

REPAIR INSTRUCTION

Dishwasher

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1 SAFETY



DANGER

Repairs may be carried out by a qualified electrician only!

The user may be put at risk and injured by improper repairs!

To prevent electric shocks, always comply with the following instructions:

- ▶ If the appliance is faulty, the housing or frame may be live!
- ▶ Electric shock may occur if live components are touched inside the appliance!
- ▶ Before commencing repairs, disconnect the appliance from the power supply!
- ▶ If tests have to be performed while the appliance is live, always use a residual-current-operated circuit-breaker!
- ▶ The protective conductor resistance must never exceed the values specified in the standard! The protective conductor is crucial for personal safety and appliance function.
- ▶ When repairs are complete, conduct a test in accordance with VDE 0701 or the corresponding national regulations!
- ▶ When repairs are complete, perform a function and leak test.



WARNING

Comply with the following instructions:

If conducting the test in accordance with VDE 0701 via the connector, the heater (instantaneous water heater) must be tested directly for insulation faults due to all-pole disconnection (relays; pressure switch) or the differential current must be measured on the appliance!

If replacing the dispensing device and the pump sump, beware of sharp edges in the area of the stainless-steel modules.

Before commencing repairs, always disconnect the appliance from the power supply! If tests have to be performed while the appliance is live, always use a residual-current-operated circuit-breaker!



Sharp edges: Wear protective gloves.



Electrostatic sensitive devices!
Please observe handling regulations.

2 INSTALLATION

2.1 Aligning the appliance

To ensure a perfect locking function and prevent leaks in the area of the door, the appliance must be aligned precisely via the height-adjustable feet. If the appliance is integrated, the middle rear height-adjustable foot can be adjusted from the front.

Note: Built-under and built-in appliances.

Using the height-adjustable feet, raise the appliance until the housing touches the worktop.

The installation instructions (drilling template) are required for attaching the furniture front to integrated and fully integrated appliances.

The tensile force of the door springs in integrated and fully integrated appliances can be adjusted to the weight of the furniture door ([See Door spring point](#)).

To prevent injury, a side cover 481271 can be fitted near the hinges of end appliances which are built in or under or are free-standing.

2.2 Electrical connection

Connect the appliance to a correctly installed earthed socket only. Comply with the specifications on the rating plate.

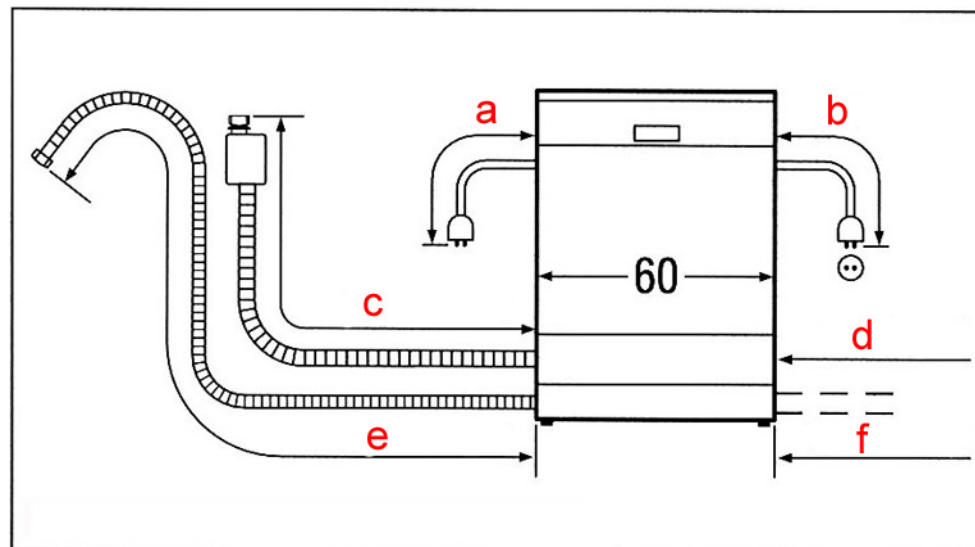
2.3 Water connection

If the appliance is connected to the drain with the standard hose length, the max. permitted height from the floor is 90 cm. If the drainage hose is extended, a max. height of 80 cm must not be exceeded. The water connection ($\frac{3}{4}$ inch) requires a conventional

water line with a water pressure of at least 0.5 bar (0.5 at.) (when the tap is turned on, the water flow rate must be more than 8 l/min.). If the water pressure is more than 10 bar (10 at.), a pressure reducing valve must be installed.

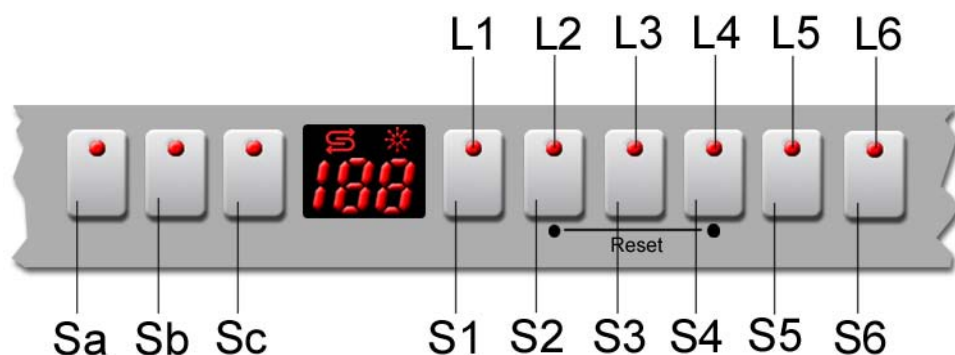
The appliances can be connected to warm water up to 60 °C. However, it is recommended to connect the appliance to cold water (better drying and washing results).

Connection dimensions for all 60 cm dishwashers



- a = 1.3 m
- b = 1.6 m
- c = 1.4 m (3.6 m with extension set)
- d = 1.2 m (3.4 m with extension set)
- e = 1.6 m (3.6 m with extension set)
- f = 1.2 m (3.2 m with extension set)

3 OPERATION



3.1 Function

3.1.1 Pushbuttons / Additional functions

Main switch

2-pole On/Off switch with fleeting contact.

Soaking (optional)

The "soaking" button can also be selected for any rinse programme. If the button is pressed, an additional prerinse occurs and the bottom basket is heated to 55°. This causes the running time to be extended by approx. 20 min. Recommended for mixed utensils (top basket: fragile utensils / bottom basket: very dirty non-fragile utensils).

Top basket (optional)

The top basket button must be pressed if only the top basket is to be rinsed. The water points are positioned for top basket rinsing throughout the rinse cycle. However, the programme sequence is the same as for alternate rinsing.

Time reduction (optional)

The time reduction button can also be selected for any programme. When the button is pressed, the circulation and drying times and therefore the rinsing and drying performance are reduced.

Bottom basket (optional)

The bottom basket button must be pressed if only the bottom basket is to be rinsed. The water points are positioned for bottom basket rinsing throughout the rinse cycle. However, the programme sequence is the same as for alternate rinsing.

Timer programming (ZVW)

The timer programming button enables the start time to be delayed by up to 19 h.

3.1.2 Display

A 2½-digit 7-segment display enables programme run times, etc., over 99 min. to be displayed. The remaining running time is recalculated at the end of the heating positions. If deviations occur on account of the aqua sensor decisions, water supply temperature, number of utensils, etc., the indicated remaining running time is corrected in these positions. Time jumps of up to 20 minutes may occur.

Refill indicators for salt and rinse-aid are integrated in the display.

The display is visible only when the door is open. While the programme is running, the display is controlled in dark mode.

3.1.3 Pushbuttons / Programme selection

Intensive 70°

The programme consists of a prerinse at 50°, wash cycle at 70°, two intermediate rinse cycles, final rinse at 70° and a drying cycle. Please ensure that only the bottom basket is rinsed until the temperature is reached.

Auto 55°–65°

In the auto programme the Aqua sensor decides not only on a water change after the prerinse, but it also specifies the temperature of the wash cycle and the number of intermediate rinse cycles. If clean water is detected in the prerinse, the water from the prerinse is also used in the wash cycle, a wash cycle at 65°, one intermediate rinse cycle and a drying cycle. If dirty water is detected in the prerinse, the prerinse cycle runs, a wash cycle at 51°, two intermediate rinse cycles and a drying cycle.

ECO 50°

The programme consists of a wash cycle at 50°, one intermediate rinse cycle, final rinse at 66° and a drying cycle. The Aqua sensor is **not** active in this programme. Please ensure that only the bottom basket is rinsed until the temperature is reached.

Gentle 40°

The programme consists of a prerinse cycle, a wash cycle at 40°, one intermediate rinse cycle, final rinse at 55° and a drying cycle.

Quick 35°

The programme consists of a wash cycle at 35°, one intermediate rinse, final rinse at 55° without drying. The Aqua sensor is **not** active in this programme.

Prerinse

The programme consists of a prerinse only. The Aqua sensor is **not** active in this programme.

3.2 Special functions

3.2.1 Setting the hardness range

Hold down the S3 button and switch on the appliance. The set value is indicated on the digital display. The set value increases by one each time the S3 button is pressed. When the value of 7 is reached, the display jumps back to 0. While the setting is being made, the L3 LED flashes. If the appliance is switched off, the value is saved. (Table below)

°dH	°fH	°Clarke	mmol / l	Salt consumption in g per rinse cycle	Set value
0–3	0–6	0–4	0–0.6	0	0
4–6	7–11	5–8	0.7–1.1	2	1
7–9	12–16	9–11	1.2–1.6	4	2
10–12	17–21	12–15	1.7–2.1	6	3
13–16	22–29	16–20	2.2–2.9	9	4
17–21	30–37	21–26	3.0–3.7	14	5
22–30	38–54	27–38	3.8–5.4	27	6
31–50	55–89	39–62	5.5–8.9	54	7

Standard setting = 4

3.2.2 Setting intensive drying

Hold down the S2 button and switch on the appliance. "0" is indicated on the digital display. If the S2 button is pressed again, "1" is displayed and intensive drying is switched on. If the appliance is switched off, the value is saved. If intensive drying is activated, the temperature is increased by 3 K in the final rinse.

3.2.3 Setting the buzzer

Hold down the timer programming button (ZVW) and switch on the appliance. The set value is indicated on the display. The set value increases by one each time the timer programming button is pressed. Setting 0 = buzzer off; 1 = quiet; 2 = loud. While the buzzer is being set, the ZVW LED flashes. If the appliance is switched off, the value is saved.

3.2.4 Setting the rinse-aid dosage (optional for top dispensers only)

Hold down the S4 button and switch on the appliance. The set value is indicated on the display. The set value increases by one each time the S4 button is pressed. When the value of 6 is reached, the display jumps back to 0. While the rinse-aid dosage is being set, the L3 LED flashes. If the appliance is switched off, the value is saved.

3.2.5 Programme reset

Press the S2 and the S4 buttons for 3 seconds while the appliance is on. Close the door; the pump is actuated for approx. one minute. Then close the detergent dispenser to reset the dispenser.

3.3 General information on control

3.3.1 Tap turned off

The appliance stops in the programme 6 minutes after the start of programme (scan filling position). The selected programme LED is permanently lit on the control. The control remains in this position until the filling level has been reached.

3.3.2 Regeneration electronics

The electronics determine, in comparison with the water hardness set on the appliance, the volume of water which is possible until the softening system is exhausted.

The number of rinse cycles are counted. Regeneration then takes place once the maximum possible number of rinse cycles has been reached.

The sequence characteristics of the regeneration electronics are described under Initial start-up / Replacing the electronics.

3.3.3 Warm water detection

If the water running into the final rinse cycle is hotter than 45 °C, the temperature in the final rinse cycle is increased to 72 °C in order to increase the inherent heat of the dishes. The heat exchanger is not filled.

3.3.4 Memory electronics

The electronics module has its own memory which remembers the programme last selected. If no new selection is made at the start of the programme, the programme last selected will run.

3.3.5 Power failure

The electronics module has a power failure memory function which ensures that the current rinse programme continues in the event of a power failure or programme interruption.

3.3.6 Sensors

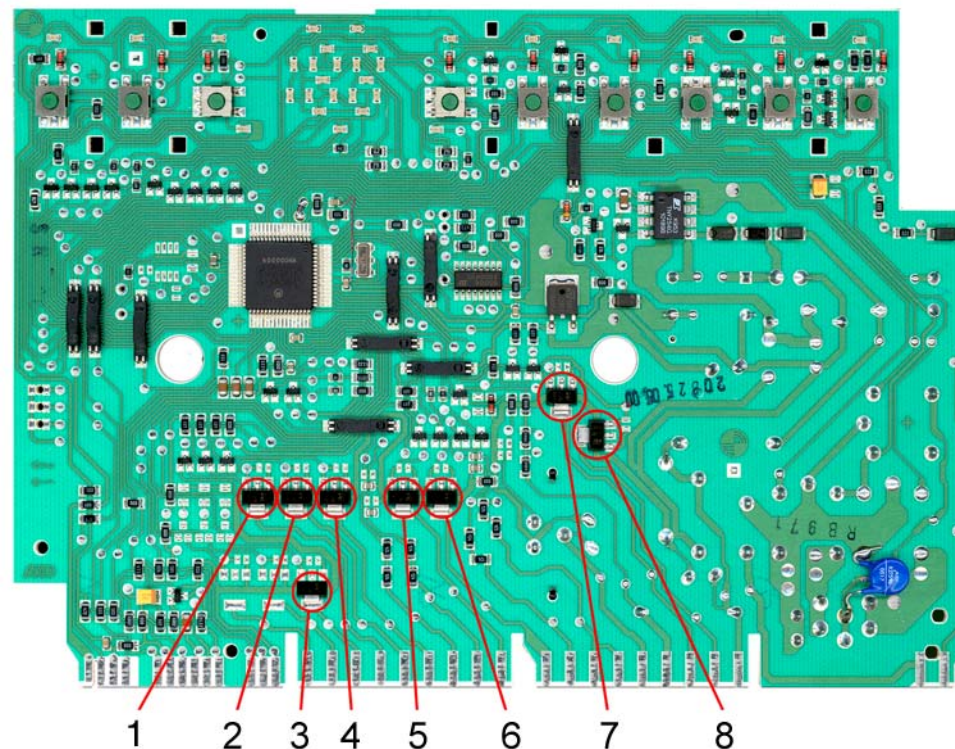
All outgoing signals from the door switch, the level switch, the NTC sensor and the refill switches are recorded and evaluated by the microprocessor at the required time.

3.3.7 Components

The components such as the valves, the detergent and rinse aid dispensers (actuator) are actuated by triacs (see photo). The drainage pump and the instantaneous water heater are switched on by relays.

3.3.8 Listing the triacs

If replacing a module due to a defective triac, ensure that the actuated component is also checked.



g000422

- | | |
|------------------------|------------------------|
| 1 = Raw water valve | 5 = Filler valve |
| 2 = Regeneration valve | 6 = Motor lock |
| 3 = Circulation pump | 7 = Outlet valve |
| 4 = Water points | 8 = Dispenser actuator |

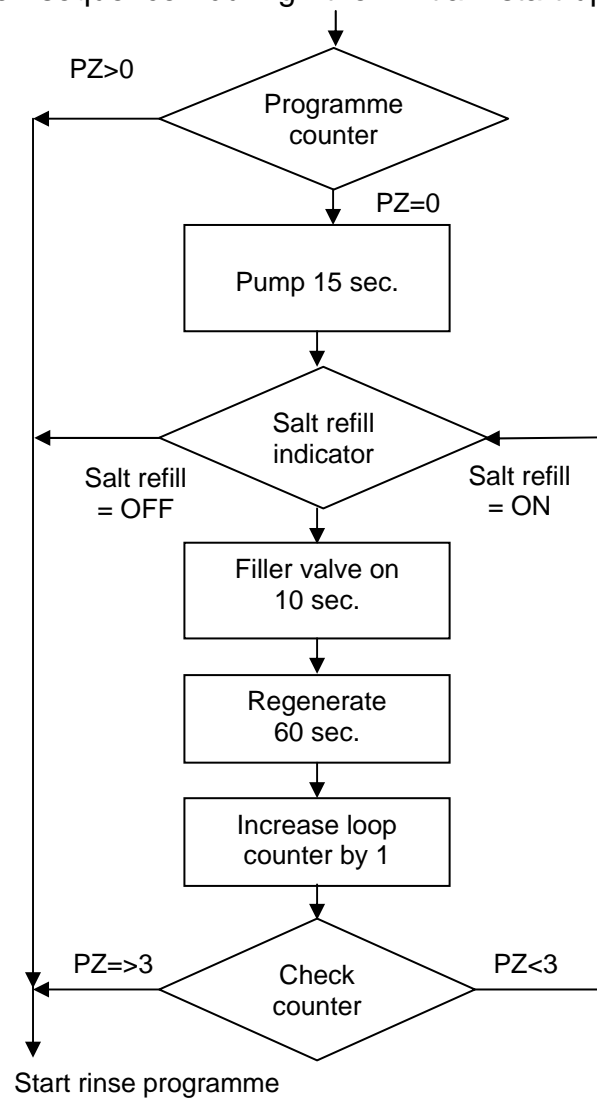


Comply with ESD information!

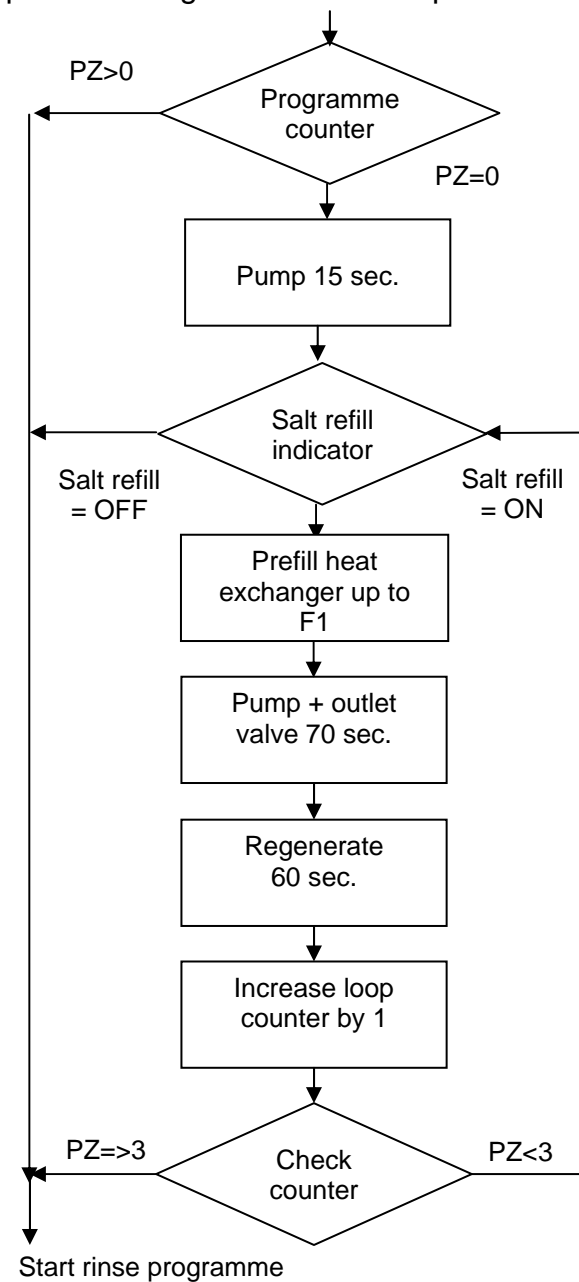
3.3.9 Initial start-up / Replacing the electronics

The following programme sequence must be taken into consideration during the initial start-up or when replacing the electronics. (Programme counter = 0!)

Programme sequence during the initial start-up **without** heat exchanger



Programme sequence during the initial start-up **with** heat exchanger



4 COMPONENTS

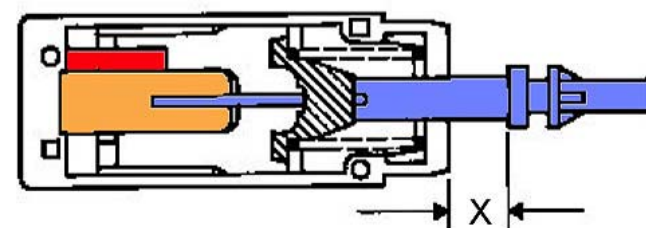
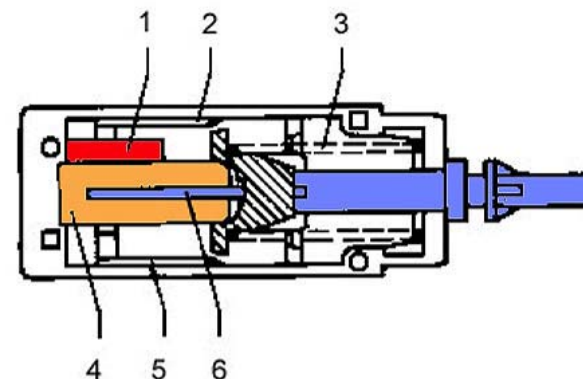
4.1 Actuator

The thermo hydraulic system consists of a metal cylinder with plunger. The cylinder is filled with a substance which expands greatly when heated. The heat source is a PTC (positive temperature coefficient) which is in direct contact with the metal cylinder. A strong pressure spring returns the plunger back to its original position when the heat source is switched off.

When voltage is applied to the PTC, the PTC heats up and transfers the heat to the wax-filled metal cylinder. The wax expands and forces the plunger out of the cylinder. The plunger transfers the mechanical movement to the release mechanism for dispensing the detergent and rinse-aid. If the heat source is switched off, the volume of wax is reduced by the cooling process. The pressure spring returns the plunger back to its original position. The actuation time is approx. 2 min., the reset time approx. 3 min.

Technical specifications:

Nominal voltage	110–240 V
Frequency	50 / 60 Hz
Resistance	0.5–1.5 kΩ

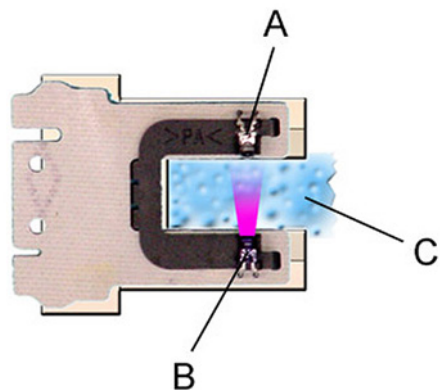


- 1 = PTC
- 2 = Contact
- 3 = Pressure spring
- 4 = Wax-filled cylinder
- 5 = Contact
- 6 = Plunger
- X = Plunger travel

4.2 Aqua sensor (optional)

The infrared light-emitting diode and the photodiode are located opposite each other in a U-shaped translucent housing on a board. The infrared diode transmits infrared light through the water flowing between the U to the light-sensitive base of the photodiode which then becomes conductive.

If the water is turbid, the light emitted by the infrared diode can no longer reach the photodiode. The absent voltage signal is detected by the microcomputer. Depending on the programme type, the water is changed after the prerinse or even the washing temperature is changed. If the turbidity value is not reached, the water remains in the rinsing tank for the wash cycle. In each programme sequence in which the Aqua sensor is active the sensor is also calibrated. If a calibration cannot be implemented successfully, a permanently stored programme is executed and an error is saved in the module.



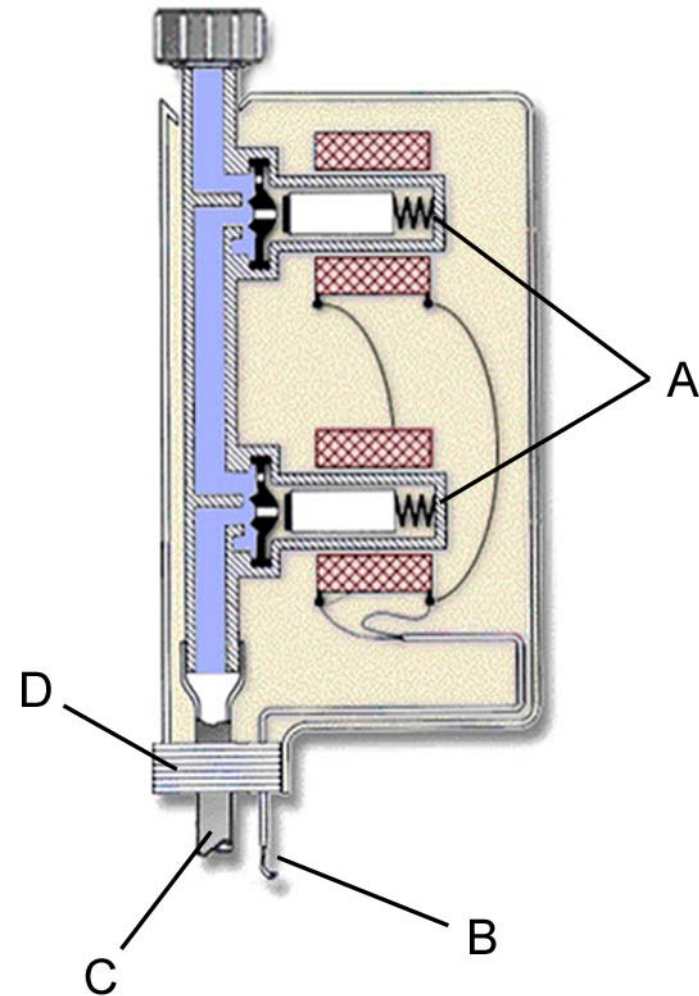
- A = Photodiode
- B = Infrared diode
- C = Detergent solution

4.3 Aqua Stop valve

The valve system consists of two valves in series, which are actuated electrically parallel, and the filler valve and safety valve. The safety function may be actuated via the safety level chamber or electrically via the float in the base pan. The water flow is then stopped mechanically. An electric solenoid valve which is enclosed by a housing is attached to the tap. The housing is connected to the base pan by a leakage water hose (sleeve of the inlet hose). The water inlet hose, which connects the valve to the water inlet, and the electrical control line for the solenoid valve are located inside this leakage water hose.

Technical specifications:

Nominal voltage	230–240 V
Frequency	50 Hz
Resistance	2 k Ω
Flow rate	2.75 l/min
Water pressure	0.5–10 bar



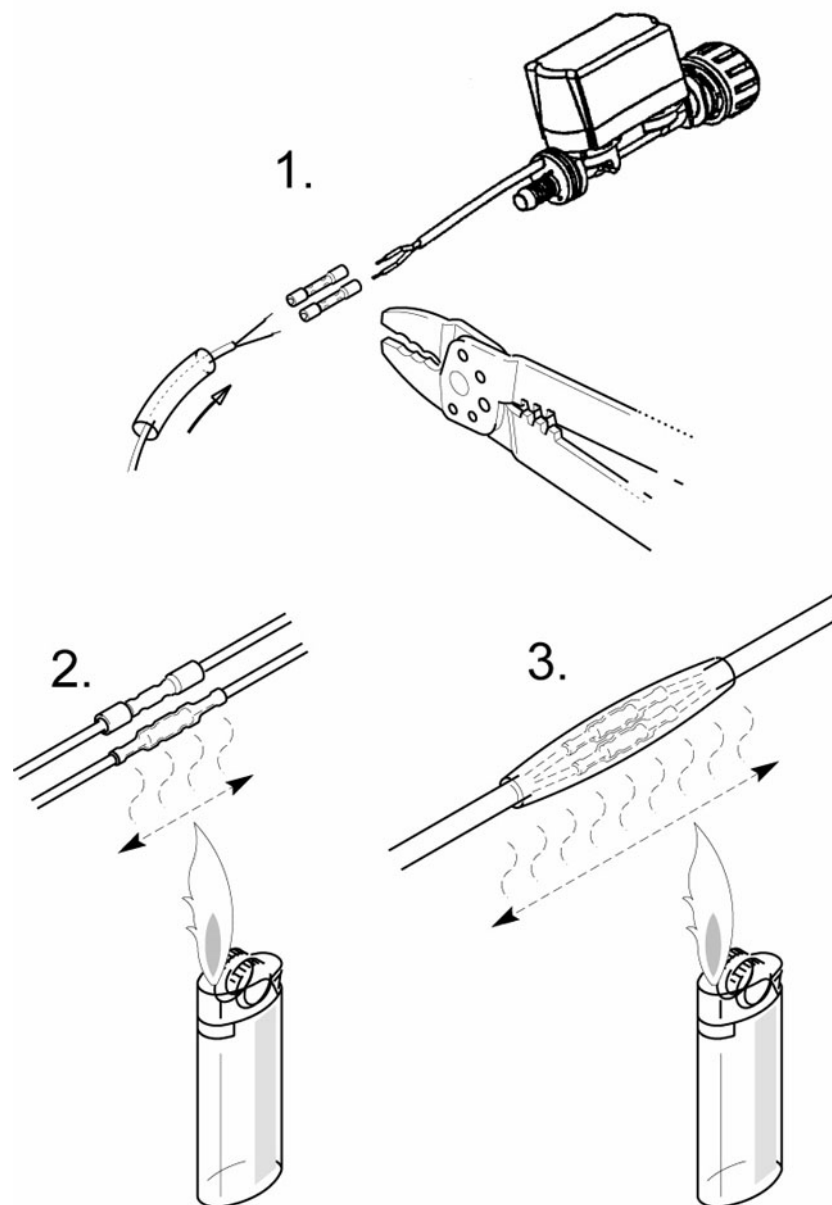
- A = Solenoid valves
- B = Control cable
- C = Inlet hose
- D = Leakage-water hose

Removal

Open the housing; disconnect the inlet hose; sever the electrical connection cables; strip the insulation from the ends of the wires; push the shrink-fit hose over the cable; connect the wires to the insulating sleeves (1).

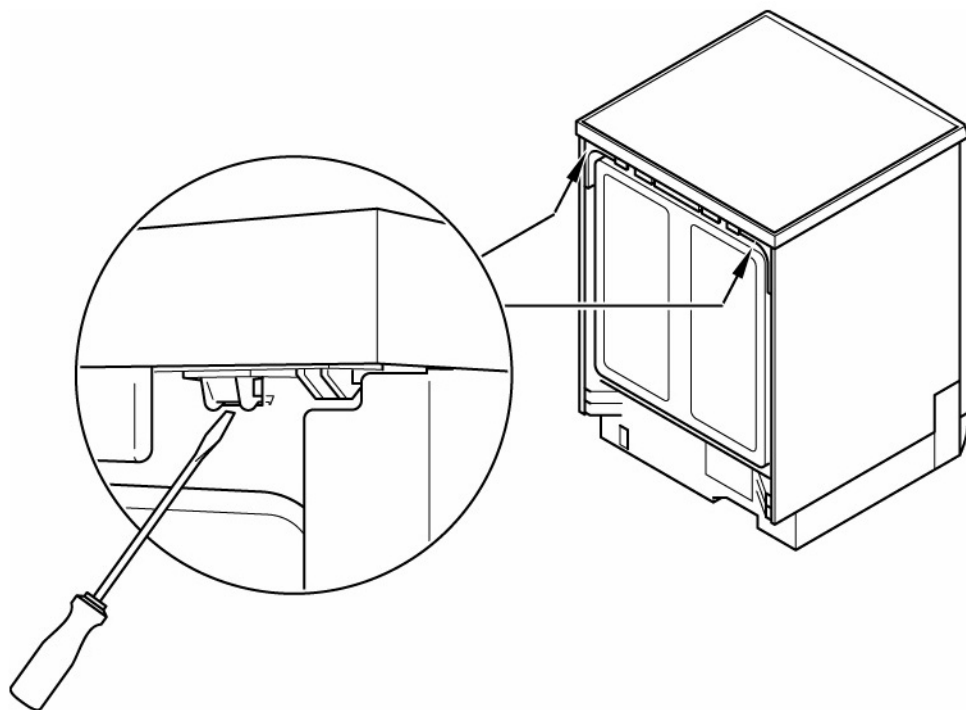
After fitting, warm the connectors until the shrinkage process occurs and the hot-melt adhesive comes out of the ends of the connectors (2).

Push the shrink-fit hose over the connectors and also warm until the shrinkage process is complete (3)



4.4 Worktop (optional)

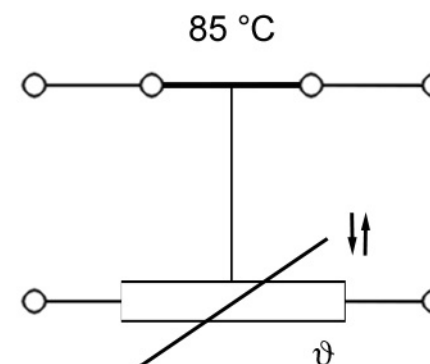
Catch tappets are located on the rear right and left hand sides of the worktop. To remove the worktop, press up the catch tappets, push the worktop back and lift off.



4.5 NTC

The utilised temperature safety switch (>85 °C) is combined with the NTC sensor. If a fault occurs, the heater is switched off at a water temperature of 85 °C (operates in switching mode).

Temperature in °C	Resistance in kW	Tolerance +/- °C
25	48.4	7.9
30	38.5	7.1
50	16.5	6.2
60	11.0	5.6
65	9.1	5.5



4.6 Regeneration / drainage valve

The regeneration valve and the drainage valve are situated in the [water softening system](#). If the regeneration valve is actuated, the water stored in the regeneration chamber is conveyed through the water softening system. If the drainage valve is actuated, the water stored in the heat exchanger is conveyed into the rinsing tank via the water softening system.

Technical specifications:

Nominal voltage	230–240 V
Frequency	50 Hz
Resistance	2.45 kΩ

4.7 Raw water valve

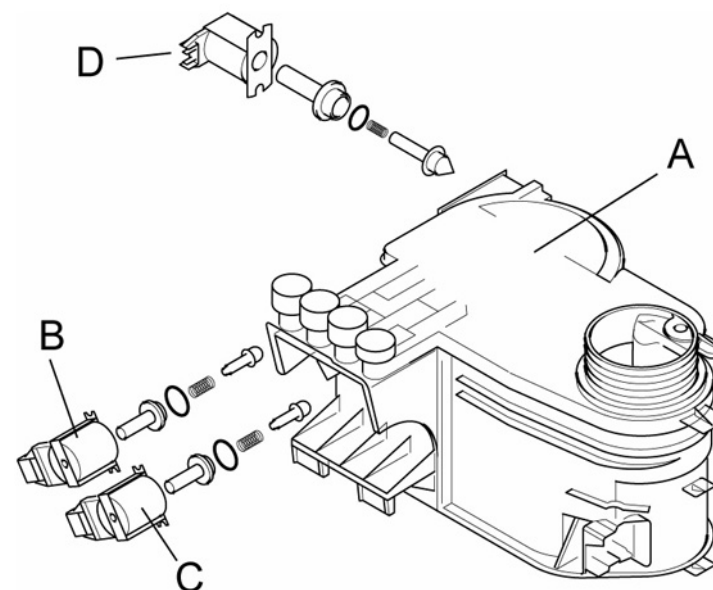
The raw water valve is located at the rear on the water softening system and is responsible for admixing hard water.

The raw or soft water valve is actuated via the electronics module which calculates how frequently and how long the valve is to be actuated for. As a result, a constant water hardness of approx. 5° dH is obtained. For this reason it is important to set the hardness range precisely.

If the valve is actuated (open), the raw water is conveyed through the water softening system and softened. If the valve is not actuated (closed), the inlet to the water softening system is sealed and the raw water flows directly into the heat exchanger via the water inlet.

Technical specifications:

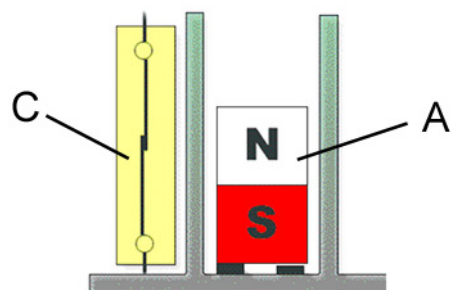
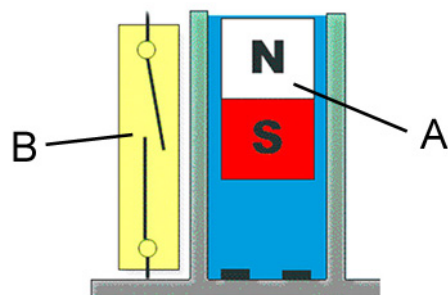
Nominal voltage	230–240 V
Frequency	50 Hz
Resistance	2.45 kΩ



- A = Water softening system
- B = Regeneration valve
- C = Heat exchanger outlet valve
- D = Raw water valve

4.8 Salt and rinse-aid indicators (optional)

The dispenser contains a float with an integrated permanent magnet. The magnetic field actuates a reed switch on the outside of the dispenser. The lamps of the refill indicators in the control panel are switched on via this reed switch.



A = Permanent magnet

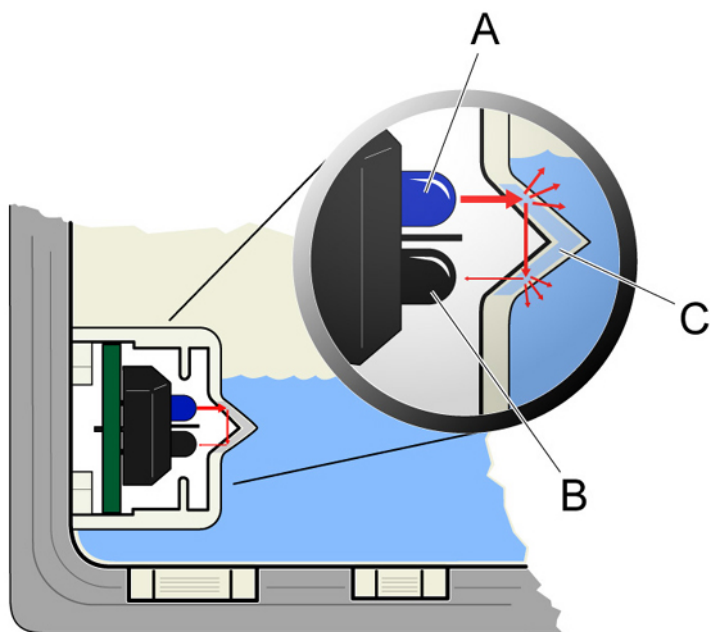
B = Reed switch open

C = Reed switch closed

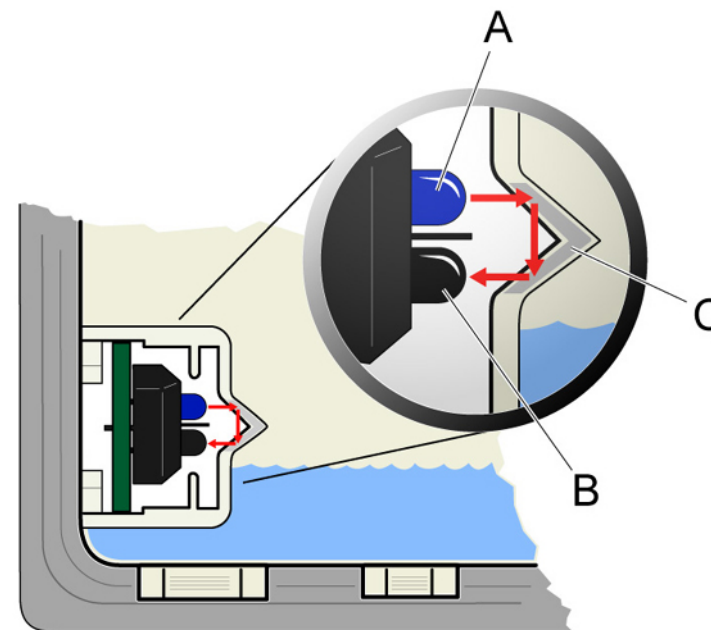
4.9 Optical low rinse-aid sensor (optional)

The optical low rinse-aid sensor consists of a transmitter diode and a receiver diode.

A light beam is transmitted from the transmitter diode to the receiver diode via a prism. If the dispenser is full, the light beam in the prism is scattered. The received signal is weaker than the transmitted one.



- A = Transmitter diode
- B = Receiver diode
- C = Prism



If the dispenser is empty, the light beam in the prism is reflected. The received signal is the same as the transmitted signal.

The module evaluates the received signal and the refill indicator LED is actuated.

4.10 Hinge

Unscrew the outer door, the base, the angle strip and the side panels; disengage the tension cord from the hinge lever; unscrew the hinge lever from the inside door; unscrew the hinge plate from the container frame.

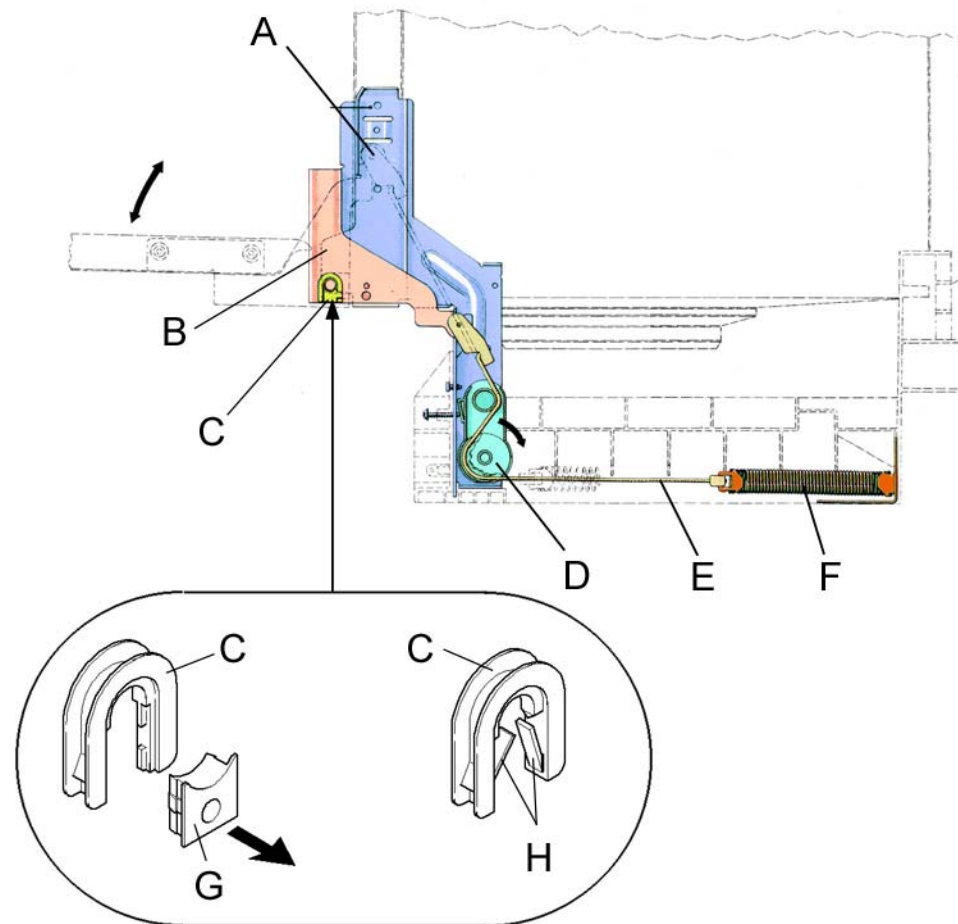
Unscrew the fixing screw which connects the hinge to the base pan; lever the hinge plate off the frame; pull the hinge up and out; remove spring clamp;

Two-piece hinge bearing bush:

Open the bearing bush by disengaging the spacer with a screwdriver (see sketch)

One-piece hinge bearing bush:

Open the bearing bush by bending up the catches with a screwdriver. When the bearing bush is removed, it must be renewed.



A = Hinge plate
B = Hinge lever
C = Bearing bush
D = Spring clamp

E = Tension cord
F = Tension spring
G = Spacer
H = Catches

4.11 Dispenser

The release mechanism is actuated via an actuator. When the actuator is actuated for the first time, the detergent-dispenser cover is opened. At the same time the release pawl engages with the switching core of the rinse-aid lever so that when the actuator is actuated again, the dosing plunger is lifted off the rinse aid.

Technical specifications:

Rinse-aid filling quantity	120 ml
Setting 1–6	per 1 ml
Detergent capacity max.	45 g

See Actuator for additional technical specifications.

Removal:

Unscrew the outer door. Disconnect the power. Using a screwdriver, lift the retention plates stamped out of the inner door off the catch tappets.

Note:

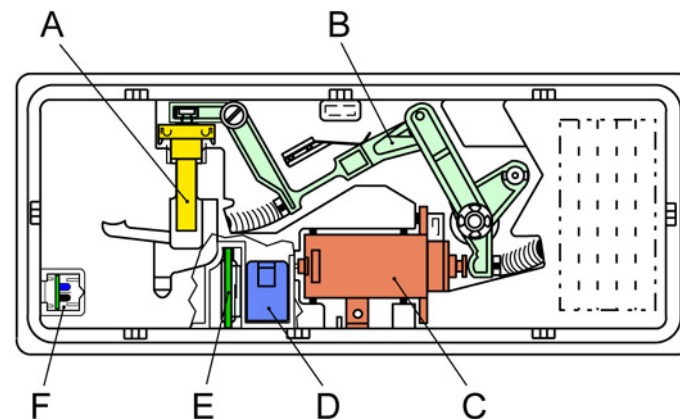


Leave the upper basket in the appliance in order to remove the dispenser; close the door and then press in the unlocked dispenser.

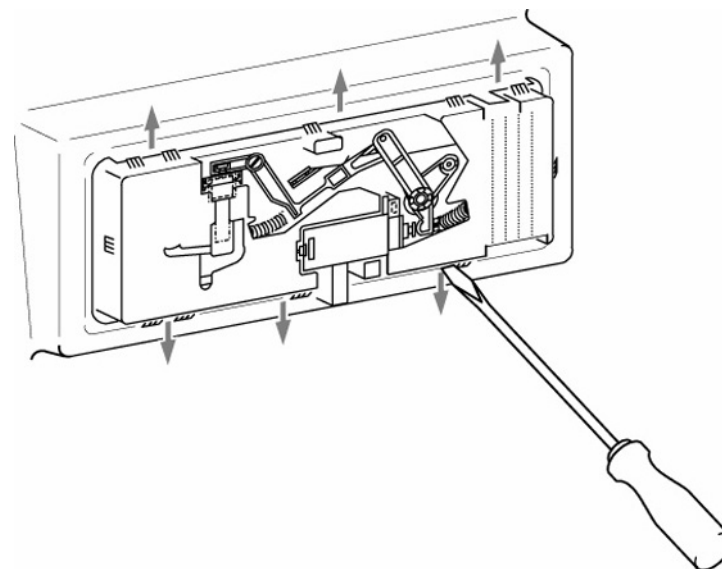
Wear [protective gloves](#); risk of cuts.

Adjust the retention plates to the middle before installing the dispenser to ensure that all the catch tappets lock securely.

Before installing the seal, lubricate with washing-up liquid.



- | | |
|--------------------|-------------------------------|
| A = Dosing plunger | D = Magnetic float |
| B = Switching core | E = Reed contact (optional) |
| C = Actuator | F = Optical sensor (optional) |



4.12 Dispenser (top dispenser)

The detergent chamber in the top dispenser can be swivelled out of the dispenser by pressing the side button. This facilitates filling.

The release mechanism is actuated by a coil which is actuated by impulses emitted by the electronics module (detergent dispenser 20 sec. / rinse-aid dispenser every 14 sec.). The first impulse opens the detergent-dispenser cover. At the same time the release pawl engages with the switching core of the rinse-aid lever so that when the coil is actuated again, the plunger is lifted off the rinse aid.

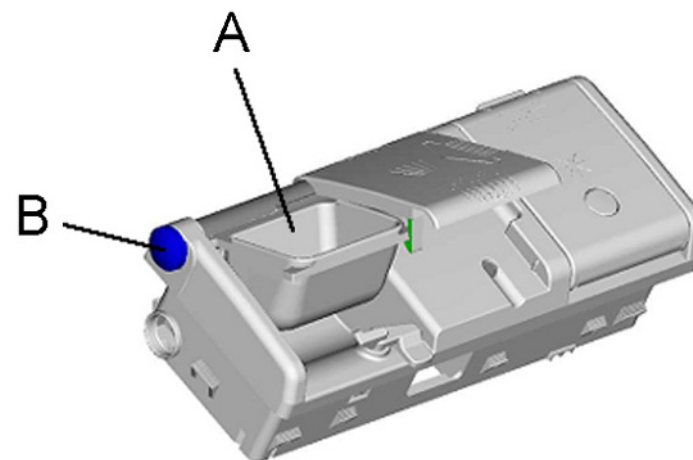
The number of impulses is changed in the final rinse cycle depending on the setting of the rinse-aid dosage on the electronics module.

Rinse-aid setting	Number of impulses
0	0
1	2
2	3
3	4
4	5
5	6
6	7

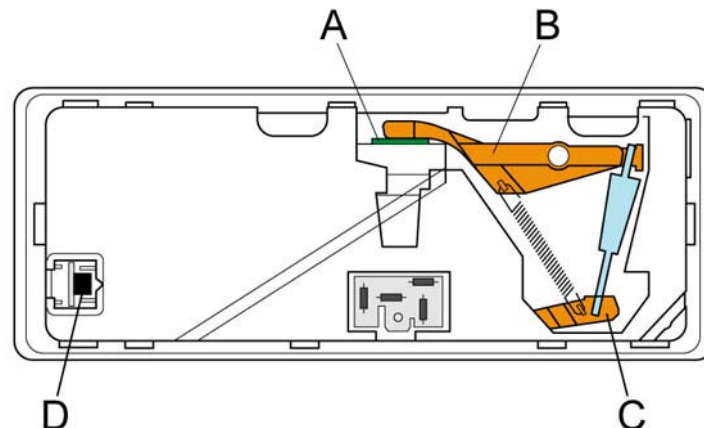
Low rinse aid is detected by a combination of IR LED and photo-transistor.

Technical specifications:

Rinse-aid filling quantity	120 ml
Setting 0–6	per 1 ml
Detergent capacity max.	45 g



- A = Hinged dispenser
B = Swivel button



- A = Dosing plunger
B = Rocker
C = Switching core
D = Low rinse-aid sensor

Removal:

Unscrew the outer door. Disconnect the power. Using a screwdriver, lift the retention plates stamped out of the inner door off the catch tappets.

Note:

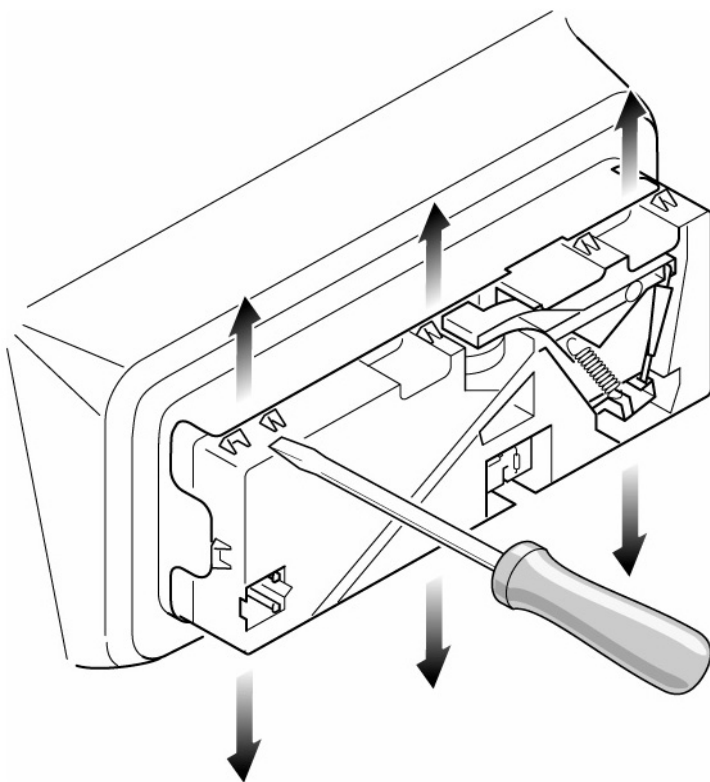


Leave the upper basket in the appliance in order to remove the dispenser; close the door and then press in the unlocked dispenser.

Wear [protective gloves](#); risk of cuts.

Adjust the retention plates to the middle before installing the dispenser to ensure that all the catch tappets lock securely.

Before installing the seal, lubricate with washing-up liquid.



4.13 Instantaneous water heater

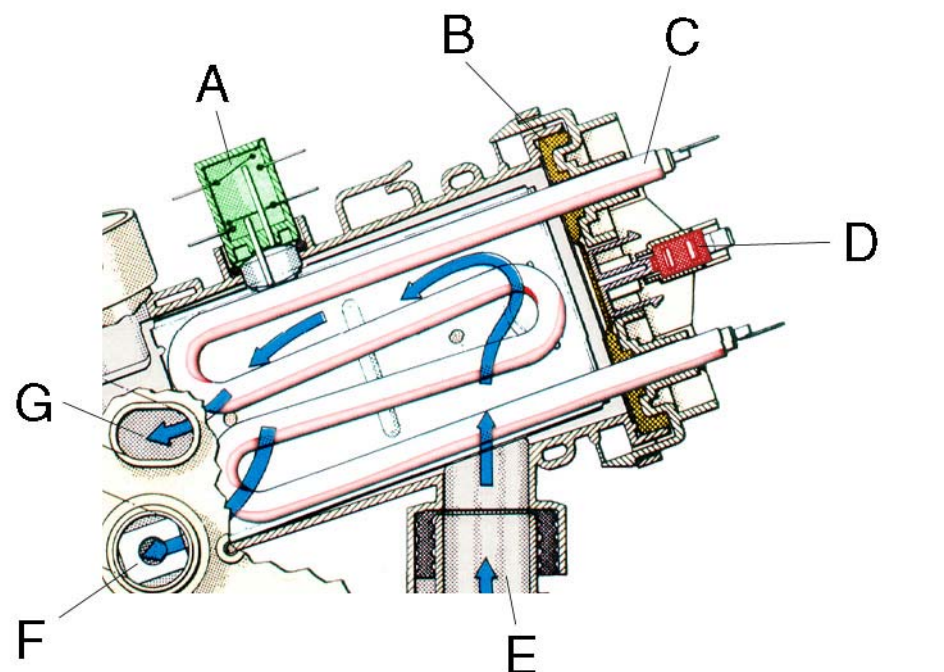
The instantaneous water heater is installed in the water circuit for the spray arms. When the detergent solution flows through the instantaneous water heater, a rubber membrane attached to the flange actuates the safety pressure switch for the heating element. If the pressure drops, the heater switches off. The heating position is over travelled, preventing dry heating.

Removal:

Unscrew outside door, base panel, angle strip and side panels. Disengage the tension cords from the hinge levers. Unscrew the screws which connect the base pan to the hinge plates. Unscrew the rinsing tank from the rear panel of the base pan. Disconnect the door cable harness from the plug-and-socket connection in the base pan. Place the appliance on its back, carefully remove the base pan and loosen the catch between the level sensor housing and the water softening system. Disconnect the circulation pump with the rubber support from the base pan. Open the base pan until the instantaneous water heater can be screwed off the pump sump. Unscrew the instantaneous water heater. Release the catch on the pump sump and lever the instantaneous water heater off the plug-and-socket connections of the pump sump / circulation pump.

Technical specifications:

Nominal voltage	230–240 V
Frequency	50 Hz
Power	2150 W
Resistance	approx. 22 Ω



- A = "Clicking" safety device / NTC;
85 °C safety switch
B = Membrane
C = Heating element
D = Safety pressure switch

- E = From the circulation pump
F = To the lower spray arm
G = To the upper spray arm

4.14 Water softening system

Unscrew the outside door, the base panel, the angle strip and the side panels; unfasten the tension cords on the hinge levers; unscrew the screws which connect the base pan to the hinge plates; unscrew the rinsing tank from the rear panel of the base pan; separate the door cable harness on the plug-and-socket connection in the base pan; remove the electrical connections from the regeneration and drainage valve; unscrew the nut which connects the salt dispenser to the rinsing tank; draw saline solution out of the dispenser with a suction syringe; place the appliance on its back; carefully remove the base pan and release the catch on the level sensor housing and the water softening system; separate the circulation pump with the rubber support from the base pan; remove the base pan until the water softening system can be pulled off the plug-and-socket connections on the water inlet and the level sensor housing; pull out the reed switch;

Note:

The following work must be carried out before the water softening system is installed:

- ▶ Place the seal on the filler neck of the salt dispenser.
- ▶ Insert sealing rings into the plug-and-socket connections.
- ▶ Put rubber cap on the bearing support in the base pan for the pump sump.
- ▶ Insert the switch rod for actuation of the safety level switch.
- ▶ Fit the rubber bearing to the circulation pump.

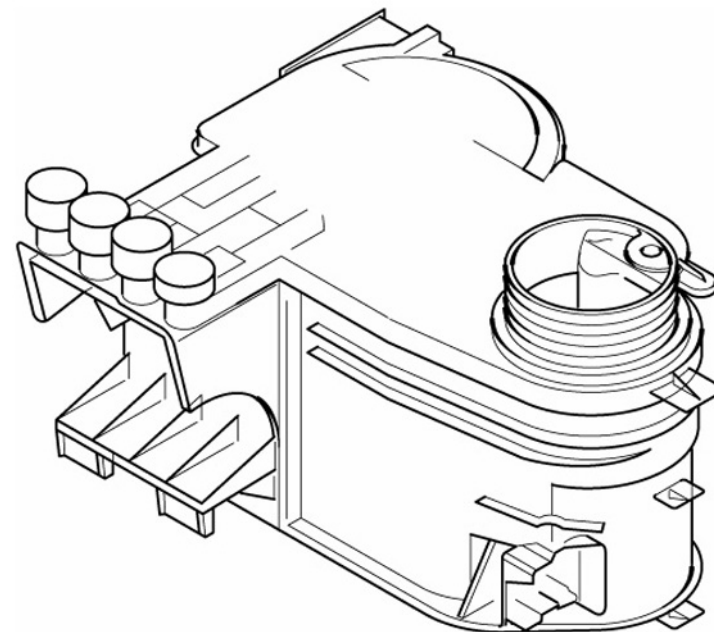
Salt dispenser

Capacity:

Fine grained salt approx. 2.0 kg

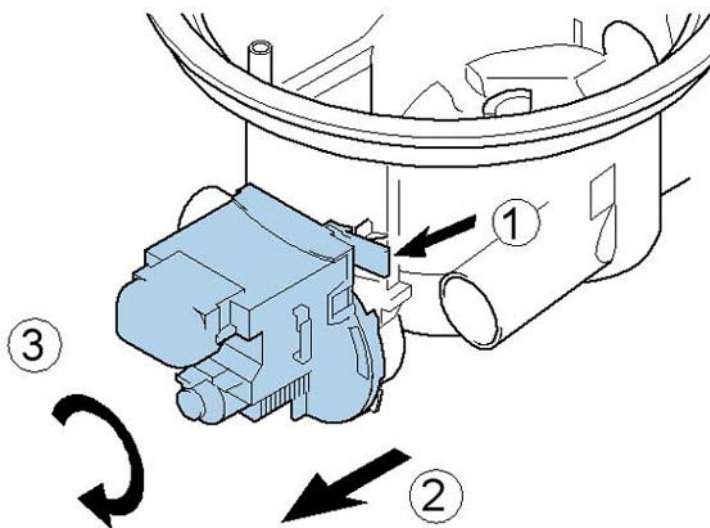
Rough-grained salt approx. 1.5 kg

Salt tablets approx. 0.7 kg



4.15 Detergent-solution pump

Remove the base panel and base plate; the detergent-solution pump is locked in position at the front left side of the pump sump. To remove the detergent-solution pump, disengage the lever (1), then rotate the pump forwards (2). The pump can be removed by rotating it through approx. one quarter of a revolution (3).



Technical specifications:

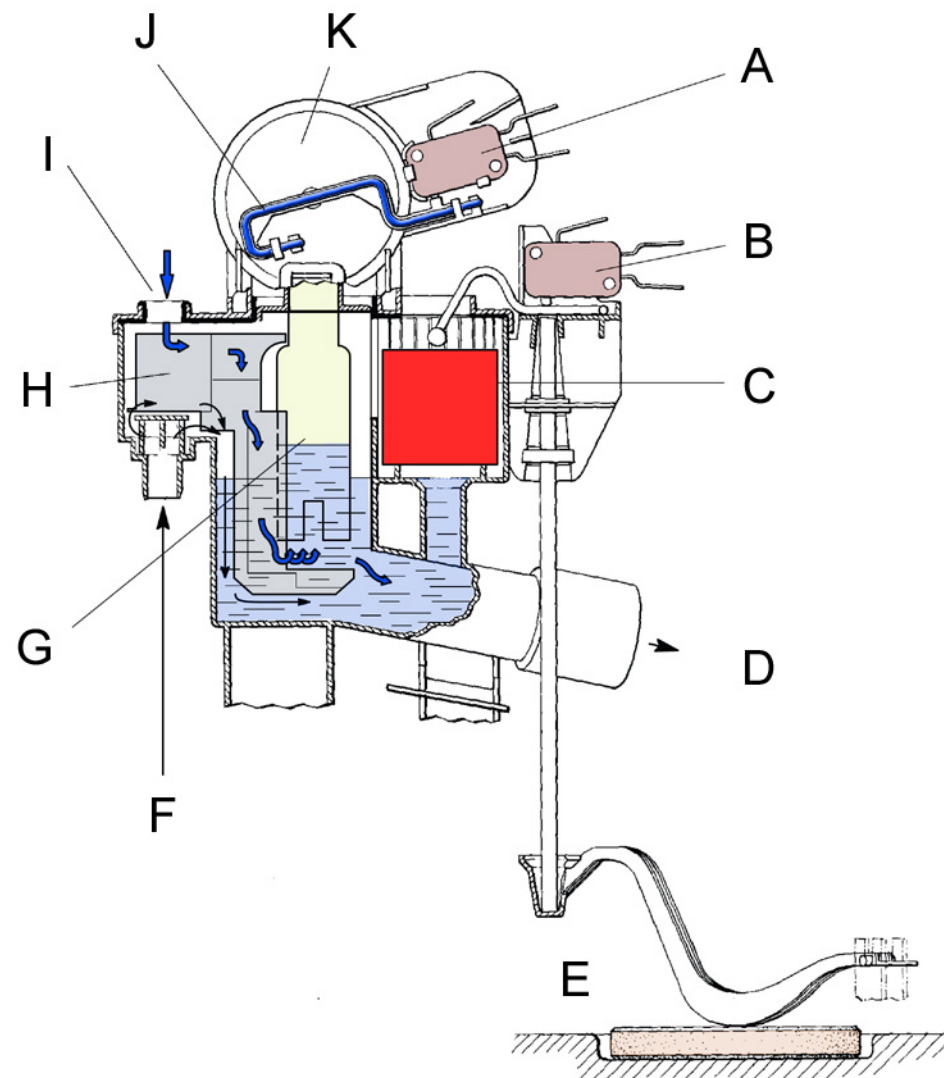
Nominal voltage	230–240 V
Frequency	50 Hz
Resistance	110–260 Ω
Delivery head	0.9 m
Conveying capacity	10 l / min

4.16 Level sensor with safety function

If the dishwasher controller or components malfunction, causing the machine to overfill, the valve combination is closed via the safety system, shutting off the water supply. The drainage pump is switched on via the safety level switch. Pumping continues until the safety level switch switches back again. Any leaks inside the machine are collected in the base pan. Any leaks in the supply hose are conveyed to the base pan via the leakage water hose.

Once a predefined level has been reached in the base pan, the float uses a switch lever to actuate the safety level switch which then electrically switches off the filling and safety valve. At the same time the drainage pump is switched on, the detergent solution is removed from the rinsing tank and the drainage pump switches to continuous operation.

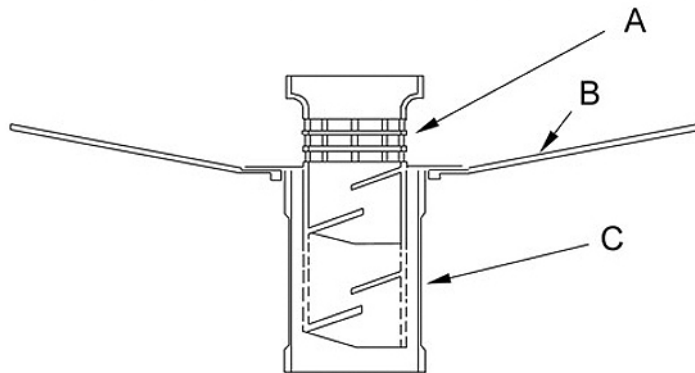
- | | |
|--|---|
| A Level switch | G Air chamber |
| B Safety level switch | H Restricting funnel for appliances with heat exchanger |
| C Safety level float | I From the overflow channel |
| D To the pump sump | J Switch lever |
| E Float in the base pan | K Pressure chamber |
| F – From the drainage valve for appliances with a heat exchanger | |
| – From the water softening system for appliances without a heat exchanger | |



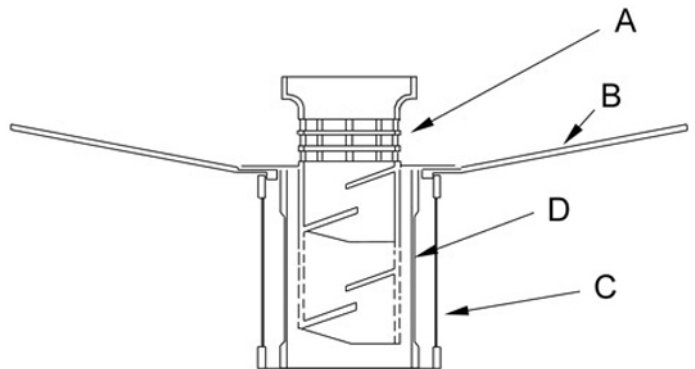
4.17 Filter system

The rough filter cylinder must be locked firmly to the pump sump (observe marking) in order to prevent dirt particles penetrating the rinsing circuit.

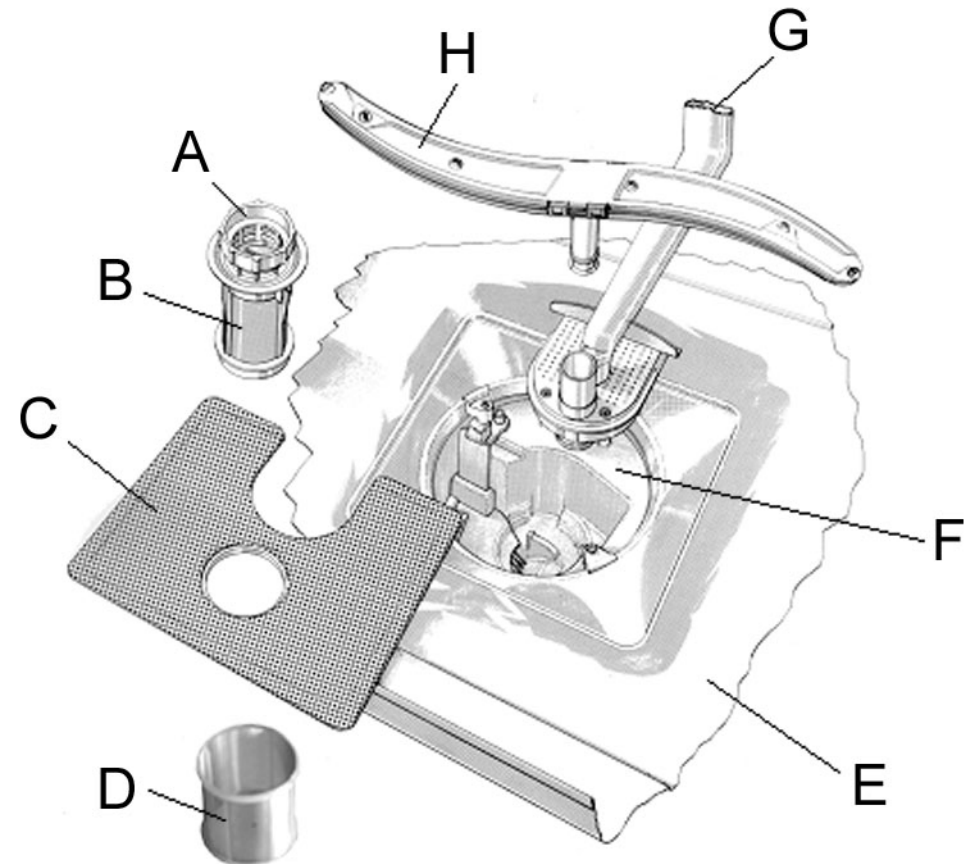
3-stage filter system



4-stage filter system



- | | |
|--------------------|--------------------------|
| A = Coarse filter | C = Microfilter cylinder |
| B = Surface filter | D = Fine filter cylinder |



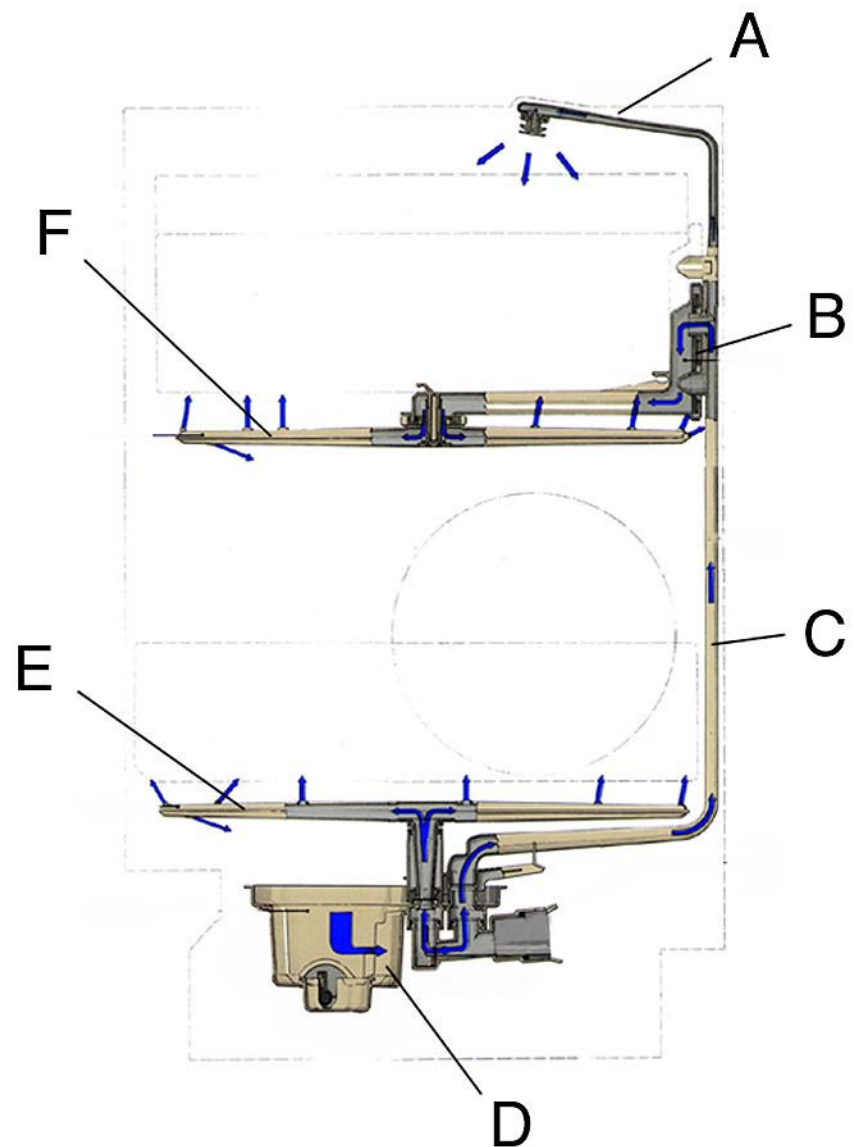
- | | |
|--------------------------|------------------------------------|
| A = Coarse filter | E = Rinsing tank |
| B = Fine filter cylinder | F = Pump sump |
| C = Surface filter | G = Supply pipe to upper spray arm |
| D = Microfilter cylinder | H = Lower spray arm |

4.18 Spray system

The rotor spray system consists of three spraying levels, the lower and upper spray arms and a roof shower head. Water is supplied to the upper spray arm and the roof shower head via the supply pipe attached to the inside of the tank rear panel. This pipe is connected by a direct plug-and-socket connection to one of the two outlets on the instantaneous water heater situated under the pump sump.

The upper spray arm is attached by its inlet pipe directly to the top basket. Connection to the supply pipe is by a variable coupling. If appliances feature a height-adjustable top basket, the water inlet to the spray arm is adjusted via this variable coupling.

The lower spray arm is connected with its bearing assembly to the second outlet of the instantaneous water heater directly via the pump sump and features a nozzle on the underside for cleaning the surface filter.

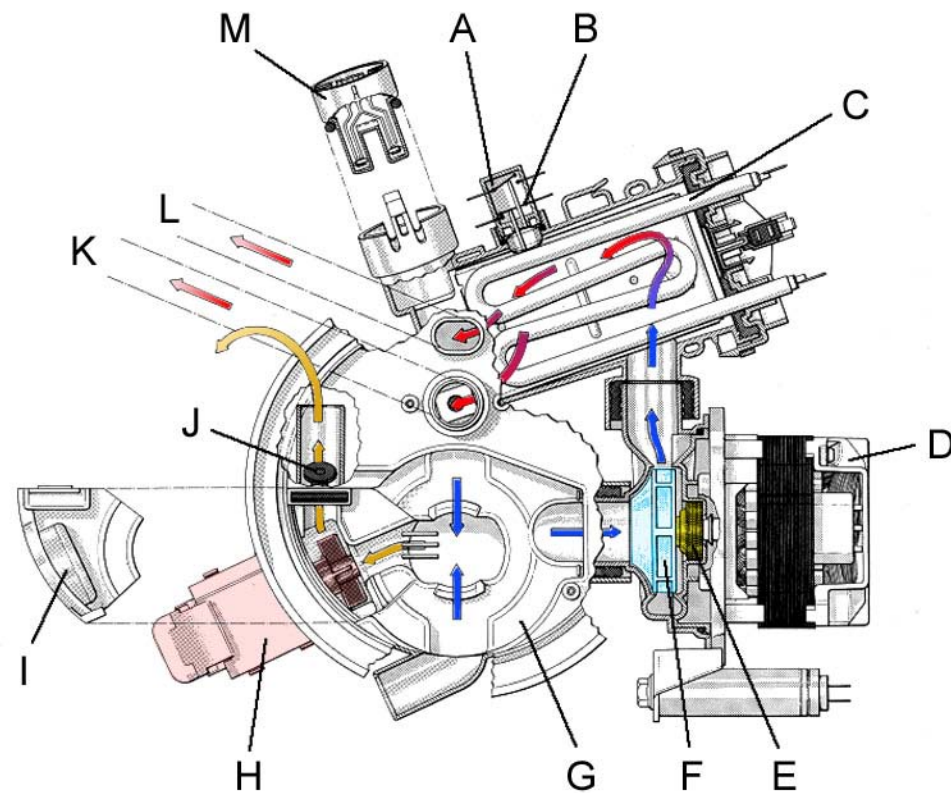


- | | |
|----------------------|---------------------|
| A = Roof shower head | D = Pump sump |
| B = Coupling | E = Lower spray arm |
| C = Supply pipe | F = Upper spray arm |

4.19 Rinsing and pumping system

The circulation and drainage pumps as well as the instantaneous water heater are connected to the pump sump via plug-and-socket connections. The instantaneous water heater is also screwed securely to the pump sump. The filter system consists of four-fold filtration (coarse filter, fine filter cylinder, surface fine filter, micro fine filter). The pump sump, which houses the micro fine filter, is covered by the surface fine filter. The surface fine filter is attached with the combined coarse and fine filter cylinders to the base of the pump sump via a bayonet catch. The detergent solution is drawn into the pump sump by the circulation pump and forced into the instantaneous water heater.

At the appropriate pressure the pressure switch for the heater is actuated via the flange-mounted membrane. A temperature controller connected in series disconnects the appliance at 85 °C to prevent overheating. In mechanically controlled appliances, this temperature switch is combined with a 65 °C temperature controller and housed in one module, in electronically controlled appliances it is combined with an NTC sensor (negative temperature coefficient) and housed in one module. The sensor surface is in direct contact with the detergent solution. The Aqua sensor is situated at the outlet of the instantaneous water heater in the detergent solution flow and measures the degree of turbidity. As the drainage pump is attached directly to the pump sump, the impeller wheel and non-return valve are accessible in the rinsing tank when the cover has been removed.



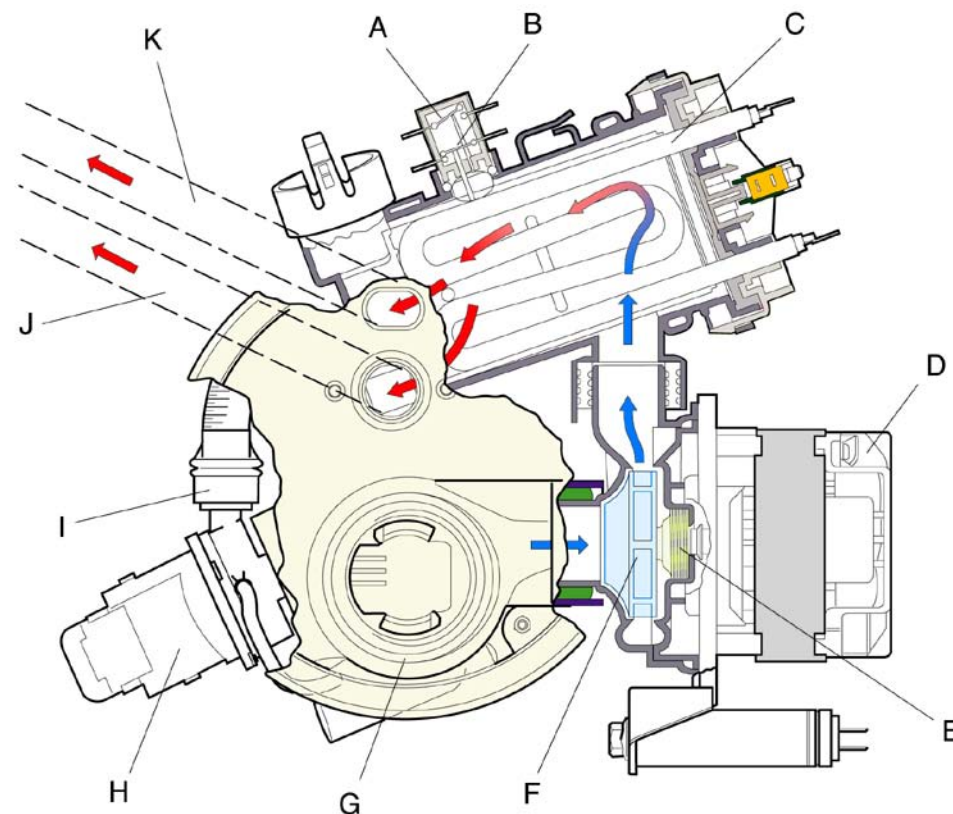
- | | |
|-----------------------------------|-----------------------------|
| A = NTC / temperature controller | H = Detergent-solution pump |
| B = Safety temperature controller | I = Pump wheel cover * |
| C = Instantaneous water heater | J = Non-return valve |
| D = Circulation pump | K = To the lower spray arm |
| E = Seal set | L = To the upper spray arm |
| F = Pump wheel | M = Aqua sensor * |
| G = Pump sump | |

* Optional

4.20 Rinsing and pumping system

The circulation and drainage pumps as well as the instantaneous water heater are connected to the pump sump via plug-and-socket connections. The instantaneous water heater is also screwed securely to the pump sump. The filter system consists of four-fold filtration (coarse filter, fine filter cylinder, surface fine filter, microfine filter). The pump sump, which houses the microfine filter, is covered by the surface fine filter. The surface fine filter is attached with the combined coarse and fine filter cylinders to the base of the pump sump via a bayonet catch. The detergent solution is drawn into the pump sump by the circulation pump and forced into the instantaneous water heater.

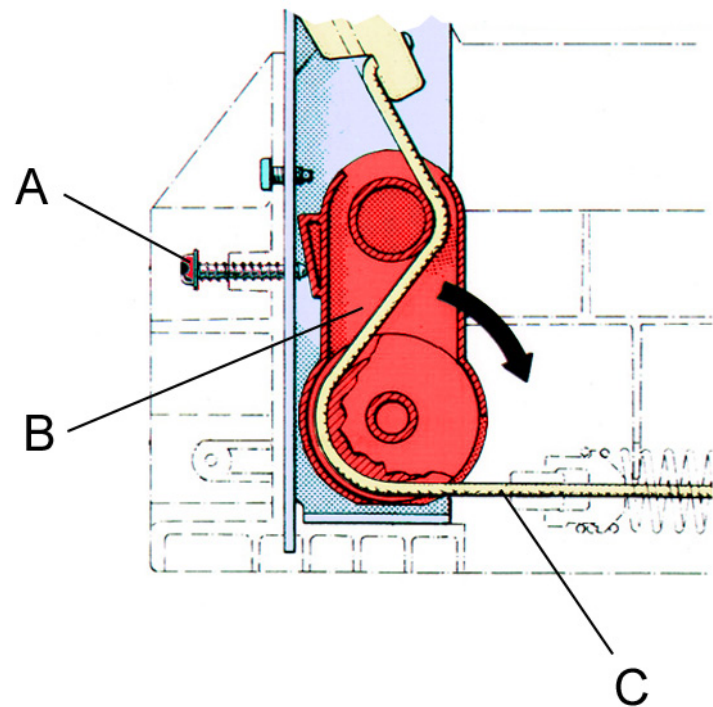
At the appropriate pressure the pressure switch for the heater is actuated via the flange-mounted membrane. A temperature controller connected in series disconnects the appliance at 85 °C to prevent overheating. In mechanically controlled appliances, this temperature switch is combined with a 65 °C temperature controller and housed in one module, in electronically controlled appliances it is combined with an NTC sensor (negative temperature coefficient) and housed in one module. The sensor surface is in direct contact with the detergent solution. The Aqua sensor is situated at the outlet of the instantaneous water heater in the detergent solution flow and measures the degree of turbidity.



- | | |
|-----------------------------------|-----------------------------|
| A = NTC / temperature controller | G = Pump sump |
| B = Safety temperature controller | H = Detergent-solution pump |
| C = Instantaneous water heater | I = Non-return valve |
| D = Circulation pump | J = To the lower spray arm |
| E = Seal set | K = To the upper spray arm |
| F = Pump wheel | |

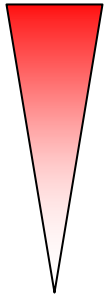
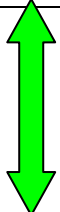
4.21 Door spring

The door spring compensates for the weight of the furniture front. The door springs are situated on the right and left under the base pan. The tensile force is transferred to the door hinge with a tension cord via a deflection roller. The clamping force of the spring can be increased with the enclosed adjusting screw (built-in appliances only) via the deflection roller.



- A = Adjusting screw
- B = Spring clamp (deflection roller)
- C = Tension cord

If the furniture doors are very heavy (e.g.: marble), the tensile force of the standard installed springs and maximum pretension of the spring tensioner is no longer adequate. In this case stronger door springs (see table) may be used. If furniture doors are very light, the door springs can also be replaced by lighter ones. The door springs must be replaced in pairs only! The maximum furniture door weight is approx.10.5 kg.

Spring force	Coloured dot	Material no.:	Max. weight of furniture
max. 	grey	165891	Approx.10.5 kg
	green	165736	
	black	168648	
	brown	167022	
	red	165297	
	yellow	173696	1 kg
min.			

Note: The door springs can be identified by a coloured dot on the rear of the appliance.

4.22 Circulation pump

The circulation pump consists of a single-phase alternating current motor.

Removal:

Remove side panels and base plate, disconnect the stainless steel tank / plastic base pan on the right, consisting of 2 screws (front and rear). Raise the tank and secure with approx. 4 cm thick object. The circulation pump is locked in position. Using a screwdriver, press in the catch on the right side of the circulation pump and rotate the pump in a clockwise direction. The pump can then be removed.

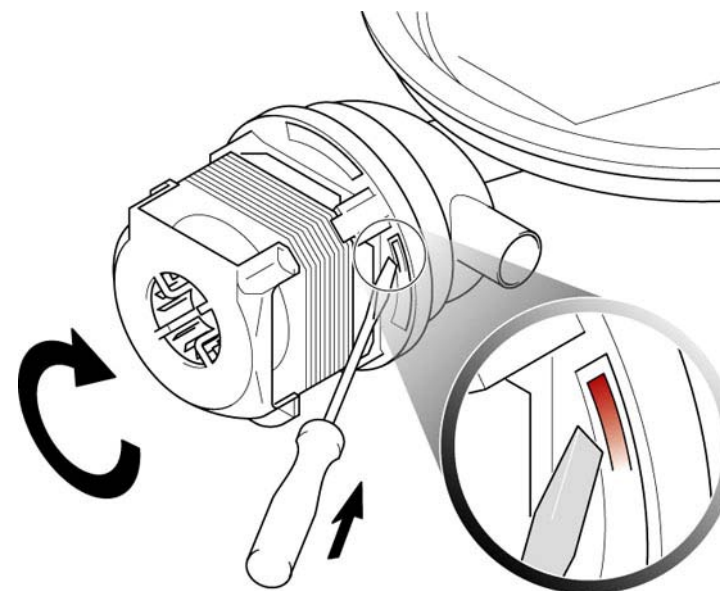
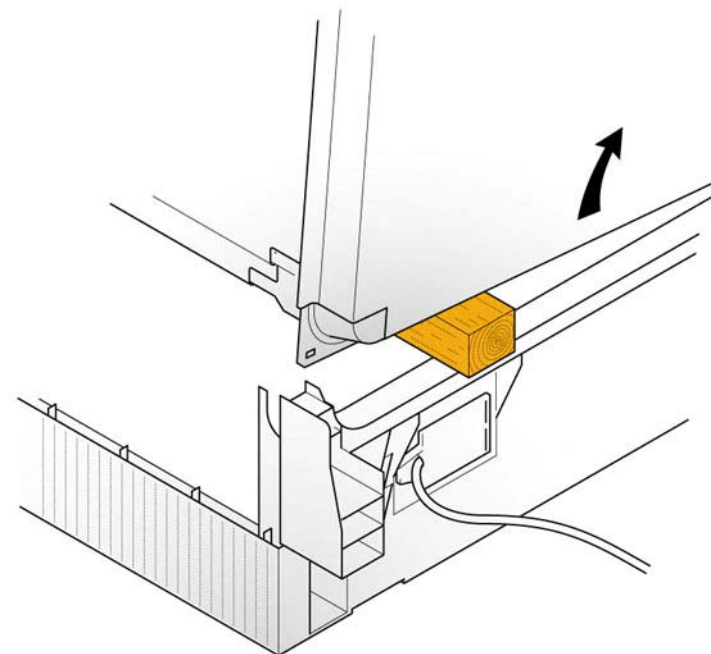
To release the impeller, block the rotor with a pen or screwdriver (hole between the rotor blades). Remove the pump housing and press out the mechanical seal.

Note: if the motor is replaced, the spacer washer on the motor shaft must be fitted to the new motor, otherwise the impeller will run less smoothly or will lock!

Installation is in reverse sequence. Prior to installation, lubricate the seal with washing-up liquid.

Technical specifications:

Nominal voltage	230–240 V
Frequency	50 Hz
Resistance	Ha approx. 80 Ω
	HI 1 approx. 85 Ω
	HI 2 approx. 13 Ω
Delivery head	3.1 m



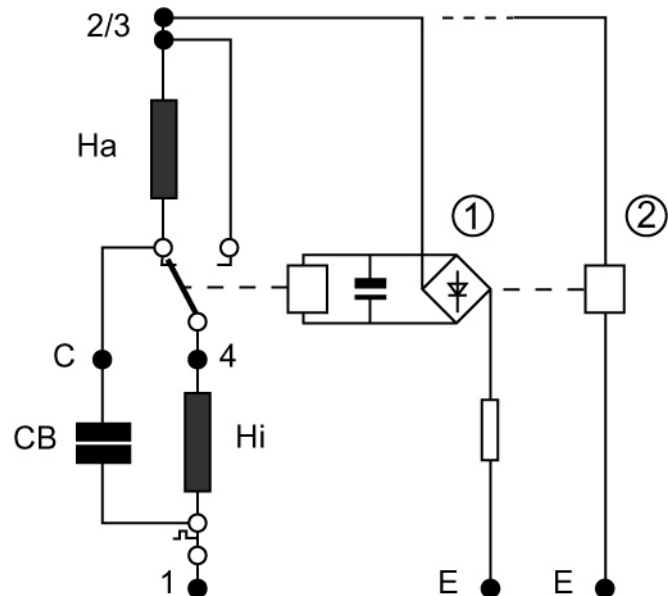
4.23 Circulation pump (SICASYM)

The circulation pump is driven by a single-phase a.c. motor.

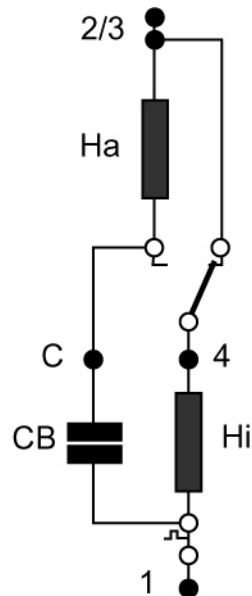
The switching of the two motor windings with the motor capacitor is actuated either via electronics or a relay on the motor connection ① or via the module ②. In the start phase the two windings (one in series with the capacitor) are connected in parallel to each other and directly to the mains voltage and generate a very high starting torque. After the switchover phase, the windings are then in series (one behind the other), i.e. each winding is connected to half the mains voltage. The motor is then adjusted optimally to the (operating) pump and generates very little noise apart from a very low power consumption – for label AAA –, as the windings are connected to half the mains voltage during operation.

Terminal diagram:

Operation:

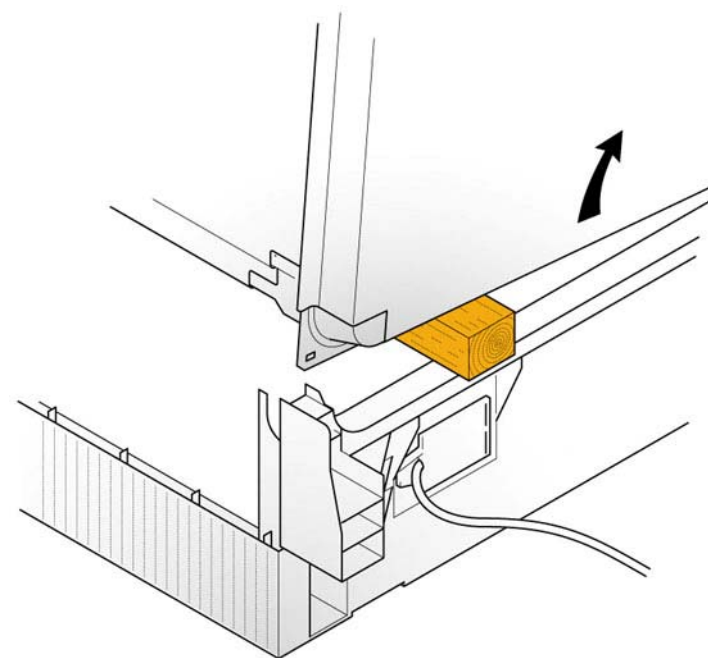


Start:

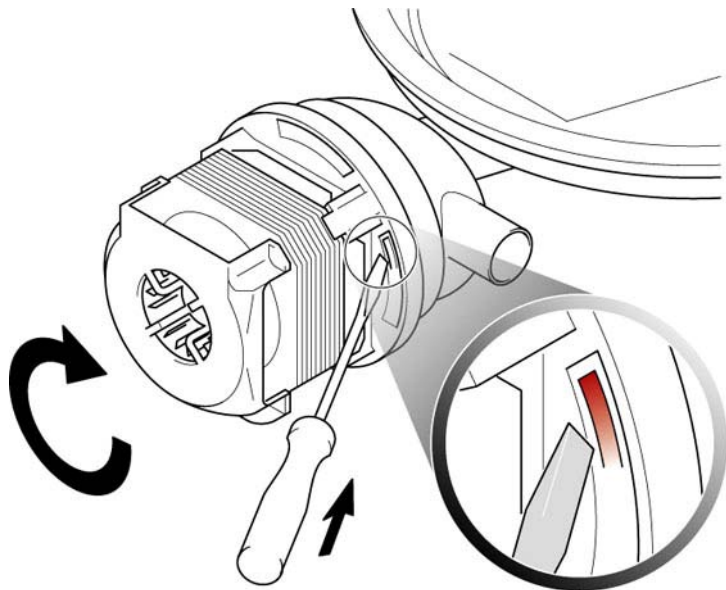


Removal:

Remove side panels and base plate, disconnect the stainless steel tank / plastic base pan on the right, consisting of 2 screws (front and rear). Raise the tank and secure with approx. 4 cm thick object.



The circulation pump is locked in position. Using a screwdriver, press in the catch on the right side of the circulation pump and rotate the pump in a clockwise direction. The pump can then be removed.



To release the impeller, block the rotor with a pen or screwdriver (hole between the rotor blades). Remove the pump housing and press out the mechanical seal.

Note: if the motor is replaced, the spacer washer on the motor shaft must be fitted to the new motor, otherwise the impeller will run less smoothly or will lock!

Installation is in reverse sequence. Prior to installation, lubricate the seal with washing-up liquid.

Technical specifications:

Nominal voltage	230–240 V
Frequency	50 Hz
Resistance	Ha approx. 80 Ω
	HI 1 approx. 85 Ω
	HI 2 approx. 13 Ω
Delivery head	3.1 m

4.24 Water inlet with heat exchanger

When the filling valve has been opened, the water flows towards the integrated inlet via the free flow channel and into the water softening system and as soft water into the heat exchanger. When the regeneration chamber has filled up, the water flows into the restricting funnel of the level sensor via the overflow channel. The pressure build-up in the pressure chamber causes the level switch to open the heat exchanger drainage valve. The electronics measure the time between the opening command of the filling valve and the closing of the level switch (t_1). The additional filling time of the filling valve is calculated from this time.

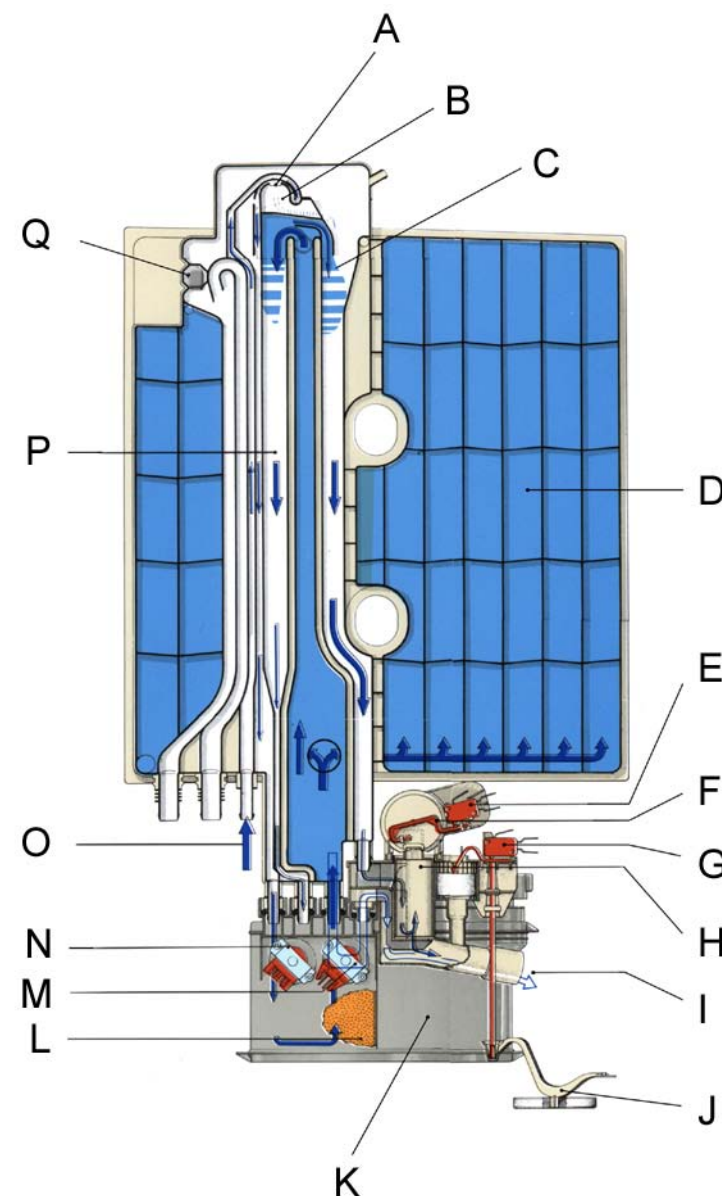
The circulation pump is switched on time-delayed, the drainage valve remains open until the heat exchanger has emptied completely.

The water volume of completed rinse cycles is recorded by the electronics counter which determines when the water softener requires regeneration.

Before each regeneration step the electronics check whether the capacity of the water softener is adequate for a complete "Normal Programme Sequence". If not, regeneration starts.

The water softening system is regenerated and rinsed through during the wash cycle. The regeneration valve on the water softening system is opened for this purpose. The stored volume of water flows into the salt dispenser via the valve, absorbs salt and flows as saline solution through the water softening system into the heat exchanger. Rinsing takes place in three stages, each with one calculated volume of water.

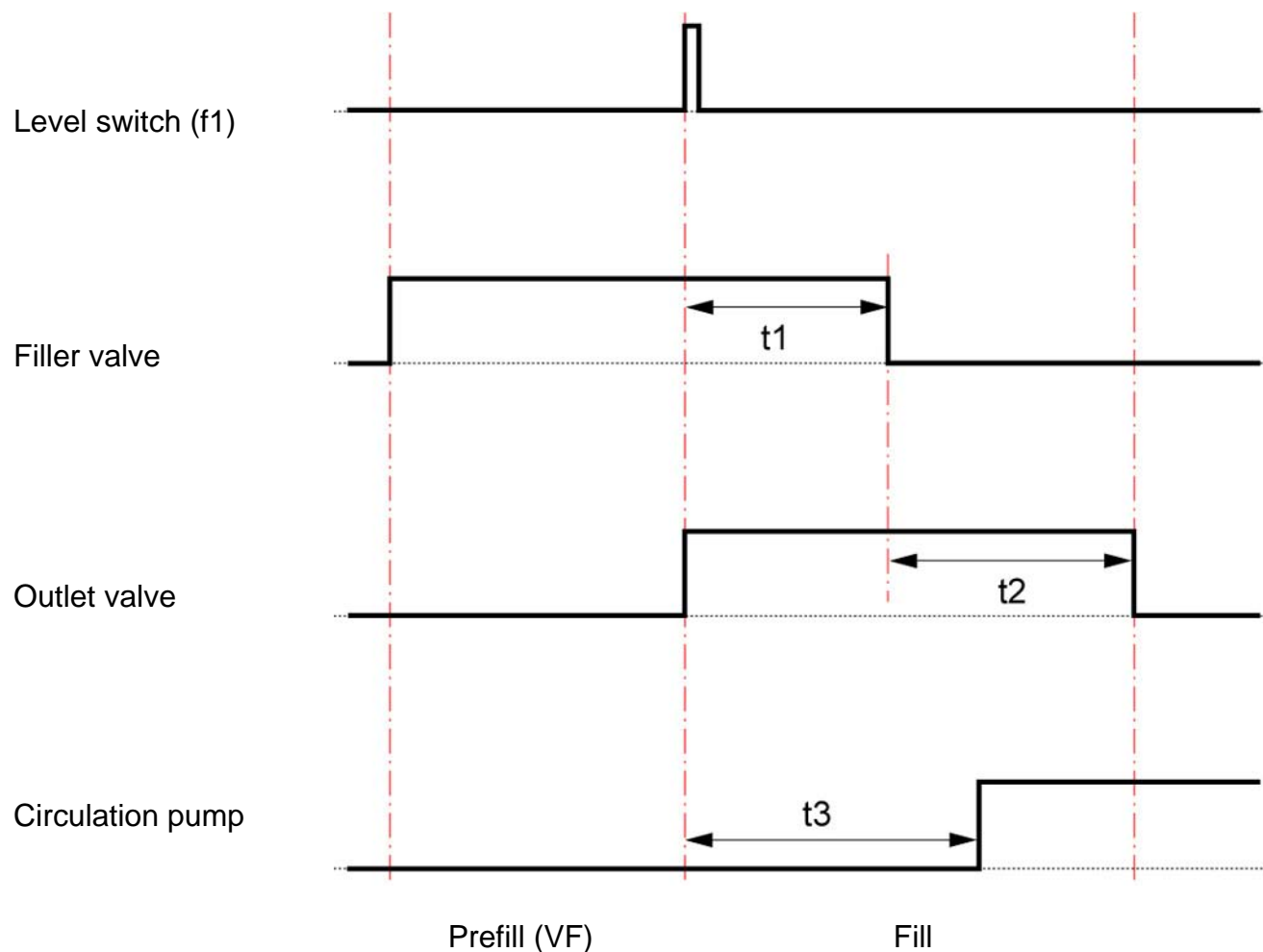
- | | | | |
|---|---------------------------|---|---------------------------------|
| A | Free flow line | J | Float in the base pan |
| B | Leakage water | K | Salt dispenser |
| C | Overflow channel | L | Ion exchanger |
| D | Heat exchanger | M | Heat exchanger drainage valve |
| E | Pressure switch, level f1 | N | Regeneration valve |
| F | Switch lever | O | Water inlet |
| G | Safety pressure switch | P | Regeneration chamber |
| H | Air chamber level | Q | Drainage hose ventilation valve |
| I | To the pump sump | | |



4.24.1 Filling process for appliances with heat exchanger

The electronics measure the time between the opening command of the filling valve and the closing of the level switch (f1). The additional filling time of the filling valve is calculated from this time. For each initial filling of the rinse programme 200 ml of water above the normal volume of water is run in.

During the initial water inflow for the rinse programme this volume of water compensates for the loss of water which is used to wet the dry utensils. The circulation pump is guaranteed to run true and water is saved in the subsequent filling baths. The circulation pump is switched on time-delayed, the drainage valve remains open until the heat exchanger has emptied completely.



t_1 = calculated refill time, t_2 = run-on time of drainage valve, t_3 = switch-on delay of circulation pump

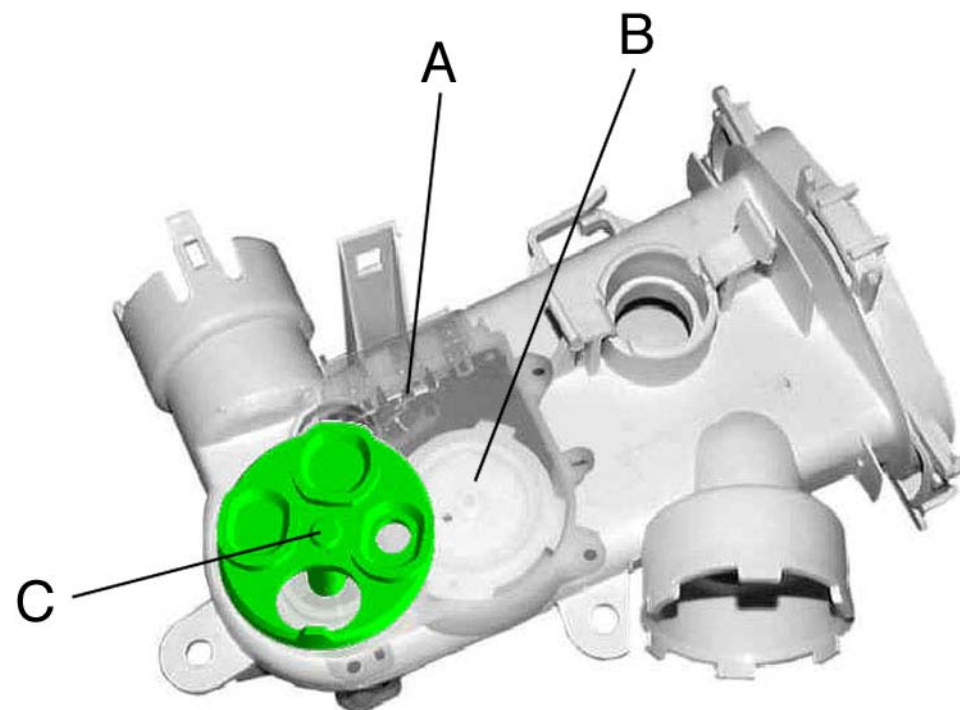
4.25 Water points

The water points are responsible for alternate rinsing (appliance rinses alternately in the top and bottom basket, bottom basket 60 sec. / top basket 55 sec., changeover lasts approx. 5 sec.) and consist of a synchronous motor with gears, cam plate, micro switch and slide. The synchronous motor is actuated via a triac. The synchronous motor drives the gears and therefore the cam disc and the locking disc. The washer locks the relevant water channel to the spray arms. The locking disc has two openings which differ in size. The smaller opening reduces the flow rate to the top basket. The controller receives information on the position of the slide from the micro switch which is actuated by the cam disc.

The water points are integrated in the instantaneous water heater and may be replaced as a complete unit only.

Technical specifications:

Nominal voltage	230–240 V (synchronous motor)
Frequency	50 / 60 Hz
Resistance	approx. 9.3 k Ω



- A = Micro switch
- B = Cam disc
- C = Locking disc

5 FUNCTIONS

See Components

6 REPAIR

6.1 Diagnosis aids

Transparent door:

Material no.: 21 4115 – appliance dimension 81 cm

Material no.: 21 4114 – appliance dimension 86 cm

Test prod:

Material no.: 340730 (remove the components from the module before measuring the resistance)



Protective gloves:

Material no.: size 9 = 340728
 size 10 = 340729

7 FAULT DIAGNOSTICS

7.1 Controller / module

Customer complaint	Cause	Remedial action
Running time too long	Alternate rinsing technology, energy saving	Advise customer, see Consumption rates or Alternate rinsing technology
Component is not actuated	Triac on the module does not switch through, there may be visible smoke marks on the module	Before replacing the module, always measure the connected consumers (valves, actuators, etc.). Follow safety instructions
Charred connections	Connector	The plug repair set can be used for defective connections on electronic controllers.
Programme cannot be started	Controller was not reset	Check contacts 5–6 on the main switch. This contact is a fleeting contact which switches through when the switch is pressed and sets the controller from the end position to the start position.
Running time too long and appliance stops at the end of the programme with "Finished in 1min."	Level sensor dirty, f1 does not switch back -> fills with too little water -> pressure switch on the instantaneous water heater is not actuated -> appliance does not heat up -> running time is longer than calculated.	Check level sensor and heat exchanger for dirt and, if required, replace, if dirt gets into the drainage channel of the heat exchanger via the ventilation valve, check that the siphon drains adequately (one-way).

7.2 Draining

Customer complaint	Cause	Remedial action
Pump is running audibly, but conveying no or little water	<p>Filter system blocked</p> <p>Trap in the inlet spigot (pump sump) dirty.</p> <p>Non-return flap is stuck in the outlet</p> <p>Outlet hose blocked</p>	<p>Advise customer, see operating instructions for cleaning the filter. Clean the filter.</p> <p>Advise customer. Clean the trap in the intake spigot of the pump.</p> <p>Remove non-return flap. Check if valve and seat are dirty and, if required, clean.</p> <p>Remove blockage (do not forget the hoses in the appliance), blockage in the area of the hose connection at the water inlet; to check, remove both drainage hoses.</p>
Pump is buzzing audibly.	Pump mechanically blocked (blocked or damaged pump)	Clean pump or, if required, remove pump
Pump is not running	<p>See also pump is buzzing or running audibly</p> <p>Water tap was closed when dry, the heat exchanger was still empty, the filling switch is waiting for level</p> <p>The pump is not activated</p>	<p>Advise customer, wait for programme sequence and then close water tap. (refer to Aqua Stop if featured)</p> <p>Actuate pump (test programme) and check according to circuit diagram. Observe safety instructions Observe safety instructions</p>
Appliance drains water briefly, circulates water, drains water, etc.	Alternate pumping (detergent-solution pump and circulation pump are actuated alternately)	Advise customer.

7.3 Odour

Customer complaint	Cause	Remedial action
Smell of burning	Connection cable improperly extended	Advise customer, comply with safety instructions in the operating instructions
	Socket to which the appliance is connected is charred (cause: socket has bad contact)	Advise customer; socket and connection cable must be replaced
	Damaged windings or insulation fault on the consumers	Measure consumers (test programme) and check according to circuit diagram. Follow safety instructions
	Bad electrical connection or creep age clearances on electrical components (note edge connectors)	Eradicate creep age distance and transition resistance, look out for leaks, high-current cables must not be extended
Smell of chemicals	Detergent or rinse aid	Advise customer. Customer specifies the chemicals; if required, change product (with citrus aroma) or recommend aroma dispenser (mat. no.460742)
	Bonding agent of noise insulation (fleece, insulating mats)	Advise customer concerning the new aroma.
	Evaporation of electronic components or printed circuit boards	Advise customer.

7.4 Noises

Customer complaint	Cause	Remedial action
Striking noises on the water inlet in the pipe system	Installation or cross-section of the water line (usually occurs on appliances which feature Aqua Stop valve because the valve is connected directly to the tap)	Advise customer and refer to plumber (have pressure reducing valve fitted).
Rattling noises during the rinse cycle	Spray arm is striking the utensils	Advise customer, utensils not arranged properly
Alternating noises in the rinse programme	Alternate rinse technology (top basket rinsing 55 sec., changeover 5 sec., bottom basket rinsing 60 sec.) utilising water points	Advise customer, put utensils in appliance; if required, install lower spray arm with larger nozzles, mat. no. 359975. See water points
	Alternate pumping (detergent-solution pump and circulation pump are actuated alternately)	Advise customer

7.5 Rinsing result

Food remnants or sandy residue

Limescale

(Analyse with diagnosis case 340070 / 10 % hydrochloric acid)

Starch deposits

(Analyse with diagnosis case 340070 / iodine solution)

Water-soluble or regeneration salt residue

(Analyse with diagnosis case 340070 / dest. water)

Discoloration / colour residue

(e.g. tea, tomato juice, coffee, lipstick, etc.)

(analyse with diagnosis case 340070 / chlorine bleach)

Detergent residue

(Analyse with diagnosis case 340070 / dest. water)

Water-insoluble residue / damage to utensils

Food remnants or sandy residue

(see additional information in general repair instructions)

Customer complaint	Cause	Remedial action
Food remnants or sandy residue	Rough, micro or fine sieve blocked, sieve not locked in the pump sump	Advise customer, sieve insert and care
	– Spray arm nozzles, roof shower blocked	Clean parts if necessary, refer customers to correct sieve insert
	– Spray arm bearings sticking (dirt around the bearings)	Clean parts if necessary, refer customers to correct sieve insert
	– Foreign body around the drainage hose connections on the water inlet (drainage channel)	Clean
	– Fish-trap in the pump sump partially blocked	Advise customer, clean
	Drainage hose kinked	Lay drainage hose correctly
	No detergent dosage or insufficient dosage, wrong programme selected	Advise customer, observe dosage instructions for the detergent, select programme with higher temperature Check dispenser
	Unfavourable arrangement of the dishes, etc. (very large pieces in the lower rack, e.g. pots), avoid holders, dish racks twisted	Advise customer, straighten dish racks (see instructions for use)
	Spray arm is blocked by dishes or cutlery	Advise customer

Limescale (see additional information in the general repair instructions)

Customer complaint	Cause	Remedial action
Limescale on the utensils	Hardness range incorrectly set or untreated water hardness > 50 °dH, check residual hardness in the wash and final rinse cycles Does not regenerate Untreated water valve does not open -> appliance is filled with untreated water only.	Adjusting hardness range Advise customer, use phosphatic detergent. Adjust regeneration position and conduct performance test (observe drainage of regeneration dispenser) Check regeneration valve carefully (mechanical – valve stem; electrical – actuation / coil) Check untreated water valve (mechanical – valve stem; electrical – actuation / coil)

Starch deposits (see additional information in the general repair instructions)

Customer complaint	Cause	Remedial action
Starch deposits on the utensils	Underdosing of detergent (wrong detergent)	Advise customer, use enzyme detergent
	Wrong programme selected (too weak programme selected)	Advise customer, select correct programme
	Appliance connected to hot water, water inlet temperature too high	Check hot water connection (setpoint: lower than 60 °C), advise customer; if required, connect to cold water

Water-soluble or regeneration salt residue on the dishes (see additional information in the general repair instructions)

Customer complaint	Cause	Remedial action
Water-soluble residue	<p>Regeneration salt on the utensils</p> <ul style="list-style-type: none"> – Leaking salt dispenser cover (check screw-fitting, regeneration dispenser is dispensing slowly) – Leaking regeneration valve (regeneration dispenser is dispensing slowly) – Regeneration valve continuously actuated <p>Initial clouding of glass: can only apparently be wiped off</p> <p>Detergent-solution carry-over</p> <p>Combination product</p>	<p>Advise customer, eliminate leaks</p> <p>Check valve and/or valve seat</p> <p>Electrical check with circuit diagrams</p> <p>See Damage to utensils</p> <p>See Food remnants</p> <p>Advise customer</p>

Discoloration / colour residue (see additional information in the general repair instructions)

Customer complaint	Cause	Remedial action
Colour residue	Insufficient detergent used	Advise customer, increase amount of detergent
	Plastic discoloration by, e.g.: tomato remnants, tea, coffee, etc.	Use detergent containing chlorine bleach. Recommend machine detergent for discoloration in the appliance
	Detergent very lumpy, washing effect and dissolving performance reduced	Advise customer, store detergent dry and sealed
	Selected programme not intensive enough (the contact time of the oxidation bleach is too brief for a short running time and at low temperatures)	Advise customer, use more intensive programme
Rainbow streaks	Silicate deposits only on glasses (not to be removed)	No remedial action possible (damage to glass)
	Final rinse dosing set too high (can be rinsed off with water)	Reduce dosing setting
Silver cutlery tarnishes	Discoloration due to sulphur compounds in the air and in various food remnants	Advise customer, rinse silver cutlery immediately after use

Detergent residue (see additional information in the general repair instructions)

Customer complaint	Cause	Remedial action
Detergent residue	Detergent cover blocked by utensils (does not open fully)	Advise customer, dishwasher not loaded properly
	Detergent cover does not open fully	Replace spring of dispensing device
	Wrong programme selected	Advise customer
	Tablets used in quick or short programme	Tablet dissolving time is too long
	Incorrect application of tablets (note use in dispenser or cutlery basket)	Advise customer, follow instructions for use of the tablets
	Spray arm nozzles blocked (filters locked)	Advise customer
	Dispensing device in spray shadow (large pan, etc. positioned at bottom left)	Advise customer
	Check draining, non-return valve	See food remnants
	Detergent very lumpy, washing effect and dissolving performance reduced	Advise customer

7.6 Drying result

Customer complaint	Cause	Remedial action
Not drying correctly	No rinse aid in the dispensing device	Advise customer
	Appliance connected to hot water, appliance is suitable for hot-water connection, but not recommended.	Advise customer, refer to function of the heat exchanger; if required, connect the appliance to cold-water supply
	Appliance not heating	Check heating circuit according to circuit diagrams, note pressure switch on the instantaneous water heater (the circulation pump cannot build up adequate pressure if there is insufficient water in the appliance).
	Programme selected without drying	Advise customer, quick programme is without drying cycle, drying level option is too low
	The rinse aid integrated in tablets has dissolved too early	Advise customer, tablet is unsuitable for this programme
	Plastic parts	Plastics retain very little heat and have a hydrophobic surface which is difficult to moisten. As a result, droplets will form during drying.
	Combined detergent products (2 in 1 / 3 in 1)	Advise customer, recommend separate detergent products (separate rinse aid and detergent)

7.7 Circulation pump

Customer complaint	Cause	Remedial action
Circulation pump does not start	After a prolonged idle time the seal set may stick to the pump wheel.	The seal set must be replaced,

8 TECHNICAL SPECIFICATIONS

8.1 General technical specifications

Voltage / frequency	230–240 V / 50 Hz
Connected load	2.3 kW
Heat output	2.15 kW
Fuse	10 / 13 A

8.2 Consumption rates

8.2.1 Appliance with water points and heat exchanger

	Intensive 70°	Auto 55–65°	Normal 65°	Eco 50°	Gentle 40°	Quick 35°	Prerinse
Duration in min.	112	95–145	145	140	72	30	19
Current consumption in kWh	1.6	1.15–1.50	1.35	1.05	0.8	0.6	0.1
Water consumption in litres	21	11–19	18	14	15	10	4

8.2.2 Appliance with water points without heat exchanger

	Intensive 70°	Auto 55–65°	Normal 65°	Eco 50°	Gentle 40°	Quick 35°	Prerinse
Duration in min.	115	95–140	140	140	71	30	19
Current consumption in kWh	1.7	1.25–1.60	1.45	1.05	0.85	0.7	0.1
Water consumption in litres	21	11–19	18	14	12	10	4

The indicated values may deviate up or down. The values correspond to laboratory measured values in compliance with EN50242 at the start of the series.