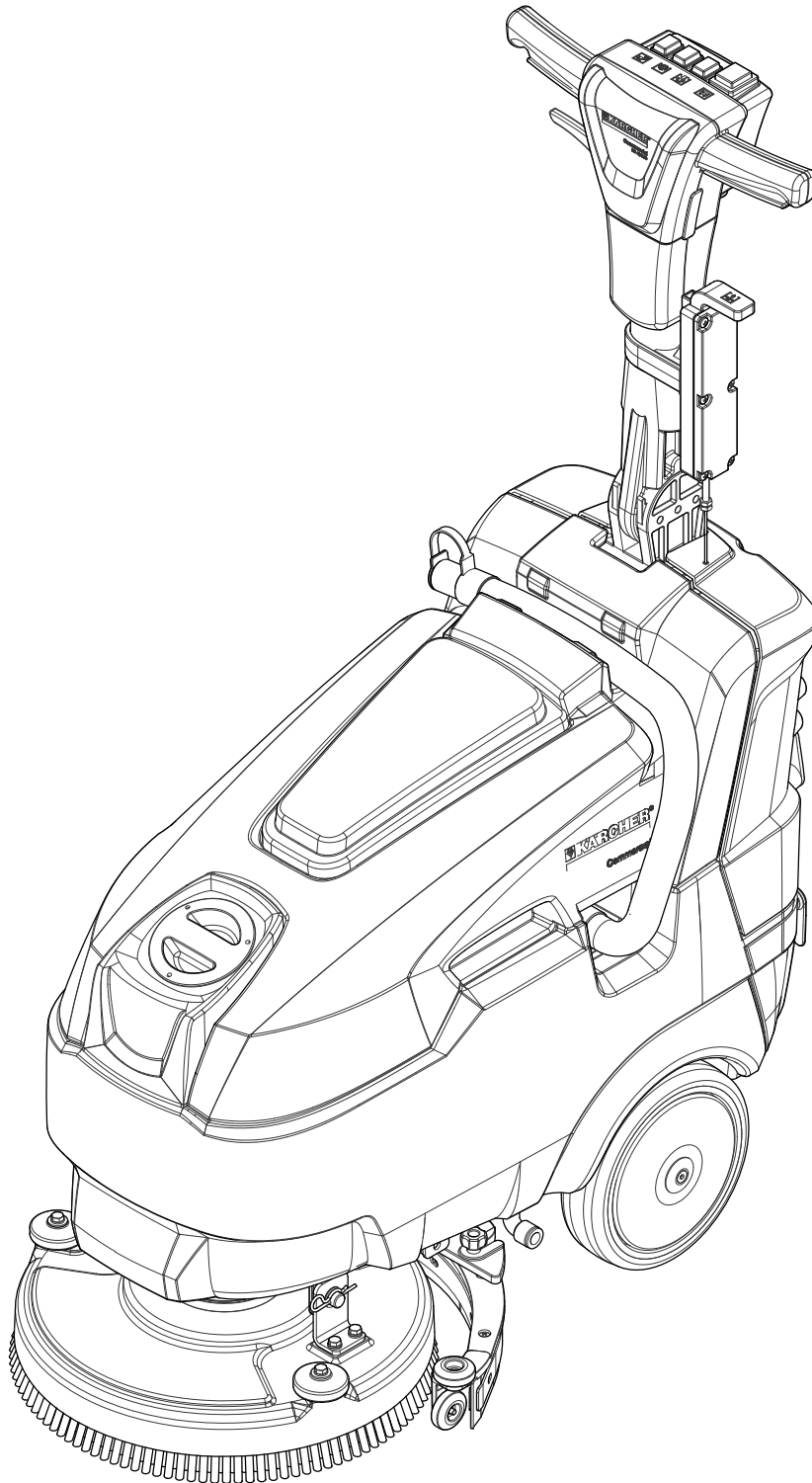


BD 40/12 C Bp Pack

Service Manual



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1 Preface

Good service work requires extensive and practice-oriented training as well as well-structured training materials.

Hence we offer regular basic and advanced training programmes covering the entire product range for all service engineers.

In addition to this, we also prepare service manuals for important appliances - these can be initially used as instruction guides and later on as reference guides.

Apart from this, we also regular information about product enhancements and their servicing.

If you should require supplements, have corrections or questions regarding this document, please address these citing the following subject to:
international-service@de.kaercher.com

Subject:	Case 110780
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The responsible product specialist will take care of your issue.

Copying and duplication of texts and diagrams as well as third-party access to this information is permitted only with the explicit permission of the company:

Alfred Kärcher GmbH & Co. KG
P O Box 160
D - 71349 Winnenden
www.kaercher.com

2 Safety instructions

2.1 Safety Devices

Safety devices serve to protect the user and must not be rendered inoperational or their functions bypassed.

The appliance may only be operated if all covers are closed.

2.1.1 Emergency-stop button

To put all functions out of operation immediately.

2.2 Hazard levels

Note

Indicates useful tips and important information about the product.

2.3 General notes on safety

First pull out the plug from the mains before carrying out any tasks on the machine.

After completing the maintenance work, check all safety and protective devices for correct installation and proper function.

3 Technical Features

The scrubbing vacuum cleaner is used for the wet cleaning of level floors.

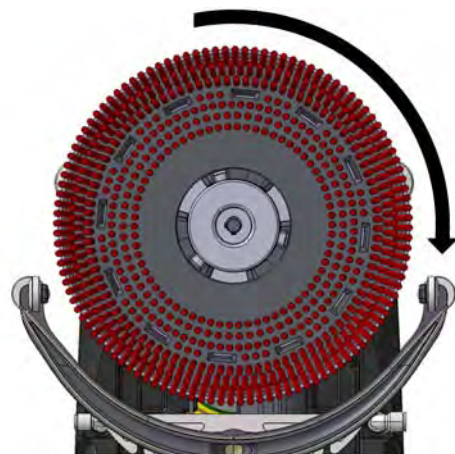
It can be easily adjusted to the cleaning task by setting the water quantity.

A working width of 385 mm and a capacity of 12 l each of the fresh and dirt water reservoirs enable an effective cleaning even when the machine is used for long duration.

The batteries can be charged using a charger connected to a 230 V socket.

Once the brush head is turned on at the control panel, the functions "Vacuum" and/or "Feed water" are possible.

3.1 Brush system



3.2 Water System

- Fresh water and wastewater reservoirs have different designs (wastewater reservoir can be removed).
- Mechanical swimmer closes the suction opening in the cover if the wastewater foams excessively or if the wastewater reservoir is full.
- Brush head must be turned on and the operating lever for the brush head must be activated for the solenoid valve (see water function diagram) to open.
- The fresh water amount can be regulated with a stopcock according to the contamination level.

3.3 Suction system

- The vacuuming does not start automatically when the suction bar is lowered.
- To start the vacuuming, the brush head and the vacuuming must be switched on on the control panel.
- To unlock, pull the lever all the way to the top and then slide it back down.
- The vacuuming does not stop automatically when the suction bar is raised.
- The vacuum bar can be adjusted in horizontal position and tilted without tools.
- The vacuum lips can be replaced without the use of tools.

3.4 Cleaning operations

- Brush replacement is possible without tools.
- The water volume can be regulated via the stopcock.

3.5 Battery

- 2x 12V 25 Ah maintenance-free.
- Battery monitoring with total discharge protection.

3.6 Turbine

- Turbine trailing time 2 seconds
- Overvoltage shut-off: Turbine 20.8 V

3.7 Brush motor

- Overvoltage shut-off: Brush motor 21.0 V
- Overload shut-off at $> 20a \pm 1A$

3.8 Adjusting the holm tilt



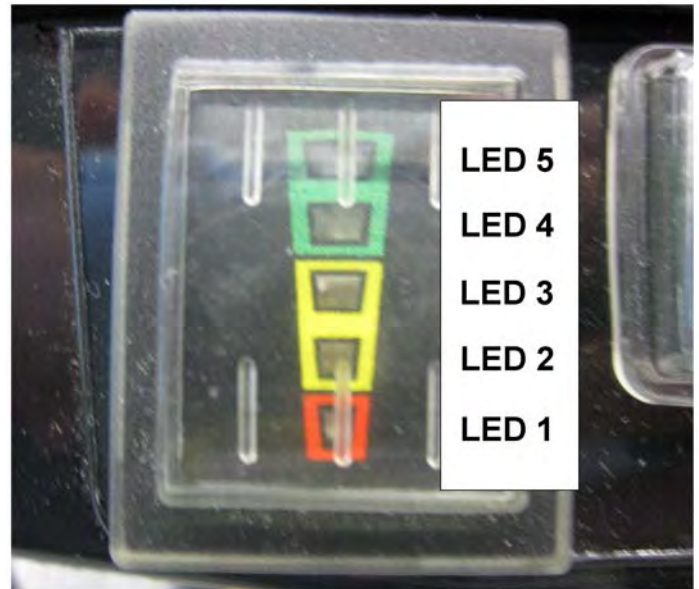
- The holm can be swivelled from the vertical position by about 90° in both directions.

3.9 Swimmer function

- With max. wastewater volume, the floater in the wastewater reservoir closes so that no further suction is possible.

3.10 Operating hours display [h]

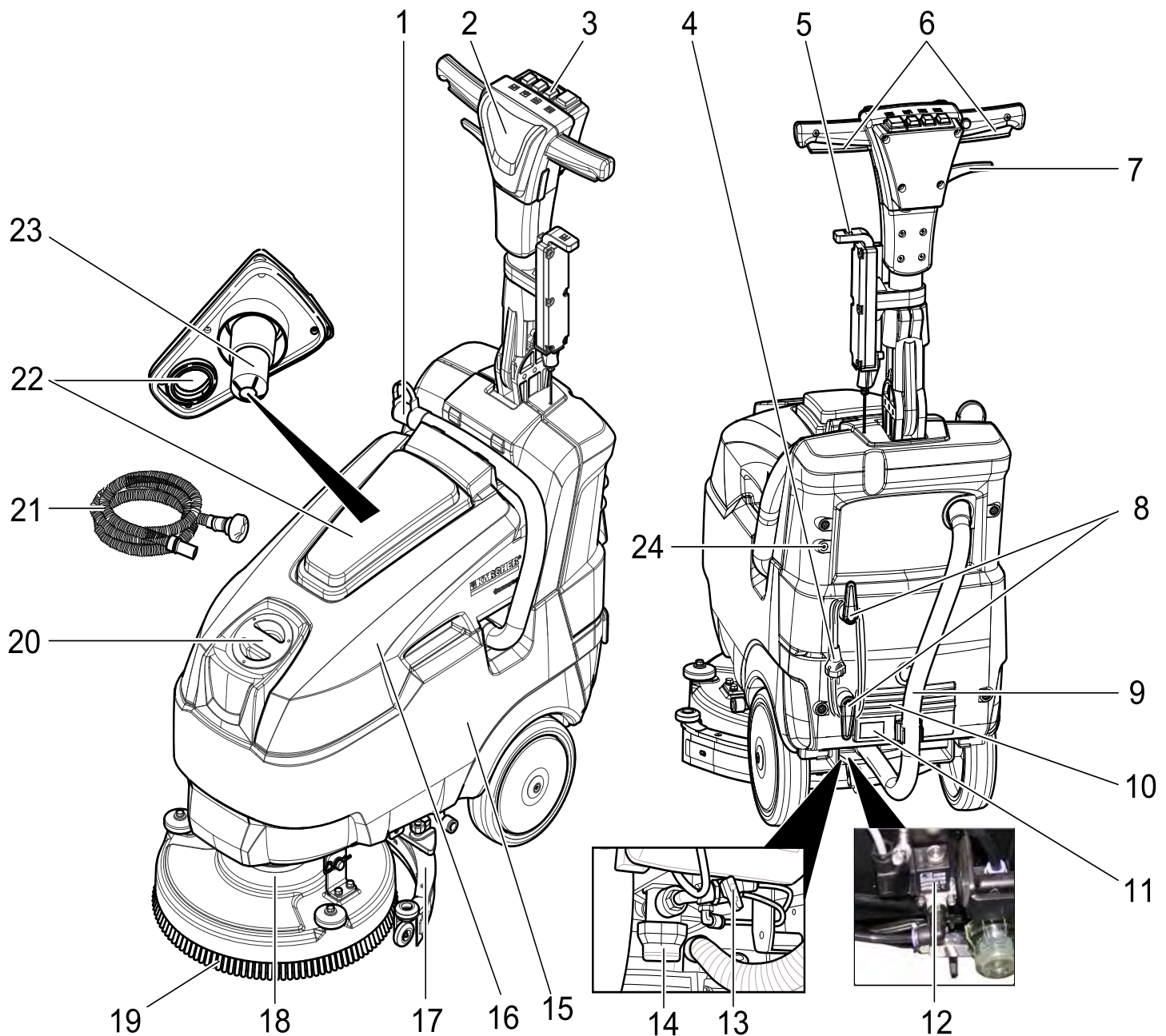
- Actuate the brush switch with the operating lever pressed down to switch to the hourmeter display.



	Number of blinks	Operating hours
	LED 1 blinks 1x	
LED 5	1-9	1-9
	LED 1 blinks 1x	
LED 4	1-9	10-90
	LED 1 blinks 1x	
LED 3	1-9	100-900
	LED 1 blinks 1x	
LED 2	1-9	1000-9000
	LED 1 blinks 1x	

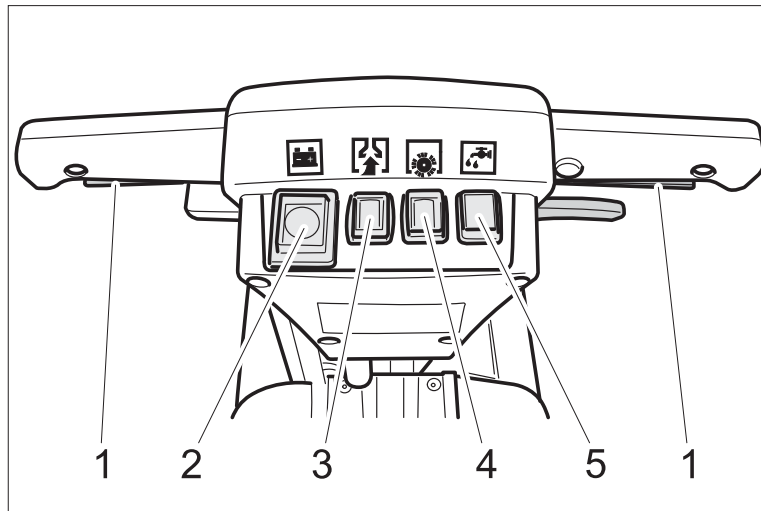
- After the operating hours are displayed, the machine will automatically switch to ready mode.

4 Setup and function



- | | | | |
|----|-------------------------------|----|--|
| 1 | Dirt water discharge hose | 17 | Vacuum bar |
| 2 | Push handle | 18 | Cleaning head |
| 3 | Operator console | 19 | Disc brush |
| 4 | Mains cable with mains plug | 20 | Fresh water reservoir filler neck |
| 5 | Vacuum bar lowering lever | 21 | Fill hose, included |
| 6 | Operating lever of brush | 22 | Cover dirt water reservoir |
| 7 | Lever for level adjustment | 23 | Float |
| 8 | Cable hook, rotating | 24 | Counter-sunk screw
(to lock the wastewater reservoir) |
| 9 | Suction hose | | |
| 10 | Charger | | |
| 11 | Battery charging display | | |
| 12 | Solenoid valve | | |
| 13 | Water volume regulating valve | | |
| 14 | Fresh water filter | | |
| 15 | Battery | | |
| 16 | Dirt water reservoir | | |

4.0.1 Operator console



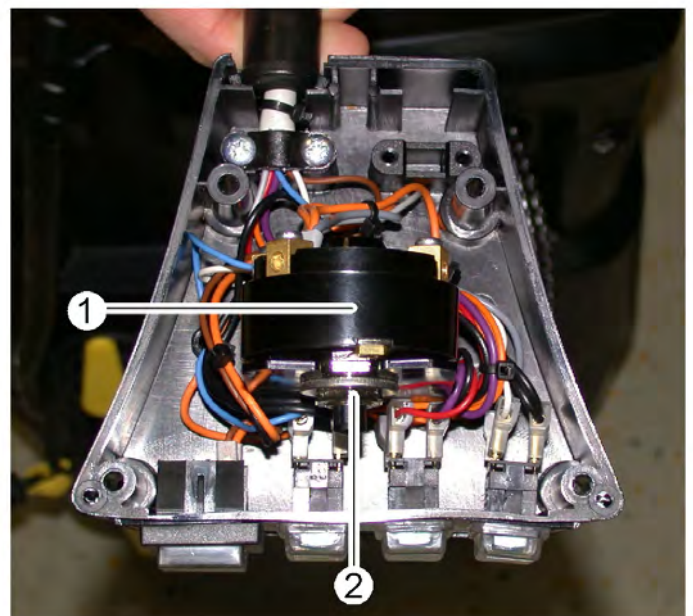
- 1 Operating lever of brush
- 2 Battery status display
- 3 Switch of suction turbine
- 4 Switch for brush operations
- 5 Switch for fresh water / detergent solution

4.1 Power switch



- 1 Screws
- 2 Casing

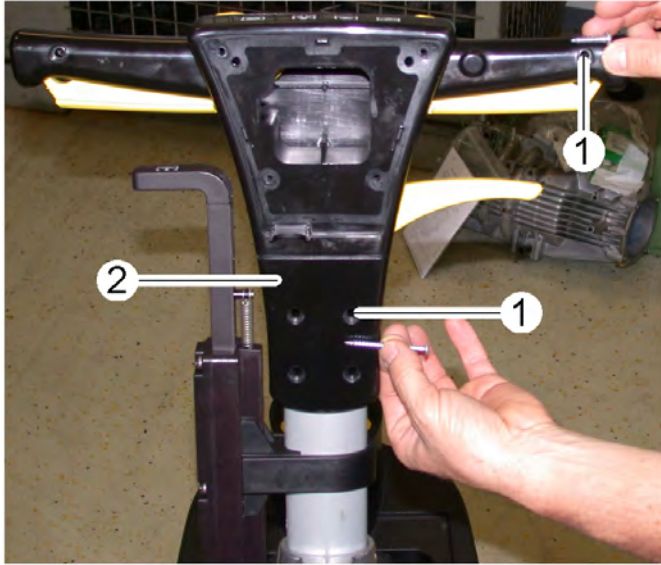
- Unscrew locking screws.
- Remove the housing.



- 1 Switch
- 2 Nut

- Replace the switch
- Apply the fixation glue to the thread and tighten the nut to a torque of 0.3 Nm (fingertight).
- Perform a function test.

4.2 Handle



- 1 Screws
- 2 Cover

- Unscrew locking screws.
- Remove cover.
- Installation: Please observe the screw length.



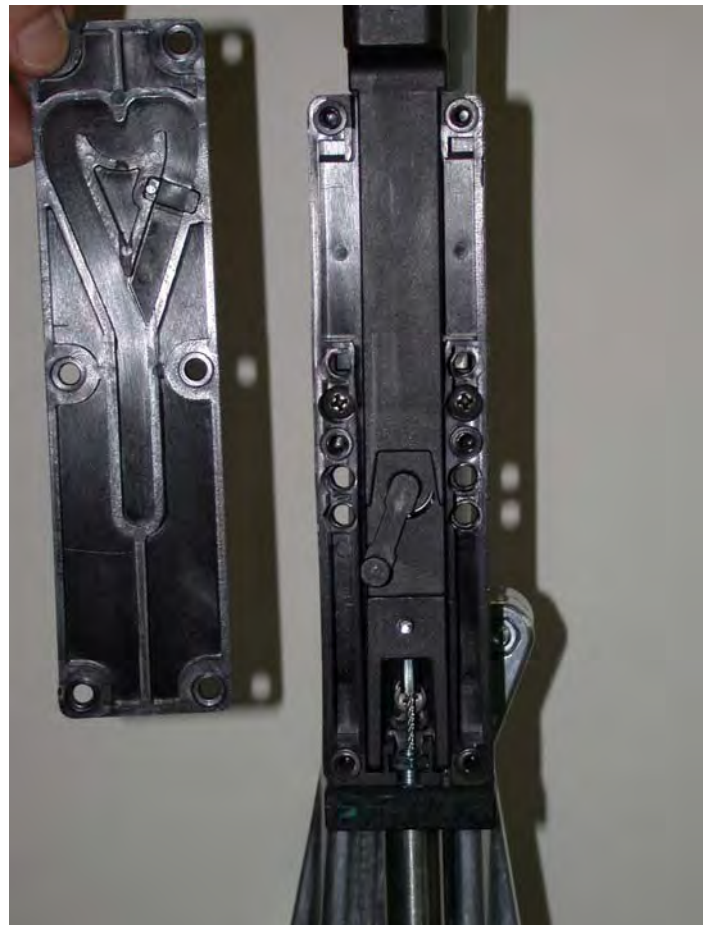
- Installation: Observe the lever layout.



- 1 Nut

- To preset the bowden cable, screw the nut onto the threaded rod for about 1 cm.

4.3 Suction bar lift

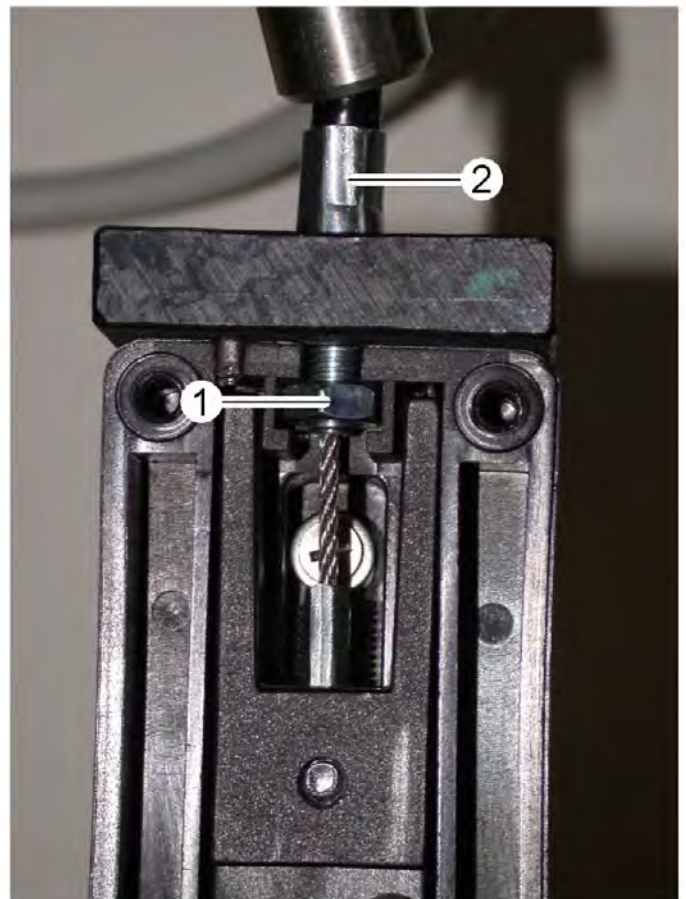


- To lock the suction bar lift, pull the lever all the way up. Must click when it locks.



1 Spring

- Pretension the spring by 1/4 turn.
- Insert the spring into the groove.
- Installation: Observe the lever position.



- 1 Bottom adjustment
- 2 Top adjustment

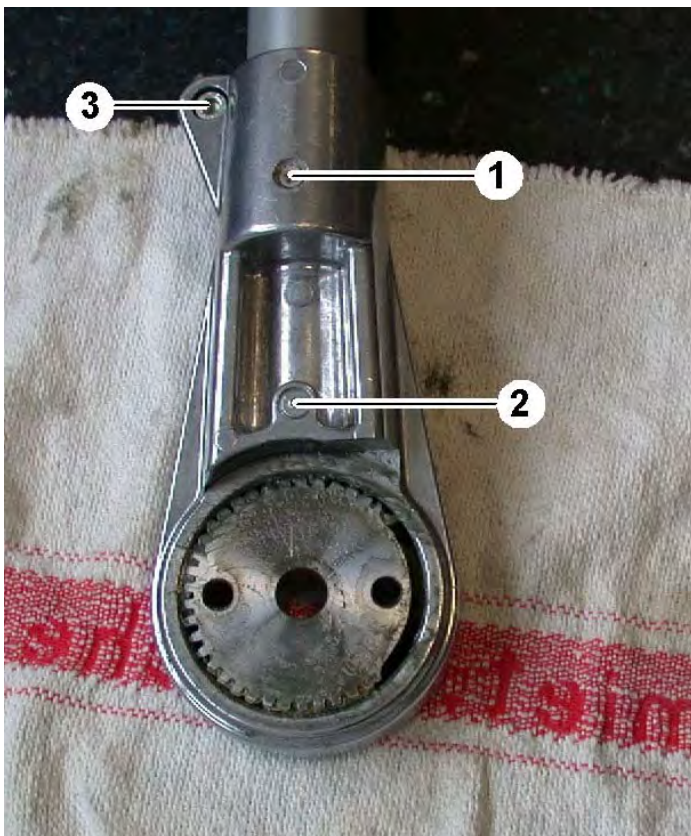
- Installation: The Bowden cable can be adjusted on the top and the bottom.

4.4 Inclination settings



- 1 Screws
- 2 Strut

- Unscrew the screws
- Pull out the holm.

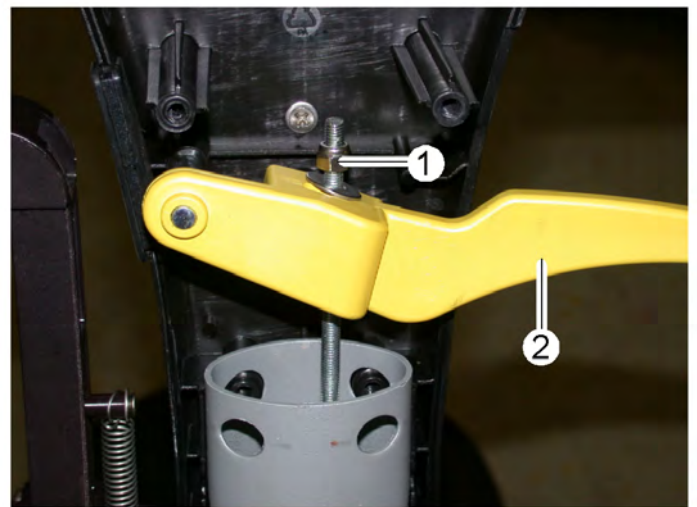


- 1 Counter-sunk screw
- 2 Counter-sunk screw
- 3 Clamping screw

- Unscrew the countersunk screws.
- Loosen the clamping screw.



- Remove the segment toothed wheel.



- 1 Nut
- 2 Hand lever

- Unscrew the nut from the threaded rod.
- Remove the manual lever.



- 1 Pipe
- 2 Threaded rod
- 3 Lock

- Pull the pipe out of the clamp.
- Pull the threaded rod with lock out toward the top.



- Installation in reverse order
- Observe the position of the elongated hole during assembly.



- Observe the position of the segmented toothed wheel during assembly.



- Perform a functional control

4.5 Water filter



Note

The stop valve must be closed before opening the water filter.

- 1 Water filter
- 2 Locking tap

- Close the stop valve.
- Unscrew the filter cup.
- Remove the sieve and rinse it.
- Installation in reverse order

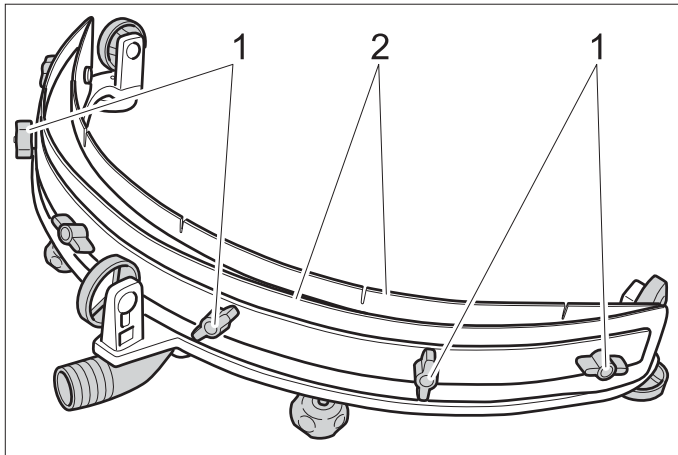
4.6 Remove the suction bar



- 1 Suction hose
- 2 Cross handle for fastening of vacuum bar
- 3 Vacuum bar

- Pull off the suction hose.
- Loosen cross-handles.
- Remove the vacuum bar.

4.7 Turn or replace vacuum lips



- 1 Wing nut
- 2 Vacuum lip

- Unscrew the wing nuts.
- Reverse or replace the vacuum lips.

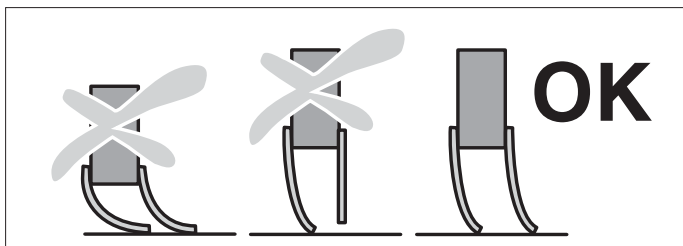
Note

Do not transpose the front and rear vacuum lips.

- Reassemble the suction bar in the reverse sequence.

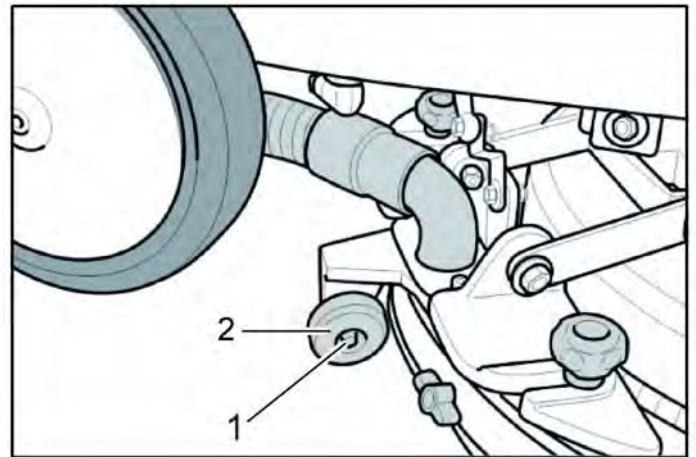
4.8 Check the vacuum bar setting

- Press the switch of the suction turbine; the vacuum process will start.
- Lower the vacuum bar.
- Push the appliance forward a bit.
- Switch off suction turbine switch.



- Adjustment of the vacuum bar, adjust if necessary.

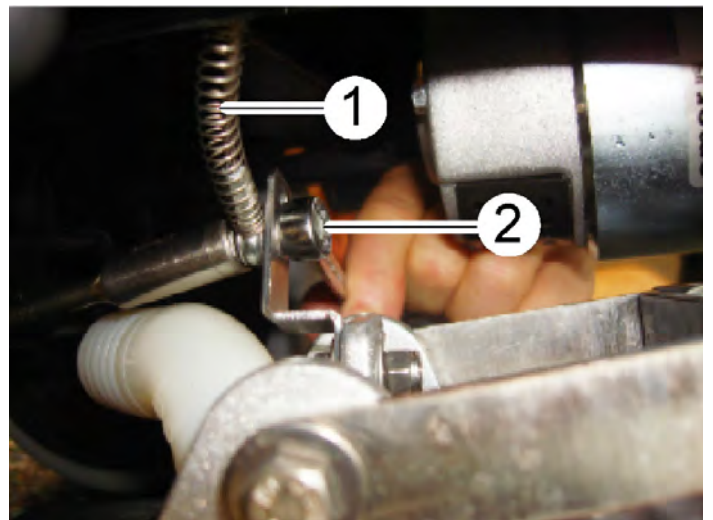
4.9 Setting the vacuum Bar



- 1 Nut
- 2 Wheel

- Loosen the nut.
- Move the wheel upwards or downwards.
- Tighten nut.
- Check the setting of the vacuum bar.

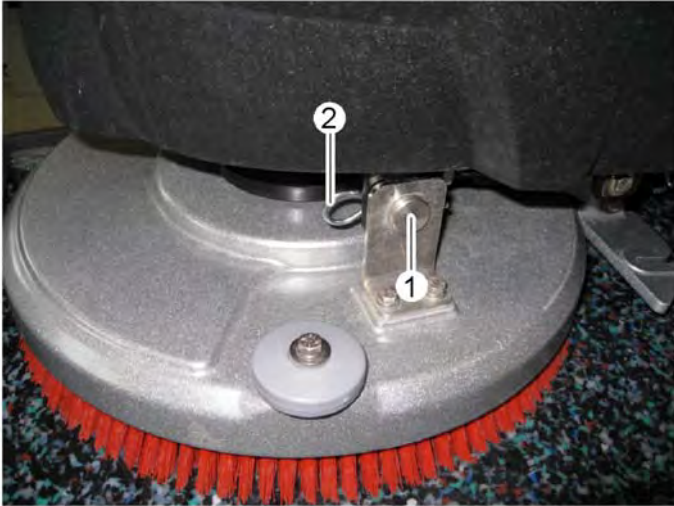
4.10 Dismantling / installing the brush head



- 1 Bowden cable
- 2 Screw

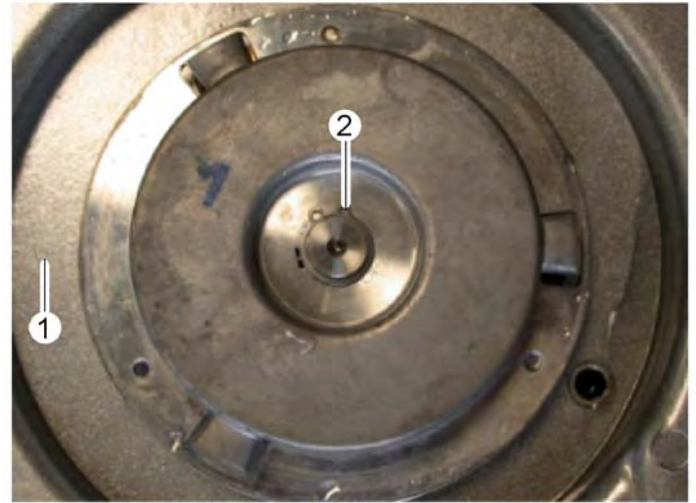
- Loosen screws.
- Remove the bowden cable.

4.11 Brush head drive



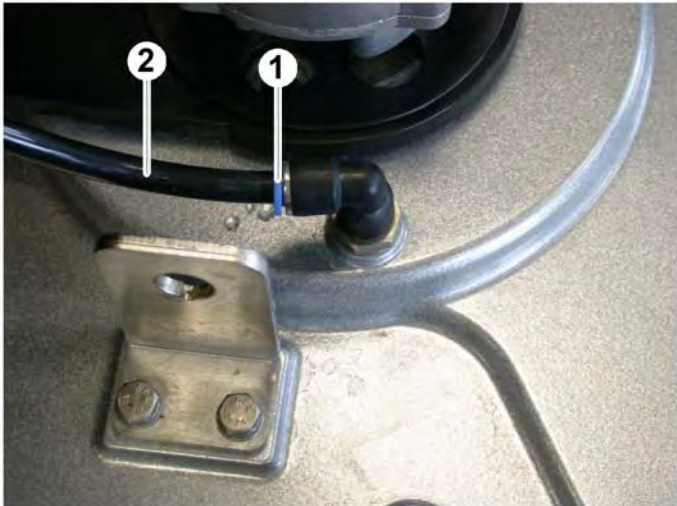
- 1 Bolts
- 2 Safety splint

- Pull out the securing splint.
- Pull out the bolt.



- 1 Brush head
- 2 Safety ring

- Reverse the brush head.
- Remove the safety ring.



- 1 Ring
- 2 Hose

- Slide the ring back and pull the hose off at the same time.
- Pull out the hose.
- Pull the brush head out toward the front.



- 1 Flange

- Remove the flange.



- 1 Screws
- 2 Motor

- ➔ Remove the screws.
- ➔ Remove the motor.



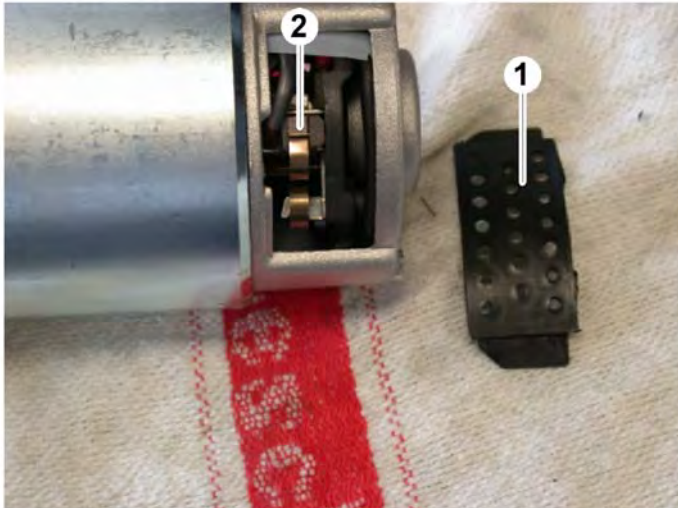
- ➔ *Note!*
- ➔ The water supply for the brush must not be plugged.

4.12 Removing the suction turbine



- 1 Bowden cable

- ➔ Unscrew the bowden cable from the brush head.



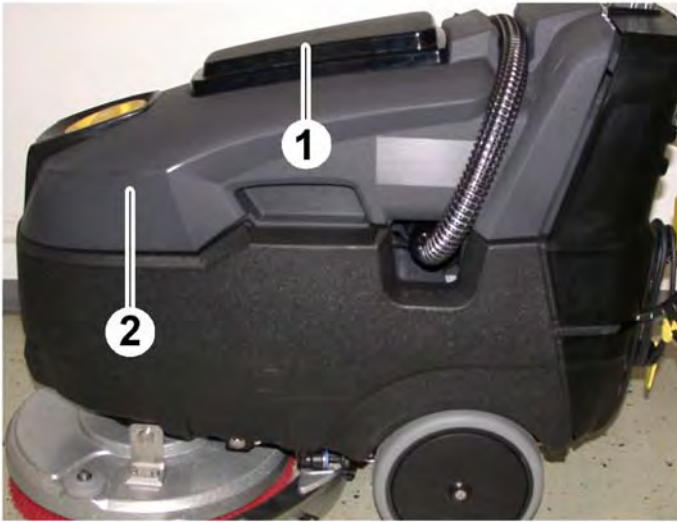
- 1 Cover
- 2 Carbon brush

- ➔ Remove the cover.
- ➔ Replace carbon brushes.
- ➔ Assemble in reverse order.



- 1 Counter-sunk screw

→ Remove the countersunk screw

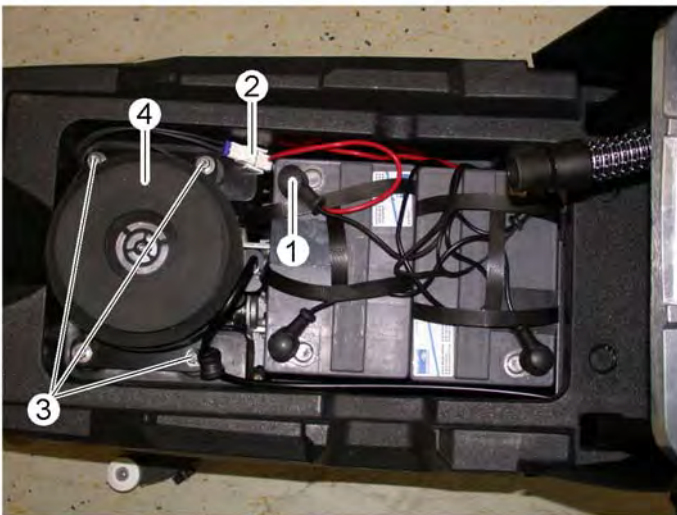


- 1 Cover
- 2 Dirt water reservoir

→ Remove the lid.
→ Remove the dirt water reservoir.

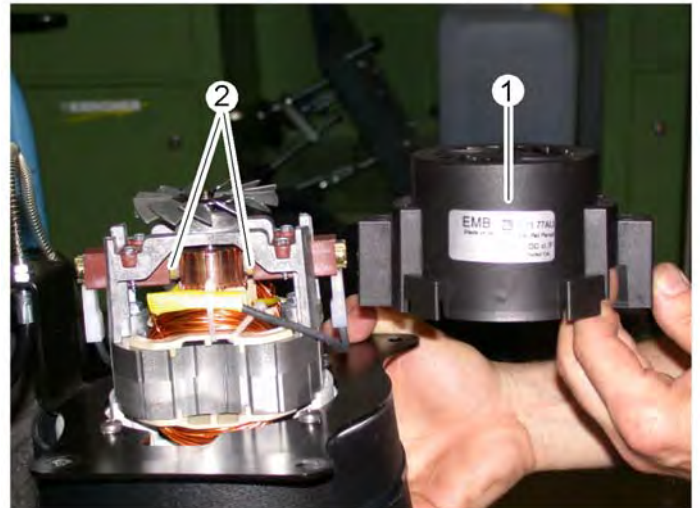


→ *Note!*
→ Replace damaged foam filter.



- 1 Connection, battery plus terminal
- 2 Socket plug connection
- 3 Nuts
- 4 Suction turbine

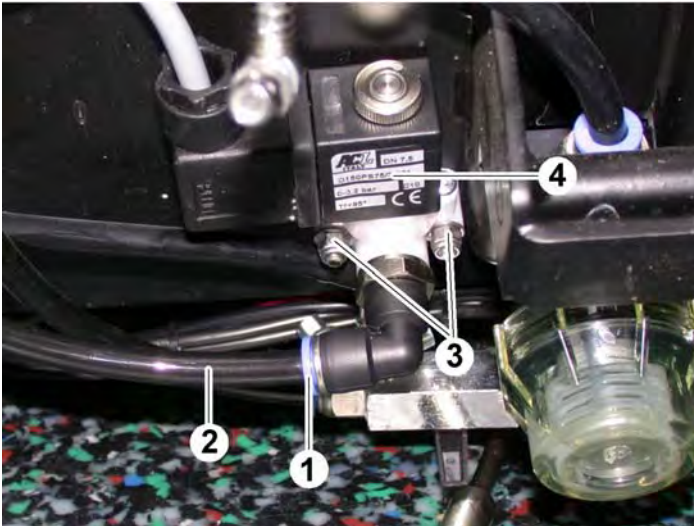
→ Remove the cover caps.
→ Disconnect pole terminal to positive pole (-).
→ Cover the battery and protect it from short circuit.
→ Disconnect the connector.
→ Unscrew the nuts.
→ Remove the suction turbine.



- 1 Cover
- 2 Carbon brush (2x)

→ Remove cover.
→ Check carbon brush of the suction turbine, replace if required.
→ Installation in reverse order

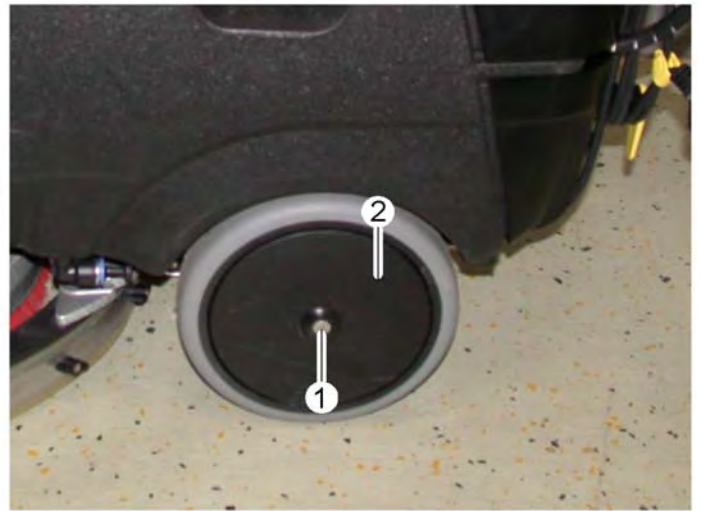
4.13 Replace solenoid valve



- 1 Ring
- 2 Hose
- 3 Nuts
- 4 Solenoid valve

- Slide the ring back and pull the hose off at the same time.
- Pull out the hose.
- Unscrew the nuts.
- Remove the solenoid valve.

4.14 Removing the wheel



- 1 Screw
- 2 Wheel cap

- Loosen screws.
- Remove the wheel cover.



- 1 Wheel
- 2 Cylinder roller bearing

- Remove wheel.
- Check the cylinder roller bearing for damage and replace if necessary.
- Installation in reverse order

4.15 Fill in fresh water



- 1 Fill hose
- 2 Diaphragm

- ➔ Insert the fill hose into the fresh water reservoir.
- ➔ Put the diaphragm over the water faucet.
- ➔ Open tap.
- ➔ Fill in fresh water.

4.16 Charging battery

Note

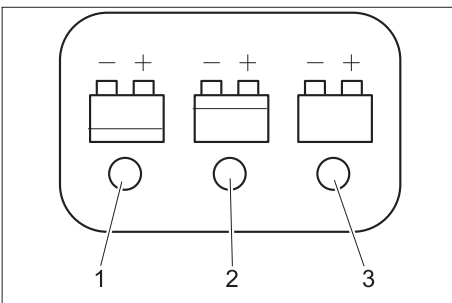
The device is equipped with a safety mechanism to prevent total discharge, i.e. when the permissible minimum capacity is reached, the machine will be shut off.

The charging process takes approx. 10 hours.

The charger automatically switches off the charging process.

- ➔ Insert the mains plug into the socket.

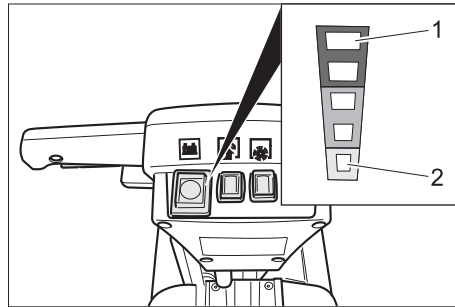
4.16.1 Battery charging display



- 1 Battery is discharged (red)
- 2 Battery is charged halfway (yellow)
- 3 Battery is charged (green)

4.17 Battery status indicator

Lights up when the brush drive switch is switched on,

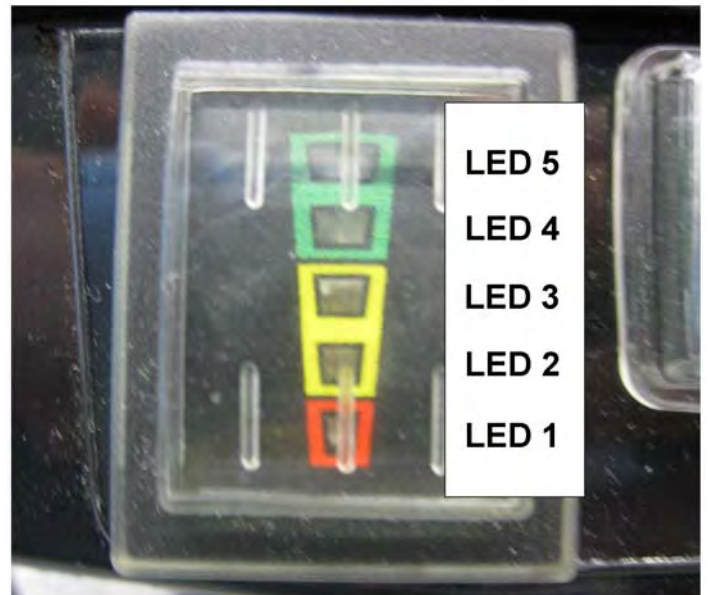


- 1 Battery is charged
- 2 Battery is discharged

Battery runtime:

The battery runtime on smooth ground and medium discharge current (16 A) is 1 hour. 15 min.

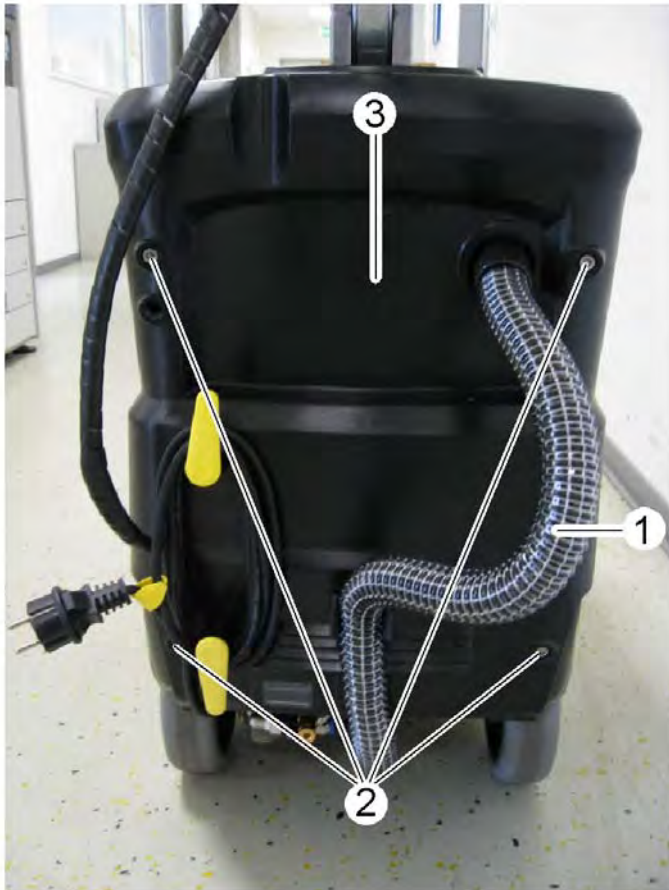
4.18 Battery status values



Values for GEL battery

LED 5	> 24.2V
LED 4	> 23.3 V < 24.2 V
LED 3	> 21.7 V < 23.3 V
LED 2	> 20.9 V < 21.7 V
LED 1	< 20.9 V

4.19 Electrical system



- 1 Hose
- 2 Screws
- 3 hood

- ➔ Pull out the hose.
- ➔ Unscrew the fastening screws of the device hood; remove the device hood.

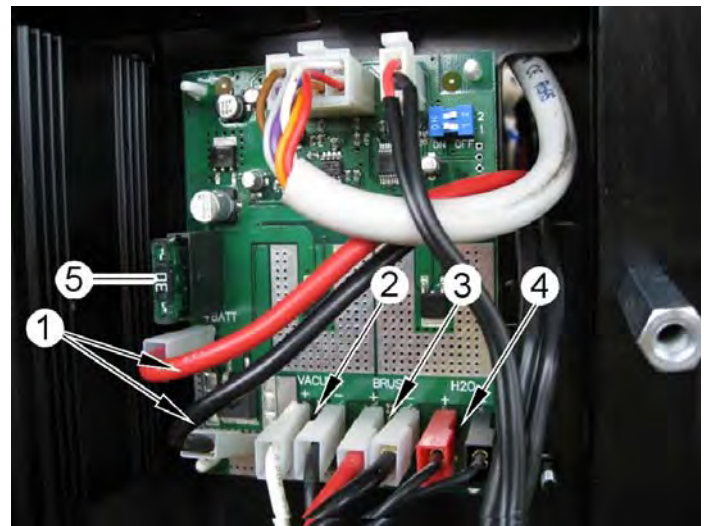


- 1 Screws
- 2 hood

- ➔ Unscrew the screws.
- ➔ Remove the hood.



4.19.1 Measuring points and fuse

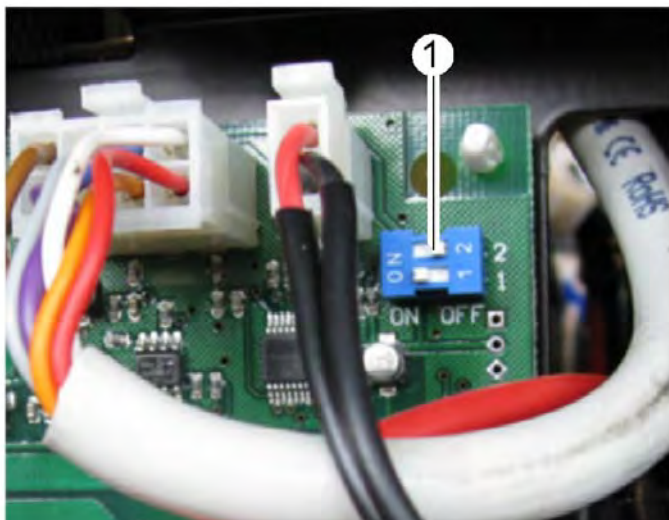


- 1 Power supply for battery
- 2 Turbine
- 3 Brush motor
- 4 Solenoid valve water
- 5 Fuse 30 A

Measuring values to:

- Turbine:
U = battery voltage,
Current pickup = 10 A
- Brush motor:
U = battery voltage,
Current pickup = 4.1 A (loaded)
- Solenoid valve:
U = battery voltage,
Current pickup = 0.3 A
- Fuse 30 A:
U = battery voltage,

4.19.2 DIP switch



DIP switch 1:

The built-in battery type can be selected on DIP switch 1.

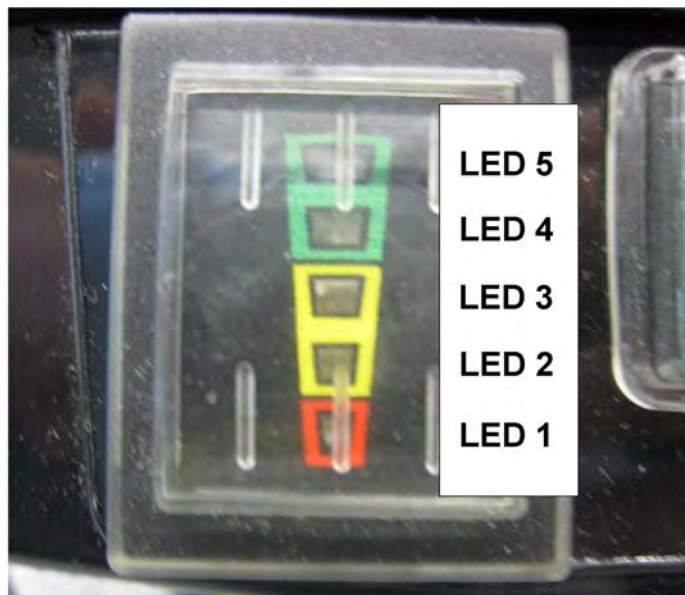
- ON: Gel battery
- OFF: Lead battery

DIP switch 2:

The adjustment "Total discharge protection" can be made on DIP switch 2.

- ON: Gibli mode = once the battery is completely discharged, the appliance will shut off. The appliance cannot be used again until the battery is charged.
- OFF: Kärcher mode = once the battery is completely discharged, the appliance will shut off. The appliance be run for 1 minute after switching it off and back on, before it will shut off again due to total discharge.

5 Reading faults



- Fault diagnosis function
- Display in the battery status field by respective blinking of LEDs.

Fault	Visualisation
Suction turbine overload	LED1 blinks + LED 2 is lit continuously
Brush motor overload	LED1 blinks + LED 3 is lit continuously
Interruption of suction turbine	LED1 blinks + LED 4 is lit continuously
Interruption of the brush motor	LED1 blinks + LED 5 is lit continuously

6 Check the maintenance-free batteries

The battery must be fully charged prior to the inspection to obtain a reliable result.

The following checks must then be made:

6.1 1. Measurement - idle voltage

The idle voltage provides a measure for the charging status of a maintenance-free battery. If this value is below a certain limit, this indicates that the battery is not charged.

You can estimate the approximately available charge from the idle voltage.

12 volt battery block	6 volt battery block	Charge approx.
> 12.80 Volt	> 6.42 Volt	100 %
> 12.55 Volt	> 6.30 Volt	75 %
> 12.32 Volt	> 6.20 Volt	50 %
> 12.18 Volt	> 6.00 Volt	25 %
< 12.00 Volt	< 6.00 Volt	totally discharged

The idle voltage should reach at least the following limit values:

6 V battery block6.15 volts;

12 volt battery block ...12.30 Volt

If these values are not reached, the battery must be charged first.

6.2 2. Measuring the battery under load

Caution: The battery terminals must be checked prior to the load test. The battery terminals must always be clean and tight.

- Switch the appliance on, start operating the suction turbine and the cleaning head on an insensitive floor.
Important: The consumers must run continuously during this test.
The load test can also be performed while the suction turbine is turned on.
- Measure the battery voltage of each individual battery block several times with the voltmeter/multimeter and record it.
Measure the current during the voltage measurement using the ammeter and record it.

- The battery block with the lowest battery voltage must be replaced if it is outside the tolerance values.

See item "Limit value of battery voltage between the individual battery blocks".

If this procedure still does not indicate clearly that there is a faulty cell, the third measurement must be performed after the second load test.

6.3 3. Measuring the battery under load

- Use a voltmeter / multimeter to measure and record the battery voltage of every individual battery block.
- Measure the current using a clip-on ammeter during the voltage measurement and record it.
- Operate the appliance until the discharge end voltage / the total discharge protection shuts the appliance off. Here, several measurements should be performed and recorded.

Result:

In case of a problem, one or more battery blocks / battery cells will be significantly different from each other so that the fault can be pinpointed without doubt.

6.4 Limit value – battery voltage between the individual battery blocks

- With all measurements, the difference must not exceed the following voltage under load:

Exide batteries:

between the 6 volt battery blocks 0.1 volts

between the 12 volt battery blocks 0.2 volt

Hoppecke batteries:

between the 6 volt battery blocks 0.2 volts

between the 12 volt battery blocks 0.4 volt

6.5 Battery measuring log - maintenance-free battery

Measurement - idle voltage:

Measure the idle voltage with charged battery without consumers.

Battery block 1	Battery block 2	Battery block 3	Battery block 4
Battery block 5	Battery block 6		

6.5.1 Measurement - load test

Measure the battery voltage several times while the turbine is turned on.

Battery block 1	Battery block 2	Battery block 3	Battery block 4
Battery block 5	Battery block 6		

6.5.2 Measurement - load test

Measure the battery voltage while the turbine is turned on, shortly before the discharge end voltage is triggered.

Battery block 1	Battery block 2	Battery block 3	Battery block 4
Battery block 5	Battery block 6		

6.5.3 Record further machine data

Current pickup:

Drive motor		Ampere
Suction turbine		Ampere
Brush motor		Ampere
All consumers during cleaning		Ampere

Final discharge voltage:

When does the discharge end voltage get triggered?		Volt
--	--	------

Runtime indication:

How long was the customer able to work with the appliance when the batteries were still fully functional?		Hours / minutes
---	--	-----------------

Battery date:

Is indicated near the battery terminal on the battery		Date or code
---	--	--------------

6.6 Replacing a battery due to old age

Battery	Duration of use	Charging cycles
6 volt battery block	6 months	100
12 volt battery block	-----	-----

With 12 volt battery blocks, the complete battery set must be replaced in case of damage.

If the 6 volt battery blocks have reached the above mentioned use time or the number of loading cycles, replacing the battery block with a new one is no longer worth it. We recommend replacing the entire battery set.

6.6.1 Adapting the load

If the use duration or the number of load cycles is below the above values, it makes sense to replace a defective battery block. However, the following measures must be taken to adapt/balance the load of the different battery blocks.

- Remove the defective battery block.
- Charge the remaining battery blocks and the new battery block individually. You can use a laboratory device for that. The load voltage must be set to exactly 7.14 volts. The load current must not exceed 14 A / 100 Ah.
- The load current must have decreased to under 4 A / 100 Ah at the end of the battery block.

6.6.2 Taking out of operation

If batteries are not to be used for a while, the following must be observed when storing them:

- Disconnect the negative battery connection on the battery and store it so that it cannot inadvertently come into contact with the negative terminal of the battery.
- Only store batteries while charged.
- The storage location should be cool (the self-discharge rates will be lower).

Maintenance-free batteries:

- Carry out the monthly voltage test.
- Recharge once the battery capacity is lower than 60%.

Discharge end voltage or total discharge protection:

The settings of the discharge end voltage must be checked to ensure that the runtime of the machine is not limited and that the battery cannot deeply discharge.

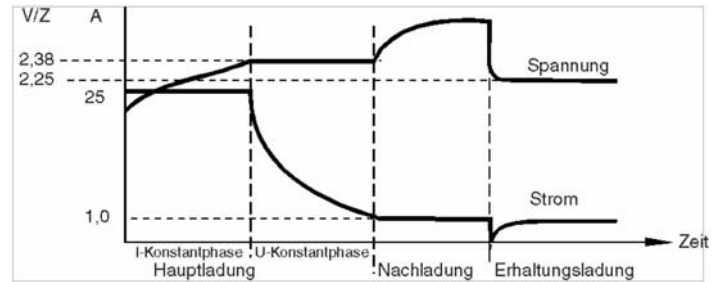
6.7 Test the charger

- Connect the charger to the batteries.
- Connect the voltage meter and clip-on ammeter to the batteries.
- Insert the power cord of the charger into the socket and turn the charger on.
- Determine the current and voltage measuring values after switching on the charger and record them.
- Determine the current and voltage measuring values after about 10 minutes and record them.
- The measuring result of the I constant phase in the main charge must be close to the manufacturer's values of the charger. (See typeplate of charger.)

6.8 Regulated charge ID line IUI charger for maintenance-free batteries

AGM / glass mat battery 2.4 / gel 2.35

AGM / glass mat battery 2.25 / gel 2.3



IUIa means:

I = constant current line

U = constant voltage line

I = constant current line recharging

a = automatic switch-off (transition to maintenance charge)

- During the I constant phase, the charger is charged with the nominal current (see typeplate on charger) and the charge voltage will increase slower or faster depending on the charge condition. After that, the charger will switch to U constant phase.
- In the U constant phase, the voltage remains constant and the current sinks continuously. After that, the charger will switch to I constant phase.
- In the I constant recharging phase, the voltage will rise to the values indicated in the diagrams and the current remains constant. After that, the charger will switch to maintenance charge.
- The recharging phase serves to achieve the complete transformation of the active mass in all battery blocks.
- During the maintenance charge, the fully charged battery status remains at constant voltage. The maintenance charge has no time limits.

8 Specifications

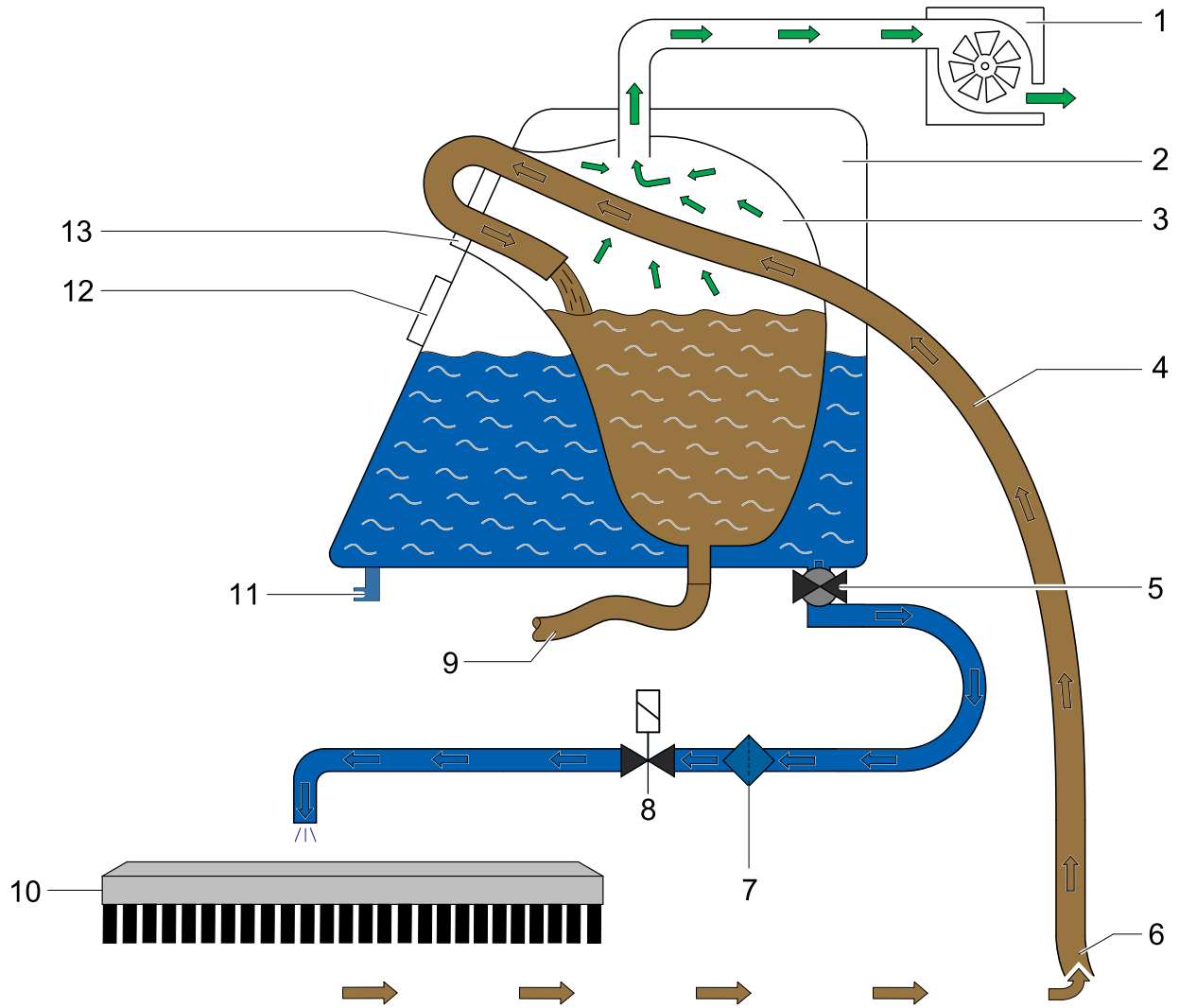
Current pickup of brush head, no load	1.5 A ± 0.2 A
Current pickup of brush head, loaded	4.0A ± 0.2 A
Current pickup of suction turbine (suction bar up)	10A ± 1A
Max. feed volume of the suction turbine (remove suction hose from the suction bar and connect it to the measuring device)	20 l/s ± 2 l/s
Max. vacuum pressure of the suction turbine with the suction opening close (pull off the suction hose from the suction bar and connect it to the measuring device)	85 mbar ± 10 mbar

Speed, brush	150 rpm ± 10 rpm
Current pickup of brush motor on cement slab: Fresh water reservoir filled to the max., wastewater reservoir empty, standard brush.	10A ± 1A
Overload switchoff, brush motor	> 20A
Load current during the charging of a depleted battery (I phase)	4.5A
Max. feed amount for detergent solution (fresh water tank 100 % filled)	0.6 l/min ± 0.1 l/min

The technical specification sheet and the circuit diagram will be included in the next version of the spare parts CD (DISIS) and in the Intranet.

The operating instructions and the spare parts list can be requested in paper form with the respective part numbers from our spare parts service department.

9 Water function diagram



- 1 Suction turbine
- 2 Fresh water tank
- 3 Dirt water reservoir
- 4 Suction hose
- 5 Locking tap
- 6 Vacuum bar
- 7 Fresh water filter
- 8 Solenoid valve
- 9 Dirt water drain hose
- 10 Disc brush
- 11 Drain-off tap
- 12 Fresh water reservoir filler neck
- 13 Cover dirt water reservoir

10 Tools needed for installation (not supplied)



11 Exchange times

	Exchange time in minutes
Dirt water reservoir	5
Drain hose	5
Suction hose	5
Batteries	10
Threaded rod Driving lever	25
Turbine	15
Bowden cable Vacuum bar	20
Brush motor	20
Fresh water tank	45
Vacuum bar	5
Water filter	15
Wheel per piece	5

Electronics system	15
Charger	20
Power switch per piece	10
Joint of push handle	15
Solenoid valve	20
Threaded rod for drive lever adjustment	25
Suction lips	10