- ◆ Fill in engine oil through the oil fill hole (1) until the oil level reaches the “MAX” mark on the dipstick (2).
- ◆ Start the engine and allow it to idle for approximately 2 minutes.
- ◆ Shut down the engine and let it cool down.
- ◆ Check the oil level and top up the oil if necessary.

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Changing engine oil filter

The engine oil filter must be replaced with every oil change.

CAUTION	
	<p>Danger of engine damage The engine system is very sensitive and can be damaged by dirt.</p> <p>▷ Prime the new filter with oil.</p>

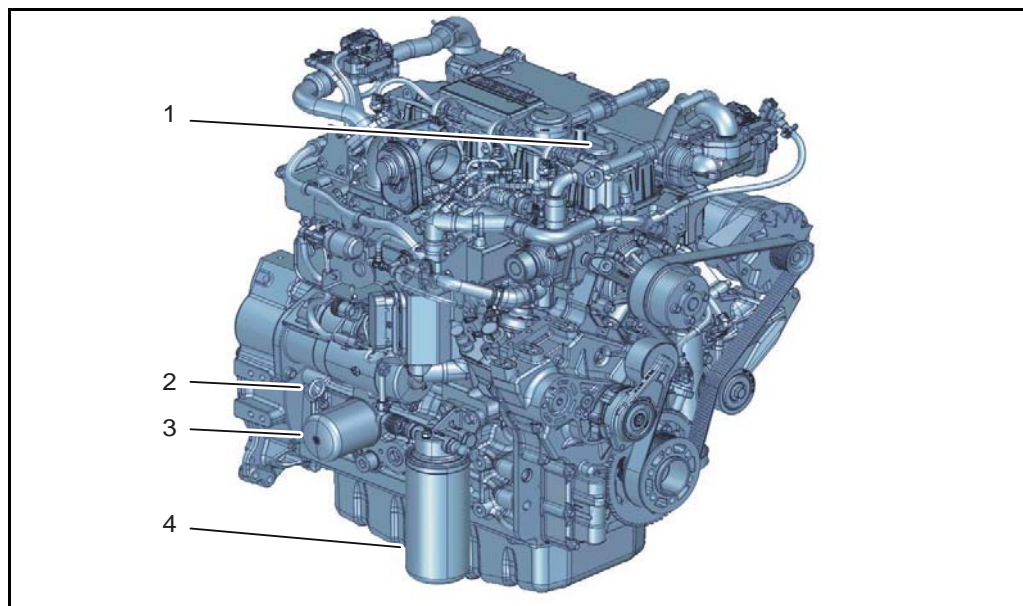


Fig. 6-6 Changing engine oil filter

- 1** Sealing cap
- 2** Oil dip stick
- 3** Engine oil filters
- 4** Oil drain plug

- ◆ Place a receptacle underneath the engine oil filter (3).
- ◆ Clean the outside of the engine oil filter.
- ◆ Unscrew the filter cartridge using a commercially available tool. Check if the fastening stud sits firmly in the filter head.
- ◆ Catch any lubricating oil that runs out.
- ◆ Clean the sealing surface of the filter holder with a clean lint-free cloth.
- ◆ Dispose of the filter cartridge according to regulations.
- ◆ Lightly oil the seal of the new filter cartridge.
- ◆ Screw the new filter on by hand until the seal is in place.
- ◆ Tighten the filter to a torque of approx. 10 - 12 Nm.
- ◆ Perform a test run.
- ◆ Check the engine oil filter cartridge for leaks.

6.7.3 Engine cooling system

- When using coolants, adhere to safety procedures and country-specific regulations.
- Dispose of any leaked coolant in accordance with regulations and do not let it seep into the ground.
- Never run the engine without coolant, not even for a short period.

Checking the coolant level and topping it up

⚠ WARNING	
	<p>Danger posed by hot coolant and machine parts</p> <p>Risk of burns.</p> <ul style="list-style-type: none"> ▷ Do not open the cooler cover until the engine has cooled down. ▷ Avoid skin contact with coolant and hot machine parts. ▷ Wear personal protective equipment. ▷ In the event of injuries, seek medical attention.

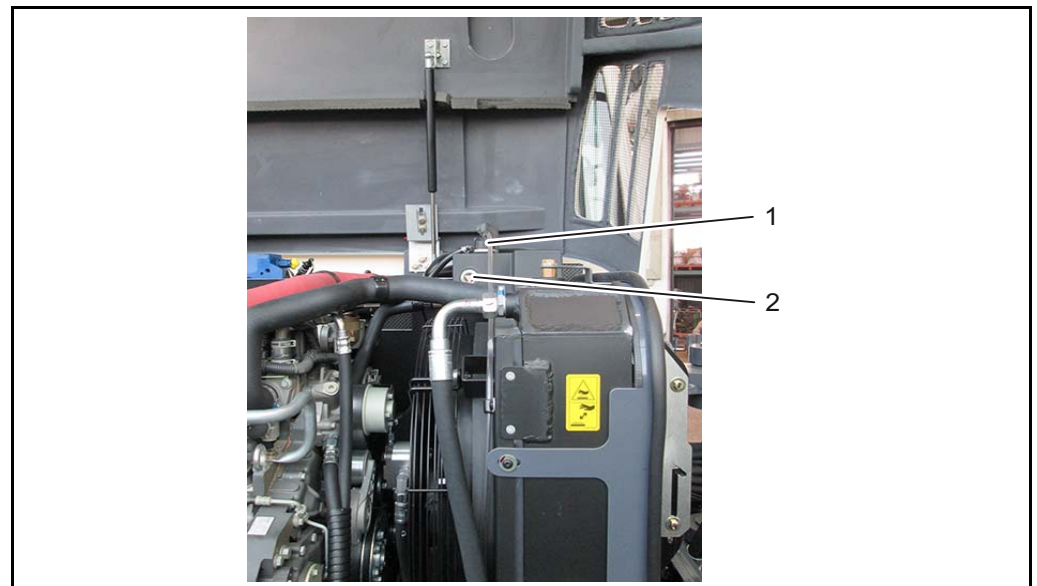


Fig. 6-7 Check coolant level

- 1** Cooler cover
- 2** Sight glass



Notice

Top up with a 50%-50% mixture of water and antifreeze. See chapter "Fill quantities".

6

Maintenance

- ◆ Remove the cooler cover (1) and top up the water level.
- ◆ Read coolant level on sight glass (2).
- *When the engine has cooled down, the fluid tank should be half full.*

Checking antifreeze

- ◆ Check the antifreeze setting before the beginning of the cold season.
- ◆ At the factory, the antifreeze protection is set to approx. -25 °C.
- *Adjust the antifreeze protection for lower temperatures, if required.*

Cleaning the cooling fins

CAUTION	
	<p>Risk of machine damage If the machine is cleaned while hot or while the engine is running, there is a risk of damage. Exposure to high pressure during cleaning can damage the cooler.</p> <ul style="list-style-type: none"> ▷ Only perform cleaning after stopping the engine and letting it cool down. ▷ Maintain an adequate distance during cleaning.
CAUTION	
	<p>Risk posed by overheating A dirty cooler can cause the engine/hydraulic system to overheat and result in serious damage to the machine.</p> <ul style="list-style-type: none"> ▷ Clean the cooler carefully.
⚠ WARNING	
	<p>Danger posed by dislodged parts Air cleaning with compressed air can dislodge parts and result in eye injuries.</p> <ul style="list-style-type: none"> ▷ Wear personal protective equipment.
⚠ WARNING	
	<p>Risk posed by hot / moving machine parts Machine parts may move while the machine is running. Fluids/machine parts may remain hot even after the machine has been parked. Danger of crushing and burns.</p> <ul style="list-style-type: none"> ▷ Only perform cleaning after stopping the engine and letting it cool down.

- ◆ Clean the combination cooler by blowing it out with compressed air from the air discharge side.
- ◆ If necessary, e. g. in if the cooler is contaminated with oil, clean it with cold cleansing agent or steam cleaning equipment.
- *For this work, park the machine on a washing area equipped with an oil separator.*
- ◆ After cleaning, run the engine until it reaches the operating temperature so that it can dry the water cooler.

Reversing fan (option)

- ◆ Use the reversing fan of the engine to remove any foliage or the like from the cooler.
- *See chapter "Submenu, fan control".*

6

Maintenance

Changing the coolant

⚠ WARNING	
	<p>Danger posed by hot coolant and machine parts</p> <p>Risk of burns.</p> <ul style="list-style-type: none"> ▷ Do not open the cooler cover until the engine has cooled down. ▷ Avoid skin contact with coolant and hot machine parts. ▷ Wear personal protective equipment. ▷ In the event of injuries, seek medical attention.

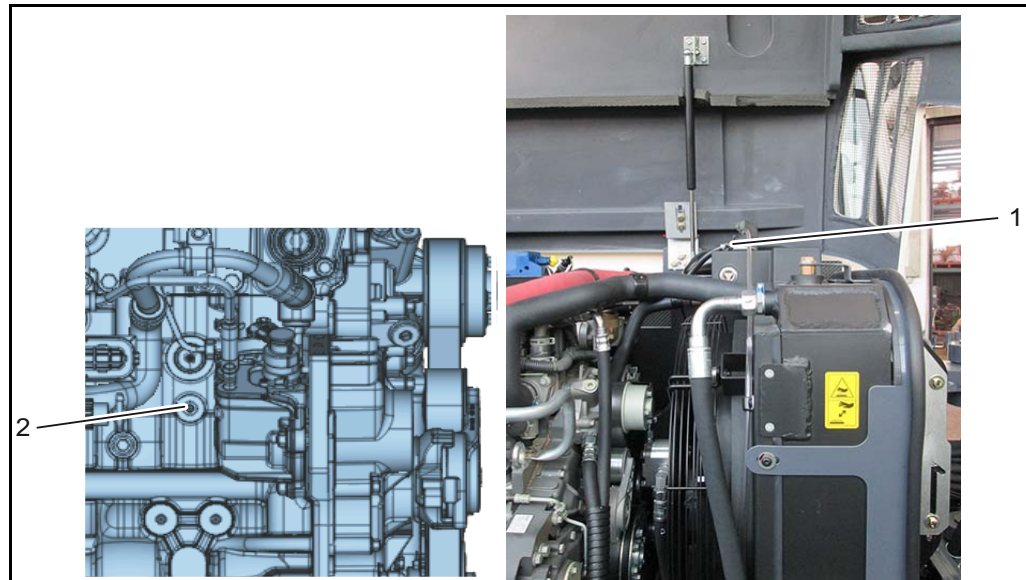


Fig. 6-8 Change the coolant

- 1** Cover
- 2** Drain plug

- ◆ Park the machine in a horizontal position.
- ◆ Shut down the engine and allow the cooling system to cool down.
- ◆ Place a collecting vessel under the cooler.
- ◆ Carefully unscrew the cover (1) from the water cooler until all pressure has been relieved from it.
- ◆ Remove the cover from the water cooler.
- ◆ Unscrew the water-drain plug (2) on the cylinder block and drain off the coolant.
- ◆ Open the drain tap on the radiator and drain the coolant.
- ◆ If necessary, flush the cooling system with clean water.
- ◆ Reinstall the drain taps on the engine using sealant.
- ◆ Reinstall the drain tap on the radiator.
- ◆ Fill the cooling system with coolant (See chapter 6.4.1 “Fuels, lubricants, and coolants”.) and close the cap.

- ◆ Turn on any heating system, to flush and ventilate the heating circuit.
- ◆ Start the engine and run it until operating temperature is reached.
- ◆ Shut down the engine and let it cool down.
- ◆ Check the coolant level and top it up (if necessary, several times).

6

Maintenance

6.7.4 Air intake system

CAUTION	
	<p>Danger posed by dust being drawn into the engine There is a risk of the engine taking in dirty air and sustaining serious damage.</p> <ul style="list-style-type: none"> ▷ All maintenance work on the air intake system must be carried out with the engine shut down. ▷ Do not start the engine after the filter cartridge has been removed. ▷ Only install filter cartridges that are in perfect condition. ▷ Only use brushes with synthetic or natural bristles. ▷ Ensure that everything is spotless. Close suction openings.



Fig. 6-9 Air filter maintenance

1 Filter element

Preparing machine for maintenance

- ◆ Position upper carriage out of travel direction approx. 75° to the right.
- ◆ Position the work attachment in line with the uppercarriage and lower it onto the ground.
- ◆ Shut down the engine.
- ◆ Open the engine hood.
- ◆ You can change the air filter cartridge (1) while standing on the ground.

Checking the air intake

- ◆ Clean the air intake space in front of the air filter to remove any dirt (foliage, etc.).
- ◆ Check the air filter fastening and retaining straps for damage.
- ◆ Check the air channel between the air filter and the engine for leaks.
- ◆ Check the rubber parts for damage.



Notice

Replace damaged parts immediately.

Replacing the air filter main cartridge

CAUTION



Danger posed by dust being drawn into the engine
There is a risk of the engine taking in dirty air and sustaining serious damage.

- ▷ All maintenance work on the air intake system must be carried out with the engine shut down.
- ▷ Do not start the engine after the filter cartridge has been removed.
- ▷ Only install filter cartridges that are in perfect condition.



- ◆ Replace the air filter main cartridges in accordance with the "Service schedule and inspection plan" chapter and/or if the air filter maintenance control light on the control panel lights up during operation.



Notice

A brief delay in maintenance does not result in lower filter efficiency.

6

Maintenance

Cleaning the main cartridge

⚠ WARNING	
	Danger posed by dislodged parts Air cleaning with compressed air can dislodge parts and result in eye injuries. ▷ Wear personal protective equipment.
CAUTION	
	Danger posed by dust being drawn into the engine There is a risk of the engine taking in dirty air and sustaining serious damage. ▷ All maintenance work on the air intake system must be carried out with the engine shut down. ▷ Do not start the engine after the filter cartridge has been removed. ▷ Only install filter cartridges that are in perfect condition. ▷ Do not, under any circumstance, clean or brush the main cartridge with fuel or hot liquids. ▷ Make sure that no dust ends up on the inside of the main cartridge when blowing out.

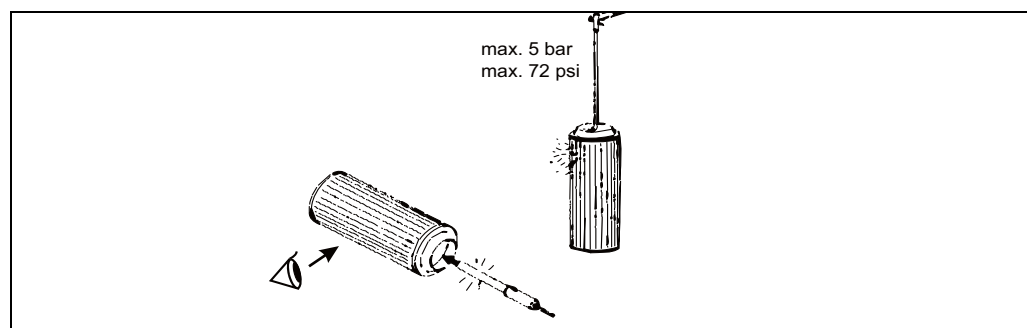


Fig. 6-10 Cleaning the main cartridge

- ◆ Clean the main cartridge if there is minimal dirt. Replace the main cartridge if there is a lot of dirt.
- ◆ The main cartridge can be cleaned up to 5 times if necessary. It must be replaced once it reaches its maximum service life of two years, at the latest. Record the number of cleaning operations.
- ◆ For cleaning, a pipe with the end bent at 90° should be attached to the compressed-air pistol. The pipe must be long enough to reach the base of the cartridge. Blow out the main cartridge from the inside to the outside with dry compressed air (max. 5 bar) by moving the tube up and down in the cartridge and continue until no more dust escapes.
- ◆ Inspect the cleaned main cartridge for damage to the paper bellows and rubber seals. Tears and perforations in the paper bellows can be determined using a flashlight.

Changing the main cartridge

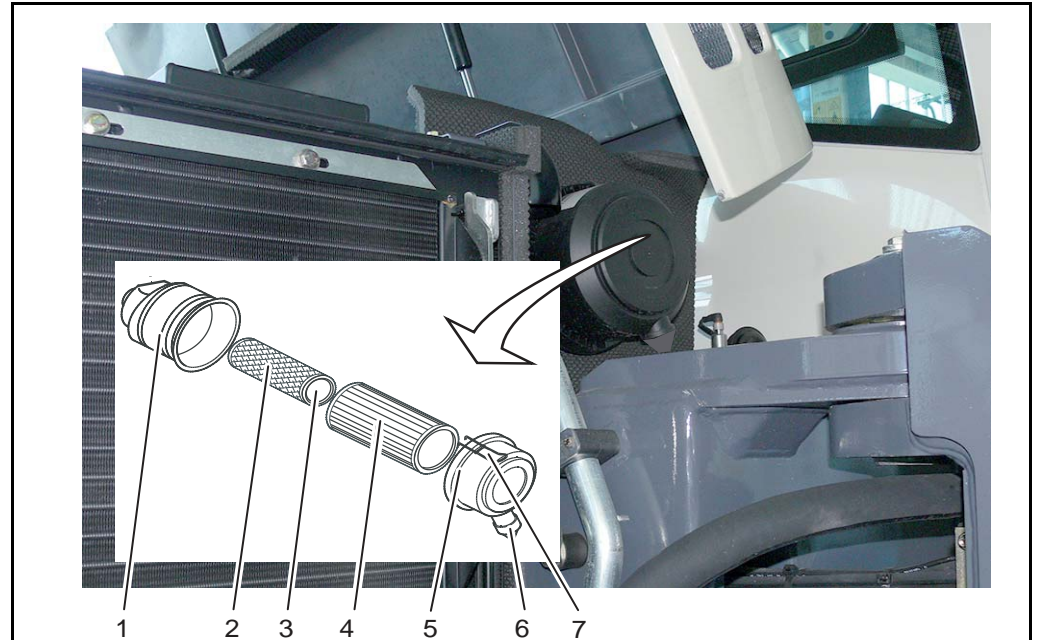


Fig. 6-11 Changing the main cartridge

- 1 Filter housing
- 2 Safety cartridge
- 3 Nut
- 4 Air filter cartridge
- 5 Cover
- 6 Dust ejection valve
- 7 Retaining bracket

- ◆ Open the retaining brackets (7) and remove the cover (5) with the dust ejection valve
- ◆ Slightly turn and pull out the air filter cartridge (4) and dispose of it.
- ◆ Record the maintenance work in the corresponding marked fields on the safety cartridge (2).
- ◆ Clean the filter body (1) with a damp cloth, especially the seal area for the air filter cartridge.
- ◆ Check the new air filter cartridge for signs of damage.
- ◆ Turning the new air filter cartridge slightly, insert it into the filter body.
- ◆ Fit the cover with the dust ejection valve pointing down (pay attention to the position of the dust ejection valve) and fasten it using the retaining clips.


6

Maintenance

Replace the air filter safety cartridge

- ◆ Replace the air filter safety cartridge:
 - After the main cartridge has undergone maintenance for the third time
 - After 2 years of operation at the latest
 - If the maintenance indicator switches on straight after maintenance has been performed on the main cartridge
 - If the main cartridge is defective
 - If the safety cartridge is defective

Changing the safety cartridge

CAUTION	
	Risk posed by damaged safety cartridge There is a risk of the engine taking in dirty air and sustaining serious damage.
	<ul style="list-style-type: none"> ▷ Do not attempt to clean the safety cartridge. ▷ Always install a new safety cartridge.

Replace safety cartridge

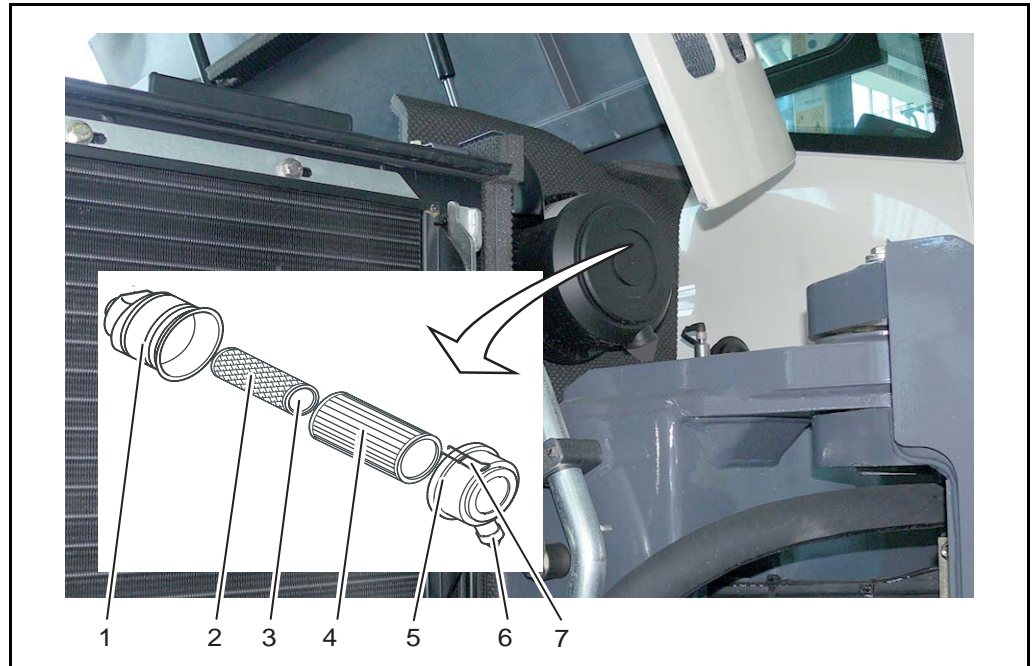


Fig. 6-12 Changing the safety cartridge

- 1 Filter housing
- 2 Safety cartridge
- 3 Nut
- 4 Air filter cartridge
- 5 Cover
- 6 Dust ejection valve
- 7 Retaining bracket

- ◆ Remove the main filter cartridge. See chapter “Changing the main cartridge”.
- ◆ Undo the nut (3).
- ◆ Carefully turn, tilt, and pull the safety cartridge (2) out and dispose of it in an environmentally friendly way.
- ◆ Clean the filter body (1) with a damp cloth, especially the seal area for the cartridges.
- ◆ Turn the new safety cartridge slightly and insert it into the filter body.
- ◆ Insert the main cartridge into the filter body.
- ◆ Fit the cover with the dust ejection valve pointing down (pay attention to the position of the dust ejection valve) and fasten it using the retaining clips.

6

Maintenance

6.7.5 Fuel system

⚠ DANGER	
	<p>Danger posed by fuel Fuel and fuel fumes are harmful to health and there is a risk of ignition.</p> <ul style="list-style-type: none"> ▷ Switch off the engine. ▷ Wear personal protective equipment. ▷ No smoking, no open flames. ▷ Do not wear loose clothing. ▷ Take care around hot fuel.

- When filling up or handling the fuel system, ensure it remains spotless.
- Carefully clean around the components in question.
- Dry any wet spots using compressed air.
- When handling fuel, adhere to safety procedures and country-specific regulations.
- Dispose of any leaked fuel and filter elements in accordance with regulations. Do not allow fuel to seep into the ground.
- When first commissioning the machine, or after maintenance work has been carried out or the tank has run empty, bleed the fuel system, See chapter “Bleeding the fuel system”. It is vital that you again bleed the fuel system through a five minute test run, with little or no load.
- Ensure that everything is spotless. Before beginning work, thoroughly clean and dry the engine and engine compartment. Cover any dirty areas in the engine compartment with new, clean foil. Prevent the fuel system from coming into contact with any air pollution (e.g., dust, dirt, damp).
- Ensure the fuel system is closed and has no leaks. Perform a visual inspection for leaks/damage to the system.



Notice

Refueling with AdBlue®. See chapter 6.7.7 “AdBlue® system”.



Notice

Fold down/fold up maintenance ladder. See chapter 6.7.5 “Fuel system”.

Refueling

Fold down
maintenance
ladder

⚠ WARNING	
	<p>Danger when entering the machine Maintenance steps must be erected on solid ground. You risk falling from steps that are not firmly secured.</p> <ul style="list-style-type: none"> ➤ Ensure that the uppercarriage is straight, before folding the maintenance steps down.

CAUTION	
	<p>Danger posed by maintenance steps that have not been folded away Folded down maintenance ladder can be damaged if the uppercarriage is swung.</p> <ul style="list-style-type: none"> ➤ Following the completion of maintenance and repair work fold the maintenance ladder back. ➤ At the opening (4), check whether the maintenance ladder is secured in the latching device. ➤ The maintenance ladder is necessary when refueling with AdBlue®, when checking the hydraulic oil level or when filling up the windscreen washer tank.

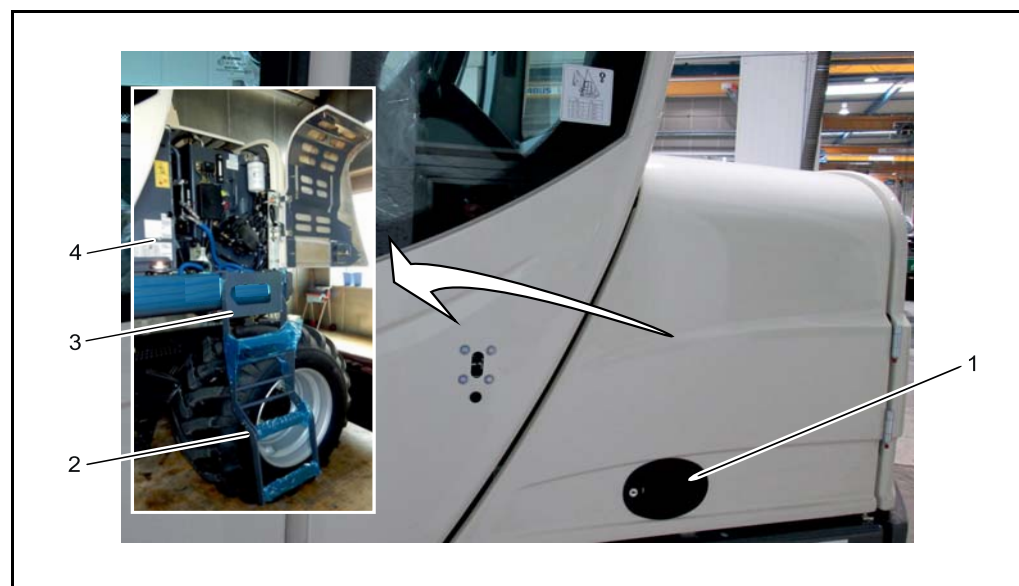


Fig. 6-13 Maintenance flap

- 1 Maintenance cover with handle
- 2 additional ladder (only on the B95W)
- 3 Maintenance ladder
- 4 Fuse & relay board

6 Maintenance

**Fold down
and fold up
maintenance
ladder**

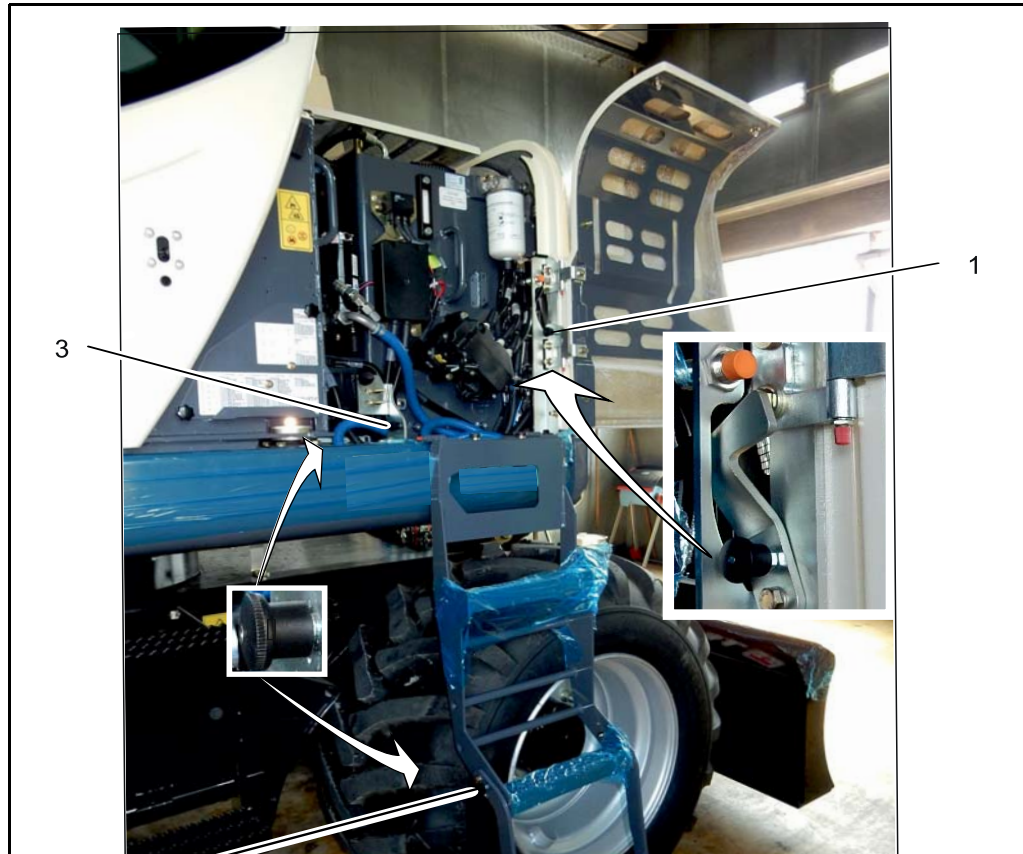


Fig. 6-14 Maintenance ladder - locked

- 1** Securing bracket - maintenance ladder
- 2** Locking - additional ladder (only on the B95W)
- 3** Locking - maintenance ladder

- ◆ Open maintenance cover to the right, unlock securing bracket (1) and apply.
- ◆ Unlock and fold down maintenance ladder (3).
- ◆ Unlock and fold down additional access ladder (2).
- ◆ When folding up the maintenance ladder and cover, ensure that the locks (1), (2) and (3) lock into place.

Check the fuel level

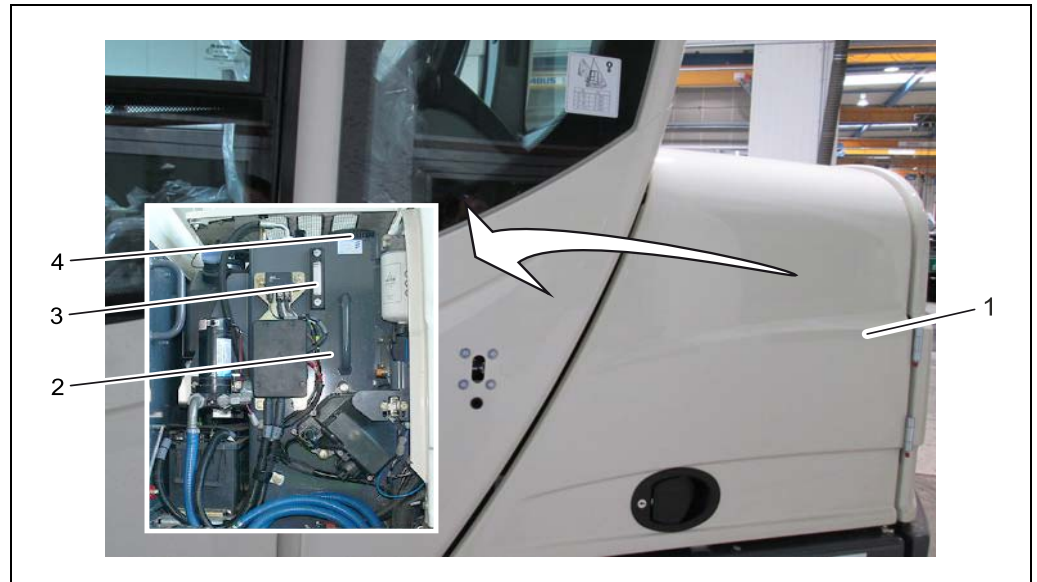


Fig. 6-15 Fuel system

- 1 Side/maintenance cover
- 2 Fuel tank
- 3 Level Indicator
- 4 Refueling inlet



- ◆ Check the fuel level using the indicator on the operator control panel.
- ◆ In order to prevent condensation forming between uses of the machine, top up fuel through the refueling inlet (4) every day after use.

6

Maintenance

Refuel with the electrical tank filling pump (option)

⚠ WARNING	
	<p>Risk posed by excessive pressure while refueling</p> <p>When refueling with an electrical filling pump (option), there is a risk of excess pressure building up inside the tank. This excess pressure may suddenly be released, resulting in serious burns or explosions.</p> <p>➤ Open the fuel tank cap when using the electric refueling pump to avoid excessive pressure in the fuel tank!</p>

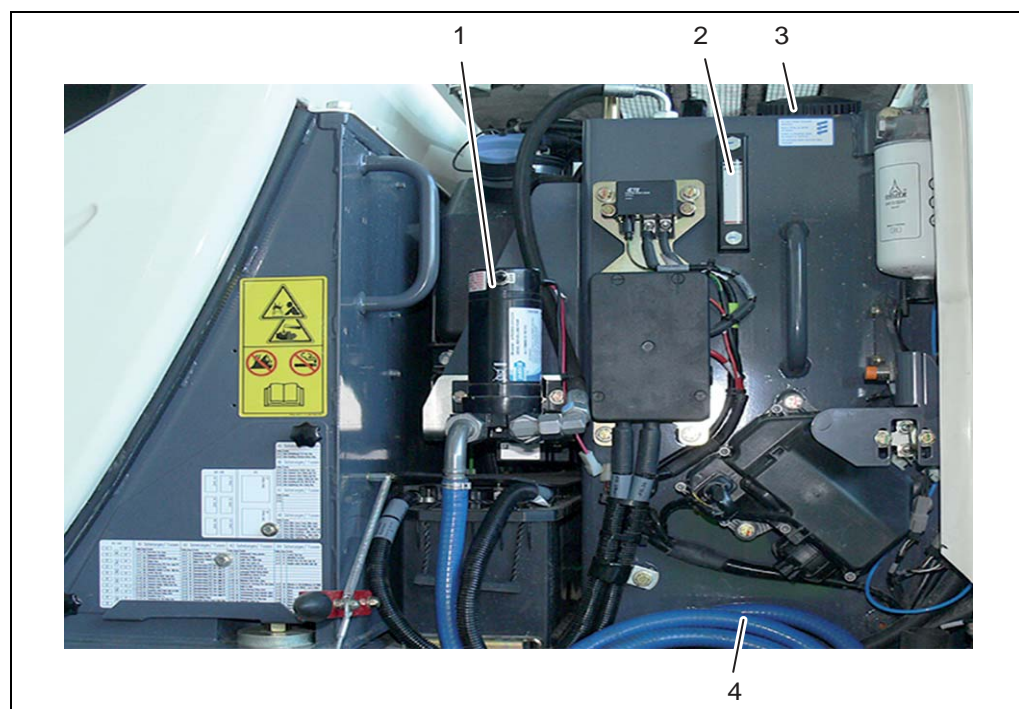


Fig. 6-16 Refueling with the electrical tank filling pump (option)

- 1** Pump on/off switch
- 2** Sight glass
- 3** Refueling inlet
- 4** Pipe winder



- ◆ Check the fuel level using the indicator on the instrument panel.
- ◆ Check the fuel level in the sight glass (2).
- ◆ Open the cover of the refueling inlet (3).
- ◆ Insert the fuel dispenser (4) into the vessel containing fuel.
- ◆ Turn on the pump (1).
- ◆ When the level is full on the sight-glass (2), turn off the pump (1) to prevent overflow.
- ◆ Close the refueling inlet cover (3).
- ◆ Replace the dispenser pipe around the pipe winder (4).

In order to prevent condensation forming between uses of the machine, top up fuel through the refueling inlet (3) every day after use.

6

Maintenance

Fuel prefilter

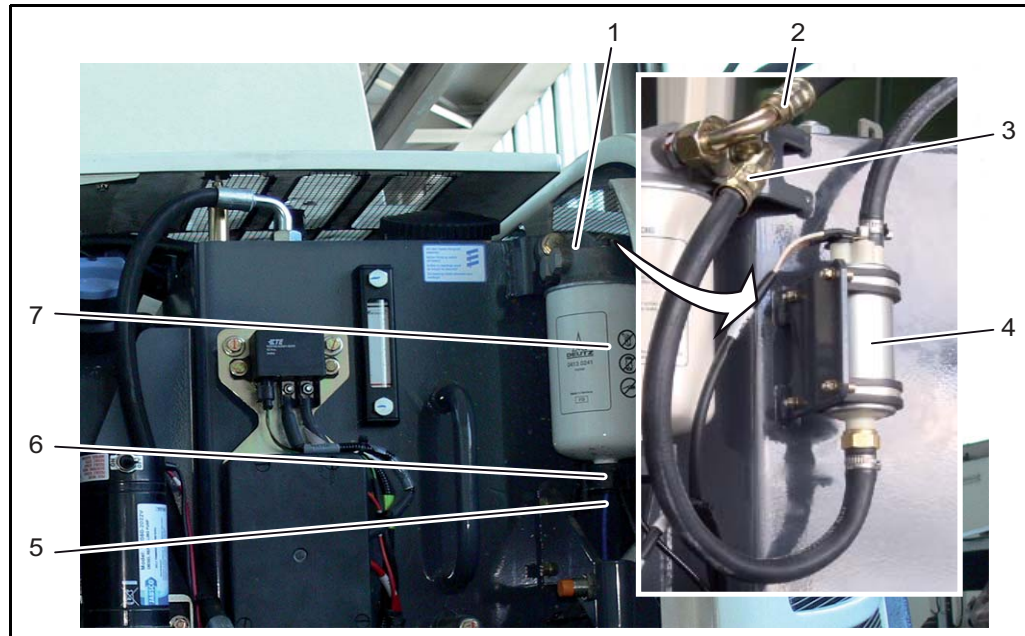


Fig. 6-17 Fuel prefilter

- 1 Bleeding screw
- 2 Fuel feed from fuel tank
- 3 Fuel supply to pump
- 4 Fuel transfer pump
- 5 Electric connection for water level sensor
- 6 Drain plug
- 7 Filter element

Empty the water collection tank

- ◆ Shut down the engine.
- ◆ Detach the cable (5).
- ◆ Attach a hose to the drain plug (6) and feed it into a container.
- ◆ Release the drain plug (6) and allow the fluid to drain until clear diesel fuel comes out.
- ◆ Fit the drain plug (6).
Torque: 1.6 ± 0.3 Nm
- ◆ Attach the cable (5).

Changing the fuel pre-filter element

- ◆ Shut down the engine.
- ◆ Shut off the fuel supply to the engine (with tank elevated).
- ◆ Detach the cable (5)
- ◆ Attach a hose to the drain plug (6) and feed it into a container.
- ◆ Open the drain plug (6) and drain the fluid.
- ◆ Unscrew the filter insert (7).
- ◆ Clean the sealing surface of the new filter element and the opposite side of the filter head.
- ◆ Moisten the sealing surface of the filter element (7) slightly with fuel.
- ◆ Install the filter element in a clockwise direction. Tighten it to a torque of 17-18 Nm.
- ◆ Fit the drain plug (6).
Torque: 1.6 ± 0.3 Nm
- ◆ Attach the cable (5).
- ◆ Open the fuel shut-off valve and vent the system.
→ See chapter "Bleeding the fuel system".
- ◆ Start the engine.
- ◆ After starting the engine, check the system for leaks.

6

Maintenance

Changing the fuel filter

CAUTION	
	Danger of engine damage
	The fuel system is very sensitive and can be damaged by dirt. ▷ Prime the new filter with fuel.

CAUTION	
	Danger posed by environmentally hazardous substances
	There is a risk of fuel being discharged into the environment and causing considerable environmental damage. ▷ Do not allow fuel to seep into the ground. ▷ Place a suitable receptacle for the collection of fuel underneath the working area. ▷ Collect fuel and dispose of it according to regulations!

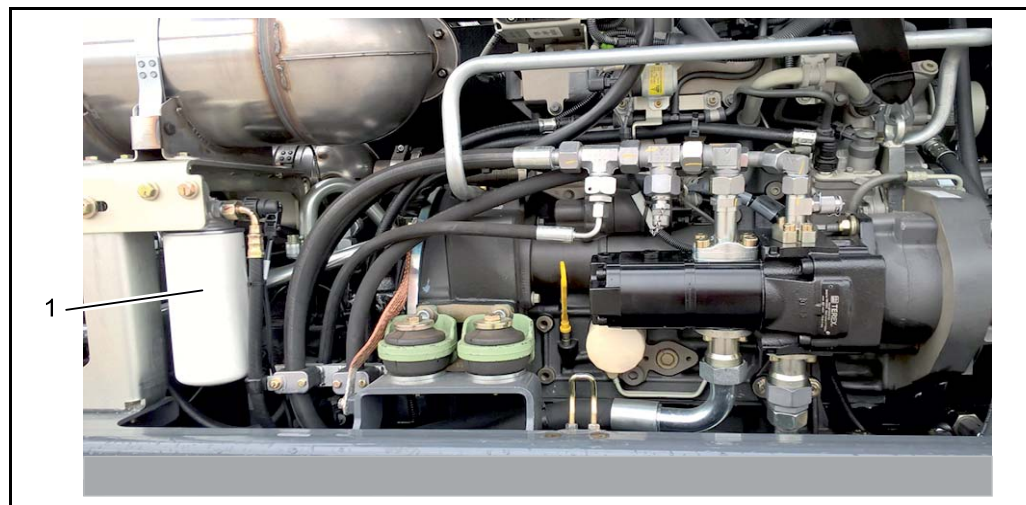


Fig. 6-18 Changing the fuel filter

1 Fuel change filter

- ◆ Clean the fuel filter on the outside.
- ◆ Unscrew the filter cartridge (1).
- ◆ Collect the fuel according to regulations.
- ◆ Dispose of the filter cartridge according to regulations.
- ◆ Clean the sealing surface of the filter holder with a clean lint-free cloth.
- ◆ Lightly oil the seal of the new filter.
- ◆ Screw the new filter on by hand until the seal is in place.

- ◆ Tighten the filter to a torque of approximately 10 - 12 Nm.
- ◆ Bleed the fuel system.
- ◆ Perform a test run.
- ◆ Check the filter for leaks.
- ◆ Clean the inlet strainer and check it for damage.



Notice

A brief delay in maintenance does not result in lower filter efficiency.

Bleeding the fuel system

The fuel system is bled via the electric fuel pump.

To ensure that no error messages are created, you must not attempt to start the system during the bleeding process.

- ◆ Turn on the ignition.
- *The electronic fuel pump switches on for 20 seconds to bleed the fuel system and establish the required fuel pressure.*
- ◆ Wait until the electric fuel pump has been switched off by the control unit.
- ◆ Turn off the ignition.
- ◆ Repeat the process at least four times until the fuel system is bled.
- ◆ Check the fuel prefilter and the fuel filter for leaks after starting the engine.

6

Maintenance

Draining water from the fuel tank

CAUTION	
	<p>Danger posed by environmentally hazardous substances</p> <p>There is a risk of fuel being discharged into the environment and causing considerable environmental damage.</p> <ul style="list-style-type: none"> ▷ Do not allow fuel to seep into the ground. ▷ Place a suitable receptacle for the collection of fuel underneath the working area. ▷ Collect fuel and dispose of it according to regulations!

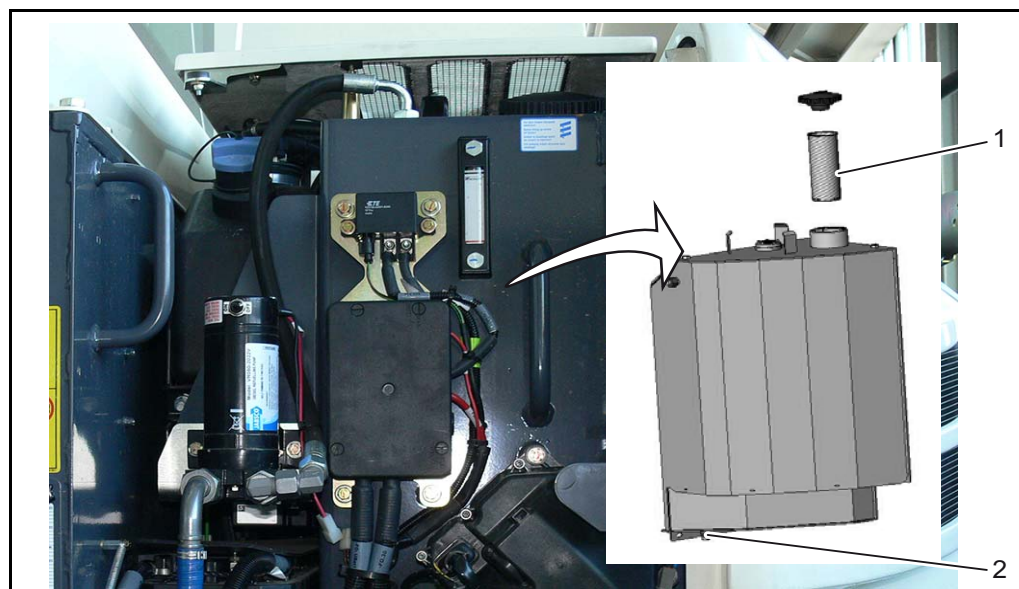


Fig. 6-19 Fuel tank

- 1** Filling screen filter
- 2** Water-drain plug

- ◆ Remove the cover on the underside of the uppercarriage below the fuel tank.
- ◆ Drain water from the fuel tank via the water-drain plug (2) until diesel fuel runs out.
- ◆ Close the water-drain plug when fuel comes out.
- ◆ Clean the inlet strainer (1) and check it for damage.

6.7.6 V-rib belt

⚠ WARNING	
	<p>Risk posed by moving machine parts There is a risk of body parts getting crushed.</p> <ul style="list-style-type: none"> ▷ Only check or replace alternator belts when the engine is turned off. ▷ Secure the engine to prevent it being started up by unauthorized persons.

Checking V-rib belt

- ◆ Check the entire circumference of the alternator belt for damage (visual inspection).
- ◆ Replace worn or damaged alternator belts immediately.
- ◆ Refit any safety equipment you may have removed.
- ◆ Check new alternator belts for correct fit and tension after running for 15 minutes.

6

Maintenance

Replace the alternator belts

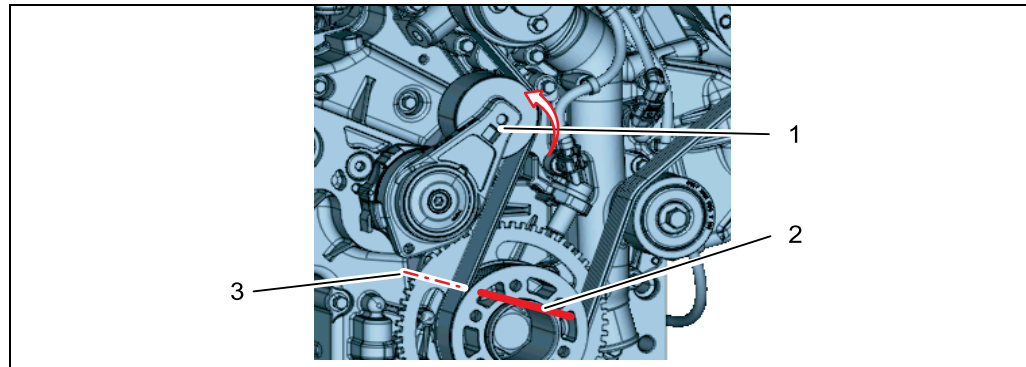


Fig. 6-20 V-rib belts

- 1** Tensioning pulley
- 2** Locking pin
- 3** Mounting hole

- ◆ Shut down the engine and pull out the ignition key.
- ◆ Open the engine hood.
- ◆ Push the idler pulley (1) with a socket wrench in the direction of the arrow until the locking pin (2) can be fixed in the mounting hole (3).
- *The alternator belt is now without tension.*
- ◆ Pull the alternator belt first off the smallest pulley or the idler pulley.
- ◆ Install the new alternator belt.
- ◆ Hold the idler pulley (1) using socket wrench and remove the locking pin (2).
- ◆ Tension the alternator belt using the idler pulley (1) and socket wrench.
- ◆ Check whether the alternator belt is properly positioned in its guide.
- ◆ Close the engine hood.

Checking the V-belt tension

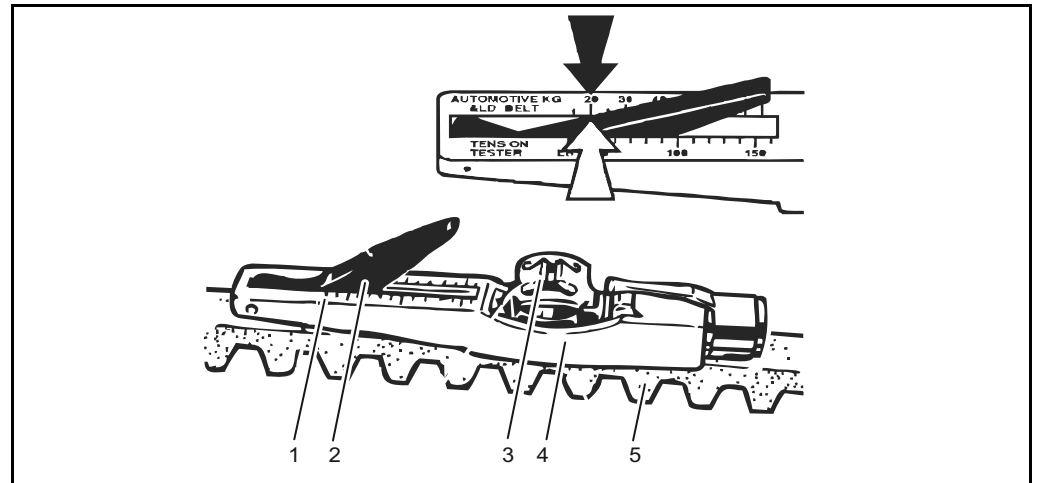


Fig. 6-21 V-rib belt

- 1 Dial
- 2 Indicator arm
- 3 Thrust Button
- 4 Guide
- 5 V-belt

V-belt tension pre/post-tightening:

650 N \pm 50 N / 400 N \pm 50 N

- ◆ Lower the indicator arm (2) in the measuring device.
- ◆ Insert the guide (4) between two pulleys on the V-rib belt. Make sure that the side of the stop makes contact.
- ◆ Press button (3) equally and at right angle to the V-rib belt, until you hear/feel the spring unlocks.
- ◆ Carefully lift the measuring device without altering the position of the indicator arm (2).
- ◆ Read the measured value on the interface (arrow), scale (5) and indicator arm (2).
- ◆ If necessary, re-tighten and repeat the measurement.

The belt tension measuring device can be acquired through your local DEUTZ supplier.

6

Maintenance

6.7.7 AdBlue® system

Notice



Once the engine has been turned off, the pump will continue to suck AdBlue® out of the system for approx. another 1 minute.

- ◆ Only begin work once the pump has sucked all AdBlue® out of the system.
- ◆ After switching off the engine, only activate the battery isolator switch after 2 minutes.

⚠ WARNING



Dangers of AdBlue®

Ammoniac fumes have a stinging smell and can irritate skin, eyes and mucous membranes.

- ▷ Only carry out work in the open or in well-ventilated spaces.
- ▷ Wear protective equipment (protective gloves, sealed safety goggles).
- ▷ If skin comes into contact, wash thoroughly with soap and water. If eyes comes into contact, rinse thoroughly for at least 15 minutes with running water.
- ▷ If you come into contact with AdBlue®, contact a doctor immediately.
- ▷ Do not swallow.
- ▷ Adhere to safety data sheet.

CAUTION



Danger of engine damage

The AdBlue® fuel system is very sensitive and can be damaged by dirt.

- ▷ Ensure that no coolant or other contaminants enter the AdBlue® system.

Also, during maintenance/servicing, ensure that:

- *The system is tightly sealed (check for leaks, material weaknesses etc.).*
- *There is no mechanical damage or overloading.*
- *The V-belt clips, brackets, connectors etc. are all correctly fitted.*
- *If foreign substances have entered the exhaust train or the combustion chamber, the engine must be run in without the SCR catalytic converter.*
- *Any potential problems with the device must be solved by the customer before use.*
- *Housing sealing points must be clean.*

Refilling AdBlue®



Notice

Refueling with AdBlue®. See chapter 6.7.5 "Fuel system".



Notice

Fold down/fold up maintenance ladder. See chapter 6.7.5 "Fuel system".

CAUTION



Danger of mechanical breakdown

If you put in the wrong fuel, the exhaust aftertreatment system (SCR system) can get damaged.

- ▷ If you have put in the wrong fuel, do not turn on the ignition and engine under any circumstances. In this case, the state of the SCR system should be inspected by the client service team and, if necessary, SCR components should be replaced.



Notice

Do not dilute the carbamide solution with water or use a solution with a carbamide concentration of lower than 31.8 percent by weight.

- ▷ The carbamide solution's concentrate is measured and monitored by the On Board Diagnostics. If the quality requirements should be breached, the engine performance shall weaken.

Refilling with the engine off



Notice

It is paramount that the tank only be refilled with the engine off.

- ▷ The carbamide solution must not be contaminated by dust ingress from the environment.

Refueling with a running engine

If you are unable to refuel while the engine is off, you may refuel with a running engine only under the following conditions.

- ◆ Constant RPM (+/- 50 min-1)
- ◆ Constant torque / motor loading
- ◆ Machine must not move
- ◆ Non-dusty environment

6 Maintenance

Minimum top-up amount

- ◆ When refilling carbamide solution, ensure you add the minimum top-up amount.
- ◆ Only add less than the minimum top-up amount if the tank is already too full to do so.

Tank capacity	Minimum top-up amount
<20 liters	5 liters AdBlue®, for a full tank
≥20 liters	10 liters AdBlue®, for a full tank

Refilling AdBlue®



Fig. 6-22 AdBlue® tank

1 Inlet lid

- ◆ Check the AdBlue® level based on the indicator on the instrument cluster.
- ◆ Top up the Adblue® through the inlet (1).

Adblue® - change filter

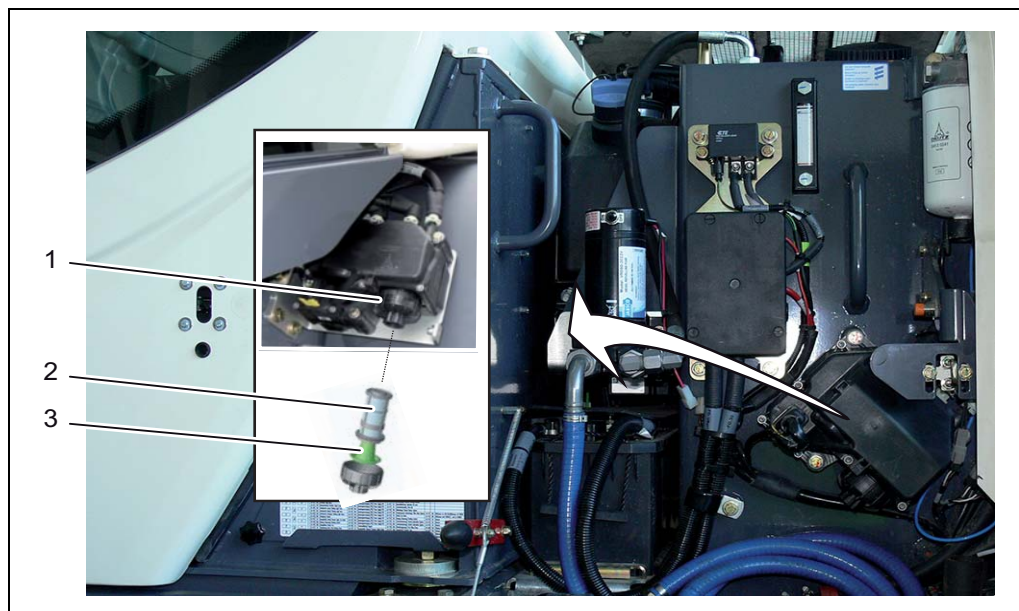


Fig. 6-23 Adblue® filter

- 1 Cover
- 2 Filter element
- 3 Compensation body

- ◆ Remove lid (1) and check for tears. Replace lid if faulty.
- ◆ Remove and dispose of the filter element (2) and compensation body (3).
- ◆ Fit new compensation body (3) and filter element (2).
- ◆ Replace the lid (1). Torque: 22.5 ± 2.5 Nm.

6

Maintenance

6.7.8 Hydraulic oil tank

⚠ WARNING	
	<p>Danger posed by hot oil and machine parts, and a pressurized hydraulic system</p> <p>Risk of burns. Risk of serious injury – hydraulic oil can get under the skin.</p> <ul style="list-style-type: none"> ▷ Depressurize the hydraulic system for any maintenance or servicing. With the engine turned off, lower the loading equipment to the ground and actuate all hydraulic operating levers until there is no more pressure in the hydraulic system. ▷ Avoid skin contact with oil, grease, and machine parts. ▷ Wear personal protective equipment. ▷ In the event of injuries, seek medical attention.

Check hydraulic oil level

-
- | | |
|--|--|
| | <p>Notice</p> <ul style="list-style-type: none"> Park the machine in a horizontal position. Place the loading equipment flat on the ground. Completely retract the bucket cylinder and the dipperstick cylinder and completely lower the boom, articulated to the left, onto the ground. Place the dozer blade on the ground. |
|--|--|
-
-
- | | |
|--|--|
| | <p>Notice</p> <p>Fold down/fold up maintenance ladder. See chapter 6.7.5 “Fuel system”.</p> |
|--|--|
-

Checking the hydraulic oil level

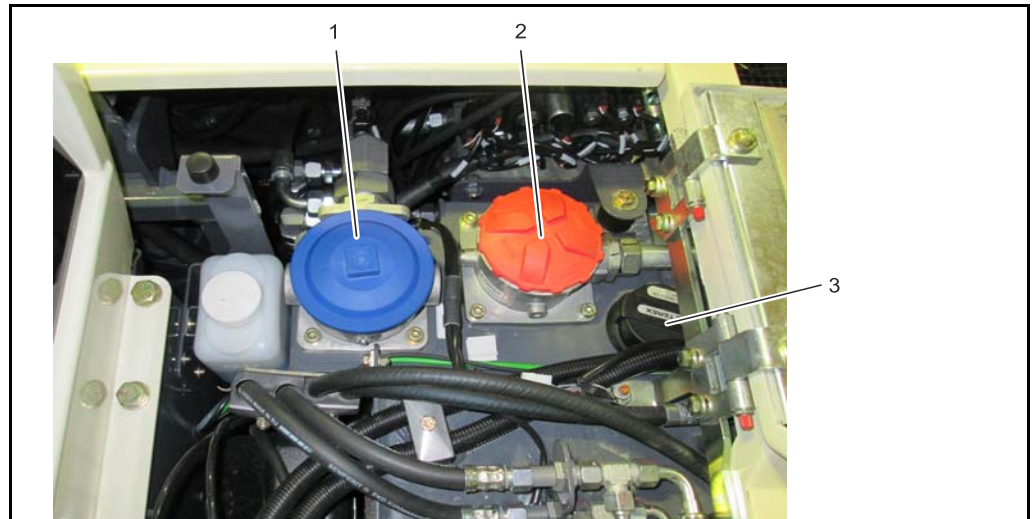


Fig. 6-24 Hydraulic oil tank

- 1 Return flow filter
- 2 Suction filter
- 3 Ventilation filter

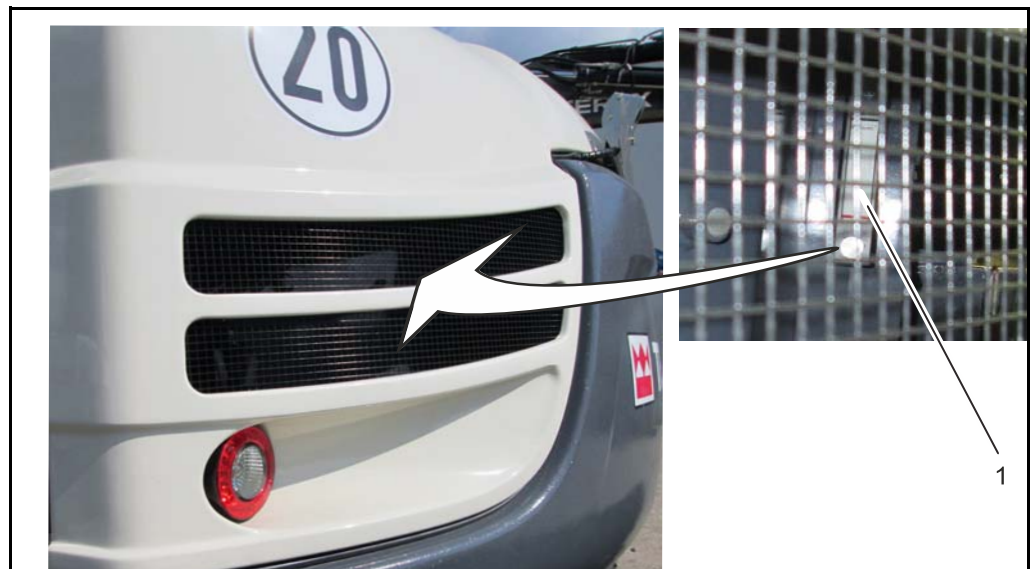


Fig. 6-25 Hydraulic oil tank - sight glass

- 1 Sight glass

- ◆ Check the hydraulic oil level via the sight glass (1), (found on the left side of the machine, visible if you lift the rear cover), fill up with hydraulic oil as necessary. Ensure that the hydraulic oil level in the sight glass remains at two-thirds.

6

Maintenance

Changing hydraulic oil

CAUTION	
	<p>Danger posed by environmentally hazardous substances</p> <p>Waste oil can be discharged into the environment and cause considerable environmental damage.</p> <ul style="list-style-type: none"> ▷ Do not allow waste oil to seep into the ground. ▷ Always place a receptacle for the collection of waste oil under the working area (when draining oil or removing the filter element). ▷ Collect the waste oil and dispose of it according to regulations.

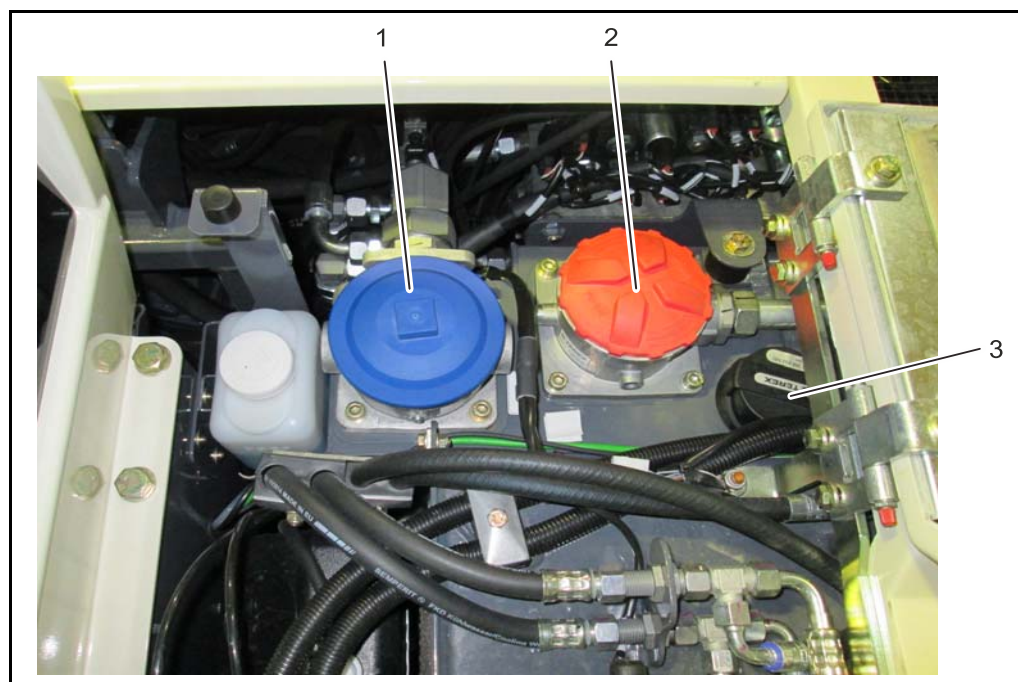


Fig. 6-26 Hydraulic oil tank

- 1** Return flow filter
- 2** Suction filter
- 3** Ventilation filter

Draining the hydraulic oil

- ◆ Place the loading equipment flat on the ground.
- ◆ Completely retract the bucket cylinder and the dipperstick cylinder and completely lower the boom, articulated to the left, onto the ground.
- ◆ Place the dozer blade on the ground.
- ◆ Bring the hydraulic oil up to operating temperature.
- ◆ All hydraulic cylinders must be retracted.
- ◆ Shut down the engine.
- ◆ Unscrew the ventilation filter (3).
- ◆ Place suitable oil collecting vessels under the drain opening.
- ◆ Attach an oil draining hose (it is in the tool bag) to the oil change valve on the underside of the tank.
- *The oil drains away.*
- ◆ Flush and clean the hydraulic oil tank if necessary. To do this, remove the return filter (1).
- ◆ Drain off oil into a clean vessel.
- ◆ Remove the oil drain hose and screw the protective cap on the oil change valve.

Topping up hydraulic oil

- ◆ Remove the cover from the return filter (1).
- ◆ Fill up with new hydraulic oil until the right level has been reached on the sight glass.
- ◆ Fit the cover to the return filter (1).
- ◆ Screw in the ventilation filter (3).
- ◆ Check the filter and drain plug for leaks.

6

Maintenance

Replace ventilation filter

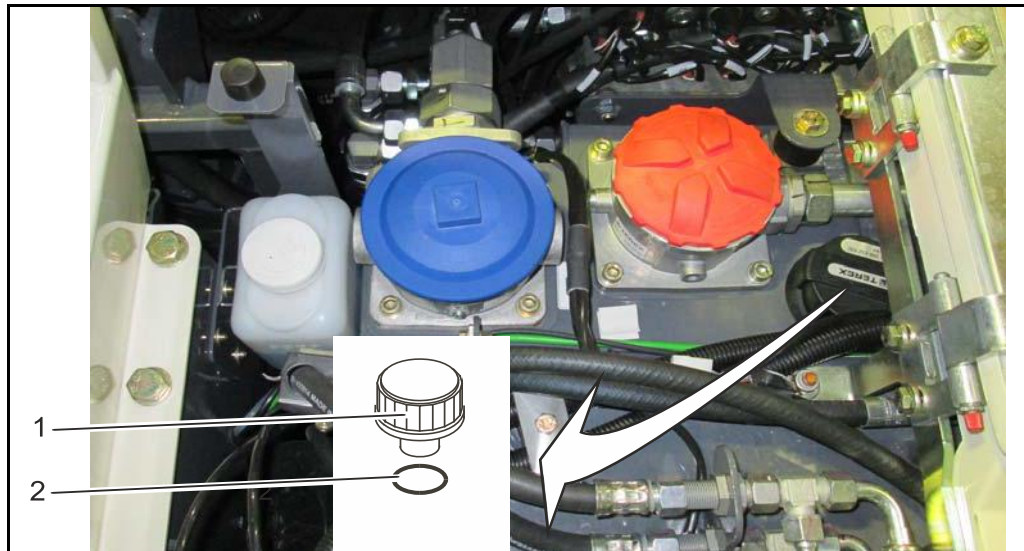


Fig. 6-27 Replace ventilation filter

- 1 Ventilation filter
- 2 O-ring



Notice

The ventilation filter must be replaced if it is soiled, e.g. by oil mist.

- ◆ Remove the ventilation filter (1) and dispose of it according to regulations.
- ◆ Screw the new ventilation filter (1) with O-ring (2) and tighten by hand.

6.7.9 Hydraulic oil return filter

When to perform cartridge maintenance



- ◆ Replace the filter cartridge if the control light for filter maintenance on the display lights up during operation.



Notice

After a fairly extensive repair job and a test run, the filter cartridge of the return filter (2) must be replaced.
Faulty hydraulic attachments can reduce the service life of the return filter.

Changing the filter element of the hydraulic oil return filter

⚠ WARNING



Danger posed by hot oil and machine parts

There is a risk of burns.

- ▷ Avoid skin contact with oil, grease, and machine parts.
- ▷ Wear personal protective equipment.
- ▷ In the event of injuries, seek medical attention.

CAUTION



Danger posed by environmentally hazardous substances

Waste oil can be discharged into the environment and cause considerable environmental damage.

- ▷ Do not allow waste oil to seep into the ground.
- ▷ Always place a receptacle for the collection of waste oil under the working area (when draining oil or removing the filter element).
- ▷ Collect the waste oil and dispose of it according to regulations!

6

Maintenance

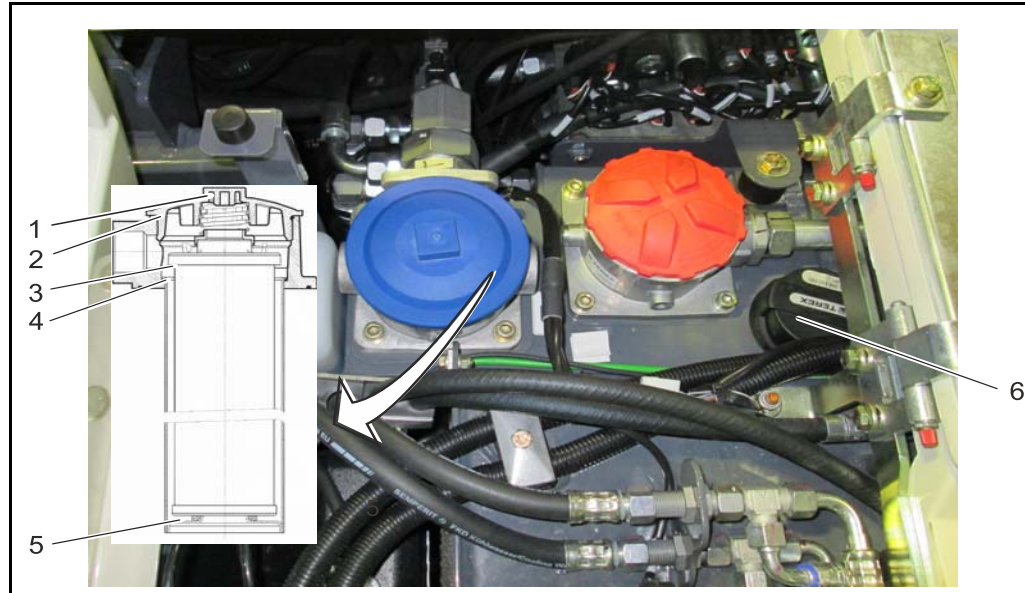


Fig. 6-28 Return filter

- 1 Return filter cover
- 2 Gasket
- 3 "O" ring
- 4 Filter element
- 5 "O" ring
- 6 Ventilation filter

- ◆ Shut down the engine.
- ◆ Open the cover of the ventilation filter (6) in order to release the tank's charging pressure.
- ◆ Loosen the cover (1) on the return filter with the help of a tool and screw it off.
- ◆ Check the condition of the cover itself (1) and its seal (2).
- ◆ Pull out the filter element (4) and dispose of it in accordance with regulations.
- ◆ Clean the filter bowl, if necessary.
- ◆ Inspect the O-rings (3) (5) and replace the damaged parts.
- ◆ Check the condition of the sensor for the contamination indicator (option).
- ◆ Insert the new filter element.
- ◆ Apply a small amount of oil to the cover seal (2) and tighten the cover so it is hand-tight.
- ◆ Check the filter for leaks.

6.7.10 Bleeding the plunger cylinders

⚠ DANGER	
	<p>Risk of injury as a result of hydraulic oil under pressure Hydraulic oil can get into the skin and eyes and cause serious injury. Hot hydraulic oil can cause burns.</p> <ul style="list-style-type: none"> ▷ Avoid skin contact with oil, grease, and hot machine parts. ▷ Wear personal protective equipment. ▷ Take the utmost precaution when working.

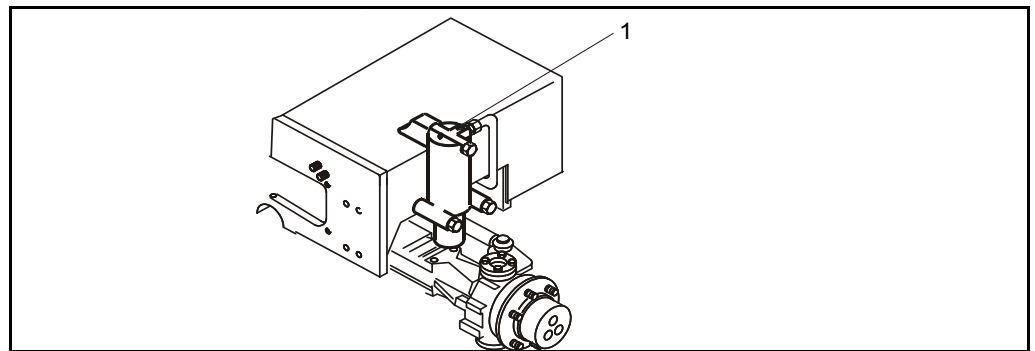


Fig. 6-29 Bleeding the plunger cylinders

1 Bleeding screws

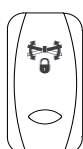


- Pressure supply is via the flushing oil circuit of the hydrostatic drive.
- Latching occurs by blocking the connection line between the plunger cylinders by means of a locking valve, which is activated by the excavator brake or the rocker switch “pendulum axle locking”.
- The axle may not oscillate with excavator brake engaged or toggle switch for pendulum axle locking activated.



Bleeding

- ◆ Secure the machine against rolling away
- ◆ Release the parking brake.



- ◆ Set the toggle switch for pendulum axle locking to “OFF”.
- ◆ Allow the engine to run at medium speed.
- ◆ Open the bleed screws (1) on plunger cylinder right and left one after another until hydraulic oil emerges without bubbles.
- ◆ Tighten the bleed screws.

6


Maintenance

6.7.11 Hose-rupture safety valves of support legs

⚠ WARNING	
	<p>Danger as a result of faults with the hose-rupture safety valves</p> <p>The machine may move unexpectedly. Risk of serious injury.</p> <ul style="list-style-type: none"> ➤ Take care to ensure that no one is in the immediate vicinity of the machine or in the danger zone. ➤ The machine must be secured in such a way that, in the event of a defect in the hose-rupture safety valves, there can be no danger to persons or objects.


- ◆ Subject the outrigger to be tested to a load applied in the non-operating direction.
 - ◆ Shut down the engine.
 - ◆ Turn on the ignition.
 - ◆ Actuate the control lever for the support leg.
- *The function is correct when the controls do not move the support leg!*


6.7.12 Steering

CAUTION	
	<p>Danger due to drivetrain under tension Risk of being knocked over or crushed.</p> <ul style="list-style-type: none"> ▷ When working on the steering, remove from machine and place on supports.

6.7.13 Axles

General information

CAUTION	
	<p>Risk posed by lack of oil Immediately after filling, the oil has not yet been channeled to the system.</p> <ul style="list-style-type: none"> ▷ Move the machine 5 minutes after filling up. ▷ Check the oil level again and top up if necessary.

CAUTION	
	<p>Danger posed by environmentally hazardous substances Waste oil can be discharged into the environment and cause considerable environmental damage.</p> <ul style="list-style-type: none"> ▷ Do not allow waste oil to seep into the ground. ▷ Always place a receptacle for the collection of waste oil under the working area (when draining oil or removing the filter element). ▷ Collect the waste oil and dispose of it according to regulations!



Notice

The axle oil must be changed at operating temperature.

6

Maintenance

Differentials of the front and rear axle

⚠ WARNING	
	<p>Danger posed by hot oil and machine parts Risk of burns.</p> <ul style="list-style-type: none"> ▷ Avoid skin contact with oil, grease, and machine parts. ▷ Wear personal protective equipment. ▷ In the event of injuries, seek medical attention.

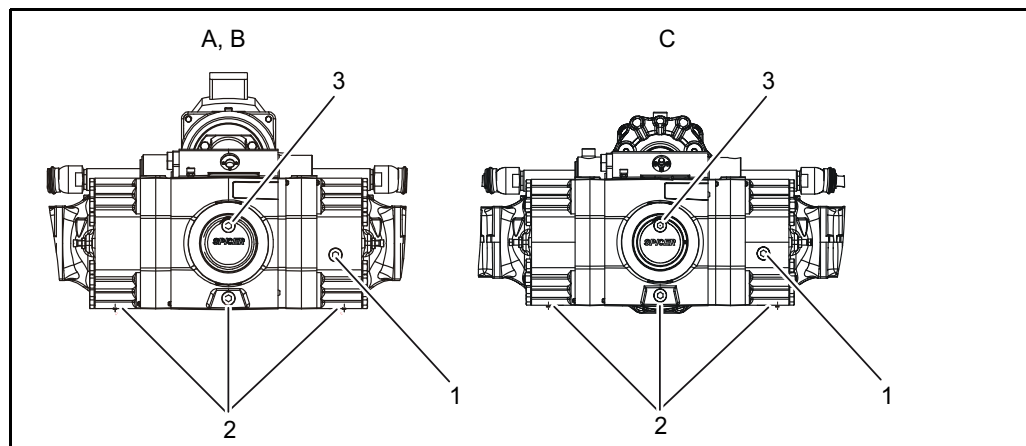


Fig. 6-30 Front axle differential

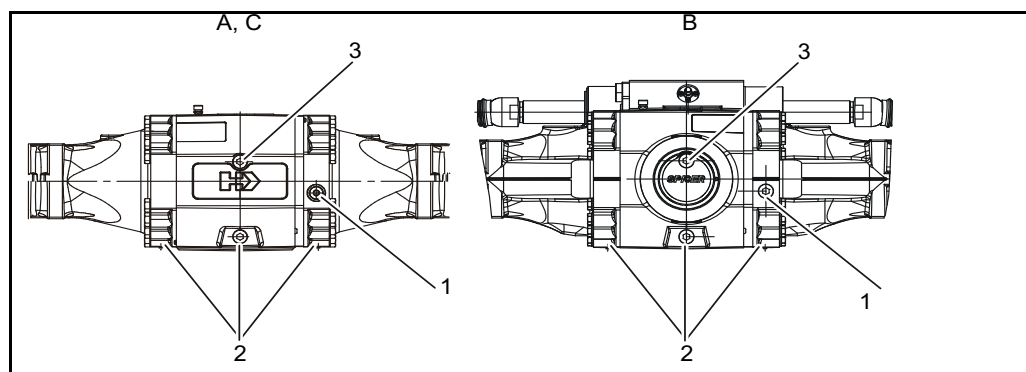


Fig. 6-31 Rear axle differential

- 1** Checking plug
- 2** Differential
- 3** Refueling inlet

A - B95W

B - B95W AL

C - B95W S

Checking the axle oil level

- ◆ Remove the inspection plug (1), check the axle oil level and fill with oil through the filler opening (3) if required.

Changing axle oil

- ◆ Park the machine in a horizontal position.
- ◆ Remove the inspection plug (1) and the filler plug (3).
- ◆ Remove the drain plug on the differential (2) and the brake housing and drain the oil.
- ◆ Flush the axle, if necessary.
- ◆ Carefully seal the drain plug.
- ◆ Pour in oil through the inlet (3) until oil emerges from the inspection hole (1).
- ◆ Carefully seal the inspection/filling plugs.

6

Maintenance

Front axle transmission

⚠ WARNING	
	<p>Danger posed by hot oil and machine parts Risk of burns.</p> <ul style="list-style-type: none"> ▷ Avoid skin contact with oil, grease, and machine parts. ▷ Wear personal protective equipment. ▷ In the event of injuries, seek medical attention.

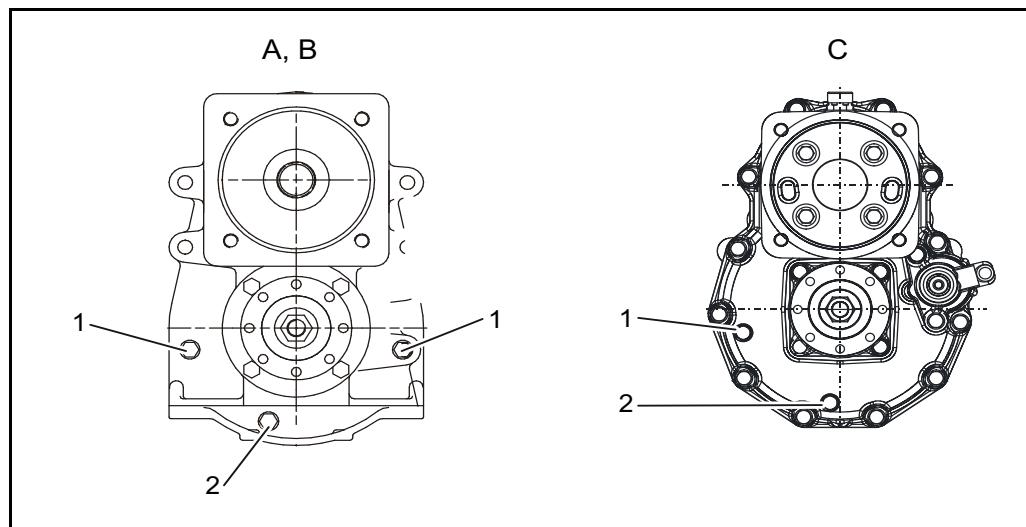


Fig. 6-32 Gearbox unit

- 1** Inspection hole
- 2** Drain plug

A - B95W
B - B95W AL
C - B95W S

Checking the oil level

- ◆ Remove the checking plug (1), check the axle oil level and refill with oil, if required.

Changing axle oil

- ◆ Park the machine in a horizontal position.
- ◆ Remove the inspection plug (1) on the transmission.
- ◆ Remove the drain plug (2) on the transmission and drain the oil.
- ◆ Flush the transmission, if necessary.
- ◆ Carefully seal the drain plug.
- ◆ Pour in oil through the inlet (3) until oil emerges from the inspection hole (1).
- ◆ Carefully seal the inspection/filling plugs.

6

Maintenance

6.7.14 Wheel hub

⚠ WARNING	
	<p>Danger posed by hot oil and machine parts</p> <p>Risk of burns.</p> <ul style="list-style-type: none"> ▷ Avoid skin contact with oil, grease, and machine parts. ▷ Wear personal protective equipment. ▷ In the event of injuries, seek medical attention.

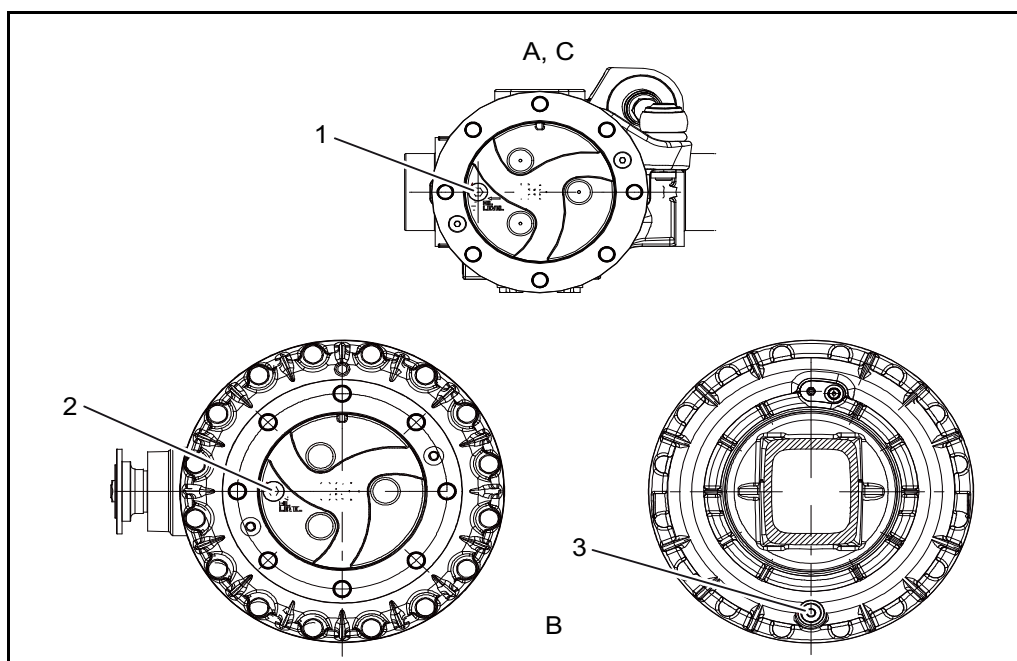


Fig. 6-33 Wheel hub

- 1** Screw plug
- 2** Refueling inlet
- 3** Drain plug

A = Front axle

B = Rear axle

C = Rear axle B95W AL



Notice

The wheel hub has a combined inspection, filling and drain hole.

Front axle, rear axle B95W AL

Checking the oil level

- ◆ Turn the wheel hub to the inspection position.
- ◆ Remove the screw plug (1), check the oil level and fill with oil if required.

Oil change

- ◆ Turn the wheel until the screw plug (1) on the hub is at the bottom.
- ◆ Unscrew the screw plug and catch the oil.
- ◆ Flush, if necessary.
- ◆ Turn the wheel to the filling and inspection position.
- *The inspection mark must be in a level position.*
- ◆ Pour in the oil up to the lower edge of the opening.
- ◆ Carefully seal the filler opening.

Rear axle (except B95W AL)

Checking the oil level

- ◆ Turn the wheel hub to the inspection position.
- ◆ Remove the screw plug (1), check the oil level and fill with oil if required.

Oil change

- ◆ Turn the wheel until the screw plug (1) on the hub is at the bottom.
- ◆ Remove the screw plug (1) and the drain plug (3) and catch the oil.
- ◆ Flush, if necessary.
- ◆ Gently turn the drain plug (3) back in.
- ◆ Turn the wheel to the filling and inspection position.
- *The inspection mark must be in a level position.*
- ◆ Fill in oil up to the lower edge of the hole.
- ◆ Pour in the oil up to the lower edge of the opening.
- ◆ Carefully seal the filler opening (2).

6

Maintenance

6.7.15 Wheels

Checking the tire pressure

- ◆ Check the tire pressure in accordance with the pressure chart at regular intervals.
- See chapter 9.2.10 "Tires".

Checking condition of tires

- ◆ Check the tires for cuts, tears, foreign objects, etc.

Checking the tightness of wheel nuts

- ◆ During the first 50 operating hours, check the tightness of the wheel nuts (type A 22) for the required tightening torque daily, and subsequently at regular intervals.
Tightening torque: 610 Nm.
Tighten as required.
- ◆ When changing a wheel, always tighten the wheel nuts to the specified torque crosswise in several steps.

6.7.16 Brakes

⚠ WARNING	
	<p>Danger due to heavy load</p> <p>The machine may move unexpectedly. Risk of serious injuries with fatal consequences.</p> <p>▷ Before starting the engine, take care to ensure that no one is in the immediate vicinity of the machine or in the danger zone.</p>

Front axle, rear axle B95W AL

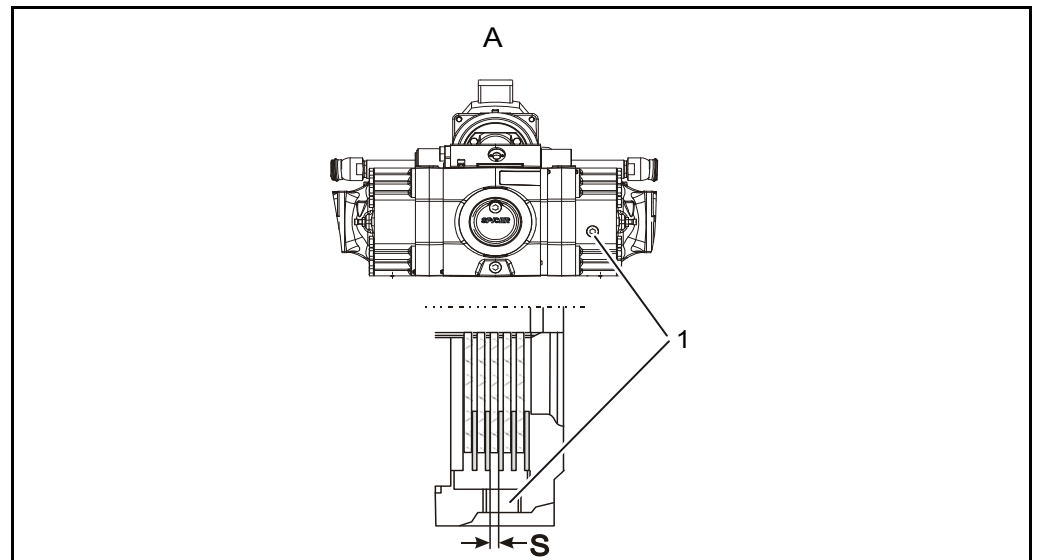


Fig. 6-34 Brake discs

- 1** Inspection hole
- 2** Park Brake

A = front axle, rear axle B95W AL



Checking function of brake disc play

- ◆ Apply the parking brake.
 - ◆ Remove the inspection screws (1).
 - ◆ Check the wear of the brake discs using a measuring gauge.
- Minimum strength $S = 4.5 \text{ mm}$.

Rear axle (except B95W AL)

The brake disks of the disk brakes in the wheel hubs cannot be inspected.

6

Maintenance

Bleeding the service brake

⚠ DANGER



Risk of injury as a result of hydraulic oil emerging under pressure

Hydraulic oil can get into the skin and eyes and cause serious injury. Hot hydraulic oil can cause burns.

- ▷ Avoid skin contact with oil, grease, and hot machine parts.
- ▷ Wear personal protective equipment.
- ▷ Take the utmost precaution when working.

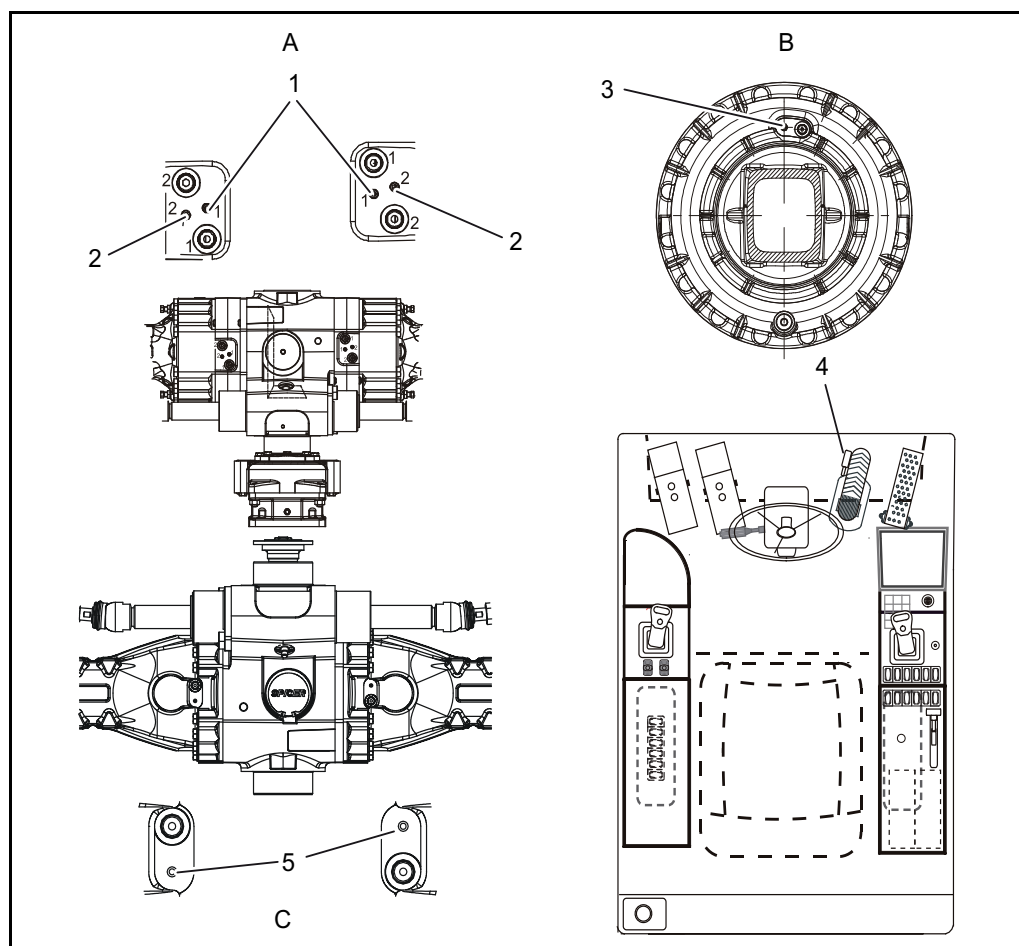


Fig. 6-35 Operation

- 1** Bleeding screw
- 2** Bleeding screw
- 3** Bleed screws (except B95W AL)
- 4** Service brake/excavator brake
- 5** Bleeding screws (B95W AL)

A = Front axle

B = Rear axle except for B95W AL

C = Rear axle B95W AL

Notice



This work must be carried out by two people.

- ◆ Allow the engine to run at medium speed.
- ◆ Step halfway down on the brake pedal (4).
- ◆ Open the bleeding screws (2) on the two brake housings of the front axle, one after the other, until the braking medium (hydraulic oil) emerges bubble-free.

CAUTION



Danger posed by environmentally hazardous substances

Waste oil can be discharged into the environment and cause considerable environmental damage.

- ▷ Do not allow waste oil to seep into the ground.
- ▷ Always place a receptacle for the collection of waste oil under the working area (when draining oil or removing the filter element).
- ▷ Collect the waste oil and dispose of it according to regulations!

- ◆ Tighten the bleed screws.
- ◆ Open the bleeding screws on the two brake housings of the rear axle one after the other until the braking medium (hydraulic oil) emerges bubble-free.
- ◆ Tighten the bleed screws.
- ◆ Remove the bleed screw on the brake inching (hydraulic pump for travel) until the braking medium (hydraulic oil) escapes without bubbles.
- ◆ Tighten the bleed screw.

6

Maintenance

Bleeding the spring-loaded brake

⚠ WARNING



Danger due to heavy load

The machine may move unexpectedly. Risk of serious injuries with fatal consequences.

- ▷ Before starting the engine, take care to ensure that no one is in the immediate vicinity of the machine or in the danger zone.

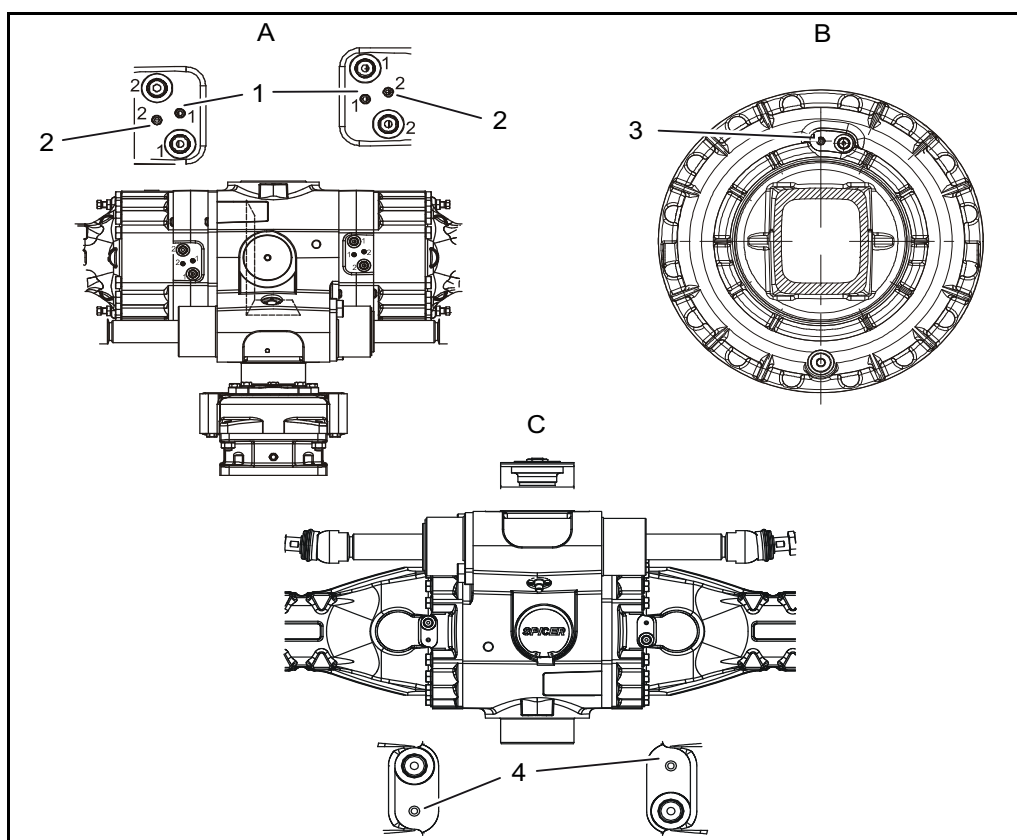


Fig. 6-36 Bleeding the brake

- 1 Bleeding screw
- 2 Bleeding screw
- 3 Bleeding screw
- 4 Bleeding screw

A = Front axle

B = Rear axle except for B95W AL

C = Rear axle B95W AL



Notice

This work must be carried out by two people.

- ◆ Secure the machine to prevent it from rolling away (e. g. with supports).
- ◆ Allow the engine to run at medium speed.
- ◆ Open the excavator brake and the parking brake.
- ◆ Remove the bleed screw (1) on the brake housing of the front axle until the braking medium (hydraulic oil) emerges without bubbles.
- ◆ Tighten the bleed screw.

6.7.17 Swing gear



Notice

The slewing gear is maintenance-free. Recirculating lubrication is provided by the hydraulic system.

⚠ WARNING



Danger posed by hot oil and machine parts

Risk of burns.

- ▷ Cover hot surfaces.
- ▷ Avoid skin contact with oil, grease, and machine parts.
- ▷ Wear personal protective equipment.
- ▷ In the event of injuries, seek medical attention.

6

Maintenance

6.7.18 Swing connection

⚠ WARNING	
	<p>Danger posed by hot oil and machine parts Risk of burns.</p> <ul style="list-style-type: none"> ▷ Cover hot surfaces. ▷ Avoid skin contact with oil, grease, and machine parts. ▷ Wear personal protective equipment. ▷ In the event of injuries, seek medical attention.

⚠ WARNING	
	<p>Danger posed by rotating gear ring There is a risk of limbs getting crushed. Risk of serious injury.</p> <ul style="list-style-type: none"> ▷ Only lubricate the gear ring once it has come to a complete stop. ▷ Operating and maintenance staff must keep an eye on each other.

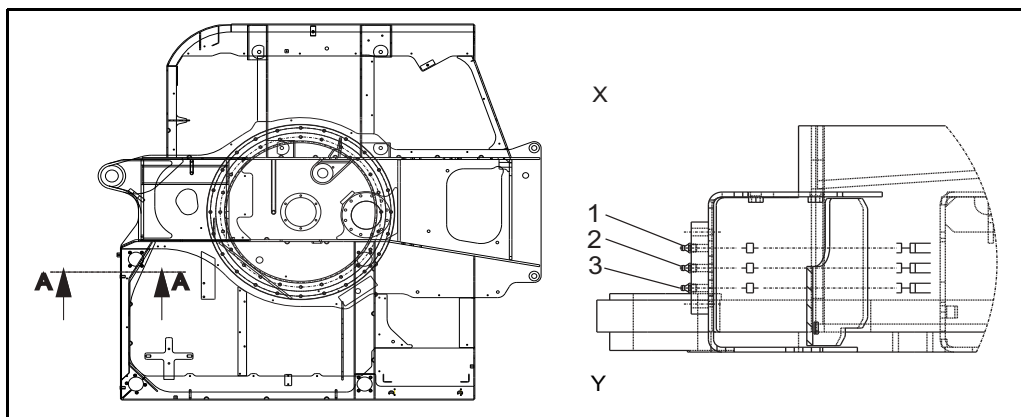


Fig. 6-37 Swing connection

- 1** Grease nipple, articulated cylinder, upper carriage
- 2** Grease nipple, bearing races
- 3** Grease nipple, toothings

X = plan view

Y = cut A-A

Lubricating the toothing

- ◆ Apply grease to the gear ring toothing via the grease nipple (3) outside the driver's cab using the nozzle tube.
- ◆ To ensure the grease is evenly spread, slowly slew the uppercarriage every now and then while thoroughly greasing it.

Lubricating the bearing races

- ◆ The bearing races are lubricated via the lubricating nipple mounted outside the driver's cab and through a lubricating pipe.
- ◆ Slowly swivel the uppercarriage to the left and right and lubricate thoroughly with the grease gun until both seals have a collar of fresh grease all over.

6

Maintenance

Checking the fastening of slewing joint and swing assembly

CAUTION	
	<p>Danger posed by damaged screws Danger due to damage to the machine.</p> <ul style="list-style-type: none"> ▷ Replace damaged screws/bolts immediately. ▷ After installing new ones: Check the tightening torque of the screws/bolts after 100 operating hours.

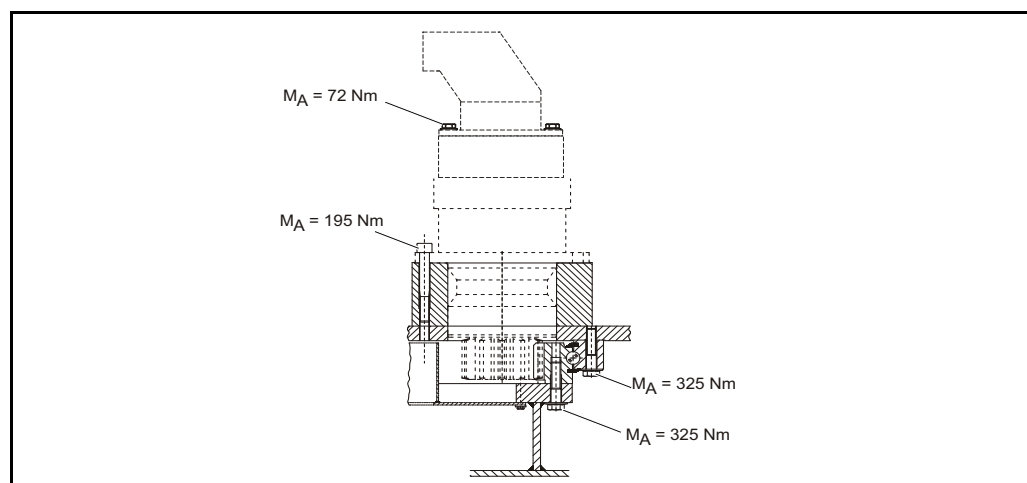


Fig. 6-38 Torque values

The following mounting conditions are prerequisites for an optimum bolted connection on the undercarriage and the uppercarriage:

- ◆ The contact faces of the screw/bolt heads must be bare metal, i.e., absolutely free from grease and paint.
- ◆ The thread and the screw/bolt head, particularly the tothing of the head, must not be damaged.
- ◆ Check all accessible screws for the specified tightening torques.

Check slewing break

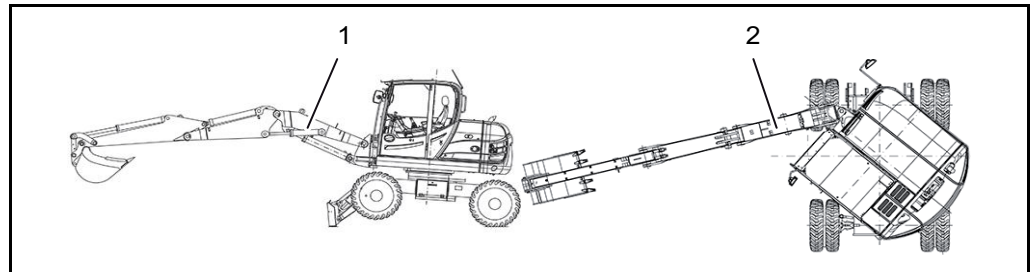


Fig. 6-39 Check slewing break

- 1 Digging tool straightened
- 2 Uppercarriage at 45°

- ◆ Park vehicle on level, solid ground.
- ◆ Raise vehicle fully using the support function.
- ◆ Adjust digging tool for maximum reach (1).
- ◆ Retract bucket.
- ◆ Turn uppercarriage by 45° (2).
- ◆ Retract bending cylinder fully.
- ◆ Lower digging tool until the bucket is floating around 10 cm above the ground.
- ◆ Align the side edge of the bucket/building tool with a reference point in your environment. Remember this point of reference.
- ◆ Stop the engine.
- ◆ Wait one minute (machine operator must not leave the machine).
- ◆ Look at the reference point during this waiting period (one minute).
- ◆ If the building tool has not moved from its alignment with the point of reference, the excavator may be operated further.
- ◆ If the building tool has moved out of alignment with the reference point, cease operations as the excavator is not in a usable condition, and contact an authorized specialist workshop.

6

Maintenance

6.7.19 Electrical equipment

Fuse & relay board

⚠ WARNING	
	<p>Danger when entering the machine Maintenance steps must be erected on solid ground. You risk falling from steps that are not firmly secured.</p> <ul style="list-style-type: none"> ▷ Ensure that the uppercarriage is straight, before folding the maintenance steps down.

CAUTION	
	<p>Danger posed by maintenance steps that have not been folded away Folded down maintenance ladder can be damaged if the uppercarriage is swung.</p> <ul style="list-style-type: none"> ▷ Following the completion of maintenance and repair work, fold the maintenance ladder back. ▷ Check whether the maintenance ladder's securing bracket is locked into place.

Fuse & relay box

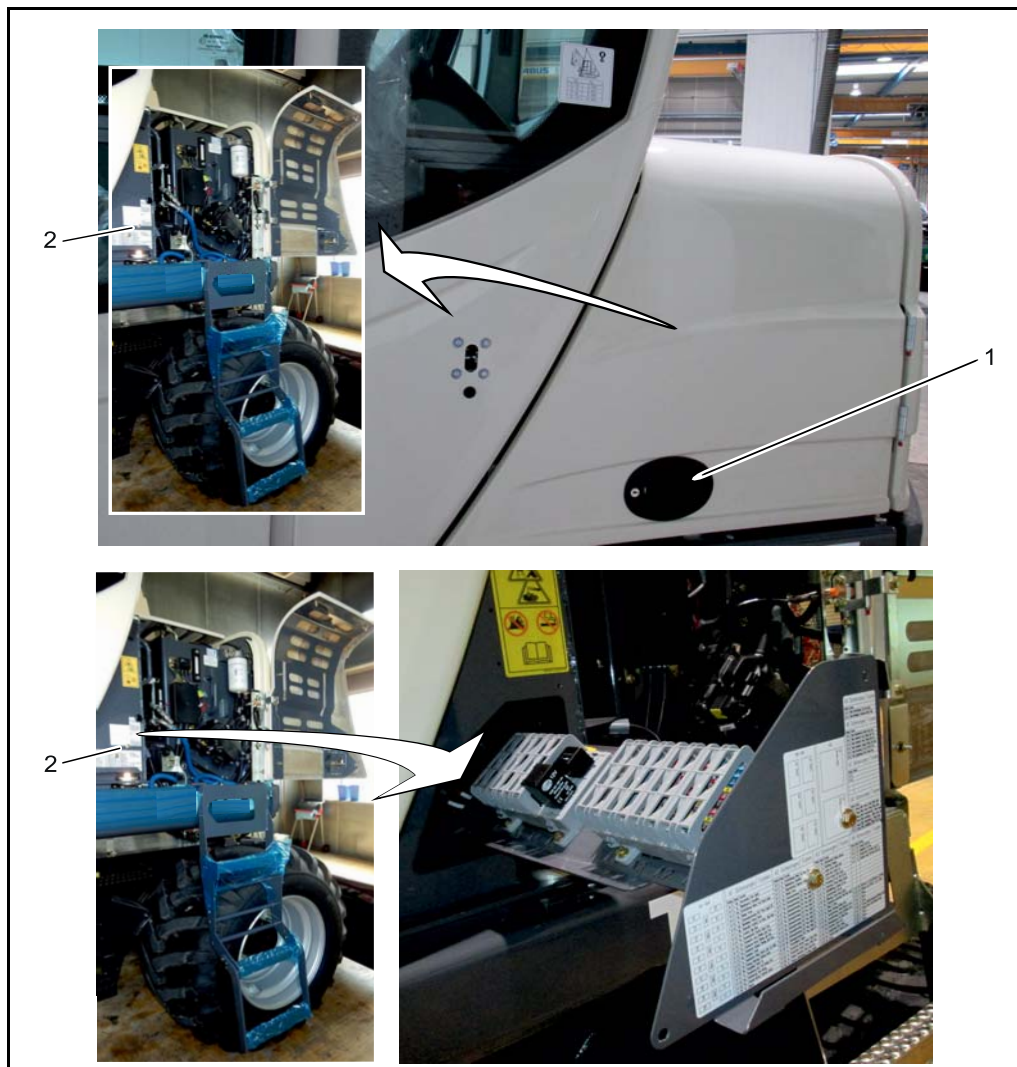


Fig. 6-40 Fuse & relay box

- 1 Maintenance cover with handle
- 2 Fuse & relay box

- ◆ Open maintenance cover (1) to the right, unlock securing bracket and apply.
- ◆ Carefully remove the fuse and relay box (2).
- ◆ When folding up the maintenance cover, ensure that the locking strap is locked into place.

6

Maintenance

Battery

⚠ WARNING	
	<p>Risk when handling batteries</p> <p>Battery acid is corrosive. There is a risk of explosion due to the formation of explosive gas.</p> <ul style="list-style-type: none"> ▷ Ensure good ventilation. ▷ Wear personal protective equipment. ▷ Do not smoke, do not allow naked flames. ▷ Never place any tools on the batteries. ▷ Under no circumstances should you check the current by touching the cables for spark. ▷ Do not touch live parts.

⚠ CAUTION	
	<p>Risk posed by sudden disconnection of power</p> <p>There is a risk of damage to the machine electronics.</p> <ul style="list-style-type: none"> ▷ Only operate the battery isolator switch after the engine has been switched off. ▷ When disconnecting the battery, electronic data may be lost.

→ Notice

The power supply to the engine may not be interrupted using the battery isolator switch, since the control device needs to run approximately another 40 seconds to store system data, after which it turns itself off. This process can last up to 2 minutes for engines with an SCR system, given that the SCR lines need to be out in this time.

→ Notice

Follow the instructions of the battery manufacturer when putting a battery into service for the first time.

The delivered machine comes with a maintenance-free battery.

→ Notice

Fold down/fold up maintenance ladder. See chapter 6.7.5 "Fuel system".

Removing and installing the battery



Fig. 6-41 Battery

- 5 Battery circuit breaker
- 6 Battery

Battery removal

- ◆ Put the machine into the parking position (the uppercarriage in driving position).
- ◆ Put the travel direction pre-selection level into neutral.
- ◆ Place the working attachment on the floor.
- ◆ Activate the parking brake.
- ◆ Shut down the engine.
- ◆ Open maintenance cover to the right, unlock locking strap and lodge. See chapter 6.7.5 "Fuel system".
- ◆ Unlock and fold down maintenance ladder.
- ◆ Turn off the battery isolator switch (5).
- ◆ Disconnect the ground cable (-) first and then the positive cable (+).
- ◆ Loosen the clamping bracket.
- ◆ Remove the battery (6).
- ◆ When folding up the maintenance ladder and cover, ensure that the locks are locked into place.

6

Maintenance

Installing batteries

CAUTION	
	<p>Risk posed by incorrectly applied voltage There is a risk of damage to the machine electronics.</p> <p>▷ Ensure that the negative terminal is attached to the negative pole (-) and the positive terminal to the positive pole (+).</p>

- ◆ Place the battery inside the machine.
- ◆ Secure the battery with the clamping bracket.
- ◆ Connect the positive cable (+) first and then the ground cable (-).
- ◆ Ensure the battery is firmly in place.
- ◆ Turn on the battery isolator switch (5).
- ◆ When folding up the maintenance ladder and cover, ensure that the locks are locked into place.
- ◆ Dispose of old batteries in an environmentally friendly way.
- ◆ In winter, in particular, the battery charge should be closely monitored.

Check battery

→ *The battery is maintenance-free.*

Lighting and warning devices

⚠ WARNING	
	<p>Hot surfaces hazard Risk of burns.</p> <ul style="list-style-type: none"> ▷ Switch off the engine. ▷ Avoid skin contact with hot machine parts. ▷ Wear personal protective equipment.

CAUTION	
	<p>Danger of falling objects Danger of falling objects due to unsecured mounts on the machine.</p> <ul style="list-style-type: none"> ▷ Only access the machine using the designated access steps and surfaces or suitable aids (such as ladders or platforms). ▷ Ensure the ladder is stable.

CAUTION	
	<p>Danger due to visible and ultraviolet rays Eyes can be damaged by the lights.</p> <ul style="list-style-type: none"> ▷ Switch off lights. ▷ Remove start key. ▷ When checking that they work, do not stare directly at the lights.

Checking the lighting and warning devices

	<p>Notice Any defective lighting and warning devices must be repaired/replaced immediately.</p>
--	--

Lighting equipment

- ◆ Switch on the working floodlights and the tail lamps and check that they are functioning correctly.
- ◆ Ensure the ignition is turned off before replacing faulty lamps.

Control lights

- ◆ Switch on the ignition to check that the control lights on the operator control panel are functioning correctly.

6

Maintenance

Warning equipment

- ◆ Check the visual and audible signals of the overload warning device
→ See chapter *“Checking the overload warning device”*.
- ◆ Check the travel motion alarm by switching on the machine and operating the levers.
- ◆ Check the warning buzzer by turning the key.
- ◆ Sound the signal horn and check that it is functioning correctly.
- ◆ Switch on the rotating beacon on the keypad and check its function.
- ◆ Check the signs and warning labels to make sure they are all present and correct.
- ◆ Drive in reverse. The reversing horn must sound.

6.7.20 Cab ventilation dust filter

The air intake for the heater and for fresh air features a dust filter, with the option of a charcoal / pollen filter.

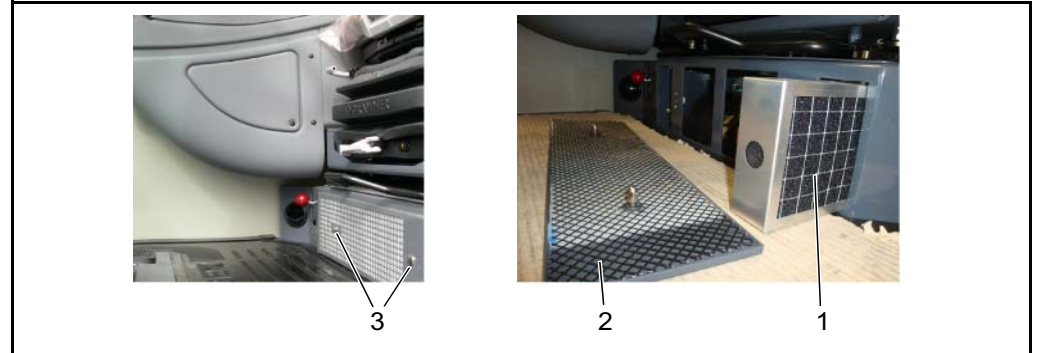


Fig. 6-42 Cab ventilation dust filter

- 1 Fresh air filter element
- 2 Cover plate and circulating air filter
- 3 Screw caps

Removal

- ◆ Access to the air filters (1) and the heating system is located underneath the driver's seat.
- ◆ Remove the snap fastenings (3), by turning them 90°.
- ◆ Remove the cover plate (2).
- ◆ Remove the filter element (1).

Cleaning

- ◆ Knock the intake side of the filter (side covered by mesh) several times on a flat and hard surface.
- ◆ Blow out the filter with dry compressed air (max. 5 bar), working in the opposite direction to the direction of flow.
- ◆ Check the filter for damage to the paper bellow and the seal.
- ◆ Insert a new or cleaned dust filter as far as it will go.

Installation

- ◆ Insert a new filter element (1).



Notice

Pay attention to the mounting position! Air flow arrows pointing toward heating.

Please pay attention to the operating instructions from the manufacturer of the heating and air conditioning systems!

- ◆ Attach the cover plate (3) to the seat console and fasten it with the snap fasteners (2) by turning 90°.

6

Maintenance

6.7.21 Windshield wash/wipe system

The windshield washer fluid tank is located under the side hood of the diesel tank and hydraulics system. It can be accessed when the cover is raised.



Notice

Fold down/fold up maintenance ladder. See chapter 6.7.5 "Fuel system".

Topping up the windshield wash/wipe system

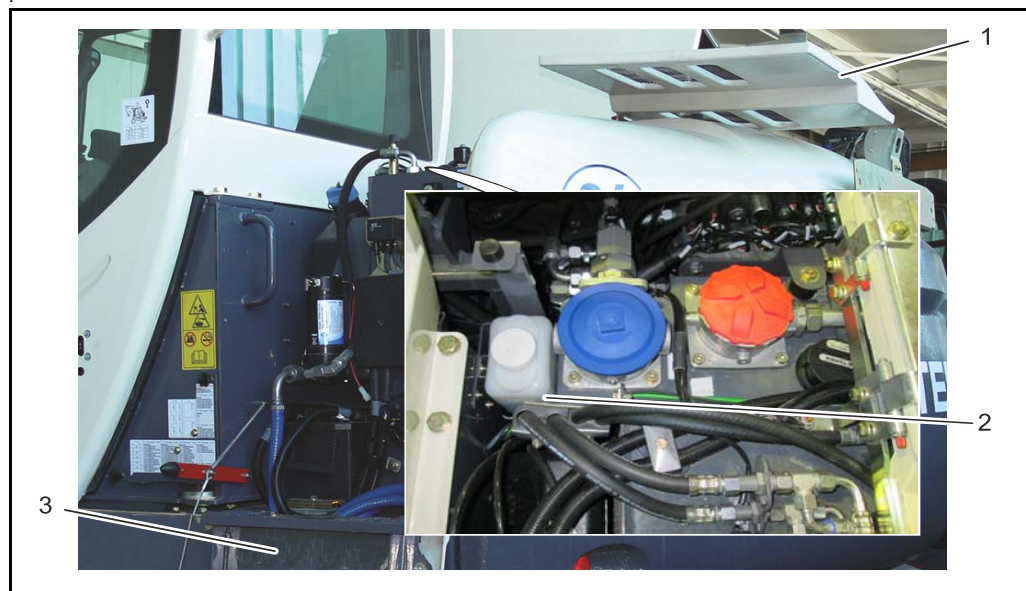


Fig. 6-43 Windshield washer tank

- 1 Diesel tank/hydraulic system cover
- 2 Reservoir
- 3 Maintenance ladder

- ◆ Open maintenance cover to the right, unlock locking strap and lodge.
- ◆ Unlock and fold down maintenance ladder (3).
- ◆ Open the diesel tank/hydraulics system cover (1).
- ◆ Fill up the washing water reservoir (2) as required.
- ◆ Add antifreeze when temperatures are around or below freezing.
- ◆ Close the diesel tank/hydraulics system cover.
- ◆ When folding up the maintenance ladder and cover, ensure that the locks are locked into place.

6.8 Decommissioning

6.8.1 Preservation measures for taking the machine out of service temporarily

CAUTION	
	<p>Dangers posed by long periods of non-usage Machine damage caused by bearing defects (e.g., corrosion damage) if the equipment is not used for more than three months.</p> <p>▷ Take preservation measures.</p>

Preservation measures to protect the machine

- ◆ We recommend keeping the machine in a dry, dust-free room during the storage period.
- ◆ Thoroughly clean the inside and outside of the machine, including the engine.
- ◆ Lubricate the machine in accordance with the lubrication schedule.
- See chapter 6.5.1 "Lubrication schedule".
- ◆ Check and top up all oil levels in components such as the engine, transmission, etc.
- ◆ Check and top up the hydraulic oil level.
- ◆ Repair paint damage.
- ◆ Fill the diesel fuel tank completely to avoid wall corrosion.
- ◆ Fill the AdBlue[®] tank to the top.

Max. constant storage temperature (°C)	Min. shelf-life (month)
≤ 10	36
≤ 25 ^{a)}	18
≤ 30	12
≤ 35	6
> 35	-- ^{b)}

^{a)} To avoid disintegration, the transport and storage temperatures should not exceed 25 °C for any longer period of time.

^{b)} Significant reduction of shelf life: inspect each lot before use.

The main factors that influence shelflife are the constant storage temperature and the alkalinity of the AdBlue[®] solution. Varying evaporation levels of ventilated and unventilated storage containers further affects shelflife.

6

Maintenance

- ◆ Check the antifreeze properties of the coolant and adapt these, if necessary.
- ◆ Apply all preservation measures as specified in the operating instructions for the engine.
- ◆ Protect tires from direct sunlight.
- ◆ Treat bare piston rods with a commercially available corrosion protection agent.
- ◆ Remove the battery, clean it, and store it properly in a dry and, over winter, in a frost-free room. Cover the poles with pole grease.
- ◆ Close the air intake openings of the air filter system and the exhaust outlet on the exhaust pipe.
- ◆ Switch off the battery isolator switch.

6.8.2 While out of service

Movements

- ◆ The anti-corrosion coat must be cleaned from the piston rods, and the openings of the air filter system and the exhaust pipe freed.
- ◆ Once the machine has been out of use for six months, all assemblies must be brought to operating temperature and set in motion for approx. 15 minutes.
- ◆ Renew the preservation measures after performing these movements.

6.8.3 At the end of the period of non-usage

Before recommissioning the machine, the following measures must be carried out:

Putting the machine back into service

- ◆ Clean the piston rods to remove the corrosion protection coating.
 - ◆ Clear the air intake of the air filter and the exhaust opening.
 - ◆ Check the condition of main air filter cartridge and safety cartridge, replace if necessary.
 - ◆ Wash the machine with a neutral detergent.
 - ◆ Check the battery, recharge if necessary and install it.
 - ◆ Carry out all measures for putting the diesel engine back into service as detailed in the engine operating instructions.
 - ◆ If the machine has been out of use for more than 6 months, the oil in assemblies such as the engine, transmission, etc. must be changed.
 - ◆ As soon as the machine has been out of action for six months (if not before), replace the hydraulic filters (pressure, return, and ventilation filter, if applicable).
 - ◆ Lubricate the machine in accordance with the lubrication schedule.
- See chapter 6.5.1 "Lubrication schedule".

6.8.4 Dismantling/disposal


⚠ WARNING	
	<p>Hazardous fuel and oils in the machine</p> <p>Failing to dispose of the machine correctly at the end of its service life can result in accidents and environmental damage.</p> <p>Risks are posed by the following:</p> <ul style="list-style-type: none"> • All oils (water-polluting, skin irritation after prolonged contact, do not get into eyes) • Lubricants/other consumables • Substances containing glycol, coolant • Diesel fuel • Batteries (battery acid H₂SO₄) • Pressurized media/pressure accumulator • Residual energies (e.g. raised articulated boom) • Moving parts • Alcohol in windshield cleaning agent • Greases • AdBlue® <ul style="list-style-type: none"> ◆ Only an appropriate disposal company should be charged with dismantling and disposing of the machine in accordance with applicable laws, directives, and standards. ◆ Yanmar recommends returning the machine to a Yanmar dealer. ◆ Observe the national safety standards for dismantling machinery. ◆ Wear personal protective equipment. ◆ Relieve pressure in the hydraulic system.




6


Maintenance

7 Operation

 **Notice**
Strictly observe all safety notes.
See chapter 3.7 "Operation".

7.1 Before operation

⚠ WARNING	
	<p>Risk posed by incorrect operation The machine may move unexpectedly. Danger of serious injury and death.</p> <p>▷ Familiarize yourself with all display and control elements before you start excavating. See chapter 5.3.1 "Controls".</p>

 **Notice**
An initial inspection must be carried out before commissioning.
See chapter 6.6.1 "Initial inspection (delivery inspection)".

The section "Operation". describes all functions for operating the machine.

- ◆ Familiarize yourself with the display and control elements before driving or starting work.
→ See chapter 5.3 "Display and control elements in the operator's compartment".
- ◆ Familiarize yourself with the control levers and pedals.
→ See chapter 5.3 "Display and control elements in the operator's compartment".
- ◆ Acquaint yourself with the keypad and display.
→ See chapter 5.3.3 "Keypad".
→ See chapter 5.3.4 "Display".
- ◆ Thoroughly inspect the machine visually before each start-up. Watch out for damage, loose or missing screws, oil deposits, and oil or fuel leaks.
- ◆ Any faults must be immediately rectified.
- ◆ If the operational safety of the machine is at risk, you must only start operation after the faults have been eliminated.
- ◆ Switch on the battery isolator switch.



7

Operation

7.1.1 Adjustments

Adjusting the driver's seat

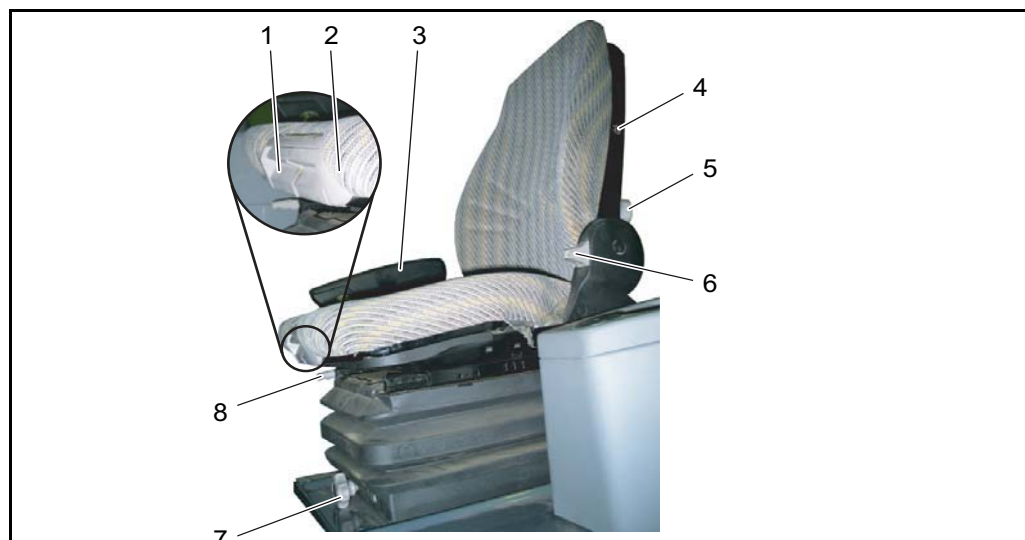


Fig. 7-1 Driver's seat

- 1 Handle for adjusting seat depth
 - 2 Handle for adjustment of seat angle
 - 3 Right arm rest, left arm rest
 - 4 Option: Switch for seat heating
 - 5 Handwheel for lumbar support
 - 6 Handle for tilting backrest
 - 7 Handle for combined height and body weight adjustment
Optional: Lever for weight adjustment
 - 8 Handle for longitudinal adjustment
- ◆ Operate the horizontal adjustment (8) feature to move the seat into your preferred position:
Adjustment to the front: Slide the seat forwards.
Adjustment to the back: Slide the seat backwards.
 - ◆ Adjust the seat to the most comfortable height for you (1):
Raising seat: Raise seat until it clicks audibly into place.
Lowering seat: Raise the seat as far as the stop; the seat then sinks to its lowest position.
 - ◆ Use the tilt adjustment (6) feature to adjust the backrest so it is at the right angle for you.
 - ◆ The setting for the driver's weight can be adjusted in 9 stages (increments of 10 kg each).
Use the handle (7) to set the correct weight for you.
If your seat has a lever for body weight adjustment, move the lever to the right until it reaches the stop.
The weight adjustment automatically switches to the 50 kg position.

7

Operation

Steering wheel

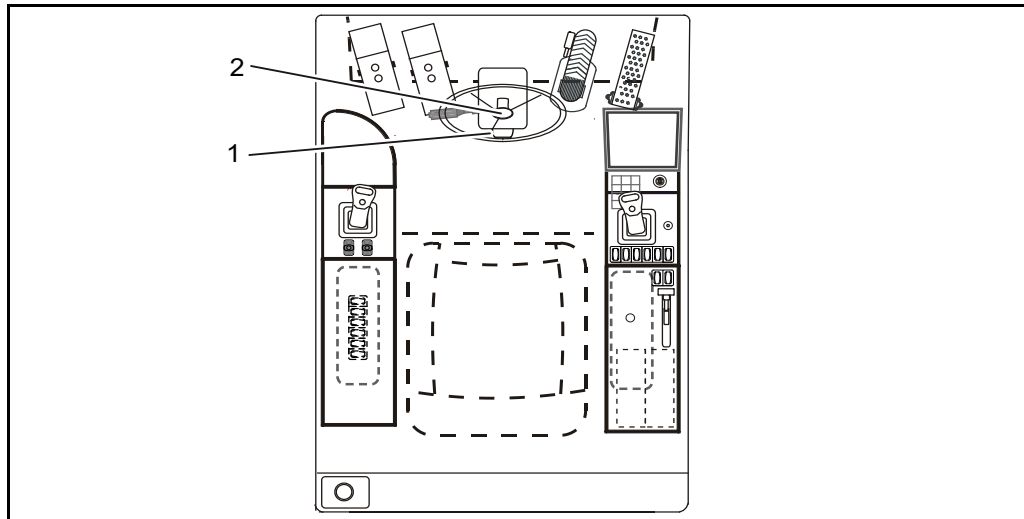


Fig. 7-2 Steering wheel

- 1** Pedal for steering wheel angle adjustment
- 2** Button for steering wheel height adjustment

Height adjustment

- ◆ Rotate the adjustment knob on the control column (2) counter-clockwise.
- ◆ Set the desired steering wheel height.
- ◆ Rotate the adjustment knob clockwise to fix it in position.

Tilt adjustment

- ◆ Press the pedal (1).
- ◆ Set the desired steering wheel tilt.
- ◆ Release the pedal.



Notice

How to achieve good cooling performance:

- ◆ After switching on the air conditioning system, open the windows for 2-3 minutes to allow the hot air (stored heat) to escape.
- ◆ Keep windows and doors closed.
- ◆ We recommend that you do not cool the vehicle interior temperature down to a level that is more than 6 to 8°C below the outside temperature.

Steering-column switch

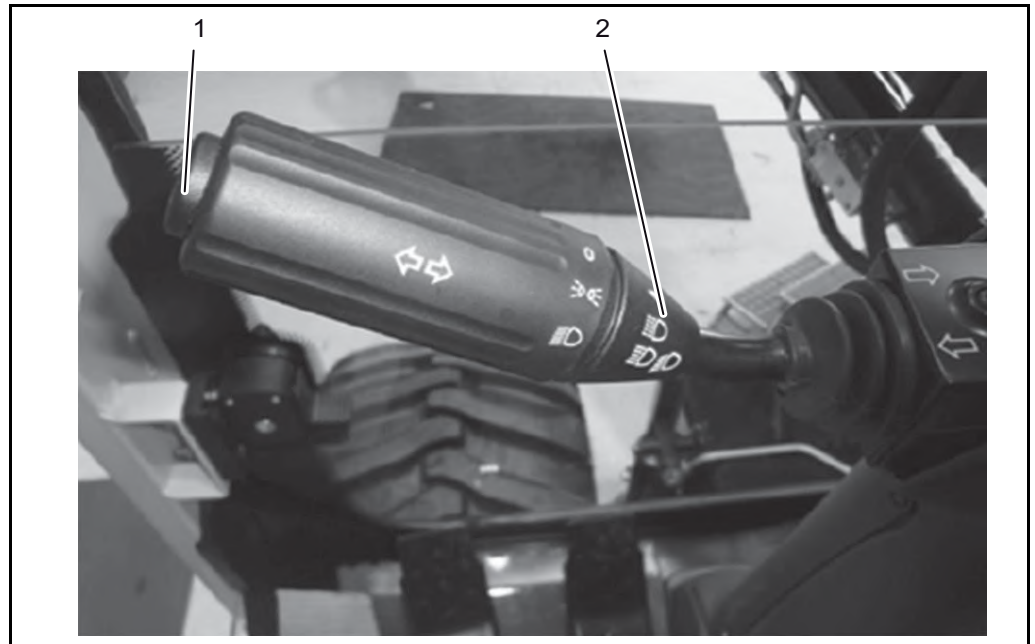


Fig. 7-3 Operation of steering-column switch

- 1** Signal horn
- 2** Indicator and light switches

- ◆ The lighting of the excavator is switched on and off by the light switch (2).
 - *Setting 0 = Light off*
 - *Setting 1 = Parking light*
 - *Setting 2 = Driving light (low beam / high beam)*
- ◆ Switch to high beam by lifting the steering-column switch (1).
 - *Blue indicator lamp "High beam". is illuminated.*



7

Operation

Front window

⚠ WARNING	
	<p>Danger due to impact A falling window can result in serious injury with fatal consequences.</p> <p>▷ Ensure that the open window is locked with the locking bolt on the left side of the window.</p>

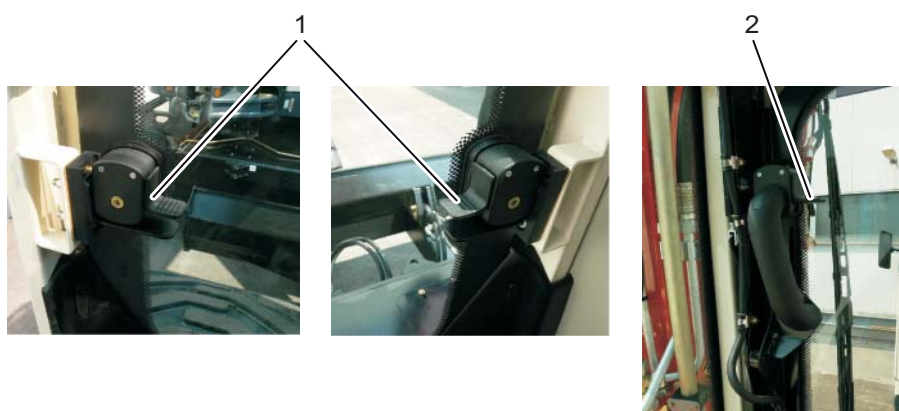


Fig. 7-4 Front window

- 1** Lever
- 2** Lever

Adjusting the front windshield

- ◆ Unlock both levers (1) to open the front window.
- ◆ Pull the window back and up at the same time.
- ◆ Lock the window in top position with the lever (2).

Ventilation position

- ◆ Release both levers (1).
- ◆ Tip the lower windshield inwards.

Door lock

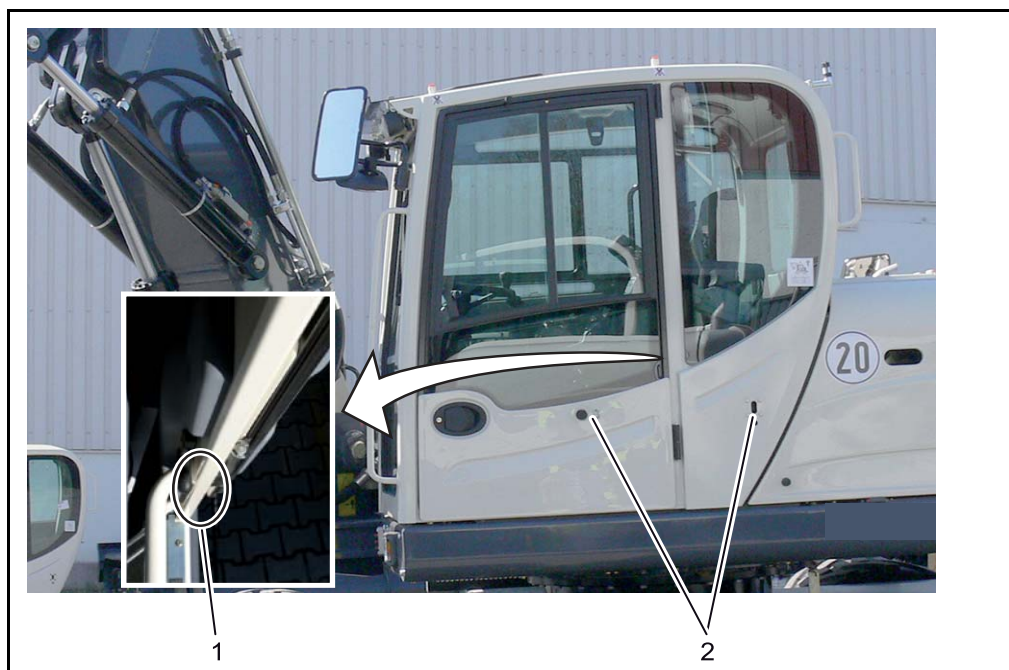


Fig. 7-5 Door lock

- 1** Inner locking lever
- 2** Outer locking device

If the door is open it must be locked in position. In such an instance, the door is to be opened until the stop, so that the lock can engage.

Releasing the door lock

- ◆ Press the lever (1) to release the door lock.

7

Operation

Dark, always switch on the lighting

⚠ WARNING



Risk of dazzle

Incorrectly adjusted headlamps can cause accidents. Danger of serious injuries with fatal consequences.

▷ Ensure that headlights are correctly adjusted.

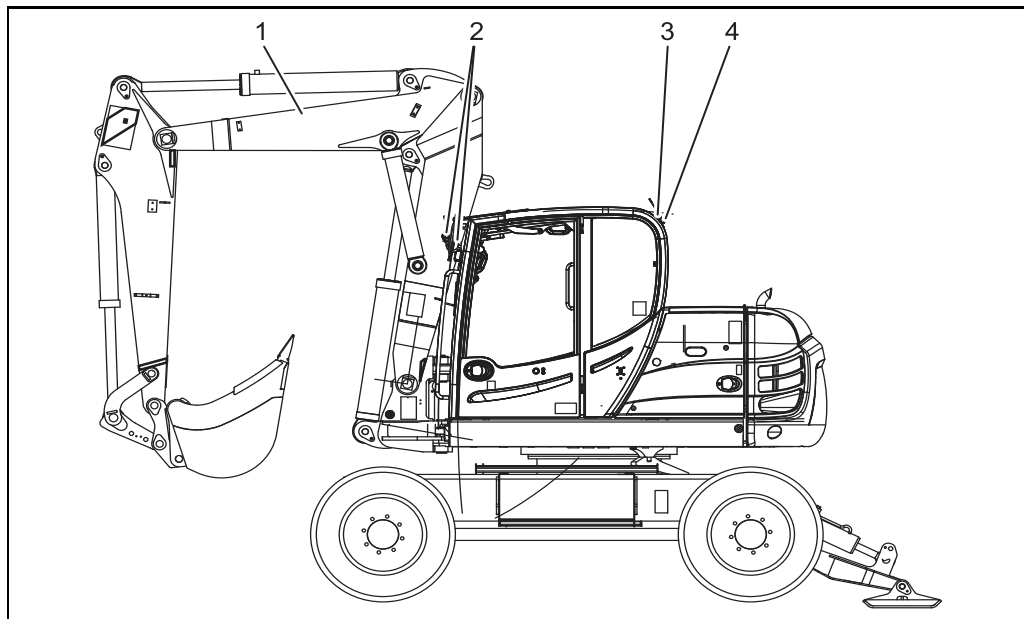


Fig. 7-6 Adjusting the lighting

- 1 Working floodlight, boom (optional)
- 2 Front working floodlight
- 3 Rear working floodlight (optional)
- 4 Rotating beacon rear left (optional)

◆ Adjust the working floodlight in such a way that the working area is illuminated.

7.2 Starting and switching off the engine

Starting the engine

⚠ WARNING	
	<p>Danger due to heavy load Machine may move unexpectedly. Danger of serious injuries with fatal consequences.</p> <p>▷ Before starting the engine, take care to ensure that no one is in the immediate vicinity of the machine or in the danger zone.</p>
CAUTION	
	<p>Risk posed by insufficient lubrication Insufficient lubrication may result in damage to the engine.</p> <p>▷ Do not drive the engine at full throttle straightaway. ▷ Drive with restraint until the engine reaches operating temperature.</p>

Notice



Each time before putting the machine into operation, the inspections according to section 7.8 must be carried out.



- ◆ Set all control levers to the neutral position.
- ◆ Engage the parking brake.



- ◆ Place the lever for the travel direction preselection in the neutral position.
- ◆ Insert the ignition key into the preheating/start switch.
- ◆ Turn the ignition key clockwise to position "1".
 → The control light "Charge indicator" lights up.
- ◆ When the main view appears on the display, turn the ignition key to position "2".
- ◆ Release the ignition key as soon as the engine is running smoothly.
 → The ignition key turns back to position "1".
 → The control light "Charge indicator" goes off.
- ◆ If the engine does not start after max. 30 seconds, return the ignition key to position "1" or "0". Repeat the starting procedure after 1 minute at the earliest.
- ◆ If the engine fails to fire after 2 starting attempts, there is a fault.



Notice








Fault causes and their resolution: See chapter 10.3 "Troubleshooting and fault rectification", consult your Yanmar dealer if necessary.

7

Operation

Monitoring during operation

Symbol	Name	Required actions when lit up
	Battery charge indicator	♦ Shut down the engine immediately, perform troubleshooting and call out service staff, if necessary.
	Engine oil pressure	
	Engine diagnostics	♦ Shut down the engine immediately, perform troubleshooting and call out service staff, if necessary.
	Particle filter regeneration	♦ Start standstill regeneration.
	Ash lamp	♦ Replace the filter. → <i>Maintenance is only to be performed by a qualified DEUTZ service team.</i>
	Air filter indicator	♦ Service the air filter, if necessary determine the cause of the contamination.
	Coolant level	♦ Shut the machine down and top up with coolant.
	Condensed water in the fuel filter	♦ Shut the machine down and empty the collecting container on the fuel filter.
	Accumulator pressure	♦ Allow the engine to run until the light goes off.
	Hydraulic oil level	♦ Shut the machine down and top up with hydraulic oil.

Symbol	Name	Required actions when lit up
	Hydraulic oil filter	Notice <ul style="list-style-type: none"> When the hydraulic oil is cold, the hydraulic oil filter clogging indicator may light up briefly. It will go out once the operating temperature is reached. ◆ Change the filter element; if necessary identify the cause of clogging.
	Put gears into neutral	<ul style="list-style-type: none"> ◆ Accelerate slightly and allow the machine to roll until the preselected gear setting is reached. → Refer to the section "See chapter "Apportionable driving with rocker acceleration pedal (excavating mode)".".
	Coolant temperature	<ul style="list-style-type: none"> ◆ Stop work. ◆ Allow the engine to cool down and idle with no load. ◆ Shut down the engine after it has cooled down. ◆ Clean the filter by switching on the reversible fan.
	Low fuel level	<ul style="list-style-type: none"> ◆ Refuel the machine.
	Overload warning indicator	<ul style="list-style-type: none"> ◆ Set down the load.



Notice

Consult the operating instructions of the engine manufacturer for all fault messages concerning the engine.

7

Operation

CAUTION	
	<p>Risk posed by unresolved faults If the engine and the machine are put into operation without prior remedy of the defect, severe damage to the engine may result.</p> <p>▷ Pay attention to the indicators and resolve any faults immediately.</p>

In the event of a malfunction, the corresponding warning lamps on the control panel will light up. See chapter 5.3 “Display and control elements in the operator's compartment”.


CAUTION	
	<p>Risk posed by lack of consumables Operating the machine with insufficient or no working consumables can result in serious machine damage!</p> <p>▷ Pay attention to the indicators. ▷ Top up the consumables.</p>

The machine is equipped with a warning buzzer, which emits a warning signal, should a fault occur.

The following faults are indicated by a warning signal:

	Low fuel level
	Engine coolant overheated

Shutting off the engine

CAUTION	
	<p>Risk of overheating</p> <p>The engine cools down steadily when run at idle speed. Shutting off the engine during cooling can lead to serious engine damage!</p> <p>▷ Before switching off the engine, allow it to run briefly at low idle speed without any load.</p>

- ◆ Turn the ignition key to position “0”.
- The engine stops automatically.

7

Operation

7.3 Drive operation

⚠ WARNING



Danger due to heavy load

Machine may move unexpectedly.

Danger of serious injuries with fatal consequences.

- ▷ Before starting the engine, take care to ensure that no one is in the immediate vicinity of the machine or in the danger zone.

⚠ WARNING



Danger due to uncontrolled movements of the machine

The machine can make unexpected movements due to technical or human errors.

In case of danger:

- ▷ Hoot at endangered people to encourage them to leave the danger zone and evade them if possible.
- ▷ Steer and break to guide the machine to safety.



Notice

When traveling on the public highway, the machine must comply with the statutory regulations for self-driving working equipment in the country in which it is being used; in the Federal Republic of Germany this is the German Road Traffic Act and the Road Traffic Licensing Act.



Notice

B95W AL: While driving on roads, the all-wheel steering must be deactivated. See chapter 7.3.2 "Steering".

7.3.1 Travel

⚠ DANGER	
	<p>Danger to life Physical injury due to incorrect operation.</p> <ul style="list-style-type: none"> ▷ The travel direction is always in relation to the undercarriage (travel drive at rear, dozer blade at front).

⚠ WARNING	
	<p>Danger due to heavy load Machine may move unexpectedly. Danger of serious injuries with fatal consequences.</p> <ul style="list-style-type: none"> ▷ When lifting and closing the exit barrier, ensure that no other operating levers and/or pedals are actuated. ▷ When driving under risky conditions, select the "slow" driving mode.

	<p>Notice When the left control console is raised, all hydraulic functions are deactivated.</p>
--	---

7

Operation

Driving with the gas pedal (on roads and off-road)

⚠ WARNING	
	<p>Danger due to heavy load Machine may move unexpectedly. Danger of serious injuries with fatal consequences.</p> <p>▷ When driving the machine with the foot throttle, always put the manual throttle into the idle position.</p>

Start Up

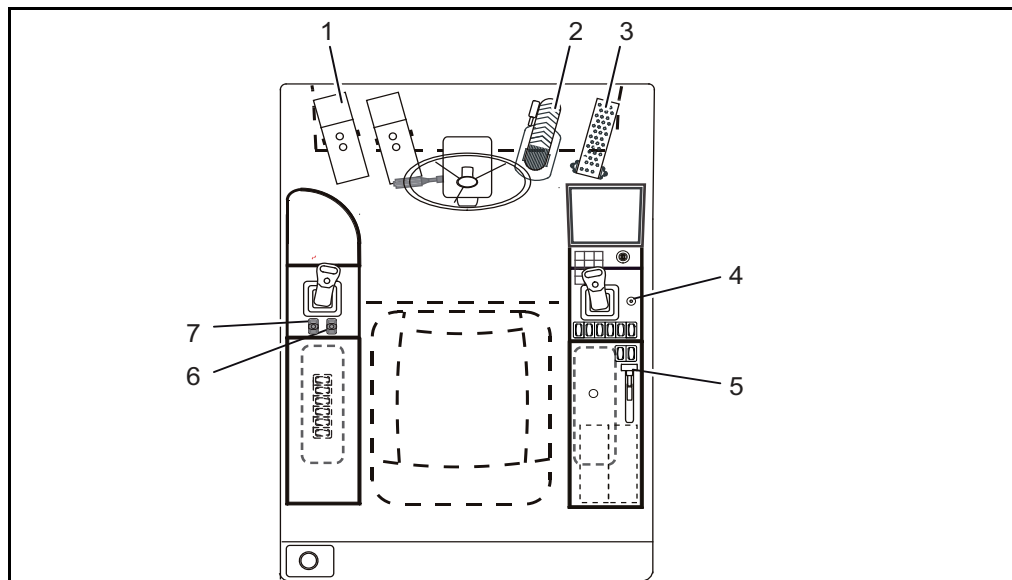


Fig. 7-7 Travel

- 1** Apportionable driving
- 2** Service brake/excavator brake
- 3** Accelerator pedal
- 4** Move forwards/backwards
- 5** Engine speed setting (manual throttle)
- 6** Right-hand support
- 7** Left-hand support



- ◆ Engage the parking brake.
 - ◆ Put the selection lever for the direction of travel (4) into neutral.
 - ◆ Start the engine.
 - ◆ Put the manual throttle (5) into idle position.
 - ◆ Move the outrigger upwards (6, 7).
 - ◆ Select driving setting 1 (slow) or 2 (fast).
- The driving setting selected will be shown on the display.



- ◆ Release the parking brake.
→ *Indicator light is off.*



- ◆ Switch off the axle oscillating lock.



- ◆ Select the desired driving direction with the driving direction selection lever (4) (the relevant direction arrow lights up) and operate the gas pedal (3).
→ *The driving direction selected will be shown on the display.*
- ◆ Control the speed with the gas pedal (3).
→ *The direction of travel may be changed quickly by operating the lever for selecting the direction of travel (4).*

Stopping

- ◆ Reduce the driving speed by easing off the throttle (3).
The hydrostatic travel drive acts as a non-wearing auxiliary brake.
→ *See chapter 7.3.3 "Braking".*

7

Operation

Apportionable driving with rocker acceleration pedal (excavating mode)

The “additional accelerator pedal for apportionable driving” is used for applications in which the maximum hydraulic power of the work attachment is demanded by the excavator and the excavator must simultaneously be shifted with great regulation.

The travel direction and travel speed are controlled by a foot rocker in this case.

⚠ WARNING



Danger due to incorrect operation

Switching to normal mode while actuating the manual throttle can lead to serious injury with fatal consequences.

- ▷ First put the manual throttle into the idle position, then switch back to normal mode with the direction of travel switch.

➔ Notice

When working hydraulics are deactivated, the “additional acceleration pedal” is without functionality.

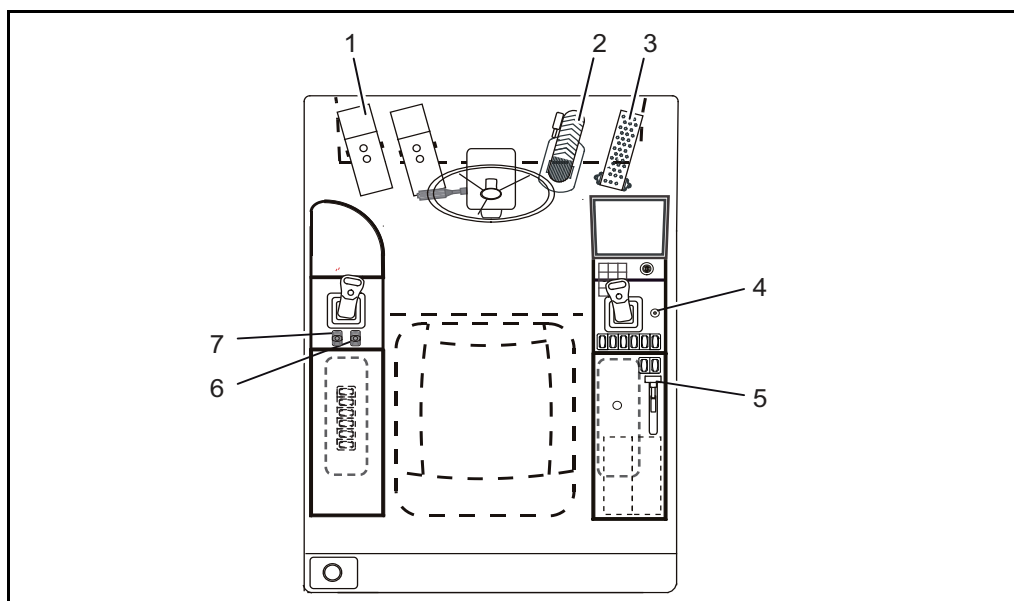
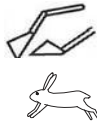


Fig. 7-8 Travel

- 1 Apportionable driving
- 2 Service brake/excavator brake
- 3 Accelerator pedal
- 4 Move forwards/backwards
- 5 Engine speed setting (manual throttle)
- 6 Right-hand support
- 7 Left-hand support

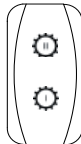


- ◆ Switch on the working hydraulics using the keypad.
- ◆ Switch off the travel range switch for high gear using the keypad.
- ◆ Put the selection lever for the direction of travel (4) into neutral.



- ◆ Switch on driving with rocker.
 - ◆ Increase the engine speed with the manual throttle (5) as required.
 - ◆ You can move the machine out of neutral by operating the foot rocker (1).
- The foot rocker (1) automatically returns to neutral position.

Gear shift control



- ◆ Select the required setting I or II on the gear shift control switch.



→ The control light on the display shows the selected setting.



- ◆ Operate the foot brake until the machine comes to a standstill.
- If the control light on the display turns red, the selected gear setting cannot be used.
- ◆ Accelerate slightly until the control light shows the selected gear setting.

Automatic idle (optional)



When the auto-idling system is activated (See chapter 5.3.4 "Display"), the motor switches to idle speed after five seconds unless the driver operates one of the control levers.

Advantages:

- Lower fuel consumption
- Lower noise level
- Increased engine lifespan

When one of the operating levers is used again, the engine speed increases to the preselected setting.

7 Operation

7.3.2 Steering

⚠ WARNING	
	<p>Risk posed by unresolved function faults Danger of serious injury and death.</p> <p>▷ In the event of steering malfunctions, determine the cause immediately (See chapter "No steering".) and call for service personnel if necessary.</p>



Notice

No support is given to servo steering while diesel engine is standing. The steering forces are very high!

Normal steering

The machine has a front axle with full hydraulic control and an emergency steering system with which the machine can still be towed if the hydraulics fail.



Fig. 7-9 Submenu, machine functions

All-wheel steering (optional)

The machine has a front and rear axle that are both controlled fully hydraulically.



Notice

In four-wheel steering, only the "slow" travel speed is possible.



Notice

When the display is activated, four-wheel steering only becomes active when the front axle is in the neutral position. Check the display.



Notice

Switching from 4WS "crab steering" to normal four-wheel steering and back is only activated if both the front and rear axles are in the neutral position. Check the display.



Notice

After deselecting four-wheel steering on the display, normal steering is only activated when the rear axle is in the neutral position. Check the display.

7

Operation

7.3.3 Braking

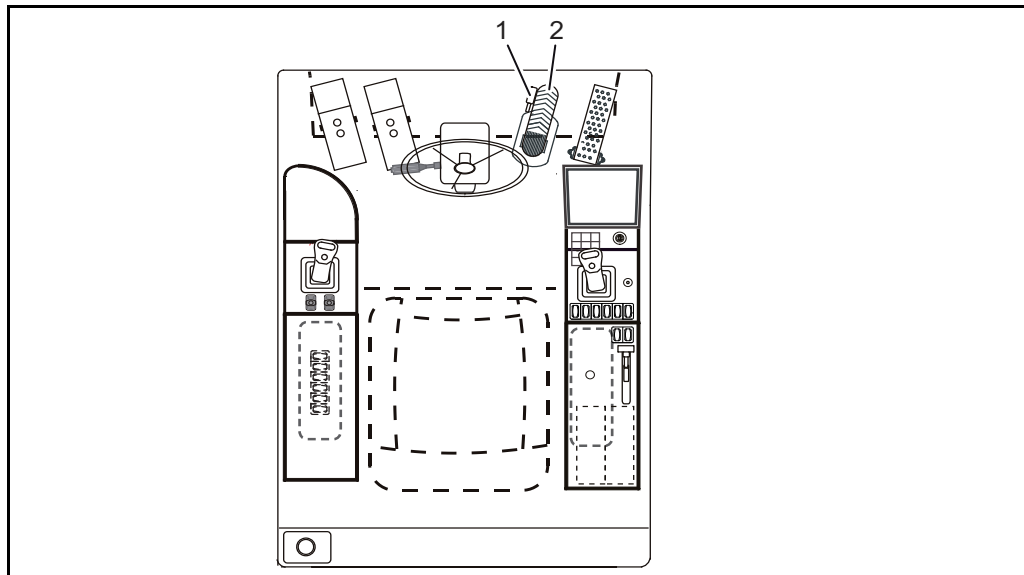


Fig. 7-10 Operation

- 1 Excavator brake unlocking
- 2 Service brake/excavator brake

Working brake

- ◆ Operate the service brake (2) as required.

Park brake

⚠ DANGER	
	<p>Risk posed by full braking</p> <p>Traveling machines come to an immediate standstill when the parking brake is activated. Risk of serious injuries.</p> <p>▷ Activate parking brake only when machine is at standstill.</p>



- ◆ The parking brake must be activated when shutting off the machine.

Excavator brake

- ◆ Apply the excavator brake/working brake (2) fully until the fastening device (1) engages. This is essential for all excavating work.

Notice



The oscillating axle is simultaneously locked with the excavator brake.

7

Operation

7.3.4 Driving on roads

It is the operator's responsibility to ensure that a first-aid box, warning triangle, hazard lights are kept with the machine according to the road traffic licensing authority (StVZO) and that the driver has a valid driver's license.

⚠ WARNING	
	<p>Danger due to heavy load</p> <p>Machine parts may move by accident. Risk of serious injury with fatal consequences.</p> <p>▷ With a front dozer blade installed, the grab must be removed while driving on roads.</p>

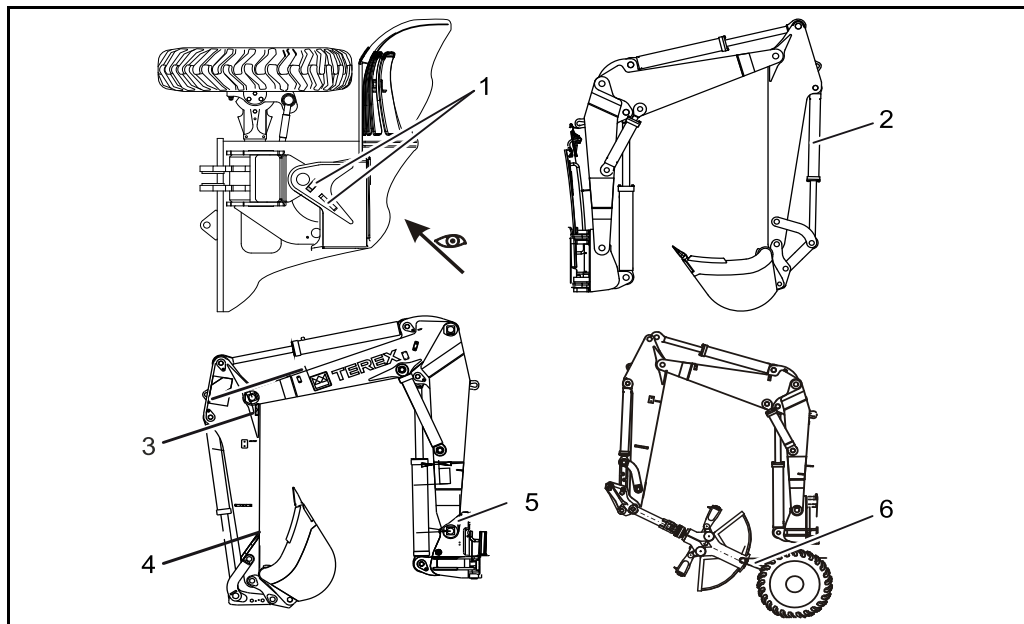


Fig. 7-11 Driving on roads

- 1 Backsight
- 2 Bucket cylinder
- 3 Colored marking above tilt control lever
- 4 Colored marking on dipperstick
- 5 Colored marking on swivel column
- 6 Pincer tube for grab

- ◆ Rotate the uppercarriage into the drive position (message on display).
- ◆ Raise the boom up to the mark on the slewing column. If there is no mark, simply raise the boom as high as it will go.
- ◆ Move the working device into transport position using the backsight (1).
- ◆ Retract the intermediate boom cylinder fully.
- ◆ Put the dipperstick into a horizontal position so that the colored marking (3) above the dipperstick aligns with the underside of the intermediate boom.



Notice

With clamshell grabs attached, the grab must be suspended on the pincer tube (6) and closed. The position of the dipperstick must be adjusted.

- ◆ Rotate the bucket in accordance with the colored marking (4) above the tilt control lever.
- ◆ Rotate the ditch-cleaning bucket in accordance with the colored marking (4) beneath the tilt control lever, position it horizontally and lock it to prevent it from swaying.
- ◆ Retract the support legs fully and secure the support plates mechanically with the chain.
- ◆ Move the support plate (optional) fully upwards and attach the removable rear reflector.
- ◆ Move the front dozer blade (optional) fully upwards.
- ◆ Switch off the working hydraulics and all-wheel drive on the keypad.




- ◆ While driving on roads, the switch for the oscillating axle locking and direction reverser must be set to "OFF".
- *The control lights in the switch are off.*
- ◆ Put the manual throttle into the idle position.
- ◆ Attach lighting unit on bucket cylinder (2) and connect to the socket (on upper carriage, in front, next to cab) (only as required, e.g. in case of poor visibility, darkness, etc).
- ◆ Check the function of the direction indicators, hazard warning lights, horn, low/high beam.
- ◆ Close the cab door.

7

Operation

Traveling downhill

⚠ WARNING	
	<p>Danger due to heavy load Machine parts may move by accident. Risk of serious injury with fatal consequences.</p> <ul style="list-style-type: none"> ▷ When traveling downhill, proceed carefully and at moderate speed. ▷ Do not push the pedal down fully. ▷ Before switching out of hydraulic fast gear “rabbit” into the hydraulic slow gear, reduce travel speed. ▷ When driving downhill at a gradient of more than 8 %: Stop before gradient and change back to gear setting “I”.

7.4 Switching off the machine (parking)

⚠ WARNING	
	<p>Danger due to heavy load Machine may move unexpectedly. Danger of serious injuries with fatal consequences.</p> <p>➤ Use chocks to stop the machine from rolling away.</p>

- ◆ If possible park the machine on solid and level ground.
- ◆ Lower the loading equipment to the ground by supporting it on the dipper.
- ◆ Lower the dozer blade/support device.
- ◆ Put the machine into the parking position (the uppercarriage in driving position).
- ◆ Return the manual throttle lever to the low idle position.
- ◆ Relieve any residual pressures.
- ◆ Put the travel direction pre-selection switch into neutral.
- ◆ Engage the parking brake.



- ◆ Switch the working hydraulics off on the keypad.
- ◆ Shut down the engine and pull out the ignition key.
- ◆ Put the exit barrier in an upright position.
- ◆ Lock the windows and the doors.
- ◆ If necessary, flick the main battery switch to “zero”.

7

Operation

7.5 Work operation of the machine

7.5.1 General safety

⚠ WARNING



Danger due to heavy load

Machine may move unexpectedly.

Danger of serious injury and death.

- ▷ Before starting the engine, take care to ensure that no one is in the immediate vicinity of the machine or in the danger zone.
- ▷ If the loading equipment makes uncontrolled movements, switch off the engine.
- ▷ Start at a low engine speed when familiarizing yourself with the controls.

⚠ WARNING



Danger due to heavy load

The uppercarriage may drift unexpectedly when slewing commences.

Danger of serious injuries with fatal consequences.

- ▷ When starting to swing: Actuate slewing pressure switch. For this purpose, actuate button until the uppercarriage starts to swing.
- ▷ Counteract the drift motion with greater joystick control.
- ▷ Releasing the joystick causes the slew gear brake to respond.

⚠ WARNING



Danger due to heavy load

Machine may move unexpectedly.

Danger of serious injuries with fatal consequences.

- ▷ When opening and closing the exit barrier, ensure that no other operating lever and/or pedals are actuated.

Notice



If the exit barrier is lifted or the maintenance ladder folded out, all travel and work functions are deactivated.

Control system

The machine is equipped with an "ISO control". as standard. The following description is based on this version. At the customer's request, the machine can be fitted with a switchable control system for the work equipment.

→ This machine may be equipped with an option that allows changeover from ISO to SAE control. Before operating the work equipment, check whether there is a changeover switch or which operating mode is set.

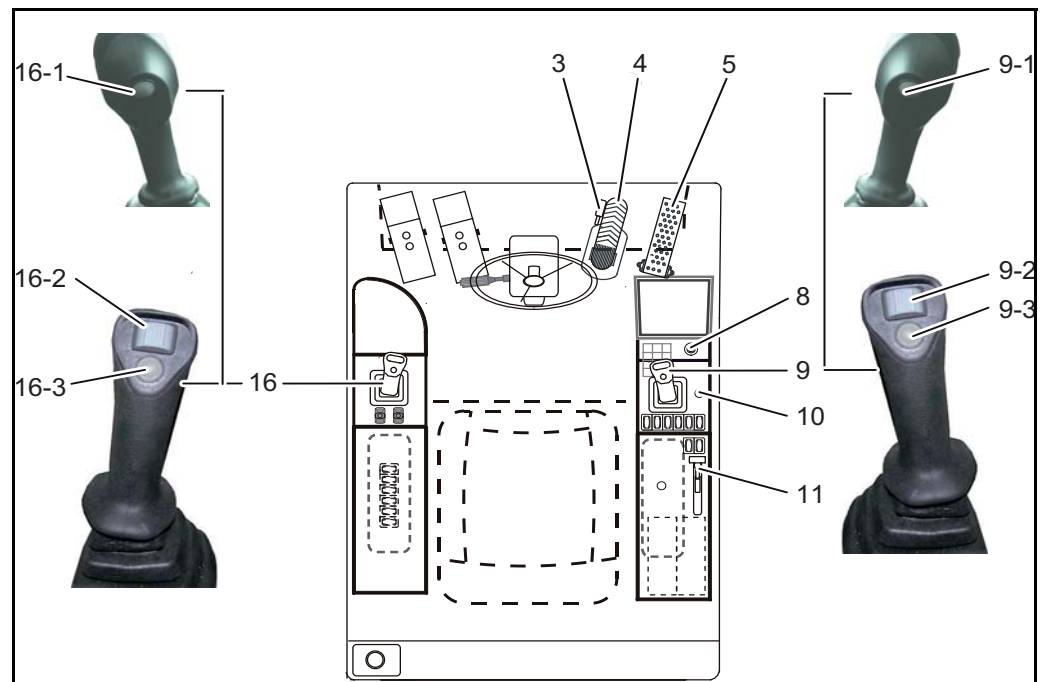


Fig. 7-12 Operation

- 3** Excavator brake unlocking
- 4** Service brake/excavator brake
- 5** Accelerator pedal
- 8** Start switch
- 9** Joystick - excavator equipment right
 - 9-1 Continuous operation for additional control circuit (save key)
 - 9-2 Side control for additional control circuit
 - 9-3 Switch articulation/articulated boom
- 10** Forwards/reverse
- 11** Engine speed control (manual throttle)
- 16** Joystick - excavator equipment, left
 - 16-1 Signal horn
 - 16-2 Actuate dial for auxiliary control circuit 2
 - 16-3 Slewing pressure switch

7 Operation

Lever control

⚠ WARNING	
	<p>Danger due to heavy load Machine may move unexpectedly. Danger of serious injuries with fatal consequences.</p> <ul style="list-style-type: none"> ▷ During excavation work, engage excavator brake and oscillating axle lock. ▷ Support excavator with support legs and/or support plate. Ensure that the wheels have sufficient grip. Only in this way is an optimal stability achieved.

ISO control

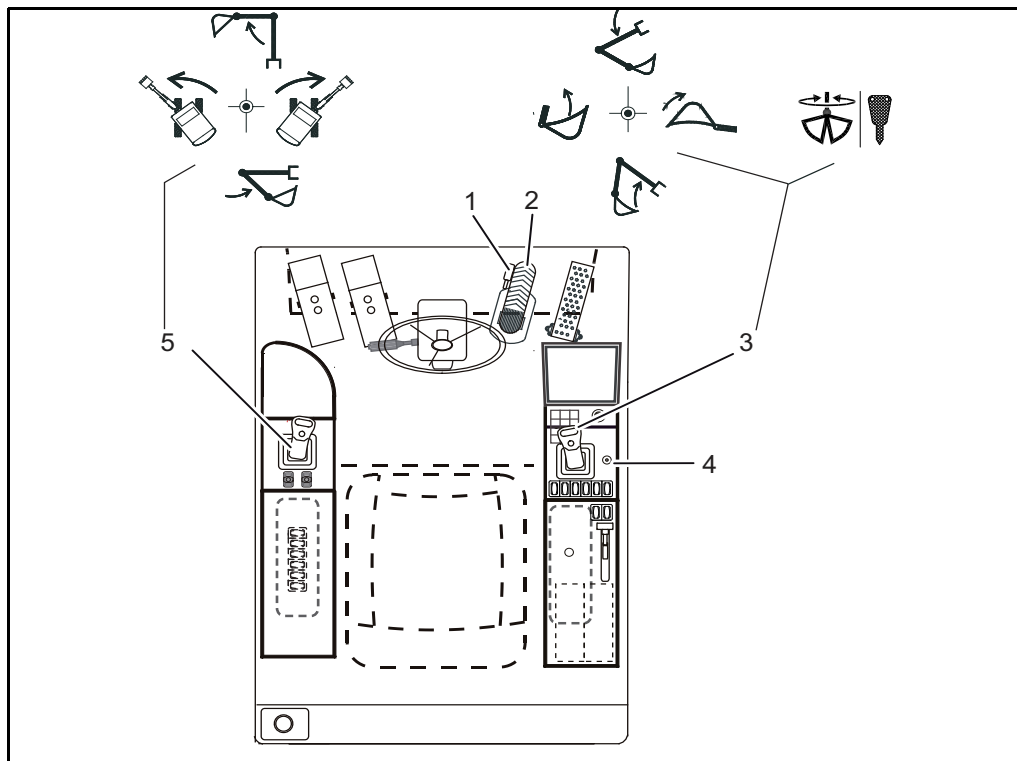











Fig. 7-13 Lever control

Loc.	Function
1	Excavator brake unlocking
2	Service brake/excavator brake
3	Joystick - excavator equipment, right
	Tilt dipper forward
	Tilt dipper back
	Lower boom
	Raise boom
	Grabber/hammer mode
4	Move forwards/backwards
5	Joystick - excavator equipment, left
	Swing to the left
	Swing to the right
	Extend dipperstick
	Retract dipperstick

Tab. 7-1 Lever control

- ◆ Acquaint yourself well with the lever controls before commencing excavation work.
- ◆ Use low engine speed when familiarizing yourself with the controls.
- ◆ Always lock the excavator brake (3/4).
- ◆ Put the travel direction lever (10) into the neutral position.

N



- ◆ Switch the working hydraulics on on the keypad.

7 Operation

Optional

SAE control system

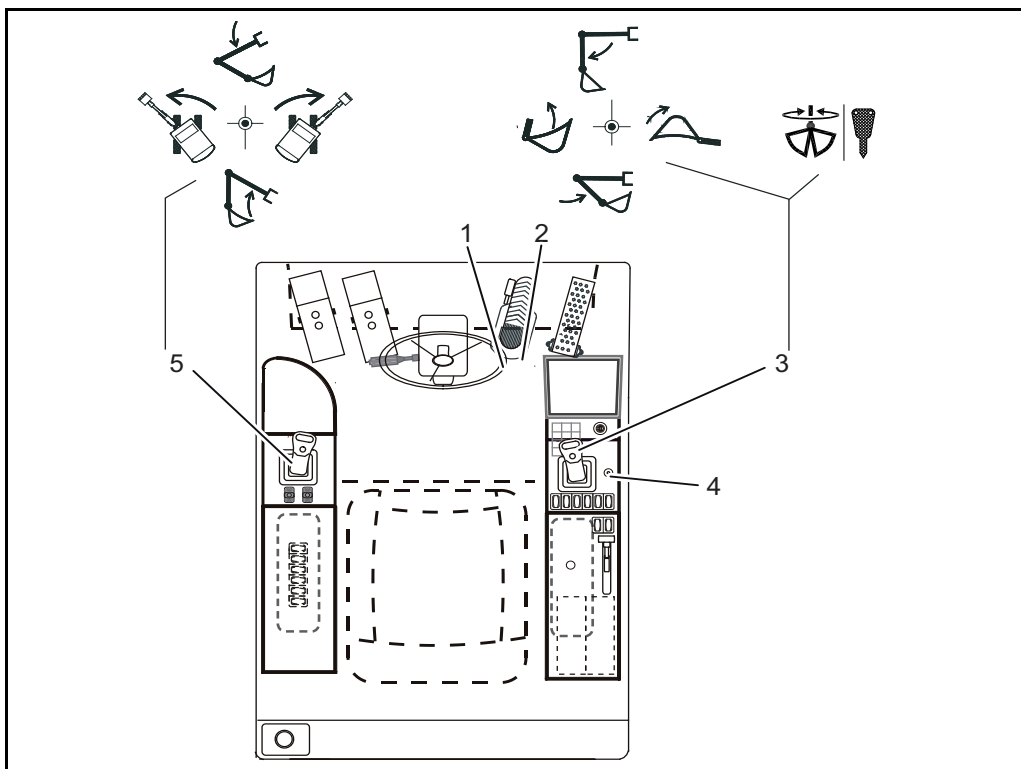











Fig. 7-14 Lever control

Pos.	Functionality
1	Excavator brake unlocking
2	Service brake/excavator brake
3	Joystick - excavator equipment, right
	Extend dipperstick
	Retract dipperstick
	Tilt dipper forward
	Tilt dipper back
	Grabber/hammer mode
4	Move forwards/backwards
5	Joystick - excavator equipment, left
	Lower boom
	Raise boom
	Swing to the left
	Swing to the right

Tab. 7-2 Lever control

- ◆ Acquaint yourself well with the lever controls before commencing excavation work.
- ◆ Use low engine speed when familiarizing yourself with the controls.
- ◆ Put the travel direction lever into neutral. Check the display.
- ◆ Switch the working hydraulics on on the keypad.



7

Operation

7.5.2 Operation of the loading equipment

Actuating the working equipment

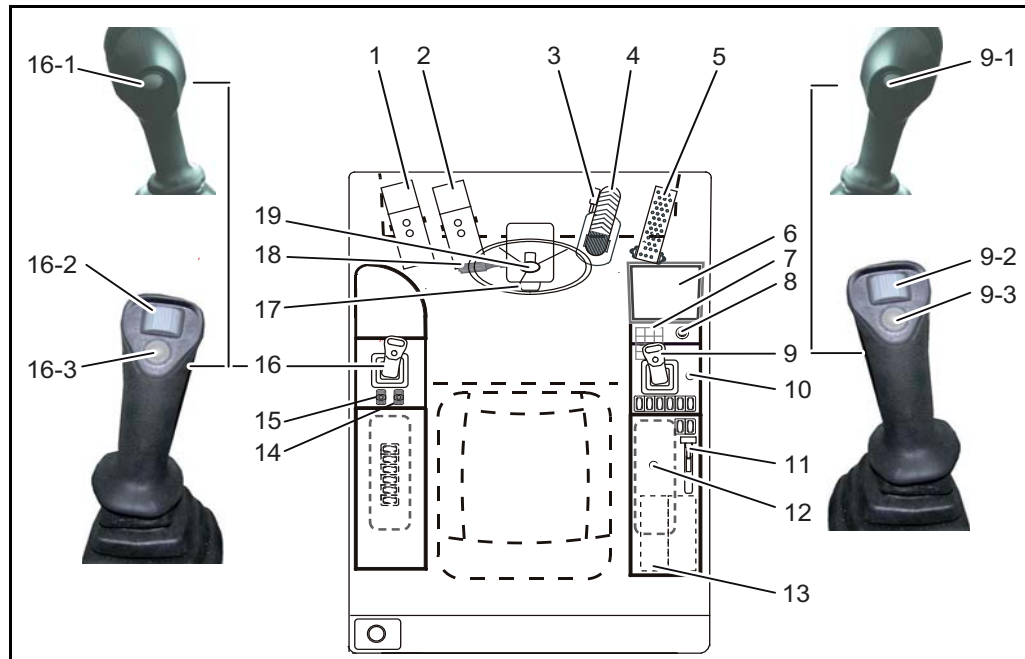


Fig. 7-15 Control elements

- 1** Apportionable driving
- 2** Actuate intermediate boom/articulation
- 3** Excavator brake unlocking
- 4** Service brake/excavator brake
- 5** Accelerator pedal
- 6** Display
- 7** Keypad
- 8** Start switch
- 9** Joystick - excavating equipment, right
 - 9-1 Continuous operation for additional control circuit (save key)
 - 9-2 Slide control for additional control circuit 1
 - 9-3 Switch articulation/articulated boom
- 10** Move forwards/backwards
- 11** Engine speed setting (manual throttle)
- 12** Power socket 12 V
- 13** Option - radio
- 14** Left-hand support
- 15** Right-hand support
- 16** Joystick, left
 - 16-1 Signal horn
 - 16-2 Actuate dial for auxiliary control circuit 2
 - 16-3 Slewing pressure switch
- 17** Steering wheel angle adjustment pedal
- 18** Signal horn, direction indicator and light switch
- 19** Button for steering wheel height adjustment

Actuate intermediate boom/ articulation

⚠ WARNING	
	<p>Danger due to heavy load Machine may move unexpectedly. Danger of serious injuries with fatal consequences.</p> <p>▷ When using wide work tools, e. g. Ditch cleaning bucket, wide backhoe bucket or special attachments, the driver must exercise particular caution when working with the Knickmatik.</p>

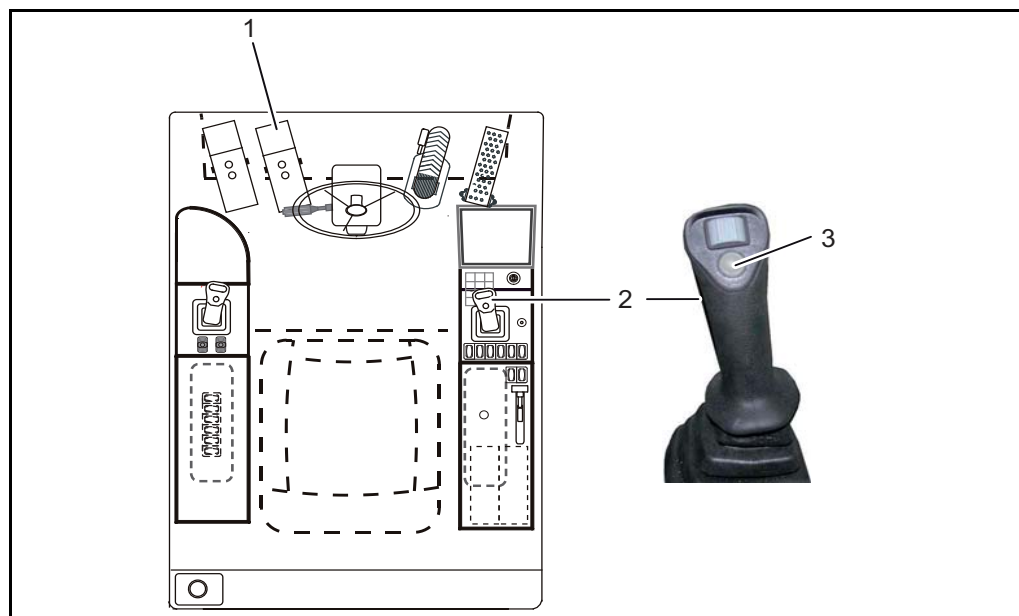


Fig. 7-16 Operation of intermediate boom

- 1** Actuate intermediate boom/articulation
- 2** Joystick - excavator equipment right
- 3** Changeover articulation/articulated boom

Pedal for articulation (1)

Position/actuation	Effect	
forwards	Boom swings to the left.	
backwards	Boom swings to the right.	

Tab. 7-3 Control pedal for articulation

- ◆ Press and hold button on actuating lever (3) – “articulation” actuation activated.

7 Operation

Actuation of support legs

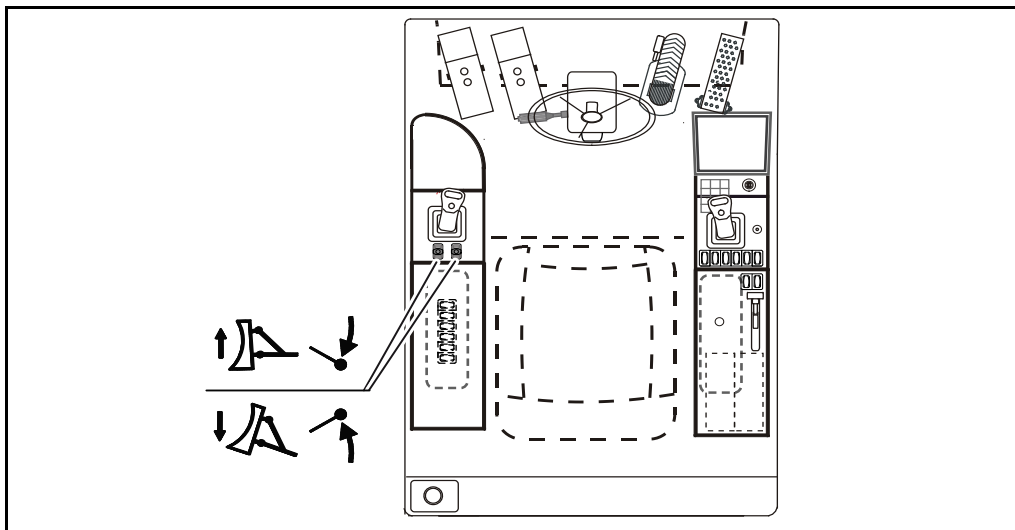


Fig. 7-17 Stabilizer control

Level for support legs

Actuation	Effect
Right lever forwards	Right support leg is lowered.
Right lever back	Right support leg is raised.
Left lever forward	Left support leg is lowered.
Left lever back	Left support leg is raised.

Tab. 7-4 Outrigger



Notice

Depose load before raising support legs.
Before activating the support legs, the front dozing blade (optional) must be deactivated.
The uppercarriage and digging tool must be in the driving position.

Operation of rear support plate (optional)

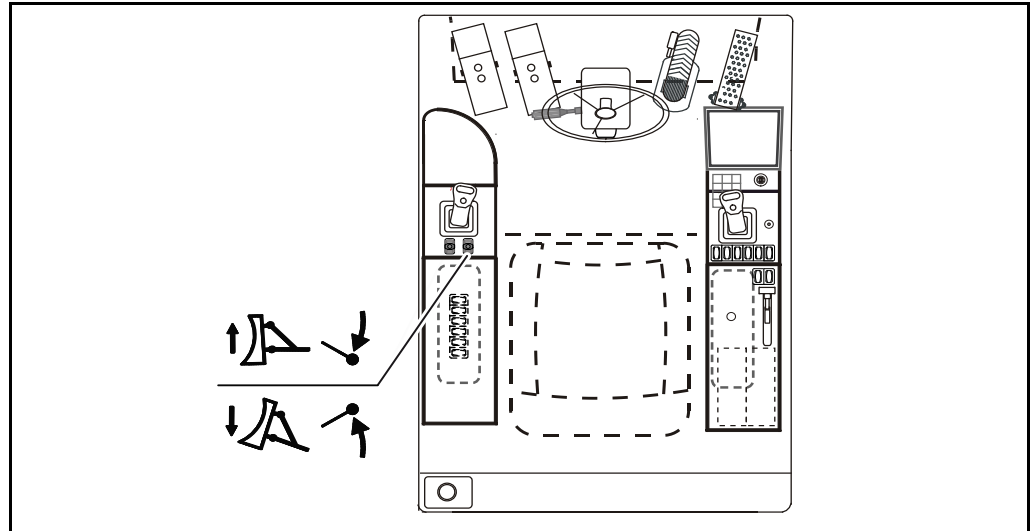


Fig. 7-18 Operation of rear support plate



Support plate lever

- ◆ Activate the support plate on the display in the machine options menu.

Actuation	Effect
Right lever forwards	Support plate is lowered.
Right lever back	Support plate is raised.

Tab. 7-5 Support plate

7

Operation

Actuation of front dozing blade (optional)

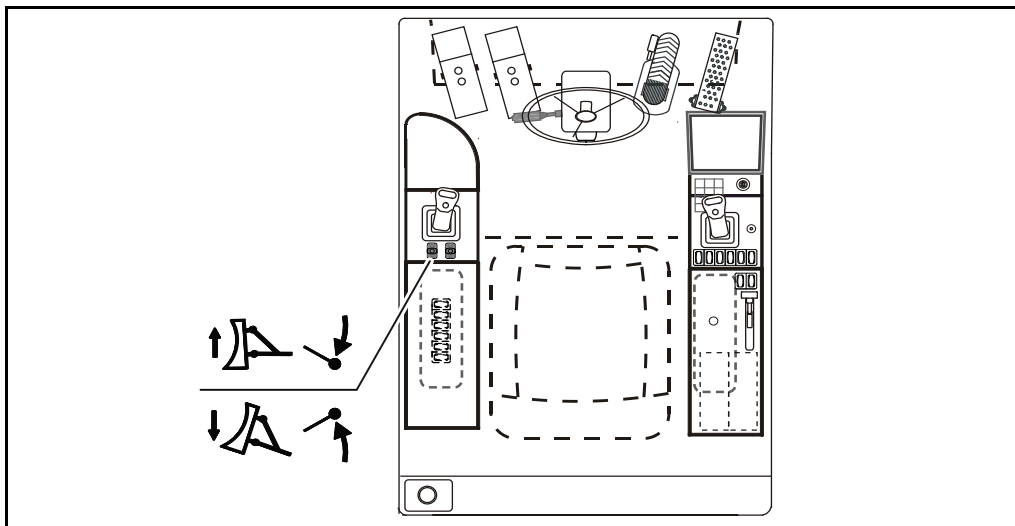


Fig. 7-19 Front dozing blade control

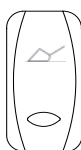


- ◆ Activate the front dozing blade on the display in the machine options menu.

Front dozer blade lever

Actuation	Effect
Left lever forward	Front dozing blade is lowered.
Left lever back	Front dozing blade is raised.

Tab. 7-6 Front dozer blade



Float position front dozing blade (optional)

- ◆ Move the “float position dozing blade” switch to the ON position.
- The change is made from lowering the dozing blade to the float position.



Notice

When the float position is activated, the dozer blade cannot be operated.

Actuation of oscillating axle lock

The oscillating axle lock is controlled by the excavator brake; that is, upon engaging the brake, the oscillating axle is automatically locked.

For special application cases, it is possible to activate the oscillating axle locking independent of the excavator brake.



Notice

Before locking the oscillation axle, stabilize the machine using the supports.



- ◆ Turn on the oscillating axle lock.
- The indicator light in the switch lights up red.



Notice



After completing the special work, set switch for oscillating axle locking immediately back to "OFF".



Bucket change-over with fork carrier fitted (optional)

- ◆ Switch on the bucket changeover on the display in the machine functions sub-menu.

Joystick right

Position/actuation	Effect	
to the left	Tilt fork carrier back	
to the right	Tilt fork carrier forward.	

Tab. 7-7 Bucket change-over with fork carrier fitted

7 Operation

Actuating auxiliary control circuit 1

Operating lever for auxiliary control circuit 1 (1)

Depending on the attached additional tool the pedal functions for the auxiliary control circuit (1) will vary:

- Actuate hammer and grab
- Open and close grab
- Rotate grab

Possible additional tools are:

- Hydraulic hammers
- Grabs
- Clamshell grabs
- Milling attachment
- Tilt bucket
- Ditch cleaning bucket

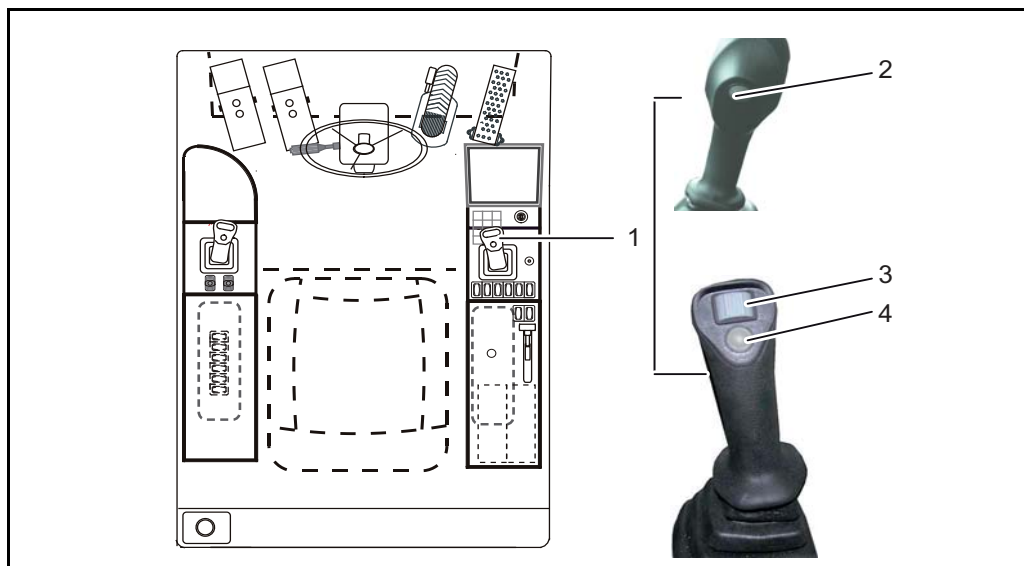


Fig. 7-20 Using auxiliary control circuit 1

- 1 Joystick - excavator equipment right
- 2 Continuous operation for additional control circuit (save key)
- 3 Actuate dial for auxiliary control circuit 1
- 4 Changeover articulation/articulated boom



Notice

The slide control integrated into the right joystick facilitates continuously variable control of the auxiliary hydraulic circuit for attached devices. The quantity of hydraulic oil required for the proportionally controllable auxiliary circuit can be set via the display and adapted to suit the device fitted, e.g. hydraulic breaker.

→ See chapter 5.3.4 "Display".

Continuous operation - additional control circuit 1

- ◆ Switch on continuous operation: Move the dial (3) integrated into the right joystick to the right or left and hold it there, then press the front button on the joystick (2).
- ◆ Deactivating continuous operation: Press the button at the front of the joystick (2) again or push dial (3) fully to the right or left until it reaches the stop.

Operating the hammer



Notice

The mounting and operating instructions of the hydraulic rock breaker manufacturer must be observed.



- ◆ Set max. available oil volume for auxiliary control circuit 1 on the display.
→ See chapter 5.3.4 "Display".
- ◆ Use the roller on the right-hand joystick (3) to control the hammer precisely.

Using the grab (swing bucket etc.)



- ◆ Set required oil volume for auxiliary circuit 1 on the display.
→ See chapter 5.3.4 "Display".
- ◆ Activate the auxiliary control circuit via the dial (3) on the joystick.

7 Operation

Operating lever for auxiliary control circuit 2 (3)

Actuation – auxiliary control circuit 2 (optional)

Depending on the attached additional tool the pedal functions for the auxiliary control circuit (3) will vary:

- Operating the grab
- Open and close grab
- Rotate grab

Possible additional tools are:

- Sorting grab
- Mowing bucket
- Hammer

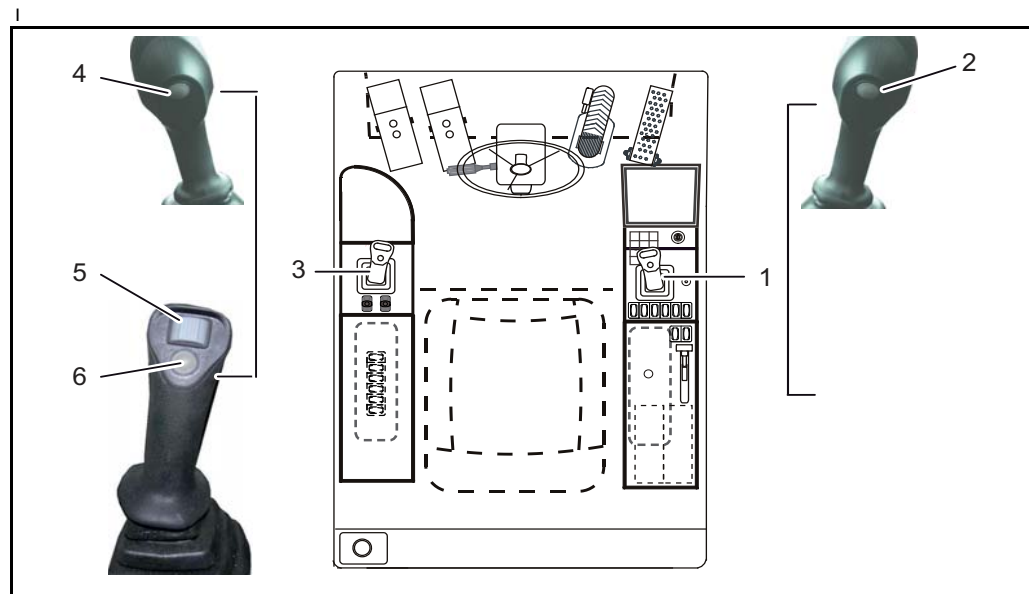


Fig. 7-21 Operating auxiliary control circuit 2

- 1 Joystick - excavator equipment right
- 2 Continuous operation for additional control circuit (save key)
- 3 Joystick - excavator equipment, left
- 4 Signal horn
- 5 Actuate dial for auxiliary control circuit 2
- 6 Slewing pressure switch

Operating the hammer



Notice

The mounting and operating instructions of the hydraulic rock breaker manufacturer must be observed.



- ◆ Set max. available oil volume for auxiliary control circuit 2 on the display.
- See chapter 5.3.4 "Display".
- ◆ Use the dial (5) on the left-hand joystick to control the hammer precisely.

Using the grab (swing bucket etc.)

- ◆ Set required oil volume for auxiliary circuit 2 on the display.
→ See chapter 5.3.4 "Display".
- ◆ Activate the auxiliary control circuit via the dial (5) on the joystick.

Continuous operation - additional control circuit 2

- ◆ Switch on continuous operation: Move the dial (5) integrated into the right joystick to the right or left and hold it there, then press the front button on the joystick (2).
- ◆ Deactivating continuous operation: Press the button at the front of the joystick (2) again or push dial (5) fully to the right or left until it reaches the stop.

Operating the hammer



Notice

The mounting and operating instructions of the hydraulic rock breaker manufacturer must be observed.



- ◆ Set max. available oil volume for auxiliary control circuit 2 on the display.
→ See chapter 5.3.4 "Display".
- ◆ Use the roller on the left-hand joystick (5) to control the hammer precisely.

Using the grab (swing bucket etc.)



- ◆ Set required oil volume for auxiliary circuit 2 on the display.
→ See chapter 5.3.4 "Display".
- ◆ Activate the auxiliary control circuit via the dial (5) on the joystick.

7 Operation

Actuation – auxiliary control circuit 2 and 3 (optional)

Operating level for auxiliary control circuit 2 and 3 (1 or 3)

Depending on the additional tool attached, the operating lever functions for the additional control circuit (9 or 17) will differ:

- Operating the grab
- Open and close grab
- Rotate grab

Possible additional tools are:

- Sorting grab
- Mowing bucket
- Hammerl

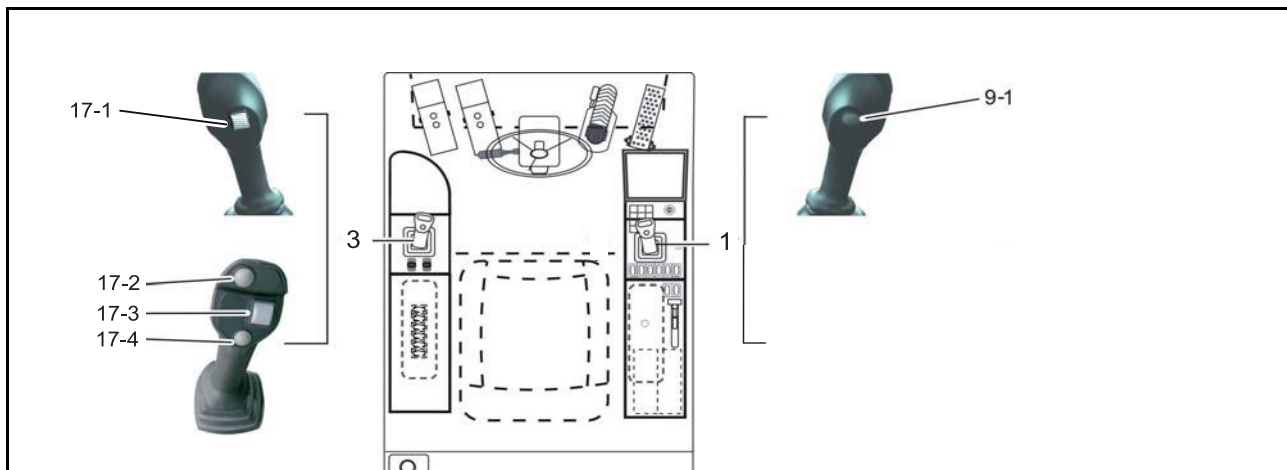


Fig. 7-22 Operating the auxiliary control circuit 2 and 3

9 Joystick – excavating equipment, right

9-1 Continuous operation for additional control circuit (save key)

17 Joystick – excavator equipment, left

17-1 Auxiliary control circuit 3

17-2 Slewing pressure switch

17-3 Actuate dial for auxiliary control circuit 2

17-4 Signal horn

Operating the hammer



Notice



The mounting and operating instructions of the hydraulic rock breaker manufacturer must be observed.

- ◆ Set max. available oil volume for control circuit 2 or 3 on the display.
- See chapter 5.3.4 "Display".
- ◆ Make fine adjustments to the breaker using the dial on the joystick (4 or 6).

**Using the grab
(swing bucket
etc.)**



- ◆ Set required oil volume for control circuit 2 or 3 on the display.
→ *See chapter 5.3.4 "Display"*.
- ◆ Activate the auxiliary control circuit via the dial (4 or 6) on the joystick.

Continuous operation - auxiliary control circuit 2 and 3

- ◆ Switch on continuous operation: Move the dial (4 or 6) integrated into the right joystick to the right or left and hold it there, then press the front button on the joystick (1).
- ◆ Deactivating continuous operation: Press the front button on the joystick (9-1) again or move the dial (4 or 6) fully to right or left.

**Operating the
hammer**



Notice

The mounting and operating instructions of the hydraulic rock breaker manufacturer must be observed.

- ◆ Set max. available oil volume for control circuit 2 or 3 on the display.
→ *See chapter 5.3.4 "Display"*.
- ◆ Make fine adjustments to the hammer using the dial on the joystick (4 or 6).

**Using the grab
(swing bucket
etc.)**



- ◆ Set required oil volume for control circuit 2 or 3 on the display.
→ *See chapter 5.3.4 "Display"*.
- Activate the auxiliary control circuit via the dial (4 or 6) on the joystick.

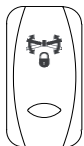
7

Operation

7.5.3 Using the machine for hoisting

CAUTION	
	Risk posed by overload
	Risk of machine damage
	▷ Machines may only be used for hoisting if they are equipped and approved for such work.
	▷ The permitted load of the machine must not be exceeded.
	▷ Observe the maximum permissible load for the load hook.

- ◆ When using the machine for hoisting, the safety notes must be observed.
- See chapter 3.20 "Hoisting operation".
- ◆ Loads may only be fastened which do not exceed the lifting capacities of the machine and the lifting gear.
- See chapter 9.2.12 "Load capacities".
- ◆ Turn on the oscillating axle lock.
- The indicator light in the switch lights up red.



Overload warning device

WARNING	
	Risk of tipping over
	In the event of an overload, a warning is issued in the form of a visual display and acoustic signal. This does not prevent the risk of tipping over.
	Danger of serious injury and death.
	▷ Do not overload the machine.
	▷ Operate the machine with due care.



- ◆ The permitted load of the machine must not be exceeded.
- During operation, keep an eye on the display of the overload warning device.

The integrated overload warning device cannot fully rule out the possibility of accidents due to incorrect operation.

This is particularly true with regard to the following:

- Bottom hook of the load or lifting gear
- Excessive delay or acceleration forces (hard braking or a strong start to the slewing action with the load being moved)
- A load falling against the cable
- Pulling up at an angle
- Moving the machine to an area where the ground slopes more
- Wind load

Avoid these hazards by using the machine cautiously and prudently.

Using as a crane ♦ Switch the overload warning device on using the keypad when using as a crane.



♦ Keep an eye on the overload warning indicator.

When the warning signal (continuous buzzing noise) sounds, you must:

- ♦ Immediately set down the load
- ♦ Reduce the reach and/or
- ♦ Reduce the load

Suspension options, attaching loads

⚠ WARNING	
	<p>Risk posed by heavy loads Loads may move unexpectedly. Danger of serious injury and death.</p> <ul style="list-style-type: none"> ▷ Attach loads securely so that they cannot slip or fall out of place. ▷ Always wear personal protective equipment when working with load-bearing equipment. ▷ Do not enter the danger area.

- Load hook is fitted in place of bucket etc.
- Hook with safety net is screwed onto the bucket rod (in the case of quick-mounting buckets with ejectors, remove the hook).
- ♦ A suitable and appropriately sized load-bearing medium must be employed for picking up the material to be lifted.

Attaching and moving loads

Observe the safety instructions. See chapter 3.20 "Hoisting operation".

Checking the overload warning device



The proper working condition of the overload warning device must always be checked before using the machine for crane operations.

- ♦ Switch the overload warning device on using the keypad when using as a crane.
- ♦ Move the boom fully upwards (extend boom cylinder).
 - Load warning indicator rises to the red range.
 - An acoustic warning signal (continuous noise) sounds.
 - Overload warning device is working.

7

Operation

7.5.4 Changing the work attachments

Various work attachments are available to achieve maximum utilization of the machine for a variety of applications.

The machine can be equipped with a quick attach to shorten the time it takes to change attachments.

When mounting a clamshell grab, slewable ditch-cleaning bucket or a hydraulic rock breaker, an auxiliary control circuit is required. Additionally, a reduced-pressure return (return directly to tank) may be required for hydraulic hammer operations.



Notice

Under certain circumstances, it is possible to use the work attachments of predecessor models on our machines. If work attachments of predecessor models are mounted, they may have to be adjusted and/or may be subject to utilization restrictions. It is essential to consult your dealer before mounting such a work attachment.

⚠ WARNING



Danger due to heavy load

Machine parts may move by accident.

Danger of serious injuries.

- ▷ Wear personal protective equipment.
- ▷ Always begin by ensuring that work attachments will not tilt.
- ▷ Do not enter the danger area.
- ▷ After removing work attachments, secure them to prevent them from tipping over.

CAUTION



Risk posed by mounting tools from other manufacturers

Risk of machine damage.

- ▷ When attaching tools from other companies, you must observe the manufacturer specifications regarding maximum and minimum operating pressure as well as the permissible volume flows for the tool concerned.
- ▷ It may consequently be necessary to carry out readjustments (e.g., to the pressure relief valves).

CAUTION



Risk posed by dirt

Dirty bearing points can result in damage to the quick-attach system.

- ▷ Keep the bearing points on the quick-attach system and work attachment free of dirt.

Mounting work attachments

⚠ WARNING



Danger due to heavy load

Machine parts may move by accident. Work attachments may fall down.

Danger of serious injuries.

- ▷ Wear personal protective equipment.
- ▷ Always begin by ensuring that work attachments will not tilt.
- ▷ Do not enter the danger area.
- ▷ After removing work attachments, secure them to prevent them from tipping over.

Procedure for changing work attachments using the mechanical quick-attach system

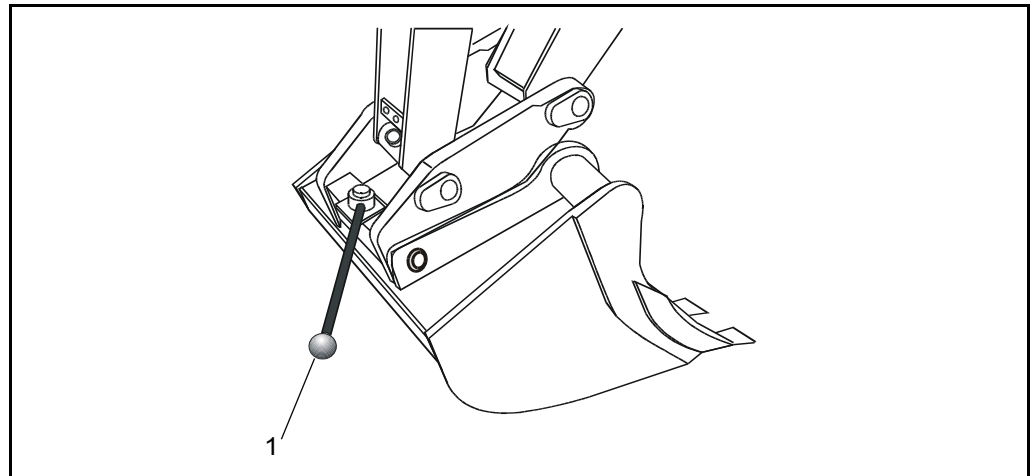


Fig. 7-23 Install working tools

1 Control rod



Notice

In the case of a hydraulically actuated auxiliary tool, the hydraulic connection must be loosened. The hydraulic system must be depressurized.

- ◆ Place the work attachment on the ground such that it cannot tip or turn over.
- ◆ Open the quick-attachment system using the control rod (1), until the locking pins are completely retracted.
- ◆ Check the function of the quick-attach system lock and grease the bolts, if required.
- See chapter 6.5.1 "Lubrication schedule".
- ◆ Attach another work attachment and close the quick-attach system until the locking pins are completely extended and the lock has engaged.
- ◆ Keep the control rod in the driver's cab in the compartment intended for it on the left of the driver's seat.

7

Operation

Hydraulic quick-attachment system (optional)



Notice

Two-handed operation (safety switching) is required to operate the hydraulic quick-attachment system.

Picking up work attachments



Opening the quick-attachment system:

- ◆ Release the lock on the toggle switch and hold it in the “open quick-attachment system” position.
- ◆ At the same time, move the right joystick (9) to the “bucket on”. function, until the quick-attachment system is unlocked and the tool has been released.
- *The locking pins on the quick-attachment system retract.*
- *The work attachment can be picked up.*

Closing the quick-attachment system:

- ◆ When the tool is released, move the toggle switch to the “Close quick-attachment system”. and lock the switch.
- ◆ At the same time move the right joystick (9) until the quick-attachment system is locked.
- *When the rocker switch is not operated, the quick-attach system receives pressure via the pump control and consequently extends automatically; when it is extended there is always pump pressure available. This prevents the locking pins from being opened unintentionally.*

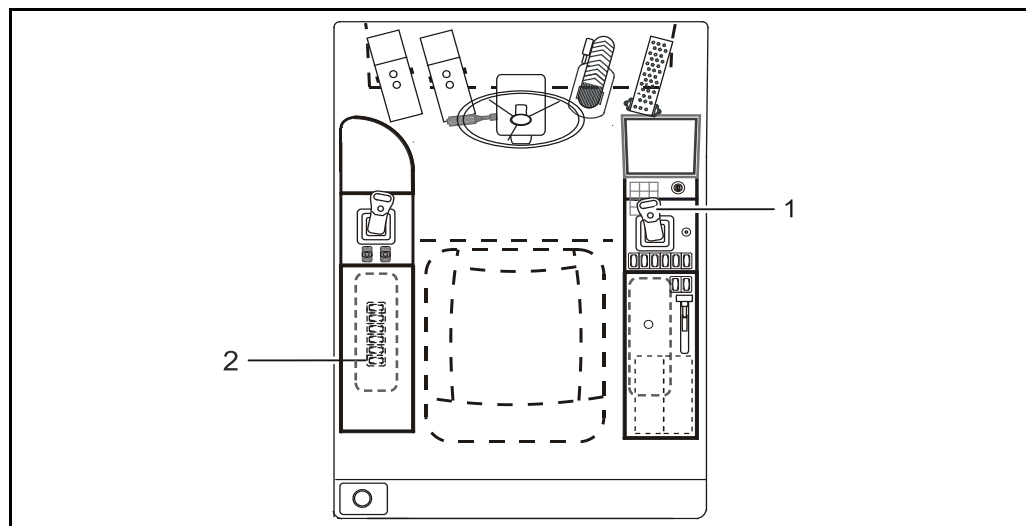


Fig. 7-24 Open/close quick-attachment system

- 1** Joystick - excavator equipment right
- 2** Toggle switch to open quick-attach system

Changing the clamshell grab

⚠ WARNING	
	<p>Danger due to heavy load Machine parts may move by accident. Danger of serious injuries.</p> <ul style="list-style-type: none"> ▷ Wear personal protective equipment. ▷ Always begin by ensuring that work attachments will not tilt. ▷ Do not enter the danger area. ▷ After removing work attachments, secure them to prevent them from tipping over.

CAUTION	
	<p>Risk of machine damage Bucket cylinder piston rod may be damaged.</p> <ul style="list-style-type: none"> ▷ The bucket cylinder piston rod must be fully retracted. ▷ Brace the digger with the dozer blade. Ensure that the wheels have sufficient grip. Only in this way is an optimal stability achieved.

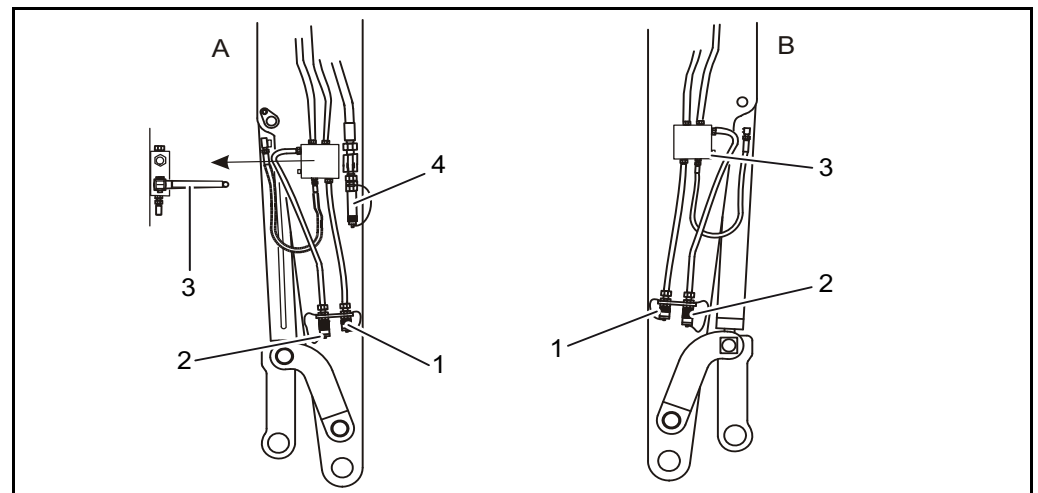


Fig. 7-25 Auxiliary control circuit

- 1** Auxiliary control circuit
- 2** Couplings
- 3** Ball valves
- 4** Depressurized return port

A = left

B = right

7 Operation

Changing procedure using the quick-attach system

- ◆ Pick up the clam shell grab and close the quick-attachment system.
- ◆ Fully retract the bucket cylinder piston rod and close the ball valves (3).
- ◆ Connect the swivel motor to the couplings (1) - auxiliary control circuit - and connect the "Open/Close" function to the bucket cylinder couplings (2).

Notice



When the grab has been dismantled, reopen the ball valves.

Mounting the hydraulic hammer

CAUTION	
	<p>Danger due to unsuitable equipment made by other companies</p> <p>Using unsuitable products from other manufacturers may result in damage to the machine or to the product in question. Risk of mixing up hydraulic hammers.</p> <ul style="list-style-type: none"> ▷ Only use hydraulic hammers approved by Yanmar. ▷ The mounting and operating instructions provided by the hydraulic hammer manufacturer must be observed. ▷ Neither the permissible capacity in liters in the hammer supply line nor the permissible operating pressure of the hammer (= pressure at hammer entry during operation) may be exceeded. The hydraulic circuit of the hammer must be secured according to the instructions of the hydraulic hammer manufacturer. If malfunctions should occur during operation, the auxiliary control circuit of the machine is fitted with a pressure relief function as standard. ▷ Connect the feed and return of the hammer correctly, note operating direction (dial). ▷ When working in or under water, special hammer attachments must be used.

⚠ WARNING	
	<p>Danger due to heavy load</p> <p>Machine parts may move by accident.</p> <p>Work attachments may fall down. Danger of serious injury.</p> <ul style="list-style-type: none"> ▷ Wear protective clothing. ▷ Always begin by ensuring that work attachments will not tilt. ▷ Do not enter the danger area. ▷ Once work attachments have been removed, they must be secured against tilting and overturning to avoid possible injuries to persons.

7

Operation

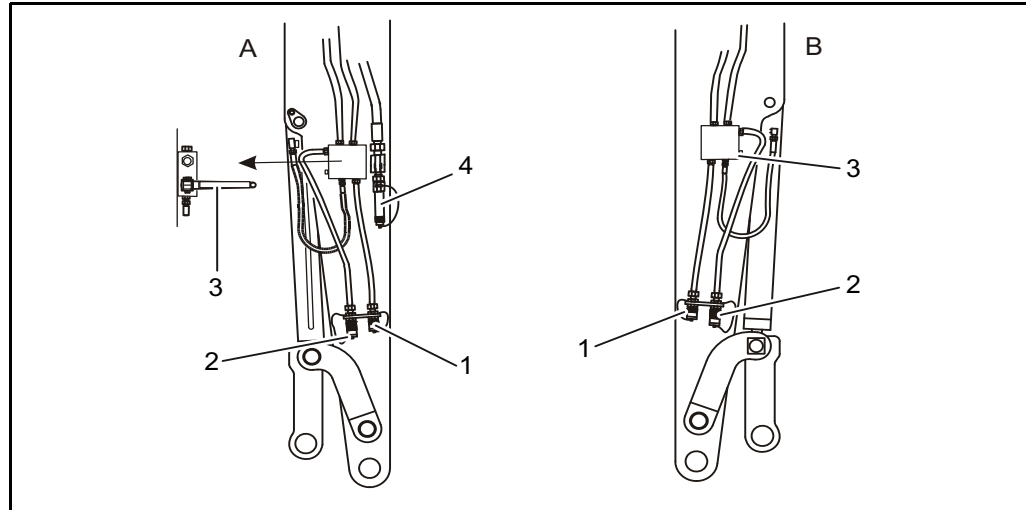


Fig. 7-26 Auxiliary control circuit

- 1 Auxiliary control circuit
- 2 Couplings
- 3 Ball valves
- 4 Depressurized return port


A = left

B = right

- ◆ Carry out mechanical installation in the same way as attaching a bucket.
 - ◆ The hydraulic pressure supply for the SMS140 rock breaker is connected to the lines of the auxiliary control circuit (1) via a hose coupling.
 - ◆ The hydraulic pressure supply for rock breakers from other manufacturers is connected to a line of the auxiliary control circuit (1) and the open return via the depressurized return supply (4).
 - ◆ Set the oil quantity for the auxiliary control circuit to the maximum volume in the machine adjustment menu.
- See chapter 5.3.4 "Display".

Working with the hydraulic rock breaker

The mounting and operating instructions of the hydraulic rock breaker manufacturer must be observed.

CAUTION	
	Danger due to incorrect use
	<p>Improper use may lead to severe damage to the hammer, holder, and the digger itself.</p> <p>▷ Apply the pressure force axially to the rock breaker and vertically to the material surface.</p>

Servicing

Maintenance of the hydraulic hammer must be performed according to the instructions of the hydraulic hammer manufacturer.

7

Operation

7.5.5 Notes for winter operation

The following points and the relevant notes in the engine operating instructions must be observed during winter operation.

Hydraulic oil

- ◆ If the machine has not been used for a considerable period of time and temperatures are around or below freezing, warm up the engine by running at medium revs (for approx. 3-5 minutes).

Engine oil

The oil viscosity (SAE class) should be selected according to the ambient temperature at the machine's place of operation.

Condition of the battery

Good cold start performance requires a well charged battery.

- ◆ Ensure good contact of the terminal connections when installing the battery.
- Only tighten terminal screws "hand-tight", to prevent deformation of the terminal cones.

Coolant

- ◆ Check the antifreeze setting before the beginning of the cold season.
- ◆ Adjust the antifreeze protection to suit the ambient temperature, as required. At the factory, antifreeze protection is set to approx. -25 °C.

Fuel

⚠ WARNING	
	<p>Risk posed by improper handling of fuel</p> <p>Fuel and its fumes are harmful and flammable. Danger of explosion. Risk of serious injury with fatal consequences.</p> <ul style="list-style-type: none"> ▷ Wear protective clothing. ▷ Do not smoke, do not allow naked flames. ▷ Do not wear loose clothing. ▷ Do not mix petrol and flow-enhancing agents.

- ◆ Use only winter diesel fuel in winter to prevent line connections becoming blocked by paraffin deposits. Even if winter diesel fuel is used, the disturbing of paraffin separations (jelling) can occur at very low temperatures.

8 Transport



Notice

The weight of the machine is approx. 9500 kg
Strictly observe all safety notes.
See chapter 3.22 "Recovery, loading, and transporting".

8.1 Towing the machine

⚠ WARNING



Danger posed by heavy loads

The machine may move unexpectedly. Danger of serious injury and death.

- ▷ Use wheel chocks to prevent the machine from rolling.
- ▷ Release the pressure in the hydraulic system.



Notice

We recommend recovering the machine using a crane.

CAUTION



Risk of machine damage

When towing the machine, damage can be caused to the hydrostatic travel drive.

- ▷ Towing of the machine must be restricted to clearing a junction or a road.
- ▷ If possible, let the engine idle during towing.
- ▷ Tow machine max. 50 m wide.



Notice

No support is given to servo steering while engine is standing. The steering forces are very high!

8 Transport

Towing lugs

For towing the machine the following towing lugs are available.

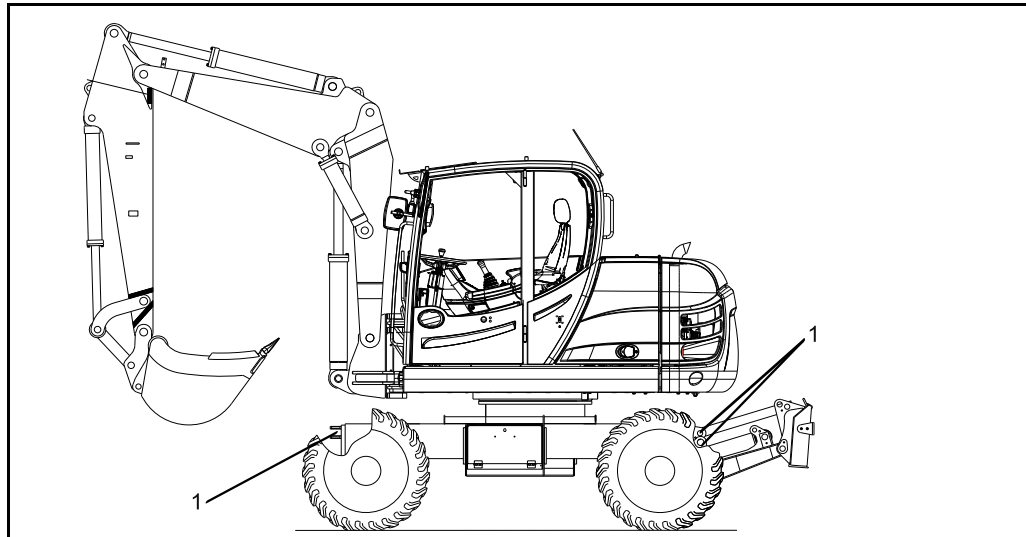


Fig. 8-1 Lifting points

1 Lifting points

The **fastening points** (1) are located at the front by the towing lug and at the rear on the eyes right and left on the undercarriage.



Notice

Max. load of towing lugs approx. 9500 kg.

8.1.1 Preparation for recovery

⚠ WARNING



Danger due to heavy load

The machine may move unexpectedly.
Risk of serious injury with fatal consequences.

- ▷ Use wedges to prevent the machine from rolling.
- ▷ Release the pressure in the hydraulic system.

CAUTION



Risk of getting dirty

The hydraulic system is very sensitive and can be damaged by dirt.

- ▷ Ensure cleanliness when working on the hydraulic system.
- ▷ Clean around the component areas.

Opening the “travel” oil circuit (not for B95W with high-speed version)

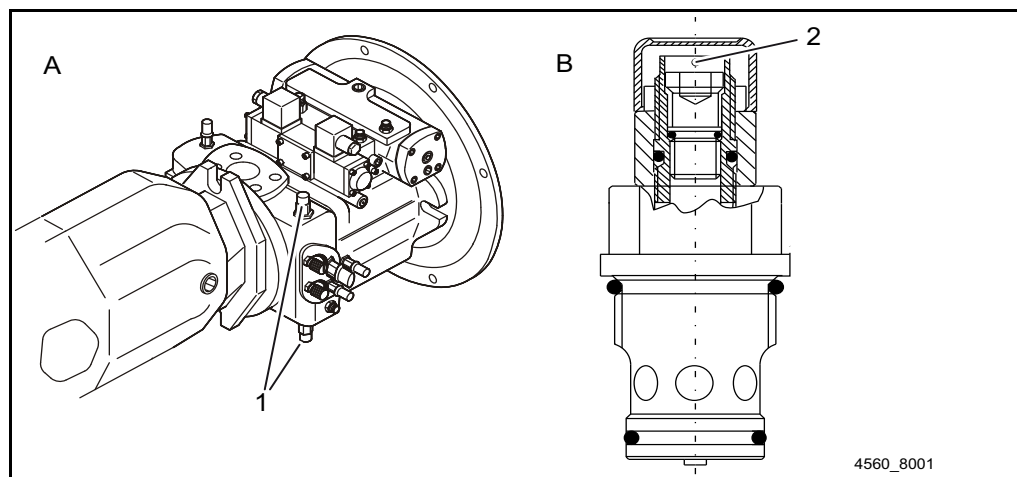


Fig. 8-2 Hydraulic Pump

- 1** Limiting valve
- 2** Screw
- A = Hydraulic pump
- B = Valve

When the swing loader is towed the “travel” oil circuit must be opened so that the hydrostatic transmission no longer acts as an auxiliary brake.

- ◆ At the two high-pressure relief valves (1) with bypass, located on top and bottom, loosen the screw (2) by no more than 3 turns.
- ◆ After towing, turn the screws (2) back in fully.

8

Transport

Setting manual transmission to idle (only or B95W with high-speed version)

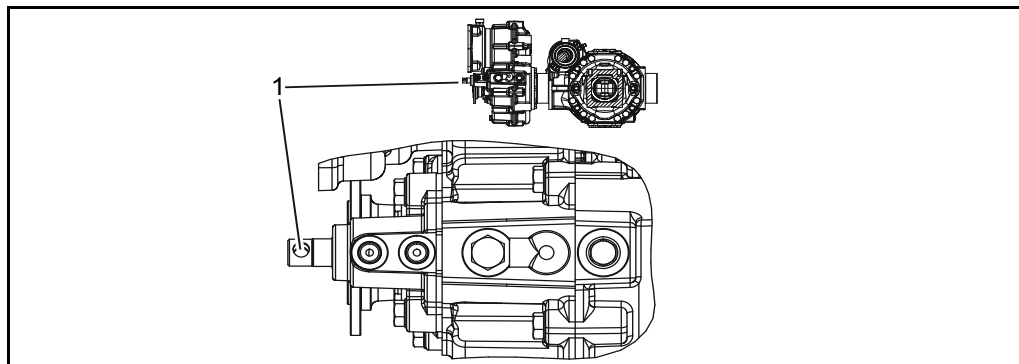


Fig. 8-3 Manual transmission idle position

1 Switch rod

- ◆ Pull or push switch rod (1) to idle position (center position) with appropriate tool.



Notice

The preselected gear is automatically engaged upon starting the engine and the hydraulic system.

Spring-loaded brake “emergency release”

⚠ WARNING



Danger due to heavy load

The machine may move unexpectedly. Risk of serious injury with fatal consequences.

- ▷ Use wedges to prevent the machine from rolling.
- ▷ After towing, activate the spring-loaded brake.

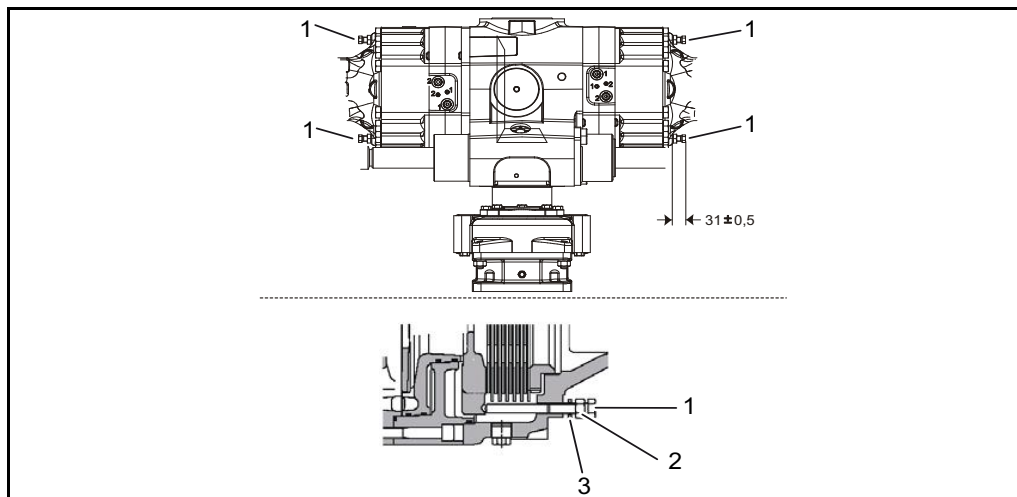


Fig. 8-4 Spring-loaded brake

- 1 Screw
- 2 Nut
- 3 Gasket

- ◆ Loosen the nuts (2) and turn screws (1) by approx. 8 mm.
- ◆ Tighten screws (1) in alternation with ring wrench, 1/4 rotation each, up to the stop on the pressure plate.



Notice

Screw in one rotation at maximum.

Adjust spring-loaded brake after emergency release

- ◆ Unscrew the screws (1) with nut (2) and gasket (3).
- ◆ Replace gasket (3), grease or oil screw and reinstall.
- ◆ Tighten the screws (1) until the adjustment dimension is 31 ± 0.5 mm.
- ◆ Counterlock screws with nuts (2).
- ◆ Check adjustment dimension again.

8

Transport

8.2 Loading the machine using a crane

⚠ WARNING	
	<p>Danger due to heavy load</p> <p>Machine can fall down. Risk of serious injury with fatal consequences.</p> <ul style="list-style-type: none"> ▷ Be aware of the total machine weight. ▷ Use a crane and lifting gear with adequate lifting load capacity. ▷ Only use approved and undamaged sling gear. ▷ Do not drag sling gear over sharp edges. ▷ Do not enter or stand in the danger zone.

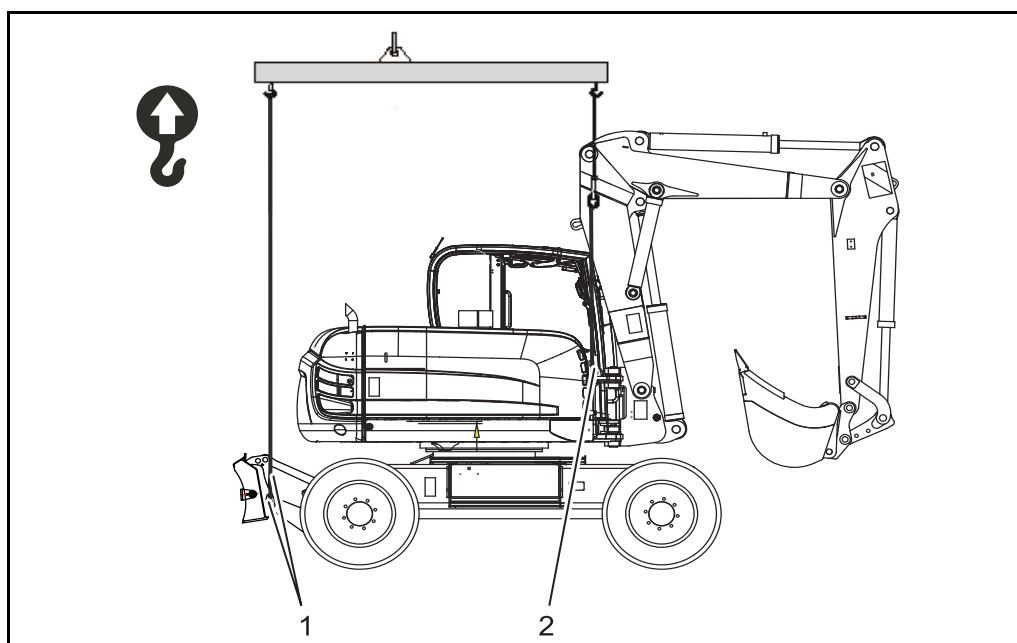


Fig. 8-5 Loading the machine using a crane

- 1** Towing lugs
- 2** Suspension points

To load the machine using a crane, the following preparations are required:

Securing the machine

- ◆ Empty the dipper and fold it in.
- ◆ Position the work equipment to be pointing straight ahead.
- ◆ Rotate the uppercarriage so that the working direction is opposite to the dozer blade in the “straight ahead” position.
- ◆ Raise the boom to the specified (Fig. 8-5) height.
- ◆ Retract the dipperstick.
- ◆ Retract the intermediate boom.
- ◆ Raise the support device/dozer blade right up.
- ◆ Shut down the engine.
- ◆ Leave the machine and close the door.

Lifting the machine

- ◆ Attach the machine to the 3-point lifting gear at the points illustrated (Fig. 8-5) in the correct manner
- ◆ Ensure correct fastening of the crane lifting harness.
- ◆ Carefully and smoothly lift the machine.



Notice

Pay attention to the correct length with 3-point lifting gear, as otherwise the machine can be damaged.

8

Transport

8.3 Loading the machine onto a truck

⚠ WARNING	
	<p>Danger due to heavy load</p> <p>The machine may move unexpectedly. Risk of serious injury with fatal consequences.</p> <p>▷ Use wedges to prevent the machine from rolling.</p>

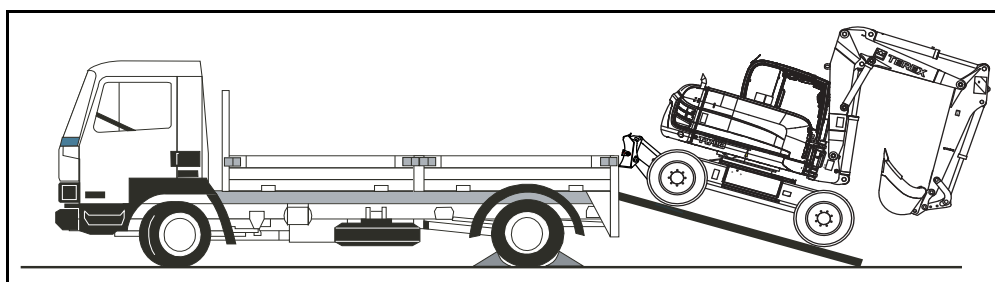


Fig. 8-6 Loading onto a truck

- ◆ Connect a loading ramp to the vehicle (max. angle 15°).
- ◆ Reverse the machine slowly in the lowest gear onto the vehicle. Ensure the support plate faces in direction of travel and the loading equipment against direction of travel.
- ◆ Shut down the engine.
- ◆ Carefully lash the machine to the lashing points provided so that it is ready for transport. See chapter 8.4 “Transporting the machine”.
- ◆ Secure the vehicle to be loaded with chocks to prevent it rolling away.

8.4 Transporting the machine

⚠ WARNING



Risk posed by excessive width / height

Risk of serious injury with fatal consequences.

- ▷ Pay attention to the overall dimensions for transport.
- ▷ Pay attention to clearance heights for tunnels, bridges, etc.

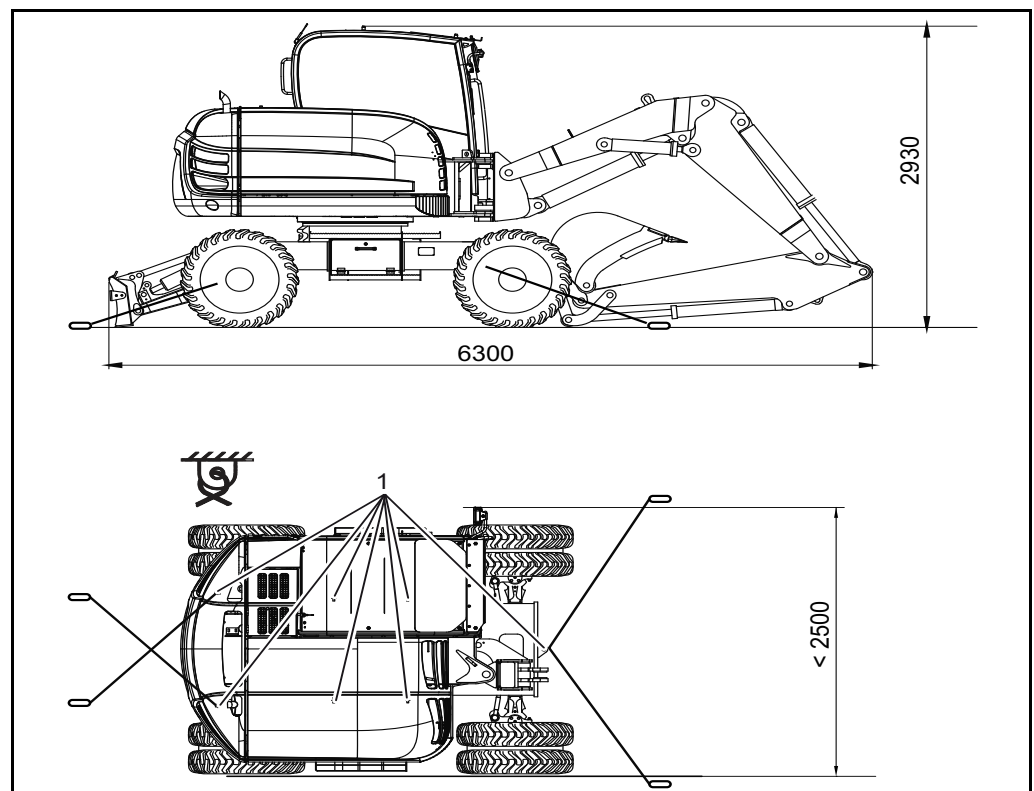


Fig. 8-7 Lashing for transport

1 Possible rigging points

To transport the machine on a flat bed trailer, railway goods wagon, etc., the following measures must be taken:

Securing the machine

- ◆ Depose the support legs (and/or dozer blade) and the working equipment on the ground.
- ◆ Shut down the engine.
- ◆ Lash the machine down with straps at the marked points.
- ◆ Secure the machine with wheel chocks against rolling.



8 Transport

9 Technical data

9.1 Views

9.1.1 Digging envelopes

Articulated boom with dipperstick 2000

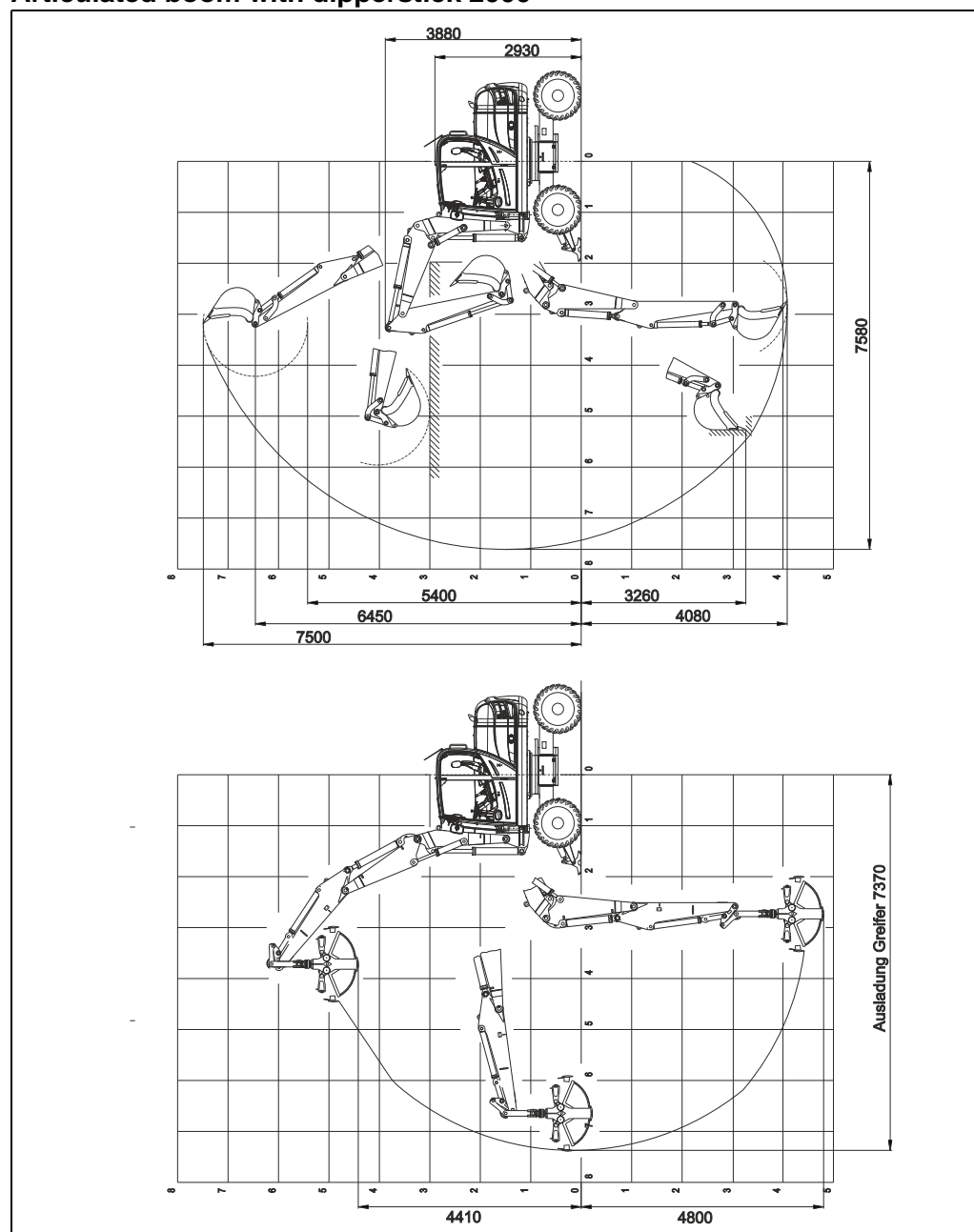


Fig. 9-1 Digging envelope - 2000 mm

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Technical data

Articulated boom with dipperstick 2200

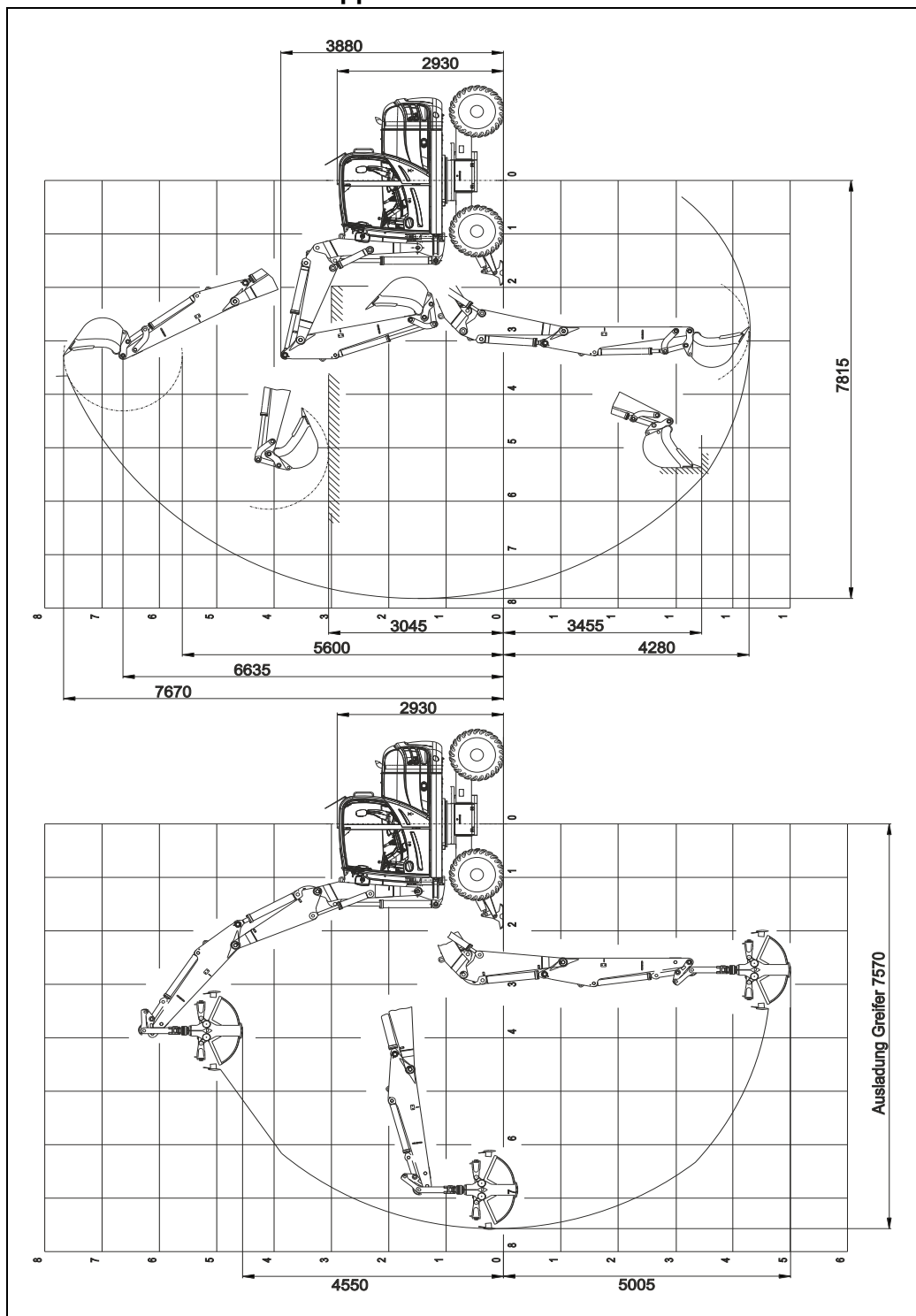


Fig. 9-2 Digging envelope - 2200 mm

Circular boom

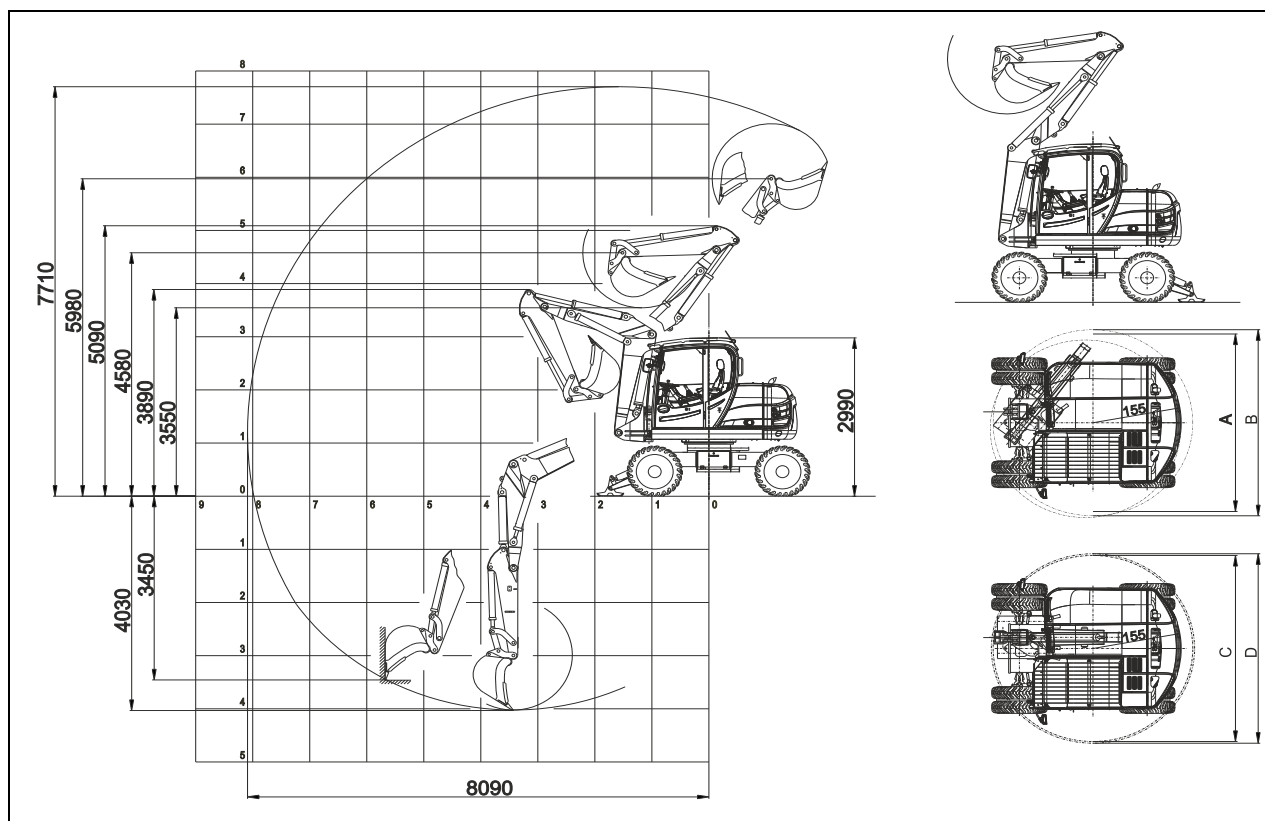


Fig. 9-3 Digging envelope - circular boom

A	3340mm	with 600 bucket
B	3500mm	with 800 bucket
C	3500mm	with 600 bucket
D	3570mm	with 800 bucket

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Technical data

Monobloc offset boom

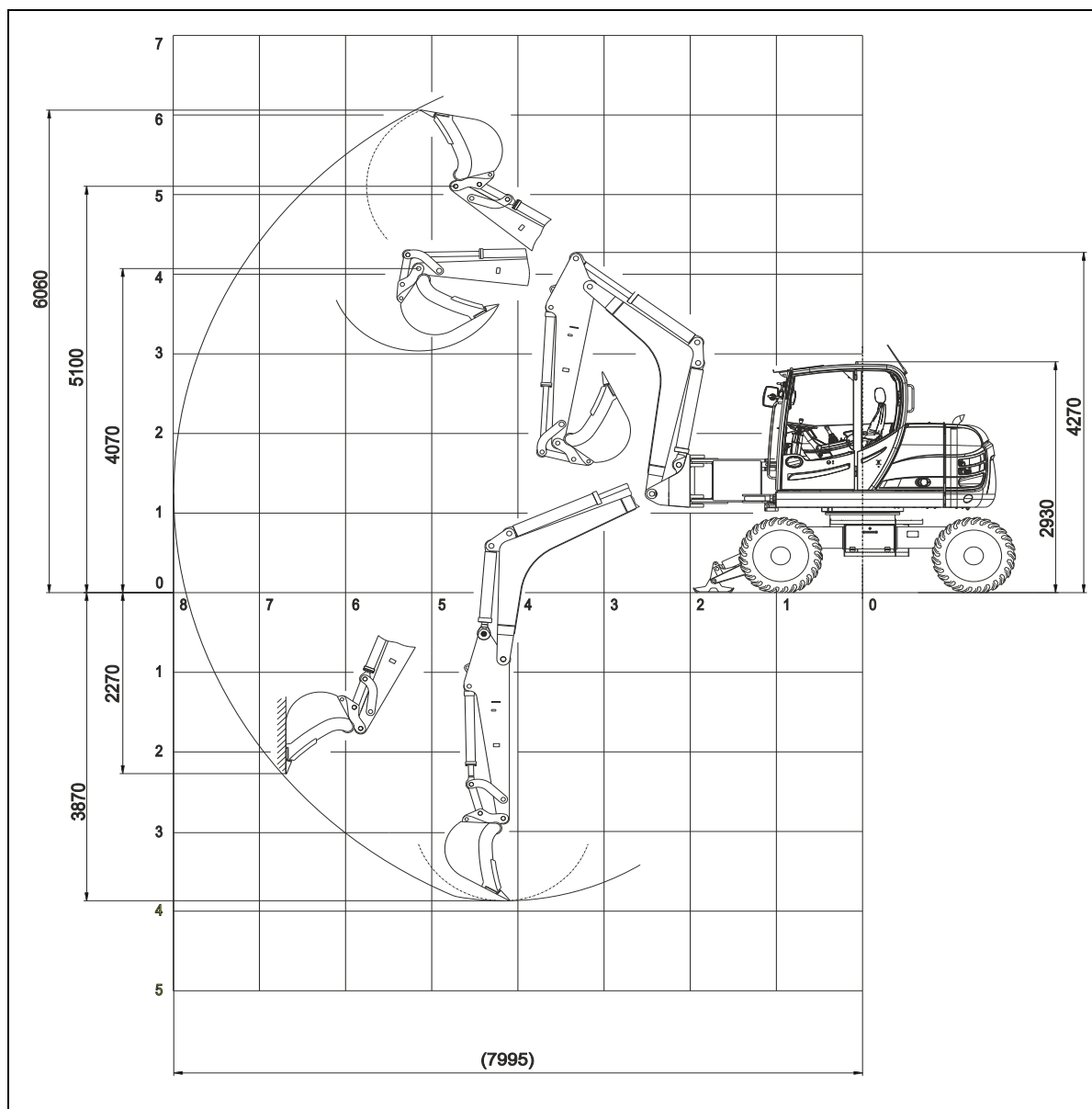


Fig. 9-4 Digging envelope - monobloc offset boom

9.1.2 Envelope circle

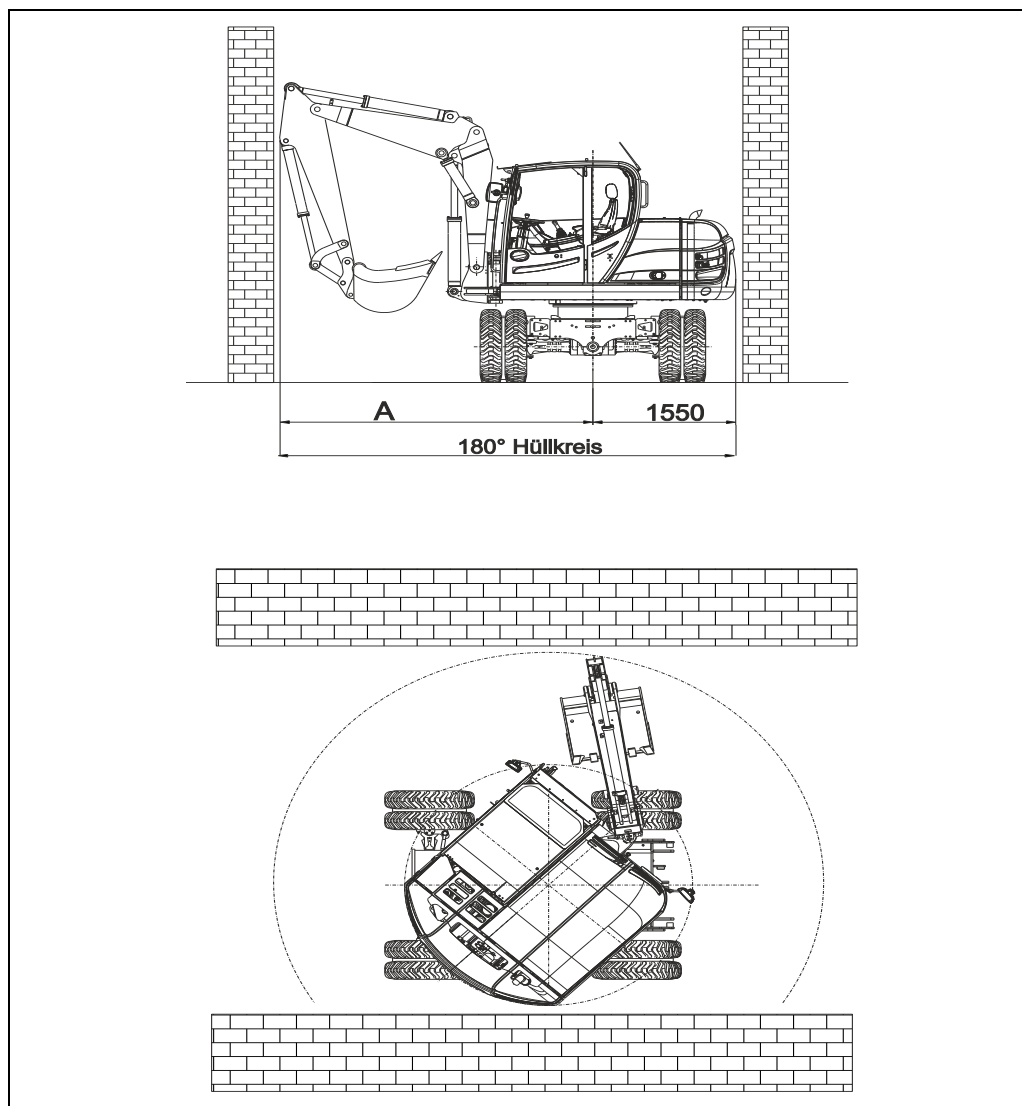


Fig. 9-5 Envelope circle

Envelope circle	Articulated boom LS 2000 mm	Circular boom with 600 bucket LS 1650 mm
Dimension A	2960 mm	1670 mm
180° working envelope	4510 mm	3220 mm
360° working envelope	5920 mm	3340 mm

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Technical data

9.1.3 Lateral parallel adjustment

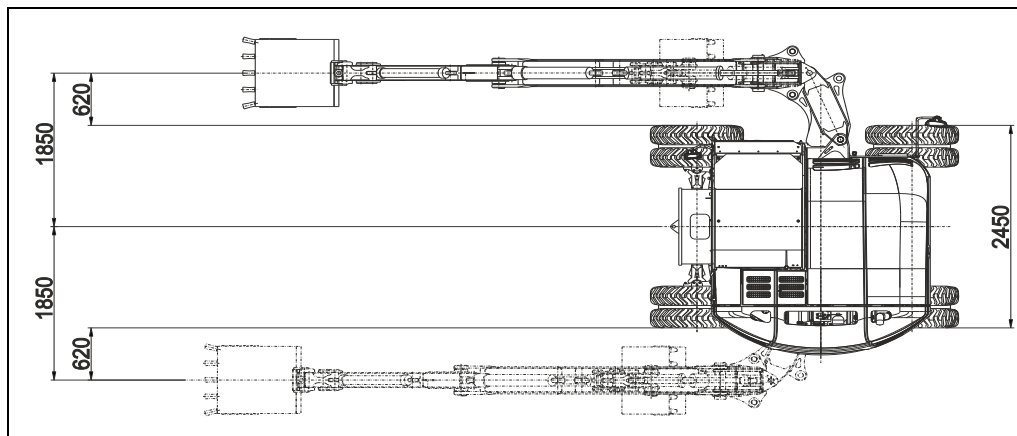


Fig. 9-6 Lateral parallel adjustment - adjustable boom

9.1.4 Articulated boom - excavators adjusted

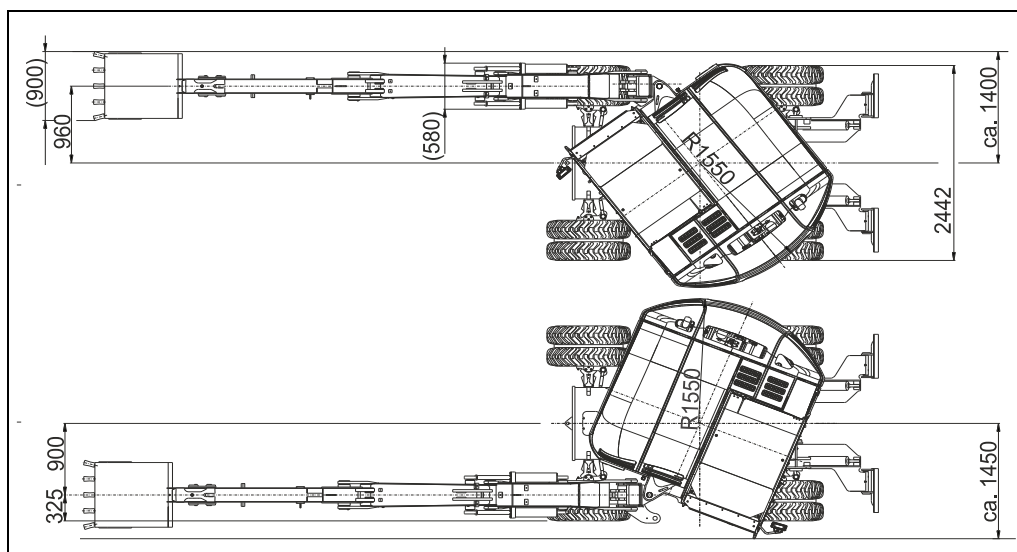


Fig. 9-7 Articulated boom - excavators adjusted

9.2 Technical data

9.2.1 Operating data

Dimensions and weights	Unit	GA with LS2000	GA with LS2200	Circular	Mono with offset boom
Operating weight	approx. kg	9300	9350	9500	9500
Total width (at outside edge of tires)	mm	2450	2450	2450	2450
Total length (travel position)	mm	5570	5570	5700	6290
Total height (travel position)	mm	3950	3950	3950	3950
Total height up to cab	mm	2930	2930	2990	2930
Uppercarriage rear end radius	mm	1550	1550	1550	1550
Ground clearance below propeller shaft	approx. mm	400	400	400	400
Wheelbase	mm	2240	2240	2240	2240
Track width	mm	1942	1942	1942	1942
Smallest turning radius on outer tire, B95W, B95W S, B95W AL-regular steering	mm	6700	6700	6700	6700
Smallest turning radius on outer tire	mm	4000	4000	4000	4000

Tab. 9-1 Operating data

Reference



All dimensions and weights are based on the standard version.

Noise levels

Noise levels as per directive 2000/14/EC und EN 474	
Guaranteed sound power level	LWA 100 dB (A)
Sound pressure level (at driver's ear)	LpA 72 dB (A)

Tab. 9-2 Noise levels

Vibration values

Vibration values as per directive 2006/42/EC and EN 474	
Effective values of acceleration below	0.5 m/s ² for whole-body vibration
and	2.5 m/s ² for the upper arm system

Tab. 9-3 Vibration values

9

Technical data

9.2.2 Equivalent vibration values

Equivalent vibration values for the whole body as per ISO/TR 25398						
Typical operating condition	Average value			Standard deviation		
	1.4*aw, eqx	1.4*aw, eqy	aw, eqz	1.4*Sx	1.4*Sy	Sz
	m/s ²					
Excavating	0.52	0.35	0.29	0.26	0.22	0.13
Driving	0.41	0.53	0.61	0.12	0.20	0.19

Tab. 9-4 Equivalent vibration values

9.2.3 Drive motor

Motor	
Manufacturer	Deutz
Type	TCD 3.6 L4 EU tier 4 final
Design	4 cylinder, turbocharged diesel engine with charge air cooling
Procedure	4-stroke, common rail fuel injection
Cooling	Water / antifreeze mixture
Displacement	3600 cm ³
Performance as per ISO 9249	74.4 kW where n=2000 min ⁻¹
Maximum torque	410 Nm where n=1600 min ⁻¹
Max. permissible inclined position	30° on all sides
Heating	Water-heat exchanger
Maximum operation height	3570 m

Tab. 9-5 Drive motor

9.2.4 Electrical system

Electrical system	
Operating voltage	12 V
Battery	12 V 135 Ah 1000 A
Generator	14 V 95 A three-phase AC current
Starter motor	12 V / 4.0 kW
Start-up	Glow plugs
Lighting system	in compliance with German and European standards

Tab. 9-6 Electrical system

9.2.5 Chassis

Chassis				
Travel drive	Variable displacement pump flange-mounted directly onto diesel engine Two-stage variable displacement motor with power shift on front axle reduction gear Suction filter in the form of a tank insert filter.			
Driving speed		Forwards - backwards		
		B95W, B95W AL	B95W S	
			Driving speed I	Driving speed II
	Travel range "Work":	0 - 6 km/h	0 - 5.2 km/h	0 - 12 km/h
	Travel range "Street"	0 - 20 km/h	0 - 15 km/h	0 - 36 km/h
Transmission		Hydrostatic travel drive with automatic adjustment of drawbar pull and speed over the entire travel range by variable displacement travel motor Two-stage gearshift with power shift and infinitely variable speed control forward and reverse Actuation with accelerator pedal, all-wheel drive from transmission on front axle via driveshaft to rear axle		
Operating pressure - driving		max. 440 bar		

Tab. 9-7 Chassis

9

Technical data

9.2.6 Excavator equipment

Description	Unit	GA with LS 2000	GA with LS 2200	Circular	Mono with adjustable
Digging depth	mm	4080	4280	4030	3910
Max. dump height	mm	5400	5600	3550	4035
Maximum height of bucket hinge point	mm	6450	6635	5980	5070
Max. reach	mm	7580	7815	8090	7950
Bucket angle of rotation	°	187	187	187	187
Tear resistance	N	42 600	36 000	42 000	42 600
*Breakaway torque	N	53 200	53 200	53 200	53 200

Tab. 9-8 Excavator equipment

*Data are theoretical values as per DIN 24086

9.2.7 Brakes

Brakes	
Service brake	Hydraulic pump accumulator two-circuit brake B95W, B95W S Oil-immersed multi-disk brake in the middle housing of the front axle and by the rear axle's wheel hub B95W AL Oil-immersed multi-disk brake in the middle housing of the front axle and rear axles
Excavator brake	Operating brake locking mechanism that acts on all 4 wheels
Parking brake	Hydraulic, internal spring-loaded brake effective on the multiple disk brake in the front axle, electrically activated.
Additional brake	The hydrostatic travel drive in closed circuit additionally acts as an additional non-wearing auxiliary brake.
Slewing brake	The hydrostatic swing motor acts as a wear-free swing brake. The locking takes place automatically via a transmission-integrated hydraulic spring-applied disk brake that may be unlocked.

Tab. 9-9 Brakes

9.2.8 Hydraulics

Hydraulics	
Hydraulic circuit 1	<p>Work functions: Boom, dipperstick, bucket, intermediate boom, rock breaker/auxiliary fitting</p> <p>Axial piston variable capacity pump with flow adjustment and pressure cut-off Flanged onto the flywheel side on throughdrive of variable displacement pump Flow rate: max. 142 l/min Pressure: max. 280 bar</p>
Hydraulic circuit 2	<p>Work functions: Slewing, all positioning functions, 2. auxiliary circuit, 3. Auxiliary circuit (option) Pump components 2 and 3 of the triple gear pump flange-mounted to the power take-off Flow rate: max. 2x40 l/min Pressure: max. 250 bar</p>
Steering, brake and fan control	<p>Pump component 1 of the triple gear pump Flow rate: max. 40 l/min Pressure: max. 260 bar</p>
Servo control	<p>Pressure tapping point on variable displacement pump of travel drive Max. pressure circa 35 bar</p>
Actuation	Hydraulic pilot-operated excavator valves for all functions
Hydraulic cylinder	Double-acting work cylinder, partially with end-position damping
Swivel drive	<p>Hydrostatic with reduction gear and drive pinion on internally toothed ring gear of swing bearing Swivel range 360° unlimited Swing speed: 0/-10 rev/min</p>
Hydraulic oil filter	Suction strainer located in tank for hydraulic circuit "travel" Return filter in tank for the work system.
Hydraulic oil cooler	<p>Thermostatically controlled Operating range: 50-45 °C</p>
Knickmatik	<p>Bend mechanism for the lateral parallel adjustment of the boom axle at total digging depth to the right and left Lateral adjustment to the right: 960 mm Lateral adjustment to the left: 900 mm</p>
Priority valve	Priority supply of hydraulic oil to steering
Steering B95W, B95W S	Fully-hydraulic, proportionally jointed front axle, via steering control device and a steering cylinder integrated in the axle

9 Technical data

Hydraulics	
Steering B95W AL	Electrically preselectable steering mode Fully-hydraulic, proportionally jointed front and rear axle, by means of a steering control device and a steering cylinder integrated in the axles The following steering variants are possible through the two steerable axles:
Normal steering mode:	normal steering mode for driving in the street and regular work - only the front axle turns.
All-wheel steering "round":	this steering mode reduces the turning circle. Both axles steer in opposition.
All-wheel steering "crab":	this steering mode enables lateral movement. Both axles steer in the same direction.
Wheel deflection	max. 30°

Tab. 9-10 Hydraulics

9.2.9 Axles

Axles	
Front axle	B95W, B95W AL Steering planet drive axle with oscillating suspended transmission, with 2 multiple disk brakes running in oil bath in center housing and integrated steering cylinder <ul style="list-style-type: none"> Oscillation $\pm 6,5^\circ$ B95W S Steering planet drive axle with two-stage, switchable oscillating suspended transmission, with two multiple disk brakes running in oil bath in center housing and integrated steering cylinder <ul style="list-style-type: none"> Oscillation $\pm 6,5^\circ$
Rear axle	B95W, B95W S Planet drive axle with 2 multiple disk brakes running in oil bath in the hub B95W AL Steering planet drive axle with two multiple disk brakes running in oil bath in center housing and integrated steering cylinder

Tab. 9-11 Axles

9.2.10 Tires

Tiresize	Type	Profile	Note	Tire pressures front in bar	Tire pressures rear in bar
8.25-20	12/14 PR	Studs	Twin tires	4.5	4.5
500/45-20	Special	J 331	Super wide-base tires	6.0	6.0
365/70 R 18 MPT	133 E	70 E	Narrow track design	3.8	3.8

9.2.11 Permissible loads in compliance with German Road Traffic Regulations (StVZO)

Permissible total weight	siehe type plate or general operating licence
Permissible axle load, front	
Permissible axle load, rear	

9.2.12 Load capacities

The stated load capacities in tons (t) were determined as per ISO 10567 and contain a stability factor of 1.33 or 87 % of the hydraulic lifting capacity.

All values were determined with load hook. If a bucket is attached, the difference weights bucket minus load hook must be deducted from the permissible payloads.



Reference

If a bucket is attached, the difference weights bucket minus load hook must be deducted from the permissible payloads.
(weight see type label).

Carrying capacity table with the following equipment:

- ◆ Without bucket
- ◆ Twin tires 8.25-20 with filling rings
- ◆ Full tank with driver

A = Supported by blade, V = Traveling

9 Technical data

Articulated boom with dipperstick 2000

Load distance from middle of slewing ring											
Bucket hinge pin height		3 m		4 m		5 m		6 m		7 m	
		longitudinal	lateral	longitudinal	lateral	longitudinal	lateral	longitudinal	lateral	longitudinal	lateral
3.0 m	A	-	-	2.6	2.3	1.7	1.6	1.5	1.0	-	-
	V	-	-	2.2	2.2	1.6	1.6	1.0	1.0	-	-
1.5 m	A	4.1	3.5	2.6	2.3	2.1	1.6	1.5	1.0	-	-
	V	3.4	3.3	2.2	2.2	1.3	1.5	0.9	1.0	-	-
0.0 m	A	4.5	2.7	2.7	1.8	2.0	1.3	1.5	0.9	-	-
	V	2.6	2.6	1.7	1.7	1.2	1.2	0.9	0.9	-	-
-1.0 m	A	4.7	2.7	2.9	1.7	2.0	1.2	-	-	-	-
	V	2.6	2.6	1.6	1.7	1.2	1.2	-	-	-	-

Articulated boom with dipperstick 2000 mm and additional rear weight

Load distance from middle of slewing ring											
Bucket hinge pin height		3 m		4 m		5 m		6 m		7 m	
		longitudinal	lateral	longitudinal	lateral	longitudinal	lateral	longitudinal	lateral	longitudinal	lateral
3.0 m	A	-	-	2.6	2.4	1.8	1.7	1.5	1.1	-	-
	V	-	-	2.4	2.3	1.7	1.7	1.1	1.1	-	-
1.5 m	A	4.2	3.7	2.6	2.3	2.1	1.7	1.6	1.1	-	-
	V	3.6	3.7	2.3	2.3	1.7	1.6	1.1	1.1	-	-
0.0 m	A	4.7	2.9	2.8	1.9	2.1	1.4	1.6	1.0	-	-
	V	2.8	2.9	1.8	1.9	1.3	1.4	1.0	1.0	-	-
-1.0 m	A	4.8	2.9	3.0	1.9	2.1	1.4	-	-	-	-
	V	2.8	2.8	1.8	1.9	1.3	1.4	-	-	-	-

Articulated boom with dipperstick 2200 mm

Load distance from middle of slewing ring											
Bucket hinge pin height		3 m		4 m		5 m		6 m		7 m	
		longitudinal	lateral	longitudinal	lateral	longitudinal	lateral	longitudinal	lateral	longitudinal	lateral
3.0 m	A	-	-	2.4	2.0	1.8	1.7	1.4	1.1	1.4	0.9
	V	-	-	2.1	1.9	1.5	1.6	0.9	1.0	0.8	0.8
1.5 m	A	4.2	3.5	2.6	2.3	1.6	1.6	1.5	1.0	1.3	0.8
	V	3.1	3.3	2.1	2.2	1.5	1.6	0.9	1.0	0.7	0.8
0.0 m	A	4.5	2.8	2.8	1.8	2.1	1.3	1.6	1.0	1.2	0.8
	V	2.5	2.6	1.6	1.7	1.2	1.2	0.9	0.9	0.7	0.8
-1.0 m	A	4.8	2.7	3.0	1.8	2.2	1.3	1.3	1.0	1.1	1.1
	V	2.5	2.6	1.6	1.7	1.2	1.2	0.9	0.9	0.8	0.9

Articulated boom with dipperstick 2200 mm and additional weight

Load distance from middle of slewing ring											
Bucket hinge pin height		3 m		4 m		5 m		6 m		7 m	
		longitudinal	lateral	longitudinal	lateral	longitudinal	lateral	longitudinal	lateral	longitudinal	lateral
3.0 m	A	-	-	2.4	2.4	1.8	1.8	1.9	1.2	-	-
	V	-	-	2.2	2.4	1.7	1.8	1.1	1.1	-	-
1.5 m	A	4.2	3.9	2.6	2.5	2.2	1.8	2.0	1.2	-	-
	V	3.5	3.7	2.3	2.5	1.7	1.7	1.1	1.1	-	-
0.0 m	A	4.3	3.1	2.6	2.1	2.0	1.5	1.6	1.1	-	-
	V	2.9	3.0	1.9	2.0	1.4	1.4	1.0	1.1	-	-
-1.0 m	A	4.6	2.9	2.9	1.9	2.1	1.5	1.2	1.3	-	-
	V	2.8	2.9	1.9	1.9	1.4	1.4	1.1	1.3	-	-

9 Technical data

Circular boom

Load distance from middle of slewing ring											
Bucket hinge pin height		3 m		4 m		5 m		6 m		7 m	
		longitudinal	lateral	longitudinal	lateral	longitudinal	lateral	longitudinal	lateral	longitudinal	lateral
3.0 m	A	4.4	3.8	2.5	2.5	1.7	1.7	1.7	1.0	1.3	0.8
	V	3.3	3.6	2.2	2.3	1.3	1.6	0.9	1.1	0.7	0.7
1.5 m	A	4.8	3.1	2.8	2.0	2.1	1.4	1.6	1.0	0.8	0.8
	V	2.7	2.9	1.8	1.9	1.2	1.3	0.9	0.9	0.6	0.7
0.0 m	A	5.3	2.7	3.3	1.8	2.2	1.3	1.5	1.0	0.5	0.6
	V	2.3	2.4	1.5	1.7	1.1	1.2	0.8	0.9	0.5	0.6
-1.0 m	A	4.4	2.6	2.9	1.8	1.6	1.3	1.1	1.1	0.3	0.4
	V	2.3	2.4	1.5	1.6	1.1	1.2	0.9	0.9	0.3	0.4

Circular boom with additional weight

Load distance from middle of slewing ring											
Bucket hinge pin height		3 m		4 m		5 m		6 m		7 m	
		longitudinal	lateral	longitudinal	lateral	longitudinal	lateral	longitudinal	lateral	longitudinal	lateral
3.0 m	A	4.2	4.1	2.5	2.7	1.7	1.6	1.7	1.1	1.3	0.9
	V	3.7	3.9	2.4	2.5	1.8	1.6	1.0	1.1	0.8	0.8
1.5 m	A	4.8	3.3	2.6	2.1	2.1	1.5	1.7	1.1	0.9	0.6
	V	2.9	3.1	1.9	2.1	1.4	1.5	1.0	1.1	0.7	0.6
0.0 m	A	5.1	2.8	3.2	1.9	2.2	1.4	1.5	1.0	0.4	0.4
	V	2.5	2.7	1.7	1.8	1.3	1.3	0.9	1.0	0.4	0.4
-1.0 m	A	4.3	2.8	2.8	1.8	1.9	1.4	1.0	1.2	0.3	0.3
	V	2.4	2.7	1.7	1.8	1.2	1.3	1.0	1.1	0.3	0.3

Monobloc offset boom

Load distance from middle of slewing ring											
Bucket hinge pin height		3 m		4 m		5 m		6 m		7 m	
		longitudinal	lateral	longitudinal	lateral	longitudinal	lateral	longitudinal	lateral	longitudinal	lateral
3.0 m	A	-	-	-	-	-	-	1.7	1.1	1.9	0.9
	V	-	-	-	-	-	-	0.9	1.0	0.7	0.8
1.5 m	A	-	-	4.4	1.9	3.0	1.3	2.3	1.0	1.8	0.8
	V	-	-	1.6	1.8	1.1	1.2	0.9	0.9	0.7	0.7
0.0 m	A	-	-	5.3	1.7	3.2	1.3	2.3	0.9	1.7	0.8
	V	-	-	1.4	1.5	1.1	1.2	0.8	0.9	0.7	0.6
-1.0 m	A	-	2.4	4.4	1.6	2.8	1.2	1.9	0.9	1.6	0.8
	V	2.2	2.3	1.4	1.5	1.1	1.1	0.8	0.9	0.8	0.8

Monobloc offset boom with additional weight

Load distance from middle of slewing ring											
Bucket hinge pin height		3 m		4 m		5 m		6 m		7 m	
		longitudinal	lateral	longitudinal	lateral	longitudinal	lateral	longitudinal	lateral	longitudinal	lateral
3.0 m	A	-	-	-	-	-	-	1.9	1.1	1.9	1.0
	V	-	-	-	-	-	-	1.0	1.1	0.8	0.9
1.5 m	A	-	-	4.4	2.0	2.9	1.5	2.3	1.1	1.8	0.9
	V	-	-	1.8	1.9	1.3	1.4	1.0	0.8	0.8	0.8
0.0 m	A	-	-	5.3	1.9	3.2	1.3	2.3	1.1	1.7	0.9
	V	-	-	1.7	1.7	1.2	1.3	0.9	1.0	0.8	0.8
-1.0 m	A	-	2.9	4.3	1.8	2.8	1.4	1.9	1.1	1.6	1.0
	V	2.4	2.5	1.6	1.7	1.2	1.3	0.9	1.0	0.9	0.9

9 Technical data

9.2.13 Work attachments

Approval based on tires 8.25-20

Width	Fill quantity	Density	approved for			
mm	m ³	t/m ³	TPA	Mono	Circular	Offset boom
Deep bucket						
290 ejector	0.065	1.8	X	X	X	X
350 ejector	0.085	1.8	X	X	X	X
450 ejector	0.115	1.8	X	X	X	X
290 conical	0.095	1.8	X	X	X	X
350 conical	0.115	1.8	X	X	X	X
450 conical	0.160	1.8	X	X	X	X
600	0.240	1.8	X	X	X	X
800	0.335	1.8	X	X	--	--
900*	0.385	1.8	--	X	--	--
900*	0.385	1.6	X	X	--	--
Trenching bucket						
1500	0.270	1.8	X	X	X	X
Tilting bucket						
1500	0.345	1.8	--	X	--	--
1500	0.345	1.7	X	X	--	--
Clamshell grab type GM 2						
325	0.135	1.8	X	--	X	--
400	0.170	1.8	X	--	X	--
500	0.220	1.8	X	--	--	--
600	0.260	1.8	X	--	--	--


* These work attachments are not road driving approved!

Other work attachments available on request.

9.2.14 Supports

Tail support legs for attachment of various support plates	
Support width	2320 mm
Lift under surface	from 230 - 290 mm
Plate size in version	Flat 570 x 595 mm
	Site 570 x 595 mm
	Rubber 485 x 595 mm
Rear support plate	
Width	2460 mm
Width	2290 mm (narrow track design)
Front dozer blade	
Width	2460 mm

9.2.15 Other equipment

CAUTION	
	<p>Danger posed by unauthorized modifications There is a risk of machine damage if unauthorized alterations are made to the design, additional equipment, and work attachments of Yanmar products.</p> <p>▷ Alterations must be approved by the manufacturer in writing. If that does not succeed, our warranty as well as our product liability for potential damages are void.</p>

- Load hook integrated in quick-attach system
- Load hook can be screwed onto bucket rod
- Hydraulic hammer
- Auger
- Hammer attachment adapter
- Transvere cutting fitting
- Fork carrier

9 Technical data

Options

- Auto-idling system
- Changing out buckets when attaching fork carrier
- Steering reversal
- Front dozer blade float position
- MS08 hydraulic quick-attach system
- HS08-type mechanical quick-attach system
- Second and third control circuit
- Change-over ISO - SAE control
- Pressureless return
- Protective roof grids, FOPS approved
- Electrical fuel pump
- Anti-theft protection (immobilizer)
- Travel motion alarm
- Auxiliary heating
- Seat heating
- LED work spotlight
- Rotating beacon
- Klimatronic
- Rear fog light
- Automatic engine shutoff

Reference



Additional accessories are available from the manufacturer

10 Troubleshooting

V. ⚠ WARNING	
	<p>Danger due to hot, pressurized components and materials Hydraulic system, cooling system, machine components, etc., may be hot and pressurized. Risk of serious injury and burns.</p> <ul style="list-style-type: none"> ▷ Allow the machinery to cool. ▷ Depressurize the machine. ▷ Take great care when working. ▷ Wear personal protective equipment. ▷ If there are any hot surfaces, cover them appropriately.

V. ⚠ WARNING	
	<p>Danger due to moving and turning machine parts Entanglement hazard. Risk of serious injury.</p> <ul style="list-style-type: none"> ▷ Switch off the machine. ▷ Disconnect the machine's power supply by flicking the battery isolator.

Malfunctions are frequently caused by:

- Incorrect handling of the machine
- Use of unsuitable fuels and lubricants
- Irregular maintenance

10 Troubleshooting

10.1 Who is allowed to rectify malfunctions?

- During the warranty period, malfunctions must be dealt with by your responsible service agent or a specialist workshop.
- If a problem can only be eliminated through repair, then your responsible service agent must be called in.
- Only service staff may carry out troubleshooting. Maintain sufficient distance from rotating parts.

Engine malfunctions

- All defects and faults in the engine must be examined as described in the separate engine operating instructions. During the warranty period, malfunctions must be dealt with by the responsible service agent or a specialist workshop.
- When carrying out repairs in the engine compartment, ensure that the engine is cold.

10.2 Before troubleshooting and fault rectification

- ◆ Park the machine on a solid and level base.
- ◆ Put the machine into the parking position.
- ◆ The machine is only to be parked in places where it does not cause an obstruction, e.g., for public or construction site traffic.
- ◆ Lower the loading equipment to the ground by supporting it on the dipper, by depositing it on the ground or similar.
- ◆ Lower the dozer blade.
- ◆ Lower work tool. Relieve any residual pressures.
- ◆ Shut down the engine and pull out the ignition key.
- ◆ Disconnect the machine's power supply by flicking the battery isolator.
- ◆ Put the exit barrier (left-hand armrest) in the upright position.
- ◆ Lock the windows and the doors.
- ◆ Secure the machine with wheel chocks to prevent it from rolling.
- ◆ When stepping up into or out of the vehicle, use the designated steps and surfaces or suitable aids (such as ladders or platforms). At least three of the machine's supports must be in place whenever entering or exiting the vehicle.
- ◆ Take great care when troubleshooting.

10.3 Troubleshooting and fault rectification

10.3.1 General malfunctions

Fault	<i>Machine fails to drive</i>
Cause	<ul style="list-style-type: none"> • Left-hand armrest control panel lifted or switch defective • Pilot pressure too low or no pilot pressure at all • Low hydraulic oil level • Hydraulic pump has failed
Corrective measure	<ul style="list-style-type: none"> ◆ Lower armrest panel. ◆ Check pilot pressure ◆ Top up the hydraulic oil to the mark ◆ Have pump checked by specialist and replace if necessary
Fault	<i>Poor travel performance</i>
Cause	<ul style="list-style-type: none"> • Engine output is insufficient • Pump has insufficient output
Corrective measure	<ul style="list-style-type: none"> ◆ Check diesel engine ◆ Check the pump and replace if necessary
Fault	<i>Excavator equipment not working</i>
Cause	<ul style="list-style-type: none"> • Toggle switch for working hydraulics set to "OFF" • Left-hand armrest control panel lifted or switch defective • Switch on armrest panel defective • Oil supply to hydraulic pump interrupted • Hydraulic pump has failed • Main relief valves have failed • Maintenance cover folded down • Switch on maintenance cover defective
Corrective measure	<ul style="list-style-type: none"> ◆ Switch the working hydraulics toggle switch ◆ Lower armrest panel ◆ Check the switch and repair or replace if necessary ◆ Check lines ◆ Have hydraulic pump checked by a specialist and replace, if necessary ◆ Check main relief valves and replace, if necessary ◆ Close maintenance cover ◆ Repair or replace maintenance cover switch

10 Troubleshooting

Fault	<i>No steering</i>
Cause	<ul style="list-style-type: none"> • Oil supply to pump interrupted • Hydraulic pump damaged • Priority valve damaged • Hand metering unit damaged • Steering cylinder damaged • Switch for travel direction damaged • Solenoid valve gets stuck or is damaged • Power supply towards switch for travel direction or solenoid valve interrupted • Filling circuit – non-return valve defective • High-pressure relief valve is faulty or incorrectly adjusted • Leak on adjusting piston • Mechanical damage to variable displacement pump and/or engine
Corrective measure	<ul style="list-style-type: none"> ◆ Check and repair suction line ◆ Check, repair or replace the hydraulic pump ◆ Priority valve: Remedy fault (call service agent) ◆ Steering control device: Remedy fault (call service agent) ◆ Repair steering cylinder ◆ Repair or replace travel direction switch ◆ Check solenoid valve and replace if necessary ◆ Check power supply and repair (incl. ground connection) ◆ Check and replace if necessary ◆ Swap valves around. If machine now travels in the other direction, examine valve, clean and replace if necessary ◆ Inspect positioning pressure on adjusting piston (behind the floating time nozzle) ◆ Check variable displacement pump, call service agent if necessary
Fault	<i>Drop in machine's performance</i>
Cause	<ul style="list-style-type: none"> • Engine output is insufficient • Low hydraulic oil level • Pump is sucking up air • Insufficient working pressure • Switch for travel direction damaged (short-circuit) • Magnet gets stuck or is damaged • Centering actuator has no neutral position • Internal damage to variable displacement pump
Corrective measure	<ul style="list-style-type: none"> ◆ Check diesel engine ◆ Top off hydraulic oil to the mark ◆ Retighten hose connections, replace O-ring or seals ◆ Readjust main pressure relief valves (pressure cut-off) and replace them, if necessary ◆ Repair or replace travel direction switch

	<ul style="list-style-type: none"> ◆ Repair or replace magnet ◆ Check, re-calibrate support cylinder (call service agent) ◆ Replace variable displacement pump completely
Fault	<i>Machine accelerates and decelerates sluggishly, too little propulsive power</i>
Cause	<ul style="list-style-type: none"> • Engine performance not to standard • Breaks have not released fully • No tank pressurization • Suction filter clogged • Oil loss in rotary joint • Charge pump sucking up air • Insufficient charge or supply pressure • Pressure relief valve of charge circuit dirty or damaged • Insufficient high-pressure • Variable displacement pump does not open fully • Adjusting motor not adjusting • Internal damage to variable displacement pump or variable displacement motor
Corrective measure	<ul style="list-style-type: none"> ◆ Check diesel engine ◆ Check, remedy damage ◆ Check tank seal, replace ◆ Replace filter ◆ Re-seal rotary joint ◆ Check, re-seal ◆ Check pressure, adjust ◆ Check, re-adjust or replace ◆ Check high-pressure (pressure cut-off); if necessary, re-adjust ◆ Insufficient pilot pressure. Mechanical damage to pump adjustment. Check, re-adjust or repair ◆ Adjustment start is set too high. Mechanical damage on controller or adjustment. Adjust or call service agent ◆ Replace unit
Fault	<i>Machine working too slowly, hydraulic oil overheating</i>
Cause	<ul style="list-style-type: none"> • Main pressure relief valve set too low or defective • Impermissible degree of wear on hydraulic pump • Incorrect hydraulic oil • Oil level too low • Hydraulic oil cooler dirty or damaged • Air in hydraulic system
Corrective measure	<ul style="list-style-type: none"> ◆ Adjust the main pressure relief valve and replace it if necessary. ◆ Replace hydraulic pump ◆ Quality of hydraulic oil must conform to our recommendation See chapter 6.4.1 "Fuels, lubricants, and coolants".

10 Troubleshooting

- ◆ Top up hydraulic oil to recommended mark
- ◆ Clean, check, and replace hydraulic oil cooler if necessary
- ◆ Tighten connections with engine off and system relieved of pressure

Fault

Hydraulic oil exceeds max. admissible temperature

Cause

- Thermo switch damaged
- Oil level too low
- Oil cooler dirty or damaged
- Suction filter clogged
- High-pressure valves do not respond all the time
- Flushing circulation not functioning
- Variable displacement pump or variable displacement motor damaged (wear)

Corrective measure

- ◆ Replace thermo switch
- ◆ Top off oil to the mark on the sight glass
- ◆ Clean, check and replace oil cooler if necessary
- ◆ Replace suction filter
- ◆ Check high-pressure valves, re-adjust if necessary
- ◆ Check pressure of flushing and charge pump, possible back pressure in cooling circuit, check housing pressure
- ◆ Replace variable displacement pump and/or variable displacement motor

Fault

Hydrostatic travel drive works in neither direction

Cause

- Too little hydraulic oil in tank
- Mechanical connection to diesel engine faulty
- Charge pump damaged, no charge pressure
- Switch for travel direction damaged
- Valve for travel direction damaged
- Power supply towards switch for travel direction and/or solenoid valve interrupted
- Pressure relief valve (supply pressure) faulty
- Suction filter clogged
- Suction line between tank and pump kinked
- No or insufficient supply pressure
- Variable displacement pump activation interrupted
- Mechanical damage to variable displacement pump and/or engine
- Internal damage to variable displacement pump or variable displacement motor
- Mechanical connection between variable displacement motor and axle interrupted

Corrective measure

- ◆ Top up hydraulic oil to mark on sight glass
- ◆ Check and repair mechanical connection to diesel engine
- ◆ Replace variable displacement pump
- ◆ Check travel direction switch and replace if necessary

- ◆ Check, repair or replace travel direction switch if necessary
- ◆ Check and repair power supply towards switch for travel direction and/or solenoid valve
- ◆ Check pressure relief valve and replace if necessary
- ◆ Replace suction filter
- ◆ Check suction line between tank and pump
- ◆ Check pressure and troubleshoot
- ◆ Check pressure and troubleshoot
- ◆ Check variable displacement pump, call service agent if necessary
- ◆ Completely replace variable displacement pump unit or variable displacement motor
- ◆ Check and repair mechanical connection between variable displacement motor and axle

Fault

Working cylinders not operating correctly

Cause

- Seals in cylinders worn
- Secondary valves faulty

Corrective measure

- ◆ Reseal cylinder(s)
- ◆ Check secondary valves and replace if necessary

Fault

Uppercarriage slewing too far

Cause

- Unacceptable wear in slewing gear
- Brake worn

Corrective measure

- ◆ Check slewing gear and replace if necessary
- ◆ Replace brake completely

Fault

No or insufficient interlock of plunger cylinder

Cause

- Mechanical fault
- Electrical malfunction
- No pressure build-up
- Spongy interlock

Corrective measure

- ◆ Check valves and replace if necessary
- ◆ Check switches, cables, connections, and fuse
- ◆ Check hydraulic supply
- ◆ Bleed plunger cylinders

10 Troubleshooting

Fault	<i>Insufficient performance of service brake</i>
Cause	<ul style="list-style-type: none"> • Wear in brake discs • Brake system damaged
Corrective measure	<ul style="list-style-type: none"> ♦ Repair brake discs ♦ Repair or replace brake system
Fault	<i>Parking brake without function</i>
Cause	<ul style="list-style-type: none"> • Spring-loaded brake mechanically unblocked • Hydraulic fault in spring-loaded brake actuation
Corrective measure	<ul style="list-style-type: none"> ♦ Activate spring-loaded brake ♦ Repair spring-loaded brake
Fault	<i>Malfunctions in the electrical system</i>
Cause	<ul style="list-style-type: none"> • Outside and/or interior lighting does not come on • Windshield wiper is not working • Starting system not working satisfactorily • Horn not responding • Indicator elements are imprecise
Corrective measure	<ul style="list-style-type: none"> ♦ Check cables, connections, bulbs, and fuses for lighting ♦ Check cables, connections, and fuses for windshield wipers Examine windshield wiper for mechanical damage; replace if necessary ♦ Check charge capacity of battery. Test starter function. Check connection and condition of power and ground cables. Check function of ignition lock and starting relays; replace if necessary ♦ Check cables, connections, and fuses for signal horn; replace signal horn if necessary ♦ Determine the fault or source of the indicator element problem and eliminate it, call service personnel if necessary
Fault	<i>Faults in the overload warning device</i>
Cause	<ul style="list-style-type: none"> • No visual indication • No acoustic warning • Overload warning sensor or indicator module defective • Overload warning device is not switched on
Corrective measure	<ul style="list-style-type: none"> ♦ Call Service agent to check overload warning sensor or display module ♦ Switch on overload warning

10.3.2 Immobilizer faults

Fault

Immobilizer not working

Cause

- Plug-in contacts not connected to power supply
- Antenna cable not plugged in or defective
- Key contains a transponder that has not been taught in

Corrective measure

- ◆ Inspect power supply at plug-in contacts
- ◆ Check antenna plug-in connection
- ◆ Check antenna cable
- ◆ Use key with matching transponder

Fault

Not possible to set up new keys

Cause

- Terminal 30 not connected to control unit
- No or incorrect master key used previously (red grip)
- Time for master key in ignition too short or too long
- Key for setup does not have transponder
- Defective antenna
- Setup time for key in ignition too short

Corrective measure

- ◆ Connect terminal 30 to control unit
- ◆ Use master key
- ◆ Calculate time for master key correctly
- ◆ Check whether the key being taught in has a transponder
- ◆ Check whether the antenna is working
- ◆ Extend the teach-in time for the key in the ignition lock

Fault

Not possible to clear taught-in keys

Cause

- No or incorrect master key used (red grip)
- Time for master key in ignition lock too short
- Defective antenna

Corrective measure

- ◆ Use the correct master key
- ◆ Calculate time for master key correctly
- ◆ Check whether the antenna is working



10 Troubleshooting

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