



Hako
Clean ahead



Operation and Maintenance Instruction

Hako-Citymaster 2000 (1411) Euro 3

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The technical data, special equipment (options) as well as the figures in this Operation Manual are not binding.

Certain special equipment (options) in this Operation Manual may not yet be available at the time of the delivery.

Subject to modifications.

These operation and maintenance instructions are valid only for the following models/vehicle versions:

The cover features the vehicle with possible optional equipment.

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1 Introduction

1.1 Notes on this Operation and Maintenance Manual

This operation and maintenance manual contains important information on how to work safely, correctly and economically with your **Citymaster**. Therefore, it aims not only at new operators, but is also a reference for experienced ones. It helps to avoid dangerous situations, and reduce repair costs and downtimes. Furthermore, the reliability and the service life of the vehicle will be increased by following the instructions in the operation manual. For these reasons, the operation and maintenance manual **must** always be kept at hand in the vehicle.

Your own safety, as well as the safety of others, depends to a great extent on how the vehicle is moved and operated. Therefore, carefully read and understand this operation and maintenance manual prior to the first drive. This operation and maintenance manual will help to familiarise yourself more easily with the vehicle, thereby enabling you to use it more safely and efficiently.

Prior to the first drive, carefully read Section 2 "Safety Instructions" as well, in order to be prepared for possible dangerous situations, as it will be too late for it during operation. As a rule, keep the following in mind:

Careful and prudent working is the best way to avoid accidents!

Operational safety and readiness of the vehicle do not only depend on your skill, but also on maintenance and service of the vehicle. This is why regular maintenance and service work is absolutely necessary. Extensive maintenance and repair work should always be carried out by an expert with appropriate training. Insist on using original spare parts when performing maintenance and repair work. This ensures operating safety and readiness and condition in accordance with the regulations of your vehicle and maintains its value.

Your authorised Hako dealer will be pleased to answer further questions regarding the vehicle or the operation and maintenance manual.

We urgently recommend to read this manual!


1.2 Notes on Using the Position Numbers

The controls always have the same position numbers across all sections. You can fold out the overview pages for better orientation.

The symbols used in the description have the following meanings:

- This symbol stands for an enumeration
 - This symbol stands for the subdivision of an enumeration or an activity. If possible, follow the recommended sequence.
- ☞ *This symbol requires you to carry out the activity described*
 - ➔ This symbol marks the passages in the text describing the effects or results of an activity

1.3 Abbreviations/Symbols

Abbreviation/ Symbol	Explanation
	This symbol shows the direction of travel – for better orientation in figures and graphics.
ADR	Work speed control
AWS	Superstructure change system
BG	Size
Bh	Operating hours
EBD	Electronic brake effort distribution system
DIN	German Industrial Standard
NW	Nominal width
o. Abb.	not shown
SO	Option
	Used whenever controls or other components of the vehicle are installed as an option.
SWV	Quickhitch facility
UVV	Accident prevention regulations
StVO	Road Traffic Regulations of the Federal Republic of Germany
StVZO	Road use registration of the Federal Republic of Germany

1.4 Vehicle data

The following data provide a detailed description of your vehicle. Please supply your authorised Hako workshop or Hako-Werke GmbH with these data for all correspondence or telephone inquiries.

- Vehicle type: _____
- Serial no.: WMU _____
- Hako-article no.: _____
- Commissioning / date of registration: _____
- Operating hours / kilometre reading: _____
- Engine no.: _____
- Hydraulic pump no.: _____
- Hydraulic motor no.: _____
- Front wheel no.: _____
- Rear axle no.: _____
- Optional implements: _____

Please enter the applicable vehicle data in the above list. They will immediately be at hand for all inquiries or spare parts orders.

Your local Hako dealer

- Address: _____

- Telephone: _____

1.5 Brief description

The Citymaster has been designed as a tool carrier / machine.

The large number of possible applications make for year-round operation. In addition to the sweeping equipment, the Citymaster can be equipped with snow blade or spreader.

The vehicle is equipped as per StVZO (German road use registration).

Its maximum speed is 50 kph with
tyres 225/75 - R16C.

The main components are:

- Modern and comfortable cab in "space frame design" with 3-fold adjustable suspension seat for the driver and unsprung passenger's seat, all-around tinted windows, heated windscreen, warm water heating
- 4-cylinder turbodiesel engine with 63 kW performance, meets exhaust standard Euro III according to 1999/96 EC
- Torsionally flexible, welded ladder frame, offset and inclined in the front part
- High driving comfort due to helical springs, auxiliary rubber springs and hydraulic oscillation stabilisers.
- Rigid axles on 4 trailing arms each and panhard rod, front axle as steering and drive axle, rear axle as driving axle, optionally as steering and drive axle
- Hydrostatic steering, optionally with four wheel steering (not in transport mode)
- Hydrostatic drive with automatic control and differential lock switchable under load
- Two drive modes:
1st drive mode 0 – 15 kph
2nd drive mode 0 – 50 kph (0 – 25 kph reverse)
- Hydraulic 2-circuit brake system with power brakes on front and rear wheels. Load-dependent brake-power controller on rear axle, mechanical parking brake on separate brake drum on transfer gearbox acting on the rear axle
- Powerful, operator-friendly hydraulic system:
 - Adjustable axial piston pump (116 l/min at 280 bar) with front and rear plug connections
- Front power lift with mounting triangle, rear power lift (optional)

1.6 Implements

The available implements will primarily determine where and how the vehicle can be used.

The following implements are available:

- Outdoor cleaning:
 - Compact sweeper including sweeping unit, suction port and dirt hopper
- Optional winter service accessories:
 - Additional parts for fitting winter service tools
 - Snow blade
 - Sand and salt spreader
 - Pre-sweeper

Your authorised Hako dealer/workshop will be pleased to inform you which implements and superstructures are possible and allowed for your vehicle. All implements must have been released by Hako.

Bear in mind the following when driving on public roads with implements fitted.

- The legal regulations of your country, especially those concerning the use of implements
- The regulations specified in the operation licence or in the vehicle papers
- The axle loads specified in the operation licence or in the vehicle papers as well as the gross weight rating

In addition, bear in mind the mandatory regulations relevant to accident prevention.

1.7 Regulations

Driving licence

According to the old Driving Licence Act of the Federal Republic of Germany, the driver of the Citymaster used as a machine or other vehicle tool carrier must be bearer of a driving licence of the following classes:

- Class 2: Motor vehicle of 7.5 tons or more or combination with more than 3 axles with bearing in mind the total weights of the combination!
- Class 3: Motor vehicle of up to 7.5 tons. Applies for drawbar combinations as well (= Citymaster as tool carrier plus trailer) and including not more than three axles; (towing a single-axle trailer only is admitted; two axles with a distance of 100cm and less are considered as one axle.

According to the reformed German Driving Licence Act applicable from 1.1.1999, drivers of the Citymaster used as a machine or other motor vehicle - tool carrier must be bearer of a driving licence of the following classes:

- Class C: Motor vehicle of 3.5 tons and more with trailer of up to 750 kg
- Class CE: Motor vehicle of 3.5 tons and more with trailer of 3.5 tons and more (but limited to up to a total combination weight as specified by the manufacturer)
- Classes B and BE: Motor vehicle of up to 3.5 tons and trailer of up to 750 kg (admissible total weight) or trailer of up to the empty weight of the towing vehicle as long as an admissible total weight of 3.5 tons for the combination is adhered to.

Equipment

The legal regulations of your country may require you to equip your vehicle with the following (not included in the scope of delivery):

- 1 warning triangle with design certification
- 1 warning light with design certification
- 1 warning vest
- 1 first-aid kit in accordance with the legal regulations of your country

Observe the relevant national regulations in your country.

Documents

Observe the legal regulations of your country which deal with the documents required for driving and working with the vehicle, such as driving licenses, general certifications, vehicle registrations etc.

- Vehicle registration certificate
- Valid driving licence of vehicle driver

Observe the relevant national regulations in your country.

Vehicle inspection

- Get informed on the national regulations of your country.
- Your vehicle may possibly be subject to registration.

Observe the relevant national regulations in your country.

1.8 Labels at the Machine

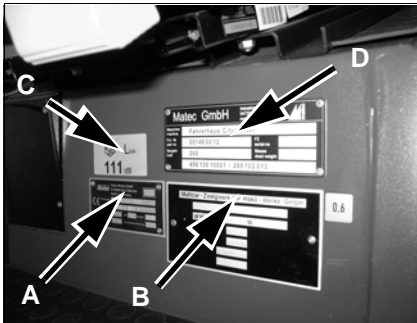


Fig. 1:

The following safety and information labels are legibly attached to the vehicle. Replace missing or illegible labels immediately.

Nameplate and Manufacturer's plate

In the driver cab under the driver's seat are located:

Nameplate (A), chassis number (B), noise emission value (C) and driver cab number (D).

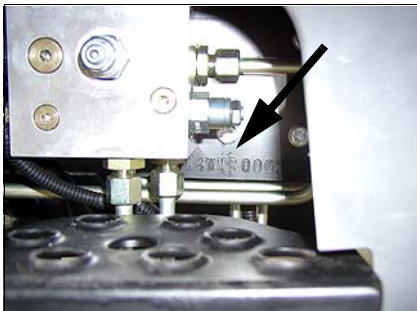


Fig. 2:

Vehicle ID on chassis

The Vehicle ID is stamped on the vehicle frame on the front right side (behind the foothold).

Example:

WMU2X560V4W000001



Fig. 3:

Engine number

The engine number is located on the type label on the timing case cover and stamped on the engine block.

Example:

AVM / 01176

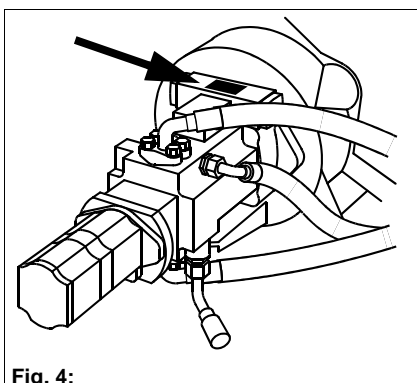


Fig. 4:

Hydraulic pump

The type label (arrow) is located on the flange connecting the hydraulic pump to the engine.

Example:

A4VG40 EP1DT1/32R-NAC02F025LT

9602124 252.15.41.10

Identification no. 4420219

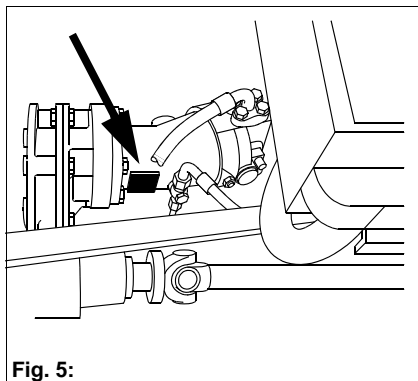


Fig. 5:

Hydraulic motor

The type label (arrow) is located on the lower side of the hydraulic motor housing.

Example:

A6VM 80 EP1/63W-VZB017DAT

9604224 262.20.42.75

Identification no. 4465615

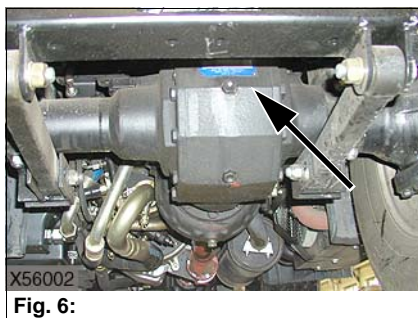


Fig. 6:

Rear axle

The rear axle number is stamped on top of the input flange.

Example:

Y 732211

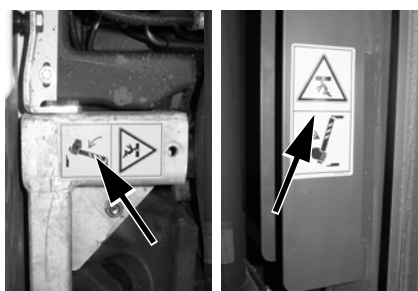


Fig. 7:

Pinching hazard label (safety strut)

Staying under unsupported dirt hopper is prohibited.

Before working under a lifted dirt hopper, make sure to have properly fastened the foldable safety stand. The pinching hazard labels have been attached in the dirt hopper area (superstructure or safety strut).



Fig. 8:

Maximum vehicle speed:

Maximum authorised vehicle speed in kph.

The labels are located at the vehicle rear and at the hopper sides.

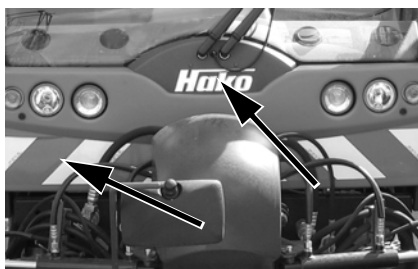


Fig. 9:

Hako-Label:

The Hako labels are located under the windscreen wipers, at the lateral fairing and the hopper rear.

Safety foil

Safety foils (red/white) have been attached at the front under the headlights and to the tool box at the rear.

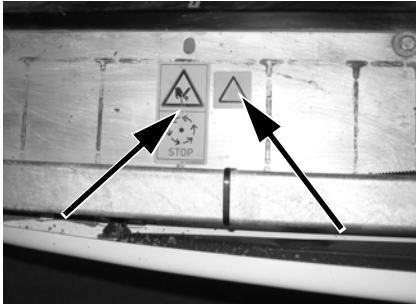


Fig. 12:

Burning surfaces

Burning hazard due to heated surfaces of the cooling system. The label is located at the radiator.

Rotating parts

Risk of injury due to rotating parts of the cooling system. The label is located at the radiator.

2 Safety instructions

2.1 Identification of warnings and dangers

Important indications regarding the safety of the operating personnel and the vehicle are indicated in this operation manual with the following terms and symbols:



Danger!

Failure to observe the instructions identified by this symbol may result in personal injury or death for the operator or other persons.

Measures for avoiding danger



Caution!

Failure to observe the instructions identified by this symbol may result in damage to the vehicle.

Measures for avoiding danger for the vehicle



Important!

This symbol identifies instructions for a more efficient and economical use of the vehicle.



Environment!

Failure to observe the instructions identified by this symbol may result in damage to the environment.

The environment is in danger if environmentally hazardous material (e.g. waste oil) is not subject to proper use or disposal.

2.2 Warranty

Warranty claims can be made only if the conditions of warranty have been observed. They are included in the General Conditions of Sales and Delivery for vehicles and spare parts manufactured or sold by Hako-Werke GmbH, Federal Republic of Germany. Furthermore, the instructions in this operation manual must be observed.

2.3 Designated use and exemption from liability

- The Hako-Citymaster 2000 is used as tool carrier / machine for industrial and municipality work around the year. This implies outdoor cleaning by use of the sweeping unit, the suction port and the dirt hopper as well as the optional winter service by use of a snow blade, a sand or salt spreader and a pre-sweeper.

Every other application is regarded as not designated for the use of the vehicle.

Hako-Werke GmbH will not be liable for damage resulting from use other than mentioned above. The user alone will bear the risk.

Designated use also includes observing the instructions in the operation manual and observing the conditions of maintenance and service.

- Observe the pertinent regulations relevant to accident prevention, other generally acknowledged regulations regarding safety and occupational medicine, as well as the regulations and standards relevant to motor vehicles and traffic which are valid in your country. Hako-Werke GmbH will not be liable for damage resulting from the failure to observe these regulations.
- The safety of the vehicle can be negatively affected by carrying out vehicle modifications without proper authority and by using spare parts, equipment, implements and optional equipment which have not been checked and released by Hako-Werke GmbH. Hako-Werke GmbH will not be liable for damage resulting from this.
Any unauthorised modification invalidates the Type Approval according to §19(2) StVZO. The vehicle no longer complies with the model described in the manufacturer documentation. This entitles the manufacturer to refuse any warranty claims of the operator against the manufacturer.
- Hako-Werke GmbH will not be liable when:
 - Other implements are used than those checked and approved by Hako-Werke GmbH
 - The service and maintenance work specified in the operation and maintenance manual has not been performed correctly or not at all
- Hako-Werke GmbH will not be liable for personal injury and/or damage to property caused by failure to observe the safety instructions and the operation manual, and by the negligence of the duty to exercise due care when:
 - Handling
 - Operation
 - Servicing and carrying out maintenance work
 - Repairing the vehicle.

2.4 General conduct and safety instructions

Organisational measures

- The vehicle has been designed and built in accordance with state-of-the-art standards and the recognised safety regulations. Nevertheless, its use may constitute a risk to life and limb of the user or of third parties, or cause damage to the vehicle and to other material property.
- The vehicle must only be used in technically perfect condition in accordance with its designated use and the instructions set out in the operation manual, and only by safety-conscious persons who are fully aware of the risks involved in operating the vehicle. Any functional disorders, especially those affecting the safety of the vehicle, should therefore be rectified immediately!

Basic rule:

Before starting up the vehicle, inspect the vehicle for safety in work and road operation!

- Careful and prudent working is the best way to avoid accidents!
- The operating instructions must always be at hand at the place of use of the vehicle, and must therefore be kept in the storage compartment provided for in the cab.
Immediately complete or replace an incomplete or illegible operation manual.
- Also read carefully all additional instructions which may have been handed out to you before carrying out activities with which you are not familiar!
- When implements and superstructures are used, also pay attention to the operation manual of the respective manufacturer
- In addition to the operating instructions, observe the operator in all other generally applicable legal and other mandatory regulations relevant to accident prevention and environmental protection.
These duties may also concern handling hazardous substances, issuing and/or wearing personal protective equipment, or traffic regulations.
- Persons entrusted with work on the vehicle must have read and understood the operation manual and in particular, section 2 "Safety Instructions" before beginning work. This applies especially to persons working only occasionally on the vehicle, e.g. set-up or maintenance.
- The user/owner commits himself to operate and keep the vehicle in a perfect condition, and, if necessary or required by law, to require the operating or servicing persons to wear protective clothing.

- Never make any modifications, additions or conversions to the vehicle and its implements, which might affect safety without the approval of Hako-Werke GmbH! This also applies to the installation and the adjustment of safety devices and valves, as well as to welding work on load-bearing elements.
- Spare parts must comply with the technical requirements specified by Hako-Werke GmbH. Original spare parts can be relied to do so.
- Check the hydraulic hoses for damages at regular intervals.
- Before working on or with the vehicle, take off jewellery, such as rings, wristwatches, bracelets, etc., and tie back long hair and do not wear loose-fitting garments, such as unbuttoned or unzipped jackets, ties or scarves.
Injury may result from being caught up in the machinery or from rings catching on moving parts!
- Keep the vehicle clean. This reduces:
 - Fire hazard, e.g. due to oil-soaked rags lying around
 - Risk of injury, e.g. due to dirt or debris on the steps
 - Risk of accidents, e.g. due to dirt on the brake or accelerator pedal!
- Observe all safety, warning and information signs and labels on the vehicle.
- Adhere to prescribed intervals or those specified in the operation manual for routine checks/inspections and maintenance work!
- For the execution of service, inspection, maintenance or repair work, tools and workshop equipment adapted to the task on hand are absolutely indispensable.
- Any work on or with the vehicle must be executed by reliable personnel only. Do not let unauthorised persons drive or work with the vehicle! Observe statutory minimum age limits!
- The operators must have the required driving licenses
- Employ only trained or instructed staff on the vehicle, and set out clearly and unequivocally the individual responsibilities of the personnel for operation, set-up, maintenance and repair!
- Do not allow persons to be trained or instructed or persons taking part in a general training course to work on or with the vehicle without being permanently supervised by an experienced person!
- Work on the electrical system and equipment, on the chassis and the steering and brake systems may be carried out only by skilled personnel specially trained for such work.
Work on the hydraulic system of the vehicle must be carried out only by personnel with special knowledge and experience of hydraulic equipment!
- Use your mobile phone only after having stopped the vehicle and via a separate external antenna!
- Switch engine off and wait for standstill of fan before removing dirt from the clogged suction pipe!

2.5 Safety instructions regarding operation

Standard operation



Danger!

In some rare cases of internal soiling such as e.g. due to soiled hydraulic fluid, wear debris or residual dirt particles from system components, the controller valve of the travel drive axial plunger pump may block. The volume flow of the variable-displacement pump then cannot be controlled by the user any longer. In such cases, the vehicle may start moving slowly upon starting even in neutral lever position or the expected slowing down is not initiated when backing off the throttle during ride.

- ☞ Provide for safe condition of the machine then by braking with service or parking brake and immediate stop of the combustion engine by pulling ignition key
- ☞ Have the machine inspected or towed by qualified personal only

- Before beginning work, familiarise yourself with the surroundings and circumstances of the work site. These are for example obstacles in the working and travelling area, the soil bearing capacity and any necessary barriers separating the work site from public roads
- Take the necessary precautions to ensure that the vehicle is used only when in a safe and reliable state!
Operate the vehicle only if all protective and safety-oriented devices, such as removable safety devices, sound proofing elements and exhausters etc. are in place and fully functional!
- Check the vehicle at least once a day/per working shift for visible damage and defects. Report any changes (incl. changes in the vehicle's working behaviour) to the competent organisation/person immediately! If necessary, stop the vehicle immediately and lock it!
- In the event of malfunctions, stop the vehicle immediately and lock it! Have any defects rectified immediately!
- Start and operate the vehicle from the operator seat only unless special controls intended for this purpose are available!
- Carry out start-up and shut-down procedures in accordance with the operation manual, and observe the telltales!
- Before putting the vehicle/implement into operation (start-up/moving), make sure nobody is at risk by putting the vehicle/implement into operation!
- Before driving with the vehicle, and also after interrupting work, check whether the brakes, the steering, signalling and light systems are functional!

- Before moving the vehicle always check whether the supplementary equipment and the implements have been safely stowed away or attached!
- Always switch on the lights by poor visibility and after dark!
- Persons accompanying the operator must sit on the passenger seats provided for this purpose. Never carry persons on the tipper nor on implements and superstructures!
- When working in buildings or in enclosed areas, watch out for the
 - Height of the ceiling
 - Width of the entrances
 - Maximum load of the ceilings and floorsProvide for sufficient room ventilation – risk of poisoning!
- Avoid any operation that might be a risk to vehicle stability!
- During operation on slopes, drive or work uphill or downhill. Tipping hazard when riding transverse to the hill!!
Always keep the implements/work equipment close to the ground. This also applies to driving downhill!
- On sloping terrain always adapt your driving speed to the prevailing ground conditions. Never change to a lower gear on a slope but always before reaching it!
- Before leaving the operator seat always secure the vehicle against inadvertent movement and unauthorised use!
Lower the work equipment/implements to the ground.
- Before starting work, check whether
 - All safety devices are properly installed and functional
 - Warning triangle
 - Approved warning light
 - First-aid kitare available
- Before moving the vehicle or before starting work:
 - Make sure visibility is sufficient (do not forget rearview mirrors!)
 - Adjust correct seat position (brake pedal must be depressed to the limit).
Never adjust the operator seat when driving or working!
 - Fastening the seat belt
 - Inspect the immediate area (children!)The operator is responsible for third parties in the work area!
- Caution when handling fuel – increased risk of fire!
Make sure fuel does not come into contact with hot parts!
Do not smoke during refuelling, and avoid fire and sparks! Stop the engine during refuelling and do not smoke!

- Never get on or off a moving vehicle! Never jump off the vehicle!
- Should the lights of the vehicle not be sufficient for the safe execution of certain work processes, provide additional lighting of the work area.
- Installed work lights must not be switched on during travel on public roads. They can be switched on in work operation if users of public roads are not dazzled.
- Hydrostatic four wheel steering takes time getting used to it. Therefore, adjust the driving speed to your abilities and the circumstances. Selection and change of steering mode at vehicle standstill only!

Trailers and implements

The below items refer to trailer operation and apply only for Citymaster being registered as other motor vehicle - tool carrier (For machines, operation with trailer is prohibited).

- Prior to driving on public roads unhitch the implements which can not be secured in compliance with the legal regulations of your country.
- Implements, trailers and ballast weights affect handling, as well as the steering and brake capability of the vehicle! Adapt the handling accordingly!
- Fix the implements and the trailers with the specially required devices only!
- Secure trailers and implements to prevent them from rolling away!
- Trailer operation is authorised only if the trailer coupling is in normal position and if the coupling pin is safely locked.
- Hitch the trailer according to the legal regulations of your country. Check the function of the trailer brake system. Observe the manufacturer's instructions.
- Observe the maximum authorised drawbar load and trailer weight on the trailer coupling!
- Coupling implements requires special care!
- Before uncoupling or coupling hydraulic lines (hydraulic quick couplers)
 - Switch off the engine
 - Unpressurise hydraulic connections (see page 3-72)
- Operate the vehicle only if all protective facilities have been installed and are functional, and if all brake, light and hydraulic connections have been connected!
- Do not exceed the admissible total weights as specified in the type approval and applicable for the vehicle, for the front and rear axle loads and the entire combination (vehicle plus trailer or attached implement).
- If optional equipment is installed, all additionally required light installations, telltales, etc., must be provided for and functional.

- Mount the implements only if the engine has been stopped and the drive switched off.
- Especially when driving or working with vehicles provided with a quick-hitch facility for the implements, make sure that the implement is safely locked in the quickhitch facility. Check before starting work.
- Make sure hydraulic hoses are connected correctly when connecting hydraulic cylinders and hydraulic motors.
- Be careful when coupling implements: risk of personal injury due to crushing and shearing. Make sure nobody is between the vehicle and the equipment without securing the vehicle and the implement against movement.

Transport

- The vehicle must be towed, loaded and transported only in accordance with the operation manual!
- For towing the vehicle observe the prescribed transport position, admissible speed and route.
- Safely secure the vehicle on means of transport! Use suitable mounting points and load-securing devices.
- Restarting after transport must be strictly in accordance with the operation manual!

2.6 Safety instructions for maintenance

Apart from the regular main inspection and according to § 57 of the BGV 29 (accident prevention regulations - vehicles by German employer's liability insurance association), the Citymaster is to be maintained and inspected for its safe condition at regular intervals but at least once yearly.

- Avoid any operational mode that might be prejudicial to safety!
- Observe the adjusting, maintenance and inspection activities and intervals set out in the operation and maintenance manual, including information on the replacement of parts/partial equipment. These activities may be executed by skilled personnel only.
- The vehicle may not be serviced, repaired or test-driven by unauthorised personnel.
- In any work concerning the operation, conversion or adjustment of the vehicle and its safety-oriented devices, or any work related to maintenance, inspection and repair, observe the start-up and shut-down procedures set out in the operation and maintenance manual, and the information on maintenance work.
- If required, secure the maintenance area appropriately!
- Prior to performing service, maintenance and repair work, attach a warning label, such as "Repair work - do not start vehicle" to the ignition lock/steering wheel or to the control elements.
 - ➔ Remove the ignition key!

- Perform service, maintenance and repair work only if the
 - Vehicle is positioned on firm and level ground
 - Lever for selecting the driving direction is in neutral position
 - Parking brake has been applied
 - All hydraulically movable implements and working equipment have been lowered to the ground
 - Engine is stopped
 - Ignition key is removed
 - Vehicle has been secured against unintentional movement
- Should maintenance or repair be inevitable with the engine running:
 - Only work in groups of two
 - Both persons must be authorised for the operation of the vehicle
 - One person must be seated on the operator seat and maintain visual contact with the other person
 - Observe the specific safety instructions in the respective work manual
 - Keep a safe distance away from all rotating and moving parts, such as fan blades, V-belt drives, PTO shaft drives, blowers, etc.
- Prior to performing assembly work on the vehicle, make sure all movable parts will not roll away or start moving.
- Never work or stand under suspended loads!
- Never use vehicle parts or implements as a climbing aid!
- Clean the vehicle, especially connections and threaded unions, of any traces of oil, fuel or preservatives before carrying out maintenance/repair work!
Do not use aggressive detergents!
Use lint-free cleaning rags!
- Before cleaning the vehicle with water, steam jet (high-pressure cleaning) or detergents, cover or tape up all openings which – for safety and functional reasons – must be protected against water, steam or detergent penetration. Special care must be taken with the electrical system. Do not direct the vapour jet or the high-pressure equipment on electric or electrical components.
- After cleaning, remove all covers and tapes applied for that purpose!
- After cleaning, examine all fuel, lubricant and hydraulic oil lines for leaks, chafe marks and damage!
Any defects found must be rectified without delay!

- Always tighten any screwed connections that have been loosened during maintenance and repair!
- Any safety devices removed for set-up, maintenance or repair purposes must be refitted and checked immediately upon completion of the maintenance and repair work.
- Ensure that all consumables and replaced parts are disposed of safely and with minimum environmental impact!
- Do not use work equipment as lifting platforms for persons, except for the lifting platform itself!
- Perform maintenance and repair work beneath a raised vehicle, work equipment/implements or additional equipment only if a safe and secure support has been provided for (the sole use of hydraulic cylinders, jacks, etc. does not sufficiently secure raised vehicles or equipment/implements).
- Avoid contact with hot parts, such as the engine block or the exhaust system during the operation of the vehicle and for some time afterwards – risk of burns!
- Do not use starting fuel! This especially applies to those cases in which heater plugs (intake-air preheating) are used at the same time – risk of explosions!
- Apply special care when working on the fuel system – increased risk of fire!

2.7 Warning of special hazards

Electric energy

- Use only original fuses with the specified current rating! Switch off the vehicle immediately and rectify malfunction if trouble occurs in the electrical system!
- Work on the electrical system may only be carried out by a skilled technician, in accordance with the applicable electrical engineering rules.
- Inspect and check the electrical equipment of the vehicle at regular intervals. Defects such as loose connections or scorched cables must be rectified immediately.
- Observe the operating voltage of the vehicle/implements!
- Always remove the earthing strap from the battery when working on the electrical system or when performing welding work!
- Starting with a battery jump cable can be dangerous if performed improperly. Observe the safety instructions regarding the battery!

Gas, dust, steam, smoke

- Operate the vehicle only on adequately ventilated premises! Before starting internal combustion engines or operating fuel-operated heating systems on enclosed premises, make sure that there is sufficient ventilation! Observe the regulations in force at the respective site!
- Carry out welding, flame-cutting and grinding work on the vehicle only if this has been expressly authorised. For example, there may be a risk of explosion and fire!
- Before carrying out welding, flame-cutting and grinding work, clean the vehicle and its surroundings from dust and other inflammable substances, and make sure that the premises are adequately ventilated – risk of explosions!

Hydraulics

- Work on the hydraulic equipment of the vehicle may be carried out only by persons with special knowledge and experience in hydraulic systems!
- Check all lines, hoses and screwed connections regularly for leaks and obvious damage! Repair any damage and leaks immediately! Splashed oil may cause injury and fire.
- In accordance with the operation manual/instructions for the respective assembly, unpressurise all system sections and pressure lines (hydraulic system) to be opened before carrying out any implementing/repair work!
- Ensure that no hydraulic connections are interchanged. The fittings, lengths and quality of the hoses must comply with the technical requirements.

Noise

- All sound baffles must be closed during operation.
- Wear ear protectors if necessary!

Oil, grease and other chemical substances

- When handling oil, grease and other chemical substances, such as battery electrolyte (sulphuric acid), observe the product-related safety regulations (Safety Data Sheet)!
- Be careful when handling hot consumables – risk of burning or scalding!

Battery

- When handling the battery observe the specific safety instructions and regulations relevant to accident prevention. Batteries contain sulphuric acid – caustic!
- During charging in particular, but also during normal battery operation, an oxyhydrogen mixture is formed in the battery cells – risk of explosion!
- In the case of a frozen battery or an insufficient electrolyte level, do not try to start with a battery jump cable. The battery can burst or explode.

Tyres

- Repair work on tyres and rims may be carried out by skilled personal or by an authorised workshop only!
- Damaged tyres and/or wrong tyre pressure reduce the operational safety of the vehicle. Make regular tyre checks for:
 - Prescribed tyre pressure
 - Damage
- Do not inflate tyres with inflammable gas – risk of explosion!
- Make regular checks of the wheel nuts for tightness, however, after 150 operating hours or 5000 km at the latest. Check the wheel nuts after 40 km after changing tyres – tighten if necessary!

Axle loads and total weights

- Comply with the admissible axle load and total weight values as specified in the technical data.

Sweeping unit

- Lift the sweeping unit before proceeding to transport rides!
- The operator has to make sure during sweeping operation that no person stays in the hazard zone of the sweeping unit and that all objects have been removed from that zone!

Dirt hopper

- Fully lower the dirt hopper before proceeding to transport rides!
- A filled dirt hopper significantly affects handling of the vehicle and it is recommended to adapt the handling accordingly!
- Empty the hopper and install the safety strut whenever working under the dirt hopper!
- Nobody is allowed to stay in the zone of danger during the lifting or lowering of the dirt hopper!
- Passenger transport on the dirt hopper is prohibited!
- Make sure that the folding safety strut has safely locked!
- Be seated before starting, riding or stopping the vehicle!
- Check the fan for wearing and unbalanced condition at regular intervals!
- Access to fan outlet only after opening of hopper flap or dismounting of maintenance cover; exhaust air flow is directed to the bottom!
- Mind hot parts of the exhaust system accessible after lifting-out of the hopper!

3 Operation

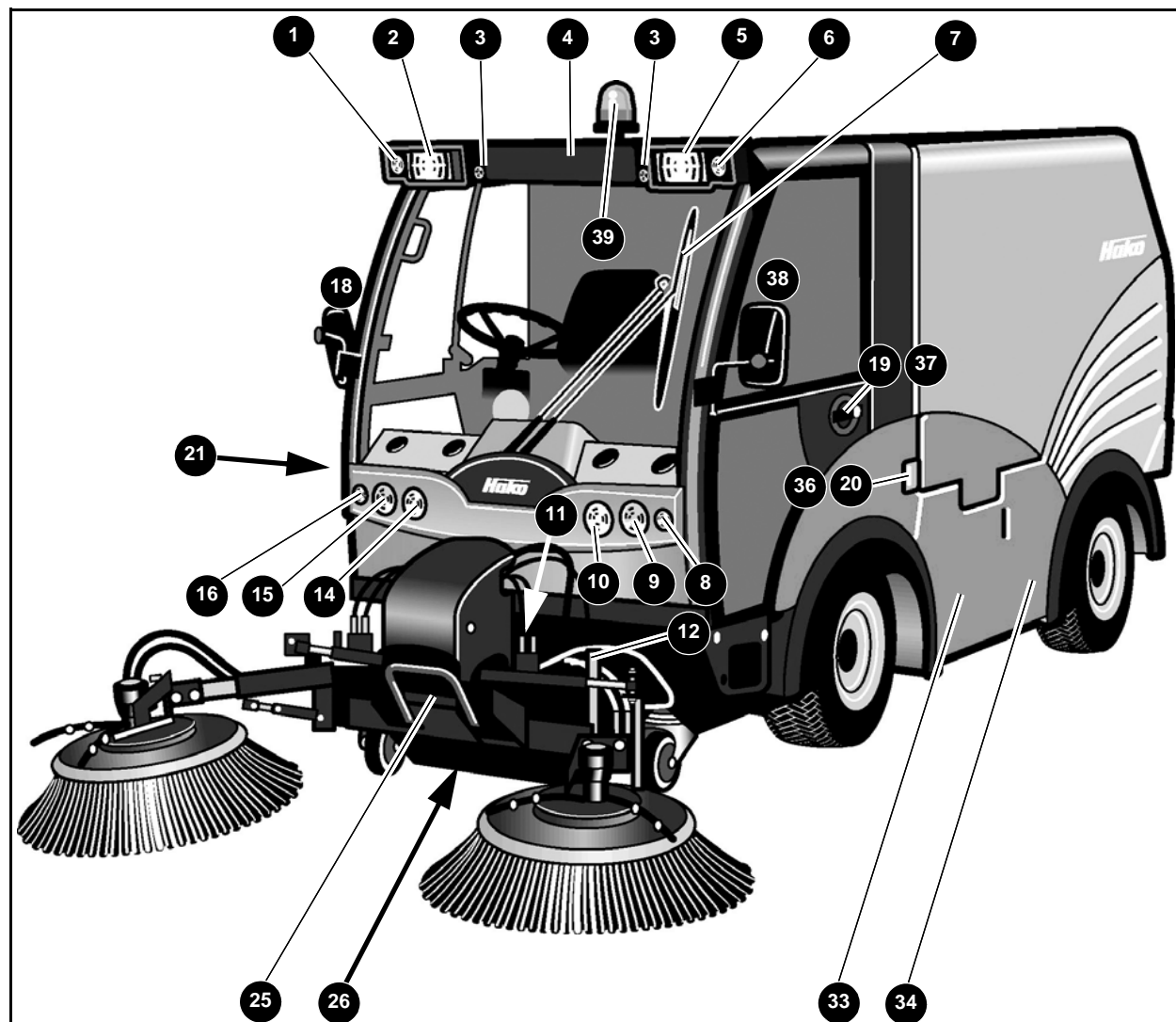
3.1 Introduction

This chapter describing the controls contains information on the function and the handling of the individual telltales and controls of the vehicle. The controls always have the same position numbers across all sections. You can fold out the overview pages for better orientation.

3.2 Controls: overview

3.2.1 Front View of Vehicle

See inside



Positionen 25, 26, 33, 34, 36, 37, 38, 39, siehe nächste Seite

Front view of vehicle

Pos.	Description
1	Additional turn indicator (right)
2	Auxiliary headlight for low beam, high beam headlight (right)
3	Working light (front, option))
4	Numberplate bracket (front)
5	Auxiliary headlight for low beam, high beam headlight (left)
6	Additional turn indicator (left)
7	Wiper
8	Turn indicator (left)
9	High beam headlight (left)
10	Low beam headlight (left)
11	Quickhitch facility for implements
12	23-pole socket
13	Not used
14	Low beam headlight (right)
15	High beam headlight (right)
16	Turn indicator (right)
17	Access (right)
18	Rearview mirror (right)
19	Door handle / door lock (right)
20	Side turn indicator (right)
21	Radiator cover

Fig. 10:

3.2.2 Rear View of Vehicle

See inside

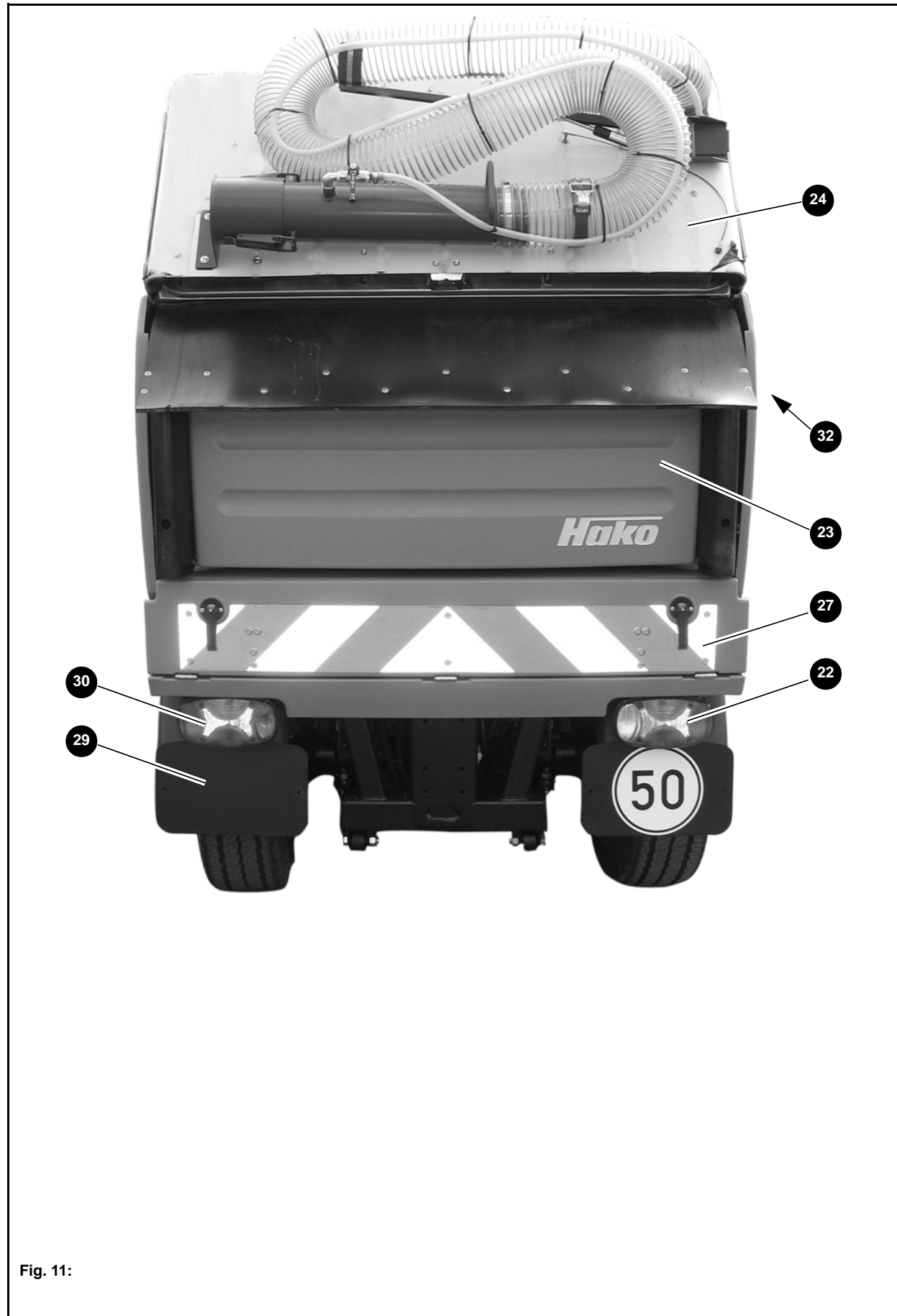


Fig. 11:

Pos.	Description
Rear view of vehicle	
22	Brake light, rear light, turn indicator (right), reversing light
23	Superstructure
24	Dirt hopper
25	Sweeping unit
26	Suction port
27	Toolbox
28	Not used
29	Numberplate bracket (rear)
30	Brake light, rear light, turn indicator group, rear fog light (left) with numberplate light
31	Not used
32	Safety strut
33	Fuel tank
34	Hydraulic oil tank
35	Not used
36	Side turn indicator (left)
37	Door handle / door lock (left)
38	Rearview mirror (left)
39	Rotating beacon (option)
40	Not used

3.2.3 Vehicle doors

See inside

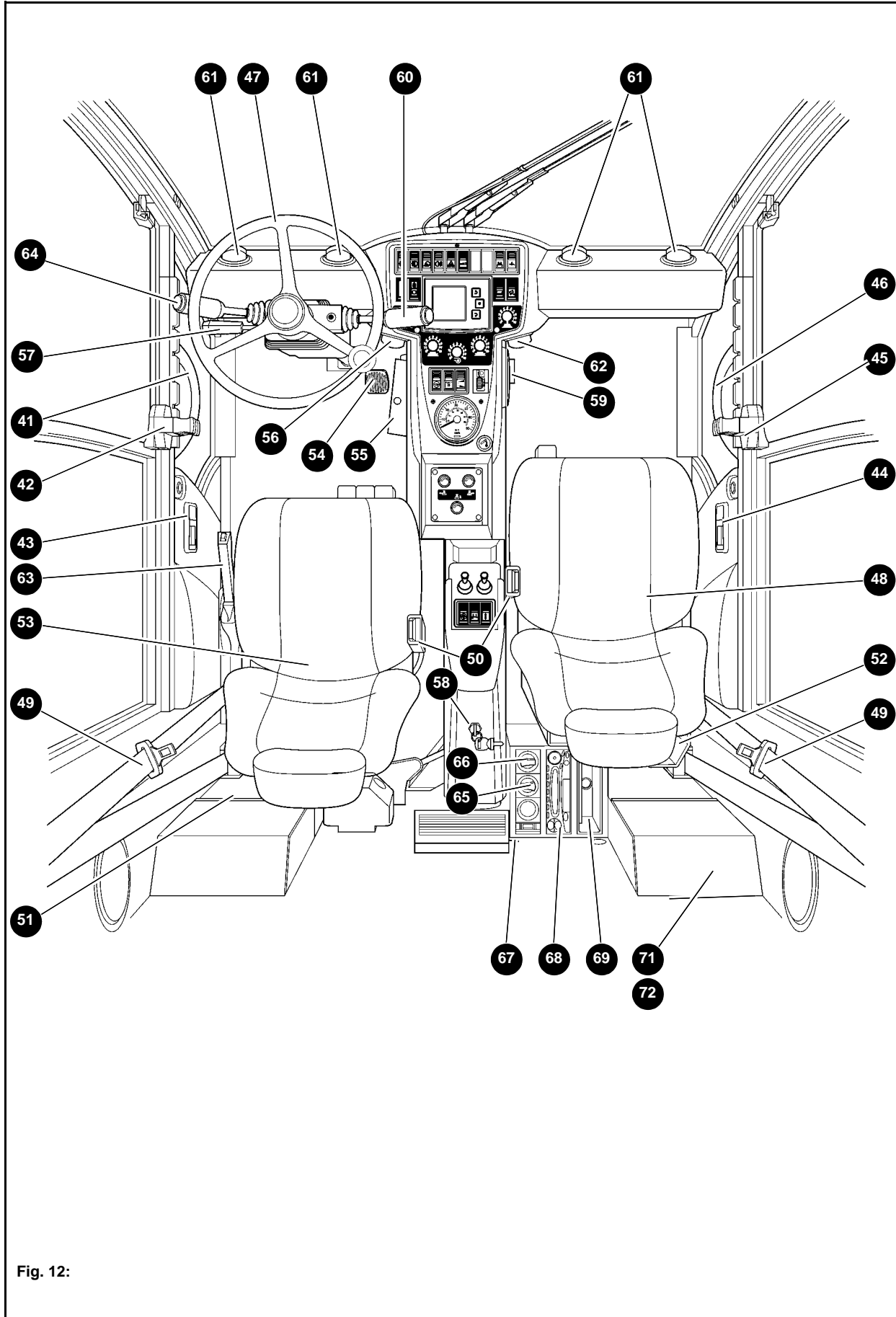


Fig. 12:

Pos.	Description
Vehicle doors	
41	Handle (left)
42	Lock for sliding window (left)
43	Door opener/lock (left)
44	Door opener/lock (right)
45	Lock for sliding window (right)
46	Handle (right)
Operator's compartment controls	
47	Steering wheel for power steering
48	Passenger's seat
49	Three-point seat belt
50	Seat belt – buckle
51	Storage compartment for tool kit, warning triangle and first-aid kit (behind passenger's seat)
52	Storage compartment for operation manual (behind passenger's seat)
53	Operator's seat
54	Brake pedal (service brake)
55	Accelerator pedal
56	Leg room air vent (left)
57	Lever on steering column (left) for steering column adjustment.....
58	Ignition switch
59	3 pole socket
60	Combined switch on steering column (right) for wiper, washer system, headlights on and off, headlight flasher and horn, direction indicator
61	Heater nozzle – windscreen
62	Leg room air nozzle (right)
63	Parking brake lever
Controls between the seats	
64	Rotary switch (hot/cold)
65	Rotary switch - 3-stage blower
66	Recirculated air control lever
67	Drive lever FORWARD/NEUTRAL/REVERSE
68	Radio/transceiver installation area
69	Tachograph (option)
70	Not used
71	Fuse box
72	Towing operation switch (lockable)
73	Not used
74	Not used

3.2.4 Roof console controls

See inside

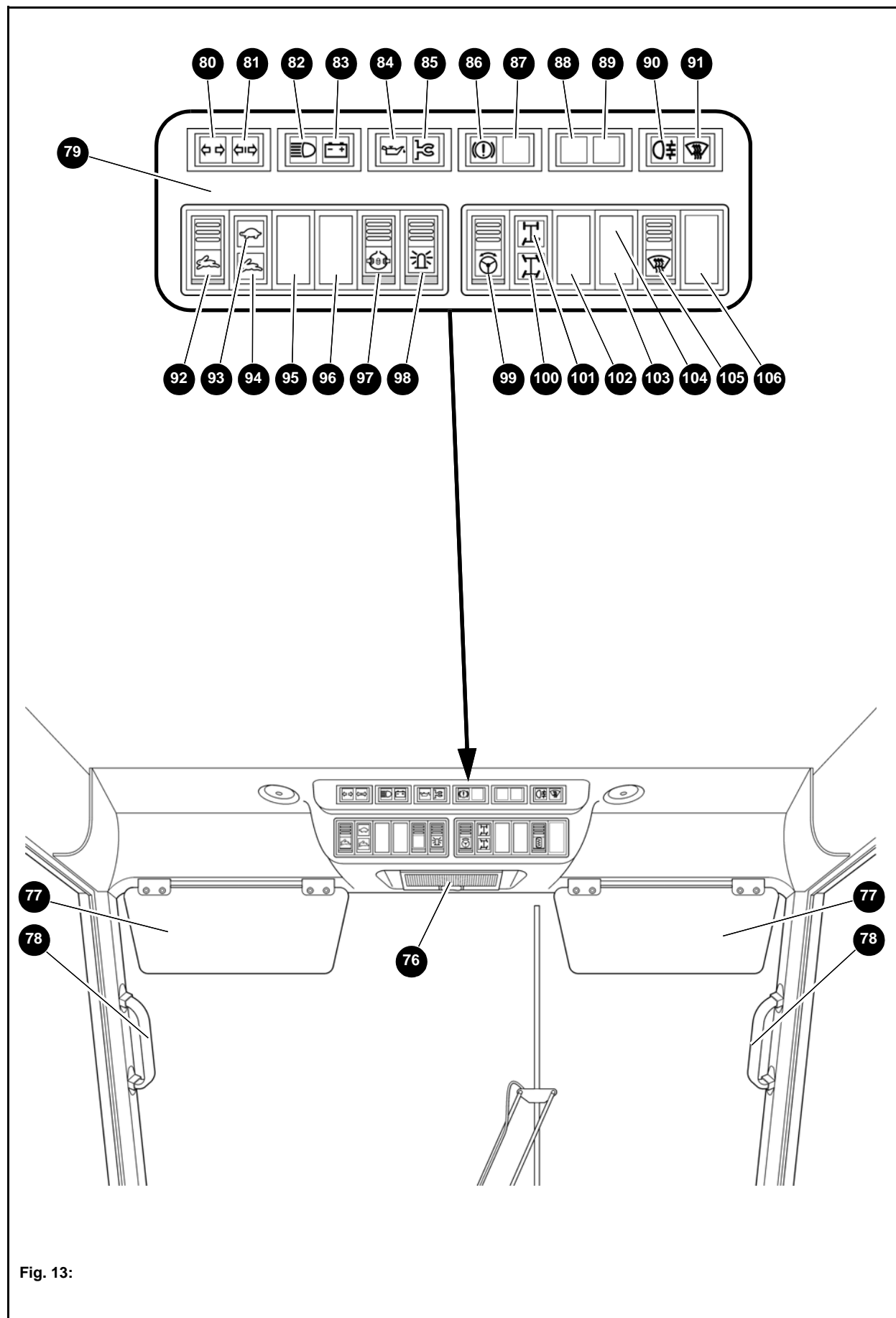


Fig. 13:

Pos.	Description
Controls in the roof area	
75	Not used
76	Interior light
77	Sun visor (left/right)
78	Handles (left/right)
79	Roof console
80	Telltale - direction indicator (tractor vehicle, green)
81	Telltale - direction indicator (trailer, green)
82	Telltale – high beam (blue)
83	Warning light - battery charging, alternator (red)
84	Warning light - engine oil pressure (red)
85	Telltale - engine preheater (yellow)
86	Warning light – brake fluid level (red)
87	Not used
88	Not used
89	Not used
90	Telltale – rear fog light (yellow)
91	Telltale – window heating and mirror heating (option, green)
92	Tip switch – working mode/transport mode
93	Telltale – working mode (orange)
94	Telltale – transport mode (green)
95	Not used
96	Not used
97	Tip switch – differential lock (green)
98	Rocker switch – rotating beacon (yellow)
99	Tip switch – front wheel steering/four wheel steering (green)
100	Telltale – four wheel steering (green)
101	Telltale – front wheel steering (green)
102	Not used
103	Not used
104	Not used
105	Tip switch – heated windscreen / heated outside rearview mirror (green)
106	Not used

3.2.5 Centre console controls

See inside

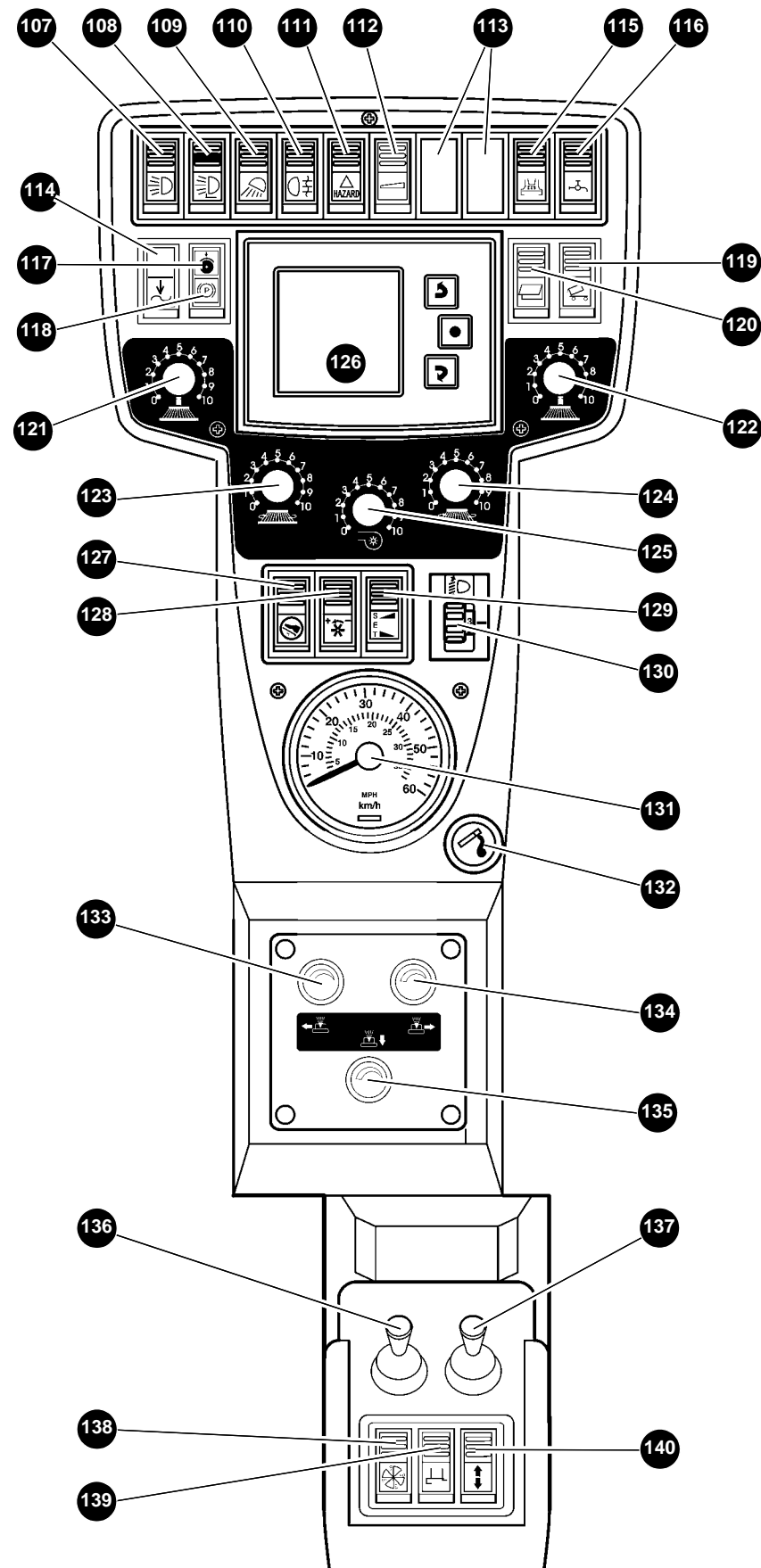


Fig. 14:

Pos.	Description
Centre console controls	
107	Superstructure
108	Tip switch - superstructure headlight ON/OFF (green)
109	Toggle switch - front working headlight ON/OFF (SO)
110	Tip switch - rear fog light ON/OFF (green)
111	Toggle switch - warning flasher ON/OFF (red)
112	Switch for distance-dependent spreading
113	not used
114	Tip switch for Druckentlastung hydraulic connection at the rear 150 - 153
115	Tip switch - water valve ON/OFF
116	Tip switch - clear water pump ON/OFF
117	Warning light - dirt hopper overload
118	Warning light - parking brake
119	Tip switch - dirt hopper LIFT/LOWER
120	Tip switch - dirt hopper flap OPEN/CLOSED
121	Potentiometer for ground pressure of left brush
122	Potentiometer for ground pressure of right brush
123	Potentiometer for speed of left brush
124	Potentiometer for speed of right brush
125	Potentiometer for fan speed
126	Multifunction display
127	not used
128	Tip switch - work speed control
129	Cruise control
130	Headlight levelling
131	Tachograph
132	Socket, cigarette lighter
133	Valve for water nozzles at left brush
134	Valve for water nozzles at right brush
135	Valve for water nozzles in suction pipe
136	Joystick - left brush (LIFT/LOWER SWIVEL)
137	Joystick - right brush (LIFT/LOWER/SWIVEL)
138	Tip switch for working mode (Hako key) with the following functions: Brush ground pressure, fan ON/OFF, LIFT/LOWER brush, LIFT/LOWER suction port, water valve ON/OFF and clear water pump ON/OFF
139	Switch for suction port flap
140	Switch for front power lift

3.2.6 Controls on vehicle exterior

See inside

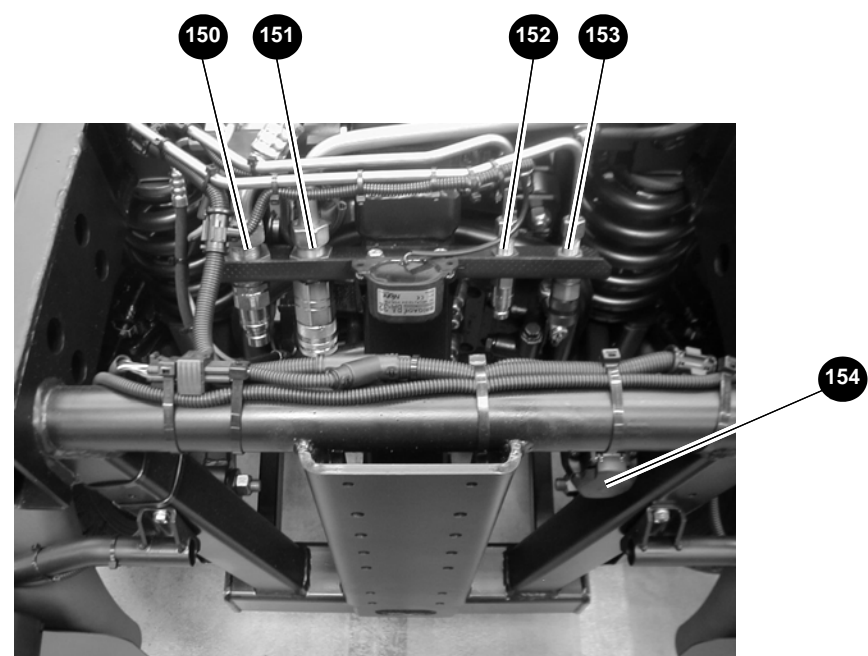
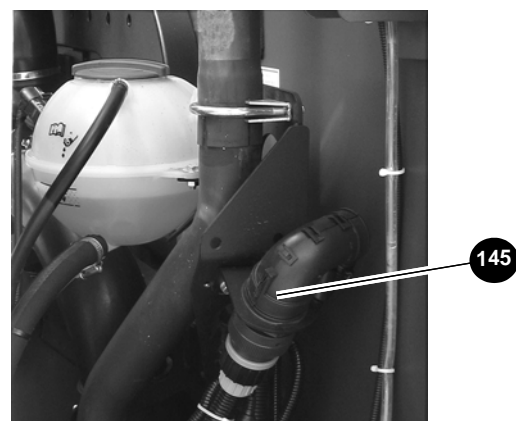


Fig. 15:

Hydraulic connections and operating elements on the vehicle exterior

Pos.	Designation
on the front of the vehicle	
141	Return from external control block/winter service: return - snow sweeper (blue)
142	Winter service: advance - snow sweeper (green)
143	Water connection - spray nozzles at left brush
144	Water connection - spray nozzles at right brush
145	23pin socket for superstructure
146	Advance to external control block (green)
147	LS (demand-dependent fluid supply) to external control block (yellow)
148	Winter service (e.g. snow shield) swivel to the left (red)
149	Winter service (e.g. snow shield) swivel to the right (red)
at the back of the vehicle	
150	Return - fan drive
151	Advance - fan drive
152	Return - left and right hydraulic cylinder of dirt hopper flap
153	Advance - left and right hydraulic cylinder of dirt hopper flap
154	13-pin socket e.g. for spreader

3.3 Taking into service

3.3.1 Safety instructions

- Only use the steps and handles provided when entering and leaving the cab
- Never use the controls or movable lines and cables as handles
- Never board or jump off a moving vehicle

3.3.2 Taking the vehicle into service for the first time

Important information

- The vehicle may be taken into service by authorised personnel only – see also section "Regulations" of this operation manual
- The operators must have read and understood this operation manual before taking the vehicle into service
- The vehicle may only be used in technically perfect condition in accordance with its designated use and the instructions set out in the operation manual, and only by persons who are fully aware of the risks involved in operating the vehicle
- Go through the "Start-up" check list in the following section

Running-in period

Handle the vehicle carefully during its first 100 operating hours.

The future performance and service life of the vehicle are heavily dependent on the observance of the following recommendations during the running-in period.

- Do not overload the vehicle, but at the same time do not drive too cautiously either, otherwise the vehicle will never reach its proper operating temperature
- Do not run the engine at high revolutions for extended periods
- Increase the load gradually whilst varying the engine revolutions
- Strictly follow the maintenance plans (see page 4-56)

3.3.3 Check lists

The check lists below are intended to assist you in checking and monitoring the vehicle before, during and after operation. These check lists cannot claim to be exhaustive; they are merely intended as an aid for you in fulfilling your duties as a conscientious operator. The checking and monitoring jobs listed below are described in greater detail in subsequent sections. If the answer to one of the following questions is NO, first clear the cause of the fault before commencing or continuing work.

Start-up check list

Check the following points before taking the vehicle into service or starting the engine:

No	Question	✓
1	Sufficient fuel in the tank? (➡ 3-20)	
2	Coolant level OK? (➡ 4-15)	
3	Engine oil level OK? (➡ 4-9)	
4	Oil level in hydraulic oil tank OK? (➡ 4-23)	
5	Oil level in brake fluid tank OK? (➡ 4-36)	
6	Water level in windscreen washer tank OK? (➡ 4-45)	
7	V-belt checked? (➡ 4-18)	
8	Brake system (incl. parking brake) OK? (➡ 4-35)	
9	Tyre condition and pressure OK? (➡ 4-42)	
10	Wheel nuts securely tightened (especially after a wheel change)? (➡ 4-43, 5-6)	
11	Lights, signals, indicators, warning lights and telltales OK? (➡ 3-34)	
12	Dirty hopper emptied? (➡ 4-52)	
13	Vehicle cleaned? (➡ 4-49)	
14	Clean water refilled? (➡ 4-40)	
15	Recirculatory water refilled? (➡ 4-41)	
16	Especially after cleaning, maintenance or repair work: Rags, tools and other loose objects removed?	
17	Approved warning triangle, hazard light, warning vest and first aid kit in the vehicle?	
18	Steering wheel, seat position and rearview mirror correctly adjusted? (➡ 3-43)	
19	Seat belt fastened? (➡ 3-44)	

Operation check list

After starting the engine and during operation, check and observe the following points:

No	Question	✓
1	Warning lights for engine oil pressure, alternator and coolant level message gone off? (☛ 3-20)	
2	Braking effect sufficient? (☛ 3-54)	
3	Engine coolant in normal range? (☛ 3-20)	
4	Is the steering working properly? (☛ 3-52)	
5	Is anyone dangerously close to the vehicle? (☛ 2-1)	
When travelling on public roads, particular attention should be paid to the following points:		
6	Press Hako key (☛ 3-61) (all functions of sweeping mode are OFF)	
7	If required, change over to front wheel steering (☛ 3-28)	
8	Select riding mode (switch on transport ride mode) (☛ 3-31)	
For workrides (sweeping operation)		
1	Select riding mode (switch on work ride mode) (☛ 3-31)	
2	Select steering mode (☛ 3-28)	
3	Press Hako key (☛ 3-61)	
4	Select brush speed (☛ 3-63), brush ground pressure (☛ 3-63), fan speed (☛ 3-66) according to the degree of soiling encountered	
5	Switch on the clear water pump supplying the spray nozzles at the sweeping unit and select delivered water amount so as to provide for optimal dust binding (☛ 3-63)	
6	If required, switch on recirculatory water valve to the suction port (☛ 3-62)	
7	Switch on rotating beacon and lighting if required (☛ 3-34)	
Briefly interrupting the work ride mode:		
1	Press Hako key (☛ 3-61)	
2	Work ride mode interrupted	
3	Press Hako key again to return to work ride mode (all functions for sweeping operations are ON again)	

Parking check list






Check and observe the following points when parking the vehicle:

No.	Question	✓
1	Press Hako key (☛ 3-61)	
2	Parking brake applied? (☛ 3-54)	
3	Cab locked (especially if the vehicle cannot be supervised)? (☛ 3-54)	
When parking on public roads:		
4	Vehicle adequately secured? (☛ 3-54)	
When parking on uphill and downhill gradients:		
5	Vehicle additionally secured with chocks under one of the wheels to prevent it from rolling away? (☛ 3-54)	

3.4 Indication and operation elements

3.4.1 Telltales and warning lights

The following telltales and warning lights are built into the roof console **79**:

Ref. no.	Symbol	Colour	Function	Lights/flashes:
80		Green	Direction indicator of tractor vehicle	<ul style="list-style-type: none"> • Periodically when the direction indicator is set (lever 60)
81		Green	Direction indicator of trailer	<ul style="list-style-type: none"> • Periodically when the direction indicator is set (lever 60) and there is an electric connection to the trailer
82		blue	High beam	<ul style="list-style-type: none"> • When the high beam is switched on (lever 60) • When the headlight flasher is activated (lever 60)
83		Red	Battery charging, alternator	<ul style="list-style-type: none"> • When the ignition is switched on but goes out when the engine has been started • The V-belt for the alternator, or the charging circuit of the alternator is faulty if the telltale lights with the engine running. The battery is no longer charged → page (see page 4-18)
84		Red	Engine oil pressure	<ul style="list-style-type: none"> • When the ignition is switched on but goes out when the engine has been started • When the engine oil pressure is too low




Caution!


Risk of engine damage as soon as warning light **84** lights while the engine is running!

☞ Stop vehicle without delay and at a safe place

☞ Switch off the engine immediately and check the oil level (→ page (see page 4-9))

☞ Rectify, or have insufficient engine oil pressure rectified!

Ref. no.	Symbol	Colour	Function	Lights:
85		Yellow	Preheating system and engine control	<ul style="list-style-type: none"> • Lights when the key in ignition switch 58 is in pos. 1 • Does not light when the engine is already at operating temperature. The engine can be started immediately. • Goes off when the ignition temperature is reached • If the telltale flashes, the preheating process was interrupted and must be repeated • If the telltale flashes slowly or fast when the key in ignition switch 58 is in pos. 1 or during operation, an error in the engine control has occurred <p>➔ Contact your authorised Hako workshop!</p>

Ref. no.	Symbol	Colour	Function	Lights:
86		Red	Brake warning light	<ul style="list-style-type: none"> • When the brake fluid level in the brake system tank is too low







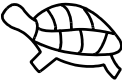





Danger!

If warning light **86** lights

Accident hazard!

- ☞ *Stop vehicle without delay and at a safe place*
- ☞ *Rectify, or have the cause for the malfunction or the brake fluid loss rectified*
- ☞ *Check brake fluid level and correct it, as appropriate (➔ page (see page 4-15))*

The brake warning light goes off when the brake fluid level is again in the admissible range and/or the malfunction of the brake system has been corrected.

Ref. no.	Symbol	Colour	Function	Lights:
88			not used	
89			not used	
90		Yellow	Rear fog light	<ul style="list-style-type: none"> When the rear fog light is switched on (tip switch 126)
91		Green	Windscreen heating and mirror heating (option)	<ul style="list-style-type: none"> When the windscreen heating and the mirror heating (option) is switched on (tip switch 105)
93		Orange	Working mode	<ul style="list-style-type: none"> When the working mode is switched on (tip switch 92)
94		Green	Transport mode	<ul style="list-style-type: none"> When the transport mode is switched on (tip switch 92)
101		Green	Front wheel steering	<ul style="list-style-type: none"> When the front wheel steering is switched on (tip switch 99) only in working mode (tip switch 92)
100		Green	Four wheel steering	<ul style="list-style-type: none"> When the four wheel steering is switched on (tip switch 99) only in working mode (tip switch 92) Flashes during the synchronisation until the process is completed Flashes when the rear axle is locked
117		Red	Axle load	<ul style="list-style-type: none"> When admissible axle load is exceeded
118		Red	Parking brake	<ul style="list-style-type: none"> When parking brake lever 63 of the parking brake is pulled



Caution!

Risk of breakage when the parking brake has not been completely released!

*Always release the parking brake completely before driving away until warning light **87** goes off*

3.4.2 Multifunction display

The Multifunction display **126** monitors a variety of functions and operating parameters of the vehicle. The multifunction display also provides information as to the vehicle status and maintenance as well as malfunctions.

The multifunction display is split into the top, middle and bottom areas. A maximum of two operating parameters can be displayed at the same time. Buttons **A** and **B** can be used to toggle between the individual operating parameters. If an operating parameter is displayed for more than four seconds, this status is saved and displayed when the ignition is turned on again.

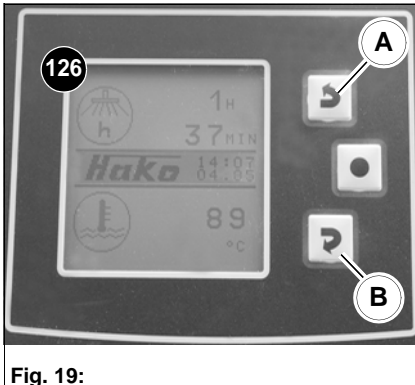


Fig. 19:






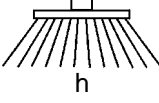
Operating parameters in the top area of the multifunction display:

Symbol	Operating parameter:	Unit:	Remarks:
	Engine revolutions	rpm	-
	Total kilometres/miles	km/mls	Is permanently saved, cannot be deleted
	Daily kilometres/miles	km/mls	Is permanently saved, can be deleted
	Vehicle operating hours	h / min	Is permanently saved, cannot be deleted
	Work hydraulics operating hours	h / min	Is permanently saved, cannot be deleted

In the middle area next to the Hako logo:

Symbol	Operating parameter:	Unit:	Remarks:
	Time	h:min	-
	Date	Day, month	-
	Service information	h	Displays the operating hours until the next service time









Operating parameters in the bottom area of the multifunction display:

Symbol	Operating parameter:	Unit:	Remarks:
	Diesel fuel quantity	l	-
	Coolant temperature	°C	-
	Hydraulic oil temperature	°C	-
	Time	Hours / minutes	-
	Clear water	l	-
	Brush	h	-

The following messages are displayed as clear text on the multifunction display:

- Diesel fuel quantity below 10 litres
- Coolant temperature over 110 °C
- Hydraulic oil temperature over 75 °C
- Coolant level too low
- Hydraulic oil level too low
- Air filter soiled
- Return filter of the work hydraulics soiled
- Drive pressure filter soiled
- Hopper!
- Front implement carrier not in transport position
- Overload of the axial piston pump of the work hydraulics (low supply)
- Error message of hydrostatic control unit
- Error message of work hydraulics control unit
- Error message of steering control unit
- Error message of controls
- Clear water level below 10 litres
- Operating hours of brushes

The messages are split into:

Symbol	Message:	Function:	Buzzer:	Reaction:
	Information	Message concerning an uncritical vehicle status	Sounds only once, does not have to be acknowledged	 <i>Pay attention to the information and correct the error</i>
	Warning	Message concerning a critical vehicle status	Sounds several times, has to be acknowledged by pressing the button	 <i>Investigate the cause</i>  <i>Contact an authorised workshop</i>
	Error message	Message concerning a very critical vehicle status	Sounds permanently, has to be acknowledged by pressing the button	 <i>Stop the vehicle immediately</i>  <i>Contact an authorised workshop</i>



Important!

If several messages occur simultaneously, they are displayed in the sequence in which they were received. If the message is acknowledged by pressing a button, the next message is displayed. Acknowledged messages are displayed in the middle part of the multifunction display as a reminder.

When the ignition is switched off and switched on again, all messages are redisplayed and have to be acknowledged again.

Setting of the multifunction display – setting mode

In the setting mode, the daily kilometres/miles can be *reset* to zero or the brightness, contrast, time and language *adjusted*.

☞ Press button **C** for approx. 1.5 seconds

➔ Men 1: Setting mode activated

☞ Selection is possible by pressing button **A** (up) or **B** (down).

☞ The selection (arrow) is confirmed by pressing button **C**.

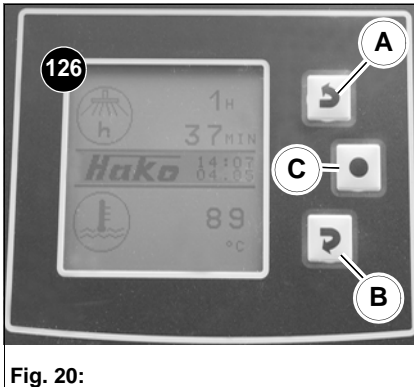
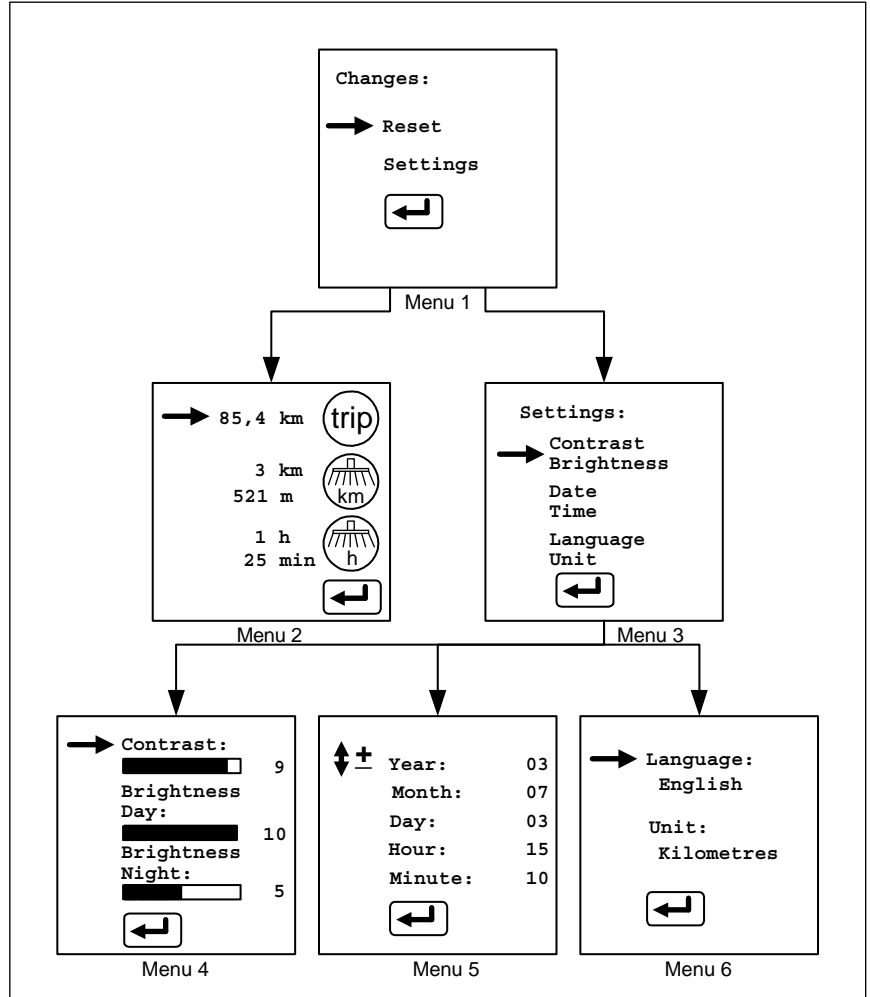


Fig. 20:



MFA_Menue.eps

↩ means return to the next higher menu level.

3.4.3 Speedometer



Fig. 21:

Function:

Indicates the current driving speed in kph (kilometres per hour) and mph (miles per hour).



Important!

The speedometer has been set at the factory to the tyre size fitted on the vehicle at delivery. If the vehicle is fitted with a different tyre size, the speedometer must be set accordingly by an authorised Hako workshop!

3.4.4 Ignition switch



Important!

The engine will not start unless drive lever **67** is in neutral. The ignition switch **58** is equipped with a start repeat lock to prevent the starter from engaging into the running diesel engine: Switch back to position **0 (Stop)** before switching again from position **1** to position **2**.

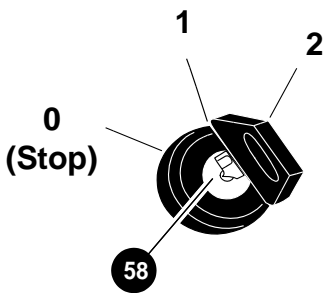


Fig. 22:

Position	Function	Power consumer
0 (Stop)	Ignition OFF/parking position Insert or remove the ignition key	➤ Parking light, cigarette lighter, interior lighting, rotating beacon, hazard warning light
1	Ignition ON / driving position System check Engine preheating (below 5 °C approx. 20 seconds)	➤ All telltales and warning lights (except 85) light for about. 2 seconds ➤ Warning light 87 lights if parking brake 63 is applied ➤ All telltales and warning lights light for approx. 3 seconds ➤ Warning lights 84 , 83 light ➤ Telltale 85 (preheating) lights, engine is preheated until telltale goes off ➤ All functions are operational
2	Starts the engine	➤ Starter is actuated ➤ Telltales and warning lights must go off

3.4.5 Brakes

General information

Brake lining wear depends very much on:

- Conditions of use, e.g. short or long distance travel
- Flat land, mountains
- Driving style

Therefore it may be necessary to have the brake linings also checked between the specified maintenance intervals by your authorised Hako workshop.

The brake effect may be negatively affected by:

- Dampness and/or coldness
 - ☞ Apply the brakes until they are dry
- De-icing salt
 - ☞ The salt layer on brake discs and brake linings must first be worn off during braking
- Overheating
 - ☞ Do not "ride" the brakes by pressing the pedal lightly
 - ☞ When driving on slopes, reduce speed in time
 - ☞ Utilise brake effect of diesel engine
 - ☞ During long downhill stretches additionally brake in intervals
 - ☞ Drive carefully and observe traffic conditions



Danger!

In specific operating states as for example after riding through water pools, riding in heavy rainfall, after cleaning the vehicle or when riding on salt-spread roads the braking effect may change!

Accident hazard!

☞ *Grinding of the brakes is required during slow ride by thoroughly actuating the brake pedal!*

Power brakes

The power brakes work with negative pressure which is generated only while the engine is running.



Danger!

The power brakes do not work when the engine is at a standstill. The brake pedal has to be pressed much harder! Take this into account, especially when towing the vehicle!

Accident hazard!

☞ *Use a towing bar whenever possible!*

A malfunction in the brake system (brake fluid level) is indicated by warning light **86**.

Parking brake lever

Function

- To park the vehicle safely and to prevent it from rolling away (parking brake)!
- Emergency brake in the case of service brake breakdown



Danger!

Use the parking brake instead of the service brake in an emergency only, i. e. in the case of a breakdown of the service brake. This does not cause the brake lights to light. Accident hazard!

- ☞ *Take machine to workshop without delay!*
- ☞ *In normal operation, only use brake pedal 54 as a service brake. Otherwise, the brake lights at the rear of the vehicle do not light*

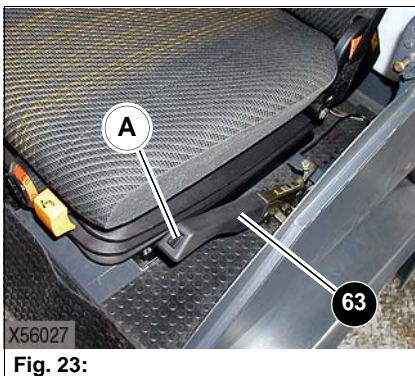


Fig. 23:

To prevent the vehicle rolling away

- ☞ *Pull the parking brake lever 63 upward to apply the parking brake.*

➔ *The warning light 87 lights*

A firm resistance must be felt after 6 to 8 notches.

➔ *Otherwise the parking brake is not in working order!*

- ☞ *Have the parking brake immediately checked by a specialist*



Danger!

The brake power of the parking brake depends on the rear wheel with the lowest friction factor. When the vehicle is parked on a slope with one rear wheel placed on solid and dry ground while the other rear wheel is placed on ice or snow, the maximum brake power is determined by the friction factor between the wheel and the ice. Prevent the vehicle from rolling away!

Accident hazard!

- ☞ *When parking the vehicle on a slope, additionally switch on four wheel drive*
- ☞ *When parking the vehicle on a slope, use chocks as well!*

To release the parking brake

- ☞ *Slightly raise the parking brake lever, press button A on the parking brake lever and lower the parking brake lever*

➔ *The parking rake is released and warning light 87 goes off*

Using the parking brake as secondary brake (only in an emergency) while driving.

- ☞ *Pull parking brake lever 63 upward quickly **only in an emergency***



Important!

The parking brake lever acts via a pull cable on a separate brake drum on the gearbox shaft. When the four wheel drive is switched on, the parking brake acts on the front and rear axle.

Brake pedal



Function

- Brakes the vehicle

Actuation of service brake

- ☞ Press brake pedal **54** depending on the desired braking effect



Important!

When the vehicle is fully loaded, a higher braking pressure is required for braking.

- ➔ Pedal travel and foot power to be applied increase
- ➔ The maximum achievable braking effect of a loaded vehicle is reduced as compared to an unloaded vehicle



Danger!

When a brake circuit fails (brake warning light **86** lights) the pedal can be pressed through much further and the achievable brake effect is considerably lower.

Accident hazard!

- ☞ Continue immediately to depress the pedal
- ☞ Stop vehicle without delay and at a safe place
- ☞ Rectify, or have the cause for the malfunction or the brake fluid loss rectified
- ☞ Check brake fluid level and correct it, as appropriate (☞ page (see page 4-15))

3.4.6 Steering



Danger!

Failure of steering assistance:
Turning the steering wheel requires greater effort! Take this into account especially when towing the vehicle!
The vehicle is no longer operational –

Accident hazard!

- ☞ Drive the vehicle only to the next possible stop
- ☞ Adapt towing speed to the altered steering behaviour!



Important!

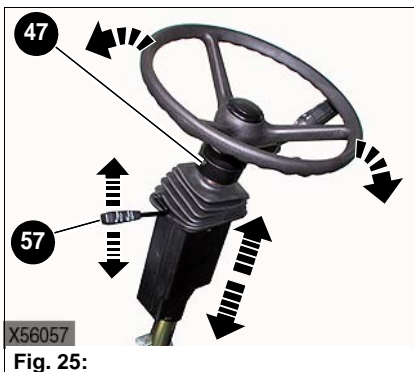
The steering system is only operational when the engine is running! In the event of a failure of the diesel engine or of the hydraulic power steering (e.g. failure of the pump drive), the vehicle can still be steered (emergency steering feature).

Do not lock the steering wheel in fully for more than 15 seconds. A continuous full lock causes the servo pump to heat the hydraulic oil quite strongly. This can damage the servo steering system.
Every full lock while standing is also noticeable by noise because of the strong load on the servo pump. In addition, the idle speed of the engine is reduced for a short time.

Steering column adjustment

The height and inclination of the steering wheel and steering column **47** can be adjusted to each driver.

Adjust the steering column as follows before starting to drive



X56057

Fig. 25:

Steering column adjustment		
Height	☞ Pull up lever 57	☞ Height of steering column 47 adjustable
Inclination	☞ Push down lever 57	☞ Inclination of steering wheel 47 adjustable

Steering modes

Choice of the following steering modes:

- Front wheel steering, for transport mode during road travel and working mode
- Four wheel steering (can be selected only in working mode)



Danger!

Switch steering mode with the vehicle at a standstill only

Accident hazard!

- ☞ *First stop the vehicle*
- ☞ *Synchronise the steering*
- ☞ *Select new steering mode*

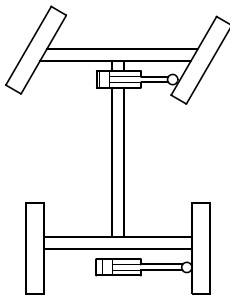


Fig. 26:

Front wheel steering

- Generally used steering mode



Important!

Always engage front wheel steering when driving on public roads in transport mode (0 – 50 kph). During the change-over of the drive mode to transport mode with switch **92** front wheel steering is switched on automatically. The rear axle is locked in the centre position.

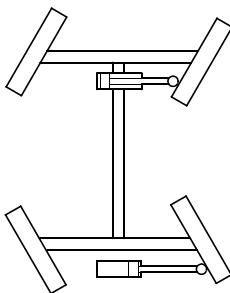


Fig. 27:

Four wheel steering

- In this steering mode, the rear axle wheels are steered in the direction opposite to the front axle wheels.
Advantage: Small turning radius
- This steering mode is possible only in working mode



Important!

Before changing over to transport mode after termination of operating with four-wheel drive, stop the vehicle and move the hand wheel to the left or the right by getting over the straight-line ride point.

Steering mode switch

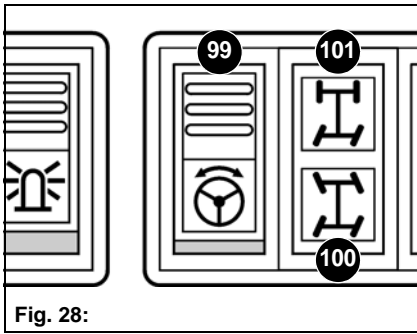


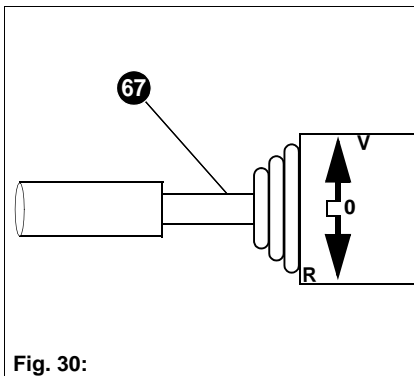
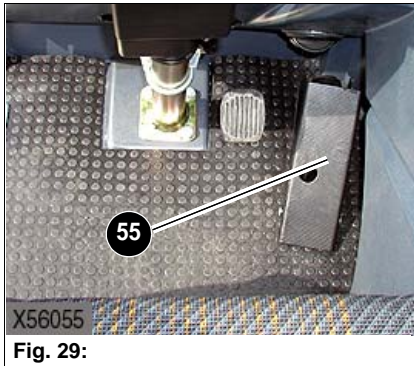
Fig. 28:

Four wheel steering can be activated only in working mode

Steering mode	Tip switch 99	Effect
Four wheel steering	☞ <i>Press tip switch 99 on the lower half on the symbol</i>	<ul style="list-style-type: none"> ☞ Telltale 100 (four wheel steering) flashes until the front axle reaches the straight-ahead position ☞ Four wheel steering is switched on automatically ☞ Telltale 100 (four wheel steering) lights
Front wheel steering	☞ <i>Press tip switch 99 on the upper half</i>	<ul style="list-style-type: none"> ☞ Telltale 101 (front wheel steering) flashes until the rear axle reaches the straight-ahead position ☞ Front wheel steering is switched on automatically ☞ Telltale 101 (front wheel steering) lights

3.4.7 Power train

Selecting drive mode



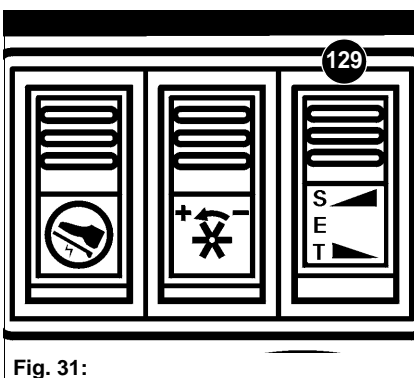
The Citymaster offers several drive modes for driving and working (depending on the version). We recommend the following drive modes depending on the type and duration of applications.

Automotive driving

This is the normal driving style in working mode and in transport mode to drive the vehicle on the road with and without trailer. The vehicle can be driven the same as a "car":

- ☞ Select maximum speed and driving direction with drive lever **67**
- ☞ Move the vehicle with accelerator pedal **55** in the selected direction, until reaching the preset maximum speed at full throttle

Cruise control



Tip switch **129** allows riding the vehicle at constant driving speed. Adjust the desired speed (2kph min.) with the accelerator pedal and press the switch to accept it.

Controling is interrupted by actuation of the brake or by pressing the tip switch. Pressing the tip switch **129** to re-set the adjusted driving speed.



Danger!

Higher accident hazard due to reduced caution of the driver and due to delayed braking (according to foot position).

Accident hazard

- ☞ Keep foot ready for braking
- ☞ Increased vigilance

Accelerator pedal



Different drive modes are possible depending on equipment and work performed. The standard mode of the vehicle is the automotive drive mode. Accelerator pedal **55** regulates the engine revolutions of the diesel engine as follows:

Accelerator pedal	Effect
• Press pedal down	➔ Engine speed, driving speed increases
• Release pedal slowly	➔ Engine speed, driving speed decreases
• Release pedal fully	➔ The braking effect of the hydrostatic drive and the diesel engine takes effect



Important!

The maximum speed achievable depends on the following factors:

- Which drive mode was preselected with rocker switch **92**

As a result of the strong brake effect of the hydrostatic drive when abruptly taking the foot from the accelerator pedal, it is possible that the wheels of the rear axle block when the road conditions are poor (wet or dirty road, ice and/or snow)!

When the vehicle is braked abruptly with the hydrostatic drive or when abruptly taking the foot from the accelerator pedal, the brake lights are switched on to warn the following traffic.

Drive lever

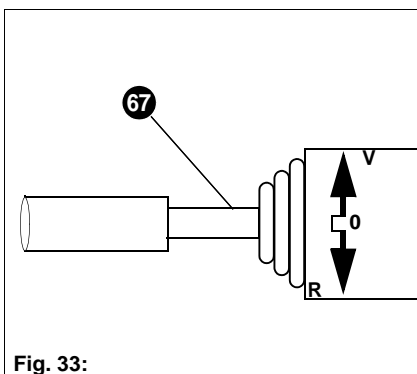


Danger!

Strong brake effect of the hydrostatic drive when the driving direction is changed abruptly.

Accident hazard!

☞ *Bring vehicle to a standstill before changing the driving direction!*



Function:

- Selection of forward or backward driving direction
- Continuous selection of speed range



Important!

The engine will not start when drive lever **67** is not in neutral position.

Selection of driving direction and speed with drive lever

The drive lever has the following switch positions

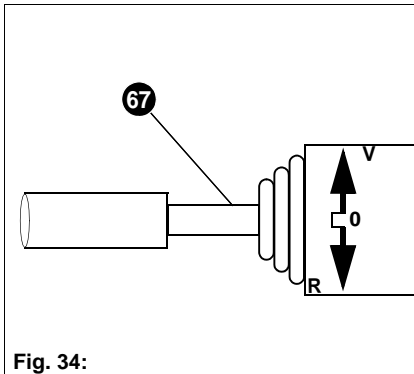


Fig. 34:

Position	Drive lever	Effect
• V	☞ Slowly push 67 to the right and then forwards	☞ Forward travel, increasing speed
• O	☞ In centre position	☞ Neutral position
• R	☞ Slowly push 67 to the right and then backwards	☞ Reverse travel, increasing speed ☞ The reversing light lights ☞ With the backup warning system (option), a pulsating warning signal sounds

Drive range selector

The hydrostatic drive in the production version allows for two drive modes. The **Transport** and **Working** modes are preselected with switch 92. For the possible driving speeds in the different drive modes (see page 5-2). In **working mode**, the driving speed (0 to 15 kph) allows for precisely adapting the driving speed to the application with higher driving torque. The result is uniform and smooth performance.

In **transport mode**, a higher driving speed (0 to 50 kph) is possible with a smaller driving torque.

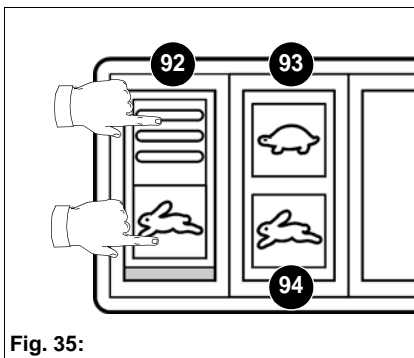


Fig. 35:

Select the drive modes with switch 92.

Drive range selector 92		
Transport 	☞ Press tip switch 92 on the lower half on the "Hare" symbol	☞ Telltale 94 lights
Work 	☞ Press tip switch 92 on the upper half	☞ Telltale 93 lights

3.4.8 Light and signal system



Important!

Follow the regulations of your country when using the described signalling and light systems!

Headlights switch

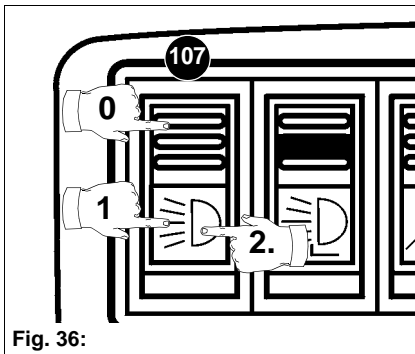


Fig. 36:

Function

The following functions are performed with switch **107** in the centre console:

- Switching on and off the headlights (parking light, low beam light), clearance lights, rear lights, instrument lighting

Operation

Parking light, headlights		
1	Press switch 107 on symbol to the first position	➔ Parking light on ➔ Telltale in switch 107 lights ➔ Instrument lighting on
2	Press switch 107 on symbol to the second position	➔ Low beam or high beam light on (depending on the position of lever 60) ➔ Telltale in switch 107 lights ➔ Instrument lighting on
OFF (0)	Press upper half of switch 107	➔ Parking light and low beam light off ➔ Telltale in switch 107 off ➔ Instrument lighting off

Combined switch on the right on the steering column

Function

The following functions are performed with combined switch **60** on the right of the steering column:

- Operation of headlights (low beam/high beam)
- Headlight flasher
- Direction indicator
- Horn
- Operation of wipers and washer system (see page 3-40)

Headlights



Important!

When the ignition is switched off with the low beam or high beam lights on – key in ignition switch **58** in position **0** – only the parking light remains on!

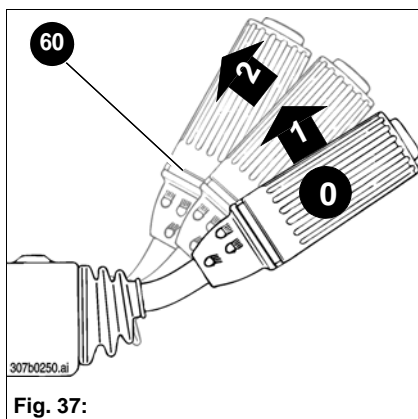


Fig. 37:

Low beam/high beam/headlight flasher		
0	☞ Lever 60 in home position	☞ High beam off ☞ Telltale 82 off
1	☞ Pull up lever 60	☞ Headlight flasher on ☞ Telltale 82 on
2	☞ With low beam on, pull up lever 60	☞ High beam on ☞ Telltale 82 on
1	☞ With high beam on, pull up lever 60	☞ Low beam on ☞ Telltale 82 off

Headlight beam adjustment

To prevent dazzling other drivers, the headlight setting can be adjusted or changed for high load conditions.

☞ Check the headlight setting after every weight change!

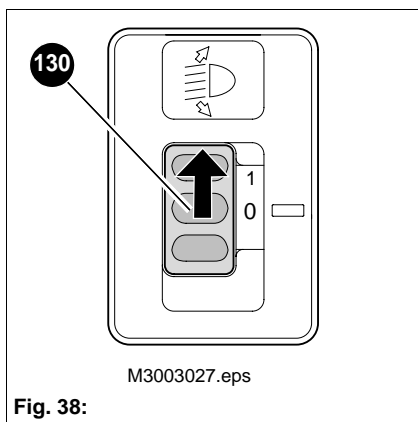


Fig. 38:

Headlight beam adjustment		
0	☞ With low beam switched on, rotary switch 130 in position 0	☞ Home position with unloaded vehicle up to a payload of 500 kg
1	☞ With low beam switched on, turn rotary switch 130 in position 1, 2 or 3	☞ Payload of 500 kg to 1500 kg
2		☞ Above 1500 kg payload
3		☞ Special use with heavy rear implements



Important!

Headlight beam adjustment **130** does not affect the setting of the auxiliary headlights (option).

The basic setting of the headlights must always be performed by your authorised Hako workshop. Headlight beam adjustment **130** must be in basic position (**0**) for this adjustment!

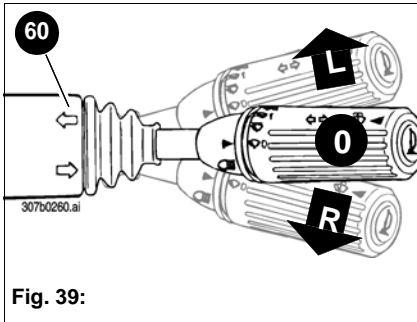


Fig. 39:

Turn indicators		
LEFT (L)	☞ Press combined switch 60 to the front	☞ Telltale 80 flashes, in trailer operation, telltale 81 also flashes
RIGHT (R)	☞ Pull combined switch 60 to the rear	☞ Telltale 80 flashes, in trailer operation, telltale 81 also flashes
OFF (0)	☞ Combined switch 60 in centre position	☞ Telltales 80 and 81 go off



Caution!

The turn indicator system is not in working order if telltales **80** or **81** flash approximately twice as fast as normally!

☞ Immediately check the front, rear and side turn indicators, and those of the trailer

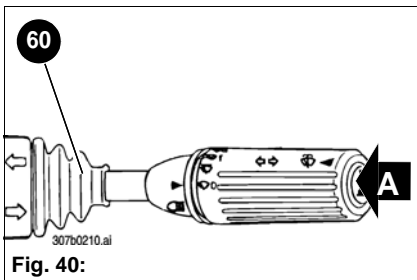


Fig. 40:

Horn		
0	☞ Lever 60 in home position	☞ Horn off
1	☞ Press pushbutton A on lever 60	☞ Horn on

Rear fog light rocker switch

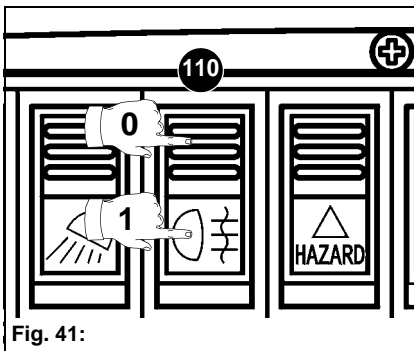


Fig. 41:

Rear fog light		
ON (1)	☞ With the low beam switched on, press switch 110 on symbol	☛ Telltale 90 on
OFF (0)	☞ With the low beam switched on, press switch 110 in upper half	☛ Telltale 90 off



Caution!

Switch on the rear fog light only in conditions of short visibility (e.g. in Germany below 50 m), otherwise motorists behind you will be dazzled!

☞ Follow the legal regulations!



Important!

The rear fog light lights only with the low beam or high beam switched on, but not the parking light. The rear fog light can also be switched off by switching off the lights. When the lights are switched on again, the rear fog light also has to be switched on again.

Hazard warning system rocker switch

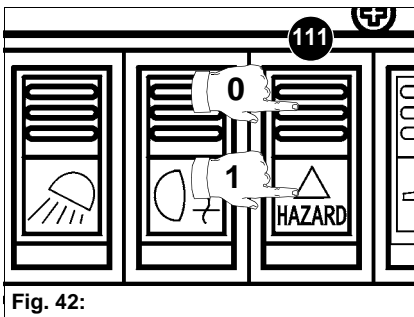


Fig. 42:

Hazard warning system		
ON (1)	☞ Press rocker switch 111 on symbol	☛ Telltale in rocker switch flashes
OFF (0)	☞ Press upper half of rocker switch 111	☛ Telltale off

Rotating beacon rocker switch

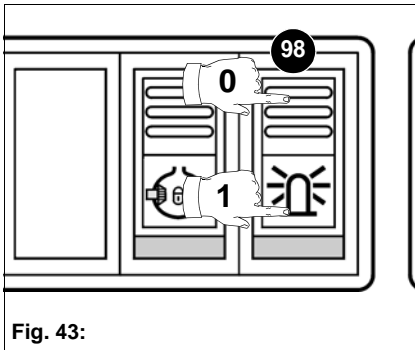


Fig. 43:

Rotating beacon

ON (1)	Press rocker switch 98 on symbol	➔ Telltale in rocker switch on
OFF (0)	Press upper half of rocker switch 98	➔ Telltale in rocker switch off

i Important!

Follow the legal regulations of your country, which may require you not to switch on the rotating beacon on public roads unless the road is within the vehicle's working range and the vehicle represents an obstruction to the normal flow of traffic when working. Observe the relevant national regulations in your country.

Front working light rocker switch

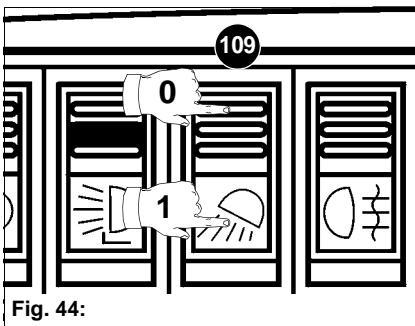


Fig. 44:

Working light (front) ,

ON (1)	Press rocker switch 109 on symbol	➔ Telltale in rocker switch on
OFF (0)	Press upper half of rocker switch 109	➔ Telltale off

i Important!

The working lights light only with the low beam or high beam switched on, but not the parking light. The working lights can also be switched off by switching off the lights.

The working lights must only be used when the vehicle is working, and only if blinding of drivers of vehicles on public roads is not expected.

Auxiliary headlight change-over switch

When working with implements covering the lower light systems, e.g. winter use with snow plough, auxiliary headlights are required. A change-over switch **108** on the instrument panel can be used to switch from the lower main headlights and direction indicators to the auxiliary headlights and upper direction indicators.

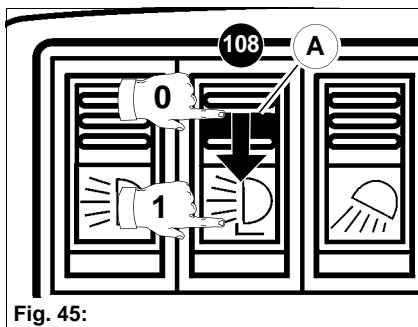


Fig. 45:

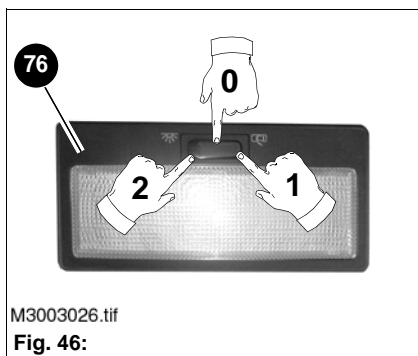
Auxiliary headlight change-over switch		
ON (1)	➤ Push lock A downwards and press rocker switch 108 on symbol	➡ Telltale in rocker switch on
OFF (0)	➤ Push lock A downwards and press rocker switch 108 in the upper half	➡ Telltale off



Important!

The headlight beam adjustment **130** does not adjust the auxiliary headlights.

Interior light



M3003026.tif
Fig. 46:

Interior light		
OFF (0)	➤ Set rocker switch of interior light 76 to centre position (0)	➡ Interior light off
ON (1)	➤ Press rocker switch of the interior lighting 76 on the right (1)	➡ Interior light lights when the doors are opened
ON (2)	➤ Press rocker switch of the interior lighting 76 on the left (2)	➡ Interior light lights permanently

3.4.9 Windscreen washer unit

Combined switch on the right on the steering column

Function

The following functions are performed with combined switch **60** on the right of the steering column:

- Wipers
- Windscreen washer unit
- Operation of light system and horn (see page 3-35)

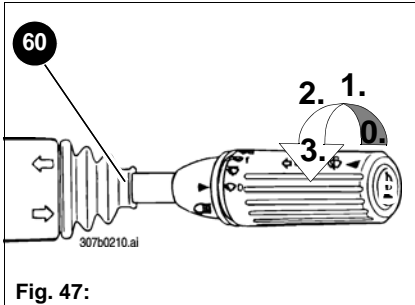


Fig. 47:

Wiper		
0	☞ Combined switch 60 in home position	☞ Wiper OFF
1	☞ Turn combined switch 60 to the 1st position	☞ Interval switching
2	☞ Turn combined switch 60 further to the 2nd position	☞ Slow
3	☞ Turn combined switch 60 further to the 3rd position	☞ Fast

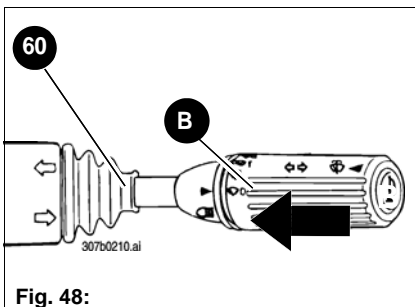


Fig. 48:

Windscreen washer unit		
0	☞ Combined switch 60 in home position	☞ Windscreen washer unit OFF
1	☞ Push rotary switch B of combined switch 60 to the left	☞ Windscreen washer unit ON

i Important!

The reservoir for the windscreen washer unit is located behind the passenger's seat (see page 4-45)!

3.4.10 Cab heating and ventilation



Danger!

Good visibility is important for safety, and is only ensured if all windows are free of ice, snow and condensation –

Accident hazard!

- ☞ *Make yourself familiar with the correct operation of heating and ventilation as well as with clearing/defrosting the windows of the vehicle*
- ☞ *Maximum heating output and quick defrosting of the windows can only be achieved after the engine has reached operating temperature*



Important!

The vehicle is equipped with a warm-water fan heating. The heater of the vehicle can be set to 2 operating conditions:

- Ventilation
- Heating

A 3-stage fan blows air to the heater nozzles **61** of the windscreen and via the legroom area nozzles **56** and **62** into the cab.

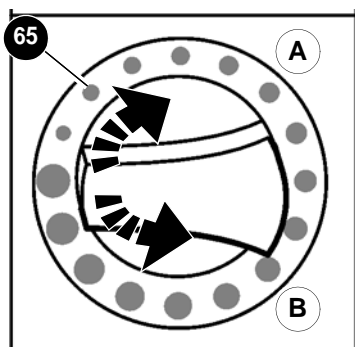


Fig. 49:

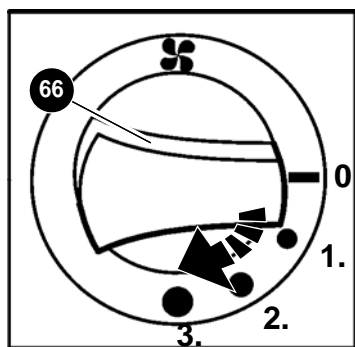


Fig. 50:

Temperature setting	
Warmer	☞ Turn rotary switch 64 clockwise to A
Colder	☞ Turn rotary switch 64 counterclockwise to B

Fan for ventilation and heating		
OFF	☞ Rotary switch 65 to symbol	➡ Fan OFF
1st step	☞ Turn rotary switch 65 clockwise to position 1	➡ Fan runs at 1st speed
2nd step	☞ Turn rotary switch 65 further clockwise to position 2	➡ Fan runs at 2nd speed
3rd step	☞ Turn rotary switch 65 further clockwise to position 3	➡ Fan runs at 3rd speed

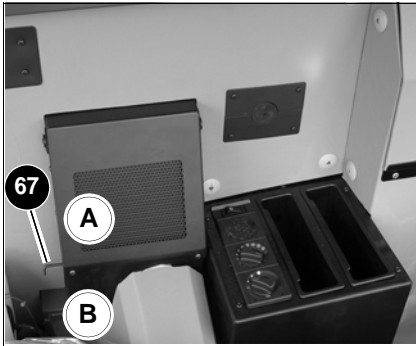


Fig. 51:

Recirculated air control lever

A	☞ Turn control lever 66 to (A)	☞ Recirculated air position, air is drawn in from the cab
B	☞ Turn control lever 66 to (B)	☞ Air is drawn in from the outside

For quick clearing/defrosting of the windscreen:

- ☞ Start the vehicle
- ☞ Turn recirculated air control lever **66** to **(A)**
- ☞ Switch fan with rotary switch **65** to the **3rd speed**
- ☞ Turn temperature setting **64** into direction **(A)** as far as it will go
- ☞ Operation of heated windscreen (option) rocker switch **105**

Rocker switch for heated windscreen (standard) and heated outside rearview mirror (option)

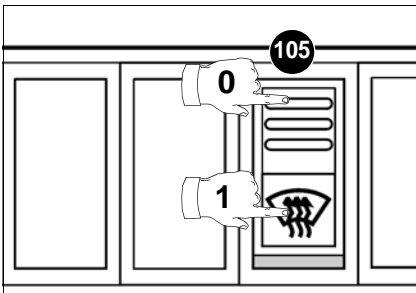


Fig. 52:

Heated windscreen (standard) and heated outside rearview mirror (option)

ON	☞ Set rocker switch 105 to symbol (1)	☞ Telltale 91 on
OFF	☞ Press rocker switch 105 in upper half (0)	☞ Telltale 91 off

i Important!

Switch the heated windscreen/outside rearview mirror off again when the windows/outside rearview mirrors are free. High current consumption!
After approx. 10 minutes, the heated windscreen/outside rearview mirror are switched off automatically (time lag relay).

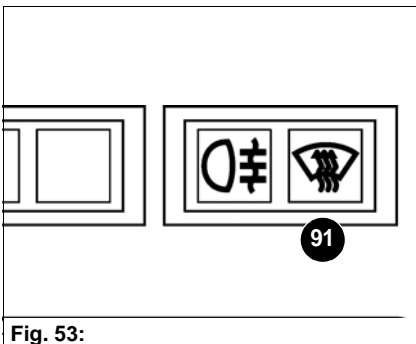


Fig. 53:

3.4.11 Operator's seat/ passenger's seat



Danger!

Never change the seat position when driving or working –

Accident hazard!

- ☞ *Adjust the seat before moving the vehicle!*
- ☞ *Observe the operation manual of the seat manufacturer!*

53 48

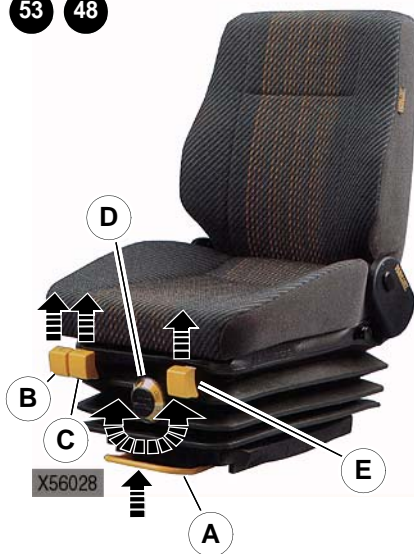


Fig. 54:

Longitudinal adjustment A (driver's seat only)

- ☞ *Sit down on the operator's seat*
 - Pull lever **A** upward
 - Move the seat forward or backward
 - Release lever **A** and let the operator's seat engage

Height of rear edge of seat B (driver's seat only)

- ☞ *Sit down on the operator's seat*
 - Pull lever **B** upward

Height of front edge of seat C (driver's seat only)

- ☞ *Sit down on the operator's seat*
 - Pull lever **C** upward

Weight setting D (driver's seat only)



Important!

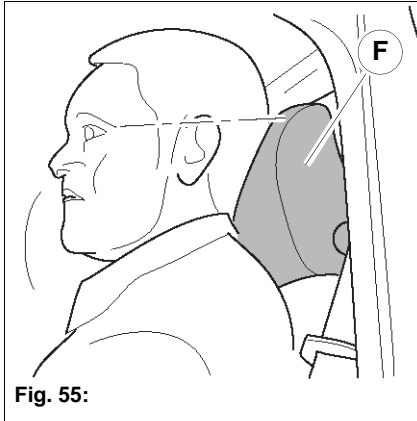
The driver seat has been equipped with a seat contact switch. In case of excessive seat springing adjustment, travel drive cannot be activated!

Use handwheel **D** to continuously adjust the seat suspension to the operator's weight (possible ranges from 50 – 130 kg).

- ☞ *Sit down on the operator's seat*
 - Turn handwheel **D** to adjust the seat suspension

Backrest adjustment E

- ☞ *Sit down on the operator's seat*
 - Press your back lightly against the backrest and pull up lever **E** at the same time
 - Release lever **E** and let the backrest engage



Head rest F (option)



Danger!

Do not drive if the head rest is not adjusted correctly!

Risk of injury!

☞ *Adjust the head rest so that the back of your head is supported at the height of your ears*

☞ *Sit down on the operator's seat*

- Pull head rest **F** up or push down
- Pull head rest **F** to the front or push it to the rear

3.4.12 Seat belt



Danger!

Do not drive or work with the seat belt undone –

Risk of injury!

☞ *Fasten the seat belt before moving or working with the vehicle!*

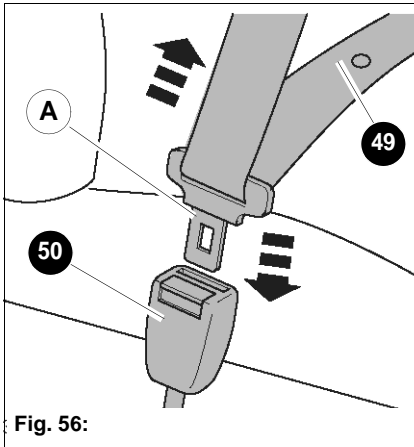
- Do not twist the seat belt!
- The seat belt must run across the pelvis – not the stomach – and always sit firmly!
- Do not place the seat belt over hard, edged or breakable objects (tools, metre rules, glasses, pens) in your clothes!
- Never fasten 2 persons (children!) with one seat belt!
- Check seat belt condition regularly. Have damaged parts immediately replaced by your authorised Hako workshop!
- Always keep seat belt clean, because coarse contamination can affect the function of the automatic belt!
- The lock may not be jammed by foreign objects (paper or similar) otherwise the buckle latch cannot lock into place!

The seat belt is stretched after an accident, and can no longer be used. Therefore, in case of an accident, this overstretched belt strap is

Not safe any longer!

☞ *Replace the seat belt after an accident!*

☞ *Have anchor points and seat attachment checked for further load resistance!*

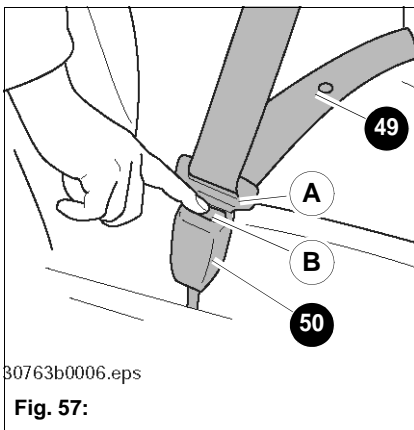


The three-point seat belts are for the operator's and passenger's safety. Fasten your seat belt before driving as follows

Fastening the seat belt:

☞ *Fasten your seat belt 49 before driving as follows:*

- Hold belt strap at the buckle latch **A** and pull it slowly and evenly across the pelvis to the lock **50**
- Insert buckle latch **A** into lock **50** until it noticeably locks into place (**pull test**)
- Retension seat belt by pulling at the end
 - ➔ The seat belt must always rest firmly on the pelvis!



Taking off the seat belt

☞ *Take off seat belt 49 as follows:*

- Hold the seat belt
- Press red button **B** on lock **50**
 - ➔ Buckle latch **A** jumps out of lock **50** by spring pressure
- Slowly return the seat belt to the retractor

i Important!

When pulled slowly, the automatic seat belt ensures free and easy movement. However, when braking suddenly, it blocks. The automatic seat belt can also block when driving through pitch-holes or similar uneven surfaces.

i Important!

Clean the belt strap with lukewarm water only, do not use solvents!

3.4.13 Cab doors



Danger!

Do not drive with open doors!

Accident hazard!

- ☞ Close the doors when driving on public roads and during work
- ☞ Always use handles **41** and **46** when closing doors!



X56060

Fig. 58:

Door openers (inside)

- ☞ To open the doors, pull lever **43** or **44**



Important!

The doors can be unlocked and locked only with the door key from the outside.

Side window left/right

The left/right side windows are opened or closed with latches **42** and **45**.

Side window left/right	To do this ...
Open/close	<ul style="list-style-type: none"> ☞ Push latch 42 or 45 down and slide window accordingly ☞ Release latch 42 or 45

3.4.14 Tachograph (option)

The digital tachograph stores all information available from the machine. These are, among others, the driving and rest times, driving speeds and distances.

Data are digitally recorded in parallel by vehicle-related digital tachograph and by driver-related chip card.

The tachograph **69** is located in the console between the seats.



Important!

Bear in mind the legal regulations of your country and the tachograph manufacturer's instructions!



Fig. 59:

3.4.15 Electric sockets

Socket, cigarette lighter

Cigarette lighter **132** is located in the centre console.



Danger!

Heated cigarette lighter –

Risk of burns!

- ⚠ Do not touch the hot heating spiral!
- ⚠ Do not place the cigarette lighter onto an inflammable surface!

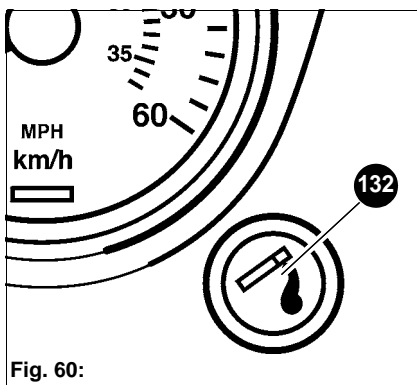


Fig. 60:

Function:

Cigarette lighter and socket for hand lamp etc.

Operation:

When using as cigarette lighter:

- ⚠ Press in cigarette lighter **132**
- ⚠ Cigarette lighter **132** returns to its initial position after a couple of seconds and can be pulled out to light a cigarette

When using as socket

- ⚠ Pull out cigarette lighter **132** and keep it elsewhere
- ⚠ The opening serves as a 12 V socket, max. 10 A



Important!

Cigarette lighter/socket **132** also works when the diesel engine is switched off, but then just runs using the battery.

3 pole socket for superstructure equipment

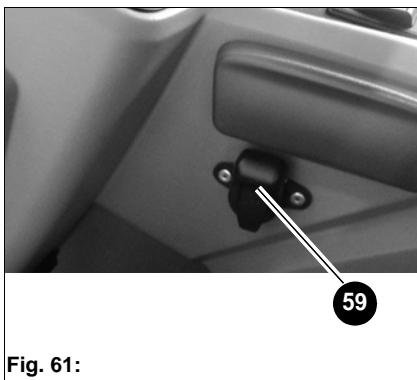


Fig. 61:

Socket **59** is located at the right of the centre console below the ashtray.

- Socket for additional equipment

Socket at the front



Fig. 62:

The sockets at the front **12** and rear **154/155** of the vehicle serve for communication and control between the control panel in the cab and implements.

- Sockets at the front **12** (23-polig) for sweeping unit

Socket at the rear

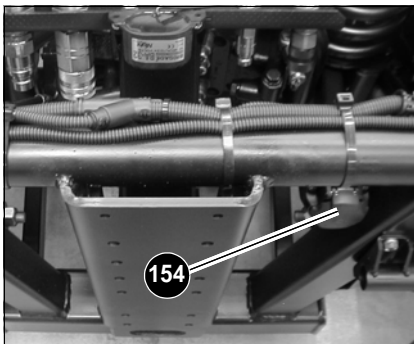


Fig. 63:

- Socket at the rear **154** (13-polig) for spreader

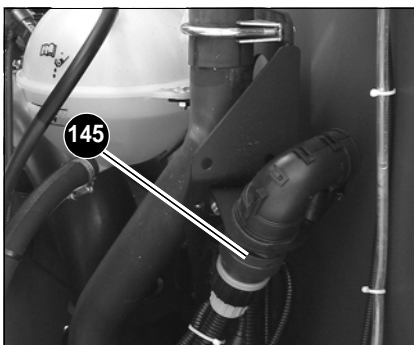


Fig. 64:

- Sockets behind the cab **145** (23-polig) for superstructure

3.5 Driving the Citymaster

3.5.1 Before starting the engine

- ☞ *Run through the "Start-up" check list (see page 3-14)*
- ☞ *Adjust seat position (see page 3-43)*
- ☞ *Adjust steering column and steering wheel (see page 3-28)*
- ☞ *Adjust outside rearview mirror*



Important!

All controls must be within easy reach. You must be able to move the brake and accelerator pedals to their limit positions!

- ☞ *Fasten seat belt (see page 3-44)*
- ☞ *Make sure that:*
 - Drive lever **67** is in neutral position
 - All implement drives are switched off
 - Parking brake **63** is applied
- ☞ *Press down brake pedal **54** to check after a maximum of half the pedal travel, firm resistance can be felt on the pedal*

3.5.2 Starting the engine

General

- The engine will not start unless drive lever **67** is in neutral
- The starter cannot be actuated if the engine is already running (start repeat interlock)
- Do not run the starter for more than 10 seconds
- Wait for about 1 minute to let the battery recover before trying again



Danger!

If the engine is running in enclosed areas -

Risk of poisoning!

- ☞ *Do not run the engine in enclosed areas. The engine exhaust fumes contain carbon monoxide which is colourless and odourless. Inhaling this gas can damage your health.*
-

Procedure

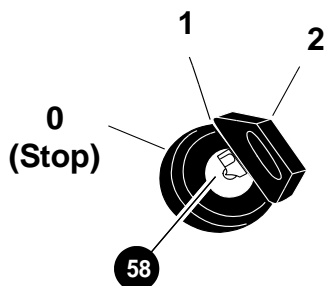


Fig. 65:

After carrying out start-up preparations according to Section 3:

- Insert ignition key in ignition switch **58**
- Turn the ignition key to position "1"
 - System check of the control units
 - Warning light **87** lights if parking brake **63** is applied
 - Warning lights **84**, **83** light
 - Warning message in the multifunction display with the dirty hopper raised or not fully lowered
- When temperatures are below 5°C :
 - Engine is preheated (approx. 20 seconds) until telltale **85** goes off. The engine must be started immediately after the telltale **85** went off
- Do not press accelerator pedal **55** during the start-up
- Turn the ignition key to position "2" and hold it in this position until the engine starts
- Release the ignition key

When the engine has started:

- Check that the following warning lights have gone off:
 - Warning light **84**
If not, switch off the engine and check the engine oil level!
 - Warning light **83**
If not, switch off the engine and check the V-ribbed belt connection to the alternator!

**Environment!**

If possible, do not warm up the engine at idling speed!

In the cold season or after a longer standstill:

- Increase the engine speed gradually
- Only set off at full power when the engine has reached its operating temperature

**Important!**

In the cold season, use oil which is suitable for the temperature (see page 4-55)

3.5.3 Before moving off

Special instructions for driving on public roads

The vehicle is subject to the

- Applicable legal regulations of your country
- The regulations specified in the operation licence or in the vehicle papers

In addition, bear in mind the mandatory regulations relevant to accident prevention.

Observe the relevant national regulations in your country.

Before moving off

☞ Check the function of:

- Brakes
- Steering
- Lighting

☞ Raise sweeping unit

☞ Lower dirt hopper

Inspection of important functional units

Steering

☞ *Functional check: Move the steering wheel to the left and right. Check whether the wheels move (depending on the steering mode).*

Service brake



Danger!

The brake lights at the rear of the vehicle do not light up when the

- Parking brake is applied

☞ *When driving on public roads and during work operation, use the brake pedal **54** to brake the vehicle, so that the brake lights light up.*

Dirt accumulation in the area of the brake pedal can result in brake malfunctions –

Accident hazard!

☞ *Always keep the brake pedal **54** in a clean condition!*

☞ *Before moving off, press down the brake pedal **54** to check that*

- After a maximum of half the pedal travel and high power applied there is a firm resistance to be felt
- The brake lights light up when the brake pedal is pressed down

☞ *After moving off, check in the rearview mirror that no-one will be hindered by a brake manoeuvre*

☞ *Check the brake action at low speed*

Lighting

☞ *Functional check: Check all lights on the vehicle and trailer (see page 3-34)*

3.5.4 Moving off



Caution!

Make sure you have released the parking brake - driving with the parking brake applied overheats the parking brake and causes its failure!

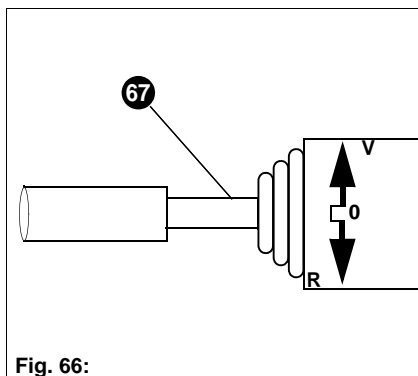


Fig. 66:

After starting the engine:

- ☞ Select drive mode with switch **92**
- ☞ Select driving direct and maximum speed on drive lever **67**
- ☞ Release parking brake with parking brake lever **63**
 - ➔ Warning light **87** goes off
- ☞ Slowly press accelerator pedal **55**
- ☞ Test the brakes at low speed
- ☞ Always warm the engine up before running it under full load



Important!

The vehicle starts to move only when the operator is sitting on the operator's seat (seat contact switch)

3.5.5 Driving



Fig. 67:

The driving speed can be continuously adjusted with accelerator pedal **55**. Depending on the tyres, the maximum speed on even ground is reached at engine revolutions of 2700 to 2900 rpm. This means that after the acceleration phase, accelerator pedal **55** can be released somewhat when driving on level ground without reducing the driving speed. This actively contributes to noise reduction as well as reduction of the fuel consumption.

To achieve maximum acceleration or the maximum speed when driving on an incline, full throttle must be used so that the diesel engine operates at its rated horsepower at approx. 3100 rpm.



Caution!

If the hydraulic oil temperatures are below 10°C, the diesel revolutions are limited by the drive control to prevent damage to the hydraulic pumps. When the pressure filter of the hydraulic pump is soiled (warning message in the multifunction display), the hydraulic pump no longer delivers the full flow rate and the vehicle no longer achieves its full maximum speed.

3.5.6 Stopping the vehicle

Braking the vehicle

- ☞ Release accelerator pedal **55** or set drive lever **67** slowly to neutral position
- ☞ Press brake pedal **54** gently



Important!

When the vehicle is braked abruptly with the hydrostatic drive or when abruptly taking the foot from the accelerator pedal, the brake lights are switched on to warn the following traffic.

Stopping the vehicle

- ☞ Reduce engine revolutions (below 1200 rpm): Take your foot off accelerator pedal **55** or switch off work speed control **128**
- ☞ Set drive lever **67** to neutral position
- ☞ Press brake pedal **54** until the vehicle comes to a standstill
- ☞ Pull parking brake lever **63**
 - ➔ Warning light **87** lights

3.5.7 Parking the vehicle



Danger!

Vehicles parked on slopes may roll away.

- ☞ Use the parking brake to park the vehicle safely and to prevent it rolling away (see page 3-26)!
- ☞ Also secure the vehicle by placing chocks under the downhill sides of the wheels!

- ☞ Stop the vehicle
- ☞ Apply parking brake (see page 3-26)
- ☞ Place the implements on the quickhitch facility on the ground

After operation at full power:

- ☞ Allow the engine to run on for about 60 seconds so that the temperature can stabilise
- ☞ Switch off the engine by turning the ignition key to position "0"
- ☞ Remove the ignition key!
- ☞ Lock the doors of the operator's compartment after leaving the cab

On uphill and downhill gradients:

- ☞ Also secure the vehicle by placing chocks under the downhill sides of the wheels!

3.5.8 Differential lock

The differential lock can be used when a wheel of the rear axle spins and driving is not possible.

The differential lock can be switched on only in working mode.

When the differential lock is switched on, the rigid connection of the drive axles evenly transfers the driving torque to both wheels of the rear axle.



Caution!

If the differential lock is switched on incorrectly, it is possible that the differential of the rear axle will be damaged.

The differential lock can be switched on only if:

- the drive is **not under load**,
- the **wheels are not spinning** and

Differential lock tip switch [97]

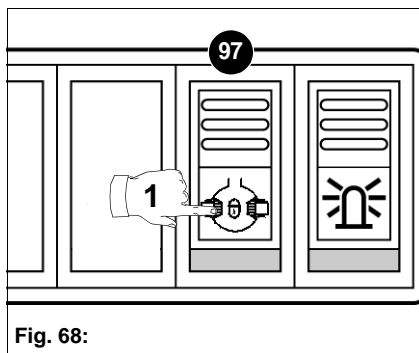


Fig. 68:

Switch on the differential lock of the rear axle with tip switch 97.

Differential lock	
ON (1)	Press tip switch 97 on symbol
OFF	Release tip switch 97



Important!

The differential lock can be switched on while driving, but only if the wheels are not spinning, i.e. as long as the wheels turn with ground contact and only while driving straight ahead.

The differential lock engages only after the occurrence of low speed differences at the wheels of rear axle (e.g. when cornering).

The differential lock is active only as long as the tip switch is pressed.

Driving on firm ground with the differential lock switched on increases tyre wear.

Never use the differential lock longer than necessary.

3.5.9 Towing and transporting the vehicle

Safety instructions

- The vehicle may only be towed using suitable towing equipment (towing bar or cable) in conjunction with suitable towing facilities, such as a towing coupling, hooks and eyes!
- Move off slowly! Ensure that no-one is dangerously close to the towing rod
- The vehicle may only be towed with a cable if the service brakes and steering are fully operational!

When loading and transporting the vehicle:

- The transport vehicle must be of adequate size – refer to section *Specifications* for the dimensions of the vehicle!
- Remove any mud, snow or ice from the tyres so that the vehicle can be driven safely onto ramps
- Secure the vehicle against unintentional movement!

Towing



Danger!

Turning the steering wheel requires greater effort if the diesel engine breaks down.
The power brakes do not work when the engine is at a standstill.
The brake pedal has to be pressed much harder!
Take this into account, especially when towing the vehicle!

Accident hazard!

- ☞ *Drive the vehicle only to the next possible stop*
 - ☞ *When the hydraulic oil is cold, do not tow the vehicle. It must be transported in this case!*
 - ☞ *Maximum towing speed: 10 kph!*
 - ☞ *Towing only with front wheel steering!*
 - ☞ *Use a towing bar whenever possible!*
-



Caution!

The vehicle may not be towed with the engine running when drive lever **67** is not in neutral position and switch **72** was not pressed!
Towing could damage the hydrostatic drive!

- ☞ **With the engine running:**
The vehicle may be towed at a maximum speed of 10 kph and over a maximum distance of 10 km!
 - ☞ **With the engine at a standstill:**
The vehicle may be towed at a maximum speed of 5 kph and over a maximum distance of 2 km!
-

Towing operation switch

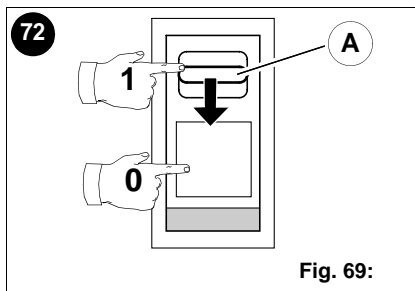


Fig. 69:

Towing operation switch **72** is located on the right of the cab rear panel below the fuse box cover

Towing operation

ON (1)	☞ Push lock A downwards and press rocker switch 72 on the upper half
OFF (0)	☞ Push lock A downwards and press rocker switch 72 on the lower half

Tow the vehicle away as follows:

- ☞ Set drive lever **67** to the neutral position
- ☞ Switch off the implement drives
- ☞ Raise sweeping unit
- ☞ Lower dirt hopper
- ☞ Switch on the front wheel steering!
- ☞ Switch drive range selector **92** to transport mode
- ☞ Switch on towing operation switch **72**
- ☞ Fit an adequately sized towing bar to the towing facilities
- ☞ If possible, run the engine at idling speed when towing the vehicle
- ☞ Go to your authorised Hako workshop via the shortest possible route!

3.6 Working with the Vehicle

3.6.1 Hydraulics

Work hydraulics

The working hydraulic unit is equipped with a Load Sensing hydraulic pump to ensure supply of the following vehicle functions:

- Front power lift
 - Lift/lower front power lift
- Suction nozzle
 - Lift/lower suction port
 - Open/close suction port flap
- Sweeping unit
 - Lift/lower sweeping unit
 - Swivel brush left/right
 - Brush drive left and right
- Superstructure
 - Lift/lower dirt hopper
 - Open/close hopper flap
 - Fan drive
- Front and rear connections for implements

Interlocking circuit

To protect work hydraulics on the vehicle against overheating, all hydraulic variants have an interlocking circuit.

After a hydraulic fluid temperature of 75°C, a message appears on the multi-functional display and a warning signal sounds.

If the fluid temperature in the circuit rises to 85 °C, the main consumer axes are additionally switched off. If the fluid temperature falls below 75°C, the main consumer axes can be switched on again by the operator.

Auxiliary functions such as lifting, lowering and swivelling the implements or tipping of the dirt hopper are not switched off with the second stage of the safety switch-off.

Drive assembly

A hydrostatic drive assembly drives the vehicle.

A diesel engine controls the drive pump which generates the volume flow for the hydraulic motor. The drive pump also supplies the differential lock and the water valve with hydraulic pressure.

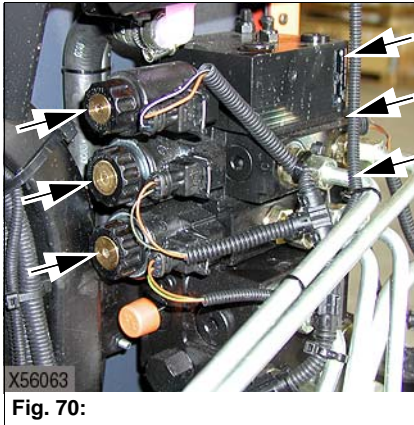
Steering

Hydrostatic front wheel steering with selectable four-wheel steering is supplied by a separate steering pump.

Fan drive

The fan for engine cooling is supplied by a separate hydraulic pump.

Manual EMERGENCY control for hydraulics



Danger!

When the manual EMERGENCY is operated with the engine running

Accident hazard!

Use manual EMERGENCY control only to terminate a started operation and to make the vehicle ready for operation! Not for permanent operation!



Caution!

Qualified service personnel only is authorised to operate the manual EMERGENCY control in emergencies!

The electro-magnetically operated Load Sensing control blocks with manual EMERGENCY control are located behind the driver's cab on the left and in the right frame. This manual EMERGENCY control allows manual control of hydraulics when the electric system of the vehicle is defective.

Operation:

The manual EMERGENCY control is operated by pressing on the central pins of the solenoids (with a suitable screwdriver).

3.6.2 Work Speed Control

The work speed control keeps the desired engine speed constant in the working mode, also under varying loads.

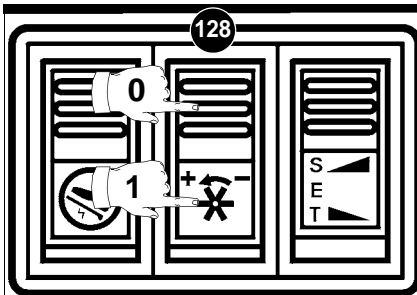


Fig. 71:

Position	Tip switch	Effect
+	Press lower half of tip switch 128 (symbol)	Speed increase in a range between 1900 rpm and up to 2200 rpm max.
-	Press upper half of tip switch 128	Speed reduction in a range between 1900 rpm and up to 2200 rpm max.

The following measure for improved sweeping results can be taken in case of heavy soiling:

- Reduce driving speed
- Increase brush speed
- Increase fan speed
- Increase engine speed with tip switch **128**.

For normal soiling reduce engine and fan speed again.

3.6.3 Hako Key

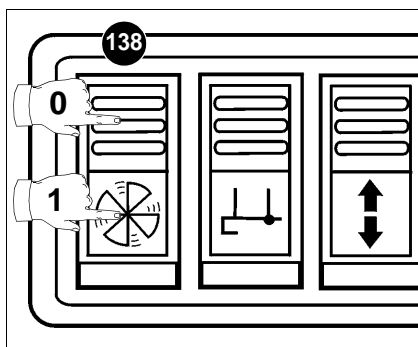


Fig. 72:

Actuation of the tip switch **138** allows interruption of work for a short-distance ride to re-start operation by simply pressing the tip switch again.

Tip switch 138	Effect
1	<ul style="list-style-type: none"> Fan drive ON, clean water pump ON, water valve ON, LOWER suction port, LOWER sweeper/implement carrier and brush drives ON
0	<ul style="list-style-type: none"> Fan drive OFF, clean water pump OFF, water valve OFF, LIFT suction port, LIFT sweeper/implement carrier and brush drives OFF

i Important!

Fan is running only after dirt hopper has been lowered and the hopper flap closed.

3.6.4 Front Power Lift

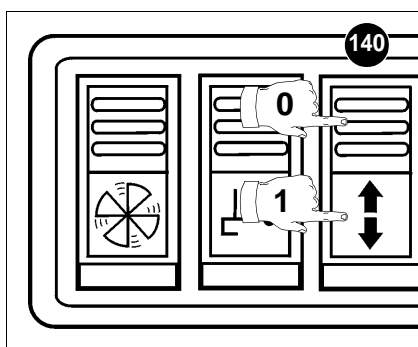


Fig. 73:

Use tip switch **140** on the central panel to operate the front power lift **11**.

Tip switch 140	Effect
1	<ul style="list-style-type: none"> Front power lift 11 is fully lowered to float position
0	<ul style="list-style-type: none"> Briefly press switch to interrupt the lowering procedure Press again to lift the front power lift 11

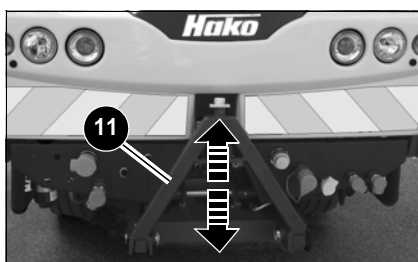


Fig. 74:

3.6.5 Suction port

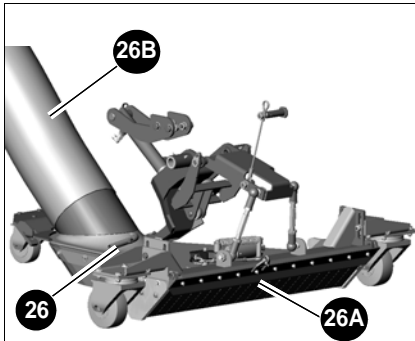


Fig. 75:

The suction port **26** with flexible and shock-proof suspension runs on casters between the front wheels. Lift or lower the suction port via the tip switch (Hako key). In case of coarse dirt particles in front of the suction port, tip switch **139** allows opening of the suction port flap **26A**. Use switch **115** to switch the recirculation water supply on and off. Use switch **116** to switch the clean water pump on and off. The valve **135** controls the flow volume.

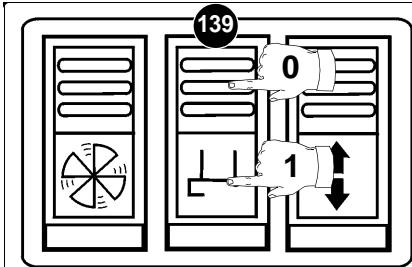
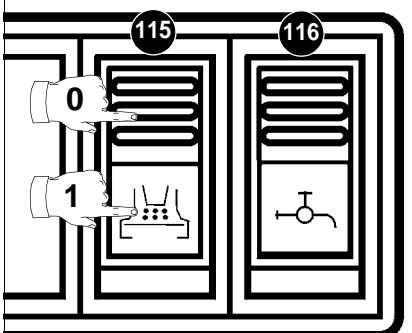


Fig. 76:

Tip switch for suction nozzle flap

Tip switch 139	Effect
1	• Open suction port flap
0	• Close suction port flap



Switch for recirculation water supply

Tip switch 115	Effect
1	• Switch on for recirculation water supply
0	• Switch off for recirculation water supply

Clean water pump switch

Switch 116	Effect
1	• Clean water pump switched ON
0	• Clean water pump switched OFF

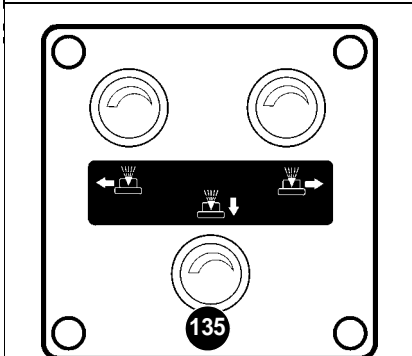


Fig. 77:

In case of second clear water pump (option) set tip-switch **116** to second stage.

Valve for recirculation water supply

Valve 135	Effect
0 - 10	• recirculation water supply for suction port

3.6.6 Sweeping Unit

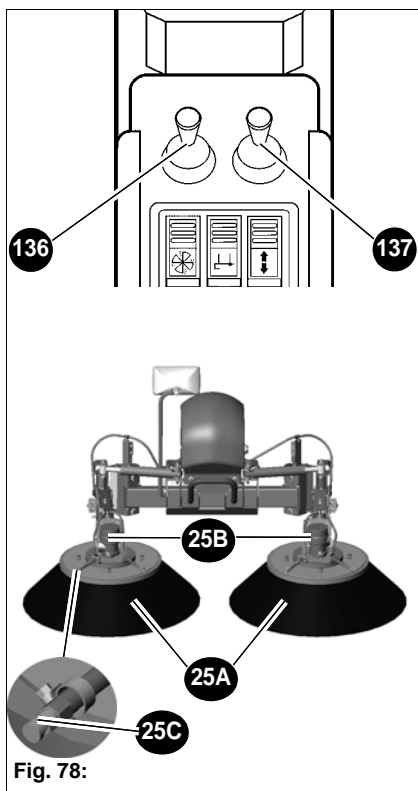


Fig. 78:

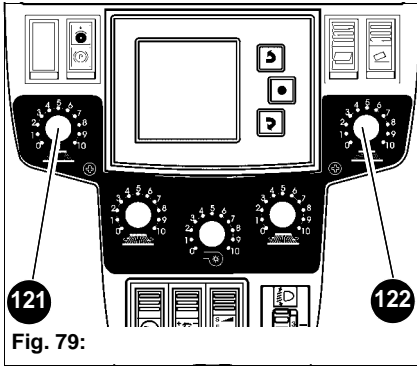
The sweeping unit **25** collects the dirt and transports it to the joint-saving suction port. The joysticks **136** and **137** control the lift/lower and swivel function on the sweeping brushes **25A** of the sweeping unit. The brush ground pressure is continuously adjusted with the switches **121** and **122**. Speed of the sweeping brush drives **25B** is continuously controlled with the switches **123** and **124**.

The spray nozzles **25C** are fitted to the sweeping unit so as to direct a water jet in front of the brushes to bind the dust and to humidify the surface in front of the brushes to be cleaned. Tip switch **116** lows to switch on and off the clean water pump supplying the spray nozzles.

The valves **133** and **134** control the flow volume at the spray nozzles.

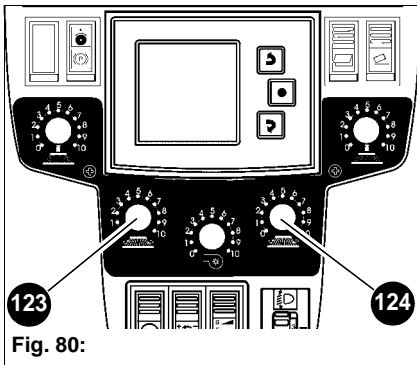
Joysticks for the sweeping brushes

Joystick 136	Effect
	• Lift left sweeping brush
	• Lower left sweeping brush
	• Swivel left sweeping brush to the left
	• Swivel left sweeping brush to the right
Joystick 137	Effect
	• Lift right sweeping brush
	• Lower right sweeping brush
	• Swivel right sweeping brush to the left
	• Swivel right sweeping brush to the right



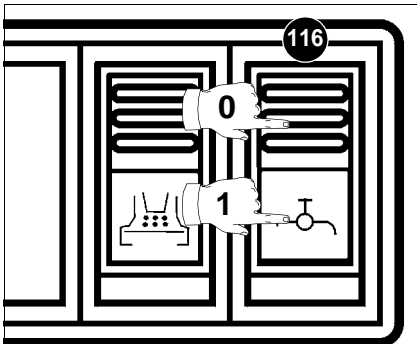
Brush ground pressure control

Potentiometer	Effect
121	
0 - 10	• Left sweeping brush is pressed down
122	
0 - 10	• Right sweeping brush is pressed down



Sweeping brush drive control

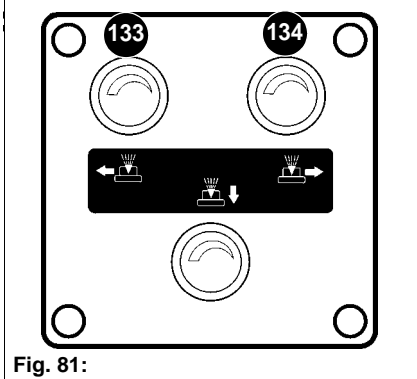
Potentiometer	Effect
123	
0 - 10	• Left brush drive supplied with hydraulic fluid
124	
0 - 10	• Right brush drive supplied with hydraulic



Clean water pump switch

Switch	Effect
116	
1	• Clean water pump switched ON
0	• Clean water pump switched OFF

In case of second clean water pump (option) set tip-switch **116** to second stage.



Spray nozzle valves

Valve	Effect
133	
0 - 10	• Clean water supply to left sweeping brush
134	
0 - 10	• Clean water supply to right sweeping brush

3.6.7 Superstructure

The superstructure **23** holds the clean water tanks, the dirt hopper and the tool box.

The superstructure has been equipped with an automatic folding safety strut **32**.

The clean water tank **23A** is located below the dirt hopper and holds 350 litres. The clean water pump **23B** delivers the clean water to the spray nozzles at the sweeping brushes and to the pipe at the suction port.



Danger!

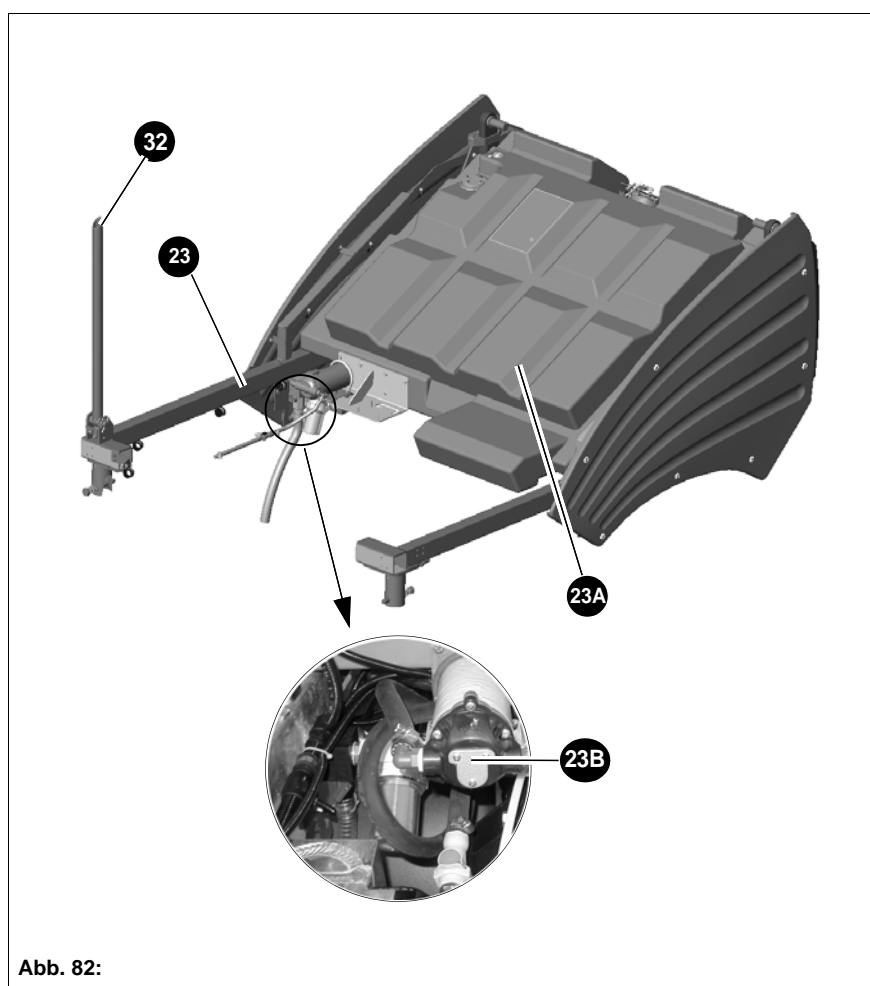
Raised superstructure!

Risk of injury!

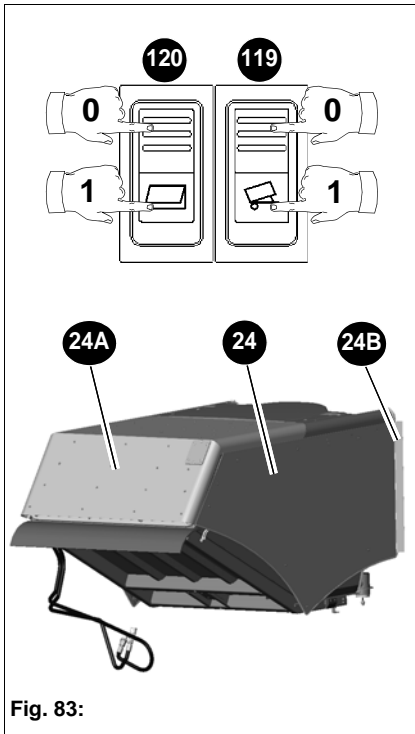
☞ Check safety strut **32** before working under the superstructure!

☞ Stay clear of the lifting or lowering superstructure

Working with the superstructure



Dirt hopper



The dirt is drawn into the dirt hopper by a fan. Speed of the fan drive **24C** is continuously controlled by the potentiometer **125**.

For emptying and cleaning:

Use tip switch **120** to open and close the flap **24A** of the dirt hopper **24** and lift or lower it with tip switch **119**. The lever **24B** is used to open the bottom flap of the dirt hopper.



Caution!

Set engine to increased idling speed before emptying the dirt hopper!

Tip switch for lifting/lowering dirt hopper

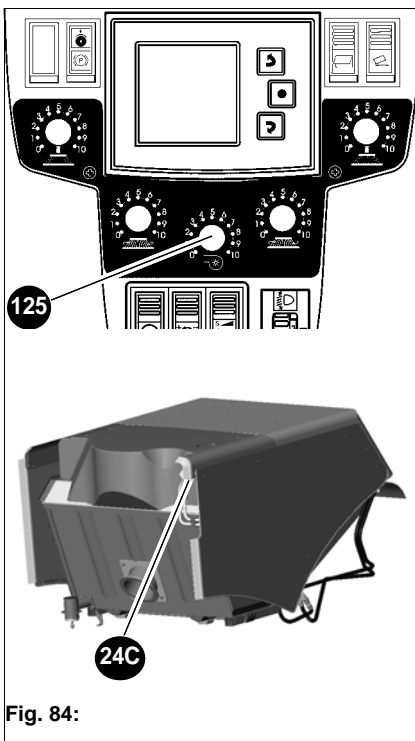
Tip switch 119	Effect
1	• Lift dirt hopper
0	• Lower dirt hopper

Tip switch for opening/closing hopper flap

Tip switch 120	Effect
1	• Open hopper flap
0	• Close hopper flap

Fan drive potentiometer

Potentiometer 125	Effect
0 - 10	• Fan drive is supplied with hydraulic fluid



Important!

The fan runs only if hopper flap is closed and after lowering of the dirt hopper.

3.6.8 Winter Service Operating Elements

After dismantling of the sweeping unit (disconnect coding plug from socket 12) the controller automatically recognizes winter service. In case of front broom equipment, additionally plug a jumper plug to socket 12. Socket 154 is reserved for sand and salt spreader. The operating elements for snow plow, cylindrical broom and spreader are then assigned as follows:

Swivel snow (SO)

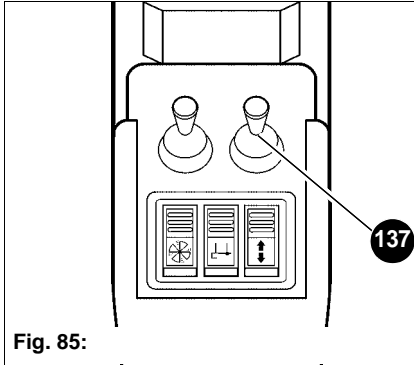


Fig. 85:

Joystick 137 allows control of the lift/lower and swivel snow plow function.

Joystick 137	Effect
	<ul style="list-style-type: none"> Lower snow plow
	<ul style="list-style-type: none"> Lift snow plow
	<ul style="list-style-type: none"> Swivel snow plow to the left
	<ul style="list-style-type: none"> Swivel snow plow to the right

Cylindrical broom (SO)

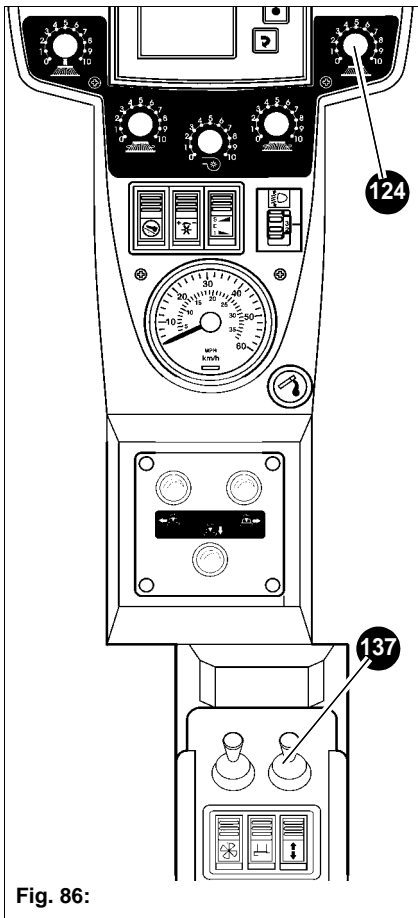


Fig. 86:

Modification of the cylindrical broom speed is available from the driver's seat.

The potentiometer **124** continuously modifies the flow volume of the hydraulic fluid in the cylindrical broom drive.

The joystick **137** controls the lift/lower (cylindrical broom drive ON/OFF) and swivel function at the cylindrical broom.

Potentiometer 124	Effect
0 - 10	<ul style="list-style-type: none"> Cylindrical broom drive supplied with
Joystick 137	Effect
	<ul style="list-style-type: none"> Lower cylindrical broom Upon lowering, the cylindrical broom drive is switched on
	<ul style="list-style-type: none"> Lift the cylindrical broom Upon lifting, the cylindrical broom drive is switched off
	<ul style="list-style-type: none"> Swivel the cylindrical broom to the left
	<ul style="list-style-type: none"> Swivel the cylindrical broom to the right

Spreader (SO)

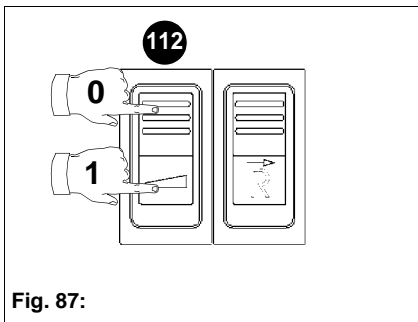


Fig. 87:

Distance-dependent spreading

Tip switch **112** is used to switch the distance dependence for the spreader cylinder ON and OFF. The distance dependence controls the oil volume dependent on the speed.

Tip switch 112	Effect
1	<ul style="list-style-type: none"> Distance-dependent spreading switched ON
0	<ul style="list-style-type: none"> Distance-dependent spreading switched OFF

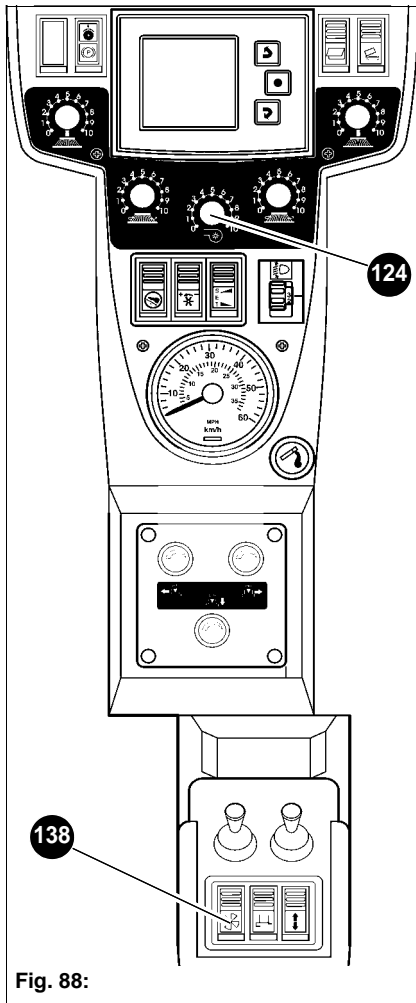


Fig. 88:

Spreader cylinder (SO)

Speed of the spreader cylinder can be changed from the driver's seat. Potentiometer 125 continuously controls the flow volume of the hydraulic fluid in the spreader cylinder drive. The work tip switch (Hako key) is used to switch the spreader cylinder drive ON and OFF.

Potentiometer 125	Effect
0 - 10	<ul style="list-style-type: none"> • Spreader cylinder drive supplied with hydraulic fluid
Tip switch 138	Effect
1	<ul style="list-style-type: none"> • Spreader cylinder drive switched ON
0	<ul style="list-style-type: none"> • Spreader cylinder drive switched OFF

3.6.9 Implements

If not otherwise provided by the manufacturer, operate the implements in the work stage only! Mount and operate only implements approved by Hako Werke GmbH! The following information refers to implements such as e.g. snow plow or cylindrical broom.



Danger!

Implements being inappropriately fixed to the quick coupling facility may fall off!

Accident hazard!

- ⓘ *Always secure implements with lock!*
- ⓘ *Observe the operating instructions of the implement!*
- ⓘ *Only implements approved by Hako Werke GmbH or implements offered as retrofit variants and complying with the superstructure guidelines must be mounted and operated! Unintentional actuation of the operating elements for work hydraulics especially when driving on public road may cause*

Attachment of extremely heavy implements may require attachment of ballast observe the admissible axle loads or minimum load of the rear axle - see chapter "weights and loads" on page 6-4.



Danger!

Staying below the minimum load of the rear axle with attached implement may cause critical driving situations, especially when abruptly braking.

Accident hazard!

- ⓘ *Observe a minimum load on the rear axle!*
- ⓘ *Do not exceed axle loads and admissible total weight!*

For mounting and operation of an implement respect the operating instructions of the respective implement as well.

Mount implement with coupling carrier

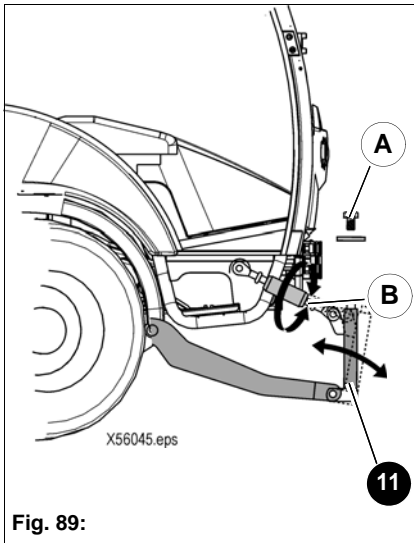


Fig. 89:

- ☞ Lower quick coupling facility **11** and secure vehicle against rolling
- ☞ Fold back protection of front attachment **A** (hexagonal screw and washer)
- ☞ Lightly incline coupling triangle at the upper link **B** to the front
- ☞ Take the quick coupling system **11** slowly and straight under the housing of the implement.
- ☞ Slowly lift up quick coupling system **11**.
Make sure the quick coupling system is appropriately seated, if it is not:
 - Lower quick coupling system **11**
 - Align vehicle and implement straight
 - Take the system again under the implement housing.

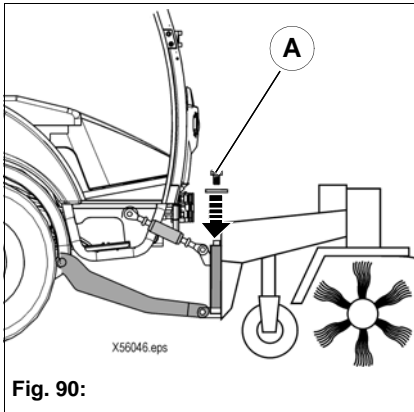
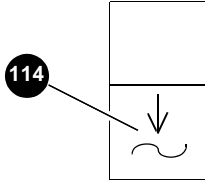


Fig. 90:

After implement has been safely lifted:

- ☞ Turn off engine
- ☞ Engage parking brake
- ☞ Mount protection of front device **A** (M16 hexagonal screw and washer)
- ☞ Connect hydraulic connections (if required)
- ☞ Connect electric system (if required)
- ☞ Remove parts for implement storage (if required)
- ☞ Check and make sure before start operation:
 - Is the implement appropriately mounted and secured?
 - Is a sufficient freedom for movement of the attached implement guaranteed along the entire lifting height?
 - Above all, make sure when laying electric or hydraulic lines not to twist, to bend to squeeze or to strain them or to lay in insufficient loops
 - Are all safety facilities attached to the implement and operable?
 - Is safe operation of the attachment possible?
 - Are the maximum lifting force and the maximum axle load observed?

Hydraulic connections



Important!

If hydraulic connections are still pressurised, the hydraulic coupler of the implement may not be connected.

⚠ Depressurise hydraulic connections:

- Switch on ignition (do not start engine!)
- Front: Actuate the operating element (tip switch/joystick) up and down several times or left and right.
- Rear: Switch **114** for pressure less of the rear hydraulic connection 150 - 153

⚠ Connect hydraulic connections

The type of hydraulic coupling to which the implement is to be connected depends on the version of your vehicle. See operating instructions of the implement.

⚠ If required connect additional lighting by socket (SO)

⚠ If existent, remove support stands of the implement

Dismount implement

⚠ Lift implement

⚠ Turn off engine

⚠ Engage parking brake

⚠ Disconnect all electric connections (if existent)

⚠ Depressurise and loosen hydraulic connections (if existent)

⚠ Mount all devices provided for storage of the implement (if existent) or

⚠ Safely block implement from below (if required)

⚠ Dismount protection for front implement

⚠ Lower quick coupling system

After the implement has been safely lowered and positioned on the ground, the quick coupling system has loosened of the implement housing and all connections between implement and vehicle have been disconnected,

⚠ back the vehicle carefully

⚠ lift quick coupling system

Operate implement

**Danger!**

Implements being inappropriately fixed to the quick coupling facility may fall off!

Accident hazard!

- ☞ *Always secure implements with lock!*
- ☞ *Observe the operating instructions of the implement!*
- ☞ *Only implements approved by Hako Werke GmbH or implements offered as retrofit variants and complying with the superstructure guidelines may be mounted and operated!*

Unintentional actuation of the operating elements for work hydraulics especially when driving on public road may cause

Accident hazard!**Important!**

If hydraulic connections are still pressurised, the hydraulic coupler of the implement may not be connected - refer to "Connect hydraulic connections".

Winter Service Operating Elements (see page 3-67)

4 Maintenance

4.1 Introduction

Before carrying out service and maintenance work, always read, understand and follow the instructions given in

- Section 2 "SAFETY INSTRUCTIONS" of this operation manual
- The instructions in the operation manuals of the implement equipment manufacturers

Daily and weekly service and maintenance work can be performed by a specially trained operator. All other maintenance work must be carried out by trained and qualified mechanics only.

All warranty claims become obsolete in case of nonobservance and the resulting damage!

For the repair and maintenance of the Citymaster, our wide network of contract dealers and workshops with trained specialists, modern equipment and all necessary special tools is available. Here you can obtain advice from specialists as well as fast and effective help.

The maintenance plans (see page 4-56) state when the maintenance work mentioned below must be carried out.

4.1.1 Accessibility to assemblies

Assemblies to be serviced are accessed as follows:

- Wash water tank for windscreen washer unit, fuse box, relay
 - ➔ In cab
- Air filter, oil dip stick for engine oil
 - ➔ Behind the cab
- Hydraulic oil tank, suction/return filter hydraulics, fuel tank
 - ➔ On the left of the chassis
- Coolant expansion tank
 - ➔ On the right of the chassis
- Cooling system, radiator
 - ➔ With the right radiator cover removed
- Filling opening for engine oil, engine oil filter, fuel filter, breather filter of hydraulic oil tank, battery, grease nipple of parking brake camshaft
 - ➔ Raise the dirt hopper and check the position of the safety strut (see page 3-65) and removed engine cover (see page 4-2)
- Brake-fluid tank, V-ribbed belt alternator/water pump
- Engine oil drain plug, axles
- Differentials of front and rear axle, drive axles, cardan shaft to rear axle, transfer gearbox
- Drive hydraulics pressure filter
 - ➔ From underneath the vehicle

4.1.2 Removing the cover

Removing the engine cover

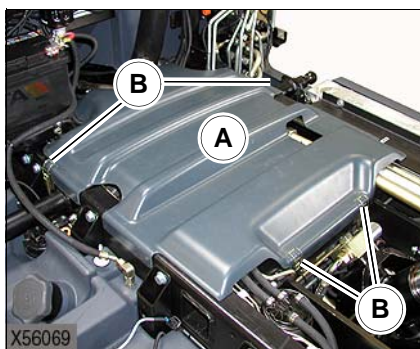


Fig. 91:

For maintenance and repair work on the engine and/or fuel system, engine cover **A** has to be removed as follows.

- ☞ Park vehicle on even ground and secure against rolling away
- ☞ Raise the dirt hopper and check the position of the safety strut (see page 3-65)
- ☞ Switch off the engine, pull the ignition key
- ☞ Remove engine cover **A**. To do this:
 - Loosen snap clip **B**
 - Remove engine cover **A**
- ☞ Install the engine cover in reverse order after completing maintenance and repair work

Removing the radiator cover

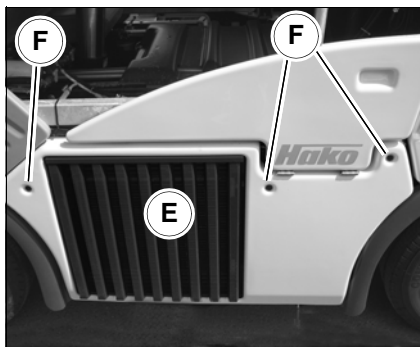


Fig. 92:

For maintenance and repair work on the battery, radiator cover **E** has to be removed as follows.

- ☞ Park vehicle on even ground and secure against rolling away
- ☞ Switch off the engine, pull the ignition key
- ☞ Remove radiator cover **E**. To do this:
 - Loosen quick fasteners **F**
 - Remove radiator cover **E**
- ☞ Install the radiator cover in reverse order after completing maintenance and repair work

4.2 Fuel system

4.2.1 Specific safety instructions

- Extreme caution is essential when handling fuel – high risk of fire!
- Due to the high fuel pressures in the injection system, the fuel can reach temperatures of up to 70°C especially when the fuel level in the tanks is low – risk of burns!
- Never perform work on the fuel system in the vicinity of open flames or ignitable sparks!
- Do not smoke when working on the fuel system or when refuelling!
- Before refuelling switch off the engine and remove the ignition key!
- Do not refuel in closed rooms!
- Wipe away spilt fuel immediately!
- Keep the vehicle clean to reduce the risk of fire!
- When working on the fuel system, ensure absolute cleanliness!



Environment!

Use a suitable container to collect any spilt fuel and dispose of it according to local or national environment protection regulations!

4.2.2 Specification of diesel fuel

Only use high-grade fuels according to **DIN EN¹ 590** with a Cetan number² of at least 49.

Winter operation

With decreasing outside temperatures, the flow property of the diesel fuel is reduced by the formation of paraffin. The use of "**summer diesel fuel**" can cause malfunctions. Therefore, more cold-resistant "**winter diesel fuel**" is available in Germany which - depending on the fuel brand - is still safe to operate between -15°C and -22°C.

With night temperatures below - 25°C, diesel fuel can become so viscous that the engine does not start any more. We therefore recommend parking the vehicle in a heated room.

Fuel additives (flow improvers) and similar agents may **not** be added to the diesel fuel!

PME fuel (biodegradable diesel fuel)

The vehicle **cannot** be operated with PME fuels (**P**lant **M**ethyl**E**ster). PME fuels have not been tested and approved by Hako-Werke GmbH. They may have a negative effect on the safety of the vehicle. Hako-Werke GmbH assumes no liability for resulting damage.

1. Euro Standard
2. Cetan number = measure for the ignition capability of the diesel fuel

4.2.3 Refuelling



Danger!

All work involving fuel carries an increased

Risk of fire and poisoning!

☞ *Do not refuel in closed rooms*

☞ *Never perform work on the fuel system in the vicinity of open flames or ignitable sparks!*



Environment!

Use a suitable container to collect any spilt fuel and dispose of it according to local or national environment protection regulations!



Important!

Never run the fuel tank completely empty, otherwise dirt is drawn into the fuel system.

The fuel system does not bleed automatically.

Stationary fuel pumps

General

If possible, only refuel from stationary fuel pumps. Fuel from drums or canisters is usually soiled.

Even the smallest particles of dirt can cause

- Increased engine wear
- Malfunctions in the fuel system and
- Reduced effectiveness of the fuel filters

Refuelling from drums

If refuelling from drums cannot be avoided, note the following points (see figure 94):

- Drums should neither be rolled nor tilted before refuelling
- Protect the intake manifold opening of the drum pump with a fine-mesh filter
- Immerse the intake manifold opening of the drum pump down to max. 15 cm above the floor of the drum
- Only fill the tank with refuelling aids (funnels or filler pipes) with integral microfilter
- Keep all refuelling containers clean at all times

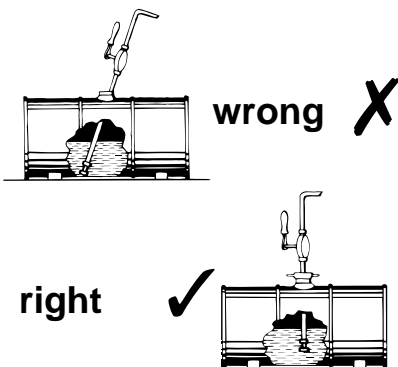


Fig. 93:

Refuelling the vehicle

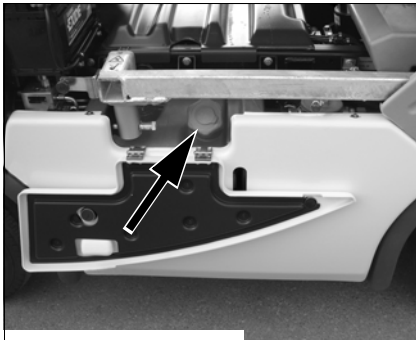


Fig. 94:

Cleaning the fuel tank

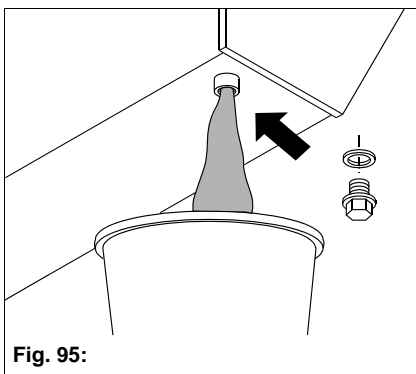


Fig. 95:



Environment!

When refuelling, make sure that no fuel flows out next to the tank filling opening! Never refuel up to the upper edge of the filling opening - the fuel expands under heat and can overflow! Use a suitable container to collect any spilt fuel and dispose of it according to local or national environment protection regulations!

- ☞ Open the tank lock, unlock lockable tank lock (option) as applicable
- ☞ Immerse the nozzle of the fuel pump as deep as possible in the tank to prevent splashing or spilling diesel fuel
- ☞ After refuelling, replace the tank lock and turn it to the right until it audibly locks into place
- ☞ Close tank lock and lock (option) as applicable



Caution!

If petrol or supergrade petrol was refuelled by mistake, the engine may not be started to avoid damage.

- ☞ Have the fuel system drained by an authorised workshop with consideration of the environmental standards and fill again with diesel fuel!



Environment!

Use a suitable container to collect any spilt fuel and dispose of it according to local or national environment protection regulations!



Important!

Drain the condensation water from the fuel tank at regular intervals, at the latest **every 600 operating hours** or **at the latest every year**.

Deposits of dirt particles and water in the tank cannot be entirely avoided. The fuel tank should therefore be cleaned occasionally, particularly before winter operation.

Clean the fuel tank when the fuel level in the tank is as low as possible!

Clean the fuel tank as follows:

- ☞ Place a drip pan under the fuel tank
- ☞ Open the tank lock
- ☞ Remove the drain plug (see figure 96)
- ☞ Flush out the fuel tank with fuel, several times if necessary
- ☞ Turn in the drain plug with a new sealing ring
- ☞ Fill the tank
- ☞ Check the drain plug for tightness
- ☞ Bleed the fuel system as required (see page 4-6)

4.2.4 Bleeding the fuel system

Normally, the fuel system vents automatically via the fuel pump when the ignition is switched on.

Bleed the fuel system in the following cases:

- After the fuel lines were removed
- After water was drained from the fuel filter
- After the fuel filter was replaced
- After the fuel pre-filter was replaced
- After the fuel tank was run completely empty
- After repairs to the fuel system
- Before the engine is placed into operation after long downtimes



Danger!

When spilt fuel runs on hot engine parts or on the exhaust pipe

Risk of fire!

Never bleed the fuel system when the engine is hot!

Bleed the fuel system as follows:



Environment!

Use a suitable container to collect any spilt fuel and dispose of it according to local or national environment protection regulations!

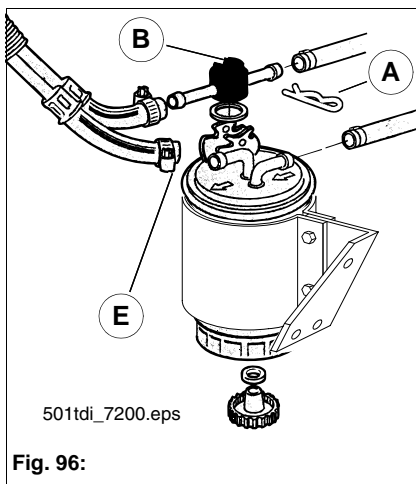


Fig. 96:

- Remove the spring pin lock from preheating valve **A**
- Pull out preheating valve **B** upwards on the filter
- Fill the filter with fuel through the opening for the preheating valve **B**
- Insert preheating valve **B** on the filter
- Mount the spring pin on preheating valve **A**
- Remove clamp **E** on the feed connection (to distributor injection pump)
- Remove the feed line
- Fill the feed line to the distributor injection pump with fuel by means of a funnel
- Mount the feed line
- Tighten clamps **E**

4.2.5 Fuel filter maintenance



Environment!

Use a suitable container to collect any spilt fuel and dispose of it according to local or national environment protection regulations!

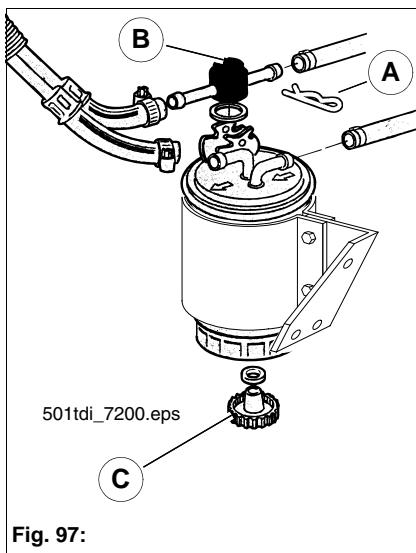


Important!

It is not possible to clean the fuel filter!

- Replace the fuel filter for the first time after **300 operating hours**.
- Replace the fuel filter at regular intervals **every 600 operating hours** or **at the latest every year**.
- Drain the condensation water in the fuel filter **at regular intervals**.

Draining condensation water



➤ Proceed as follows:

- Park vehicle on even ground and secure against rolling away
- Raise the dirt hopper and check the position of the safety strut (see page 3-65)
- Switch off the engine, pull the ignition key
- Remove the engine cover (see page 4-2)
- Remove the spring pin lock from preheating valve **A**
- Pull out preheating valve **B** upwards on the filter so that the fuel can drain
- Open the lower drain plug **C** (plastic knurl)
- Drain the fuel/water mixture into a container until the fuel runs out with no traces of water
- Close drain plug **C** again
- Fill the filter with fuel through the opening for the preheating valve **B**
- Insert preheating valve **B** on the filter
- Mount the spring pin on preheating valve **A**
- Bleed the fuel system (see page 4-6)

Replacing the fuel filter

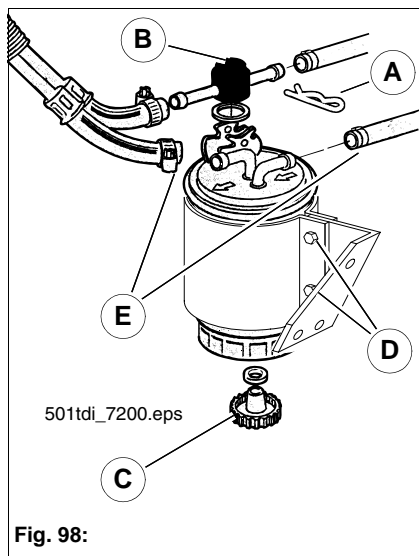


Fig. 98:

⚠ Proceed as follows:

- Remove both screws **D** on the filter bracket and remove the filter bracket with the filter cartridge
- Remove clamps **E** from the feed connections
- Remove the feed lines
- Remove the spring pin lock from preheating valve **A**
- Remove preheating valve **B** upwards on the filter, with the return lines
- Remove the old filter and insert the new one
- Mount the feed line
- Tighten clamps **E**
- Insert the filter with the filter bracket and tighten both screws **D**
- Fill the filter with fuel through the opening for the preheating valve **B**
- Insert preheating valve **B** on the filter
- Mount the spring pin on preheating valve **A**
- Bleed the fuel system (see page 4-6)

4.3 Engine lubrication system

4.3.1 Engine oil specification



Caution!

Do not use any additives with the lubricants. Damage caused by such agents is excluded from the warranty.

At least engine oil with specification SAE 10W-40 according to specification VW 505 00 (for multigrade oils) must be used for the VW engine to ensure high cold start capability.

4.3.2 Checking the oil level

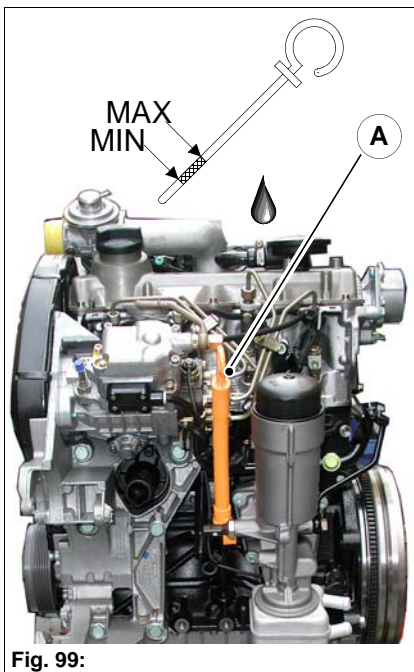


Fig. 99:



Caution!

Engines always consume oil, even under normal conditions. Oil consumption can reach up to 0.5% of the fuel consumption, depending on driving style and operating conditions. Oil consumption can be even higher during the first operating hours! Therefore:

- ☞ **Check the engine oil level every 10 operating hours or every day (preferably before you start working) with the oil dipstick!**

Engine oil dipstick A is located on the left side of the vehicle behind the fuel tank and is accessible from the outside.

Check the engine oil level

- ☞ If the warning light for the engine oil pressure **84** lights
- ☞ After 10 operating hours or daily
 - With the vehicle on level ground
 - Before starting the engine or
 - No sooner than 5 minutes after switching off the engine

Check the oil level as follows:

- ☞ Park vehicle on level ground and secure against rolling away
- ☞ Switch off the engine, pull the ignition key
- ☞ Oil dip stick A
 - Pull it out
 - Wipe it with a lint-free cloth
 - Push it back in as far as possible
 - Withdraw and
 - Read off the oil level
- ☞ Top up the oil level if necessary (at the latest when the oil reaches the MIN mark on the dip stick)

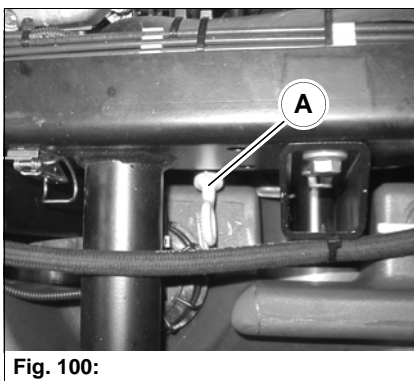


Fig. 100:



Important!

The topping up volume between MIN and MAX on the oil dip stick is about 1.0 l engine oil.

4.3.3 Topping up engine oil



Caution!

Excessive or incorrect engine oil may result in engine damage!
For this reason:

- ☞ Do not add engine oil above the MAX mark of the oil dip stick
- ☞ Use only the specified engine oil (see page 4-55)



Environment!

Collect the drained engine oil in a suitable container and dispose of it according to local or national environment protection regulations!

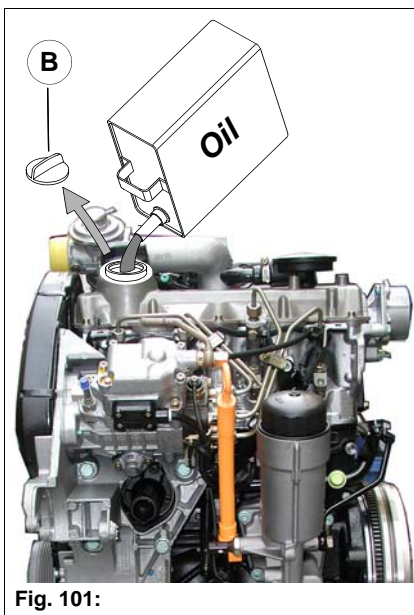


Fig. 101:

Top up the engine oil level as follows:

- ☞ Park vehicle on level ground and secure against rolling away
- ☞ Switch off the engine, pull the ignition key
- ☞ Raise the dirt hopper and check the position of the safety strut (see page 3-65)
- ☞ Remove the engine cover (see page 4-2)
- ☞ Clean the area around oil filler cap **B** with a lint-free cloth
- ☞ Open filler cap **B**
- ☞ Add engine oil with a suitable oil can
- ☞ Wait a few minutes until the oil has settled in the oil sump
- ☞ Check the oil level (see page 4-9)
- ☞ Top up if necessary and check the oil level again
- ☞ Close filler cap **B**
- ☞ Push the oil dip stick back in as far as possible
- ☞ Completely remove any oil spilt on the engine

4.3.4 Changing the engine oil



Danger!

Caution when draining hot engine oil –

Risk of burns!

- ☞ Wear protective gloves and goggles
- ☞ Use suitable tools – e.g. for unscrewing the oil drain plug



Environment!

Collect the drained engine oil in a suitable container and dispose of it according to local or national environment protection regulations!

Keep waste oil safely away from children!



Important!

Change the engine oil and the engine oil filter **for the first time** after **50 operating hours** as well as after the **first 300 operating hours**, then **every 300 operating hours**, at the latest **every year**. Specification (see page 4-55)!

Change the engine oil as follows:

- ☞ Warm up the engine

As soon as the oil temperature is about 80 °C:

- ☞ Park vehicle on level ground and secure against rolling away
- ☞ Raise the dirt hopper and check the position of the safety strut (see page 3-65)
- ☞ Switch off the engine, pull the ignition key
- ☞ Place an oil drip pan (with a capacity of at least 10 litres) under the engine
- ☞ Unscrew oil drain plug **C**
- ☞ Completely drain the oil
- ☞ Turn in oil drain plug **C** with a new sealing ring and tighten it to 30 Nm
- ☞ Fill in engine oil (see page 4-10)
- ☞ Start the engine and run at low speed for a short time
 - ➔ Warning light **84** must go off after a few seconds
- ☞ Switch off the engine
- ☞ Check the oil level again
- ☞ Top up if necessary and check again
- ☞ Completely remove any oil spilt on the engine

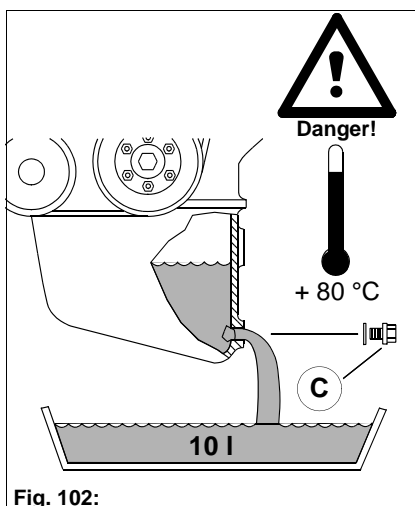


Fig. 102:

4.3.5 Changing the engine oil filter



Danger!

Caution when handling hot engine oil –

Risk of burns!

☞ *Wear protective gloves and goggles*



Environment!

Use a suitable container to collect any spilt engine oil.

Dispose of used oil and filters according to local or national environment protection regulations!

Keep waste oil and used filters away from children!



Important!

Change the engine oil and the engine oil filter **for the first time** after **50 operating hours** as well as after the **first 300 operating hours**, then **every 300 operating hours**, at the latest every year (see page 4-55)

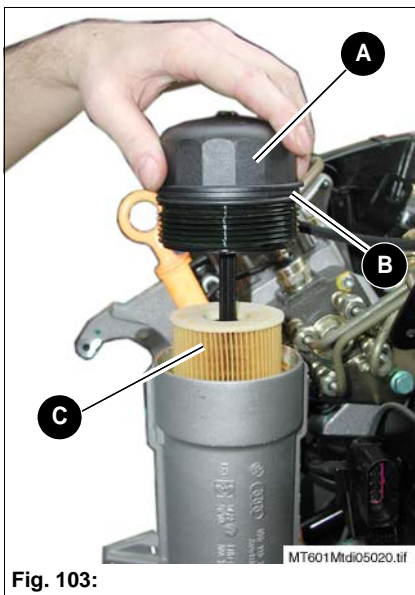


Fig. 103:

Change the filter as follows:

- ☞ *Drain the engine oil (see page 4-11)*
- ☞ *Loosen the filter cover A with an oil filter spanner*
- ☞ *Remove oil filter cover A*
- ☞ *Remove filter insert C from oil filter housing*
- ☞ *Insert new filter insert C*
- ☞ *Clean the sealing surfaces if they are fouled*
- ☞ *Insert new sealing ring B*
- ☞ *Install oil filter cover A, maximum tightening moment = 25 Nm*
- ☞ *Check oil level, top up if necessary (see page 4-9)*
- ☞ *Start the engine*
- ☞ *Check for leakage*
- ☞ *Switch off the engine*
- ☞ *Check the oil level again*
- ☞ *Top up if necessary and check again*

4.4 Cooling systems

The combined charge air/oil/radiator is located on the right vehicle side behind the engine. It cools both the charge air for the turbocharger and the diesel engine coolant as well as the hydraulic oil of the drive and work hydraulics.

The expansion tank for the coolant is located on the right behind the cab.

4.4.1 Specific safety instructions



Danger!

Never open the radiator and never drain coolant if the engine is warm, since the cooling system is under high pressure –

Risk of burns!

- ☞ Wait at least 10 minutes after switching off the engine!
- ☞ Wear protective gloves and clothing
- ☞ Always start by actuating the safety valve in the cap of the expansion tank. To do this: Open the cap to the first notch and allow the pressure to escape.



Fig. 104:

- The coolant agent and the coolant are detrimental to health! Therefore, store the coolant agent in the original container especially safe from children!
- Dirt on the cooling ribs reduces the radiator's heat dissipation capacity! Therefore:
 - ☞ Clean the outside of the radiator at regular intervals. Cleaning intervals (see page 4-56)
 - ☞ In dusty or dirty work conditions, clean more frequently than indicated in the maintenance plans
- An insufficient coolant level reduces the heat dissipation capacity as well, and can lead to engine damage! Therefore:
 - ☞ Check the coolant level at regular intervals (see page 4-56).
 - ☞ If coolant must be added frequently, check the cooling system for leakage and/or contact your authorised workshop!
 - ☞ Never fill in cold water/coolant if the engine is warm!
 - ☞ After filling the radiator, test run the engine and check the coolant level again after switching off the engine
- The use of the wrong coolant can severely damage the engine and radiator. Therefore:
 - ☞ Use only **G 12 plus** and/or an additive with the specification TL-VW 774 F as a coolant additive, since it already contains an anticorrosion agent (see page 4-55)
 - ☞ Do not use radiator cleaning compounds if an antifreeze compound has been added to the coolant – otherwise this causes sludge to form, which can damage the engine



Environment!

Use a suitable container to collect the any spilt coolant and dispose of it according to local or national environment protection regulations!

4.4.2 Specification of engine coolant

The coolant agent prevents damage by frost and corrosion, prevents lime deposits and also raises the temperature of ebullition of the water. For these reasons, the cooling system has to be filled with coolant agent the whole year round.

Especially in countries with a tropical climate, the coolant with its higher boiling point contributes to operating safety when the engine is under high load.

The coolant system must be filled with a mixture of water and coolant agent **G 12 plus** (observe instructions on container) or an additive with the specification TL-VW 774 D.

The cooling system contains approx. 12 l coolant. The permanent filling of the cooling system consists of 50% – but never more than 55% – coolant agent **G 12 plus** and provides antifreeze protection up to -35 °C.

The water must have the following characteristics:

- Water hardness low
- pH value 7 – 8
- Chloride content < 75 mg/l

Ask your local water authority for tap water specifications.

Unsuitable coolants are e.g. saltwater, rainwater, distilled water, water with a high content of chloride and fully demineralised water from ion exchangers.

4.4.3 Checking the coolant level / Topping up the coolant level

i Important!

Check the coolant level for the first time after **50 operating hours** as well as after the **first 300 operating hours as well as regularly every 300 operating hours**. We recommend checking the oil level before starting the engine.

A warning message on the multifunction instrument is displayed if the coolant level is too low.

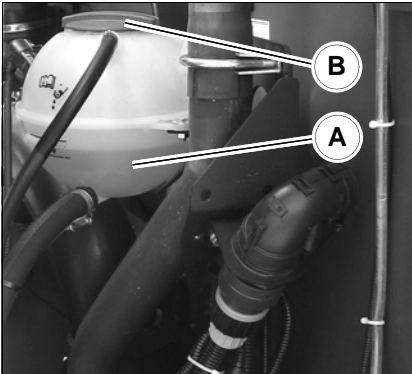


Fig. 105:

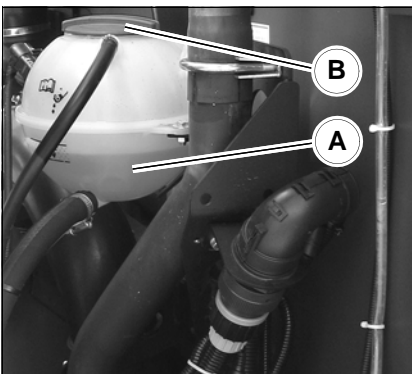


Fig. 106:

Checking the coolant level

- ☞ Park vehicle on even ground and secure against rolling away
- ☞ Switch off the engine, pull the ignition key
- ☞ Allow the engine to cool
- ☞ Check the coolant level:

➔ The coolant level must be visible between MIN and MAX marks of expansion tank **A**. It can also be slightly above the middle if the engine is warm.

If the coolant level is below the MIN mark:

- ☞ Add coolant
- ☞ Check the mixing ratio of the coolant

Topping up the coolant level

After the engine has cooled down:

- ☞ Raise the dirt hopper and check the position of the safety strut (see page 3-65)
- ☞ Cover filler cap **B** with a cloth
- ☞ Unscrew filler cap **B** carefully to the stop
- ☞ Wait until the vapour has escaped completely
- ☞ Press down filler cap **B** and open completely
- ☞ Slowly top up coolant

If the radiator is filled up to the maximum coolant level:

- ☞ Close the filler opening
- ☞ Turn rotary switch (hot/cold) **64** towards red (hot), as far as it will go
- ☞ Let the engine run at increased idling revolutions for a few minutes
- ☞ Switch off the engine
- ☞ Check the coolant level again, and top up if necessary, observe expansion of the coolant at higher temperatures
- ☞ Check the mixing ratio of the coolant

4.4.4 Draining the coolant



Important!

Replace the coolant **every three years at the latest** (see page 4-55)!

Draining the coolant completely

The cooling circuit contains 12 litres of coolant.

- ☞ Turn rotary switch (hot/cold) **64** towards red (hot), as far as it will go
- ☞ Place a drip pan under the radiator
- ☞ Remove radiator hose from the radiator
- ☞ Drain the coolant into the drip pan
- ☞ Install radiator hose on the radiator
- ☞ Fill in coolant (see page 4-15)

Filling an empty cooling system

If possible use neutral and well filtered water with a low content of lime to fill the cooling system after it has been cleaned.

The coolant must always be refined with 50% coolant agent **G 12 plus** or an additive with specification TL-VW 774 F (see page 4-14).

Fill up the cooling system as follows:

- ☞ Turn rotary switch (hot/cold) **64** towards red (hot), as far as it will go
- ☞ Slowly fill in prescribed coolant via the radiator

When the radiator is full:

- ☞ Close the filler opening
- ☞ Let the engine warm up
 - ➔ The coolant must be warmed up beyond a temperature of >70°C, at which the thermostat opens. Only this ensures optimum bleeding of the cooling system.
- ☞ Switch off the engine
- ☞ Check the coolant level again
- ☞ Check the mixing ratio of the coolant
- ☞ Add coolant if necessary

4.4.5 Cleaning the cooling ribs



Caution!

Be careful when cleaning the radiator with a high-pressure cleaner or steam jet! The radiator fins are of 0.1 mm thick sheet metal and can be easily damaged.

☞ *Make sure the nozzle is not nearer than 30 cm to the radiator fins!*

Slow increase of coolant and/or hydraulic oil temperature is a sign the cooling system is soiled.

If the coolant temperature is too high (above 107°C), this is also signalled by warning message on the multifunction display

Check the radiator at regular intervals for outside contamination (see page 4-56).

Completely remove all foreign bodies from the radiator fins.

Exterior cleaning of charge air cooler and radiator:

☞ *Park vehicle on even ground and secure against rolling away*

☞ *Switch off the engine, pull the ignition key*

☞ *Remove radiator cover **D**. To do this:*

- Loosen quick fasteners **E**

☞ *Use either water or compressed air to clean the radiator fins from the engine side. Wipe parallel along the fins if you use a brush*

☞ *Install radiator cover **D***

☞ *Reinstall quick fasteners **E***

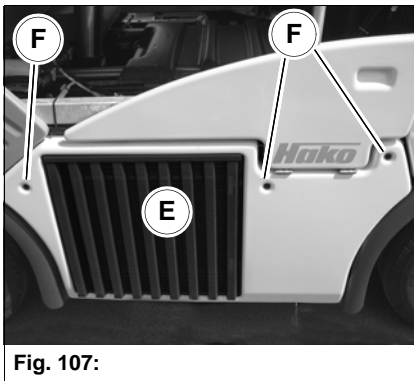


Fig. 107:

4.4.6 Checking the V-ribbed belt



Danger!

Only check/retension/replace the V-belts when the engine is stopped:

Risk of injury!

☞ *Switch off the engine before carrying out maintenance work in the engine compartment!*



Caution!

Do not change the V-ribbed belt for the alternator and of the coolant pump of the airconditioning system (option) on your own!

- ☞ *Carefully check the V-ribbed belts for damage!*
- ☞ *Have damaged V-ribbed belts replaced by your authorised Hako workshop!*

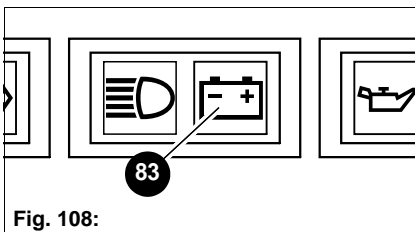


Fig. 108:

If the belt tension of the alternator is too low or the V-ribbed belt is torn, this is also signalled by warning light **83** on the instrument panel. Check the V-ribbed belt for the alternator and the coolant pump for the first time after **50 operating hours** as well as after the **first 300 operating hours as well as regularly every 300 operating hours**. Change the V-ribbed belt **every 1500 operating hours!** Check new V-belts after approx. 15 minutes operating time. Regular checks can prevent premature wear of the V-belts.

V-ribbed belts of alternator and coolant pump (option)

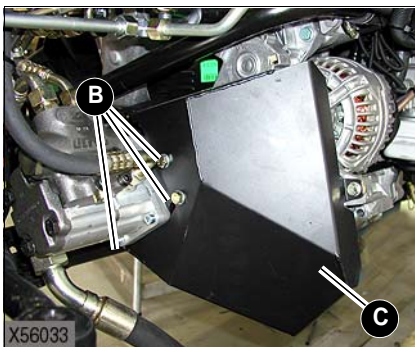


Fig. 109:



Important!

V-ribbed belt **A** of the alternator and coolant pump (option) has a spring-mounted tensioning pulley and cannot be re-tensioned.

☞ *Proceed as follows:*

- Park vehicle on even ground and secure against rolling away
- Switch off the engine, pull the ignition key
- Remove screws **B** and cover plate **C**

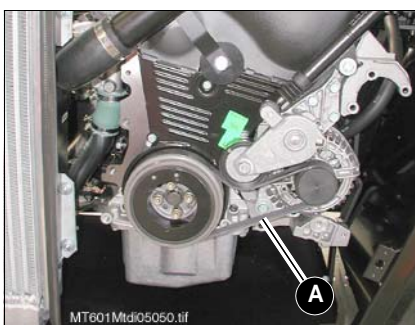


Fig. 110:

- Check condition and tension of V-ribbed belt **A**

When the V-ribbed belt is worn or too slack:

- ➔ Have V-ribbed belt and/or tensioning pulley replaced by your authorised Hako workshop!

Checking the V-ribbed belt

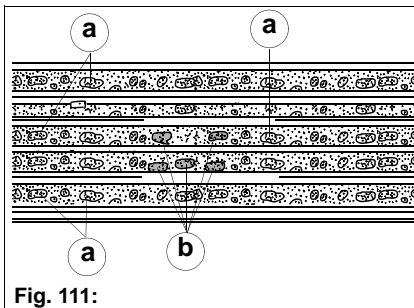


Fig. 111:

☞ Check V-ribbed belt for wear at regular intervals.

Replace the V-ribbed belt in case of the following damage:

- Rubber lumps at the base of ribs **a**
- Dirt or stones **b**

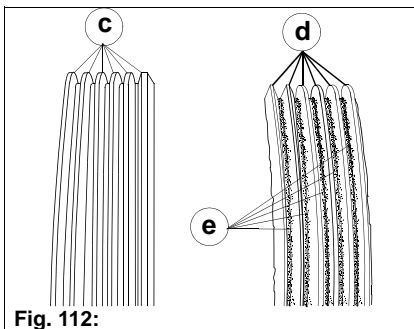


Fig. 112:

- Wear on flanks (ribs are pointed **d**, new ribs have a trapezoidal shape **c**) and fibres are visible at the base of the ribs (brighter spots **e**)

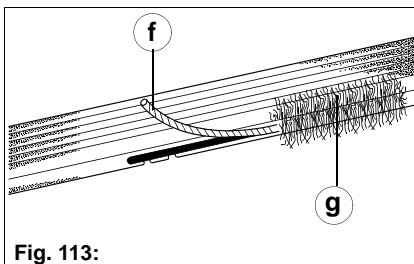


Fig. 113:

- Fibres torn out at sides **f** or outer fibres fringed **g**

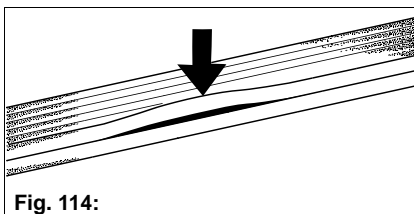


Fig. 114:

- Rib separated from base of V-belt

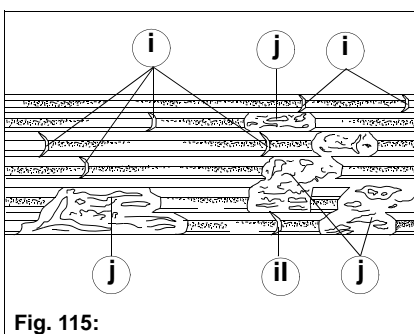


Fig. 115:

- Cross-cracks in ribs **i** and/or rib fractures **j**

Toothed belt of engine control



Caution!

Check the toothed belt **for the first time after 300 operating hours, then every 300 operating hours** for dirt, damage and correct tension!

Change the toothed belt **every 1200 operating hours!**

🔧 The toothed belt may only be changed in authorised work-shops!

4.5 Air filter

The air filter is located behind the cab.



Caution!

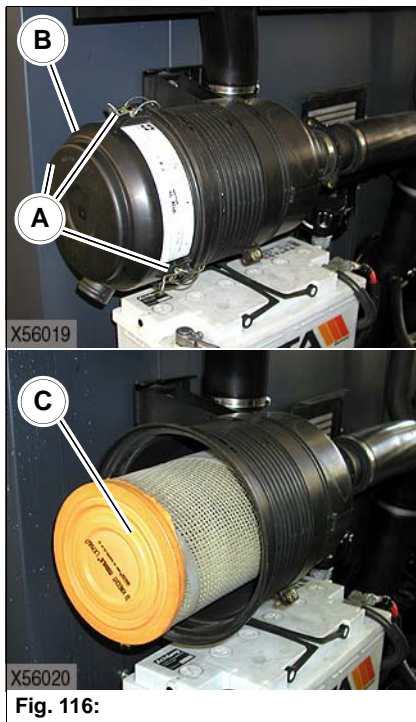
The filter cartridge will be damaged if it is washed, blown or brushed out!

- ☞ *Do not clean the filter cartridge*
- ☞ *Replace the filter cartridge as indicated by the telltale on the instrument panel!*
- ☞ *Never reuse a damaged filter element. Replace it if you are unsure!*

A warning message in the multifunction display serves to monitor the filter element. Replace the filter element:

- If the warning message is displayed
- For the first time after **300 operating hours**, then regularly every **600 operating hours** (see page 4-56)

4.5.1 Replacing the filter cartridge



☞ *Replace as follows:*

- Park vehicle on even ground and secure against rolling away
- Switch off the engine, pull the ignition key
- Open all 3 snap clips **A** on the filter cover
- Remove filter cover **B**
- Pull out filter cartridge **C** with slight turning movements
- Remove soiling from the housing
- Clean the sealing surface and sealing contact area
- Insert new filter cartridge **C**
- Re-install filter cover **B**
- Close all 3 snap clips **A**



Important!

Air filter insert: **Knecht/Mahle LX 7060**

4.6 Hydraulic system

4.6.1 Specific safety instructions

- All lines carrying hydraulic oil must be unpressurised prior to any maintenance and repair work. To do this:
 - ☞ Lower all hydraulically controlled implements to the ground
 - ☞ Operate all controls for the work hydraulics several times
- Apply the parking brake to prevent the vehicle from rolling away before you carry out service and maintenance work
- Hydraulic oil escaping under high pressure can penetrate the skin and cause serious injuries. Always consult a doctor immediately even if the wound seems insignificant – otherwise serious infections could set in!
- Cloudy hydraulic oil in the sight glass indicates that water or air has penetrated the hydraulic system. This may damage the hydraulic pump!
 - ☞ Contact your authorised Hako workshop immediately
- Insufficient or incorrect hydraulic oil will damage the hydraulic system! For this reason:
 - Only use authorised oils
 - Always top up the hydraulic oil before the level gets too low
 - If the hydraulic system is filled with biodegradable oil, then only use biodegradable oil of the same type for topping up – observe the sticker on the hydraulic oil tank!
 - You must contact our customer service if the hydraulic system filters are soiled with metal chippings. Otherwise, follow-on damage may result!



Important!

The hydraulic oil tank is located on the left side of the vehicle below the tipper. The oil level can be checked in the sight glass.

- Check and top up, if necessary, the hydraulic oil level **weekly or every 50 operating hours!**
- Change the hydraulic oil **for the first time after 300 operating hours**, then regularly **every 1500 operating hours, at the latest every three years!**
- Change the hydraulic oil filter **for the first time after 300 operating hours** as well as regularly **every 1500 operating hours, at the latest according to the fouling indicator!**
- Maintenance intervals for the hydraulic system (see page 4-56).



Environment!

Collect drained or spilt hydraulic oil in a suitable container and dispose of it according to local or national environment protection regulations!

4.6.2 Checking the hydraulic oil level



Important!

If the hydraulic oil level is too low, this is also signalled by a warning message in the multifunction display

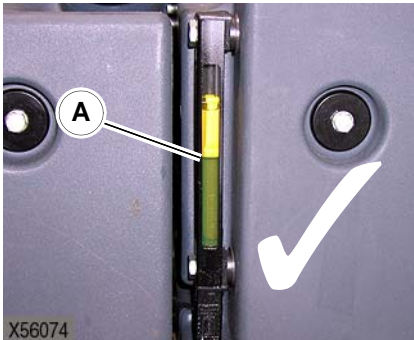


Fig. 117:

Proceed as follows:

- Park vehicle on even ground and secure against rolling away
- Switch off the engine, pull the ignition key
- Retract all hydraulic cylinders
- Switch off the engine

When all the oil has returned to the hydraulic oil tank:

- Check the oil level at sight glass **A**

If the oil level is lower than in fig. 118/A:

- Top up the hydraulic oil

4.6.3 Topping up the hydraulic oil



Caution!

The lock of the filter housing for the hydraulic oil is made of plastic material.

Be careful when opening or closing the filter housing – risk of breakage!

Do not tilt the lock, as this could damage the thread!

Do not top up the hydraulic oil unless the engine is switched off. Otherwise, hydraulic oil will run out of the filler opening on the hydraulic tank.

Top up as follows:

- Park vehicle on even ground and secure against rolling away
- Retract all hydraulic cylinders
- Switch off the engine
- Apply parking brake

When all the oil has returned to the hydraulic oil tank:

- Clean the area around the filler opening with a cloth
- Unscrew screw plug **B** (SW 32) of the return filter
- Slowly top up hydraulic oil
- Check the hydraulic oil level in sight glass **A** (see page 4-23)
- Top up if necessary and check again
- Screw in screw plug **B**

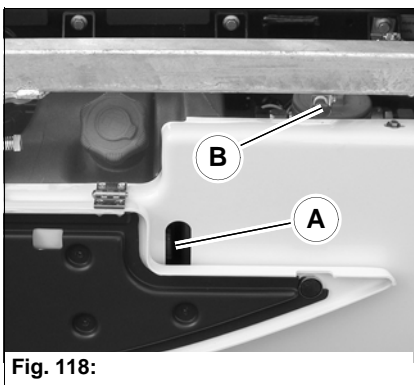


Fig. 118:

4.6.4 Changing the hydraulic oil



Danger!

Draining hot hydraulic oil and removing the filter element is hazardous –

Risk of burns!

☞ *Wear protective gloves*



Important!

Also change the filter element of the return filter whenever hydraulic oil is changed (see page 4-26).

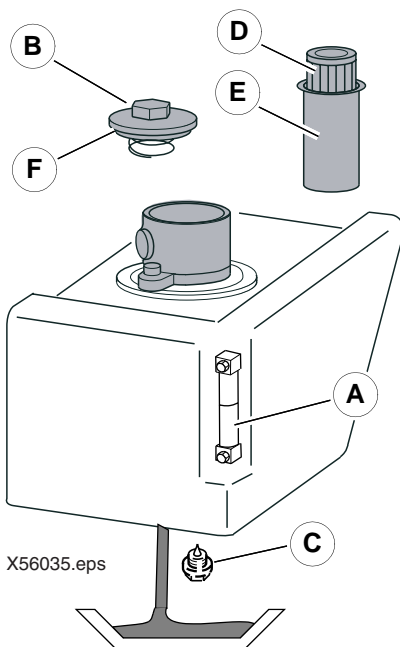


Fig. 119:

☞ Proceed as follows:

- Warm up the vehicle and park it on level ground
- Retract all hydraulic cylinders
- Switch off the engine
- Unscrew screw plug **B** of the return filter
- Position a suitable container to collect the oil as it drains (see page 4-55)
- Unscrew oil drain plug **C** on the underside of the hydraulic oil tank
 ➔ The oil drains into the container
- Remove complete filter element **D** with filter pot **E**
- Clean filter pot **E**
- Flush out the hydraulic oil tank with a little fresh hydraulic oil
- Install filter pot **E** and new filter element **D**
- Fit oil drain plug **C** with a new sealing ring
- Fill in fresh hydraulic oil up to the middle of sight glass **A**
- Make sure O-ring **F** on screw plug **B** is in perfect condition and replace, if necessary
- Screw in screw plug **B**
- Starting the engine
- At a low engine speed: Move all the equipment that can be moved hydraulically, as far as it will go several times
- Retract all hydraulic cylinders again
- Switch off the engine

When all the oil has returned to the hydraulic oil tank:

- Check the hydraulic oil level in sight glass **A** (see page 4-23)
- Top up if necessary and check again

Important information for the use of biodegradable oil

- Use only the biodegradable hydraulic fluids approved by Hako-Werke GmbH (see page 4-55). Always contact Hako-Werke GmbH for the use of other, not recommended products. In addition, ask the oil supplier for a written declaration of guarantee. This guarantee is applicable to damage occurring on the hydraulic components, which can be proved to be due to the hydraulic fluid.
- When topping up or changing the oil, use only biodegradable oil of the same type. In order to avoid misunderstandings, a label providing clear information is located on the hydraulic oil tank (next to the filler inlet) regarding the type of oil currently used! Replace missing labels! The joint use of two different biodegradable oils can affect the quality of one of the oil types. Therefore, make sure the remaining amount of initial hydraulic fluid in the hydraulic system does not exceed 8 % when changing biodegradable oil (manufacturer indications).
- Do not top up with mineral oil – the content of mineral oil should not exceed 2 % by weight in order to avoid foaming problems and to ensure biological degradability.
- When running the vehicle with biodegradable oil, the same oil and filter replacement intervals are valid as for mineral oil (see page 4-56). The condensation water in the hydraulic oil tank must be drained every 600 operating hours, but in any case before the cold season starts. The water content should not exceed 0.1 % by weight.
- The instructions in this operation manual concerning environmental protection are also valid for the use of biodegradable oil.
- If additional hydraulic implements are mounted or operated, use the same type of biodegradable oil for these implements to avoid mixtures in the hydraulic system.

Subsequent change from mineral oil to biodegradable oil requires you to completely flush the hydraulic components

☞ Switch from mineral oil to biodegradable oil as follows:

- Park the vehicle on level ground when it is at operating temperature
- Retract all hydraulic cylinders
- Switch off the engine

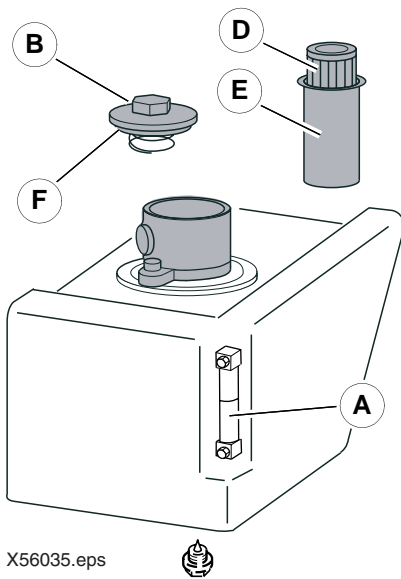
When all the oil has returned to the hydraulic oil tank:

- Completely drain the hydraulic oil
- Fill up the hydraulic system with the new oil grade
- Start the engine
- Operate all the components of the hydraulic system, such as cylinders, to "flush" the lines, cylinders and pumps
- Retract all hydraulic cylinders

When all the oil has returned to the hydraulic oil tank:

- Completely drain the hydraulic oil again
- Replace the filter element of the hydraulic oil return filter (see page 4-26)
- Fill up the hydraulic system with fresh oil up to the required level
- Check the oil level and top up if necessary
- Affix a suitable, clear and permanent label to the vehicle if biodegradable oil has been filled in

4.6.5 Hydraulic oil filter




X56035.eps

Fig. 120:

A warning message in the multifunction display serves to monitor the filter element in the hydraulic oil filter. Replace the filter element:

- If the warning message is displayed
- For the first time after **300 operating hours**, then regularly every **1500 operating hours** (see page 4-56)
- **At the latest according to the fouling indicator**

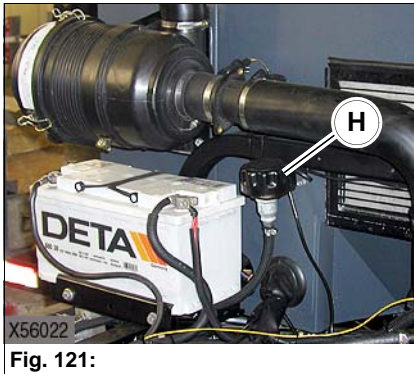
 *Change the filter element in the return filter as follows:*

- Warm up the vehicle and park it on level ground
- Switch off the engine
- Unscrew screw plug **B** of the return filter
- Remove complete filter element **D** with filter pot **E**
- Dispose of filter element **D** according to local or national environment protection regulations
- Clean filter pot **E**
- Make sure O-ring **F** on screw plug **B** is in perfect condition
- Replace defective O-rings
- Install filter pot **E** and new filter element **D**
- Screw in screw plug **B**
- Starting the engine
- Carry out a test run of the hydraulic system
- Check the return filter for tightness with the engine at a standstill

When all the oil has returned to the hydraulic oil tank:

- Check the hydraulic oil level in sight glass **A** (see page 4-23)
- Top up if necessary and check again

4.6.6 Breather filter of hydraulic oil tank



A breather filter to ventilate the hydraulic oil tank of the hydraulics is located behind the cab.

i Important!

Change breather filter **H** every two year under normal conditions of use, or more often under severe environmental conditions. It is not possible to clean breather filter **H**!

To change breather filter H proceed as follows:

- Park vehicle on even ground and secure against rolling away
- Kehrgutbehälter anheben und sichern
- Switch off the engine, pull the ignition key
- Unscrew breather filter **H**
- Screw on new breather filter **H**

4.6.7 Breather filter of the vacuum valves



A breather filter to ventilate the vacuum valves is located in the cab, on the cab rear wall on the right behind the lining.

i Important!

Change breather filter **I** every three year under normal conditions of use, or more often under severe environmental conditions. It is not possible to clean breather filter **I**!

To change breather filter I proceed as follows:

- Park vehicle on even ground and secure against rolling away
- Switch off the engine, pull the ignition key
- Fold the backrest of the driver's seat forward
- Fold up the lining
- Remove breather filter **I**
- Install new breather filter **I**

4.6.8 Drive hydraulics pressure filter



Environment!

Collect drained oil and dispose of this oil and the filter element according to local and national environment protection regulations.

The maintenance of the pressure filter is displayed on the multifunction display. Change the filter insert:

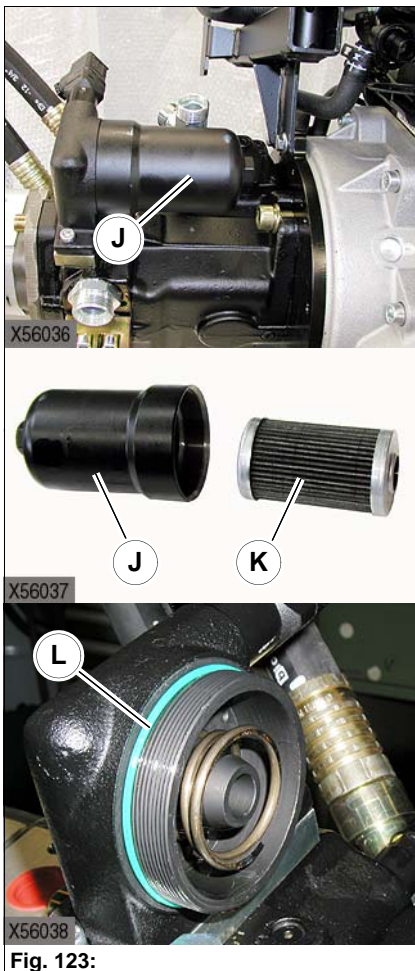
- For the first time after **50 operating hours** as well as after the first **300 operating hours**, then regularly every **1500 operating hours** (see page 4-56)
- At the latest, however, when the warning message is shown on the multifunction display with the hydraulic oil at its operating temperature.
- Maintenance intervals for the hydraulic system (see page 4-56).

Changing the filter element of the pressure filter

The pressure filter of the drive hydraulics is located on the hydraulic pump of the vehicle and is accessible from below the vehicle.

☞ *Change the filter element of the pressure filter as follows:*

- Switch off the engine
- Place a drip pan under the hydraulic pump
- Loosen and unscrew filter housing **J** with a 24 mm ring spanner
- Collect the drained hydraulic oil!
- Remove complete filter element **K** with filter housing **J**
- Dispose of filter element **K** according to local or national environment protection regulations
- Clean filter housing **J**
- Clean the sealing surface of the filter carrier from soiling as required
- Make sure O-ring **L** on the filter carrier is in perfect condition and replace, if necessary
- Lightly oil the rubber seal of the new filter element
- Install filter housing **J** with new filter element **K**
- Starts the engine and let it run for some minutes
 - ➔ The hydraulic system bleeds automatically
- Check the hydraulic oil level and top up as necessary
- Check for leakage



4.6.9 Hydraulic pressure lines

Specific safety instructions



Danger!

Caution when checking hydraulic lines, especially when searching for leaks. Hydraulic oil escaping under high pressure can penetrate the skin and cause serious injuries.

Risk of injury!

- ☞ *Always consult a doctor immediately, even if the wound seems insignificant – otherwise serious infections could set in!*
- ☞ *Always observe the following instructions:*
 - Retighten leaking screwed fittings and hose connections only when the system is not under pressure; i.e. release the pressure before working on pressurised lines!
 - Never weld or solder faulty or leaking pressure lines and screw connections. Replace damaged parts with new ones!
 - Never search for leakage with your bare hands, but wear protective gloves!
 - Use paper or wood to check for minor leaks. Never use an unprotected light or open flame!
 - Make sure hose lines are not twisted when they are replaced!

- Leakage and damaged lines must be repaired or replaced as quickly as possible. This not only increases the operating safety of the vehicle, but also helps to protect the environment
- Replace hydraulic hoses **every five years** from the date of manufacture, even if they do not seem to be damaged
- Replace high pressure lines of the drive system **every 3000 operating hours, at the latest, however, every five years** from the date of manufacture, even if they do not seem to be damaged

In this respect, we recommend that you observe all the relevant safety regulations for hydraulic lines, as well as the safety regulations regarding accident prevention and occupational health and safety in your country. Also observe DIN 20066, Part 5.

The date of manufacture (month or quarter and year) is indicated on the flexible line.

Example:

The indication "1 Q/04" means manufactured in the 1st quarter of 2004.

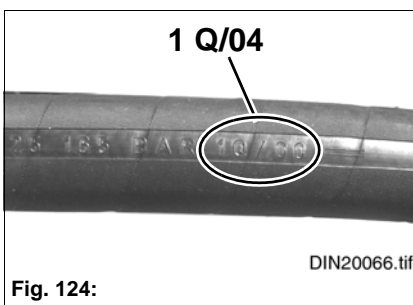


Fig. 124:

4.7 Gearbox

Maintenance of these components is limited to checking oil levels and changing the oil at the prescribed intervals (see page 4-56).



Danger!

Draining hot gearbox oil is hazardous:

Risk of burns!

- ☞ *Wear protective gloves*
 - ☞ *Use suitable tools, e.g. to unscrew the oil drain plug*
-



Caution!

The gearboxes of the Hako are filled with different types of oil depending on their function. Therefore, do not attempt to correct oil levels yourself, since an incorrect oil could cause considerable damage. Always go to your authorised workshop when you notice leaks!



Environment!

Collect drained or spilt gearbox oil in a suitable container and dispose of it according to local or national environment protection regulations!



Important!

Only use new sealing rings for oil filler and drain plugs. Drain oil only after running the vehicle for a longer period of time!



Important!

The inspection, filler and drain plugs of the individual gearboxes are best accessible from the underside of the vehicle.

Only use new sealing rings for oil filler and drain plugs. Drain oil only after running the vehicle for a longer period of time!

First oil change after 50 operating hours.

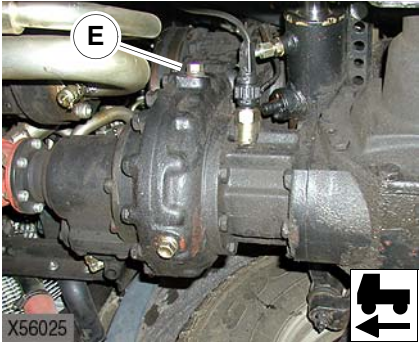
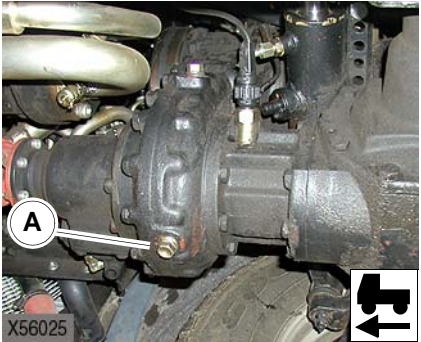
Check the oil level **every 300 operating hours.**

Then change the oil **every 1500 operating hours, at the latest every four years.**

4.7.1 Reduction gearbox and transfer gearbox

Overview of inspection, filling and drain openings

The inspection, filler and drain plugs of the reduction gearbox and transfer gearbox are best accessible from the underside of the vehicle.

Gearbox variant	Inspection or filler plug (E)	Drain plug (A)
<ul style="list-style-type: none"> Reduction gearbox and transfer gearbox 		

Checking oil levels

- ☞ Park vehicle on even ground and secure against rolling away
- ☞ Switch off the engine, pull the ignition key
- ☞ Clean and turn out oil filler plugs **E**

When the oil levels are below the rims of the oil filler plugs **E** or are no longer visible:

- ☞ Top up oil, specification (see page 4-55)
- ☞ Screw in oil filler plugs **E** with new sealing rings to make oil-tight seals

Topping up oil

- ☞ Clean and turn out oil filler plugs **E**
- ☞ Fill oil at the oil filler plugs **E** until oil just overflows, specification (see page 4-55)
- ☞ Check the oil levels again after a couple of minutes and add oil as required
- ☞ Screw in oil filler plugs **E** with new sealing rings to make oil-tight seals

Changing oil

Run the vehicle until warm before changing the oil so that the old oil is fluid by heating and can be completely drained.

- ☞ Place suitable oil container underneath oil drain plugs **A**
- ☞ Clean and unscrew oil filler plugs **E** and oil drain plugs **A**
- ☞ Drain old oil completely
- ☞ Screw in oil drain plugs **A** with new sealing rings to make oil-tight seals
- ☞ Top up fresh oil at the oil filler plugs **E** until oil just overflows, specification and capacity (see page 4-55)
- ☞ Check the oil levels again after a couple of minutes and add oil as required
- ☞ Screw in oil filler plugs **E** with new sealing rings to make oil-tight seals, tightening moment 35 + 3 Nm

4.8 Axles

Maintenance of these components is limited to checking oil levels and changing the oil at the prescribed intervals (see page 4-56).



Danger!

Draining hot gearbox oil is hazardous:

Risk of burns!

- ☞ *Wear protective gloves*
 - ☞ *Use suitable tools, e.g. to unscrew the oil drain plug*
-



Environment!

Collect drained or spilt gearbox oil in a suitable container and dispose of it according to local or national environment protection regulations!



Important!

Only use new sealing rings for oil filler and drain plugs. Drain oil only after running the vehicle for a longer period of time!

First oil change after 50 operating hours.

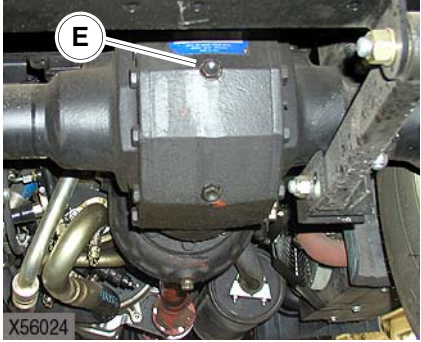
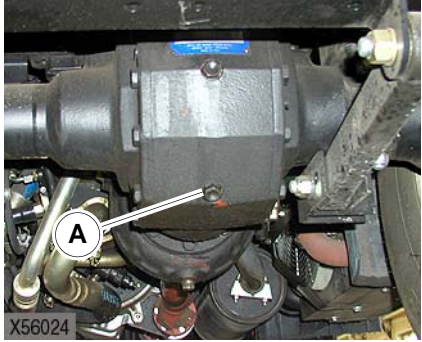
Check the oil level **every 300 operating hours.**

Then change the oil **every 1500 operating hours, at the latest every four years.**

4.8.1 Rear axle differentials

Overview of inspection, filling and drain openings

The inspection, filler and drain plugs on the axle is best accessible from the underside of the vehicle.

Axle variant	Inspection or filler plug (E)	Drain plug (A)
<ul style="list-style-type: none"> Rear axle 		

Checking oil levels

☞ Park vehicle on even ground and secure against rolling away

☞ Switch off the engine, pull the ignition key

☞ Clean and turn out oil filler plugs **E**

If the oil levels are below the rim of the oil filler plugs **E** or are no longer visible:

☞ Top up oil, specification (see page 4-55)

☞ Screw in oil filler plugs **E** with new sealing rings to make oil-tight seals

Topping up oil

☞ Clean and turn out oil filler plugs **E**

☞ Fill oil at the oil filler plugs **E** until oil just overflows, specification (see page 4-55)

☞ Check the oil levels again after a couple of minutes and add oil as required

☞ Screw in oil filler plugs **E** with new sealing rings to make oil-tight seals

Changing oil

Run the vehicle until warm before changing the oil so that the old oil is fluid by heating and can be completely drained.

☞ Place suitable oil container underneath oil drain plugs **A**

☞ Clean and unscrew oil filler plugs **E** and oil drain plugs **A**

☞ Drain old oil completely

☞ Screw in oil drain plugs **A** with new sealing rings to make oil-tight seals

☞ Top up fresh oil at the oil filler plugs **E** until oil just overflows, specification and capacity (see page 4-55)

☞ Check the oil levels again after a couple of minutes and add oil as required

☞ Screw in oil filler plugs **E** with new sealing rings to make oil-tight seals

4.8.2 Steering-stub bearing

Lubricating the steering-stub bearings

Lubricate the steering-stub bearings of the rear axle and front axle:

- **For the first time** after the **first 50 operating hours** as well as after the **first 300 operating hours**
- Then **regularly every 300 operating hours**, or more often as necessary

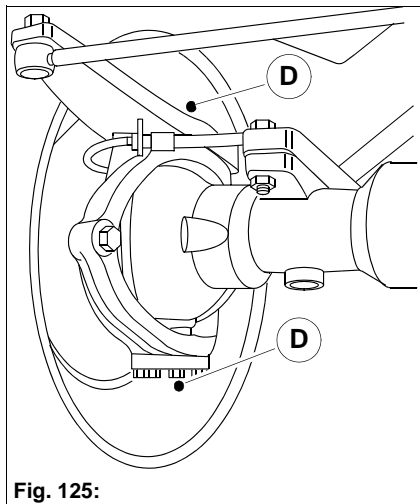


Fig. 125:

There are 2 grease nipples on either side of the axle.

Four wheel steering: also lubricate the rear axle accordingly!

☞ Grease the steering-stub bearing via grease nipples **D** using lithium saponified multipurpose grease (see page 4-55)

4.9 Brake system

4.9.1 Specific safety instructions

Brakes are top priority safety components; incorrect work can cause brake failure. All maintenance and repair work performed on the brake system must be carried out by trained personnel. This does not include the following activities which must be performed by the operator of the vehicle:

- Daily check of the level in the brake fluid tank
- Daily check of the brake system for effectiveness before starting to drive


Avoid brake fluid contact with the paintwork of the vehicle as it may dissolve the paint.



Danger!

Caution when handling brake fluid

Risk of poisoning!

 *Keep the brake fluid in the closed original container only and safe from children!*



Environment!

Collect drained or spilt brake fluid in a suitable container and dispose of it according to local or national environment protection regulations!



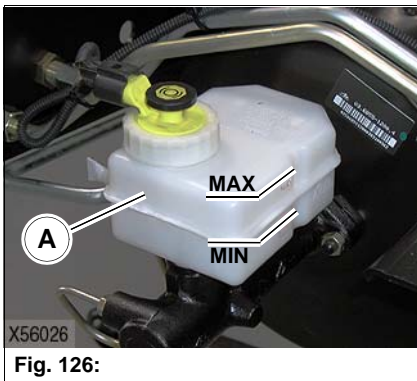
Important!

Maintenance intervals for the hydraulic brake system (see page 4-56).

- Do not use brake fluid on mineral oil basis!
- Only use original brake fluid for topping up (see page 4-55)
- Warning light **86** on the instrument panel lights if the brake fluid level is too low.
- Check and top up, if required, the brake fluid level **every day!** If brake fluid must be refilled more frequently, this is a sign of leakage in the brake system.
- Have the brake system repaired immediately by your authorised Hako workshop.
- The brake fluid **must be replaced every two years** at the latest by your authorised Hako workshop!
- The brake hoses **must be checked every 1800 operating hours** by your authorised Hako workshop for damage and cracks!
- The brake hoses **must be replaced every five years** at the latest by your authorised Hako workshop!

4.9.2 Brake fluid

Checking the brake fluid

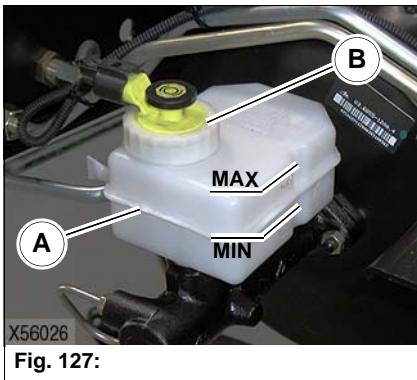


Brake fluid tank **A** is located on the left underneath the cab.

☞ Proceed as follows:

- Park vehicle on even ground and secure against rolling away
- Switch off the engine, pull the ignition key
- If the brake fluid level in the brake fluid tank is not between the MIN and MAX mark
 - ➔ Filling up the brake fluid

Filling up the brake fluid



☞ Fill up brake fluid as follows:

- Clean filler cap **B** and the area around the filler opening



Caution!

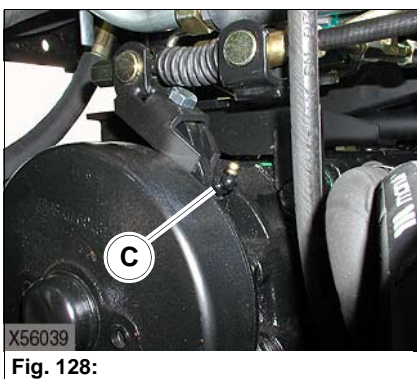
Soiling of the brake fluid could cause failure of the brake system!

☞ Ensure absolute cleanliness when working on the brake system!

- Remove filler cap **B**
- Top up original brake fluid (see page 4-55) – up to the MAX mark
- Firmly screw filler cap **B** back on
- Make sure there is no leakage

4.9.3 Parking brake camshafts

Lubricating the parking brake camshaft



The parking brake camshaft is located on the reduction and transfer gearbox and must be lubricated at regular intervals.



Important!

Lubricate the parking brake camshaft **after the first 50 operating hours as well as after the first 300 operating hours and then every 300 operating hours** and after each cleaning with a high-pressure cleaner (see page 4-56). Specification of lubricant (see page 4-55).

☞ Park vehicle on level ground and secure against rolling away

☞ Lift dirt hopper and secure it

☞ Switch off the engine, pull the ignition key

☞ Lubricate grease nipple **C** with multipurpose grease, specification (see page 4-55)

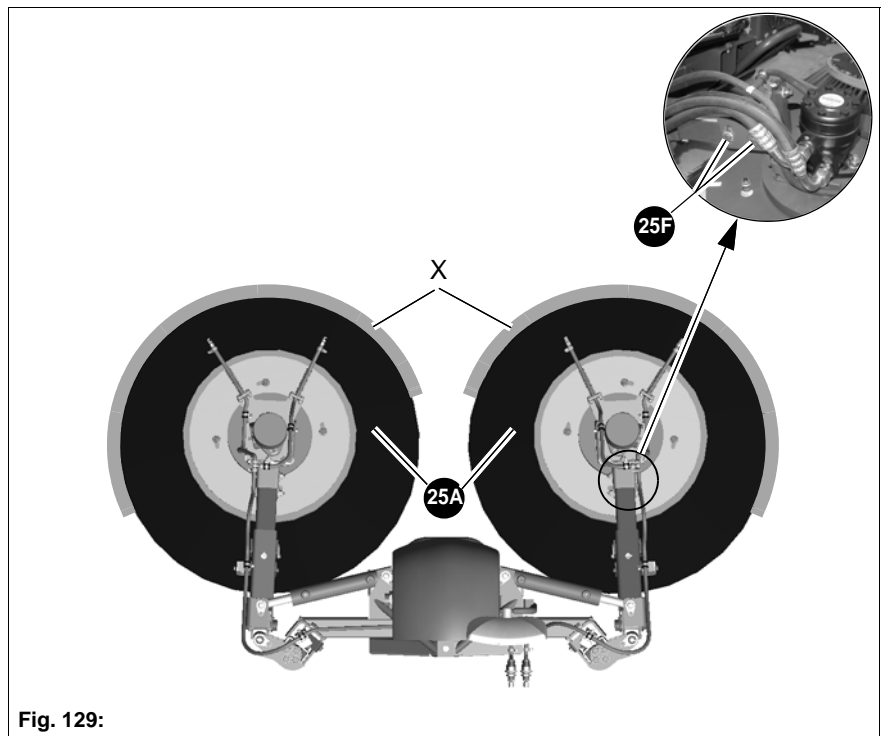
4.10 Sweeping unit

4.10.1 Adjust sweeping track

The locating surfaces of the brushes **25A** on the floor (sweeping track) as well as the lift-out arms have been set in the factory. With the lowered sweeping unit, the sweeping track on the floor (see draft X) should be as follows:

- R-h brush = 10 to 4 o'clock;
- L-h brush = 8 to 2 o'clock.

As wearing progresses, the sweeping track has to be adjusted. If the brushes are half-worn, loosen the screw **25F** and tilt the brush to the front.

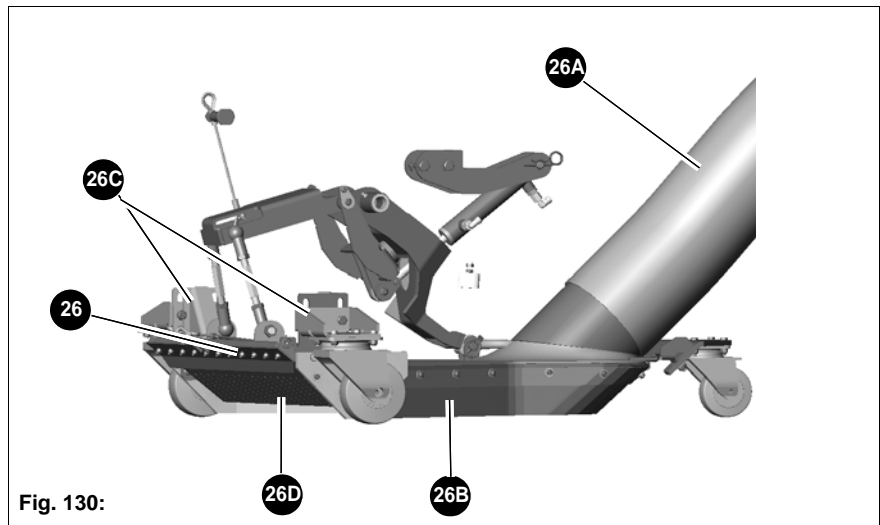


4.11 Suction port

4.11.1 Adjust suction port

Due to the suction power of the fan, the dirt is collected by the suction port **26** and taken into the dirt hopper through the suction pipe **26A**.

Clearance of the sealing strip **26B** around the suction port has to amount to 10mm. Before ground clearance adjustment, loosen the caster roller holder **26C**. Immediately replace any defective sealing, even those at the suction port flap **26D**, since otherwise suction performance reduces significantly.



4.12 Superstructure



Danger!

Lifted superstructure!

Danger of injury!

- ☞ Before start working under the superstructure check function of the foldable safety strut **32**!
- ☞ Do not stay under the superstructure while it is lifted or lowered!

4.12.1 Hand-held suction hose (SO)

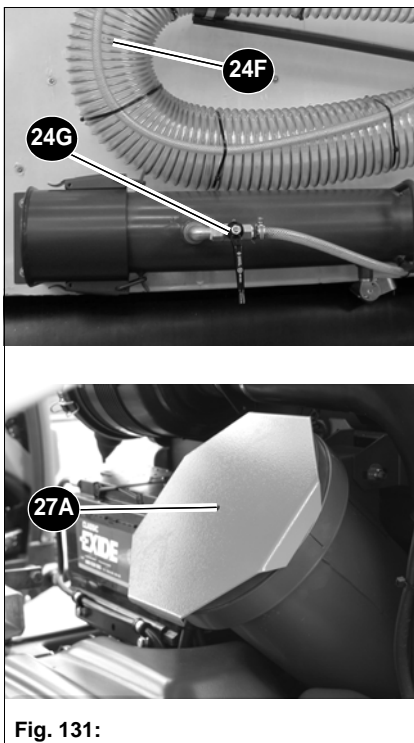


Fig. 131:

The hand-held suction hose is used for effective cleaning of grass verges and beds as well as for emptying dirt baskets etc.

Lift dirt hopper **24** with tip-switch **119** and place the insertion plate from the tool box **27** onto suction pipe. Then lower dirt hopper again.

For cleaning with the handheld suction hose **24F**, close valves **133** and **134** and switch on pump **23B** with switch **116**. Take hose from the holder and open clear water supply with valve **24G**.

4.12.2 Refill and empty clear water tank



Caution!

At temperatures below 0°C (freezing hazard) drain water from all water-containing components.

Fill the clear water tank **23A** through the opening **23D**. Filling level is monitored by the sensor **23C** and shown on multi-function display **126**. The pump **23B** delivers clear water to the spray nozzles at the sweeping unit and to the handheld suction hose.

Open valve **23E** for emptying the clear water tank. Check the filter sieve **23F** for clogging at daily intervals and clean if required

A second pump is optionally available to ensure dust binding in the suction pipe. This pump will be mounted next to pump **23B**.

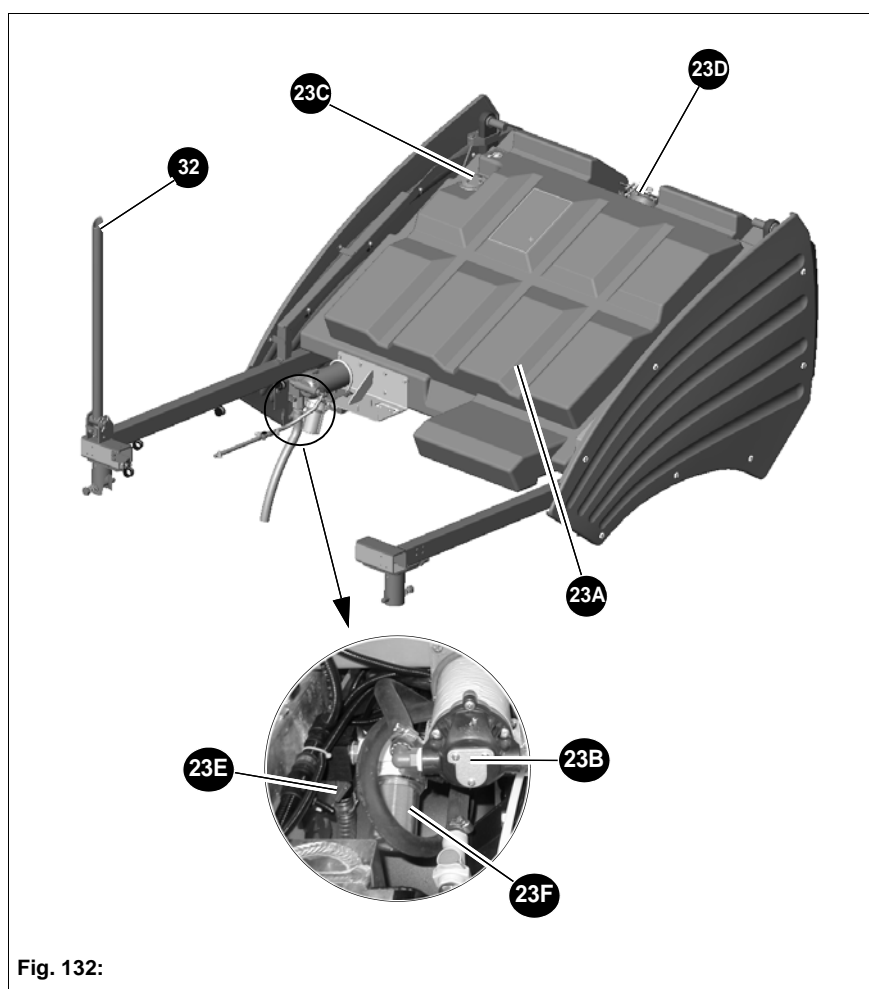


Fig. 132:

4.12.3 Refill Recirculatory water



Caution!

At temperatures below 0°C (freezing hazard) drain water from all water-containing components.

In order to guarantee as long dirt-free sweeping as possible, we recommend filling the dirt hopper **24** with approx. 180 litres water before each use.

To do so, open the hopper flap **24A**, hinge a water hose into the hopper and fill with water. Refer to draft **X** for water level.

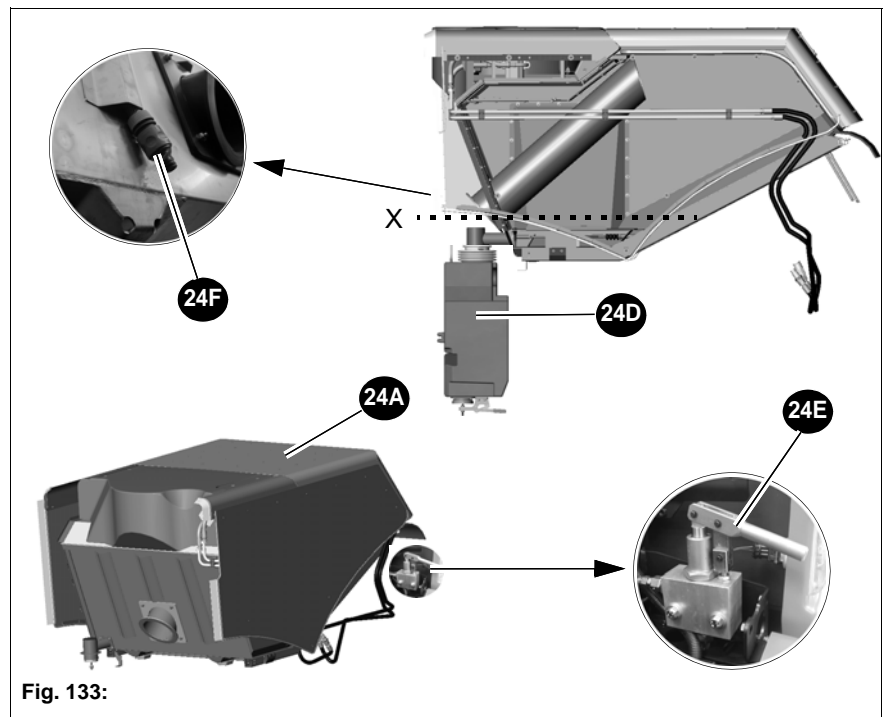
Use the valve on the soiled water tank **24D** to drain the recirculatory water system.

4.12.4 Fan

For easy fan cleaning, a water connection is fitted underneath the fan. Switch on the fan and connect a water hose to the connection **24F**.

4.12.5 Lift/lower dirt hopper with hand pump

In case of failure of the "Lift dirt hopper" tip switch, use the hand pump **24E** to lift and lower the dirt hopper.



4.13 Tyre care



Danger!

Improper tyre repairs constitute an

Accident hazard!

- ☞ *All repair work on tyres and rims may only be carried out by authorised specialist workshops.*
- ☞ *After a tyre change, the wheel must be balanced before fitting by your authorised Hako workshop.*
- ☞ *When changing tyres, only use wheels and tyres approved by Hako!*



Environment!

Have old tyres disposed of by your authorised Hako workshop according to local or national environment protection regulations!



Important!

Regular inspection of tyres

- Improves operating safety
- Increases the service life of the tyres and
- Reduces vehicle downtimes

Refer to the table in section "Specifications" for the authorised tyre types and the correct tyre pressures.

New tyres do not have optimum adhesion and therefore should be run in for about 100 kilometres whilst driving carefully.

Worn tyres mean worse grip on the road, especially when it is wet! Therefore, they should be replaced when their profile depth is down to 3 mm!

For winter service, the manufacturer recommends use of snow tyres! Recommended manufacturer; other manufacturer of this tyres size may be used if equal ultimate load certificate is available!

Due to the physical properties of the tyres and the constructive provisions of the sweeper, a driving habit adapted to the vehicle compartment is required when using the CM2000 with Goodyear Wrangler HP 265/70 R15 tyres. Increased tyre deformation by reduced inflation pressure enhances a risk of building up vehicle dynamics which may cause skidding.

Tyres older than 6 years may not be used!

4.13.1 Inspection work

Daily checks

☞ Carry out the following maintenance work daily:

- Check the tyre pressure (visual check)

Weekly checks

☞ Carry out the following maintenance work every week:

- Check the tyre pressure (when the tyres are cold)
- Check the tyres and rims for damage (cracks, ageing, etc.) – also on the inside
- Remove foreign bodies from the tyre tread
- Remove traces of oil and grease from the tyres
- Check the wheel nuts for firm seating
- Check the tyres for wear and measure the tread depth
- When the tyre wear differs very much:
Check or have the track checked and change the wheels diagonally:
front right with rear left, and front left with rear right.

4.13.2 Changing wheels



Caution!

All repair work on tyres and rims may only be carried out by authorised specialist workshops

The wheels are heavy and can damage the threads on the wheel studs if they are handled incorrectly!

☞ Use suitable assembly tools, such as covering sleeves for the studs, a jack etc.

Removing the wheels

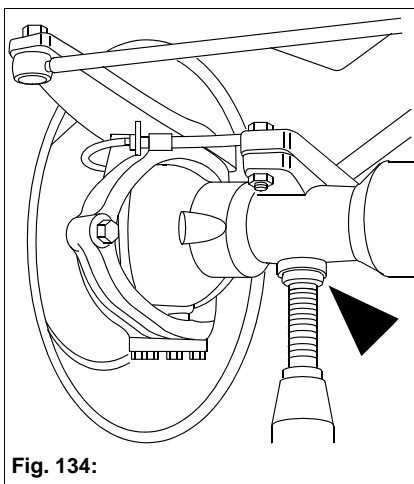
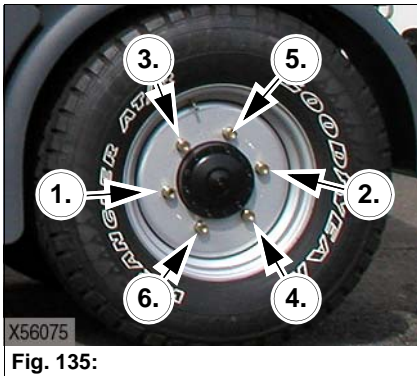


Fig. 134:

☞ Proceed as follows:

- Park vehicle on even ground and secure against rolling away
- Switch off the engine, pull the ignition key
- Remove caps of the wheel nuts
- Slightly loosen the wheel nuts of the wheel you want to remove
- Place a jack safely under the axle housing
- Raise the side of the axle from which you want to remove the wheel
- Check the vehicle is standing firmly
- Completely remove the wheel nuts
- Remove the wheel

Fitting the wheels



☞ Proceed as follows:

- Place the wheel on the centrepiece
- Tighten all the wheel nuts slightly
- Lower the raised axle
- Tighten the wheel nuts with torque 280^{+20} Nm (see page 5-6) crosswise as shown in Fig. 135
- Fit caps of the wheel nuts
- Retighten the wheel nuts after driving about 50 km in the above sequence and with the prescribed torque

4.13.3 Snow chains (option)

Fit snow chains on tyre size **215/70 R15** only.

- ☞ Park vehicle on even ground and secure against rolling away
- ☞ Switch off the engine, pull the ignition key
- ☞ Mount, tighten and remove snow chains in accordance with the manufacturer's instructions.

4.14 Windscreen washer unit

4.14.1 Filling up the windscreen washer unit



Caution!

If sufficient antifreeze has not been added, the washer fluid can freeze and cause severe damage to the motor of the windscreen wash unit.

- ☞ When mixing the washer fluid with the additive or antifreeze, observe the correct mixing ratio. Refer to the manufacturer's instructions on the packing of the additive or antifreeze.

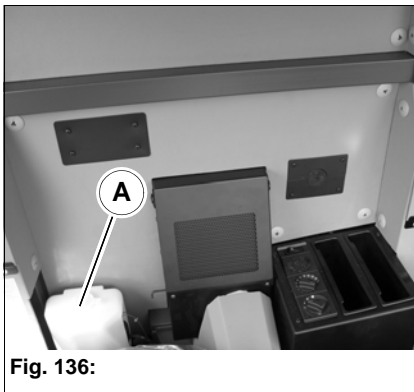


Fig. 136:

The washer tank is located in the cab behind the driver's seat.

- ☞ Park vehicle on even ground and secure against rolling away
- ☞ Switch off the engine, pull the ignition key
- ☞ Fold the backrest of the driver's seat forward (see page 3-43)
- ☞ Open washer tank cover **A** and fill up the tank



Important!

Fill with clean tap water only!

Add a suitable cleaning agent if necessary. (see page 4-55)

In winter:

Add antifreeze for windscreen washer units to the water. Refer to the instructions for using the antifreeze for information on concentrations. If no cleaning agent with antifreeze is available, use methylated spirit.

Never use coolant or other additives!

Daily checks

- ☞ Check level of windscreen washer unit and top up, if necessary

Weekly checks

- ☞ Check the condition of the wiper blades. When soiled or damaged, they can considerably affect visibility
- ☞ Remove grease, dirt and tar from the windscreen at regular intervals. This increases the service life of the wiper blades considerably.
- ☞ Check the nozzles of the windscreen washer unit to see whether the water jet is correct. Use a needle to clear any nozzle blockages.

4.15 Electrical system

4.15.1 Specific safety instructions

- The battery contains sulphuric acid! This acid must not come into contact with the skin, eyes, clothing or the vehicle.
Therefore when recharging or working near the battery:
 - ☞ Always wear goggles and protective clothing with long sleevesIf acid is spilt:
 - ☞ Thoroughly rinse all affected surfaces immediately with plenty of water
 - ☞ Thoroughly wash any part of the body touched by the acid immediately with plenty of water and seek medical attention at once!
- Keep battery acid only in closed original container!
- Keep battery acid away from children!

- Do not use a battery recharger to start the engine
- Disconnect the battery from the vehicle circuits before recharging the battery
- Do not disconnect battery while the engine is running
- During charging in particular, but also during normal battery operation, an oxyhydrogen mixture is formed in the battery cells – **risk of explosion!**
- Do not attempt to jump-start the vehicle if the battery is frozen or if the acid level is low. The battery may rupture or explode!
- Avoid open flames and sparks and **refrain from smoking** in the vicinity of opened battery cells – otherwise the gas produced during normal battery operation may ignite!
- Use only 12 V power sources. Higher voltages will damage the electrical components
- Never place tools or other conductive articles on the battery – **risk of short circuit!**

- When connecting the battery make sure the poles are not reversed, otherwise sensitive electric components will be damaged
- When re-connecting the battery **first connect the positive terminal, then the negative terminal!**
- After every maintenance involving disconnecting the battery, make sure that the clamps are firmly seated on the terminals after connection!

- Dispose of used batteries properly!
- Observe the precautions in the instructions of use and the product description of the battery!

4.15.2 Service and maintenance work at regular intervals

Before driving the vehicle

☞ Check every time before driving the vehicle:

- Light system OK?
- Is the signalling and warning system OK?

Every 300 operating hours

☞ Check every 300 operating hours:

- Fuses
- Headlight settings
- Cable and earth connections
- Check cables for chafe marks and damage
- Check alternator for soiling and clean alternator, if necessary
- Charge and filling levels of the battery (see page 4-48)
- Condition of the battery terminals

4.15.3 Instructions concerning specific components

Cables, bulbs and fuses

Always observe the following instructions:

- Defective components of the electrical system should always be replaced by an expert. Bulbs and fuses may be replaced by unqualified persons
- Disconnect the negative battery terminal before starting repair work on the electrical system
- When carrying out maintenance work on the electrical system, pay particular attention to ensuring good contact in leads and fuses
- Frequently blown fuses indicate overloading or short circuits. The electrical system should therefore be checked by your authorised Hako workshop before installing the new fuse
- Only use fuses with the specified load capacity (amperage), (see page 5-8)
- Only test the engine with the battery connected
- When connecting the battery, ensure that the poles are not reversed
- Always disconnect the battery before carrying out welding work or connecting a quick battery charger

Electronic control units

To avoid work which could permanently damage the installed control units or cause malfunctions, observe the following rules:

- When performing welding work on the chassis:
 - Disconnect first the negative terminal, then the positive terminal and connect the cables with each other
 - Disconnect the central electric system, remove the central electric system when performing welding work near the central electronic system
 - Attach ground terminal of the welding equipment as close as possible to the area to be welded
 - Do not lay the cable of the welding equipment parallel to the vehicle cable
- Do not disconnect the connections of the control units while the engine is running or the control units are switched on
- Remove control units if temperatures above 80°C could be generated during the work
- Disconnect the battery leads from the central electric system prior to the removal of the engine starter relay

Battery

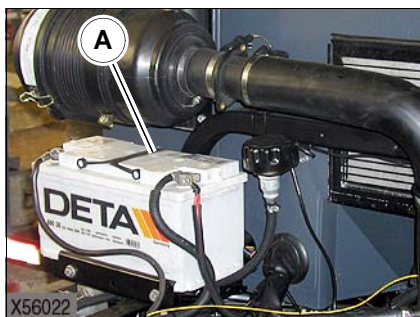


Fig. 137:

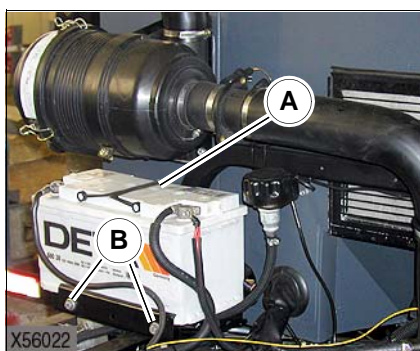


Fig. 138:

Battery **A** is located behind the cab.

Battery **A** is "maintenance-free" and electrolyte fluid does not have to be filled up during normal use. Battery **A** should still be checked at regular intervals to ensure that the electrolyte level is between the MIN and MAX marks.

Always observe the specific safety instructions (see page 4-46)!

☞ *Check the battery charge condition as follows:*

- Park vehicle on even ground and secure against rolling away
- Switch off the engine, pull the ignition key
- Remove the battery caps
- Measure the acid density with the acid meter

If the acid density is below 1.21 kg/l:

- Disconnect and recharge battery **A**

Removing the battery

☞ *To do this, proceed as follows:*

- Before disconnecting the battery, first disconnect the consumers which are permanently supplied electricity (tachograph, interior lighting etc.) by pulling the respective fuse out (see page 5-8)
- Disconnect the connecting cable **first from the negative terminal and then from the positive terminal** of battery **A**
- Unscrew screws **B** of battery holder
- On machines with oil cooler, first remove the guard on the side **33** to be able to take out the battery
- Take out the battery
- When connecting the battery again, **first connect the positive terminal, then the negative terminal**
- After every maintenance involving disconnecting the battery, make sure that the clamps are firmly seated on the terminals after connection!
- Dispose of used batteries properly!

4.16 General maintenance work

4.16.1 Cleaning

Cleaning the vehicle is divided into 3 separate areas:

- Inside the cab
- Exterior of the vehicle
- Engine compartment

The wrong choice of cleaning equipment and agents may impair the operating safety of the vehicle on the one hand, and on the other undermine the health of the persons in charge of cleaning the vehicle. It is therefore essential to observe the following instructions.



Environment!

Only use authorised washing places for cleaning the vehicle!

General instructions for all the areas of the vehicle

When using washing solvents

- Ensure adequate room ventilation
- Wear suitable protective clothing
- Do not use flammable liquids, such as petrol or diesel

When using compressed air

- Work carefully
- Wear goggles and protective clothing
- Do not aim the compressed air at the skin or at other people
- Do not use compressed air to clean your clothing

When using a high-pressure cleaner or steam jet

- Keep a minimum distance of at least 30 cm!
- Max. pressure 120 bar at max. 80°C
- Cover electrical components and insulating mats, and do not expose them directly to the jet
- Do not expose the ventilation grid at the rear wall of the cab, the breather filter of the hydraulic oil tank and the lids of the fuel and hydraulic oil tanks etc. to the direct jet, or cover these parts
- Protect the following components from moisture:
 - Electrical components, such as three-phase alternator, sensors, electric plug and socket connections, engine control block etc..
 - Control devices and seals
 - Air intake filters etc.

When using volatile and easily flammable anticorrosion agents and sprays:

- Ensure adequate room ventilation
- Avoid unprotected fire and light sources!
- Do not smoke!

Exterior of the vehicle

Wash your vehicle at regular intervals with water and a mild cleaning agent.

How often the vehicle has to be washed depends on the following factors:

- Area of usage of the vehicle
- Driving on roads spread with salt
- Parking under trees where resin can drip on the vehicle

Observe the following for washing:

- Do not use coarse brushes or dirty cloths to prevent the paint from being scratched and becoming dull
- Do not wash the vehicle after it has stood in the sun for a long time, the paint could lose its gloss

Cleaning plastic parts

Clean the outside plastic parts in the same manner as the vehicle. If the dirt cannot be removed in this manner, we recommend special cleaning agents for plastic materials. You can use these also for plastic parts inside the vehicle.

Do not use paint cleaners or products containing solvents, methanol or hydrocarbon.

Cleaning glass surfaces

Use special glass cleaning agents and clean cloths to prevent scratches and dullness.

Inside of the cab



Caution!

Never use high-pressure cleaners, steam jets or high-pressure water to clean the inside of the operator compartment. Water under high pressure may

- Penetrate into the electrical systems and cause short circuits
 - Damage seals and disable the controls!
-

We recommend using the following aids to clean the cab:

- Vacuum cleaner
- Damp cloth
- Soft brush
- Bucket of water

Cleaning cloth surfaces

Remove dust from seats and other cloth surfaces with a soft brush or a vacuum cleaner. More thorough cleaning can be achieved with special upholstery cleaning agents. Observe instructions on use and warning information from the manufacturer!

Do not use solvents on a chlorine basis.

Engine compartment

**Danger!**

Clean the engine at engine standstill only –

Risk of injury!

☞ Switch off the engine before cleaning

**Caution!**

When cleaning the engine using a water jet or steam jet, do not point the jet directly at electrical plug and socket connections and sensors, such as the oil pressure switch.

Otherwise, liquid penetrating such units can lead to corrosion and failure of the measuring function!

Clean sweeping unit

Proceed to the cleaning works described in the following at least at daily intervals and yet more often in case of heavy soiling.

Do not use steam or high-pressure cleaning equipment. Do not direct water jet on electric or electronic parts.

☞ Switch on fan by Hako key **138**

☞ Place water hose in suction port **26** (see page 4-38) and open water

☞ Have the water jet sucked through into the dirt hopper until suction port and pipe are clean

☞ Switch off fan

☞ Clean sweeping unit outside

Clean filter sieve on the clear water tank

☞ Clean filter sieve **23F** on the clear water tank at daily intervals (see page 4-40)

Empty and clean dirt hopper

- ☞ Take the vehicle to suitable place for cleaning. Back the vehicle at the place of disposal, slow down to standstill and engage parking brake.
- ☞ Use tip switch **120** to open the dirt hopper flap and use a water hose to clean the fan grid top and bottom. Use tip switch 119 to lift and empty the dirt hopper (see page 3-66). Set engine to increased idling speed before emptying the dirt hopper!
- ☞ Open the dirt hopper bottom flap (see page 3-66). Clean dirt hopper inside thoroughly by water hose. Close bottom flap again.
- ☞ Open valve of the separate soiled water tank (see page 4-41) and thoroughly clean the soiled water tank by water hose.
- ☞ Close valve and fill separate soiled water tank with water. switch on recirculation system with tip-switch **115** and let water run until clear water comes out of the suction port.
- ☞ Lower dirt hopper and close hopper flap.
- ☞ Switch on fan and connect water hose to fan fitting (see page 4-41). Clean fan by water pressure
- ☞ Clean dirt hopper outside, especially: dirt hopper, inlet of clear water tank, toolbox, suction pipe and soiled water tank with valve.
- ☞ Clean working place.

4.16.2 Screw connections

Screw connections on wearing parts subjected to heavy loads (e.g. axles, engine, chassis, trailer coupling etc.) should be checked regularly every 300 operating hours, especially if they have been loosened for maintenance and repair work.

Tighten loose screw connections immediately. Tightening torques can be found in (see page 5-6).

4.16.3 Pivots and hinges

All mechanical pivot points on the vehicle (e.g. door hinges, joints) and fittings (e.g. door holders) should be lubricated regularly every 300 operating hours, even if they are not listed in the lubrication plan.

4.17 Proofs of maintenance

The following table provides clear information on the maintenance work to be carried out after a certain number of operating hours. You will find the maintenance plans on page 4-56.

The performance of the work must be confirmed by the workshop in the following table.

Guarantee and warranty claims will be considered only when all maintenance intervals were performed by an authorised workshop and registered Hako-Werke GmbH.

In this context, we refer to the warranty regulations of Hako-Werke GmbH.

After operating hours	Maintenance plan	Date	Operating hour reading	Company/ signature
	Delivery			
50	1st Inspection			
300	2nd Inspection			
600	B			
900	A			
1200	C			
1500	D			
1800	E			
2100	A			
2400	C			
2700	A			
3000	B + D			
3300	A			
3600	C + E			
3900	A			

Maintenance

After operating hours	Maintenance plan	Date	Operating hour reading	Company/ signature
4200	B			
4500	D			
4800	C			
5100	A			
5400	E			
5700	A			
6000	C + D			
6300	A			
6600	B			
6900	A			
7200	C + E			
7500	D			
7800	B			
8100	A			
8400	C			
8700	A			
9000	D + E			

4.17 Engine fluids and lubricants

Component/application	Engine / vehicle fluid	SAE grade Specification	Season / temperature	Capacities ^a
VW turbodiesel engine	Engine oil	SAE 10W-40 according to VW 505 00 for multigrade oils	year-round	4.5 l, of which about 1.0 l in the oil filter
Engine cooling, heating	Coolant	Water + G12 plus according to TL-VW 774 mixing ratio 1:1	year-round	12.0 l
Hydraulic oil tank	Hydraulic oil HLP 46 as per DIN 51524 part 2	VG 22	arctic temperatures	58 l
		VG 32	Winter	
	VG 46	Summer		
	Biodegradable oil on ester basis	equivalent to first filling	year-round	
Reduction gearbox and transfer gearbox	Hypoid gearbox oil	SAE 85 W-90 MIL-L-2105; API - GL5	year-round	1.15 l
Differential on rear axle				2.5 l each
Lubrication points	Grease	DIN 51825, KP 2N-20	year-round	as required
Cardan shafts	Multipurpose grease	DEA Paragon EP 2; Shell Alvania EP 2; Retinax MS / LX	year-round	as required
Battery terminals	Acid-proof grease		year-round	as required
Paint preservative	Anticorrosion agent	Förch L 250 black	year-round	about 1 l
Fuel tank	Diesel fuel	DIN EN 590, min 49 CZ	year-round	55 l
Brake system	Brake fluid	DOT 5.1 - FMVSS 116	year-round	2.0 l
Windscreen washer unit	Cleaning agent	Water + antifreeze	year-round	1.5 l


a. The capacities indicated are approximative values; the oil level check alone is relevant for the correct oil level

4.18 Maintenance plan (overview)

Work description ^a	Ref. no. in lubrication plan	Maintenance work daily	Maintenance work weekly	1st inspection after 50 hours ^b	2nd inspection after 300 hours ^b	A every 300 hours	B every 600 hours	C every 1200 hours	D every 1500 hours	E every 1800 hours	At the latest after ^c
Oils and filters, engine/machine fluids (Hako-Service):											
• Engine oil level	1	●	●	●	●	●	●	●	●	●	
• Engine oil, engine oil filter	2, 3			■	■	■	■	■	■	■	■ Every year
• Check engine coolant ^d , antifreeze	6			●	●	●	●	●	●	●	■ Every 3 years
• Fuel filter, drain water from fuel filter	15			■	■	■	■	■	■	■	■ Every year
• Change air filter insert ^e , clean air filter housing	21			■	■	■	■	■	■	■	■ According to indicating instrument
• Breather filter of vacuum valves										■	■ Every 3 years
• Gearbox oil in rear and front axle differentials	24, 10			■	●	●	●	●	■	●	■ Every 4 years
• Gearbox oil in reduction gearbox	8			■	●	●	●	●	■	●	■ Every 4 years
• Brake fluid of service brake	25	●	●	●	●	●	●	●	●	●	■ Every 2 years
• Hydraulic oil ^f	16, 17		●		■				■		■ Every 3 years
• Hydraulic oil filter insert ^e (return filter)	16				■				■		■ According to indicating instrument
• Pressure filter, drive ^e	5			■	■				■		■ According to indicating instrument
• Breather filter of hydraulic oil tank	19										■ Every 2 years
• Windscreen washer fluid ^d	22	●	●	●	●	●	●	●	●	●	
• Battery: Check acid level and charging condition, clean and grease battery terminals	20		●	●▲	●▲	●▲	●▲	●▲	●▲	●▲	

Work description ^a Explanation of symbols: ● ■ ▲	Ref. no. in lubrication plan	Maintenance work daily	Maintenance work weekly	1st inspection after 50 hours ^b	2nd inspection after 300 hours ^d	A every 300 hours	B every 600 hours	C every 1200 hours	D every 1500 hours	E every 1800 hours	At the latest after ^c
Inspection work (operator):											
● Sweeping unit: spray nozzles		●									
● Sweeping unit: suction pipe in suction port		●									
● Sweeping unit: sealing strips on suction port		●									
● Sweeping unit: plate brush wearing and sweeping track		●									
● Clear water tank: filter sieve		●									
● Dirt hopper: recirculatory water system, filters and sieves		●									
● Dirt hopper: sealing strips		●									
● Electric system (lighting, heater fan, horn, windscreen wiper etc.)		●	●								
● Steering system		●	●								
● Service and parking brake		●	●								
● Engine oil level		●	●								
● Brake fluid		●	●								
● Windscreen washer liquid		●	●								
● Hydraulic fluid			●								
● Battery: check electrolyte level and charge condition, clean and grease battery poles			●								
● Check tyres (for damages, pressure and tread)			●								
● Thoroughly clean machine			●								

Work description ^a Explanation of symbols: ● ■ ▲	Ref. no. in lubrication plan	Maintenance work daily	Maintenance work weekly	1st inspection after 50 hours ^b	2nd inspection after 300 hours ^b	A every 300 hours	B every 600 hours	C every 1200 hours	D every 1500 hours	E every 1800 hours	At the latest after ^c		
												Check or clean/top up Change Lubricate	
Inspection work (Hako-Service):													
• Read and clear, if necessary, error memory of engine electronics						●	●	●	●	●	●		
• Read and clear, if necessary, error memory of SG hydrostatic, SG steering and SG work hydraulics				●	●	●	●	●	●	●	●		
• Toothed belt of engine control	4				●	●	●	■	●	●	●		
• V-ribbed belt: Check condition and function of automatic belt tensioner and replace, if necessary	26			●	●	●	●	●	■	●	●		
• Check alternator for soiling and clean alternator				●	●	●	●	●	●	●	●		
• Check and clean radiator for charge air, water and hydraulic oil ⁹	7			●	●	●	●	●	●	●	●		
• Clean and check the brake linings and drums. Replace if necessary							●						
• Check brake hoses; replace, if necessary											■	Every 5 years	
• Check parking brake function; have re-adjusted if necessary						●	●	●	●	●	●		
• Check check (damage, air pressure, tread depth)													
• Change high-pressure hoses of drive system												■	Every 3000 hours or every five years
• Change hydraulic hoses (except high-pressure hoses of drive system)												■	Every 5 years

Work description ^a Explanation of symbols: ● ■ ▲	Check or clean/top up Change Lubricate	Ref. no. in lubrication plan	Maintenance work daily	Maintenance work weekly	1st inspection after 50 hours ^b	2nd inspection after 300 hours ^b	A every 300 hours	B every 600 hours	C every 1200 hours	D every 1500 hours	E every 1800 hours	At the latest after ^c	
													● And after repairs
Check screw connections for firm seat, tighten if necessary (Hako-Service):													
• Engine and engine suspension, gearbox					●	●	●	●	●	●	●	●	
• Steering system					●	●	●	●	●	●	●	●	
• Hydraulic system					●	●	●	●	●	●	●	●	
• Axle mounting, axle suspension, frame components					●	●	●	●	●	●	●	●	
• Wheel nuts ^h					●	●	●	●	●	●	●	●	
Lubrication (Hako-Service) ():ⁱ													
• Steering-stub bearing of front axle and rear axle (option)		9, 23			▲	▲	▲	▲	▲	▲	▲	▲	▲ And after cle- aning with high- pressure cleaner
• Parking brake camshaft		12			▲	▲	▲	▲	▲	▲	▲	▲	
• Hinges, joints and fittings (e.g. cab, safety strut)					▲	▲	▲	▲	▲	▲	▲	▲	
• Suction port lift-out		11											
• Sweeping unit		27 - 33											
• Dirt hopper		33 - 35											

Work description ^a Explanation of symbols: ● ■ ▲	Check or clean/top up Change Lubricate	Ref. no. in lubrication plan	Maintenance work daily	Maintenance work weekly	1st inspection after 50 hours ^b	2nd inspection after 300 hours ^b	A every 300 hours	B every 600 hours	C every 1200 hours	D every 1500 hours	E every 1800 hours	At the latest after ^c
Functional check, leakage check (Hako-Service):												
Check pipes and hose lines and screw connections for firm seating, leakage and chaffing marks and damage												
● Air intake line (air filter - turbocharger - charge-air cooler - engine)						●	●	●	●	●	●	●
● Engine lubrication (engine – filter)		2, 3			●	●	●	●	●	●	●	●
● Exhaust system					●	●	●	●	●	●	●	●
● Fuel lines		15			●	●	●	●	●	●	●	●
● Cooling system (engine oil cooler, radiator, heating)		7, 6			●	●	●	●	●	●	●	●
● Service and parking brake		12	●	●	●	●	●	●	●	●	●	●
● Steering system			●	●	●	●	●	●	●	●	●	●
● Gearbox, axles		8, 10, 24			●	●	●	●	●	●	●	●
● Functional check of work hydraulics!												
● Lift cylinder of front and rear power lift (option)					●	●	●	●	●	●	●	●
● Tilt cylinder of tipper					●	●	●	●	●	●	●	●
● Electrical system (light system, heater fan, horn, wiper, etc.)			●	●	●	●	●	●	●	●	●	●
● Check headlight setting, adjust, if necessary					●	●	●	●	●	●	●	●
● Check cables for chafe marks and damage												
● Check cable and earth connections												
● Exhaust gas test (AU) according to StVZO § 47a			N1:	For the first time after 36 months, thereafter every 24 months								
● Technical inspection as required according to the regulations of your country			N2:	After every 12 months								
			N1:	For the first time after 36 months, thereafter every 24 months								
			N2:	After every 12 months								

a. For service and maintenance work on the diesel engine/implement, please also refer to the operation and maintenance manual of the engine/implement manufacturer.

b. Performance of the work after the first 50 and 300 operating hours by an authorised workshop is required for the acceptance of guarantee claims

c. Maintenance after maximum time as from the day of the initial registration!

d. Check antifreeze in addition in autumn or at temperatures below 4°C

e. Replace filter insert according to the maintenance display on the multifunction display!

f. When using biodegradable oil: Drain condensation water in the hydraulic oil every 300 operating hours and before the cold season in any case

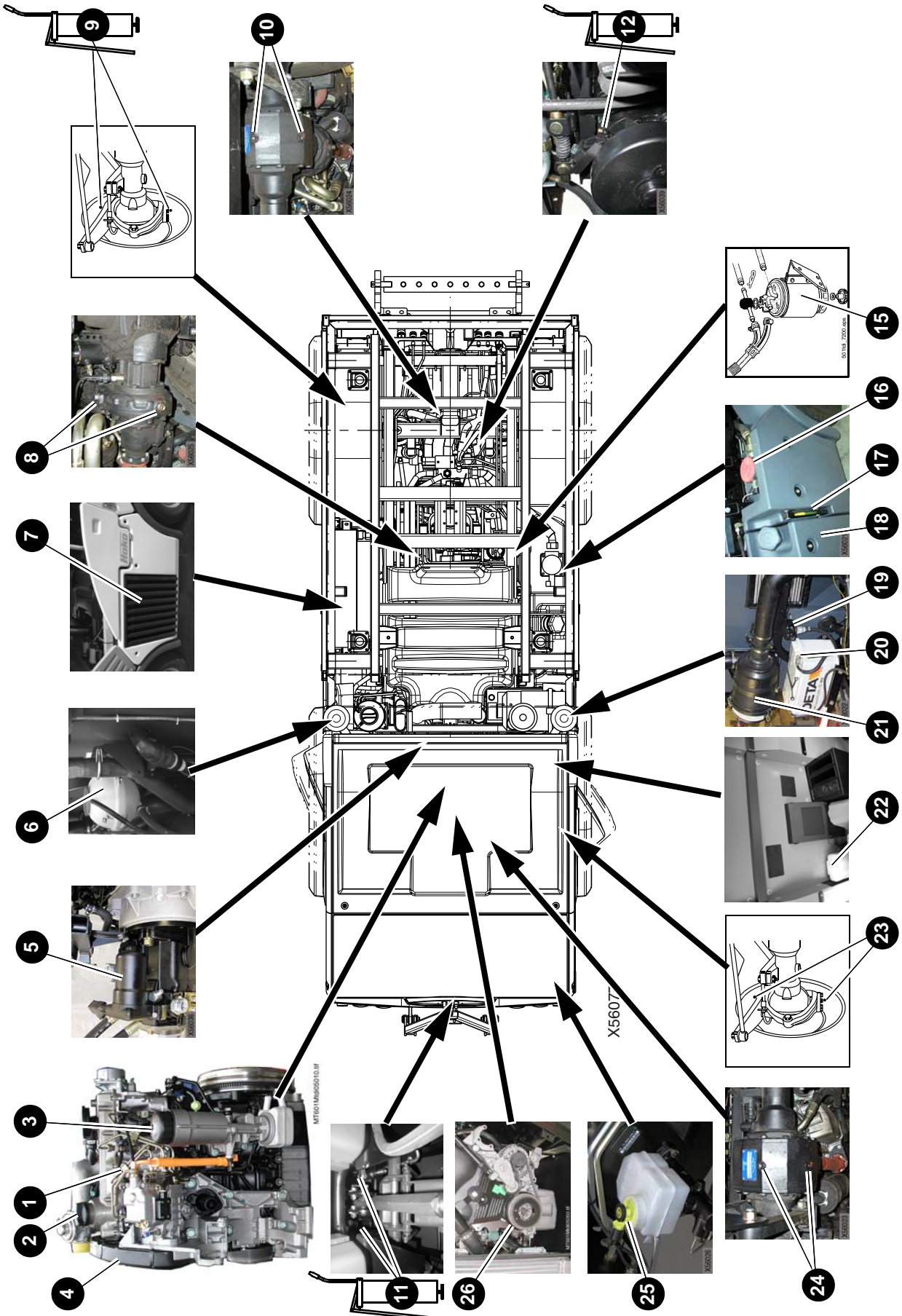
g. It may be necessary to clean the cooler more frequently depending on operation and dust conditions.

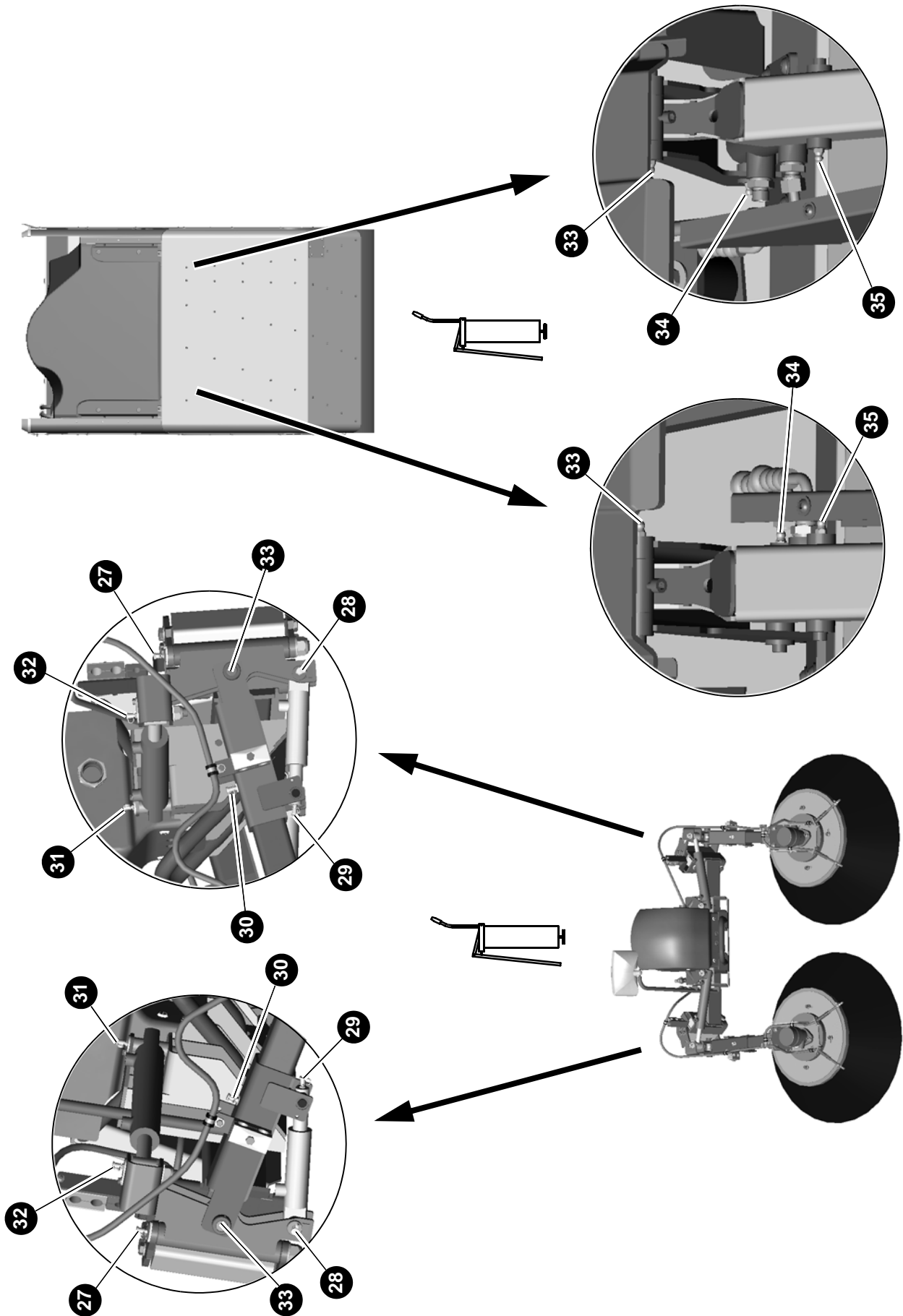
h. Retighten wheel nuts after 50 km or 10 operating hours after changing a wheel

i. Observe lubrication for the implements and superstructure equipment (e.g. snow plough) according to manufacturer's information!

j. Switching of all consumer axes with pressure measurement at the control blocks

4.19 Lubrication plan





5 Specifications

5.1 Frame

Torsionally flexible, welded ladder frame, offset and inclined at the front part of the frame. Four-point ball joints for superstructure

5.2 Engine

Engine	1.9 l VW-TDI diesel engine
Product:	Volkswagen AG
Model:	EA 188 038.S AVM (TDI)
Cylinder arrangement:	Four-cylinder, four-stroke diesel engine with exhaust-gas turbocharging and charge-air cooling, in-line engine
Control (Bosch):	Engine management with electronic diesel control
Cooling:	Water cooling as closed overpressure system with water pump installed on the engine block and separate expansion tank
Displacement:	1896 cm ³
Bore and stroke:	79.5 x 95.5 mm
Compression ratio:	19.5 : 1
Valves:	2 valves per cylinder Valve control by overhead camshaft, with toothed belt drive, hydraulic valve clearance compensation
Power:	63 kW (85 HP) at 3100 rpm
Maximum torque:	215 Nm at 1900 rpm
Idling revolutions:	900 rpm
Lubricating oil consumption:	0.05 – 0.1 l/h
Exhaust gas values:	Complies with the requirements of EURO III according to 1999/96/EC

5.3 Cooling

Combined water, hydraulic oil and charge-air cooler, fan control via viscosity clutch, AC condenser (option) fitted in front.

5.4 Power train

The vehicle is driven by a hydrostatic drive. The hydraulic pump is directly connected via a torsional elastic (not shiftable) coupling with the crankshaft of the diesel engine. The hydraulic motor transfers its torque to a transfer gearbox which transmits the torque either only to the rear axle, or for four wheel drive, to the front and rear axle.

Hydraulic motor and hydraulic pump are electrically proportionally adjusted. The adjustment is performed by the control unit of the hydrostatic drive. The respective high pressure side of the closed circuit is secured by a pressure relief valve.

Hydraulic motor		
Design	Skewed axis, axial piston motor	
Driving speed (standard)	0 – 15 kph, forward and reverse	
Working mode:	0 - 15 kph, forward and reverse	
Transport mode:	0 - 50 kph forward and 0 - 25 kph reverse	
Minimum driving speed	0.5 kph, forward and reverse	
With tyres: 215/70 R15	Traction force: 1830 daN	Hill climbing capability (at m_{ges}) 42% (4500 kg)

5.5 Steering

Steering is provided by hydrostatic single-circuit steering without feedback (power steering system with purely hydraulic transmission). Both axles have steering cylinders, so that four-wheel steering is possible in working mode. In transport mode, only front wheel steering can be activated. The switch-over is performed by a latching 4/2-way valve. This valve is activated by an electronic control unit.

Steering	Citymaster	
Design	Hydrostatic single-circuit steering with emergency steering features	
Steering wheel revolutions	approx. 5.5	
Maximum steering angle		
Front axle:	35° (inside wheel in curve)	
Rear axle:	35° (inside wheel in curve)	
Minimum turning radius (outer edge of vehicle)	Front wheel steering 4.75 m	Four wheel steering 3.10 m

5.6 Tyres

Tyres	Standard	Wide base tyre	Winter tyre*
Tyre manufacturer	Conti	Goodyear	Conti**
Tyre dimension	215/70 R15C	265/70 R15	225/70 R15C
Tread design	Vanco 8	Wrangler HP M+S	Vanco Winter M+S
Rim size	6J15	7J15	6J15
Rolling circumference in mm	2069	2295	2112
Static imbalance	311	335	317
Perimeter in mm	2069	2295	2112
Operating identification	109R	112H	(112/110)R(115N)
Tyre pressure front: rear:	bei 1225 kg 6,0 bar 6,0 bar	bei 1288 kg 3,0 bar 3,0 bar	bei 1225 kg 5,0 bar 5,0 bar
Wheel nuts tightening moment	280 ⁺⁵ Nm	280 ⁺⁵ Nm	280 ⁺⁵ Nm
Snow chains (option)	yes	no	yes
Snow chains (option)	yes	no	yes
3,5 t Side walk version	no	yes	no
4,5 t Sweeper	yes	yes	yes
4,9 t Winter service with Attachment Spreader	yes*	yes	yes
4,9 t Winter service with Loading platform and Spreader	yes*	nonein	yes
Option only from factory	no	yes	no
Speedometer adjustment: large => small	no	no	no
Speedometer adjustment: small => large	no	yes	no

5.7 Weights and loads

	Total	Front axle	Rear axle
Admissible axle load		2450 kg	2450 kg
Kerb weights	2900 kg	1900 kg	1000 kg
Gross weight rating	4500 kg	2450 kg	2450kg

Basic vehicle in standard version without options with tyres 215/70 R15 without driver with full tanks

5.8 Brakes

The vehicle brake system is designed as a servo power boosted hydraulic two-circuit brake system with brake power control on the rear axle. The parking brake acts as a drum brake on the transfer gearbox to the rear axle.

Service brake	
Design:	Hydraulic 2-circuit brake system with brake servo and load-dependent brake-power controller on the front and rear axle
Parking brake	
Design:	Mechanically actuated drum brake via pull cable and cam
Diameter:	Simplex drum brake \varnothing 180 x 30 mm

5.9 Cab

Cab	
Seats:	2
Driver's seat:	Suspended seat. Air suspension (option)
Passenger's seat:	Unsprung, suspended seat (option)
Heating / airconditioning:	Warm water heating with 3-stage fan, manually operated air conditioning system (option)
Standard equipment:	Three-point seat belts Windscreen heating
Optional equipment	Mirror heating (option) Glass roof vent (option) Radio (option) Tachograph (option)

5.10 Sweeping unit / Dirt hopper

Sweeping unit	
Brushes (piece/diameter)	2 / 900 mm
Speed Brushes	120 +/- 5 1/min
Dirt hopper	
Speed Suction fan	1500 - 3000 1/min
Suction tube diameter	200 mm
Dirt hopper (cubic capacity)	1380 l
Clean water (cubic capacity)	350 l
Recirculation system	160 l

5.11 Vehicle dimensions

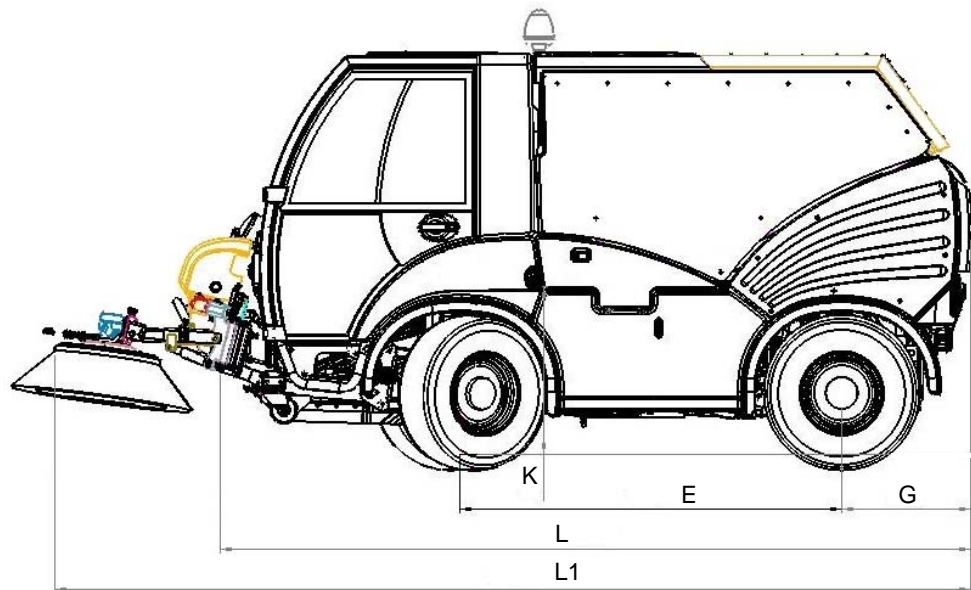
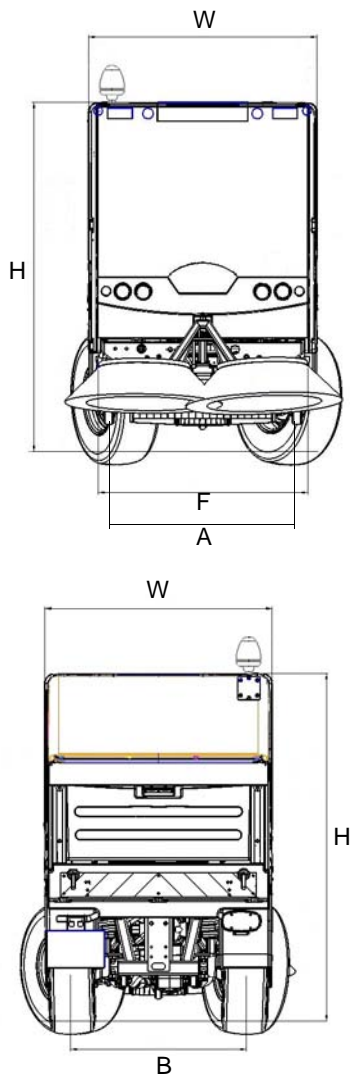


Abb. 139:



Dimensions with tyres ^a in mm		215/70 R15
A	Front track width	1010
B	Rear track width	1033
E	Wheel base:	1900
F	Sweeping unit	1197
G	Rear overhang with superstructure	643
	Front clearance angle	20 °
	Rear clearance angle	34 °
H	Overall height:	2000
	Height of rotating beacon	2207
K	Height of upper edge of frame	850
L	With front power lift	3737
L1	With sweeping unit and superstructure	4558
W	Overall width:	1300
	Overall width with rearview mirrors	1690
	Ground clearance:	
	Under front wheel + rear axle ^b	190
	Under intermediate bearing of cardan shaft	155
	Under reduction gearbox	145

a. All dimensions with unloaded vehicle
 b. With authorised total mass of 5000 kg

Fig. 140:

5.12 Noise levels

Stationary noise as per 70/157/ECC	102 dB(A)
Drive noise as per 70/157/ECC	77 dB(A)
Acoustik power level (LpA) as per DIN ISO EN 3744	111 dB(A)
Sound pressure level (L _{WA}) as per DIN EN ISO 11201	82 dB(A)

5.13 Vibration

Effective acceleration value for the upper extremities of the body	< 2.5 m/s ²
Effective acceleration value for the body	< 0.5 m/s ²

5.14 Tightening torques

5.14.1 General screw tightening torques

These values are valid for screws with untreated, non-lubricated surfaces

Screw dimensions	Tightening torques in Nm		
	8.8	10.9	12.9
M4	3	4	5
M5	5,5	8	10
M6	10	14	16
M8	23	34	40
M10	46	67	79
M12	79	115	135
M14	125	185	220
M16	195	290	340
M18	280	400	470
M20	395	560	660
M22	540	760	890
M24	680	970	1150
M27	1000	1450	1700
M30	1350	1950	2300

5.14.2 Specific tightening torques

Description	Tightening torque
Wheel nuts M 18x1.5	280 ⁺ 20 Nm
Engine oil pan oil drain plug	30 Nm
Engine oil filter (seal oiled)	25 Nm
Pressure filter, drive	45 Nm
Proximity switch of steering on rear axle	20 Nm

5.15 Electrical system

The vehicle has an electrical system with an on-board mains voltage of 12 V. It is equipped with a lighting and signal system according to the regulations of your country.

The drive, steering mode switch-over and work hydraulics are each controlled by an electronic control unit. These three control units are interconnected via a CAN bus according to ISO 11898 (2.0a) with a display for showing operating parameters and messages.

On-board mains voltage	14 V
Alternator	14 V / 120 A
Starter	12 V / 2.0 kW
Battery	12 V 100 Ah
Socket	Cigarette lighter; max. 10 A (120 W)

5.15.1 Fuse box in cab

The fuse box **71** is located behind the passenger's seat at the cab rear panel.

Fuses

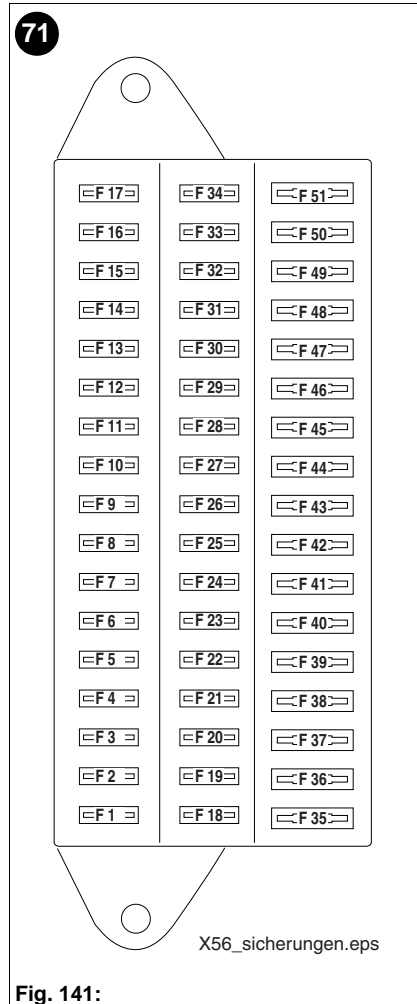


Fig. 141:

No.	Rated current (A)	Terminal	Protected circuit
F1	10 A	56	High beam, left
F2	10 A	56	High beam, right
F3	10 A	56	Low beam, left
F4	10 A	56	Low beam, right
F5	10 A	56	High beam auxiliary headlight, left (option)
F6	10 A	56	High beam auxiliary headlight, right (option)
F7	10 A	56	Low beam auxiliary headlight, left (option)
F8	10 A	56	Low beam auxiliary headlight, right (option)
F9	5 A	56	Rear fog light
F10	7.5 A	58	Left parking light
F11	7.5 A	58	Right parking light, relay for working light (option)
F12	5 A	58	Speedometer lighting, controls, switch light
F13	15 A	X	Front working light (option)
F14	20 A	AFM	Frischwasserpumpe, Grüne Hako-Taste, wegabh. Streuen, Taste Frontgeräteträger
F15			Reserve
F16	15 A	X	Wiper/wash system, horn
F17	15 A	15	Turn indicators
F18	15 A	X	Terminal X for 21 pole, 4 pole and 13 pole trailer socket
F19	5 A	X	Controls
F20	15 A	X	Headlight flasher
F21	5 A	AFM	Steering control unit – electronics
F22	20 A	AFM	Steering control unit - load circuit, differential lock
F23	15 A	X	3 pole socket in centre console
F24	5 A	X	Diesel engine control unit
F25	10 A	X	Work hydraulics actuators
F26	5 A	X	Work hydraulics control unit - electronics
F27	10 A	15	Four wheel valve, reversing light, reversing buzzer
F28	5 A	15	Radio, transceiver, tachograph, speedometer
F29	5 A	15	Lighting, switch, tip switch, transducers, sensors in cab
F30	5 A	15	Hydrostatic control unit- electronics
F31			Reserve

No.	Rated current (A)	Terminal	Protected circuit
F32	5 A	15	Transducers, sensors in chassis
F33	15 A	15	Heating blower, AC compressor (option)
F34	10 A	15	Oil pressure telltale, tip switch ADR +/-, tip switch ADR resume, charge telltale, engine diagnosis plug, immobiliser control unit
F35	5 A	15	Diesel engine control unit, air volume sensor
F36	30 A	X	Windscreen / mirror heating (option)
F37	30 A	X	Work hydraulics control unit- basic module load circuit
F38	30 A	X	UH: Work hydraulics control unit - extension module
F39	30 A	15	Hydrostatic control unit - load circuit
F40	5 A	30	Radio, transceiver, tachograph
F41	30 A	HRM	Diesel engine control unit, injection unit quantity regulator
F42	10 A	HRM	Exhaust gas recirculation valve, turbocharger pressure valve, shut-off flap valve, fuel shut-off valve
F43	15 A	30	Hazard warning system
F44	15 A	30	Rotating beacon (option)
F45	10 A	30	Brake lights
F46	10 A	30	Interior light, cigarette lighter
F47	15 A	30	
F48	5 A	30	Clock in hydrostatic control unit, engine diagnosis plug, immobiliser control unit
F49	5 A	30	Brake light activation
F50	10 A	30	Compressor (operator's seat) (option)
F51	10 A	HRM	Brake signal for diesel engine control valve
F52	50 A	30	Glow plugs

Terminal	Terminal types
30	Continuous- Plus
15	Supply for ignition ON
X	Supply for ignition ON, no supply during starting
58	Supply with the parking light switched on
56	Supply with the low beam and high beam light switched on
AFM	Supply with working mode active
HRM	Supply via relay K36.5 (J317)

5.15.2 Relay assignment

The relays are located behind the passenger's seat at the cab rear panel.

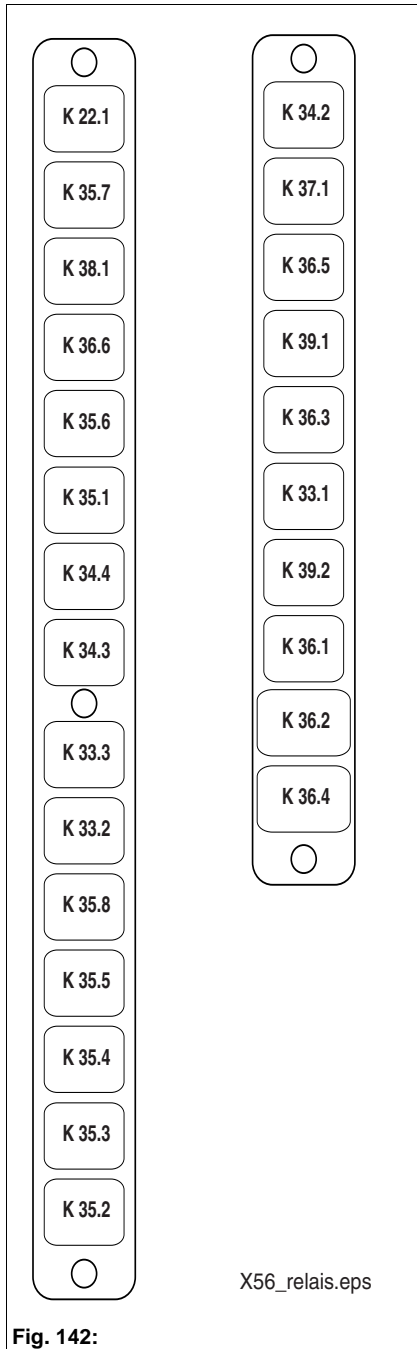


Fig. 142:

Relay no.	Relay switching function
K22.1	Fresh water pump (option, rotary broom)
K35.7	Rear fog light
K38.1	Brake lights
K36.6	Oil pressure
K35.6	Reversing light
K35.1	Working light (option)
K34.4	Switch-off relay 2 for hydraulic motor
K34.3	Switch-off relay 1 for hydraulic motor
K 33.3 – K 35.2: Switch-over unit for auxiliary headlights (option)	
K33.3	Switch-over relay for direction indicator, right
K33.2	Switch-over relay for direction indicator, left
K35.8	Relay for low beam
K35.5	Switch-over relay for high beam
K35.4	Switch-over relay for low beam
K35.3	Switch-over relay for parking light, right
K35.2	Switch-over relay for parking light, left
K34.2	Mooring valve
K37.1	Steering control unit
K36.5	Voltage supply
K39.1	Interval relay
K36.3	Coolant level
K33.1	Turn indicator unit
K39.2	Windscreen / mirror heating (option)
K36.1	Starting interlock
K36.2	X contact
K36.4	Glow plugs

**Hako-Werke GmbH
Hamburger Straße 209-239
D-23843 Bad Oldesloe**

declare under our sole responsibility, that the product

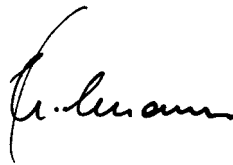
**Hako-Citymaster 2000
Type: 1411**

to which this declaration relates, corresponds to the relevant basic safety and health requirement of the Directive 98/37/EC, and to the requirements of the other relevant Directive 89/336/EEC.

For the relevant implementation of the safety and health requirements mentioned in the Directives, the following standard (s) and / or technical specification (s) has (have) been respected:

**EN ISO 13019
DIN EN ISO 14982**

Bad Oldesloe, 14.11.2005



Bernd Heilmann
Managing director

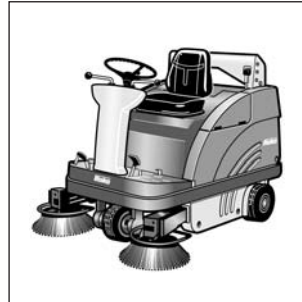
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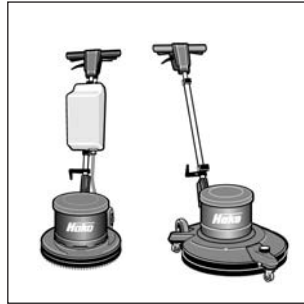
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