TEREX® | FUCHS

Operating Instructions

MHL331 D

Mobile Hydraulic Loading Machine

MHL331 D

Vehicle ID No. starting at

331110 / 1130 - 1409

Year of manufacturing beginning

2007

Version

05.11.08 en (englisch)

The TEREX | Fuchs operating instructions consist of 10 chapters aimed at different staff members:

Chapter	Subject	Staff members
1	FOREWORD	**Operating staff** **Inspection and maintenance staff** **Repair staff**
2	SAFETY AND ACCIDENT PREVENTION	**Operating staff** **Inspection and maintenance staff** **Repair staff**
3	TECHNICAL DATA	**Operating staff** **Inspection and maintenance staff** **Repair staff**
4	CONTROL AND DISPLAY ELEMENTS	**Operating staff** The operating staff must be familiar with the contents of the operating instructions and the use of this or comparable machinery.
5	WORK OPERATION	**Operating staff** The operating staff must be familiar with the contents of the operating instructions and the use of this or comparable machinery.
6	RECOVERY, LOADING AND TRANSPORT	**Operating staff** **Inspection and maintenance staff** **Repair staff**
7	CARE AND MAINTENANCE	**Operating staff** **Inspection and maintenance staff** **Repair staff** The inspection, maintenance and repair staff must have expert knowledge as well as experience about inspection, maintenance and repair of this or comparable machinery.
8	TROUBLE-SHOOTING	**Operating staff** **Inspection and maintenance staff** **Repair staff**
9	APPENDIX	**Operating staff** **Inspection and maintenance staff** **Repair staff**
10	SPECIAL EQUIPMENT	**Operating staff** The operating staff must be familiar with the contents of the operating instructions and the use of this or comparable machinery.

1 Foreword

1.1 General

The **MHL 331 Mobile Hydraulic Loading Machine** was thoroughly tested before it left the factory. The final inspection showed that all parts are in perfect working order and that the machine achieves the expected level of performance.

These operating instructions are intended to help you to familiarize yourself with your machine and the uses to which it may be put.

The operating instructions contain important information telling you how to use the machine safely, expertly and economically. Observing the operating instructions will help you avoid danger and increase reliability in applications and extend the life expectancy of the machine. Repair costs and down times will thus be reduced.

Information on national requirements for accident prevention and environmental protection has to be added to the operating instructions.

1.2 Proper use

The MHL 331 loading machine is intended solely for work which is suited to the function of the machine and its work attachment. Such work involves:

- loading
- moving and
- shifting

of materials such as scrap, scrap metal, chips as well as different recycling materials.

The appropriate work attachments for these purposes are:

- clamshell and cactus grabs
- magnet
- load hook
- sorting grabs

The specifications of the manufacturer contained in these operating instructions must be complied with.

Before using the machine for timber rehandling, consult the manufacturer.

Any usage above and beyond that specified here and any non-compliance with the manufacturer's instructions are regarded as improper use. The manufacturer shall not be liable for damage resulting from improper use. This risk is borne solely by the operator.

When mounting work attachments (provided by outside suppliers), the proper use of this attachment as stated by its manufacturer must be observed.

Compliance with the operating instructions, the performance of maintenance work as specified and adherence to maintenance intervals are all aspects of proper use.

! **ATTENTION**

The operating temperature at which the machine may be used with fuels, lubricants and coolants filled in as standard is within the range from -15 °C to +45 °C.

In operating sites with lower temperatures we recommend engine oil preheating and hydraulic oil preheating. This makes the machine ready for use faster and thus prolongs its life. For fuels, lubricants and coolants for temperatures below -15 °C see chapter 3.19 "Fuels, lubricants and coolants" and chapter 4.4.7 "Notes for use in winter".

1.3 Abbreviations and terms

Below is an explanation of abbreviations and terms that are used in these operating instructions:

MHL : **M**obile **H**ydraulic **L**oading Machine

StVO : Road Traffic Regulations (Germany)

StVZO : Regulations Authorizing the Use of Vehicles for Road Traffic in Germany

UVV : Accident Prevention Regulation in Germany

GLR : Load limit sensing control

1.4 Introduction

It is basically assumed that the machine will only be operated by authorized, trained and specially instructed personnel.

The operating instructions and any other supplied instructions must be kept handy in the machine at all times.

Your attention is drawn in the operating instructions to points of special importance for safe, expert use of the machine.

Only if the user is familiar with the operating instructions can errors be prevented and trouble-free operation be assured. It is therefore very important that those persons who are actually responsible for operation are familiar with the operating instructions. They must be thoroughly read and understood, as the manufacturer will not assume liability for damages and malfunctions arising as a result of non-compliance with the operating instructions.

If you require additional information or if any point is unclear, please contact your dealer immediately.

We reserve the right to modify the machine within the scope of technical developments without changing the operating instructions.

1.5 Warranty and maintenance

ATTENTION

TEREX | Fuchs can provide no warranty for modifications or attachments to equipment on TEREX | Fuchs products which have not been approved by us or have not received our express written consent. In such cases, our warranty for the machine lapses, as does our product liability for any resulting consequential damages.

The warranty period covers 2000 operating hours, but not more than 12 months starting from the day the machine is transferred or placed into operation.

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

Careful observation of the machine while in function and the use of the specified fuels, lubricants and coolants will prevent malfunction.

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.

In respect of possible claims for damages during the warranty period, all service work contained in the maintenance and inspection plan must be carried out at the specified intervals.

After the warranty period, too, regular maintenance work should be performed in order to ensure that the machine is constantly in good working order and enjoys a reasonable service life.

Insist that only **original TEREX | Fuchs spare parts** are used in the event of any repair work. In this way, you will have a product of lasting high quality, thereby ensuring that your machine maintains its original condition.

The vehicle identity number as well as data on vehicle type and manufacturer can be found on the identification plate (1/1).

The vehicle identity number is in addition struck on the undercarriage (1/2).

ATTENTION

The vehicle type and the vehicle identity number must be stated absolutely in all enquiries and all correspondence.

1.6 Environmental standards

When operating or working on the machine the currently valid environmental standards must be observed at all times.

When performing repair and maintenance work, special care must be taken to ensure that ecologically harmful substances such as

- grease and lubricating oil
- hydraulic oil
- fuel
- coolant
- battery acid
- liquid detergents containing solvent

do not seep into the ground or the sewerage system.

These substances must be collected, kept, transported and disposed of in suitable containers.

If above-mentioned liquids seep into the ground, their escape must be stopped immediately and the liquid be bound with suitable binding agents. If necessary, this area of soil must be excavated. Binding agents and excavated soil must be disposed of in the proper manner. The relevant environmental regulations must be complied with.

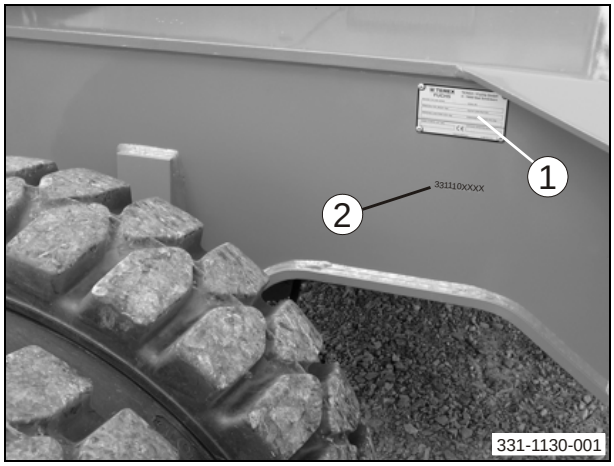


Fig. 1 Vehicle identity number

1.7 Notes on using the operating instructions

1.7.1 References to pictures and items

The references to pictures and items contained in the text, such as (14/1), for example, mean figure 14, item 1.

1.7.2 Dangers and important notes

DANGER

DANGER – indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

WARNING – indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

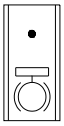
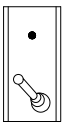
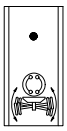
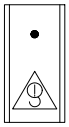
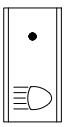
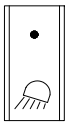
CAUTION – indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

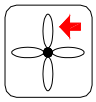
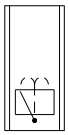
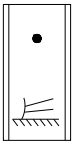
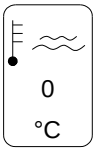
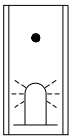
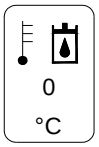
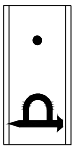
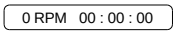
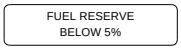
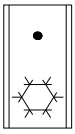
ATTENTION

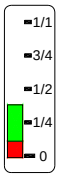
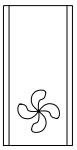
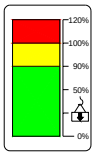
ATTENTION – indicates a situation which, if not avoided, may result in property or equipment damages.

1.7.3 Pictograms

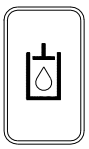
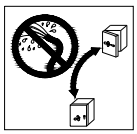
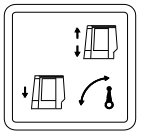
The table below explains the meaning of the pictograms on the operator control panel. Functions and displays marked (*) are optional.

Display Symbol	Description (Indicators)	Functionality Symbol	Description (Switches)
	Dual assignment: Coolant temperature Hydraulic oil temperature		Parking brake
	Charge air temperature		Swing brake
	Battery charge control		In an emergency only: bypass the hydraulic oil level or temperature cut-off / enable all travel and work functions
	Engine oil pressure		Oscillating axle lock release
	Dual assignment: Coolant level Hydraulic oil level		Deactivate close range cut-off (dipperstick)
	Dual assignment: Air filter clogging Return filter clogging		Bypass overload cut-off *
	Service brake		Raise/lower cab
	Parking brake		Auto-idling system
	Swing brake		Parking light / headlamps
	Load limit sensing control		Working floodlights

Display Symbol	Description (Indicators)	Functionality Symbol	Description (Switches)
	Reversing fan mode *		Transmission control slow/fast
	Close range cut-off (dipperstick)		Engine control error / preheat display
	Fuel reserve indicator		Windshield wiper/washwipe (upper window section)
	Display oscillating axle released		Windshield wiper/washwipe (lower window section)
	Automatic central lubrication system – triggering additional lubrication		Dozer blade *
	Engine coolant temperature		Rotating beacon *
	Hydraulic oil temperature		Magnet system *
	Time/operating hours and optionally current engine speed		Multi-purpose stick *
	Text output to the indicator displays		Air conditioning

Display Symbol	Description (Indicators)	Functionality Symbol	Description (Switches)
	Fuel gauge		Blower
	Load display *		

The table below explains the meaning of the pictograms on the machine.

Symbol	Description	Symbol	Description
	Safety distance		Hydraulic oil
	Danger of injury		Fuel
	Lashing point		Suspension point for loading by crane
	No pressure jet!		Emergency lowering of cab
	Air conditioning		

1.8 Operating instructions provided by outside suppliers

The operator must also observe the subsequent operating instructions covering components from outside suppliers. Reference is made to these operating instructions in the TEREX | Fuchs operating instructions.

Operating instructions	Manufacturer
Diesel engine	Deutz
Central lubrication system	Lincoln
Air conditioning	Aurora
optional:	
Generator	GTS
Supplementary heating	Eberspächer

1.9 Copyright

2 Safety and Accident Prevention

Working with the machine involves potential dangers to life and limb, which you may encounter as the owner, operator or maintenance specialist. If you read, then continuously and attentively reread and observe the various safety instructions, you can prevent dangers and accidents. This applies especially to persons who only work occasionally with the machine, for example during maintenance work.

Conscientiously following the safety requirements listed below will ensure your safety and that of others and will prevent damage to the machine.

When describing jobs that could cause dangers, the necessary safety precautions are described in these operating instructions, and the terms **DANGER, WARNING, CAUTION** and **ATTENTION** are emphasized.

2.1 Declaration of conformity

CE

The machine meets the basic requirements of applicable European regulations.

Conformity is hereby confirmed. The original of the Declaration of Conformity is enclosed in the sales records.

A copy of the Declaration of Conformity is kept on file by the manufacturer.

2.2 General safety requirements

- Become familiar with the operating instructions before the machine is placed into operation for the first time. Make certain you have in your possession, have read and understood any additional instructions regarding relevant special equipment.
- Only persons explicitly authorized to do so may operate, maintain or repair the machine. All such persons must be of the legal minimum age.
- Use only trained personnel with the proper instruction. Make certain personnel responsibilities for operating, fitting, maintaining and repairing the machine are clearly delineated. Give your personnel the option of refusing to perform directions of a third party that are contrary to safety. This also applies in reference to instructions contrary to traffic regulations.
- Only allow personnel who are being trained, instructed or are involved in a general training program to work with the machine under the supervision of an experienced person.
- Check at regular intervals to ensure personnel are working in a safety-conscious manner and observe the operating instructions.
- Wear safe work clothing when you are working on or with the machine. Avoid wearing rings, wristwatches, ties, shawls or open jackets or clothing that is not close-fitting. Otherwise there is a danger of injury caused for example by clothing being caught or drawn in. Protective goggles, protective boots, helmets, gloves, reflecting jackets, ear-muffs, etc. may be required for some jobs.
- Find out what special safety requirements there are for the job location from the local supervisor.
- Always fold up the left armrest before leaving the driver’s seat.
- When getting in and out, do not hold onto the steering column, the operator control panel or the operating levers. This could cause unintended movements that could result in an accidents.

- Never jump off the machine. Instead use the steps, ladders, and hand grips designed for mounting and descending. Use both hands to hang on and turn your face to the machine.
- Become acquainted with the emergency exit through the windshield.
- If there are no instructions to the contrary for maintenance and repair jobs, proceed as follows:
  - turn off the machine on a solid, level surface and set down the work attachment carefully on the ground,
  - move all operating levers to the neutral position and fold up the left armrest,
  - switch off the engine and remove the ignition key.
- Before performing any work on the hydraulic circuit, with the ignition key in the contact position, you must also activate all joysticks and similar devices (four-way control levers and pedals) in both directions to release the control pressure and backup pressure in the working circuits. Then reduce the pressure inside the container as described in these operating instructions.
- Secure all loose parts on the machine.
- Never place the machine into operation without having first performed a thorough walk-around inspection and checking whether any warning signs are missing or illegible.
- Observe all danger and safety instructions.
- The machine must be equipped with specific safety equipment for special applications. If this is the case, work only if they are attached and fully functional.
- Do not make any changes, additions or conversions to the machine that could have a negative effect on safety without the manufacturer's approval. This also applies to installing or adjusting safety equipment and valves and welding on bearing parts.

2.2.1 Equipment and attachment parts

Equipment and attachment parts from third party manufacturers or those that have not been generally approved by TEREX | Fuchs for fitting or mounting must not be fitted or mounted to the loading machine without the prior written consent of TEREX | Fuchs.

The necessary technical materials must be made available to TEREX | Fuchs for this purpose.

2.2.2 Safety instructions for replacing the xenon lamp (optional)

- Always switch the headlamp off and disconnect it from the supply voltage before changing the lamp.
- Never grasp into the lamp socket.
- The electrical connection between headlamp and ballast conducts high-voltage and must not be separated.
- The ballast (electronic component in the headlamp housing) may never be operated without lamp, since dangerous voltage flashovers leading to damage can occur.
- Let the lamp cool down first.
- Wear safety goggles and safety gloves when changing the lamp.
- The glass body of the xenon lamp is filled with various gases and metal gases and stands under pressure **(risk of splintering!)**.
- Never touch the glass bulb of the xenon lamp, grasp it only at the base.
- Carefully remove fingerprints with a clean cloth and alcohol.
- Operate the xenon lamp only in a closed headlamp.
- Should the xenon lamp burst in a closed room, the room must be aired for at least 20 minutes to exclude a danger to health due to gases.
- Dispose of the replaced xenon lamp as hazardous waste.
- To ensure that the permissible current intensity is not exceeded for the cable and plug connections, do not connect any further working floodlights to the existing ones.

CAUTION

In the case of continuing starting difficulties on switching on (flickering light) immediately switch the xenon headlamp off. Otherwise the electronics in the ballast can be destroyed.

2.3 Avoiding crushing and burns

- Do not work under the loading equipment unless it is resting safely on the ground or is fully supported.
- Do not use any restraining devices such as cables or chains that are damaged or do not have sufficient carrying capacity. Wear safety gloves when working with wire cables.
- Never align the holes with your fingers when working on the equipment. Instead use a suitable mandrel.
- Make certain there are no objects that could be drawn into the fan when the engine is running. The fan would deflect these objects away or destroy them and would itself be damaged by the objects.
- The entire cooling system is hot and under pressure when it is close to the operating temperature. Avoid touching parts that carry coolant. There is a danger of burns.
- Only check the coolant level if the cap of the expansion container has cooled off enough for you to hold it. Then turn the cover carefully to first release the excess pressure.
- The engine and hydraulic oil are hot close to the operating temperature. Avoid skin contact with hot oil or parts carrying oil.
- Wear protective goggles and protective gloves when you are working on the battery. Avoid sparks and open flames.
- Never allow the grab to be guided manually by a helper.
- Before performing any work in the engine compartment, always protect the engine cover from closing unintentionally by using the support provided for that purpose.
- There is a risk of being crushed by the lift frame due to the movement of the cab, since the operator in the cab cannot see all areas fully. This also applies to the emergency lowering function of the elevating cab by the fitted ball cocks (refer to chapter 4.8.6 "Procedure for manual lowering of elevated cab (in case of malfunction)").

2.4 Avoiding fire and danger of explosion

- Turn the engine off when refueling.
- When refueling or charging the batteries, avoid smoking and working with open flames.
- Always start the engine according to the description in the operating instructions.
- Check the electrical system regularly. Have all faults such as loose connections, burnt fuses and glow lamps, singed or worn away wiring repaired by professional personnel immediately.
- Do not take any flammable liquids with you on the machine except in tanks provided for that purpose.
- Regularly check all lines, hoses and threaded couplings for leaks and damages. Repair all leaks immediately and replace the defective parts. Oil spraying out of leaks can easily lead to fire.
- Make certain all supports and protective signs are installed as required to withstand vibrations, rubbing and heat buildup.
- Do not use any starting aids containing ether to start diesel engines with pre-glow or flame-glow systems! Otherwise there is a **DANGER OF EXPLOSION!**
- Make yourself acquainted with where fire extinguishers are on the machine and how to use them as well as local options for reporting and fighting fires.

2.5 Safety instructions for placing into operation

- Every time before placing the machine into operation, perform a thorough walk-around inspection of the machine.
- Check the machine for loose pins, tears, wear, leaks and deliberate damage.
- Never place a damaged machine into operation.
- Make certain the damage is eliminated immediately.
- Make certain you have closed and locked all hoods and covers and all warning signs are in place.
- Make certain the windshields and the inside and outside mirrors are clean. Secure doors and windows against unintentional movements.
- Make certain no one is working on or under the machine and warn any persons standing nearby the machine will be placed into operation.
- Before placing the machine into operation, adjust the driver’s seat, the mirror and the operating levers so you can work comfortably and safely.
- The noise protection equipment on the machine must be in the protective setting during operation.

2.6 Safety requirements for starting

- Before starting, check all indicator lamps and instruments to make certain they are working properly, move all operating levers to neutral setting and fold the left armrest down.
- After starting the engine up, give a short blast of the horn to warn persons who are in the vicinity of the machine.
- Only start the machine from the driver's seat.
- Unless there are instructions to the contrary, start the engine in the manner described in the operating instructions.
- Only allow the engine to run in enclosed rooms if there is adequate ventilation. If necessary, open doors and windows to ensure a proper supply of fresh air.
- Bring the engine and hydraulic oil up to operating temperature. Low oil temperatures cause the control system to respond sluggishly.
- Check the loading equipment control unit to ensure it is working properly.
- Move the machine carefully to open ground and then check the functionality of the travel and swing brakes and steering as well as the signal and lighting equipment.

2.7 Instructions for working safely

- Before starting work, become acquainted with special features of the work site, special requirements and warning signals. The work environment includes, for example, obstructions in the work area, the carrying capacity of the ground and requirements to close the work site off from public traffic.
- Always maintain an adequate safety distance to overhanging features, edges, embankments and unsafe surfaces.
- Be especially attentive if visibility is unfavorable and soil conditions vary.
- Become acquainted with the location of supply lines at the work site and be especially careful when working close to them. If necessary, inform local authorities.
- Keep the machine at an adequate distance from overhead electrical lines. When working in the vicinity of overhead electrical lines, do not come close to the lines with the loading equipment. Danger of fatal injuries! Learn what the safety distances to observe are.
- In the event electrical current jumps from a line to the machine, follow these rules:
  - do not perform any movements with the machine or its loading equipment,
  - do not leave the cab,
  - warn persons outside not to approach or touch the machine,
  - have the current turned off.
- Before moving the machine, always check that accessories are positioned so they will not cause an accident.
- Always turn on the light when visibility is poor or it is dark.
- Do not allow any passengers on the machine.
- Always be seated with the safety belt fastened while working.

- Report all operating faults and make certain the necessary repairs are performed immediately.
- Make certain personally that no one is endangered when the machine is placed in motion.
- Before starting work, check the brake system according to the requirements in the operating instructions.
- Never leave the driver's seat as long as the machine is in motion.
- Never leave the machine unattended with the engine running.
- The machine must be used, driven and operated in such a way that its stability against overturning is ensured at all times. Loading equipment must only be used with known loads, especially in grab operation.
- Adjust the travel speed to local conditions.
- Avoid work movements that could cause the machine to tip over. If the machine nevertheless starts to tip or slip to the side, set down the loading equipment immediately and point the machine uphill.
- If possible, always work facing uphill or downhill and never sideways on the incline.
- Move carefully on ground close to a drop-off or on a slope.
- Drive downhill only at the permitted speed. Otherwise you could lose control of the machine.
- Always change down to the lowest gear before the incline. Here the diesel engine must run at maximum speed and the travel speed may be reduced only via the travel pedals.
- Insist when loading a truck that the driver leaves the driver's seat, even if there is protection against falling rocks.
- In terrain with a poor overview and whenever necessary, have a guide help you. Have only one person assigned to give you signals.
- Assign only experienced persons the task of attaching loads and guiding the loading machine operator. The guide must remain in the field of view of the operator or stay in spoken contact with him.
- Depending on the combination of equipment, there is a danger of collision between the grab and cab, the cab guard or the boom cylinders. The greatest possible attentiveness is demanded when the grab moves into this area so as to avoid damage.

2.8 Proper parking of the machine

- If possible, turn the machine off only on an even and solid surface. If it must be turned on on an incline, secure the machine against moving with wedges.
- Lower the loading equipment and anchor the work attachment slightly into the ground (see chapter 4.10 "Parking the machine").
- Move the operating levers to neutral positions and close the travel and swing brake.
- Turn off the engine as described in the operating instructions and fold up the left armrest before leaving the driver's seat.
- Close up the machine well, remove all keys and secure the machine against unauthorized use and vandalism.

2.9 Transporting the machine safely

- Use only suitable transport and lifting equipment with sufficient carrying capacity.
- Park the machine on flat ground and use wedges to secure the wheels.
- The gradient of the ramp for driving onto the flat-bed trailer must not exceed 30°. Wooden planks must be laid upon ramps to prevent slipping.
- Before driving onto the ramp, clean the machine's wheels of snow, ice and sludge.
- Secure the uppercarriage against the undercarriage with the swing brake before driving up the ramp.
- It is prohibited to turn the uppercarriage while the machine is on the transport vehicle.
- Line the machine up exactly to the loading ramp.
- Make certain a guide gives the machine operator the necessary signs.
- Have blocks on hand while the machine is ascending the ramp to prevent it from rolling back.
- Swing in the loading equipment and drive onto the ramp. Always keep the loading equipment just above the loading surface. Move carefully onto the ramp and then onto the transport vehicle.
- Before you leave the machine, relieve all pressure lines. Move all operating levers into neutral positions and close the parking brake. Pull out the ignition key and fold the left armrest up.
- Close all doors, covers and hoods of the loading machine.
- Secure the machine and other individual pieces against slipping with chains, ropes and wedges.
- Before setting off, find out about the route to be taken, especially in regard to limits for width, height and weight.
- Pay close attention to driving under electrical lines and bridges and driving through tunnels.
- Use the same caution when unloading as for loading. Remove all cables/chains and wedges. Start the engine as described in the operating instructions. Carefully drive down the ramp from the loading area. Keep the loading equipment as close above the ground as possible. Use a guide.

2.10 Towing the machine safely

- Always observe the correct procedure. See chapter "Recovery, loading and transport" in the table of contents in these operating instructions.
- Before the machine can be towed, the power shift gear must be set to neutral position (idle running).
- The machine may be towed only in exceptional cases, for example to bring the machine away from an endangered place for repair.
- Check all trailing and drawing devices for their safety when pulling or towing.
- Towing equipment such as ropes, rods, etc., must have sufficient tensile strength and must be fastened to the towing bar on the undercarriage intended for this. Damage and accidents that arise when towing the machine can be covered under no circumstances by the warranty of the manufacturer.
- Make sure that when towing no one is in the area of the towing equipment.
- Keep the rope taut and avoid kinks.
- Pull the rope taut carefully. A sudden jerk can cause a sagging rope to tear.
- Comply with the specified transport setting, permissible speed and distance when towing.
- Restore the standard condition of the machine after towing.
- When placing into operation again proceed only according to the operating instructions.

2.11 Load hook applications

DANGER

Staying under suspended loads is forbidden. Danger of fatal injuries!

Load hook applications are the hoisting, transporting and lowering of loads with the aid of a fixing device (rope, chain, etc.). The assistance of personnel is required to attach and release the load.

Loading machines are only to be used for load hook applications when the prescribed safety devices are present and in full working order.

According to EC Machinery Directive 98/37/EC and DIN EN 474-5 of October 2001, these are:

- overload warning device
- boom cylinder hose rupture safety devices (only for a carrying force of more than 1000 kg or a tipping torque of more than 40,000 Nm)
- table of carrying capacity in the cab
- secure attachment of loading implements (e.g. load hook or shackle)

If a loading machine is to be equipped for load hook applications, an overload warning device and hose rupture safety devices on the boom cylinders and, if necessary, a load hook must be installed.

Note the following when working with load hook applications:

- Loads must be attached in such a way that they cannot slip or fall out.
- Persons guiding the machine present and persons attaching the load must not go outside the field of view of the machine operator.
- The machine operator must guide the load as close to the ground as possible and must avoid allowing it to swing back and forth.
- Loading machines are only to travel with an attached load if the path of travel is fairly level.
- In load hook applications, personnel attaching loads shall only approach the boom with the machine operator's permission and only from the side.
- The machine operator is only to give his permission if the machine is standing still and the loading equipment is not in motion.
- Do not use fixing devices (ropes, chains) which are damaged or of inadequate dimensions. Protective gloves must always be worn when working with fixing devices.
- The operator is responsible for operation in load hook applications. Furthermore the accident prevention requirements of relevant trade unions apply.

2.12 Measures to ensure safe maintenance

- Do not perform any maintenance work or repairs that you do not understand thoroughly.
- Observe the recommended times or times specified in the operating instructions for recurring checks/inspections. A workshop with equipment for the task is absolutely essential for performing maintenance measures.
- The inspection plan precisely defines who must or may perform which jobs. The jobs listed under "Daily and weekly tasks" in the operating instructions can be performed by the machine operator or maintenance personnel. The remaining jobs must only be performed by specialized personnel with the appropriate training.
- Spare parts must match the technical requirements set by the manufacturer. This is always ensured if you use original spare parts.
- Wear safe work clothing when performing maintenance work. Certain jobs require, in addition to a safety helmet and safety boots, protective goggles and protective gloves.
- Keep unauthorized persons well away from the machine during maintenance.
- If necessary, secure ample room for the maintenance area.
- Inform operating staff before starting to perform special and maintenance jobs. Appoint supervisors.
- If nothing is indicated to the contrary in the operating instructions, all maintenance work must be performed on a solid and level surface with the loading equipment set down and the engine turned off.
- Always tighten screws that were loosened during maintenance and repair jobs.
- If safety equipment needs to be dismantled to fit equipment or perform maintenance or repairs, it must be reattached and tested immediately after the maintenance and repair jobs are completed.
- For all maintenance work, especially for work under the machine, hang a warning sign "Do not turn on" by the ignition key lock where it is clearly visible. Pull out the ignition key.
- Clean the machine. Clean especially the connections and screw couplings of oil, fuel and upkeep materials at the beginning of the maintenance/repair job. Do not use any aggressive cleaning agents and use lint-free rags.
- Do not use flammable liquids for cleaning the machine.
- Perform jobs on the machine that involve welding, burning and grinding only if explicitly approved. Clean the machine and the area around it of dust and combustible materials before welding, burning or grinding. Ensure there is adequate ventilation. There is a risk of fire and/or explosion.
- Before cleaning the machine with water or steam jets (high-pressure cleaner) or other cleaning agents, cover or seal over all openings in which water, steam or cleaning agents should not penetrate for safety and/or functional reasons. Electrical motors, switch cabinets and plug connections are especially subject to danger. Before cleaning, inspect all fuel, engine oil and hydraulic oil lines for leaks, loose connections, rubbed spots and damage. Eliminate any discovered defects immediately.
- Do not use any aggressive cleaning agents or steam jet devices to clean the machine during the first two months after it has been placed into operation (or after it has been repainted).
- When working with oils, greases and other chemical substances, observe the safety requirements that apply to the product in question.

- Ensure that fuels, lubricants and coolants as well as replaced parts are disposed of in an environmentally proper manner.
- Proceed carefully when working with hot lubricants, coolants and fuels (danger of burns and scalding).
- Operate internal combustion engines and fuel-driven heatings only in areas with adequate ventilation. Before starting the machine in enclosed areas, make certain there is adequate ventilation. Follow applicable regulations for the work site.
- Do not attempt to lift heavy parts. Use work aids with sufficient carrying capacity designed for that purpose. Fasten and secure individual parts and large assemblies carefully on lifting equipment so they cannot cause any danger. Use only suitable lifting equipment with no technical defects. Loads must be supported by hoisting equipment with sufficient carrying capacity. Do not remain or work under suspended loads.
- Do not use lifting equipment that is damaged or does not have sufficient carrying capacity. Wear protective gloves when working with wire cables.
- Assign only experienced persons the task of attaching loads and guiding. The guide must remain in the field of view of the operator or stay in spoken contact with him.
- Use the climbing aids and work platforms provided or other that meet safety requirements for assembly jobs above body height. Do not use machine parts as climbing aids if they were not designed for that purpose. Wear fall protection for maintenance work performed at high heights. Keep all grips, steps, platforms, ladders, etc. free of dirt, snow and ice.
- Make sure there is safe support when working on the equipment (for example, changing grab tips). Avoid metal-to-metal contact.
- Always support the machine so that any shifting of weight will not endanger standing stability. Avoid metal-to-metal contact.
- Work on drive mechanisms, brake and steering systems must only be performed by professionals trained for the task in question.
- If the machine needs to be repaired on an incline, place blocks under the wheels to secure them and lock the uppercarriage.
- Only persons with specialized knowledge and experience are permitted to work on the hydraulic equipment.
- Wear protective gloves when searching for leaks. A fine spray of liquid under pressure can penetrate the skin.
- Do not loosen any lines or screw connections until the loading equipment has been set down and the engine has been turned off. Then you must also activate all joysticks and similar devices (four-way control levers and pedals) in both directions, with the ignition key in the contact position, to release the control pressure and backup pressure in the working circuits. Then reduce the pressure inside the container as described in these operating instructions.
- The two plug connections on the electronic engine control as well as the positive cable of the battery must be disconnected for arc welding work on the machine. The positive cable of the battery must be connected to the nearby ground pin.
- Disconnect the battery before working on the electrical system. Loosen the negative pole first, then the positive one. When reconnecting it, proceed in the opposite order.
- Check the electrical system regularly. Have all faults such as loose connections, burnt fuses and glow lamps, singed or worn away wiring repaired by professional personnel immediately.
- Use only original fuses with the recommended current strength.

- Work on electrical equipment must only be performed by an electrical specialist or trained persons under the supervision of an electrician in accordance with technical electrical regulations.
- When working on parts conducting voltage, use a second person to press the emergency stop or main switch in the event of an emergency. Close off the work area with a red-and-white safety cordon and a warning sign. Use only electrically insulated tools.
- For work on medium and high voltage assemblies, after turning off the electrical power, short circuit the power supply cable to the ground and short circuit the assemblies, for example condensers, with a grounding rod.
- First check parts conducting current to ensure they are free of voltage. Then ground them and short circuit them. Insulate adjacent parts that are under voltage.

DANGER

Hydraulic accumulators are under hydraulic and gas pressure and must not be opened. They contain hydraulic fluid and nitrogen (danger of asphyxiation).

Only trained specialist personnel should replace the hydraulic accumulator or place it into operation. Do not touch a hydraulic accumulator unless it has cooled off.

No changes must be made to the hydraulic accumulators (welding, drilling, opening it by force, etc.).

2.13 Hydraulic hoses and hydraulic hose lines

- Repairs to hydraulic hoses and hydraulic hose lines are forbidden!
- All hoses, hose lines and screw connections must be checked regularly, at least once a year, for leaks and externally visible damage! Replace any damaged parts immediately! Oil spraying out can cause injuries and burns.
- Even if they are stored properly and subject to proper loads, hoses and hose lines are subject to natural aging. Their service life is therefore limited.

  Improper storage, mechanical damage and impermissible load are the most frequent causes of failure.

  The usage period of a hose line should not exceed 6 years, including a storage time of no more than 2 years (note manufacturer's date on the hoses).

  Use in the limit zone of permissible load may reduce the duration of the usage period (for example high temperatures, frequent changing movements, extremely high pulse frequencies, multi-shift operation).
- Hoses and hose lines must be replaced if any of the following criteria are encountered during inspections:
  - damage to the outer hose up to the insert (for example worn spots, cuts and tears),
  - embrittlement of the outer layer (formation of cracks in the hose material),
  - deformation when under pressure, without pressure or when bending which differ from the original shape of the hose or hose line, for example separation of layers, formation of bubbles,
  - leaks,
  - failure to observe requirements of installation,
  - damage or deformation to the hose fitting that reduce the stability of the fitting or the hose/fitting connection,
  - hose coming loose from the fitting,
  - corrosion of the fitting that reduces functionality and stability,
  - exceeding storage times and usage periods.

  When replacing hoses and hose lines, use only original spare parts.
- Lay and mount hoses and hose lines properly. Do not mix up connections.

2.14 Elevating cab

- Place the machine on a level and horizontal surface. Position the uppercarriage in relation to the undercarriage so that the steps are aligned to one another.
- Keep steps and handrails (handles) in perfect working order. Take special care that they are free of dirt, oil, ice and snow.

ATTENTION

To guarantee that the door can be opened in all weather conditions, the door seals must be brushed with talcum or silicone oil at least every two months or more frequently if required. Grease the door hinges and door locks regularly. Absolutely wear safety goggles and suitable protective clothing during the maintenance work.

- When climbing up turn your face to the machine and always use the three-point support, i.e. two hands and one foot or two feet and one hand must always have contact at the same time with the access system.
- When you can reach the door handle with your free hand, open the door first before you climb higher. External influences, for example wind, can make it difficult to open the door. Therefore always guide the door with your hand when opening it. Make sure that the door has snapped into place when it is open, so that the door opening or closing is prevented.
- Now climb higher and immediately sit on the driver's seat in the cab. Then close the door and put on the safety belt.
- When leaving the machine proceed with the same care as when entering.
- Place the machine on a level and horizontal surface. Position the uppercarriage in relation to the undercarriage so that the steps are aligned to one another. Open the safety belt.
- When climbing down stand with your face to the machine and use the three-point support. Climb down so far that you can close the door without danger. Always guide the door with your hand when closing it.
- Then climb down to the ground.

WARNING

As long as the machine is driven the cab must be in its rest position. The cab must not be elevated.

WARNING

When the cab is being moved, and during driving and working, the left-hand armrest must be folded down and the cab door shut.

2.14.1 Cab rock guard

Loading machines are only to be used where there is a danger of falling objects when the cab is equipped with cab rock guards (FOPS).

If there is a danger that material can strike the cab from the front, then a front protective roof grating must be fitted.

If there is a danger that objects can get through the intermediate spaces of the cab rock guard, then the cab must be equipped in addition with armored glazing.

2.14.1.1 FOPS/Protective roof grating in compliance with DIN EN ISO 3449-II

The cab features four holes in the roof for fastening a protective roof grating. This guard is a special version for the applications in question. Test certificates according to DIN EN ISO 3449-II can be obtained from the manufacturer.

2.14.1.2 FOPS/Front protective roof grating in compliance with ISO 10262

The cab features six holes on the front side and in the roof for fastening the front protective roof grating. Test certificates according to ISO 10262: 1998-06 and SAE J 1356: 2002-08 can be obtained from the manufacturer.

3 Technical Data

3.1 Dimensions

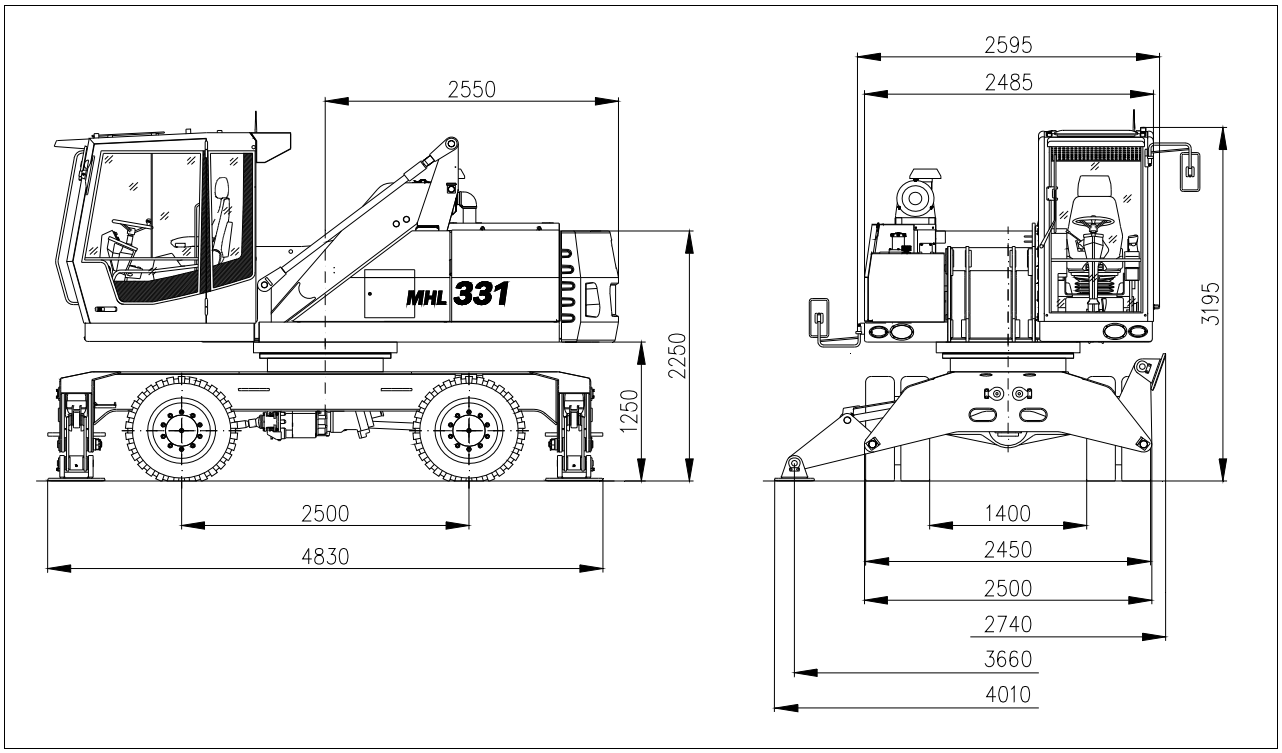


Fig. 2 Dimensions (dimensions in mm) with 9.00-20 tires

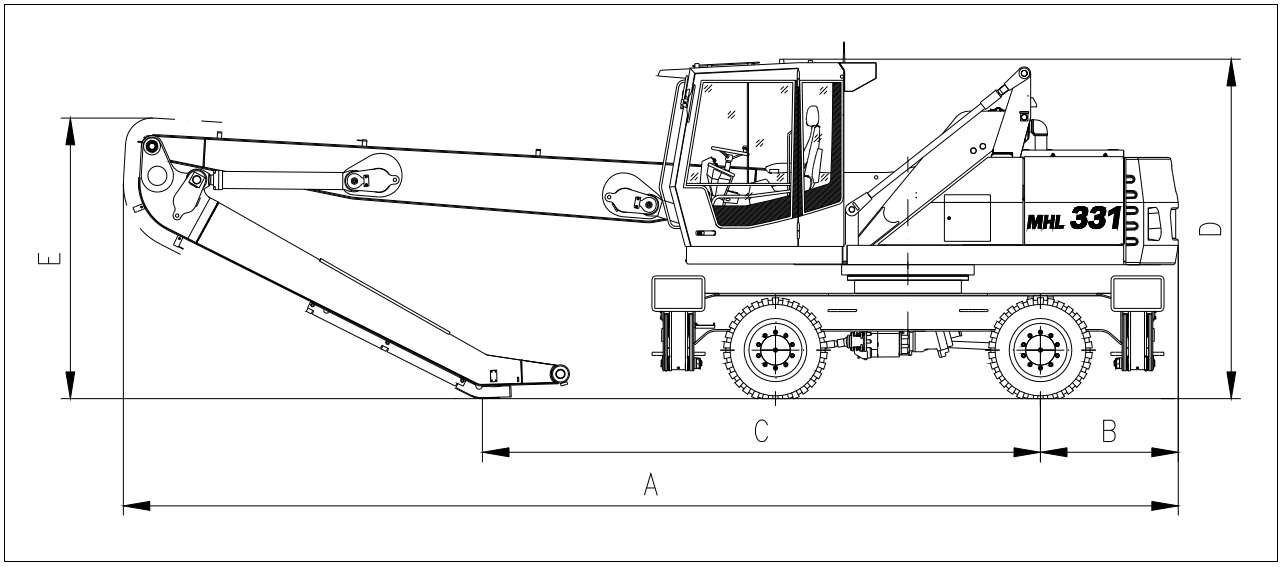


Fig. 3 Transport dimensions (dimensions in mm)

TRANSPORT DIMENSIONS		
Dimensions mm	**Loading equipment 11 m**	**Loading equipment 12 m**
A	9950	9900
B	1300	1300
C	5250	4280
D	3195	3195
E	2650	3100

3.2 General structure

1 Front axle (steering)
2 Rear axle (oscillating)
3 Two-speed power shift gear with a variable speed axial piston motor
4 4-point outriggers
5 Counterweight
6 Boom cylinder
7 Elevating cab
8 Cab lift frame
9 Box-type boom
10 Dipperstick cylinder
11 Dipperstick
12 Cactus grab

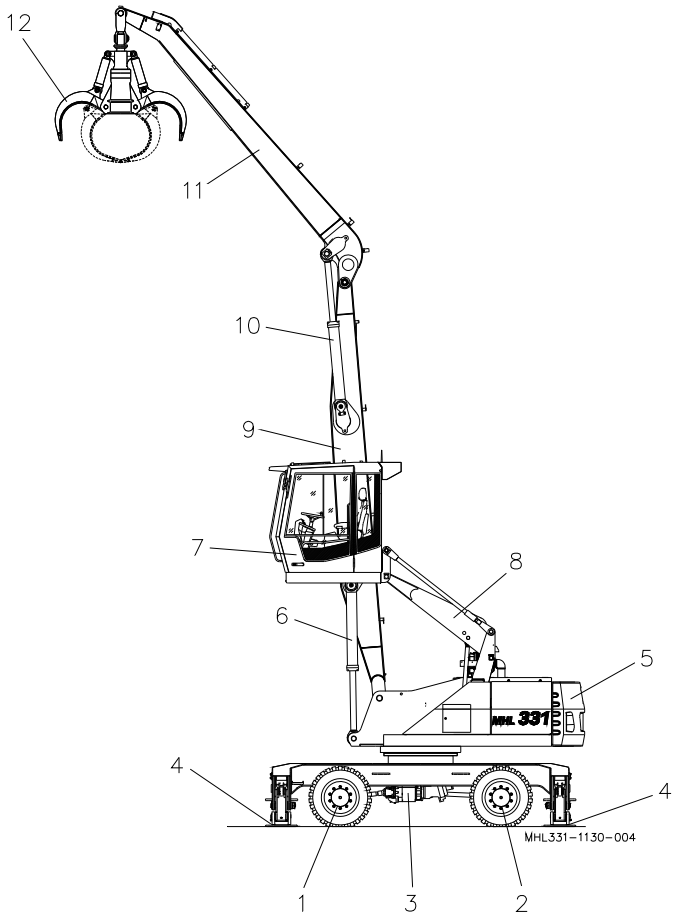


Fig. 4 General structure

3.3 Diesel engine

Manufacturer and model	Deutz TCD 2012 L06 2V
Design	6-cylinder in-line engine
Control	EMR III
Method of operation	4-cycle Diesel, common rail open-combustion-chamber injection, turbo charger, charge air cooling
Engine performance	114 kW
Rated speed	2000 rpm
Stroke displacement	6.0 l
Cooling system	Water and charge air cooling with temperature controlled fan speed
Emission standard	COM III and EPA Tier III
Specific fuel consumption	238 g/kWh at 100 % nominal output
Air filter type	Two-stage filter with safety valve

3.4 Electrical system

Operating voltage	24 V
Battery	2 x 12 V / 100 Ah / 760 A (according to EN)
Generator	28 V 55 A
Starter	24 V 4.0 kW
Cold start auxiliary device	6 x glow plugs
Lighting system	1 x H3 headlamp at dipperstick, 1 x H3 headlamp at uppercarriage, 1 x H3 headlamp on cab floor, limiting and blinker lights All working floodlights are available in H3 or in Xenon.
System for operating magnet plate	Choice of 11 kW or 13 kW three-phase generator with control system, driven directly by diesel engine via V-belt.

3.5 Hydraulic system

Main pump	Variable displacement pump in the open circuit
	Pump capacity: max. 380 l/min at 2000 rpm
	Working pressure: max. 360 bar
	The pump is regulated by the amount of current required and thus pumps only the amount of oil actually required by the consumers.
	The power transfer between the pump and the engine is monitored by the load limit sensing control. The engine is thus protected from speed pressures and overloads that are too high even in the partial throttle range. This allows the load limit sensing control to ensure optimal use of the available engine power.
Additional pumps	Gear pumps in the open circuit for supplying auxiliary loads such as "Elevating cab" or the "Grab rotation" function.
Control block	Control block in section design – single-circuit system with built-in torque control valve for torque-controlled rotation drive depending on other consumers.
Oil cooler	The fan speed is controlled thermostatically. This ensures that the hydraulic system will reach its operating temperature quickly and stay at that level constantly. Thermostatic control and the adjusted speed resulting from it result in a lower level of noise, beneficial for the operator and the environment.

3.6 Travel drive

The hydrostatic travel drive is controlled by a variable speed axial piston engine with a directly attached brake pedal valve with a flange connection on the two-speed power shift gear.

All-wheel drive via propeller shafts between the drive transmission and the axles.

Travel speed:	0 – 20 km/h
Max. drawbar pull:	100 kN
Gradability:	max. 50 %
Turning radius:	7.0 m

3.7 Rotation drive

Large diameter double-row slewing ring with inner gear teeth. The drive is transferred by a 2-stage planetary gear with an integrated multi-disk brake. It can be electrically locked in place by a push-button.

Uppercarriage speed:	0 – 8 rpm
Swing range:	360° unlimited
Max. torque:	48 kNm
Swing brake:	electrically activated

3.8 Undercarriage

Front axle	Planetary drive axle with integrated drum brake, rigid bearing, max. steering angle 28°
Rear axle	Planetary drive axles with integrated drum brake, with self aligning bearing and switching oscillating lock
Outrigger	4-point outriggers
Tires	Solid rubber elastic 8x 9.00-20

3.9 Brakes

Service brake	A hydraulically activated single-circuit brake system that works on all four pairs of wheels.
Parking brake	Electrically or hydraulically activated disk brake on the drive transmission that transfers power to the front and rear axles.

3.10 Driver's cab

	Elastically bearing, variably adjustable up and down hydraulically to a viewing height of 5.20 m.
	The cab is optionally available with bullet-proof glass or Lexan glazing (windshield and skylight).
	The standard model cab's optimal seat position, the arrangement of the control elements and ample thermal panoramic glass windows ensure an excellent all-round view.
Heating	Hot water heating with variable temperature adjustment and 3-level fan plus four adjustable defroster nozzles
Driver's seat	Air-cushioned comfort seat with integrated headrest, safety belt, and lower lumbar support; optionally with seat heater and air conditioning built into the upholstery (charcoal). It facilitates comfortable working by means of universal adjustment possibilities of the seat position, the seat incline, as well as the position of the seat cushion with regard to the armrests and pilot controls.
Monitoring	Ergonomically positioned, glare-free instrument cluster, multifunction monitor, automatic monitoring, warning and saving of deviating operating conditions, such as filter pressure monitoring with warning display and shut-off of the pilot controls, warning, or shut-off, respectively, of the pilot controls in case the hydraulic oil temperature limits are exceeded.
Air conditioning	Air conditioning system with reheat function

3.11 Control

The loading machine is equipped as standard with an ISO control see chapter 5.1.

3.12 Service weights

Service weights	22 – 23.5 t

3.13 Permissible loads

Permissible gross vehicle weight	23.5 t
Permissible axle load, front	12 t
Permissible axle load, rear	12 t
* Maximum surface load with standard 4-point outrigger	$p_{max.}$ = 250 N/cm²

(* Load bearing according to the table of carrying capacity in accordance with DIN ISO 10567 – 11 m loading equipment)

3.14 Sound level values according to directive 2000/14/EC and DIN ISO 6395 Appendix A

The machine has CE-approval (confirmed by German Civil Engineering Trade Association) and, based on this approval, complies with European harmonized standards and draft standards.

Type Examination in compliance with Measuring Method Directive 2000/14/EC.

Measured representative sound power level:	L_{WA} = 101.2 dB(A)
Guaranteed sound power level:	L_{WA} = 102 dB(A)
Sound pressure level, driver's seat:	L_{pA} = 71 dB(A) *

* This value is smaller than the permissible limit value of L_{pA} = 85 dB(A).

3.15 Vibrations

Weighted r.m.s. value of acceleration of upper limbs is below 2.5 m/s².

Weighted r.m.s. value of acceleration of seat area and feet is below 0.5 m/s².

3.16 Official homologation

Certification in accordance with CE guidelines.

3.17 Working zone of the machine

3.17.1 Working range diagram (11 m loading equipment)

Loading equipment: box-type boom 6.5 m, dipperstick 4.4 m and cactus grab

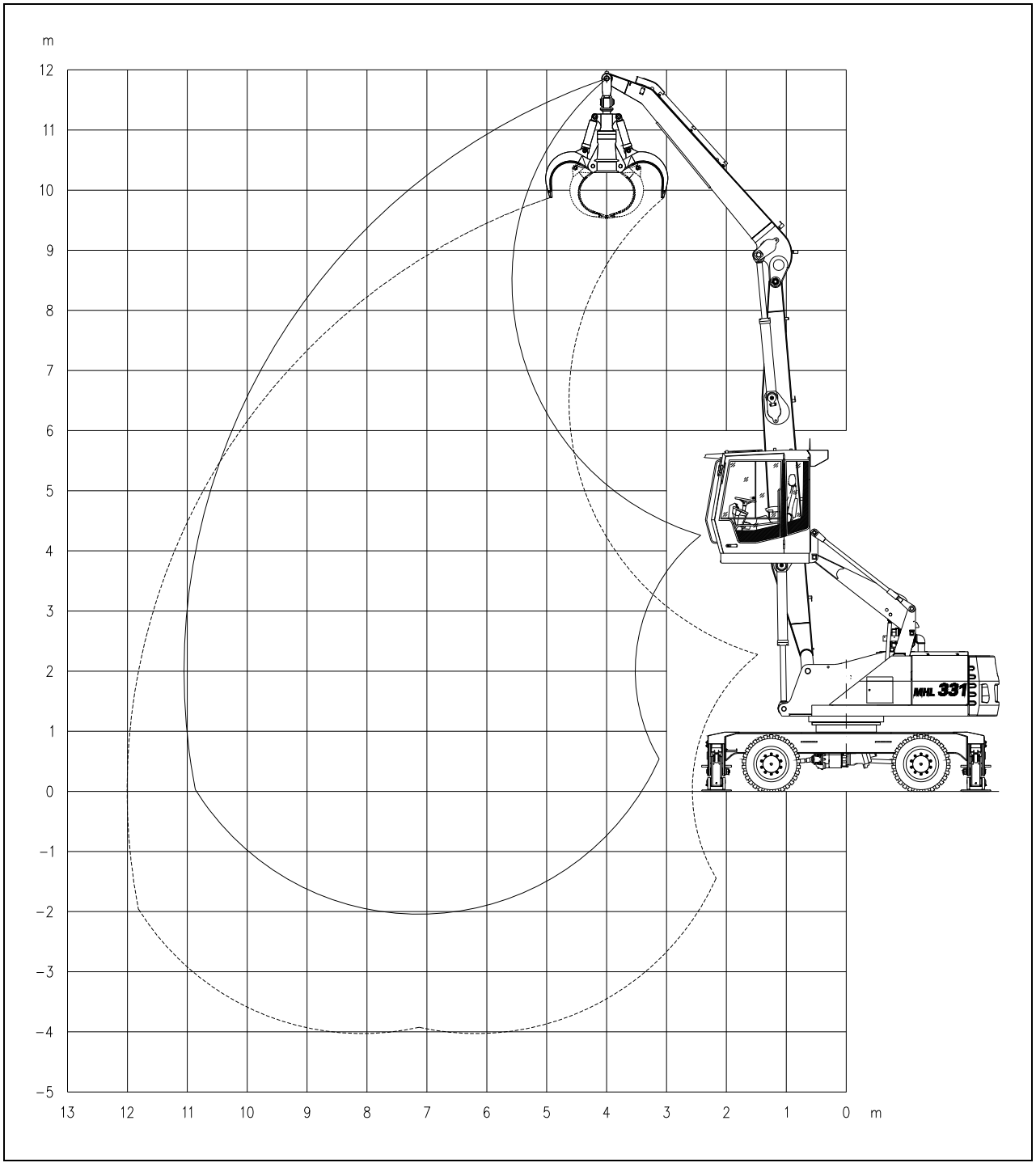


Fig. 5 Working range diagram (11 m loading equipment)

3.17.2 Table of carrying capacity (11 m loading equipment)

The carrying capacity values are stated in metric tons (t). The pump pressure for this table is 360 bar. The figures are 75 % of the static overturning limit or 87 % of the hydraulic lifting force, in compliance with DIN ISO 10567, marked (°).

When the machine is standing on solid, even ground, the values apply to slewing operation through 360°. The figures in brackets apply in the lengthwise direction of the undercarriage. The values specified as "not supported" only apply when the load is hoisted above the front or rear axle.

! ATTENTION

The weight of the attached load hoisting equipment (grab, magnet, load hook, etc.) must be deducted from the carrying capacity values.

In accordance with CE guidelines, hose rupture safety devices on the boom cylinders and an overload warning device are required for crane operation.

Loading equipment: box-type boom 6.5 m, dipperstick 4.4 m						
Height	Undercarriage	Reach in m				
m	Outrigger	4.5	6	7.5	9	10.5
10.5	Not supported		(5.2)			
	4-pt. supported		5.6° (5.6°)			
9	Not supported		(5.3)	(3.6)		
	4-pt. supported		6.3° (6.3°)	5.6° (5.6°)		
7.5	Not supported		(5.2)	(3.7)	(2.7)	
	4-pt. supported		6.4° (6.4°)	5.7 (5.8°)	4.2 (4.9°)	
6	Not supported		(5.1)	(3.6)	(2.6)	
	4-pt. supported		6.8° (6.8°)	5.6 (6.0°)	4.2 (5.2)	
4.5	Not supported	(7.5)	(4.8)	(3.4)	(2.6)	(2.0)
	4-pt. supported	9.6° (9.6°)	7.6° (7.6°)	5.5 (6.4°)	4.1 (5.1)	3.2 (4.0)
3	Not supported	(6.8)	(4.5)	(3.3)	(2.5)	(2.0)
	4-pt. supported	11.6° (11.6°)	7.4 (8.5°)	5.3 (6.6)	4.0 (5.0)	3.2 (3.9)
1.5	Not supported	(6.2)	(4.2)	(3.1)	(2.4)	(1.9)
	4-pt. supported	10.1° (10.1°)	7.1 (9.0)	5.1 (6.4)	3.9 (4.9)	3.1 (3.9)
0	Not supported	(5.9)	(4.0)	(3.0)	(2.3)	(1.9)
	4-pt. supported	7.0° (7.0°)	6.8 (8.8)	5.0 (6.2)	3.8 (4.8)	3.1 (3.9)
-1.5	Not supported		(3.9)	(2.9)	(2.3)	
	4-pt. supported		6.8 (8.7)	4.9 (6.2)	3.8 (4.7)	

Fig. 6 Table of carrying capacity (11 m loading equipment)

3.17.3 Working range diagram (12 m loading equipment)

Loading equipment: box-type boom 6.5 m, dipperstick 5.45 m and cactus grab

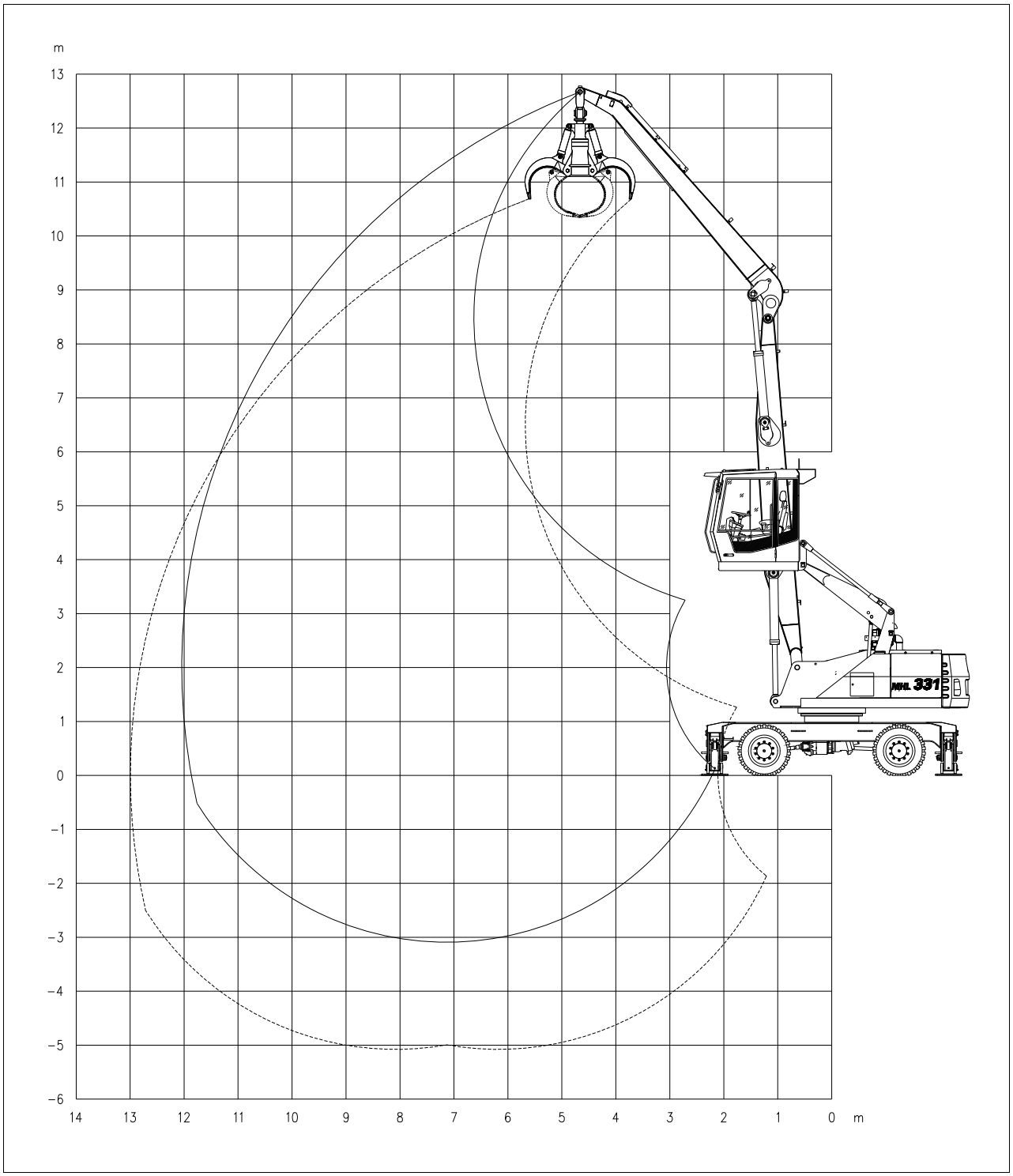


Fig. 7 Working range diagram (12 m loading equipment)

3.17.4 Table of carrying capacity (12 m loading equipment)

The carrying capacity values are stated in metric tons (t). The pump pressure for this table is 360 bar. The figures are 75 % of the static overturning limit or 87 % of the hydraulic lifting force, in compliance with DIN ISO 10567, marked (°).

When the machine is standing on solid, even ground, the values apply to slewing operation through 360°. The figures in brackets apply in the lengthwise direction of the undercarriage. The values specified as "not supported" only apply when the load is hoisted above the front or rear axle.

! ATTENTION

The weight of the attached load hoisting equipment (grab, magnet, load hook, etc.) must be deducted from the carrying capacity values.

In accordance with CE guidelines, hose rupture safety devices on the boom cylinders and an overload warning device are required for crane operation.

Loading equipment: box-type boom 6.5 m, dipperstick 5.45 m							
Height	Undercarriage	Reach in m					
m	Outrigger	4.5	6	7.5	9	10.5	12
10.5	Not supported			(3.7)			
	4-pt. supported			4.3° (4.3°)			
9	Not supported			(3.8)	(2.8)		
	4-pt. supported			5.1° (5.1°)	4.0° (4.0°)		
7.5	Not supported			(3.8)	(2.8)	(2.1)	
	4-pt. supported			5.1° (5.1°)	4.3 (4.8°)	3.1° (3.1°)	
6	Not supported			(3.7)	(2.7)	(2.1)	
	4-pt. supported			5.3° (5.3°)	4.3 (4.9°)	3.3 (4.1)	
4.5	Not supported		(5.1)	(3.6)	(2.6)	(2.0)	
	4-pt. supported		6.6° (6.6°)	5.6 (5.8°)	4.2 (5.2°)	3.3 (4.0)	
3	Not supported	(7.3)	(4.7)	(3.4)	(2.5)	(2.0)	(1.5)
	4-pt. supported	10.0° (10.0°)	7.6° (7.6°)	5.4 (6.3°)	4.1 (5.0)	3.2 (4.0)	2.6 (3.1°)
1.5	Not supported	(6.5)	(4.3)	(3.1)	(2.4)	(1.9)	(1.5)
	4-pt. supported	11.5 (12.1°)	7.2 (8.7°)	5.2 (6.5)	3.9 (4.9)	3.1 (3.9)	2.6 (3.1°)
0	Not supported	(6.1)	(4.1)	(3.0)	(2.3)	(1.9)	
	4-pt. supported	9.2° (9.2°)	6.9 (8.8)	5.0 (6.3)	3.8 (4.8)	3.1 (3.8)	
-1.5	Not supported	(5.8)	(3.9)	(2.9)	(2.2)	(1.8)	
	4-pt. supported	7.4° (7.4°)	6.7 (8.6)	4.9 (6.1)	3.8 (4.7)	3.0 (3.8)	
-3	Not supported			(2.8)			
	4-pt. supported			4.8 (6.1)			

Fig. 8 Table of carrying capacity (12 m loading equipment)

3.18 Work attachments

The documentation covering work attachments supplied by FUCHS is contained in every shipment of work attachments.

It includes:

- Operating instructions
- Spare parts catalog

3.18.1 Other equipment (optional)

- Overload warning device
- Overload cut-off
- Boom cylinder hose rupture safety devices
- Dipperstick cylinder hose rupture safety devices
- Magnet system
- Electrical refueling pump
- Preheating of hydraulic oil
- Engine preheating
- Individual actuation of 4-point outrigger
- Dozer blade for 4-point outrigger
- Cab with bullet-proof glass for front windshield and skylight
- Cab with Lexan glazing of front windshield
- Reversing fan for the water-charge air cooler and hydraulic oil cooler
- Protective guard for cab
- Protective grating in front of the water-charge air cooler and hydraulic oil cooler
- Protective guard for headlamps
- Seat heater and air conditioning built into the upholstery (charcoal)
- Supplementary heating
- Powder fire extinguisher
- Additional tray on the operator control panel
- Various electrical accessories such as xenon headlamps, additional headlamps, rotating beacon, radio, etc.

ATTENTION

Additional accessories are available from the manufacturer.

CAUTION

Unapproved changes in the design, additional equipment and work attachments of TEREX | Fuchs products may result in damage to the machine.

Note that changes must be approved in writing by the manufacturer. Without such permission our warranty expires, as does our product liability for any resulting consequential damages.

3.19 Fuels, lubricants and coolants

Conscientiously following the requirements for lubrication, level checks and changing fuels, lubricants and coolants will ensure increased reliability and service life of the machine.

It is especially important to perform the various oil changes regularly and at the recommended intervals and to observe the specified lubricant qualities.

CAUTION

When checking or changing fuels, lubricants and coolants, make certain the following requirements are followed:

- *If nothing to the contrary is specified, perform all jobs on the loading machine on an even solid surface and with the engine turned off.*
- *Before performing any task in the engine compartment, always secure the cover and side doors against falling back or closing unintentionally.*
- *Always turn the engine off to refuel.*
- *Do not smoke and avoid open fires when refueling.*

Cleanliness is of greatest importance when changing engine oil, transmission oil or hydraulic oil. Before removing screw couplings or filling covers clean them and the area around them.

Also clean the filling and drain plugs when changing oil.

ATTENTION

Oil should preferably always be drained out at operating temperature.

Collect old oil and dispose of it along with discarded oil filter cartridges in an environmentally proper manner.

Instructions for reducing contamination of hydraulic fluid in work and dust-intensive applications

If the loading machine is generally operated under difficult conditions (frequent changing of work attachments, surroundings exposed to dust), there is a danger the hydraulic oil will become dirtier than normal.

To avoid resulting premature wear on hydraulic components, reduce the time between oil changes (or take oil samples).

3.19.1 Filling quantities

Designation	Filling quantity	Fluid	Remark
Fuel tank	300 l	Diesel	
Engine oil	16 l	Engine oil	
Hydraulic oil tank	340 l	Hydraulic oil	Change quantity
Front axle, cpl.	20.8 l	Transmission oil	
per wheel hub	1.3 l	Transmission oil	
differential	18.2 l	Transmission oil	
Rear axle, cpl.	18.2 l	Transmission oil	
per wheel hub	1.3 l	Transmission oil	
differential	15.6 l	Transmission oil	
Power shift gear	5.7 l	Transmission oil	
Swing gear	Supplied by hydraulic system (circulating lubrication)		
Ring gear of slewing joint	28 kg	Low-viscosity grease	
Grease lubrication system	3 kg	Multi-purpose grease	
Service brake	Supplied by hydraulic system		
Oil-immersed air filter (heating)	0.16 l	Engine oil	Only when supplementary heating fitted
Air conditioning	1650 g	Coolant R134a	
	150 g	Cooling oil PAG	
Cooling system	approx. 36 l	Coolant	Water + nitrite-, amine- and phosphate-free coolant (for composition see operating instructions of the engine manufacturer)
Windshield washwipe system	4 l	Water with wind-shield detergent	
Grab gear (TEREX | Fuchs 0.4 m³ – 0.8 m³)	0.7 l	Transmission oil	

! ATTENTION

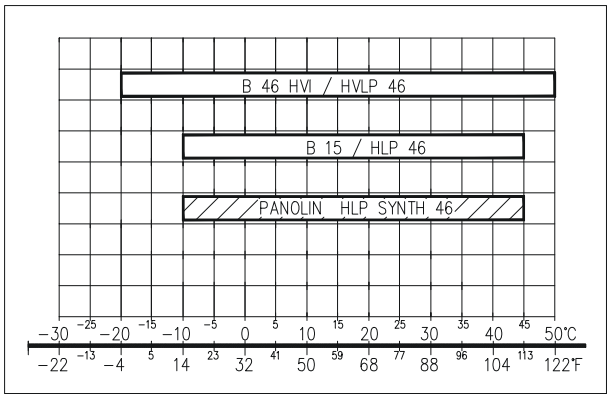
The filling quantities specified in the filling quantities table are only approximate values. The level must be checked in the corresponding assembly after every oil change or refill.

3.19.2 Fuels, lubricants and coolants specifications

Application	Prescribed fuels, lubricants and coolants for Central Europe		
	Designation	**Recommended product**	**Specification, standards, quality**
Drive engine	Diesel fuel	Use of branded fuels with a sulfur content of < 0.05 %. A higher sulfur content will affect the oil change intervals and service life of the engine.	DIN EN 590 ASTM D 975-88; 1-D/2-D Before using **RME fuels** (rape oil methyl ester), it is essential to consult your responsible TEREX	Fuchs dealer for further details.
Drive engine	Engine oil	Titan Cargo MC 10W-40	DQC III ACEA-E4-99/E6-04 see also operating instructions of the engine manufacturer
Cooling for engine	Coolant	Fricofin	BASF G 48 clean water and antifreeze based on ethylene glycol see also operating instructions of the engine manufacturer
Hydraulic working circuits	Hydraulic oil or hydraulic multi-grade oil	Renolin B 15 or Renolin B 46 HVI (Brand label on the machine.)	HLP or HVLP ISO VG 46 The following viscosity limit values must be observed (according to ASTM 445): at 100 °C min. 7.0 mm²/s (cSt) at -10 °C < 1300 mm²/s (cSt)
	Biodegradable hydraulic oil on synthetic ester base	PANOLIN HLP SYNTH 46	HEES ISO VG 46 Filling according to customer specifications. Brand label on machine. Do not mix biodegradable oils of different manufacturers. The same viscosity specifications apply as for mineral hydraulic oils. When changing from mineral to biodegradable hydraulic oil, the tank and hydraulic system must be completely drained, cleaned and flushed. Before changing oils, please ask your TEREX	Fuchs dealer for more details.
Power shift gear, wheel hubs, axles, grab and magnet gears	Transmission oil	Titan Supergear SAE 80W-90	SAE 80W-90 API GL-4/GL-5 ZF-TZ-MZ 02B, 05A, 07A, 12B, 16F, 17B
Grease lubrication system, other lubricating points	Multi-purpose grease	Renolit Duraplex EP 2 (Can be used at temperatures down to -20 °C.)	Lithium complex soap K P 2P-30 DIN 51 502 Alternative recommendation at lower operating temperatures down to -30 °C: Renolit JP 1619 Molykote TTF 52 see also enclosed user information from Lincoln
Ring gear of slewing joint	Low-viscosity grease	Renolit LZR 000	Lithium-calcium soap GP 00/000 G-40 DIN 51502

3.19.3 Alternative recommendations for other temperature ranges

Hydraulic oil: ambient temperature



3.19.4 Biologically degradable hydraulic oil PANOLIN HLP SYNTH 46

We recommend biodegradable hydraulic oils based on synthetic ester as an alternative to mineral oils. The same viscosity limit values apply as for mineral oils.

CAUTION

When changing from mineral to biodegradable hydraulic oil, the tank and hydraulic system must be completely drained, cleaned and flushed. Warrantee conditions as well as the changing guideline of KLEENOIL PANOLIN AG should be observed.

***Do not mix** biodegradable oils of different suppliers.*

Before changing oils, please ask your TEREX | Fuchs dealer for more details.

4 Control and Display Elements

4.1 First commissioning

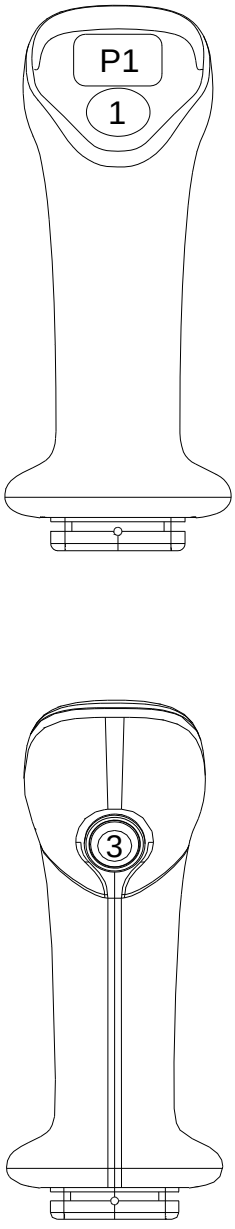
If you are not yet familiar with the control and display elements of this machine, read this chapter carefully **before** operating the machine.

This chapter deals with all functions.

- Before traveling and working with the machine it is necessary to thoroughly familiarize yourself with the control and display elements.
- Each time before placing the machine into operation it must be subjected to a thorough visual inspection. Take care to ensure that there are no damages, loose or missing screws, oil accumulations, oil or fuel leakages. Defects must be remedied immediately. In the event of shortcomings which jeopardize the operating safety, the machine shall not be put into operation until these have been eliminated.
- Each time before placing the machine into operation, the inspections according to chapter 7.5 must be carried out.

4.2 Cab control and display elements

4.2.1 Four-way control lever, left



rotated by 180° in the illustration

Fig. 9 Four-way control lever, left

Four-way control lever, left

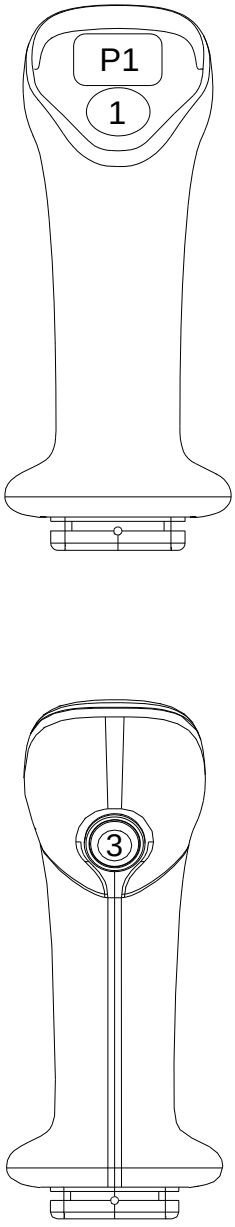
1 = Push-button for magnet system (optional)

P1 = Push-button for flasher right/left

3 = Dead man's button (optional)

Machines for the Italian market must be equipped with a dead man's button. All hydraulically controlled work movements (raise/lower boom, extend/retract dipperstick, swing uppercarriage, extend/retract outrigger) can only be enabled if the dead man's button is pressed.

4.2.2 Four-way control lever, right



rotated by 180° in the illustration

Fig. 10 Four-way control lever, right

Four-way control lever, right

1 = Push-button for increasing the operating pressure

P1 = Push-button for grab rotation to the right/left

3 = Push-button for horn

4.2.3 Control elements

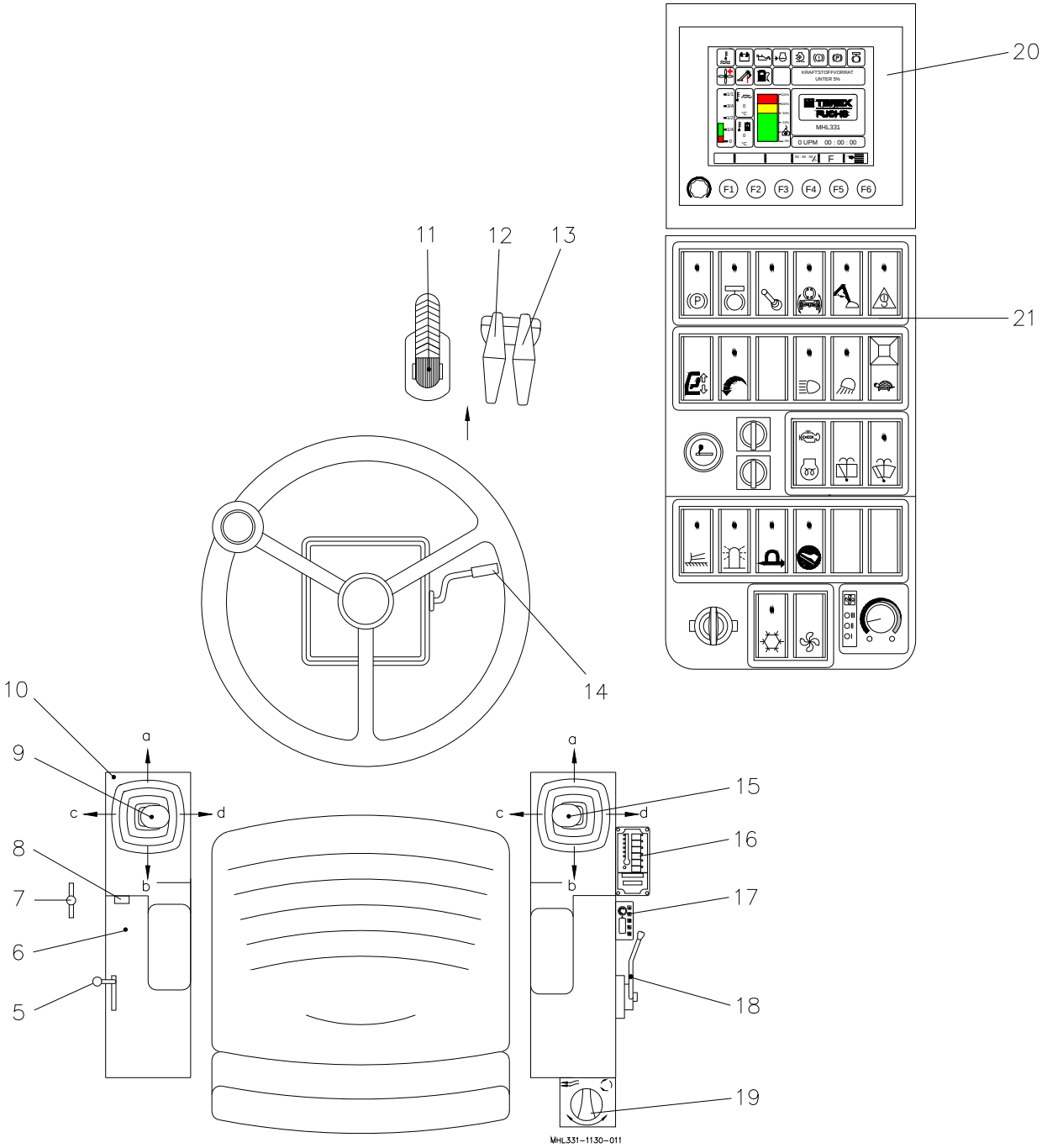


Fig. 11 Control elements

Control elements

5 = Lever for outrigger out/in
6 = Armrest switch (work functions disabled)
7 = Emergency lowering of cab
8 = "Fine mode" potentiometer
9 = Four-way control lever, left
10 = Upward folding armrest
11 = Service brake pedal, lockable
12 = Travel pedal, forward
13 = Travel pedal, reverse
14 = Steering column lever for adjusting the angle of inclination
15 = Four-way control lever, right
16 = Magnet system control device (optional)
17 = Operator control panel for supplementary heating (optional)
18 = Engine speed control lever
19 = Rotary knob for fresh air/re-circulating air (air conditioning)
20 = Multifunction monitor
21 = Control panel

4.3 Operator control panel in cab

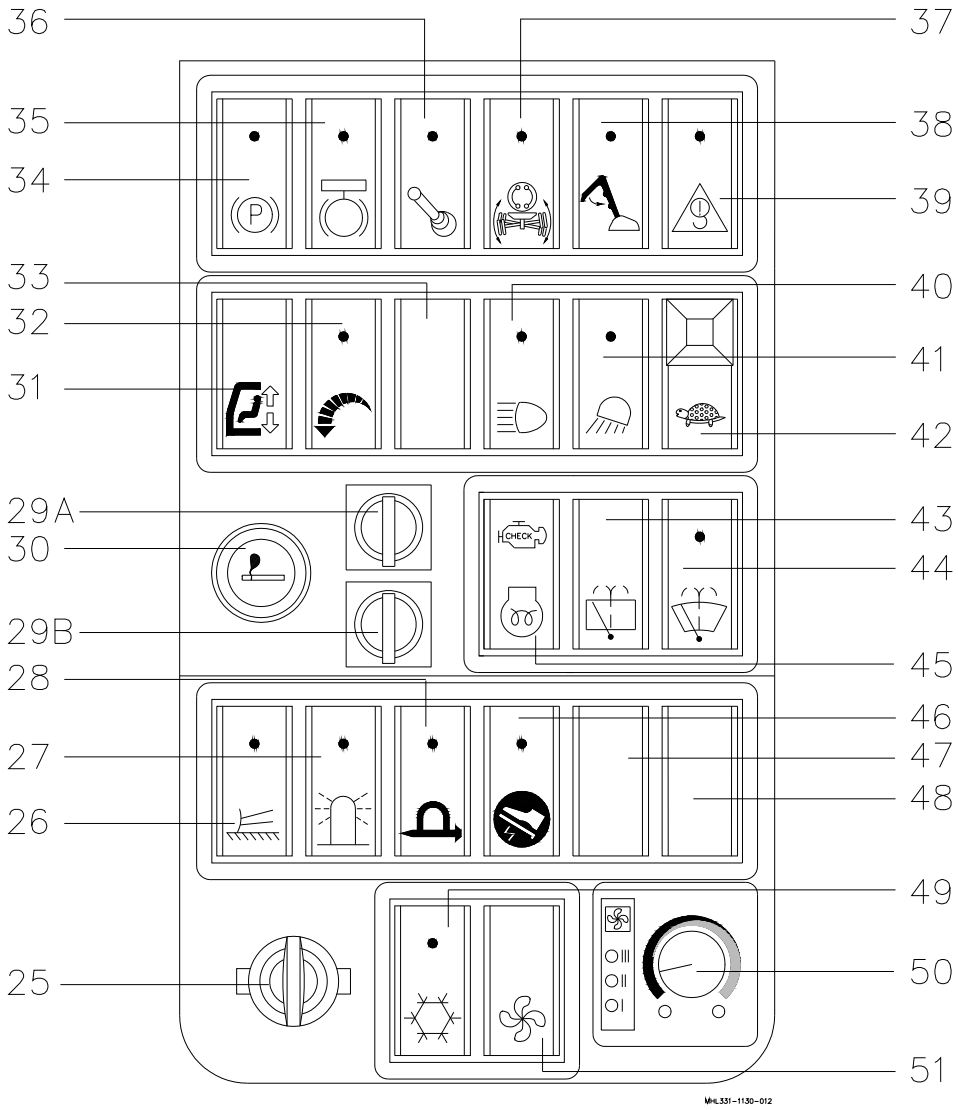


Fig. 12 Operator control panel

Operator control panel

25 = Ignition lock

26 = Dozer blade toggle switch (optional)

27 = Rotating beacon toggle switch (optional)

28 = Magnet system toggle switch (3-stage) (optional)
Toggle switch up: Off
Toggle switch in center position: normal operation (used for loading)
Toggle switch down: jog mode (used for sorting)

29A = Deactivate key switch (black) overload warning device / overload cut-off (optional)

29B = Key switch (blue) reduce hydraulic oil pressure or enable work movements with the diesel engine stopped (optional)

30 = Cigarette lighter

31 = Push-button for cab up/down

32 = Auto-idling system toggle switch

33 = Not assigned

34 = Parking brake toggle switch

35 = Swing brake push-button

36 = Travel and work functions toggle switch (2-stage)
1st stage: enable work functions
2nd stage: bypass cut-off of work functions (emergency)

37 = Oscillating axle lock release toggle switch

38 = Deactivate close range cut-off toggle switch (dipperstick)

39 = Bypass overload cut-off push-button (optional)

40 = Toggle switch
(2-stage)
1st stage: parking light
2nd stage: headlamps

41 = Toggle switch
(2-stage)
1st stage: dipperstick working floodlight
2nd stage: roof working floodlight (optional)

42 = Transmission control toggle switch with slow/fast lock

43 = Windshield wiper push-button (2-stage) (upper window section)
Buttons up: continuous wiping
Buttons down: intermittent wiping
Buttons up or down (hold): wash/wipe

44 = Toggle switch with windshield wiper push-button function (2-stage) (lower windshield)
1st stage: windshield wiper
2nd stage: washwipe

45 = Engine control error / preheat pilot indicator lamp

46 = Multi-purpose stick toggle switch (optional)

47 = Not assigned

48 = Not assigned

49 = Heating and air conditioning toggle switch (2-stage)
1st stage: air conditioning
2nd stage: reheat function (cooling/heating/dehumidifying)

50 = Heating and air conditioning rotary control

51 = Blower push-button
1st position up : "ON" – "Level +"
2nd position down: "Level -" – "OFF"

4.3.1 Multifunction monitor

After the machine is switched on the main control display appears on the multifunction monitor. The main control display remains on constantly as long as one of the function keys F 1 – F 6 is operated/pressed. You can return to the main control display from a menu with ESC – OK (F 6). The system returns to the main control display automatically if no entries have been made for 10 seconds. After the engine is switched off the monitor goes for 10 minutes into the "STANDBY" mode. The engine then switches off automatically.

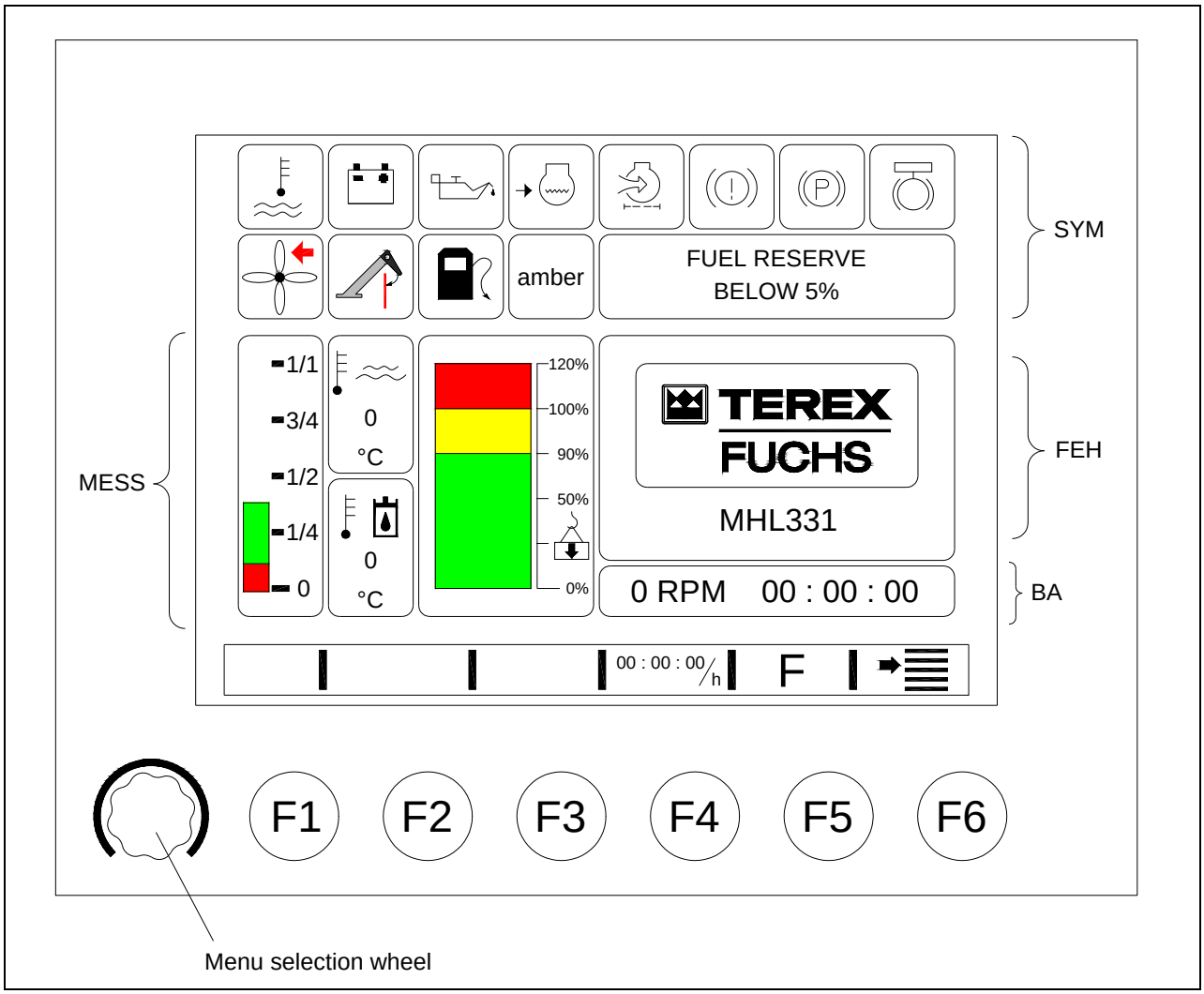


Fig. 13 Multifunction monitor

SYM field (symbols):

"Messages" with the associated message text are displayed in the upper part of the main control display. The meaning of all symbols displayed in this field is explained further on pages 4.11/4.12.

MESS field (measured value displays):

The MESS field serves for displaying fuel reserve, coolant temperature, hydraulic oil temperature and the load (optional) in graphic/numeric form, see page 4.12/4.13.

BA field (time/operating hours and optionally current engine speed):

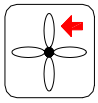
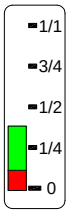
Time of day/operating hours appear in this field, as well as (optionally) the current speed of the diesel engine.

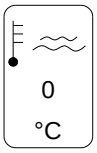
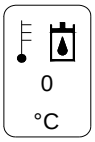
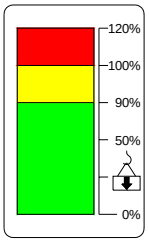
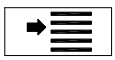
FEH field (error):

In this field an error message is displayed instead of the company logo if there is an error, e.g. on failure of a valve.

4.3.1.1 Structure of the main control display

Symbol	Item No.	Explanation of the function
	65	**Indicator (dual assignment): coolant temperature / hydraulic oil temperature (see also indicator 80 / 81)** Lit to indicate high operating temperatures. A warning buzzer sounds at the same time. If the shutoff limits are exceeded, all travel and work functions are disabled. Open the engine hood and allow the engine to cool down by running the engine at a high idle. Once the coolant or hydraulic oil temperature is again within the permitted limits, disabled functions will be made available again. The indicator goes out.
	65	**Charge air temperature indicator** Lit for a charge air temperature in the range of 100 °C – 105 °C. A warning buzzer sounds at the same time at one-second intervals. The warning buzzer sounds continuously at a charging air temperature of greater than 105 °C. Work functions are turned off. If the charge air temperature falls below 95 °C again after the warning or disabling, the warnings are reset and work functions are enabled again.
	66	**Battery charge control indicator** Lights up if the ignition key is moved to contact position. Goes out as soon as the engine runs. In operation this indicator lights up if there is a fault in battery charging by the generator. Switch off the engine and eliminate fault.
	67	**Engine oil pressure indicator** This indicator lights up if the engine oil pressure falls below a specified value during operation. The buzzer gives an acoustic warning of low oil pressure at the same time. Move the engine to a lower idle range immediately, allow it to run for about 5 more seconds, and then turn it off.
	68	**Indicator (dual assignment): coolant level / hydraulic oil level** Lights up when the coolant level or hydraulic oil level fall below the minimum required level. An acoustic signal (a buzzing tone) is heard at the same time and the travel and work functions are turned off. Once the level of the coolant or hydraulic oil is again within the permitted limits, disabled functions will be made available again. The indicator goes out.
	69	**Indicator (dual assignment): air filter clogging / return filter clogging** Whenever this indicator appears and stays on, the air filter must be maintained or the return filter must be replaced. The indicator may light up briefly, but that is not important and is mostly due to the engine speed being increased too quickly.

	70	**Service brake indicator** Lights up when there is not enough reserve pressure. The brake is **not** ready for operation. The indicator and warning buzzer must go off about 10 seconds after the engine is started. If they do not, stop the machine immediately and check the brake system.
	71	**Parking brake indicator** Lights up when the parking brake is engaged or when the parking brake pressure falls below the triggering level.
	72	**Reversing fan mode message (optional)** The "reversing fan mode" indicator (optional) is lit and the message "REVERSING FAN MODE" appears on the multifunction monitor if reversing fan mode is active.
	73	**Swing brake message** Lit when the swing brake is turned on.
	74	**Close range cut-off (dipperstick) indicator** Lights up if the dipperstick is in the close range (within the safety distance of the cab).
 or 	75	**Indicator (dual assignment): fuel reserve / oscillating axle released** The "Fuel reserve" indicator lights up if the fuel in the diesel tank is less than the reserve volume of 5 %. The "Oscillating axle released" indicator lights up if the oscillating axle is released.
amber	76	**Travel and work functions disabled indicator** Lights up when travel and work functions are turned off: • Travel and work functions toggle switch off • Maintenance steps folded down • Left armrest folded up • Coolant or hydraulic oil temperature above maximum • Coolant or hydraulic oil level too low
FUEL RESERVE BELOW 5%	77	**Text output for the indicator displays**
0 RPM 00 : 00 : 00	78	**Display – time/operating hours and optionally the current engine speed** Time of day/operating hours appear in this field, as well as (optionally) the current speed of the diesel engine.
	79	**Display – fuel reserve** The bar in the display indicates how much fuel there is in the diesel tank. The bar display is green at more than 5 % of the tank contents. If the tank is below the reserve level, the bar appears red and indicator 75 "Fuel reserve" lights up in addition.

 Background colors: Cold running temperature (blue): T ≤ 50 °C Work temperature (black): 50 °C < T < 105 °C Warning limit (red): 105 °C ≤ T < 110 °C Shutoff limit (red): 110 °C ≤ T Reenable limit (black): T < 95 °C	80	**Engine coolant temperature (in °C) indicator** Indicates numerically the coolant temperature of the engine. The background color of the symbol changes corresponding to the coolant temperature (see the table to the side). During operation, the background color of the symbol must be black. In the range of 105 °C – 110 °C, the warning buzzer also sounds at intervals of one second. If overheating extends beyond the shutoff limit, indicator 65 "Coolant temperature" lights up in addition in the main control display. Overheating is also indicated acoustically at the same time by a continuous buzzer sound. Travel and work functions are disabled. Stop work immediately and allow the engine to continue running at a high idle. If the alarm message is still present after 60 seconds, bring the engine to a low idle. Let it continue running for 3 – 5 minutes at low idle and then turn it off. Determine the cause of the problem and eliminate it.
 Background colors: blue: ≤ 15 °C black: > 15 °C red: ≥ 95 °C	81	**Hydraulic oil temperature (in °C) indicator** Indicates numerically the hydraulic oil temperature. The background color of the symbol changes corresponding to the adjacent table. If the permissible hydraulic oil temperature of 95 °C is exceeded, indicator 65 "Coolant/hydraulic oil temperature" is also lit.
	82	**Load indicator (optional)** The bar display shows the current pressure that is caused in the main cylinders by the load (display in percent of the maximum permissible load pressure). If 90 % of the permissible load pressure is exceeded, the color of the bar changes from green to yellow, and the message "OVERLOAD" appears on a yellow background in the main control display. At the same time, an audible warning signal sounds in the cab. If 100 % of the permissible load is exceeded, the bar color changes from yellow to red. If the "Overload cut-off" option is selected, the "OVERLOAD" message appears in the main control display against a red background. Depending on the various dynamic parameters, work functions that increase load may be turned off.
	F1	**Not assigned**
	F2	**Not assigned**
	F3	**Not assigned**
00 : 00 : 00/h	F4	**Switching the time/operating hours display**
F	F5	**Function menu**
	F6	**Main menu**
		**Move menu arrow up**
		**Move menu arrow down**
OK		**Confirm selection**

4.3.1.2 Menu levels of the multifunction monitor

Navigation through the menus

ATTENTION

In the menus a further sub-menu for a function is selected by moving a green arrow (F 4, F 5) and confirmed with OK (F 6). Alternatively turning the menu selection wheel corresponds to the arrow movements and pressure on the selection wheel for confirmation with OK.

Menu selection in the main control display

F 1 menu: not assigned

F 2 menu: not assigned

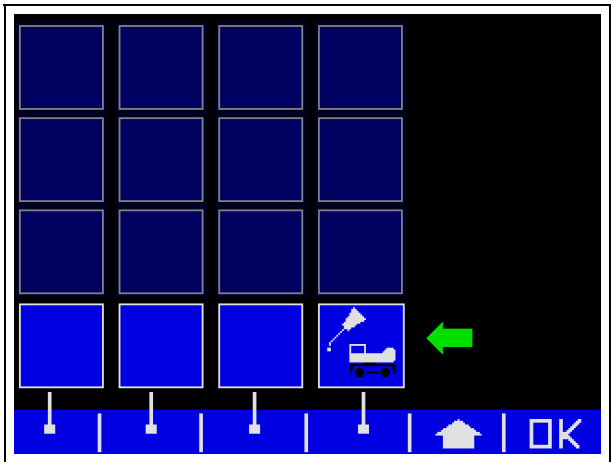
F 3 menu: not assigned

F 4 menu: time/operating hours

The (F 4) function key is used to display the operating hours for 10 seconds instead of the time of day.

F 5 Function menu

Up to 16 additional functions can be switched in the function menu. Select one of four levels with the menu arrow key (F 5) on the multifunction monitor or using the menu selection wheel. The corresponding function of the selected level is then triggered with the function keys F 1 – F 4. An additional lubrication pulse is triggered by operating the F 4 key in the lower level. Press the OK (F 6) key to return to the main control display.

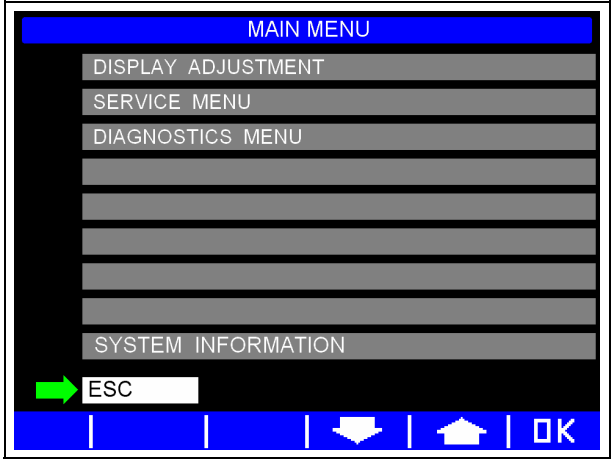


ATTENTION

The other 15 additional functions are currently not assigned!

F 6 Main menu

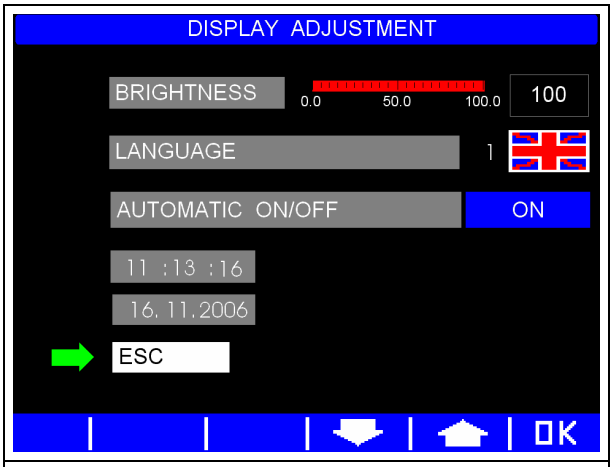
Up to 9 sub-menus can be selected in the main menu. You can use the menu arrow keys (F 4, F 5) to select one of the sub-menus "DISPLAY ADJUSTMENT", "SERVICE MENU", "DIAGNOSTICS MENU" and "SYSTEM INFORMATION". You can press the OK (F 6) key to bring up the selected submenu. Selecting the ESC – OK (F 6) key returns to the main control display.



Submenus

DISPLAY ADJUSTMENT

You can use the menu arrow keys (F 4, F 5) to set the overall brightness of the display, the menu language, the time of day, and the date on the multifunction monitor. Automatic switching back to the main control display can be switched on or off using the "AUTOMATIC ON/OFF" function. The changed settings remain saved permanently after exiting the menu with ESC – OK (F 6).

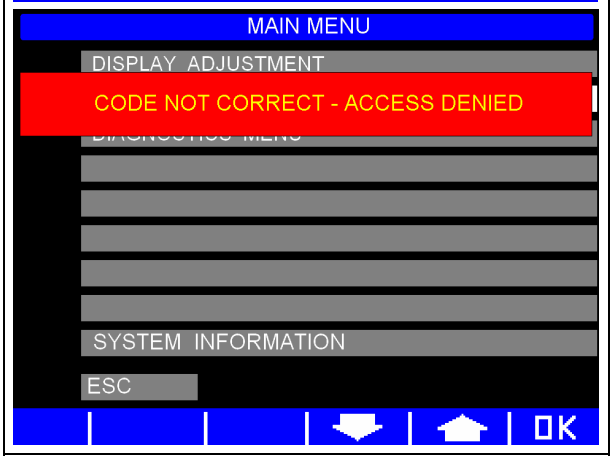


SERVICE MENU

The service menu requires entry of a 6-digit access code. The access code is entered by turning/pressing on the menu selection wheel or with menu arrow keys (F 4, F 5) and the OK (F 6) key. The service menu is accessible only to trained dealer or service personnel. Access to the service menu is rejected if the code is not entered correctly.

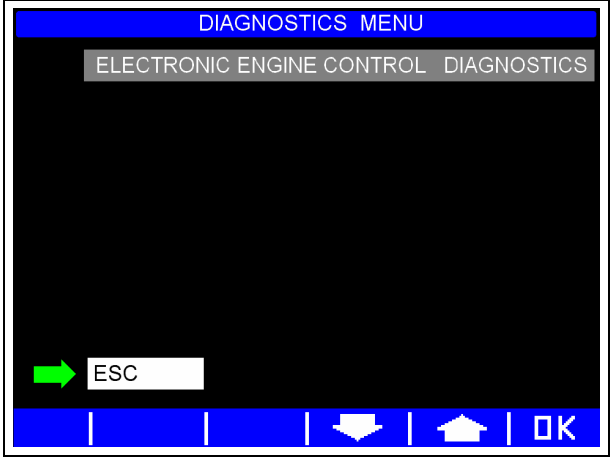
If "ESC" is selected, the entry is canceled. This makes it possible to exit code entry and make another menu selection.

You can select "<" to delete the last number entered.



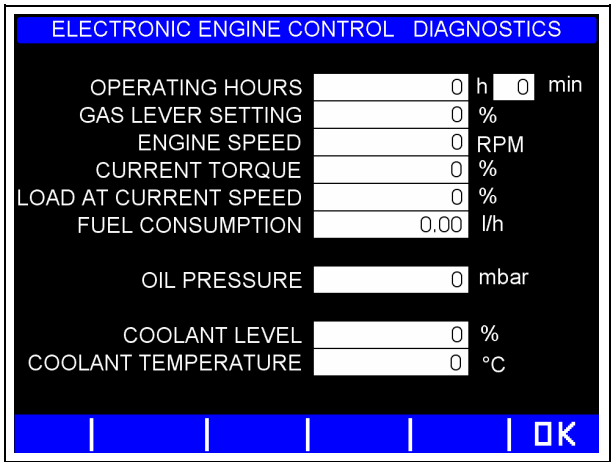
DIAGNOSTICS MENU

The diagnostics menu shows information about various components, currently "ELECTRONIC ENGINE CONTROL" DIAGNOSTICS. You can select the "ELECTRONIC ENGINE CONTROL" level with the menu arrow keys (F 4, F 5) on the multi-function monitor or with the menu selection wheel. You can press the OK (F 6) key to bring up the selected submenu. You can press the OK (F 6) key again to return to the main menu.



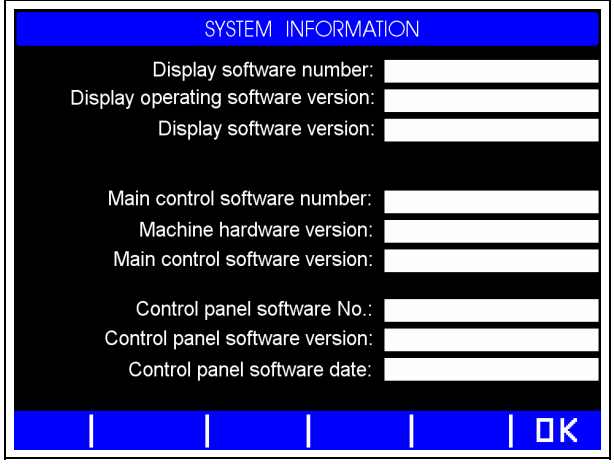
"ELECTRONIC ENGINE CONTROL" DIAGNOSTICS

Current engine data are displayed in this menu.



SYSTEM INFORMATION

The system information shows the current software statuses of the control components. You can press the OK (F 6) key to return to the main menu.



4.4 Engine

Before starting the engine the battery disconnect switch (14/1) must be switched on. The battery disconnect switch of the machine is located in the service section.

ATTENTION

Before placing the machine into operation, the inspections described in chapter 7.5 "Work before placing into operation" must be performed.

WARNING

Before starting the engine, make certain there is no one in the machine's danger zone.

4.4.1 Starting the engine

- All gear levers must be in neutral setting.
- Insert the ignition key in the ignition lock (15/25) and turn it to position I. Wait about 5 – 10 seconds for the starting of the machine control unit.
- Wait until indicators (15/66) and (15/67) light up.

If a buzzer sounds and the red service brake indicator (15/70) lights up before the engine has been started, the necessary brake pressure has not yet been built up.

Once the engine is running and the brake pressure has built up, the buzzer stops and the indicator goes out.

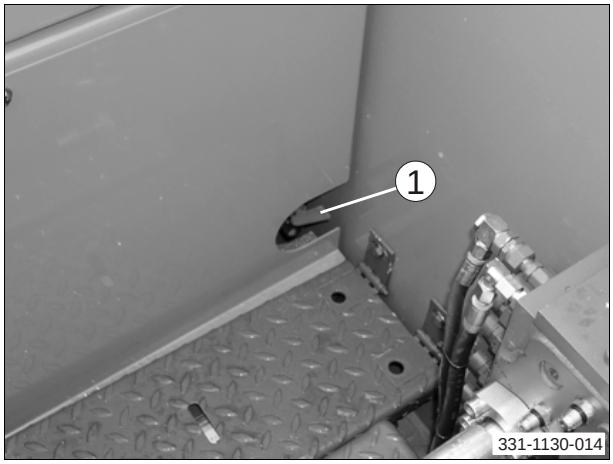


Fig. 14 Battery disconnect switch

4.4.1.1 Cold start (normal start)

- Insert the ignition key in the ignition lock (15/25).
- Bring the engine speed control lever (15/18) to low idle position.
- Turn the ignition key to position I. If the display is in STANDBY, indicators (15/66) and (15/67) light up after about 5 seconds, otherwise after about 10 seconds.
- Wait until indicators (15/66) and (15/67) light up.
- Then turn the ignition key further to position II. The preheat indicator (15/45) lights up for a few seconds. As soon as the preheat indicator is not lit any longer, turn the ignition key further to position III and start the engine.
- As soon as the engine is running, release the ignition key. Then the ignition key automatically returns to position I. Indicators (15/66), (15/67) must go out.

If the engine does not start up after 15 sec. max., move the ignition key to 0 and, after waiting for at least 30 sec., repeat the start-up procedure.

CAUTION

To prevent damage to the engine, do not drive at full power just after starting. Drive with restraint until the machine reaches operating temperature.

ATTENTION

When starting at temperatures under -18 °C, we recommend equipping the machine with a DEUTZ cold start auxiliary device.

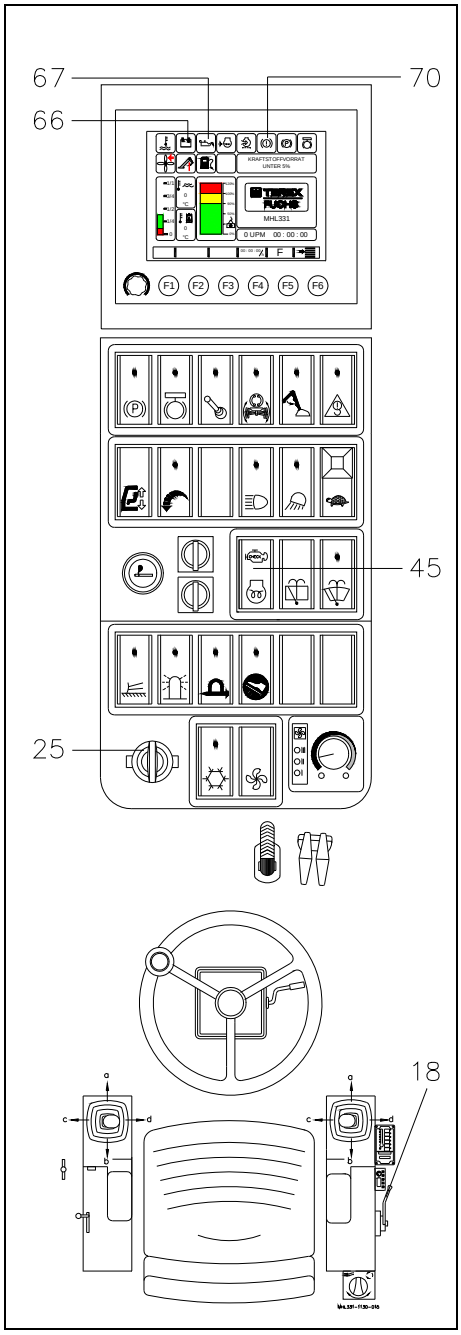


Fig. 15 Starting the engine

4.4.1.2 Hot start

- Insert the ignition key in the ignition lock (15/25).
- Bring the engine speed control lever (15/18) to low idle position.
- Turn the ignition key to position I. If the display is in STANDBY, indicators (15/66) and (15/67) light up after about 5 seconds, otherwise after about 10 seconds.
- Wait until indicators (15/66) and (15/67) light up.
- Then turn the ignition key further to position II. If the engine is hot, the preheat display (15/45) will only be lit briefly. Then turn the ignition key further to position III and start the engine.
- As soon as the engine is running, release the ignition key. Then the ignition key automatically returns to position I. Indicators (15/66), (15/67) must go out.

4.4.2 Reversing fan mode (optional)

Depending on the operating conditions of the machine, the cooling system

- combined water-charge air cooler
- hydraulic oil cooler

can optionally be equipped with reversing fan mode.

The air flow can be reversed in the control electronics, thereby allowing the fan to blow freely without interrupting work. Free impurities are eliminated and the required cleaning cycles, which are essential for proper functionality of the cooling system, are extended depending on usage conditions to 24 hours.

Fan reversing mode can be switched on by briefly pressing the F 3 menu arrow key on the multifunction monitor. The fan icon (16/72) appears against a green background with a black arrow pointing forward. The time remaining until the next reversing phase also appears in the green fan icon. The reversing function automatically starts when the preset interval time is reached. If reversing fan mode is active, the background of the fan icon (16/72) is lit yellow with a red arrow pointing backwards. The text message (16/77) "REVERSING FAN MODE" appears.

The user can press and hold down menu arrow key F 3 to switch to the reversing fan menu (see fig. 17). The interval between reversing phases can be set to any value between 15 and 60 minutes in the reversing fan menu.

The reversing fan function can be turned off by briefly pressing the menu arrow key F 3. Then the fan icon (16/72) appears against a black background.

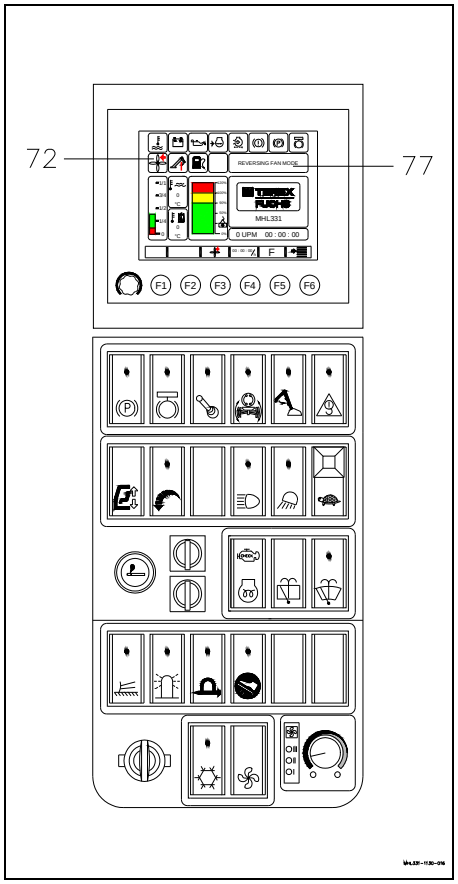


Fig. 16 Reversing fan mode

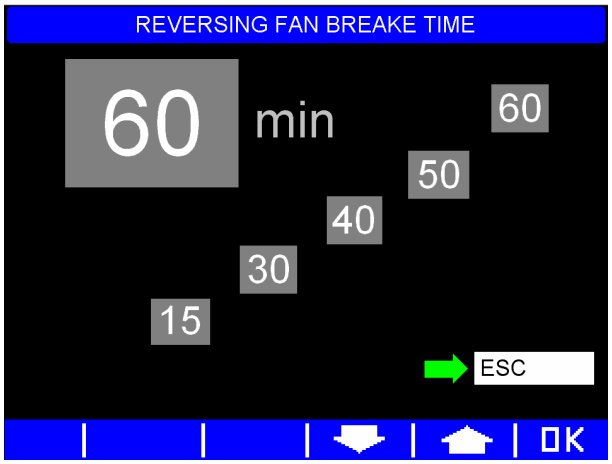


Fig. 17 Reversing fan menu

4.4.3 Monitoring the machine during operation

- If the battery charge control indicator (18/66) or engine oil pressure indicator (18/67) light up, switch off the engine immediately and determine the cause, or call for service personnel if necessary.

CAUTION

Eliminate the fault before placing the engine and the machine into operation again.

- At a coolant temperature in the range of 105 °C – 110 °C, the red symbol in the main control display (18/65) "Coolant/hydraulic oil temperature" lights up and the warning buzzer sounds at intervals of one second. "COOLANT TEMPERATURE" appears in the text output.
- At a coolant temperature of more than 110 °C as well as at a hydraulic oil temperature of 95 °C, the red symbol (18/65) "Coolant/hydraulic oil temperature" in the main control display remains lit with indicators (18/80) and (18/81). The warning buzzer sounds at the same time continuously. Travel and work functions are disabled. Indicator (18/76) lights up. Open the engine hood and allow the engine to cool down by running the engine at a high idle. Once the coolant temperature is below 95 °C or the hydraulic oil temperature is below 90 °C, disabled functions will be made available again. Indicators (18/65) and (18/76) go out.
- If the coolant temperature falls below 95 °C or the hydraulic oil temperature falls below 90 °C after a warning or disable, the (symbols, text output, buzzer) warnings are reset and travel and work functions are enabled again.

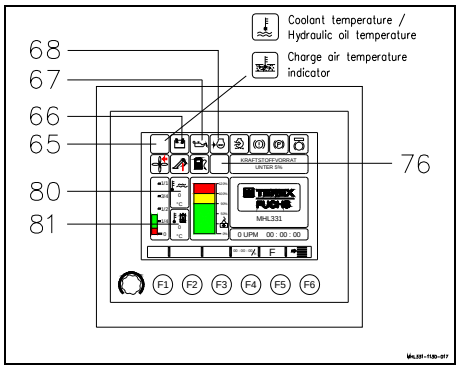


Fig. 18 Monitoring the engine

- At a charge air temperature in the range of 100 °C – 105 °C, the red symbol (18/65) "Charge air temperature" in the main control display lights up (this symbol takes precedence over the "Coolant/hydraulic oil temperature" symbol). The warning buzzer sounds at intervals of one second. "CHARGE AIR TEMPERATURE" appears in the text output.
- At a charge air temperature of more than 105 °C, the red symbol (18/65) "Charge air temperature" in the main control display is still lit and the warning buzzer sounds continuously. Work functions are disabled.
- If the charge air temperature falls below 95 °C again after the warning or disabling, the warnings (symbols, text output, buzzer) are reset and work functions are enabled again.
- If the level of the coolant or hydraulic oil is below the minimum level, indicator (18/68) lights up. A continuous warning buzzer is heard at the same time and the travel and work functions are disabled. Indicator (18/76) lights up. Stop work immediately and replenish hydraulic oil or coolant **after** the engine has **cooled down**. Once the level of the coolant or hydraulic oil is again within the permitted limits, disabled functions will be made available again. Indicator (18/76) goes out.

WARNING

Do not top off coolant unless the engine is cold. Risk of scalding from hot coolant!

4.4.3.1 Deactivating the overheat protection

The overheat protection can be deactivated using toggle switch (19/36). The machine can still be relocated and the loading equipment moved.

CAUTION

As long as the overheat protection is deactivated, the machine may only be moved briefly as otherwise damage to the engine may occur.

The deactivation only takes effect as long as toggle switch (19/36) is pressed.

4.4.3.2 Auto-idling system

This device automatically reduces engine speed to idle after about 5 seconds if no hydraulic function is activated by the four-way control lever or pedals. This saves fuel and reduces noise.

The auto-idling system must be switched on/off using the toggle switch (19/32). While the auto-idling system is activated the indicator lamp in the switch lights up.

Whenever a hydraulic function is controlled, the speed is automatically adjusted from what it was before by the electrical speed adjustment system.

ATTENTION

When the diesel engine is started and while driving downhill, the auto-idling system must be switched off. The indicator lamp in the switch should not light up.

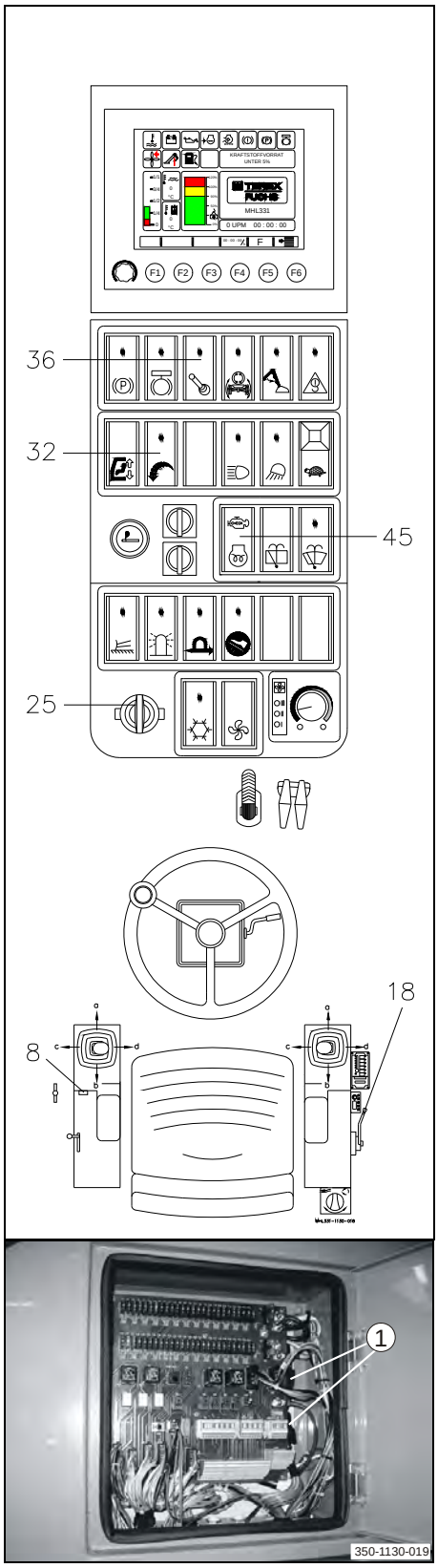


Fig. 19 Switching off the engine

4.4.4 Load limit sensing control

The machine is equipped with a load limit sensing control. The control includes:

- an electronic control of the hydraulic pump
- a sensitive adjustment of the response characteristic of the main drive functions (fine mode)

Load limit sensing control protects the engine from speed pressures that are too high and thus from overloads for each engine speed selected.

This allows the load limit sensing control to ensure optimal use of the available engine power.

In order to ensure that the engine continues to operate in the event of control malfunctions, the control can be disconnected. For more information, refer to chapter 8.6 "Load limit sensing control".

4.4.4.1 Fine mode

The maximum flow rate of the pump can be continuously adjusted between the settings "sensitive" and "normal" on the potentiometer (19/8).

- Turn to the left (→ 0): sensitive (min. flow rate)
- Turn to the right (→ 100): normal (max. flow rate)

! ATTENTION

During normal work operation, the potentiometer must be set to "100".

4.4.5 Switching off the engine

! ATTENTION

Do not switch off the engine when running at full throttle, but allow it to run for a short time at no load.

- Bring the engine speed control lever (19/18) to idle position.
- Turn the ignition key (19/25) to the "0" position.
- The engine turns off automatically.

4.4.6 Electronic Engine Control

4.4.6.1 Engine protection function of Electronic Engine Control

Electronic engine control protects the engine from speed pressures that are too high and thus from overloads for each engine speed selected.

Depending on the severity of an error that has been detected, the engine can continue to run with some limitations including possibly reduced output, in which case indicator lamp (19/45) is continuously lit, or the engine is turned off, in which case indicator lamp (19/45) flashes. As soon as the error is no longer present, indicator lamp (19/45) goes out.

If Electronic Engine Control has switched over to emergency speed, the engine must be turned off briefly with the ignition key (19/25) to turn off indicator lamp (19/45).

Errors that have been eliminated or are no longer current still remain stored in the error memory of the control unit. They can be read or deleted with the DEUTZ diagnostic software program SERDIA.

CAUTION

To avoid damage to the control device, the two plug connections (19/1) on the electronic engine control as well as the positive cable of the battery must be disconnected before performing welding jobs on the machine! The positive cable of the battery must be connected to the nearby ground pins.

If faults occur in the Electronic Engine Control system, please contact customer service.

4.4.7 Notes for use in winter

Observe the following points and instructions in the engine operating instructions for use in winter:

4.4.7.1 Hydraulic oil

If the machine is not used for longer periods at temperatures around and below freezing, warm up the engine by running at medium engine speed. The operating temperature must be reached by performing the following work movements:

- raise/lower box-type boom,
- open/close grab and
- extend/retract dipperstick

! ATTENTION

When the loading machine is warmed up by the engine running at idle, the following guidelines apply:

Temperature in °C	Warming up time in minutes
0 °C and over	approx. 15 min
-18 °C to 0 °C	approx. 30 min
below -18 °C	over 30 min

4.4.7.2 Engine oil

The viscosity class (SAE class) of the engine oil should be selected according to the ambient temperature at the machine's place of operation (see chapter 3.19 "Fuels, lubricants and coolants").

4.4.7.3 Note on options

If the customer so wishes, the machine may be equipped with an engine preheating.

For places of operation with lower temperatures, these preheating features ensure that the machine is ready for operation within a very short time and also extend service life.

4.4.7.4 Coolant

Before the cold time of the year begins, the level of antifreeze protection must be checked and if necessary adjusted to the requirements of ambient temperature (for the mixing ratio see the engine manufacturer's operating instructions). The antifreeze level is set to approx. -35 °C at the factory.

4.4.7.5 Battery

Pre-heating the battery makes it possible to facilitate a cold start.

4.4.7.6 Fuel

Use only standard commercial brand diesel fuel with a sulfur content lower than 0.05 %. A higher sulfur content will affect oil change intervals and the service life of the engine (see also chapter 3.19 "Fuels, lubricants and coolants").

Only use winter diesel fuel with additives for cold temperatures to prevent clogging of the fuel system due to paraffin separation. Even if winter diesel fuel is used, disturbing paraffin separations (jelling) can occur at very low temperatures.

Blending in gasoline is impermissible for safety and technical reasons (cavitation on the fuel injection system)!

4.5 Operator's stand

4.5.1 Comfort driver's seat

WARNING

If you adjust the seat during operation, you can lose control over the machine by unexpected seat movements and cause an accident. Therefore adjust the seat only with the machine at standstill.

If the outside mirror is not adjusted correctly you cannot recognize dangers in time and can cause an accident. Therefore after adjusting the seat also adjust the outside mirror when the machine is at standstill.

The comfort driver's seat is an air-cushioned seat with shock absorbers.

The seat complies with the safety and health requirements according to DIN EN ISO 6683 and DIN EN ISO 7096, Class IV.

(20/1) Rocker switch for upper and lower lumbar support
- tilt forward ⇒ lumbar part round; tilt backward ⇒ lumbar part straight

(20/2) Handle for seat back adjustment (tilt)

(20/3) Handle for seat upholstery adjustment (tilt)

(20/4) Handle for seat depth adjustment (leg rest)

(20/5) Handle for longitudinal adjustment of seat (upper part)

(20/6) Lever for horizontal spring system (reduces horizontal vibrations in travel direction)
- Lever locked in place backward ⇒ seat locked in place
- Lever set forwards ⇒ seat not locked in place

(20/7) Handle for combined height and body weight adjustment
- Press handle briefly: weight is adjusted automatically
- Raise or press lever: adjust height

ATTENTION

To prevent damage to health, the individual driver's weight setting should be checked and adjusted before placing the machine into operation.

(20/8) Handle for longitudinal adjustment of entire seat assembly

(20/9) Two point safety belt

(20/10) Rocker switch seat heating (optional)
The seat heating switches off automatically when the temperature is reached.

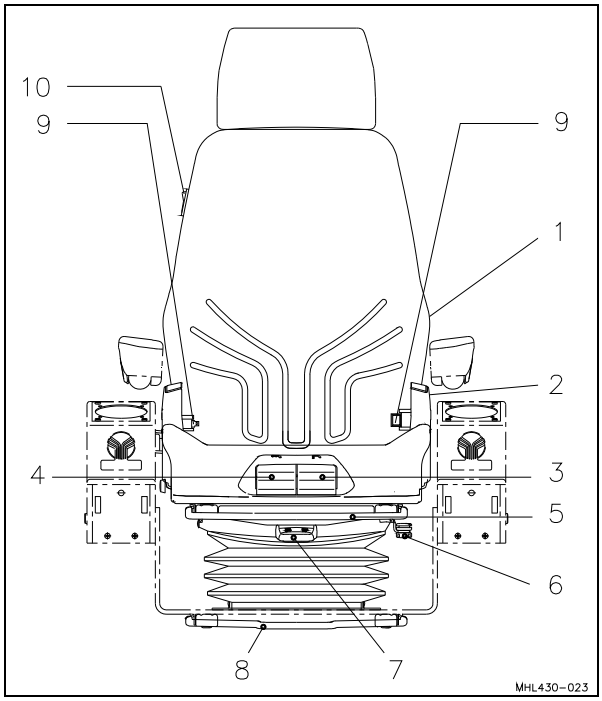


Fig. 20 Comfort driver's seat

WARNING

Before placing the machine into operation, the operator must fasten the two point safety belt.

To ensure safety, the condition, functionality and fastening of the belt must be checked at regular intervals and damaged parts must be replaced immediately.

The safety belt must not be twisted when it is worn.

4.5.2 Steering wheel

4.5.2.1 Adjusting the steering column

WARNING

If you adjust the steering column during operation, you can lose control over the machine by uncontrolled steering movements and cause an accident.

Therefore adjust the steering column only with the machine at standstill.

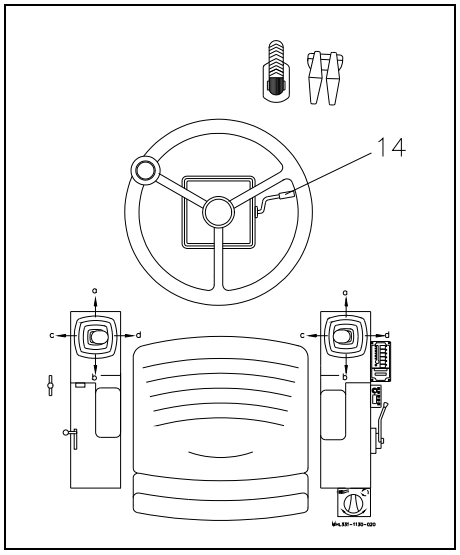


Fig. 21 Adjusting the steering column

Adjusting height:

- Hold the steering wheel firmly.
- Pull the steering column lever (21/14) up and lift the steering wheel to the desired height.
- Once the desired height is reached, release the steering column lever (21/14).

Adjusting inclination:

- Hold the steering wheel firmly in place and do not allow it to tip forward uncontrolled.
- Press the steering wheel column (21/14) down and adjust the angle of inclination as desired.
- Once the desired inclination is reached, release the steering column lever (21/14).

4.6 Heating and air conditioning

The cab is equipped with a heating and air conditioning as standard features. They can be used for heating, air conditioning and venting the cab.

4.6.1 Heater operation

The cab heating is dependent upon the engine coolant temperature. The fan air flow is routed through a heat exchanger whose temperature is controlled by the flow rate of the coolant.

The heating is operated as follows:

- Toggle switch (22/49) must not be switched on for the heating mode.
- Adjust the desired level of heat using rotary knob (22/50). Turn clockwise ⇒ greater heat.
- Adjust the desired blower stage using push-button (22/51).
- The air is distributed and aimed as desired by adjusting the heating vents (22/1), (22/2) and (22/3).

In order to prevent the heater from becoming dirty, the circulating air/fresh air is drawn off through the air filter (rear of cab below driver's seat).

! ATTENTION

In dusty ambient conditions, the air filter fleece should be cleaned or changed every 100 operating hours. See chapter 7.7.3 "Maintenance and inspection plan".

- Remove the covering plate (22/4) on the cab rear wall, take out the fleece and clean or replace it.
- When re-fitting the fleece, make sure that the blue side of the fleece shows to the inside to ensure optimum filtering of the circulating air/fresh air.

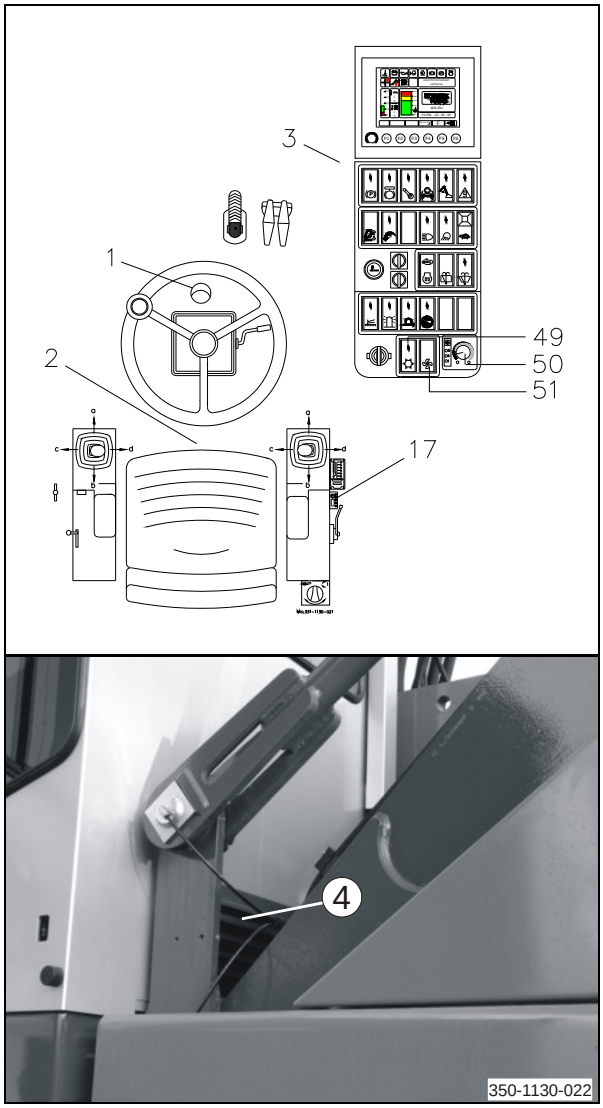


Fig. 22 Heating and ventilation

4.6.2 Supplementary heating (optional)

The supplementary heating is located in the driver's cab, on the right side under a sheet-metal cover. It serves for heating the cab.

Any other use of the supplementary heating and of the associated timer is not permitted.

The supplementary heating is connected directly to the fuel system, so that it can be operated independently of the drive engine.

The supplementary heating is operated on the operator control panel (22/17) in the right armrest of the driver's seat.

The functions and the operation of the supplementary heating may be read up in the operating instructions provided by the heater manufacturer.

WARNING

The supplementary heating must always be switched off when filling up with fuel. The heating shall not be operated in enclosed spaces.

ATTENTION

In order to ensure that the heater functions correctly, the combustion air is drawn off through the oil-immersed air filter (rear of cab). In the case of high exposure to dust, the oil should be changed every 100 operating hours (see chapter 7.7.3 "Maintenance and inspection plan").

The following maintenance work must be carried out before each heating period:

- Check the glow plug (23/1) for burn-off and replace if necessary.
- Examine the fuel filter for clogging and replace if necessary.
- Check that electrical connections are securely fastened.
- Check that fuel lines and connections are not leaking.
- Check the oil level in the oil-immersed air filter.

If the heating does not come on, proceed as follows:

- Switch heating off
- Check fuses
- Switch heating on

If the **heating still does not function when switched on for the third time**, please contact the Eberspächer Customer Service. In the case of further unsuccessful attempts, the heating is completely switched off and cannot be switched on again.

If the heating overheats:

Possible causes may be that the outflow openings are covered up or the suction intake grate is dirty.

- Switch heating off
- Uncover vents
- Switch heating on

Other malfunctions which cannot be remedied by self-help measures shall be checked and repaired by Customer Service only.

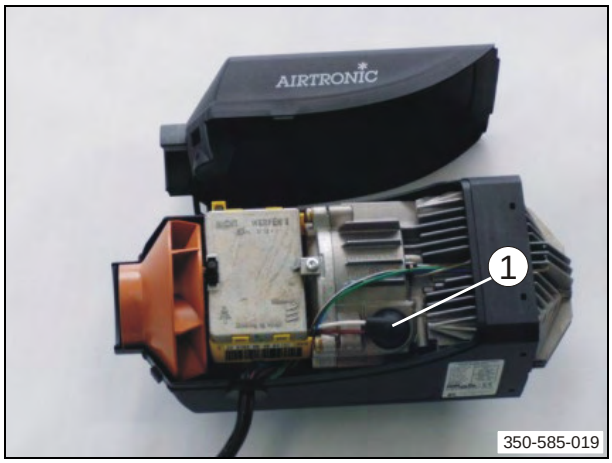


Fig. 23 Supplementary heating

CAUTION

The battery disconnect switch shall only be turned off approx. 5 minutes after the heating has been switched off, since otherwise cooling down of the heating will be interrupted. This can lead to fires. The battery disconnect switch of the machine is located in the service section.

4.6.3 Air conditioning operation

ATTENTION

The air conditioning only works when the engine is running.

The air conditioning is switched on with toggle switch (24/49) by switching into the 1st stage. At the same time, push-button (24/51) for the fan must be set to 1, so that the air conditioning starts to operate. Indicator lamp (24/49) lights up.

The room temperature in the cab falls.

Temperature is adjusted by operating the rotary knob (24/50):

Turn counterclockwise ⇒ increase in cooling output.

The greater the cooling output of the air conditioning you have selected with the rotary knob (24/50), the higher you should also adjust the fan level (24/51).

To achieve maximum cooling in the cab:

- rotary knob (24/50) must be turned counterclockwise as far as it will go
- the highest fan level (24/51) must be set
- the air flap must be set to circulating air
- and the cab must be closed.

You can operate the air conditioning together with your heating even in the colder time of the year down to temperatures above 5 °C. In this case the air in the cab remains dry. This prevents the windowpanes from getting coated with moisture. For this purpose switch toggle switch (24/49) into the 2nd stage "Reheat function" and set rotary knob (24/50) to the wanted heating level. Indicator lamp (24/49) lights up.

ATTENTION

The air conditioning must be turned on for a brief period at least once a month. The system needs to be operated to lubricate the compressor.

ATTENTION

Coolant must be visibly flowing with no bubbles in the sight glass (24/1) of the fluid container while the engine is running and the air conditioning is at the highest level. If there are bubbles in the sight glass, there is not enough coolant in the system. The system must be checked by an authorized specialist for leaks and filled again.

DANGER

Maintenance work on the air conditioning must only be carried out by trained specialists.

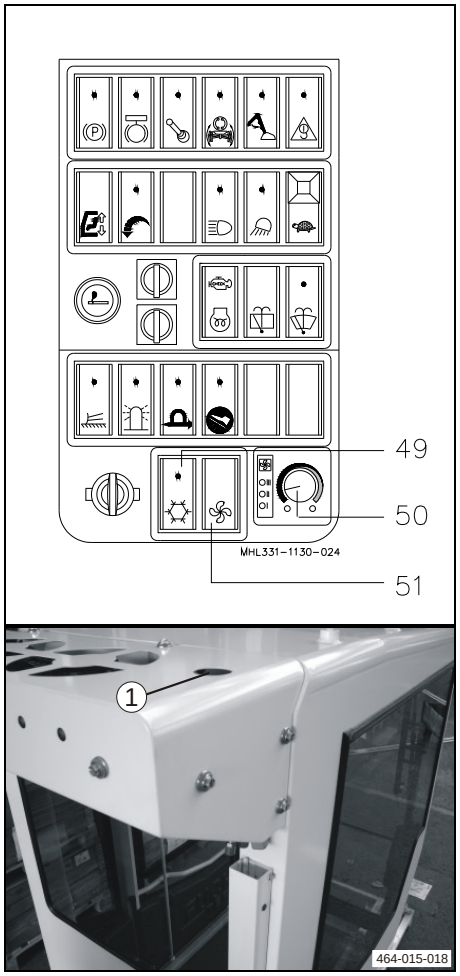


Fig. 24 Air conditioning

4.7 Driver's cab

4.7.1 Opening/closing the windshield

The windshield can only be opened completely. It is not possible to open it in stages. The windshield is released from the catch by pressing in both release levers (25/1) and can be pulled in under the cab roof.

The windshield is released from the catch by pressing in both release levers (25/1) and can be brought back to the end position.

CAUTION

Always take care to ensure that the windshield is locked in the end position to avoid accidents.

ATTENTION

The cab is optionally available with bullet-proof glass or Lexan glazing (windshield and skylight). With bullet-proof glazing the front window and skylight cannot be opened.

4.7.2 Adjusting the sunblind

Windshield

Pull the sunblind down using handle (25/2) and hook it into the holders in the wanted position.

Skylight

Pull the sunblind down using handle (25/3) and hook it into the holders in the wanted position.

ATTENTION

The sunblind is pulled back by spring force. When rolling it up grasp the sunblind on handle (25/2) or (25/3) and guide it back.

4.7.3 Skylight

To ventilate the cab the skylight can be opened by pulling on handle (25/4).

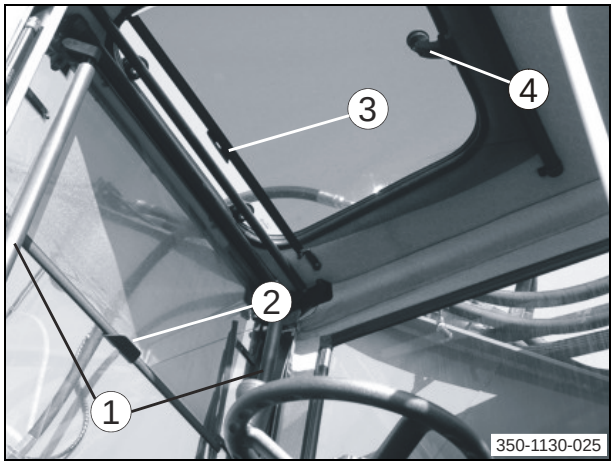


Fig. 25 Opening/closing the windshield and skylight

4.7.4 Cab door

Push handle (26/1) upwards and open the cab door.

ATTENTION

If the cab door is opened to get in and out, it must be engaged in the catch (27/2) using the locking device (27/1).

The cab door is released from the catch by means of the lever (26/1).

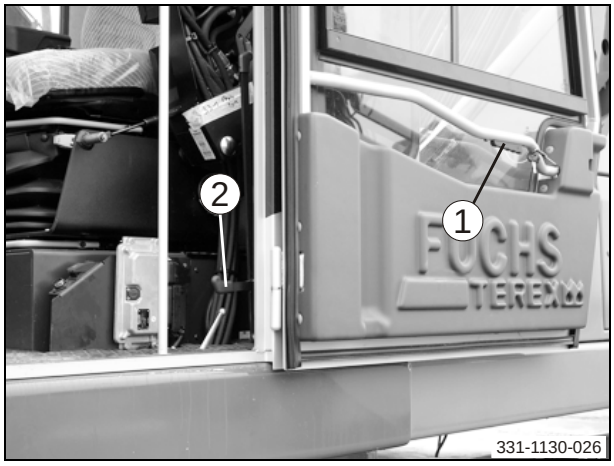


Fig. 26 Opening the cab door

4.7.5 Side window

Pull on the handle and push the side window to the front. To close the side window push the handle back until the window locks into place.

4.7.6 Interior lighting

The interior lighting is switched on and off by turning the lamp glass (28/1).

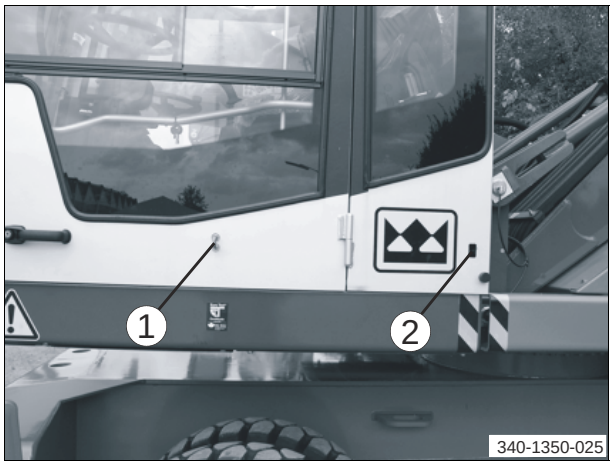


Fig. 27 Cab door catch

4.7.7 Emergency hammer

The emergency hammer (28/2) is located in the operator's cab on the right window pillar.

The front window serves as an emergency exit. If a front protective roof grating is fitted or this exit can no longer be used for any other reason, the rear window must be used as an emergency exit.

4.7.8 Fire extinguisher (optional)

The optional fire extinguisher (max. 4 kg) is located in the driver's cab on the rear left window pillar.

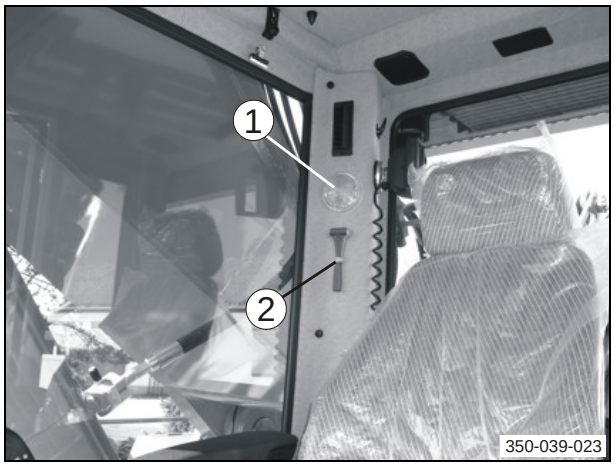


Fig. 28 Emergency hammer / lamp glass

4.7.9 Windshield wiper

The push-button (29/43) for the upper windshield has the following functions when the ignition is turned on:

- Buttons up: continuous wiping
- Buttons down: interval wiping
- Buttons up or down (hold): wash/wipe

When you release the push-button you return to the previous condition (continuous wiping, interval wiping or OFF position).

The toggle switch with button function (29/44) for the lower windshield has the functions of:

- 1st stage: windshield wiper
- 2nd stage: washwipe

To switch off the windshield wiper, press the toggle switch (29/44) downward.

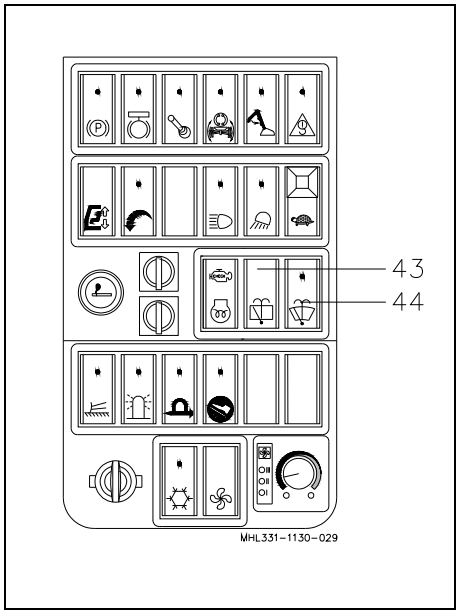


Fig. 29 Windshield wipers

! ATTENTION

The windshield wiper only works if the windshield is properly closed.

4.7.10 Windshield washwipe system

The container for the windshield washwipe system fluid (30/1) is situated in the cab behind the driver's seat. The container holds approx. 4 liters. We recommend that you always add window cleaner with antifreeze to the water.

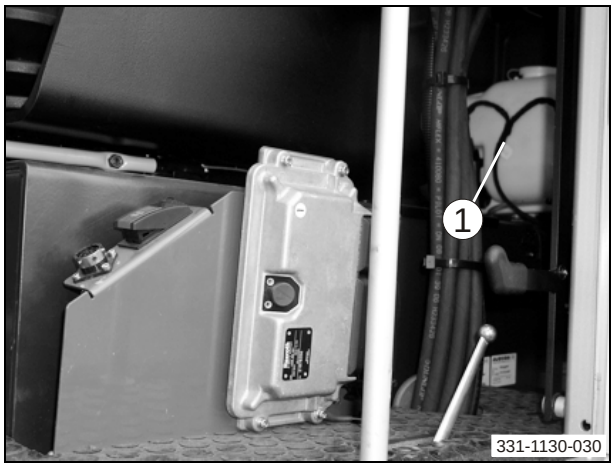


Fig. 30 Fluid container

4.8 Cab with hydraulic elevation

The cab can be steplessly elevated hydraulically to a viewing height of 5.20 m.

4.8.1 Before placing into operation

The lifting equipment of the cab must be subjected to a function test every day.

DANGER

The cab may only be repaired whilst in elevated position when the lift frame is adequately supported.

A sleeve may be affixed to the piston rod of the lift frame cylinder to support the cab. This support sleeve can be obtained from TEREX | Fuchs. Order number of the support sleeve: 6090031600.

4.8.2 During operation

Only enter or leave the cab when it is in the lower end position. The cab must not be elevated. Do not remain on the chassis or undercarriage or on the access stairs. During all movements of the cab, the machine operator must take care to ensure that s/he and other persons are not in danger.

DANGER

When working with elevated cab, special care must be taken to ensure that no overhead power lines are touched. If the machine has touched an overhead power line, it must only be left or touched by persons standing outside the cab when it is certain that the machine is no longer in contact with the power line or the current has been switched off. See also chapter 2.7 "Instructions for working safely".

DANGER

When close range cut-off (dipperstick) is deactivated, please note that the distance between the cab and the work attachment decreases. When loading long and thin parts which stand out of the loading grab, these parts may break into the cab if the loading grab swings out strongly.

4.8.3 Driving with elevated cab

WARNING

When driving with elevated cab, even small irregularities in the ground cause the cab to dip. This may result in injuries of the driver (operator) or to incorrect operation of the machine.

The machine may only be driven with elevated cab when the door is closed, and not on public roads.

When driving with elevated cab, it must be ensured that there are sufficient entrance heights to work bays and other premises. In the event of a collision the operator is exposed to an increased danger of injury.

The following points must also be observed:

- There must be no obstacles in the vehicle's path.
- The route must be such as not to endanger the stability of the machine and the safety of the person in the cab.
- The driver must have a sufficient overview of the vehicle's path, or the area must be marked, e.g. by safety posts.

4.8.4 Switching off the machine

The cab must be returned to the rest position.

4.8.5 Positioning the cab

The cab can be steplessly elevated hydraulically.

WARNING

When the cab is being moved, and during driving and working, the left-hand armrest must be folded down and the cab door shut.

Adjust the cab as follows:

- Close the cab door and fold down the left-hand armrest (31/10).
- Press upper part of push-button (31/31) until the cab reaches the desired height.
- Pressing lower part of push-button (31/31) lowers the cab.

4.8.6 Procedure for manual lowering of elevated cab (in case of malfunction)

The cab can be lowered from the cab interior using ball valve (31/7) or from the uppercarriage using ball valve (32/1) on the hydraulic tank.

In order to raise the cab once more, after lowering, the ball valves (31/7) and (32/1) must be returned to the shut-off position.

DANGER

There is a risk of being crushed by the lift frame due to the movement of the cab, since the operator in the cab cannot see all areas fully.

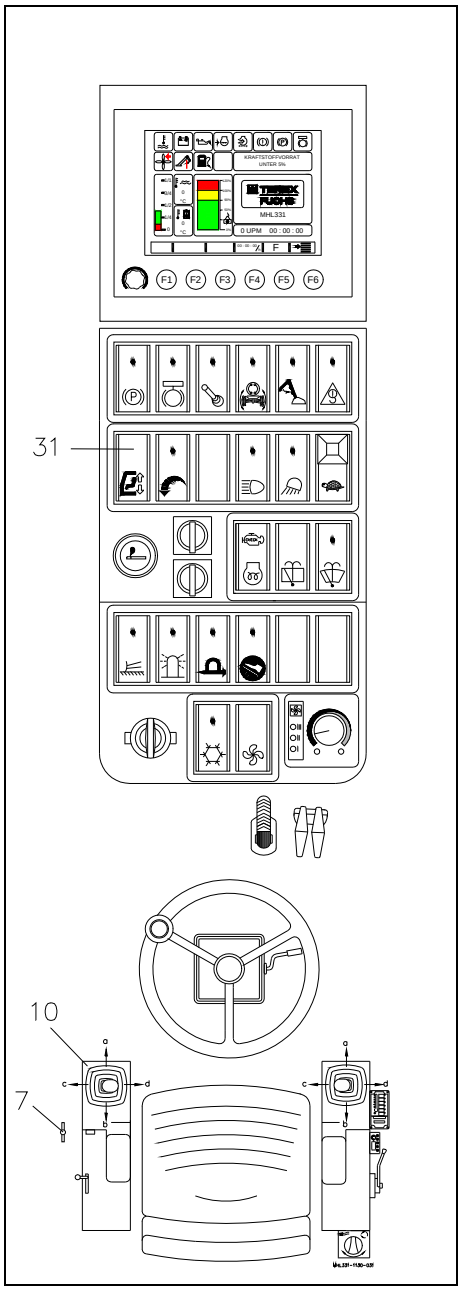


Fig. 31 Positioning the cab

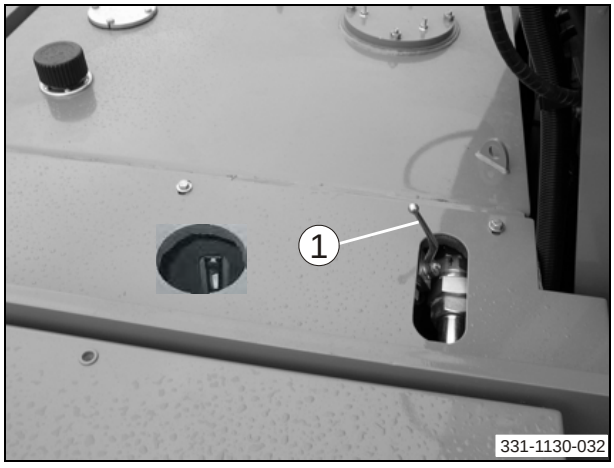


Fig. 32 Ball valve

4.9 Travel operation

WARNING

Absolutely comply with all safety instructions in chapter 2 before and during travel.

DANGER

Make sure before and during travel that no persons or obstructions are in the travel direction.

Look to the rear before and during reversing.

Warn persons in the vicinity of the danger zone by sounding the horn.

ATTENTION

The loading machine is not licensed for use on the road, and therefore must not be driven on public highways (in Germany).

4.9.1 Placing the machine in motion

DANGER

Starting in the wrong direction can lead to serious accidents. Make sure before driving where the steering axle is located and steer the machine accordingly.

If possible, always turn the uppercarriage so that the steering axle is at the front.

- Start the engine as described on pages 4.17 – 4.19.
- Retract the 4-point outriggers.
- Select the slow or fast gear by pressing toggle switch (33/42) **only** when the machine is stationary.
- Turn off the parking brake toggle switch (33/34) and release the service brake (33/11) when the pedal is locked.

ATTENTION

The machine cannot be placed in motion if the parking brake is applied. Indicator (33/71) lights up.

- **Travel direction forwards** (related to the steering axle)

  Forwards travel is initiated by operating pedal (33/12).

- **Reverse travel direction** (related to the steering axle)

  Reversing is initiated by operating pedal (33/13).

ATTENTION

Travel speed is regulated by means of travel pedals (33/12) and (33/13). Operate the service brake pedal (33/11) for braking and stopping.

CAUTION

*Change from forward to reverse traveling and vice versa only when the machine is at a standstill. **Do not** revere.*

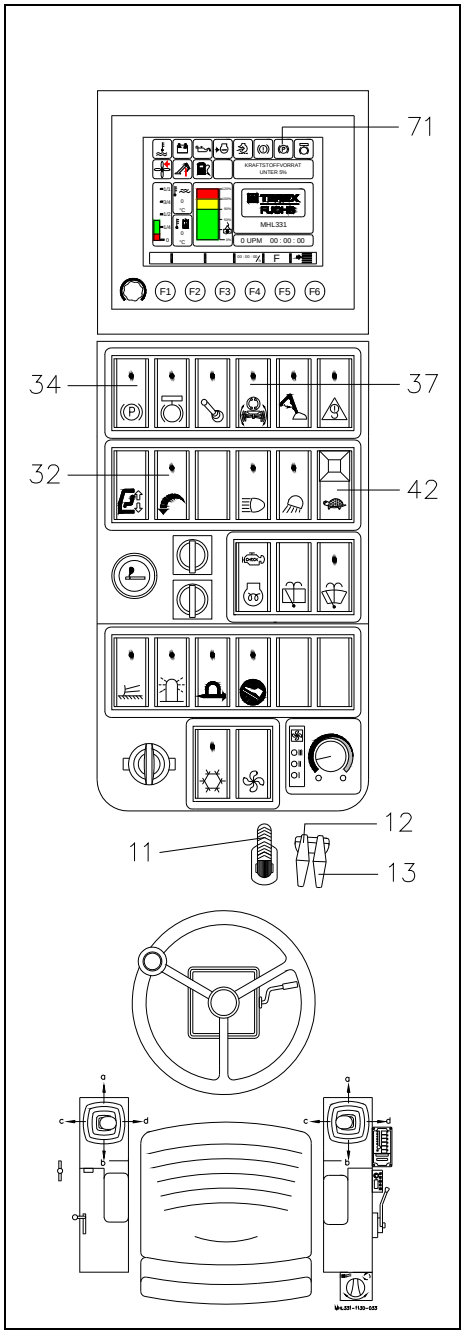


Fig. 33 Travel operation

If the machine is stuck in difficult terrain, do not attempt to free it by rocking. See chapter 6 "Recovery, loading and transport" for how to proceed.

Machines carrying loads with laterally shifted uppercarriage must travel exclusively on level paths and with the oscillating axle locked. The oscillating axle is locked using toggle switch (33/37) (refer to chapter 5.1.5).

4.9.2 Coming to a halt

Travel speed is reduced by releasing travel pedals (33/12) and (33/13). The hydrostatic travel drive acts as a non-wearing service brake. See also chapter 4.9.5 "Brakes".

4.9.3 Driving down- and uphill

The loading equipment can be used when driving down or up steep gradients to prevent the machine from tipping over. When driving down a steep gradient, the loading equipment must be retracted as far as possible. When driving up a steep incline it must be extended.

Normally it is sufficient when driving downhill or uphill to lift the loading equipment far enough to maintain good clearance to the ground.

DANGER

Do not traverse a slope. Do not park the machine on an incline.

ATTENTION

The auto-idling system (33/32) must be turned off when driving on inclines. The indicator lamp in the switch should not light up.

4.9.4 Steering

The steering of the front axle of the machine is hydraulic.

CAUTION

In the event of steering malfunctions, stop work immediately, determine the cause (see Trouble-shooting) and call for service personnel if necessary.

4.9.5 Brakes

- Service brake (can be locked in place)

  Apply service brake (33/11) as required. When the service brake is locked in place, care must be taken that the **brake pressure diminishes after the engine has been stopped** for some time.

- Parking brake

  Switch on the parking brake toggle switch (33/34) when parking the machine.

CAUTION

Do not engage the parking brake unless the machine is stopped, with the exception of emergency braking.

4.9.6 Driving and working floodlights

- Parking light/headlamp toggle switch (34/40)

  Toggle switch (34/40) can be used to turn on the parking light as well as the headlamp.

  1st stage: parking light

  2nd stage: headlamps

- Working floodlights toggle switch (34/41)

  The working area to the front or rear can be illuminated with the working floodlights (front and rear).

  1st stage: Working floodlights on the dipperstick can be turned on in the first stage.

  2nd stage: Optional working floodlights on the roof can be turned on in the second stage.

4.9.7 Direction indication

Flashing to the right

- Press the rocker button (34/P1) in the left four-way control lever to the right.

Flashing to the left

- Press the rocker button (34/P1) in the left four-way control lever to the left.

Switching off

- To turn off the flasher, press the rocker button (34/P1) in the left four-way control lever to the right or left again.

4.9.8 Hazard warning

The hazard warning system can be turned on and off with the rocker button (34/P1) in the left four-way control lever by pressing right **and** left.

4.9.9 Horn

- Press push-button (34/3) in the right four-way control lever.

4.9.10 Rotating beacon (optional)

Thanks to the rotating beacon the loading machine can be recognized more easily during work operation. The rotating beacon is switched on and off with toggle switch (34/27).

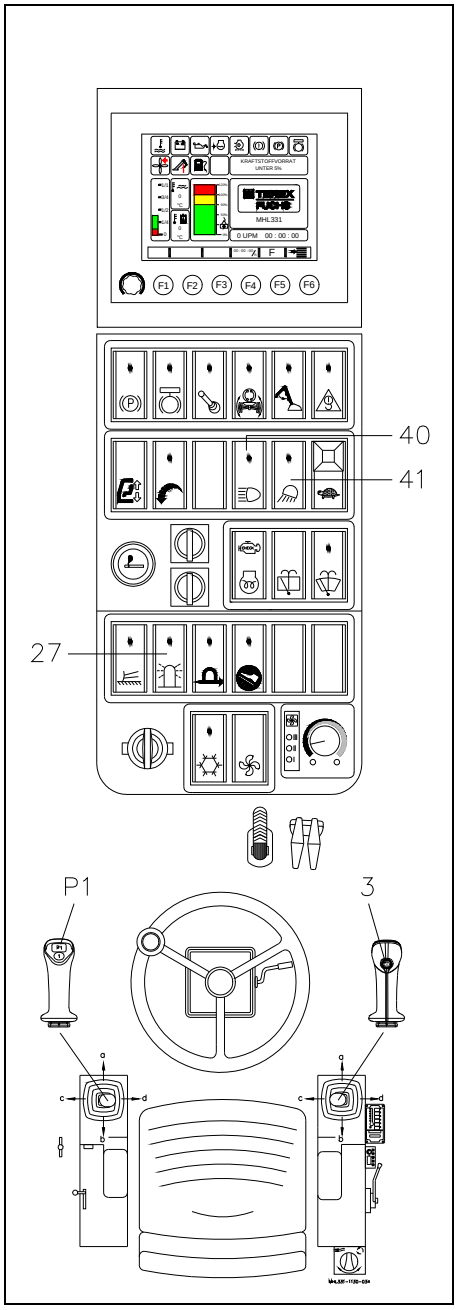


Fig. 34 Lighting

4.10 Parking the machine

CAUTION

When switching off the machine, the work attachment must be let down carefully since the surface could be damaged by the weight of the loading equipment.

- Park the machine only on an **even and solid** surface.
- Lower the loading equipment onto the ground.
- Switch the parking brake toggle switch (35/34) on and open the service brake (35/11).
- Switch the swing brake toggle switch (35/35) on.
- Reduce the engine speed by moving the engine speed control lever (35/18) away from the body, and allow the engine to run at idle for a short time in order to cool down.
- Move the engine-speed control lever (35/18) away from the body until the stop; switch off the engine. Turn the ignition key to "0".
- Turn the ignition key to "I" and wait about 5 seconds for the starting phase of the machine control unit. Hold down toggle switch (35/36) and briefly actuate all hydraulic levers in order to relieve the hydraulic system of pressure.
- Turn the ignition key to "0" and withdraw it.
- Fold up the left armrest (35/10).
- Lock the cab as well as all windows and skylights when work is finished, so that it cannot be entered by unauthorized persons.
- The machine must be cleaned at regular intervals.

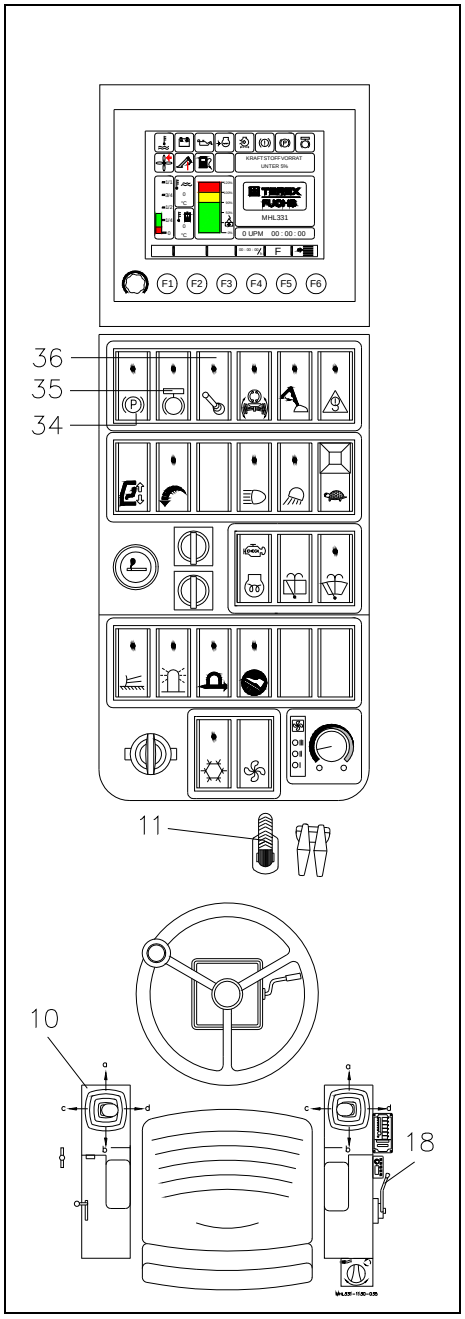


Fig. 35 Parking the machine

DANGER

When parking the machine, the uppercarriage must be in longitudinal direction as compared to the undercarriage, and the cab must be in its lower end position. The dipperstick must be positioned vertically and the open grab must be placed onto the ground (see fig. 36).

Plates should be pushed under the grab tips. Otherwise they will press down on the surface.

Fig. 36 Proper parking of the machine

5 Work Operation

5.1 Work operation

The loading machine is equipped as standard with ISO control (fig. 37), upon which the following description is based.

DANGER

If the customer so wishes, the loading machine may be equipped with a special control. Your loading machine must therefore be checked to see whether or not a special control is installed. Incorrect operation may endanger persons or tangible assets.

Before commencing work, memorize the lever controls well. Commence at low engine speed when familiarizing yourself with the controls.

5.1.1 Operation of loading equipment

Four-way control lever, left

a = Extend dipperstick
b = Retract dipperstick
c = Swing uppercarriage counterclockwise
d = Swing uppercarriage clockwise

Four-way control lever, right

a = Lower box-type boom
b = Raise box-type boom
c = Close grab
d = Open grab

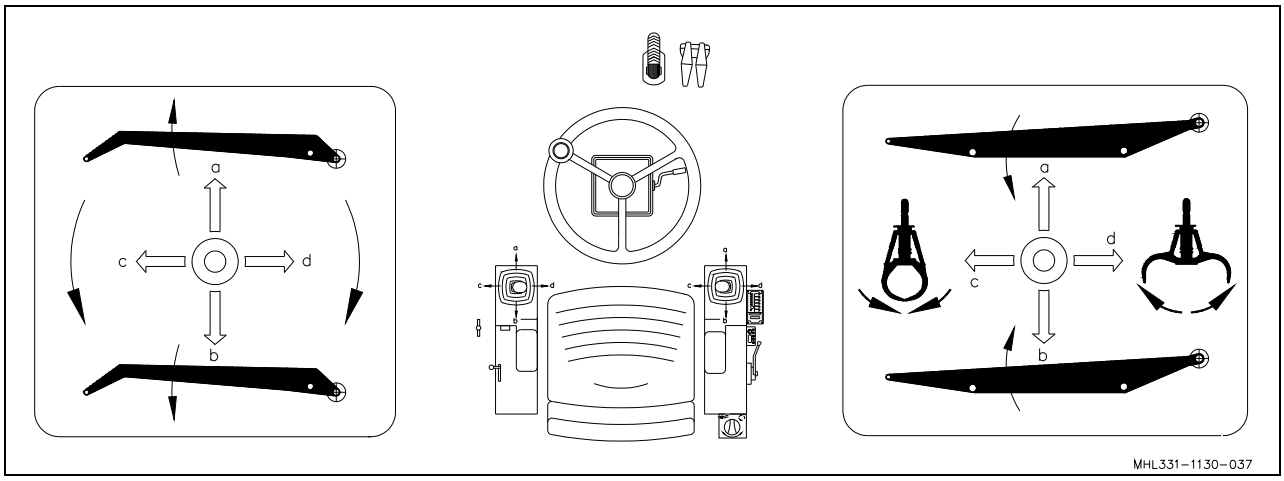


Fig. 37 ISO control

5.1.2 Operation – Increasing the operating pressure

With the function "Increasing the operating pressure", the hydraulic pressure can be increased from 320 to 360 bar. This may be necessary for heavy-duty work. To increase pressure, press the push-button (38/1) in the right-hand four-way control lever. The function only takes effect while the push-button is being pressed.

The pressure increase affects the boom and dipperstick only. There is no pressure increase for the functions "travel" or "open/close grab".

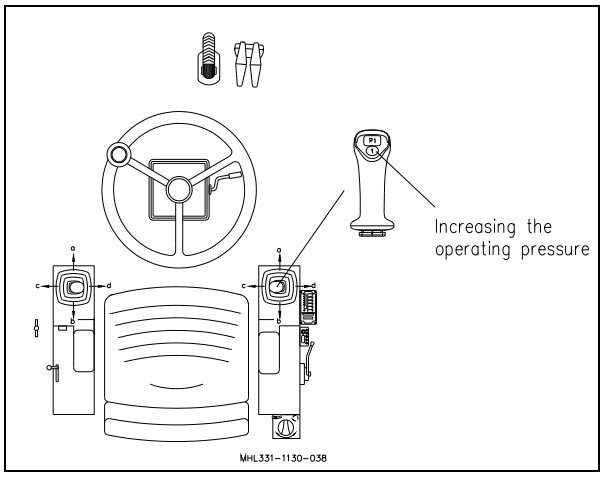


Fig. 38 Increasing the operating pressure

5.1.3 Operation – 4-point outrigger

The 4-point outrigger is operated with lever (39/7).

- Operating lever (39/7) forward ⇒ extend 4-point outrigger.
- Operating lever (39/7) backward ⇒ retract 4-point outrigger.

5.1.4 Disabling all travel and work functions

- All work functions are disabled when toggle switch (40/36) is switched off. The indicator lamp in the switch **does not** light up; indicator (40/76) lights up.
- At a coolant temperature of more than 110 °C as well as at a hydraulic oil temperature of 95 °C, the red symbol (40/65) "Coolant/hydraulic oil temperature" in the main control display lights up together with indicators (40/80) and (40/81). A warning buzzer sounds at the same time continuously. Travel and work functions are disabled. Indicator (40/76) lights up. Open the engine hood and allow the engine to cool down by running the engine at a high idle. Once the coolant temperature is below 95 °C or the hydraulic oil temperature is below 90 °C, disabled functions will be made available again. Indicators (40/65) and (40/76) go out.
- At a charge air temperature of more than 105 °C, the red symbol (40/65) "Charge air temperature" in the main control display lights up and the warning buzzer sounds continuously. Work functions are disabled. Indicator (40/76) lights up. If the charge air temperature falls below 95 °C after shutoff, the work functions will be enabled again.
- If the level of the coolant or hydraulic oil is below the minimum level, indicator (40/68) lights up. A continuous warning buzzer is heard at the same time and the travel and work functions are disabled. Indicator (40/76) lights up. Stop work immediately and replenish hydraulic oil or coolant **after** the engine has **cooled down**. Once the level of the coolant or hydraulic oil is again within the permitted limits, disabled functions will be made available again. Indicator (40/76) goes out.
- If the service ladder is not closed and the left armrest is folded up, all travel and work functions are disabled. Indicator (40/76) lights up.

! ATTENTION

Toggle switch (40/36) has a second switching stage (push-button). Switching off the work functions and if necessary travel functions can be bypassed briefly for emergency operation with it.

See also chapter 4.4.3 "Monitoring the machine during operation".

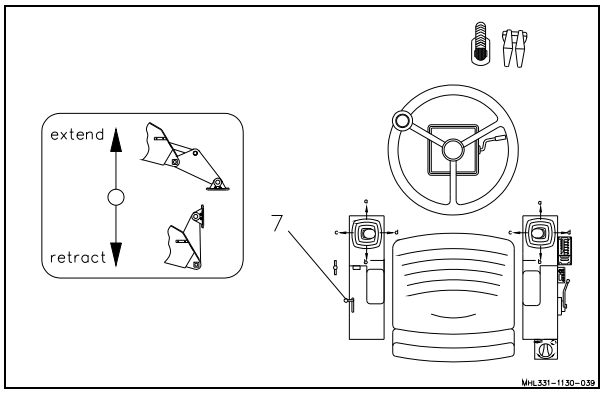


Fig. 39 4-point outrigger

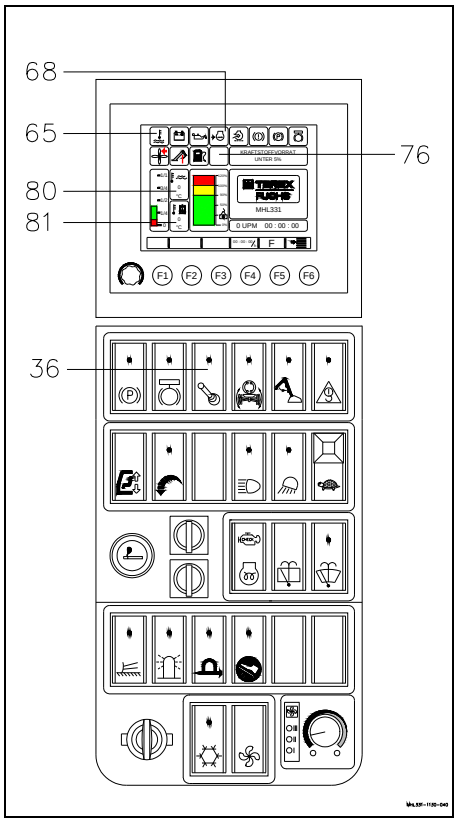


Fig. 40 Disabling travel and work functions

5.1.5 Oscillating axle lock release

The oscillating axle can be released with the toggle switch (41/37). If the oscillating axle is released, the indicator lamp in the switch (41/37) is lit along with indicator (41/75) and the text message (41/77) "OSCILLATING AXLE RELEASED" appears in the multifunction monitor. The oscillating axle is automatically locked when the parking brake (41/34) is set or if the diesel engine is stopped **even if the toggle switch (41/37) is turned on**!

- For slewing and loading operations: Lock the oscillating axle. The stability of the machine is increased by this. The indicator lamp in the switch (41/37) and indicator (41/75) are **not** lit.
- For travel operation (without load): Unlock the oscillating axle. The indicator lamp in the switch (41/37) and indicator (41/75) are lit.

DANGER

A released oscillating axle results in a reduction of stability and may cause the machine to tip over if a load has been placed on it.

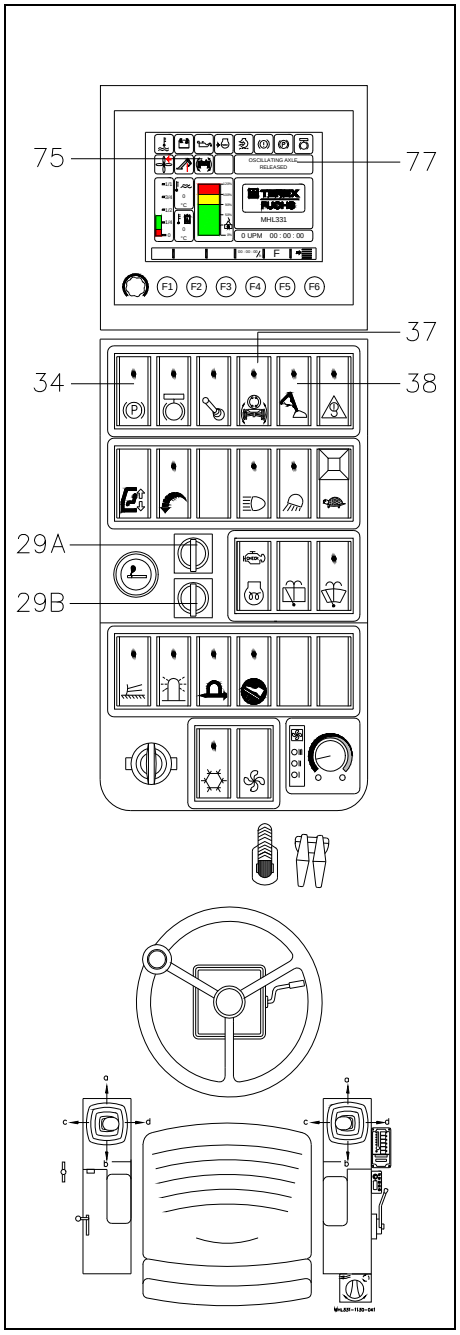


Fig. 41 Oscillating axle lock release

5.1.6 Key switch (optional)

Optionally, the machine may be equipped with two key switches (41/29A) and (41/29B).

5.1.6.1 Black key switch

Black key switch (41/29A) ⇒ deactivate overload warning device/overload cut-off

The overload cut-off with warning function sends an audible and visible alert whenever the machine's load approaches the permissible maximum load due to a load received. Once the permissible load is exceeded, the load increasing work functions (raise/lower boom and extend dipperstick) are cut off. The overload warning and cut-off functions can be completely deactivated by means of the key switch (41/29A)!

DANGER

The cut-off function is no absolute protection against generating critical load torques that exceed the stability of the machine. Depending on the foundation the machine is supported on, and on the dynamic forces during the movement of large loads at high speeds, and on the resulting swinging out of the grab and load, the machine may be overloaded beyond its stability, even with overload cut-off active!

5.1.6.2 Blue key switch

Blue key switch (41/29B) ⇒ reduce hydraulic oil pressure or enable work movements with the diesel engine stopped

Optionally, the machine may be equipped with a device that prevents work movements during the idle operation of the diesel engine (for the Italian market, for example). In order to lower the load or reduce any oil pressure that may be present in the hydraulic system when the diesel engine is off with this option, the key switch (41/29B) must be switched to position I by an authorized person. The operator can then lower the load by means of lowering the boom, or by retracting the dipperstick, or can reduce the oil pressure in the hydraulic system by triggering another work movement. In machines that are equipped with a dead man's button in the left four-way control lever, the dead man's button must also be pressed.

5.1.7 Close range cut-off (dipperstick)

When the dipperstick is moved (retracted) in the direction of the cab, it may come into the area around the cab with the suspended load.

Lack of attention on the operator's part could result in danger to the operator, the cab, the surrounding area or the loading equipment together with the load that is in place.

To eliminate this possibility, the range of motion of the dipperstick (retracting) is restricted in the direction of the cab by the electrical close range cut-off function.

When the close range limit is reached, an inductive proximity switch turns off retraction of the dipperstick.

The electrical close range cut-off function is <u>not</u> a safety device! The shut-off serves only as an aid for the operator!

A 1.5 m safety distance from the cab must be observed.

DANGER

There is a danger that the loading equipment or overhead load could come too close to the area around the cab:

- *Due to a work attachment (load hook, grab, etc.) swinging or because of differences in dimensions in work attachments when they are open as opposed to closed.*
- *Because of a delay in the shut-off. Depending on the oil temperature and different types of equipment, the shut-off path can be extended by up to 0.5 m, and depending on the retracting speed and grab content up to 1.0 m.*

A minimum safety distance of 1.5 m must be observed from the cab.

CAUTION

Danger of damage! Avoid rapid motions of the dipperstick if you are moving it close to the shut-off points.

5.1.7.1 Deactivating close range cut-off

If the dipperstick needs to be extended towards the cab beyond its shut-off point, close range cut-off can be deactivated with toggle switch (42/38). Indicator lamp (42/38) is lit as long as close-range cut-off is deactivated.

DANGER

When close-range cut-off is deactivated, there is a danger that the work attachment could come into the area around the cab. Exercise extreme caution when working in the area close to the cab. There is an increased danger of accidents!

If the dipperstick is in operation in close range (the safety zone of the cab), indicator (42/74) lights up.

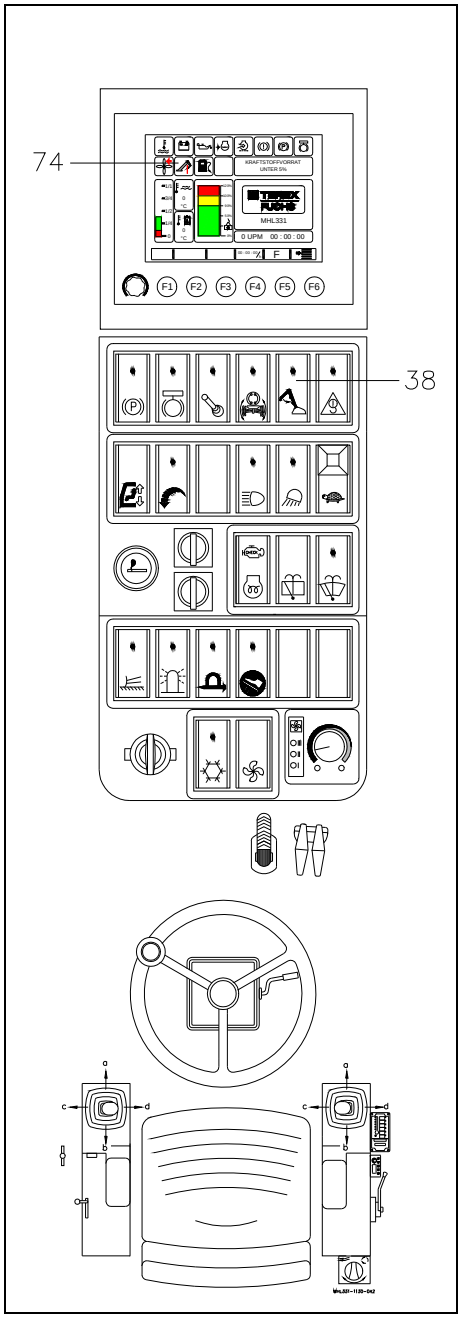


Fig. 42 Deactivating close range shut-off

5.1.8 Hose rupture safety devices (optional)

Loading machines with a permissible carrying capacity corresponding to DIN ISO 10567 of more than 1000 kg or with a tipping torque of more than 40,000 Nm must be equipped for crane operation with hose rupture safety devices on the outrigger cylinders corresponding to the requirements of DIN ISO 8643.

Hose rupture safety devices are used to keep the loading equipment in position in the case of a hose or pipe rupture. Controlled letting down is possible.

Hose rupture safety devices should protect persons who must stay in the danger zone, for example slingers, against the loading equipment dropping down in the case of pipe or hose rupture.

The hose rupture safety devices must be checked for external leaks (tightness) regularly by a specialist.

5.1.9 Overload cut-off with warning function (optional)

The overload cut-off with warning function sends an audible and visible alert whenever the machine's load approaches the permissible maximum load due to a load received. Once the permissible load is exceeded, the load increasing work functions (raise/lower boom and extend dipperstick) are cut off.

The warning and cut-off functions are based on the measurement of the oil pressure in the bottom pressure equalizing pipe of the boom cylinder. A pressure sensor (44/1) converts the oil pressure resulting from the weight of the boom, dipperstick, grab and load that has been received into an electrical signal. The machine control generates a warning signal, and if necessary, a cut-off signal, for raise/lower boom and extend dipperstick.

Bar display (43/82) shows the current pressure that is caused in the main cylinders by the load (display in percent of the maximum permissible load pressure). If 90 % of the permissible load pressure is exceeded, the color of the bar changes from green to yellow, and the message "OVERLOAD" appears on a yellow background in the main control display. At the same time, an audible warning signal sounds in the cab.

If the permissible load pressure exceeds 100 %, the bar color changes from yellow to red, the background color of the overload message also changes to red, and depending on the different dynamics parameters, the load increasing work functions will be cut off.

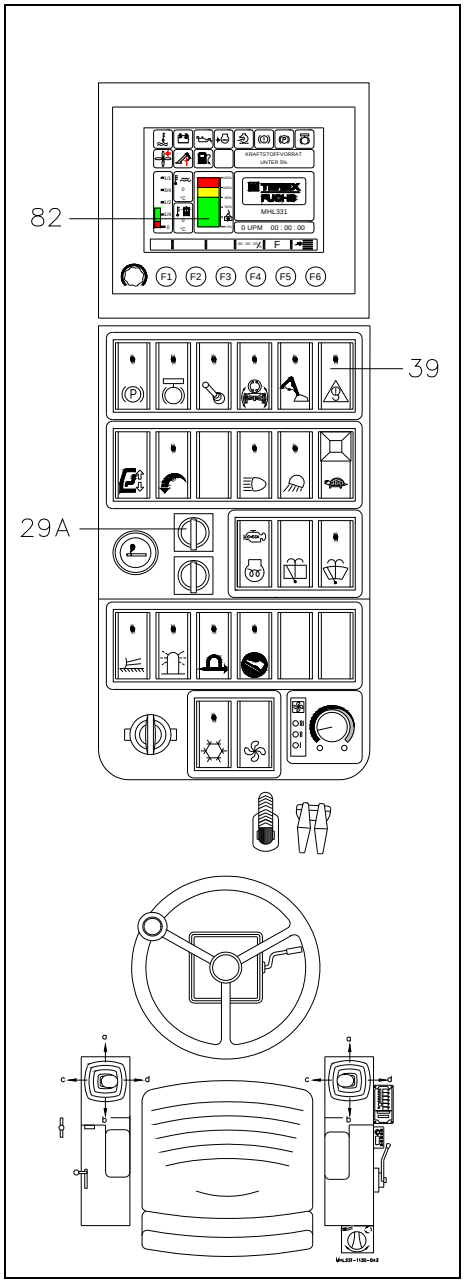


Fig. 43 Overload cut-off

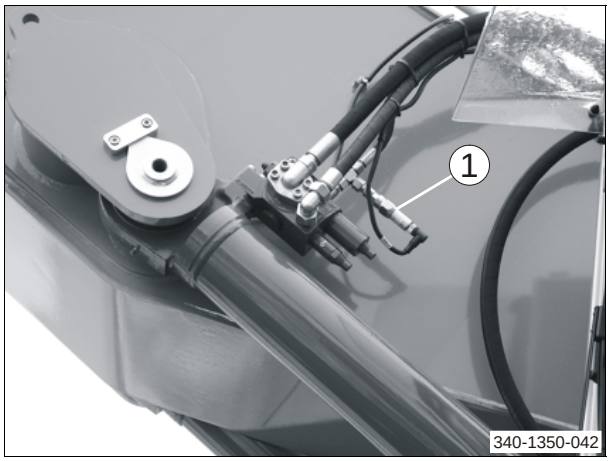


Fig. 44 Sensor for load pressure measurement

In case the load cut-off is triggered, the operator can bring the load closer to the machine by means of folding the dipperstick under, in order to reduce the overly high load pressure. The load increasing work movements remain disabled until the machine is again operated within the permissible work range. In some situations the load pressure may not be reduced by means of folding under the dipperstick. In this case it may be possible for the operator to deliberately bypass the cut-off of the load increasing work movements "raise/lower boom" by pressing the bypass key (43/39). In this case, the operator is additionally warned in the main control display by the display "!!! DANGER !!! – NO OVERLOAD CUTOFF" highlighted in red, of the bypassed state of the overload cut-off. Simultaneously, in addition to this visible warning, the audible alert is also active.

If the cut-off limit falls below the target again, the deactivation automatically becomes inactive once more, i.e. the cut-off of all load increasing work functions occurs again the next time the cut-off conditions are achieved.

DANGER

The cut-off function is no absolute protection against generating critical load torques that exceed the stability of the machine. Depending on the foundation the machine is supported on, and on the dynamic forces during the movement of large loads at high speeds, and on the resulting swinging out of the grab and load, the machine may be overloaded beyond its stability, even with overload cut-off active!

The overload warning and cut-off functions can be completely deactivated by means of the key switch (43/29A)! If the switch is in position I (the key cannot be pulled in this case), the load display is hidden in the multifunction monitor, and there is **no audible/visible warning and no cut-off in case of overload!**

The function of the overload cut-off is checked as follows:

- connect any load as listed in the table of carrying capacity, but with the smallest possible reach;
- lift the load approx. 30 cm up from the ground;
- increase the reach, always keeping the load close to the ground, until the warning signal sounds on reaching the limit condition and shut-off is performed;
- check to make certain the achieved reach agrees with the value listed in the table of carrying capacity for the corresponding load in this test run. If this is not the case, interrupt the check and have the correct operation of the machine restored by a specialist workshop.

WARNING

The overload cut-off requires the machine to be supported on a foundation having sufficient carrying capacity.

Applicable accident prevention requirements must be observed when performing load lifting jobs.

WARNING

It is in any event forbidden to lift loads without having previously switched on the overload cut-off.

WARNING

This important safety device has been inspected and calibrated.

THE CALIBRATION OF THE DEVICE MAY NOT BE CHANGED UNDER ANY CIRCUMSTANCES.

5.2 Swinging and loading operations

Observation of the following points is essential:

- Machine with outriggers up

– When the outriggers are up, loads shall only be hoisted above the front or rear axle respectively, see table of carrying capacity.

– When outriggers are up, the oscillating axle must not be locked for work operations; see chapter 5.1.5 "Oscillating axle lock release".

– When the machine is at a standstill, the parking brake (45/34) must be applied. When the parking brake is applied, the oscillating axle is automatically locked.

- Machine with outriggers down

– During work operation, the 4-point outrigger must be set down firmly on the ground until the wheels no longer touch the ground. This must also be monitored continuously during work operation, and the support cylinders must be re-adjusted if necessary.

- General notes

– **The values in the table of carrying capacity must be strictly observed and must not be exceeded.**

– Released while the uppercarriage is slewing, the left-hand four-way control lever (45/9) automatically goes to neutral position, and the uppercarriage is "smoothly" braked. The uppercarriage may also be braked by countering, i.e. steering in the opposite direction of slewing.

– The uppercarriage can be kept in a certain position by pressing push-button (45/35), for example for transport on a flatbed trailer or when driving. **The swing brake (45/35) must not be used to brake the uppercarriage.**

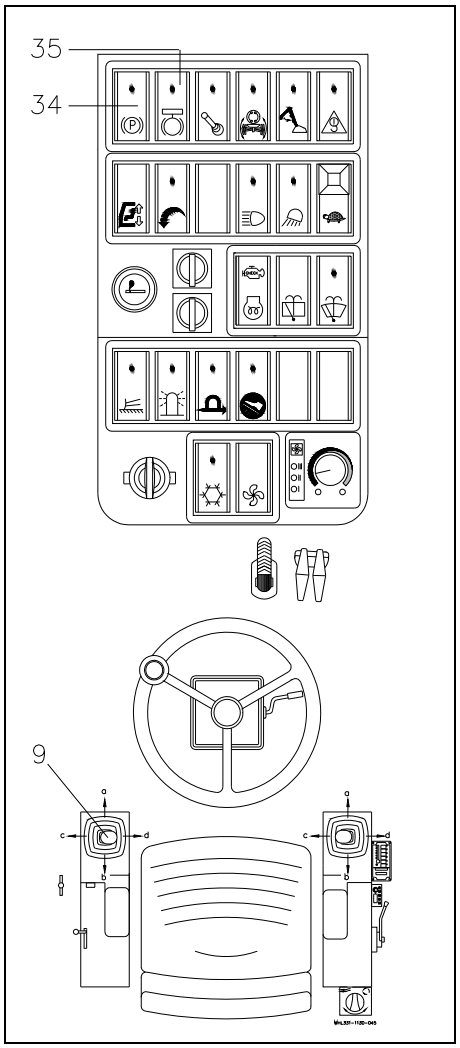


Fig. 45 Swing brake

- Do not level the ground in front of the loading machine with the loading equipment by slewing the uppercarriage to and fro.
- Neither push, knock nor beat with the grab.
- Pay attention to hoses when lowering the grab into a shaft.
- Do not pull loads with the swing assembly.
- The uppercarriage must only be swung that fast that the load is not pulled strongly outward through centrifugal force and the load does not swing when braking.
- Do not brake the slewing motion of the machine by dropping the loading equipment.
- When slewing, ensure that there is sufficient all-round carrying capacity.
- **No one except the driver may remain on the machine or in the danger zone during operation.**
- Never force the operating levers.

5.3 Load hook applications

See chapter 2.11

5.4 Magnet system (optional)

5.4.1 Operation of magnet system

ATTENTION

The magnet system should be switched on only after attachment of the magnetic plate.

- Bring the engine speed control lever (46/18) to full power. Insufficient speed results in the generator not being ready for operation. LED 6 (see fig. 46a) in the control device for the magnet system (46/16) is lit.
- Switch on the magnet system using the toggle switch (46/28). The indicator lamp in switch (46/28) and LED 1 (see fig. 46a) in the magnet system (46/16) control device are lit.

  The toggle switch (46/28) has three positions:

  Toggle switch up: Off

  Toggle switch in center position:
  normal operation (used for loading)

  – Activate and release push-button (46/P1) → material is magnetized

  – Activate push-button (46/P1) again → material is quickly and completely dropped

  Toggle switch down:
  jog mode (used for sorting)

  – Activate and hold push-button (46/P1) → material is magnetized

  – Release push-button (46/P1) → material drops slowly

DANGER

Jog mode must not be used for loading. It may only be used for sorting material. Use Jog mode only with a low working height!

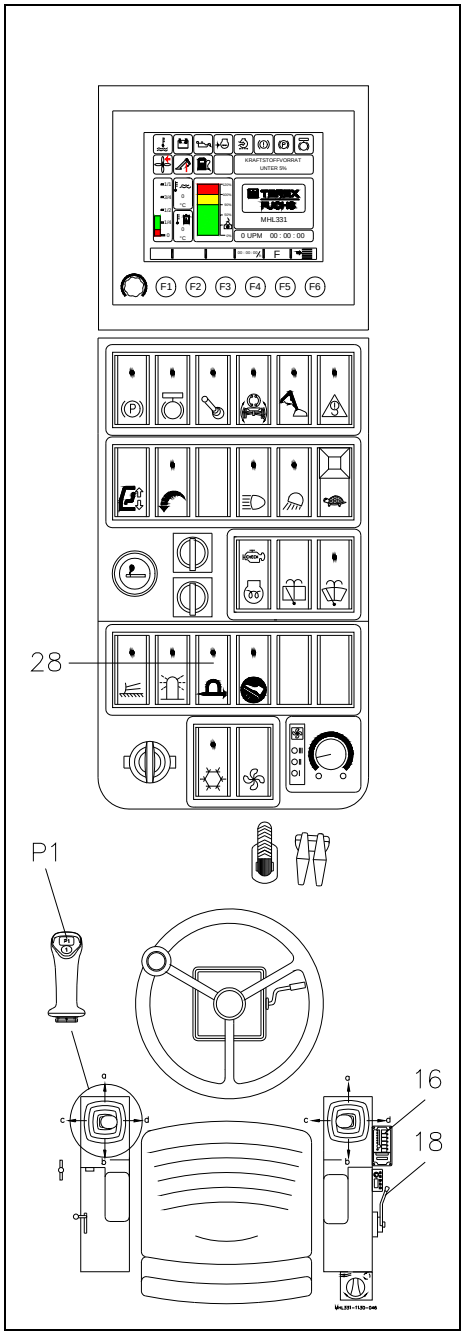


Fig. 46 Magnet system

- Move the magnetic plate onto the material to be picked up.
- Activate the magnet using push-button (46/P1) on the left-hand four-way control lever. LED 2 (see fig. 46a) in the magnet system (46/16) control device is lit.

  In order to achieve optimum performance when picking up material with the magnetic plate, only magnetize the plate immediately before positioning the magnet on the material to be picked up. Do so using push-button (46/P1) on the left-hand four-way control lever. Lift the magnetic plate up out of the material after max. 5 sec.
- Withdraw the magnetic plate with attached material.
- To drop the material, deactivate the magnet by means of the push-button (46/P1). LED 3 (see fig. 46a) in the magnet system (46/16) control device is lit briefly.

To avoid excessive generator overload, the maximum permissible output of the magnet plate must not be exceeded in accordance with the following table and depending on the generator system that is installed.

Output of the generator system installed	**Max. permissible output of magnet plate**
11 kW	7.5 kW *
13 kW	9 kW *

* Magnet plates with a lower power consumption rate can be used at any time.

5.4.1.1 Magnet system control device (MMI – Man/Machine Interface)

LED 1 Supply voltage present for magnet system control device – green status indicator

The system is switched on and operative, the generator is running.

LED 2 Magnet plate switched on "Lift" – yellow status indicator

This LED is illuminated as long as the magnet plate is switched on. When the magnet plate is switched off, i.e. when the load is dropped, this LED turns off.

! ATTENTION

If, after switching on the magnet plate, this LED is only illuminated for approx. 1 second and then automatically turns off, the connecting cable of the magnet plate is not plugged in or interrupted.

LED 3 Quick demagnetization of the magnet plate "DROP" – yellow status indicator

This LED is illuminated during the automatic quick demagnetization. The LED turns off as soon as quick demagnetization is completely finished.

This LED also turns off if quick demagnetization is interrupted. In this case there might be a remaining magnetization on the magnet plate for a certain time as natural demagnetization is considerably slower.

LED 4 Interruption / interface error – red error indicator

LED is illuminated: Interruption

This LED is illuminated if the connecting cable of the magnet plate is not plugged in or interrupted. After switching on there is a check whether current is supplied to the magnet plate. If there is no current, the magnet plate is switched off again after approximately 1 second and this LED is illuminated.

This indicator turns off if the error has been eliminated before the system is switched on again.

LED flashing: Interface error:

This LED flashes if there is an error on the interface by means of which the magnet system communicates with the control system.

Fig. 46a Magnet system control device

LED 5 Overload / short circuit – red error indicator

LED is illuminated: Overload

This LED flashes if the magnet plate connected is too large for the MAPLA system. As a result, the system is overloaded.

This indicator remains illuminated after switching on the system again. It does not turn off until the magnet plate is switched off again and when the system could no longer recognize an overload.

LED flashing: Short circuit

The LED flashes if the magnet plate connecting cable has a short circuit. In this case the exit towards the magnet plate is immediately switched off. The LED does not turn off until the system is RESET. It is not possible to switch it on again beforehand.

LED 6 Insufficient speed / excessive speed – red error indicator

LED is illuminated: Insufficient speed

If this LED is illuminated, the speed of the generator is insufficient and thus can possibly no longer achieve full power. If this LED is illuminated there is no "quick demagnetization" with pulse excitation when the magnet plate is switched on. The indicator turns off automatically as soon as the speed is again within tolerance.

LED flashing: Excessive speed

If this LED flashes, the speed of the generator is too high. If the LED flashes, the system cannot be switched on again after dropping the load. The indicator turns off automatically as soon as the speed is again within tolerance.

LEDs 7 Relative operating time of the magnetic plate (50 % green, 60 % and 70 % yellow, 80 % – 100 % red) – multi-colored status indicator

The relative operating time of the magnet plate is the ratio between operating time and turn-off time. For instance, an operating time of 1 minute and a subsequent turn-off time of 1 minute corresponds to a relative operating time of 50 %.

This indicator shows the relative operating time of the magnet plate as a percentage. Values below 50 % are not indicated. At a value of 100 %, the magnet plate will **not** be prevented from being turned on again.

ATTENTION

When 100 % of the operating time is used up, there is a reduction in output and under some circumstances the magnetic plate may heat up impermissibly.

ATTENTION

To protect the magnetic plate, 80 % of the relative operating time should not be exceeded.

5.4.1.2 Malfunctions in the magnet system

If malfunctions occur in the magnet system, write down the operating state on the display diodes of the magnet system control device. Please have this information available when you contact Customer Service.

DANGER

The load must be set down immediately and work with the magnet system must be interrupted.

See chapter 8 "Trouble-shooting" for how to proceed.

6 Recovery, Loading and Transport

6.1 Towing the machine

The loading machine may be towed only in exceptional cases, for example to bring the machine away from a dangerous place for repair.

Damage and accidents that arise when towing the loading machine can be covered under no circumstances by the warranty of the manufacturer.

Rods that are used for towing must have sufficient tensile strength and be fastened to the towing lug (47/1) provided for this purpose at the front or back of the undercarriage.

Symbol: 

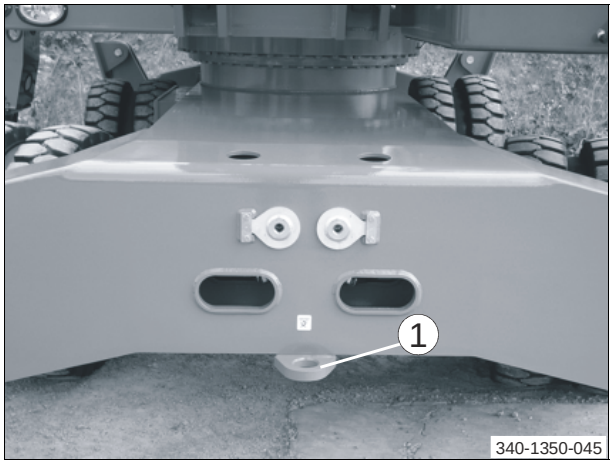


Fig. 47 Towing lug

ATTENTION

The towing lugs have a maximum bearing pressure of 100 kN (10 t).

CAUTION

The following values must not be exceeded when towing:

Towing speed: max. 5 km/h

Towing distance: max. 10 km

DANGER

Before working on the transmission, parking brake or, generally speaking, underneath the machine, the machine must be secured with chocks so that it cannot roll away.

Before the machine can be towed, the power shift gear must be set to neutral position (idle running) and the parking brake must be released. The way to proceed depends on the diesel engine (if it is running during towing or not).

CAUTION

With the diesel engine turned off and the parking brake released, ***all*** *brakes of the machine are out of operation and the steering is not ready for operation.*

Diesel engine is stopped:

- Switch on the ignition (48/25).
- Switch through the gears using toggle switch (48/42) for approx. 10 x. The transmission control is now pressureless. The gear is in neutral position.

Releasing the parking brake:

- Remove the screw cap (49/1).
- Loosen the counter-nut (49/2). Unscrew the threaded pin (49/3) until the brake disk is free.
- Screw on screw cap (49/1) by a few pitches of thread because of dirt.

The machine can now be towed.

After towing, the parking brake must be locked again.

Locking the parking brake:

- Start the engine, release the parking brake.
- Remove the screw cap (49/1).
- Screw back the counter-nut (49/2) on the threaded pin (49/3).
- Turn the threaded pin (49/3) clockwise until the two brake lining carriers (49/4) have contact with the brake disk.
- Screw back the threaded pin (49/3) by ½ turn and tighten counter-nut (49/2).
- Screw on the screw cap (49/1) hand-tight.

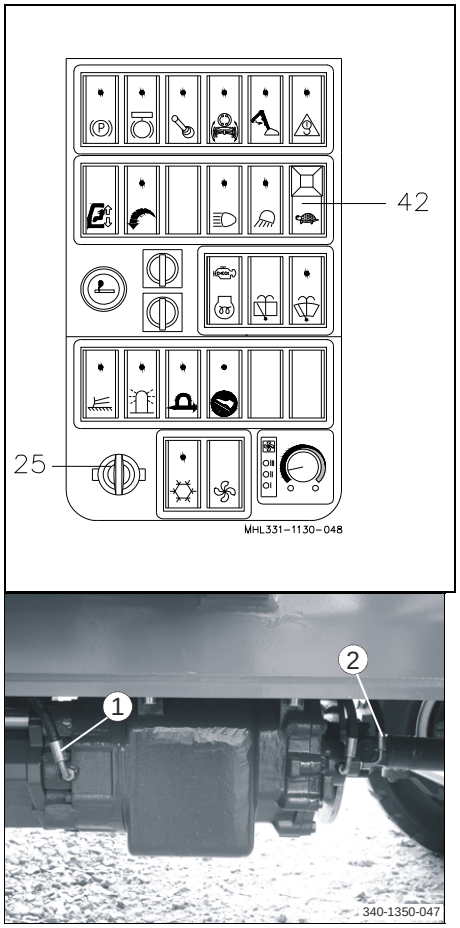


Fig. 48 Switching gears pressureless

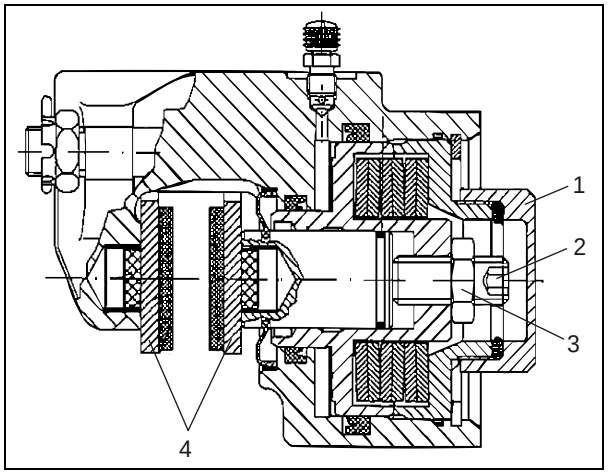


Fig. 49 Releasing the parking brake

Diesel engine is running during towing:

- Switch off the diesel engine; switch on the ignition (48/25).
- Switch through the gears using toggle switch (48/42) for approx. 10 x. The transmission control is now pressureless. The gear is in neutral position.
- Switch off the ignition (48/25).
- Unscrew the hoses (48/1) and (48/2) on the transmission.
- Seal the hoses and connections on the transmission. Bind loosened hoses firmly to the undercarriage.
- Start the engine.

The transmission is now pressureless and remains in neutral position with the engine running.

After towing, the hoses must be re-attached to the transmission.

6.2 Recovery of the machine

If the machine is stuck fast in difficult terrain, do not attempt to free it by rocking.

The machine can be pulled free with the aid of the loading equipment. The "slow" gear (48/42) must be switched on in this case. In certain conditions, the work attachment must be removed.

If the machine cannot be freed using the loading equipment, it must be towed clear following the instructions in chapter 6.1.

If the machine needs to be recovered, for example because of a technical defect, it can only be lifted and loaded with a suitable crane as described in chapter 6.3.

6.3 Safety requirements for loading with a crane

ATTENTION

Pivot-mounted work attachments such as a grab or magnet must be removed before the machine is lifted. Swinging movements of the work attachment would otherwise make safe lifting impossible.

- Dismantle the supporting feet from the supporting legs.
- Fasten the hoisting device (50/1) with the pins (50/2) and the fastening elements (50/3). Move the outriggers (50/4) to horizontal position.
- The pins and fastening elements match the attachment of the outrigger feet.
- If required, the hoisting device may be obtained from TEREX | Fuchs.
- Shackle (50/5) size 10 in compliance with DIN 82101 is recommended, in accordance with the weight of the machine.
- Lower the loading equipment and tilt the dipperstick in up to the stop. In this position, the load, based on the fixing points, is distributed fairly evenly.
- Move all operating levers into neutral position and close the parking brake.
- Lock the swing brake and stop the engine according to the operating instructions. Fold up the left armrest before leaving the driver's seat.
- Close all doors, covers and hoods of the loading machine.
- Assign only experienced persons the task of attaching loads and guiding the loading crane drivers. The guide must remain in the field of view of the operator or stay in spoken contact with him.
- The minimum lifting capacity per rope must be 100 kN (10 t).
- The four fixing ropes (50/6) shall not be shorter than 12.5 m for reasons of weight distribution or a sufficiently dimensioned lifting harness must be used.
- Lift the loading machine carefully with the crane.
- The ropes must be routed so that no damage occurs to the cab or paneling.

DANGER

Staying under the raised loading machine is forbidden.

- When placing into operation again proceed only according to the operating instructions.

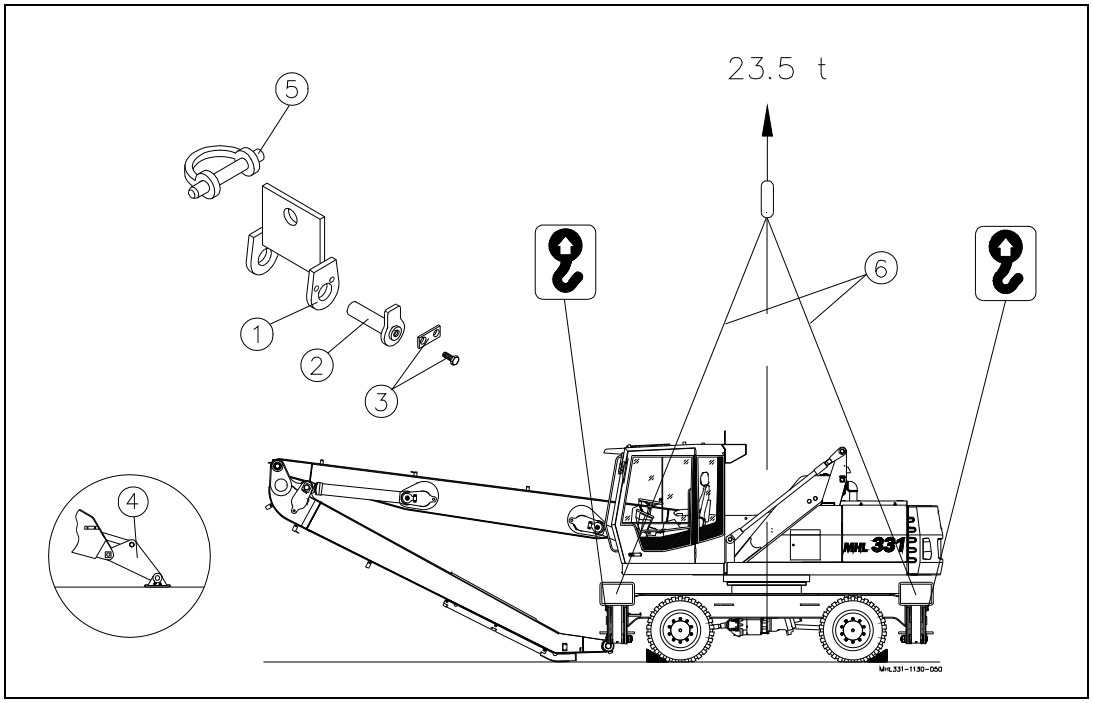


Fig. 50 Lifting the machine

6.4 Flat-bed trailer loading

For transport on a flat-bed trailer, the machine must be lashed in place so that it cannot move.

The machine is equipped with two lashing points on the undercarriage for this purpose (see fig. 51).

Symbol: 

WARNING

The machine must not be lifted by these lashing points.

- Use only suitable transport and lifting equipment with sufficient carrying capacity.
- Park the machine on flat ground and use wedges to secure the wheels.
- The gradient of the ramp for driving onto the flat-bed trailer must not exceed 30°. Wooden planks must be laid upon ramps to prevent slipping.
- Before driving onto the ramp, clean the machine's wheels of snow, ice and sludge.
- Secure the uppercarriage against the undercarriage with the swing brake before driving up the ramp.
- It is prohibited to turn the uppercarriage while the machine is on the transport vehicle.
- Line the machine up exactly to the loading ramp.
- Make certain a guide gives the machine operator the necessary signs.
- Have blocks on hand while the machine is ascending the ramp to prevent it from rolling back.
- Swing in the loading equipment and drive onto the ramp. Always keep the loading equipment just above the loading surface. Move carefully onto the ramp and then onto the transport vehicle.

- Before you leave the machine, relieve all pressure lines. Move all operating levers into neutral positions and close the parking brake. Pull out the ignition key and fold the left armrest up.
- Close all doors, covers and hoods of the loading machine.
- Secure the machine and other individual pieces against slipping with chains, ropes and wedges.
- Before setting off, find out about the route to be taken, especially in regard to limits for width, height and weight.
- Pay close attention to driving under electrical lines and bridges and driving through tunnels.
- Use the same caution when unloading as for loading. Remove all cables/chains and wedges. Start the engine as described in the operating instructions. Carefully drive down the ramp from the loading area. Keep the loading equipment as close above the ground as possible. Use a guide.

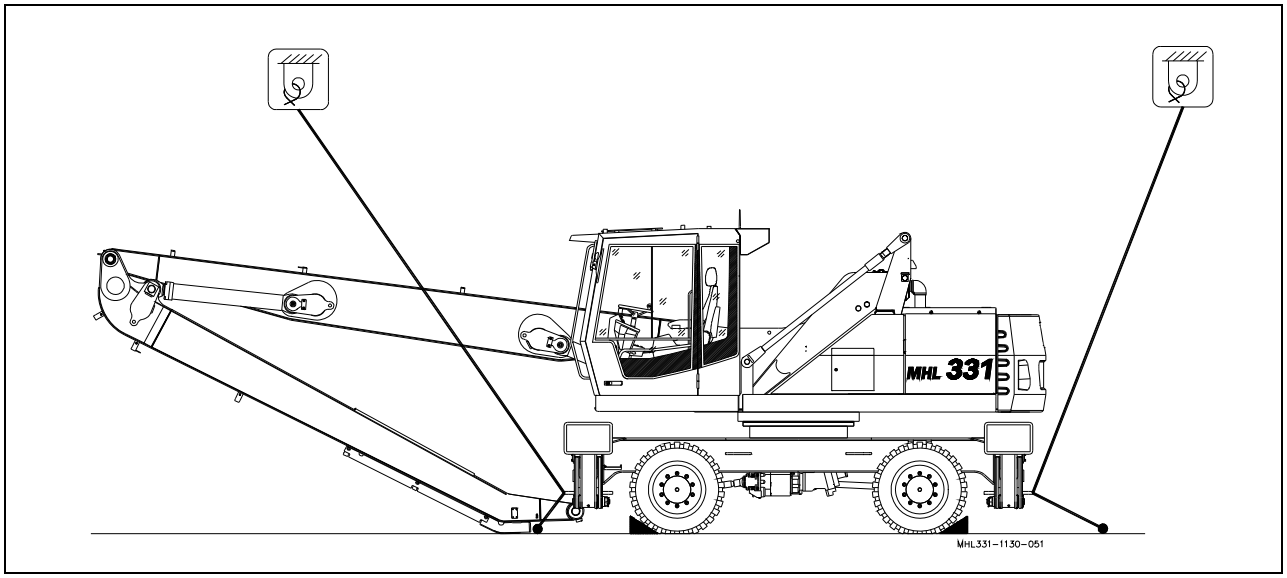


Fig. 51 Flat-bed trailer loading

7 Care and Maintenance

7.1 General information

The good operating condition and life expectancy of the machine are largely influenced by care and maintenance.

For this reason, it is in every machine owner's interest to perform the recommended maintenance work and comply with these maintenance instructions. The operating instructions contain detailed information on periodic maintenance, inspection and lubrication tasks in this chapter.

The type-related maintenance and inspection plan contains a list of all jobs that must be performed on the machine at regular intervals. All operating instructions contain maintenance and inspection plans.

Inspections are stipulated during the warranty period. They must be carried out by trained specialist personnel.

Inspection intervals

Inspection intervals in operating hours	
1st inspection	after 500 operating hours
2nd inspection	after 1000 operating hours
3rd inspection	after 1500 operating hours
Subsequently	every 500 operating hours

ATTENTION

The inspections as specified are obligatory during the warranty period and must be paid for.

The performance of the inspections as specified shall be confirmed on the inspection cards in the warranty and handing-over certificate.

If this is omitted, the warranty may be subject to restrictions.

ATTENTION

The battery disconnect switch of the machine is located in the service section. Before working on the electrical system, the electric circuit must be interrupted by means of the battery disconnect switch. The two plug connections on the electronic engine control device as well as the positive cable of the battery must be disconnected for welding work on the machine. The positive cable of the battery must be connected to the nearby ground pin. The running machine must not be switched off using the battery disconnect switch, as this causes damage to the electrical system.

CAUTION

When changing fuels, lubricants and coolants, such as engine oil, lubricating oil, hydraulic oil, fuel, etc., care must be taken to ensure that these fluids do not seep into the ground. Suitable containers must be used to collect them. If they do run into the soil nevertheless, their escape must be stopped immediately and the fluid bound with suitable binding agents. If necessary, this area of soil must be excavated. Binding agents and excavated soil must be disposed of in the proper manner. The relevant environmental regulations must be complied with.

DANGER

Repair work may only be performed on the elevated cab when the lift frame is securely supported (see chapter 4.8.1 "Before placing into operation").

CAUTION

When performing maintenance and repair work, observe the necessary safety precautions according to chapter 2.12 "Measures to ensure safe maintenance".

DANGER

Hydraulic accumulators are under hydraulic and gas pressure and must not be opened. They contain hydraulic fluid and nitrogen (danger of asphyxiation).

Only trained specialist personnel should replace the hydraulic accumulator or place it into operation. Do not touch a hydraulic accumulator unless it has cooled off.

No changes must be made to the hydraulic accumulators (welding, drilling, opening it by force, etc.).

7.2 Regular oil analyses

Oil analyses are not meant to question the oil change intervals specified but to take into account a potential reduction of maintenance costs, the early recognition of imminent damage as well as increased environmental consciousness.

Advantages of an oil analysis

- Extension of oil change intervals in the case of normal or light-duty operating conditions.
- Minimum wear of high-quality components because of optimum utilization of fuels, lubricants and coolants.
- Periodic lab analyses allow early recognition of imminent damage.
- Early service/repair work protects equipment from serious and unforeseeable damage.
- Consequential damage is avoided.

At what intervals should the oil be analyzed?

Regular oil analyses show the development of the oil condition and the condition of the machine.

Upon reaching the scheduled oil sampling point, oils should be analyzed at the following intervals in order to check the quality of the oil and thus extend oil change intervals:

- Hydraulic oil: 500 operating hours

Oil sample intervals according to the first results and as specified by test lab.

Your TEREX | Fuchs dealer will let you have an informative leaflet specifying oil test procedures, etc.

7.3 Letting off residual pressure in the hydraulic circuit

CAUTION

When performing maintenance and repair work on the hydraulic system, the residual pressure in the hydraulic circuit must be let off. Before performing this work, the loading equipment must be safely lowered onto the ground.

ATTENTION

The ignition must be switched on (ignition key in position I). The left armrest (52/10) must be folded down and the service ladder must be locked. Toggle switch (52/36) "Travel and work functions enabled" must be operated. Indicator (52/76) "Travel and work functions disabled" must not be lit.

ATTENTION

Items 1, 2 and 3 must be executed consecutively at least 5 times to let off the residual pressure as well as the pilot pressure.

1. Lower four-way control levers (52/9) and (52/15), loading equipment, slew upper-carriage, open/close grab
2. Service brake pedal (52/11) (actuate 20 times)
3. Toggle switch (52/34) parking brake
4. Push-button (52/35) swing brake
5. Travel pedals (52/12), (52/13)
6. Elevating cab emergency lowering function (52/7) or (32/1)
7. Lever (52/5) for extending/retracting outriggers
8. Push-button (52/P1) for grab rotation to the right/left
9. Toggle switch (52/37) oscillating axle lock
10. Toggle switch (52/42) for transmission control slow/fast

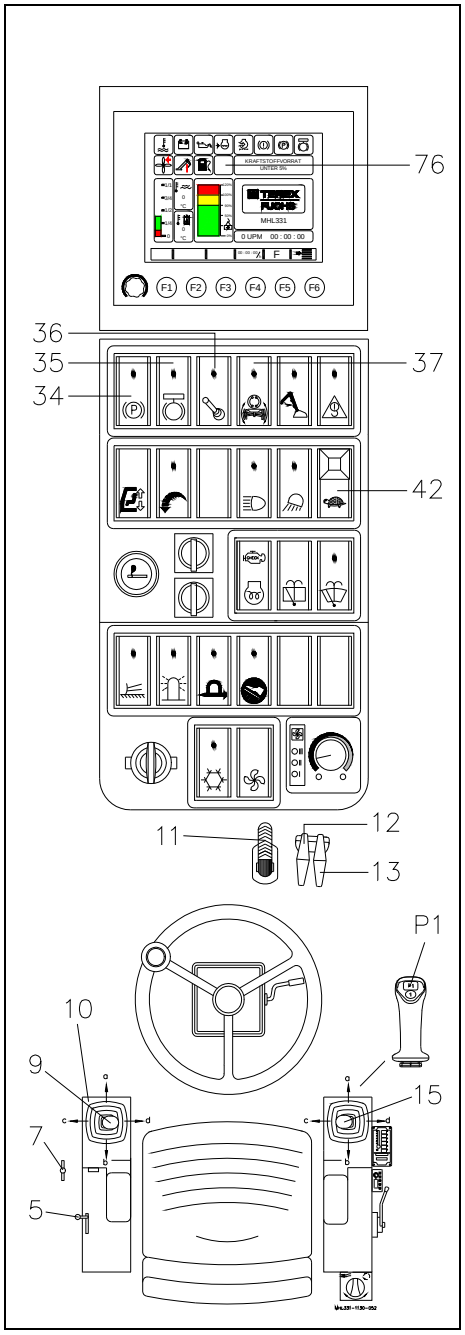


Fig. 52 Letting off residual pressure

7.4 Maintenance and wearing parts

! ATTENTION

You can find the list of maintenance and wearing parts in chapter 1.10 of the supplied spare parts catalogue.

Keep a stock of maintenance and wear parts for inspections.

Fuels, lubricants and coolants

The machine's life expectancy and operating condition are largely dependent upon the use of the specified fuels, lubricants and coolants and compliance with the service intervals.

If fuels, lubricants and coolants 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.

Filling quantities **see chapter 3.19.1**

Fuels, lubricants and coolants specifications **see chapter 3.19.2**

7.5 Work before placing into operation

- Before parking the machine, turn the uppercarriage in travel direction. Move the dipperstick to a steep position if possible, and make sure the grab is open when it is placed on the ground (see fig. 36).
- The service ladder (53/1) must be used for maintenance work on the machine. After ending the maintenance work on the machine lock the service ladder (53/1) again, otherwise the travel and work functions are disabled.
- Use only the steps and handgrips provided to climb in and out of the machine. Use both hands to hang on and turn your face to the machine.

! ATTENTION

Before placing the machine into operation, the necessary safety precautions as described in chapter 2.5 must be observed.

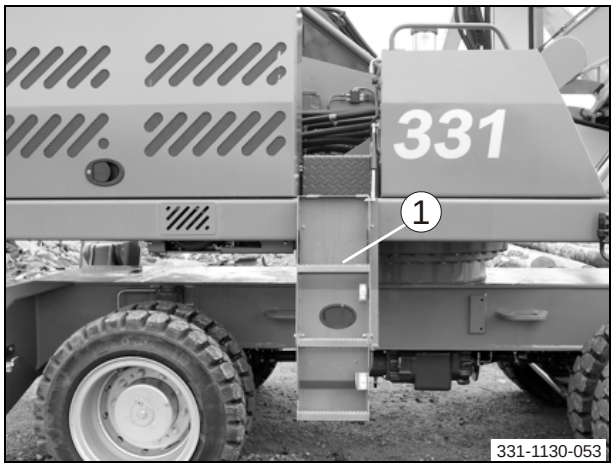


Fig. 53 Service ladder

7.5.1 Checking the engine oil level

WARNING

Engine oil is hot when the machine is at operating temperature. Avoid skin contact with hot oil or parts carrying oil.

- The oil level of the machines that are positioned horizontally must be checked daily before starting work (with the engine turned off and after a short wait so the oil can be collected in the oil pan).
- The oil must be between **MIN** and **MAX** on the oil dipstick (54/1).
- If necessary, add oil until the level has reached the upper mark **MAX**.
- For filling quantity, oil quality and change intervals, see chapter 3.19 "Fuels, lubricants and coolants" and chapter 7.7.3 "Maintenance and inspection plan".

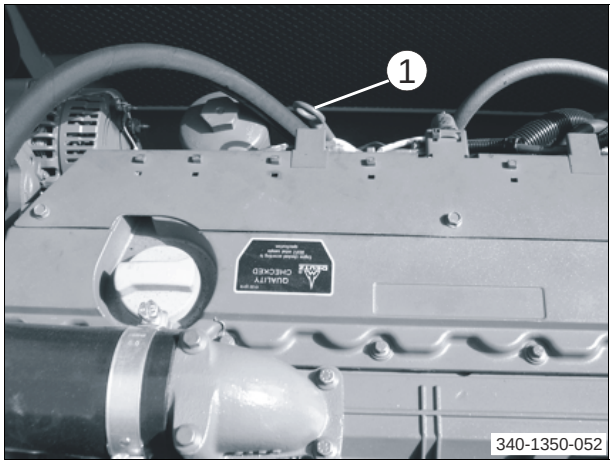


Fig. 54 Checking the engine oil level

7.5.2 Fuel system

7.5.2.1 Fuel level

Check the fuel level on the fuel gauge (55/79). If the fuel in the diesel tank is below the reserve quantity of 5 %, indicator (55/75) lights up. In order to prevent condensation forming before the next time the machine is placed into operation again, the tank must be filled up with fuel after daily use. To do so, open the tank cap (56/1).

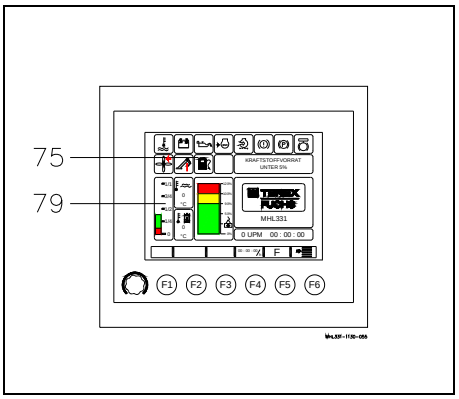


Fig. 55 Fuel level

! ATTENTION

Wear protective goggles and gloves when filling the tank, since diesel fuel could splash out while you are refueling and cause irritation if it comes in contact with your skin or eyes.

! ATTENTION

Keep the level of fuel in the tank high if possible to prevent condensation from building up.

Never allow the fuel tank to run empty, as otherwise the fuel system has to be vented.

7.5.2.2 Fuel pre-filter

Open the drain valve (56/2) on the fuel pre-filter once a week and observe the escaping fluid. Once fuel instead of water escapes, close the drain valve.

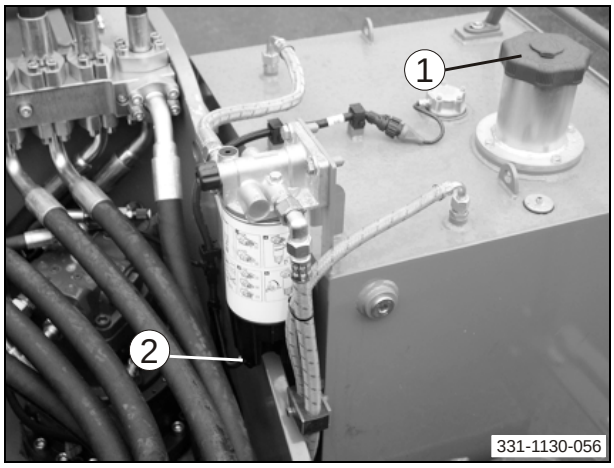


Fig. 56 Fuel pre-filter

7.5.3 Cooling system

7.5.3.1 Coolant level in the engine cooling circuit

WARNING

The entire cooling system is hot and under pressure when the machine is running at operating temperature.

Avoid touching parts with coolant or parts carrying coolant. There is a danger of burns.

Only check the coolant level if the cap has cooled off enough for you to hold it. Then turn the cover carefully to first let the excess pressure reduce.

- Check the engine, fan and radiator for damage. Clean if necessary.
- If the coolant level is too low, indicator (58/68) lights up.
- Unscrew the protective cover (57/1).
- Remove the cap (57/2) and check the coolant level.
- The coolant must be up to the overflow pipe.
- After filling the cooling system, let the engine run for a while with the heating turned on. Then check the coolant level again.
- When the machine is delivered, the coolant contains antifreeze protection to -35 °C (corresponding to a mixture of about 45 % antifreeze).

Antifreeze should be added during each season every time the system is refilled.

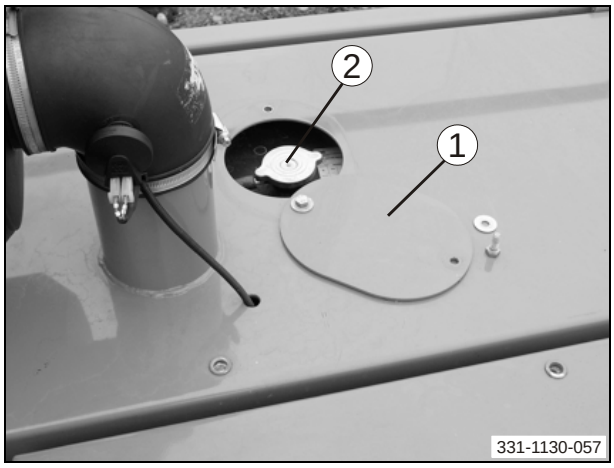


Fig. 57 Engine radiator

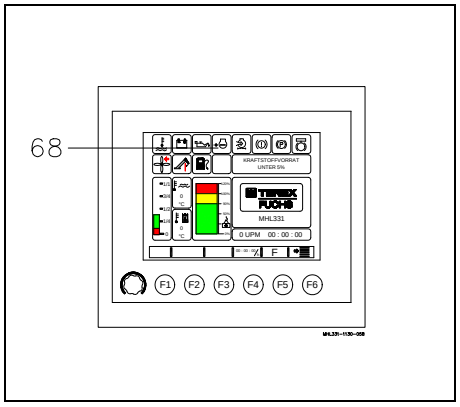


Fig. 58 Coolant level

7.5.3.2 Checking the antifreeze

Check the level of antifreeze protection before the beginning of the cold season.

! ATTENTION

Always use an antifreeze with anti-corrosion protection. The antifreeze level is set to approx. -35 °C at the factory. When topping up, only a mixture of water and 45 % low-temperature protection agent should be used. Low-temperature protection agent in concentrations higher or lower than 45 % must be avoided, as this impairs the effectiveness of the cooling system. For the exact composition and concentration, please refer to the operating instructions of the engine manufacturer (see also chapter 3.19 "Fuels, lubricants and coolants").

7.5.4 Checking the hydraulic oil level

When checking the oil level or when adding oil:

- the machine must be positioned horizontally
- and the loading equipment must be set down on the ground extended.

In this position, the level must not be below the middle mark in the viewing glass (59/1).

Otherwise oil must be added through the ventilation filter (59/2) until the level reaches the middle mark.

For further details on the refilling process see chapter 7.8.13.2 "Replacing hydraulic oil".

The upper mark **MAX** shows the maximum oil level when the cylinders are completely retracted.

The lower mark **MIN** shows the minimum oil level when the cylinders are completely extended.

If the oil level falls somewhat lower than the lower mark, the corresponding symbol (60/68) appears when the minimum level is reached.

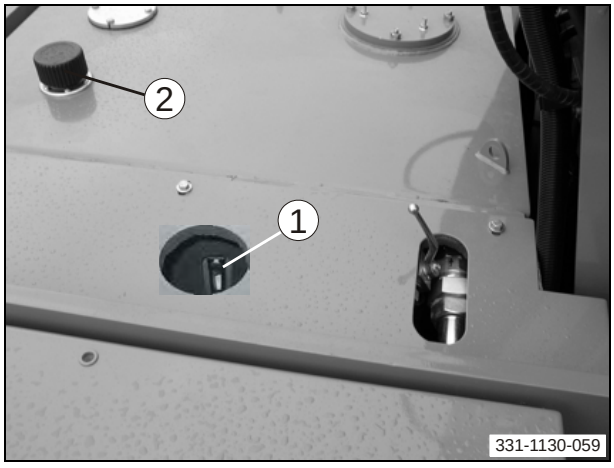


Fig. 59 Hydraulic oil sight glass

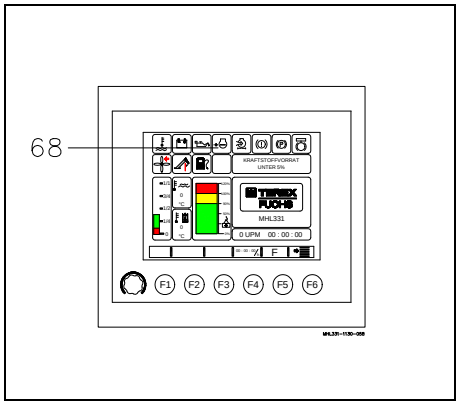


Fig. 60 Hydraulic oil level

7.5.5 Cleaning the radiator

The machine is equipped with separate radiators for combined water-charge air cooling and the hydraulic oil.

CAUTION

Engine overheating can result in damage to the machine. Clean the radiators carefully of any dirt that has become attached.

ATTENTION

Cleaning jobs must only be performed with the engine turned off and cooled down!

- Clean the combined water-charge air cooler (61/2) and the hydraulic oil cooler (61/1) from the outlet side with compressed air.
- Clean the engine compartment (remove deposits of dirt, oil and diesel fuel).
- Blow the engine off with compressed air or clean it with a cold cleaner. Wash off the loosened dirt with water. (Do not spray with a direct water jet against sensitive engine parts, for example generator cabling, electronic components.)
- After every wet cleaning let the engine warm up so that water residues evaporate and corrosion formation is avoided.

If necessary, for example if the radiator is dirty, clean it with a cold cleaner or a steam-jet appliance.

- Place the machine on a washing surface equipped with an oil separator.
- Clean the machine with a steam-jet appliance.
- After cleaning, bring the drive engine to operating temperature to dry out the radiator.

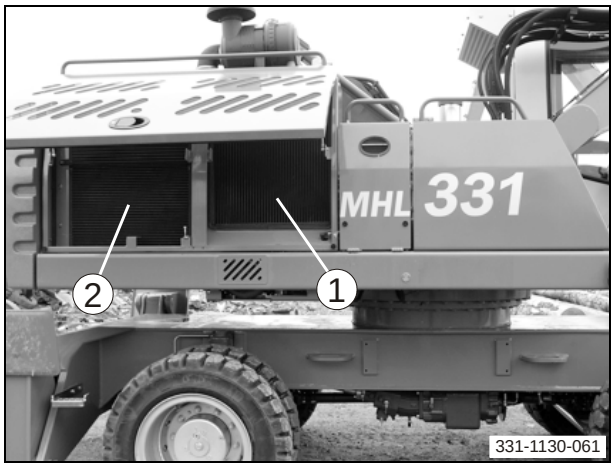


Fig. 61 Cleaning hydraulic oil cooler and water/charge air cooler

7.5.6 Tires

DANGER

Repair work on the wheels, for example dismantling tires from the rim or fitting them onto the rim, may be performed only by specialists and with suitable assembly tools.

When working on the tires make sure that the machine is parked safely and has been secured against rolling away (chocks)!

Testing condition of the tires

- Check the tires for cracks, cuts, foreign bodies, etc.
- Tightness of wheel nuts.
- During the first 50 operating hours, check the torque of the wheel nuts weekly, and subsequently at regular intervals, and tighten to the correct torque if necessary.

Tightening torque: 450 Nm

When changing a wheel, always tighten the wheel nuts to the specified torque crosswise in several steps.

7.5.7 Checking the oil levels in axles, wheel hubs and power shift gears

For filling quantity, oil specification and change intervals, see chapter 3.19 "Fuels, lubricants and coolants" and chapter 7.7.3 "Maintenance and inspection plan".

WARNING

Oil is hot when the machine is at operating temperature. Avoid skin contact with hot oil or parts carrying oil.

Check the oil level as follows:

- Park the machine on level ground.
- Turn the wheel until the drain plug (64/2) is at the bottom.
- Switch off the engine.

Remove the checking plugs from:

- the rear axle (62/1)
- the front axle (63/1)
- the wheel hub (64/1)
- the power shift gear (65/1),

check the oil level and top up if necessary (see 7.8.14).

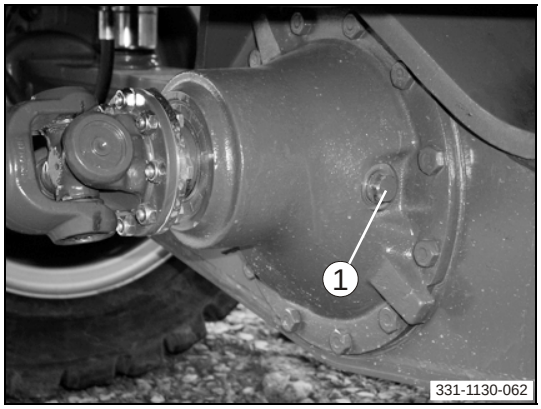


Fig. 62 Rear axle

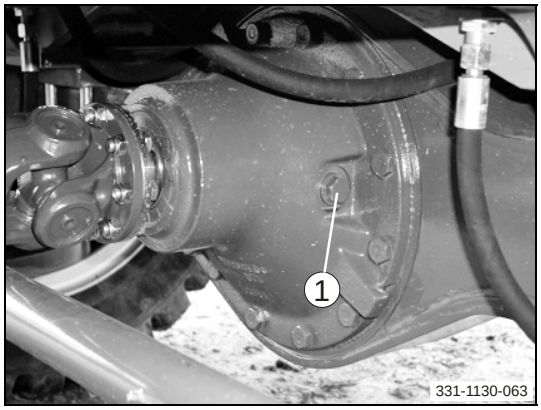


Fig. 63 Front axle

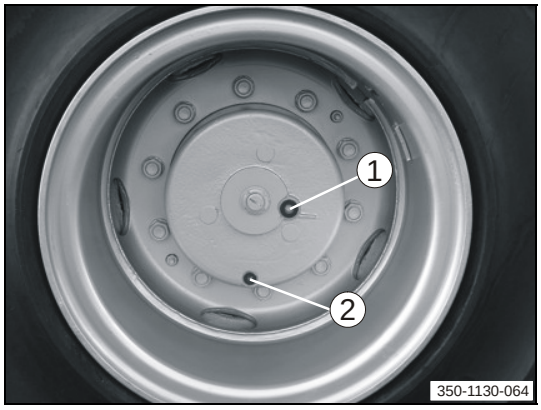


Fig. 64 Wheel hub

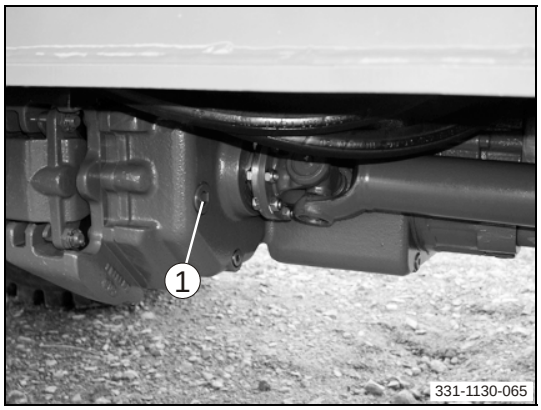


Fig. 65 Power shift gear

7.5.8 Electrical equipment

The lighting and warning equipment as well as the function of the indicator lamps, must be checked prior to use.

7.5.8.1 Batteries

The batteries are located in the service section in front of the diesel engine under the covering plate.

! ATTENTION

Before installing or removing the batteries, the electric circuit must be interrupted by means of the battery disconnect switch.

! ATTENTION

The instructions of the battery manufacturer must be observed when using the batteries for the first time.

It is important that the batteries are always kept clean to ensure it functions properly.

The terminal heads and cable terminals must be cleaned regularly and then greased with a thick coating or acid protection grease.

The level of liquid in the cells should always be 10 mm above the top of the plates.

If you need to add water, use only distilled water.

Measure the acid density from time to time with an acid tester. When the battery is fully charged, the specific weight is 1.28 kg/l (37 % sulfuric acid).

If the acid tester indicates a lower value, the battery is discharged to some extent and must be recharged.

! ATTENTION

Maintenance-free batteries need not to be checked.

Removing the battery

- Remove the cover.
- Disconnect first the negative cable (-) and then the positive one (+).
- Loosen the clamping bracket and lift the battery.

Installing the battery

- Place the battery in the machine.
- Fasten the battery with the clamping bracket.
- Clamp the positive cable (+) on, then the negative one (-).

! ATTENTION

Ensure that the negative terminal is attached to the negative pole (-) and the positive terminal to the positive pole (+).

- Set the cover in place.

In winter, in particular, the battery charge should be closely monitored.

7.5.8.2 Lighting and warning equipment

- Check the lighting equipment for proper functionality.
- Check the indicator lamps for proper functionality.
- Check the warning equipment for proper functionality.

7.5.8.3 Slip ring bodies (optional)

There is a slip ring body on the rotary transmission that responds sensitively to moisture. A layer of oxide can form on conducting surfaces that inhibits the flow of current. Electrical consumers in the undercarriage will not longer receive an adequate supply of electrical current, which can result in malfunctions.

To counteract this effect, the following jobs should be performed every 500 operating hours:

Screw on the lock nuts and remove the housing of the slip ring. Clean oxidation off of the slip ring body (use cleaning spray if necessary). Replace worn out (eaten through) cable lugs and spray "Cramolin" contact spray on all slip ring elements.

Set the housing in place and fasten it evenly with lock nut.

7.6 Overview of lubricating points

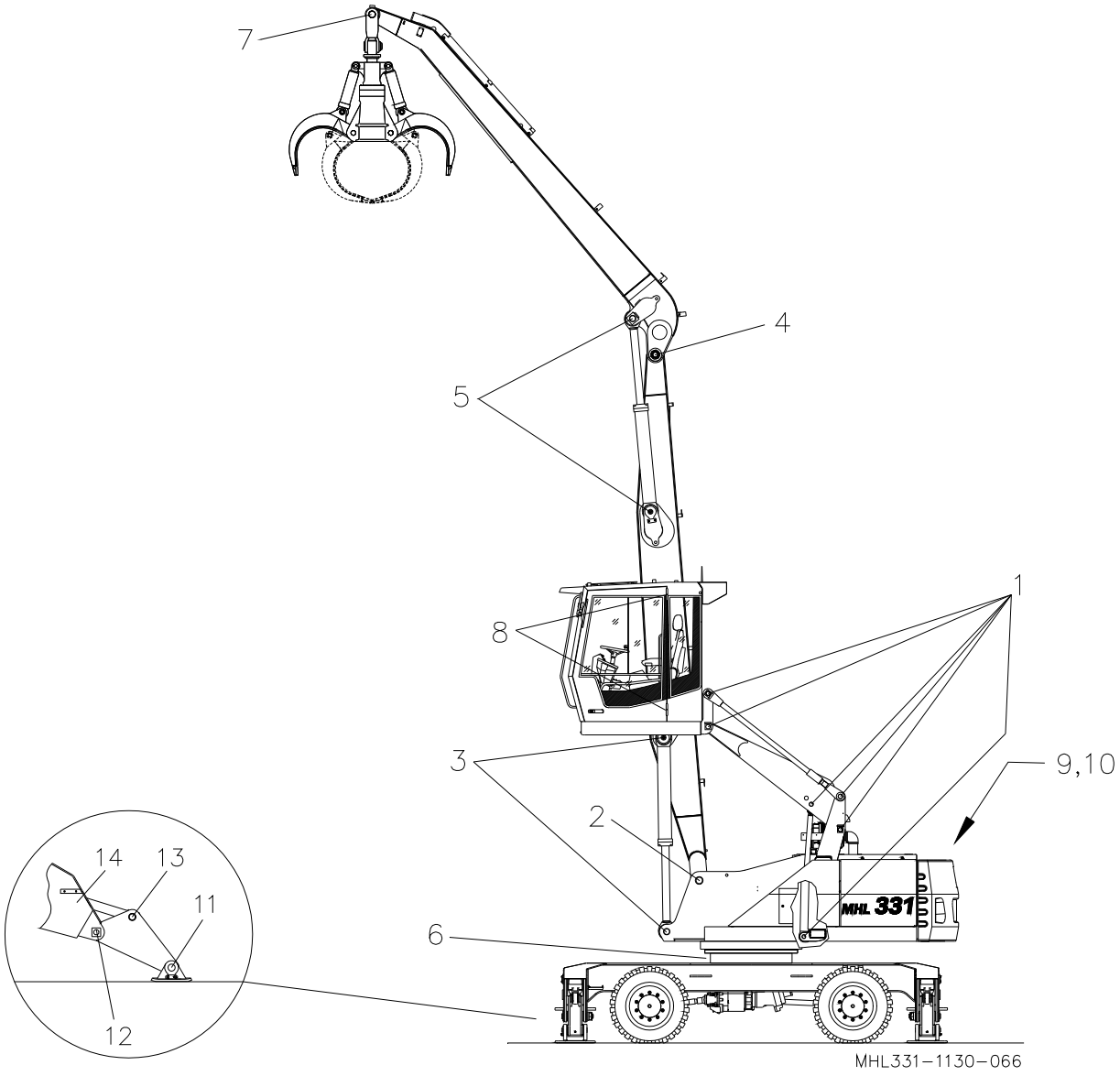


Fig. 66 Overview of lubricating points

No.	Lubricating point	Qty.	daily	weekly	Remarks	
1 *	Elevating cab bearing	10	X			
2	Box-type boom bearing	2	X		automatic	
3	Boom cylinder bearing	4	X		central lubrication	
4	Dipperstick bearing	2	X		uppercarriage	
5	Dipperstick cylinder bearing	4	X			
6	Slewing joint (ring gear, toothing)	4	X			
7	Work attachment mounting bearing	2	X			
8	Cab door hinge	2		X		
9	Engine hood hinge	2		X		
10	Service ladder hinge	2		X	manual	
11	Outrigger foot bearing	4		X	lubrication	
12	Outrigger bearing	4		X		
13	Outrigger cylinder bearing (for outrigger)	4		X		
14	Outrigger cylinder bearing (for undercarriage)	4		X		
15	Steering gear case bearing	4		X		see fig. 67
16	Steering cylinder bearing	4		X		see fig. 68
17	Oscillating axle bearing	1		X		see fig. 69

CAUTION

** The designated points must be subjected to a visual and functional inspection **every 500 operating hours** (see chapter 7.7.3 "Maintenance and inspection plan"). In particular, general damage and wear must be observed.*

CAUTION

Defective lubrication nipples may result in damage to the bearing. Replace damaged lubrication nipples immediately and check to ensure grease is passing through them.

ATTENTION

Before greasing the machine, apply the outriggers and lower the loading equipment (boom in horizontal position).

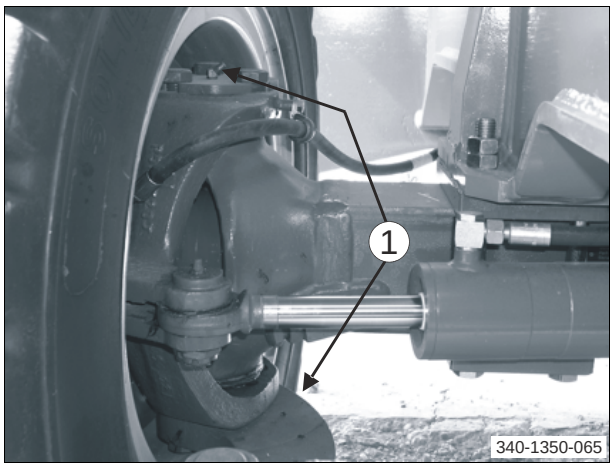


Fig. 67 Steering gear case

Steering gear case: 4 lubricating points

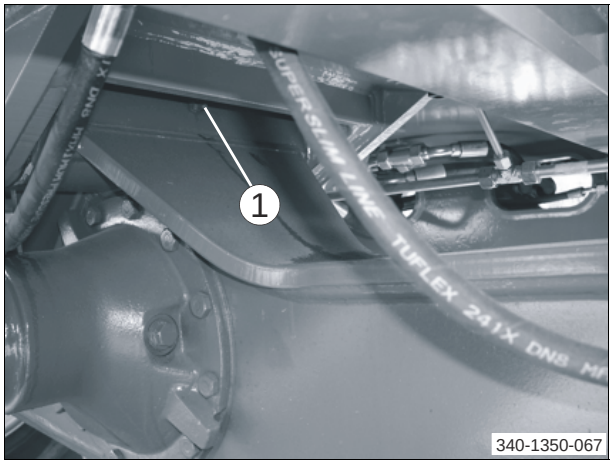


Fig. 69 Oscillating axle

Oscillating axle: 1 lubricating point

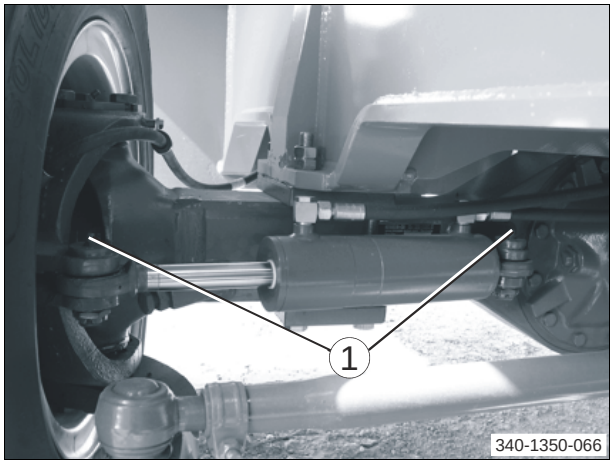


Fig. 68 Steering cylinder

Steering cylinder: 4 lubricating points

7.6.1 Lubrication of the ring gear slewing joint

- The level of grease in the ring gear must be checked every quarter.
- The grease must be renewed once a year.

7.6.1.1 Checking the level of grease

- After work (machine at operating temperature) park the machine on level ground.
- Open the filler hole by unscrewing the four wing nuts (70/1) and removing the cover along with the seal (70/2).
- Check the level of grease. The level must be between at least 25 mm and maximum 50 mm. Top up grease if necessary.
- Close the filler hole by replacing the cover and seal (70/2) and screwing back in the four wing nuts.
- Check the function of the venting valve (70/6).

7.6.1.2 Renewing the grease

The grease must be renewed with the machine at operating temperature.

- Position the machine on a slope to ensure the grease outlet (70/3) is inclined downwards.
- Place a suitable container below the outlet.
- Unscrew the four hexagon bolts (70/4) and remove the cover (70/5) along with the seal.
- Remove the used grease from the ring chamber by slewing the uppercarriage several times.
- Close the grease outlet by replacing the cover (70/5) with seal and by screwing back in the four hexagon bolts (70/4).
- Park the machine on level ground.
- Introduce new grease. Distribute the grease in the ring chamber by swinging the uppercarriage. Maximum height of grease level 50 mm.

7.6.1.3 Cleaning the vent valve

Unscrew and clean the vent valve (70/6) every quarter.

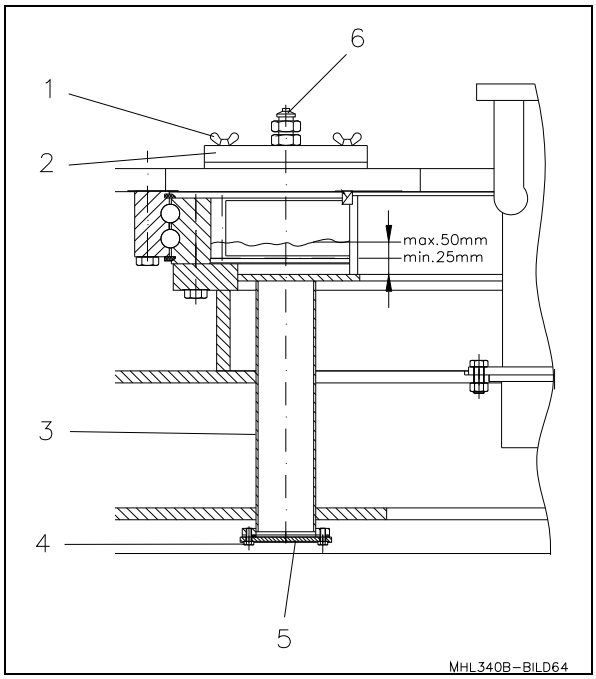


Fig. 70 Slewing joint

7.6.2 Automatic central lubrication system for uppercarriage, loading equipment and work attachment mounting

The machine is equipped with an automatic central lubrication system that ensures significant time savings in daily lubrication of the loading machine.

All lubricating points on the slewing joint and all bearing points on the uppercarriage as well as on the loading equipment are permanently connected to the automatic lubricating system (see chapter 7.6 "Overview of lubricating points").

Lubrication is performed cyclically and automatically according to the preset interval time.

The interval time is set by default to 28 minutes. The preset interval time can only be changed by service personnel. The interval time between lubrication processes can be adjusted between 10 to 30 minutes in the service menu.

7.6.2.1 Filling the grease container

Fill the grease container with grease using the filler pump which is in the tool kit.

- To do so, insert an appropriate re-fill cartridge into the filler pump.
- Remove the protective plug (71/1).
- Screw the filler pump onto the threaded connector.
- Operate the filler pump (container has a capacity of approx. 3 kg of multi-purpose grease).

It is also possible to fill the container via the filler nipple (71/2) up to the "Max" mark.

For information on the grease to be used, see chapter 3.19 "Fuels, lubricants and coolants".

! ATTENTION

If the lubricating system runs completely dry, you should add a few drops of oil before refilling it with grease. This will force the air out of the piston components.

! ATTENTION

Grease must be free from impurities and its viscosity shall not change over time. Grease additives, such as molybdenum disulfide, shall not be added.

After filling, additional lubrication can be triggered if necessary (see chapter 7.6.2.2) to ensure that lines are fully vented.

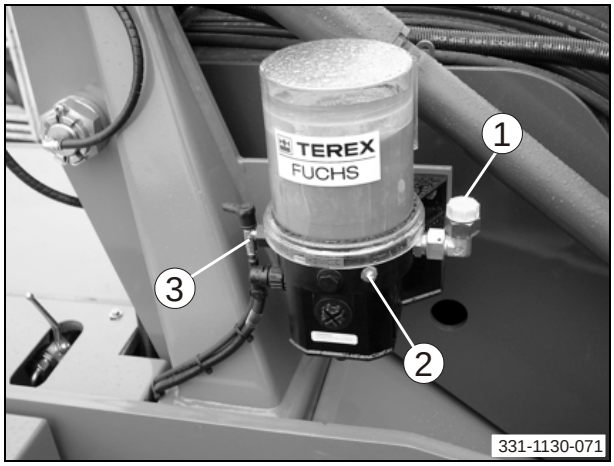


Fig. 71 Grease container

7.6.2.2 Triggering additional lubrication

The operator may trigger additional lubrication at any time in the function menu (see fig. 72).

Select the fourth level with the menu arrow key (F 5) on the multifunction monitor or with the menu selection wheel. An additional lubrication pulse is triggered by operating the F 4 key in the lower level. Press the OK (F 6) key to return to the main control display.

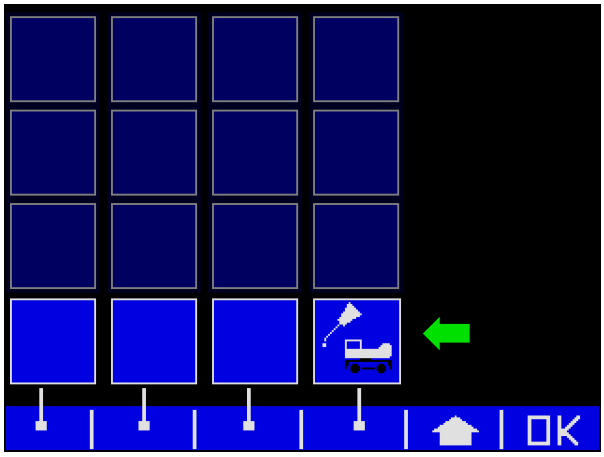


Fig. 72 Additional lubrication push-button

7.6.2.3 Lubrication when lubricating pump is defective

If the lubricating pump is damaged, the bearing points may be greased manually using the lubricating nipple (71/3) on the pump.

7.7 Monitoring, maintenance and inspection plans

7.7.1 Initial inspection (transfer inspection)

Work to be performed by trained dealer or service personnel:

Item	Test method	Chapter
1	Check whether machine-specific operating instructions are in the machine	—
2	Check the engine oil level	7.5.1
3	Check the coolant level	7.5.3
4	Check the hydraulic oil level	7.5.4
5	Check the fuel level	7.5.2
6	Check the oil levels in axles, wheel hubs and power shift gears	7.5.7
7	Check condition of tires and fastening of the wheel nuts	7.5.6
8	Check the filling level and charge of the batteries	7.5.8.1
9	Fill the windshield washwipe system	4.7.10
10	Lubricate the machine (all lubricating points)	7.6
11	Perform test run, hydraulic function monitoring and test job	—
12	Perform a visual leak inspection of all lines, hoses, cylinders, etc.	—
13	Check electrical indicating and warning elements as well as lighting for functionality	7.5.8
14	Initial transfer card and return to manufacturer	7.1

7.7.2 Daily and weekly tasks

7.7.2.1 Daily tasks

Inspection and maintenance work to be performed by operating staff:

Item	Test method	Chapter
1	Check the hydraulic oil level	7.5.4
2	Check the engine oil level	7.5.1
3	Check the coolant level	7.5.3
4	Check the fuel pre-filter in the fuel line for water and accumulation of sludge and clean if necessary	7.5.2.2
5	Check fuel level (fuel gauge in the multifunction monitor)	7.5.2
6	Check the cleaning fluid level for the windshield wiper	4.7.10
7	Perform a visual inspection (general) for example for material rips, external damage, completeness, etc.	—
8	Check the tightness of lines, hoses, control valves, hydraulic pumps, cylinders, etc. ! When tightening hose and line connections, the screw couplings must be locked to prevent rotation.	—
9	Check electrical indicating and warning elements and lighting system	7.5.8
10	Check control elements for precise ease of operation	—
11	Lubricate machine according to overview of lubricating points	7.6

7.7.2.2 Weekly tasks

Inspection and maintenance work to be performed by operating staff:

Item	Test method	Chapter
12	Clean the cooling fins of the water-charge air cooler and hydraulic oil cooler  If there is a heavy accumulation of dust, shorten the cleaning intervals. Otherwise the result could be engine damage.	7.5.5
13	Check coolant level and perform visual inspection on viewing glass as well as function test of air conditioning system	4.6.3
14	Check the windshield for proper functionality	4.7.1
15	Check the door catch for proper functionality	—
16	Check the fastening of the wheel nuts	7.5.6
17	Check the fastening of the slewing joint (hydraulic motor, transmission and slewing ring)	7.8.15.1
18	Check the bearing bushings and pins of the loading equipment	—
19	Check hydraulic axle lock and vent oscillating axle cylinders	7.8.12
20	Check the pneumatic springs of the maintenance flaps on the windshield to ensure they are functioning properly	—
21	Check function, condition and completeness of safety equipment	—
22	Lubricate machine according to overview of lubricating points	7.6

7.7.3 Maintenance and inspection plan

Work to be performed by trained dealer or service personnel:

O = Checking, maintenance X = Replace		Operating hours		
	Perform work with machine at operating temperature!	**every 500**	**every 1000**	**at least once a year**
1	Check whether machine-specific operating instructions are in the machine	O		O
2	Change engine oil	X		X
3	Replace the engine oil filter	X		X
4	Drain water from fuel tank	O		O
5	Flexible fuel lines (replace completely) [1)]		O	
6	Replace fuel filter		X	X
7	Replace fuel pre-filter cartridge		X	X
8	Check air filter pipe	O		O
9 *	Air filter – replace main cartridge and safety cartridge		X	X
10	Clean the cooling fins of the water-charge air cooler and hydraulic oil cooler. If there is a heavy accumulation of dust, shorten the cleaning intervals. Otherwise the result could be engine damage.	O		O
11	Check antifreeze level of coolant (AVIA, BASF, SHELL)			O
12	Change coolant [1)]	O		
13	Check V-ribbed belts (retension or replace if necessary) [1)]	O		
14	Check the engine suspension and pump attachments	O		O
15	Check the engine speed adjustment / load limit sensing control	O		O
16	Check the exhaust system	O		O
17	Check the engine valve lash (adjust if necessary) [2)]			
18	Check the acid level and connections of the batteries		O	
19	Check condition of the tires and fastening of the wheel nuts	O		O
20	Check fastening of axles and propeller shafts	O		O
21	Tighten the fastening screws on the counterweight (1000 Nm)	O		O
22	Check the bearing of the height-adjustable cab (see chapter 7.6)	O		O

1) at least every 2 years

2) every 1500 operating hours

ATTENTION

** A filter element is not considered dirty and does not have to be replaced until the contamination indicator responds once the hydraulic system has reached operating temperature and the signal comes up continuously.*

O = Checking, maintenance X = Replace		Operating hours		
	Perform work with machine at operating temperature!	**every 500**	**every 1000**	**at least once a year**
23	Check the door catch for proper functionality and replace if necessary	**O**		**O**
24	Check the bearing bushings and pins of the loading equipment and adjust to "no play"	**O**		**O**
25	Check electrical indicating and warning elements and lighting system	**O**		**O**
26	Check the control elements for ease of operation and adjust if necessary	**O**		**O**
27	Check hydraulic axle lock for function and vent oscillating axle cylinders	**O**		**O**
28	Check the steering for proper functionality	**O**		**O**
29	Check condition and function of the outriggers	**O**		**O**
30	Visual inspection of all steel parts and components for material cracks, deformation, wear or other damage, etc.	**O**		**O**
31	Check tightness of all lines, hoses, control valves, hydraulic pumps, cylinders, etc. ! When tightening hose and line connections, the screw couplings must be locked to prevent rotation.	**O**		**O**
32	Check function of brakes and brake disk play and vent brakes	**O**		**O**
33	Check the pump drive	**O**		**O**
34	Check the slewing ring fastening screws to ensure proper seat	**O**		**O**
35	Secure fastening of slewing ring attachment, swing gear, swing gear motor	**O**		**O**
36	Lubricate machine according to overview of lubricating points	**see chapter 7.6**		
37	Check function, condition and completeness of safety equipment	**O**		**O**
38	Hydraulic function check with pressure function test	**O**		**O**
39	Oil-immersed air filter heating (optional): oil change [3)]	**O**		**X**
40	Change filter fleece of the air filter (hot water heating) [3)]	**O**		**X**
41	Check V-belt tension, generator	**O**		**X**
42	Check the condition, V-belt tension and filter of the air conditioning	**O**		**O**
43	Power shift gear: oil check or oil change	**X**		**X**
44	Replace hydraulic oil tank ventilation filter		**X**	**X**
45	Test run and test work	**O**		**O**
46	Initial inspection cards and return to TEREX | Fuchs	**O**		

3) The intervals should be shortened in dusty ambient conditions.

O = Checking, maintenance X = Replace		Operating hours		
	Perform work with machine at operating temperature!	after 500	every 1000	at least once a year
47	Wheel hubs, front and rear axles: oil check or oil change	X	X	X
48	Differential, rear and front axles: oil check or oil change	X	X	X

O = Checking, maintenance X = Replace		Operating hours		
	Perform work with machine at operating temperature!	every 500	every 3000	at least once a year
49	Check hydraulic oil or oil change [4), 5)]	O	X	X
50	Hydraulic oil – replace return filter insert		X	X
51	Check crankcase venting valve [6)]		X	

4) Extension of the hydraulic oil change intervals
Hydraulic oil change based on analysis of oil sample and lab report. Oil sample intervals as specified by test lab.

5) Shortening of the hydraulic oil change intervals
If the loading machine is generally operated under difficult conditions (frequent change of work equipment, surroundings exposed to dust), there is a danger the hydraulic oil will become dirtier than normal.

To avoid resulting premature wear on hydraulic components, reduce the time between oil changes (or take oil samples).

6) every 1000 operating hours

7.8 Inspection and maintenance work

7.8.1 Engine oil

All inspection and maintenance work not contained here should be performed as described in the separately supplied diesel engine operating instructions.

7.8.1.1 Checking the engine oil level

WARNING

Engine oil is hot when the machine is at operating temperature. Avoid skin contact with hot oil or parts carrying oil.

- The oil level of the machine must be checked when it is positioned horizontally (with the engine turned off and after a short wait so the oil can be collected in the oil pan).
- The oil must be between **MIN** and **MAX** on the oil dipstick (74/2).
- If necessary, add oil until the level has reached the upper mark **MAX**.

7.8.1.2 Changing the engine oil

For filling quantity, oil quality and change intervals, see chapter 3.19 "Fuels, lubricants and coolants" and chapter 7.7.3 "Maintenance and inspection plan"; also chapter 7.2 "Regular oil analyses".

- Perform the oil change only when the engine is hot.
- Park the machine on level ground.
- Rotate the uppercarriage 90° to the undercarriage.
- Switch off the engine.
- Unscrew the protective cap from the drain valve (73/1).
- Screw the oil drain hose (included with delivery) (73/2) onto the drain valve (73/1) of the oil pan and collect the oil in a suitable container.

WARNING

Danger of scalding when hot oil is drained! Wear suitable protective clothing and safety goggles.

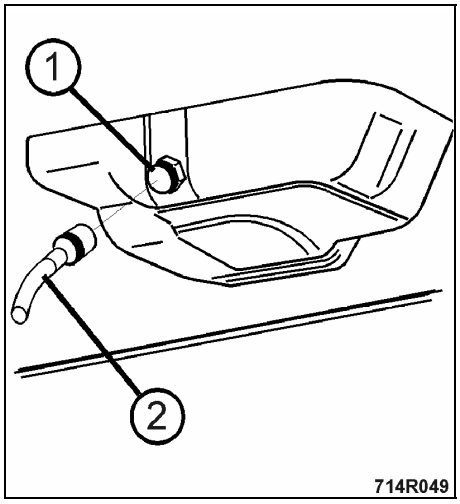


Fig. 73 Drain valve in oil pan

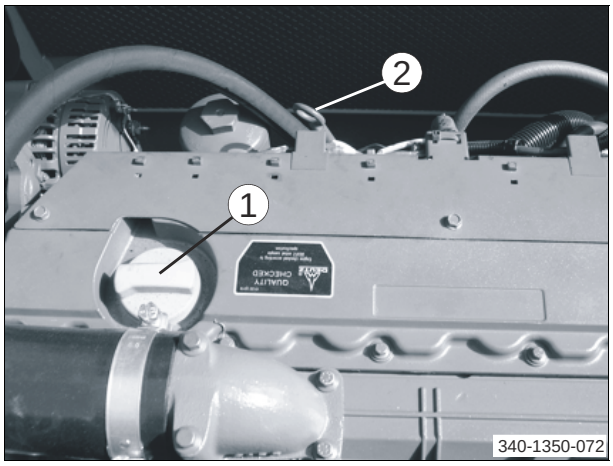


Fig. 74 Cap

ATTENTION

Collect the old oil in a suitable container and dispose of it in compliance with environmental regulations.

- Remove the oil drain hose (73/2) and screw the protective cap onto the drain valve (73/1).
- Replace the engine oil filter (see chapter 7.8.1.3).
- Remove the cap (74/1).
- Add oil until the level reaches the top mark on the oil dipstick (74/2).
- Close the cap (74/1).
- Start the engine and run at bottom-end idle for approx. 2 minutes.
- Switch off the engine.
- Check the oil level after approx. 15 minutes and top up oil if necessary.

7.8.1.3 Replacing the engine oil filter insert

The engine oil filter insert must be replaced every time the engine oil is changed:

- Place a suitable container under the engine oil filter.
- Clean the outside of the engine oil filter housing (75/1).
- Loosen and unscrew the filter housing cover (75/2) using a standard tool W/F 36.
- Remove the engine oil filter insert (75/3) and dispose of in the proper manner.
- Fit new sealing ring in the filter housing cover (75/2) and wet it with oil.
- Insert the engine oil filter insert (75/3) manually into the filter housing cover (75/2).
- Screw in the filter housing cover (75/2) and tighten using 25 Nm.
- **Only start the engine if there is sufficient oil in the engine (see chapter 7.8.1.1).**
- After a trial run, check the engine oil filter for leaks.

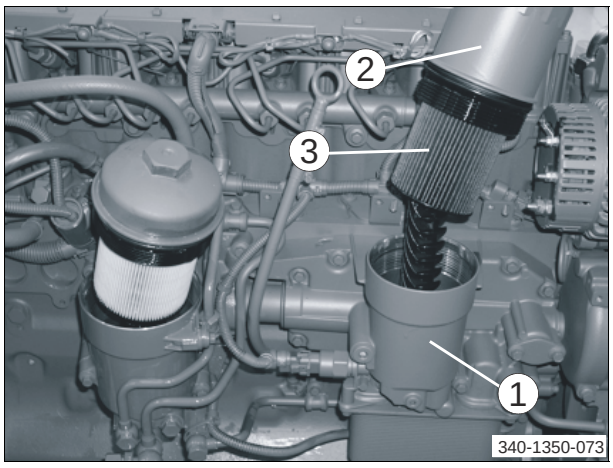


Fig. 75 Engine oil filter

7.8.2 Fuel system

7.8.2.1 Fuel level

- Check the fuel level on the fuel gauge (76/79).
- If the fuel in the diesel tank is below the reserve quantity of 5 %, indicator (76/75) lights up.
- In order to prevent condensation forming before the next time the machine is placed into operation again, the tank must be filled up with fuel after daily use.

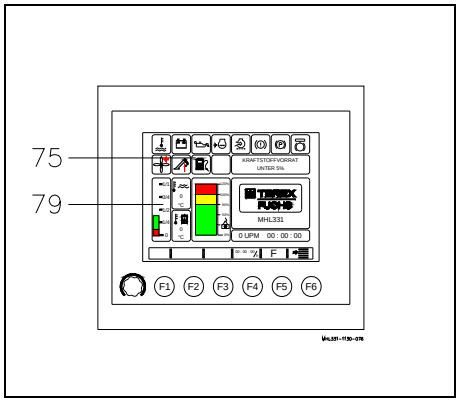


Fig. 76 Fuel gauge

CAUTION

Option: *When refueling with the electrical refueling pump, open the tank cover so no excess pressure can build up in the fuel tank!*

7.8.2.2 Electrical refueling pump (optional)

The electrical refueling pump is used to pump fuel into the fuel tank of the loading machine.

WARNING

The machine must only be refueled when the diesel engine is shut off. Smoking is forbidden during refueling. Risk of fire.

ATTENTION

Do not allow the fuel tank to run empty, as otherwise the fuel system has to be vented.

For refueling, proceed as follows:

- Open the tank cover on the fuel tank (pressure equalization!).
- Remove the cap (77/1) from the intake adapter (77/2).
- Mount the intake hose on the intake adapter (77/2).
- Introduce the free end of the intake hose into a fuel barrel.
- Keep the toggle switch (77/3) next to the refueling pump in the upper position, "ON", to pump fuel into the tank of the machine. The maximum fill level has been reached when LED (77/4) lights up red.

CAUTION

Please note that the refueling pump does not shut off automatically when the tank is full. The pump should therefore not be left unattended during the fueling process.

ATTENTION

Make certain the fuel level does not fall below the intake level of the intake hose. The pump should not be allowed to run dry under any circumstances.

- Release the toggle switch (77/3) to the lower "OFF" position. The refueling pump stops.
- Uncouple the intake hose and make sure that there is no fuel in the intake hose before stowing it away. Close the intake adapter (77/2) with the cap (77/1).

ATTENTION

It is essential to use the cap, since the built-in non-return valve is not suitable for providing a long-term seal.

- Close the tank cover.

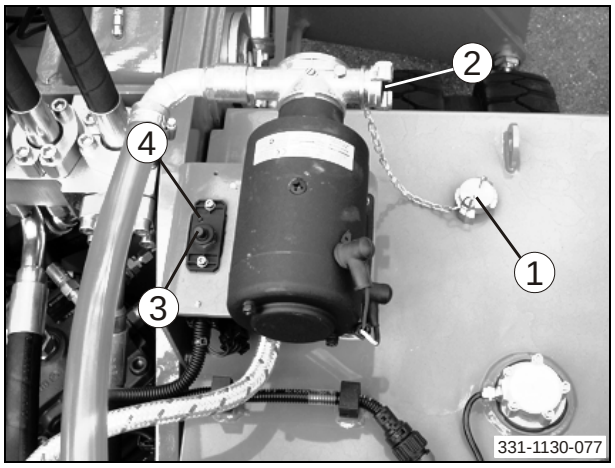


Fig. 77 Refueling pump

7.8.2.3 Replace the fuel filter insert

Replace as described in chapter 7.7.3 "Maintenance and inspection plan".

- Place a suitable container under the fuel filter.
- Clean the outside of the fuel filter housing (78/1).
- Loosen and unscrew the filter housing cover (78/2) using a standard tool W/F 36.
- Remove the fuel filter insert (78/3) and dispose of in the proper manner.
- Fit a new sealing ring in the filter housing cover (78/2) and wet it with oil or diesel fuel.
- Insert the fuel filter insert (78/3) manually into the filter housing cover (78/2).
- Screw in the filter housing cover (78/2) and tighten using 25 Nm.

! ATTENTION

There is no need to vent the fuel system.

- After a trial run, check the fuel filter for leaks.

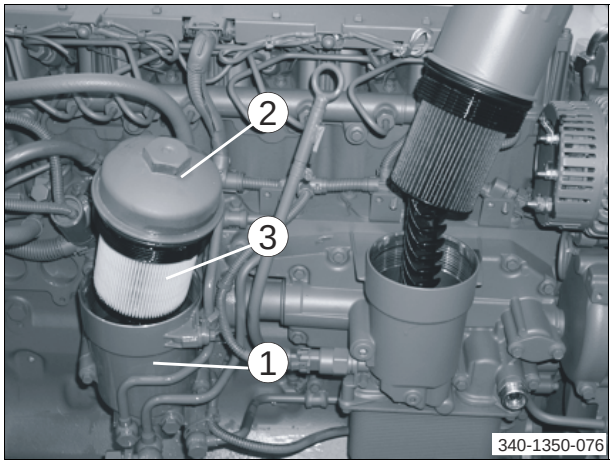


Fig. 78 Fuel filter

7.8.2.4 Cleaning fuel pre-filter with integrated filter cartridge

See chapter 7.7.3 "Maintenance and inspection plan".

ATTENTION

*All maintenance work on the fuel pre-filter must be carried out **only with the engine shut off.***

- Switch off the engine.
- Open the filter cover vent plug (79/1).
- Open the drain valve (79/2), collect any dirt and water in an appropriate container and dispose of in compliance with environmental regulations.
- Close the drain valve (79/2).
- Vent the fuel pre-filter using the hand pump (79/6).
- Operate the hand pump until fuel free of bubbles escapes from the opened vent plug of the fuel pre-filter cover. Collect the escaping fuel and dispose of in compliance with environmental regulations.
- Close the vent plug (79/1).

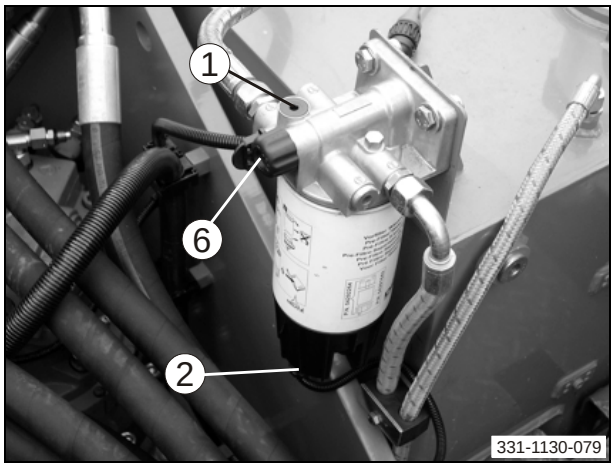


Fig. 79 Fuel pre-filter

7.8.2.5 Replacing fuel pre-filter with integrated filter cartridge

Replace as described in chapter 7.7.3 "Maintenance and inspection plan".

! ATTENTION

*All maintenance work on the fuel pre-filter must be carried out **only with the engine shut off**.*

! ATTENTION

Function of drain valve: Press control knob towards the valve body, then turn.

- Switch off the engine.
- Open the filter cover vent plug (79/1).
- Open the drain valve (79/2), collect any dirt and water in an appropriate container and dispose of in compliance with environmental regulations. **The volume of fluid to be disposed of should not exceed 0.5 – 1.0 liters.**
- Close the drain valve (79/2).
- Unscrew the lower part of the housing (80/3). Unscrew filter cartridge (80/4) from the filter head (80/6). Dispose of the filter cartridge in compliance with environmental regulations.
- Oil the thread and the sealing surfaces on the lower part of the housing (80/3) and on the filter head (80/6) as well as the sealing rings (80/5) with hydraulic fluid.
- Carefully push the new filter cartridge (80/4) onto the holding lug. Make sure it sits correctly! Screw filter cartridge (80/4) onto the filter head (80/6).
- Screw the lower part of the housing (80/3) on by hand up to the stop and then turn it back one quarter of a revolution.
- Vent the fuel pre-filter as described in chapter 7.8.2.4.
- After starting the engine, check the tightness of the fuel pre-filter.

! ATTENTION

The starter is not to be operated longer than max. 20 seconds.

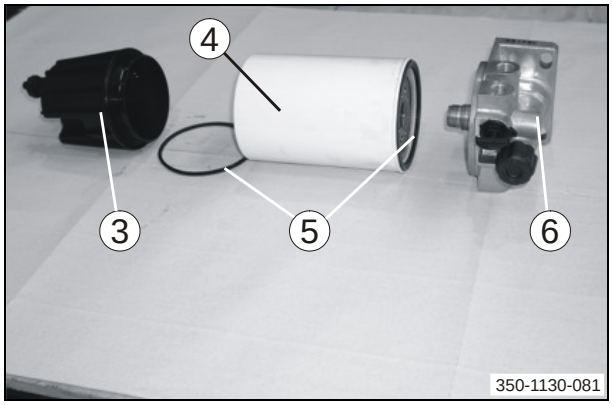


Fig. 80 Fuel pre-filter cartridge

7.8.2.6 Draining water from the fuel system

See chapter 7.7.3 "Maintenance and inspection plan".

Water must be drained from the fuel system through the fuel tank and the fuel pre-filter daily.

ATTENTION

Collect the fuel-water mixture in a suitable container.

Fuel tank

- Drain water from the fuel tank via the drain valve (81/1).
- Screw the drain hose onto the drain valve and drain water. Once fuel instead of water escapes tighten drain valve.

ATTENTION

Keep the level of fuel in the tank high to prevent condensation from building up.

Fuel pre-filter

- Open the drain valve (79/2) once a week and observe the escaping fluid. Once fuel instead of water escapes, close the drain valve.

7.8.2.7 Venting the fuel system

- Operate the hand pump (79/6) until fuel free of bubbles escapes from the open fuel pre-filter cover vent plug (79/1). Collect the escaping fuel and dispose of in compliance with environmental regulations.
- Tighten the vent plug (25 Nm).

ATTENTION

If the engine has not started after max. 30 sec., turn the ignition key to pos. "I" or "0", and pause for at least 30 seconds before trying again. Repeat the start-up procedure.

CAUTION

Do not drive the engine at full throttle right away. Drive with restraint until the engine reaches operating temperature.

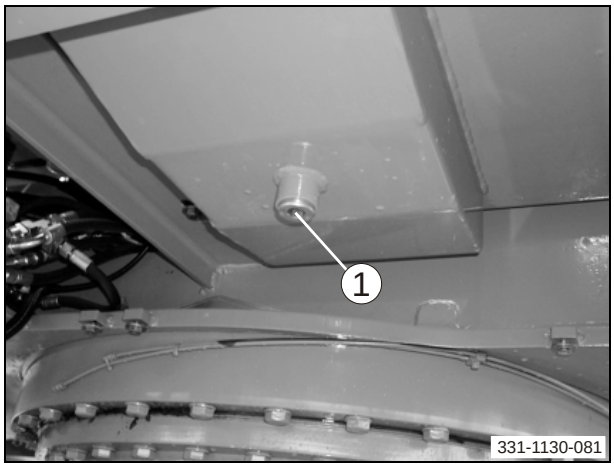


Fig. 81 Drain valve

7.8.3 Air filter

CAUTION

All maintenance work on the air filter pipe must be carried out only with the engine shut off! Do not start the engine while the main cartridge and safety cartridge are removed.

Maximum engine protection against premature wear caused by dust is only possible if the air filter is maintained at regular intervals.

The air filter is designed to offer maximum protection at long maintenance intervals.

Maintenance includes replacing filter elements.

For safety reasons, we do not recommend washing out filter inserts.

The air filter must be maintained as soon as the indicator (82/69) lights up continuously. This indicator may light up briefly, but this is unimportant and is mostly due to the engine speed being increased too quickly.

Furthermore, a clogged filter can be noticed by smoky exhaust fumes and perceptibly lower engine power.

The corresponding main cartridge must be replaced.

We urgently recommend replacing the main cartridge (fig. 85) when the maximum permissible intake negative pressure is reached, but in any case at least once a year.

Installing and removing cartridges too frequently may damage the seals between the filter element and the filter housing.

The safety cartridge only needs to be replaced with every fifth change of the main cartridge, but at least once a year.

When installing a new insert, the seals and seal surface in the housing must be cleaned carefully.

The discharge slot on the dust emptying valve (83/5) should be opened by hand once a week to ensure it does not jam due to high relative humidity and dust.

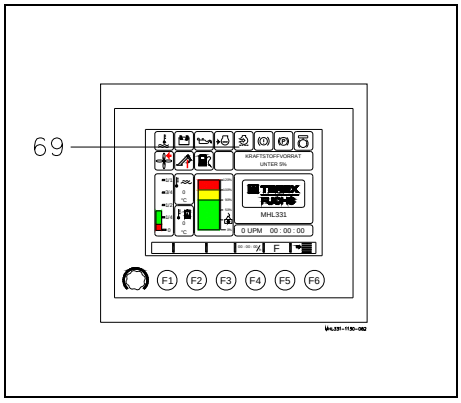


Fig. 82 Air filter clogging

7.8.3.1 Changing cartridges

Replacing the main cartridge

- Open the support brackets (83/1) and remove the cover (83/2) with the dust emptying valve (83/5).
- Remove the dirty main cartridge (84/1) by carefully turning and tipping and dispose of the cartridge.
- Record the maintenance job on the safety cartridge (84/2).
- Clean the inside of the air filter housing and the sealing surface in the housing with moist rags. Do not blow off the housing with compressed air.
- Check the new main cartridge for damage.

CAUTION

Do not install damaged main cartridges. The diesel engine can be damaged if dust enters it.

- Insert the main cartridge by turning it slightly into the filter housing. Check to make sure it creates a seal.
- Install the cover with the dust emptying valve below and fasten the support brackets (83/1).

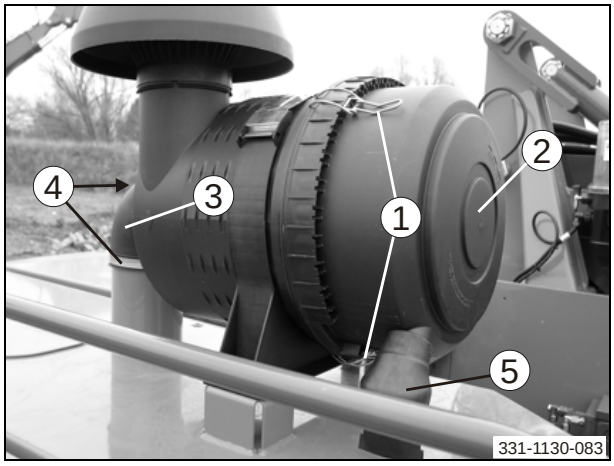


Fig. 83 Dust collector

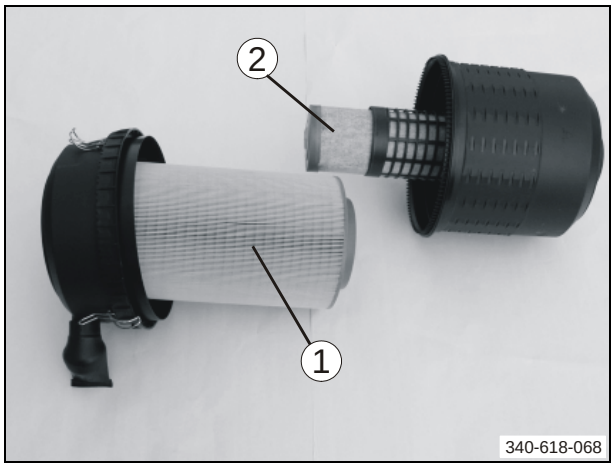


Fig. 84 Filter replacement

7.8.3.2 Cleaning the main cartridge

ATTENTION

Only blow out, never wash or brush out the main cartridge. When blowing out, take care to ensure that dust does not land on the inside of the main cartridge.

The main cartridge can be cleaned up to 5x if necessary. The main cartridge must be replaced once it reaches its maximum service life of one year, at the latest. A note must be made of the number of times it is cleaned.

For cleaning, a pipe the end of which is bent at 90° should be attached to the compressed-air pistol. It must be sufficiently long to reach the floor of the cartridge. Blow out the main cartridge from the inside to the outside with dry compressed air (max. 5 bar) by moving the pipe up and down in the cartridge. Continue until no more dust escapes (fig. 85).

Check the clean main cartridge for damage to the paper bellows and rubber seals. Tears and perforations in the paper bellows can be determined using a torch.

CAUTION

Do not install damaged main cartridges. The diesel engine can be damaged if dust enters it.

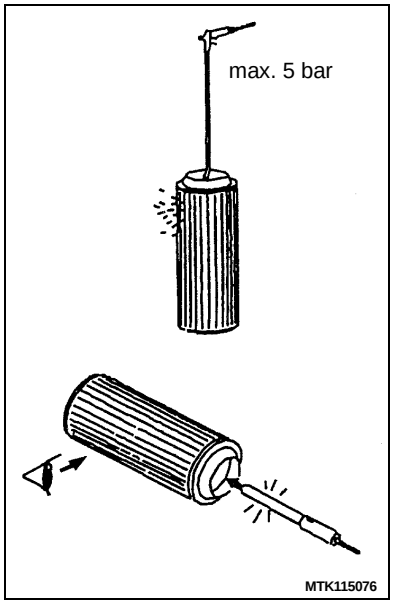


Fig. 85 Cleaning the main cartridge

7.8.3.3 Replacing the safety cartridge

CAUTION

Do not clean the safety cartridge and, once it has been removed, ***do not use it again****.*

- Open the support brackets (83/1) and remove the cover (83/2) with the dust emptying valve (83/5).
- Carefully turn the main cartridge (84/1) and tip it to remove.
- The safety cartridge (84/2) is in the main cartridge.
- Remove the safety cartridge by turning and tilting it carefully. Dispose of it in compliance with environmental regulations.
- Clean the inside of the air filter housing and the sealing surface in the housing with moist rags.
- Install the new safety cartridge into the main cartridge by giving it a slight turn.
- Insert the main cartridge by turning it slightly into the filter housing. Check to make sure it creates a seal.
- Install the cover with the dust emptying valve below and fasten the support brackets (83/1).

7.8.3.4 Checking the clean air line

The clean air line between the filter output and the engine intake pipe (83/3) must be checked for damage and leaks every time the filter element is replaced.

If necessary, tighten the clamping bracket bolts (83/4).

7.8.4 Cooling system

The machine is equipped with separate radiators for combined water-charge air cooling and the hydraulic oil.

7.8.4.1 Coolant level

See chapter 7.5.3.1 "Coolant level in the engine cooling circuit"

7.8.4.2 Checking the antifreeze

See chapter 7.5.3.2 "Checking the antifreeze"

7.8.4.3 Cleaning the radiator

See chapter 7.5.5 "Cleaning the radiator"

7.8.4.4 Changing the coolant of the combined water-charge air cooler

Replace as described in chapter 7.7.3 "Maintenance and inspection plan".

Replace the coolant in the entire cooling circuit at least every 2 years.

WARNING

All work on the cooling system (e.g. opening the cooler cover, removing hoses) is only to be carried out when the engine and the coolant have cooled down. Risk of scalding from hot coolant! Wear suitable protective clothing and safety goggles.

ATTENTION

Collect the drained coolant with a suitable container. The coolant must not be spilled on the ground. ***Dispose of coolant properly!***

- Park the machine on level ground.
- Place a basin under the engine and radiator to collect liquid.
- First release the pressure from the cover (86/1) and then remove on cooler.
- Remove the protective cap (87/1) from the drain valve. Drain off the coolant and dispose of used coolant in compliance with environmental regulations.

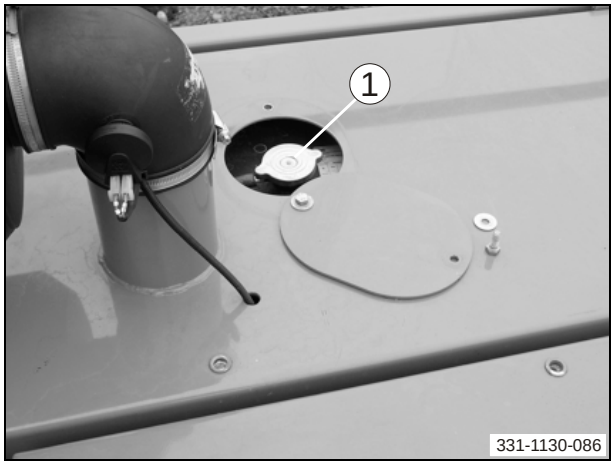


Fig. 86 Engine radiator

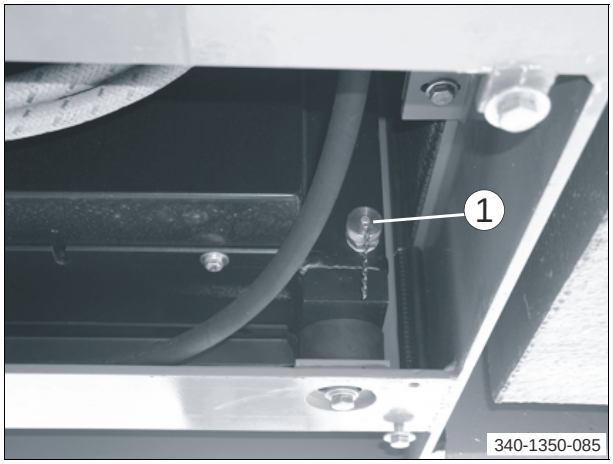


Fig. 87 Drain valve

- Unscrew the coolant drain plug (88/1) on the cylinder block and properly dispose of the coolant in compliance with environmental regulations.
- If necessary, rinse the cooling system with clean water.
- Install the drain plug on the engine again and screw the protective cap onto the drain valve.
- Release the vent plug (88/2) by 2 turns.
- Fill the cooling system with coolant (see 3.19 "Fuels, lubricants and coolants" and chapter 7.5.3.2 "Checking the antifreeze").
- Close the radiator with the cover (86/1) and tighten the vent plug (88/2).
- Start the engine and bring it up to operating temperature. Then turn it off and let it cool down.
- Check the coolant level and top up (several times, if necessary).
- Check the tightness of the cooling system.

CAUTION

If the coolant level indicator (89/68) lights up, bring the engine to idle immediately and then turn it off.

Check the coolant level and refill if necessary.

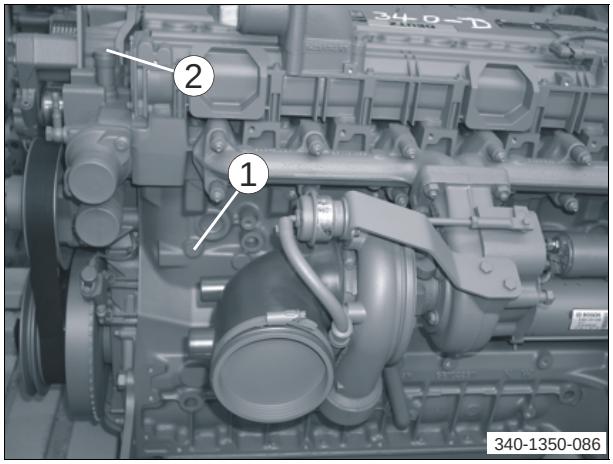


Fig. 88 Coolant drain plug and vent plug

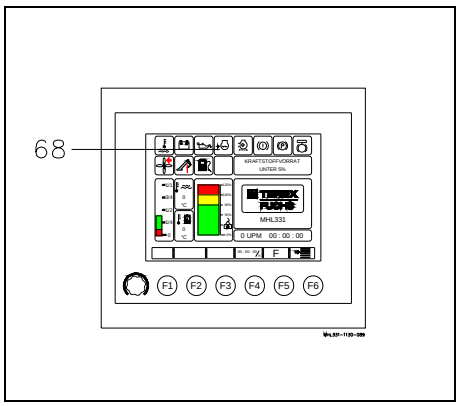


Fig. 89 Coolant level

7.8.5 Checking V-ribbed belts

Replace as described in chapter 7.7.3 "Maintenance and inspection plan".

CAUTION

Rotating V-ribbed belts pose a danger of injury.

Only check and tighten the V-ribbed belts when the engine is stopped.

Secure the engine against being started without authorization.

ATTENTION

We recommend a V-ribbed belt tension measuring instrument to check the V-belt tension.

Perform the test using the manufacturer's operating instructions.

Checking without a tension measuring device

Press the V-ribbed belt until tight with your thumb at the center of the greatest length and measure the sag of the belt.

Using medium thumb pressure of approx. 45 N (about 4.5 kg), the V-ribbed belt sag should equal 13 mm.

If a V-ribbed belt shows cracks or if it is contaminated with oil, coolant, grease or the like, it must be replaced.

7.8.5.1 Replacing and tensioning V-ribbed belts

- Switch off the engine and remove the ignition key.
- Operate the battery disconnect switch.
- Place a ½" square spanner into the dent (90/1) of the tensioning pulley and press the tensioning pulley into the direction of arrow until the drill holes are positioned one over the other (see fig. 91). Then secure in place with a suitable fastening pin of Ø 6 mm.
- Remove the V-ribbed belt from the water pump pulley first.
- Fit new V-ribbed belt. For the routing of the V-ribbed belt see fig. 91.
- The V-ribbed belt must be installed in reverse order.
- Switch the battery disconnect switch on.
- Check the tension once more.

CAUTION

When replacing the V-ribbed belt, test the tensioning pulley and idler pulley for ease of movement and play. Immediately replace defective tensioning or idler pulley.

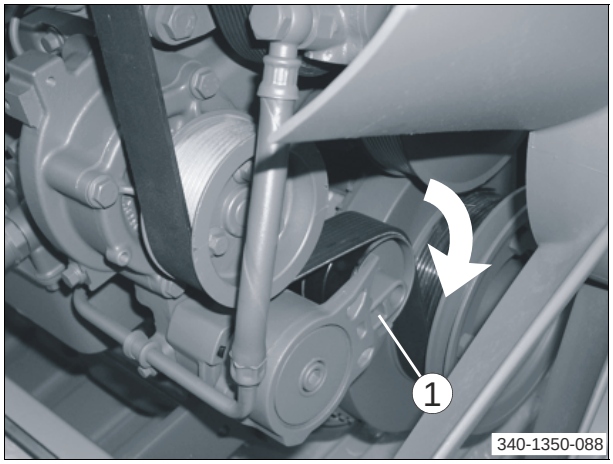


Fig. 90 Tensioning and replacing the V-ribbed belt

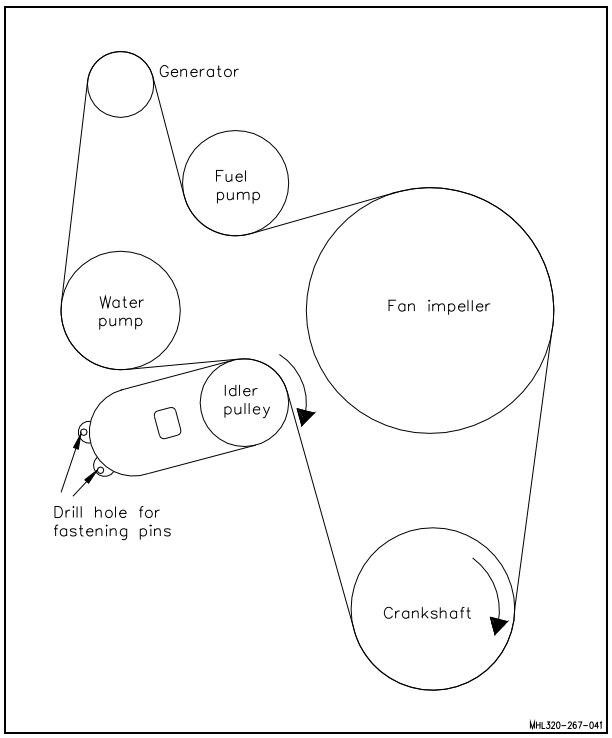


Fig. 91 Routing of the V-ribbed belt

7.8.5.2 Replacing and tensioning V-belt of the air conditioning compressor

- Switch off the engine and remove the ignition key.
- Operate the battery disconnect switch.
- Loosen the fastening screws (92/1-3), do not screw them out completely.
- With a suitable tool, for example tire lever, swing the air conditioning compressor far enough so the V-belt can be removed.
- Fit new V-belt.
- With a suitable tool, for example tire lever, swing the air conditioning compressor far enough so that the correct V-belt tension is reached.
- Tighten the fastening screws (92/1-3).
- Switch the battery disconnect switch on.
- Perform a trial run.
- Check the tension on the new V-belt after 15 minutes and readjust if necessary.

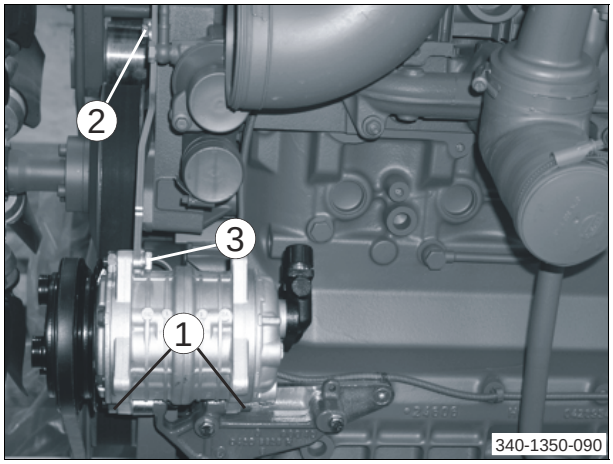


Fig. 92 Tensioning and changing V-belt of the air conditioning compressor

7.8.6 Checking and adjusting the valve lash

See chapter 7.7.3 "Maintenance and inspection plan".

The valve lash is to be tested according to the operating instructions provided by the engine manufacturer and to be adjusted if necessary.

7.8.7 Venting the hydraulic pump

The hydraulic pump must be vented for work on the pump or for changing oil in the hydraulic system.

For this purpose loosen the leakage oil hose (93/1) and let the air escape, as soon as hydraulic oil flows out connect the leakage oil hose again.

Before the first start-up of the pump, after a repair or replacement, the pump housing must be filled with hydraulic oil through the same connection.

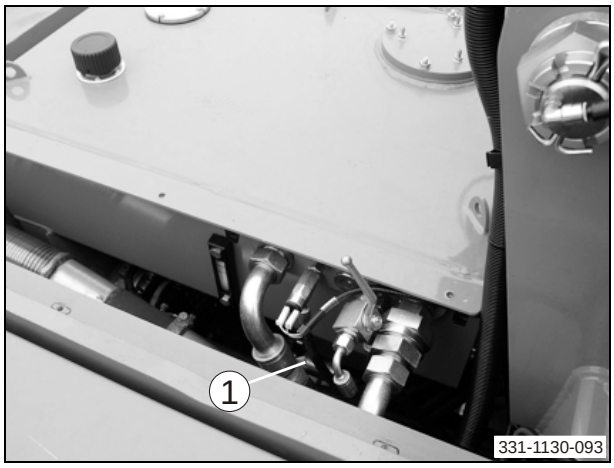


Fig. 93 Venting the hydraulic pump

7.8.8 Venting the pilot control

The pilot control must be vented if the pilot control lubricant circuit has been opened during maintenance or repair work.

The pilot control can be vented by loosening the venting screws (measuring connections) positioned on the control caps of the valves on the control block and on the control caps of the valves on the torque motor.

7.8.9 Venting the brake

See chapter 7.7.3 "Maintenance and inspection plan".

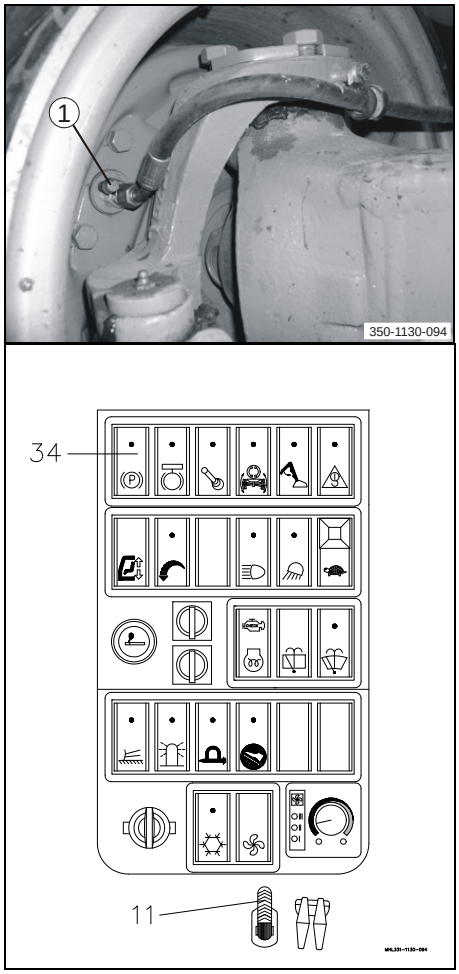


Fig. 94 Venting the brake

! ATTENTION

Collect the drained oil with a suitable container. The old oil must not be spilled on the ground. ***Dispose of old oil properly!***

- Run the engine at medium speed.
- Apply the parking brake (94/34).
- Operate and lock the service brake pedal (94/11).
- Remove the cap on the ventilation valve (94/1) and fit suitable hose.
- Direct the hose into a container.
- Slightly loosen the ventilation valve using a key (W/F 9) and keep open until hydraulic oil escapes in the container without bubbles.
- Tighten the ventilation valve and re-fit dust cap.
- Vent the other three brakes as described.

7.8.10 Venting the parking brake

See chapter 7.7.3 "Maintenance and inspection plan".

ATTENTION

Collect the drained oil with a suitable container. The old oil must not be spilled on the ground. ***Dispose of old oil properly!***

- Operate and lock the service brake pedal (97/11).
- Release the parking brake (97/34).
- Run the engine at medium speed.
- Open the vent plug (95/1) on the parking brake.
- When hydraulic oil escapes without bubbles, close the vent plug (95/1).

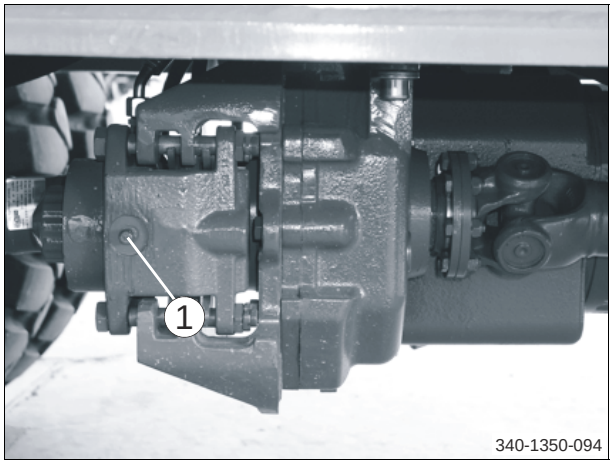


Fig. 95 Venting the parking brake

7.8.11 Adjusting the play of the parking brake

See chapter 7.7.3 "Maintenance and inspection plan".

- Release the parking brake (97/34).
- Remove the cover (96/1).
- Loosen the counter-nut (96/3).
- Screw in the threaded pin (96/2) until resistance is tangible (brake linings (96/4) sit close to the brake disk).
- Screw the threaded pin (96/2) back by half a turn.
- Counter with nut (96/3).
- Re-fit the cover (96/1).

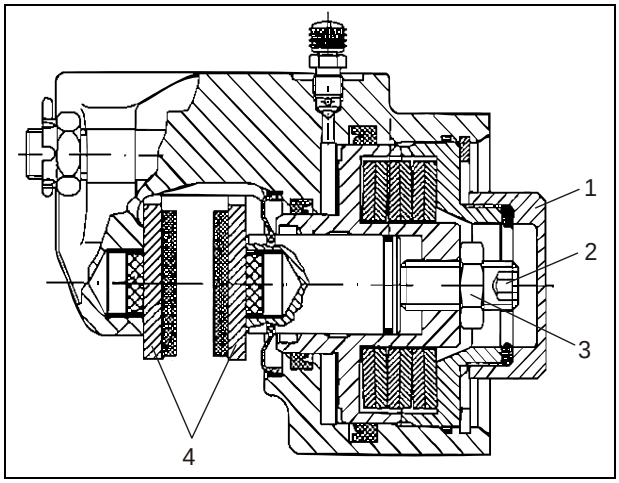


Fig. 96 Adjusting the parking brake

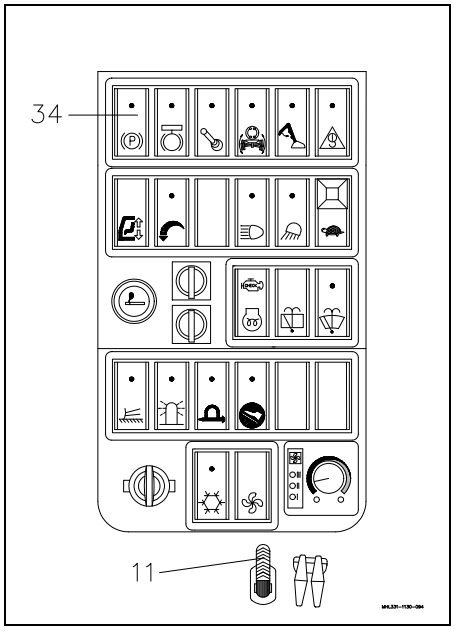


Fig. 97 Adjusting the parking brake

7.8.12 Venting the oscillating axle cylinders

ATTENTION

Collect the drained oil with a suitable container. The old oil must not be spilled on the ground. ***Dispose of old oil properly!***

- The oscillating axle must be released. If the oscillating axle is released, the indicator lamp in the switch (98/37) is lit along with indicator (98/75) and the text message (98/77) "OSCILLATING AXLE RELEASED" appears in the multifunction monitor.
- Jack up the machine so that the wheels of the oscillating axle are off the ground.
- Engage the service brake (98/11).
- Release the parking brake (98/34).
- Run the engine at medium speed.
- Open the vent plugs (99/1) one after the other, until there are no bubbles in the escaping hydraulic oil.
- Close the vent plug (99/1).

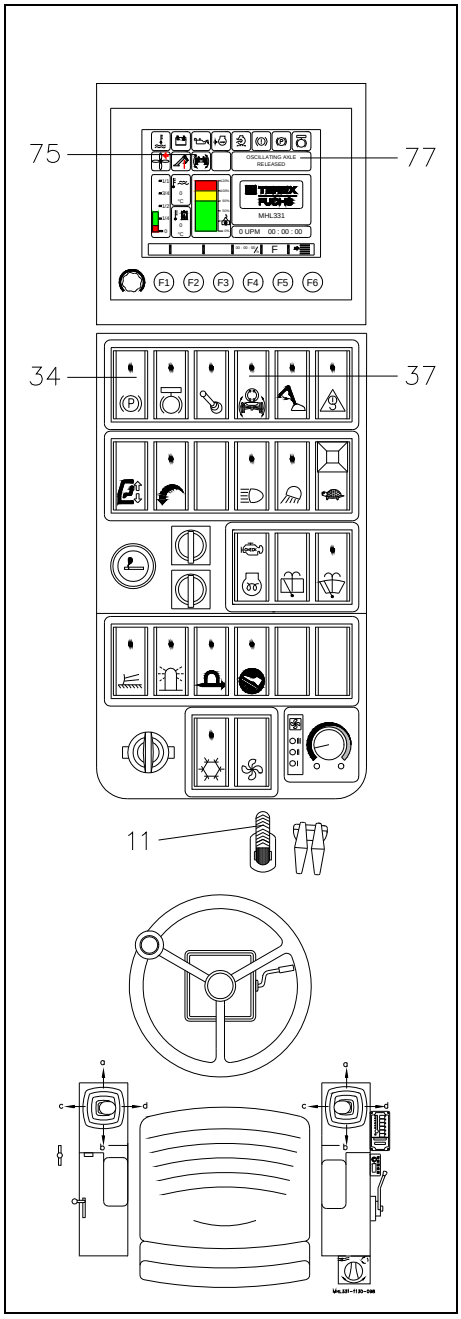


Fig. 98 Venting the oscillating axle cylinder

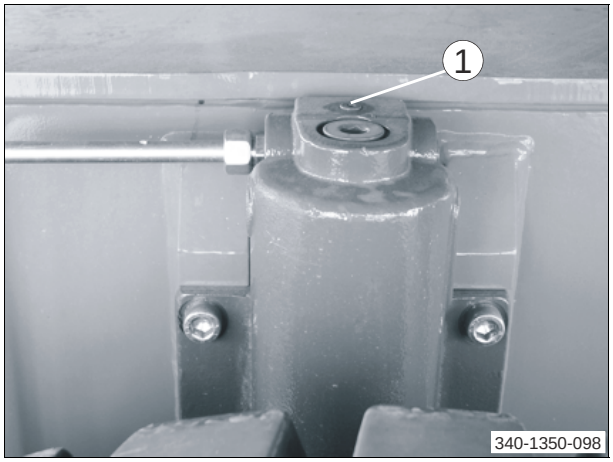


Fig. 99 Oscillating axle cylinder vent plug

7.8.13 Hydraulic system

For filling quantity, oil quality and change intervals, see chapter 3.19 "Fuels, lubricants and coolants" and chapter 7.7.3 "Maintenance and inspection plan"; also chapter 7.2 "Regular oil analyses".

Maintenance work on the hydraulic system is limited mainly to the hydraulic oil tank.

No other assemblies in the system require special maintenance.

The pipe and hose network must be inspected for leaks at regular intervals.

DANGER

Do not use your bare hands to perform the inspection. A fine spray of liquid under high pressure can penetrate the skin and cause severe injuries.

Absolute cleanliness is especially important for the hydraulic system. Because of this, recommended intervals for replacing the return filter element, for cleaning the oil cooler and for oil change must be observed.

DANGER

The pressure in the hydraulic system must be reduced before performing any work on the hydraulic system.

Note the following points:

- *Set down the loading equipment.*
- *Switch off the engine.*
- *Activate the four-way control lever in all directions (with the ignition key in the contact position).*
- *Then unscrew the ventilation filter (101/1) one turn.*

Hydraulic oil is hot at operating temperature and may be under pressure.

Avoid skin contact with hot oil or parts carrying oil.

7.8.13.1 Checking the hydraulic oil level

See chapter 7.5.4 "Checking the hydraulic oil level"

7.8.13.2 Replacing hydraulic oil

ATTENTION

Change the hydraulic oil at operating temperature.

- Retract all hydraulic cylinders.
- Switch off the diesel engine.
- Unscrew the ventilation filter (101/1).
- Place suitable oil drip pans below the engine.

CAUTION

Hot oil on the skin and eyes can cause burns. Wear suitable protective clothing and safety goggles.

- Loosen the cap (100/1) on the drain valve of the hydraulic tank and drain the oil into clean containers.

ATTENTION

Dispose of the oil in compliance with environmental regulations.

- Close the cap on the drain valve carefully.
- Open the return filter cover (101/2) and remove the complete filter assembly.
- Flush and clean the hydraulic tank as required.

ATTENTION

Before filling in hydraulic oil the appropriate preparations for the work to be done must be made.

- Add clean hydraulic oil through the opening of the ventilation filter (101/1).
- Screw on the ventilation filter.
- Close the covers of the return filter and install the complete filter.

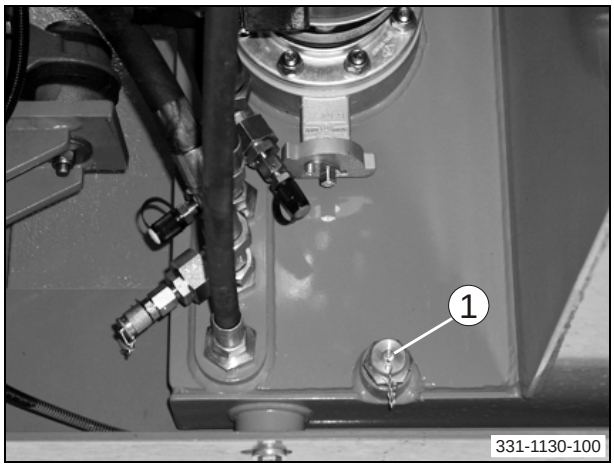


Fig. 100 Drain valve

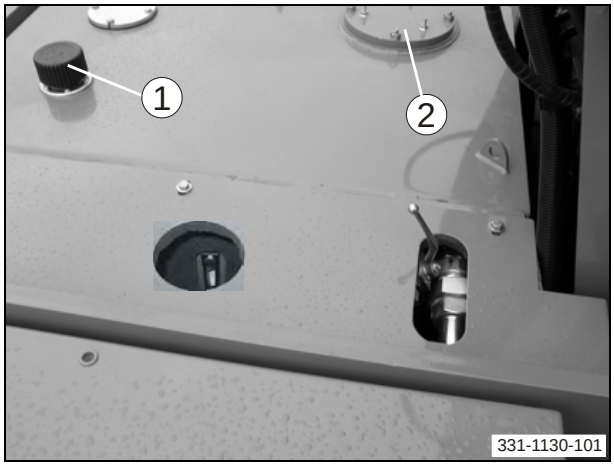


Fig. 101 Ventilation and return filter

7.8.13.3 Hydraulic oil – return filter

Replace as described in chapter 7.7.3 "Maintenance and inspection plan".

ATTENTION

After a major repair job, replace the filter insert after the trial run.

Faulty hydraulic attachment devices can reduce the service life of the return filter.

ATTENTION

The pressing force of the return filter must be checked routinely every time the return filter is opened or closed.

Replacing the filter insert

ATTENTION

Before replacing the filter insert, the suitable equipment to this purpose (e.g. a pedestal) has to be provided.

The filter element (103/2) (Exapor) cannot be cleaned.

The return filter must be replaced as soon as the indicator (102/69) lights up continuously. The indicator may light up briefly, but that is not important and is mostly due to the engine speed being increased too quickly.

- Switch off the engine.
- Use a tool to loosen the cover (103/1) of the return filter and then unscrew it.
- Check the condition and seal of the cover.
- Remove the complete return filter from the hydraulic tank by the bracket (103/6).
- Place an open-jaw wrench on the hex head (103/5) and push a rod through the bracket (103/6). Release the sieve element (103/7) from the return filter (103/2) by turning.

ATTENTION

The screen element (103/7) must be cleaned as described below every time the filter element is changed!

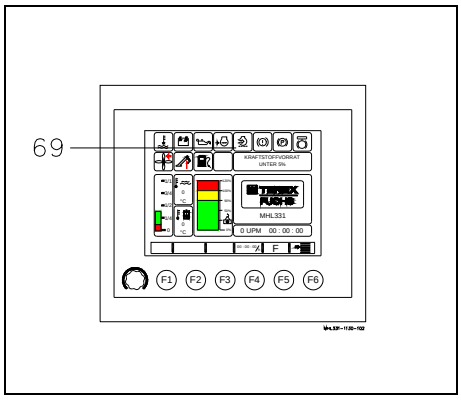


Fig. 102 Return filter clogging

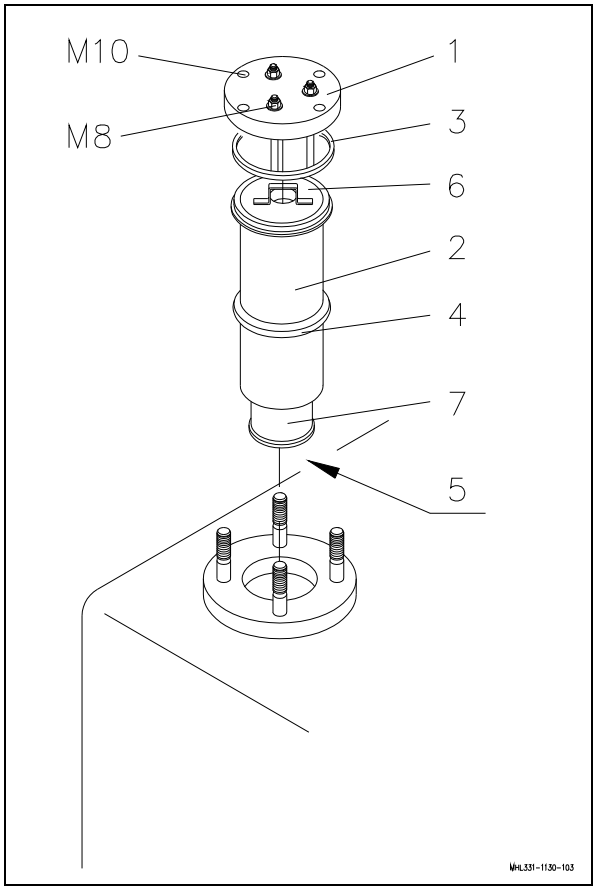


Fig. 103 Return filters

- Unscrew the screen element (103/7) and clean with a neutral detergent.
- Using a compressed-air pistol, blow out from the outside to the inside.
- Screw on the new filter element with the cleaned sieve element.
- Ensure that the seal between the sieve element and filter element is lying flat.
- Clean the O-ring (103/3) between the hydraulic tank and the return filter cover.
- Check the O-ring (103/4) and replace if necessary.
- Insert the new return filter in the hydraulic tank with the O-ring.
- Oil the cover seal slightly and place the cover of the return filter on the hydraulic tank with the O-ring.
- Check the distance between the hydraulic tank and the cover: The distance should be about 2 mm with the cover screws loosened.
- If necessary, adjust the distance using the three M8 set screw (see fig. 103) and lock.
- Tighten the M10 cover nuts. As you do so, make certain the O-ring is correctly seated between the cover and the hydraulic tank.
- Check the filter for leaks.

7.8.13.4 Hydraulic oil – ventilation filter

Replace as described in chapter 7.7.3 "Maintenance and inspection plan".

Remove the ventilation filter (101/1), replace it with a new one and tighten by hand.

! ATTENTION

Replace the ventilation filter if it has become dirty with hydraulic oil mist.

7.8.13.5 Blocking off the hydraulic oil on the tank

To enable repairs to the intake line, the hydraulic pump or the hydraulic lines to be undertaken without having to drain the oil from the tank, the oil supply line to the main pumps can be blocked off.

- Remove the fillister-head screw (104/1) on the retaining fixture.
- Remove the retaining fixture (104/2).
- Turn the square 90° using a fork wrench from the open position (105/1) to the shut-off position (105/2).

! ATTENTION

The marking on the end face of the square must lie across the passage.

! ATTENTION

When repair work is complete, it is essential to turn back the square to the open position (105/1) before the engine is switched on. Otherwise the hydraulic pump will be destroyed on starting.

- Fasten the retaining fixture (104/2) once more with the fillister-head screw (104/1) and secure with Loctite "blue".

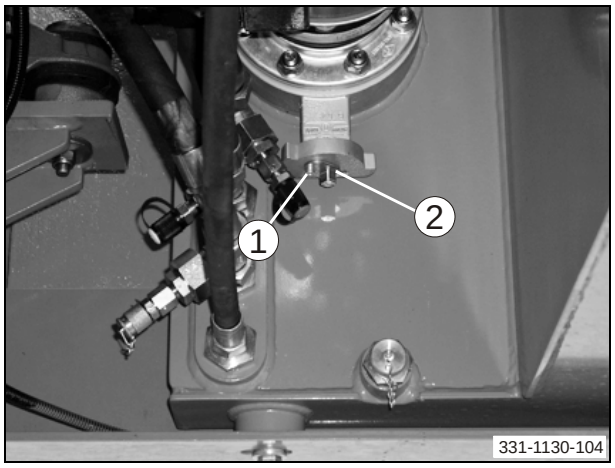


Fig. 104 Blocking off the hydraulic oil

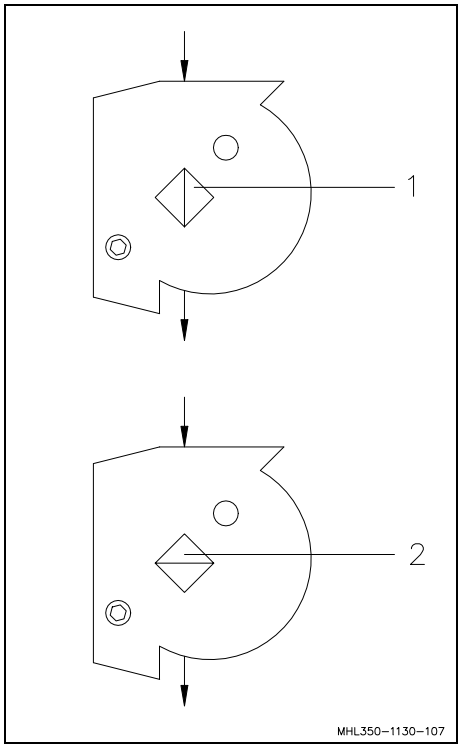


Fig. 105 Direction of flow

7.8.14 Changing axle and transmission oil

For filling quantity, oil quality and change intervals, see chapter 3.19 "Fuels, lubricants and coolants" and chapter 7.7.3 "Maintenance and inspection plan"; also chapter 7.2 "Regular oil analyses".

The axle oil must be changed at operating temperature.

! ATTENTION

Collect the drained oil with a suitable container. The old oil must not be spilled on the ground. ***Dispose of old oil properly!***

! ATTENTION

After filling the axles with oil, move the machine for approx. 5 minutes in order to ensure that the oil is distributed. Check the oil level again and top up if necessary.

7.8.14.1 Front axle differential

ATTENTION

The wheel hubs and axle casings (differentials) of the steering axle have separate oil chambers.

Checking the axle oil level

- Remove the check and filler plug (106/1). If necessary add oil.

Changing axle oil

- Park the machine on level ground.
- Apply the parking brake.
- Open the checking and filler plug (106/1).
- Open the drain plug (106/2) on the differential and drain the oil.
- Purge the axle if necessary.
- Carefully close the drain plug (106/2).
- Fill in oil via the checking and filler plug (106/1) up to the bottom edge of the bore.
- Carefully close the checking and filler plug.

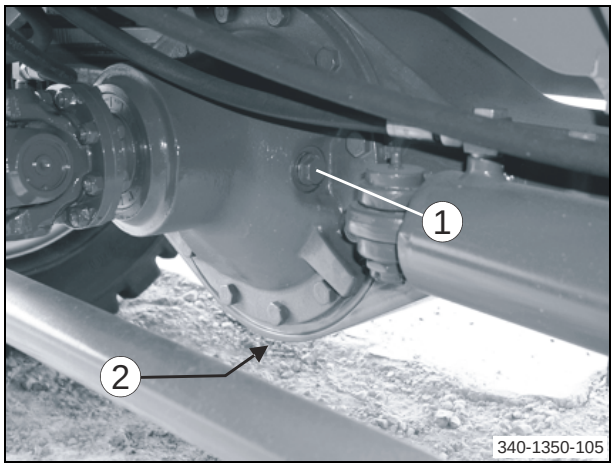


Fig. 106 Front axle differential

7.8.14.2 Rear axle differential

Checking the axle oil level

- Remove the check and filler plug (107/1). If necessary add oil.

Changing axle oil

- Park the machine on level ground.
- Apply the parking brake.
- Open the checking and filler plug (107/1).
- Open the drain plug (107/2) on the differential and drain the oil.
- Purge the axle if necessary.
- Carefully close the drain plug (107/2).
- Fill in oil via the checking and filler plug (107/1) up to the bottom edge of the bore.
- Carefully close the checking and filler plug.

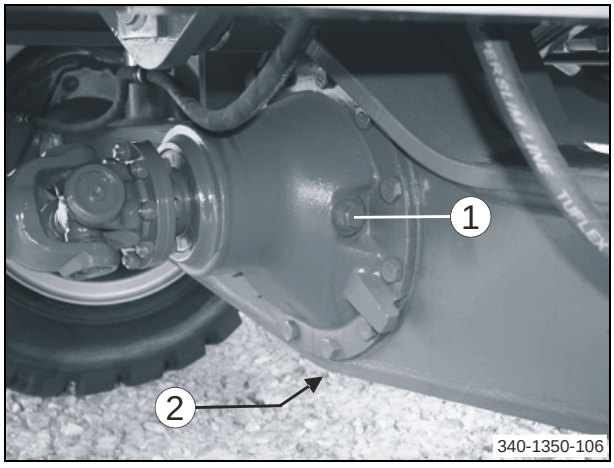


Fig. 107 Rear axle differential

7.8.14.3 Wheel hub

ATTENTION

The wheel hubs and axle casings (differentials) have separate oil chambers.

Checking the oil level

- Turn the wheel until the drain plug (108/2) on the hub is at the bottom.
- Remove the check and filler plug (108/1). If necessary add oil.

Oil changing

- Turn the wheel until the drain plug (108/2) on the hub is at the bottom.
- Open the checking and filler plug (108/1).
- Open the drain plug and drain the oil.
- Purge as required.
- Carefully close the drain plug.
- Fill in oil via the checking and filler plug (108/1) up to the bottom edge of the opening.
- Carefully close the checking and filler plug.

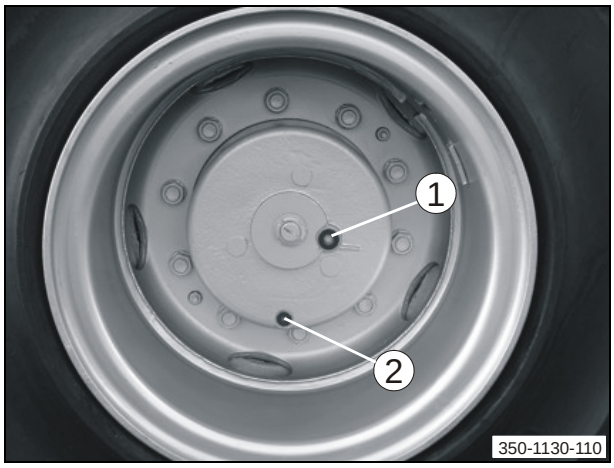


Fig. 108 Wheel hub

7.8.14.4 Power shift gear

Checking the oil level

- Park the machine on level ground.
- Remove the check and filler plug (109/1). If necessary add oil up to the bottom of the drill hole.

Oil changing

- Park the machine on level ground.
- Open the checking and filler plug (109/1).
- Open the drain plugs (109/2) und (109/3) and drain the oil.
- Purge the transmission as required.
- Carefully close the drain plugs (109/2) and (109/3).
- Fill in oil via the checking and filler plug (109/1) up to the bottom edge of the bore. Check the oil level of the power shift gear once again.
- Carefully close the checking and filler plug.

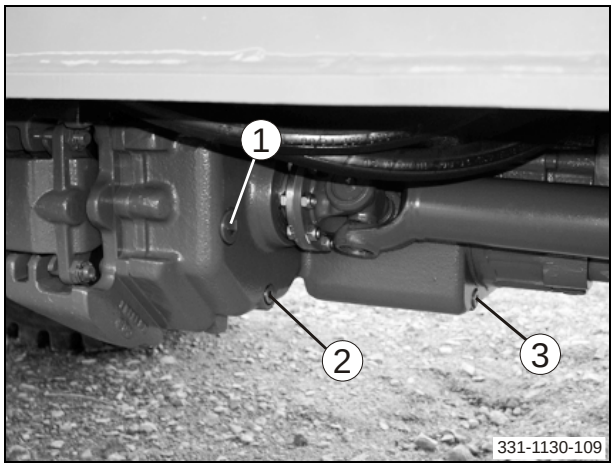


Fig. 109 Power shift gear

7.8.14.5 Swing gear

ATTENTION

The swing gear with integrated multi-disk brake is maintenance-free. It is lubricated by the hydraulic circuit. Therefore, the oil does not have to be changed. The main bearing is equipped with and sealed by its own separate "life-long" lubrication. After repairs, the bearing must be filled with lithium-soap based grease.

7.8.15 Slewing joint

7.8.15.1 Checking the fastening of the slewing joint

! ATTENTION

When remounting, check the screws after 100 operating hours.

The holding surfaces of the screw heads must be unpainted metal, i.e. absolutely free of grease and paint.

The threading and screw head must not be damaged.

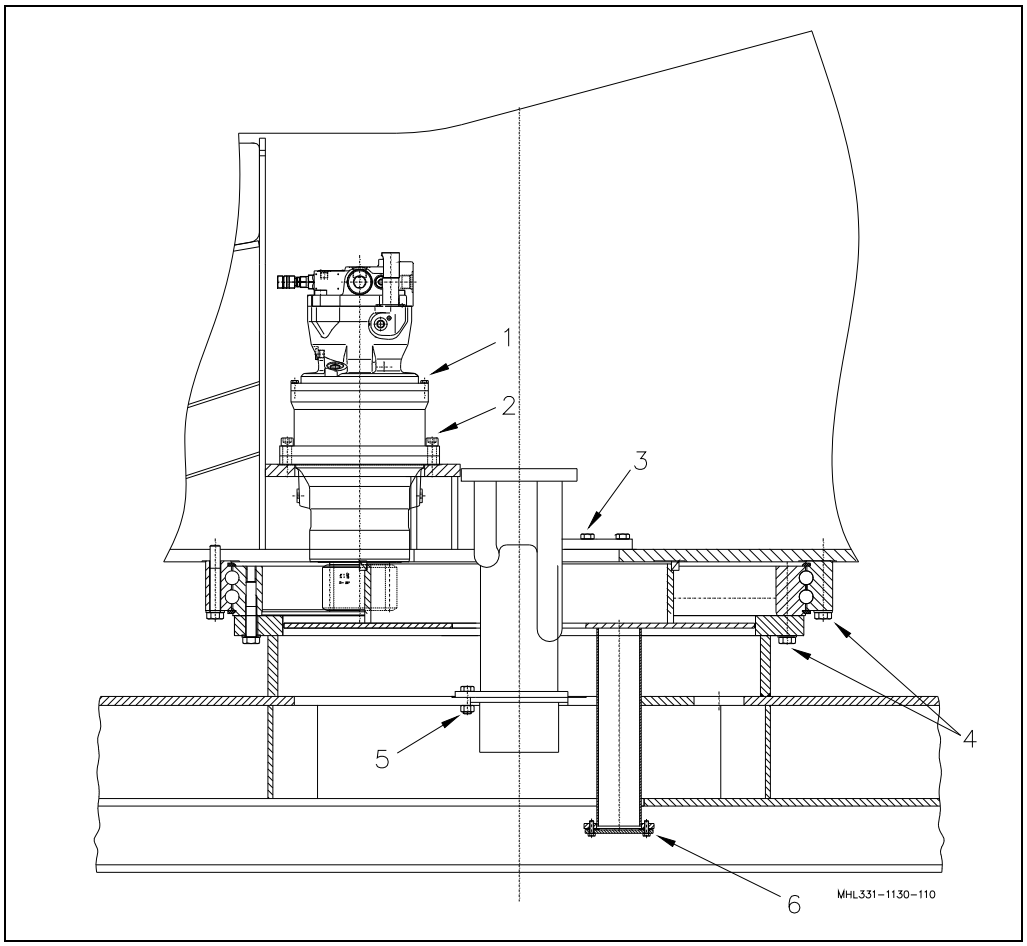


Fig. 110 Tightening torques

Item No.	Tightening torque
1	25 Nm
2	195 Nm
3	195 Nm
4	510 Nm
5	195 Nm
6	23 Nm

! ATTENTION

Use only original TEREX | Fuchs screws when replacing the slewing ring screws (110/4). Grease the slewing ring screws (110/4) on the thread and under the screw head with multi-purpose grease before screwing them in.

7.9 Care and cleaning

! ATTENTION

The machine must be cleaned on a suitable surface with an oil separator.

- The machine must not be cleaned with a steam-jet appliance or high-pressure cleaner in the first two months after it is placed into operation or after it has been newly painted. This will allow the paint to cure completely.
- Do not use aggressive detergents for cleaning the machine. We recommend using commercially available cleaning agents for passenger cars.
- When cleaning with steam-jet appliances, the hot water jet must not exceed 80 °C and a spray pressure of 70 bar. The nozzle must be at a minimum distance of 30 cm from the machine.
- The slewing ring of the machine shall **not** be cleaned with a high-pressure or steam-jet cleaner, as otherwise the seals will be damaged.
- Linings (insulating materials, etc.) shall not be exposed directly to water, steam or high-pressure jets.
- When cleaning with water or steam jets, take care not to spray the electrical components such as solenoid valves and pressure switches. When cleaning with water jets, take care not to spray exhaust-gas and air filter openings.
- If cleaning the engine with water or steam jets, do not expose sensitive engine parts, such as generator, cabling, oil pressure switch, etc. directly to the jet.
- The machine must be lubricated according to the lubrication plan after every wet cleaning. All work movements and travel functions must be performed. In the case of machines with central lubrication system, three lubricating processes must be manually triggered. To activate manual lubrication, please read chapter 7.6.2.2, "Triggering additional lubrication".

7.10 Shutdown

7.10.1 Preserving the machine for temporary shutdown

CAUTION

In order to prevent damage (corrosion, etc.) from storage during shutdown periods over three months, certain preservation measures must be taken.

Preservation measures:

- We recommend keeping the machine in a dry, dust-free room during the storage period.
- Clean the inside and outside of the machine thoroughly, including the engine.
- Lubricate the machine according to the lubrication plan.
- Check the oil levels of all assemblies such as transmissions, etc. and top up if necessary.
- Check the hydraulic oil level and top up if necessary.
- Repair paint damages.
- Fill the diesel tank in order to prevent corrosion of the tank walls.
- Check the antifreeze level in the coolant and adjust if necessary.
- Perform all the preservation measures contained in the diesel engine operating instructions.
- Treat bare piston rods with a commercially available anti-corrosion agent.
- Remove and clean the batteries and store them as specified in a dry room that does not freeze during winter. Coat connections with pole grease.
- Seal off the air intake opening of the air filter system and the exhaust pipe opening.

7.10.2 During shutdown

When the machine is out of use for six months, after this time all assemblies must be brought to operating temperature and maneuvered for approx. 15 minutes.

Beforehand, the anti-corrosion coat must be removed from the piston rods, and the openings of the air filter pipe and the exhaust pipe freed.

After the maneuvering cycle, preserve the machine once more as previously described.

7.10.3 After shutdown

Perform the following jobs when placing the machine into operation again:

- Clean the piston rods of the layer of corrosion protection.
- Make the air filter pipe of the air filter and the exhaust gas opening free.
- Check the condition of the air filter main cartridge and safety cartridge and replace if necessary.
- Clean the machine with a neutral detergent.
- Check the batteries. If necessary, charge and reinstall them.
- Carry out all measures for placing the diesel engine back into operation stated in the engine operating instructions.
- Lubricate the machine according to the lubrication plan.

7.10.4 After the machine has been out of use for more than half a year

- Perform oil change in the units such as transmission, etc.
- Replace the hydraulic oil filter (return and ventilation filter).

8 Trouble-shooting

8.1 General

Malfunctions are often the result of incorrect handling of the machine, the use of unsuitable fuels, lubricants and coolants, or irregular maintenance.

The following table presents a summary of a range of malfunctions and their possible causes.

If a malfunction can only be eliminated through repair, then your responsible service agent must be called in.

8.2 Drive engine

All defects and faults in the diesel 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.

8.3 Lowering the loading equipment when the engine has shut down

If the diesel engine has shut down, lower the loading equipment by means of the four-way control levers (see chapter 5.1.1 "Operation of loading equipment") using the available pilot pressure. The ignition must be switched on.

8.4 Malfunctions in the central electrical system

The fuses for the individual electrical circuits and various relays are located in the central electrical system behind flap (111/1) on the left side of the uppercarriage.

In case of malfunctions, check the fuses. If they operate correctly, contact your Customer Service. Assignment of fuses see Appendix, chapter 9.

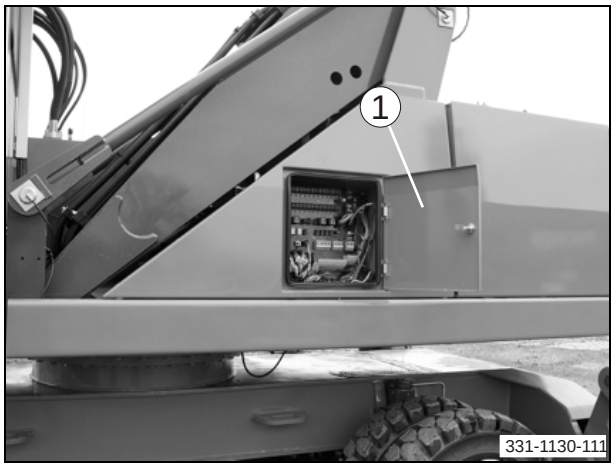


Fig. 111 Central electrical system flap

8.4.1 Fuse test

The central electrical system includes a push-button (112/1) that can be activated to perform a fuse test when the ignition is turned on.

Faulty fuses are indicated by LEDs (112/2) that are lit red.

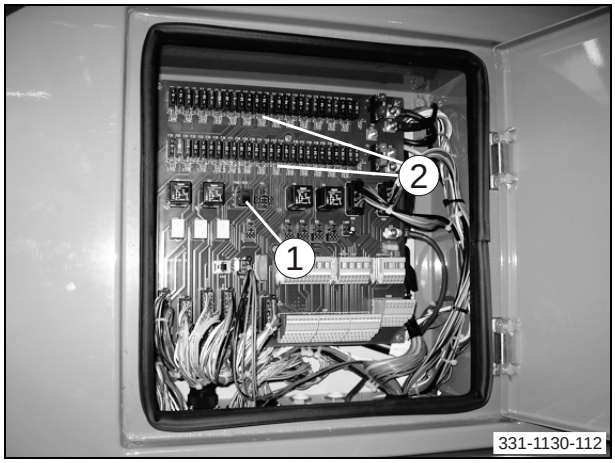


Fig. 112 Central electrical system

8.5 Malfunctions in the magnet system

ATTENTION

Do not switch off the engine of the loading machine as otherwise the diodes on the magnet system control device can no longer be read.

- Check which error is shown in the control device (113/1).
- Observe the operating status using the diodes (113/2).
- Switch off the machine and re-start it to eliminate the error via "RESET" if required. Otherwise:
  - check fuses F 17 and F 19 in the central electrical system switch box.

If the malfunction occurs repeatedly, contact your Customer Service and inform it about the operating status.

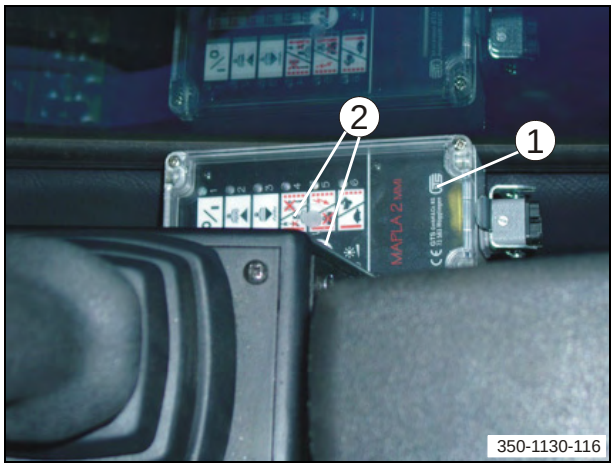


Fig. 113 Magnet system control device

8.6 Load limit sensing control

8.6.1 Bypassing the load limit sensing control

In order to ensure that the engine continues to operate in the event of load limit sensing control malfunctions, load limit sensing control can be disconnected. **During this emergency service, the machine's use is limited.**

CAUTION

As long as load limit sensing control is deactivated, the machine may only be moved briefly; otherwise damage to the engine may occur.

- Switch off load limit sensing control by pressing switch (114/1) next to the load limit sensing control box (114/2). The indicator lamp in switch (114/1) lights up (with ignition switched on).

CAUTION

If the load limit sensing control is bypassed, there is no control of the hydraulic pump. An overload of the diesel engine by the hydraulics is possible, and may result in bringing the engine to a stop! Turning the engine off and on a number of times at full speed may result in damage to the engine!

8.6.2 Activating the load limit sensing control

Once the malfunctions in the load limit sensing control have been remedied, the deactivation must be undone and the load limit sensing control re-activated.

- Switch on load limit sensing control by pressing switch (114/1) next to the load limit sensing control box (114/2). The indicator lamp in switch (114/1) does not light up (with ignition switched on).

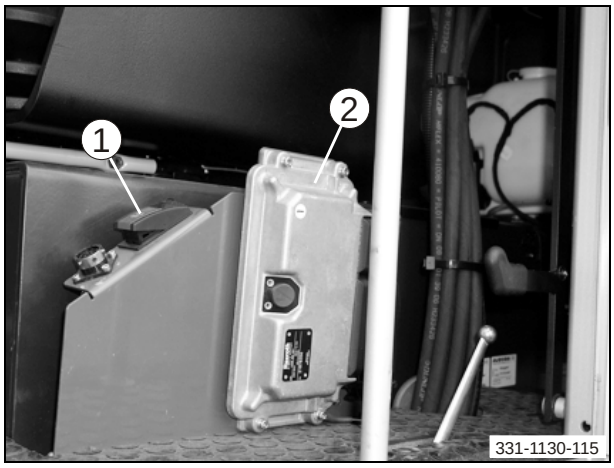


Fig. 114 Bypass switch load limit sensing control

8.7 Trouble-shooting table

Possible cause		Remedy
8.7.1 No steering		
1	Oil supply to pump interrupted.	Check suction line and repair.
2	Hydraulic pump defective.	Have the pump examined by a specialist for mechanical damage. Replace the entire hydraulic pump.
3	Priority valve defective.	Have priority valve checked by a specialist; repair or replace as required.
4	Steering control unit defective.	Have steering control unit checked by a specialist; repair or replace as required.
5	Steering cylinders defective.	Repair, replace.
6	Mechanical fault.	Repair.
8.7.2 No brake pressure		
1	Oil supply to pump interrupted.	Check suction line and repair.
2	Hydraulic pump defective.	Have the pump examined by a specialist for mechanical damage. Replace the entire hydraulic pump.
3	Shut-off valve defective.	Have shut-off valve checked by a specialist; repair or replace as required.
8.7.3 Insufficient braking power		
1	Foot-brake valve defective.	Have foot-brake valve checked by a specialist; repair or replace as required.
2	Wear on the brake disks.	Repair.
3	Oil loss in brake system.	Check and repair.
4	Discontinuous buzzing tone.	Malfunctions in service brake system. Lowest brake pressure range of 85 bar not reached. Check and repair.
8.7.4 Parking brake cannot be released		
1	No brake pressure.	Check oil supply to pump and shut-off valve, repair or replace.
2	Disk brake is sticking.	Check and repair.
3	Parking brake valve defective.	Check and repair or replace.
4	Oil loss in parking brake system.	Check and repair.

Possible cause		Remedy
8.7.5 No driving function		
1	Faulty drive engine.	Check the drive engine.
2	Too little hydraulic oil in tank.	Top up hydraulic oil to mark on sight glass.
3	Hydraulic pump has failed.	Have the pump examined by a specialist for mechanical damage. Replace the entire hydraulic pump.
4	Pump drive is faulty.	Replace the pump drive. Examine to discover cause of the fault.
5	Main excess pressure valve is faulty or set incorrectly.	Have the main excess pressure valve replaced by a specialist.
6	No pilot pressure.	Measure the pilot pressure and find where the problem is.
7	Solenoid valve defective.	Have solenoid valve checked by a specialist; repair or replace as required.
8	Power supply to solenoid valve interrupted.	Have the power supply to the solenoid valve checked by a specialist and repaired if necessary.
9	Mechanical connection to axle interrupted.	Check and repair.
10	Service or parking brake engaged.	Release brakes.
8.7.6 Sluggish acceleration and deceleration, too little drawbar pull		
1	Engine does not have sufficient power.	Check the diesel engine.
2	One of the brakes is sticking.	Check, remedy fault.
3	Main excess pressure valve is faulty or set incorrectly.	Have the pressure checked by a specialist. Readjust the main excess pressure valve and replace if necessary.
4	Oil loss in rotary transmission.	New seal for rotary transmission.
5	Air filter clogged.	Clean air filter and replace if necessary.
6	High pressure level is too low.	Check high pressure, replace or re-adjust HP valves if necessary.
7	Pump does not travel fully.	Have pump checked by a specialist; readjust if necessary.
8	Internal damage to variable displacement pump or engine.	Have the units replaced by a specialist.

Possible cause		Remedy
8.7.7 Loading equipment is not working		
1	All travel and work functions are disabled.	Release the travel and work functions (see chapter 5.1.4 "Disabling all travel and work functions").
2	Armrest switch faulty.	Check the armrest switch and repair or replace if necessary.
3	Oil supply to hydraulic pump interrupted.	Check the lines.
4	Hydraulic pump has failed.	Have hydraulic pump checked by a specialist, replace complete pump if necessary.
5	Main excess pressure valve has failed or is set incorrectly.	Have main excess pressure valve checked by a specialist, replace complete pump if necessary.
6	Engine temperature above 110 °C.	Allow the engine to cool down (see chapter 4.4.3 "Monitoring the machine during operation").
8.7.8 Machine has reduced power		
1	Engine has insufficient power.	Check the diesel engine.
2	Hydraulic oil level is too low.	Top up hydraulic oil to mark on sight glass.
3	Pump is taking in air.	Retighten the hose connections. Replace the O-ring or seals.
4	Working pressure too low.	Have main excess pressure valve readjusted by a specialist; replace pump if necessary.
8.7.9 Machine is working too slowly and hydraulic oil is getting hot		
1	Main excess pressure valve is set too low or faulty.	Have main excess pressure valve readjusted by a specialist; replace pump if necessary.
2	Hydraulic pump has impermissible degree of wear.	Replace hydraulic pump.
3	Incorrect hydraulic oil.	Hydraulic oil must be of the recommended quality.
4	Hydraulic oil level is too low.	Top up hydraulic oil to mark on sight glass.
5	Oil cooler dirty or faulty.	Clean oil cooler, check and replace if necessary.
6	Air in hydraulic system.	Vent the pilot control. Tighten connections with engine off and system relieved of pressure.
7	Fine mode not set to 100.	Check if Fine mode is set to 100; set to 100 if required.

Possible cause		Remedy
8.7.10 Hydraulic oil exceeds max. permissible temperature		
1	Thermostat in fan motor defective.	Replace thermostat.
2	Hydraulic oil level is too low.	Top up hydraulic oil to mark on sight glass.
3	Oil cooler dirty or faulty.	Clean oil cooler, check and replace if necessary.
8.7.11 Swinging motion of the uppercarriage cannot be stopped		
1	Defective swing brake.	Re-seal foot brake pedal, replace disks.
2	Secondary valves faulty or set incorrectly.	Readjust secondary valves, replace if necessary.
3	Swing gear motor leaking – internal wear.	Replace the hydraulic motor.
8.7.12 Hydraulic cylinders are weakening		
1	Seals in hydraulic cylinders are worn.	Replace the seals.
2	Secondary valves faulty or set incorrectly.	Check secondary valves; replace if required.
3	Main excess pressure valve set incorrectly.	Have main excess pressure valve checked by a specialist, replace pump if necessary.
8.7.13 Malfunctions in the electrical system		
1	Outside and/or interior light not working.	Check cables, connections, bulbs and fuses.
2	Windshield wiper does not work.	Check cables, connections and fuses. Examine windshield wiper for mechanical damage. Corrosion on contacts between front windshield and cab. Replace complete windshield wiper if necessary. Close the front windshield and lock it into place correctly.
3	Horn does not work.	Check the cables, connections and fuses. If necessary, replace the entire horn and have a specialist find out what caused the defect.
4	Warning/indicating components are not working accurately.	Have an expert determine the source of the problem/malfunction and eliminate it.
5	Starting system does not work satisfactorily.	Check charge capacity of the batteries. Test starter functions. Check connection and condition of power and battery ground cables. Have the functionality of the ignition lock checked and replace if necessary. Check battery disconnect switch.

Possible cause		Remedy
8.7.14 Malfunctions in the magnet system		
1	In the event of malfunctions in the magnet system, e.g. no magnetizing or no de-magnetizing function.	Have the fuses checked by a specialist and eliminate defects.
8.7.15 Work attachments		
1	Grab does not open or close, or opens and closes too slowly.	Check quick coupling, replace if required.
2	Grab does not rotate.	Check quick coupling and electrical connection between micro switch and solenoid valve.

9 Appendix

9.1 Arrangement of fuses

CAUTION

*Use only original fuses. Electrical fuses must **never** be bypassed or repaired.*

The table below shows the fuses and relays in the central electrical system:

Fuse number	Release current	Terminal designation	Functionality
F 1	50 A	Terminal 30	Master fuse terminal 30
F 2	70 A	Terminal 15	Master fuse terminal 15
F 3	3 A	Terminal 30	Multifunction monitor
F 4	7.5 A	Terminal 30	Parking light
F 5	15 A	Terminal 30	Supplementary heating option
F 6	5 A	Terminal 30	Supplementary heating option
F 7	15 A	Terminal 30	Radio, socket, cigarette lighter
F 8	5 A	Terminal 30	Reserve
F 9	20 A	Terminal 30	Working floodlight on roof, flasher lights front/rear, parking light, headlamps
F 10	20 A	Terminal 30	Refueling pump option
F 11	5 A	Terminal 15	Close-range cut-off sensors
F 12	10 A	Terminal 15	Diesel tank level transmitter
F 13	3 A	Terminal 15	CAN +VBBc, CR2031
F 14	10 A	Terminal 15	Blower
F 15	7.5 A	Terminal 15	Flasher control front/rear
F 16	5 A	Terminal 15	Multifunction monitor
F 17	10 A	Terminal 15	(B1) magnet system enable, travel, working hydraulics, rotating beacon option
F 18	7.5 A	Terminal 15	Load limit sensing control
F 19	5 A	Terminal 15	(B2 inputs) dozer blade option, rotating beacon option, magnet system option, transport setting, multi-purpose stick option, brake pressure monitoring, armrest switch, pressure increase, grab rotation left/right, reserve push-button four-way control lever left, "Magnet on" push-button, reserve push-button four-way control lever right, blower stages
F 20	10 A	Terminal 15	CAN-BUS, CR2012 – operating voltage
F 21	5 A	Terminal 15	Air conditioning
F 22	5 A	Terminal 15	Proximity switch for service ladder, proximity switch for piston detector / lubrication distributor
F 23	7.5 A	Terminal 15	Reserve relay (K 12, K 13)
F 24	2 A	Terminal 15	CR0020 – VBBs sensors supply
F 25	5 A	Terminal 15	Generator, charge indicator lamp on central control unit
F 26	7.5 A	Terminal 15	Reserve relay (K 14, K 15)
F 27	10 A	Terminal 30	Reserve X30:81 / X30:82
F 28	15 A	Terminal 30	Reserve X30:83 / X30:84

Fuse number	Release current	Terminal designation	Functionality
F 29	3 A	Terminal 15	EMR3 main relay control
F 30	25 A	Terminal 15	EMR3 main relay
F 31	5 A	Terminal 15	Power relay activation K 1
F 32	10 A	Terminal 15	Air conditioning condenser M 1
F 33	10 A	Terminal 15	Air conditioning condenser M 2
F 34	10 A	Terminal 15	Air conditioning condenser M 3
F 35	15 A	Terminal 15	CR2031 – undercarriage
F 36	15 A	Terminal 15	CR2031 – VBBo (output)
F 37	30 A	Terminal 15	Back-up fuse air conditioning condenser M 1 – M 3
F 38	10 A	Terminal 15	Air conditioning
F 39	10 A	Terminal 15	CR0301 digital outputs X3/Ucom01/Ucom02, load limiter unit mode – CEB16 Mode 2, working floodlight on roof
F 40	15 A	Terminal 15	Washwipe window below, wiper motor, driver's seat
F 41	10 A	Terminal 15	Hydraulic oil return filter clogging sensor, hydraulic oil temperature sensors, hydraulic oil level sensor, open/close grab pressure switch, "travel" pressure switch, auto-idling system pressure switch, parking brake pressure switch
F 42	10 A	Terminal 15	CAN-BUS, CR0301 – operating voltage
F 43	7.5 A	Terminal 15	Reserve
F 44	10 A	Terminal 15	CAN-BUS, CR2012 – operating voltage
F 45	15 A	Terminal 15	CR0020 – VBBo supply outputs
F 46	15 A	Terminal 15	Working floodlights
F 47	15 A	Terminal 15	CR0020 – VBBR supply through relay
F 48	15 A	Terminal 15	Steering column reserve
F 49	3 A	Terminal 15	Water level probe
F 50	15 A	Terminal 15	Reversing fan mode option
F 51	7.5 A	Terminal 15	EMR3, air differential pressure switch, diagnostic plug EMR3
F 52	15 A	Terminal 15	Undercarriage, transmission speed sensor option
F 53	15 A	Terminal 15	Reserve X30:89 / X30:90
F 54	15 A	Terminal 15	Cab protection ventilation power supply

CR0020 I/O module
CR0301 I/O module – operator control panel
CR2012 Extension module 12 I / 4 O
CR2031 Central area – valve island, cab output module

Power supply:

F1-Mega	100 A	Generator
F2-Mega	100 A	Pre-heat relay glow plugs
F3-Mega	100 A	Terminal 30
F4-Midi	40 A	Ignition lock

Arrangement of the relays

Relay number	Functionality
Central electrical system	
K 1	Power relay terminal 15
Engine environment	
K 2	Power relay pre-heat relay
Operator control panel board (switch above)	
K 1, K 2, K 3	Fan stage 1 – 3
K 4	Working floodlight on roof
K 5	Parking light
Central electrical system board	
K 2	EMR3 main relay
K 3	Air conditioning condenser fan
K 4	Working floodlight on roof
K 5	Reversing fan mode option
K 6	Reserve
K 8	Preheat display
K 9	Reserve
K 10	Diesel tank level transmitter
K 11	Refueling pump option
K 12	Reserve
K 13	Reserve
K 14	Reserve
K 15	Reserve

9.2 Conversion factors

Pressure

1	bar	=	100 Kpa	=	14.5 psi
10	psi	=	68.95 Kpa	=	0.6895 bar

Flow

1	l/min	=	0.0353 cfm
1	gallon (Brit.)/min	=	0.1605 cfm

Distances

1	km	=	39370 in	3280.8 ft	1093.6 yd	0.62137 mile	0.53996 n mile	10^6 mm	1000 m

Weight

1	kg	=	2.205 lb	=	35.27 Oz

Length

1	m	=	1000 mm	=	39.38 inch	=	3.281 ft
1	inch	=	25.4 mm	=	0.0254 m	=	0.08333 ft
1	ft	=	304.8 mm	=	0.3048 m	=	12 inch

Output

HP	=	kW x 1.341
KW	=	HP x 0.746

Temperature

°F	=	(°C x 9/5) + 32
°C	=	(°F – 32) x 5/9

Volume

1	m^3	=	1000 liters	=	35.31 ft^3	=	61020 $inch^3$
1	ft^3	=	28.32 liters	=	0.02832 m^3	=	1728 $inch^3$
1	l	=	0.2642 gallons (US)	=	0.2201 gallons (Brit.)	=	
1	gallon (US)	=	3.785 liters	=	231 $inch^3$	=	
1	gallon (Brit.)	=	4.544 liters	=	277 $inch^3$	=	

10 Special Equipment

The parts and functions described in this chapter are special equipment, which may differ from standard equipment.

It may happen that the functions described in the operating instructions are supplemented by functions described in this chapter.

Chapters 1 to 9 of these operating instructions are valid despite special equipment.

10.1 Multi-purpose stick

10.1.1 Transport dimensions with multi-purpose stick

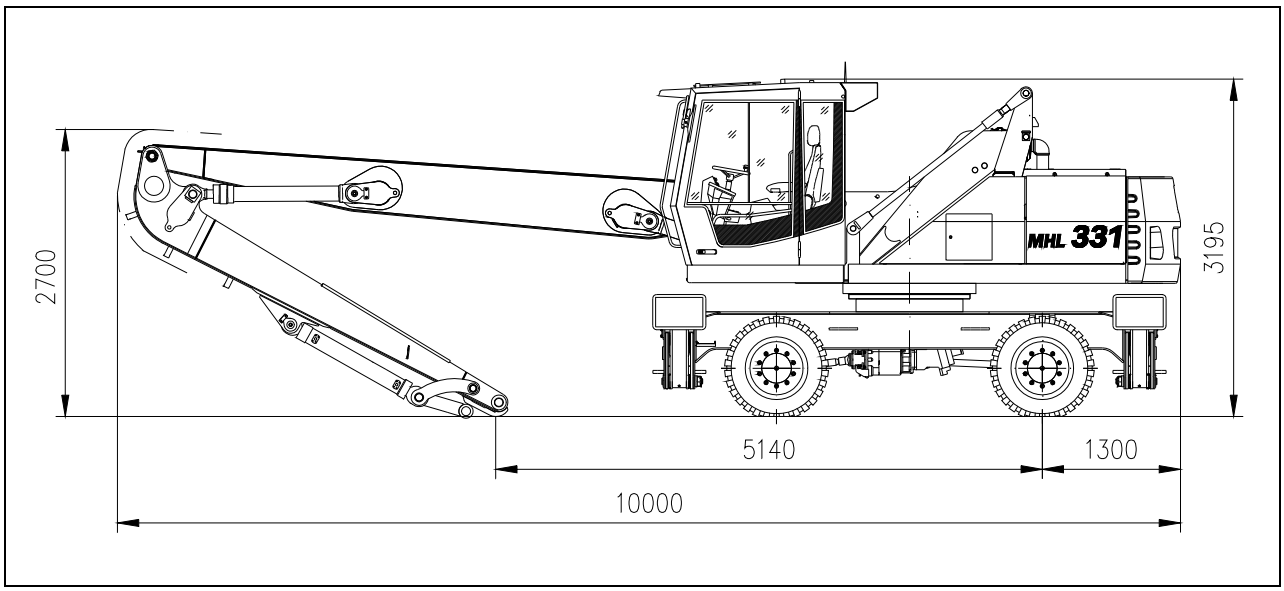


Fig. 115 Transport dimensions with multi-purpose stick (dimensions in mm)

10.1.2 Working zone of the machine

10.1.2.1 Working range diagram (10.7 m loading equipment)

Loading equipment: box-type boom 6.5 m, multi-purpose stick 4.0 m and sorting grab

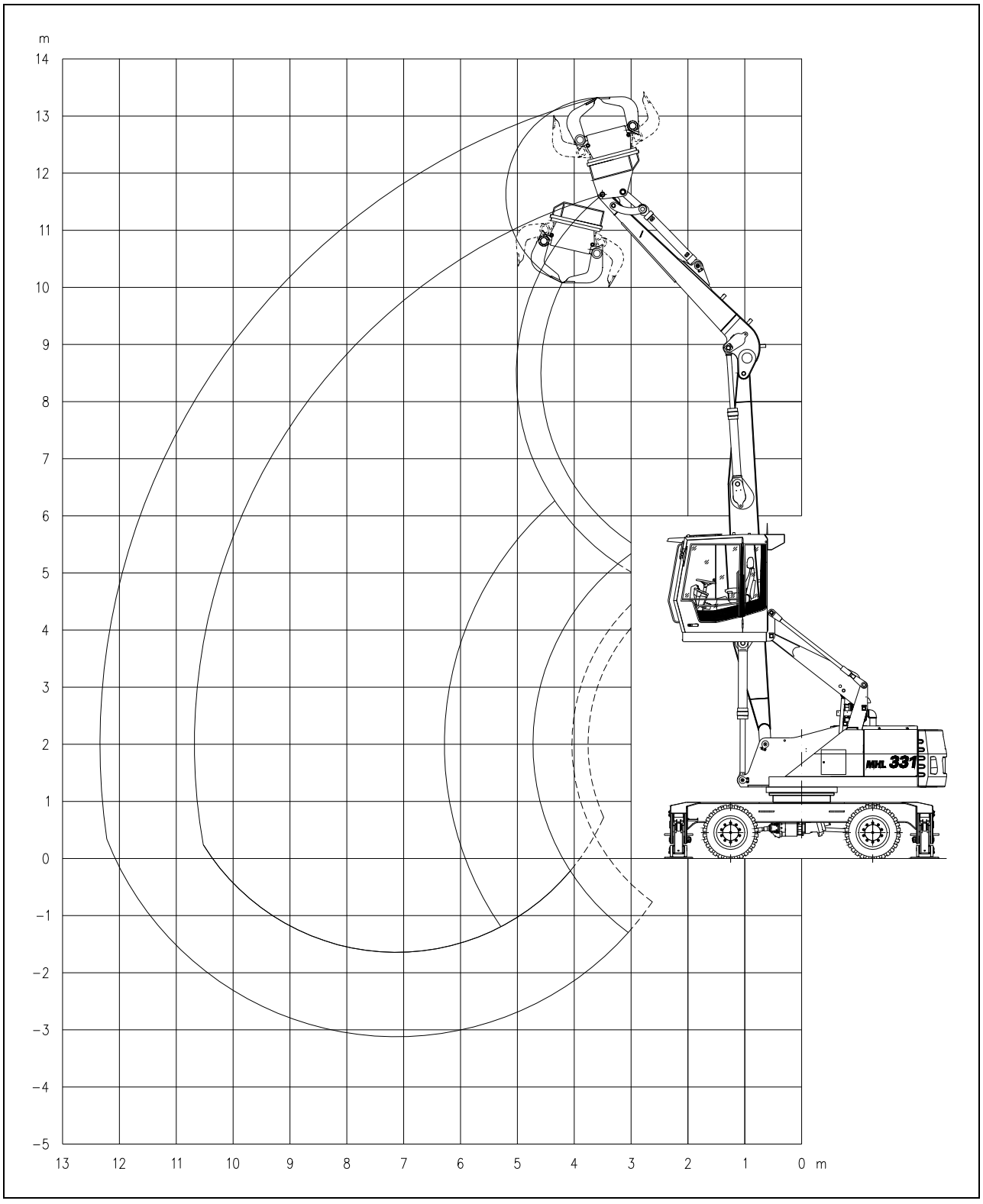


Fig. 116 Working range diagram (10.7 m loading equipment)

10.1.2.2 Table of carrying capacity (10.7 m loading equipment)

The carrying capacity values are stated in metric tons (t). The pump pressure for this table is 360 bar. The figures are 75 % of the static overturning limit or 87 % of the hydraulic lifting force, in compliance with DIN ISO 10567, marked (°).

When the machine is standing on solid, even ground, the values apply to slewing operation through 360°. The figures in brackets apply in the longitudinal direction of the undercarriage with the oscillating axis locked. The values specified as "not supported" apply when the load is hoisted above the front or rear axle.

! ATTENTION

The weight of the attached load hoisting equipment (grab, magnet, load hook, etc.) must be deducted from the carrying capacity values.

In accordance with CE guidelines, hose rupture safety devices on the boom cylinders and an overload warning device are required for crane operation.

Loading equipment: box-type boom 6.5 m, multi-purpose stick 4.0 m						
Height	Undercarriage	Reach in m				
m	Outrigger	4.5	6	7.5	9	10.5
9	not supported		(5.0)	(3.4)		
	4-pt. supported		6.4° (6.4°)	5.0° (5.0°)		
7.5	not supported		(4.9)	(3.4)	(2.4)	
	4-pt. supported		6.4° (6.4°)	5.4 (5.7°)	4.0 (4.0°)	
6	not supported	(7.7)	(4.8)	(3.3)	(2.4)	
	4-pt. supported	8.3° (8.3°)	6.8° (6.8°)	5.4 (5.9°)	3.9 (4.9)	
4.5	not supported	(7.1)	(4.5)	(3.2)	(2.3)	
	4-pt. supported	9.8° (9.8°)	7.5 (7.6°)	5.2 (6.3°)	3.9 (4.8)	
3	not supported	(6.4)	(4.2)	(3.0)	(2.2)	(1.7)
	4-pt. supported	11.4 (11.8°)	7.1 (8.4°)	5.0 (6.3)	3.8 (4.7)	2.9 (3.7)
1.5	not supported	(5.8)	(3.9)	(2.8)	(2.1)	(1.7)
	4-pt. supported	7.6° (7.6°)	6.8 (8.7)	4.8 (6.1)	3.7 (4.6)	2.9 (3.6)
0	not supported	(5.6)	(3.7)	(2.7)	(2.1)	
	4-pt. supported	6.3° (6.3°)	6.6 (8.5)	4.7 (6.0)	3.6 (4.5)	
-1.5	not supported			(2.7)		
	4-pt. supported			4.6 (5.9)		

Fig. 117 Table of carrying capacity (10.7 m loading equipment)

10.2 Dozer blade

10.2.1 Dozer blade for 4-point outrigger

The dozer blade (118/1) can be used to clear small loose objects lying on an even surface to the side (for example scrap or pieces of wood). The blade can be positioned at a "floating" level on the surface or at a fixed height.

When the **"float position"** is activated, the blade sinks to the surface due to its own weight and adjusts "floating" to the unevenness of the surface. If the unevenness is greater, the blade must be raised. Although the "float position" is the preferred setting, it may dig into the ground if the soil is soft. In this case the blade has to be lifted.

The blade can still move upward in "floating" mode in the raised setting.

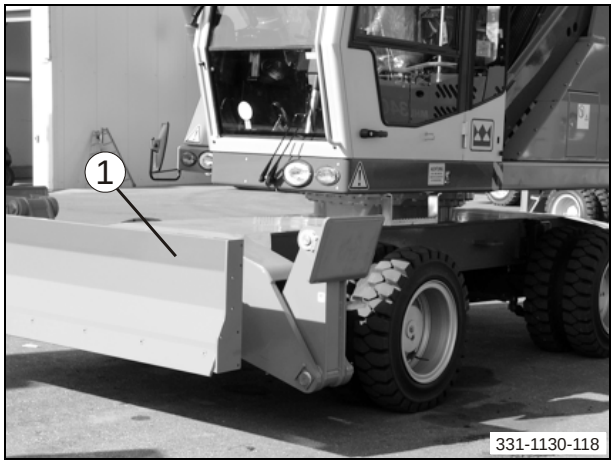


Fig. 118 Dozer blade in addition to the 4-point outrigger support

10.2.2 Operating the dozer blade

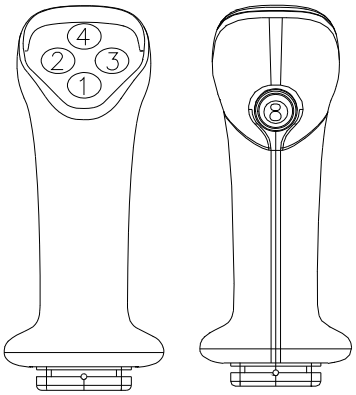
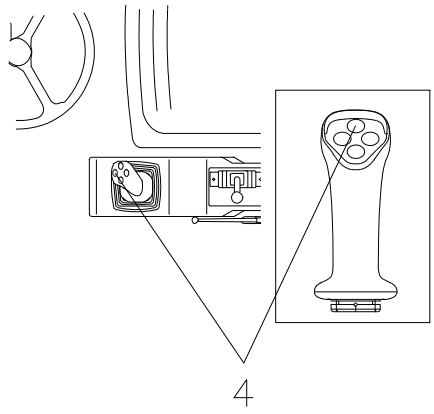
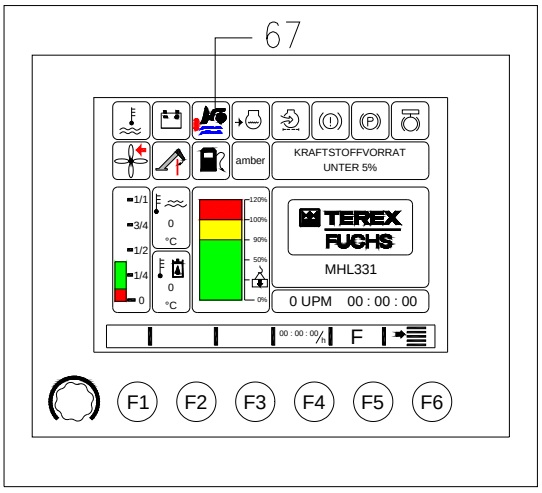
CAUTION

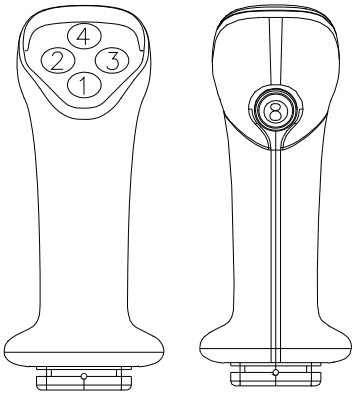
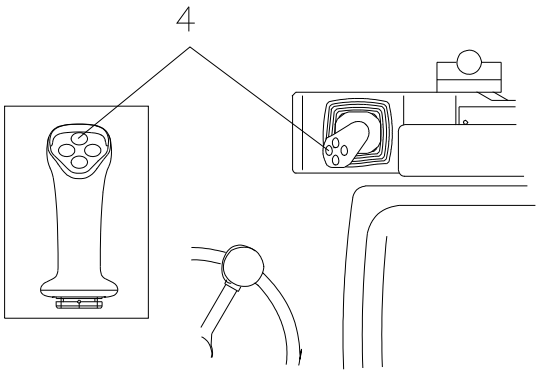
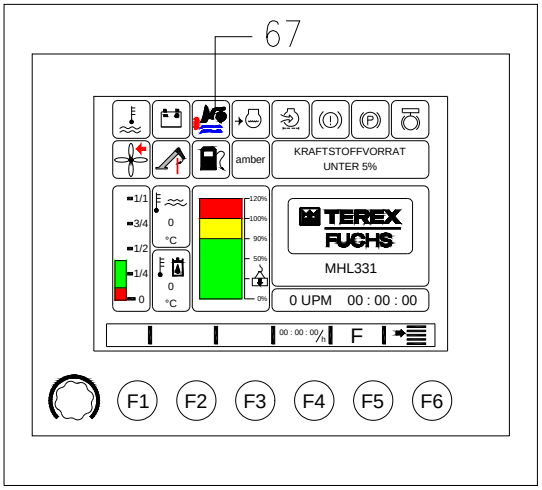
Damage can be caused to the dozer blade by:

- *a high level of unevenness (for example curb stones, etc.)*
- *speed not properly adjusted*

If necessary, raise the dozer blade and adjust the speed.

Operating the dozer blade

Four-way control lever, left	
 Fig. 119	1 = Push-button for magnet system 2 = Push-button for flasher left 3 = Push-button for flasher right 4 = Push-button for to raise the dozer blade 8 = Dead man's button
  Fig. 120	**To raise the dozer blade:** ⇨ Activate push-button (120/4) and hold it down. Indicator (120/67) "Float position" on the multi-function monitor is not lit. **To stop raising:** ⇨ Release push-button (120/4).

Four-way control lever, right	
 Fig. 121	1 = Push-button for increasing the operating pressure 2 = Push-button for grab rotation to the left 3 = Push-button for grab rotation to the right 4 = Push-button for to lower the dozer blade 8 = Push-button for horn
  Fig. 122	**To lower the dozer blade:** ⇨ Activate push-button (122/4) once. The blade sinks to the surface and can be adjusted in both directions up and down to adjust to surface and soil conditions during clearing. Indicator (122/67) "Float position" on the multi-function monitor is lit. **To stop lowering:** ⇨ Activate push-button (122/4) again. Indicator (122/67) "Float position" on the multi-function monitor goes out.

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