KÄRCHER

New Unit Information

BR/BD 75/140 R
BR/BD 90/140 R

1.246- . . .

Drive unit system

– 3-wheel running gear with front wheel steering and front wheel-hub motor with electro-magnetic brake.
– Forwards and reverse drive unit with one drive pedal, changeover with selector button on the instrument panel.
– Machine brakes automatically, if the driver moves away (removes weight) from the seat (seat contact switch) or if the drive pedal is released. The brake function takes place with approx. 1.5 seconds delay.
– When not in operation, an electromagnetic brake on the wheel-hub motor prevents the unit from rolling away.

Brush system

– Brush head with two brush rollers or two disc brushes (two drive motors each).
– Brush rollers rotate from below towards; each other disc brushes rotate together at the front.
– Coarse dirt pan for coarse dirt picked up at the brush head (BR version only).
– Brush head contact pressure is adjustable.
– Brushes can be changed without tools.
– Brush head with lateral sealing strips to limit water distribution.

Water system

– Fresh-water tank in the front of the unit housing.
– Dirty water tank at the rear with float switch.
– Water feed to brush head with water pump.
– Water flow control with electric metering valve, 10 positions.
– Air bleeder valve for quick bleeding of the water hose at the brush head (only BR head).

Vacuum system

– Suction motor (long life) vacuums the dirty water into the dirty water tank.
– If the dirty water tank is full the electric float switch switches off the suction motor with a time delay between 15-20 seconds.
– Suction bar available in a straight or curved version.
– On switching the suction motor On/Off the suction bar is lowered/raised. When raised the suction motor continues running for approx. 10 seconds.
– Rubber strips on the suction bar can be replaced without tools.
– The inclination of the suction bar can be adjusted without tools.

Electrics

– The main control printed circuit board is located behind the metal cover to the left next to the footrest.
– The instrument panel printed circuit board is located underneath the control panel.

Battery

– 24 Volt block battery, 400 Ah, low-maintenance with filling system.
– Battery monitoring with exhaustive discharge protection.

Note:
Various things have been changed in the **REVISED** version of the unit. They are identified in this document with **REVISED**. The most important change concerns the new printed circuit board 2.816-067, which will be installed as of manufacturing number 10800.

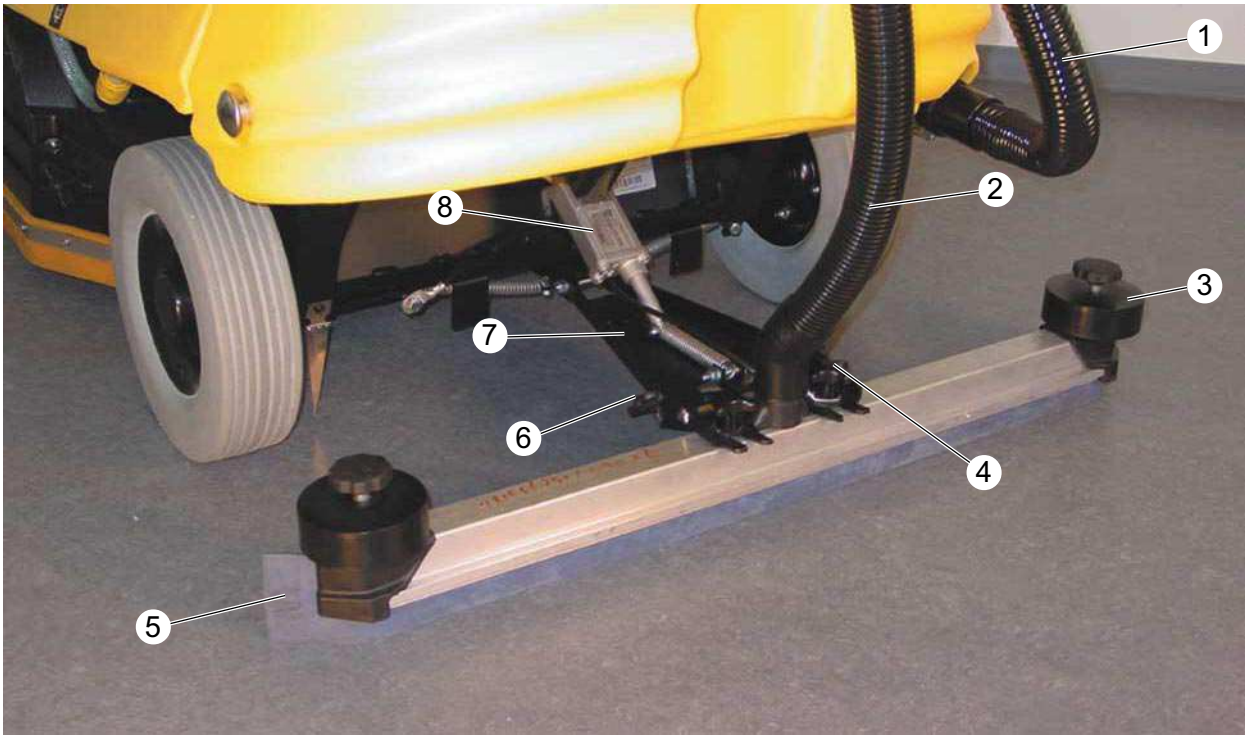
View from front (BR-Version)

1	Steering wheel	7	Drive unit pedal
2	Control panel	8	Front wheel, wheel hub motor
3	Cap, fresh-water tank	9	Lateral sealing strip, spring-loaded
4	Fresh-water tank	10	Brush head, BR version
5	Cover, main control printed circuit board	11	Coarse dirt pan (BR version only)
6	Central battery connector (X1)	12	Seat

View from rear (BR-Version)

1	Cover, main control printed circuit board	7	Deflector wheel, suction bar
2	Brush head, BR version	8	Drain hose, dirty water tank
3	Lateral sealing strip, spring-loaded	9	Suction hose
4	Coarse dirt pan (BR version only)	10	Dirty water tank
5	Supporting castor for suction bar, optional	11	Cover, dirty water tank
6	Suction bar, straight version	12	Control panel

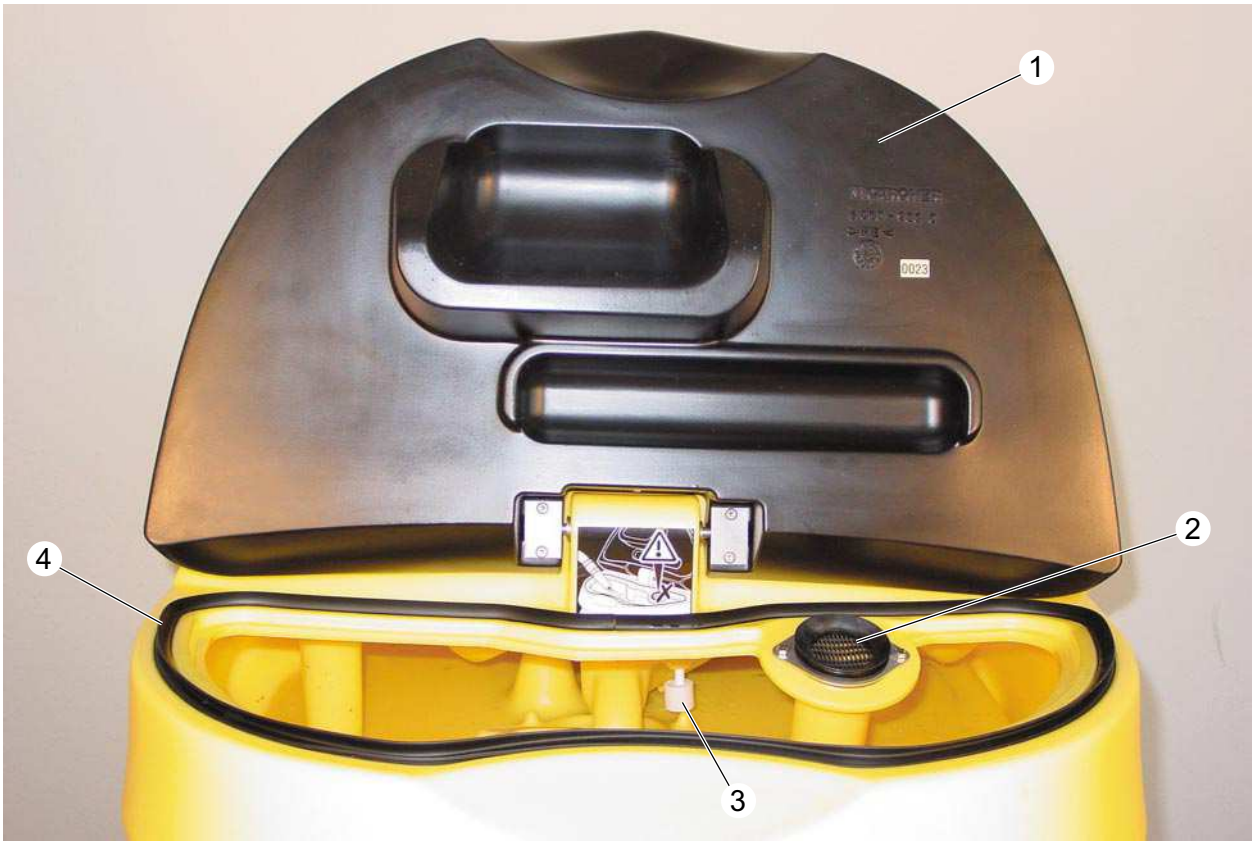
Suction bar



1 Drain hose, dirty water tank
2 Suction hose
3 Deflector wheel with star handle for replacing/rotating the rubber strips
4 Star handle, for installing the suction bar
5 Rubber strip
6 Wing nut, for adjustment of suction bar inclination
7 Bracket, suction bar
8 Lifting motor (M30) for lowering and raising the suction bar

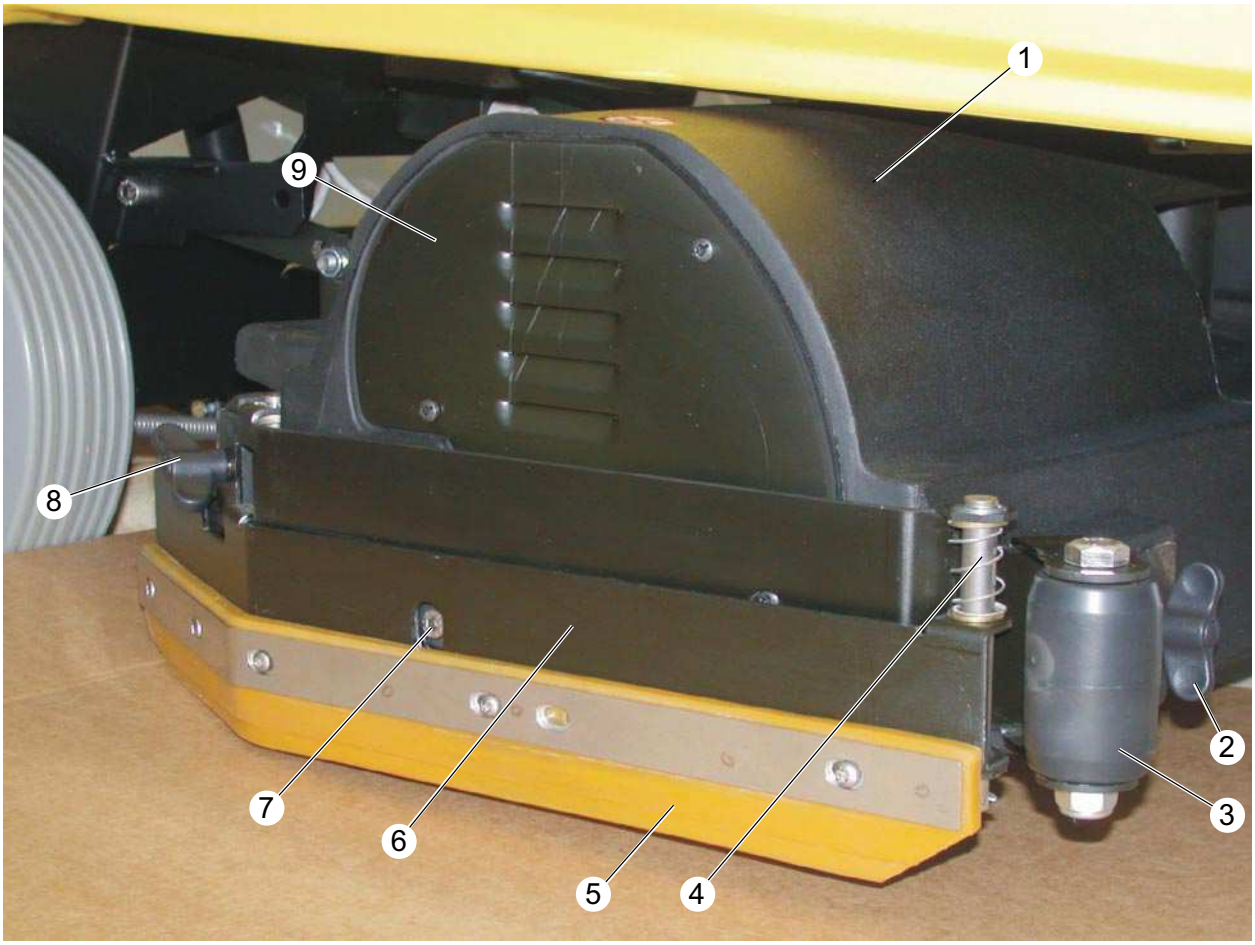
Note:
As a standard, the front rubber strip is grooved and the rear one is smooth. In case of wear, both rubber strips can be rotated to extend their application life.

Dirty water tank



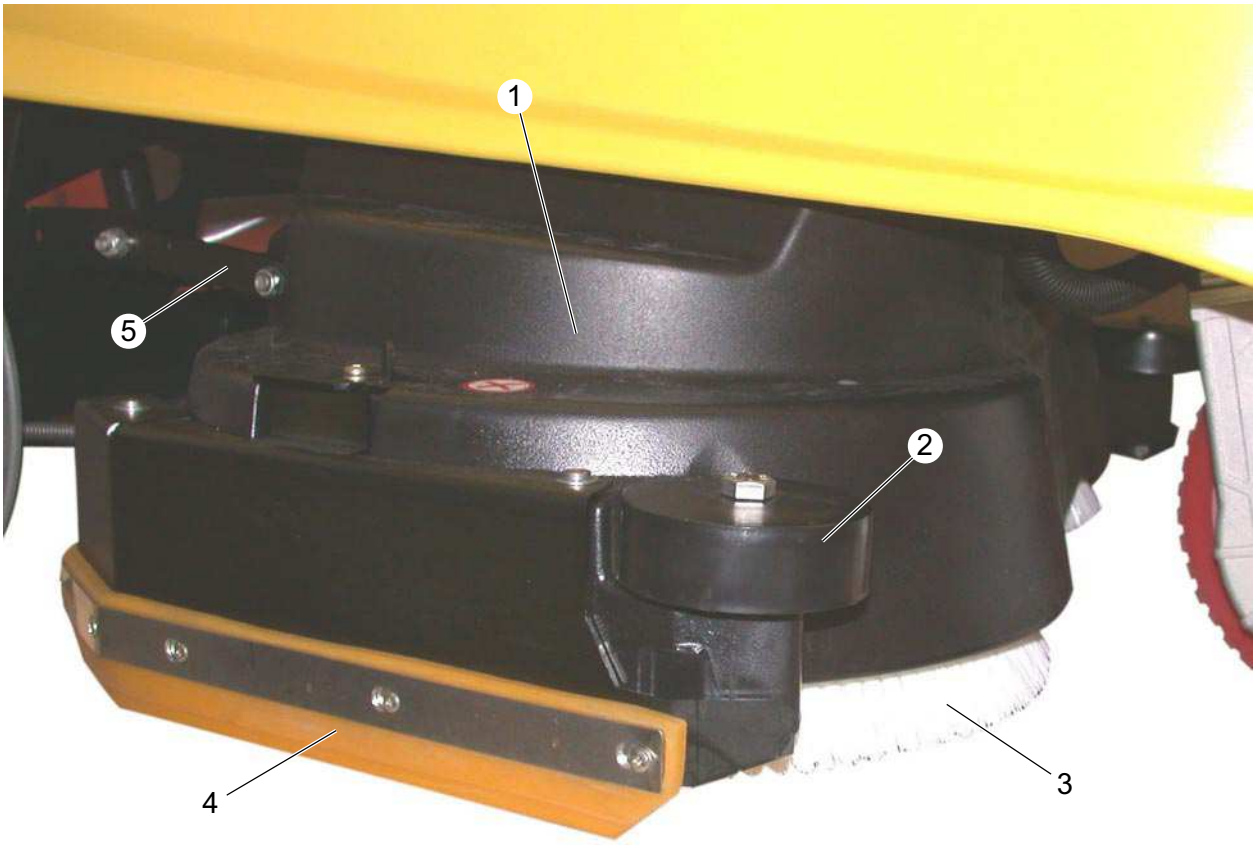
1 Tank cover
2 Fluff strainer, air intake suction motor
3 Float switch (S17)
4 Seal, tank cover

Brush head (BR-Version)



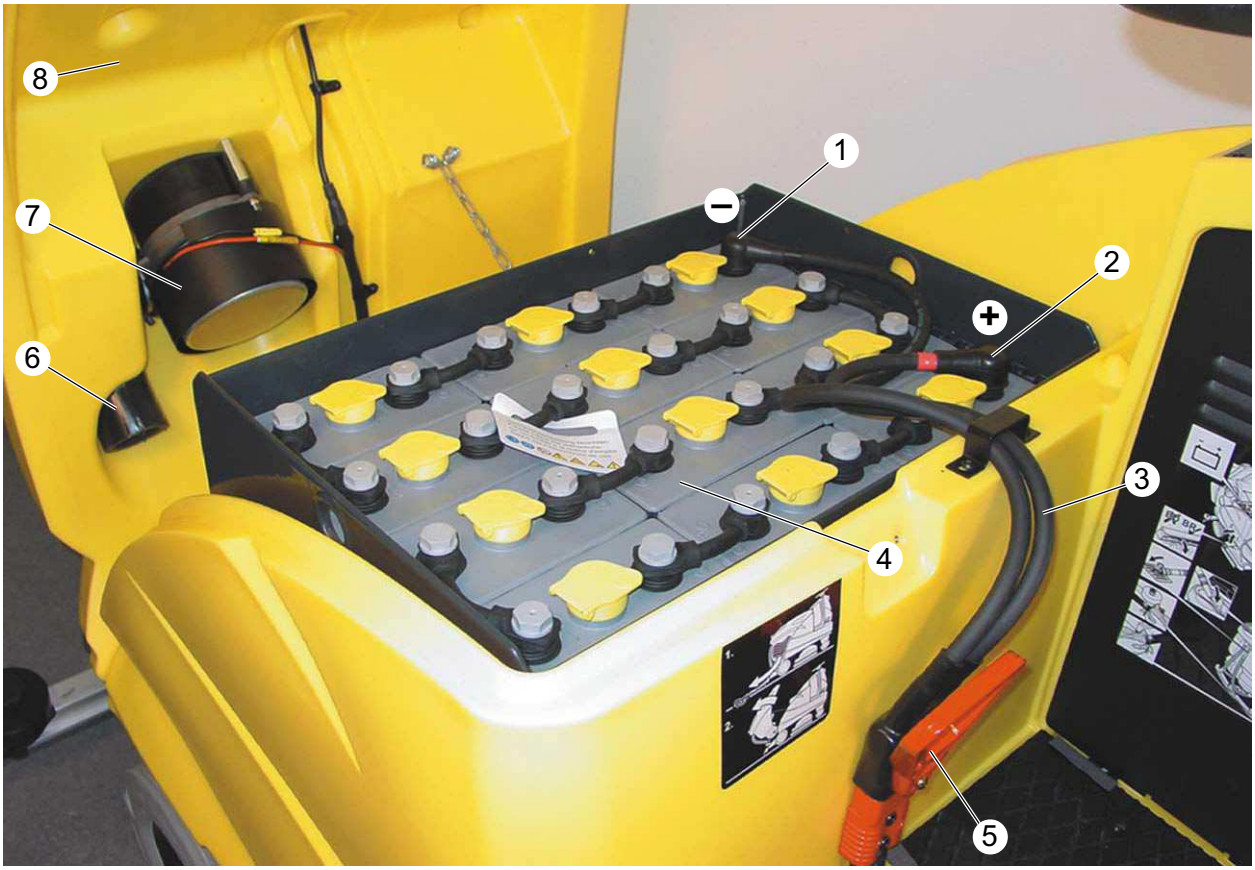
1 Brush head (BR version)
2 Front wing nut, for securing the mounting plate
3 Deflector wheel
4 Spring for lateral sealing strip mounting plate
5 Lateral sealing strip
6 Mounting plate for sealing strip, spring-loaded
7 Adjusting screw, brush pattern
8 Rear wing nut, for securing the mounting plate
9 Cover for brush drive unit assembly

Brush head (BD-Version)



1 Brush head (BD version)
2 Deflector roller
3 Disc brush
4 Side sealing strip, spring loaded
5 Brush head bracket

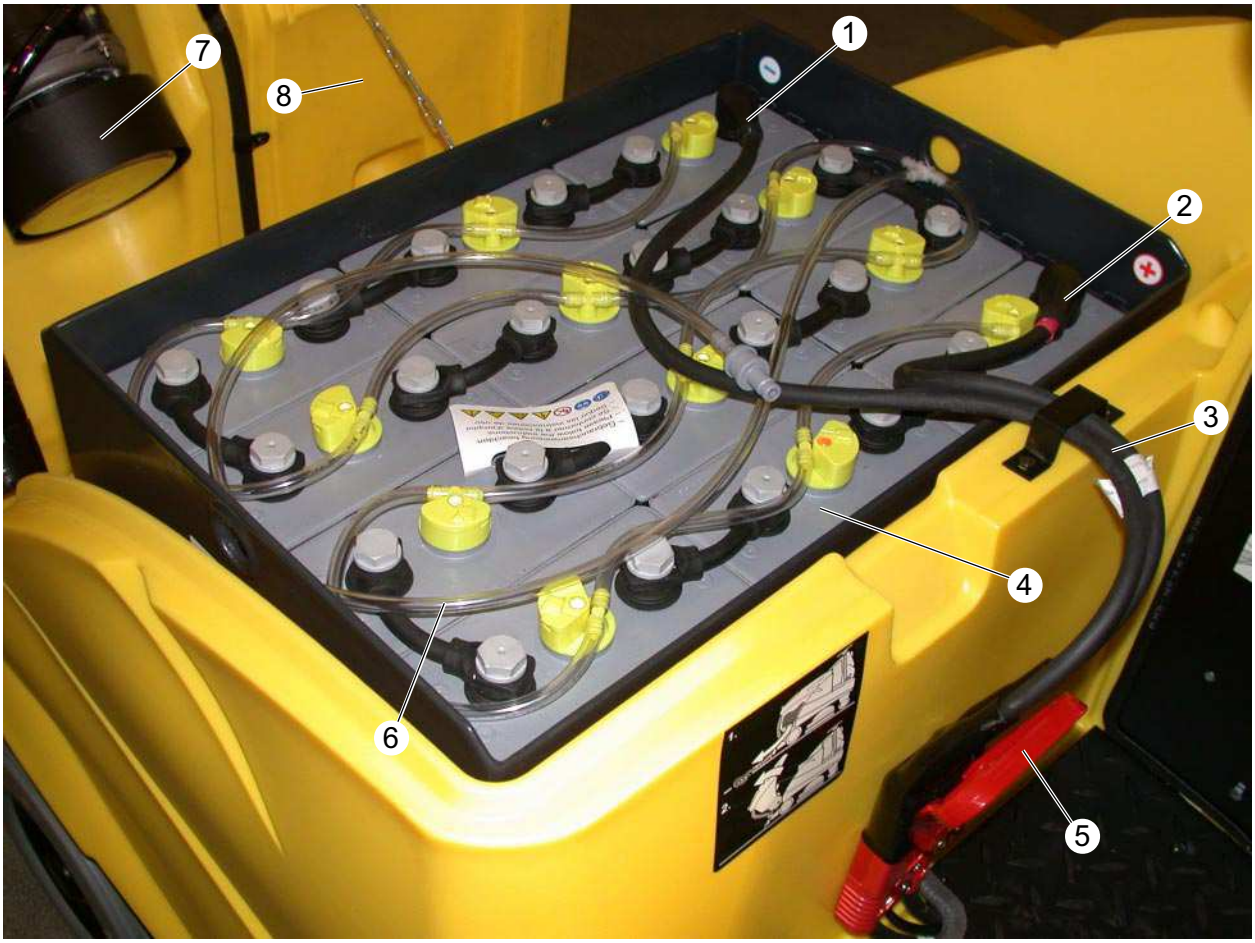
Battery ORIGINAL



1 Connecting terminal minus pole
2 Connecting terminal plus pole
3 Connection cable
4 Battery (G1)
5 Central battery connector (X1)
= EMERGENCY STOP
6 Air outlet hose, suction motor
7 Suction motor (M3, EC long life)
8 Dirty water tank

Note:
The dirty water tank (8) can only be lifted if the dirty water has been drained.

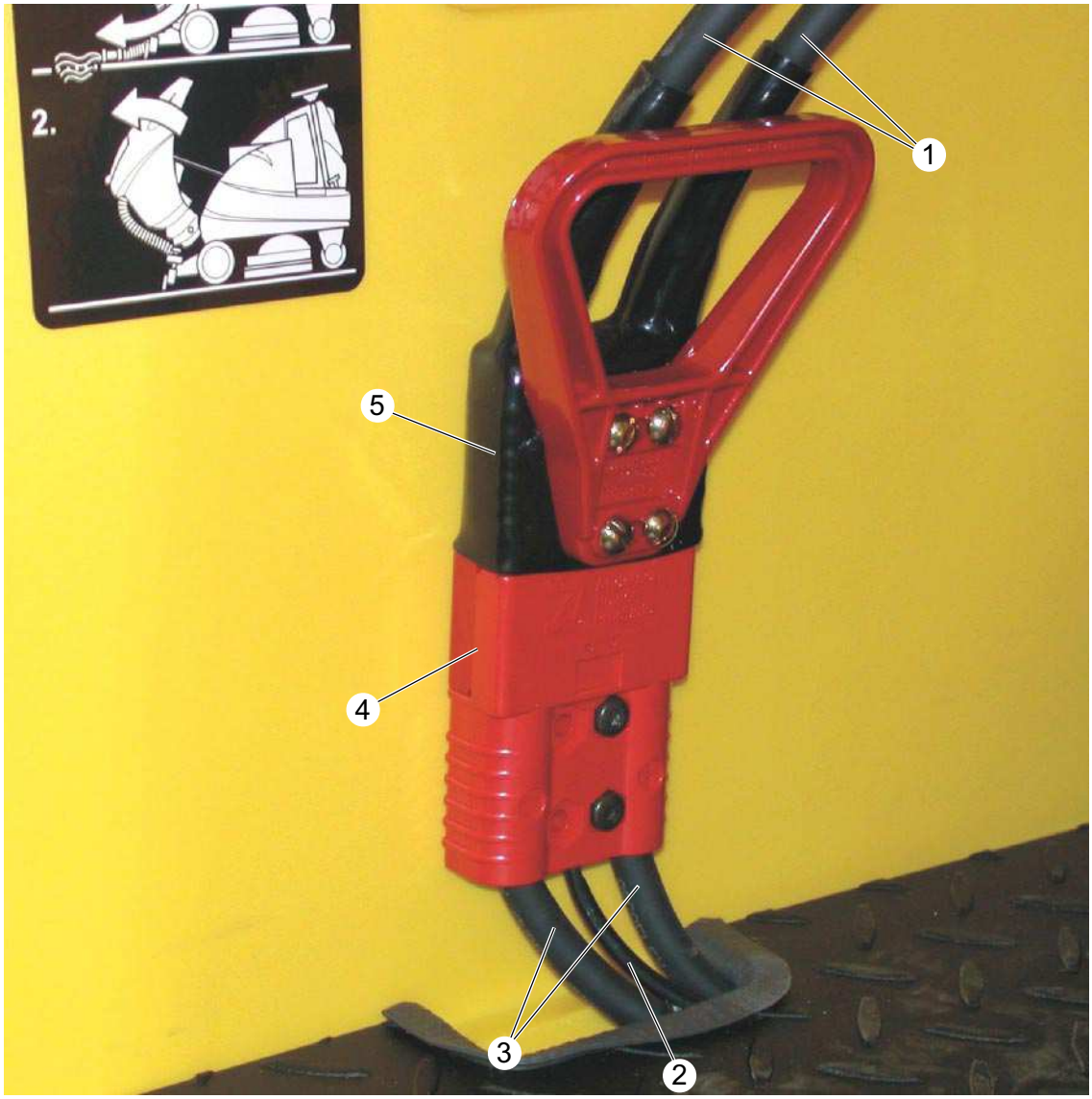
Battery REVISED



1 Connecting terminal minus pole
2 Connecting terminal plus pole
3 Connection cable
4 Battery (G1)
5 Central connector (X1) = EMERGENCY STOP
6 Filling hose
7 Suction motor (M3, EC long life)
8 Dirty water tank

Note:
The dirty water tank (8) can only be lifted if the dirty water has been drained.

Central battery connector ORIGINAL and REVISED



1 Connection cable from the block battery
2 Connection cable (auxiliary contact S32)
ORIGINAL to the control panel
REVISED to the main control printed circuit board
3 Connection cable with the main control printed circuit board (A1)
4 Central connector (X1) - lower section
5 Central connector (X1) - upper section with handle

EMERGENCY STOP function

All the unit's electrical components are connected to the block battery via the central connector. If the upper section (5) is pulled off, the whole unit becomes isolated and the electromagnetic brake is activated in the front wheel and the unit is braked.

Note:
An external battery charger is connected to the central connector-upper section (5).

Battery charger

1 Central connector (X1) - upper section with handle
2 Plug for connection with the battery charger
3 Battery charger
4 Central connector (X1) - lower section
5 Mains cable, battery charger

Control panel ORIGINAL and REVISED

Control panel ORIGINAL (up to software version 2.5)

Item	Name	Function
1	Indicator light (green)	Lights up when warning beacon light is switched on.
2	Indicator light (green)	Lights up if working lights are switched on.
3	"Working light" push-button (optional)	Switches working light ON/OFF.
4	"Warning beacon light" button (optional)	Switches warning beacon light ON/OFF.
5	Indicator light (red)	Lights up if brush pressure too high, brushes are switched off after 4 sec.
6	Indicator light (red)	Lights up if dirty water tank is full. Suction motor switches off after approx. 15 sec.
7	"Suction motor" push-button	– Switches the suction motor ON/OFF and simultaneously lowers/ raises the suction bar. – Suction motor continues to run for approx. 10 sec after being switched off.
8	"Increase brush pressure" push-button	Increases the brush pressure.
9	"Brush motor" push-button	Activates the brush motors. The brush motors only start up if the drive pedal is pressed.
10	Indicator light (green)	– Flashes if brush motors are activated. – Lights up if brush motors are running.
11	"Reduce brush pressure" push button	Reduces the brush pressure.
12	"Memo" push-button	Starts/ends pre-selected functions of brush motors, suction motor, water pump.
13	"Forward drive" push-button	Activates forward movement.
14	Indicator light (green)	Lights up if forward movement is activated.
15	Indicator light (green)	Lights up if reverse movement is activated.
16	"Horn" push-button	Acoustic alarm sound signal.
17	"Reverse drive" push-button	Activates reverse movement.
18	Key switch	Activates the unit's power supply.
19	"Info" push-button	Shown in display: – Current operating voltage. – Hours-run meter (hh.mm). As soon as the operating hours counter starts a "+" symbol appears behind the minute display.
20	"Reduce water flow" push-button	Reduces the quantity of water by adjusting the metering valve.

Control panel ORIGINAL (up to software version 2.5)

Item	Name	Function
21	Indicator light (green)	– Flashes if water function is activated. – Lights up if water pump is running and metering valve is open.
22	"Water pump" push-button	Activates water pump and metering valve. The water pump does not start unless the drive pedal has first been pressed and the brush motors are activated.
23	Display	2-line, 16 characters/line.
24	"Increase water flow" push-button	Increases the quantity of water by adjusting the metering valve.
25	Indicator light (green)	– Lights up if suction motor is running. – Flashes during the after-running time.
26	Indicator light (red)	Lights up if magnet brake is activated.
27	Indicator light (red)	– Flashes, if battery voltage has fallen to 1 Volt above the set end-point voltage. In addition, a one-time acoustic alarm signals. – Lights up, if battery voltage has dropped below the deep-discharge protection voltage.
28	"Wall-Floor-Ceiling Nozzle" push-button	Switches water pump and suction motor on for wall-ceiling-floor nozzle. Function can only be selected when unit is at a standstill.
29	Indicator light (green)	Lights up if push-button 28 is activated.
–	Drive pedal, forward drive	If the drive pedal is pressed the following functions are activated (if pre-selected): – Brush motors are switched on. – Brush head lowers. – Suction motor is switched on. – Suction bar lowers. – Water pump is switched on. – Metering valve opens. – Indicator lights (10), (14), (21) and (25) continuously light up. **Note: The suction motor remains active irrespective of the drive pedal.**
–	Drive pedal, reverse drive	If the drive pedal is pressed the following functions are activated (if pre-selected): – Suction bar rises. – Indicator lights (10), (15), (21), (25) continuously light up. – Acoustic alarm sound signal. **Note: The suction motor remains active irrespective of the drive pedal.**

Control panel REVISED (from display software version V1.0)

Item	Name	Function
1	Indicator light (green)	Lights up when warning beacon light is switched on.
2	Indicator light (green)	Lights up if working lights are switched on.
3	"Working light" push-button (optional)	Switches working light ON/OFF.
4	"Warning beacon light" button (optional)	Switches warning beacon light ON/OFF.
5	Indicator light (red)	Lights up if brush pressure too high, brushes are switched off after 4 sec.
6	Indicator light (red)	Lights up if dirty water tank is full. The suction motor switches off after approx. 15 sec. If "empty" is recognised again, the LED continues to flash for one minute. During this time period it is not possible to switch on the suction motor using the "memo" function or the Wall-Floor-Ceiling-Nozzle function.
7	"Suction motor" push-button	– Switches the suction motor ON/OFF and simultaneously lowers/ raises the suction bar. – Suction motor continues to run for approx. 10 sec after being switched off.
8	"Increase brush pressure" push-button	Increases the brush pressure.
9	"Brush motor" push-button	Activates the brush motors. The brush motors only start up if the drive pedal is pressed.
10	Indicator light (green)	– Flashes if brush motors are activated. – Lights up if brush motors are running.
11	"Reduce brush pressure" push button	Reduces the brush pressure.
12	"Memo" push-button	Starts/terminates preselected brush motor, suction motor and water pump functions and automatically switches the components ON/OFF at defined time intervals.
13	"Forward drive" push-button	Activates forward movement.
14	Indicator light (green)	Lights up if forward movement is activated.
15	Indicator light (green)	Lights up if reverse movement is activated.
16	"Horn" push-button	Acoustic alarm sound signal.
17	"Reverse drive" push-button	Activates reverse movement.
18	Key switch	Activates the unit's power supply.

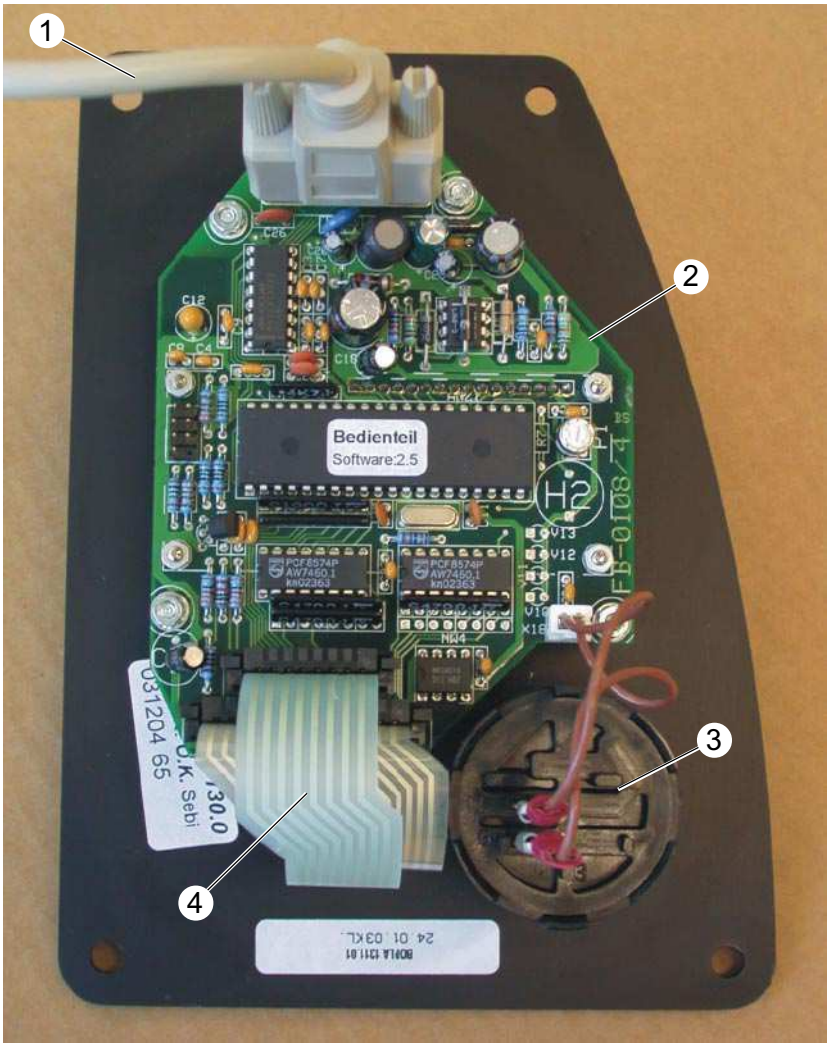
Control panel REVISED (from display software version V1.0)

Item	Name	Function
19	"Info" push-button	Appears on the display: – Battery status (bar diagram). – Temperature of the main control printed circuit board. – Drive motor temperature (bar diagram). – Version numbers of the individual micro controllers. – Type of floor cleaner.
20	"Reduce water flow" push-button	Reduces the quantity of water by adjusting the metering valve.
21	Indicator light (green)	– Flashes if water function is activated. – Lights up if water pump is running and metering valve is open.
22	"Water pump" push-button	Activates water pump and metering valve. The water pump does not start unless the drive pedal has first been pressed and the brush motors are activated.
23	Display	2-line, 16 characters/line.
24	"Increase water flow" push-button	Increases the quantity of water by adjusting the metering valve.
25	Indicator light (green)	– Lights up if suction motor is running. – Flashes during the after-running time.
26	Indicator light (red)	Lights up if magnet brake is activated.
27	Indicator light (red)	– Flashes, if battery voltage has fallen to 1 Volt above the set end-point voltage. In addition, a one-time acoustic alarm signals. – Lights up, if battery voltage has dropped below the deep-discharge protection voltage.
28	"Wall-Floor-Ceiling Nozzle" push-button	Switches water pump and suction motor on for wall-floor-ceiling nozzle. Function can only be selected when unit is at a standstill.

Control panel REVISED (from display software version V1.0)

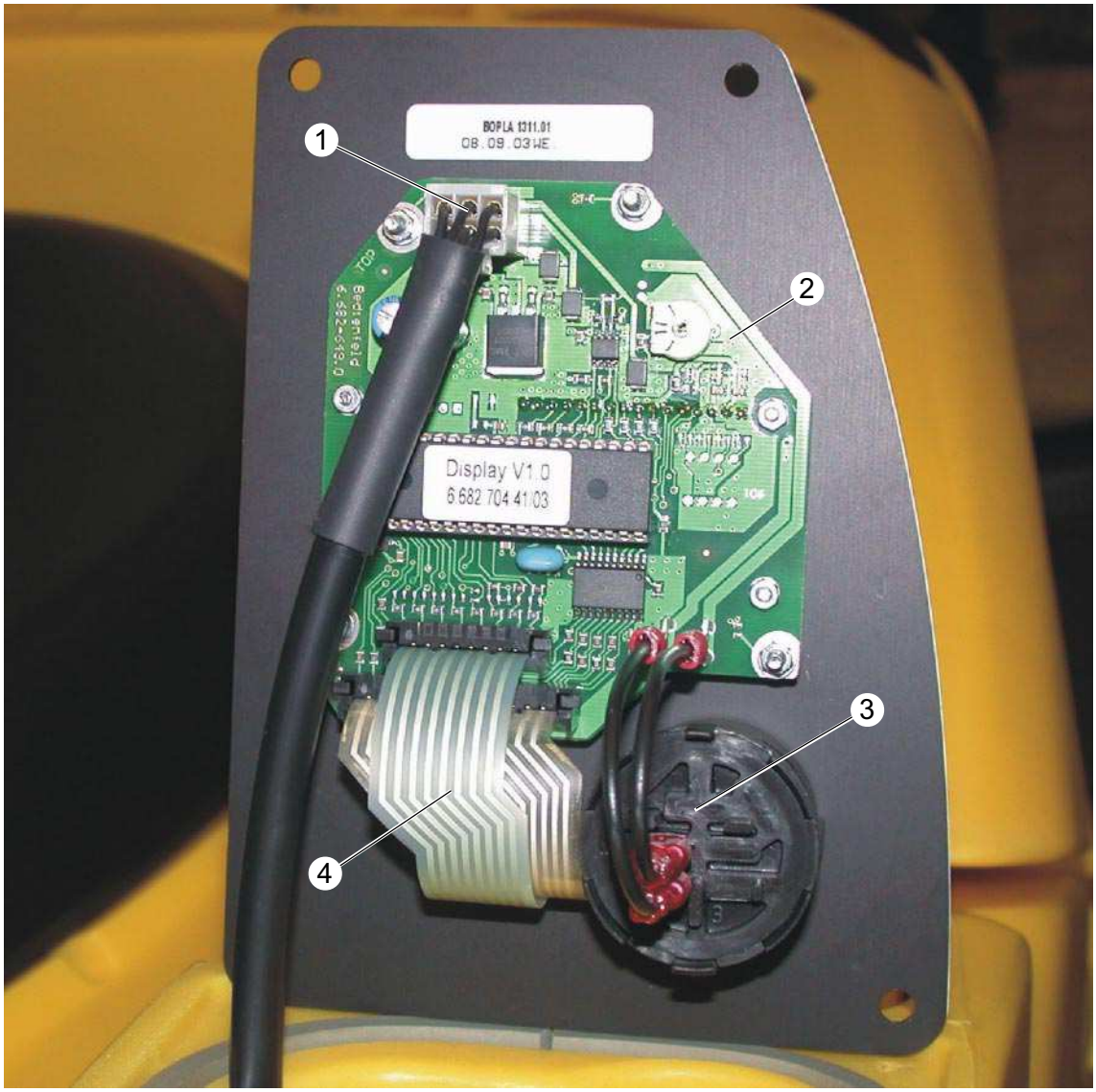
Item	Name	Function
29	Indicator light (green)	Lights up if push-button 28 is activated.
–	Drive pedal, forward drive	When the drive pedal is pressed the following functions are activated (if pre-selected): – Brush motors are switched on. – Brush head lowers. – Suction bar lowers. – Water pump is switched on. – Metering valve opens. – Indicator lights (10), (14), (21) and (25) continuously light up. **Note: The suction motor remains active irrespective of the drive pedal!**
–	Drive pedal, reverse drive	When the drive pedal is pressed the following functions are activated (if pre-selected): – Suction bar rises. – Indicator lights (10), (15), (21), (25) continuously light up. – Acoustic alarm sound signal. – When in pre-set of the Setup menu the warning beacon light switches on during reverse drive. **Note: The suction motor remains active irrespective of the drive pedal!**

Control panel printed ciruit board, view reverse side ORIGINAL



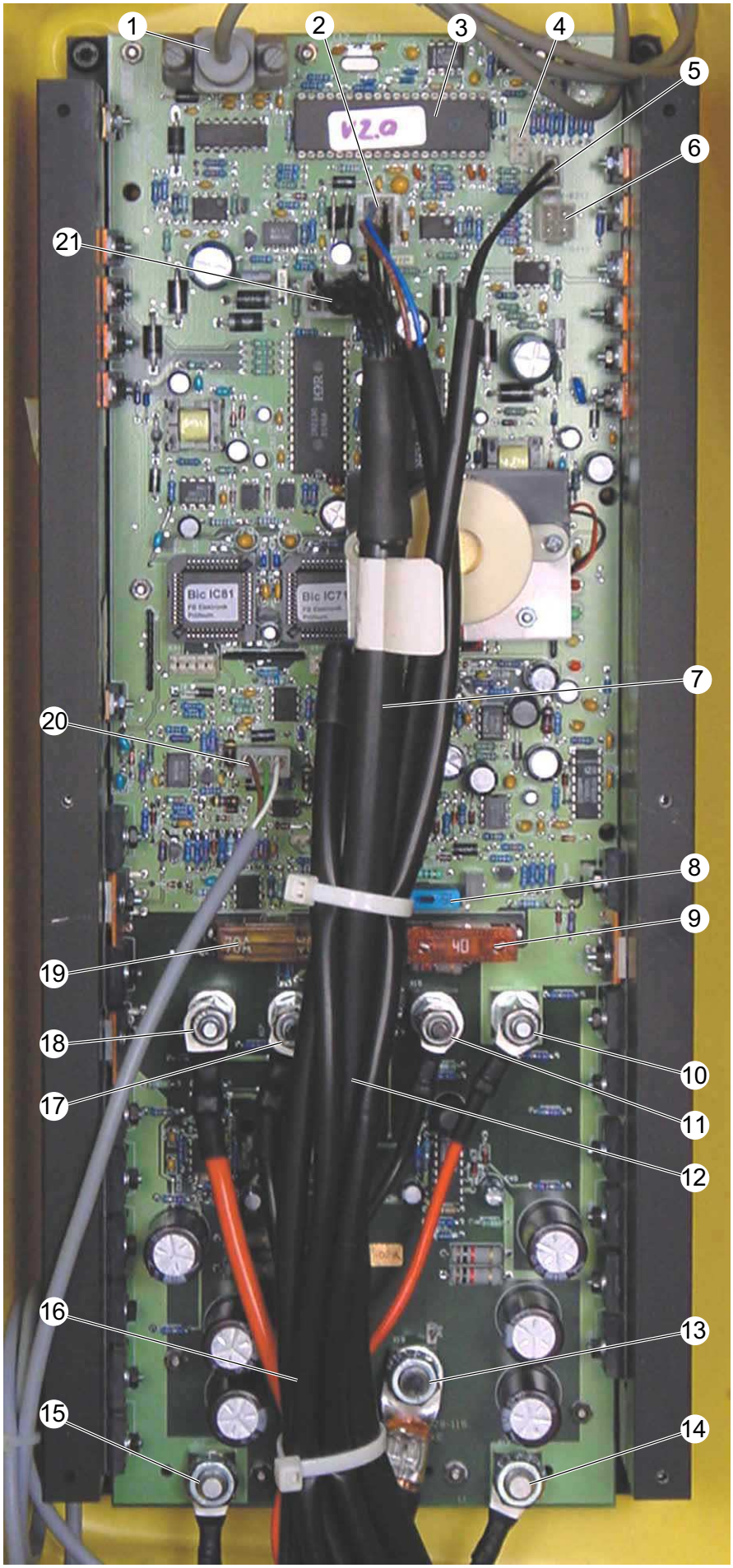
1 Connection cable, to main control printed circuit board
2 Control panel printed circuit board (A2)
3 Key switch (S1)
4 Flat cable, connection to plastic foil control panel

Control panel printed ciruit board, view reverse side REVISED



1 Connection cable, to main control printed circuit board
2 Control panel printed circuit board (A2)
3 Key switch (S1)
4 Flat cable, connection to plastic foil control panel

Main control printed circuit board ORIGINAL



Main control printed circuit board ORIGINAL

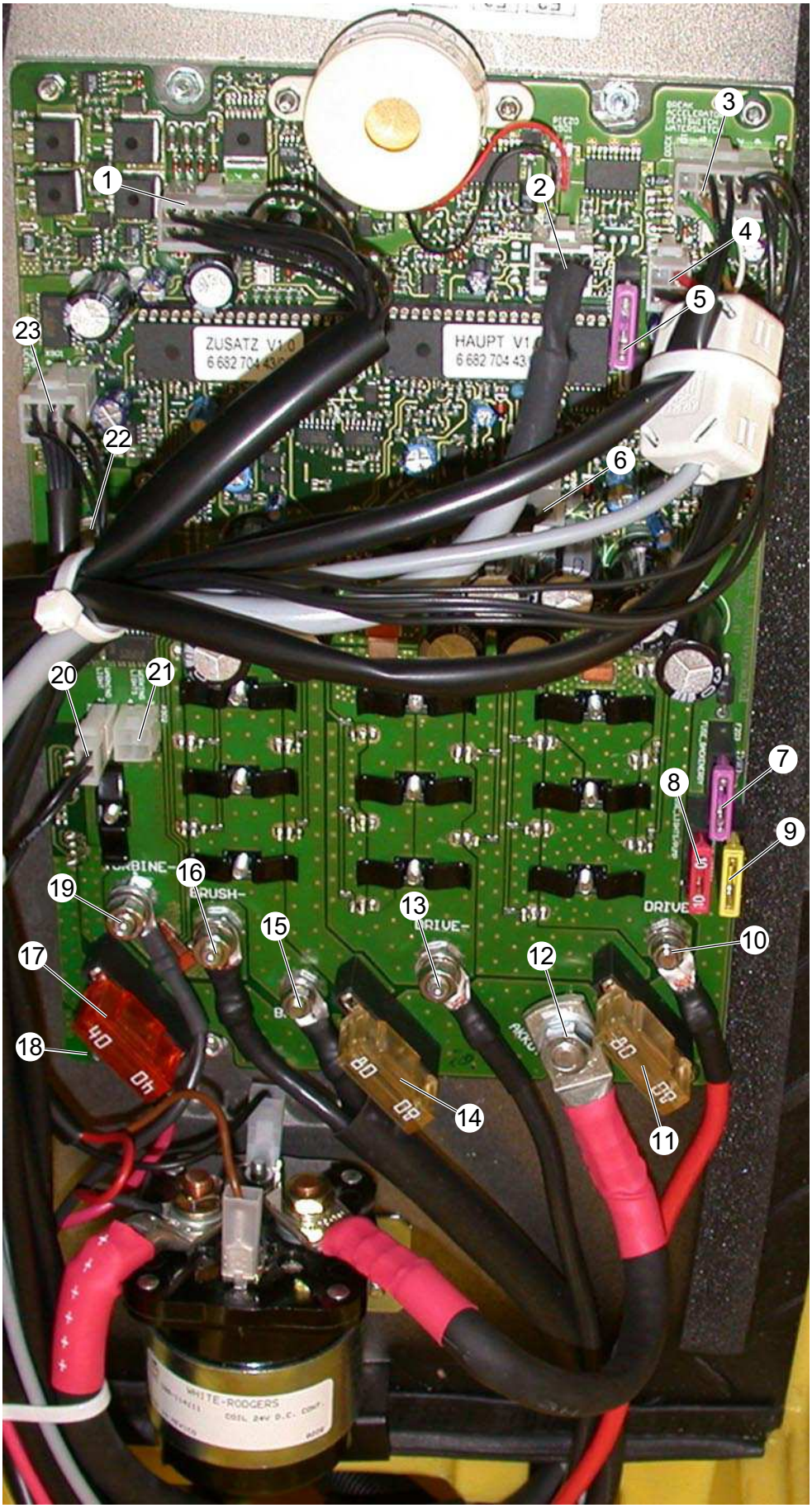
1 Connection instrument panel printed circuit board (X2)
2 Terminal strip (X11)
3 Processor
4 Terminal strip (X1)
5 Terminal strip (X9)
6 Terminal strip (X10)
7 Terminal strip (X5)
8 Fuse - controls (F1)
9 Fuse - suction motor (F4)
10 Electric connection - suction motor (X14) “+”
11 Electric connection - suction motor (X15) “–”
12 Fuse - drive unit motor (F2)
13 Electric connection - battery (X19) “–”
14 Electric connection - drive motor (X13) „sw“
15 Electric connection - drive motor (X12) „rt“
16 Electric connection - battery (X18) “+”
17 Electric connection - brush motors (X17) „–“
18 Electric connection - brush motors (X16) „+“
19 Fuse - brush motor (F3)
20 Terminal strip (X6)
21 Terminal strip (X7)

Note:
For connections on terminal strips concerned and fuse values see circuit diagram 0.088-555

Tightening torques for:

Item 10, 11, 17, 18 (M6) = 3.9 Nm
Item 13, 16 (M8) = 9 Nm

Main control printed circuit board REVISED



Main control printed circuit board REVISED

1 Terminal strip (X1)
2 Terminal strip (X204)
3 Terminal strip (X200)
4 Terminal strip (X201)
5 Fuse, controller (F1)
6 Terminal strip (X205)
7 Fuse, EMERGENCY STOP mode (F5)
8 Fuse light/water pump (F6)
9 Fuse, lifting motors, brush head and suction bar (F7)
10 Electrical connection, drive motor (X300) “+”
11 Fuse Drive motor (F2)
12 Electrical connection, main contactor (X202) “+”
13 Electrical connection, drive motor (X301) “–“
14 Fuse, brush motor (F3)
15 Electrical connection, brushmotor (X400) “+”
16 Electrical connection, brushmotor (X400) “–“
17 Fuse, suction motor (F4)
18 Electrical connection, suction motor (X700) “+”
19 Electrical connection, suction motor (X701) “–“
20 Terminal strip (X900)
21 Terminal strip (X902)
22 Electrical connection, battery plug connection, negative battery post (X203) “–“
23 Terminal strip (X901)

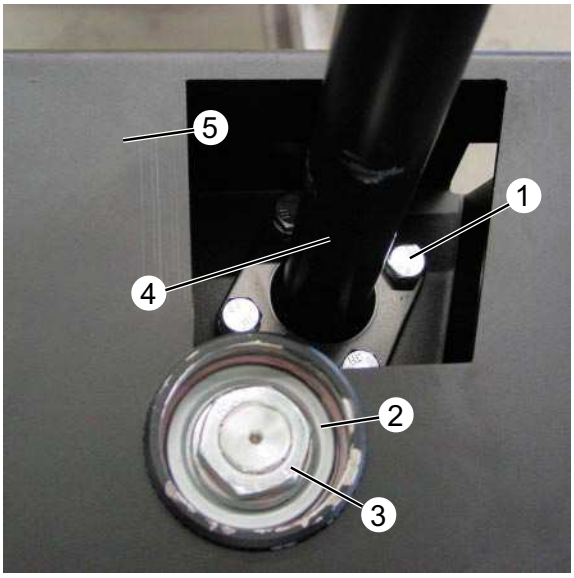
Note:
The new main control printed circuit board 2.816-067 will be installed as of manufacturing number 10800.

For connections on terminal strips concerned and fuse values see circuit diagram 0.088-682

Tightening torques for:

Item 10, 15, 18 (M5) = 3,5 Nm
Item 13, 16, 19 (M6) = 5,9 Nm
Item 22 (M10) = 17 Nm

Steering

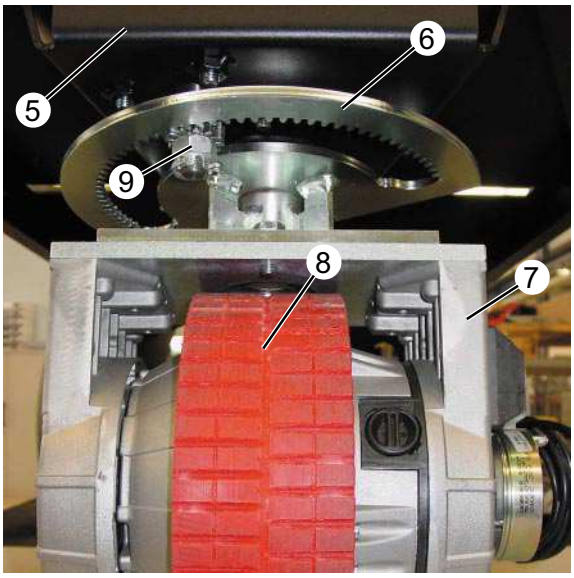


Steering column with steering bearing

Steering column

The steering column (4) with internal steering rod (9) is fixed to the base frame (5) by four retaining bolts (1).

The steering movement of the steering wheel is transferred via the steering rod (9) to the steering head (7) via the ring gear (9).



Drive wheel

Steering head and wheel-hub motor

The steering head (7) is mounted to the steering rod bearing (2) by a fastening nut (3).

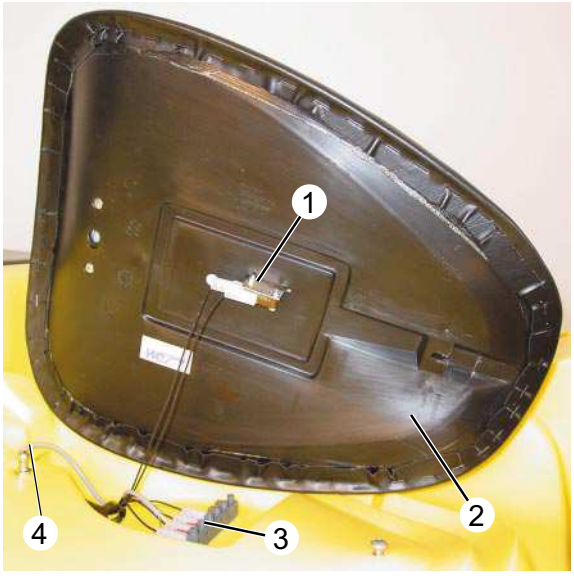
Note: **REVISED**
Regularly grease the ring gear (6) in order to minimise wear.

Grease type 6.288-000

Drive whell with electromagnetic brake

1 Retaining bolts, steering column
2 Steering rod bearing
3 Fastening nut, steering head, wrench size 36 mm
4 Steering column
5 Base frame
6 Ring gear
7 Steering head
8 Front wheel
9 Steering rod with toothed wheel
10 Electromagnetic brake (Y1)
11 Wheel-hub motor M1)
12 Free-roll lever for manual release of the electromagnetic brake

Seat contact switch, junction box



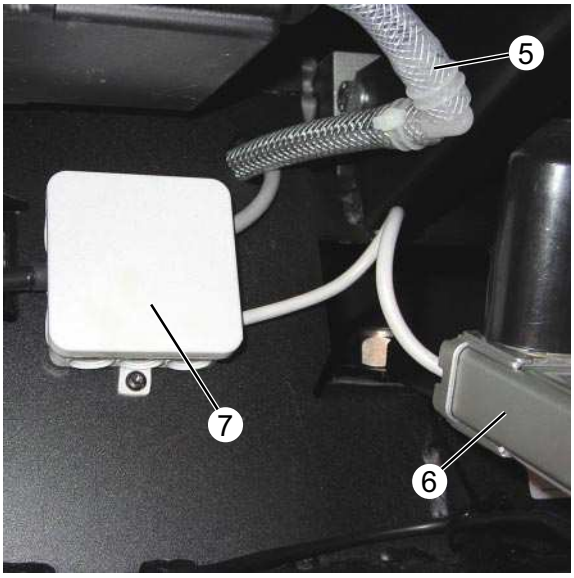
Drivers' seat, view from below

Seat contact switch

The seat contact switch (1) is located on the underside of the drivers' seat (2). To get to the seat contact switch (1), the seat (2) must be lifted at the rear and pushed back with a jolt. The seat released from its latch and can be tilted to one side.

Note:
The seat switch (1) is actuated from a weight of 10kg.

In case of danger, it acts as a safety switch for the operator. The unit is braked until it comes to a standstill, if the operator leaves the seat for more than 1.5 sec during operation.



View of unit from the rear, underneath

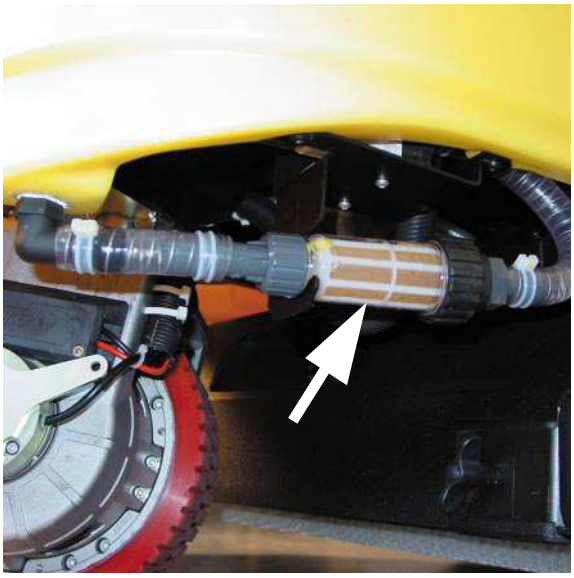
Junction box

The cables from the lifting motor brush head and the lifting motor suction bar are connected in the junction box (7).

The junction box (7) is located at the rear, beneath the dirty water tank.

1 Seat contact switch (S16)
2 Seat
3 Terminal strip (circuit diagram EXT.X1)
4 Connecting wire, float switch (S17)
5 Fresh-water hose to brush head
6 Lifting motor suction bar
7 Junction box (circuit diagram EXT.X3)

Water system



Water filter (ALT)

Water filter ORIGINAL

The water filter removes contaminations from the fresh-water to protect the water pump.

It is located at the front, on the left-hand side beneath the fresh-water tank.

Water filter (REVISED) with stopcock

Water filter REVISED

In front of the water filter is a shut-off valve, which is used to shut off the fresh-water flow when changing/cleaning the filter.

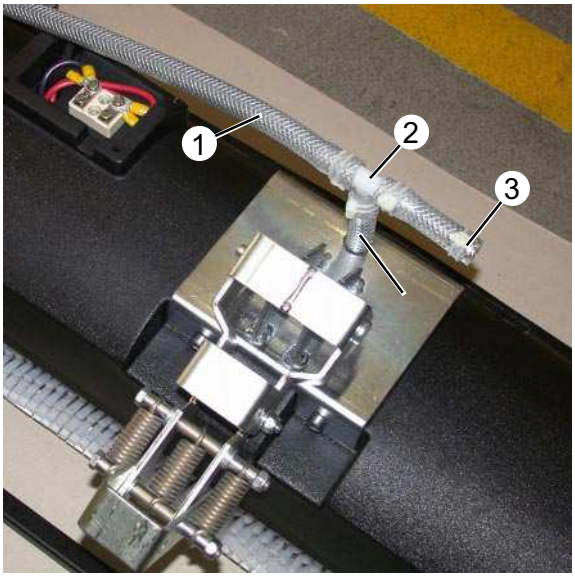
Water pump (M4)

Water pump (M4)

The water pump transports the fresh-water to the brush head.

The water pump is located at the front beneath the fresh-water tank.

Water system

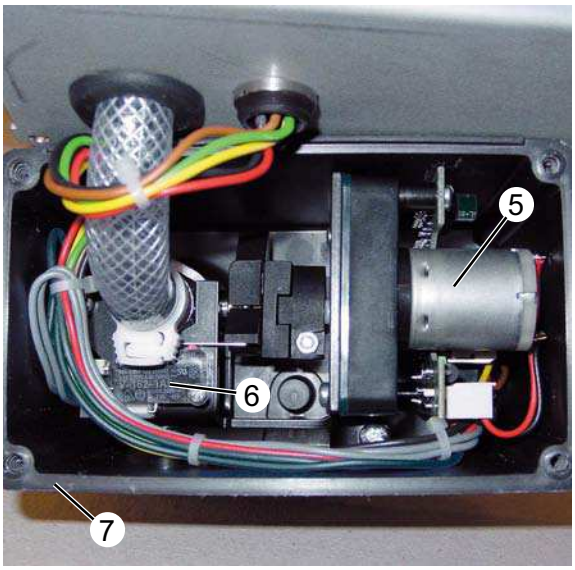


Air bleeder valve BR head

Air bleeder valve (only BR-head)

If the water pump is switched off and the metering valve is closed the air bleeder valve (3) opens and allows the water in the hose between the metering valve and the T-junction to drain. This reduces dribbling at the brush head to a minimum.

The air bleeder valve (3) is located on top of the brush head.



Metering valve (ORIGINAL)

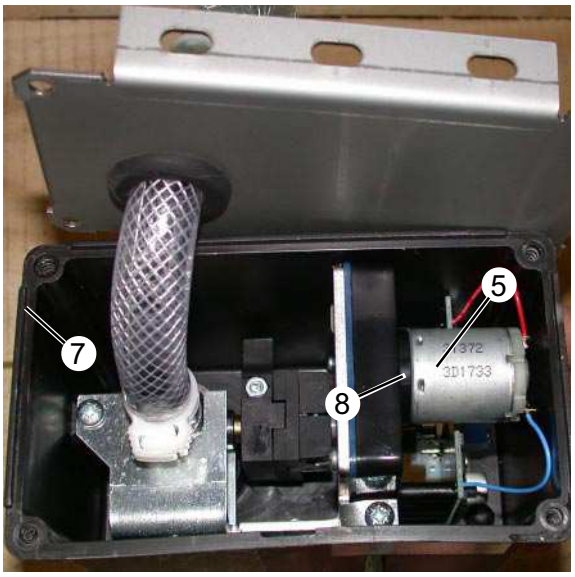
Metering valve (Y2) ORIGINAL

The metering valve is located at the rear beneath the dirty water tank.

The servo motor (5) only opens the metering valve if the following conditions are fulfilled:

– Water pump is switched on (instrument panel button)
– Brush head is lowered (instrument panel button)
– Driving operation forwards or reverse (instrument panel button)
– Drive unit pedal pressed

The two microswitches (6) switch off the servo motor (5) in the end positions. They are not adjustable. The buttons on the instrument panel can be used to adjust the metering valve in 10 steps with the servo motor.



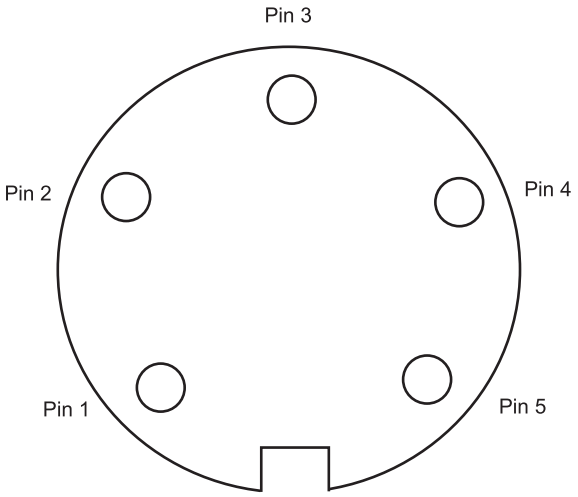
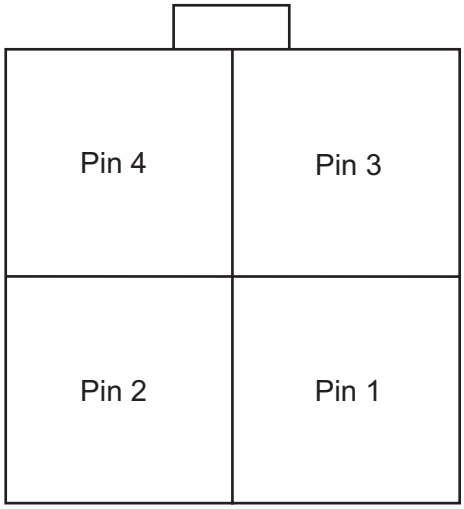
Metering valve (REVISED)

Metering valve (Y2) REVISED

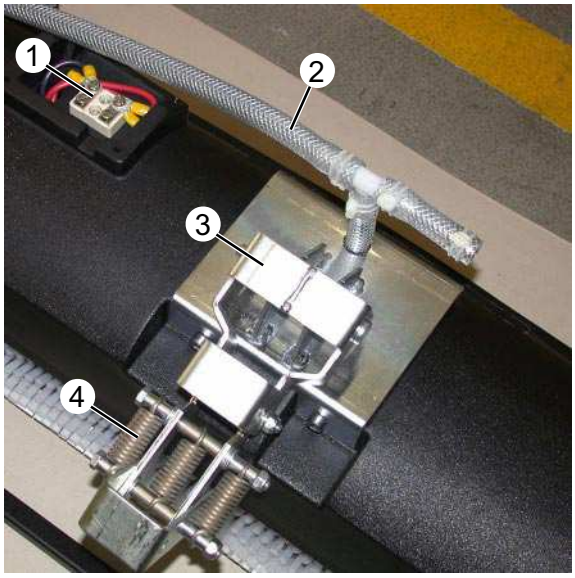
This metering valve does not have microswitches (6), instead the position is recorded via a potentiometer (8).

1 Hose from the water pump
2 T-junction
3 Air bleeder valve
4 Hose to the brush head
5 Servo motor
6 Microswitch (2x) ORIGINAL
7 Metering valve housing
8 Potentiometer REVISED

Water system

PIN	Round connection plug, valve 4.580-599 **ORIGINAL**	Square connection plug, valve 4.580-605 **REVISED**
		
1	Battery voltage 24 Volt (+)	Battery voltage 24 Volt (+)
2	Earth 0 Volt	24 Volt if water pump ON 0 Volt if water pump OFF
3	24 Volt if water pump ON 0 Volt if water pump OFF	Earth 0 Volt
4	Not used	Control voltage for servo motor 1.8 Volt = metering valve max. opened 3.8 Volt = metering valve min. opened Increment 0.1-0.2 Volt, fixed
5	Control voltage for servo motor 3.8 Volt = metering valve min. opened 2.9 Volt = metering valve max. opened Increment 0.1-0.2 Volt, variable	Not used

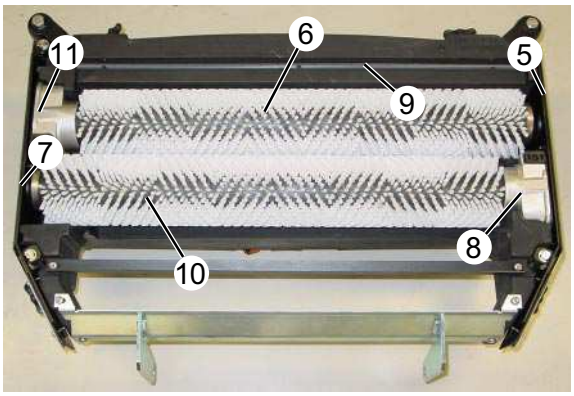
Brush head - BR version



Brush head from above (REVISED)

Brush head from above **REVISED**

1 Terminal strip brush motors (EXT.X2)
2 Water inlet hose
3 Brush head, top bracket
4 Springs (3x)



Brush head from below

Brush head from below

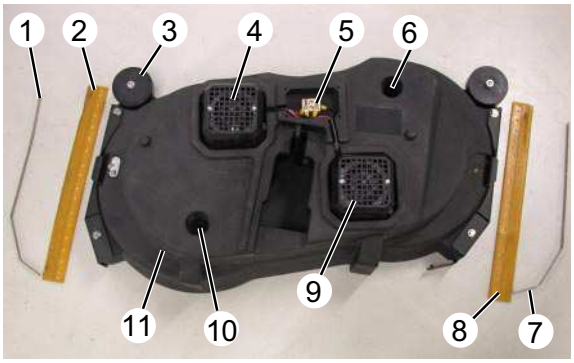
5 Side sealing strip
6 Brush roller, front
7 Side sealing strip
8 Drive, rear brush roller
9 Fresh-water distribution pipe
10 Brush roller, rear
11 Drive, front brush roller

Fresh-water distribution tube

Fresh-water distribution tube

The distribution tube (9) is located in front of the front brush roller. It must be installed so that the holes are facing slightly towards the rear.

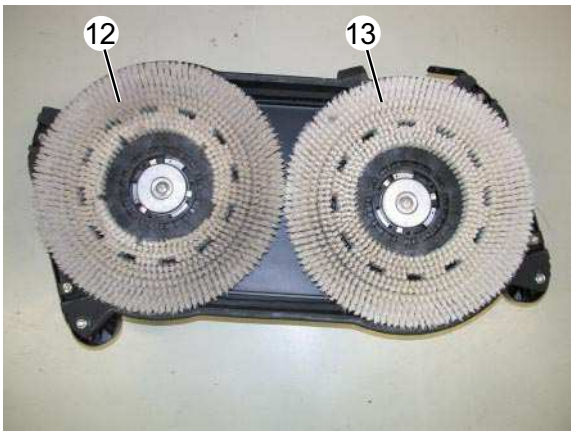
Brush head BD version



Brush head from above

Brush head from above

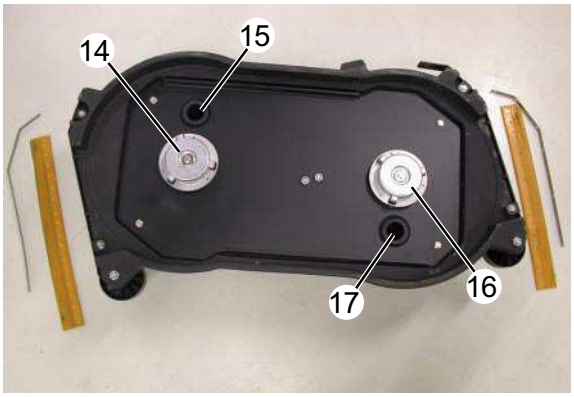
1 Retainer plate, sealing strip left
2 Sealing strip, left
3 Deflector wheel
4 Drive motor (M2), disc brush left
5 Terminal strip, brush motors (EXT.X2)
6 Fresh-water inlet, right side
7 Retainer plate, sealing strip right
8 Sealing strip, right
9 Drive motor (M2.1), disc brush right
10 Fresh-water inlet, left
11 Brush head, BD version



Brush head from below with disc brushes

Brush head from below, with disc brushes

12 Disc brush left
13 Disc brush right

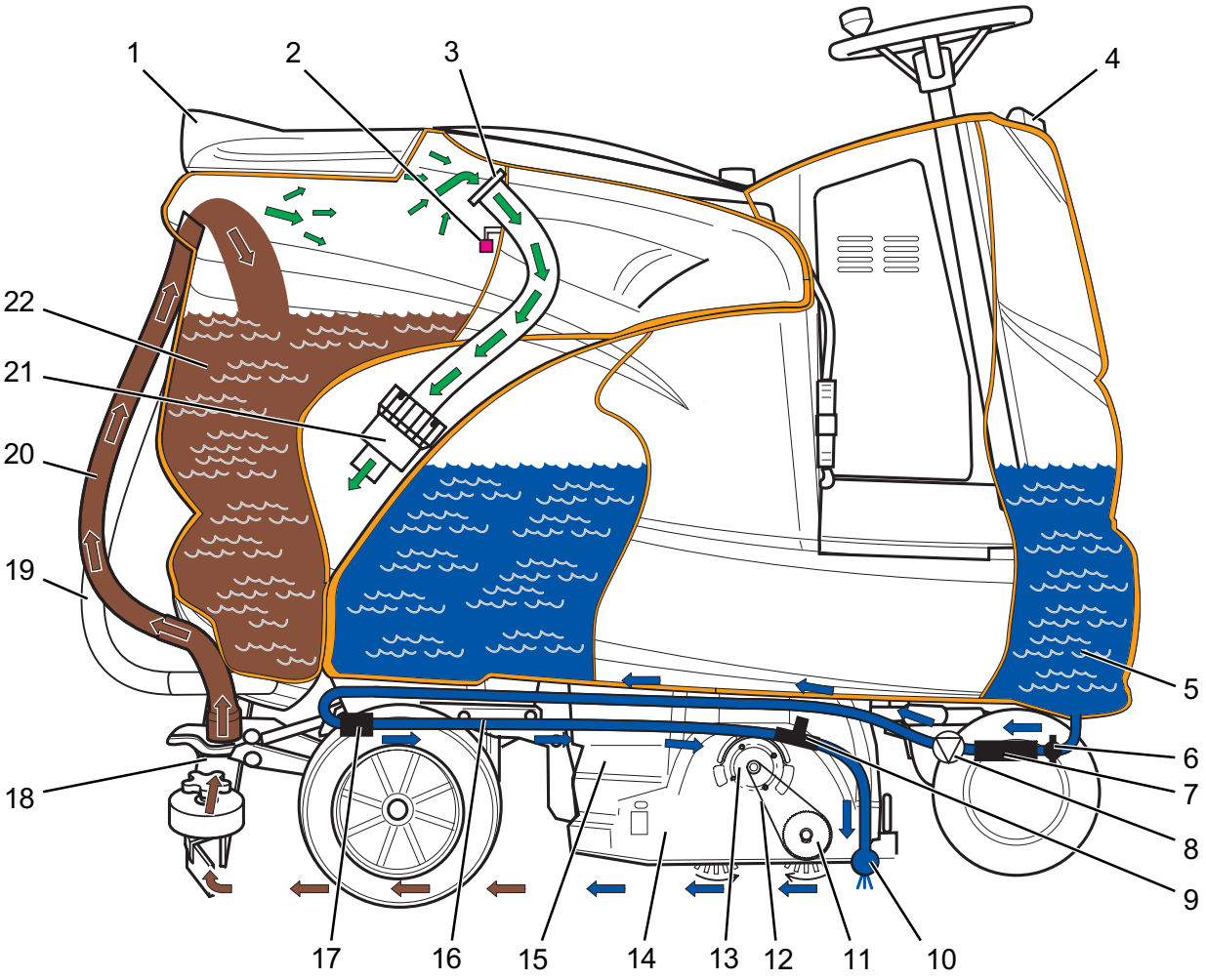


Brush head from below without disc brushes

Brush head from below, without disc brushes

14 Adaptor, disc brush left
15 Fresh-water outlet, left
16 Adaptor, disc brush right
17 Fresh-water outlet, right

Functional diagram



1 Cover, dirty water tank
2 Float switch (S17)
3 Fluff strainer
4 Cover, fresh-water tank
5 Fresh-water tank
6 Shut-off valve **REVISED**
7 Water filter, fresh-water
8 Water pump (M4)
9 Air bleeder valve
10 Water distribution pipe
11 Brush rollers (2x) (rotational direction, towards each other)
12 Drive belt
13 Brush motor (M2, M2.1)
14 Brush head
15 Coarse-dirt container (only BR version)
16 Fresh-water hose to the brush head
17 Metering valve (Y2), fresh-water
18 Suction bar
19 Draining hose, dirty water
20 Suction hose
21 Suction motor (M3), long life
22 Dirty water tank

Control panel test REVISED

The control panel test enables the user to check the function of the plastic foil control panel and the indicator lamps. The item numbers refer to the “control panel” (page 13).

Access control panel test

To access the control panel test, press any button and switch on the key switch at the same time.

Mode of operation

Each button has one or several indicator lamps assigned to it, which must only light up if the button is pressed. The assignment is:

"Wall-floor-ceiling nozzle" push-button (28)	"Wall-floor-ceiling nozzle" indicator lamp (29)
"Warning beacon light" push-button (4)	"Warning beacon light" indicator lamp (1)
"Work light" push-button (3)	"Work light" indicator lamp (2)
"Increase water flow rate" push-button (24)	"Magnet brake activated" indicator lamp (26)
"Reduce water flow rate" push-button (20)	"Battery empty" indicator lamp (27)
"Increase brush pressure" push-button (8)	"Brush overloaded" indicator lamp (5)
"Reduce brush pressure" push-button (11)	"Dirt water tank full" indicator lamp (6)
"Suction motor" push-button (7)	"Suction motor" indicator lamp (25)
"Water pump" push-button (22)	"Water pump" indicator lamp (21)
"Brush motor" push-button (9)	"Brush motor" indicator lamp (10)
"Info" push-button (19)	"Water pump" (21) and "Suction motor" (25) indicator lamps
"Memo" push-button (12)	"Brush motor" (10) and "Suction motor" (25) indicator lamps
"Forward drive" push-button (13)	"Forward drive" indicator lamp (14)
"Reverse drive" push-button (17)	"Reverse drive" indicator lamp (15)
"Horn" push-button (16)	"Forward drive" (14) and "Reverse drive" (15) indicator lamps

Terminate control panel test

The test is terminated by turning the key switch to the “0” position.

Test mode ORIGINAL

	**Access to test mode** The user can use test mode to check the function of all the setings separately from each other. The item numbers given for the push- buttons refer to the illustration of the control panel. (page 13) Turn the key switch to position "I" and then within 2 seconds press the "warning beacon light" (4) and "working light" (3) push-buttons at the same time. "Test Mode" and the installed control version no. appear on the display. The connected working light or warning beacon light is automatically switched on. Switch them back off by pressing the relevant push-button again.
Press the "water pump" (22) push-button	Indicator light (21 green) lights up. Water pump switches on. The water-metering valve opens to its maximum.
Press the "water pump" (22) push-button again	Indicator light (21 green) goes off. Water pump switches off. Water metering valve closes completely.
Press "reduce water flow" (20) push-button	Suction bar lowers as long as the push-button is pressed, the suction motor must be switched off with push-button (7).
Press "increase water flow" (24) push-button	Suction bar rises as long as the push-button is pressed, the suction motor must be switched off with push-button (7).
Press the "suction motor" (7) push-button	Indicator light (25 green) lights up. Suction motor switches on. If the direction of travel "F" (13) is also selected, the suction bar lowers at the same time.
Press the "suction motor" (7) push-button again	Indicator light (25 green) flashes while the suction motor continues running. Indicator light (25 green) goes off if the suction motor is off. If the direction of travel "F" (13) is also selected, the suction bar rises at the same time.
Press the "brush motor" (9) push-button	Indicator light (19 green) lights up. Both brush motors run.

Test mode ORIGINAL

Press the "brush motor" (9) push-button again	Indicator light (19 green) goes off. Both brush motors switch off.
Press the "Memo" (12) push-button	This push-button has no function in the test mode.
Press the "Info" (19) push-button	Development-specific information. No information for the service department.
Press the "Increase brush pressure" (8 +) push-button	Brush head rises as long as the push-button is pressed.
Press the "Reduce brush pressure" (11 –) push-button	Brush head lowers as long as the push-button is pressed.
Press the "Wall-floor-ceiling nozzle" (28) push-button	Indicator light (29 green) lights up. Suction motor switches on. Indicator light (25 red) lights up. Water pump switches on. Indicator light (21 green) lights up. Suction bar rises. Metering valve remains closed. Pre-selected direction of travel is switched off. Indicator light (14/15) goes off.
Press the "Wall-floor-ceiling nozzle" (28) push-button again	Indicator light (29 green) goes off. Suction motor switches off after the after-running time. Indicator light (25 red) goes off. Water pump switches off. Indicator light (21 green) goes off. Suction bar remains in upper position. Metering valve remains closed.
Press the "warning beacon light" (4) push-button	Indicator light (1 green) lights up. Warning beacon light switches on, if available.
Press the "warning beacon light" (4) push-button again	Indicator light (1 green) goes off. Warning beacon light switches off, if available.
Press the "working light" (3) push-button	Indicator light (2 green) lights up. Working light switches on, if available.
Press the "working light" (3) push-button again	Indicator light (2 green) goes off. Working light switches off, if available.

Test mode ORIGINAL

Press "forward drive" (13) push-button. Seat contact switch must be closed by loading (sitting on) the seat.	Indicator light (14 green) lights up. Magnetic brake is released. Indicator light (26 red) goes off. Unit moves forwards if the pedal is pressed.
Press "reverse drive" (17) push-button. Seat contact switch must be closed by loading (sitting on) the seat.	Indicator light (15 green) lights up. Magnetic brake releases. Indicator light (26 red) goes off. Unit moves reverse if the pedal is pressed. Pulsating signal sounds from the horn.
Press "horn" (16) push-button.	Horn on.

The test mode is terminated by switching off the unit. If the unit is switched back on using the key switch, „select traction dir.“ appears on the display, if the lifting motors were not moved to their end position during test mode. The basic setting is reached again by pressing a direction of travel push-button.

Test mode REVISED

	**Access to test mode** The user can use test mode to check the function of all the setings separately from each other. The item numbers given for the push- buttons refer to the illustration of the control panel (page 14). Turn the key switch to the "I" position and after the main contactor has audibly switched (clack sound), simultaneously press the "Warning beacon light" (4) and "Work light" (3) push-buttons for 2 seconds. "Test mode" appears on the display. The work light and "Warning beacon light" can be switched back off by pressing the "Work light" or "Warning beacon light" push-buttons again.
Press the "water pump" (22) push-button	Indicator light (21 green) lights up. Water pump switches on.
Press the "water pump" (22) push-button again	Indicator light (21 green) goes off. Water pump switches off.
Press "reduce water flow" (20) push-button	Suction bar lowers as long as the push-button is pressed.
Press "increase water flow" (24) push-button	Suction bar rises as long as the push-button is pressed.
Press the "suction motor" (7) push-button	Indicator light (25 green) lights up. Suction motor switches on.
Press the "suction motor" (7) push-button again	Suction Motor switches off. Indicator lamp (25 green) goes out.
Press the "brush motor" (9) push-button	Indicator light (19 green) lights up. Both brush motors run.
Press the "brush motor" (9) push-button again	Indicator light (19 green) goes off. Both brush motors switch off.
Press the "Memo" (12) push-button	The "Memo" (12) push-button can be used to access useful machine information for diagnosis purposes. Any information selected remains continuously displayed until the next information is accessed up with the "Memo" push-button (12). The first piece of information is always displayed after the last piece of information. The access sequence is illustrated in the table on page 39.

Test mode REVISED

Press the "Info" (19) push-button	See page 17.
Press the "Increase brush pressure" (8 +) push-button	Brush head rises as long as the push-button is pressed.
Press the "Reduce brush pressure" (11 –) push-button	Brush head lowers as long as the push-button is pressed.
Press the "Wall-floor-ceiling nozzle" (28) push-button	The "Wall-floor-ceiling nozzle" indicator lamp (29) lights up. The water metering valve opens to its maximum position.
Press the "Wall-floor-ceiling nozzle" (28) push-button again	The "Wall-floor-ceiling nozzle" indicator lamp (29) goes out. The water metering valve closes.
Press the "warning beacon light" (4) push-button	Indicator light (1 green) lights up. Warning beacon light switches on, if available.
Press the "warning beacon light" (4) push-button again	Indicator light (1 green) goes off. Warning beacon light switches off, if available.
Press the "working light" (3) push-button	Indicator light (2 green) lights up. Working light switches on, if available.
Press the "working light" (3) push-button again	Indicator light (2 green) goes off. Working light switches off, if available.
Press "forward drive" (13) push-button. Seat contact switch must be closed by loading (sitting on) the seat.	Indicator light (14 green) lights up. Magnetic brake is released. Indicator light (26 red) goes off. Unit moves forwards.
Press "reverse drive" (17) push-button.	Indicator light (15 green) lights up. Magnetic brake releases. Indicator light (26 red) goes off. Unit moves reverse. Pulsating signal sounds from the horn.
Press "horn" (16) push-button.	Horn on as long as push-button is pressed.

The test mode is terminated by switching off the unit. If the unit is switched back on using the key switch, „select traction dir.“ appears on the display, if the lifting motors were not moved to their end position during test mode. The basic setting is reached again by pressing a direction of travel push-button.

Test mode REVISED

Information which can be displayed by consecutively pressing the “Memo” button (12)

Display:	Meaning:
battery voltage xx.xV	Battery voltage [resolution: 0.1V]
I_traction: xxA	Drive motor current [resolution: 1A]
I_brush: xxA	Brush motor current [resolution: 1A]
I_vacuum: xxA	Suction motor current [resolution: 1A]
I_squeegee: x.xA	Suction bar lifting motor current [resolution: 0.1A]
I_brushhead: x.xA	Brush head lifting motor current [resolution: 0.1A]
I_brake: x.xA	Magnet brake current [resolution: 0.1A]
tap_voltage:x.xV	Control voltage of the water metering valve [resolution: 0.1V]
brushhead switch upper:x lower:x	X = 0: Limit switch of brush head lifting motor not actuated X = 1: Limit switch of brush head lifting motor limit actuated
squeegee switch upper:x lower:x	X = 0: Limit switch of suction bar lifting motor not actuated X = 1: Limit switch of suction bar lifting motor actuated
seat switch: x	X = 0: Seat contact switch open (with time delay) X = 1: Seat contact switch closed (with time delay)
accelerator x.xV	Output voltage of the drive sensor (suitable for mechanical adjustment)

Setup menu ORIGINAL

Access to setup menu

The user can use the setup menu to change the basic settings. The information in ( ) refer to the illustration of the instrument panel page 13.The setup menu can be called up while the machine is in operation or at a standstill as follows.

1. Turn key switch (18) to position “I”. Wait until the basic setting appears on the display.
2. Press the “INFO” (19) push-button and forward drive (13) push-button at the same time and keep them pressed until “end use back” or “settings - end with jolt” appears on the display (23).
3. Release both push-buttons again.

Select menu

Use the “increase water flow” (24) push-button to scroll forwards in the menu. Press the “reduce water flow” (20) push-button to scroll reverse in the menu.

Change settings

Press the “Increase brush pressure” (8) push-button to increase the settings.

Press the “Reduce brush pressure” (11) push-button to reduce the settings.

Save settings

Press the “reverse drive” (17) push-button to save the settings. The display then automatically switches back to operating mode. If the unit is switched off using the key switch before the push-button “reverse drive” (17) has been pressed, the settings will not be saved. When switched back on, the unit then changes back to the original basic settings.

The settings made become effective immediately. For example, if the working speed is increased in the menu while the unit is moving, the increase can be observed directly.

Deep-discharge protection

The deep-discharge protection is set to 18.0 Volt in the factory. It cannot be changed. If the battery voltage drops to the level of the deep-discharge protection, all the functions are completely switched off.

Display with manufacture settings	Possible settings	Explanations
language english	German or English	Display text appears in German or English
Battery low Voltage 21,6V	20.0-24.0 Volt 0.1 Volt increment	If the set battery low voltage is reached, the unit can only be driven, normal operation is not possible. Settings: 21.6 V low-maintenance 22.1 V maintenance-free
Reduced cleaning speed 80%	45-90 % 5% increment	The percentages refer to the max. travel speed (6 km/h).
Delay time for brush to stopp 3s	1-5 sec	Delayed switching off of the brush rollers if the unit is at a standstill.
hardware type 1	0 or 1, Can only be changed possible from control version 2.5/2.9 (see test mode)	Metering valve part number 4.580-599 (OLD) = 0 4.580-605 (NEW) = 1

Setup menu REVISED

Access setup menu

If the machine is switched on, the setup menu can only be accessible if the unit is at a standstill. Travel and/ or cleaning modes cannot be started until the setup menu has been aborted.

The operator can use the setup menu to change the basic settings. The information given in brakkets ( ) relate to the “control panel” diagram on page 13.

1. Turn key switch (18) to position “I”. Wait until the basic setting appears on the display.
2. Press the “INFO” (19) push-button and forward drive (13) push-button at the same time and keep them pressed until “end use back” or “settings - end with jolt” appears on the display (23).
3. Release both push-buttons again.

Select menu

Use the “increase water flow” (24) push-button to scroll forwards in the menu. Press the “reduce water flow” (20) push-button to scroll reverse in the menu.

Change settings

Press the “Increase brush pressure” (8) push-button to increase the settings.

Press the “Reduce brush pressure” (11) push-button to reduce the settings.

Save settings

Press the “reverse drive” (17) push-button to save the settings. The display then automatically switches back to operating mode. If the unit is switched off using the key switch before the push-button “reverse drive” (17) has been pressed, the settings will not be saved. When switched back on, the unit then changes back to the original basic settings.

The adjustments made become effective after leaving the setup menu.

Deep-discharge protection

The deep-discharge protection is set to 18.0 Volt in the factory. It cannot be changed. If the battery voltage drops to the level of the deep-discharge protection, all the functions are completely switched off.

Setup menu REVISED

Display with manufacture settings	Possible settings	Explanations
language englisch	German or English	Display text appears in German or English
Battery low Voltage 21.6V	19.5-22.5 Volt 0.1 Volt increment	If the set battery low voltage is reached, the unit can only be driven, normal operation is not possible.
Reduced cleaning speed 80%	45-90 % 5% increment	The percentages given refer to the max. travel speed (6 km/h).
Delay time for brush to Stopp 3s	1-3 sec	Delayed switching off of the brush rollers if the unit is at a standstill.
Max brush Current 80A	50-80 A 10A increment	Maximum operating current of both brush motors.
Scrubbing power Power-Clean	45-100 % 5% increment	The percentages refer to the speed of the brushes. The percentage value is usually given, with the exception of 3 special steps: Power Clean 100% Whisper Clean 60% Fine Clean 45%
Rotating beacon on reversion 0	0 or 1	1: The warning beacon light is automatically switched on for reverse drive. Irrespective of this, the warning beacon light can always be switched on using the button (1).
Alfred Kärcher BR 90/140 R	BR 90/140R BD 90/140R BR 75/140R BD 75/140R	Machine type setting for correct display in the information menu.

Troubleshooting ORIGINAL and REVISED

Faults could occur in the unit, with or without a text display. You should always proceed as follows:

1. Turn key switch to position “0” (switch off unit).
2. Wait until the text on the display disappears.
3. Turn the key switch back to setting “I” (switch unit back on).
4. If the fault occurs again, carry out the appropriate repair work in the given sequence (see corrective measure in the table below). Before carrying out any service work on the unit always turn the key switch to the position “0” and pull the central battery connector.
5. If the fault persists despite the repair measures carried out, the main control printed circuit board or the instrument panel printed circuit board will have to be replaced, depending on the type of fault.

Faults <u>with no text</u> in the display	**Corrective measures**
Unit will not start	– Insert/check/replace battery connector. – Check/replace fuse F1/F2. – Check the auxiliary contact in the battery plug connection. – Check/replace key switch. – Check the connection cable of the main instrument panel printed circuit board. – Replace main control printed ciruit board. – Check/replace the instrument panel printed circuit board.
Not enough water	– Fill fresh-water tank. – Check/clean water filter. – Check water hose to brush head and remove any blockage/ kinks, especially by BD-version. – Check function of metering valve and replace if necessary (see chapter Water system). – Check/replace water pump.
Suction too low	– Clean fluff strainer in the dirty water tank. – Check/clean/replace the seal on the dirty water tank lid. – Clean/replace/rotate rubber strips on the suction bar. – Check/replace suction hose. – Check/adjust the suction bar settings.
Dirty water tank overflow	– Check/replace the float switch. – Check cable connections to the printed circuit board for interruptions/breaks and correct the fault. – Replace the main control printed circuit board.
Poor cleaning result	– Check the brush rollers for foreign material and remove if necessary. – Adjust the contact pressure to the brush rollers. – Check/adjust brush pattern.

Troubleshooting ORIGINAL

Faults with text in the display	Corrective measures
seat switch	– Load seat (at least 10 kg). Display must disappear after. 4 sec. – Check/replace seat contact switch. – Check cable connections to the printed circuit board for interruptions/breaks and correct the fault.
tank full	– Empty dirty water tank. – Check float switch for freedom of movement. – Check installed position of the float and correct if necessary.
error! limit switch	– Check cable connections to the main control printed circuit board for interruptions/breaks and correct any faults. – Adjust the microswitch on the lifting motor for the suction bar and/or brush head/replace.
overload traction motor	The max permissible gradient travelled along is 10%! – Check front wheel brake for blockage/adjust as necessary. – Check drive motor for blockage and adjust as necessary (see chapter Drive sensor/Electromagnetic brake adjustment).
error! travel U< XX	The two-digit code (XX) provides information about the cause of the fault/fault. XX = 0C, 00, 11, 20, 21, 22, 23, 24, 32, 33, 44: – Replace printed circuit board. XX = 31: – Check/replace the carbon brushes in the drive unit motor. – Check/replace the carbon brush connections. – Check cable connections to the main control printed circuit board for interruptions/breaks and correct any defects. XX = 10: – Check/replace fuse F2. XX = 40, 41, 42, 43: – Malfunction and correction identical to "Gas Pedal" display. XX = 01 and 02: – Switch the unit off and then back on using the key switch. If the display does not change, replace the main control printed circuit board.
overload traction U>	The supply voltage to the electronics is above 29.2 Volt. This situation occurs if the central battery connector is pulled while the unit is travelling downhill. The front wheel brake brakes the unit until it comes to a standstill. – Insert the battery connector and move the unit to a level place.

Troubleshooting ORIGINAL

Faults with text in the display	Corrective measures
error! incorrect start	– Remove your foot from the drive pedal before switching on the key switch. – With the pedal in the "off" position, check the sensor voltage at connector X6 on the main control printed circuit board between the Contacts 1 and 3. Specified value see chapter drive sensor.
overload brush motor	– Check for blockage in the brush drive assembly and remove if necessary. – Check cable connections to the main control printed circuit board for interruptions/breaks and correct any faults. – Check the function of both brush motors/replace as necessary.
error! brush I>	The power consumption of the brush motors was above 80 A for longer than 4 sec. – Reduce contact pressure to brushes. – Check brushes for blockage/remove as necessary. – Check the function of both brush motors/replace as necessary.
error! brush I<	– Check/Replace fuse F3. – Check cable connections to the main control printed circuit board for interruptions/breaks and correct any faults. – Check the function of both brush motors and their carbon brushes replace any defective parts brushes as necessary.
error! brush lift	– Check for blockage in the brush head and remove as necessary. – Check/Adjust micro switches on the lifting motor. – Check/Replace lifting motor.
error! squeegee	– Check/Remove any blockages at the suction bar. – Check/Replace lifting motor.
overload vacuum motor	– Check cable connections to the main control printed circuit board for interruptions/breaks and correct any faults. – Check/replace suction motor.
overload water pump	– Check cable connections to the main control printed circuit board for interruptions/breaks and correct any faults. – Check/replace water pump.
overload front light	– Check working lights/replace halogen lamp. – Check cable connections to the main control printed circuit board for interruptions/breaks and correct any faults.
overload rotating beacon	– Check warning beacon light/replace halogen lamp. – Check cable connections to the main control printed circuit board for interruptions/breaks and correct any faults.

Troubleshooting ORIGINAL

Faults with text in the display	Corrective measures
overload brake	– Check/adjust front wheel brake. – Check cable connections to the main control printed circuit board for interruptions/breaks and correct any faults.
select traction dir.	– Select the required direction of travel/movement.
accelerator yy	The two-digit code (yy = 01 or 02) provides information about the cause of the fault. The following apply in both cases: – Check the voltage supply to the drive sensor at connector X6 on the main control printed circuit board between the contacts 1 and 2. Specified value see chapter drive sensor. – With the pedal at rest, check the sensor voltage at the connector X6 between the contacts 1 and 3. Specified value see chapter drive sensor. – Check connector for good contact/replace if necessary. – Check/replace drive sensor.
error! watchdog	– Remove test connector on the printed circuit board. – Replace the main control printed circuit board.
EMERGENCY STOP EMERGENCY STOP	The fault display only appears if the key switch is turned to position "0" while the unit is moving or the battery connector is pulled out. – Turn key switch to position "1". – Insert battery connector.
battery empty -> charge!	The deep discharge protection voltage has been reached. The cleaning operation cannot be started up. Drive motor, lighting and horn are still ready for operation. – Move unit to the charger and charge the battery.
battery critically low!!	More than the permissible battery capacity has been extracted. The entire unit is switched off. The unit can no longer be operated. – Unlock the front wheel brake manually and push the unit to the battery charger. **Attention: The machine no longer has any braking effect!** – Charge the battery.
error! dashboard	When switching on the key switch the machine automatically checks whether the instrument panel printed ciruit board is functional or whether a push-button is depressed while switching on. – Do not press any of the push-buttons when switching the unit on with the key switch. – Replace the instrument panel printed circuit board if the display text remains the same.
RAM?	– Switch the unit ON and OFF using the key switch. – Replace the instrument panel printed circuit board if the display text remains the same.
ROM? xxxx yyyy	– Switch the unit ON and OFF using the key switch. – Replace the instrument panel printed circuit board if the display text remains the same.

Troubleshooting REVISED

Faults with text in the display	Corrective measures
seat switch open!	– Load seat, with at least 10 kg, display must disappear after approx. 1 sec. – Check/replace seat contact switch. – Check supply cables from seat contact switch to printed circuit board for interruption and damage/remove fault.
dirty tank full cleaning stops	– Empty dirty water tank.. – Check float switch for easy movement/clean/repair as necessary. – Check the mounting position of the float/install correctly. When the dirty water tank is full the indicator light illuminates continuesly (float in upper position). When the dirty water tank is emptied the float drops to the lower position and the indicator light blinks for one minute. After one minute the indicator light and display fault switch off. The unit can then be operated again.
controller temp. exceeded: xx°C	– Wait until the temperature has dropped to at least 59°C. The current temperature can be enquired by pressing the Info button several time. As of 60°C the unit can no longer be used for cleaning. The drive motor current is reduced. As of 70°C the unit can only travel along a flat surface. The lights and horn continue to function.
error! buscommunication	– Check connection cable between the controls and instrument panel/remove fault.
error! linear actuators	– Check/replace fuse F7. – Check/replace the connection cables to the lifting motors for damage.
error! contactor closed	– The main contactor sticks and has to be replaced.
error! traction	– Check/replace fuse F2. – Check connection cables to the motor for damage or interruption/repair as necessary. – Check/replace all the carbon brushes of the drive motor. – Check connection cables to the motor for damage or interruption/repair as necessary. – Check motor for damage/repair as necessary.
overload traction	– Wait until the motor has sufficiently cooled down. We recommend a waiting time of at least 10 minutes. You should then only move the unit along flat surfaces to allow the motor to cool down further. – The current motor temperature can be enquired via a bar diagram by pressing the Info button several times. – Check the front wheel brake for blockage/adjust as necessary. – Check drive motor for blockage/remove. – Max. incline of 10% is not to be exceeded.

Troubleshooting REVISED

Faults with text in the display	Corrective measures
error! high battvoltage	– Check the set of rechargeable batteries. The voltage at the battery post terminals must be less than 32 V!
release throttle!	– Remove your foot from the drive pedal before switching on the key switch. – Mechanically readjust the drive pedal. The neutral drive pedal voltage should be precisely set to 0.3V +/- 0.1V.
error! brush	– Check/replace fuse F3. – Check the connection cables to the brush motors/ eliminate fault. – Check the function of both brush motors/replace as necessary.
error! brush head	– Remove the blockage. – Check/readjust the limit switch in the brush head lifting motor. – Check the connection cables to the brush head lifting motor/eliminate fault. – Replace the brush head lifting motor.
error! squeegee	– Remove the blockage. – Check/readjust the limit switch in the suction bar lifting motor. – Check the connection cables to the suction bar lifting motor/eliminate fault. – Replace the suction bar lifting motor.
error! vacuum motor	– Check/replace fuse F4. – Check the connection cables to the suction motor/ eliminate fault. – Check the function of the suction motor/replace as necessary.
error! front light	– Are working lights connected? – Check fuse F6. – Check working lights/replace the defective halogen bulb. – Check the connection cables to the working lights/ eliminate fault.
error! rotating beacon	– Is a warning beacon light connected? – Check fuse F6. – Check warning beacon light /replace the halogen bulb or complete light. – Check the connection cables to the warning beacon light/ eliminate fault.
select traction dir.	– Select the desired direction of travel (forward/reverse) before pressing the drive pedal.
error! brake	– Check/adjust/replace the front wheel brake. – Check the cable connections with the front wheel brake/eliminate fault.
error! throttle	– Check that the drive pedal sensor wiring is properly connected and adjusted.

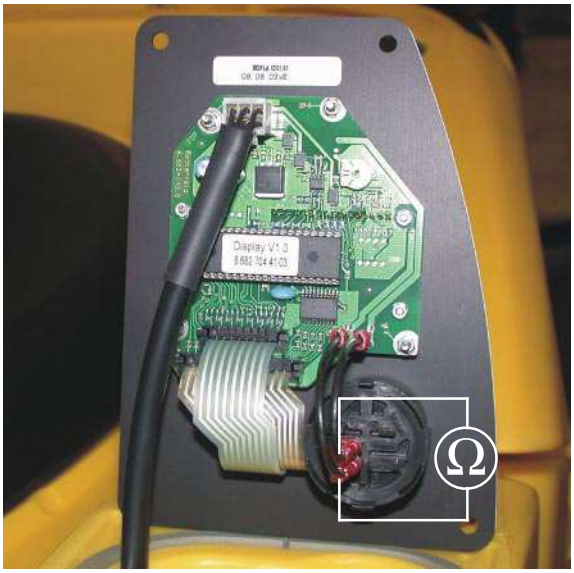
Troubleshooting REVISED

Faults with text in the display	corrective measures
battery empty -> charge!	– Move the machine to the charging station and charge the battery.
battery totally discharged!	– Manually unlock the front wheel brake. **(Attention! The machine no longer has any braking effect!)** – Push the unit to the charging station. – Charge the battery.
dashboard test	– Do not press any of the buttons when switching on the unit with the key switch. – If the fault remains, replace the instrument panel.

Note:
If the control panel printed circuit board or the main control printed circuit board is replaced during a repair, it is imperative to ensure that all 3 processors have the same version number (1 processor on the control panel printed circuit board and 2 processors on the main control printed circuit board). Malfunctions can occur in the machine if the version numbers are not the same. If necessary order the spare kit (part No. 6.682-704). It contains all 3 processors with the same version number.

Unit does not operate

Central battery connector (X1)


Check key switch (S0) (illustration of NEW control panel printed circuit board)

Instrument panel, view from above

Insert/Check/Replace central battery connector (X1)

Set multimeter to Volt setting and check the central battery connector (1), replace any defective parts.

Check the connection cable (3)

– Disconnect the positive battery post
– **ORIGINAL** : Disconnect the connection cable on the control panel printed circuit board and check for continuity
– **REVISED** : Pull off the connection cable on the main control printed circuit board (terminal strip X205) and check for continuity (auxiliary contact S32 in central connector lower section).
– If no continuity is present check the connection cable's in the lower section of the central connection plug (2).

Check/replace the key switch (S0)

– Unplug the upper section of the central connection plug (1).
– Set the multimeter to the ohm measuring range.
– Turn the key switch to the "0" position.
– Pull a connection cable off the key switch.
– Carry out the resistance measurement on the key switch.

When switched off the key switch must display a high-ohm (high-resistance) value.

When switched on the key switch must display a low-ohm (low-resistance) value.

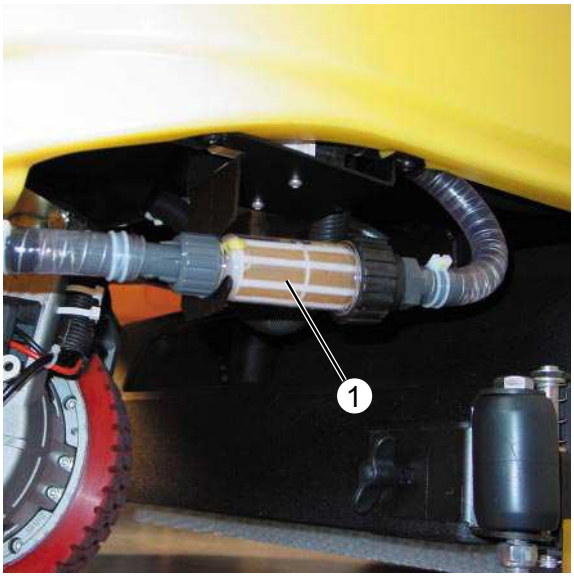
– If necessary replace the key switch.

Check/Replace fuse F1

Check fuse F1, replace defective fuse. The fuse is located on the main control printed circuit board.

1 Upper section of central connector plug
2 Lower section of central connector plug
3 Connection cable (auxiliary contact S32)
4 Key switch (S0)

Not enough water



Fresh-water filter (ORIGINAL)

Fresh-water filter with shut-off valve (REVISED)

1 Water filter
2 Shut-off valve

Fill fresh-water tank

– Open the fresh-water tank cap and fill with fresh-water and cleaning agent.

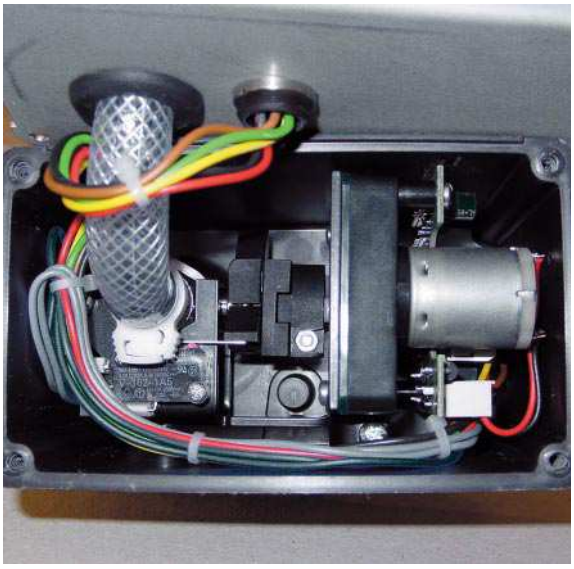
Check/clean/replace water filter

– Unscrew the water filter (1) at both ends of the hose.
– If dirty clean/replace.

Check water hose to brush head for blokkages/kinks and remove/replace as necessary

Check the water hose from the tank to the brush head for blockages. Remove any kinks in the hose. Ensure that the hose is correctly installed and positioned.

Not enough water



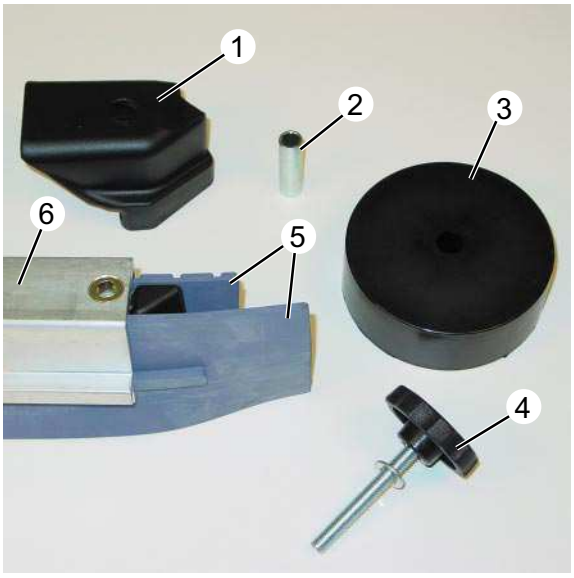
Metering valve (Y2) (ORIGINAL)

Metering valve (Y2) (REVISED)

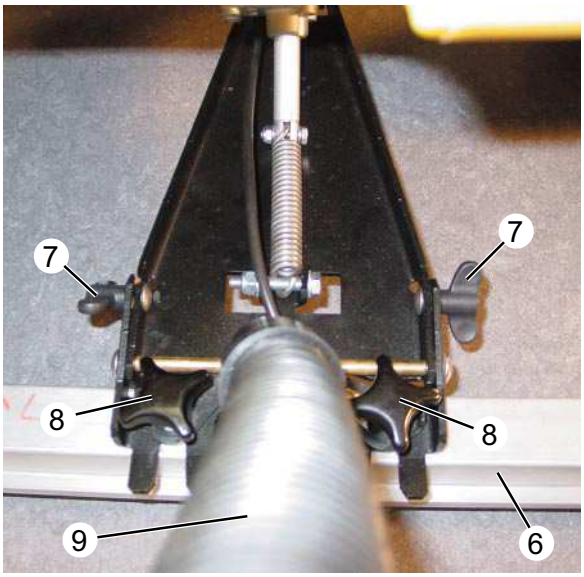
Check function of metering valve (Y2) and replace as necessary

Check function of metering valve, replace if necessary (see also chapter water system).

Suction not adequate



Suction bar - individual parts



Suction bar installed

1 Rubber strip retainer
2 Metal spacer
3 Deflector wheel
4 Retainer bolt
5 Rubber strips
6 Suction bar
7 Wing nuts, suction bar inclination adjustment
8 Star handle, for installing the suction bar
9 Suction hose

Clean/replace the rubber strips on the suction bar

Clean the rubber strips (5) on the suction bar and check for damage/wear. Rotate/replace as necessary.

– Unscrew the retaining bolts (4), remove the deflector wheels (3) with metal spacers (2) and pull off the rubber strip retainers (1) from both sides of the suction bar (6).
– Pull out the rubber strips (5) from the guide grooves at one side, install new rubber strips in reverse order.

Note:
The front and rear rubber strips can be rotated by 180°.

Check/replace the suction hose

– Check suction hose (9) for leaks, replace as necessary.

Check/adjust suction bar setting

– Loosen star handles (8).
– Align suction bar (6).
– Tighten the star handles (8).
– Loosen the wing nuts (7).
– Adjust inclination of the suction bar (6).
– Tighten wing nuts (7).

Suction not adequate

Dirty water tank cover open

1 Fluff strainer
2 Seal, dirty water tank

Check/clean/replace the seal at the dirty water tank cover

Check the dirty water tank seal (2) for damage and dirt, clean/replace as necessary.

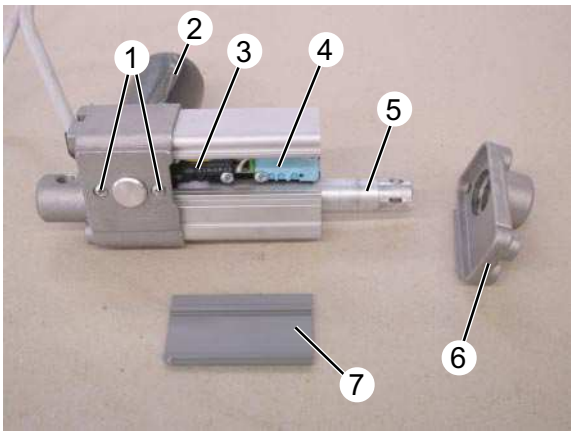
Clean fluff strainer in the dirty water tank

The fluff strainer (1) can become blocked, depending on how the unit is used and how dirty the surfaces to be cleaned are.

– Remove the fluff strainer (1) from the bracket and clean/replace.

Suction beam lifting motor

Lifting motor installed



Lifting motor cover removed

1 Retaining screws, lifting motor
2 Lifting motor
3 Microswitch, left, suction bar raised
4 Microswitch, right, suction bar lowered
5 Piston rod
6 Housing cover
7 Side cover

Micro switch adjustment

If the suction bar does not reach the most upper or lower position and/or has no movement, the micro switches must first be checked before replacing the lifting motor.

– Using a screw driver lift the side cover (7) at the edges and remove it. The cover is inserted and held in place at both edges.
– Both micro switches (3 and 4) are mounted on a guide rails. The micro switch (3) must be positioned all the way to the left, the micro switch (4) must be positioned all the way to the right. In this position the lifting motor has it's full movement.

Dirty water tank overflows

Float switch (S17), dirty water tank open

1 Float switch (S17)

Check/Replace float switch (S17)

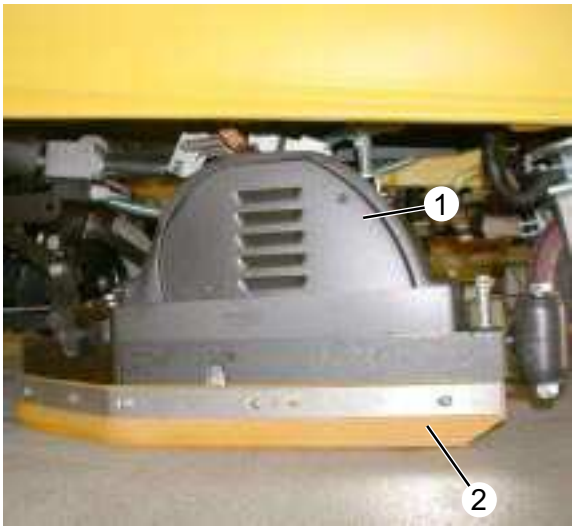
The float switch (1) must be replaced if it fails to switch off when the max. level of the dirty water in tank has been reached.

– Check float switch (1) for freedom of movement.
– Unscrew the retaining screw at the float switch (1).
– Remove float switch (1) from the bracket and check/replace.

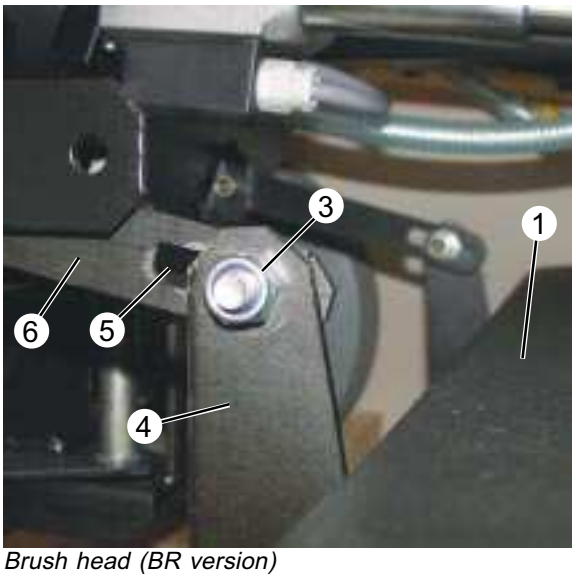
Check cable connections to main control printed circuit board for interruptions/ breaks and correct any faults as necessary

The float switch (1) is connected to the terminal strip (EXT.X1) under the seat.

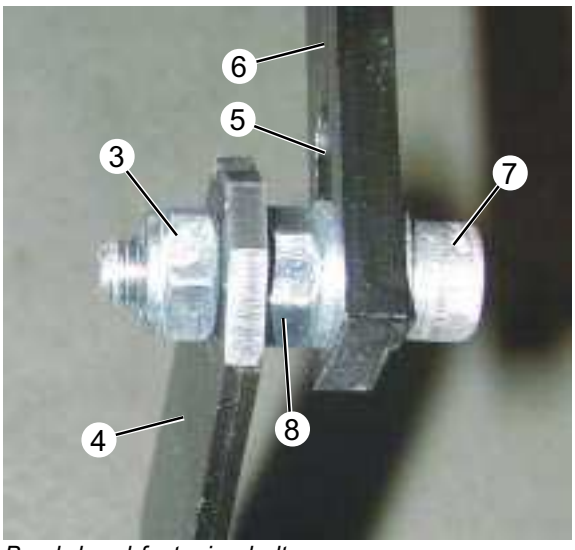
Poor cleaning results



Brush head (BR version)



Brush head (BR version)



Brush head fastening bolt

Check/Remove brush head for foreign matter

When foreign matter is on the brush roller this can influence the cleaning result.

– Remove all foreign matter.

Splashguard

The side splashguard (2) must lie on the floor when the brush head (1) is lowered, so that water cannot escape from the side.

Adjust brush head

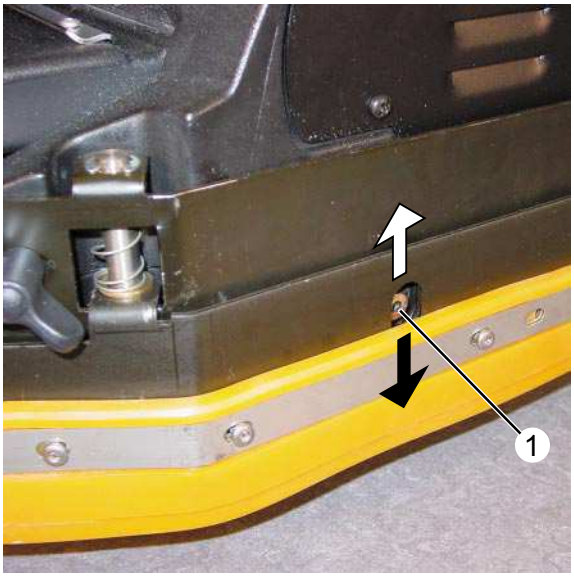
– Move the unit onto a level floor.
– Lower the brush head in the test-mode.
– Loosen the brush head fastening bolts on both sides of the oblong hole (5) (stop nut (3) and fastening nut (8)).
– Allow the brush head to run in the test mode. By doing so the brush head will align itself to the floor surface.
– While running the brushes first tighten the fastening nut (8) with the fastening bolt (7) in the oblong hole (5).
– Now tighten the stop nut (3) enough so there is approx. 1 mm (0.039 in) play at the bracket (4).
– Raise the brush head in the test-mode.

Note:
On the BR version the oblong hole (3) located on the shackle (8) is at the brush head side.

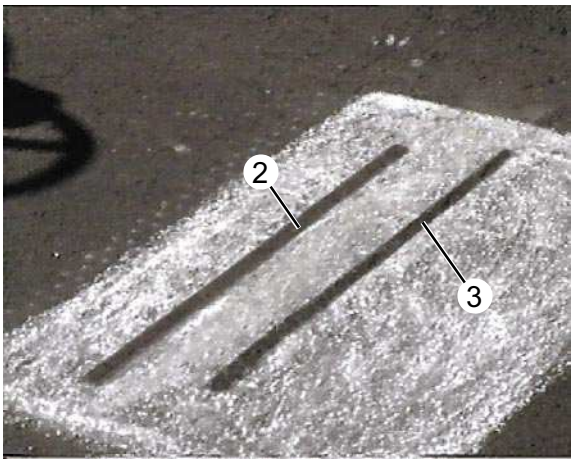
On the BD version the oblong hole (3) located on the shackle (8) is at the unit side.

1 Brush head (BR version)
2 Splashguard
3 Stop nut
4 Bracket
5 Oblong hole
6 Shackle
7 Fastening bolt
8 Fastening nut

Poor cleaning results



Adjust parallel brush pattern



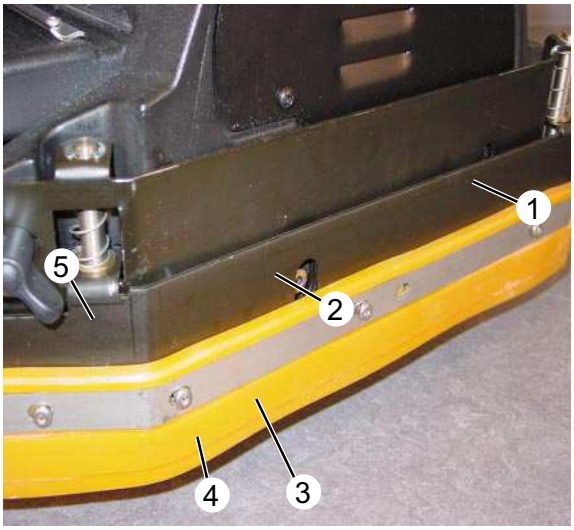
Brushing pattern, correctly adjusted

1 Side adjusting screws
2 Brushing pattern of the rear brush roller
3 Brushing pattern of the front brush roller

Check/adjust the brush pattern

– Coat a flat surface with chalk and move the unit over the chalked area.
– Lower the brush head using the test mode and allow the brushes to rotate for approx. 3 sec.
– Raise the brush head and move the unit away from the chalked area.
– Check the brush pattern (2, 3).
– The brush pattern of both brush rollers must be parallel. They are adjusted using the side adjusting screws (1).
– The brush pattern of the rear brush (2) should be set so that it is approx 1cm wider than that of the front brush (3). This prevents the front brush from being overloaded in cleaning mode.
– If necessary readjust the brush head setting in the oblong hole of the bracket (see Page 57, position 6).

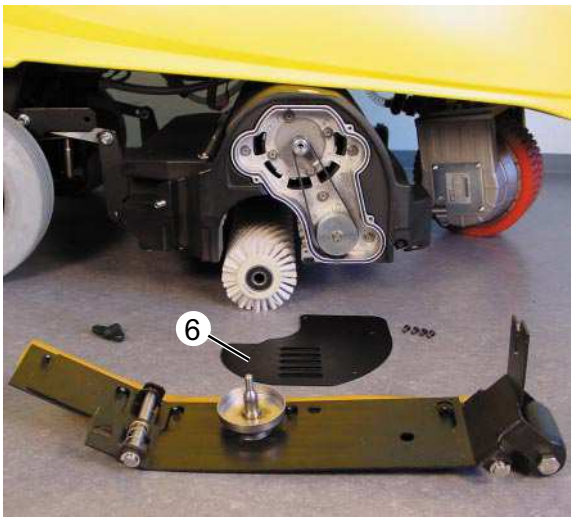
Poor cleaning results



Replace brush roller

Replace the brush rollers (BR version)

– Loosen the wing nut (1), remove the wing nut (5) and pull off the cover (4).
– Pull the brush (2) out and check for wear, replace as necessary.
– Slide the new brush onto the drive shaft of the motor and reinstall the cover (4).

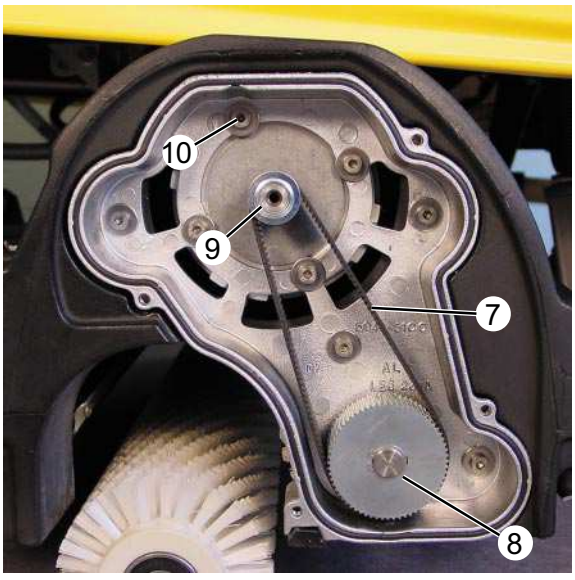


Brush head opened from the side

Replace drive belt (BR version)

– Loosen wing nut (1).
– Remove wing nut (5).
– Remove cover (4).
– Remove cover (6).
– Loosen the 4 retaining screws (10) on the motor.
– Remove the drive belt (7).
– Install a new drive belt, increase the belt tension and tighten the retaining screws (10) on the motor. The V-belt tension is determined by the location of the Motor shaft (9).

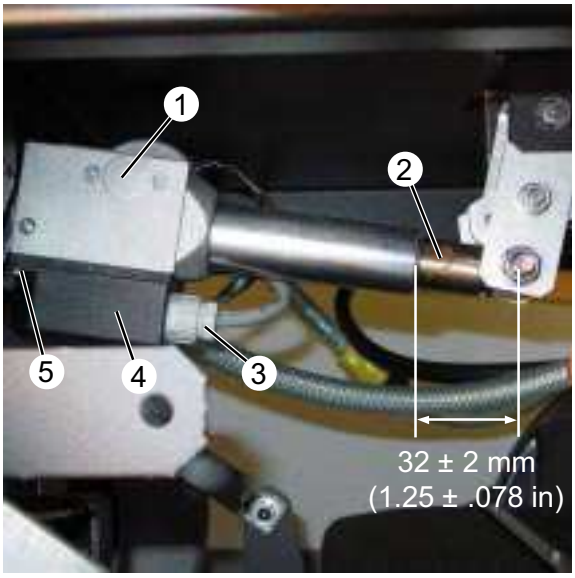
Note:
The drive belt (7) must be tightened so that it only gives by 5 mm (0.19 in) max. if it is pressed firmly with the thumb.



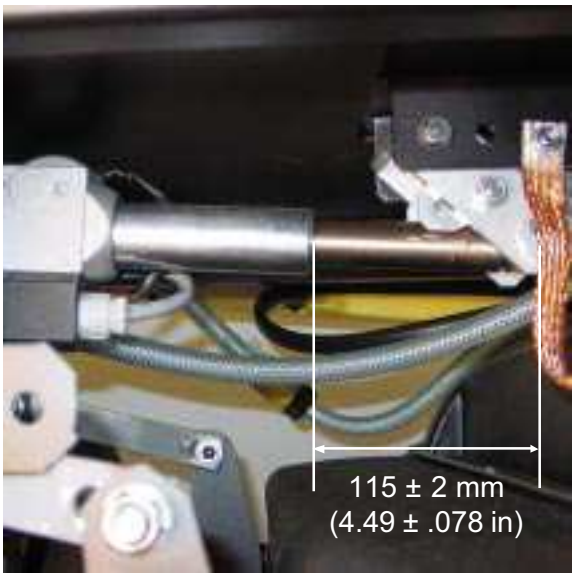
Brush head drive system

1 Front wing nut
2 Brush roller
3 Holding arbor
4 Brush roller cover
5 Rear Wing nut
6 Drive belt cover
7 Drive belt
8 Brush roller drive gear
9 Motor shaft
10 Motor retaining screws (4x)

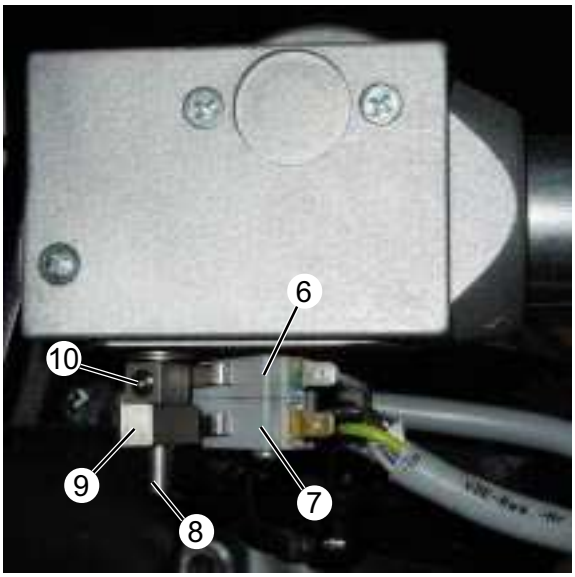
Poor cleaning results



Brush head lowered (BR and BD)



Brush head raised (BR and BD)



Micro switches and cams

Adjust the contact pressure to the brush rollers

– Loosen the cable gland (3), remove the retaining screws (5) and the cover (4).
– Move piston (2) of the the lifting motor (1) in the test mode to 32 ± 2 mm (1.25 ± .078 in). (Brush head lowered, see test mode.)
– Adjust the cam (9) for activating the microswitch (7) to this setting.
– Extend the piston (2) of the lifting motor (1) to 115 ± 2 mm (4.49 ± .078 in). (Brush head raised, see test mode.)
– Adjust the cam (10) for activating the microswitch (6) to this setting.
– When setting the cams ensure that the piston overshoot is approx. 2-3 mm (.078-1.18 in).

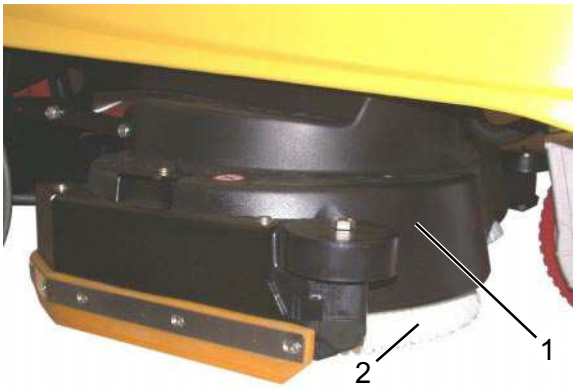
The cams (9) and (10) are fixed to the shaft (8) of the variable speed motor by means of set screws. When adjusting, note the rotational direction of the shaft (8).

Note:
The adjustment of the lifting motor (1) must be done outside the unit.

We recommend that you extend the piston (2) to approx. 75 mm (2.95 in) when changing the brush head. In this setting the brush head can be easily removed.

1 Lifting motor (M20)
2 Lifting motor piston
3 Connection cable gland
4 Microswitch cam cover
5 Cover retaining screws
6 Microswitch, piston extended 115 ± 2 mm (4.49 ± .078 in)
7 Microswitch, piston retracted 32 ± 2 mm (1.25 ± .078 in)
8 Lifting motor shaft (1)
9 Cam for microswitch (7)
10 Cam for microswitch (6)

Poor cleaning results



Brush head (BD version)

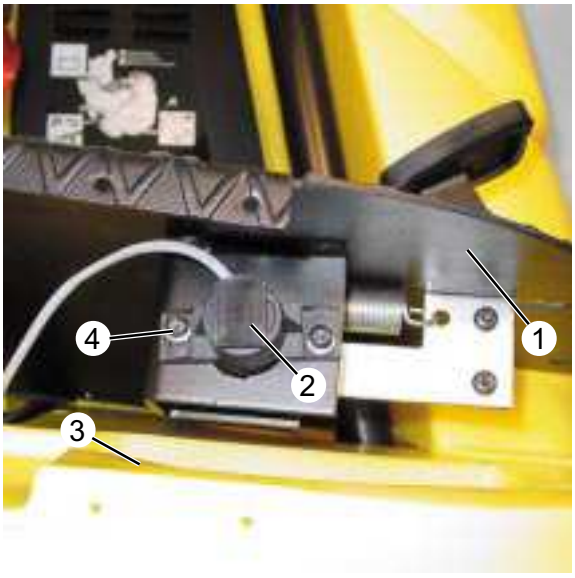
1 Brush head, BD
2 Disc brush

Check/replace disc brushes (BD version)

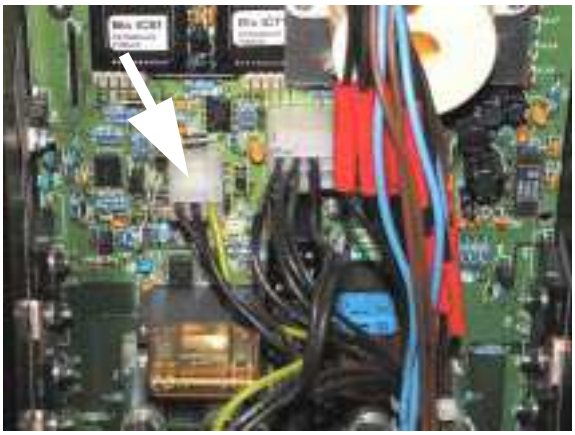
– Raise the brush head.
– Lift up the disc brushes (2), rotate then by approx. 45 degrees and then remove them from below.
– Install the new disc brush in the reverse order.

The brush pattern of the disc brushes cannot be adjusted.

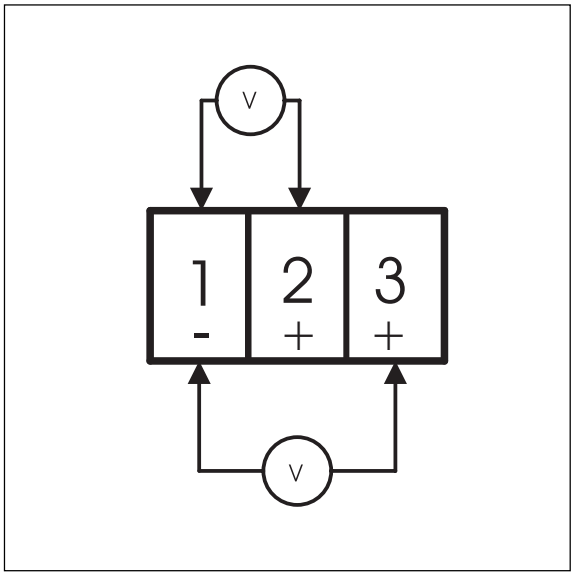
Drive sensor ORIGINAL



Drive sensor (B1)



Main control printed circuit board, terminal X6



Voltage measurement at terminal X6

Adjust drive sensor (B1)

– Remove the retaining screws of the floor panel (1) and lift up the floor panel.
– Remove the cover of the main control printed circuit board.
– Switch unit on.
– Connect the voltmeter to terminal X6 connection 1 and 2 (see diagram below) and measure the supply voltage.
– If the value exceeds the tolerance of ± 0.25 V the main control printed circuit board must be replaced.
– Connect the voltmeter on the main control printed circuit board at connector X6, attach terminal 1 and terminal 3 (see diagram below).
– If the voltage value is above the nominal value, the message „Error! Incorrect start“ appears in the display of the instrument panel.
– Loosen the adjusting screws (4) and adjust the drive sensor (2) by rotating it until the nominal value is displayed at the voltmeter.
– Retighten the retaining screws (4).

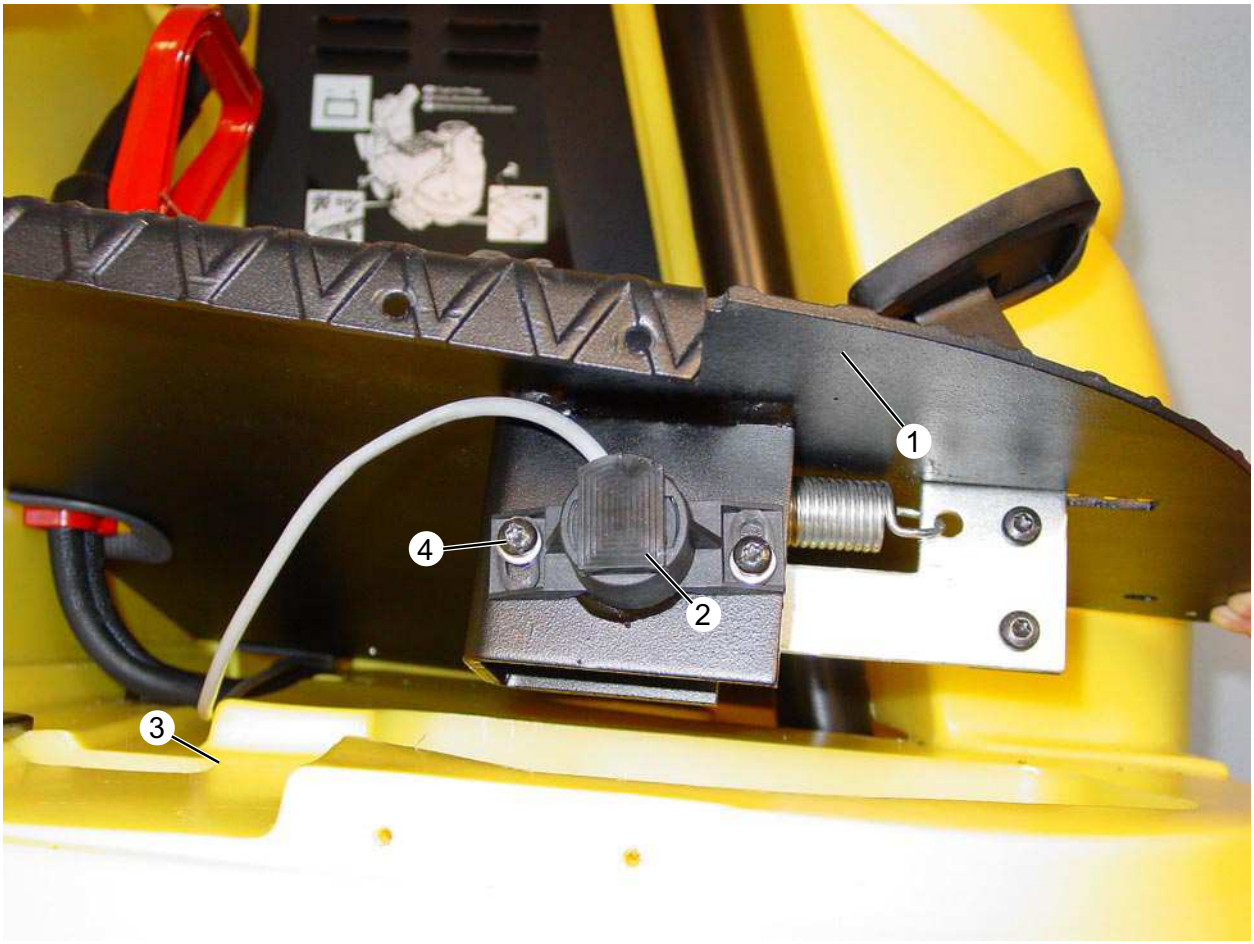
Note:
When installing the floor panel (1) ensure that the wires are not clamped or pinded to the drive sensor.

Nominal value:

1-3 Neutral voltage	= 0,3 ± 0,05 V
1-2 Supply voltage	= 5 ± 0,25 V

1 Floor panel
2 Drive sensor (B1)
3 Unit housing
4 Adjusting screws (2x), drive sensor

Drive sensor REVISED



1 Floor panel
2 Drive sensor (B1)
3 Unit housing
4 Adjusting screws (2x), drive sensor

Adjust drive sensor (B1)

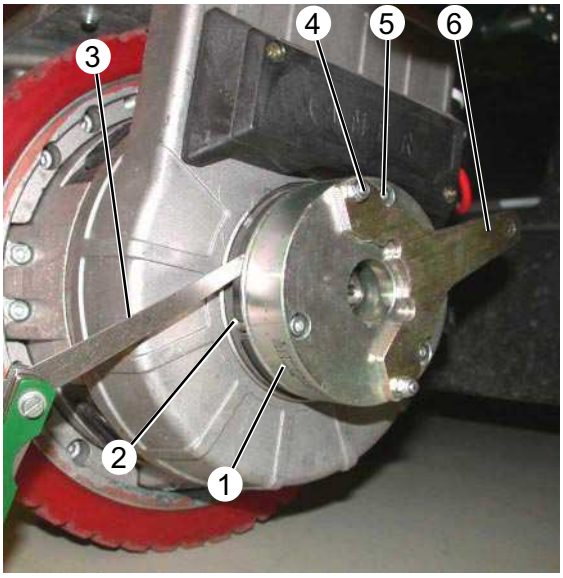
– Remove the retaining screws of the floor panel (1) and lift up the floor panel.
– Switch on the unit in test mode.
– Use the memo button to page through the display until “accelerator x.xV” appears. The instrument panel can be unscrewed and tilted to the side to enable it to be read while adjusting the sensor.
– Loosen the adjusting screws (4) and adjust the drive sensor (2) by rotating it until the nominal value appears in the display.
– Retighten the retaining screws (4).

Nominal value:

Neutral voltage = 0.3V ± 0.05V

Note:
When installing the floor panel (1) ensure that the wires are not clamped or pinded to the drive sensor.

Electromagnetic brake Y1 adjustment



Check adjustment

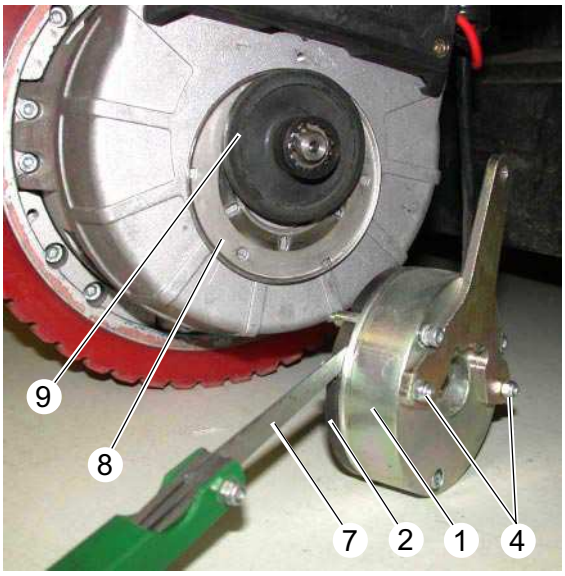
Check adjustment

The tolerance between the magnet coil (1) and the pressure plate (2) must be 0,3 mm (.012 in).

– Switch the unit off at the key switch (S0).

– Check the gap between the pressure plate (2) and the magnet coil (1) with a feeler gauge.

The gap can only be adjusted when the magnet coil (1) is removed.



Brake adjustment

1 Magnet coil
2 Pressure plate
3 Feller gauge 0,3 mm (.012 in)
4 Brake lever retainer bolts (2x)
5 Mounting bolts, magnet brake Torx 15 (3x)
6 Brake lever, to release the brake
7 Feeler gauge 0,8 mm (.032 in)
8 Steel plate
9 Brake disc

Remove the magnet coil and adjust the brake

The tolerance between the magnet coil (1) and the pressure plate (2) must be 0,8 mm (.032 in) when removed.

– Remove the mounting bolts (5) and remove the magnet coil (1).

– Check the gap between the pressure plate (2) and the magnet coil (1) with the feeler gauge.

– Make an even adjustment using the retaining bolts (4).

Note:
If the gap between the pressure plate (2) and the magnet coil (1) is 0,8 mm (.032 in) when removed, this will be automatically 0,3 mm (.012 in) when installed.

The brake must hold the unit on a 10 % inclination at full load. If the braking action after adjustment is not adequate replace the brake disc (9).

Safety checks ORIGINAL

Seat contact switch (S16)

The seat contact switch (S16) should be checked every 100 hours.

1. Turn key switch to position “1”.
2. Select the direction of travel.
3. Do **NOT** load the seat.
4. Lightly press on the drive pedal.

The unit must not move. If it does, check the function of the seat switch (S16), replace if necessary.

Parking brake

The parking brake on the front wheel should be checked each time before using the unit.

1. Load the seat.
2. Turn the key switch to position “1”.
3. Select the direction of travel.
4. Lightly press on the drive pedal.

The Parking brake must audibly unlock and the indicator light on the control panel must go out. If this is not the case check the brake lever for easy movement and readjust the brake as necessary. Additionally check the voltage supply to the magnet brake and also the wires to the main control printed circuit board, replace as necessary.

Braking function

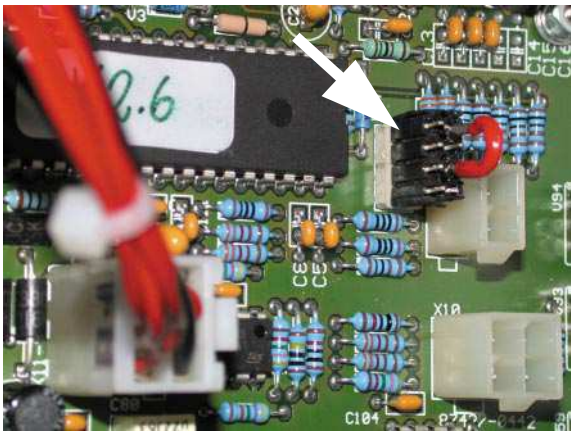
If the mechanical brake in the front wheel fails the motor brake acts automatically, so that in the worst case with maximum speed 2.4 km/h the unit rolls down an incline with a constant speed (slow walking pace).

The central battery connector must never be unpluged otherwise the braking action fails.

Allow the unit to roll to a horizontal level and then adjust the brake.

Safety checks ORIGINAL

Watchdog error message



Test connector attached to terminal strip X1

Test connector

“Watchdog” fault message

The “Watchdog” function monitors the entire control function of the unit. It should be checked every 100 operating hours. You will need a test connector (special tool) to do this.

1. Turn key switch to position “0”.
2. Unplug the central battery connector.
3. Remove the cover panel and safety cover of the main control printed circuit board.
4. Reinsert the central battery connector.
5. Turn key switch to setting “I”.
6. Attach the test connector to the 7-pin terminal strip X1 (next to the main processor). The connector is pin coded. Do not connect it with force!

After approx. 3 sec the error message “Watchdog” must appear on the display. You must not be able to activate any of the drive functions. If you can, the main control printed circuit board must be replaced.

Following successful check:

1. Turn the key switch to position “0”.
2. Unplug the central battery connector.
3. Remove off the test connector.
4. Reinstall the safety cover and the cover of the main control printed circuit board.

Safety checks REVISED

Seat contact switch (S16)

The seat contact switch (S16) should be checked every 100 hours.

1. Turn key switch to position “1”.
2. Select the direction of travel.
3. Do **NOT** load the seat.
4. Lightly press on the drive pedal.

The unit must not move. If it does, check the function of the seat switch (S16), replace if necessary.

Parking brake

The parking brake on the front wheel should be checked each time before using the unit.

1. Load the seat.
2. Turn the key switch to position “1”.
3. Select the direction of travel.
4. Lightly press on the drive pedal.

The Parking brake must audibly unlock and the indicator light on the control panel must go out. If this is not the case check the brake lever for easy movement and readjust the brake as necessary. Additionally check the voltage supply to the magnet brake and also the wires to the main control printed circuit board, replace as necessary.

Braking function

If the mechanical brake in the front wheel fails the motor brake acts automatically, so that in the worst case with maximum speed 2.4 km/h the unit rolls down an incline with a constant speed (slow walking pace).

The central battery connector must never be unpluged, otherwise the braking action fails.

Allow the unit to roll to a horizontal level and then adjust the brake.

Working time needed to replace important parts

Components Modules	Working time (Min.)	Note
Battery	30	Exchange only with a lift possible. Tightening torque of the polls 23 Nm ± 1 Nm
Fuses F1-F4	10	Main control printed circuit board
Central battery connector including EMERGENCY-STOP	30	Disconnect the battery before replacing the central battery connector and EMERGENCY-STOP. The EMERGENCY-STOP wire is routed under the floor panel, behind the main control printed circuit board cover to the instrument panel.
Key switch	15	control panel
Main control printed circuit board	30	Use a antistatic-wristband during disassembly. The wire plugs are coded, they can not be incorrectly pluged in Tightening torque, wire connections M 6 nuts = 3,9 Nm M 8 nuts = 9,0 Nm
Waterpump	20	Empty the fresh water tank or plug the inlet to the pump before replacing.
Metering valve	45	Dissconect the hose kuppling and wire connector The wire tie on the inlet hose must be replaced after removing it. Both micro switches are non-adjustable **ORIGINAL** . See tech. data for flow volume.
Dirty water tank seal and fluff strainer	10	Dirty water tank

Working time needed to replace important parts

Components Modules	Working time (Min.)	Note
Dirty water tank float switch	15	Dirty water tank
Seat switch	15	Seat
Suction bar lifting motor	30	Micro switches are adjustable
Drive motor carbon brushes	30	Drive motor
Roller brush drive motor	60	Extend the piston of the lifting motor to approx. 75 mm (2.95 in). In this position the brush head is resting on the floor. Open the terminal strip box on the brush head and disconnect the wires. Disconnect the brush head from the brackets and pull it out to the side. Remove the brush motor.
Roller brush drive belt	30	Remove side drive belt cover. Loosen motor retaining screws. Replace drive belt and tighten.
Disc brush drive motor	60	Extend the piston of the lifting motor to approx. 75 mm (2.95 in). In this position the brush head is resting on the floor. Open the terminal strip box on the brush head and disconnect the wires. Disconnect the brush head from the brackets and pull it out to the side. Remove the disc brushes from the brush head. Remove the brush motor.

Working time needed to replace important parts

Components Modules	Working time (Min.)	Note
Disc brush drive belt	45	See analog disc brush drive motor
Replace roller brush, disc brush, drive motor carbon brushes	20	See analog roller brush, disc brush drive motor
Brush head lifting motor	60	Extend the piston of the lifting motor to approx. 75 mm (2.95 in). In this position the brush head is resting on the floor. The micro switches for adjusting the lifting motor are soldered to the wires. If the lifting motor has to be replaced, carry out the adjustments before installing.
Suction motor	30	The wires must be separated from the suction motor when replaced.
Drive pedal assembly	15	Note: When installing the floor panel ensure that the wires are not clamped or pinched to the drive pedal assembly.
Instrument panel	15	The foil cables are only plugged in.
Fresh water tank	180	Fresh water tank
Dirty water tank	40	Dirty water tank
Drive motor	90	Block the rear wheels, and place the jack on the frame next to the steering head.
Steering rad bearing	150	Replacement can only be carried out when first the brush head and drive motor have been removed. Tightening torque: 25 Nm
Rear wheels	15	Place the jack on the frame
Steering wheel	15	Steering column

Technical specifications

Unit Type	Unit No.	Circuit diagram	Operating instructions	Maintenance booklet	Spare parts list
BR 75/140 R 24 V	1.246-101	0.088-555 (ORIG.) 0.088-682 (REV.)	5.960-442	5.950-583	5.958-942
BR 75/140 R Pack 24 V	1.246-121	0.088-555 (ORIG.) 0.088-682 (REV.)	5.960-442	5.950-583	5.958-942
BD 75/140 R 24 V	1.246-201	0.088-555 (ORIG.) 0.088-682 (REV.)	5.960-442	5.950-583	5.958-942
BD 75/140 R Pack 24 V	1.246-221	0.088-555 (ORIG.) 0.088-682 (REV.)	5.960-442	5.950-583	5.958-942
BR 90/140 R 24 V	1.246-301	0.088-555 (ORIG.) 0.088-682 (REV.)	5.960-442	5.950-583	5.958-942
BR 90/140 R Pack 24 V	1.246-321	0.088-555 (ORIG.) 0.088-682 (REV.)	5.960-442	5.950-583	5.958-942
BD 90/140 R 24 V	1.246-401	0.088-555 (ORIG.) 0.088-682 (REV.)	5.960-442	5.950-583	5.958-942
BD 90/140 R Pack 24 V	1.246-421	0.088-555 (ORIG.) 0.088-682 (REV.)	5.960-442	5.950-583	5.958-942

The technical data sheets and the circuit diagrams are located on the next issue of the spare parts CD-ROM (DISIS) and in the Intranet.

Technical data sheets :File “Central / Service Info Int’l / Technical Specifications”

Circuit diagrams: File “Central / Service Info Int’l / Circuit Diagram”

The operating instructions and the spare parts lists can be ordered as a paper copy as required from the spare parts service by quoting the relevant part number.

Special Tools

Steering wheel extraction tool	2.860-166
Multimeter	6.603-022
Torque wrench 2 - 25 Nm	6.815-090

Tightening torques

Printed circuit board, **REVISED** (see page 23 and 24)

Electrical connection M5 (DRIVE+; BRUSH+ and SUCTION MOTOR+)	3,5 Nm
Electrical connection M6 (DRIVE–; BRUSH– and SUCTION MOTOR–)	5,9 Nm
Electrical connection M8 (BAT.+)	9,0 Nm
Electrical connection M10 (BAT.–)	17,0 Nm

Printed circuit board, **ORIGINAL** (see page 21 and 22)

Electrical connection M6	3,9 Nm
Electrical connection M8	9,0 Nm