

***Hako***

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# Instruction Manual

**Hako-Citymaster 90 (1142)**

## Introduction

### **Preface**

Dear customer, It is our desire that the good characteristics of the Hako-Citymaster 90 should justify the confidence you demonstrated by making this purchase.

Prior to the first use, read the chapter "Safety Information" carefully as this will ensure safe operation of the machine. Your own safety, as well as the safety of others, depends to a great extent on how the machine is moved and operated. Therefore, this operation and maintenance manual must be read and understood prior to the machine being used for the first time.

The manual provides valuable information about operation, service and maintenance. The warning symbols as used in this manual identifies items relevant to safety. Please observe the safety provisions (see chapter "Safety Information"). Your authorized Hako dealer will be pleased to answer further questions regarding the machine or the operation and maintenance manual.

Please be advised explicitly that we cannot accept any legal issues out of the contents of this manual. If repair work has to be performed make sure that only genuine spare parts are used; only genuine spare parts may guarantee a dependable machine. We reserve the right for technical improvement..

Valid as of: April 2003

**Hako-Werke GmbH**  
**D-23843 Bad Oldesloe**  
**Hamburger Str. 209-239**  
**Telefon ++49 (04531) 8060**

### **Proper use**

The Hako-Citymaster 90 is designed exclusively for sweeping market places, parking grounds footpaths and other roads and paths such as collecting dry and moist matters under normal traffic and weather conditions. Using the machine beyond this scope of application will be deemed improper use; The manufacturer cannot be held liable for consequential damages; the user alone bears the risk. The sweeper

is not suitable for collecting toxic, combustible or other matters which are hazardous to health. The term of proper use also includes operation, maintenance and repair work to be performed in compliance with the manufacturer's specifications. The Hako-Citymaster 90 may only be used by persons that are familiar with the machine and aware of possible hazards involved. The applicable Accident Prevention Regulations and further regulations in vigour concerning aspects of safety and working medicine will have to be complied with. If modifications to the machine are made in absence of the manufacturer's prior consent, the latter cannot be held liable for damage resulting from such unauthorized modification.

## Introduction

### Notes on warranty

The terms of the sales contract apply. Damages are not subject to warranty if they are due to non-compliance with the maintenance and service provisions. The maintenance work has to be performed by an authorized Hako service center and confirmed in the "Maintenance certificate" which is the warranty document.

The following is excluded from warranty: fuses, natural wear, damages caused by overload, inexpert handling and unauthorized modification of the machine. Moreover, any claim for warranty cannot be accepted if damages of the machine are caused by fitting parts or accessories without Hako's prior and explicit consent or by non-compliance with the maintenance instructions.

### Acceptance of the machine

Upon arrival, check machine for possible damages in transit. For refund of such damage, have the Deutsche Bahn AG or your freight forwarder confirm such damage. Mail notification and waybill to:

**Hako-Werke GmbH**

**Hamburger Strasse 209-239  
23843 Bad Oldesloe**

### Regulations for Approval

According to §18 of the German Motor Vehicle Construction and Use Regulations (StVZO), the Hako-Citymaster 90 is an automotive machine. The manufacturer supplies the expertise required for type approval. On the base of this expertise, the local approval authority submits the valid type approval.

Due to the maximum designed speed of less than 20 km/h a license plate is not required.

According to the German Motor Vehicle Construction and Use Regulations (StVZO), the machine has to be equipped with first aid kit, warning triangle and the type approval certificate when being used on public roads, paths and places. The Hako-Citymaster 90 is subject to the regular main inspection according to § 29 of the German Motor Vehicle Construction and Use Regulations (every 24 months).

Any modification carried out at the Hako-Citymaster 90 and having an

influence on the type approval specifications and are not indicated there will render the type approval invalid. Before receiving a new type approval, the machine has to be presented to an authorized expert for issue of new expertise. This expertise turns type approval after being stamped by approval authority.

### Driving Licence

According to the Driving Licence Act, any person who is driving a vehicle running at a construction-defined maximum speed of 6 km/h or more on, public roads, paths and places has to hold a valid driving licence. A driving licence of the class L is required for driving the Hako-Citymaster 90 (automotive machine up to a speed of 25 km/h).

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
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## Safety information

### 1 Safety information

#### 1.1 Safety and Warning Symbols

All paragraphs in this manual referring to your personal safety, the safety of your machine and the environment protection are attributed one of the following warning symbols:

Symbol	Hazardous for ...	Description
Safety Provisions 	persons and goods	Safety Provisions in dangerous situation caused by misuse inaccurate adherence of instructions or prescribed work routine.
CAUTION 	the machine	important information on handling the machine in order to maintain operability.
Ecological hazard 	the environment	due to use of substances representing an inherent danger to health of environment

## Safety information

### 1.2 General Provisions

- Apart from the provisions contained in this instruction manual, the general safety provisions and the accident prevention regulations as imposed by law have to be complied with.
- Before taking your machine into operation, carefully read the instruction manual as well as other separate instructions for accessories or attached implements and comply with all points mentioned there during work.
- Persons being trained by qualified Hako technicians only are authorised to operate, service and repair the machine.
- You are advised to thoroughly study the safety instructions since precise knowledge only helps avoiding errors during operation of the machine and thus guarantee faultless usage of the machine.
- The operating instructions have to be at hand at the place of use of the machine, and therefore have to be kept readily available at the machine.
- When selling or letting the machine for rent, hand out these documents

to the new owner/operator and have the transfer certified!

- The warning and instruction plates attached to the machine contain valuable advice about safe operation. Immediately replace incomplete or illegible labels.
- As far as safety standards are concerned, spare have to equal genuine spare parts!

### 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 essenti-

al to pay attention to third parties, especially children.

- The vehicle is not suitable for clearing up hazardous, inflammable or explosive fluids, dust or substances.
- It is forbidden to use the vehicle in 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 into 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 and mirror so that you have a perfect view of the front and rear path of travel and working area!
- 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!
- 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 clo-

## Safety information

- sed rooms! Risk of poisoning!
  - It is forbidden to transport people on the vehicle!
  - The driving speed must always be adapted to the ambient conditions and load status. 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 approved gross total weight and permissible axle loads must never be exceeded. Check the fill level of the sweepings container at frequent intervals.
  - In the case of impaired visibility, particularly when reversing the Hako-Citymaster 90, it is recommended to have someone who can guide the driver with the necessary signals. The person giving the signals must always remain in the driver's field of vision.
  - Switch off the engine and wait for the suction hose to stop working when clearing blockages in the suction hose or connecting the hand-held suction hose (option). The suction hose must then be fixed back on the suction turbine fittings properly.
  - Before raising or lowering the sweepings container, ensure that there are no persons, animals or items in the working area.
  - When the vehicle is being transported on public roads, the working lights must be switched off and the circular brushes and vacuum nozzle raised fully to their transport position.
  - The towing speed may be maximally 2 kph and the towing time 30 minutes. Towing distance = 1 km.
  - Attachment devices, e.g. hand-held suction hose (available as an option), may only be connected to the connection fittings intended for them.
  - A mobile phone may only be used when the vehicle has been stopped.
- ### 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.
  - The vehicle must be switched off prior to cleaning or servicing it or to replacing parts.
  - It is not permitted to clean the vehicle with a pressure washer or steam blaster.
  - Only complete maintenance work via access through the doors in the side panels.
  - If the Hako-Citymaster 90 is jacked up with a jack, it must be properly supported.
  - No persons may be on the Hako-Citymaster 90 when it is jacked or raised.
  - Do not remove or change tires or re-



## Safety information

pair 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.

- 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.
- 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.
- It is absolutely essential to fix the articulated steering with the locking strap before being loaded on a vehicle or trailer for transport or for maintenance and repair work, refer to Section 5.4.

### 1.4.1 Fitting of Electric Devices

The machine has been equipped with electronic parts and components whose function may be influenced by electromagnetic radiation of other systems. Such influence may involve personal hazards if the following safety provisions are not complied with: Before subsequent fitting of electric or electronic devices and/or components connected to the on-board system, the user is responsible to check whether the installation causes interferences with the vehicle's standard electronic circuit or other components. In the first place, make sure that the

subsequently fitted electric and electronic components comply with the applicable version of the EMC regulation 89/336/EEC and its revisions and be marked CE.

The following requirements have to be met in addition when subsequently fitting mobile communication systems (e.g. transceivers, mobile phones):

- Fitting of devices with approval by the applicable national authorities (e.g. for Germany the BZT licence) is admitted only.
- The items have to be installed in a firm place.
- Use of handheld or mobile systems inside the vehicle will require firm installation of an external antenna.
- The transmitter module is to be installed in adequate distance from the vehicle's electronic circuits.
- When installing the antenna, establish a good contact between antenna and vehicle ground.

### 1.5 Particular risks Safety equipment

- Never operate the Hako-Citymaster

## Safety information

90 without the appropriate, effective safety equipment. (This includes all the paneling sections and the side panel doors!)

### **Refueling**

- Take the utmost care when handling fuel - increased risk of fire! Never fill fuel in the vicinity of naked flames or ignitable sparks! Do not smoke when filling fuel! Switch off the engine, remove the ignition key and apply the hand brake before filling fuel. Never fill fuel in closed rooms! Clear up spilt fuel immediately!

### **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.
- Always disconnect the negative pole of the battery when working on the electrical installation.
- 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!
- Ensure sufficient ventilation in the charging area when charging the batteries. – Risk of explosion!

## Safety information

### 1.6 Information for Protection of Environment

- For safe use of substances inheriting a danger to health and environment specific knowledge is required.
- Observe the legal directives and local regulations for disposal of detergents, see Water Management Act.
- Used batteries labelled as recyclable contain reusable economic goods. According to the crossed dustbin label these batteries must not be added to the normal waste. Provide for agreement with the Hako contract dealer on return and disposal according to § 8 BattV.

## Safety information

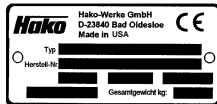
### 1.7 Labels on the vehicle

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

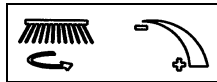
Vehicle identification number (Fig. 1/1)

1142xxxxxxx

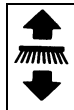
Rating plate (Fig. 1/2)



Side brush speed adjustment (Fig. 1/3)



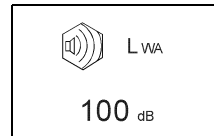
Raise sweeping unit (Fig. 1/4)



Particulate Matter (PM 10),  
emission limit values (Fig. 1/5)



Noise emission value (Fig. 1/6)



Fill solution (Fig. 1/7)



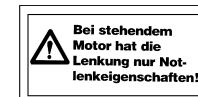
Parking brake (Fig. 1/8)



Observe operating manual  
(Fig. 1/9)

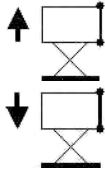


Engine emergency steering properties  
(Fig. 1/10)



## Safety information

Raise sweepings container at max. 2% gradient (Fig. 2/1)



Observe rotating parts on suction turbine (Fig. 2/5)



Check front tire pressure (Fig. 2/8) 2.0 bar (both sides)

1.5 bar

Risk of crushing by sweepings container (Fig. 3/1)



Engine speed adjustment +/- (Fig. 2/2)

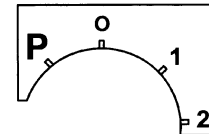


Observe rotating parts on suction turbine (Fig. 2/6)



Ignition starter switch (Fig. 3/2)

Solution for vacuum nozzle (Fig. 2/3)



Observe speed limit (Fig. 2/4) (option)

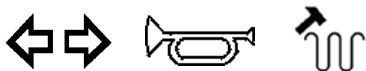


Check rear tire pressure (Fig. 2/7) 2.0 bar (both sides)

2 bar

## Safety information

Indicators, horn and agitating device  
(Fig. 3/3)



Company logo (Fig. 3/4)

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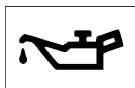
Risk of burns in engine compartment  
(Fig. 3/5)



Safety foil, red/white (both sides)  
(Fig. 3/6) (option)



Fill engine oil (Fig. 3/7)



Fill fuel (Fig. 3/8)

**Diesel**

Fill hydraulic oil (Fig. 3/9)



Machine model (Fig. 3/10)

**Hako Citymaster 90**

## Safety information

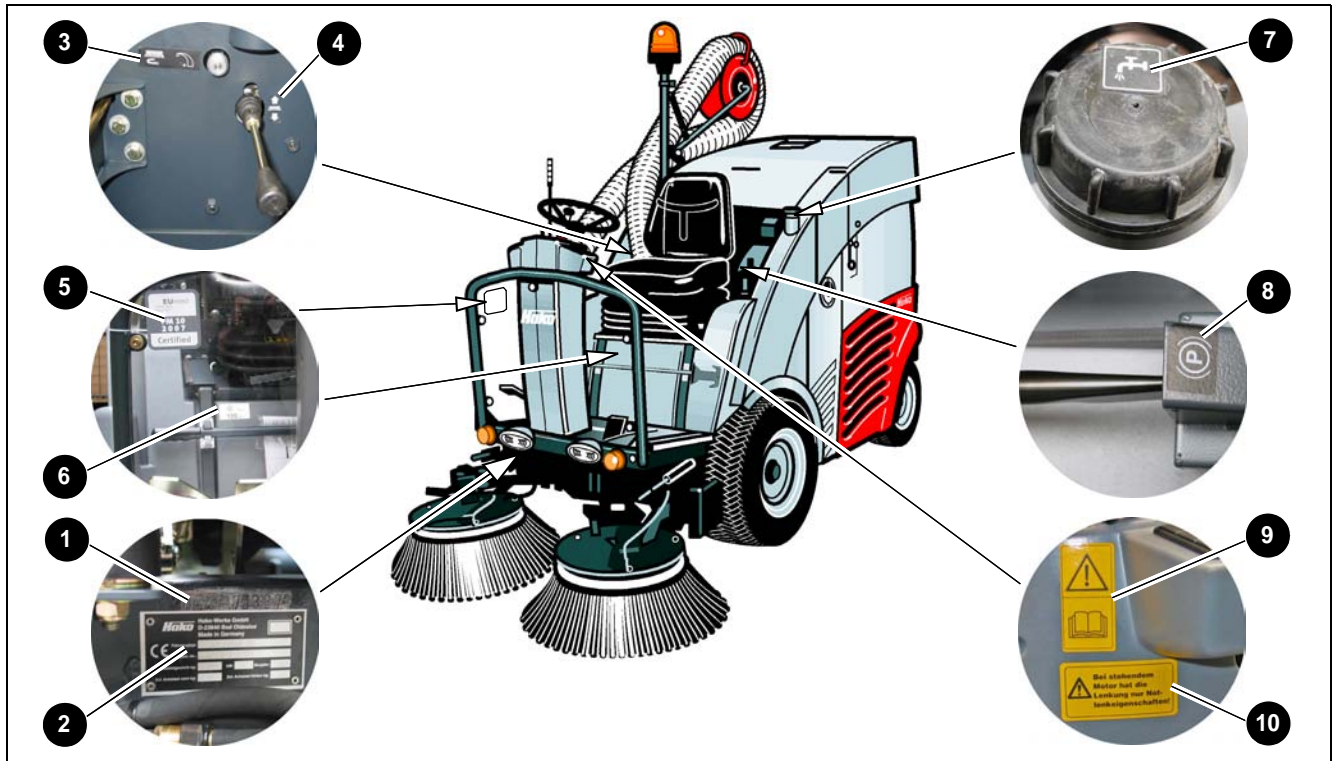


Fig.1

# Safety information

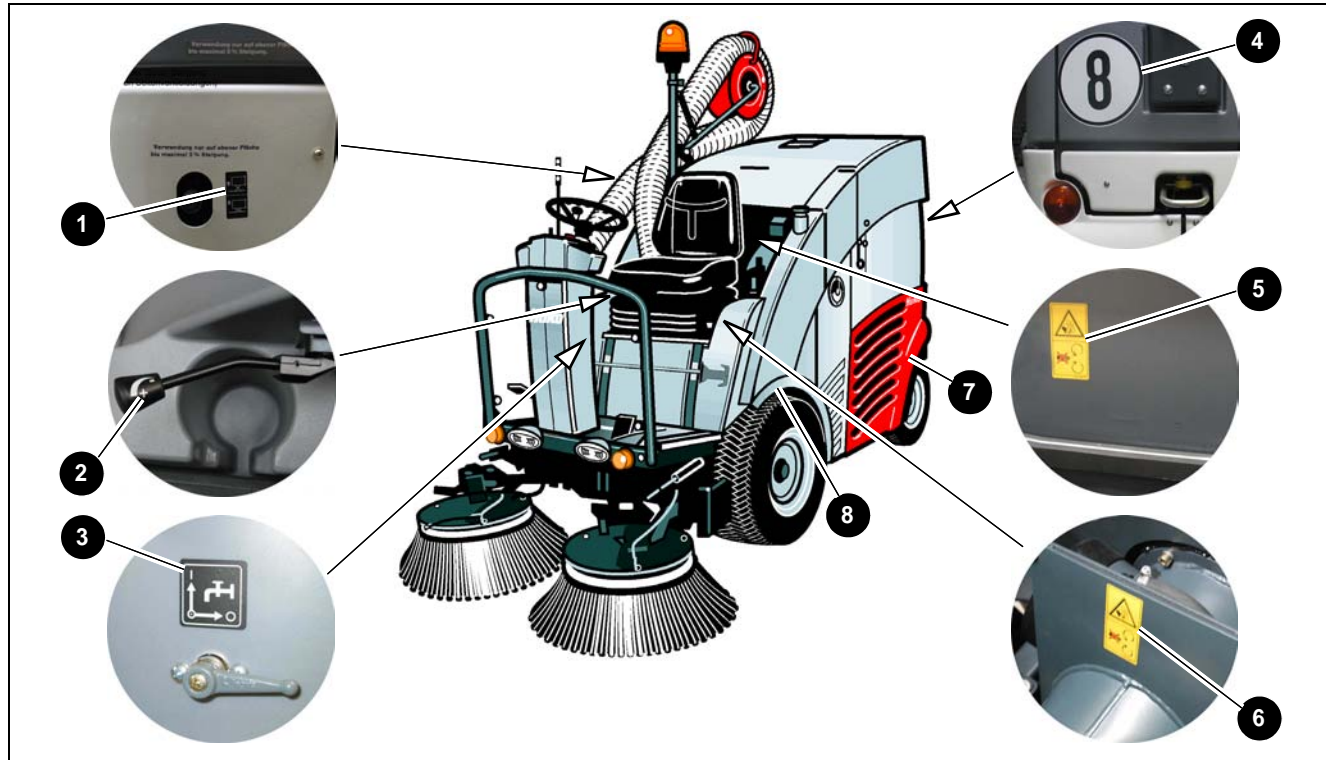


Fig.2



## Safety information

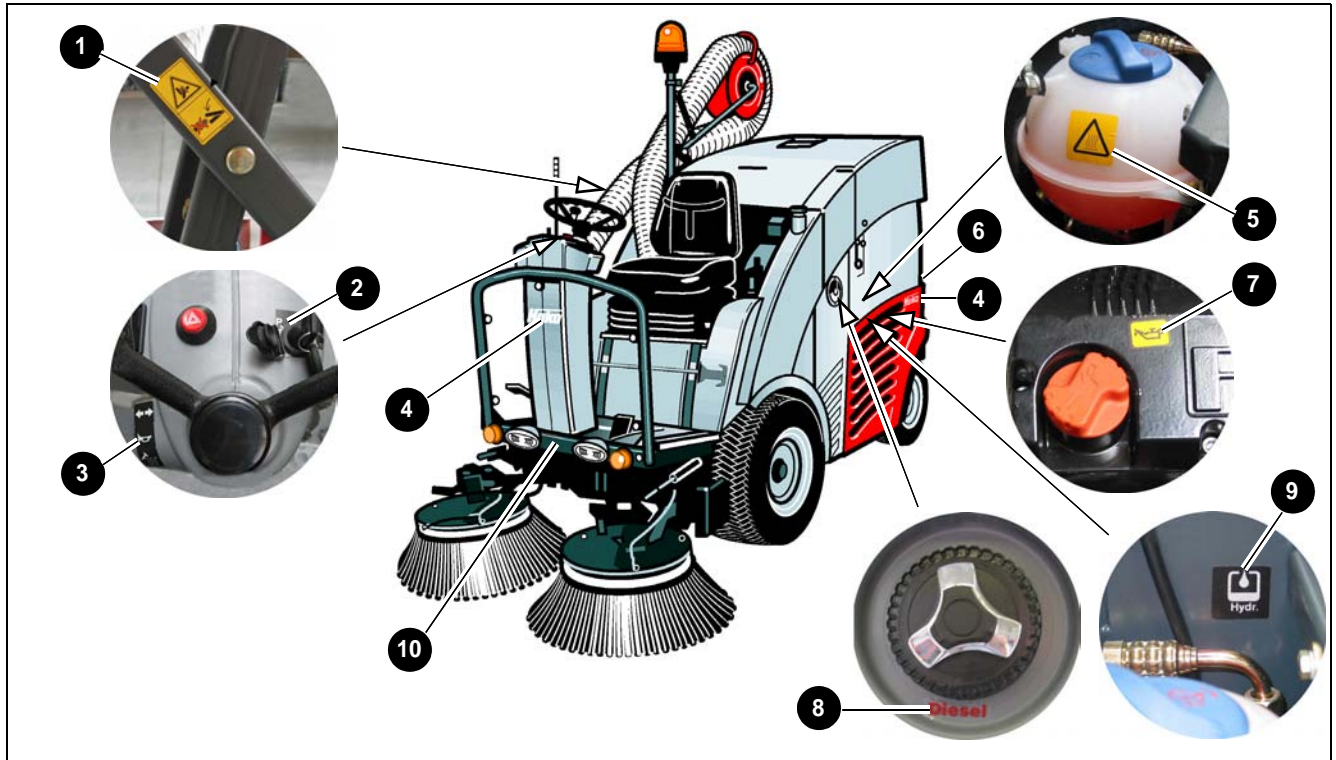


Fig.3

## 2 First Operation

### 2.1 Instruction

Instruction is required before first operation. First instruction into handling of the machine must be held by a qualified person sent by your local PowerBoss contract dealer. Your PowerBoss dealer will be informed by the manufacturer upon delivery of the vehicle and will contact you to make a date for instruction.

### 2.2 Prior to starting up

Carry out the following checks before starting the vehicle:

1. Check the engine oil level, fuel level, coolant level, hydraulic oil level, solution level, sweepings container and tire pressure; refer to Chapter "Maintenance".
2. Check the position of the driver's seat, refer to Section 3.2.
3. Check the position of the wing mirror (only with the weatherproof roof option).

### 2.3 Start Machine



Before starting the machine you are advised to read and comply with the Provisions of Operating from Safety Information chapter!

Before start to ride, subsequently actuate the following control elements:

1. Set all operating levers and switches to neutral, see paragraph 3.2.
2. Secure the vehicle by engaging the parking brake.
3. Start engine with ignition switch, see paragraph 3.2.
  - After the motor has started, the engine oil pressure and charge status lamps have to extinguish.
4. Preselect engine speed governor, see paragraph 3.2.
5. Release parking brake.



If the ambient temperature is  $-10^{\circ}\text{C}$  and less let the engine run idle for about 20 minutes (warm-up). At an ambient temperature of  $+10^{\circ}\text{C}$  and more a warming-up is not necessary.

6. Slowly depress pedal of desired direction and the vehicle starts rolling.

## First Operation

### 2.4 Operation

1. Check the machine before taking into operating, see paragraph 2.2.
2. Start vehicle, see paragraph 2.3 and ride to the place of use.
3. Set speed governor to preferred speed and turn on suction fan, see paragraph 3.2.
4. Lower sweeping unit, see paragraph 3.2.
5. Use potentiometer to set brush speed according to the degree of soiling encountered, see paragraph 3.2.
6. Adjust plate brush ground pressure according to the degree of soiling encountered, see paragraph 3.2.
7. Switch on clean water pump and set water amount supplied to the spray nozzles such that dust binding in the area to be swept is at optimum, see paragraph 3.2.
8. Heavy Dusty area: Switch on clear water valve and moistening the metal filter in the filter system.
9. Slowly depress accelerator pedal until vehicle starts rolling; increase speed by increase depressing pedal.
10. Switch on rotating beacon, see paragraph 3.2.

11. Switch on lighting if required, see paragraph 3.2.

#### 2.4.1 Cleaning during operation

Becomes necessary if the vacuuming performance i.e. the collection of matters reduces:

1. Check the filling level of the dustbin and empty if required.
2. Check filter system and clean if required, see paragraph 5.11.
3. Close the tension lock of the filter system.

If the vacuum performance has not yet improved, proceed to the following inspection:

1. Check sealing of the suction mouth, see paragraph sweeping unit.
2. Clean suction mouth and suction tube with the auxiliary tool.
3. Clean suction mouth and suction fan with water, see paragraph 5.10.

#### 2.4.2 Cleaning after sweeping work

1. Ride vehicle to a suitable site for cleaning.
2. Empty the dustbin, see paragraph 5.10.
3. Clean the filter system, see paragraph 5.11.

4. Clean suction mouth and suction turbine with water.
5. Check wearing, consumption and funktion by maintenance schedule.



In case of temperatures below 0° C (freezing hazard) drain the water from all components concerned (e.g. clear water tank, hoses, pump, filter-sieve and spray nozzles), see paragraph 5.10.

## First Operation

### 2.5 Machine stopping and parking

#### At the end of work



Let the engine idle for 1 to 2 minutes after full load operation.

1. Take pedal back to neutral position or release pedal. If releasing the pedal is insufficient for braking purposes, actuate the pedal for reversing.
2. Engage the parking brake if sweeper stands still.
3. Set speed governor to neutral position.
4. Before leaving the machine:
  - Set all operating facilities to neutral.
  - Secure the machine against unintended rolling and unauthorized use.
  - Pull ignition key
  - Lock kabin by key.

#### Parking for pauses

For brief pauses as well, the driver has to set all operating facilities to neutral before leaving the vehicle unattended. Engage the parking break and secure the vehicle against unauthorized use.

#### Stop upon occurrence of malfunction

Immediately stop the engine of the Hako-Citymaster 90 upon occurrence of malfunctions. After breakdown on public road, secure by placing the warning triangle and by a warning lamp.

## First Operation

### 2.6 Transporting and towing

#### Transporting the vehicle

When the vehicle is to be transported on another vehicle or trailer, it must be secured against rolling away. To do this, it must be secured at the front and rear at the lashing points (Fig. 4/1).

#### Towing the vehicle

When the drive motor has stopped, the driving wheels are blocked. If it becomes necessary to move the Hako-Citymaster 90 later, the bypass valve on the hydraulic pump must be opened. The bypass valve is located on the underside of the pump and must be screwed out approx. 1/2 a revolution. The towing lug (Fig. 4/2) is located at the front on the sweeping unit.



When the drive motor has stopped, the steering only has emergency steering properties.

The towing speed may be maximally 2 kph and the towing time 30 minutes.  
Towing distance = 1 km.

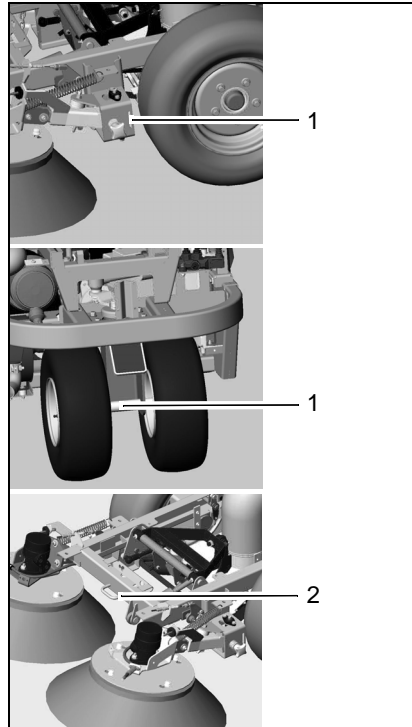


Fig.4

### 3 Operation

#### 3.1 Method of operation

##### General information

The Hako-Citymaster 90 is a sweeper exclusively designed for use in market squares and car parks, paths and similar transport routes, to clear up dry and wet refuse on them under normal street and weather conditions.

##### Options:

A weatherproof roof (1143) is available on option to protect the driver.

A hand-held suction hose (1144) is available on option for more flexible cleaning operations.

A hand pump (1145) is available on option to raise the sweepings container without the engine running.

##### 3.1.1 Sweeping unit

The sweeping unit is comprised of circular brushes and a vacuum nozzle. The circular brushes (Fig. 5/1) sweep the refuse towards the vacuum nozzle (Fig. 5/2). The vacuum nozzle runs flexibly, attached on shockproof rollers, between the front wheels.

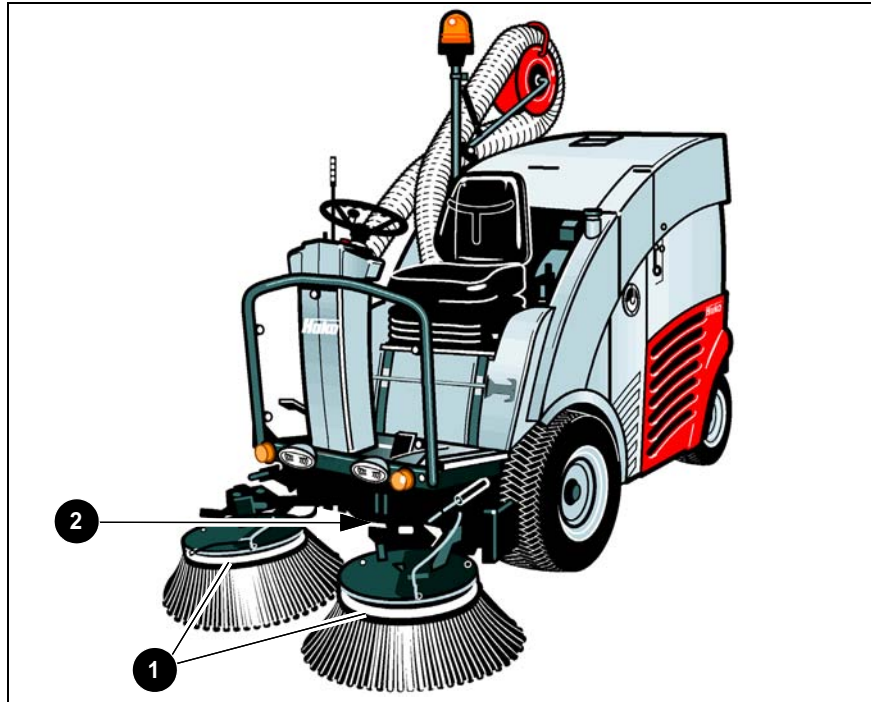


Fig.5

## Operation

### 3.1.2 Solution system

The solution system is comprised of a tank, pump, valve and spray jets. The solution tank (Fig. 6/1) is located to the left of the driver's seat and has a volume of 100 liters. An electrical pump feeds the solution to the spray jets. The spray jets are arranged at the front on the circular brush frame so that the jet for solution sprays in front of the brushes binding the dust and wetting the surface prior to being cleaned by the brushes. There is another spray jet located in front of the fan. If the metal filter option is installed, there is a spray jet on the vacuum nozzle.

### 3.1.3 Sweepings container

The waste is vacuumed up by means of the suction turbine (Fig. 6/2) and forced into the sweepings container (Fig. 6/3). To bind the dust optimally, solution from the solution system is also supplied to the vacuum nozzle.

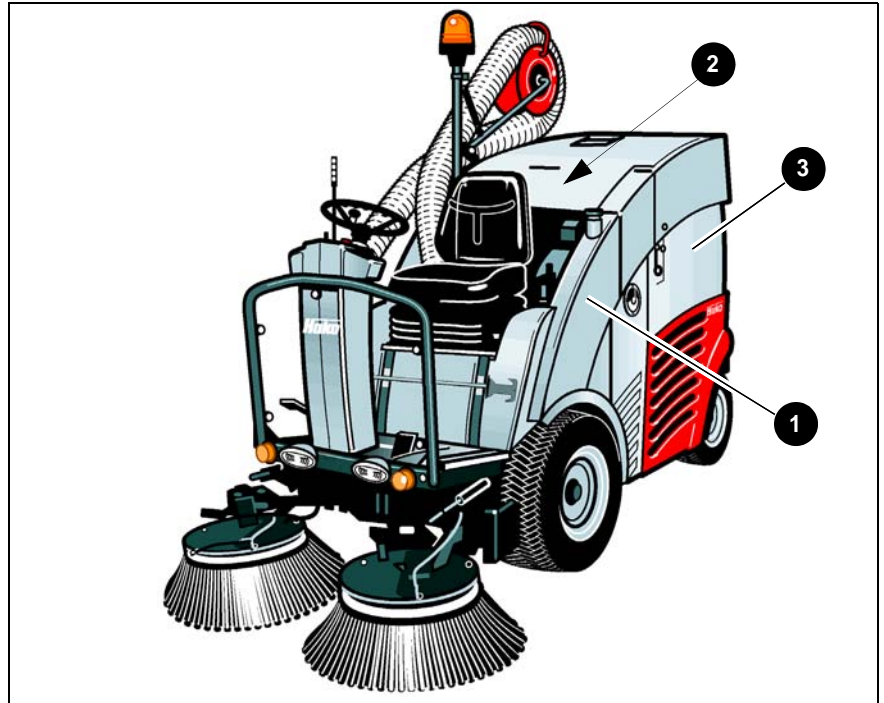


Fig.6

## Operation

### 3.1.4 Steering and brake

The vehicle is equipped with hydraulically operated steering (Fig. 7/ 1). The brake system is comprised of a mechanical parking brake (Fig. 7/2) and deceleration by means of the hydrostatic traction drive.

### 3.1.5 Hydraulic system

The hydraulic system (Fig. 7/3) supplies the traction drive and work hydraulics. The driving speed of the traction drive can be regulated continuously within the range of the preselected engine speed.

The work hydraulics is equipped with a pump unit. It supplies the functions for the sweepings container, suction turbine, sweeping unit and steering.

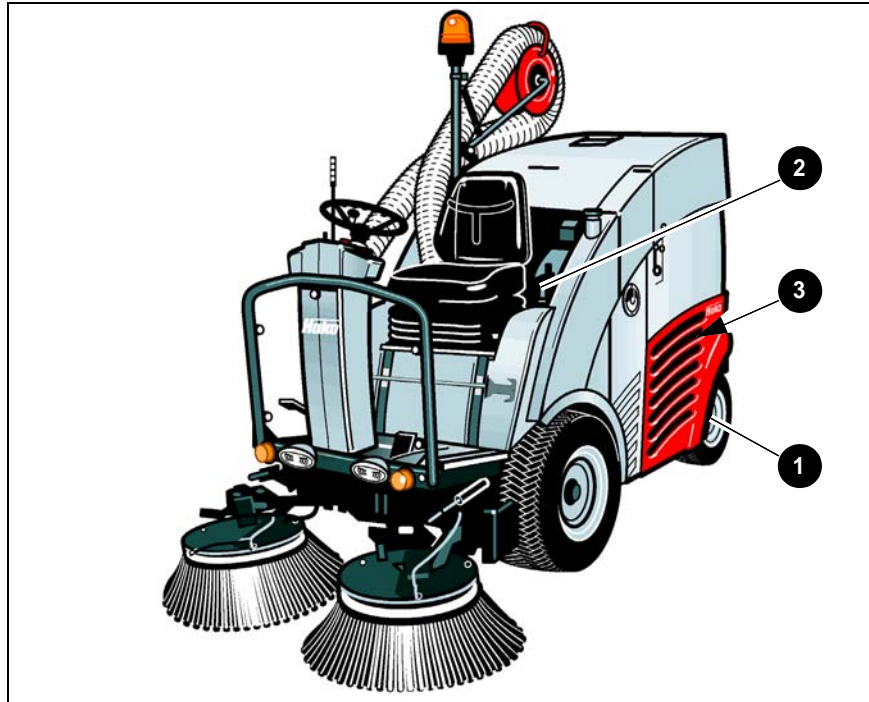


Fig.7



## Operation

### 3.2 Operating elements, overview

- 1 Operating panel
- 2 Operating console
- 3 Pedals
- 4 Driver's seat
- 5 Auxiliary tool

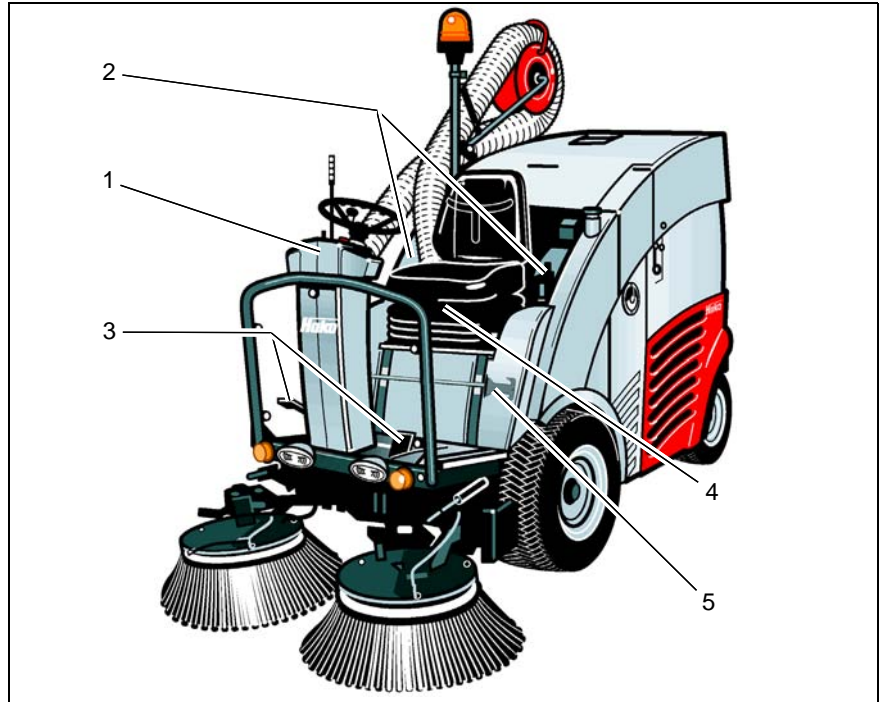


Fig.8

## Operation

### 3.2.1 Operating panel

- 1 Switch for suction turbine and solution pump
- 2 Switch for working lights and clearance lights
- 3 Switch for flashing beacon
- 4 Switch for hazard lights
- 5 Ignition switch
- 6 Control lamp for coolant
- 7 Control lamp for engine oil
- 8 Control lamp for drive direction indicator
- 9 Control lamp for sweepings container in working position
- 10 Control lamp for battery charge
- 11 Control lamp for preheating device
- 12 Combination switch for drive direction indicator / horn / agitating device
- 13 Solution quantity regulator for circular brush spray jets
- 14 Solution quantity regulator for vacuum nozzle spray jets (option)

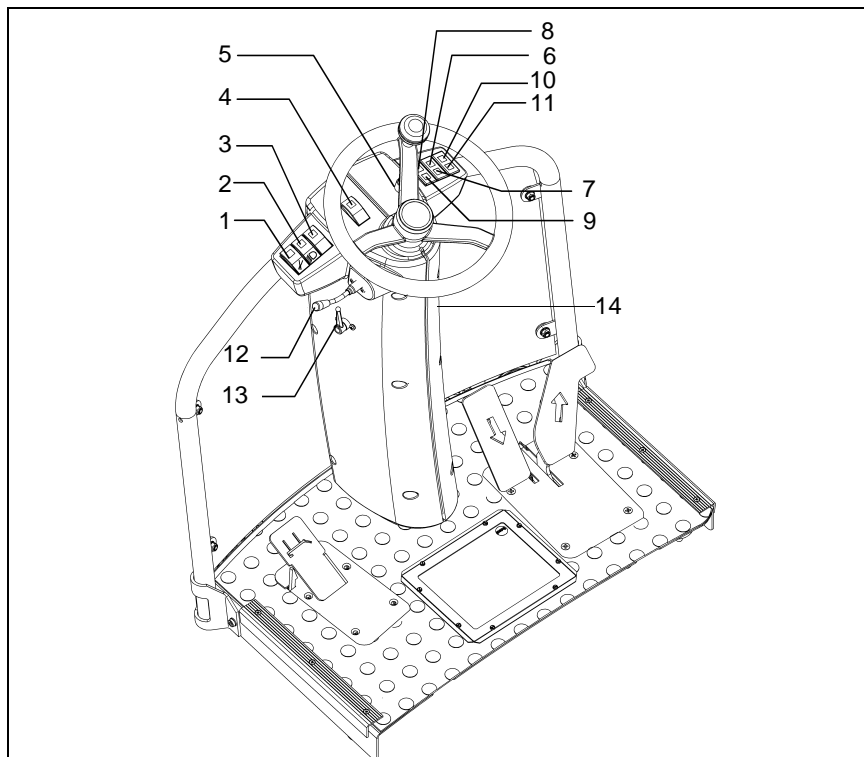


Fig.9

## Operation



### Switch for suction turbine and solution pump (Fig. 9/1)

The first stage serves to switch the suction turbine on and off. After switching off, the filter is automatically shaken clean. The second stage serves to switch the solution pump on and off. The green control lamp lights up.



### Switch for working lights (Fig. 9/2)

This serves to switch the working lights and clearance lights on and off.  
Stage 1: clearance lights, control bar lights up.  
Stage 2: working lights, control bar lights up.



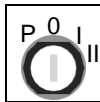
### Switch for flashing beacon (Fig. 9/3)

It serves to switch the flashing beacon on and off.



### Switch for hazard lights (Fig. 9/4)

It serves to switch the hazard lights on and off. The control lamp in the button flashes red when the hazard lights are switched on.



### Ignition starter switch (Fig. 9/5)

It serves to preheat, start and stop the engine and to prevent unauthorized use.

P = hazard warning light and clearance lights on with ignition key removed.  
0 = engine and electrical system

switched off.

I = preheating until yellow control lamp goes out.

II = Start; first press the key in and then turn a little further to start.



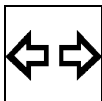
Do not repeat the start procedure more than 3 times; then allow the starter to cool down.

After starting the cold engine, allow it to run at a slightly increased idling speed to warm up.

At ambient temperatures of -10°C, allow to warm up for approx. 20 minutes, a warming up phase is not necessary from + 10°C.

For safety reasons, the driver's seat is equipped with a seat contact switch. The engine can only be started when the driver is seated on the driver's seat.

## Operation



### Control lamp for drive direction indicator (Fig. 9/6)

It lights up when the indicator is on and, at the same time, serves as a function control lamp. Fast flashing indicates defect indicators.



### Control lamp for sweepings container (Fig. 9/7)

It lights up when the sweepings container is not in its working position.



### Control lamp for coolant temperature (Fig. 9/8)

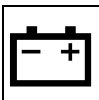
The control lamp lights up when the coolant is too hot or the coolant level in the fluid reservoir has dropped below

the minimum marking. Switch off the engine immediately and determine the cause.



### Control lamp for engine oil pressure (Fig. 9/9)

It lights up when a fault occurs in the oil pressure system during operation. Switch off the engine immediately, allow to cool down and determine the cause. Switch off the engine and check the engine oil level.



### Control lamp for battery charge (Fig. 9/10)

It lights up when starting the vehicle. When the engine has started, it must go out.



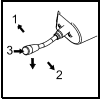
### Control lamp for preheating device (Fig. 9/11)

It must light up when preheating the cold engine. Preheat for approx. 5 seconds then start the engine immediately.



For safety reasons, the driver's seat is equipped with a seat contact switch. The engine can only be started when the driver is seated on the driver's seat.

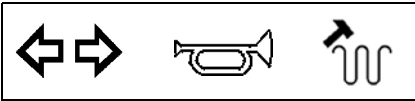
## Operation



### Combination switch (Fig. 9/12)

It controls the following functions:

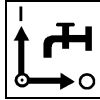
- Switch direction 1 = indicator right
- Switch direction 2 = indicator left
- Switch direction 3 = horn
- Switch direction down = agitating motor



The agitating motor switches off automatically after approx. 20 sec. Repeat the agitation process, if necessary.



The suction turbine must be switched off.



### Solution quantity regulator for circular brushes (Fig. 9/13)

This lever opens and closes the solution supply for the circular brush spray jets.

Position I = open

Position O = closed

### Solution quantity regulator for suction nozzle jets (Fig. 9/14) Only with the metal filter option!

This lever opens and closes the solution supply for the vacuum nozzle.

Position I = open

Position O = closed

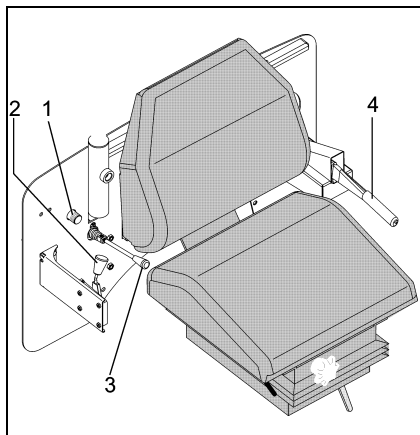


Condition: solution pump is switched on.

The quantity of the solution must be set so that the dust in the area being swept is bound properly. In the case of damp working conditions, do not use the solution quantity regulator.

## Operation

### 3.2.2 Operating console



**Fig.10**

- 1 Speed adjustor for circular brush drive
- 2 Speed adjustor (throttle) for engine
- 3 Hand lever for sweeping operation
- 4 Hand lever for parking brake

#### **Speed adjustor for circular brush drive (Fig. 10/1)**

It serves to alter the circular brush speed according to the working conditions.

Range from 0 to 105 rpm.

#### **Speed adjustor for engine (Fig. 10/2)**

It serves to alter the engine speed.

- Lever to front = full throttle
- Lever to rear = idling and start position

#### **Hand lever for sweeping operation (Fig. 10/3)**

It controls the following functions:

It is used to switch the circular brush drive on and off and to lower the vacuum nozzle. The hand lever has the following switching positions:

Down = lower the circular brushes and vacuum nozzle, and switch on the circular brush drive.

Middle = lock the sweeping unit.

Up = raise the circular brushes and vacuum nozzle, and switch off the circular brush drive.

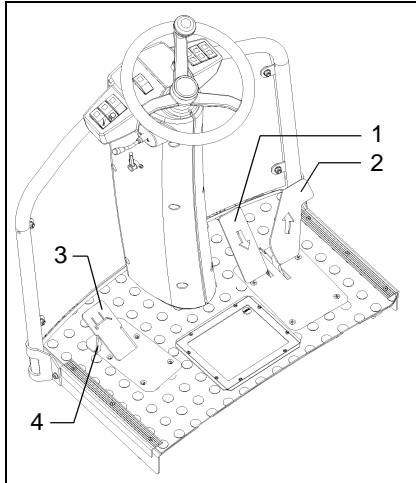


When moved to its top position, the hand lever must be held there by the operator until sweeping unit reaches its end position.

#### **Hand lever for parking brake (Fig. 10/4)**

It serves to actuate the parking brake. The lever locks when pulled up. Press the knob to release the lever.

## 3.2.3 Pedals



**Fig.11**

- 1 Accelerator pedal, forwards
- 2 Accelerator pedal, reverse
- 3 Coarse particle flap
- 4 Latch

### Accelerator pedal for driving forwards (Fig. 11/1)

This is used to control the forward driving speed in a continuous process. Pressing the accelerator down increases the speed. If the pedal is released, it automatically returns to its zero position and the vehicle comes to a stop.



Take the utmost care when driving on slopes.

### Accelerator pedal for reversing (Fig. 11/2)

This is used to control the reverse driving speed in a continuous process. Pressing the accelerator down increases the speed. If the pedal is released, it automatically returns to its zero position and the vehicle comes to a stop.



On drawing the accelerator pedal back (forwards or reverse), the vehicle comes to a stop quickly due to the hydrostatic braking effect.

### Pedal for coarse particle flap (Fig. 11/3)

It serves to open the coarse particle flap at the front of the vacuum nozzle.

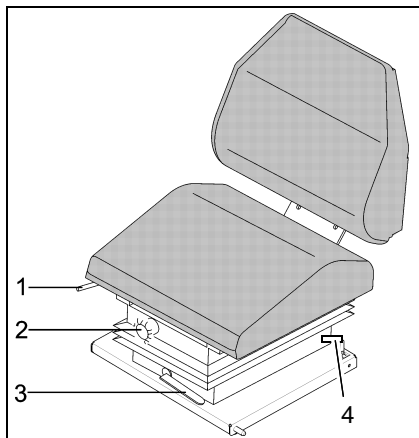
The latch (Fig. 11/4) serves to lock the pedal of the coarse particle flap. This locked position is necessary when the vacuum nozzle has to be cleaned. The pedal latch is unlocked by applying pressure with the foot against the side of the latch.



When using the coarse particle flap during a working process, pay attention that the pedal does not engage in the latch. When locked, the coarse particle flap is continually open.

## Operation

### 3.2.4 Driver's seat



**Fig.12**

- 1 Hand lever for driver's weight
- 2 Handwheel for seat height
- 3 Hand lever for seat position
- 4 Locking bar



Do not adjust the driver's seat while driving!

### Adjusting the seat position

Use the hand lever (Fig. 12/1) to release the driver's seat and adjust in longitudinal direction. The locking bar (Fig. 12/4) can be used to tip the driver's seat up.

### Adjusting the seat height

The handwheel (Fig. 12/2) is used to adjust the height of the driver's seat.

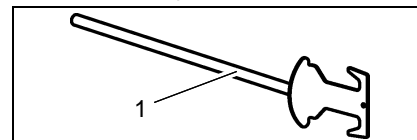
### Adjustment of the driver's weight

The hand lever (Fig. 12/3) is used to adjust the driver's seat to the weight of the driver.



For safety reasons, the driver's seat is equipped with a seat contact switch. The engine can only be started when the driver is seated on the driver's seat.

### 3.2.5 Auxiliary tool



**Fig.13**

- 1 Auxiliary tool

There is an auxiliary tool located below the driver's seat (Fig. 13/1). The auxiliary tool can be used to remove coarse dirt from the vacuum nozzle, suction nozzle path, filter system and sweepings container.



## Technical Data

### 4 Technical Data

<b>Performance</b>		
Driving and sweeping speeds, forwards/reverse	kph	0-8/0-4
Gradeability, empty / with permissible total weight (sweeping)	%	25/25
Tipping angle, empty/full	degree	25/25
Sweep width, min./max.	mm	1300/1750
Sweeping efficiency to max.	m <sup>2</sup> /h	9600
Sweeping capacity, fill volume/weight	l/kg	120/150
<b>Dimensions and weights</b>		
Length (with brushes)	mm	2580
Width (with brushes)	mm	1070
Height (without/with flashing beacon)	mm	1578/2000
Track width, front/rear	mm	892/312
Wheelbase	mm	1420
Turning circle	mm	1922
Dead weight, depending on equipment	kg	880-950
Gross total weight	kg	1300
Permissible axle load, front/rear	kg	850/450
Curb climbing ability	mm	130

## Technical Data

<b>Chassis/Brakes</b>		
Tires, front/rear		23x8.50-12 4PR
Rims, front/rear		7.00-JAx12
Tire pressure, front/rear	bar	1.5/2.0
Wheel bolt tightening torque	Nm	86
<b>Suction and sweeping system</b>		
Suction turbine speed	rpm	2120
Suction turbine diameter	mm	505
Max. intake air volume	m <sup>3</sup> /h	2800
Suction pipe diameter	mm	180
Suction nozzle width	mm	440
Circular brush diameter	mm	720
Circular brush speed	rpm	90
<b>Dust particle filter system</b>		
Fine particle filter (serial) filtration efficiency	%	V
Metal filters (option):		
- Preliminary filter (coarse fabric filling) packing density	kg/m <sup>3</sup>	220
- Main filter (fine fabric filling) packing density	kg/m <sup>3</sup>	220

## Technical Data

<b>Spraying equipment</b>		
Tank volume	l	100
Spray jets, circular brushes/suction pipe/vacuum nozzle (option)	pieces	2/1/1
Spraying volume, circular brushes/suction pipe/vacuum nozzle (option)	l/min	0.7/0.7/1.5
Spray pressure, max.	bar	4.2
<b>Hydraulic system</b>		
Hydraulic oil, e.g. ESSO Univis N 46, Mobil DTE 15M or equivalent		HLP 46 DIN 51524
Oil change quantity / System volume approx.	l	20/23
Hydraulic oil filter	Order no.	01092790
Traction drive (max. pressure) - measuring point on the pump	bar	210
Feed pressure (min./max.) - measuring point on the pump	bar	11.5 - 14
Work hydraulics (max. pressure at M2)	bar	110
<b>Electrical installation</b>		
Battery (low-maintenance)	V/Ah/Type	12/74/57412
Three-phase generator	V/A	14/45
Starter	V/kW	12/1.6

## Technical Data

<b>Engine</b>		
Manufacturer/Model		Lombardini/LDW 702
Volume	cm <sup>3</sup>	686
No. of cylinders	Pieces	2
Cylinder stroke/bore	mm	77.6/75
Power output at 2800 rpm	kW	9.7
Max. torque at 2200 rpm	Nm	40
Full throttle speed	rpm	2500
Idling speed	rpm	900 +100
Long-term coolant, note: Cannot be mixed!		GLACELF AUTO SUPRA
Fill quantity	l	4
Engine oil fill volume without/with change of filter SAE 15W40	l	1.4/1.6
Engine oil filter	Order no.	49-170
Fuel filter	Order no.	49-172
Line filter	Order no.	68-093
Diesel fuel tank volume	l	20
Fuel consumption (normal sweeping operation)	l/h	1.9
Air filter insert	Order no.	68-243
Safety cartridge for air filter	Order no.	68-242

## Technical Data

<b>Noise emission values</b>		
Max. sound power level (L <sub>WA</sub> ) measured at extreme working conditions in compliance with DIN EN 3744:	dB (A)	100
The sound pressure level (L <sub>pA</sub> ), measured in accordance with DIN EN 11201 at the operator's ear under normal working conditions, is:	dB (A)	84
<b>Vibration</b>		
Under normal working conditions, the weighted effective value of the acceleration, established in accordance with DIN EN 1032, to which the body (feet or seat surface ) is exposed does not exceed:	m/s <sup>2</sup>	< 0.5

### 5 Maintenance and Care

#### General



Before proceeding to maintenance and care work you are advised to read and comply with the Safety Information chapter!

Compliance with the recommended maintenance works will give you the certitude of always having a reliable machine at disposition.

Daily or weekly maintenance and repair works may be executed by the driver/operator having been trained accordingly. Further Hako system maintenance works have to be executed by qualified personnel only. Please contact your local Hako Service Centre or Hako contract dealer. We cannot be held liable for damages resulting from non-compliance with these instructions.

Please indicate the machine's serial number with any enquiry or spare part order, see paragraph 1.7 - Nameplate.

#### 5.1 Hako System Maintenance

The Hako System Maintenance:

- guarantees reliable operability of the

Hako machines (preventive maintenance)

- minimizes operating costs, repair costs and maintenance costs
- ensures long service life and operability of the machine

The Hako System Maintenance is structured in separate modules and determines specific technical works to be executed as well as the intervals for such maintenance works. For any specific maintenance type, the replacement parts are determined and listed in spare part kits.

#### Hako System Maintenance I :

To be performed by the customer in accordance to the maintenance and care instructions contained in the operating instructions (daily or weekly). The driver/operator will be instructed upon delivery of the machine.

#### Hako-System Maintenance I :

(after 50 hours of operation - einmalig)  
Gilt für Maschinen mit verbrennungsmotorischem Antrieb, 1. Ölwechsel, Filter usw. Durchführung vom Sachkundigen eines autorisierten Hako-Service-Stützpunktes.

#### Hako-System Maintenance II:

(every 250 hours of operation)

To be performed by qualified personnel of authorised Hako Service Centre in accordance with the machine-specific system maintenance including spare part kit.

#### Hako-System Maintenance III:

(every 500 hours of operation)

To be performed by qualified personnel of authorised Hako Service Centre in accordance with the machine-specific system maintenance including spare part kit.

#### Hako-System Maintenance S:

(every 1000 hours of operation safety check)

To be performed by qualified personnel of authorised Hako Service Centre in accordance with the machine-specific system maintenance including spare part kit. Execution of all safety-relevant inspections according to UVV-BGV-TÜV-VDE as prescribed by law.

# Maintenance and Care

## 5.2 Maintenance document

<p><b>Handing over</b></p> <p>Upgrade Test drive Handing over to the customer Instruction carried out on: at _____ operatin hours</p>	<p><b>Hako-System-Maintenance I</b> 50 operating hours Workshop stamp</p> <p>carried out on: at _____ operatin hours</p>	<p><b>Hako-System-Maintenance II</b> 250 operating hours Workshop stamp</p> <p>carried out on: at _____ operatin hours</p>	<p><b>Hako-System-Maintenance III</b> 500 operating hours Workshop stamp</p> <p>carried out on: at _____ operatin hours</p>
<p><b>Hako-System-Maintenance II</b> 750 operating hours Workshop stamp</p> <p>carried out on: at _____ operatin hours</p>	<p><b>Hako-System-Maintenance S</b> 1000 operating hours Workshop stamp</p> <p>carried out on: at _____ operatin hours</p>	<p><b>Hako-System-Maintenance II</b> 1250 operating hours Workshop stamp</p> <p>carried out on: at _____ operatin hours</p>	<p><b>Hako-System-Maintenance III</b> 1500 operating hours Workshop stamp</p> <p>carried out on: at _____ operatin hours</p>
<p><b>Hako-System-Maintenance II</b> 1750 operating hours Workshop stamp</p> <p>carried out on: at _____ operatin hours</p>	<p><b>Hako-System-Maintenance S</b> 2000 operating hours Workshop stamp</p> <p>carried out on: at _____ operatin hours</p>	<p><b>Hako-System-Maintenance II</b> 2250 operating hours Workshop stamp</p> <p>carried out on: at _____ operatin hours</p>	<p><b>Hako-System-Maintenance III</b> 2500 operating hours Workshop stamp</p> <p>carried out on: at _____ operatin hours</p>

## Maintenance and Care

### 5.3 Maintenance Plan intervals stipulated. Hako system maintenance, customer

The following maintenance work must be completed by the customer at the

Activity	Interval
	Daily
Engine and hydraulic system: visual check for loss of oil	o
Check engine oil level, refill as necessary	o
Check coolant level in fluid reservoir, refill as necessary	o
Check hydraulic oil level; refill as necessary	o
Check fuel supply, refill as necessary	o
Check the solution tank, refill as necessary	o
Check air vent on the side doors and radiator ribs, clean as necessary	o
Check spray jets and solution filter, clean as necessary	o
Clean circular brushes and vacuum nozzle	o
Clean suction turbine	o
Clean metallic filters: shake and clean fine particle filter (option)	o
Empty sweepings container	o
Check lighting system	o
Clean vehicle, complete a test drive and function test	o



## Maintenance and Care

**Hako system maintenance, customer** intervals stipulated.

The following maintenance work must be completed by the customer at the

Activity	Interval
	Weekly
Grease according to lubrication plan	o
Check tire pressure and tire condition	o
Circular brushes: check sweeping pattern, adjust as necessary	o
Circular brushes: check level of wear, change as necessary	o
Vacuum nozzle: check sealing strips, change as necessary	o
Check and clean spray jets, change as necessary	o
Sweepings container: check seals, change as necessary	o
Clean metallic filters: shake and clean fine particle filter (option)	o
Test drive and function test	o

## Maintenance and Care

### Hako system maintenance I

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

Activity	Interval
	Every 50 operating hours (one-off)
Engine: change engine oil, engine oil filter and fuel filter	o
Change hydraulic oil filter	o
Check fan belts, adjust as necessary	o
Check starter battery, charge as necessary	o
Check engine and circular brush speed	o
Grease according to lubrication plan	o
Wheels and tires: check torque of the wheel bolts	o
Check electrical installation	o
Vacuum nozzle: check settings and function	o
Sweeping unit: check settings and function	o
Check parking brake	o
Checking steering	o
Check visual appearance of the vehicle	o
Test drive and function test	o

## Maintenance and Care

### Hako system maintenance II

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

Activity	Interval
	Every 250 operating hours
All maintenance work in accordance with Hako system maintenance I	o
Clean air filter insert as necessary, change if necessary	o
Sweeping unit: check Bowden cables, change as necessary	o
Suction turbine: check fan wheel, wearing plate and ball bearing, change as necessary	o
Check metallic filters, change as necessary. Fine particle filter (option): check seals, guide plate and filter hoses, change as necessary	o
Engine and hydraulic system: visual check for loss of oil	o
Test drive and function test	o

## Maintenance and Care

### Hako system maintenance III

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 II	o
Change air filter insert	o
Engine: adjust valves and change valve cover seal	o
Change hydraulic oil and hydraulic oil filter	o
Test drive and function test	o

## Maintenance and Care

### Hako system maintenance S (safety check)

The following maintenance work must be completed by an authorized Hako service center at least once a year.

Activity	Interval
	Every 1000 operating hours
All maintenance work in accordance with Hako system maintenance II and III	o
Change air filter safety cartridges	o
Change dynamo fan belt	o
Change coolant with antifreeze	o
Change air filter in hydraulic oil tank	o
Change hydraulic pump drive fan belt	o
Change Bowden cables and brake linings in brake system	o
Change Bowden cables in hydraulic pump	o
Change suction turbine and fan belt	o
Test drive and test all safety-relevant components	o

## Maintenance and Care

### 5.4 Engine

The engine is in the rear section of the vehicle. Raising the sweepings container and opening the panels provides optimum access to the engine compartment for maintenance and servicing purposes.

- 1 Side panel
- 2 Side door
- 3 Cap
- 4 Oil dipstick
- 5 Oil filter
- 6 Lever to raise/lower sweepings container

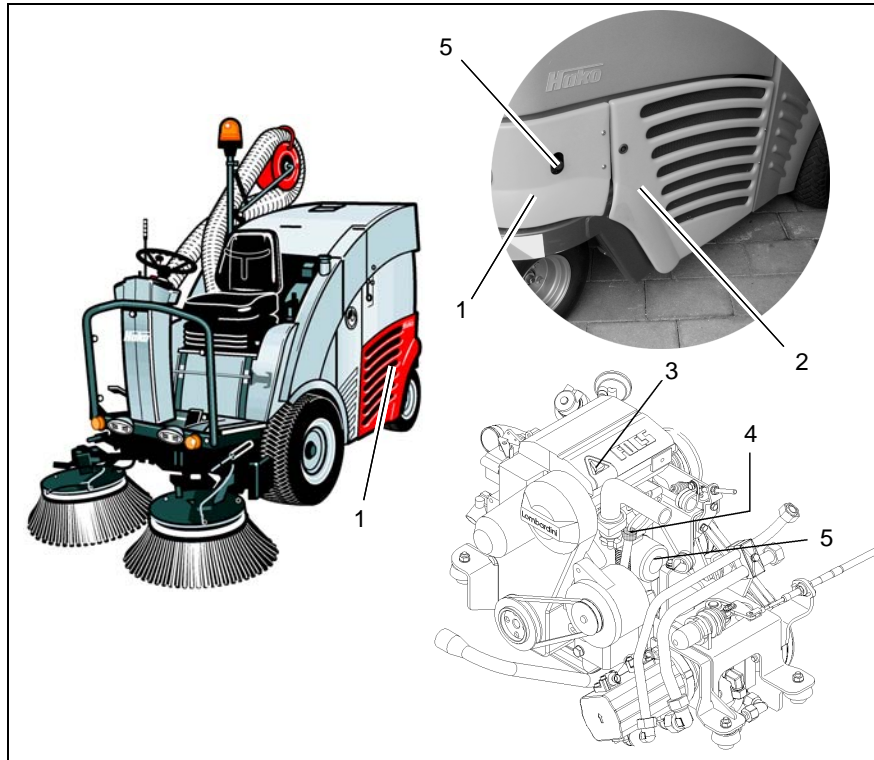


Fig.14

## Maintenance and Care

### 5.4.1 Opening the engine compartment



Always allow the engine to cool down before starting work in the engine compartment. Risk of burns!

1. Park the vehicle on a level surface with the engine at operating temperature. Raise the sweepings container using the lever (Fig. 14/5).
2. Turn the engine off and allow to cool down. Apply the parking brake.
3. If necessary, unlock the side panel (Fig. 14/2) with a square wrench and open it.
4. If necessary, unscrew the retaining screws and remove the side panel (Fig. 14/1).

### 5.4.2 Refilling engine oil

Check the engine oil level with the oil dipstick (Fig. 14/4) 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. Open the engine compartment, see paragraph 5.4.1.
2. Pull the oil dipstick out and wipe it with a clean cloth.
3. Compare the oil level with the marking at the bottom end of the oil dipstick.
4. Open the cap (Fig. 14/3). Do not pour in too much oil at one time. Allow the oil a few minutes to run into the oil sump. Then measure the oil level again.
5. Replace the cap and oil dipstick.
6. Close the side door.
7. The engine control lamp should 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 after the first 50 operating hours and subsequently every 250 operating hours, once a year at the very least.



Pay attention to hot engine parts and when draining hot engine oil. Risk of burns!

1. Open the engine compartment, see paragraph 5.4.1.
2. Place a suitable collecting vessel

- under the drain plug of the oil sump. Oil quantity with oil filter: 1.6 liter  
Oil quantity without oil filter: 1.4 liter
3. Remove the drain plug from the oil sump and drain the engine oil into the collecting vessel.
4. Disassemble the oil filter (Fig. 14/5) 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. Insert the drain plug with a new sealing ring.
6. Fill the engine oil, see paragraph 5.4.2.

## Maintenance and Care

### 5.5 Air filter

The air filter (Fig. 15/1) is in the engine compartment. The accumulation of dirt in the main filter must be checked every 250 operating hours and cleaned as necessary.

- 1 Air filter
- 2 Brackets
- 3 Main filter
- 4 Safety cartridges
- 5 Dust discharge valve

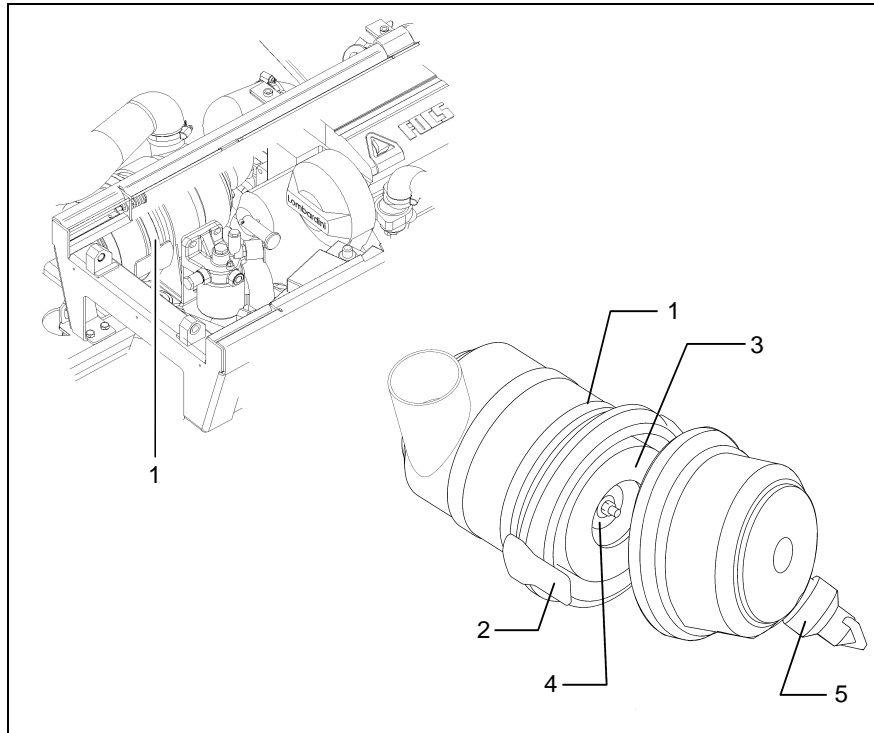


Fig.15



## Maintenance and Care

### 5.5.1 Disassembling the main filter

1. Open the engine compartment, refer to Section 5.4.1.
2. Release the brackets (Fig. 15/2) on the air filter (Fig. 15/1) and remove the lower housing.
3. Remove the main filter (Fig. 15/3) from the housing.

### 5.5.2 Cleaning the main filter

1. Clean the inside of the lower housing with a damp cloth.
2. Blow the main filter clean from the inside towards the outside with compressed air. 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, leading with open side, carefully in the upper housing section.
2. Replace the lower housing ensuring the dust discharge valve (Fig. 15/5) is fitted correctly.

3. Lock the brackets again.

### 5.5.4 Changing the main filter

The main filter (Fig. 15/3) must be replaced in the case of damage or every 500 operating hours at the latest.

1. Disassemble the main filter, see paragraph 5.5.1.
2. Insert the new main filter.
3. Install the main filter, see paragraph 5.5.3.

### 5.5.5 Changing the safety cartridge



The safety cartridge (Fig. 15/4) 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, see paragraph 5.5.1.
2. Insert the new safety cartridge.
3. Install the main filter, see paragraph 5.5.3.

### 5.5.6 Cleaning the dust discharge valve

Press the dust discharge valve (Fig. 15/5) together thus removing the accumulation of dust.

## Maintenance and Care

### 5.6 Cooling system

The hydraulic system and engine are protected from overheating by means of the cooling system. The coolant is cooled in the radiator (Fig. 16/3) by means of a fan. If the coolant temperature is too high, it is indicated in the operating panel.



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

A = Radiator for the engine

B = Radiator for the hydraulic system

- 1 Cap
- 2 Fluid reservoir
- 3 Radiator
- 4 Draining hose

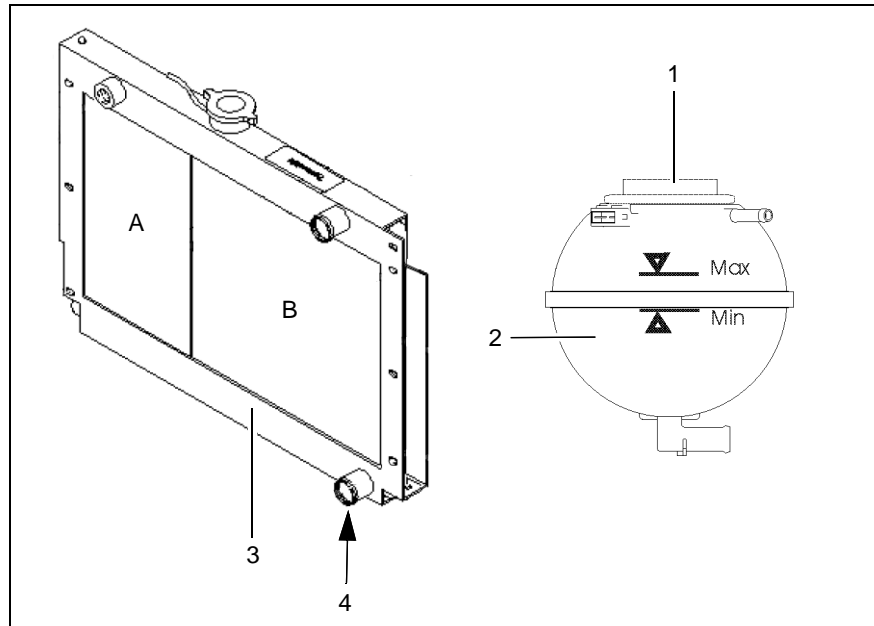


Fig.16

## Maintenance and Care

### 5.6.1 Cleaning the radiator

Check the air vents and ribs of the radiator (Fig. 16/3) for accumulations of dirt every day 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. Open the engine compartment, refer to Section 5.4.1.
2. Clean the radiator ribs carefully using compressed air.

### 5.6.2 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 every week and refill as necessary.



Only use the coolant prescribed, refer to Technical Data. Do not mix coolants!

1. Open the engine compartment, refer to Section 5.4.1.
2. When the engine has cooled down, carefully open the cap (Fig. 16/1) on the fluid reservoir (Fig. 16/2).
3. Check the coolant level. When the engine is cold, the level of liquid in the expansion tank must be between the Min. and Max. marks. In the case of a warm engine, a little above it. Fill slowly, if necessary.
4. Replace the cap.
5. Allow the engine to run for a few minutes.
6. Turn the engine off and allow to cool down.
7. Check the coolant level again and refill, if necessary.

### 5.6.3 Changing the coolant

The coolant must be changed every 1000 operating hours at the latest.

1. Open the engine compartment, refer to Section 5.4.1.
2. Place a suitable collecting vessel in position for draining the coolant. Quantity of coolant = 4 liters
3. Open the draining hose and drain off the coolant fully.



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

4. Close the draining hose again.
5. Refill coolant, see paragraph 5.6.2.
6. Replace the cap.
7. Allow the engine to run for a few minutes.
8. Turn the engine off and allow to cool down.
9. Check the coolant level again and refill, if necessary.

## Maintenance and Care

### 5.7 Fuel system



Take the utmost care when handling fuel - increased risk of fire! Never fill fuel in the vicinity of naked flames or ignitable sparks! Do not smoke when filling fuel! Switch off the engine, remove the ignition key and apply the hand brake before filling fuel. Never fill fuel in closed rooms! Clear up spilt fuel immediately!

- 1 Fuel filter cartridge
- 2 Cap
- 3 Fuel tank
- 4 Preliminary filter (between tank and engine)

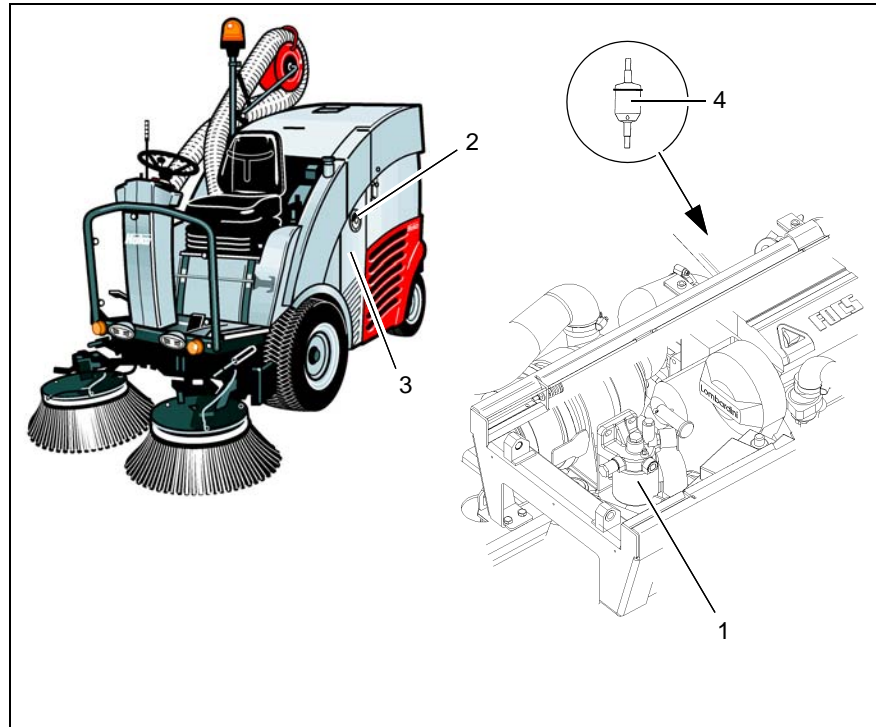


Fig.17

## Maintenance and Care

### 5.7.1 Filling fuel



Only use the fuel prescribed, refer to Technical Data!

1. Switch off the engine and remove the ignition key from the start switch before filling fuel. Apply the parking brake.
2. Remove the cap (Fig. 17/2) and fill the fuel tank (Fig. 17/3). Check the fill level when doing so. Tank volume: 20 liters.
3. Replace the cap.

### 5.7.2 Changing the fuel filter

Check the fuel filter cartridge and preliminary filter every 250 operating hours and replace, if necessary.

1. Open the engine compartment, refer to section 5.4.1.
2. Unscrew the fuel filter cartridge (Fig. 17/1).
3. Remove the preliminary filter (Fig. 17/4).



Dispose of used fuel according to the applicable environmental regulations!

4. Install new fuel filter cartridges with new sealing rings (tighten hand-tight). Insert the new preliminary filter.



The fuel pump vents automatically if the fuel tank is run empty.

## Maintenance and Care

### 5.8 Hydraulic system

The hydraulic system is located on the right-hand side of the vehicle.



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 hydraulic lines must be depressurized before completing any work on them! Cloudy hydraulic oil indicates that solution or air has penetrated into the hydraulic system! Shortages of hydraulic oil or incorrect hydraulic oil leads to damage to the hydraulic system! Hydraulic hoses must be checked and changed according to the maintenance plan!

- 1 Cap
- 2 Hydraulic oil tank
- 3 Drain plug
- 4 Dipstick
- 5 Hydraulic oil filter

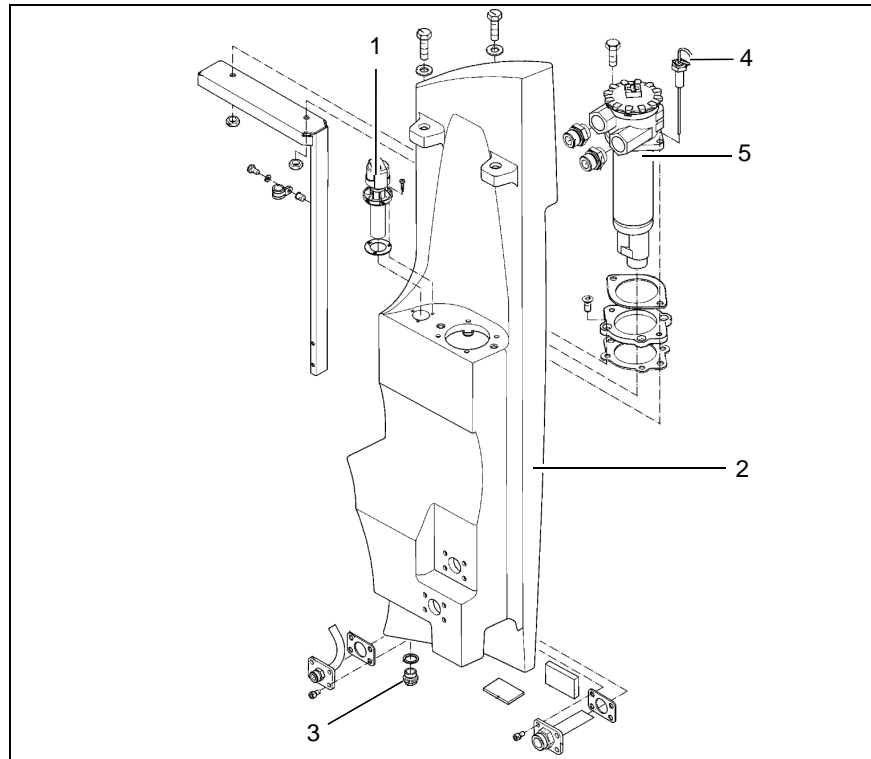


Fig.18

## Maintenance and Care

### 5.8.1 Filling hydraulic oil



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

1. Open the engine compartment, refer to Section 5.4.1.
2. Check the engine oil level with the oil dipstick (Fig. 18/4).
3. Remove the cap (Fig. 18/1).
4. Do not pour in too much oil at one time. Allow the oil a few minutes to run into the hydraulic oil tank (Fig. 18/2). Then measure the oil level again.
5. Replace the cap.

### 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. Open the engine compartment, refer to Section 5.4.1.
2. Place a suitable collecting vessel under the drain plug (Fig. 18/3) of the hydraulic oil tank.  
Oil change quantity: 20 liters  
System volume: approx. 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. Replace the drain plug with a new sealing ring and refill hydraulic oil, see paragraph 5.8.1.
5. Start the engine and check all the working functions at a low engine speed. Switch the engine off again
6. Refill more hydraulic oil, if necessary. Check the hydraulic system for leaks.

### 5.8.3 Changing the hydraulic filter

The hydraulic oil filter must be changed for the first time after 50 operating hours and subsequently every 500 operating hours.



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

1. Open the engine compartment, refer to Section 5.4.1.



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

2. Unscrew the hydraulic oil filter (Fig. 18/5).
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.

# Maintenance and Care

## 5.8.4 Hydraulic diagram

- 1 Steering
- 2 Raised emptying
- 3 Circular brush drive
- 4 Attachment lifting mechanism
- 5 Traction drive

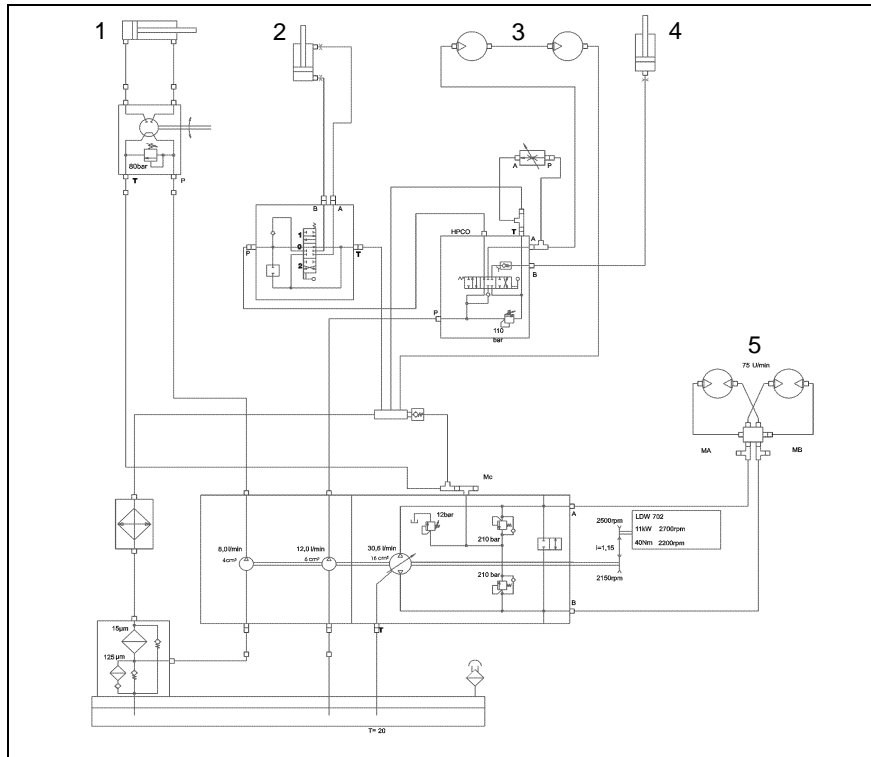


Fig.19



## Maintenance and Care

### 5.9 Sweeping unit

- 1 Spray jets
  - 1a circular brushes
  - 1b suction turbine
  - 1c suction pipe (metallic filters option)
- 2 Circular brushes
- 3 Suction nozzle
- 4 Suction turbine
- 5 Solution tank
- 6 Coarse particle flap
- 7 Cleaning flap, suction turbine
- 8 Return air flow section
- 9 Sweepings container

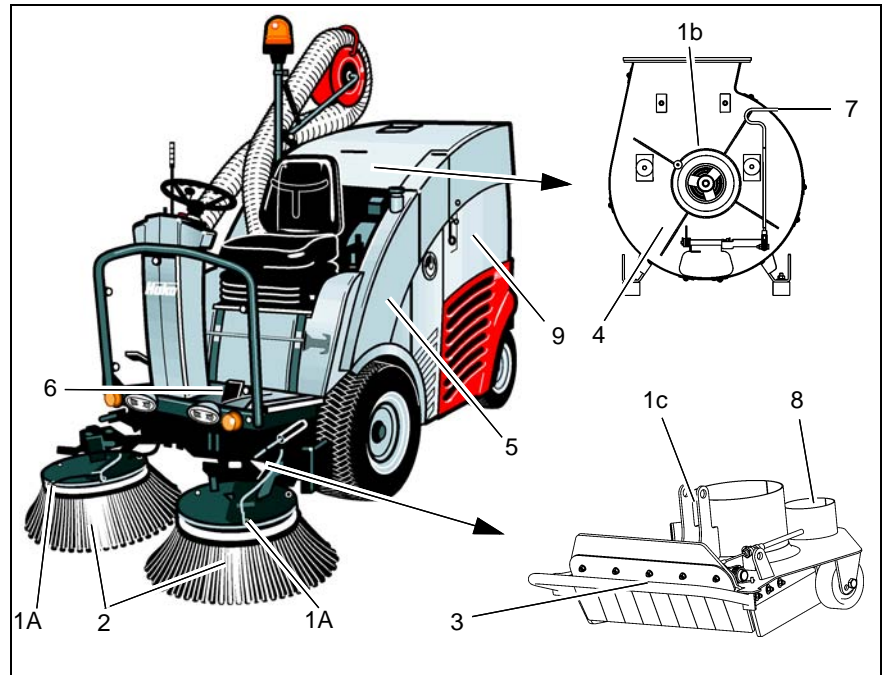


Fig.20

## Maintenance and Care

### 5.9.1 Cleaning the spray jets

Check the spray jets (Fig. 20/1) on the circular brushes and suction pipe supports of the suction turbine daily for accumulations of dirt, clean as necessary. Switch the solution pump on briefly to check the spray jets.

### 5.9.2 Cleaning the sieving filter

Check the sieving filter (Fig. 21/2) weekly for accumulations of dirt, clean as necessary. The sieving filter container must be screwed off and rinsed.

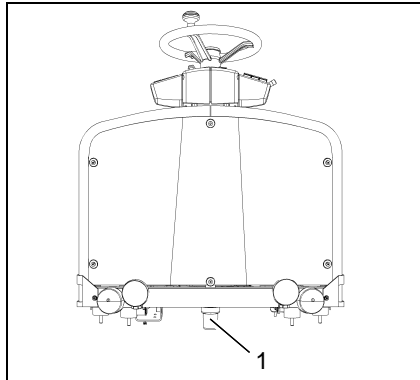


Fig.21

### 5.9.3 Draining the solution



In the case of longer periods with temperatures under 0 °C (risk of frost), the solution should be drained from all components involved in feeding the solution (e.g. solution tank, hoses, pumps).

Empty the solution tank by opening the screw plugs (Fig. 21/1) (both sides). To empty the hose lines, switch on the solution pump briefly.

### 5.9.4 Filling with solution

Check the fill level of the solution tank daily. If necessary, open the tank cap (Fig. 22/1) and fill with solution using a hose.

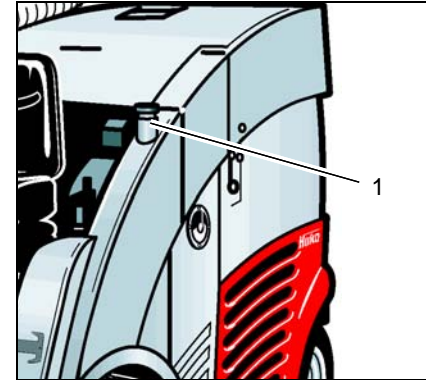


Fig.22

## Maintenance and Care

### 5.9.5 Sweeping pattern

Check the sweeping pattern weekly. The contact surfaces of the circular brushes on the ground (sweeping pattern) and the lifting arms are adjusted at the factory. When the sweeping unit is lowered, the sweeping pattern must cover the following surface areas:  
Circular brush, right = 10 to 3 o'clock;  
Circular brush, left = 9 to 2 o'clock.  
An adjustment should only be made by personnel trained at the factory.

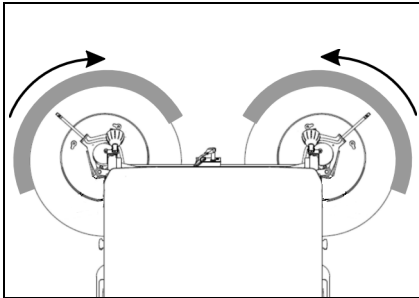


Fig.23

### 5.9.6 Adjusting the working width

The working width is adjusted by means of the star knobs (Fig. 24/1) provided on both sides. The working width can be adjusted between 1300 mm and 1750 mm.

### 5.9.7 Adjusting the circular brush pressure

The circular brush pressure is adjusted by means of the adjusting bolts (Fig. 24/2). The circular brush pressure must be adapted as the brushes wear.

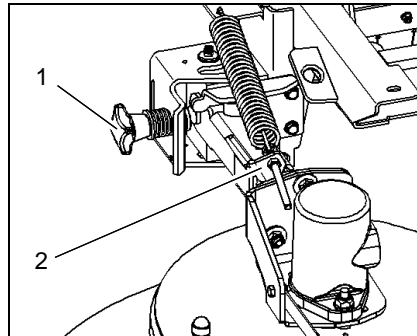


Fig.24

### 5.9.8 Changing the circular brushes

Check the circular brushes every week, replace as necessary. Each of the circular brushes is fixed to the drive by means of 4 screws. Raise the circular brush arm and change the circular brushes.

### 5.9.9 Cleaning the suction nozzle and suction turbine

1. Empty the sweepings container.
2. Start the engine, switch on the suction turbine and apply the parking brake.
3. Lower the vacuum nozzle (Fig. 20/3) and close the coarse particle flap.
4. Hold the solution hose in the vacuum nozzle. The solution sucked in cleans the vacuum nozzle and suction turbine and is fed to the sweepings container.
5. Empty the sweepings container and clean it.
6. Open the cleaning flap (Fig. 20/7) on the suction turbine and clean the suction turbine. Close the cleaning flap.
7. If necessary, clean the return air flow section (Fig. 20/8).

## Maintenance and Care

### 5.9.10 Adjusting the suction nozzle

Check the suction nozzle weekly, readjust if necessary.

The sealing strip fixed on the suction nozzle is adjusted to 5 mm ground clearance at the factory (vacuum up sand). To vacuum up foliage, it must be adjusted to approx. 10 mm. The adjustment is made by moving the rollers into the lower holes.

### 5.9.11 Changing the seal

Check the suction nozzle weekly; change the seals, if necessary. Defect seals, including those on the coarse material flap, must be replaced immediately because the suction capacity is reduced.

### 5.9.12 Solution system diagram

- 1 Spray jets, circular brushes
- 2 Spray jets and ball cock (metallic filters option)
- 3 Ball cock
- 4 Spray jets, suction pipe
- 5 Solution pump
- 6 Filter
- 7 Solution tank

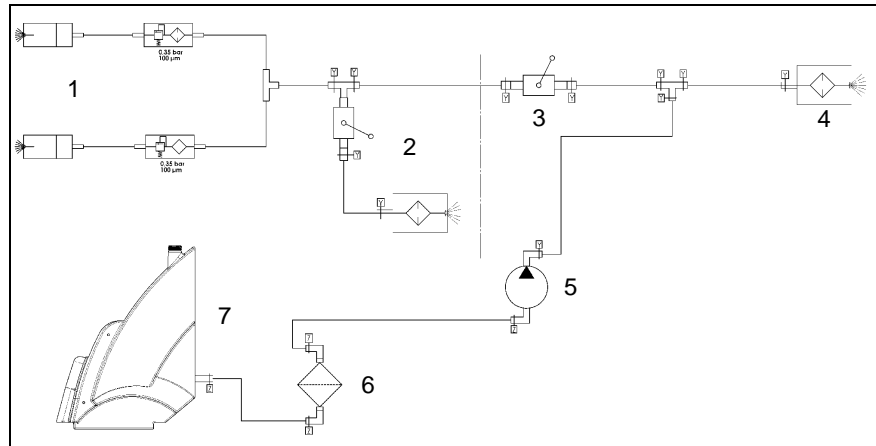


Fig.25

## Maintenance and Care

### 5.9.13 Sweepings container

#### Checking the fill level, sweepings container

Unlock the filter case and pivot towards the back.

Note: If there is a hand-held suction hose (1144) on the device, it must be pivoted 90° outwards.

The following tasks must be performed before emptying the sweepings container:

- Agitate the filter system.
- Unlock the filter case and pivot it towards the rear, remove and clean the coarse particle sieve.
- Clean the dirt deposits in the filter case.
- Remove the bottom part with the scraper.
- Reinsert the coarse particle sieve.
- Pivot the filter case back to its original position and lock it in place properly with the fastening device.

#### Emptying the sweepings container

The fastening device (Fig. 26/1) must always be locked. The pivoting lever (Fig. 26/7) must always be pushed in fully. It serves to prevent the filter case turning the wrong way.

- Raise the sweepings container (Fig. 26/6).
- Open the container flap (Fig. 26/3) by means of the lever (Fig. 26/5).
- Pull the container flap up and lock in place with the hook (Fig. 26/4).
- The waste material slides down out of the device.
- When the container is empty, the lever (Fig. 26/5) must engage on closing the container flap.

#### Positioning the slider on the suction turbine

When using the hand-held suction hose (Fig. 26/8), the slider (Fig. 26/9) is in the closed position, as illustrated in the diagram. The default setting of the slider is open.

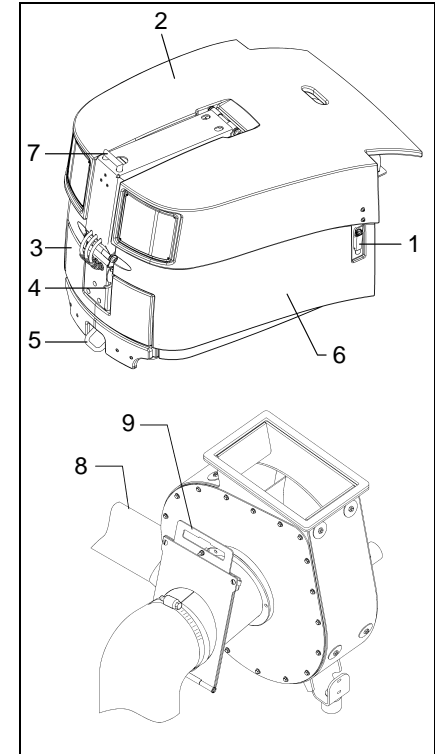


Fig.26

## Maintenance and Care

### 5.10 Filter system

- 1 Filter case
- 2 Fastening device
- 3 Pivoting lever

#### Fine particle filter

- 4 Hex nut
- 5 Filter package
- 6 Filter hoses
- 7 Perforated metal plate

#### Metal filters (option)

- 8 Preliminary filter
- 9 Main filter
- 10 Knurled nut

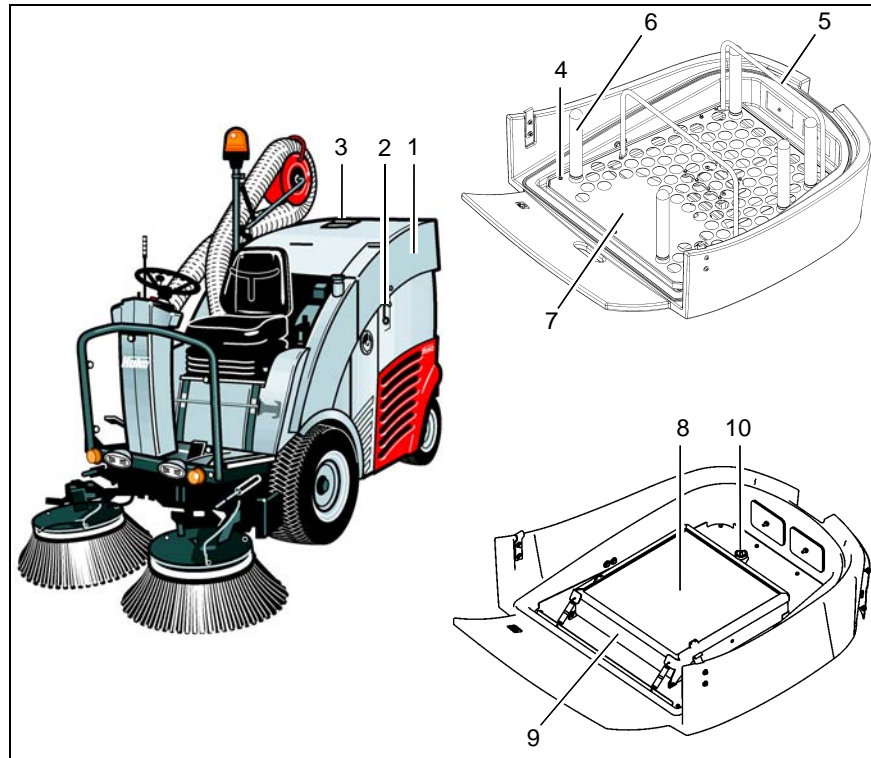


Fig.27

## Maintenance and Care

### 5.10.1 Cleaning the fine particle filter

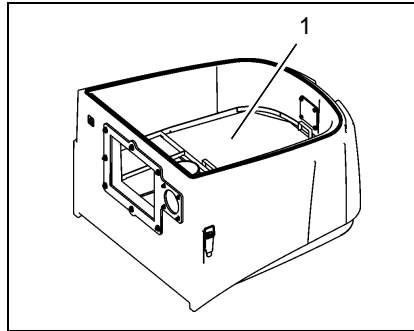
Check the coarse particle sieve and filter hoses daily for accumulations of dirt, clean as necessary.

1. Switch the suction turbine off.
2. Agitate the filter system. Actuate the agitating device (automatic agitating time approx. 20 sec.) several times, if necessary.
3. Open the fastening device (Fig. 27/ 2). Pull out the pivoting lever (Fig. 27/ 3) and pivot the filter case (Fig. 27/1) to the rear. Dry clean the filter hoses (Fig. 27/6).
4. Pivot the filter case downwards so that the loose dirt can slide out. If necessary, switch on the agitating device.



Do not use liquids to clean the filter hoses, simply beat clean or use compressed air.

5. Remove the coarse particle sieve (Fig. 28/1) and clean it. Reinsert the coarse particle sieve, pivot the filter case back in place and close it properly.



**Fig.28**

- 1 Coarse particle sieve

### 5.10.2 Changing the fine particle filter

Check the filter hoses every 250 operating hours for signs of wear, replace if necessary.

1. Open the fastening device (Fig. 27/ 2) and pivot the filter case (Fig. 27/1) out towards the rear.
2. Remove the screws at the corners.
3. Raise the filter package slightly and unplug the cable in the agitating motor.
4. Remove the filter package fully.

5. Remove the filter hoses from the perforated metal plate.
6. Clean the perforated metal plate (Fig. 27/7) thoroughly, insert new filter hoses and press on evenly.



Before inserting the new filter hoses, we recommend heating the clamping piece a little using hot air or hot water.

Installation is carried out in the reverse sequence.

## Maintenance and Care

### 5.10.3 Cleaning the metallic filters

Check the coarse particle sieve, preliminary filter and main filter daily for accumulations of dirt, clean as necessary.

1. Open the fastening device (Fig. 27/2). Pull out the pivoting lever (Fig. 27/3) and pivot the filter case (Fig. 27/1) to the rear.
2. Loosen the knurled screw (Fig. 27/10).
3. Remove the preliminary filter (Fig. 27/8), main filter (Fig. 27/9) and coarse particle sieve (Fig. 28/1) and clean using a pressure washer, for example, pointing it opposite to the normal direction of flow.
4. Reinstall the coarse particle sieve, main filter and preliminary filter.
5. Clean the inside of the roof and let the water run off.
6. Pivot the filter case back again and close properly.

### 5.10.4 Changing the metallic filters

Check the preliminary filter and main filter every 250 operating hours for signs of damage, replace as necessary.

1. Open the fastening device and pivot the filter case out towards the rear.
2. Loosen the knurled screw (Fig. 27/10).
3. Remove the preliminary filter (Fig. 27/8) and main filter (Fig. 27/9) and replace with new ones.

Installation is carried out in the reverse sequence.

### 5.10.5 Adjusting the bypass flaps

The bypass flaps in the filter case can be adjusted as follows.

- Loosen and remove the knurled screws (Fig. 29/4) and washers (Fig. 29/3).
- Remove the protective guard (Fig. 29/2).
- Loosen the handwheel (Fig. 29/1).
- The bypass flap (Fig. 29/5) can now be adjusted.

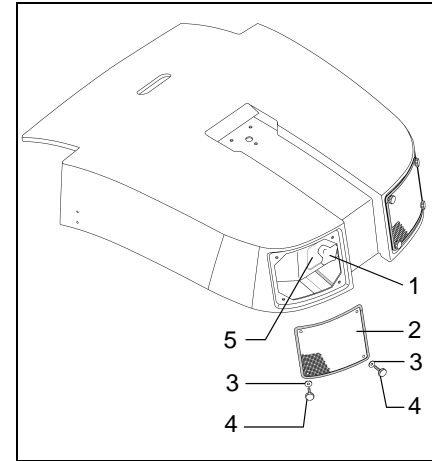
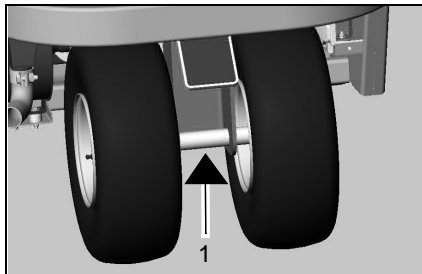


Fig.29

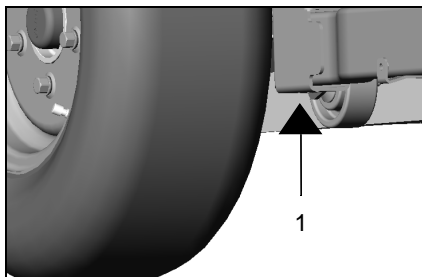


### 5.11 Wheels



**Fig.30**

1 Jacking position, rear wheels



**Fig.31**

1 Jacking position, front wheels

#### 5.11.1 Checking the tire pressure

Check the tire pressure weekly.  
Front = 1.5 bar / Rear = 2.0 bar

#### 5.11.2 Checking tire wear

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

#### 5.11.3 Changing wheels



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

#### Disassembling

1. Park the vehicle on an even surface and secure against rolling away.
2. Switch the engine off and remove the ignition key.
3. Position the jack at jacking position (Fig. 30/1) or (Fig. 31/1).
4. Raise the corresponding side of the axle and check, once again, that the vehicle is securely parked.
5. Remove the wheel bolts a/f 19 and remove the wheel.

#### Assembling

1. Mount the wheel on the centering collar and tighten all the wheel bolts a little.
2. Lower the raised side of the axle.
3. Tighten the wheel bolts using a torque wrench in a diagonally opposite sequence.



The wheel bolts must be tightened to a torque of 86 Nm.

4. The wheel bolts must be retightened as described above after approx. 50 operating hours.

## Maintenance and Care

### 5.12 Lubrication plan

- 1 Attachment lifting mechanism
- 2 Circular brush, right
- 3 Circular brush left
- 4 Coarse material flap

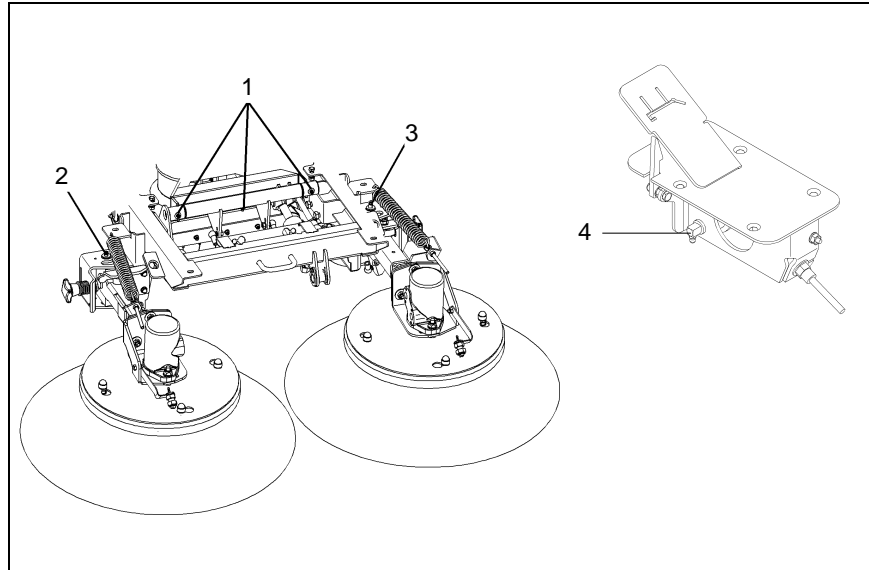
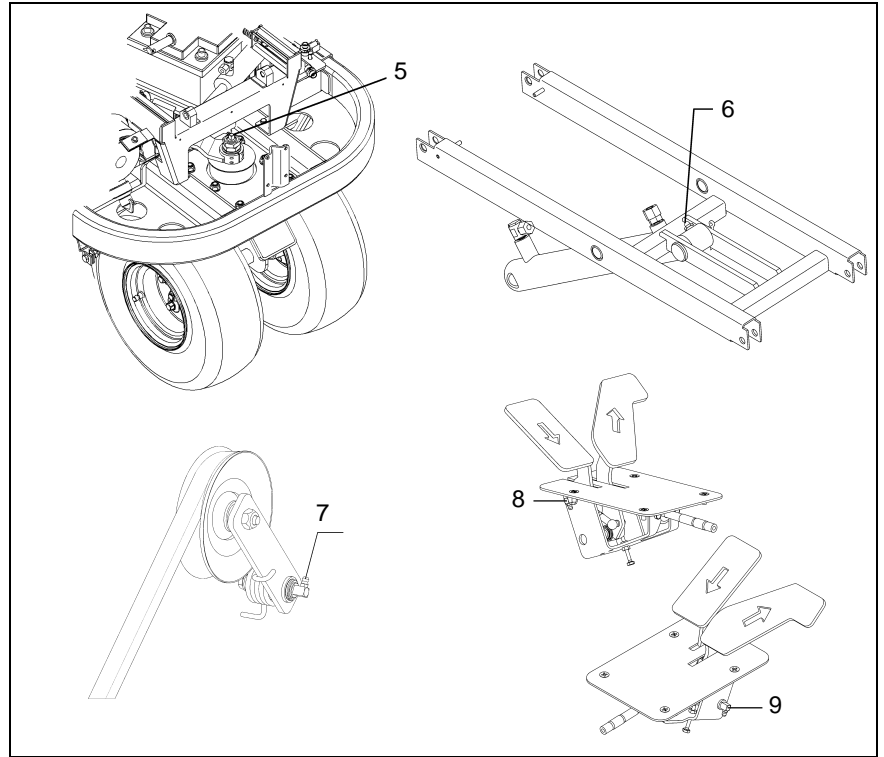


Fig.32

## Maintenance and Care

- 5 Steering, rear wheels
- 6 Lifting cylinder
- 7 Tension pulley, suction turbine
- 8 Accelerator pedal, reverse
- 9 Accelerator pedal, forwards



**Fig.33**

## Maintenance and Care

### 5.13 Fan belts

Adjustment and repair work on belts may only be carried out at an authorized Hako service center or a recognized specialist workshop! The belt tension can be controlled optimally using a measuring instrument (Fig. 34/1). Order no.: 0107-9110.

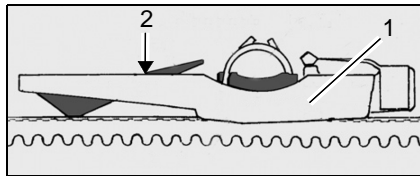


Fig.34

#### Pulling force in Newton (N)

Components	F1	F2
Hydraulic pump (1)	450	350
Dynamo (2)	100	100

F1 = Tension value for initial assembly

F2 = Retensioning value

### 5.13.1 Checking the belt tension

1. Position the measuring instrument at the top of the belt between the pulleys and press the pointer inside the scale inwards. The tension measuring instrument may only be operated by one finger.
2. Activate the measuring instrument by pressing it, slowly increasing the pressure, until you feel/hear it click. No further pressure may be exerted after the click.
3. Remove the measuring instrument from the belt and read the tension at the intersection between the scale and tip of the pointer (Fig. 34/2).
4. Adjust the belt tension until the tension measured corresponds to the value (F1) stipulated.
5. After a short running-in time, retension the belt to the value (F2).

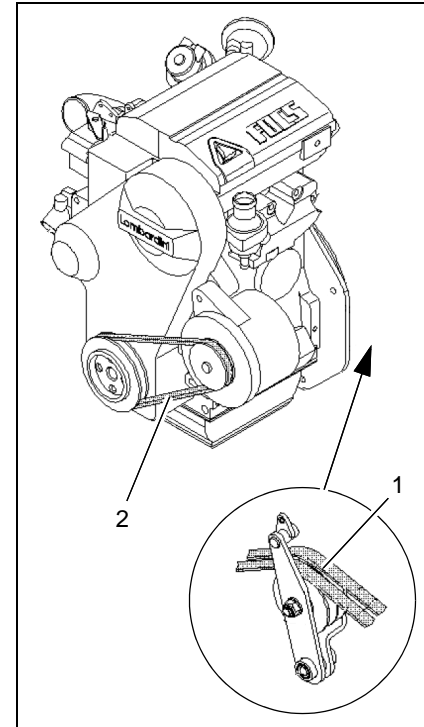


Fig.35

## Maintenance and Care

### 5.14 Electrical installation

The electrics box is located in the engine compartment. The fuses (Fx), diodes (Vx), relays (Kx) and operating hour counter are installed in the electrics box.

#### 5.14.1 Fuses

- F1 pre-fuse 30A
- F2 pre-fuse 25A
- F3 agitating motor 30A
- F4 radiator fan 30A
- F5 hazard warning light 10A
- F6 horn 10A
- F7 clearance lights 7.5A
- F8 flashing beacon 7.5A
- F9 indicators 7.5A
- F10 headlights 25A
- F11 fan/solution pump 10A
- F12 engine 5A
- F20 preheating 40A
- Fx spare fuses

#### 5.14.2 Dioden

- V1 blip encoder (steering column)
- V2 blip encoder (steering column)
- V3 generator
- V4 fan coupling
- V5 fuel valve
- V6 radiator fan
- V7 time relay, agitating motor

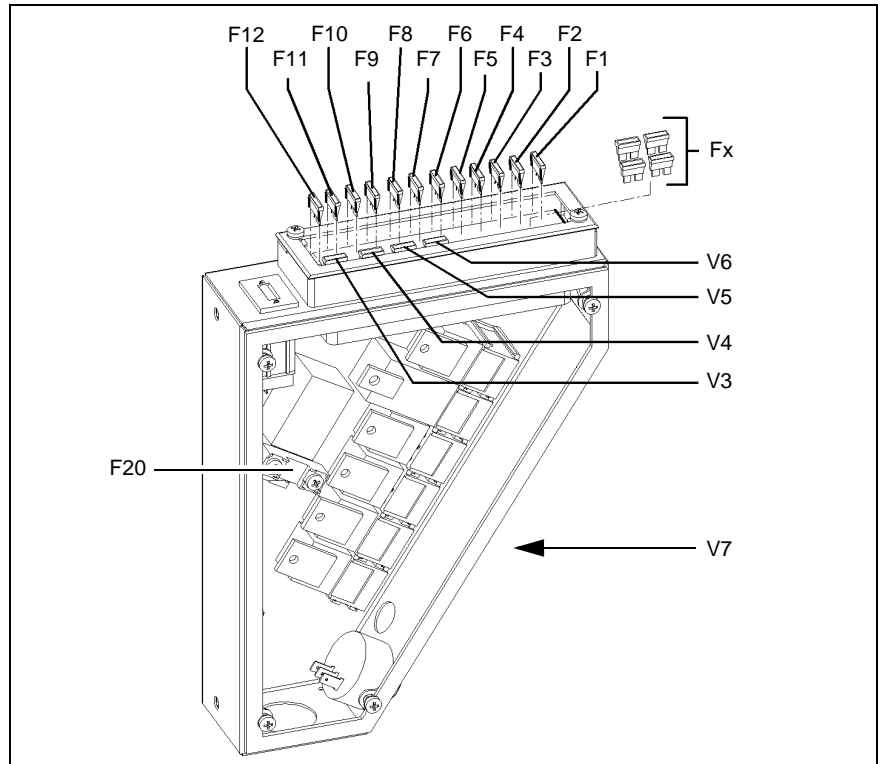


Fig.36

## Maintenance and Care

### 5.14.3 Operating hour counter

The operating hour counter (Fig. 37/1) is located at the top left of the electrics box.

### 5.14.4 Relays

K2 radiator fan  
K3 lock, suction turbine  
K4 lock, suction turbine  
K5 indicators  
K11 agitating motor  
K12 preheating  
K13 time relay, agitating motor

### 5.14.5 Battery

The battery, 12V/44 Ah (type: 57412), is located in the engine compartment.

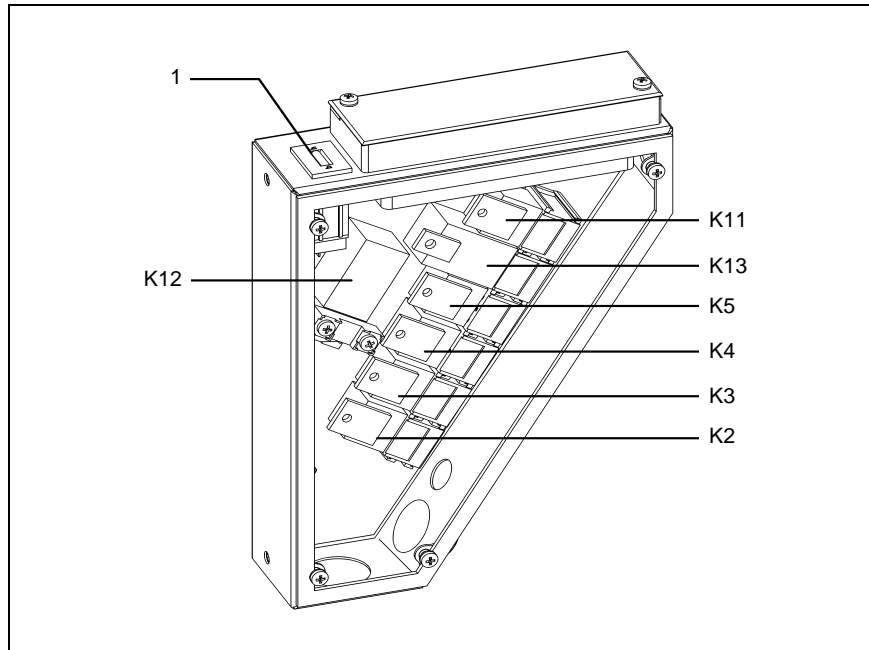


Fig.37

# Hako Citymaster 90

## Changes Due to Machine Directive 2006/42/EC



**Clean ahead**

### **Preface**

Modified text in paragraph Preface:  
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.

### **Intended use**

Modified text in paragraph Intended Use:

Based on the conception, design and construction of the model introduced onto the market by us, the machine complies with the applicable basic safety 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.

### **Disposal**

New text in Chapter Introduction:  
Render the machine inoperable. It must not represent a potential source of danger for children.

Dispose of the device according to the applicable local regulations. For further information on handling and recycling, please contact your authorized Hako dealer where you purchased the device.

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 the symbol with the crossed out 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)

### **Noise emission value**

The sound pressure level (LpA) (at the ear of the operator) measured according to DIN EN 11201 under normal working conditions: 84 dB (A)

Measurement inaccuracy (KpA):

2 dB (A)

Sound power level (LwAd) measured according to DIN EN 23744 under maximum working conditions:

100 dB (A)

Sound power level (LwAd) measured according to 2000/14/EG under maximum working conditions:

104 dB (A)

### **Vibration**

The weighted effective value of acceleration, measured in accordance with ISO 5349-1, to which the upper parts of the body (hand-arm) are exposed under normal working conditions:

< 2,5 m/s<sup>2</sup>

The weighted effective value of acceleration, measured in accordance with ISO 2631-1, to which the upper parts of the body (feet-seat) are exposed under normal working conditions:

< 0,5 m/s<sup>2</sup>

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

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

declares that the products

**Hako Citymaster 90, type 1142**

to which this declaration relates, conform to the relevant provisions of the safety and health requirements stipulated in EC Directive 2006/42/EC and is in accordance with 2004/108/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 EC Directive:

**EN 13019**

Bad Oldesloe, 27.10.2010

A handwritten signature in black ink, reading "Rainer Bavendiek". The signature is written in a cursive style with a large, prominent initial "R".

Dr. Rainer Bavendiek  
Director R&D

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

Ludger Lüttel





# *Hako*

## Spitzentechnik für eine saubere und schönere Umwelt

Superior technology for a cleaner and better environment



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