



Instruction Manual

Scrubmaster B45 (7700)

Introduction

Preface

Dear customer, It is our desire that the good characteristics of the Scrubmaster B45 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. 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 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: September 2008

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This operating manual is applicable for the machines:

- 7700.10
- 7700.12
- 7700.26
- 7700.30
- 7700.32
- 7700.37
- 7700.40
- 7700.42
- 7700.60
- 7700.62
- 7700.64
- 7700.66
- 7700.67
- 7700.77
- 7700.80

Introduction

Proper use

The machine is a vacuum scrubbing machine for wet cleaning of hard-surfaced floors. This machine is intended for commercial use, for example in hotels, schools, hospitals, factories, shops, offices and rental businesses. 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 term of proper use also includes operation, maintenance and repair work to be performed in compliance with the manufacturer's specifications. The Scrubmaster B45 may only be operated, serviced and repaired by personnel who are familiar with the work involved and are aware of the risks. The applicable accident prevention laws must be observed and any generally accepted health and safety directives must be maintained. 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 directives (refer to the Declara-

tion of Conformity). The EC Declaration of Conformity 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.

Information on the warranty

As a fundamental rule, the regulations in the purchase agreement apply. There are no rights to claims for compensation under the terms of warranty when the damage is a result of failure to observe the stipulations concerning service and maintenance. Maintenance work must be completed by an authorized Hako service center and confirmed in the "maintenance logbook"; this serves as proof of rights to claims under the terms of warranty. The following are excluded from the terms of warranty: normal wear and tear and damage caused by overuse, defective fuses, improper handling or unauthorized modifications. Claims under the terms of warranty are also annulled when damage occurs to the machine as the result of the use of parts and accessories not explicitly approved by us or to

failure to observe maintenance procedures.

Handover of the machine

Inspect the vehicle immediately on delivery for signs of transport damage. Replacement will be made when confirmation is provided immediately by the freight carrier with regard to the damage and the damage report is sent to our authorized sales partner together with the consignment note.

Disposing of the machine

Render the machine inoperable. It must not represent a source of risks to children. Dispose of the machine in accordance with the applicable local regulations. For further information on disposal and recycling, contact the authorized Hako dealer where you purchased the machine.

Table of Content

Introduction	2	2.5	Operation	15	4	Technical Data	34	
Preface	2	2.5.1	Useful tips	16	5	Maintenance and Service .	36	
Proper use	2	2.5.2	Error code table	17	5.1	Hako system maintenance . .	36	
Information on the warranty . .	3	2.6	Stopping and switching off the machine	18	5.2	Maintenance Document	37	
Handover of the machine	3	2.7	After completing work	18	5.3	Maintenance Schedule	38	
Disposing of the machine	3	2.8	Transportation and lashing points	19	5.4	Battery system	42	
1	Safety information	6	3	Operation	20	5.4.1	Charging batteries	43
1.1	Safety and Warning Symbols .	6	3.1	Method of operation	20	5.4.2	Charge status indicator	43
1.2	General Provisions	7	3.1.1	Brush head	20	5.4.3	Total discharge signal transducer (TSG)	44
1.3	Operating information	8	3.1.2	Solution tank	20	5.4.4	Servicing the driving batteries	44
1.4	Maintenance information	9	3.1.3	Squeegee	21	5.4.5	Replacing the batteries	44
1.5	Particular risks	9	3.1.4	Recovery tank	21	5.4.6	Disposing of batteries	44
1.6	Information for Protection of Environment	10	3.1.5	Power flow / traction drive . .	21	5.5	Solution tank	45
1.7	Labels on the machine	11	3.1.6	Batteries and charger	22	5.5.1	Filling the solution tank	46
2	First Operation	13	3.1.7	Options	23	5.5.2	Emptying the solution tank . .	46
2.1	Instruction	13	3.2	Operating and indicator ele- ments	24	5.5.3	Cleaning the fresh water filter	46
2.2	Initial charging procedure . . .	13	3.2.1	Operating panel	24			
2.3	Before Putting into Operation	13	3.2.2	Operating elements on the machine	32			
2.4	Switching the machine on	14						

Table of Content




5.6	Soiled Water tank	47
5.6.1	Empty Soiled Water Tank . . .	48
5.6.2	Clean Soiled Water Tank . . .	49
5.6.3	Clean Suction Filter	49
5.6.4	Checking the seal of the drain hose	49
5.6.5	Checking the Tank lid seal . . .	49
5.7	Brush head	50
5.7.1	Changing the brushes	51
5.7.2	Changing the deflector roller	51
5.7.3	Changing the sealing strip . . .	51
5.8	Squeegee	52
5.8.1	Cleaning the squeegee	52
5.8.2	Changing the sealing strips . . .	52
5.8.3	Adjusting the sealing strips . . .	53
5.9	Circular brush head	55
5.10	Rotary brush head	56
5.10.1	Cleaning the brush head	57
5.10.2	Changing the brushes	57
5.10.3	Cleaning the waste container	57
5.10.4	Changing the sealing strips . . .	58
5.10.5	Checking the spray jets	58
5.10.6	Change deflector roller	58
	EC-Declaration of Conformity	59

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.
- With Hako-AntiBac® machine variants, the plastic inner surface of the fresh water and waste water tanks contains silver ions in nanoparticle form.
- As far as safety standards are concerned, spare have to equal genuine spare parts!

Safety information

1.3 Operating information

- Before starting the machine up for the first time, the battery to be used must be fully charged, properly, by implementing the initial battery charge routine. Please pay attention to the operating manual provided with the charging unit as well as the manual from the battery manufacturer. Hako assumes no liability for damage to the battery caused by a fault when the battery is charged for the first time.
- Check the operational safety of the machine 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 machine is actually in operation!
- Always wear heavy duty, non-slip footwear when working with the machine.
- The machine may only be driven on and the equipment used on those surfaces which have been approved by the contractor or person appointed by him.
- This vehicle is not intended to be used by persons (including children) with limited physical or mental capabilities or persons without sufficient experience and ability.
- When using the machine, it is essential to pay attention to third parties, especially children.
- Start driving immediately after switching on the brush head drive otherwise imprints of the brush could be produced on the floor.
- Only use cleaning agents suitable for the vendor (non-foaming) and observe all the use, disposal and warning information provided by the cleaning agent manufacturer.
- Only open empty recovery tanks.
- The machine is not suitable for cleaning up hazardous, inflammable or explosive fluids, dust or substances.
- It is forbidden to use the machine in potentially explosive atmospheres.
- To prevent unauthorized use of the machine, remove the key from the main switch (Scrubmaster B45 CL only).
- When transporting the machine, the squeegee and brush head must be raised. The way of driving must be adapted to the local conditions.
- The machine has been conceived for use on level surfaces with a maximum gradient of 2%.

Safety information

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 machine 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.
- Before cleaning and servicing the machine or replacing parts, switch off the motors and main switch (Scrubmaster B45 CL only).
- To prevent unauthorized use of the machine, remove the key from the main switch (Scrubmaster B45 CL only).
- Always disconnect the battery terminal before starting any work on the electrical installation.
- When working in the area of the raised recovery tank, it must be hinged open fully to prevent it being knocked shut or further open and down unintentionally.
- It is not permitted to clean the machine with a pressure washer or steam blaster.
- It is not permitted to use aggressive and corrosive cleaning agents.
- Allow the machine to dry after being cleaned, e.g. over the weekend.
- Only start the machine up when all the safety equipment has been installed and brought to its protecting position.

1.5 Particular risks

Electronics

- 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.
- Only use original fuses with the presmperage.

Information on the power plug

- Only take hold of the power plug and power cable when your hands are dry.
- Never insert the power plug in the socket if the base is wet or damp.
- Never immerse the power cable or power plug in water or other fluids clean them in running water. Risk of electric shock!
- Dry any power plugs and power ca-

Safety information

bles which have become damp with a dry cloth before connecting them in power sockets.

- Pay attention that the power socket is dry.
- We recommended the use of splash-proof power sockets complying with DIN VDE 0620-1.
- Pay attention that no water or fluids can get on to live machine parts. If water should penetrate to such parts, disconnect the power plug immediately and have the vehicle checked at an authorized Hako service center.
- The power connection cable must be inspected for signs of damage at regular intervals. If damage is detected, the cable must be replaced prior to further use.

Batteries

- Observe the information in the operating manual provided by the battery manufacturer.
- Before charging the batteries, read and take heed of the safety information regarding the charging area/charging station.
- Batteries may only be handled and

changed by qualified service personnel.

- The unit is set up for running on maintenance-free and sealed batteries. Use maintenance-free batteries only!
- Due to a change in the center of gravity, only batteries approved by Hako may be installed at the intended position.
- 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!
- For further safety information, refer to flyer 88-60-2556 - Information on Driving Batteries.

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 with the recycling symbol contain reusable commodities. However, the heavy metals contained also represent a major risk to human health and to the environment. Never open or damage batteries. Never touch, inhale or swallow the content matter of batteries. Health hazard! Do not allow batteries to pollute the environment. There is a 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 the authorized Hako dealer in accordance with the Battery Act § 6 and § 8.

Safety information

1.7 Labels on the machine

The following safety and warning labels are attached to the machine where easily legible.



Missing or illegible labels must be replaced immediately.

Company logo (Fig. 1/1)

Rating plate (Fig. 1/2)



Explosive gases (Fig. 1/3)

ACHTUNG:	Explosive Gase – Flammen und Funken vermeiden – Während des Ladens für ausreichende Belüftung sorgen.
Caution:	Explosive gases – Avoid fires and sparks – Provide for sufficient ventilation during loading!
Précaution:	Gaz explosifs – Éviter des flammes et étincelles – Pourvoir suffisante ventilation pendant chargement!

Yellow point (maintenance parts) (Fig. 1/4)



Fig.1

Safety information

Waste water draining hose (Fig. 2/1)



A = Read and observe the operating manual (Fig. 2/2)

B = Maximum permissible gradient 2% (Fig. 2/2)

C = Do not clean the machine with a pressure washer (Fig. 2/2)



Only maintenance-free batteries (Fig. 2/3)

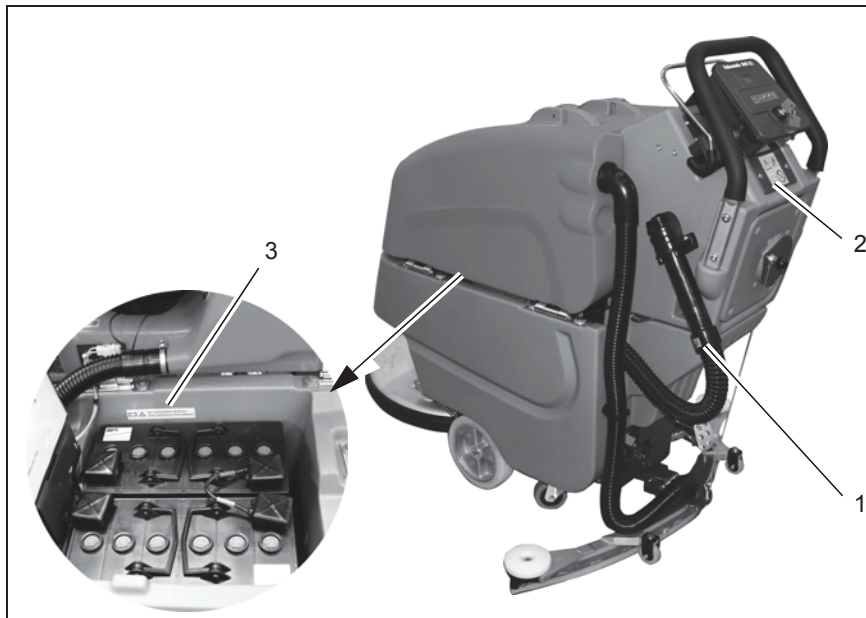


Fig.2

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 Hako contract dealer. Your Hako dealer will be informed by the manufacturer upon delivery of the vehicle and will contact you to make a date for instruction.

2.2 Initial charging procedure



Before first operation of the machine, fully charge the battery with an initial charging procedure and comply with the operating instructions of the charger as well as with those of the battery manufacturer. Hako cannot be held liable for damages resulting from an insufficient initial charge.

2.3 Before Putting into Operation

Complete the following inspections before taking the machine into operation:

1. Check the area around the machine for signs of leakage. Hoses, lines and tanks must be free from any leakage or damage.
2. Install brushes and squeegee, see maintenance chapter.
3. Install batteries and connect battery plug, see maintenance chapter.
4. Check battery charge and proceed to re-charging of batteries if required. Generally proceed to initial charging before first operation of the machine.
5. Empty recovery tank and clean it if required, see maintenance chapter.
6. Re-fill solution tank and add cleaning agent according to the manufacturer's recommendations.



Use only cleaning agents suitable for automatic machines (low-foaming) and comply with the instructions for use, disposal and with the warning information specified by the cleaning agent's manufacturer.

First Operation

2.4 Switching the machine on



Before switching the machine on, please read the safety information in Chapter 1.

Carry out the following preliminary work so that the machine is ready to operate:

Switch the machine on by actuating the switch (Fig. 3/1) from position (0) to position (1).

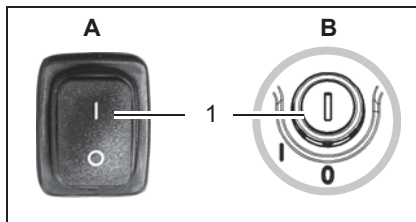


Fig.3

First Operation

2.5 Operation

Scrubmaster B45

1. Switch the machine on at the main switch. The suction turbine is switched on.
2. Lower the squeegee using the squeegee lever.
3. Lower the brush head using the foot pedal.
4. Draw back the bar on the bail system. The brush head drive and solution supply are switched on.
5. Set the solution quantity with the hand valve.
6. Push the machine. The power flow of the brush head drive supports the forward drive.



Start driving immediately after switching on the brush head drive otherwise imprints of the brush could be produced on the floor. Raise the brush head when driving over thresholds.

Scrubmaster B45 CL

1. Switch the machine on using the key switch. All the units are in Standby
2. Lower the squeegee using the squeegee lever. The suction turbine is switched on.
3. Lower the brush head using the foot pedal.
4. Draw back the bar on the bail system. The brush head drive and solution supply are switched on.
5. Set the solution quantity using the button on the operating panel.
6. Set the driving direction and speed using the bail system.
7. To alter the cleaning intensity of the cleaning process, use the buttons on the operating panel to change the solution quantity and switch the solution supply on and off.



Start driving immediately after switching on the brush head drive otherwise imprints of the brush could be produced on the floor. Raise the brush head when driving over thresholds.

First Operation

2.5.1 Useful tips

Before beginning wet cleaning, sweep the floor. This not only improves the cleaning effect but also reduces the machine's liability to wear.

The floor should be treated twice in the case of particularly dirty floors or to remove wax (thorough cleaning). During the first cleaning process, the floor is scrubbed with a cleaning agent dosage appropriate to the degree of soiling, whereby the squeegee is raised.

The cleaning agent is left to act on the floor for approx. 5 to 10 minutes according to the manufacturer's instructions, then scrub the floor again and, after that, treat it with the squeegee lowered. Important information: pay attention to the correct dosage of the cleaning agent. The correct dosage helps to reduce costs and protect the environment. The development of excessive foam impairs the machine's function. It indicates there is too much cleaning agent or the wrong one has been selected for the cleaning process being completed. Unused component parts of a cleaning agent which end up in the waste water lead to the development of foam. Information on dosage is provid-

ed on the cleaning agent container. Use the manufacturer's information as an initial basis. Practical experience will ensure that you quickly find out which is the right Hako cleaning agent and the optimum dosage to suit your needs.

First Operation

2.5.2 Error code table

In addition to the Service indicator (wrench), a four-digit service code appears in the indicator field. The dots in the service code flash. Clear the fault or note down the service code and inform your authorized Hako dealer.

Error	Cause	Remedy
1.2.5.2.	Brush motor overload	Let the brush motor cool down
1.2.6.1.	Brush is blocked	Remove foreign bodies
1.2.6.5.	Brush semiconductor	Allow the machine to cool down or inform Hako service
1.2.6.6.	Brush is not installed	Install the brush
1.4.2.1.	Suction turbine semiconductor	Allow the machine to cool down or inform Hako service
3.2.1.1.	Invalid TSG setting	Inform Hako service
4.6.1.2.	Internal SE error	Inform Hako service

First Operation

2.6 Stopping and switching off the machine

Scrubmaster B45

1. Stop the drive and release the safety switch:
 - The brush drive and solution supply are switched off
2. Raise the brush head.
3. Raise the squeegee.
4. Switch off the machine with the main switch.

Scrubmaster B45 CL

1. Release the safety switch:
 - The traction drive, brush drive and solution supply are switched off.
2. Raise the brush head.
3. Raise the squeegee.
 - The suction turbine continues to run approx. 10 seconds.
4. Switch off the machine with the key switch.
5. The machine must be protected and secured against being started up accidentally and uncontrolled movements.

2.7 After completing work

1. Drive to an appropriate maintenance area.
2. Stop the machine and switch it off.
3. Empty the recovery tank and flush it.



Observe the applicable laws and local regulations when disposing of cleaning agents.

4. Check the solution filter.
5. Check the sealing strips and suction hose.
6. Check the electrical equipment, functions and settings.
7. Clean the machine.
8. Charge the batteries.

If the machine is to be shutdown for a longer period, the solution tank must be emptied.



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

First Operation

2.8 Transportation and lashing points

When running the machine to the site of use, the squeegee and brush head must be raised.

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

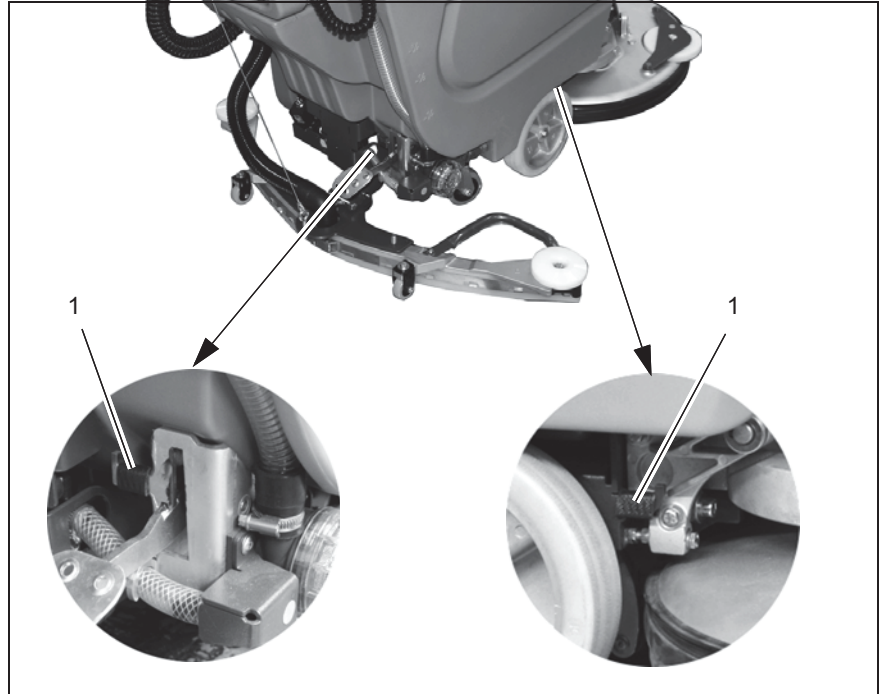


Fig.4

3 Operation

3.1 Method of operation

General information

The Scrubmaster B45 is a scrubber dryer for the wet cleaning of hard floors.

3.1.1 Brush head

The brush in the brush head (Fig. 5/1) is driven by an electric motor. The brush head is lowered by means of the brush pedal. The floor is cleaned by the rotary brush and cleaning agent. The brush can be removed for maintenance purposes by pressing a button.

3.1.2 Solution tank

The solution tank (Fig. 5/2) is filled through a detachable filling neck. The Scrubmaster B45 solution tank has a volume of approx. 45 liters. The fill level can be seen through a transparent hose. The cleaning agent quantity can be regulated.



Fig.5

Operation

3.1.3 Squeegee

The squeegee (Fig. 6/1), which is hooked in and can move, is lowered by means of a hand lever and adapts perfectly to the floor through the sealing strips. The suction turbine vacuums up the waste water from the floor.

3.1.4 Recovery tank

The waste water which is vacuumed up is fed from the squeegee to the recovery tank (Fig. 6/2) via a suction hose. A hand-held suction hose is available as an option to clean and vacuum up solution from inaccessible areas.

3.1.5 Power flow / traction drive

The hand-guided Scrubmaster B45 is optimally supported by the power flow of the brush drive. The Scrubmaster B45 CL is provided with a continuously adjustable traction drive. The driving speed, driving direction and dynamic deceleration are controlled by the electronic drive control.

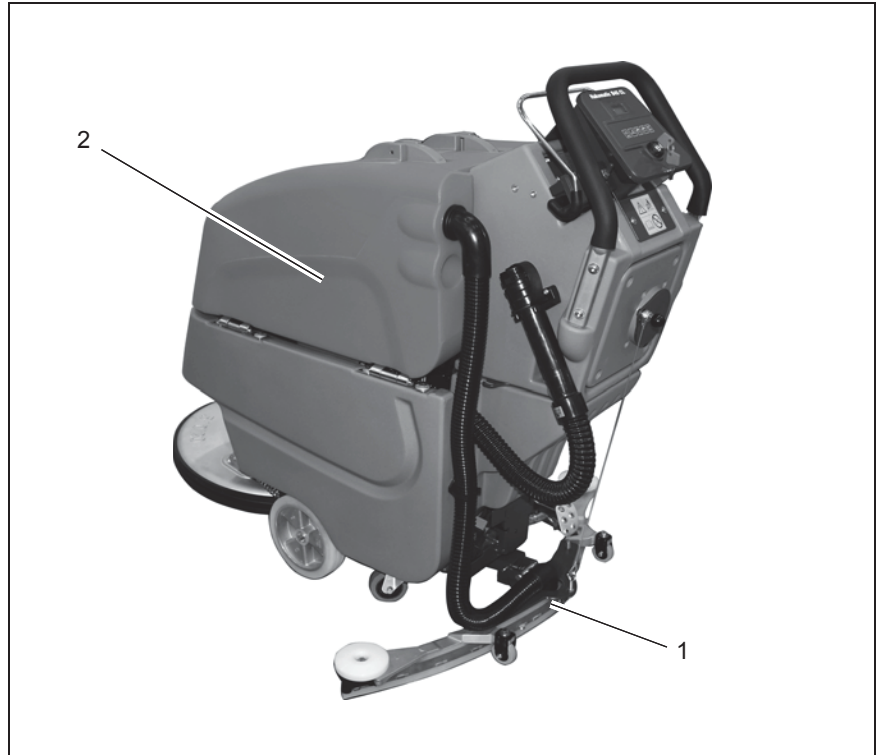


Fig.6

Operation

3.1.6 Batteries and charger

The machine is equipped with maintenance-free batteries (Fig. 7/1), a fully automatic battery charger (Fig. 7/2) and a total discharge signal transducer (TSG) to protect it against total discharge. Pay attention here to the safety information. For information on driving batteries, refer to supplementary sheet 88-60-2556



Fig.7

Operation

3.1.7 Options

- Hand suction tool incl. cleaning tools (7036.40)
- Dosing system (7056.02)
- Floating unit (7743)
- Mop holder and tool net (7725)
- Covering disk brush stainless steel (7798.20)

Scrubmaster B45 only:

- Onboard dosing system (7678)

Scrubmaster B45 CL only:

- Onboard dosing system (7678.05)

Scrubmaster B45 CL/CLH only:

- Tool connection (7724)
- Suction hose (7766)
- Floor scrubbing tool (7009)



Please refer to our spare parts catalogue in Internet under www.hako.com for information on accessories such as brushes, rollers, pads, drive plates with centerlock and suction lips.

Operation

3.2 Operating and indicator elements

3.2.1 Operating panel Scrubmaster B45

- 1 Indicator field for:
 - operating hour counter,
 - service indicator, and
 - charge status indicator
- 2 Charge mode indicator
- 3 Main switch
- 4 Bail system switch
- 5 Brush ejector

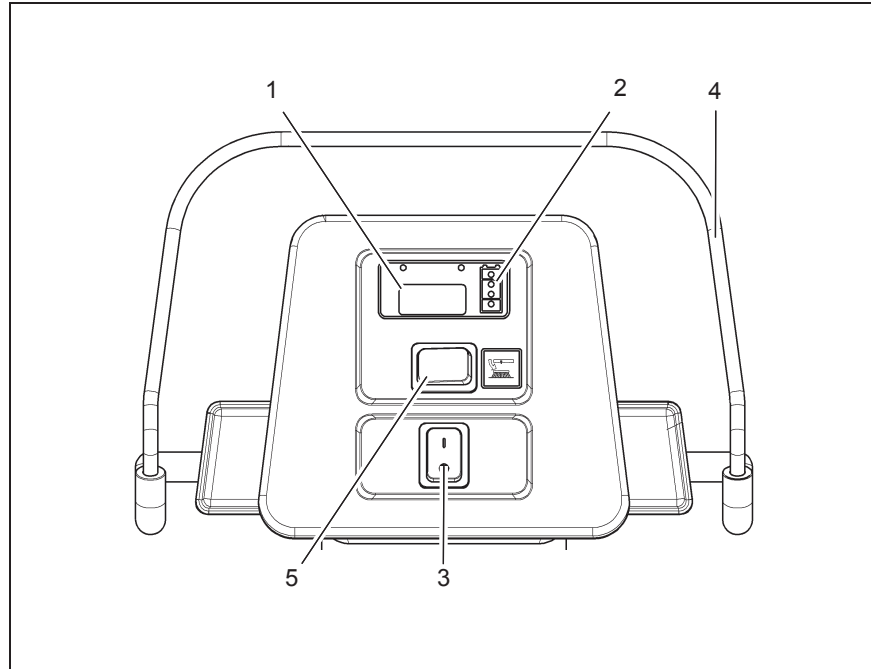
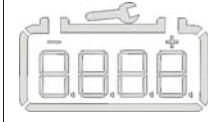


Fig.8 Scrubmaster B45

Operation



Indicator field (Fig. 8/1)

The indicator field provides a central function monitoring facility and indicates all operating states.

Operating hour counter

After switching on, the software version, last service code and current number of operating hours appear briefly in the indicator field. Then the charge status is indicated.

Service indicator

The service indicator lights up when an error has occurred in the system and the cleaning or driving process is interrupted. In addition to the service indicator (wrench), a four-digit service code appears in the indicator field. The dots in the service code flash. Clear the fault or note down the service code and inform your authorized Hako dealer.

Charge status indicator

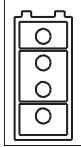
After switching on, the indicator field displays the charge status indicator. The four icons indicate the current battery charge status during operation.

- 4 icons: charge level 100%-60%
- 3 icons: charge level 60%-40%
- 2 icons: charge level 40%-20%
- 1 icon: charge level less than 20%

Battery icon flashes = three minutes until OFF.

Charge the batteries, refer to section 5.4

Operation



Charge mode indicator (Fig. 8/2)

Four green LEDs indicate the charge mode with reference to the current charging stage. If the battery is discharged, the two bottom LEDs light up. While charging, the other LEDs light up one by one.

The number of LEDs lit up corresponds to the following charge status:

1 LED:

Soft start, battery pre-charge cycle

2 LEDs

Main charge cycle - battery is being charged

3 LEDs

Trickle charge - charge level 80%

4 LEDs

Charge cycle complete - charge level 100%. Charge retention is enabled



Flashing of the bottommost LED is indicative of a fault. See charger manual.



Hako chargers are designed to work continuously, i.e., at the end of the charge cycle, the charger automatically enables charge retention to ensure that the battery is always perfectly charged. To get the most from your battery and optimize its service life, it is best to always fully charge the battery (four LEDs on).



Main switch (Fig. 8/3)

The main switch is used to switch the electrical system on and off.

Bail system switch (Fig. 8/4)

Letting go of the bail system switch during operation stops the brush head drive and the solution supply. The suction turbine remains switched on. Pulling up the bail system switch enables the brush head drive's power flow effect to support the machine drive.

Brush ejection button (Fig. 8/5)

Press the brush ejection button to eject the brush for maintenance purposes, see paragraph 5.7.1

Operation

Scrubmaster B45 CL

- 1 Indicator field for:
 - operating hour counter,
 - service indicator, and
 - charge status indicator
- 2 Charge mode indicator
- 3 Key switch
- 4 Bail system switch
- 5 Direction switch
- 6 Driving speed control
- 7 Symbol for silence kit
- 8 Symbol for tool connection (option)
- 9 Silence kit on/off button
- 10 Tool connection on/off button (option)
- 11 Solution dosage button
- 12 Solution supply on/off button
- 13 Brush ejector

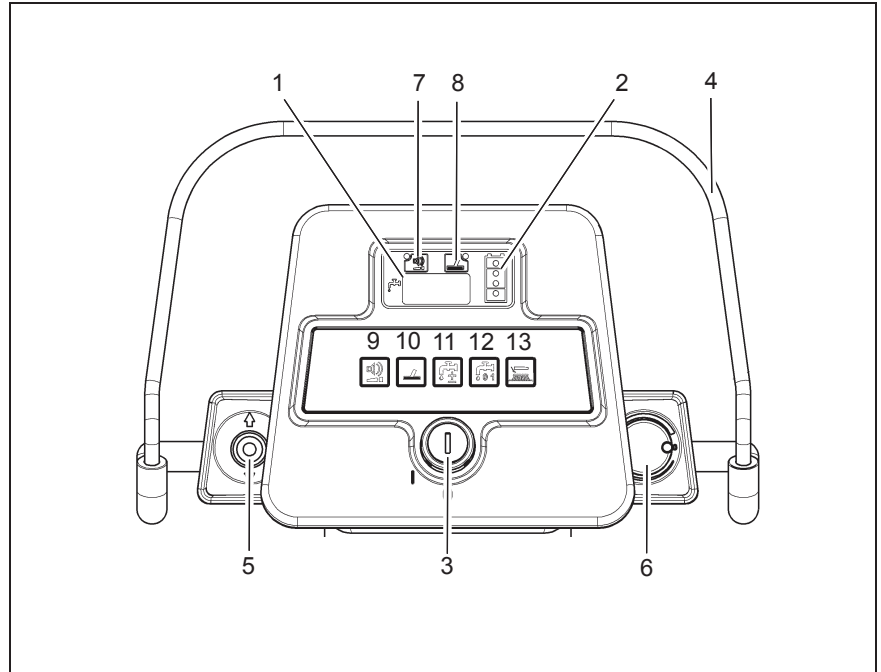
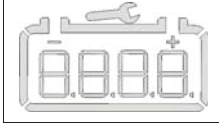


Fig.9

Scrubmaster B45 CL

Operation



Indicator field (Fig. 9/1)

The indicator field provides a central function monitoring facility and indicates all operating states.

Operating hour counter

After switching on, the software version, last service code and current number of operating hours appear briefly in the indicator field. Then the charge status is indicated.

Service indicator

The service indicator lights up when an error has occurred in the system and the cleaning or driving process is interrupted. In addition to the service indicator (wrench), a four-digit service code appears in the indicator field. The dots of the service code flash and an acoustic beep is issued.

Clear the fault or note down the service code and inform your authorized Hako dealer.

Charge status indicator

After switching on, the indicator field displays the charge status indicator. The four icons indicate the current battery charge status during operation.

4 icons: charge level 100%-60%

3 icons: charge level 60%-40%

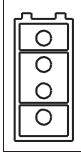
2 icons: charge level 40%-20%

1 icon: charge level less than 20%

Battery icon flashes = three minutes until OFF.

Charge the batteries, refer to section 5.4

Operation



Charge mode indicator (Fig. 9/2)

Four green LEDs indicate the charge mode with reference to the current charging stage. If the battery is discharged, the two bottom LEDs light up. While charging, the other LEDs light up one by one.

The number of LEDs lit up corresponds to the following charge status:

1 LED:

Soft start, battery pre-charge cycle

2 LEDs:

Main charge - battery is being charged

3 LEDs:

Trickle charge - charge level 80%

4 LEDs:

Charge cycle complete - charge level 100%. Charge retention is enabled.



Flashing of the bottommost LED is indicative of a fault. See charger manual.



Hako chargers are designed to work continuously, i.e., at the end of the charge cycle, the charger automatically enables charge retention to ensure that the battery is always perfectly charged. To get the most from your battery and optimize its service life, it is best to always fully charge the battery (four LEDs on).



Key switch (Fig. 9/3)

The key switch is used to switch the electrical system on and off. The indicator field displays the software version and last service code briefly after switching on.



Remove the key to prevent unauthorized use of the machine.

Bail system switch (Fig. 9/4)

Letting go of the bail system switch during operation stops the traction drive, the brush head drive and the solution supply. The suction turbine remains switched on.

Operation



Direction switch (Fig. 9/5)

The direction switch is used to preselect the driving direction for the machine.
Switch to front = forward drive
Switch to rear = reverse drive
To change the driving direction, bring the machine to a stop, select the new direction and start again.



Driving speed control (Fig. 9/6)

The driving speed control is a continuously adjustable knob to set the machine speed.



Symbol for silence kit (Fig. 9/7)

The LED lights up when the silence kit function is switched on.



Symbol for tool connection (option) (Fig. 9/8)

The LED lights up when the tool connection function is switched on.



Silence kit button (Fig. 9/9)

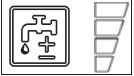
The silence kit button is used to switch low-noise operation on and off. The silence kit reduces the noise made by the vacuuming equipment.



Tool connection button (option) (Fig. 9/10)

The tool connection button is used to switch operation of the spray and vacuum tool on and off.

Operation



Solution dosage button (Fig. 9/11)

The solution quantity can be adjusted during operation. The level selected appears as an icon in the indicator field. To adjust the solution quantity, press the button until the required level is indicated. Conditions to set the solution quantity:

- Main switch is switched on
- Brush head is lowered
- The bail system switch is pulled up



Solution supply on/off button (Fig. 9/12)

The button serves to switch the solution supply on and off. When the brush is switched on, the last solution quantity set is automatically reactivated but this setting can be altered, however, with the solution dosage button.



Brush ejection button (Fig. 9/13)

The brush can be removed for maintenance purposes by pressing a button.

Eject brush:

Raise the brush head. Press the button for approx. 5 seconds when the brush head is raised. Brush ejection is indicated in the indicator field by four icons which light up successively.



After brush ejection, the top and bottom row of symbols flash alternately. The machine is not ready to operate. Switch the machine off using the main switch.



Attach brush:

Switch the machine on again using the main switch. Position the brush centered under the raised brush head. Lower the brush head. When the brush head drive is switched on by means of the bail system switch, the brush is automatically attached.

Operation

3.2.2 Operating elements on the machine

- 1 Solution tank filling neck
- 2 Squeegee lift lever
- 3 Solution filter
- 4 Solution draining hose
- 5 Power supply line to charger
- 6 Brush head lift foot pedal
- 7 Waste water draining hose
- 8 Hand valve for water dosage (Scrubmaster B45 only)

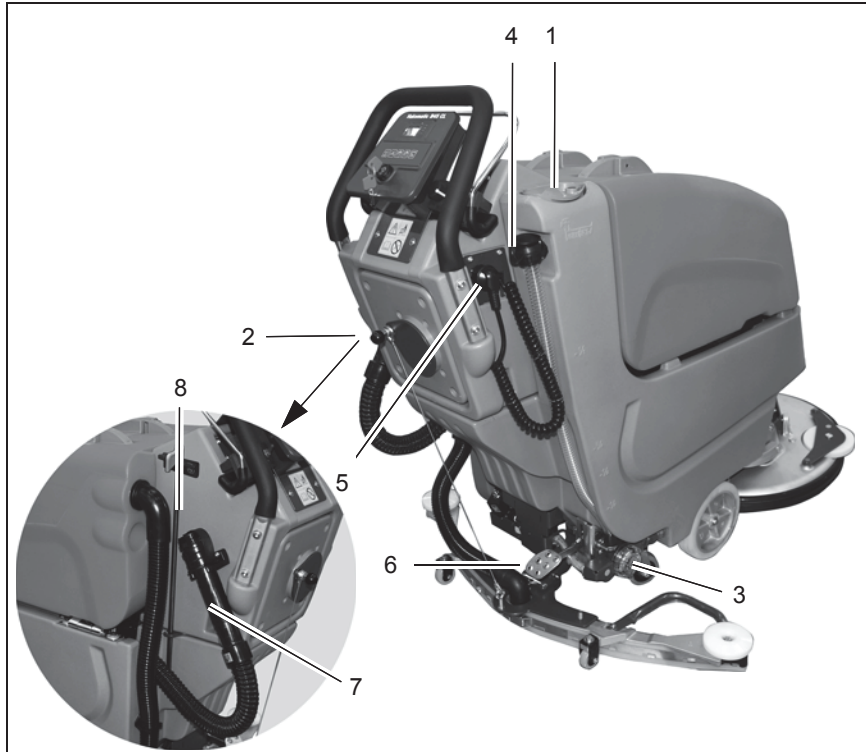


Fig.10

Operation

Solution tank filling neck(Fig. 10/ 1)

The solution tank is filled through a detachable filling neck. The fill level can be seen through the draining hose.

Squeegee lift hand lever (Fig. 10/2)

Use the hand lever to lower or lift the squeegee. On Scrubmaster B45 CL machines, this also turns the suction turbine on/off.

Solution filter (Fig. 10/3)

When the solution is fed from the solution tank to the brush head, the solution is cleaned by a filter insert.

Solution draining hose (Fig. 10/4)

The solution tank draining hose is used to drain the solution.

Power supply line (Fig. 10/5)

The power supply line feeds power to the charger.

Brush head lift foot pedal (Fig. 10/6)

This pedal raises and lowers the brush head.

Waste water draining hose (Fig. 10/7)

Use this hose to drain any waste water previously drawn up into the waste water tank.

Solution hand valve (Fig. 10/8)

Scrubmaster B45 features a hand valve for adjusting the amount of water supplied to the brush head. The solution quantity can be regulated between 0 l/min and 1.85 l/min.

Technical Data

4 Technical Data

		B45 TB*	B45 CL TB**	B45 CLH TB**	B45 CL WB**
Machine length	cm	127/135	127/135/137	135	135
Machine height at operating bar	cm	112	112	112	112
Machine width w/o squeegee	cm	50/56	50/56/67	56/86	60/86
Machine width w/ squeegee	cm	76/86	76/86/95	56/86	60/86
Working width	cm	43/51	43/51/65	51	50
Effective suction width	cm	76/86	76/86/95	86	86
Theoretical area coverage	m ² /h	1700/2000	1900/2300/2900	2300	2200
Nominal voltage	V	24	24	24	24
Power consumption of traction drive	W	-	180	180	180
Power consumption, aspirating engine	W	410	410	410	410
Power consumption, brush motor	W	720	720	720	720
No. of brushes	Pieces	1/1	1/1/2	1	2
Brush diameter	cm	43/51	43/51/2x33	51	10
Working speed	kph	4	4.5	4.5	4.5
Solution tank	Liter	45	45	45	45
Recovery tank	Liter	42	42	42	42
Weight (empty, w/o batteries)	kg	99/101	106/108/118	108	108
Weight (w/ water and batteries)	kg	221/223	228/230/237	230	230

* = power flow / ** = wheel drive

Technical Data

Noise emission value		B 45t	B 45 CL/CLH
Sound power level ($L_{WA,d}$) measured according to DIN EN 60335-2-72 under maximum working conditions:	dB (A)	84	82
The sound pressure level (L_{pA}) (at the ear of the operator) measured according to DIN IEC 60335-2-72 under normal working conditions:	dB (A)	64	61
Measurement inaccuracy (K_{pA}):	dB (A)	2	2
Vibration			
The weighted effective value of acceleration, measured in accordance with DIN EN ISO 5349-1, to which the upper parts of the body (hand-arm) are exposed under normal working conditions:	m/s ²	< 2.5	< 2.5
The weighted effective value of acceleration, measured in accordance with DIN EN ISO 2631-1, to which the body (feet-seat) is exposed under normal working conditions:	m/s ²	< 0.5	< 0.5

Battery charger		
Mains power supply	V	230
Mains current	A	1.8
Charging voltage	V	24
Charging current	A	12.6

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. Please contact your nearest Hako service center or Hako authorized 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 in the case of inquiries and spare parts orders, refer to section 1.7 - Rating plate.

5.1 Hako system maintenance

The Hako system maintenance:

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

Hako system maintenance provides individual modules explaining the special technical work to be carried out and prescribes the intervals at which the work should be performed. Parts to be replaced for the individual maintenance tasks are defined and provided 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 machine's parts to be serviced are marked with a yellow dot and yellow areas

The operator is duly instructed when the vehicle is delivered.

Hako system maintenance I:

(every 125 operating hours)

Completed by technical experts from an authorized Hako service center in accordance with the specific vehicle system maintenance using spare parts kits.

Hako system maintenance II:

(every 250 operating hours)

Completed by technical experts from an authorized Hako service center in accordance with the specific vehicle system maintenance using spare parts kits.

Hako system maintenance III S:

(every 500 operating hours, safety check)

Completed by technical experts from an authorized Hako service center in accordance with the specific vehicle system maintenance using spare parts kits. Completion of all legally prescribed, safety-related tests in accordance with UVV-BGV-TÜV-VDE

Maintenance and Service

5.2 Maintenance Document

<p>Handing over</p> <p>Upgrade Test drive Handing over to the customer Instruction carried out on: at _____ operating hours</p>	<p>Hako-System-Maintenance I 125 operating hours Workshop stamp</p> <p>carried out on: at _____ operating hours</p>	<p>Hako-System-Maintenance II 250 operating hours Workshop stamp</p> <p>carried out on: at _____ operating hours</p>	<p>Hako-System-Maintenance I 375 operating hours Workshop stamp</p> <p>carried out on: at _____ operatin hours</p>
<p>Hako-System-Maintenance III/S 500 operating hours Workshop stamp</p> <p>carried out on: at _____ operating hours</p>	<p>Hako-System-Maintenance I 625 operating hours Workshop stamp</p> <p>carried out on: at _____ operating hours</p>	<p>Hako-System-Maintenance II 750 operating hours Workshop stamp</p> <p>carried out on: at _____ operating hours</p>	<p>Hako-System-Maintenance I 875 operating hours Workshop stamp</p> <p>carried out on: at _____ operatin hours</p>
<p>Hako-System-Maintenance III/S 1000 operating hours Workshop stamp</p> <p>carried out on: at _____ operating hours</p>	<p>Hako-System-Maintenance I 1125 operating hours Workshop stamp</p> <p>carried out on: at _____ operating hours</p>	<p>Hako-System-Maintenance II 1250 operating hours Workshop stamp</p> <p>carried out on: at _____ operating hours</p>	<p>Hako-System-Maintenance I 1375 operating hours Workshop stamp</p> <p>carried out on: at _____ operating hours</p>

Maintenance and Service

5.3 Maintenance Schedule Hako-System Maintenance Customer

The daily and weekly maintenance intervals are to be performed by the customer/operator.

To be performed	Interval	
	daily	weekly
Fill clear water tank and proceed to chemical agent dosage	o	
Charge batteries	o	
Check brush head and clean if required	o	
Check squeegee and clean if required	o	
Empty soiled water tank, clean soiled water tank and suction filter	o	
Check drain hose for soiling and clean if required	o	
Check seal of the drain hose and replace if required	o	
Clean tank lid sealing of the soiled water tank	o	
Check brush head sealing strips and replace if required		o
Check brushes/pads and replace if required		o
Clean suction hose of soiled water tank		o
Check water filter and clean if required		o
Check squeegee sealing strips and eventually turn round or replace		o
Check clear water supply to brushes and clean if required		o
Check deflector roller of brush head and replace if required		o
Test drive and function test		o

Maintenance and Service

Hako-System Maintenance I

The following maintenance works are to be performed by an authorised Hako Service workshop.

To be performed	Interval
	every 125 hours of operation
Check battery charger	o
Check tank lid sealing of the soiled water tank and replace if required	o
Check function of bailsystem and operating panel	o
Check seal of the drain hose and replace if required	o
Grease joints at the brush lift-out	o
Check wheel fixing screws and tighten (10 Nm) if required	o
Check condition of tyres	o
Grease joints at the squeegee holder	o
Test drive and function test	o

Maintenance and Service

Hako-System Maintenance II

The following maintenance works are to be performed by an authorised Hako Service workshop.

To be performed	Interval
	every 250 hours of operation
Perform maintenance works according to Hako-System Maintenance I	o
Inspect steering rollers for tread damages and bearing slackness and replace if required	o
Check function of water pump and replace if required	o
Check drain hose of the soiled water tank and replace if required	o
Check deflector roller of the brush head and replace if required	o
Check suction hose for tight fitting and damages and replace if required	o
Check supporting wheel of the squeegee and replace if required	o
Test drive and function test	o

Maintenance and Service

Hako-System Maintenance III/S

(Safety check)

The following maintenance works are to be performed by an authorised Hako Service workshop at least once yearly.

To be performed	Interval
	every 500 hours of operation
Perform maintenance works according to Hako-System Maintenance II	o
Check drive protection of the charger	o
Check function of suction turbine and replace if required (replace at the latest after 1000 operating hours)	o
Check brake of the travel drive motor (Scrubmaster B45 CL only)	o
Clean travel drive motor (Scrubmaster B45 CL only) from carbon dust and check carbon brushes for smooth operation and wearing and replace carbon brushes if required	o
Clean brush motors from carbon dust and check carbon brushes for smooth operation and wearing and replace carbon brushes if required (replace at the latest after 1000 operating hours)	o
Test drive and function test	o

Maintenance and Service

5.4 Battery system

- 1 Indicator field w/ charge status indicator
- 2 Charge mode indicator
- 3 On-board charger
- 4 Charger power plug
- 5 Battery terminals
- 6 Batteries
- 7 Waste water tank
- 8 Circuit diagram
- 9 Connecting line

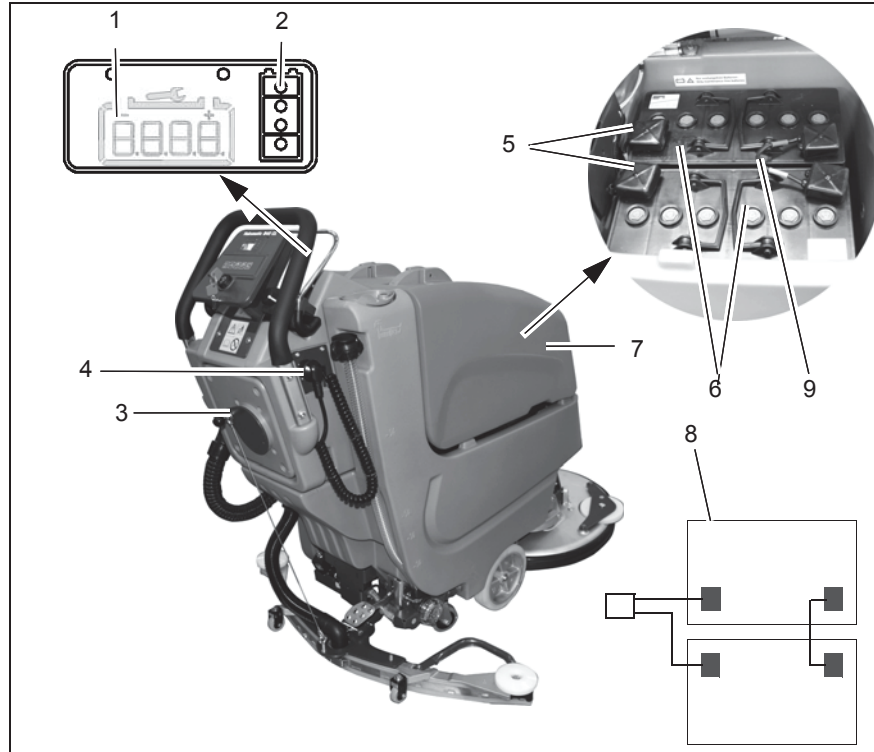


Fig.11

Maintenance and Service

5.4.1 Charging batteries



Complete an initial battery charge cycle to properly charge the batteries prior to running the machine for the first time. Hako assumes no liability for damage to the battery caused by a fault when the battery is charged for the first time.

Ensure sufficient ventilation in the charging area when charging the batteries – risk of explosion.

Before charging the battery, wait until at least one charge status indicator bar has extinguished after operating the machine. The battery is charged by the integrated on-board charger (Fig. 11/3):

1. Turn the machine off.
2. Remove the power plug (Fig. 11/4) from its receptacle on the right-hand side.
3. Plug the connector into a 230 V mains outlet.

Charging will start automatically. The charge mode indicator (Fig. 11/2) shows the progress. Pay attention to

the information in the operating manuals supplied with the charger and the battery.



You cannot turn on the machine while charging.

5.4.2 Charge status indicator

Check the indicator field (Fig. 11/1) for the current charge status of the batteries during operation. The charge status indicator is connected to a total discharge signal transducer (TSG) in the machine control unit. Four segments on the display are indicative of the batteries being fully charged. The segments extinguish one by one as more power is drawn from the batteries. At the discharge limit, the battery icon starts to flash and the TSG turns off the cleaning functions to prevent total battery discharge (machines with a traction drive can still be moved at reduced speed). Charge the batteries immediately!

Maintenance and Service

5.4.3 Total discharge signal transducer (TSG)

The machine features a total discharge signal transducer to prevent total battery discharge.

The TSG is set to the built-in batteries at the factory. The TSG needs to be adapted to other batteries approved by Hako.



The total discharge signal transducer may only be adjusted by a licensed Hako workshop!

5.4.4 Servicing the driving batteries

Never keep discharged batteries but recharge them immediately!

For information on servicing driving batteries, refer to operating manual 88-60-2556.

5.4.5 Replacing the batteries



Use batteries approved by Hako only!



Use maintenance-free and sealed batteries only!



Batteries to be replaced by qualified service technicians only!



We recommend our licensed Hako Customer Service.

5.4.6 Disposing of batteries

Used batteries with the recycling symbol contain reusable commodities. Do not throw into the household waste. See section 1.6 Ecological Information.

5.5 Solution tank

- 1 Solution tank
- 2 Marking
- 3 Fill level hose
- 4 Solution filter
- 5 Tank cap

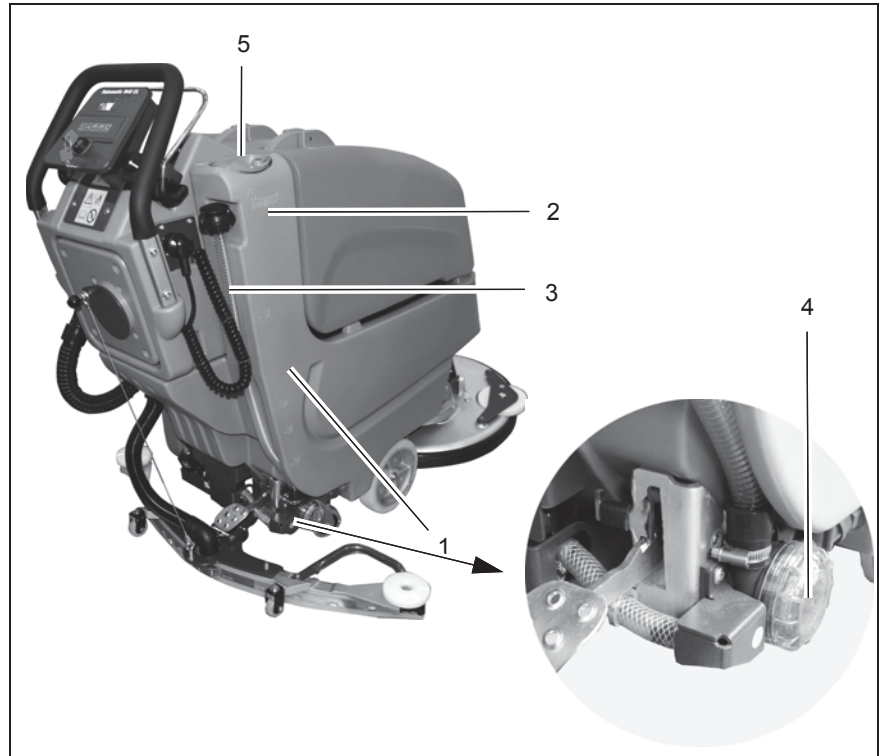


Fig.12

Maintenance and Service

5.5.1 Filling the solution tank

Fill the solution tank (Fig. 12/1) before starting work or as necessary. Park the vehicle on a level floor area.

Open the tank cap (Fig. 12/5) and fill the solution tank up to the maximum marking (1/1)(Fig. 12/2).

5.5.2 Emptying the solution tank

Park the machine so that the fill level hose (Fig. 12/3) is above a drain in the floor. Remove the fill level hose from the holder and remove the cover.

5.5.3 Cleaning the fresh water filter

Check the solution filter (Fig. 12/4) weekly and clean or replace it as necessary.



Only clean the solution filter when the tank is empty.

1. Empty the solution tank (Fig. 12/1), see paragraph 5.5.2.
2. Screw the filter cap off.
3. Remove the filter element in the filter housing to clean it. Replace it with a new one, if necessary.
4. Replace the filter element and filter cap.

5.6 Soiled Water tank

- 1 Soiled Water Tank
- 2 Drain hose
- 3 Suction filter
- 4 Tank lid
- 5 Drain valve sealing
- 6 Tank lid sealing

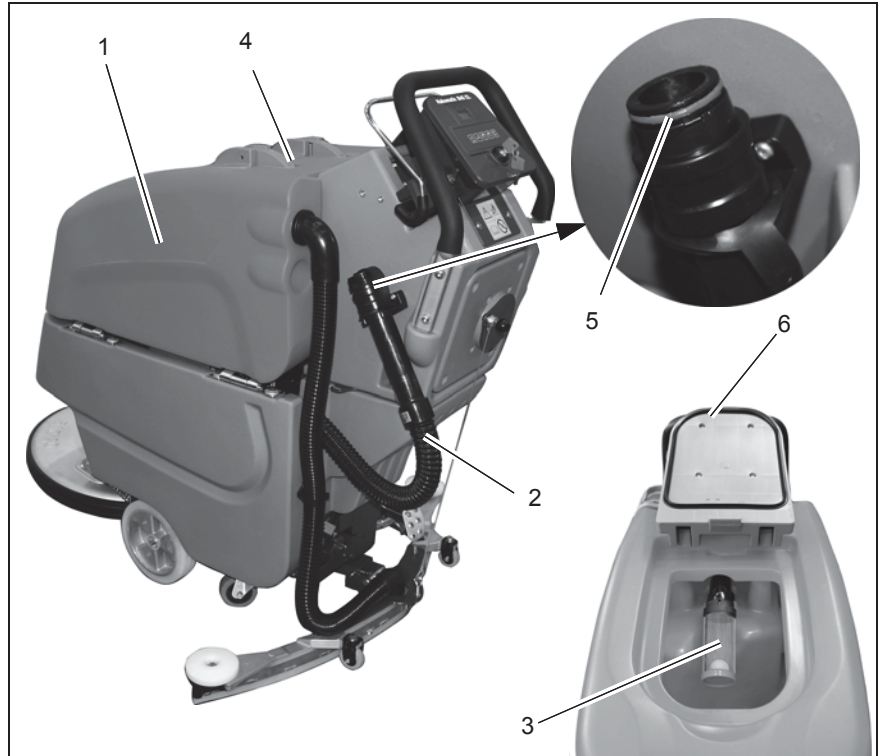


Fig.13

Maintenance and Service

5.6.1 Empty Soiled Water Tank

Clean soiled water tank (Fig. 13/1) at daily intervals, as required or upon acoustic signal (increased suction turbine speed).

1. Take machine to appropriate place for discharge.
2. Park machine such that drain hose attains drain aperture in the floor.
3. Switch off machine.



Observe the legal provisions and the local regulations for disposal of detergents!

4. Take drain hose (Fig. 13/2) from holder. Bend the drain hose in the front area.



Turn off the cap.



Put drain hose in the original position and empty soiled water tank completely.



Maintenance and Service

5.6.2 Clean Soiled Water Tank

Clean soiled water tank (Fig. 13/1) at daily intervals or as required.

1. Empty soiled water tank, see paragraph 5.6.1.
2. Open tank lid (Fig. 13/4) of the soiled water tank.
3. Take drain hose (Fig. 13/2) from holder and empty soiled water tank completely.
4. Remove remaining dirt by rinsing with clear water.
5. Rinse drain hose as well.

5.6.3 Clean Suction Filter

Check suction filter (Fig. 13/3) for function at daily intervals and clean if required. The suction filter is clipped and can be easily removed.

5.6.4 Checking the seal of the drain hose

Check the functionality of the seal from the drain hose (Fig. 13/5) daily and change it after 125 operating hours at the latest.

Check drain hose after use of soiling and clean if required.

5.6.5 Checking the Tank lid seal

Check the functionality of the seal in the tank cap (Fig. 13/6) daily and change it after 125 operating hours at the latest.

5.7 Brush head

- 1 Brush
- 2 Brush head
- 3 Brush head lift lever
- 4 Brush ejection button
- 5 Deflector roller
- 6 Sealing strip

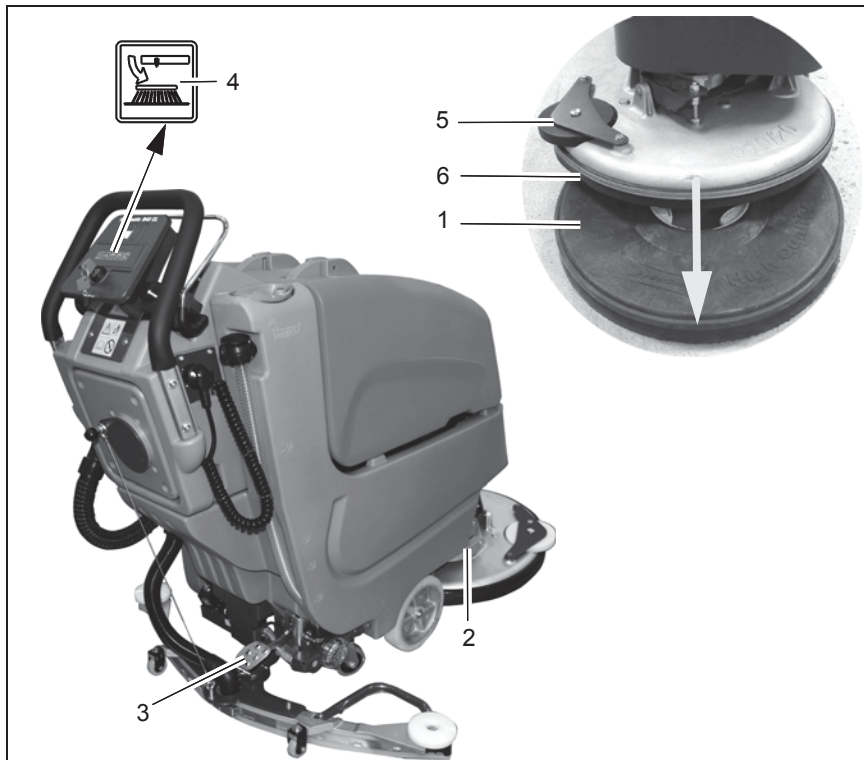


Fig.14

Maintenance and Service

5.7.1 Changing the brushes

Check the brushes (Fig. 14/1) in the brush head (Fig. 14/2) weekly for signs of wear. In the case of wear to a brush length of 1.5 cm, the brushes must be changed.

Eject brush:

Raise the brush head using the lever (Fig. 14/3). Press the button (Fig. 14/4) for approx. 5 seconds when the brush head is raised. Brush ejection is indicated in the indicator field by four icons which light up successively.



After brush ejection, the top and bottom row of symbols flash alternately. The machine is not ready to operate. Switch the machine off using the main switch.



Attach brush:

Switch the machine on again using the main switch. Position the brush centered under the raised brush head. Lower the brush head. When the brush head drive is switched on by means of the bail system switch the brush is automatically attached.

5.7.2 Changing the deflector roller

Check the deflector roller (Fig. 14/5) weekly and change it as necessary.

5.7.3 Changing the sealing strip

Check the sealing strip (Fig. 14/6) weekly and change it as necessary. To do this, loosen the fastening device and remove the sealing strip. Installation is carried out in the reverse sequence.

Maintenance and Service

5.8 Squeegee

- 1 Squeegee
- 2 Star-shaped knob
- 3 Adjusting bolt for angle adjustment
- 4 Suction hose
- 5 Fastening device
- 6 Washers for height adjustment

5.8.1 Cleaning the squeegee

Check the squeegee (Fig. 15/1) daily and clean it as necessary.

To clean the squeegee raise it, disconnect the suction hose (Fig. 15/4), loosen the two star-shaped knobs (Fig. 15/2) and remove the squeegee.

5.8.2 Changing the sealing strips

Check the inner and outer sealing strips on the squeegee (Fig. 15/1) weekly for signs of wear. The sealing strips can be turned four times (90°) and reused.

1. Raise the squeegee.
2. Disconnect the suction hose, loosen the two star-shaped knobs and remove the squeegee.
3. Loosen the fastening device (Fig. 15/5) and remove the outer sealing strip. Turn the sealing strip or replace it, as necessary. Change the inner sealing strip in the same way.

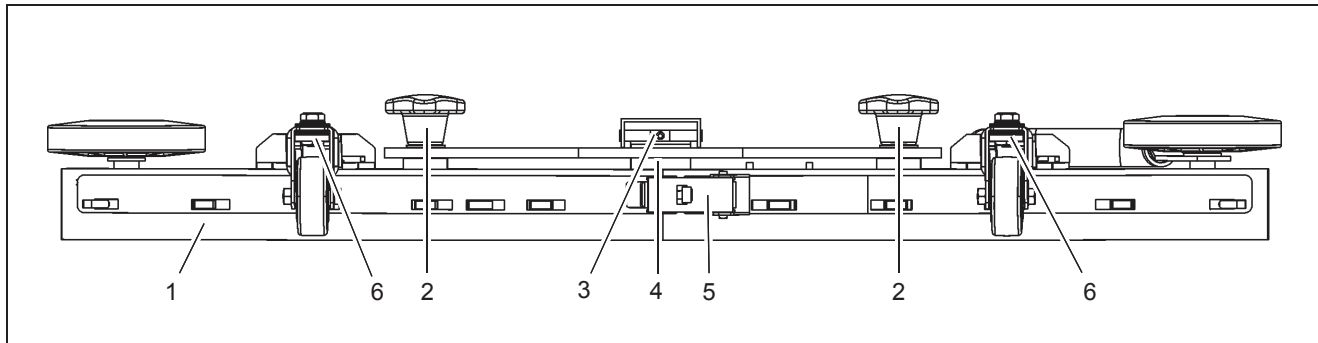


Fig.15

5.8.3 Adjusting the sealing strips Angle adjustment

The angle adjustment is decisive in controlling whether the squeegee's sealing strips lie evenly on the floor.

1. Park the machine on a level surface and lower the squeegee.
2. Loosen the counternut on the adjusting bolt (Fig. 15/3) and adjust the squeegee with the adjusting bolt until the ends of the sealing strips just make contact with the floor.

Fig. A

Turn the adjusting bolt clockwise:
Distance between sealing strip and floor is decreased in the middle.

Fig. B

Turn the adjusting bolt counterclockwise:
Distance between sealing strip and floor is increased in the middle.

3. Switch the machine on and check the suction pattern. When driving, the sealing strips must make as even a contact as possible all around (center and outer sides).
4. Tighten the counternut on the adjusting bolt at 7 Nm.

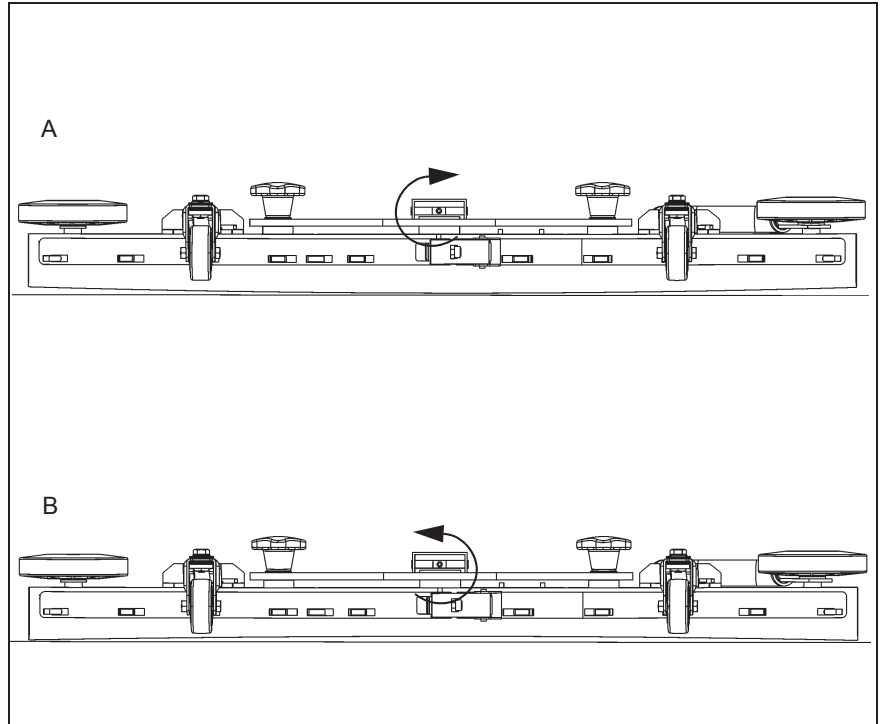


Fig.16

Maintenance and Service

Height adjustment

The height adjustment is set to 3 mm at the factory. If streaks appear despite an optimum angle adjustment, the distance of the rollers to the floor must be adjusted by changing the number of washers on the holder.

In the case of very smooth floors, e.g. varnished floors, linoleum etc.:
Number of washers = 2. This corresponds to a distance of approx. 2 mm to the floor.

In the case of very uneven floors, e.g. badly laid tiles (water does not run off):
Number of washers = 4. This corresponds to a distance of approx. 4 mm to the floor.

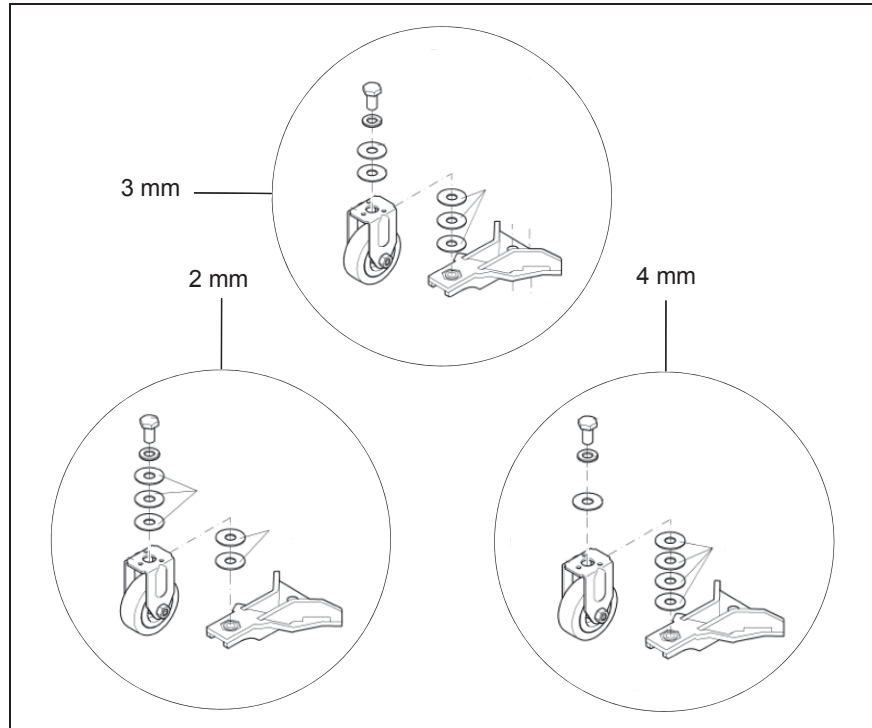


Fig.17

Maintenance and Service

5.9 Circular brush head

- 1 Brush head lift lever
- 2 Brush head
- 3 Deflector roller
- 4 Brush
- 5 Brush ejector
- 6 Sealing strip

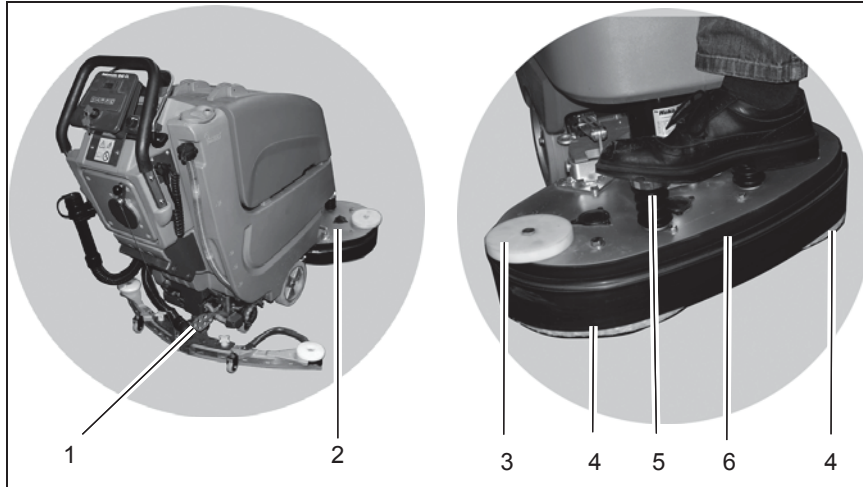


Fig.18

Cleaning the brushes

Clean the brushes in the brush head (Fig. 14/2) daily or as necessary.

1. Raise the brush head using the pedal (Fig. 14/1).
2. Press the brush ejectors (Fig. 14/5) downward and remove the brushes to clean them.

Changing the brushes

Check the brushes (Fig. 14/4) in the brush head weekly for signs of wear. In the case of wear to a brush length of 1.5 cm, the brushes must be changed.

1. Raise the brush head using the pedal (Fig. 14/1).
2. Press the brush ejectors (Fig. 14/5) downward and remove the brushes
3. Slide the new brush under the brush head and press into the support using both hands.

Changing the deflector roller

Check the deflector roller (Fig. 14/3) weekly and change it as necessary.

Changing the sealing strip

Check the sealing strip (Fig. 14/5) weekly and change it as necessary. To do this, loosen the fastening device and remove the sealing strip. Installation is carried out in the reverse sequence.

5.10 Rotary brush head

- 1 Slotted-head screw
- 2 Cover
- 3 Waste container
- 4 Deflector roller
- 5 Catch
- 6 Brushes
- 7 Sealing strips
- 8 Spray jets
- 9 Knurled screws

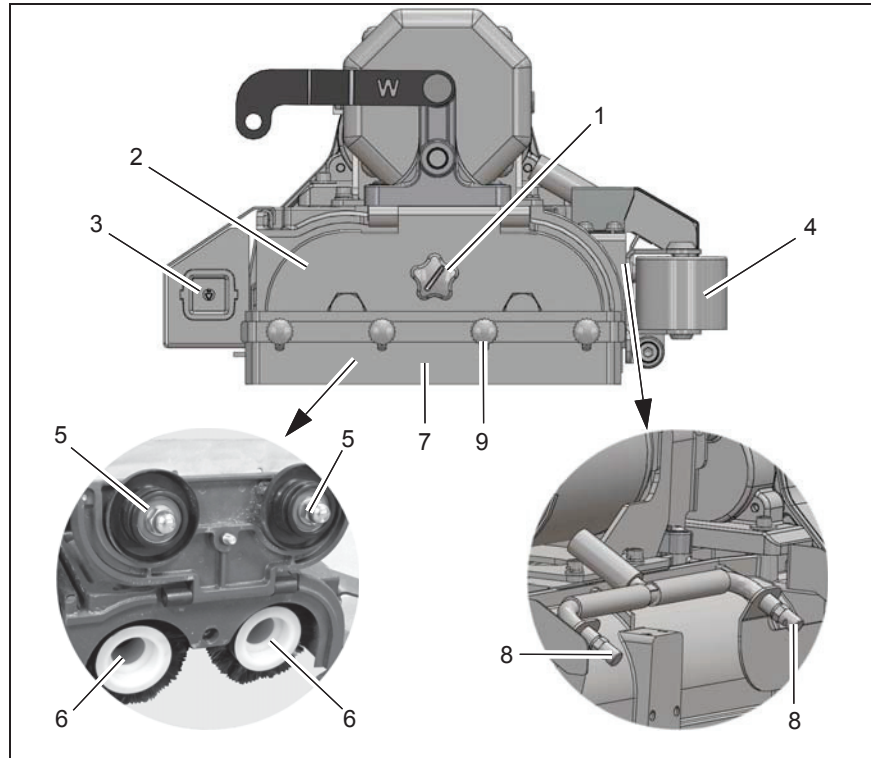


Fig.19

Maintenance and Service

5.10.1 Cleaning the brush head

Check the brush head daily and clean it as necessary.

1. Switch off the machine with the main switch.
2. Lift out the brush head with the brush head lift.
3. Loosen the slotted-head screw (Fig. 19/1) with a coin and pivot the cover (Fig. 19/2) upwards.
4. Remove the brushes (Fig. 19/6) from the brush head and clean them.



When installing the brushes, pay attention that they latch securely and properly in the catches (Fig. 19/5) provided.

5.10.2 Changing the brushes

Check the brush head weekly and change it as necessary.

1. Switch off the machine with the main switch.
2. Lift out the brush head with the brush head lift.
3. Loosen the slotted-head screw (Fig. 19/1) with a coin and pivot the cover (Fig. 19/2) upwards.
4. Remove the brushes (Fig. 19/6) from the brush head.
5. Install the new brushes and secure the cover again with the slotted-head screw. Only use original spare parts!



When installing the brushes, pay attention that they latch securely and properly in the catches (Fig. 19/5) provided.

5.10.3 Cleaning the waste container

Check the waste container daily and clean it as necessary.

1. Lower the brush head. Switch off the machine with the main switch.
2. Pivot the waste container (Fig. 19/3) down a little and pull it out of the brush head.
3. Clean the waste container and then reinstall it.

Maintenance and Service

5.10.4 Changing the sealing strips

Check the sealing strips (Fig. 19/7) weekly and change them as necessary.

1. Switch off the machine with the main switch.
2. Lift out the brush head with the brush head lift.
3. Loosen the knurled screws (Fig. 19/9) and remove the sealing strips with the tightening straps.
4. Assemble the new sealing strips so that they touch the ground lightly.
Only use original spare parts!

5.10.5 Checking the spray jets

Check the spray jets daily and clean them as necessary.

1. Switch off the machine with the main switch.
2. Lift out the brush head with the brush head lift.
3. Check the spray jets (Fig. 19/8) for signs of dirt. After cleaning them, the spray jets must produce an even spraying pattern.

5.10.6 Change deflector roller

Check deflector rollers (Fig. 19/4) at weekly intervals and replace if required.

EC-Declaration of Conformity (according to Directive 2006/42/EC)

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

declare under our sole responsibility,
that the product

Scrubmaster B45
Type: 7700

to which this declaration relates, corresponds to the relevant basic safety and health requirement of the Directive 2006/42/EC, and to the requirements of the other relevant Directives: 2014/30/EC and 2014/53/EC.

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

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

Bad Oldesloe, 23.01.2018



Ricardo Ruiz Porath
Product line Manager
Cleaning Technology

Name of the person authorised for Hako to compile the technical file:

Ludger Lüttel



Advanced Technology for a Cleaner, Better Environment



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