

# 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.



When installing the appliance, please note:

- ▶ 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 appliances which are fitted to the end, built in or under or are free-standing.

### 2.2 Electrical connection

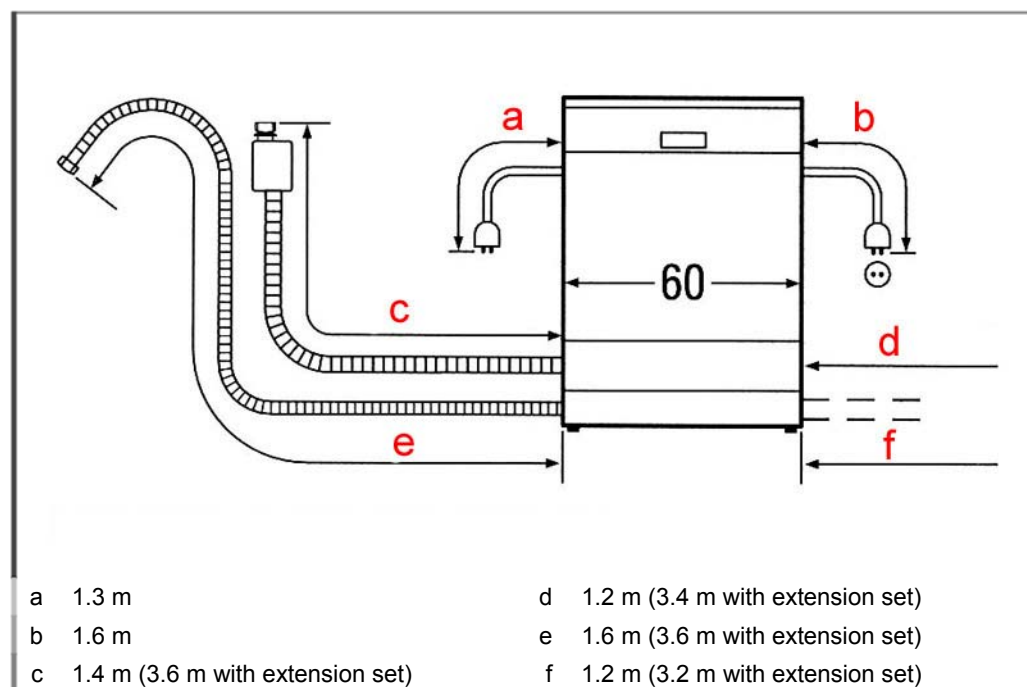
Connect the appliance to a correctly installed earthed socket only. Comply with the specifications on the rating plate.

### 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).

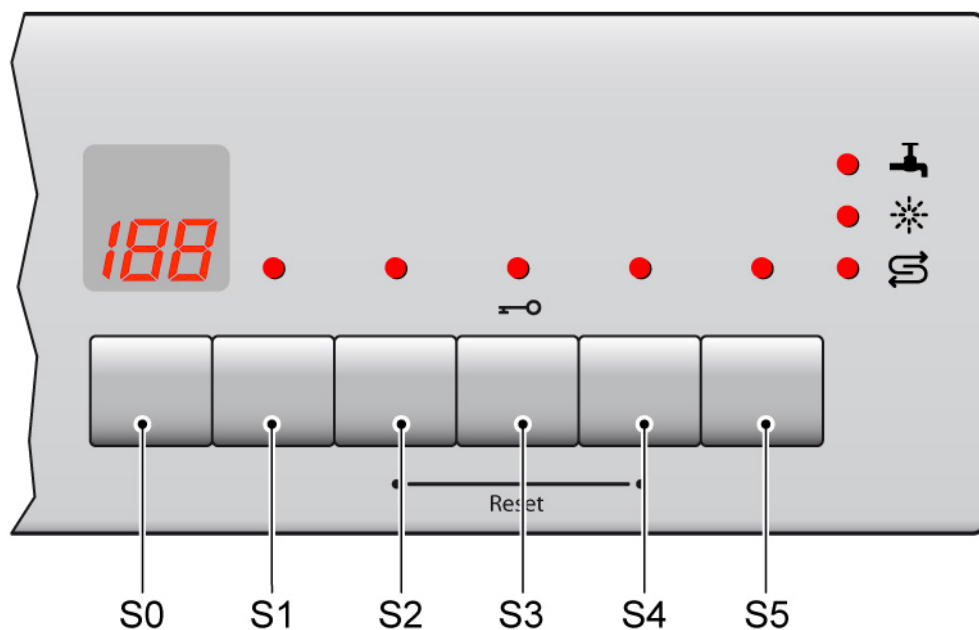
Connection dimensions for all 60 cm dishwashers



## 3 OPERATION

### 3.1 Control panel

The control panel here has maximum features



### 3.2 LEDs

- ▶ Programme selection
- ▶ Check water supply (optional)
- ▶ Low rinse aid indicator
- ▶ Low salt indicator
- ▶ 2½-digit display

### 3.3 Pushbuttons / Programme selection

#### 3.3.1 Timer programming (TP)

The timer preselection button is used to delay the programme start by up to a max. of 19 hours (setting between 0h–19h). The button must be pressed for at least 1 sec.

#### 3.3.2 Reducing time (optional)

The running time of the rinse programme can be reduced with the “Reduce time” function. To obtain optimum cleaning and drying results at a reduced running time, the water and energy consumption is increased.

#### 3.3.3 Half load (optional)

The “Half Load” function reduces water consumption and the running time. Basically this is achieved by passing over the prerinse and the second intermediate rinse cycle.

#### 3.3.4 Vario speed (optional)

The Vario speed function reduces the programme running time with a higher water and energy consumption. This is achieved by using more water in the rinse cycle and with water points with two-basket function.

#### 3.3.5 Intensive 70 / Power 75

The programme consists of a prerinse at 50°, wash cycle at 70°, two intermediate rinse cycles, final rinse at 70° and a drying cycle.

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### 3.3.6 auto 55 / 65

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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.

The Aqua sensor measurement is analysed in turbidity ranges. The washing temperature (between 45°–65° C) and the rewash time (between 5–30 min.) are determined during the wash cycle measurement. The type and number of intermediate rinse cycles are determined during the measurement at the end of the wash cycle.

### 3.3.7 ECO 50

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The programme consists of a wash cycle at 50°, one intermediate rinse cycle, final rinse at 65° and a drying cycle.

### 3.3.8 Gentle 40

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

### 3.3.9 Quick 45

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The programme consists of a wash cycle at 45°, one intermediate rinse cycle, final rinse at 55° without drying.

### 3.3.10 Prerinse

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The programme consists of a cold rinse only

## 3.4 Display

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A 2<sup>1</sup>/<sub>2</sub>-digit 7-segment display enables programme run times 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. The start time is fixed in all programmes.

## 3.5 De-activating the low rinse-aid indicator

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Hold down the S4 button and switch on the appliance. **1** is indicated on the digital display. If the S4 button is pressed again, **0** is displayed and the low rinse aid indicator is deactivated.

0 = switched off

1 = switched on

When the appliance is switched off, the setting is saved. If the low rinse aid indicator is de-activated, the temperature is increased by 3 K in the final rinse to improve the drying result. (see also [3 in 1 detergent detection](#))

## 3.6 Programme reset

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When the appliance is switched on, simultaneously press the S2 and the S4 buttons for 3 sec. The appliance is drained for approx. one minute. Then close the detergent dispenser to reset the dispenser.

### 3.7 Setting the hardness range

Hold down the S3 button and switch on the appliance. The set value is indicated on the display. The set value increases by one each time the S3 button is pressed. When "7" is reached, the display jumps back to "0". If the appliance is switched off, the value is saved.

Standard setting = 4

°dH	°fH	°Clarke	mmol/l	Salt consumption per rinse cycle in g	Set value
0-6	0-11	0-8	0-1.1	---	0
7-8	12-15	9-10	1.2-1.4	4	1
9-10	16-17	11-12	1.5-1.8	7	2
11-12	18-21	13-15	1.9-2.1	9	3
13-16	22-29	16-20	2.2-2.9	14	4
17-21	30-37	21-26	3.0-3.7	18	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

### 3.8 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. When 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.

### 3.9 Button lock (optional)

The button lock prevents a programme from being unintentionally selected.

► Activation:

Switch on appliance and select programme

Hold down S3 button for at least 4 sec.

CL is displayed

If a button is pressed while the programme is running, CL is displayed. The programme cannot be reset.

► Deactivation:

Hold down S3 button for at least 4 sec. until CL goes out

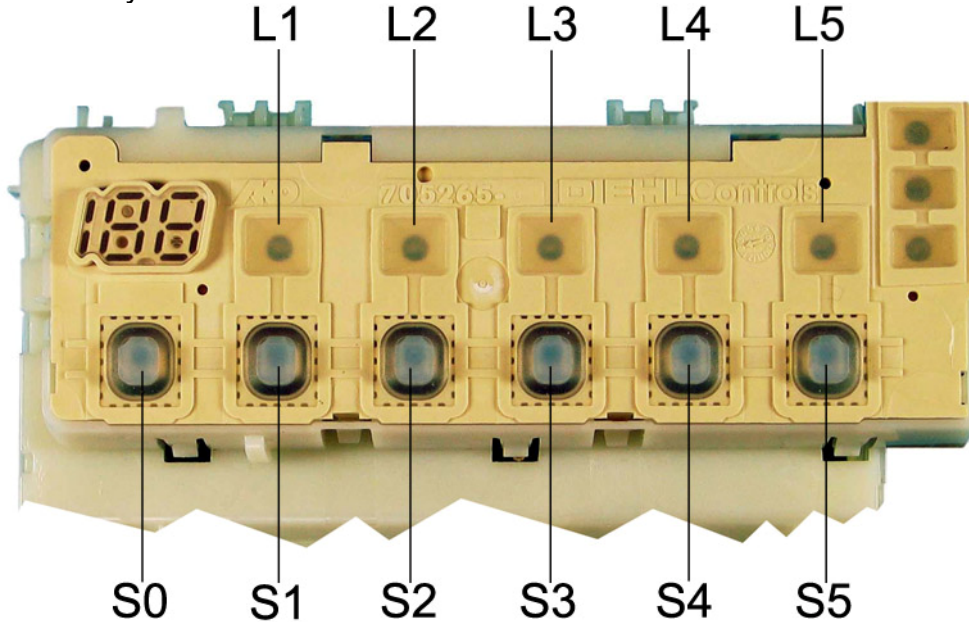


- When the programme ends, the button lock is deactivated. If there is a power failure, the button lock is activated
- Whenever a programme is started, the button lock must be re-activated

## 4 COMPONENTS

### 4.1 Module

The electronic control unit consists of two modules, fitted in a housing. The control / power module is connected to the control / display module by a ribbon cable.



#### 4.1.1 Tap turned off

If the level is not reached in the filling position after 6 min.,

- ▶ the “Check water supply” LED is activated (optional)
- ▶ the programme is terminated (60 sec. pumping)
- ▶ the programme is restarted

If the level is still not reached, the process is repeated twice. The control remains in this position until the filling level has been reached. The remaining running time stops.

#### 4.1.2 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 volume of water which has run through is calculated. 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.

#### 4.1.3 Warm water detection

If the water running in for the final rinse is hotter than 45 °C, the heat exchanger for the drying phase is not filled. In order to ensure the temperature difference required for condensation, the temperature in the final rinse cycle is increased to 72 °C, thereby increasing the inherent heat of the dishes.

#### 4.1.4 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.

#### 4.1.5 Power failure

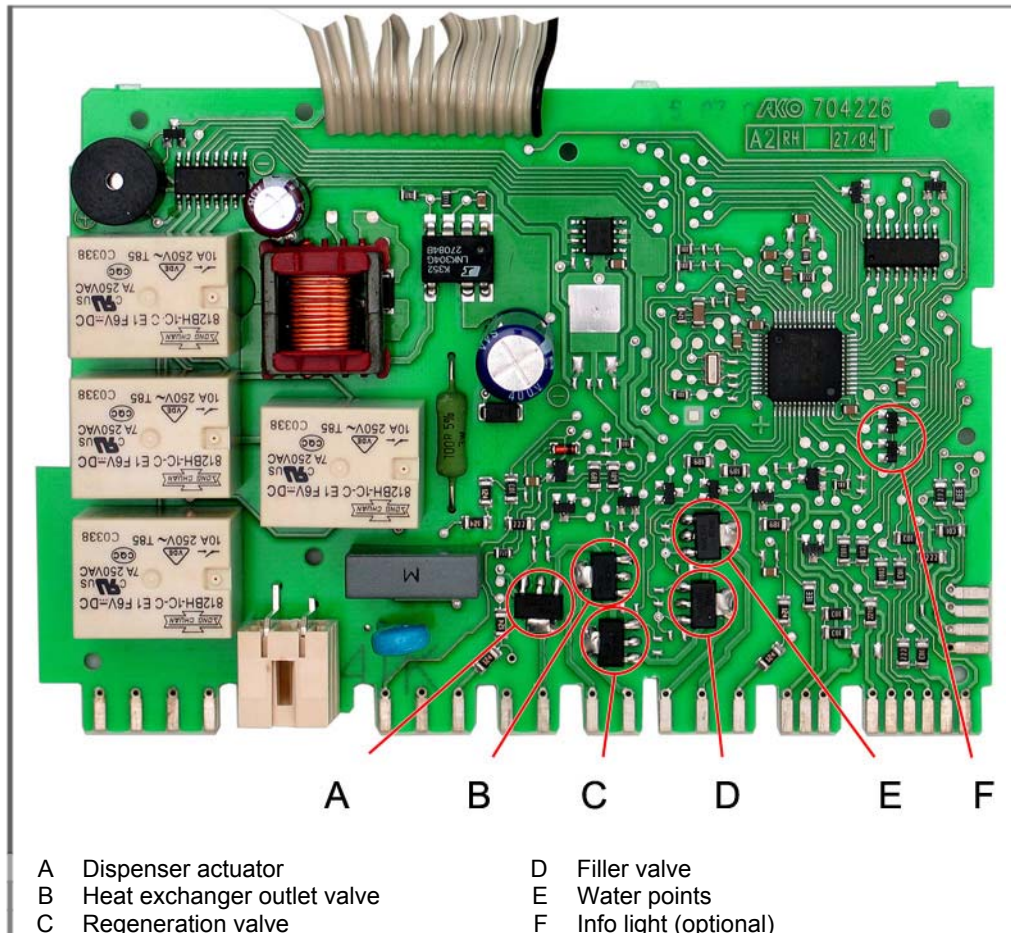
The electronics module has a power failure memory function which ensures that the current rinse programme continues in the event of a power failure or programme interruption.



## 4.1.6 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.

## 4.1.7 Consumers



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



Before replacing a module, always start the customer service test programme.



Before replacing a module, follow the ESD instructions.

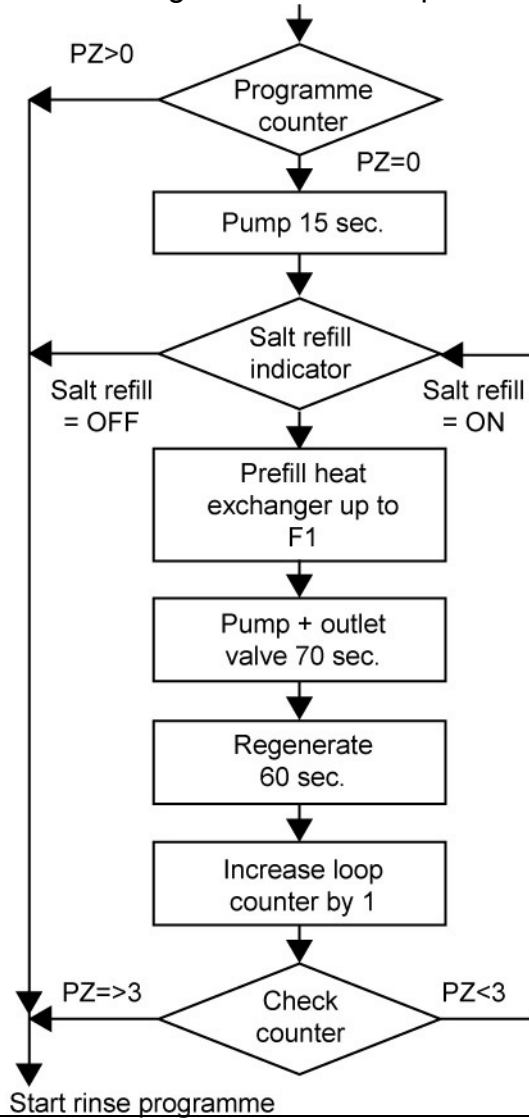


Before replacing a module due to a defective triac, test the actuated component.

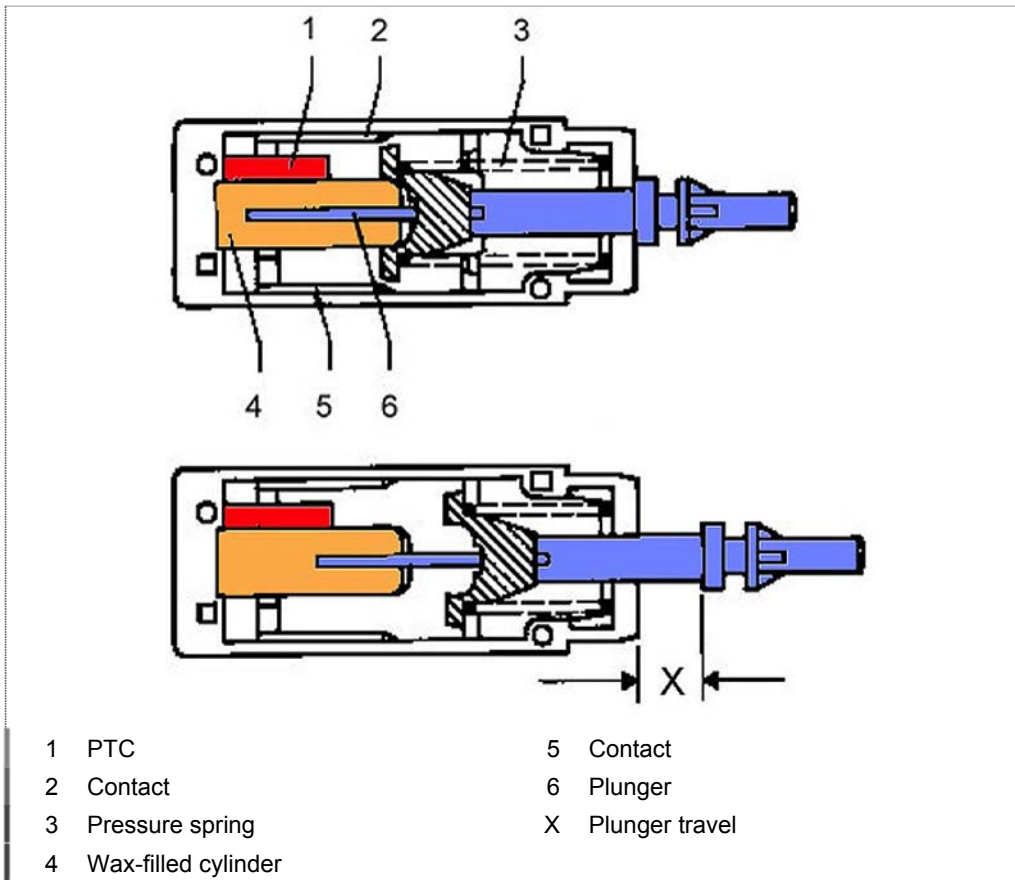
#### 4.1.8 Initial start-up / Replacing the electronics

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 **with** heat exchanger



## 4.2 Actuator



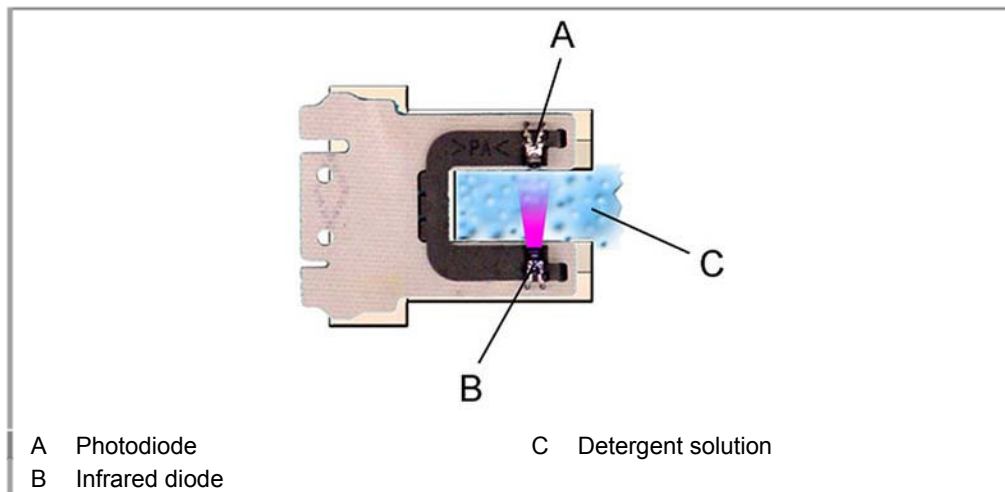
The thermohydraulic system consists of a metal cylinder with plunger. The cylinder is filled with a substance which expands greatly when heated. The heat source is a PTC (positive temperature coefficient) (1) which is in direct contact with the metal cylinder (4). A strong pressure spring (3) returns the plunger (6) back to its original position when the heat source is switched off.

When voltage is applied to the PTC (1), the PTC heats up and transfers the heat to the wax-filled metal cylinder (4). The wax expands and forces the plunger (6) out of the cylinder. The plunger (6) 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 (3) returns the plunger (6) back to its original position.

### Technical specifications:

Designation	Value	Unit
Nominal voltage	110–240	V
Frequency	50 / 60	Hz
Resistor	0.5–1.5	k $\Omega$
Actuation time	approx. 2	min.
Reset time	approx. 3	min.

### 4.3 Aqua sensor (optional)



The infrared light-emitting diode (B) and the photodiode (A) are located opposite each other in a U-shaped translucent housing on a board.

The infrared light-emitting diode (B) transmits infrared light through the detergent solution flowing between the U-shaped housing. Depending on the turbidity, the light-sensitive base of the photodiode becomes conductive.

The measurement is analysed in **turbidity ranges**. The Aqua sensor is active:

- ▶ in the prerinse cycle -> decision on water change before washing
- ▶ in the wash cycle -> washing temperature and rewash time depending on turbidity range (6 turbidity ranges)
- ▶ at the end of the wash cycle via the type and number of intermediate rinse cycles (3 turbidity ranges)

48 programme structures are possible in the automatic programme.

In each programme sequence in which the Aqua sensor is active the sensor is also calibrated.

If the calibration is defective, a fault is written to the fault memory of the module, the measurement is set to turbid and a maximum programme sequence occurs.

## 4.4 Aqua Stop valve

The Aqua Stop valve consists of two solenoid valves (A) in a row, the filler and safety valves. These valves are actuated in parallel. There are two filters on the screw connection for the tap. Under the filters is the flow limiter.

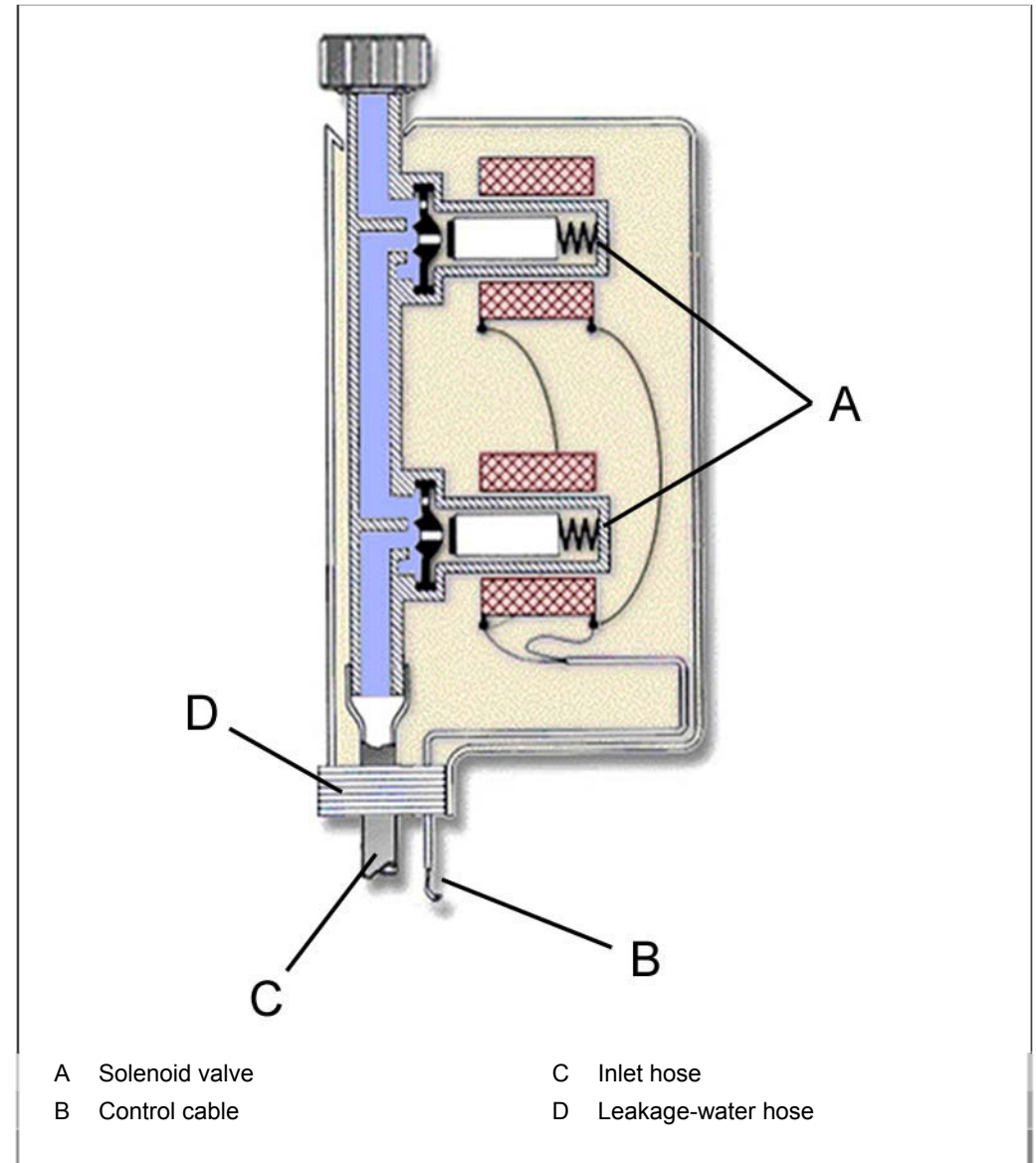
### 4.4.1 Safety function

The safety function may be actuated via the safety level chamber or via the float in the base pan.

The Aqua Stop valve is enclosed by a housing. The housing is connected to the bottom pan by a leakage water hose (sleeve of the inlet hose) (D). The inlet hose (C) and the electric control cable (B) for the solenoid valve are situated in the leakage water hose (D). If leaks occur in the area of the valve or inlet hose, these are conveyed into the base pan via the leakage water hose.

### 4.4.2 Technical specifications

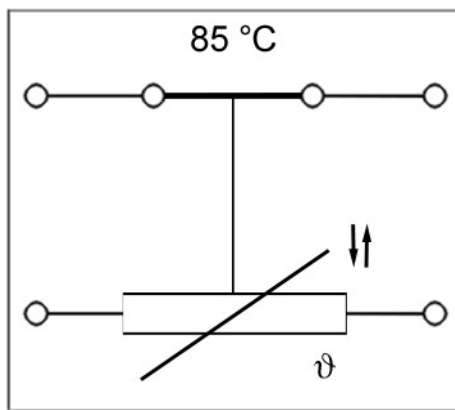
Designation	Value	Unit
Nominal voltage	230 - 240	V
Frequency	50	Hz
Resistor	approx. 2	k $\Omega$
Flow rate	2.75	l/min
Water pressure	0.5 - 10	bar



## 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

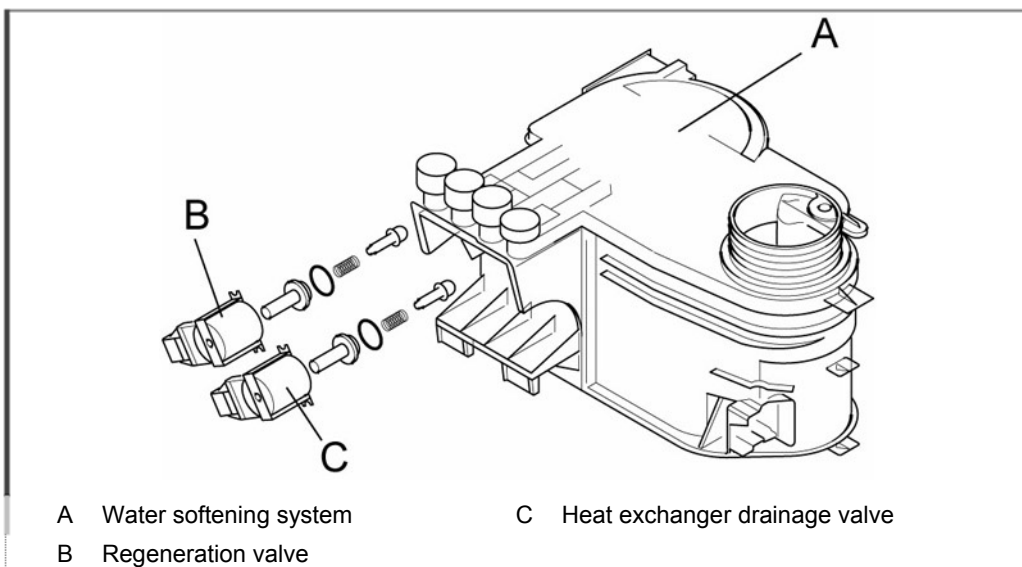


## 4.6 Regeneration / drainage valve

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

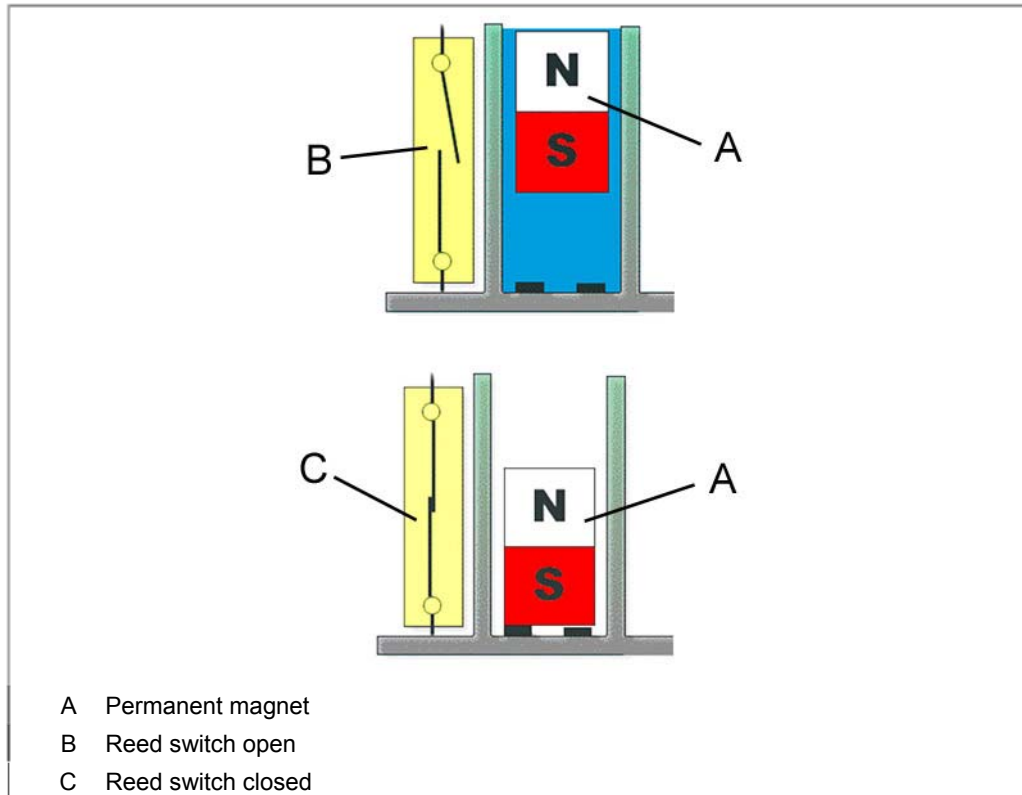
### Technical specifications:

Designation	Value	Unit
Nominal voltage	230 - 240	V
Frequency	50	Hz
Resistance	2.45	k $\Omega$



## 4.7 Salt and rinse-aid indicators (optional)

The dispenser contains a float with an integrated permanent magnet (A). 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.

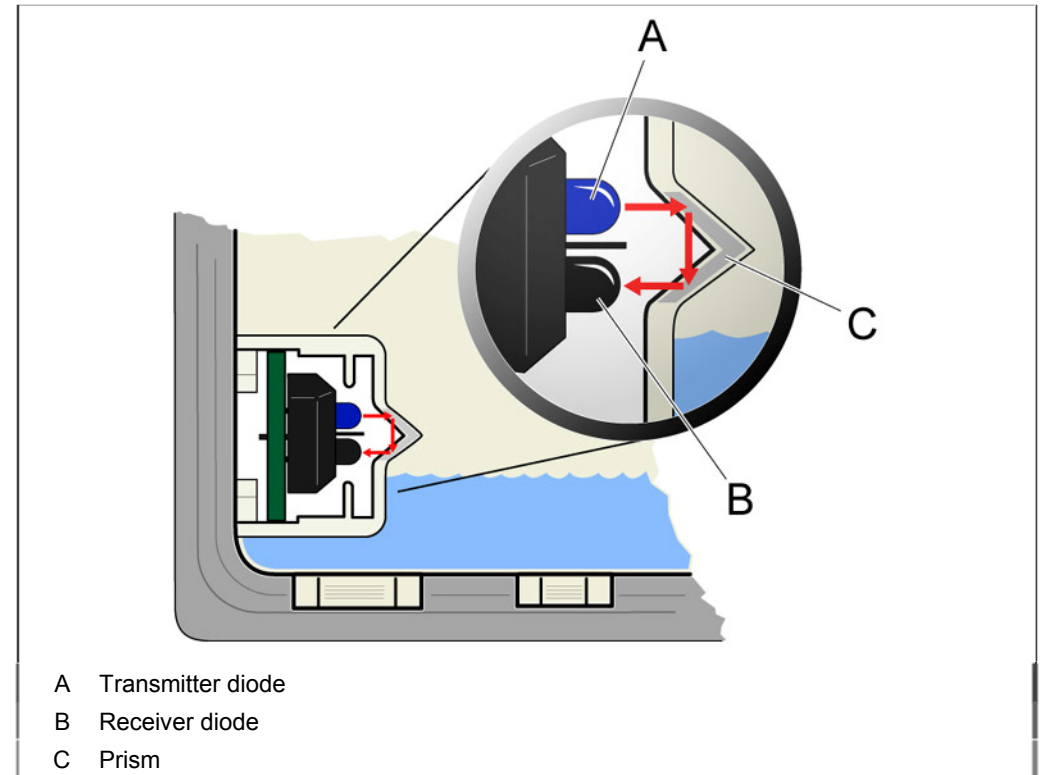
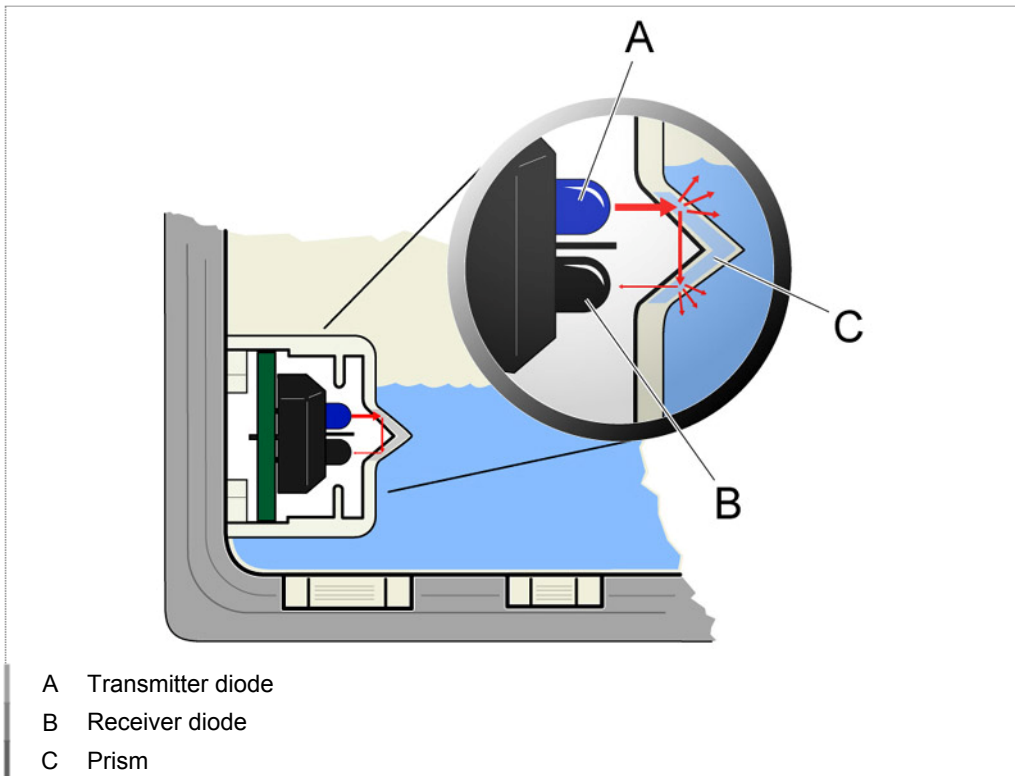




## 4.8 Optical low rinse-aid sensor (optional)

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

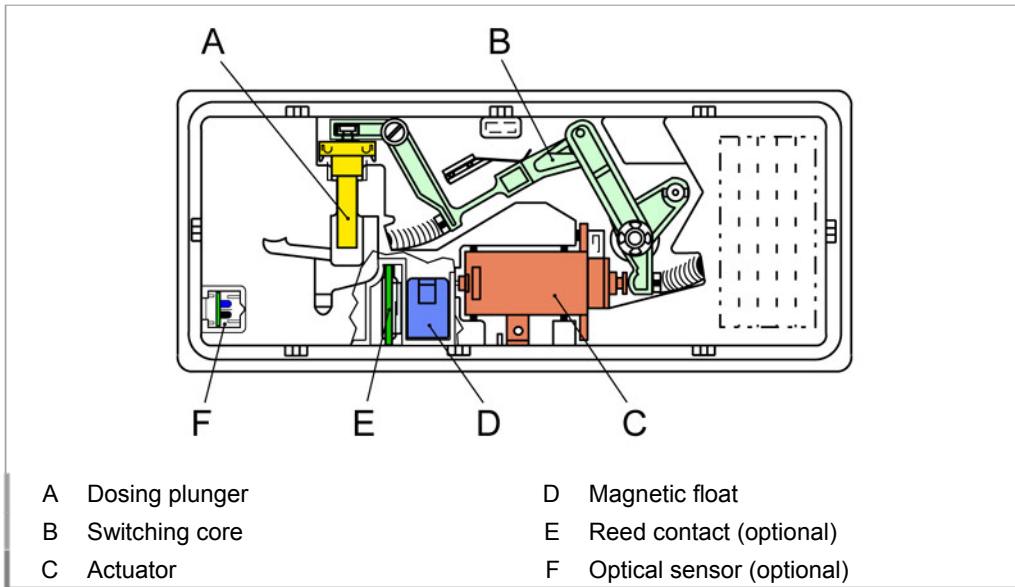
A light beam is transmitted from the transmitter diode (A) to the receiver diode (B) via a prism (C). If the dispenser is full, the light beam in the prism is scattered. The received signal is weaker than the transmitted one.



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.

## 4.9 Dispenser



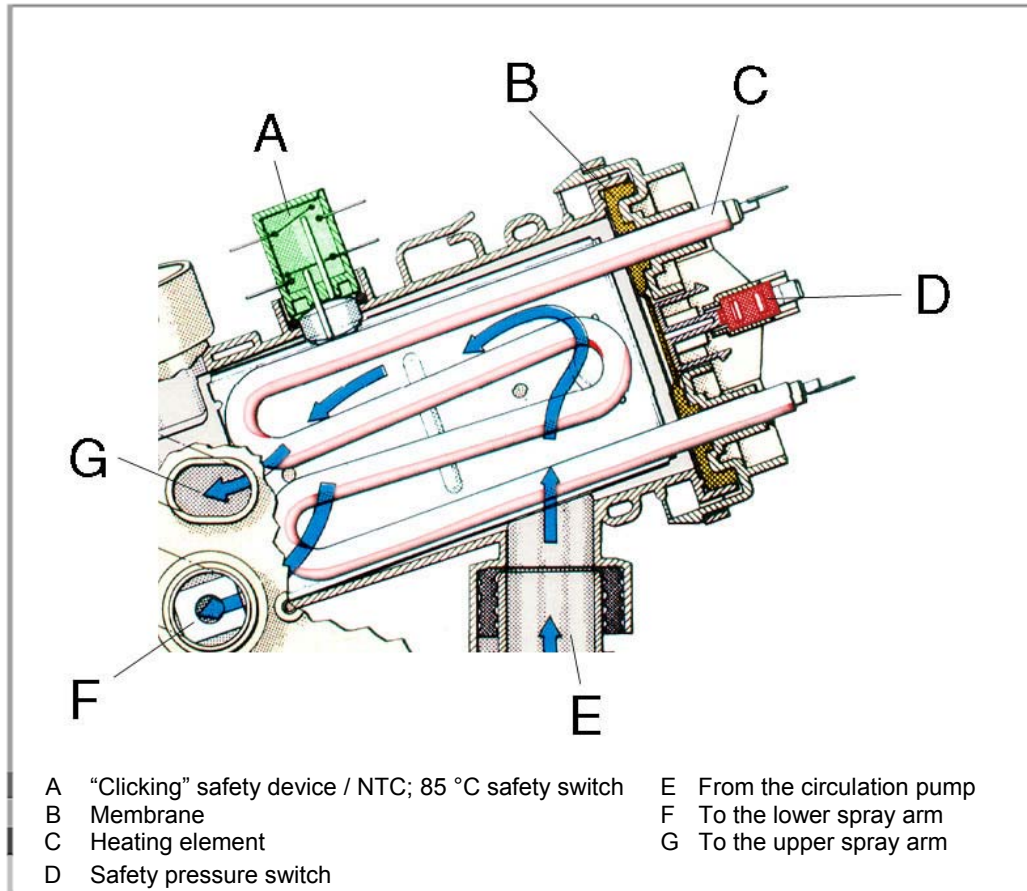
The release mechanism is activated by an actuator (C). When the actuator is actuated for the first time, the detergent-dispenser cover is opened. At the same time the release pawl engages with the switching core (B) of the rinse-aid lever so that when the actuator (C) is activated again, the dosing plunger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

Technical specifications	Value	Unit
Rinse aid capacity	120	ml
Setting 1–6	1 each	ml
Detergent capacity max.	45	g

See [Actuator](#) for additional technical specifications.

## 4.10 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 (B) attached to the flange actuates the safety pressure switch (D) for the heating element (C). If the pressure drops, the heater switches off. The heating position is overtravelled, preventing dry heating.

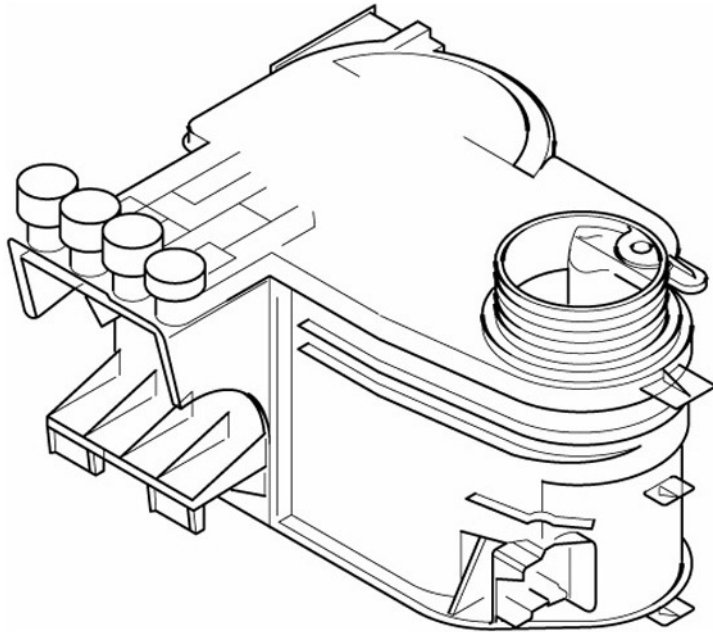


### Technical specifications:

Designation	Value	Unit
Nominal voltage	230–240	V
Frequency	50	Hz
Power	2150	W
Resistor	approx. 22	$\Omega$

## 4.11 Water softening system

The water softening system (ion exchanger) is a container which is filled with a fine-grained synthetic resin granulate. This synthetic resin replaces calcium and magnesium ions in the water with sodium ions situated on its surface.



### Technical specifications:

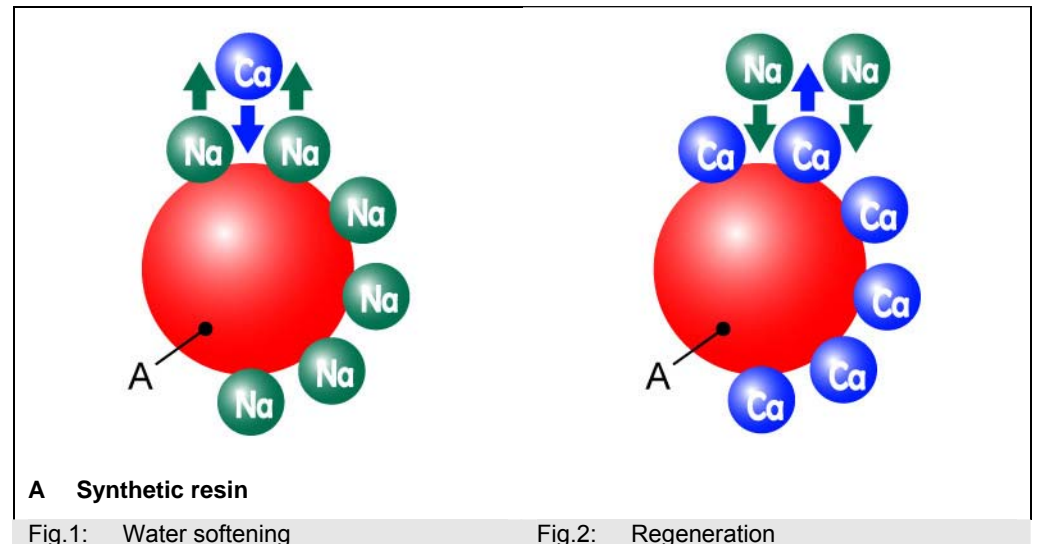
Designation	Value	Unit
Capacity:		
Fine-grained salt	approx. 2.0	kg
Coarse-grained salt	approx. 1.5	
Salt tablets	approx. 0.7	

### 4.11.1 Water softening

The inlet water with its hardness constituents is conveyed via the synthetic resin. Calcium and magnesium are bonded to the surface of the exchange compound while sodium ions are released into the water (Fig. 1). When all sodium ions have been replaced with ions of the hardness constituents, the capacity of the water softening system is exhausted and it must be regenerated.

### 4.11.2 Regeneration

To make the ion exchanger functional again, a concentrated saline solution (sodium chloride) is conveyed out of the salt dispenser through the water softening system. On account of the large excess, the sodium ions force the calcium and magnesium ions out of the saline solution and they attach themselves again to the exchange compound (Fig. 2). The ion exchanger is now loaded and ready for use again.



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## 4.12 Detergent-solution pump

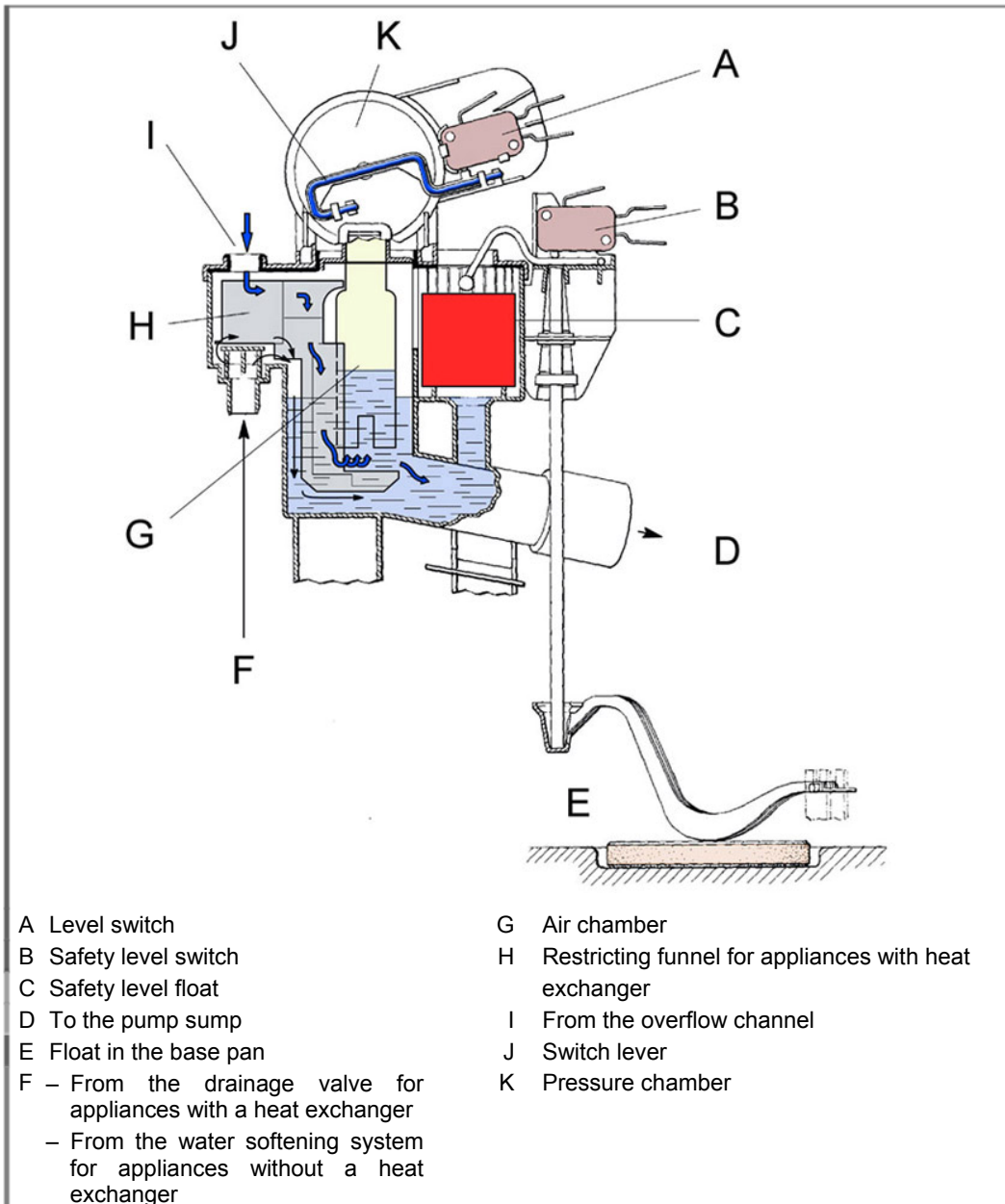
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The detergent-solution pump is flange-mounted on the pump sump. It pumps the detergent solution out of the appliance.

### Technical specifications:

Designation	Value	Unit
Nominal voltage	230 - 240	V
Frequency	50	Hz
Resistor	approx. 110 - 260	$\Omega$
Delivery height	0.9	m
Delivery capacity	10	l/m

## 4.13 Level sensor with safety function



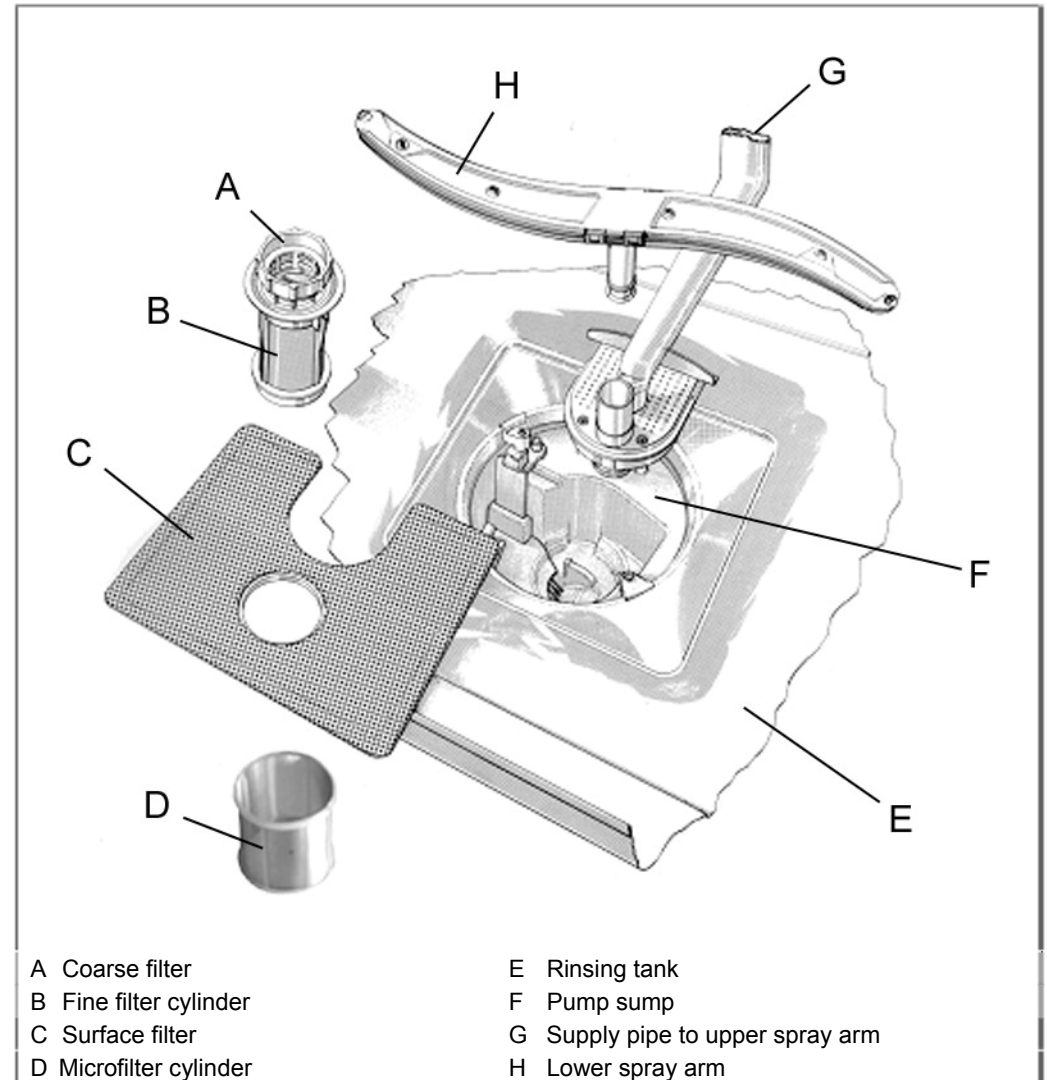
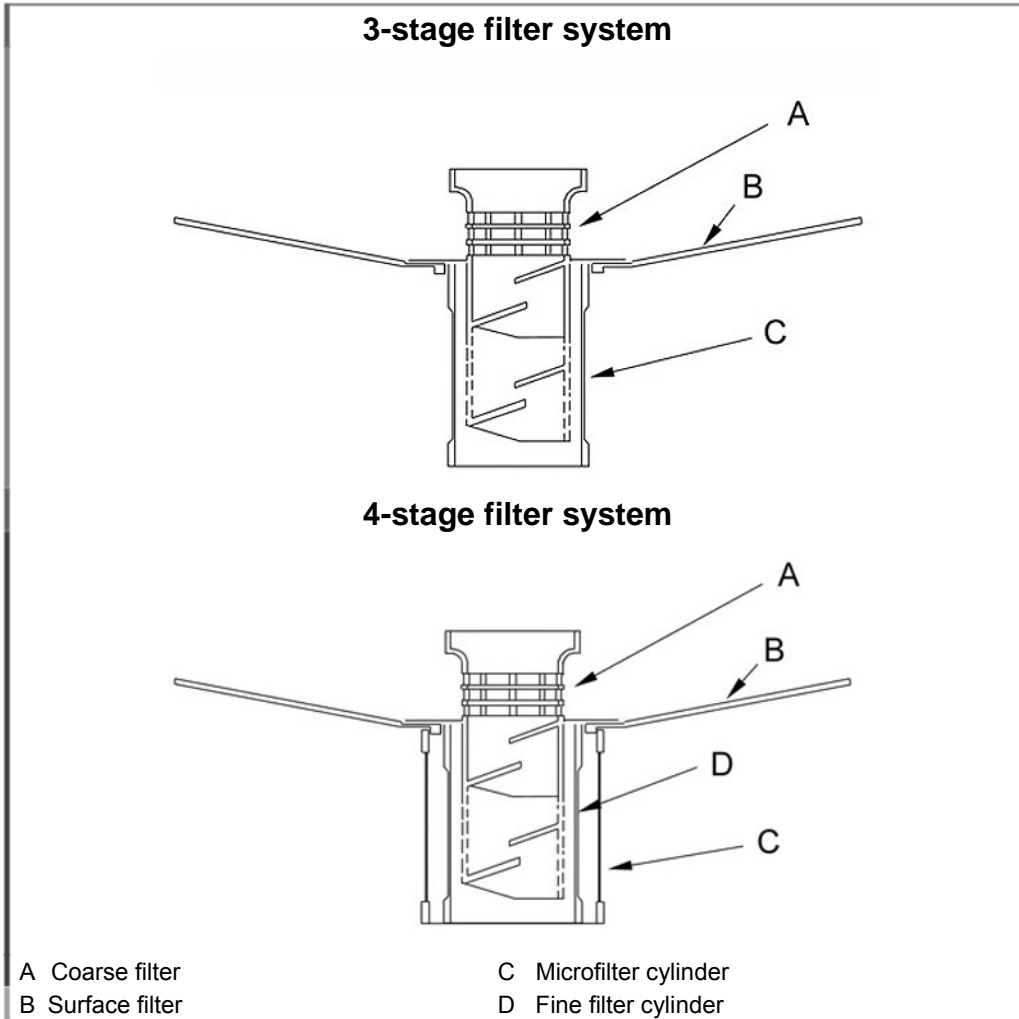
If the dishwasher controller or components malfunction, causing the machine to overfill, the valve combination is closed via the safety system, shutting off the water supply.

The drainage pump is switched on via the safety level switch (B). Pumping continues until the safety level switch (B) 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.

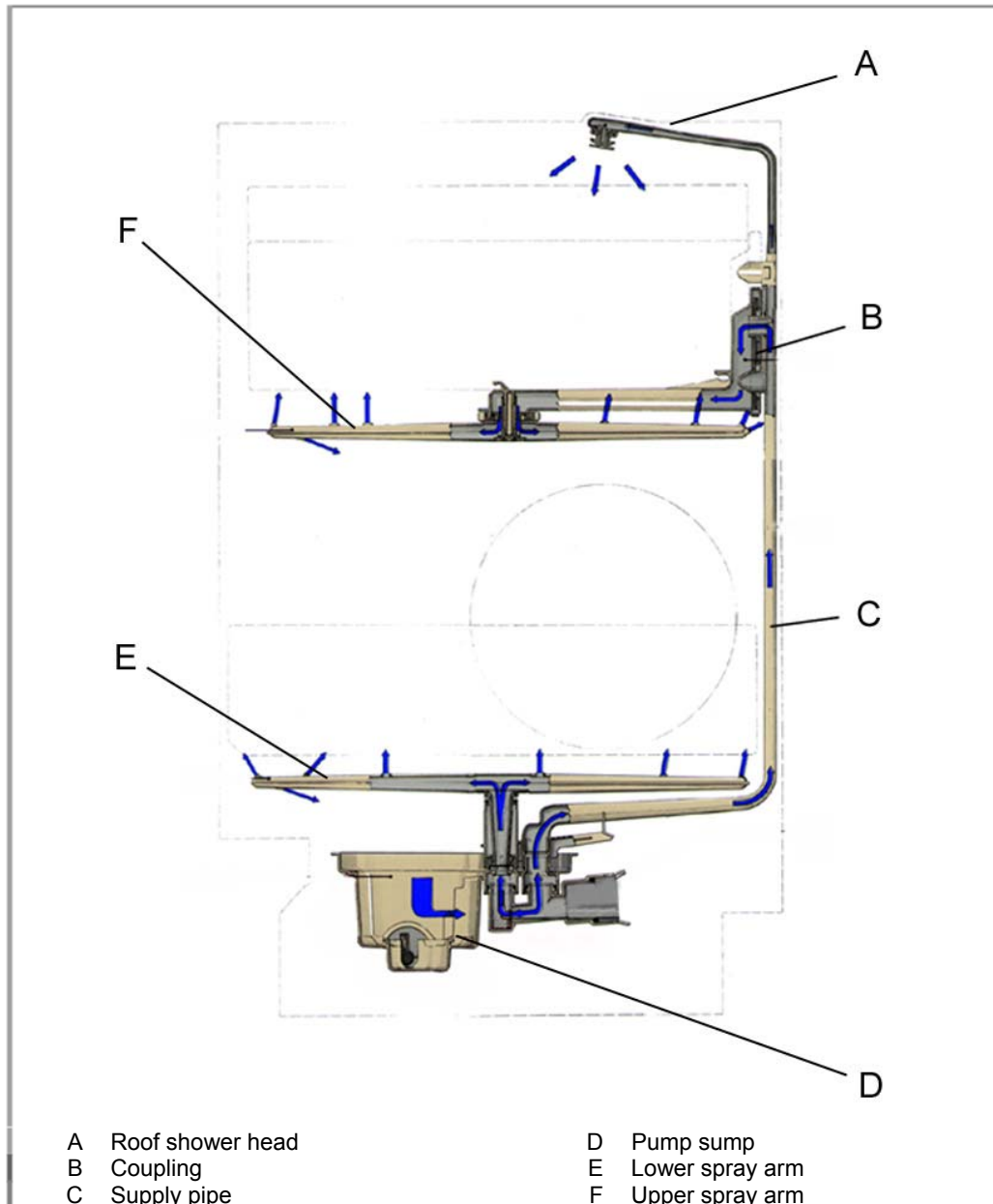
Once a predefined level has been reached in the base pan (E), the float uses a switch lever to actuate the safety level switch (B) which then electrically switches off the filling and safety valve. At the same time the drainage pump is switched on, the detergent solution is removed from the rinsing tank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

## 4.14 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.



## 4.15 Spray system



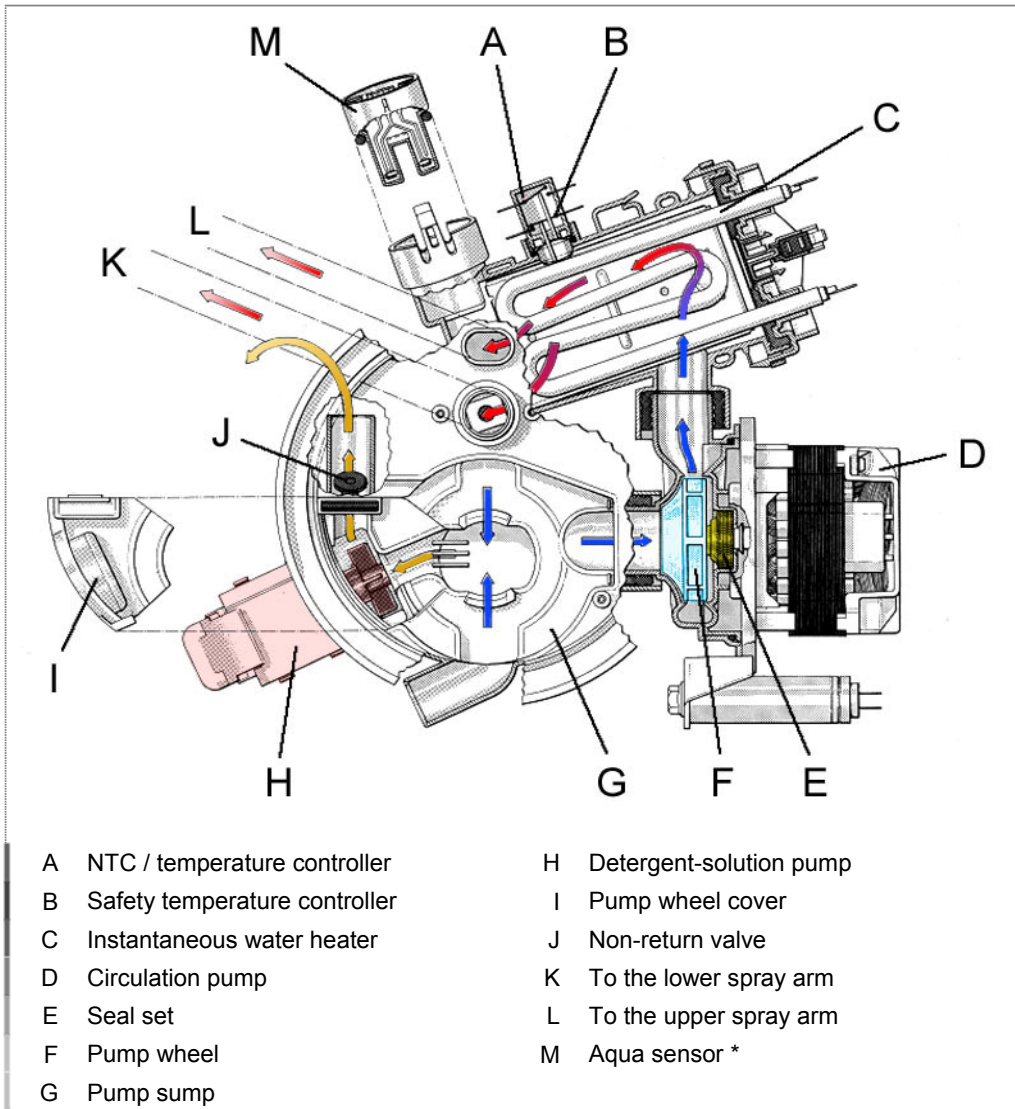
The rotor spray system consists of three spray levels, the lower spray arm (E), the upper spray arm (F) and the roof shower head (A). Water is supplied to the upper spray arm (F) and the roof shower head (A) via the supply pipe (C) attached to the inside of the tank rear panel. This pipe is connected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

The upper spray arm (F) is attached by its inlet pipe directly to the top basket. Connection to the supply pipe is by a variable coupling (B). 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 (E) 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.



## 4.16 Rinsing and pumping system



\* Optional

The circulation (D) and drainage pumps (H) as well as the instantaneous water heater (C) are connected to the pump sump (G) via plug-and-socket connections. The instantaneous water heater (C) is screwed securely to the pump sump (G). The filter system consists of fourfold filtration. The pump sump (G), which houses the microfine filter, is covered by the surface fine filter. The surface filter is attached together 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 (D) and forced into the instantaneous water heater (C).

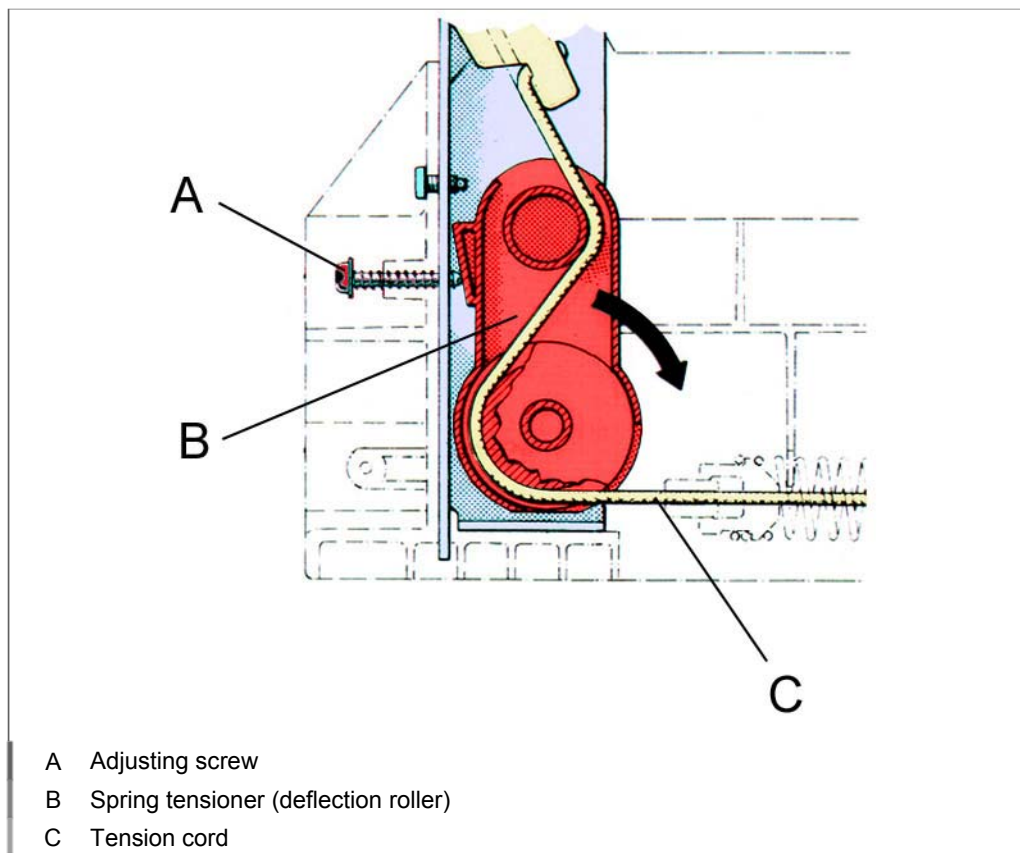
At the appropriate pressure the pressure switch for the heater is actuated via the flange-mounted membrane. A temperature controller (B) connected in series disconnects the appliance at 85 °C to prevent overheating.

In mechanically controlled appliances, this temperature switch (A) 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 (M) is situated at the outlet of the instantaneous water heater (C) in the detergent solution flow and measures the degree of turbidity. As the drainage pump (H) is attached directly to the pump sump (G), the impeller wheel and non-return valve are accessible in the rinsing tank when the cover has been removed.

## 4.17 Door spring

The door spring compensates for the weight of the furniture front.

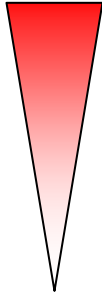



The door springs are situated on the right and left under the base pan. The tensile force is transferred to the door hinge with a tension cord (C) via a deflection roller (B). The clamping force of the spring can be increased with the enclosed adjusting screw (A) (built-in appliances only) via the deflection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

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.

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



- ▶ The door springs can be identified by a coloured dot on the rear of the appliance.
- ▶ The door springs must be replaced **in pairs** only !
- ▶ The maximum weight of the furniture door is approx. 10,5 kg.

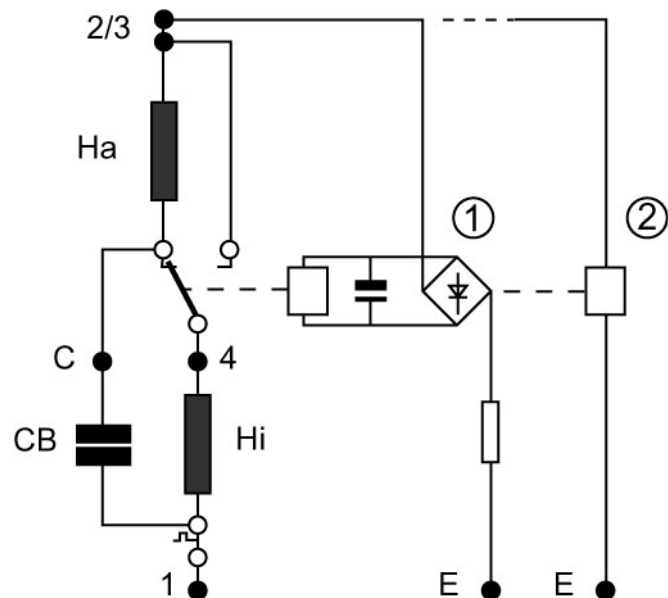
## 4.18 Circulation pump (SICASYM)

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

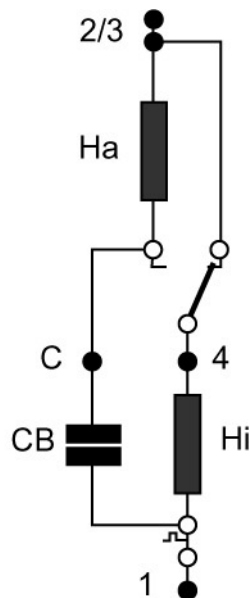
The switching of the two motor windings with the motor capacitor is actuated either via electronics or a relay on the motor connection ① or via the module ②. In the start phase the two windings (one in series with the capacitor) are connected in parallel to each other and directly to the mains voltage 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. The motor has a thermal coil protection (bimetal) against overheating.

Terminal diagram:

**Operation:**



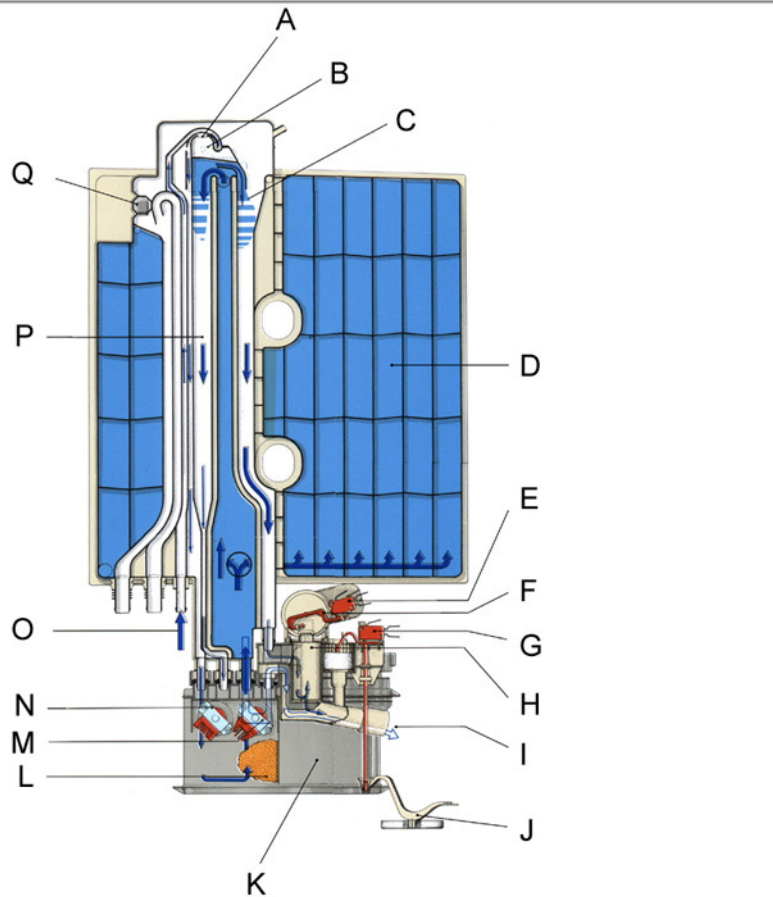
**Start:**



### Technical specifications

Designation	Value	Unit
Nominal voltage	230 - 240	V
Frequency	50	Hz
Resistor	Ha 40 - 54 Hi 45 - 70	$\Omega$
Delivery height	3.0 – 4.0	m
Delivery capacity	approx. 17 - 63	l/min
Starting current	1.3 – 2.2	A
Working current	0.3 – 0.4	A

## 4.19 Water inlet with heat exchanger



- |   |                           |   |                                 |
|---|---------------------------|---|---------------------------------|
| 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          |   |                                 |

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 ( $f_1$ ). 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.

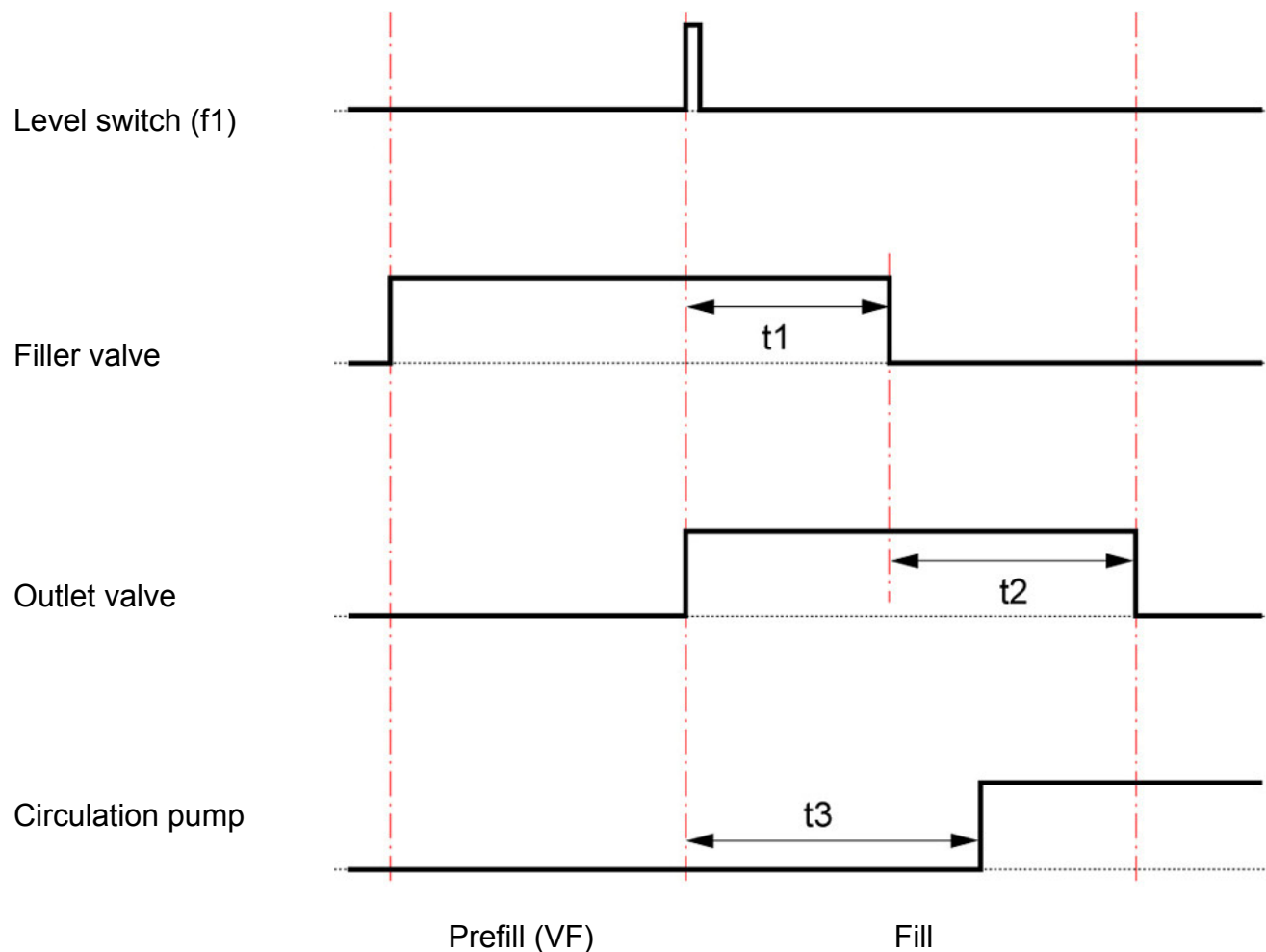
Before each regeneration step the electronics check whether the capacity of the water softener is adequate for a complete "Normal Programme Sequence". If not, regeneration starts.

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.

#### 4.19.1 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.



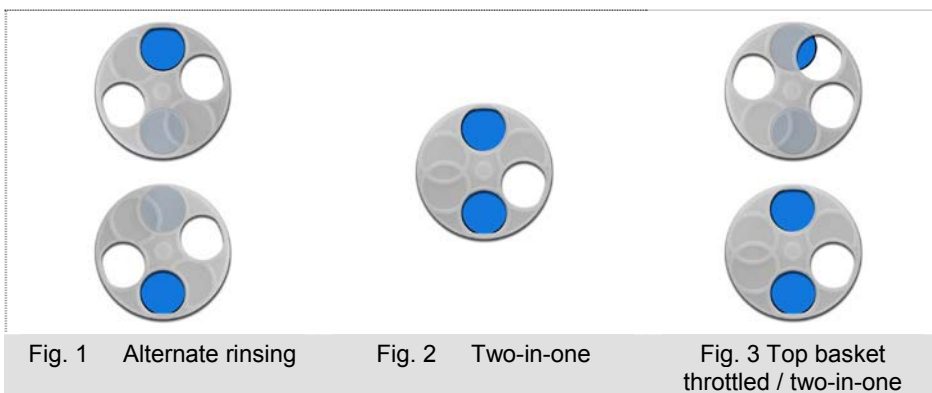
$t_1$  = calculated refill time,  $t_2$  = run-on time of drainage valve,  $t_3$  = switch-on delay of circulation pump

## 4.20 Water points

The water points are responsible for alternate rinsing and for different rinsing pressures. They consist of a synchronous motor with gears, cam disc (B), microswitch (A) and locking disc (C). The synchronous motor is actuated via a triac. The controller receives information on the position of the locking disc (C) from the microswitch (A) which is actuated by the cam disc (B). The synchronous motor drives the gears and therefore the cam disc and the locking disc.

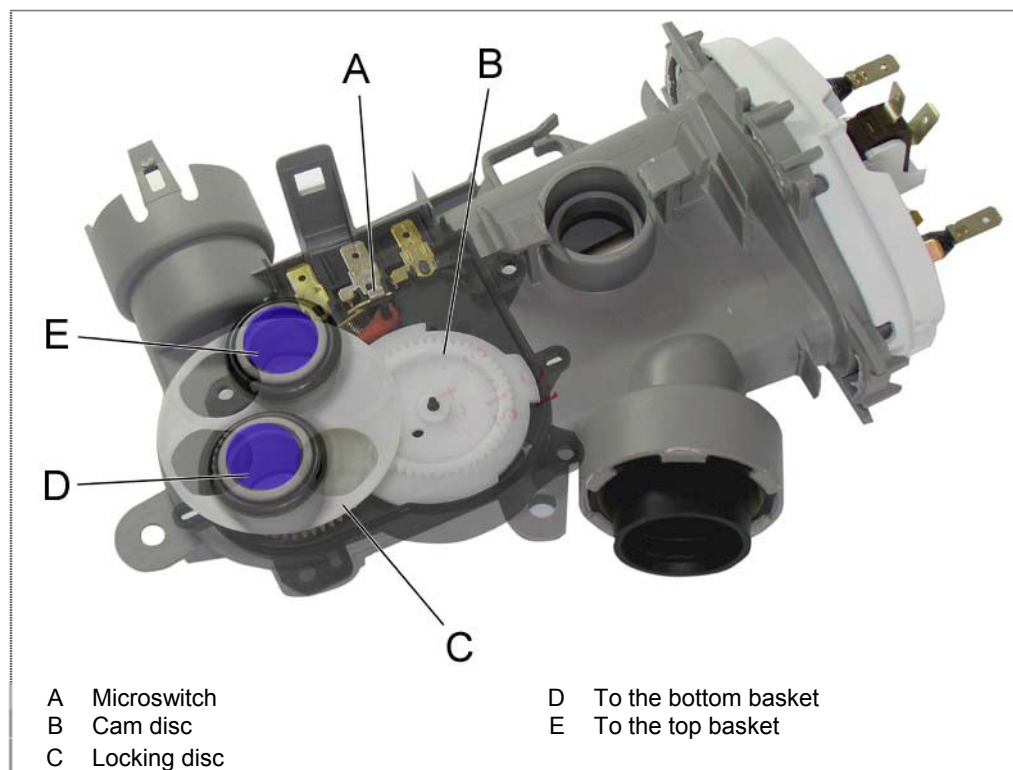
The locking disc has three openings and locks the relevant water channel to the spray arms. Water pressures vary depending on the position of the locking disc.

Rinse type	Water pressure
Alternate rinsing	Top basket <b>or</b> bottom basket = high
Two-in-one	Top basket <b>and</b> bottom basket = medium
Change between two-in-one or top basket throttled	or top basket = low



### Technical specifications:

Designation	Value	Unit
Nominal voltage (synchronous motor)	230–240	V
Frequency	50 / 60	Hz
Resistor	approx. 9.3	kΩ



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

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## 5 FUNCTIONS

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### 5.1 3 in 1 detergents

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#### 5.1.1 Detection function

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If combined detergent products (e.g. 3 in 1) are used, the drying result will be worse. To improve the drying result, a special programme sequence with less water is started in the intermediate rinse cycles. In addition, the final rinse temperature is increased by 3K (as for intensive drying). The heat exchanger is filled a second time in the drying cycle with the saved water for subsequent drying support.

The special programme sequence is activated if:

- ▶ the electronics module detects low rinse aid
- ▶ the [rinse-aid refill indicator is deactivated](#)

The “Intensive drying” additional function can still be selected, but it has no effect on the rinse-aid temperature.

The maximum temperature increase is 3 K.

#### 5.1.2 Application area

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3 in 1 detergents have an application range up to a water hardness of 21 °dH (37 °fH, 26 °Clarke, 3.7 mmol/l). The water softening system does not need to be activated up to 21 °dH.

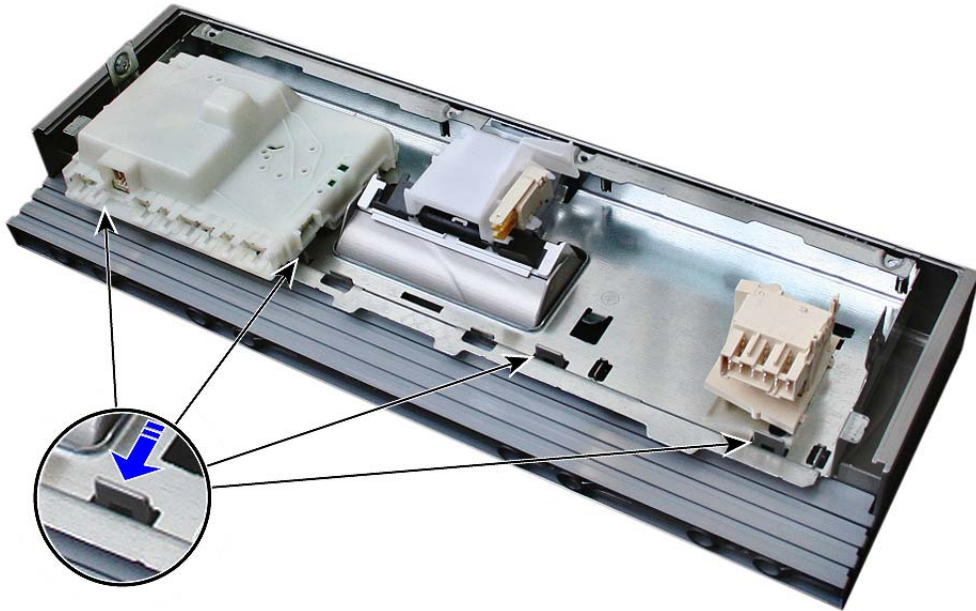
If water hardness is above 21 °dH, the water softening system must be activated and the hardness range set to 6.

## 6 REPAIR

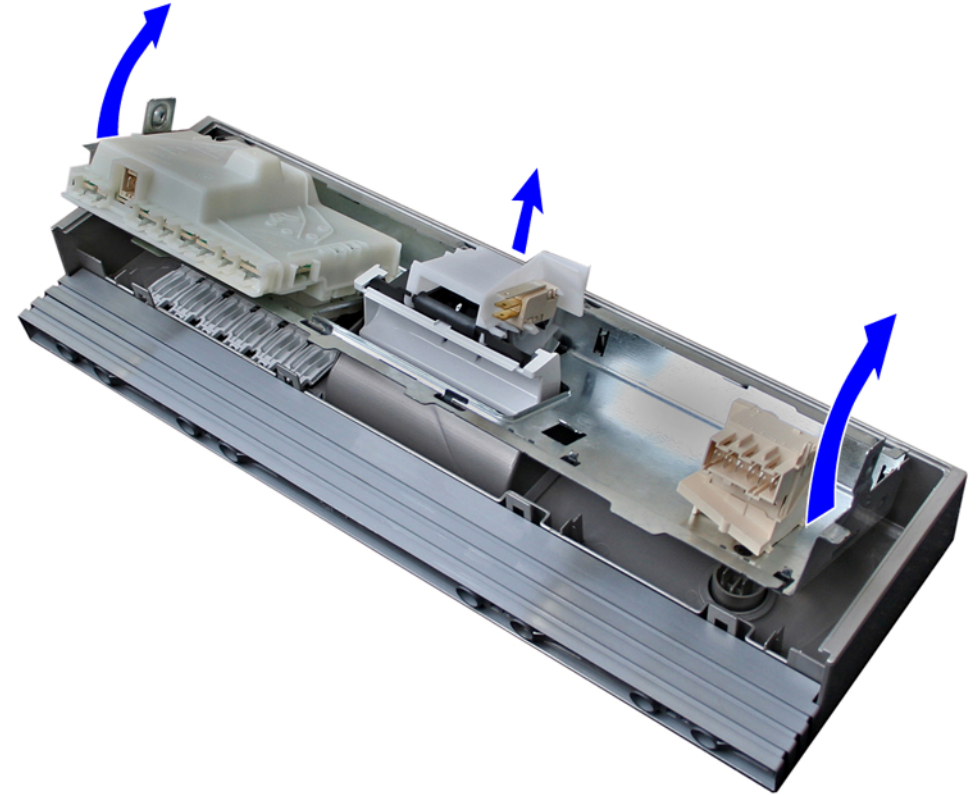
### 6.1 Module

#### 6.1.1 Removal

- ▶ Remove the furniture front (if fitted)
- ▶ Remove outer door
- ▶ Disconnect support plate with the fascia from the inner door

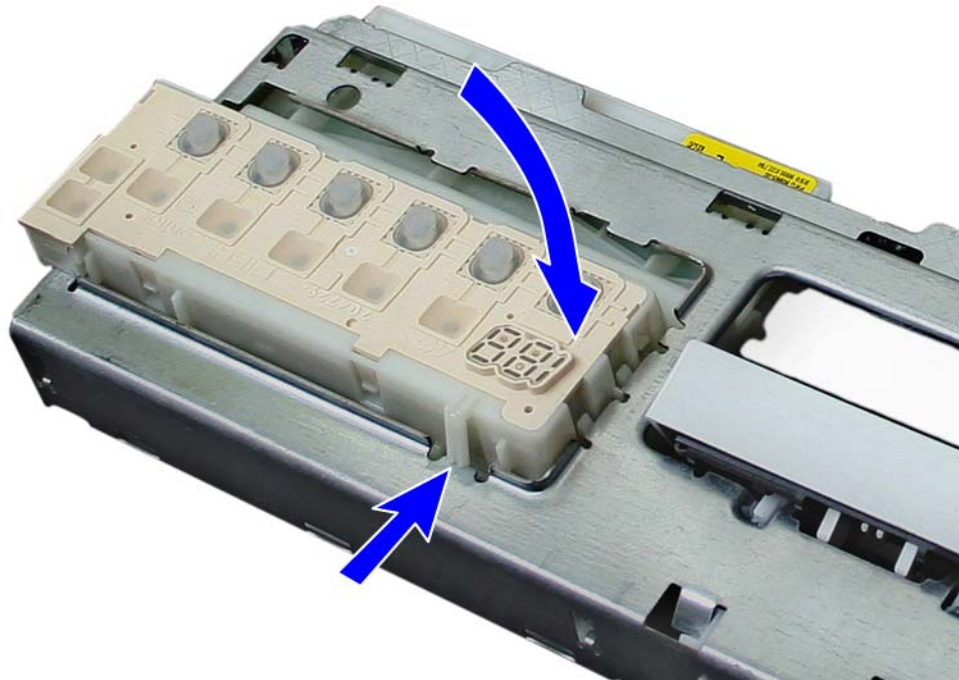


- ▶ Disengage four catches on the fascia from the support plate



- ▶ Tilt support plate away from the fascia





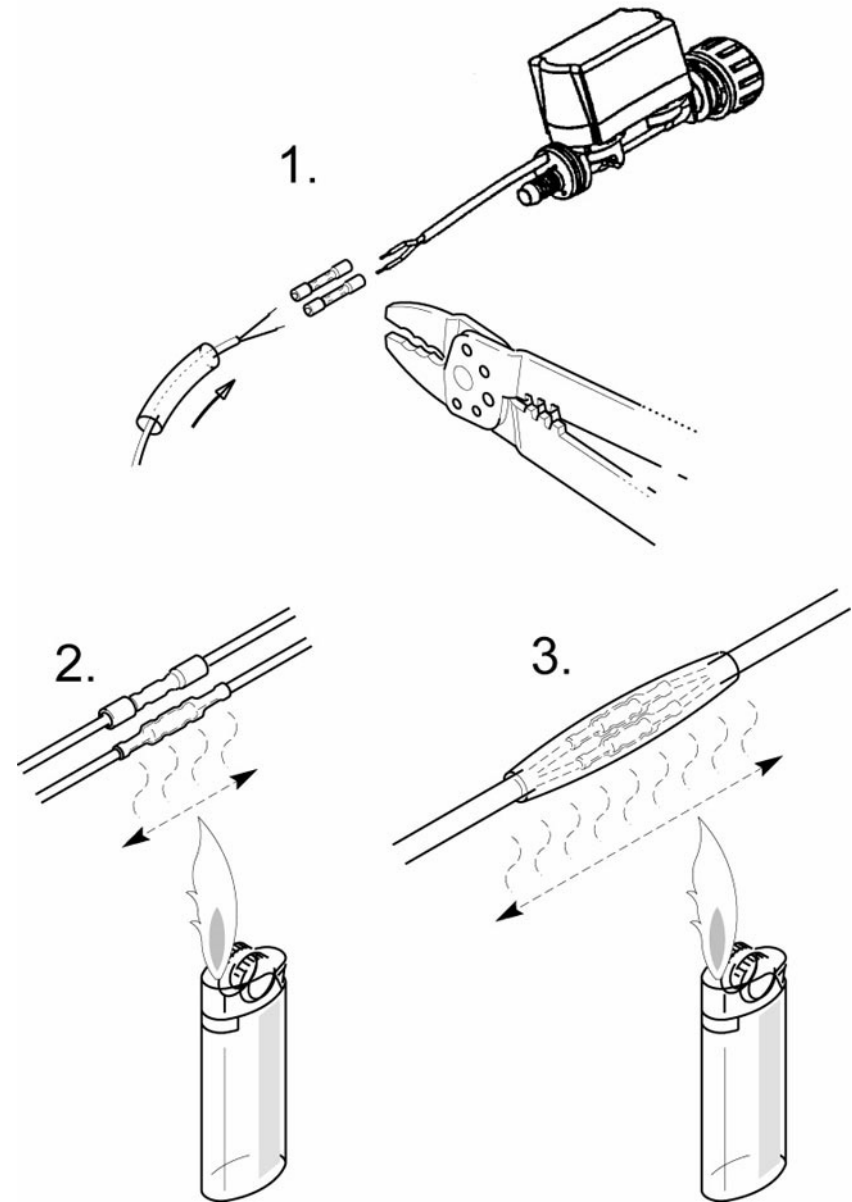
### 6.1.2 Installation

- ▶ Connect plugs from the cable harness to the module
- ▶ Push module into the control panel frame until the module is held firmly in place by the catches.
- ▶ Attach support plate to the inner door
- ▶ Attach fascia from above into the support plate and tilt down until the four catches lock
- ▶ Attach outer door
- ▶ Attach furniture front (if fitted)

- ▶ Disengage catches on the module housing from the support plate
- ▶ Pull module down out of the support plate
- ▶ Remove plugs from the module, plugs are coded

## 6.2 Replacing the Aqua Stop valve

- ▶ Open the housing
- ▶ Disconnect the inlet hose
- ▶ Cut through the electric connecting cables
- ▶ Strip the insulation off the cable ends
- ▶ Push the shrink-fit hose over the cable
- ▶ Connect electric cables 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)



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## 6.3 Worktop (optional)

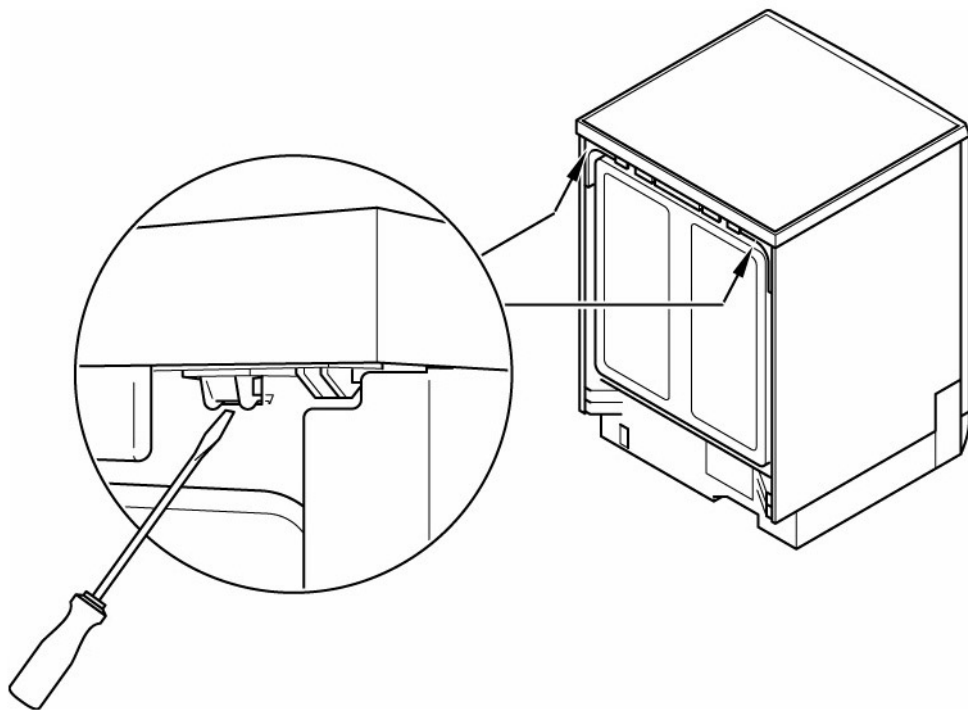
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### 6.3.1 Removal

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Catch tappets are located on the rear right and left hand sides of the worktop.

- ▶ Press up the catch tappets
- ▶ Push back the worktop and lift off



### 6.3.2 Installation

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- ▶ Insert worktop into the guide
- ▶ Push forwards until both catch tappets engage at the rear

## 6.4 Removing and installing dispenser

### 6.4.1 Removal

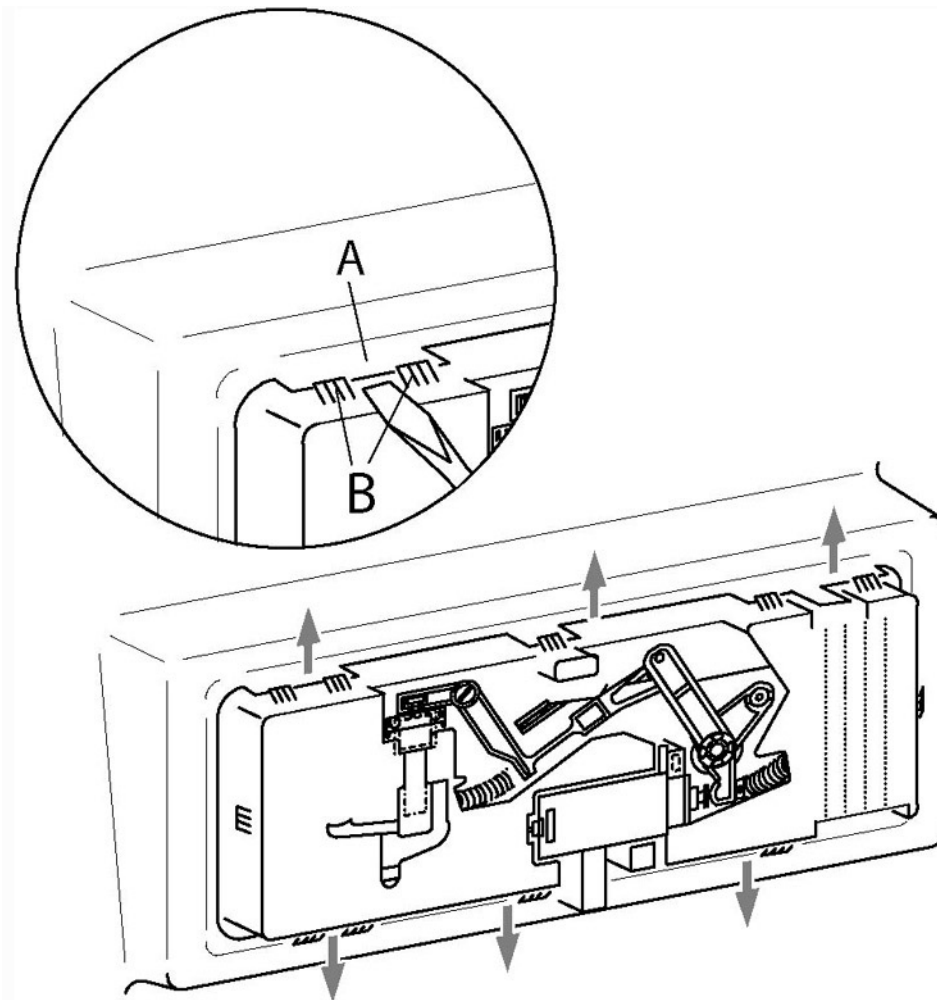


Wear [protective gloves](#); risk of cuts.

- ▶ Unscrew the outer door
- ▶ Leave top basket in the appliance and close the door
- ▶ Remove the electrical connections
- ▶ Using a screwdriver, lift the retention plates (A) stamped out of the inner door off the catches (B).
- ▶ Press the released dispenser inwards

### 6.4.2 Installation

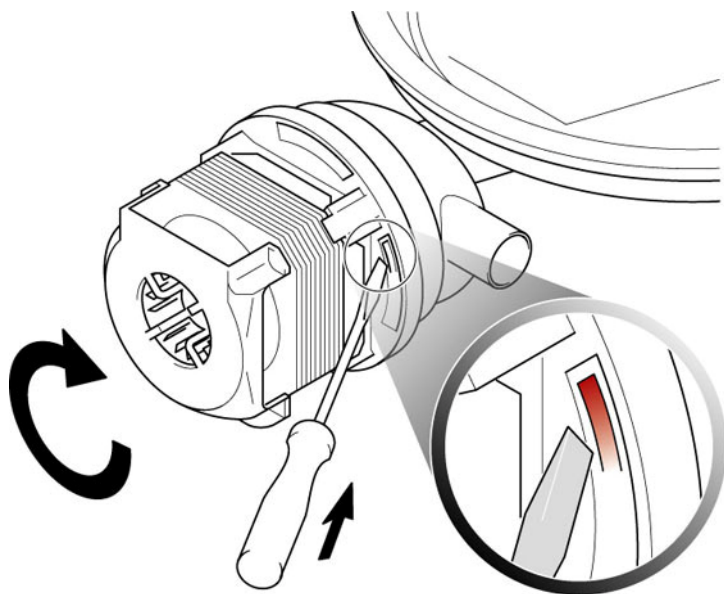
- ▶ Align retention plates (A) towards the centre so that all catches (B) lock securely into position
- ▶ Before installing the seal, lubricate with washing-up liquid
- ▶ Press dispenser outwards into the inner door
- ▶ Ensure that all retention plates (A) are firmly attached again
- ▶ Attach electrical connections
- ▶ Screw on the outer door



## 6.5 Removing and installing circulation pump

### 6.5.1 Removal

- ▶ Remove side panels and base plate
- ▶ Loosen connection between stainless steel container and plastic base pan, (2 screws at front and 2 screws at rear)
- ▶ Place appliance on its rear panel
- ▶ Fold down the base pan
- ▶ Using a screwdriver, press the clip on the right side of the circulation pump inwards



- ▶ Rotate pump to the right
- ▶ Remove pump.

### 6.5.2 Installation

- ▶ Prior to installation, lubricate the seal with washing-up liquid.
- ▶ Connect pump to the pump housing



#### Leaks

- ▶ Ensure that all 4 locking hooks in the pump housing are attached



#### Sluggish or blocked fan impeller

- ▶ When the pump is changed, the spacer ring attached to the motor shaft must be transferred to the new pump

- ▶ Rotate pump to the left into the pump housing until the clip engages
- ▶ Fold up the base pan and install appliance
- ▶ Screw stainless steel container to the base pan
- ▶ Screw on base plate and side panels

### 6.5.3 Removing the slide ring seal

- ▶ Remove circulation pump
- ▶ Loosen fan impeller, locking the rotor with a pen or screwdriver
- ▶ Remove pump housing
- ▶ Remove slide ring seal

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## 6.5.4 Installing the slide ring seal

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Sluggish or blocked fan impeller

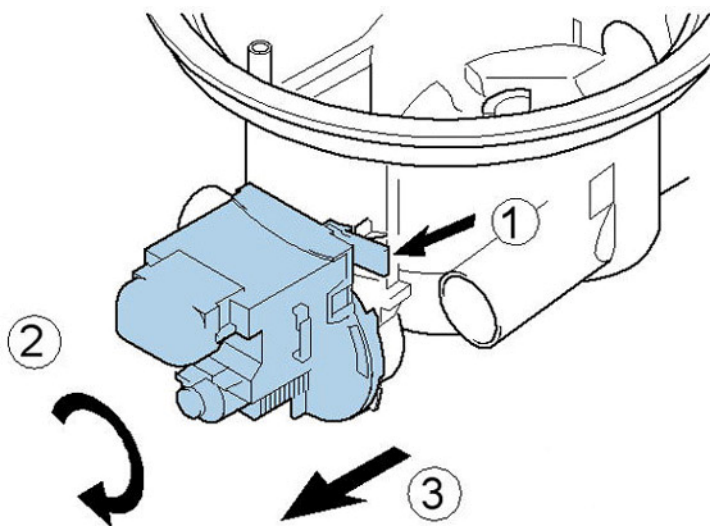
- ▶ Ensure that the spacer ring is re-attached to the motor shaft.
- 

- ▶ Press slide ring seal into the pump housing
- ▶ Manually rotate fan impeller firmly onto the motor shaft
- ▶ Attach sealing ring
- ▶ Install circulation pump

## 6.6 Detergent-solution pump

### 6.6.1 Removal

- ▶ Unscrew base panel and base plate
- ▶ Press lever (1) to right and disengage
- ▶ Rotate detergent-solution pump forwards (2)
- ▶ After a quarter revolution, remove detergent-solution pump to right (3)



### 6.6.2 Installation

- ▶ Insert detergent-solution pump
- ▶ Rotate detergent-solution pump to rear until the locking lever engages
- ▶ Screw on base plate and base panel

## 6.7 Removing and installing hinge

### 6.7.1 Removal

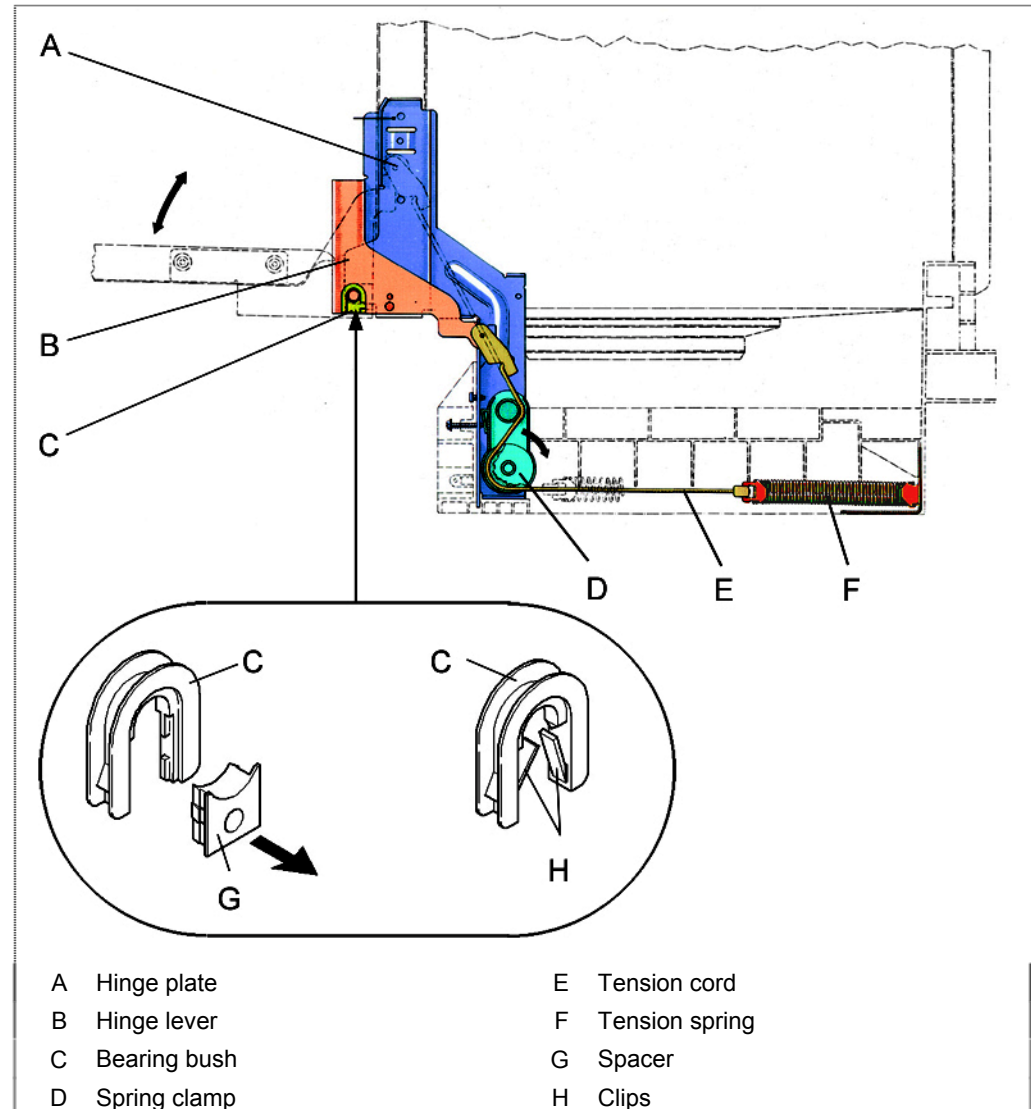
- ▶ Unscrew outside door, base panel, angle strip and side panels.
- ▶ Detach tension cord (E) from hinge lever (B)
- ▶ Unscrew hinge lever (B) from the inner door
- ▶ Disengage bearing bush (C) and remove hinge lever (B)
- ▶ Unscrew hinge plate (A) from the container frame
- ▶ Unscrew fastening screw from the hinge plate towards the base pan, as well as the adjusting screw if fitted
- ▶ Unscrew hinge plate (A) from the frame
- ▶ Pull up the hinge plate (A) and remove
- ▶ Remove the spring clamp (D);

#### Two-piece hinge bearing bush:

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

#### One-piece hinge bearing bush:

Open the bearing bush (C) by bending up the clips (H) with a screwdriver. When the bearing bush (C) is removed, it must be renewed.





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## 6.7.2 Installation

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- ▶ Insert spring clamp (D) into the hinge plate (A)
- ▶ Insert hinge plate (A) into the base pan
- ▶ Screw hinge plate (A) to the frame and base pan
- ▶ Insert hinge lever (B) with the bearing bush (C) into the hinge plate (A)
- ▶ Screw inner door to hinge lever (B)
- ▶ Attach tension cord (E) to the hinge lever (B)
- ▶ Screw on side panels, angle strip, base panel and outside door.

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## 6.8 Water softening system

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### 6.8.1 Removal

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1. Unscrew outside door, base panel, angle strip and side panels.
2. Detach the tension cords from the hinge levers
3. Remove the screws which connect the base pan to the hinge plates
4. Unscrew the rinsing tank from the rear panel of the base pan
5. Disconnect the door cable harness from the plug-and-socket connection in the base pan
6. Remove electrical connections from the regeneration and drainage valves
7. Unscrew the fastening nut which connects the salt dispenser to the rinsing tank
8. Extract brine solution out of the storage container with a syringe;
9. Place appliance on its rear panel
10. Carefully remove base pan, release the catch on the level sensor housing and the water softening system
11. Disconnect the circulation pump with the rubber support from the base pan
12. Continue removing the base pan until the water softening system can be removed from the plug-and-socket connections at the water inlet and from the level sensor housing
13. Pull out the reed switch
14. Take out water softening system

---

### 6.8.2 Installation

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Please note before and during installation

- ▶ 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

- 
1. Insert water softening system
  2. Engage reed switch
  3. Push base pan onto the tank
  4. Fit the rubber bearing to the circulation pump.
  5. Screw on the fastening nut which connects the salt dispenser to the rinsing tank
  6. Restore electrical connections to the regeneration and drainage valves
  7. Connect plug-and-socket connection from the door cable harness
  8. Screw the rinsing tank onto the rear panel of the base pan
  9. Screw the base pan to the hinge plates
  10. Attach the tension cords to the hinge levers
  11. Screw on angle strip, side panels, base panel and outside door

---

## **6.9 Instantaneous water heater**

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### **6.9.1 Removal**

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15. Unscrew outside door, base panel, angle strip and side panels.
16. Detach the tension cords from the hinge levers.
17. Unscrew the screws which connect the base pan to the hinge plates.
18. Unscrew the rinsing tank from the the rear panel of the base pan.
19. Disconnect the door cable harness from the plug-and-socket connection in the base pan.
20. 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.
21. Disconnect the circulation pump with the rubber support from the base pan.
22. Open the base pan until the instantaneous water heater can be screwed off the pump sump.
23. Unscrew the instantaneous water heater.
24. 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.

### **6.9.2 Installation**

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The instantaneous water heater is installed in reverse sequence

## 6.10 Replacing the door seal

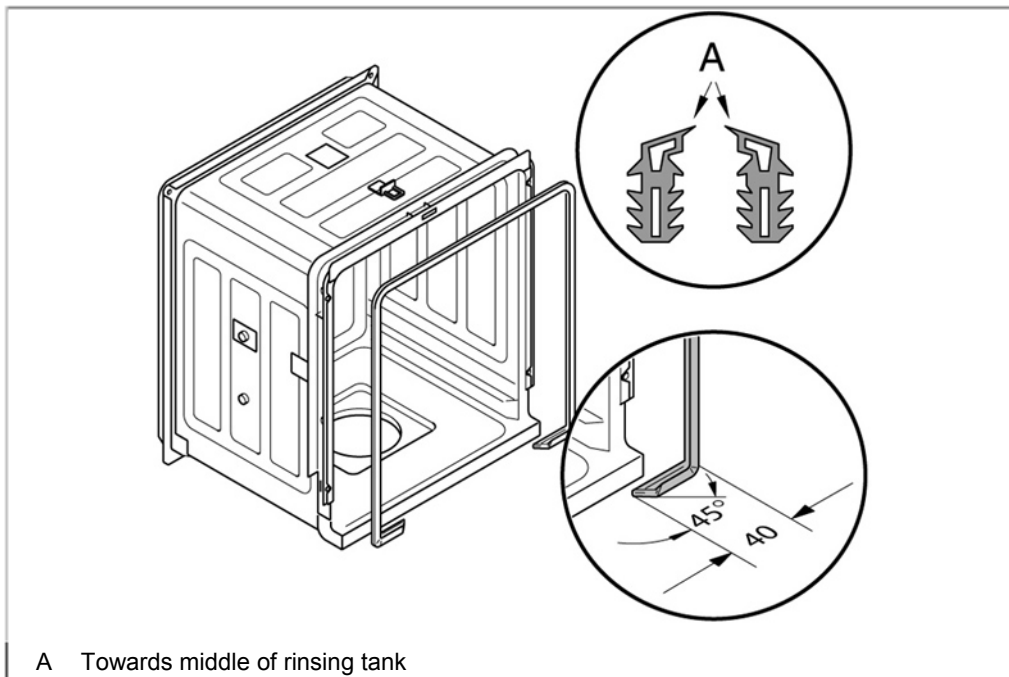
The new seal must be adjusted prior to installation.



### Adjusting the seal

- ▶ Prior to insertion, ensure that the seal lip is pointing towards the middle of the rinsing tank, otherwise there will be leaks in the area of the door

- ▶ adjust the length of the seal to the circumference of the container.
- ▶ cut the ends of the seal at an angle 45°.
- ▶ place the 40 mm seal on the base of the container. (Splash-proof protection for the lower corners).
- ▶ Press in the seal evenly and without any kinks



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## 6.11 Diagnosis aids

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### **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 Control unit / module / cable harness



Before replacing a module, start the customer service test programme.

Customer complaint	Cause	Remedial action
Running time too long	Alternating rinse technology, energy saving	Advise customer, <a href="#">See Consumption rates</a> or <a href="#">Alternate rinsing technology</a>
Component is not actuated	<a href="#">Triac on the module</a> does not switch properly, smoke traces may be visible on the module	Before replacing the module, always measure the connected consumers (valves, actuators, etc.).
Scorched connections	Mains plug scorched	Repair defective plugs on electronic control units with plug repair set 496460.
	Cable harness scorched / wire broken	Replace defective wire in the cable harness with universal wire 493906.  Remove the defective wire from the plug housing with ejection tool 340785.

## 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, <a href="#">remove pump</a>
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 <a href="#">Observe safety instructions</a></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. <a href="#">Follow safety instructions</a>
	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  Alternate pumping (detergent-solution pump and circulation pump are actuated alternately)	Advise customer, load crockery <u>see water points</u>  Advise customer

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## 7.5 Rinsing result

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### 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)

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

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

<b>Customer complaint</b>	<b>Cause</b>	<b>Remedial action</b>
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	Regeneration salt on the utensils  – Leaking salt dispenser cover (check screw-fitting, regeneration dispenser is dispensing slowly)  – Leaking regeneration valve (regeneration dispenser is dispensing slowly)  – Regeneration valve continuously actuated  Initial clouding of glass: can only apparently be wiped off  Detergent-solution carry-over  Combination product	Advise customer, eliminate leaks  Check valve and/or valve seat  Electrical check with circuit diagrams  <a href="#">See Damage to utensils</a>  <a href="#">See Food remnants</a>  Advise customer

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

<b>Customer complaint</b>	<b>Cause</b>	<b>Remedial action</b>
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	<p>No rinse aid in the dispensing device</p> <p>Appliance connected to hot water, appliance is suitable for hot-water connection, but not recommended.</p> <p>Appliance not heating</p> <p>Programme selected without drying</p> <p>The rinse aid integrated in tablets has dissolved too early</p> <p>Plastic parts</p> <p>Combined detergent products (2 in 1 / 3 in 1)</p>	<p>Advise customer</p> <p>Advise customer, refer to function of the heat exchanger; if required, connect the appliance to cold-water supply</p> <p>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).</p> <p>Advise customer, quick programme is without drying cycle, drying level option is too low</p> <p>Advise customer, tablet is unsuitable for this programme</p> <p>Plastics retain very little heat and have a hydrophobic surface which is difficult to moisten. As a result, droplets will form during drying.</p> <p>Advise customer, recommend separate detergent products (separate rinse aid and detergent)</p>

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## 7.7 Circulation pump

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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,

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## **8 TECHNICAL SPECIFICATIONS**

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### **8.1 General technical specifications**

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

## 8.1.1 Consumption rates

### 8.1.1.1 Appliance with water points and heat exchanger

	<b>Intensive 70° Power 75</b>	<b>Auto 55–65°</b>	<b>Normal 65°</b>	<b>Eco 50°</b>	<b>Gentle 40°</b>	<b>Quick 45°</b>	<b>Prerinse</b>	<b>Plate warming</b>
Duration in min.	125–135	85–140	140	140	68–72	30	9	25
with a half load	120	85–130		120	62			
with Vario Speed	85–90	71–75		65–70	52–56			
Current consumption in kWh	1.55–1.60	1.05–1.60	1.60	1.05	0.75–0.80	0.7	0.05	0.60
with a half load	1.50	1.00–1.40		1.05	0,75			
with Vario Speed	2.00–2.10	1.40–1.50		1.40–1.44	0.85–0.95			
Water consumption in litres	13–16	10–17	16	12	11–14	10	4	4
with a half load	12	10–14		10	11			
with Vario Speed	16–20	15–20		12–14	12–16			

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.