

Instruction Manual

Hako-Jonas 1900 LPG (6330.30)

Preface

Dear Customer,

We are certain that the excellent qualities of the vehicle will justify the faith you have shown in us through your purchase.

Please read the Chapter "Safety Information" prior to starting the vehicle to ensure it is operated and used safely. Your safety, and that of others, basically lies in your ability to control and operate the vehicle. Before using the equipment for the first time, read this original manual thoroughly, act according to the information contained and keep it in a safe place for future reference or subsequent owners. The operating manual contains all the most important information regarding operation, maintenance and service.

Throughout this operating manual, sections which concern safety are indicated by corresponding warning symbols. Should you have any questions in respect of the vehicle or operating manual, your authorized Hako dealer is available to provide help at any time.

Please note that only original spare parts should be used for any necessary maintenance and repair work. Only original spare parts can guarantee long, reliable operation of your machine. We reserve the right to make technical modifications in the interest of further development.

Valid as of: October 2013

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Intended use

The Hako-Jonas 1900 LPG is a sweeper conceived exclusively for sweeping up dry and wet refuse from areas such as production plants, warehouses, car parks and pedestrian precincts. Any use beyond this is regarded as improper use. The manufacturer is not considered liable for any damage resulting from improper use; the user is solely responsible for all the risks. The sweeper must not be used to clear up toxic, inflammable or other substances which represent a potential risk to health. Intended use also includes maintaining and observing the operating, maintenance and repair conditions prescribed by the manufacturer.

The Hako-Jonas 1900 LPG may only be operated, serviced and repaired by personnel who are familiar with the work involved and are aware of the risks. It is essential to observe the applicable accident prevention regulations as well as any other generally accepted industrial health and safety directives. Based on the conception, design and construction of the model introduced onto the market by us, the machine complies with the applicable basic safe-

ty and health requirements stipulated in the EC Directive (refer to Declaration of Conformity). This declaration is no longer considered valid in the event of modifications to the machine not authorized by us. The manufacturer is not deemed liable for any damage resulting from unauthorized modifications to the machine.

Notes on warranty

The terms defined in the purchase agreement apply. Claims for compensation related to damage are excluded from the terms of warranty when the damage is the result of failure to observe regulations concerning service and maintenance. Maintenance work must be performed by authorized Hako service centers and confirmed in the "Maintenance Report" which serves as a warranty logbook.

The following are excluded from the terms of warranty: wear and tear through overuse, defective fuses, improper handling and use or unauthorized modifications. Claims under the terms of warranty are also annulled when damage occurs to the vehicle resulting from the use of parts or accessories not explicitly approved by us or from failure to observe maintenance regulations.

Acceptance of the machine

Inspect the vehicle immediately on delivery for signs of transport damage. Replacement will be made when the damage is confirmed by the carrier immediately and the damage report is sent to our Hako contractual partner together with the consignment note.

Disposal of the machine

Render the machine inoperable. It must not represent a potential source of danger for children. Dispose of the machine according to the applicable local regulations. For further information on handling and recycling, please contact your authorized Hako dealer where you purchased the machine.

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1 Safety Information

1.1 Safety and warning symbols

All sections related to personal safety, safety of the vehicle and environmental protection are assigned the following symbols throughout the operating manual:

Symbol	Risks to...	Definition
Safety information 	persons or property	Safety information on preventing hazardous situations caused by failure to follow instructions or prescribed working procedures accurately or at all.
Note 	the machine	Important information on handling the equipment in order to maintain its functionality.
Ecological hazard 	the environment	Ecological hazard through the use of substances which represent a potential risk to health and the environment.

Safety Information

1.2 General information

- In addition to the information provided in this operating manual, all the legally applicable health and safety provisions must be observed.
- Before starting up the vehicle for the first time, read the operating manual supplied with it thoroughly as well as any separate manuals provided with additional or attachment devices and observe all the information during work.
- The vehicle may only be operated, serviced and repaired by personnel trained by Hako technical experts.
- Particular attention should be paid to the information regarding safety. Technical expertise is the key to preventing errors when operating the equipment and ensuring trouble-free operation.
- The operating manual must always be kept at the operating location of the vehicle and, as a result, should be kept in a safe place on the vehicle.

- If the equipment is sold or rented out, these documents should be transferred to the new owner/operator. The transfer should be confirmed!
- The warning labels attached to the equipment provide important information concerning safe operation. Labels which are illegible or missing must be replaced.
- Original spare parts must be used to ensure safety.

1.3 Operating information

- Check the operational safety of the vehicle each time before starting it up! Clear any faults immediately!
- Before starting work, the operator must be fully familiar with all adjustment, operating and control elements as well as their respective function! It is too late to do this when the vehicle is actually in operation!
- Always wear heavy duty, non-slip footwear when working with the vehicle.
- The vehicle may only be driven on and the equipment used on those surfaces which have been approved by the contractor or person appointed by him.
- When using the vehicle, it is essential to pay attention to third parties, especially children.
- The vehicle is not suitable for clearing up hazardous, inflammable or explosive fluids, dust or substances.
- This vehicle must not be used as a dust cleaner equipped with a dust filter insert (dust collector) to clear up dust which could represent a hazard to health.
- It is forbidden to use the vehicle in

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- potentially explosive atmospheres.
 - Remove the ignition key to prevent unauthorized use of the vehicle.
 - The vehicle and its equipment must be checked in terms of perfect working condition and operational safety before being put to use. The vehicle must not be used if it is not in a proper working condition.
 - Before putting the vehicle into operation, adjust the driver's seat so that you have a perfect view of the front and rear path of travel and working area!
 - Always switch off all the drives before starting the engine.
 - The vehicle must only be started, put into motion and stopped from the seat.
 - Do not allow the engine to run in closed rooms! Risk of poisoning!
 - Ensure there is sufficient ventilation when sweeping in closed spaces (dust and exhaust fumes). Risk of poisoning!
 - The driving speed must always be adapted to the ambient conditions and load status.
Three-wheel vehicles are less stable than four-wheel vehicles, therefore:
 - avoid sudden steering movements when driving at higher speeds, taking corners at too high a speed could cause the vehicle to tip.
Only use the vehicles on level surfaces, never on gradients.
Drive up and down inclines in straight lines.
When driving up, down or across slopes, avoid turning corners suddenly or in jerks. There is a risk of tipping when in an inclined position!
 - The vehicle is designed for use on level ground with a maximum gradient of 16%.
 - The approved gross total weight and permissible axle loads must never be exceeded. Check the fill level of the dirt hopper at frequent intervals.
 - Before raising or lowering the dirt hopper, ensure that there are no persons, animals or items in the working area.
 - Risk of crushing and shearing. Before raising or lowering the dirt hopper, ensure that there is a sufficient safety clearance.
 - The dirt hopper may only be raised in the direct vicinity of the waste container.
- Only empty the dirt hopper on level, solid ground.
- Never sweep when the dirt hopper is in a raised position.
 - Pay attention to any persons in the vicinity when emptying the dirt hopper.
 - The filter may only be shaken when the dirt hopper has been closed.
 - Pay attention to hot parts, e.g. cooling water, exhaust manifold, etc.
 - Never exceed the max. load capacity of the hopper!
 - The vehicle may only be driven at creeping speed when the dirt hopper has been raised. Avoid any sudden steering movements or decelerations.

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1.4 Maintenance information

- Operating personnel must complete the necessary daily and weekly maintenance work. All other maintenance work must be completed at your nearest Hako service center.
- The maintenance work and maintenance intervals prescribed in the operating manual must be adhered to.
- Suitable tools must be used for cleaning and maintenance work.
- The vehicle must be inspected by a recognized technical expert in respect of operational safety, within the terms of the applicable accident prevention laws, at reasonable intervals (we recommend at least once a year) and following modification or repairs.
- Spare parts must comply with the minimum technical requirements stipulated by the manufacturer! This is ensured by the use of original spare parts.
- Only use the cylindrical brooms and side brushes recommended by the manufacturer (refer to Technical Data). The use of other cylindrical brooms and side brushes could impair safety.
- Only use the air and oil filters recommended by the manufacturer (refer to Technical Data). The use of other filters could impair safety.
- The vehicle must be switched off prior to cleaning or servicing it or to replacing parts.
The key must be removed from the key switch.
- The dirt hopper must be cleaned regularly to prevent the accumulation of bacteria.
- The vehicle is splashproof (IPX3). It is not permitted to clean the vehicle with a pressure washer or steam blaster.
- The engine must be switched off when transporting the vehicle.
- If the Hako-Jonas 1900 LPG is jacked up with a jack, it must be properly supported.
- No persons may be on the Hako-Jonas 1900 LPG when it is jacked up or raised.
- When changing wheels, the vehicle must be additionally secured from rolling away by placing wheel chocks against the wheels.
Always change wheels on level, solid ground, where possible.
- Do not remove or replace tires or repair one on a rim. Always go to a proper workshop for work on tires and rims because they have specially trained personnel and special safety tools. Never loosen the screws in the two-part rims while the wheel is still mounted on the vehicle and there is air in the tires. Risk of severe injury!
- Do not carry out any welding, drilling, sawing or grinding work on frame parts. Damaged parts may only be replaced by specialist workshops approved by Hako.
- Only use original fuses. Using fuses which are too powerful could damage the electrical installation and lead to fires.
- Always disconnect the negative pole of the battery when working on the electrical installation.
- Never leave the batteries in a discharged state but recharge them as soon as possible.
- Only refill distilled water.
When the cells are in good condition, never refill the battery acid.
- To prevent current leaks, always keep the battery clean and dry, pro-

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- tect it from soiling by metallic dust, for example.
- Battery acid is very corrosive (keep out of reach of children).
Wear protective goggles when controlling the acid level. In the event of acid splashing in the eyes, rinse them with water for approx. 15 minutes and seek medical attention immediately.
Always wear appropriate protective clothing when handling the battery (e.g. protective gloves, finger stalls). Never use an open flame (risk of explosion).
 - When installing or removing the battery or changing it, there is a risk of crushing and shearing.
 - Any fluids (fuel, hydraulic oil) escaping under high pressure can penetrate the skin and cause severe injuries. Seek medical attention immediately in order to prevent the risk of infection. Take care when draining hot oil - risk of burns.
 - Subject the brake system to a thorough inspection regularly! Adjustments and repairs to the brake system may only be completed by specialist workshops approved by Hako or recognized brake service workshops.
 - Subject the hydraulic system to a thorough inspection regularly! Adjustment and repair work on the hydraulic system may only be performed in specialist Hako workshops.
 - Check hydraulic lines and hoses regularly for signs of damage and leaks. Replace damaged lines and hoses immediately.
 - Have the neutral setting of the hydraulic pump checked regularly at an authorized Hako service center.

1.5 Particular risks

Safety equipment

- Never operate the Hako-Jonas 1900 LPG without properly functional safety equipment. (This relates to all the paneling and trim, including the side panels.)
- For reasons of safety, the driver's seat is equipped with a seat contact switch; the function of the seat contact switch must not be bypassed!
- For reasons of safety, the hydraulic cylinder for the hopper lift is equipped with a check valve which can be unlocked hydraulically. It is forbidden to manipulate or remove it.

Electronics

- Only use original fuses with the prescribed amperage.
- In the case of defects in the electrical installation, switch the vehicle off immediately and clear the fault.
- Work on the electrical equipment may only be carried out by electricians who have received the necessary training and in accordance with the electrical engineering regulations.
- The vehicle's electrical equipment

must be inspected/checked at regular intervals. Defects, such as loose connections and cable damage, must be rectified immediately.

- Observe the information in the operating manual provided by the battery manufacturer.
- Never lay any metallic objects or tools on batteries - risk of short circuit!

Liquid propellant gas system (LPG)

- In addition to the safety information in the vehicle's operating manual and stipulations in the accident prevention regulations (BGV D 34), the following safety information must also be observed when using liquefied petroleum gas:
- Vacuum sweeper vehicles may only be operated by suitable persons who have received the necessary training with regard to handling the liquid propellant gas system, have submitted proof of their capability to operate the machine to the proprietor or his appointed representative and have been explicitly assigned the task of operating the machine by them.

- The liquid propellant gas system may only be used when it is in proper condition.
- The gas cylinder may only be used in accordance with its identification, i.e. opening in the collar at the bottom due to extraction from the liquid phase.
- Extraction from the gas phase, e.g. by turning the opening in the collar around, is not permitted.
- Operating personnel must use the machine according to its intended use. They must adapt their manner of driving according to the local conditions.
- The LPG cylinder may only be changed when the engine has stopped.
- It is forbidden to smoke or handle fire in any way when the LPG cylinder is being changed. Only use one cylinder! The connection of cylinders is dangerous and, therefore, forbidden. Seal any cylinder connections not in use with dummy plugs.
- Do not park the machine in garages or halls in the direct vicinity of heating radiators.

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- When switching off the vehicle, the extraction valves on the gas cylinders must be closed immediately and the lines run empty.
 - It is forbidden to change gas cylinders in garages or in underground areas. The gas system must be checked regularly for leaks. Machines with liquid propellant gas systems must be parked safely (e.g. pay attention to sufficient ventilation; park above ground level; keep sufficient distance to cellar entrances and windows, pits, light wells and such; close the extraction valve).
 - Machines with liquid propellant gas systems must be inspected regularly, at least once a year, by a technical expert in accordance with § 33, 37 of BGV D 34 (regulations for health and safety at work) to verify its safe working condition.
 - The toxicity of the exhaust gas must be controlled at least every six months and adjustments made as necessary to ensure a CO content of max. 0.1 vol. % at idling speed with the engine at operating temperature. The results must be documented in a test certificate in accordance with BGV D 34.
 - Work on the gas system may only be carried out by technical experts and correspondingly trained personnel!
 - Only use parts approved by the manufacturer when installing or changing parts of the gas system.
 - Following repairs and modifications which could affect the operational safety and after operation stoppages in excess of one year, the liquid propellant gas system must be tested in respect of correct characteristics, proper function and no leakage.
 - Do not park sweeper machines with a liquid propellant gas system in the vicinity of sources of heat, e.g. direct sunshine.
 - Liquid propellant gas systems must be tested in respect of correct characteristics, proper function and no leakage.
- ### 1.6 Environmental protection
- A certain factual expertise is required in order to use substances which could represent a risk to health and the environment.
 - Always observe legal regulations and local directives when disposing of cleaning agents, refer to the Water Resources Act.
 - Used batteries with the recycling symbol contain reusable commodities. The heavy metals contained simultaneously represent a serious risk to health and to the environment. Never open batteries or damage them. Never touch, inhale or swallow any material inside batteries. Health hazard! Never allow batteries to pollute the environment. Risk of contaminating the ground and water! In accordance with symbol with the crossed out garbage bin, these batteries must not be disposed of in domestic waste. The return and recycling of old batteries must be agreed on with your authorized Hako dealer in accordance with the Battery Law § 6 and § 8 (BattG).

Safety Information

1.7 Labels on the vehicle

The following safety and warning labels are attached to the vehicle where easily legible. Missing or illegible labels must be replaced immediately.

Company logo at front (Fig. 2/11) and rear (Fig. 1/1)

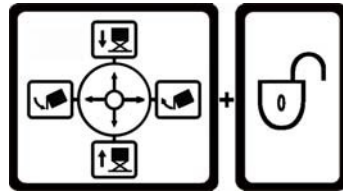
Rating plate (Fig. 1/2)



Parking brake (Fig. 1/3)



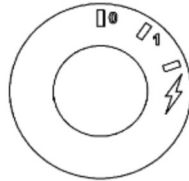
High dump (Fig. 1/4)



Read and observe the operating manual (Fig. 1/5)



Ignition lock (Fig. 1/6)



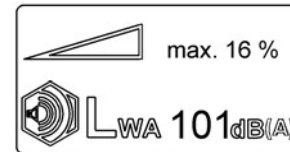
High-pressure washer/Steam cleaner are forbidden (Fig. 1/7)



Brake (Fig. 1/8)



Sound power / Gradient (Fig. 1/9)



Safety Information

Brush wear compensation
(Fig. 1/10)



Tire pressure (Fig. 1/11)

6.5 bar
95 PSI

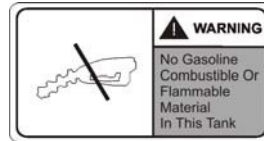
Machine model (Fig. 1/12)

Hako-Jonas 1900

Hydraulic oil (Fig. 1/13)



Hydraulic tank (Fig. 1/14)

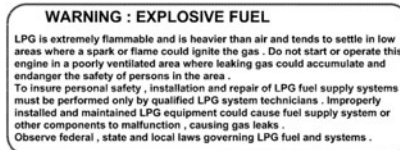


(Warning
Do not fill any fuel or combustible fluids
in the tank)

Only extract liquid (Fig. 1/15)



Explosive fuel (Fig. 1/16)



Hot surfaces on radiator and engine
(Fig. 2/1)



Rotating parts on shaking motor
(Fig. 2/2)



Lock engine with latch (Fig. 2/3)



(Ensure latch is locked securely)

Safety Information

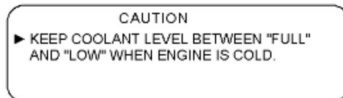
Adjust side brush sweeping pattern
(Fig. 2/4)



Risk of crushing by dirt hopper
(Fig. 2/5)



Coolant (Fig. 2/6)



(Caution
The level of coolant must be between
"FULL" and "LOW".)

Fan on radiator (Fig. 2/7)



(Warning
Keep away from the engine fan)

Fan on radiator (Fig. 2/8)



(Warning
Do not reach into the fan inlet when the
engine is running.)

Safety valve (Fig. 2/9)



(Warning
Improper installation or use of this
product may cause serious injury
and/or property damage)

Rating plate, engine (Fig. 2/10)



Safety Information

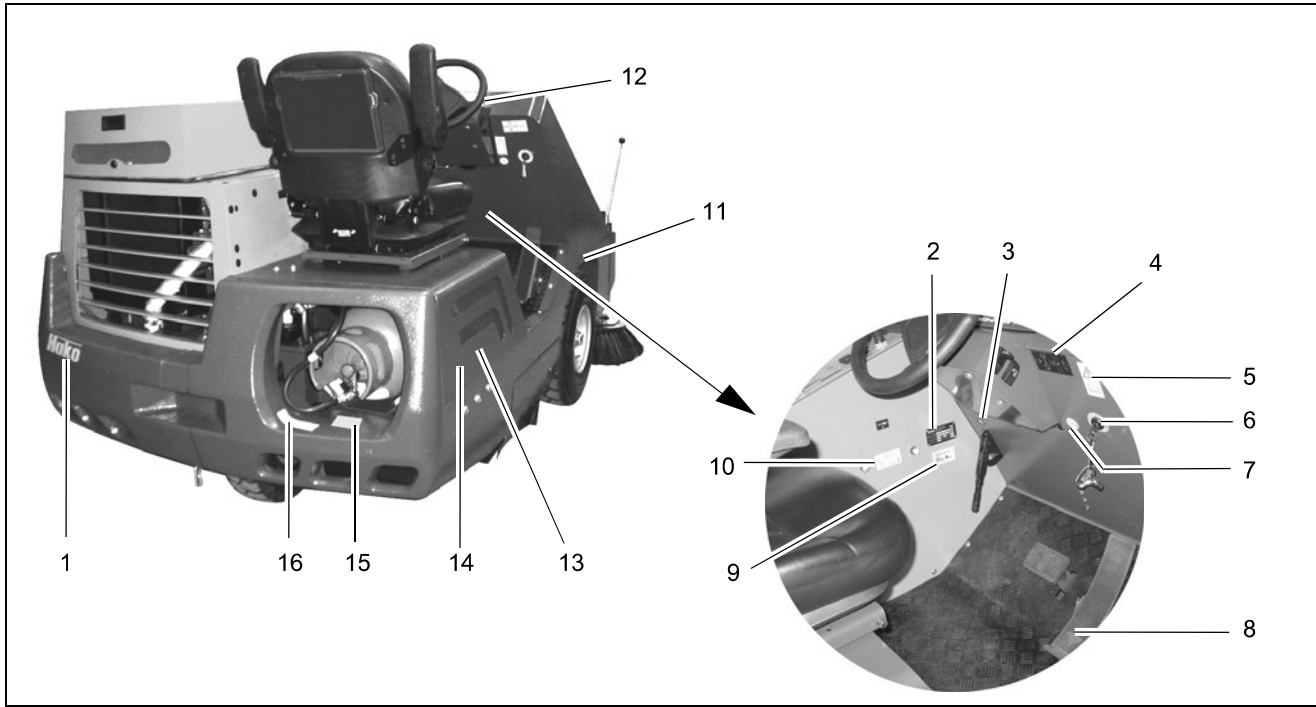


Fig.1

Safety Information

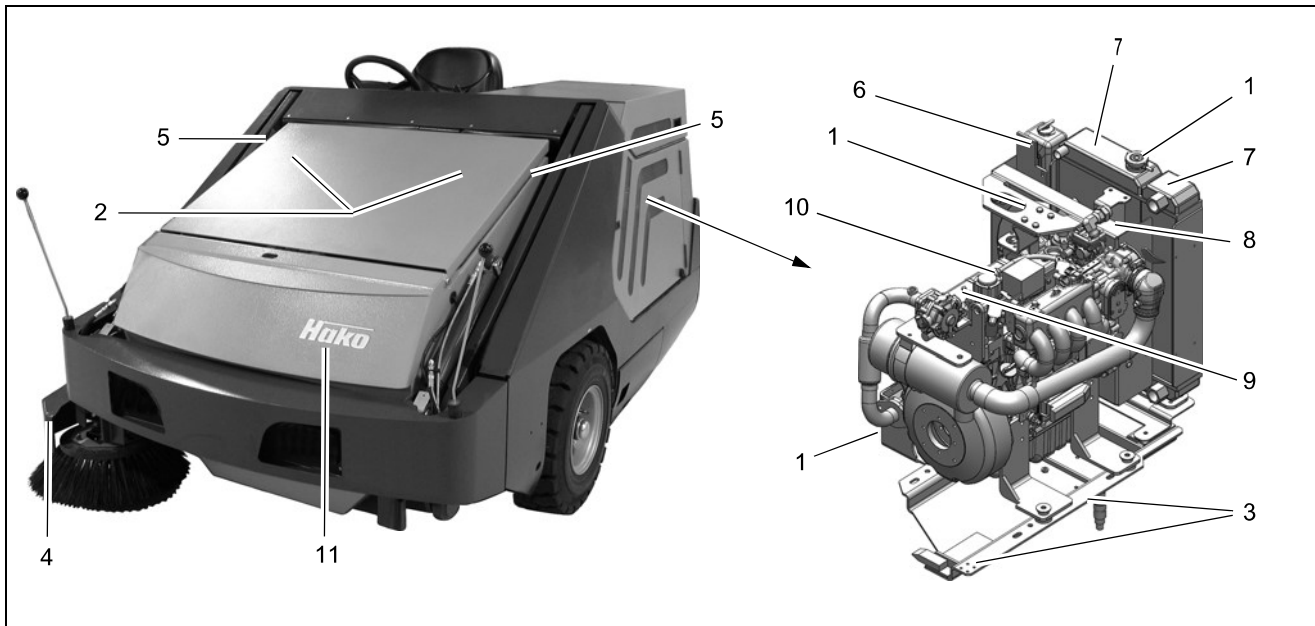


Fig.2

2 Starting Up



Work on the LPG system may only be carried out by technical experts and correspondingly trained personnel! Only use parts approved by the manufacturer when installing or changing parts of the liquid propellant gas system. It is forbidden to smoke or handle fire in any way in the vicinity of the liquid propellant gas system! Only work in rooms with adequate ventilation!

2.1 Initial instruction

Operators must be instructed before putting the machine into service. Only technicians from your local authorized Hako dealer are allowed to provide initial instruction on the machine. The manufacturing plant will notify the dealer immediately after delivering the vehicle and the dealer will contact you to arrange a date.

2.2 Prior to starting up

Carry out the following checks before starting the machine:

1. Check the parking space for signs of leaks. Hoses, lines and tanks must show no signs of leaks or damage.
2. Check the engine oil level, refer to Chapter "Maintenance and Service".
3. Check the hydraulic oil level, refer to Chapter "Maintenance and Service". The hydraulic system cannot bring its full performance at low temperatures!
4. Check the seat adjustment, refer to Chapter "Operation".
5. Check the steering wheel adjustment, refer to Chapter "Operation".

2.3 Starting the machine



Before starting the vehicle, observe the operating information in Chapter "Safety Information".



For safety reasons, the driver's seat is equipped with a seat contact switch. The function of the seat contact switch must not be bypassed.



The Hako-Jonas 1900 LPG may only be used in ambient temperatures up to 40°C. It should not be started at temperatures <-10°C. At extremely low temperatures, the hydraulic system requires a few minutes until it reaches operating temperature and can provide its full power output. Full loads should only be applied to the units on reaching operating temperature.



If the start procedure must be repeated or the engine stalls, it can only be restarted after the ignition has been switched off. A restart blocking system in the

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ignition lock prevents restarting when the engine is running.

Actuate the following operating elements in succession to start the vehicle:

1. Before starting the engine, open the LPG cylinder extraction valve.
2. All the control levers and switches (dirt hopper, cylindrical broom, accelerator, etc.) must be in their neutral position. The neutral position is monitored electronically. Deflection of the pedal prevents the start procedure of the engine.
3. The vehicle's parking brake must be applied.
4. Set the engine speed switch to idling speed.
5. Turn the key switch to "Start" and hold it there for max. 10 seconds. If it does not start, wait approx. 1 minute before repeating the process. The engine control lamp goes out. The fuel quantity, engine oil pressure, engine temperature and battery charge are displayed.



If the temperature is 0 °C or below, attempt the start for 20 seconds!

2.4 Putting into operation

Prepare for putting the machine into operation as follows:

1. Check the machine, refer to Section 2.2 - Prior to starting up.
2. Start the machine, refer to Section 2.3.
3. Set the engine speed switch to working speed.
4. Lower the cylindrical broom and side brush.
5. Switch on the side brush drive.
6. In the case of moist refuse, switch on the suction fan.
7. Release the parking brake to its end position.
8. Slowly press the accelerator down until the required driving speed is reached.
9. Actuate the shaking device to clean the filter at regular intervals.
10. Check the refuse content in the dirt hopper regularly; if necessary, optimize the dirt hopper volume by using the RTR system and empty the dirt hopper.



If the side brush and suction fan functions remain switched on, the cylindrical broom lever can be used to switch all the sweeping functions on and off.

2.4.1 Optimizing use of the dirt hopper (RTR system)

The RTR system serves to compress the refuse in the dirt hopper and thus increase the fill quantity.

If the RTR system is switched on, the dirt hopper stops automatically in front of the opening of the discharge flap.

The discharge flap remains closed and the waste drops from the throw-in section to the area of the discharge flap.

1. Set the engine speed to idling speed.
2. Switch on the RTR system.
3. Raise the dirt hopper by pressing and holding the locking switch and, at the same time, moving the dirt hopper joystick to the rear.



The dirt hopper can only be tipped after the dirt hopper has passed a minimum lifting height in order to prevent a collision between the dirt hopper and chassis. When below the minimum height, the dirt hopper is locked against pivoting.

4. Tip the dirt hopper by pressing and holding the locking switch and, at the same time, moving the dirt hopper

joystick to the right.

5. The waste is distributed optimally in the dirt hopper.
6. Tip the dirt hopper back again by pressing and holding the locking switch and, at the same time, moving the dirt hopper joystick to the left.
7. Lower the dirt hopper by pressing and holding the locking switch and, at the same time, moving the dirt hopper joystick to the front.



The dirt hopper can only be lowered fully when the dirt hopper is horizontal. If the dirt hopper is lowered at a slight angle, it stops automatically to avoid colliding with the chassis. In this case, the dirt hopper must be raised slightly again and tipped back fully to its horizontal position.

2.4.2 Emptying the dirt hopper

1. Drive the Hako-Jonas 1900 LPG to the refuse depot.
2. Position the Hako-Jonas 1900 LPG in front of the waste container, maintaining the necessary safety clearance.
3. Set the engine to idling speed.
4. Clean the filter system by switching on the shaking device motor.
5. Raise the dirt hopper by pressing and holding the locking switch and, at the same time, moving the dirt hopper joystick to the rear.
6. The minimum height for emptying the dirt hopper must be exceeded.
7. Drive the Hako-Jonas 1900 LPG forwards until the dirt hopper is over the waste container.
8. Tip the dirt hopper to its dumping position by pressing and holding the locking switch and, at the same time, moving the dirt hopper joystick to the right.
9. Empty the dirt hopper completely.
10. Tip the dirt hopper back again by pressing and holding the locking switch and, at the same time, moving the dirt hopper joystick to the left.
11. Reverse the Hako-Jonas 1900 LPG

Starting Up

and stop it in front of the waste container, maintaining the necessary safety clearance.

12. Lower the dirt hopper by pressing and holding the locking switch and, at the same time, moving the dirt hopper joystick to the front.



Driving the vehicle with the dirt hopper raised reduces the vehicle's stability. Therefore, only raise the dirt hopper immediately prior to emptying it. Before raising the dirt hopper, the operator must have ensured that there are no persons or objects behind or beside the vehicle. Only raise the dirt hopper when the vehicle is on a horizontal surface.

The vehicle may only be driven slowly when the dirt hopper is raised.

It is forbidden for anyone to move into the danger area.
Risk of crushing and shearing!
Before raising or lowering the dirt hopper, ensure that there is a sufficient safety clearance.
The dirt hopper may only be

filled to a maximum fill weight of 500 kg. Overloading leads to reduced stability.

The dirt hopper must be cleaned at regular intervals. The movements of the dirt hopper are monitored. The dirt hopper stops automatically if there is a risk of a collision with other machine parts which would and cause damage. In such cases, the dirt hopper must be moved in the opposite direction in order to be able to complete the function.

2.5 Stopping and switching off the vehicle

1. Set the accelerator slowly to its neutral position. The vehicle slows down to a stop.
2. Apply the parking brake to its end position.
3. Raise the cylindrical broom and side brush.
4. Turn the ignition key to 0.



The LPG engine has a longer stopping time after switching off. The driver must remain seated on the driver's seat until the gas is cleared from the lines and the engine stops!

5. Close the LPG cylinder's extraction valve.



The Hako-Jonas 1900 LPG can be decelerated by pressing the accelerator in the opposite direction or applying the service brake.



Remove the key when getting off the vehicle to prevent unauthorized use.

2.6 After completing work

Drive to an appropriate service area and clean the vehicle.



It is not permitted to clean the vehicle with a pressure washer or steam blaster.

2.7 Transportation and towing

2.7.1 Transportation

When the Hako-Jonas 1900 LPG is transported on a vehicle's loading bed, it must be secured by applying the parking brake, setting chocks under the wheels and applying strapping belts at the rear lashing points (Fig. 3/1) and front lashing points (both sides) (Fig. 3/2).

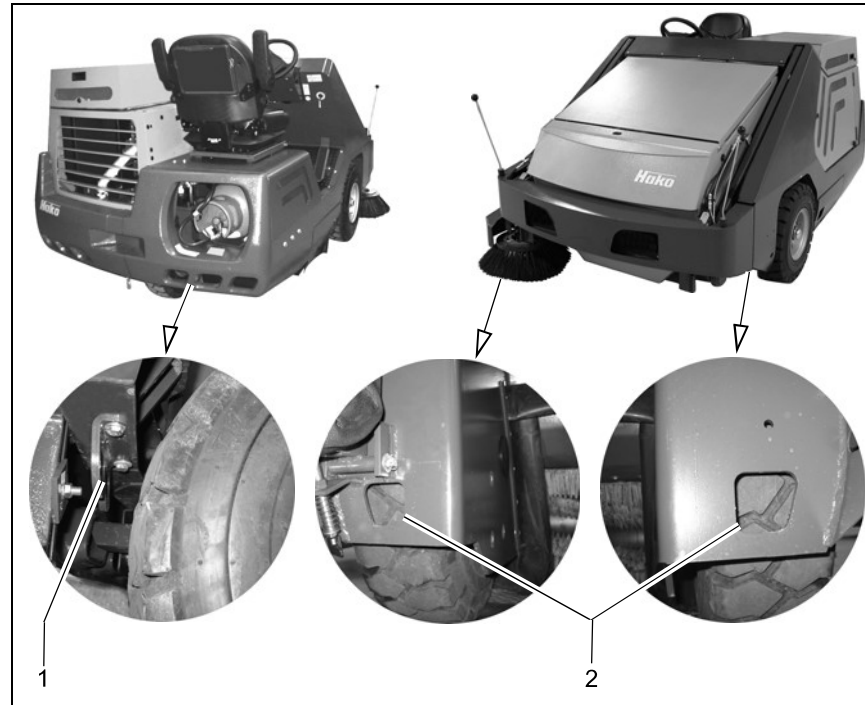


Fig.3

2.7.2 Towing

If it is necessary to tow the Hako-Jonas 1900 LPG with the engine stopped, the bypass valve (Fig. 4/3) must be actuated as follows.

1. Open and raise the cover panel (Fig. 4/1) using a square wrench.
2. Open the side panels using the handle (Fig. 4/2) and pivot open.
3. Turn the bypass valve (Fig. 4/3) clockwise by 90°.
4. After towing the vehicle, close the bypass valve (Fig. 4/3) again.



Towing with the bypass valve active should only be completed over short distances, e.g. to tow the machine out of a hazard area or to a loading area, and not faster than $V = 2$ km/h. For longer distances, raise the rear wheel to prevent damage to the hydraulics.

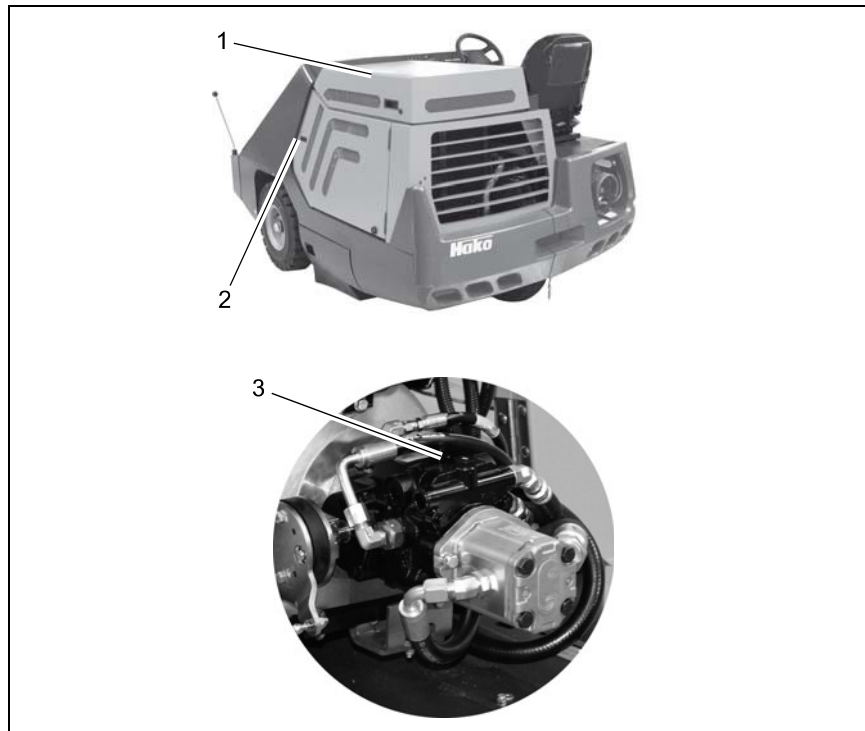


Fig.4

3 Operation

3.1 Method of operation

3.1.1 General information

The Hako-Jonas 1900 LPG is a sweeper conceived exclusively for sweeping up dry and wet refuse from areas such as production plants, warehouses, car parks and pedestrian precincts.

3.1.2 Sweeping unit

The sweeping unit sweeps up the dirt into the dirt hopper (Fig. 5/1). The side brush (Fig. 5/2) sweeps the dirt directly into the track of the cylindrical broom (Fig. 5/3). The cylindrical broom sweeps the dirt forwards into the dirt hopper. In the case of the Hako-Jonas 1900 LPG, the waste collected in the dirt hopper is disposed of directly in a standard waste container. The content of the dirt hopper can be distributed optimally by using the rotary trash relocater (RTR system).

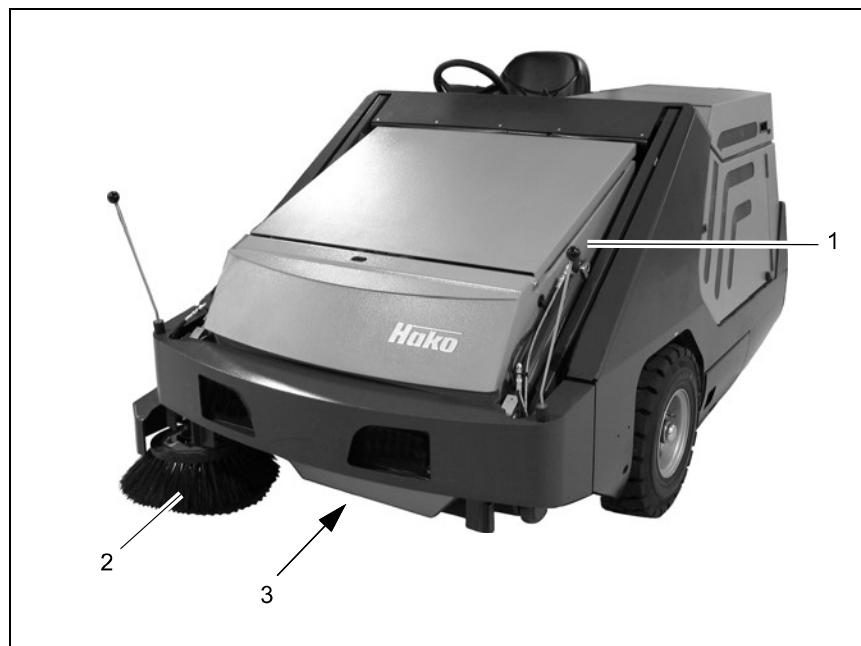


Fig.5

3.1.3 Filter system

The filter system is located under the filter housing cover (Fig. 6/1). The fine dust swirled up by the cylindrical broom is forced into the panel air filter (Fig. 6/2) by a suction turbine and filtered out. The fine dust is deposited on the filter ribs.



In the case of very dusty waste, the panel air filter (Fig. 6/2) must be checked and cleaned regularly.

3.1.4 Shaking system

The dust which precipitates on the panel air filter (Fig. 6/2) is partly shaken off by the normal working vibrations and falls into the dirt hopper. In order to operate absolutely dust-free, however, the shaking system (Fig. 6/3) must be activated regularly. When the shaking process is in progress, the dust vacuum is automatically switched off. The shaking process takes about 10 seconds. The dust vacuum switches on again automatically if it was active prior to the cleaning interval.



Fig.6

3.1.5 Engine

The engine (Fig. 7/1) is located in the rear section of the vehicle and can be accessed optimally for maintenance and service work by means of a pivoting frame. The hydraulic system and drive engine are protected from overheating by the cooling system (Fig. 7/2).

3.1.6 Hydraulic system

The combustion engine drives the hydrostatic drive and hydraulic pump for steering, side brush drive and cylindrical broom drive. The hydraulic oil filter (Fig. 7/3) and hydraulic oil tank (Fig. 7/4) are located beside the engine.

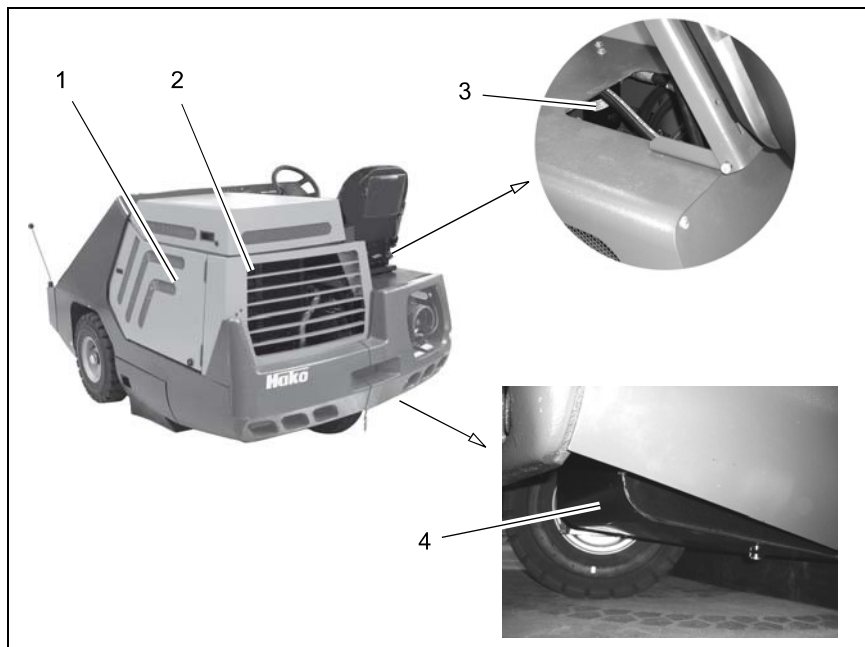


Fig.7

3.1.7 Brakes and tires

The hydrostatic drive is used for braking purposes. If this braking effect is insufficient, you can also apply the service brake. The Hako-Jonas 1900 LPG is also equipped with a parking brake. The tires are filled with compressed air. The tire pressure and tread must be checked according to the maintenance schedule.



Work on the tires and brake system may only be completed at an authorized Hako service center.

3.2 Operating elements

3.2.1 Overview

- 1 Operating panel, control lamps and indicators
- 2 Safety switch for dirt hopper
- 3 Steering column adjuster
- 4 Ignition switch
- 5 Accelerator
- 6 Service brake
- 7 Parking brake
- 8 Driver's seat
- 9 Wear compensation for cylindrical broom
- 10 Wear compensation for side brush

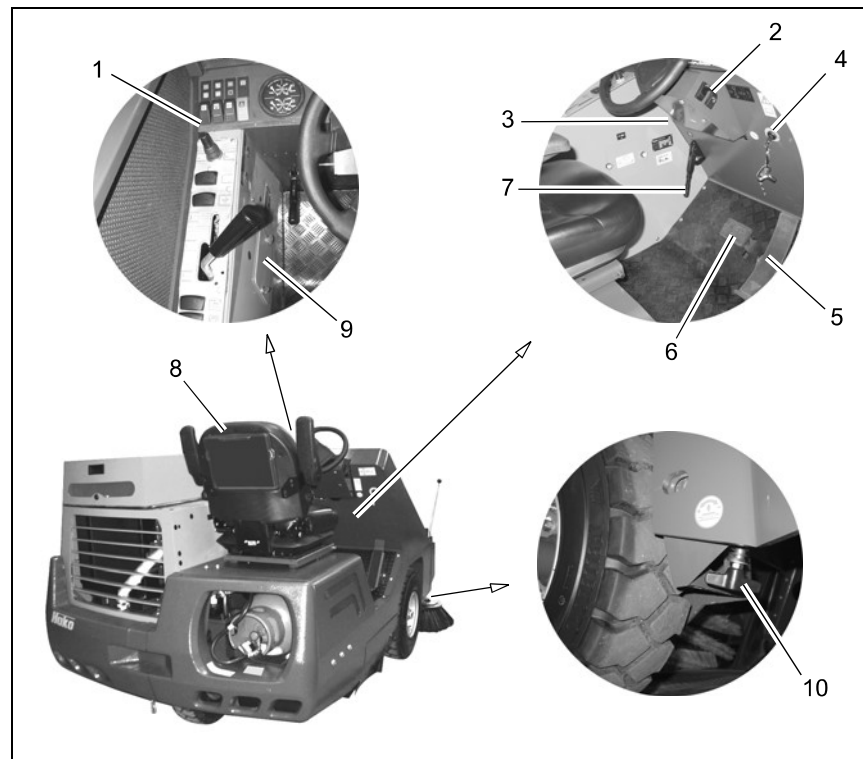


Fig.8

Overview, continued

1 Lock for the filter housing cover



Fig.9

3.2.2 Operating panel

- 1 Joystick for dirt hopper
- 2 Close dirt hopper
- 3 Raise dirt hopper
- 4 Lower dirt hopper
- 5 Open dirt hopper
- 6 Switch for RTR system (waste compression)
- 7 Switch for idling speed / working speed
- 8 Control lever for sweeping operation
- 9 Increase cylindrical broom pressure
- 10 Switch on sweeping operation
- 11 Switch off sweeping operation
- 12 Switch for side brush drive on/off
- 13 Switch for suction fan drive on/off
- 14 Switch for shaking device
- 15 Horn switch

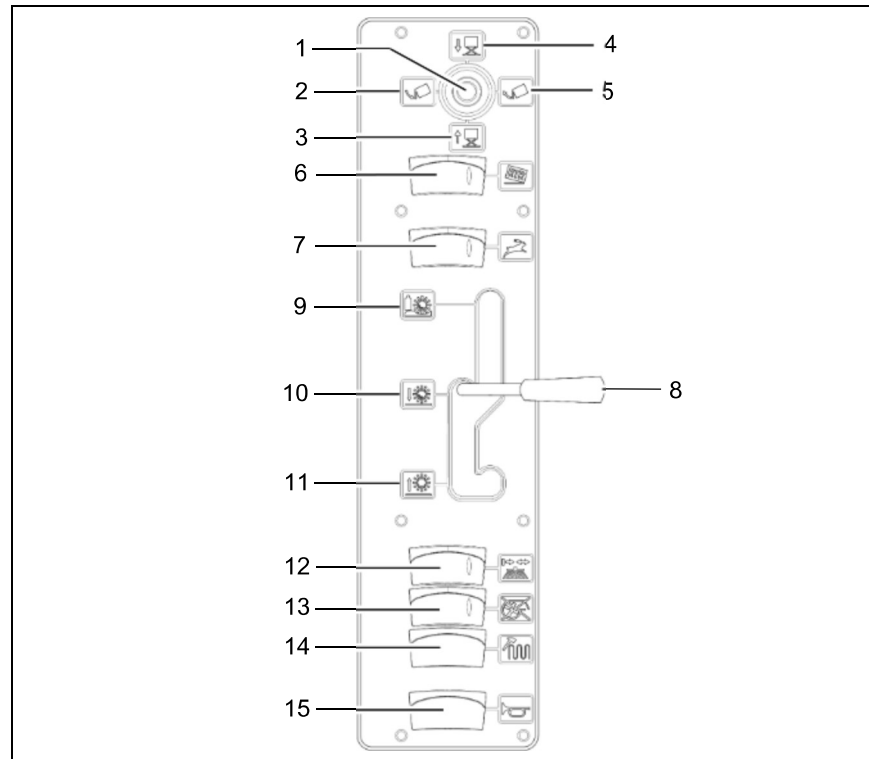


Fig.10

3.2.3 Control lamps and indicators

- 1 Engine control lamp
- 2 Control lamp for filter soiling
- 3 Control lamp for drive direction indicator (options)
- 4 Control lamp for parking brake
- 5 Control lamp for suction turbine off
- 6 Control lamp for RTR system
- 7 Indicator for engine oil pressure
- 8 Indicator for coolant temperature
- 9 Indicator for fuel level (no function)
- 10 Voltmeter

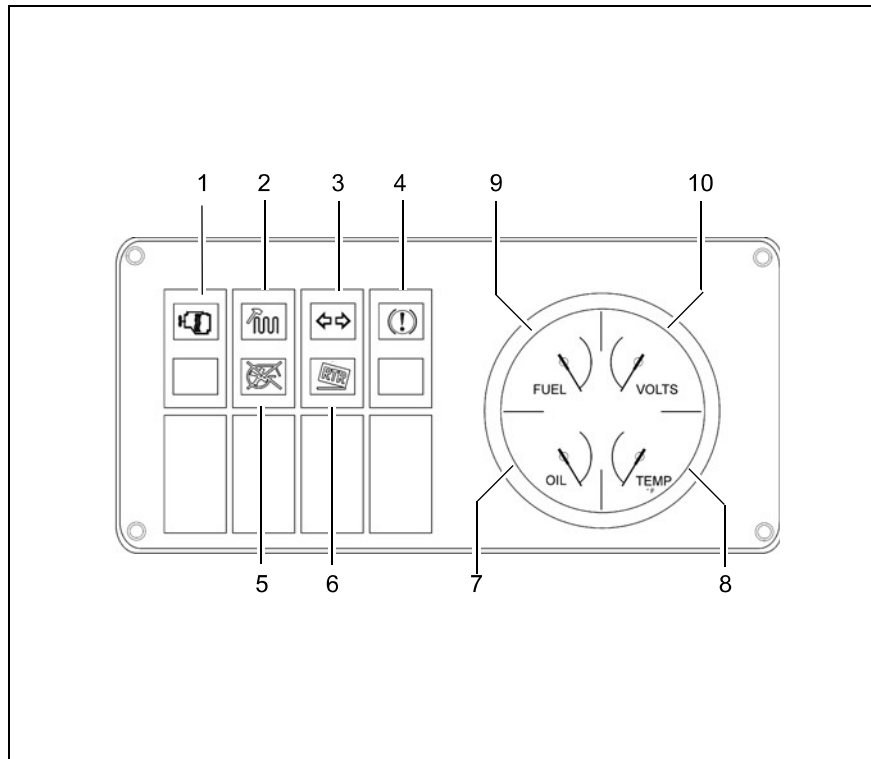
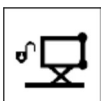


Fig.11



Safety switch for dirt hopper (Fig. 8/2)

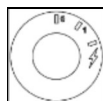
The dirt hopper functions can only be activated when the safety switch is pressed simultaneously.

Steering column adjuster (Fig. 8/3)

Pivot the lever downwards, adjust the steering column to your physical needs. Then pivot the lever upwards until it locks in place.




Only drive with the steering column locked in place and only adjust the steering wheel when the vehicle has stopped!



Ignition starter switch (Fig. 8/4)

This switch serves to start and stop the engine and prevent unauthorized use.
0 = engine and electrical system switched off.

1 = Ignition ON

 = Turn starter (start)



For reasons of safety, the Hako-Jonas 1900 LPG is equipped with a seat contact switch. The engine can only be started when the operator is sitting on the driver's seat. If the seat contact is interrupted while the engine is running, the engine switches off.

Accelerator (Fig. 8/5)

It serves for the continuously variable regulation of the vehicle speed when driving forward or in reverse. To drive forward, tread on the front of the pedal and to reverse, tread on the rear of the pedal. If the pedal is released, it automatically returns to its neutral position and the vehicle comes to a stop.

Service brake (Fig. 8/6)

When pressure is released from the accelerator (forward or reverse drive), the vehicle decelerates to a halt due to the braking effect of the hydrostatic drive. If this braking effect is insufficient, you can also apply the service brake to decelerate more quickly.

Parking brake (Fig. 8/7)

The service brake actuates the mechanical drum brakes which act on the two front wheels. Apply the parking brake before dismounting from the machine. The parking brake control lamp lights up.

Driver's seat (Fig. 8/8)



The driver's seat must be adjusted so that the driver is seated comfortably and can reach all the operating elements with ease.

- The angle of the arm rest is adjusted using the handwheel (A).
- The backrest is adjusted using the handwheel (B).
- The driver's seat is released by means of the lever (C) and can be adjusted in a longitudinal direction.
- The seat suspension can be set, in continuous adjustment, to the driver's weight (45 kg to 125 kg) using the handwheel (D).



For reasons of safety, the Hako-Jonas 1900 LPG is equipped with a seat contact switch. The engine can only be started when the operator is sitting on the driver's seat. If the seat contact is interrupted while the engine is running, the engine switches off.

Cylindrical broom wear compensator (Fig. 8/9)

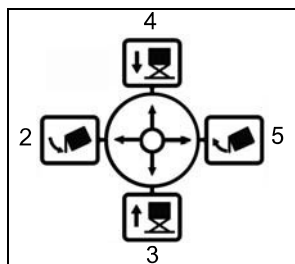
The adjustment device to compensate for wear of the cylindrical broom is located behind a cover plate. When the bristles on the cylindrical broom become shorter due to wear, a compensation adjustment can be made using this adjusting device, refer to Chapter "Maintenance and Service".

Side brush wear compensator (Fig. 8/10)

The side brush is equipped with an adjusting device to enable compensation for wear of the side brush. When the bristles on the side brush become shorter due to wear, a compensation adjustment can be made using this adjusting device, refer to Chapter "Maintenance and Service".

Lock for filter housing cover (Fig. 9/1)

The dust filters are located under the filter housing cover. Open the lock to gain access to the dust filters.



Joystick for dirt hopper (Fig. 10/1)

The joystick serves to empty the dirt hopper. In order to actuate the functions on the joystick, the safety switch on the right-hand side of the steering column must be pressed at the same time.

Joystick settings:

2 = Close dirt hopper

3 = Raise dirt hopper

4 = Lower dirt hopper

5 = Open dirt hopper

On releasing the joystick, it returns to its neutral position and the working process is interrupted.



Do not leave the dirt hopper in a raised position for a longer period! Some functions are automatically inhibited according to the position of the dirt hopper in order to prevent collisions with other vehicle parts.



Switch for RTR system (Fig. 10/6)

The RTR system serves to compress the refuse in the dirt hopper and thus increase the fill quantity.

If the RTR system is switched on, the dirt hopper stops automatically in front of the opening of the discharge flap.

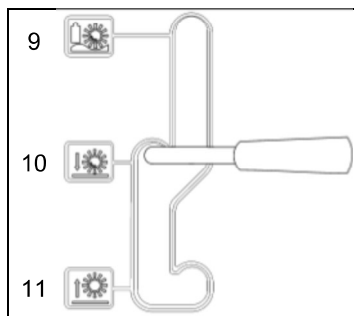
The discharge flap remains closed and the waste drops from the throw-in section to the area of the discharge flap.



Switch for idling speed / working speed (Fig. 10/7)

The switch serves to set the engine speed.

- Left-hand position: Idling speed to switch the engine on and off
- Right-hand position: Working speed for the drive, cylindrical broom drive and suction fan drive



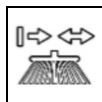
Control lever for sweeping operation (Fig. 10/8)

The control lever serves to switch sweeping operation on and off. The following settings are possible:

- 9 = Increase cylindrical broom pressure
- 10 = Switch on sweeping operation
- 11 = Switch off sweeping operation

The control lever can also be used for automatic activation of the suction fan and side brush. To do this, the respective function must be switched on. Only activate for a short time if increased cylindrical broom pressure is active, e.g. to clean stubborn dirt or in a dip in the floor. Excessive cylindrical broom pres-

sure leads to increased wear of the cylindrical broom.



Switch for side brush drive (Fig. 10/12)

The switch serves to lower and raise the side brush and to switch the side brush drive on and off. Function of the two-stage switch:

- Right-hand stage = Side brush drive off and side brush raised. Sweeping only possible with the main cylindrical broom.
- Stage 1 (middle stage): Lower right-hand side brush and side brush drive on
- Stage 2 (right-hand stage): Lower both side brushes and side brush drive on



If the side brush remains switched on, the activated and lowered or deactivated and raised functions are automatically controlled with the sweeping operation control lever.



Switch for suction fan drive (Fig. 10/13)

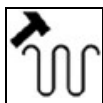
The switch serves to switch the suction fan on and off.



If the suction fan remains switched on, the function is automatically activated with the sweeping operation control lever.



Switch the suction fan off in the case of wet waste.



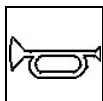
Switch for shaking device (Fig. 10/14)

On actuating the switch, the shaking device is switched on and the filter system cleaned.

Cleaning should be activated:

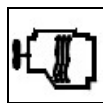
- prior to emptying the dirt hopper
- when the control lamp for filter soiling lights up.

The shaking process takes approx. 10 second. If the dust vacuum is activated, it is automatically deactivated for the duration of the cleaning process.



Horn (Fig. 10/15)

An acoustic signal is issued on actuating the switch.



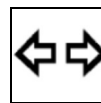
Engine control lamp (Fig. 11/1)

It lights up as soon as the ignition starter switch is actuated and must go out when the engine starts up. If the battery charge indicator lights up while driving, the battery is no longer charged by the generator or an error has occurred in the engine electronics. Switch the engine off and inform a Hako service center.



Control lamp for filter soiling (Fig. 11/2)

The filter system must be shaken when this control lamp lights up. Actuate the shaking process switch.



Control lamp for drive direction indicator (Fig. 11/3) (option)

This lamp lights up when the drive direction indicator is switched on and simultaneously serves for function control.



Control lamp for parking brake (Fig. 11/4)

It lights up when the parking brake is actuated. The control lamp goes out when the parking brake is released.



Control lamp for suction fan off (Fig. 11/5)

This lamp lights up when the suction fan is switched off.



Switch the suction fan off in the case of wet waste.



Control lamp for RTR system (Fig. 11/6)

This lamp lights up when the RTR system is switched on.

Indicator for engine oil pressure (Fig. 11/7)

This indicator has a range of 0 to 80 psi (0 to 5.5 bar). If the value indicated drops below 7 psi (0,5 bar), switch off the engine and check the oil level. Refill oil as necessary, refer to Chapter "Maintenance and Service". If the indicator does not change, although the oil level is correct, switch off the engine and inform the Hako service center.

Indicator for coolant temperature (Fig. 11/8)

This indicator has a range of 0 to 250 °F (0 to 121 °C). If the value indicated exceeds 212 °F (100 °C), switch off the engine and check the coolant level. Refill coolant as necessary, refer to Chapter "Maintenance and Service". If the indicator does not change, although the coolant level is correct, switch off the engine and inform the Hako service center.

Indicator for fuel level (Fig. 11/9)

The indicator has no function in the case of a liquid propellant gas system.

Voltmeter (Fig. 11/10)

The voltmeter indicates the voltage of the electrical on-board power supply. The normal value is approx. 14 Volt. If the value drops below 12 V while the engine is running, check the battery; refer to "Maintenance and Service". If the indicator does not change, although the battery is in order, switch off the engine and inform the Hako service center.

Technical Data

4 Technical Data

Hako-Jonas 1900 LPG		
Dimensions and weight		
Length	mm	2708
Width without side brush	mm	1520
Width with 1 side brush	mm	1655
Width with 2 side brushes	mm	1790
Height at driver's seat	mm	1466
Dead weight	kg	1724
Permissible total weight	kg	2570
Driving and sweeping performance		
Driving speed - forwards	km/h	13
Driving speed - reverse	km/h	5
Max. sweeping speed	km/h	6
Theoretical sweeping performance with 1 side brush	m ² /h	21500
Max. driving gradient	%	16

Technical Data

Hako-Jonas 1900 LPG		
Filter system		
Filter surface	m ²	12.3
Panel air filter	Pieces	2
Cylindrical broom		
Length / Diameter	mm	1220/355
Wear limit	mm	25
Speed	rpm	280
Sweeping pattern	mm	65
Ground clearance of sealing strips in brush space		
Sealing strips, left / right / rear	mm	3
Sealing strip, front	mm	2
Side brush		
Diameter	mm	610
Speed	rpm	118

Technical Data

Hako-Jonas 1900 LPG		
Dirt hoppers		
Hopper volume	Liters	500
Driving wheel		
Driving wheel, rear		6.00-9 NHS 12 PR T900
Wheels, front		6.50-10 NHS 12 PR T900
Tire pressure	Bar	6.5
Hydraulic system, traction drive		
Hydraulic oil, VG46		HVLP 46
Tank volume	Liters	23
Electrical installation		
Starter battery	V	12
Protection class against penetration by water		IPX3

Technical Data

Hako-Jonas 1900 LPG		
Engine		
Manufacturer		Kubota
Type		WG 1605-L
Working process / No. of cylinders		4-stroke/4-cylinder
Cubic capacity	cm ³	1537
Engine size	kW	Approx. 29.4 at 2150 rpm
Operating speed (with cylindrical broom, side brush and extractor fan switched on)	rpm	2150
Fuel consumption	kg / h	2.9
Engine oil / Fill quantity	Type / Liters	SAE 10W30 API Class SL / 6.0 l

Technical Data

Hako-Jonas 1900		
Noise emission values		
The sound pressure level (LpA) (at the ear of the operator) measured according to IEC 60335-2-72 under normal working conditions is:	dB (A)	82
Measurement inaccuracy (KpA):	dB (A)	3,5
The sound power level (LwAd) measured according to EN 60335-2-72 under normal working conditions is:	dB (A)	101
The sound power level (LwAd) measured according to 2000/14/EC under normal working conditions is:	dB (A)	101
Vibration values		
The weighted, effective value of the acceleration, established in accordance with ISO 2631-1 to which the lower limbs (feet-seat surface) are exposed under normal working conditions is:	m/s ²	< 0.5
The weighted, effective value of the acceleration, established in accordance with ISO 5349-1, to which the upper limbs (hand-arm) are exposed under normal working conditions is:	m/s ²	< 2.5

5 Maintenance and Service

General information



It is essential to pay attention to the information in Chapter "Safety Information" before completing any service or maintenance work!

By adhering to the maintenance work recommended by us, you can be sure that the vehicle is always ready to be put into operation.

Maintenance and repair work necessary on a daily and weekly basis can be carried out by a driver trained to complete the work, all other Hako system maintenance may only be completed by personnel who are correspondingly qualified and trained. In case of doubt, please contact your nearest Hako service center or authorized Hako dealer. Failure to observe this annuls any rights to claims under the terms of guarantee in respect of resulting damage or consequential damage.

Always specify the serial number, indicated on the rating plate, when making any inquiries and orders for spare parts, refer to Section 1.7 - Rating plate.

5.1 Hako system maintenance

Hako system maintenance:

- ensures the Hako working vehicle is always ready for operation (preventive maintenance),
- minimizes operating costs, maintenance and repair costs,
- ensures the vehicle has a long service life.

The Hako system maintenance describes the specific technical work necessary for the individual modules and defines the intervals for the maintenance tasks. Individual parts which must be changed during maintenance tasks are defined and stipulated in spare parts kits.

Hako system maintenance, customer:

Work to be carried out by the customer according to the service and maintenance instructions in the operating manual (daily and weekly). The driver/operator receives detailed instruction when the vehicle is delivered.

Hako system maintenance, one-off (after 50 operating hours)

Applies to machines with combustion engine drives, 1st change of oil, filters etc. Must be completed by skilled personnel at an authorized Hako service center.

Hako system maintenance I:

(Every 250 operating hours)
Must be completed by a skilled technician in an authorized Hako service center according to the vehicle-specific system maintenance with a spare parts kit.

Hako system maintenance II:

(Every 500 operating hours)
Must be completed by a skilled technician in an authorized Hako service center according to the vehicle-specific system maintenance with a spare parts kit.

Hako system maintenance III

(Every 1000 operating hours, safety check)
Must be completed by a skilled technician in an authorized Hako service center according to the vehicle-specific system maintenance with a spare parts kit. Completion of all legally prescribed, safety-relevant tests in compliance with VBG D 34 and controlled in accordance with BetrSichV (ordinance on industrial safety and health).

Hako system maintenance IV

(Every 2000 operating hours, safety check)
Must be completed by a skilled technician in an authorized Hako service center according to the vehicle-specific system maintenance with a spare parts kit.

Maintenance and Service

5.2 Maintenance report

<p style="text-align: center;">Handover</p> <p>Upgrading Test drive Handover to customer Initial instruction completed on: at _____ operating hours</p>	<p style="text-align: center;">Hako System Maintenance I 50 operating hours, one-off Workshop Stamp</p> <p>completed on: at _____ operating hours</p>	<p style="text-align: center;">Hako System Maintenance I 250 operating hours Workshop Stamp</p> <p>completed on: at _____ operating hours</p>	<p style="text-align: center;">Hako System Maintenance II 500 operating hours Workshop Stamp</p> <p>completed on: at _____ operating hours</p>
<p style="text-align: center;">Hako System Maintenance I 750 operating hours Workshop Stamp</p> <p>completed on: at _____ operating hours</p>	<p style="text-align: center;">Hako System Maintenance III 1000 operating hours Workshop Stamp</p> <p>completed on: at _____ operating hours</p>	<p style="text-align: center;">Hako System Maintenance I 1250 operating hours Workshop Stamp</p> <p>completed on: at _____ operating hours</p>	<p style="text-align: center;">Hako System Maintenance II 1500 operating hours Workshop Stamp</p> <p>completed on: at _____ operating hours</p>
<p style="text-align: center;">Hako System Maintenance I 1750 operating hours Workshop Stamp</p> <p>completed on: at _____ operating hours</p>	<p style="text-align: center;">Hako System Maintenance IV 2000 operating hours Workshop Stamp</p> <p>completed on: at _____ operating hours</p>	<p style="text-align: center;">Hako System Maintenance I 2250 operating hours Workshop Stamp</p> <p>completed on: at _____ operating hours</p>	<p style="text-align: center;">Hako System Maintenance II 2500 operating hours Workshop Stamp</p> <p>completed on: at _____ operating hours</p>

Maintenance and Service

5.3 Maintenance plan Hako system maintenance, customer

The following maintenance work must be completed by the customer at the intervals stipulated.

Activity	Interval
	Daily
Check the liquid gas supply, change the LPG cylinder, if necessary	o
Check the dirt hopper, empty as necessary	o
Check the engine oil level, refill engine oil as necessary	o
Check the coolant level in the cooling system, refill as necessary	o
Check the hydraulic oil level, refill as necessary	o
Check the engine and hydraulic system for leaks	o

Maintenance and Service

Hako system maintenance, customer

The following maintenance work must be completed by the customer at the intervals stipulated.

Activity	Interval
	Weekly
Check the radiator cooling ribs, clean as necessary	o
Check the function of the steering	o
Check the tire pressure	o
Check the filter system, clean or change the dust filters as necessary	o
Check the function of the shaking device	o
Check the dirt hopper seals, replace as necessary	o
Check the function of the dirt hopper flap, clean or change as necessary	o
Check the side brush for signs of wear, readjust or renew as necessary	o
Check the cylindrical broom and sealing strips for signs of wear, readjust or renew as necessary	o
Cleaning the vehicle	o

Maintenance and Service

Hako system maintenance - one-off

The following maintenance work must be completed by an authorized Hako service center.

Activity	Interval
	Every 50 operating hours (one-off)
Change the engine oil	o
Change engine oil filter	o
Check the engine speed (idling and operating speed)	o
Check the engine and hydraulic system for leaks	o
Change the hydraulic oil filter and refill the necessary oil	o
Check the electrical system	o
Check the function of the parking brake and service brake	o
Check the function of the steering	o
Check the traction drive (forward and reverse drive, neutral position)	o
Check the visual appearance of the vehicle	o
Test drive and function test	o
Check the function of the liquid propellant gas system	o

Maintenance and Service

Hako system maintenance I

The following maintenance work must be completed by an authorized Hako service center.

Activity	Interval
	Every 250 operating hours
Change the engine oil	o
Change the engine oil filter	o
Check the traction drive (forward and reverse drive, neutral position)	o
Check the main filter of the air filter	o
Check the engine and hydraulic system for leaks	o
Check the engine speed (idling and operating speed)	o
Check the tightening torque of the wheel bolts	o
Check the function of the parking brake and service brake	o

Maintenance and Service

Activity	Interval
	Every 250 operating hours
Check the hydraulic functions (hydraulic pump, working pump, motors and valves)	o
Check the antistatic chain	o
Check the electric system (starter battery, lighting, fuses, relays and control lamps)	o
Check the CO exhaust emission value (every six months)	o

Maintenance and Service

Hako system maintenance II

The following maintenance work must be completed by an authorized Hako service center.

Activity	Interval
	Every 500 operating hours
All maintenance work in accordance with Hako system maintenance I	o
Have the liquid propellant gas system checked annually, in terms of its proper condition, by a technical expert in accordance with §33, 37 of BGV D 34.	o

Maintenance and Service

Hako system maintenance III

The following maintenance work must be completed by an authorized Hako service center.

Activity	Interval
	Every 1000 operating hours
All maintenance work in accordance with Hako system maintenance I and II	o
Change the air filter safety cartridges	o
Change the hydraulic oil	o
Change the hydraulic oil filter	o
Change the brake shoes	o

Maintenance and Service

Hako system maintenance IV

The following maintenance work must be completed by an authorized Hako service center.

Activity	Interval
	Every 2000 operating hours
All maintenance work in accordance with Hako system maintenance I, II and III	o
Change the coolant in the cooling system	o
Change the hoisting cable of the side brush	o

5.4 Engine

The engine is located in the rear section of the vehicle and can be accessed optimally for maintenance and service work by means of a pivoting frame.

- 1 Dipstick
- 2 Cap
- 3 Oil filter
- 4 Draining hose of the oil sump

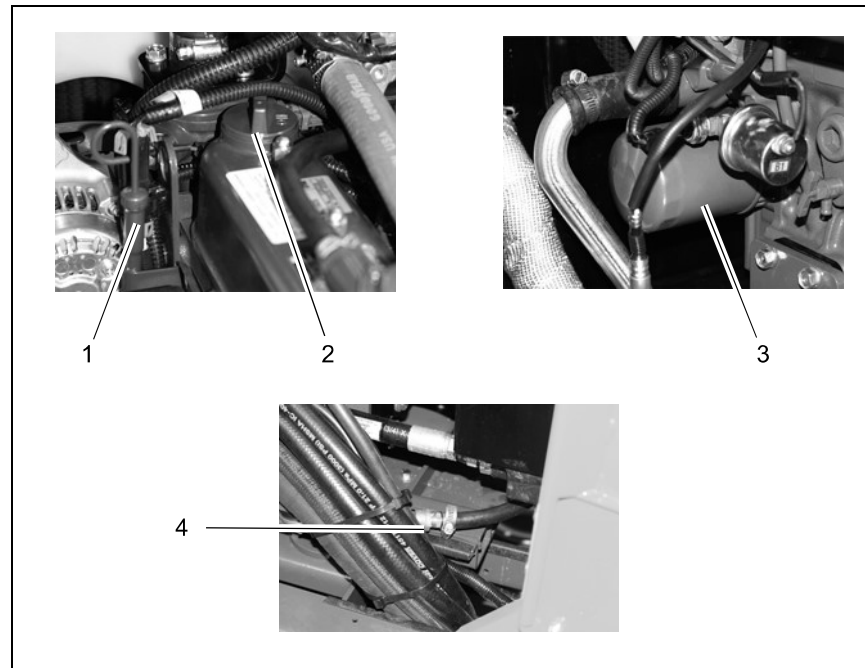


Fig.12

Maintenance and Service

- 5 Engine frame (pivoted out)
- 6 Lock on engine frame (with engine pivoted in)
- 7 Lock on the throttle
- 8 Throttle
- 9 Lock (with engine pivoted out)
- 10 Access door
- 11 Cooling system
- 12 Air filter

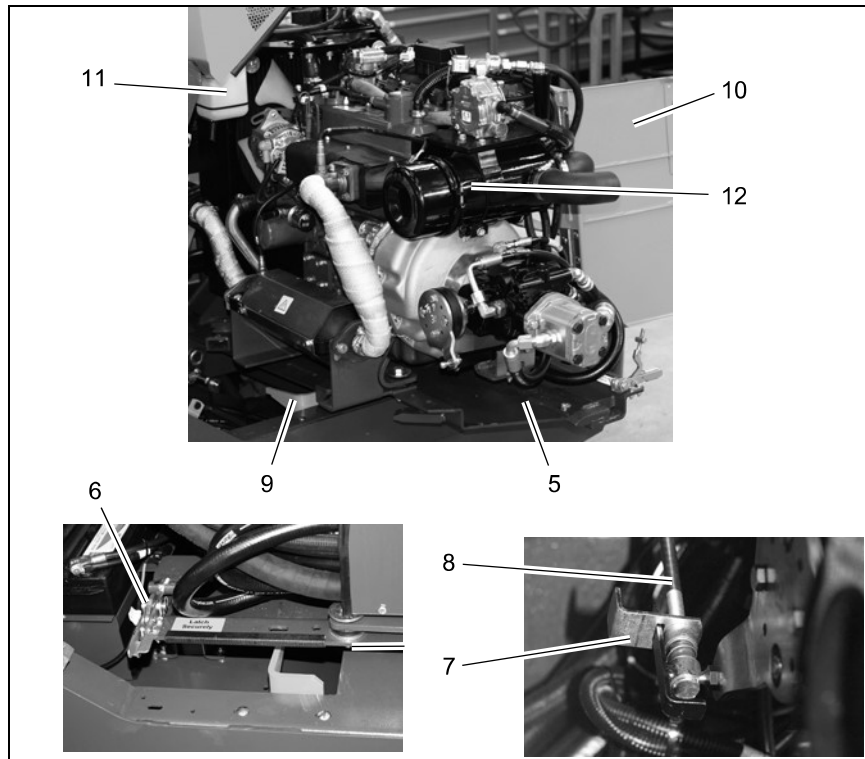


Fig.13

5.4.1 Opening the engine frame



Only open the engine frame when the engine has cooled down. Risk of burns!

1. Park the vehicle on a level surface with the engine at operating temperature. Turn the engine off and allow to cool down. Apply the parking brake.
2. Unlock the engine hood and pivot it up.
3. Swing open the engine access door (Fig. 13/10).
4. Release the lock on the throttle (Fig. 13/7) and unhook the throttle (Fig. 13/8).
5. Open the lock on the engine frame (Fig. 13/6) and pivot the engine frame (Fig. 13/5) to the side until it latches in place and is secured against pivoting back.
6. Pivoting the engine frame back is performed in the reverse sequence. Before the engine can be pivoted in, the lock (Fig. 13/9) must be released.



The engine cannot be started when it has been pivoted out (safety switch).

5.4.2 Refilling engine oil

Check the engine oil level with the oil dipstick (Fig. 12/1) every day. Refill engine oil as necessary or when the engine oil pressure control lamp lights up.



Only use the engine oil prescribed, refer to Technical Data.

1. Unlock the engine hood and pivot it up.
2. Pull the oil dipstick (Fig. 12/1) out and wipe it with a clean cloth. Insert the oil dipstick again.
3. Compare the oil level with the marking at the bottom end of the oil dipstick.
4. Remove the cap (Fig. 12/2).
5. Do not fill too much oil at one time. Allow the oil a few minutes to run into the oil sump. Then measure the oil level again.

6. Replace the cap (Fig. 12/2) and oil dipstick (Fig. 12/1).
7. Close the hood.
8. The engine control lamp must go out a few seconds after switching the engine on.

5.4.3 Changing the engine oil and oil filter

The engine oil must be changed initially after 50 operating hours and subsequently at least once a year in accordance with the maintenance schedule.



Pay attention to hot engine components and hot engine oil. Risk of burns!

1. Opening the engine frame refer to Section 5.4.1.
2. Place a suitable collecting vessel under the draining hose on the oil sump (Fig. 12/4).
Oil quantity with oil filter: 6.0 liters
Oil quantity without oil filter: 5.7 liters
3. Remove the drain plug from the draining hose (Fig. 12/4) and allow the engine oil to drain into the collecting vessel.
4. Disassemble the oil filter (Fig. 12/3) and install a new oil filter with a new sealing ring (tighten hand-tight).



Dispose of the waste oil and used oil filter according to the applicable environmental regulations!

5. Tighten the drain plug.
6. Fill the engine oil, refer to Section 5.4.2.

5.5 Air filter

The air filter (Fig. 14/1) is located at the front of the engine. The main filter (Fig. 14/4) and safety cartridge (Fig. 14/5) must be changed according to the maintenance schedule.

- 1 Air filter
- 2 Housing cover
- 3 Cap
- 4 Main filter
- 5 Safety cartridges

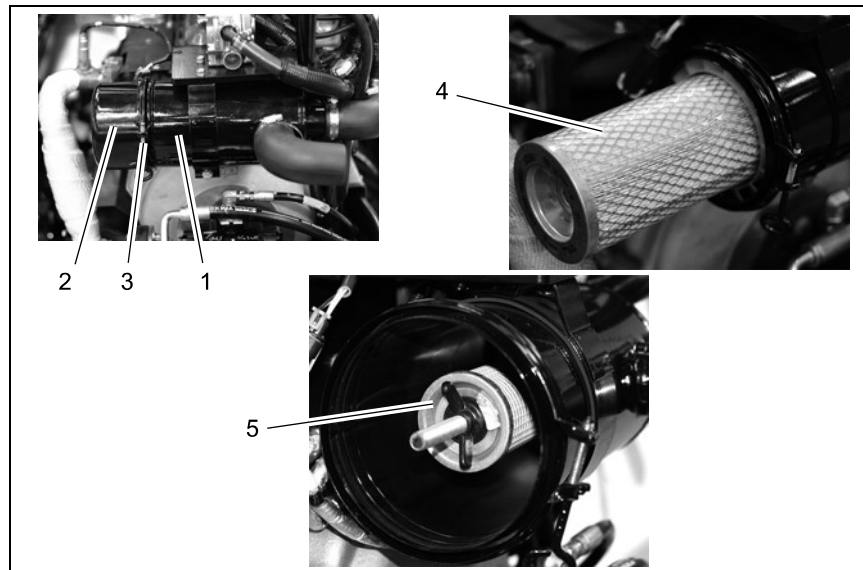


Fig.14

5.5.1 Disassembling the main filter

1. Open the engine frame, refer to Section 5.4.1.
2. Remove the fastener (Fig. 14/3) from the air filter (Fig. 14/1) and remove the housing cover (Fig. 14/2).
3. Remove the main filter (Fig. 14/4) from the housing.

5.5.2 Cleaning the main filter

1. Clean the housing cover (Fig. 14/2) on the inside with a moist cloth.
2. Blow the main filter (Fig. 14/4) clean from the inside towards the outside. Use compressed air to max. 3 bar.
3. Use a source of light to check the main filter for perforations.
4. Check the seals on the main filter for signs of damage.

5.5.3 Installing the main filter

1. Slide the main filter (Fig. 14/4) carefully back in the upper housing section, with the open side first.
2. Replace the housing cover (Fig. 14/2) ensuring it is fit correctly.
3. Close the fastener (Fig. 14/3) again.

5.5.4 Changing the main filter

The main filter (Fig. 14/4) must be changed in the case of damage or every 250 operating hours at the latest.

1. Disassemble the main filter, refer to Section 5.5.1.
2. Insert the new main filter.
3. Install the main filter, refer to Section 5.5.3.

5.5.5 Changing the safety cartridge



The safety cartridge (Fig. 14/5) must not be cleaned nor reused after being disassembled!

The safety cartridge must be replaced every 1000 operating hours at the latest.

1. Disassemble the main filter (Fig. 14/4), refer to Section 5.5.1.
2. Disassemble the safety cartridge (Fig. 14/5).
3. Insert a new safety cartridge.
4. Install the main filter, refer to Section 5.5.3.

5.6 Liquid propellant gas system (LPG)

- 1 Pressure hose
- 2 Fastening device
- 3 Extraction valve/Cylinder connection
- 4 LPG cylinder
- 5 Star knob
- 6 Bar

5.6.1 Changing the LPG cylinder



Before changing the LPG cylinder, observe the safety information in Chapter "Particular risks".



It is forbidden to change gas cylinders in garages or in underground areas. Vehicles with LPG systems must be parked safely (e.g. ensure sufficient ventilation!) When parking above ground level, pay attention to sufficient clearance from cellar entrances and windows, pits, light wells and such and close the extraction valve!

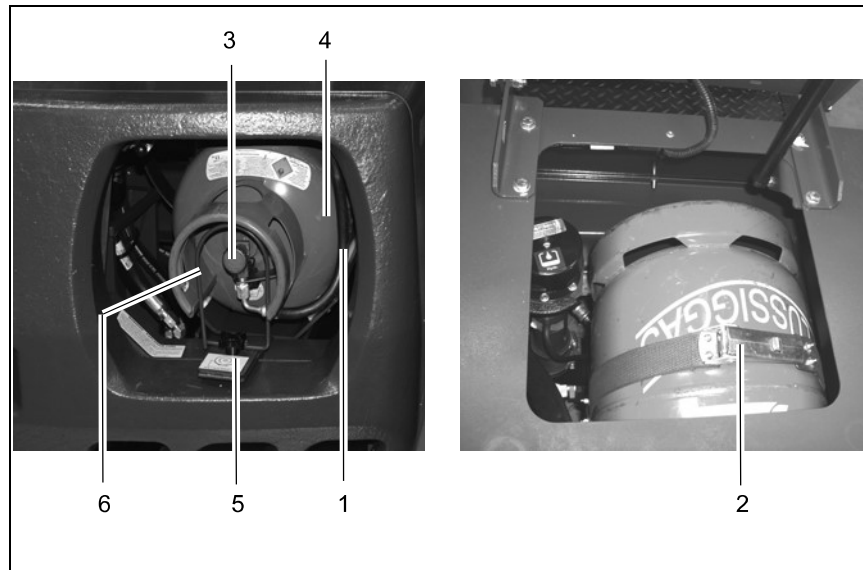


Fig.15

Maintenance and Service

- Park the vehicle on a level piece of ground and apply the parking brake.
- Close the extraction valve (Fig. 15/3) of the LPG cylinder from the driver's seat, wait until the engine stops and switch off the engine.
- Screw the pressure hose on the extraction valve (left-hand thread).
- Fix the LPG cylinder in place with the fastening device. Only drive the vehicle when the LPG cylinder has been secured properly!



The driver must remain seated on the driver's seat until the gas is cleared from the lines and the engine stops!

- Disconnect the pressure hose (Fig. 15/1) from the extraction valve (left-hand thread).
- Loosen and remove the star knob (Fig. 15/5) and then pivot the bar (Fig. 15/6) to the front.
- Loosen the fastening device (Fig. 15/2) of the LPG cylinder holder and remove the empty LPG cylinder (Fig. 15/4).
- Lay the new LPG cylinder in the holder.



The opening in the collar must point downwards because the gas is extracted from the liquid phase!

- Pivot the bar upwards and fix the star knob in place.

5.7 Cooling system

The coolant in the radiator (Fig. 16/3) is cooled by a fan (Fig. 16/2). If the coolant temperature is too high, it is indicated on the main operating panel.



Pay attention to rotating parts in the vicinity of the fan. Risk of injury!

- 1 Cap
- 2 Fan
- 3 Cooler
(left: hydraulic oil cooler
right: engine oil cooler)
- 4 Compensation tank
- 5 Drain plug

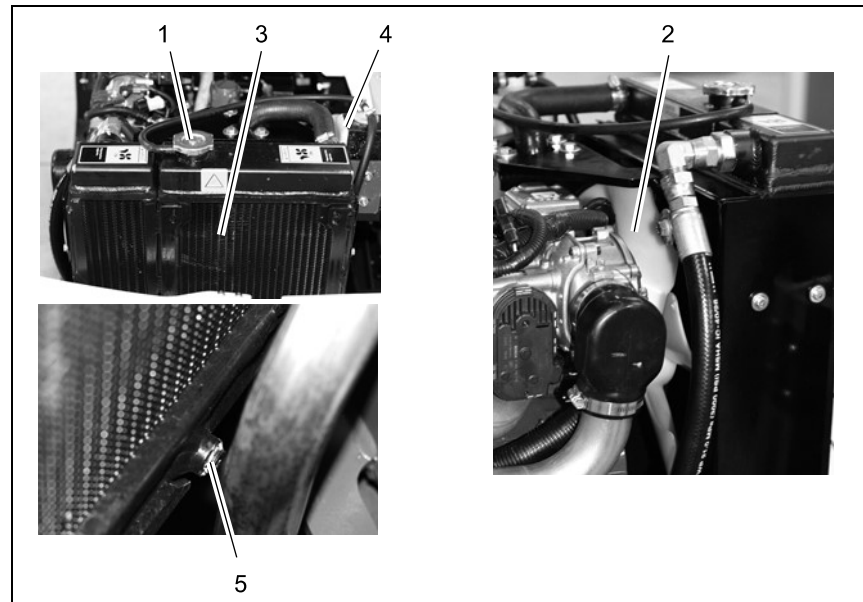


Fig.16

5.7.1 Cleaning the radiator

Check the radiator (Fig. 16/3) daily and clean as necessary. Dirt on the radiator ribs reduces the cooling capacity.



The radiator ribs are very thin and can be easily damaged!

1. Clean the radiator ribs with compressed air, blowing from the engine side outwards.

5.7.2 Refilling coolant



Never open the radiator when the engine is hot because, when it is, the cooling system is under high pressure. Risk of burns! Wear protective gloves!

Too little coolant reduces the cooling capacity. Check the coolant level weekly and refill as necessary.



Only use coolant on an ethylene glycol base in a ratio of 1:1 with water.

1. When the engine has cooled down, open the cap (Fig. 16/1) carefully.
2. Check the coolant level. The compensation tank (Fig. 16/4) should be filled by approx. 1/3 when the engine is cold. Fill slowly, if necessary.
3. Replace the cap.
4. Allow the engine to run for a few minutes.
5. Turn the engine off and allow to cool down.
6. Check the coolant level again and refill, if necessary.

5.7.3 Changing the coolant

The coolant must be changed every 2000 operating hours at the latest.

1. Place an appropriate collecting vessel under the drain plug (Fig. 16/5) of the radiator.
2. Open the drain plug and allow the coolant to drain off fully.
Coolant quantity: approx. 9.5 liters.



Dispose of the used coolant according to the applicable environmental regulations!

3. Close the drain plug again.
4. Refill fresh coolant, refer to Technical Data.
5. Replace the cap.
6. Allow the engine to run for a few minutes.
7. Turn the engine off and allow to cool down.
8. Check the coolant level again and refill, if necessary.

5.8 Hydraulic system



Work on the hydraulic system may only be carried out by technical experts and correspondingly trained personnel! Hydraulic oil under high pressure can cause severe injuries! All lines carrying hydraulic fluids must be depressurized! Cloudy hydraulic oil indicates that water or air has entered into the hydraulic system! Shortages of hydraulic oil or incorrect hydraulic oil leads to damage to the hydraulic system!

- 1 Cap with air filter and oil dipstick
- 2 Hydraulic oil tank
- 3 Drain plug
- 4 Hydraulic oil filter

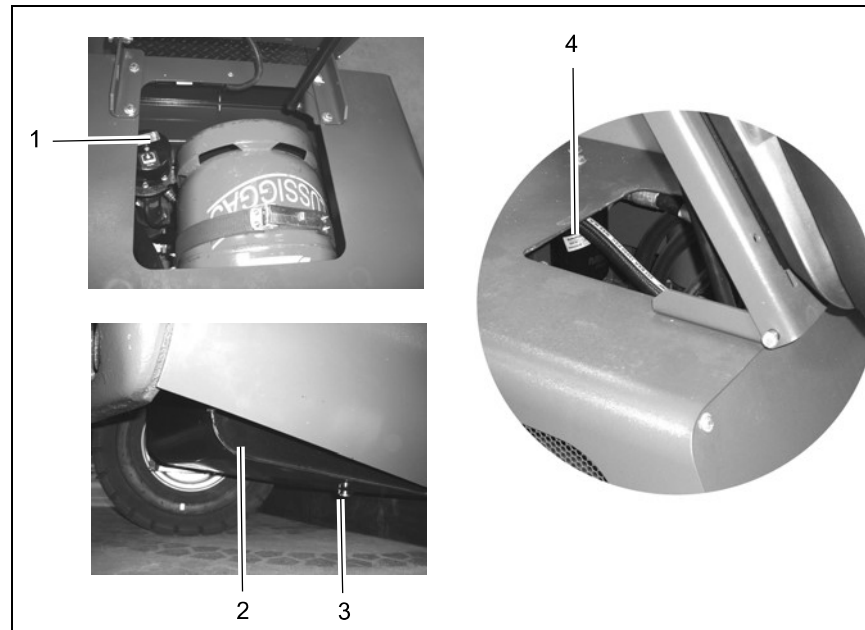


Fig.17

5.8.1 Filling hydraulic oil



Only use the hydraulic oil prescribed, refer to Technical Data.

1. Pivot the seat up.
2. Remove the cap (Fig. 17/1) and wipe the oil dipstick with a clean cloth. Replace the dipstick.
3. Compare the oil level with the marking at the bottom end of the oil dipstick.
4. Do not pour in too much oil at one time. Allow the oil a few minutes to run into the hydraulic oil tank. Then measure the oil level again.
5. Replace the cap.
6. Pivot the seat back down.

5.8.2 Changing the hydraulic oil

The hydraulic oil must be changed every 1000 operating hours.



Take the utmost care when draining hot hydraulic oil. Risk of burns!

1. Park the vehicle on an even surface and lower the dirt hopper. Switch the

engine off and apply the parking brake.

2. Place an appropriate collecting vessel under the drain plug (Fig. 17/3) of the hydraulic oil tank (Fig. 17/2). Oil quantity: 23 liters.
3. Remove the drain plug and drain the hydraulic oil into the collecting vessel.



Dispose of the used hydraulic oil according to the applicable environmental regulations!

4. Insert the drain plug with a new seal ring and refill hydraulic oil, refer to Section 5.8.1.
5. Start the engine and, when running at a slow speed, put all the work functions into operation and raise and empty the dirt hopper several times. Switch the engine off again.
6. Refill more hydraulic oil, if necessary. Check the hydraulic system for leaks.

5.8.3 Changing hydraulic oil filter

The hydraulic oil filter must be changed for the first time after 50 operating hours and subsequently every 1000 operating hours.



Take the utmost care when draining hot hydraulic oil. Risk of burns!

1. Park the vehicle on an even surface and raise the dirt hopper. Switch the engine off and apply the parking brake.
2. Unscrew the hydraulic oil filter (Fig. 17/4).



Dispose of the used hydraulic oil filter according to environmental regulations!

3. Install new hydraulic oil filter with new sealing rings (tighten hand-tight).
4. Start the engine and switch it off again. Check the hydraulic system for leaks.

5.9 Dirt hopper

- 1 Larger waste flap
- 2 Filter housing cover
- 3 Mounting frame for filters
- 4 Dust filter (2x)
- 5 Unlocking mechanism for filter housing cover
- 6 Plug connection for shaking motor (2x)
- 7 Dirt hoppers
- 8 Shaking motor

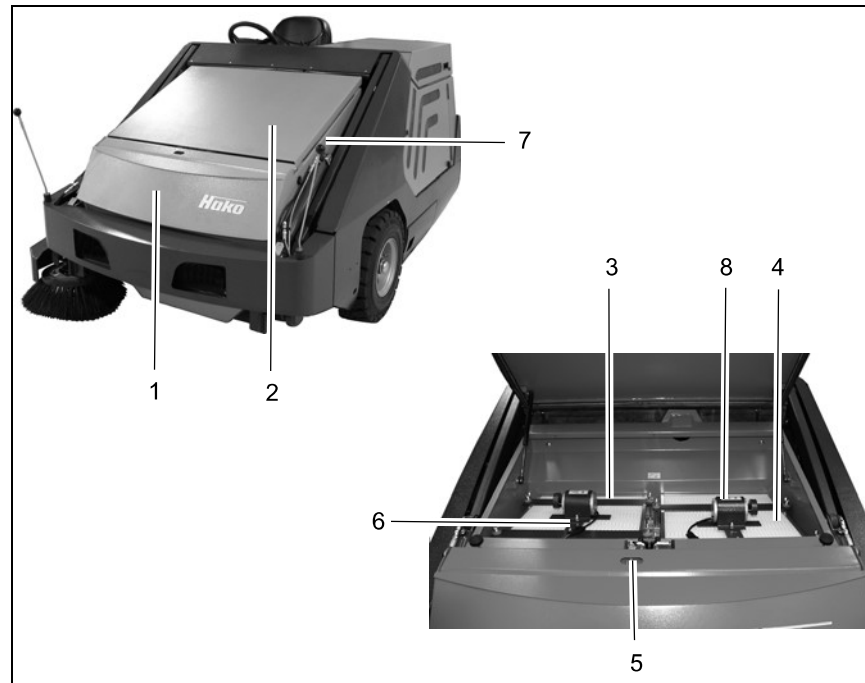


Fig.18

5.9.1 Cleaning the dust filter

The two dust filters (Fig. 18/4) are located under the filter housing cover (Fig. 18/2). The fine dust swirled up by the cylindrical broom is drawn into the filter element by the suction fan. Check the dirt in the dust filter (Fig. 18/4) on a weekly basis. Clean the dust filter and activate the shaking process as necessary. In this case, observe the control lamp for filter soiling in the operating panel.



Clean the dust filter outdoors and wear a dust mask when doing so! Dispose of the dust according to the applicable environmental laws!

1. Park the vehicle on a level area of floor. Switch the engine off and apply the parking brake.
2. Actuate the unlocking mechanism for the filter housing cover (Fig. 18/5) and pivot the filter housing cover (Fig. 18/2) up.
3. Loosen the wing nuts on the mounting frame (Fig. 18/3).

4. Disconnect the plug connections from the shaking motor (Fig. 18/6) and remove the mounting frame (Fig. 18/3) together with the dust filters (Fig. 18/4).
5. Remove the dust filters (Fig. 18/4).
6. Set the dust filters down on their edge (short side) and tap them so that they tip over. Repeat the process from both edges several times.
7. Install the dust filters again in the reverse sequence.

5.9.2 Changing the dust filter

1. Check the dust filter (Fig. 18/4) on a weekly basis for signs of damage. Change the dust filter, if necessary.
2. Park the vehicle on a level area of floor. Switch the engine off and apply the parking brake.
3. Actuate the unlocking mechanism for the filter housing cover (Fig. 18/5) and pivot the filter housing cover (Fig. 18/2) up.
4. Loosen the wing nuts on the mounting frame (Fig. 18/3).
5. Disconnect the plug connections from the shaking motor (Fig. 18/6) and remove the mounting frame (Fig. 18/3) together with the dust filters (Fig. 18/4).
6. Remove the dust filters (Fig. 18/4).
7. Install the new dust filters in the reverse sequence.
8. Actuate the switch (Fig. 10/14) to check the shaking device.

5.9.3 Emptying the dirt hopper

1. Drive the vehicle to the waste container.
2. Shake the dust filters by actuating the shaking switch (Fig. 10/14).
3. Use the accelerator to position the vehicle so that the distance between the vehicle and waste container or garbage truck is sufficient to allow the dirt hopper (Fig. 18/7) to be raised.
4. Use the joystick (Fig. 10/1) to raise the dirt hopper (Fig. 18/7) (Position 3) until it is above the level of the container.
5. Use the accelerator to drive the vehicle forwards, slowly and carefully, until the dirt hopper is positioned suitably to be emptied in the container.
6. Move the joystick (Fig. 10/1) to open the dirt hopper flap (Position 5).
7. Move the joystick (Fig. 10/1) to close the dirt hopper flap (Position 2).
8. After emptying the vehicle, drive it a short distance away from the waste container.
9. Move the joystick (Fig. 10/1) to lower the dirt hopper again (Position 4).



It is very dangerous to drive the vehicle longer distances with the dirt hopper raised. It is only permitted to drive the vehicle with the dirt hopper raised to position it over the waste container.

5.10 Side brush

- 1 Side brush
- 2 Adjusting nut with counternut
(to alter the angle)
- 3 Locking plate
- 4 Adjusting bolt
(to alter the height)

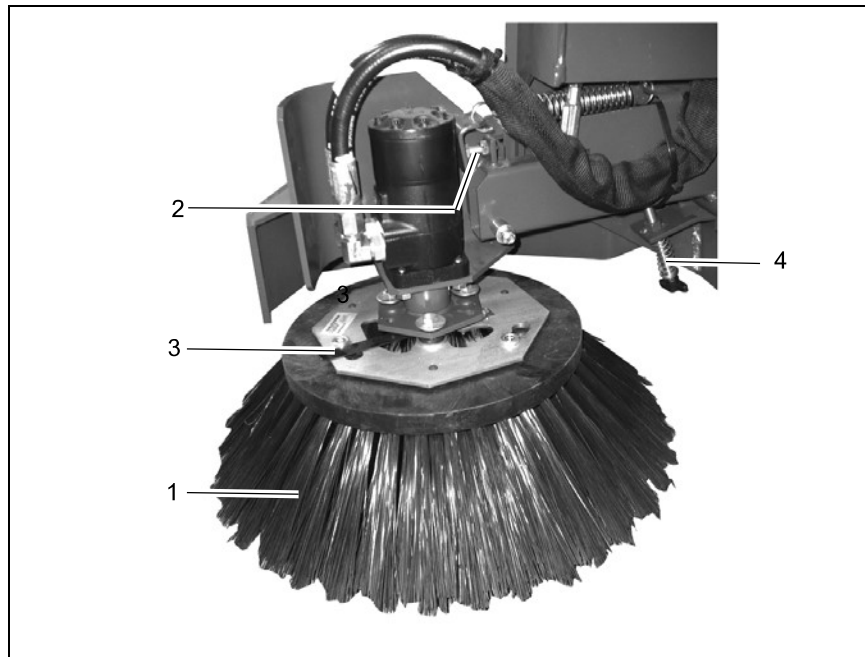


Fig.19

5.10.1 Adjusting the angle of the side brush

The angle of the side brush (Fig. 19/1) is set at the factory and only needs to be adjusted following repairs.

1. Park the vehicle on a level area of floor. Switch the engine off and apply the parking brake.
2. Loosen the counternut (Fig. 19/2).
3. Adjust the angle of the side brush to approx. 3° to 5° with the adjusting bolt and lock the adjusting nut again with the counternut (Fig. 19/2).

5.10.2 Side brush wear compensator

Check the side brush (Fig. 19/1) every week for signs of wear. In the event of wear or after the side brush has been changed, proceed as follows to complete the necessary adjustments:

1. Park the vehicle on an even surface and raise the dirt hopper. Switch the engine off and apply the parking brake.
2. Adjust the height of the side brush (Fig. 19/1) using the adjusting bolt (Fig. 19/4).
3. Start the vehicle and lower the dirt hopper.

Adjusting instructions: side brush: 11 to 3 o'clock position (Fig. 20/X)

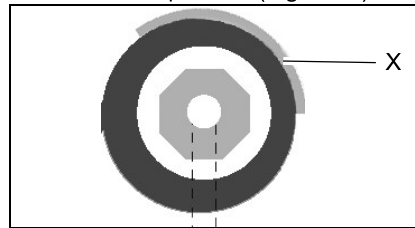


Fig.20

5.10.3 Changing the side brooms

When the brushes have worn to a bristle length of 8 cm or less, the side brushes (Fig. 19/1) must be changed. The side brushes can be detached easily thanks to the quick-release system.

1. Park the vehicle on an even surface and raise the dirt hopper. Switch the engine off and apply the parking brake.
2. Raise the locking plate (Fig. 19/3), turn the side brush (Fig. 19/1) to the right and remove it.
3. Insert a new side brush (Fig. 19/1) and fix in place with the locking plate (Fig. 19/3).
4. Adjust the side brush, refer to Section 5.10.2 and refer to Section 5.10.1.
5. Start the vehicle and lower the dirt hopper.

5.11 Cylindrical broom

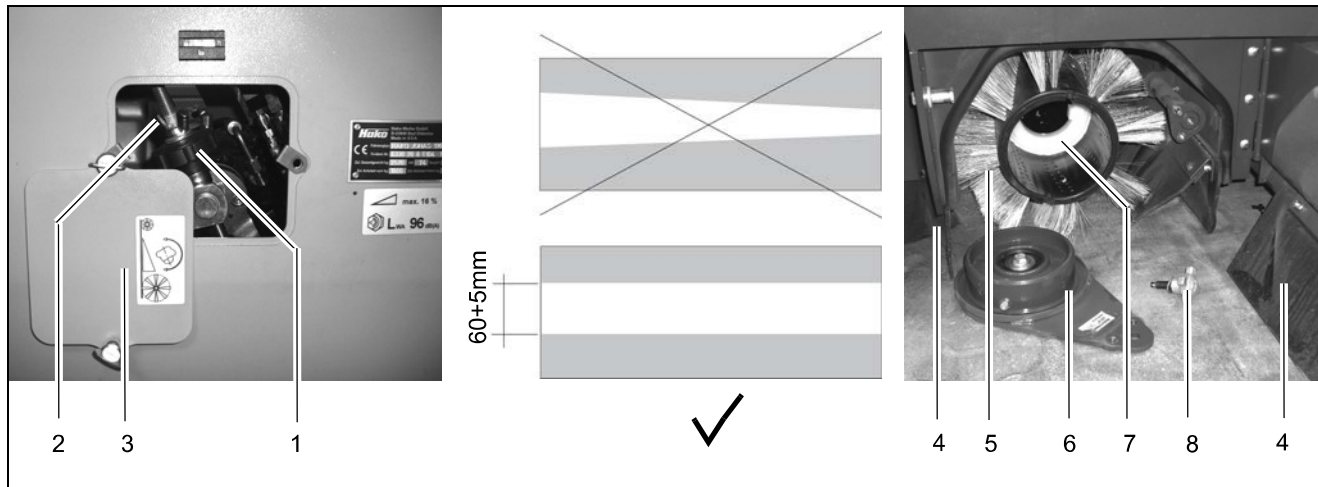


Fig.21

- 1 Adjusting bolt
- 2 Wing nut
- 3 Cover plate
- 4 Cylindrical broom apron
- 5 Cylindrical broom
- 6 Cylindrical broom holder
- 7 Catch
- 8 Star knob

5.11.1 Adjusting the cylindrical broom wear compensator

Check the cylindrical broom (Fig. 21/5) every week for signs of wear. In the event of wear or after the cylindrical broom has been changed, proceed as follows to complete the necessary adjustments:

1. Lower the cylindrical broom onto a smooth floor and allow to rotate for a short time while the vehicle has stopped.
2. Raise the cylindrical broom and drive the vehicle forwards a little.
3. Switch the engine off and apply the parking brake.
4. Check the degree of wear. When setup correctly, the cylindrical broom must produce a parallel sweeping track, 60 mm wide, on the floor, refer to the diagram in Fig. 21.

5. Remove the cover plate (Fig. 21/3) and loosen the wing nut (Fig. 21/2). Adjust the sweeping pattern using the adjusting bolt (Fig. 21/1):
 - Turn the adjusting bolt clockwise: smaller sweeping pattern
 - Turn the adjusting bolt counter-clockwise: larger sweeping pattern
6. Lock the adjusting bolt with the wing nut.

5.11.2 Setting the cylindrical broom parallel

The cylindrical broom (Fig. 21/5) is set parallel at the factory. If the sweeping pattern is not parallel, the adjusting bolt must be used to correct it. The adjusting bolt is located underneath the engine behind the cylindrical broom.

The adjustment must be completed at an authorized Hako service center.

5.11.3 Changing the cylindrical broom

In the case of wear resulting in a bristle length of at least 35 mm, the cylindrical broom (Fig. 21/5) must be changed.

The cylindrical broom can be accessed from the left-hand side (viewed facing the front) and can be disassembled as follows:

1. Park the vehicle on a level area of floor.
2. Lower the cylindrical broom and set the control lever for sweeping operation (Fig. 10/8) to Position 9.
3. Switch the engine off and apply the parking brake.
4. Open the left-hand broom door.
5. Remove the star knob (Fig. 21/8) and pull out the cylindrical broom holder (Fig. 21/6).
6. Pull out the cylindrical broom (Fig. 21/5).
7. Install the new cylindrical broom in the reverse sequence. The catch (Fig. 21/7) on the cylindrical broom (on the inside) must latch on the drive.
8. When installing the cylindrical broom holder, the two guide pins must also

engage in the slots in the cylindrical broom.

9. Adjust the cylindrical broom, refer to Section 5.11.1 and refer to Section 5.11.2

5.11.4 Changing the cylindrical broom apron

The cylindrical broom aprons (Fig. 21/4) on the side doors and in space at the rear of the cylindrical broom must be checked weekly for signs of wear. Replace worn cylindrical broom aprons immediately.

1. Park the vehicle on a level area of floor. Switch the engine off and apply the parking brake.
2. Open the broom doors.
3. Loosen the holding plates, nuts and hexagon head bolts and remove the cylindrical broom apron.
4. Install the new cylindrical broom aprons in the reverse sequence.
5. During installation, set the distance of the cylindrical broom aprons to the floor to approx. 3 mm at the rear and approx. 2 mm at the sides.

5.11.5 Adjusting the cylindrical broom aprons

In the case the cylindrical broom aprons (Fig. 21/4) become worn and their distance to the floor is greater than 3 mm at the rear and 2 mm at the sides, the cylindrical broom aprons must be adjusted as follows:

1. Park the vehicle on a level area of floor. Switch the engine off and apply the parking brake.
2. Open the broom doors.
3. Loosen the nuts and hexagon head bolts slightly and pull the cylindrical broom aprons down until there is a ground clearance of 3 mm at the rear and 2 mm at the sides.
4. Tighten the nuts on the hexagon head bolts.

5.12 Tires

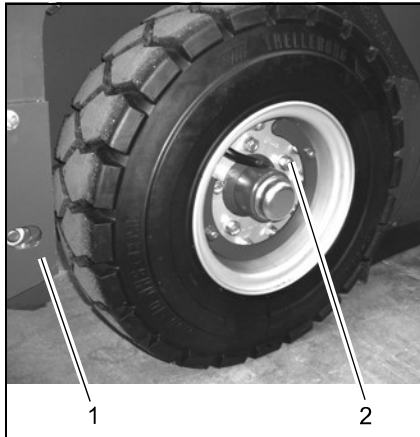


Fig.22

5.12.1 Checking tire wear

Check the tires weekly for signs of wear and tread depth.

5.12.2 Disassembling the tires



Work on the wheels may only be carried out by technical experts and correspondingly trained personnel!

1. Park the vehicle on an even surface and secure against rolling away.
2. Switch the engine off and remove the ignition key.
3. Bring the jack into position under the frame (Fig. 22/1).
4. Slightly loosen the five inner flange nuts (Fig. 22/2) in order to remove the tire from the vehicle.
5. Raise the vehicle with the jack.
6. Remove the flange nuts.
7. Remove the tires with rims.



It concerns center split rims. The tires may only be removed from the rims after being disassembled from the vehicle and completely deflated of air.

5.12.3 Fitting the tires



Work on the tires may only be carried out by technical experts and correspondingly trained personnel!

1. Remove the old tire from the rim and fit the new tire.
2. Lower the vehicle with the jack.
3. Tighten the flange nuts at a torque of 135 Nm.
4. Check the torque after approx. 5 operating hours.

5.13 Brakes



Work on the brake system may only be carried out by technical experts and correspondingly trained personnel!

The service brake and parking brake must be checked after the first 50 operating hours and subsequently after every 250 operating hours in use. The brake shoes must be changed every 1000 operating hours.

5.14 Electronics

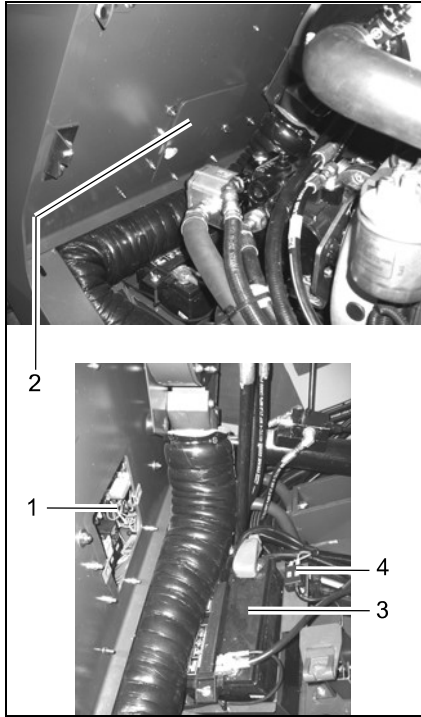


Fig.23

5.14.1 Changing the fuses

The fuse box (Fig. 23/1) is located under a cover (Fig. 23/2) above the battery in the engine compartment. Remove the wing bolts and the cover. The individual circuits are protected by fuses.

Other fuses are located in the engine compartment (Fig. 23/4). The fuses for the engine are in a box on the engine (Fig. 24).

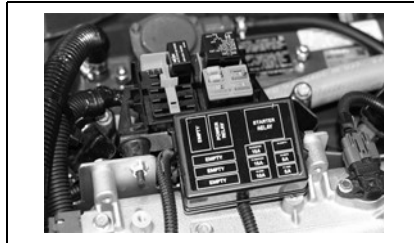


Fig.24

5.14.2 Changing the battery



The negative pole of the battery (Fig. 23/3) must be disconnected from the battery before the positive pole. This prevents short circuiting and injuries!



The battery can only be changed when the engine has been pivoted out, refer to Section 5.4.1 Opening the engine frame.

1. Park the vehicle on a level area of floor. Switch the engine off and apply the parking brake.
2. First disconnect the negative cable and then the positive cable.
3. Remove the battery.
4. Insert the new battery.
5. First disconnect the positive cable and then the negative cable.

5.14.3 Electrical installation

- F0 Main fuse (50A) (Fig. 23/4)
- F1 Key switch (25A)
- F2 Seat unit (5A)
- F3 Electromagnet (start) (10A)
- F4 Fittings (5A)
- F5 Roller, hopper (10A)
- F6 Side brush, right (4A)
- F7 Side brush left (4A), option
- F8 Hazard lights (10A), option
- F9 Lighting, front (15A), option
- F10 Brake light (7.5A), option
- F11 Rear light, left (5A), option
- F12 Rear light, right (5A), option
- F13 Preheating (40A)
- F14 Multifunction display (4A), option
- F15 Solenoid throttle (5A)
- F16 Connection, cab (7.5A), option
- F17 Shaking motor (25A)
- F18 Fuse (40A), option (Fig. 23/4)
- K1 Relay, starter lock
- K3 Relay, side brush, right
- K4 Relay, side brush, left, option
- K5 Relay, shaking motor
- K6 Relay, RTR hopper, stop
- K7 Relay, RTR hopper, stop
- K10 Relay, indicator relay
- A1 Relay, seat switch control unit
- A2 Seat switch, preheater relay

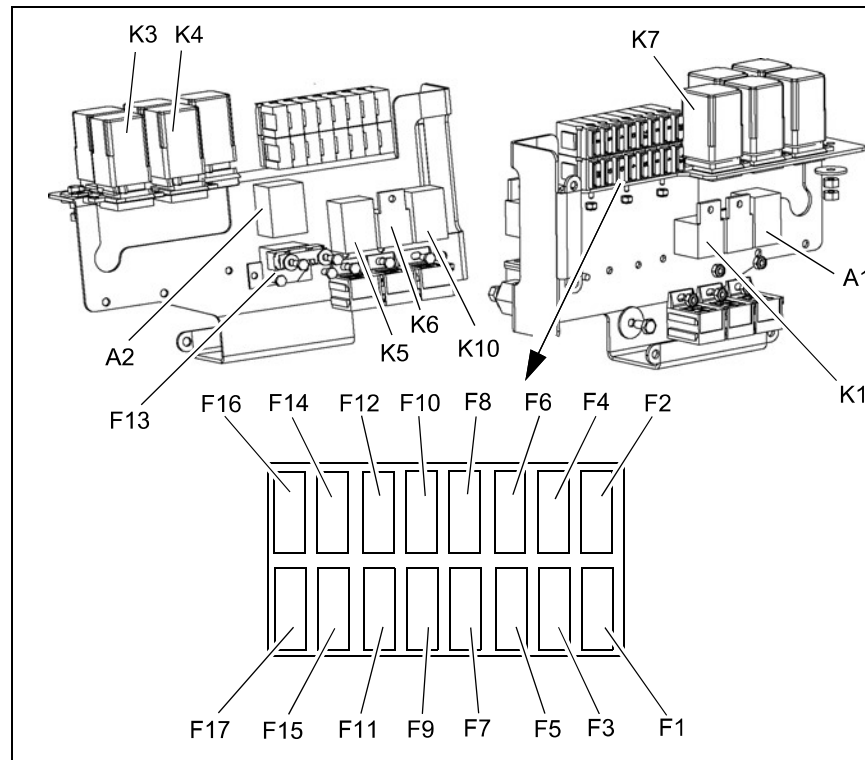


Fig.25

Electric system, engine

- F0 Main fuse (60A)
- F1 Supply voltage (5A)
- F2 Electronic control module (10A)
- F3 DEPR (5A)
- F4 Ignition (15A)
- F5 Empty
- F6 Starter (15A)
- K1 Start release relay
- K2 Starter relay

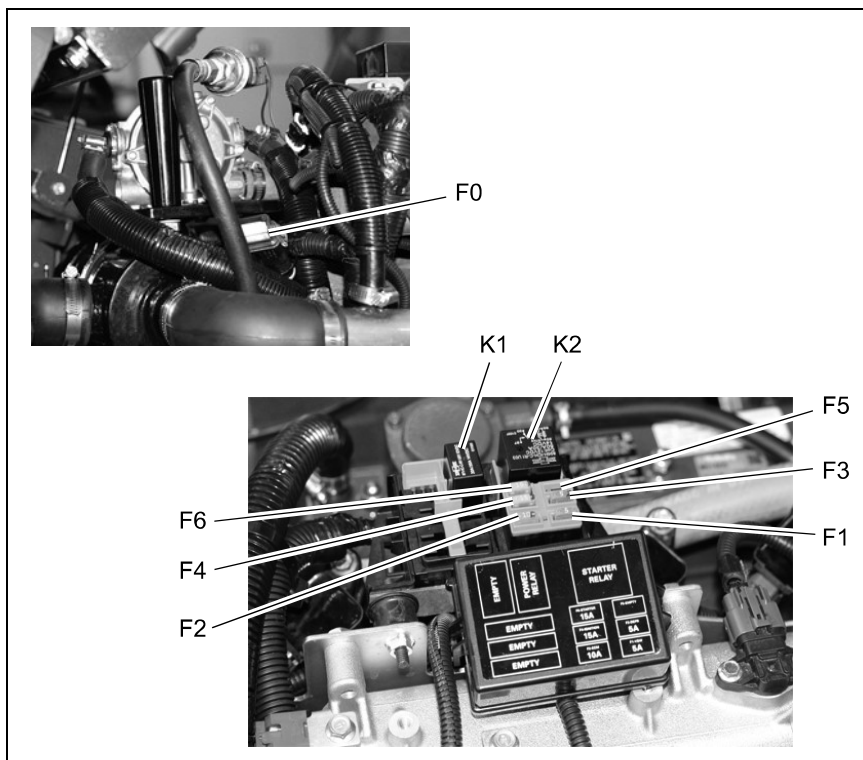


Fig.26

5.14.4 Changing the antistatic chain

Change the antistatic chain (Fig. 27/1) as follows:

1. Remove the screw in the antistatic chain.
2. Fix the new antistatic chain in place with the screw.



Fig.27

5.15 Greasing points

The greasing points are located on:

- the lifting attachment of the dirt hopper
 - right-hand side (2x) (Fig. 28/2)
 - right-hand side (2x) (Fig. 28/1)
- the drive (Fig. 28/3 and 4)

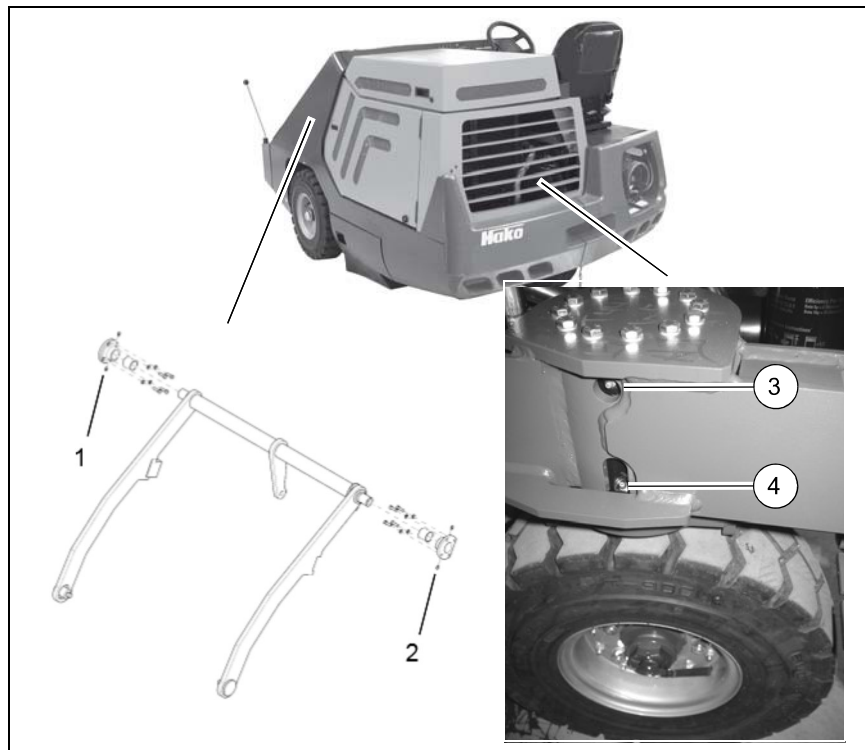


Fig.28

Maintenance and Service

5.16 Special equipment and replacement demands

Name	Description	Order no.
Cab safety roof	Hako-Jonas 1900 production series	6345
Side brush, left	To increase the sweeping width to max. 1930 mm	6343
Flashing beacon	For assembly on a cab safety roof or cab	6305
Flashing beacon	On a pole	6350
Lighting system	To light the working area (in accordance with StVZO - German road traffic licensing regulations)	6354
Working lights	Only in connection with the comfort driver's cab	6351
Spare cylindrical broom	With steel wire and fiber/arenga mixture, standard bristles	6363
Spare cylindrical broom	With PA bristle pattern, soft bristles (for particulate matter and light dirt)	6360
Spare cylindrical broom	With PA bristle pattern, hard bristles (for heavy waste)	6362
Spare side brush	PP bristles, black, standard	6355
Spare side brush	PA bristles, white	6358

EC Declaration of Conformity (corresponds to EC Directive 2006/42/EC)

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

declares that
the product

Hako-Jonas 1900 LPG
Type: 6330.30

to which this declaration relates, conforms to the relevant provisions of the safety and health requirements stipulated in EC Directive 2006/42/EC and is in accordance with 2014/30/EC.

Reference was made to the following standards and/or norms and/or technical specifications to ensure proper implementation of the safety and health requirements in the EU Directive:

EN 60335-2-72
EN 55012
EN 61000-6-2

Bad Oldesloe, 01.04.2016



Dr. Rainer Bavendiek
Development Manager

Name of the authorized person who compiles technical documents for Hako:

Ludger Lüttel



Advanced Technology for a Cleaner, Better Environment

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