Service Manual - Series 450/451

IG 448...
IG 458...
IG 459...
IG 4406.0
IG 4408.1
IGV 449...
IGV 459...
IG 4408.0
IGV 4408.0

Service Manual: H7-71-04

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Contents

1. Safety

Danger!

Repairs may only be carried out by a qualified electrician!
Improper repairs can be extremely dangerous for the user.

It is essential that you observe the following instructions in order to prevent electric shocks:

- The casing and the frame may be live in the event of faults!
- Touching live components inside the appliance may cause dangerous currents to flow through your body!
- Disconnect the appliance from the mains prior to carrying out any repair work!
- When inspecting live parts, a residual current circuit breaker must always be used!
- The earthed conductor resistance must not exceed the resistance specified in the standard! It is vital for ensuring the safety of persons and the functioning of the appliance.
- On completion of repairs, an inspection must be carried out in accordance with VDE 0701 [Association of German Electrical Engineers] or in accordance with the corresponding regulations for your country!
- On completion of repairs, a function and impermeability inspection must be carried out.

Attention!

It is essential that you observe the following instructions:

- Due to the all-pole disconnection (relay, press switch), when carrying out measurements via the connector plug in accordance with VDE 0701, a direct measurement must be used to check the heating (flow heater) for insulation faults or the appliance's differential current must be measured!
- When replacing the dispenser and the pump cavity, beware of sharp edges around the stainless steel components.
- The appliances must be disconnected from the mains prior to all repairs. If inspections must be carried out on live appliances, make sure you use a residual current circuit breaker.

Sharp edges: use protective gloves.

Components may be electrostatic!
Observe handling regulations!

2. General technical specification - 45 cm appliances

This service manual serves the purpose of providing customer service technicians who already have the know-how required to repair dishwashers with specific information on the operating mode of 45-cm dishwashers.

This manual deals with all of the appliance specifications relevant to this model.

Descriptions and operating modes of components that are not new have therefore not been included in this edition.

3. Assembly

3.1 Installing

In order to ensure that the lock functions perfectly and to prevent any leakages in the area of the door, the appliance must be perfectly aligned by means of the adjustable feet. In the case of integrated appliances, it is possible to adjust the middle adjustable foot at the back from the front.

Note: built-under and integrable appliances

Screw the appliance in an upward direction by means of the adjustable feet until the outer casing is at the same level as the working top.

For integrated and fully-integrated appliances the mounting instructions (drilling stencil) are required for fastening the front of kitchen units.

The power pull of the door springs of integrated and fully-integrated appliances can be adjusted to suit the weight of the kitchen unit doors (see item on door springs).

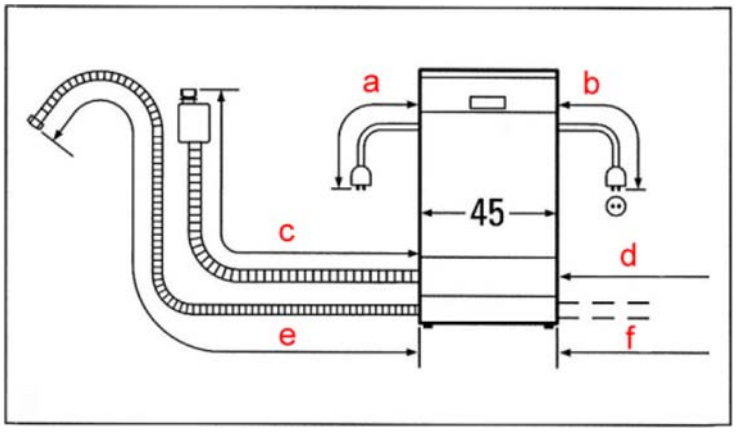
3.2 Electric connection

Connect the appliance to a wall socket with earthing in accordance with regulations only. Please observe details on the identification plate

3.3 Water connection

If the appliance is installed onto the drain with the standard length of hose, the max. permissible height above the floor is 90 cm. If the discharge hose is extended, a max. height of 80 cm is not to be exceeded. For the water supply (3/4"), a standard water pipe with water pressure of at least 0.5 bar (0.5 atmosphere above atmospheric pressure) is required (when the water tap is open more than 8 l/min must flow out). If the water pressure exceeds 10 bar (10 atmosphere above atmospheric pressure) a pressure reducing valve will have to be used. The appliances can be connected to a warm water supply of up to 60 °C. It is however recommendable to connect the appliance to a cold water supply (better drying and cleaning results).

Connection dimensions for all dishwashers 45 cm



a = 1.4 m

b = 1.7 m

c = 1.3 m (3.5 m with extension set)

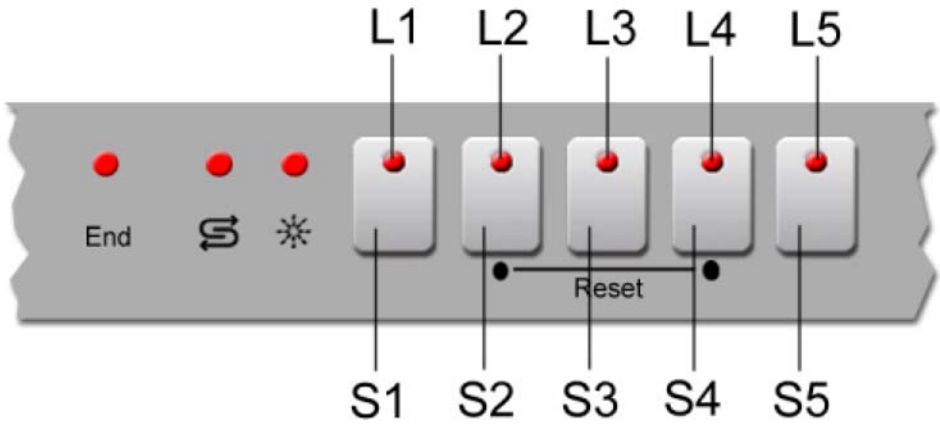
d = 1.4 m (3.6 m with extension set)

e = 1.5 m (3.5 m with extension set)

f = 1.4 m (3.4 m with extension set)

4. Functional description of the single groups

4.1 IGV 4... operation



4.1.1 Function

LEDs

- Program selection
- Clear rinse fill-up display
- Salt refill indicator
- End of program

Buttons / program selection

Intensive 70°
The program comprises a pre-rinse at 50°, a washing cycle at 70°, three intermediate rinses, a clear rinse at 70° and a drying cycle.

Normal 65
The program comprises a pre-rinse cycle, a washing cycle at 65°, two intermediate rinses, a clear rinse at 69° and a drying cycle.

ECO 50
The program comprises cleaning at 50°, an intermediate rinse, rinsing with a rinsing agent at 65°, and drying.

Rapid 35
The program comprises cleaning at 35°, an intermediate rinse, rinsing with a rinsing agent at 55°, and no drying.

Pre-wash
The program only comprises a cold rinse for the dishes.

4.1.2 Program reset

With the appliance switched on, press the S2 button and the S4 button simultaneously for 3 sec. The water will be pumped off for approx. one minute. The cleaning agent compartment should then be closed, so that the dispensing device is also reset.

4.1.3 Special functions

Setting the hardness range

Keep the S3 button pressed and switch on the appliance. The LED for fill-up salt will blink. The fault is indicated by means of the program LEDs (see chart). The setting rises once every time the S3 button is pressed. If the appliance is switched off, the setting is stored.

	°dH	°fH	°Clarke	mmol / l	LEDs		
					L2	L3	L4
0	0 - 6	0 - 11	0 - 8	0 - 1.1	O	O	O
1	7 - 16	12 - 29	9 - 20	1.2-2.9	●	O	O
2	17 - 21	30 - 37	21 - 26	3.0 - 3.7	●	●	O
3	22 - 35	38 - 60	27 - 44	3.8 - 6.2	●	●	●

Series setting = 2

4.1.4 General instructions on the controls

Tap closed

The appliance stops operating six minutes into the program procedure (filling position interrogation). In the control, the selected program LED lights up constantly. The controls remain in this position until the filling level has been reached.

Regeneration electronics system

On comparing the degree of water hardness set in the appliance, the electronics system determines what quantity of water is possible before the water softener is exhausted. The quantity of water used is calculated. Regeneration is carried out after the maximum number of rinses possible has been reached. The discharge behaviour of the regeneration electronics system can be seen in the description under initial operation / replacing the electronics unit.

Warm water recognition

If the water running in for the rinse with a rinsing agent has a temperature exceeding 45 °C, the heat exchanger is not filled for the drying stage. In order to guarantee the difference in temperature essential for condensation, the temperature for the rinse with a rinsing agent is raised to 72 °C, thus increasing the dishes own heat.

Memory electronics system

The electronics system has a memory store which registers the last program selected. Should no other program be selected on program start-up, the program selected last will operate.

Power cut

The electronics system has a mains cut-off memory which ensures that a rinsing program that has been commenced when a power failure occurs will be continued.

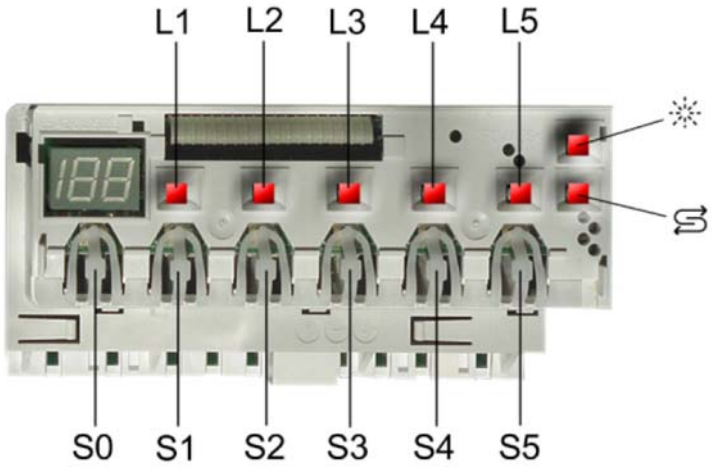
Sensors

All of the signals leaving the door switch, the level switch, the NTC sensor and the refill switches are recorded and evaluated by the microprocessor at the respective point in time.

Consumers

Consumers such as valves, detergent and clear rinse dispensers (actuators) are activated by means of triacs. The circulation and the vacuation pump and the continuous flow heater are activated with relays.

4.2 IG 4... operation



4.2.1 Function

LEDs

- Program selection
- Clear rinse fill-up display
- Salt refill indicator
- 2½ digit display

4.2.2 Pushbuttons

Pre-set time (ZVW)

The time-setting button enables the starting time to be postponed by up to 19 hours (setting between 0h and 19h). The button must be pressed for at least one second.

Saving time

The rinsing program operation time can be shortened with the „time saver“ function. The consumption of water and energy is raised so that the best results can be achieved while at the same time reducing the operation time.

Display

The display comprises a 2½ digit 7-segment display, which also enables program times of more than 99 minutes to be shown. The remaining duration is recalculated at the end of the heating positions. Should deviations result due to aqua sensor decisions, the water intake temperature, the quantity of dishes, etc., the remaining time displayed for these phases will be adjusted. Time differences of up to 60 minutes may hence result at the end of the washing and clear-rinse cycles.

4.2.3 Program dial

Intensive 70°

The program comprises a pre-rinse at 50°, a washing cycle at 70°, two intermediate rinses, a clear rinse at 70° and a drying cycle.

Please ensure that rinsing is only carried out in the bottom basket until the required temperature has been reached.

Auto 55° - 65° (depending on the model)

In the automatic program the aqua sensor not only decides on a change of water after the pre-rinse cycle; it also determines the washing temperature and the number of intermediate rinses.

Aquasensor readings are classified into turbidity levels. Readings in the wash cycle decide on the washing temperature (from 45 °C to 65 °C) and the time after washing (from 5 to 30 minutes). Readings taken at the end of the wash cycle decide on the type of intermediate rinse and on how many intermediate rinses are to be carried out.

Normal 65°

The program comprises a pre-rinse cycle, a washing cycle at 65°, two intermediate rinses, a clear rinse at 66° and a drying cycle.

ECO 50°

The program comprises cleaning at 50°, an intermediate rinse, rinsing with a rinsing agent at 65°, and drying. The aqua sensor is **not** activated in this program. Please ensure that rinsing is only carried out in the bottom basket until the required temperature has been reached.

Gentle 40°

The program comprises a pre-rinse cycle, a washing cycle at 40°, an intermediate rinse, a clear rinse at 55° and a drying cycle.

Rapid 35°/45°

The program comprises a washing cycle at 35°/45°, one intermediate rinse, a clear rinse at 55° without a drying cycle. The aqua sensor is **not** activated in this program.

Pre-wash

The program only comprises a cold rinse for the dishes. The aqua sensor is **not** activated in this program.

4.2.4 Display

The display comprises a 2½ digit 7-segment display, which also enables program times of more than 99 minutes to be shown. The remaining duration is recalculated at the end of the heating positions. Should deviations result due to aqua sensor decisions, the water intake temperature, the quantity of dishes, etc., the remaining time displayed for these phases will be adjusted. Time differences of up to 20 minutes may hence result at the end of the washing and clear-rinse cycles.

4.2.5 Program reset

With the appliance switched on, press the S2 button and the S4 button simultaneously for 3 sec. The water will be pumped off for approx. one minute. The cleaning agent compartment should then be closed, so that the dispensing device is also reset.

4.2.6 Special functions

Setting the hardness range

Keep the S3 button pressed and switch on the appliance. The setting will be shown in the display. The setting rises once every time the S3 button is pressed. Once the setting has reached 7, the indicator returns to 0. When the appliance is switched off, the setting is stored.

°dH	°fH	°Clarke	mmol / l	Salt quantity in g per rinse	Setting
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

Series setting = 4

Setting Intensive drying

Keep the S2 button pressed and switch on the appliance. 0 will appear on the number indicator. By pressing the S2 button once again, 1 will appear on the display, meaning that the intensive drying program is switched on. If the appliance is switched off, the setting is stored. Activating intensive drying raises the temperature by 3K in the rinse program with a rinsing agent.

4.2.7 General instructions on the controls

Tap closed

The appliance stops operating six minutes into the program procedure (filling position interrogation). The remaining operating period is indicated as before in the display. The controls remain in this position until the filling level has been reached.

Regeneration electronics system

On comparing the degree of water hardness set in the appliance, the electronics system determines the number of rinses which are possible until the softening device has been exhausted. The quantity of water used is calculated. Regeneration is carried out after the maximum number of rinses possible has been reached.

The discharge behaviour of the regeneration electronics system can be seen in the description under “Initial operation / electronics exchange”.

Warm water recognition

If the water running in for the rinse with a rinsing agent has a temperature exceeding 45 °C, the heat exchanger is not filled for the drying stage. In order to guarantee the difference in temperature essential for condensation, the temperature for the rinse with a rinsing agent is raised to 72 °C, thus increasing the dishes own heat.

Memory electronics system

The electronics system has a memory store which registers the last program selected. Should no other program be selected on program start-up, the program selected last will operate.

Power cut

The electronics system has a mains cut-off store which ensures that a rinsing program that has been commenced when a power failure occurs will be continued.

Sensors

All of the signals leaving the door switch, the level switch, the NTC sensor and the refill switches are recorded and evaluated by the microprocessor at the respective point in time.

Consumers

Consumers such as valves, detergent and clear rinse dispensers (actuators) are activated by means of triacs (see photo). The circulation and the vacuation pump and the continuous flow heater are activated with relays.

A* = Filling valve

A* = Dispenser

A* = Water diverter

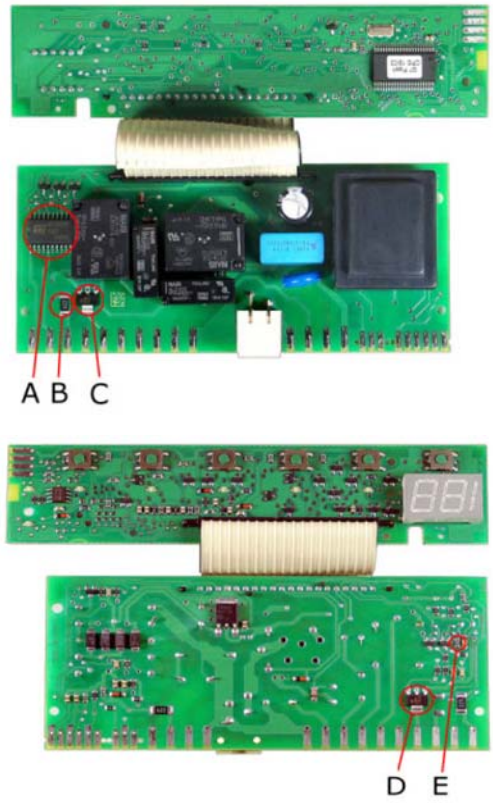
B = Filling level

C = Drain valve heat exchanger

D = Regeneration valve

E = Filling level

* = Triple triac



List of triacs

R5 = Filling level

R6 = Filling level

TY6 = Drain valve heat exchanger

TY7 = Dispenser actuator

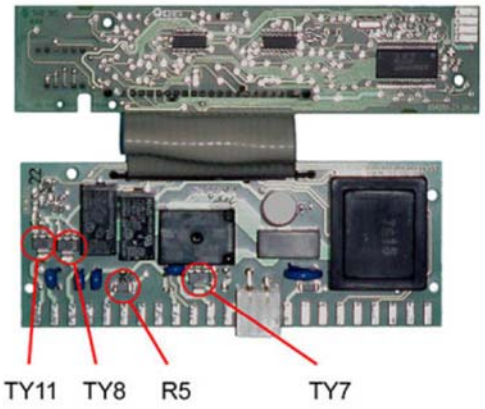
TY8 = Regeneration valve

TY9 = Filling valve

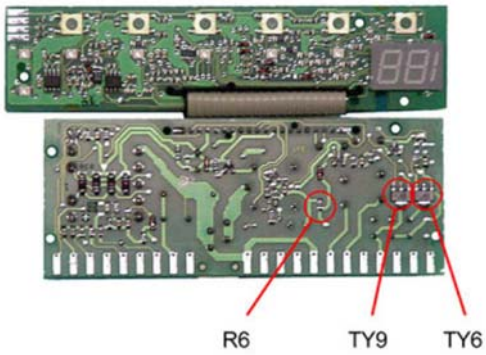
TY11 = Actuator top basket valve / Water diverter

When a module is replaced due to a defective triac it is essential to check the component selected too.

Face



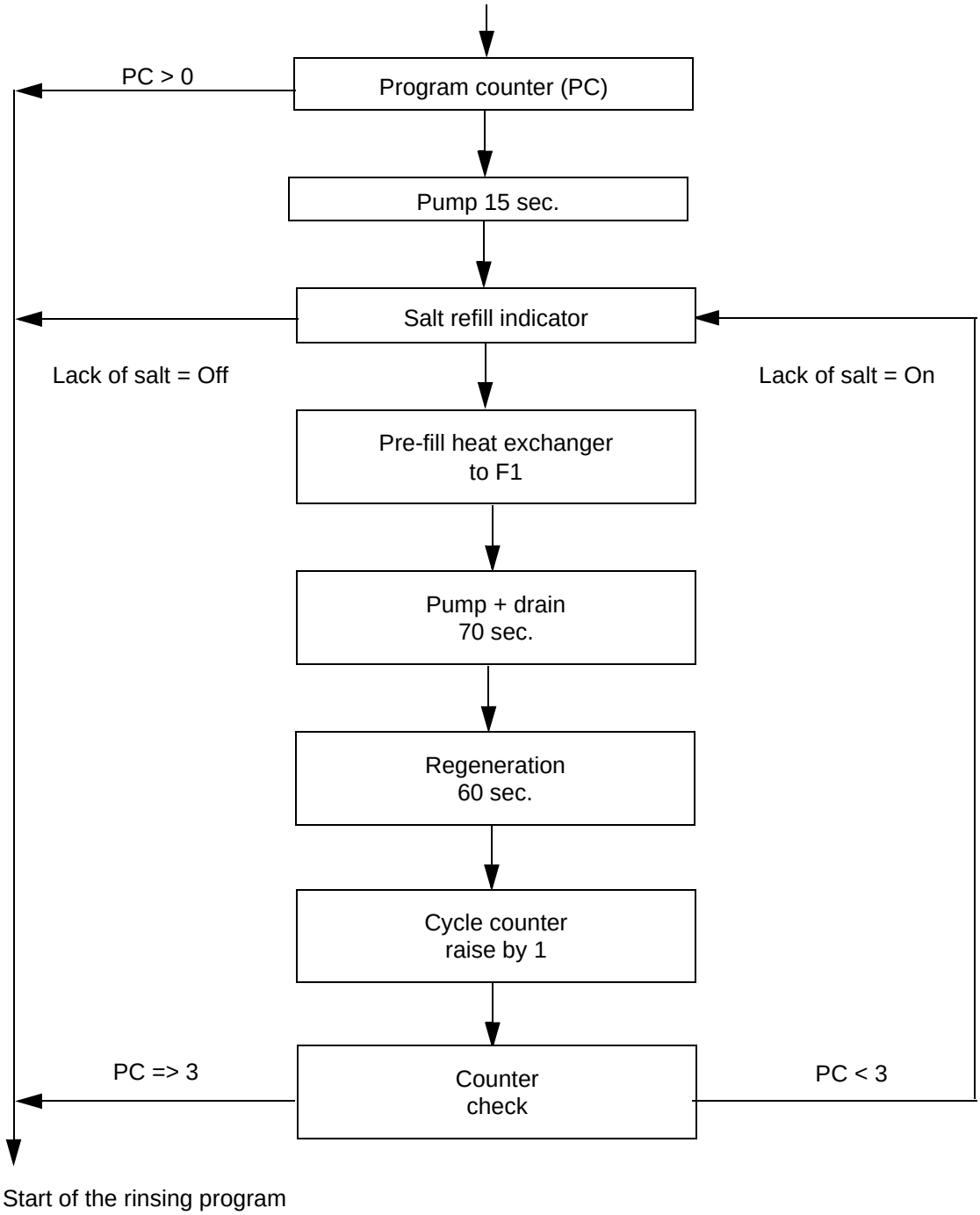
Rear



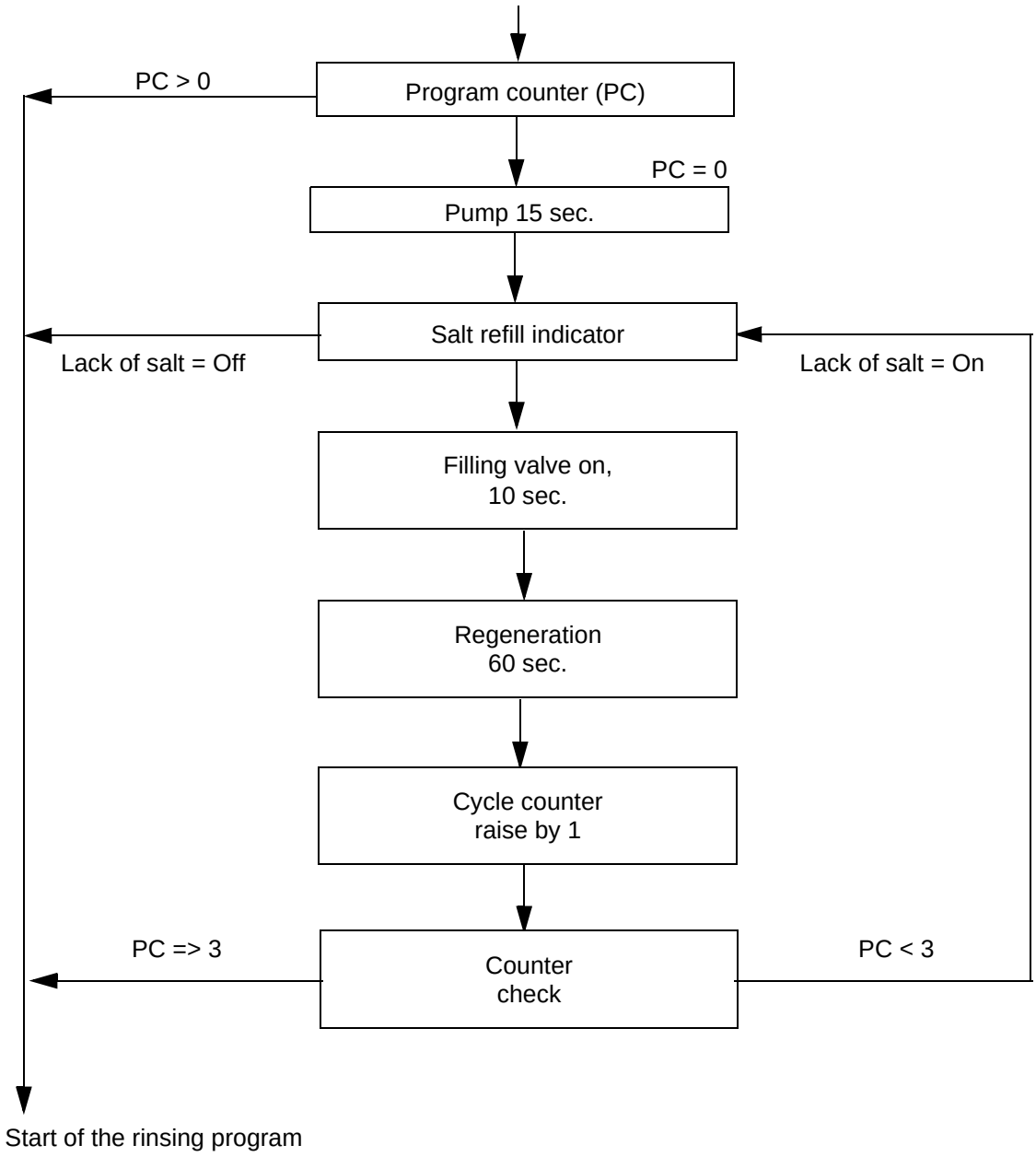
4.3 Initial operation / electronics exchange

In the case of initial operation or electronics exchange, the following program procedure is to be observed. (Program counter = 0!)

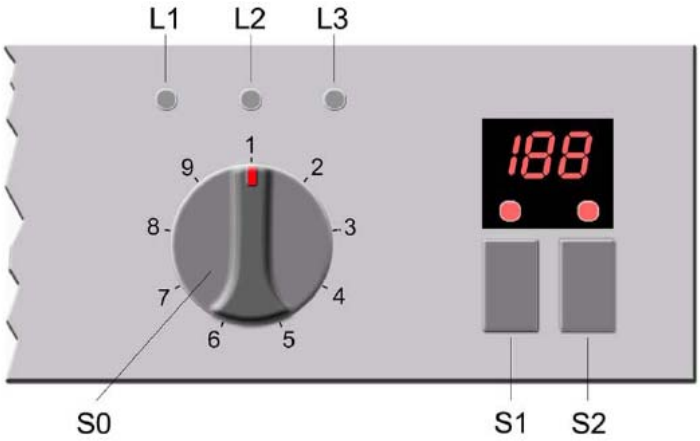
Procedure for initial start-up - appliances with a heat exchanger



Procedure for initial start-up - appliances without a heat exchanger



4.4 IG 458.1E operation



4.4.1 LEDs

- Tap closed
- Salt refill indicator
- Clear rinse fill-up display
- Additional functions
- 2½ digit display

4.4.2 Main switch

The main switch is located on the left-hand side, separate from the electronic unit.

4.4.3 Pushbuttons / additional functions

Pre-set time (PST)

The time-setting button enables the starting time to be postponed by up to 24 hours.

Soaking (optional)

The button for soaking can be pressed as a supplement to any program. When the button is pressed, an additional pre-rinse program with heating up to 55° will take place in the lower basket, resulting in an extension of the program time of approx. 20 min. This function is recommended for washing various types of dishes (top basket: sensitive dishes / bottom basket extremely dirty robust dishes).

Vario speed (optional)

The Vario speed function reduces the program 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.

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.

4.4.4 Deactivating the clear rinse refill display

Press the S1 button and keep it pressed. Switch on the appliance. The display will indicate 1. By pressing the S1 button once again, 0 will appear on the display, meaning that the clear rinse fill-up display is de-activated.

0 = off

1 = on

If the appliance is switched off, the setting is stored. Deactivating the refill clear rinse display will raise the temperature for the clear rinse by 3K in order to achieve better drying results (see too 3 in 1 detergent recognition).

4.4.5 Reset

Resetting is done with an additional position of the rotary switch for these dishwashers. This means that a reset commences 3 seconds after the switch is moved into this position.

Water is drained off for one minute and the electronic system will then be ready for a new program.

4.5 Construction components

4.5.1 Module

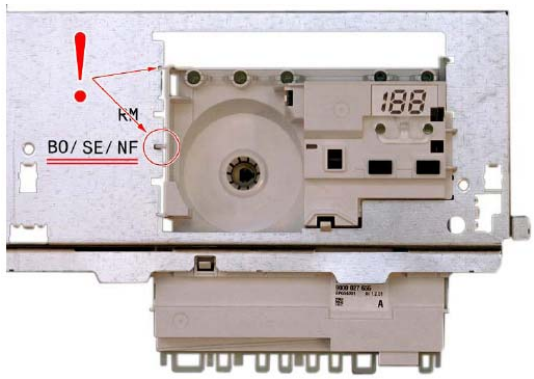
Mounting the module

If the module is not installed in the proper position, the light conductors in the panel may be severed.

The brand determines the position of the module in the support plate. There are two positions:

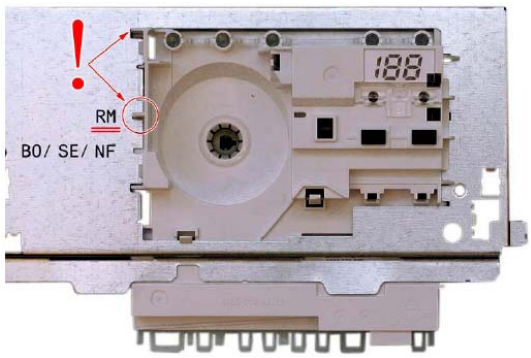
At the bottom of the support plate

The module is fastened at the points shown.



At the top of the support plate

The module is fastened at the points shown.



4.5.2 Water intake

The dishwasher detects that the tap has been closed when the flow sensor receives no signal for 30seconds.

4.5.3 Consumers

Consumers such as valves, detergent and clear rinse dispensers and the circulation pump are activated by means of triacs (see the list of triacs). The evacuation pump and the continuous flow heater are activated with relays.

4.5.4 List of triacs

When a module is replaced due to a defective triac it is essential to check the component selected too.

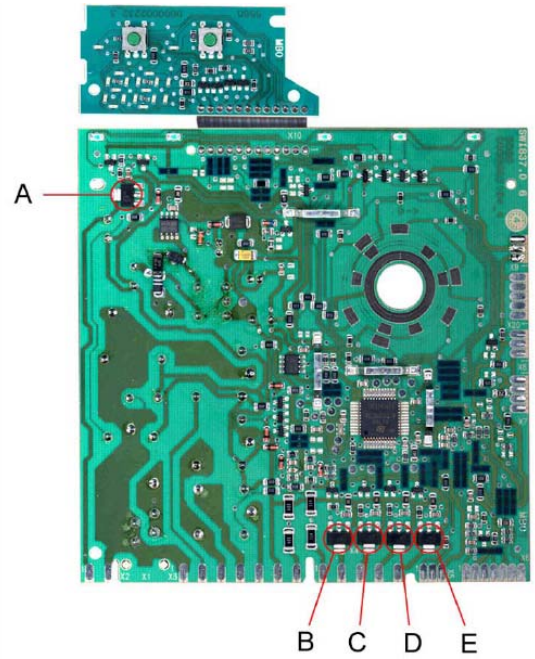
A = Dispenser actuator

B = Water diverter

C = Filling level

D = Regeneration valve

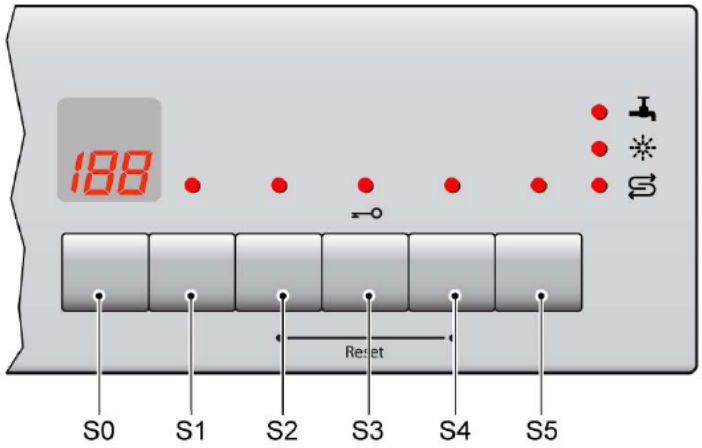
E = Drain valve heat exchanger



Start up the customer service program before replacing any modules.

Components may be electrostatic!
Instructions on electrostatic hazards are to be observed before a module is replaced.

4.6 IG 4406.0E operation



4.6.1 LEDs

- Tap closed
- Salt refill indicator
- Clear rinse fill-up display
- Additional functions
- 2½ digit display

4.6.2 Buttons / program selection

Pre-set time (PST)

The time-setting button enables the starting time to be postponed by up to 19 hours (setting between 0h and 19h). The button must be pressed for at least one second.

Saving time (optional)

The rinsing program operation time can be shortened with the „time saver“ function. The consumption of water and energy is raised so that the best results can be achieved while at the same time reducing the operation time.

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.

Vario speed (optional)

The “Vario speed” function reduces the program 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.

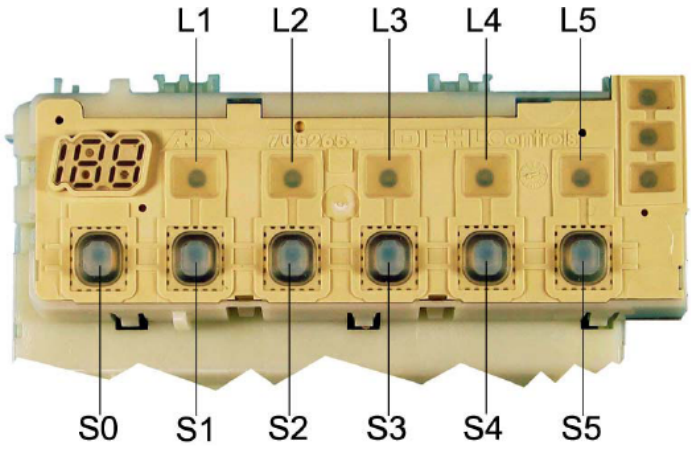
Intensive 70° / Power 75°

The program comprises a pre-rinse at 50°, a washing cycle at 70°, two intermediate rinses, a clear rinse at 70° and a drying cycle.

4.7 Construction components

4.7.1 Module

The electronics system comprises two modules installed in a cabinet. The control/output module is connected to the operating/indicating module by means of a flat cable.



Tap closed

If the level is not reached after 6 minutes in the filling position:

- The „check water intake“ LED will be activated (optional)
- The program will be discontinued (pumping for 60 sec.)
- The program will be re-started.

The procedure will be repeated twice if the level is still not reached. The controls will then remain in this position until the filling level has been reached. The remaining time which is still left will be maintained.

Regeneration electronics system

On comparing the degree of water hardness set in the appliance, the electronics system determines what quantity of water is possible before the water softener is exhausted.

The quantity of water used is calculated. Regeneration is carried out after the maximum number of rinses possible has been reached.

The discharge behaviour of the regeneration electronics system can be seen in the description under initial operation / replacing the electronics unit.

Warm water recognition

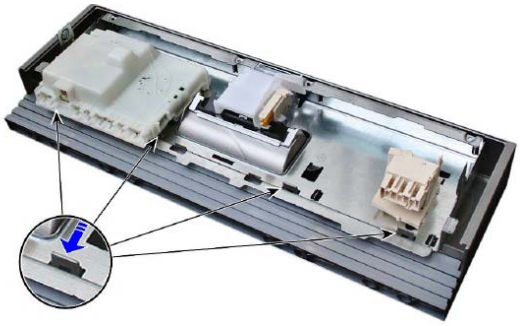
If the water running in for the rinse with a rinsing agent has a temperature exceeding 45°C, the heat exchanger is not filled for the drying stage. In order to guarantee the difference in temperature essential for condensation, the temperature for the rinse with a rinsing agent is raised to 72°C, thus increasing the dishes own heat.

Memory electronics system

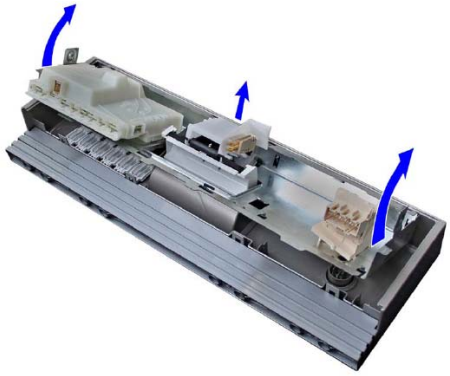
The electronics system has a memory store which registers the last program selected. Should no other program be selected on program start-up, the program selected last will operate.

4.7.2 Disassembling the module

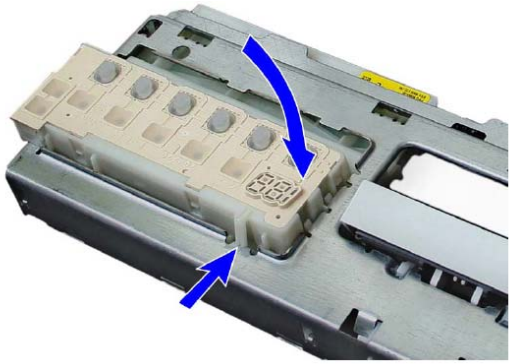
1. Remove the furniture front (if fitted).
2. Remove outer door.
3. Disconnect support plate with the fascia from the inner door.
4. Disengage the four catches on the fascia from the support plate.



5. Tilt support plate away from the fascia.



6. Disengage catches on the module housing from the support plate.
7. Pull module down out of the support plate.
8. Remove plugs from the module, plugs are coded.



4.7.3 Mounting the module

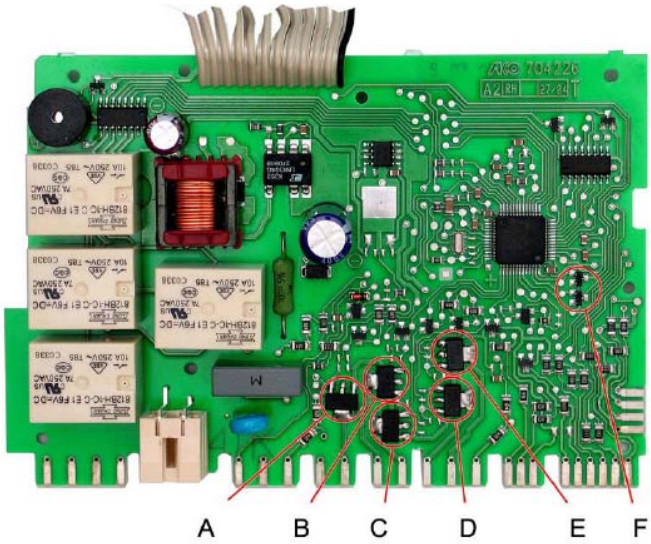
1. Connect plugs from the cable harness to the module.
2. Push module into the control panel frame until the module is held firmly in place by the catches.
3. Attach support plate to the inner door.
4. Attach fascia from above into the support plate and tilt down until the four catches lock.
5. Attach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

4.7.4 Consumers

Consumers such as valves, detergent and clear rinse dispensers (actuators) are activated by means of triacs. The circulation and the vacuation pump and the continuous flow heater are activated with relays.

4.7.5 List of triacs

When a module is replaced due to a defective triac it is essential to check the component selected too.



A = Dispenser actuator

B = Drain valve heat exchanger

C = Regeneration valve

D = Filling level

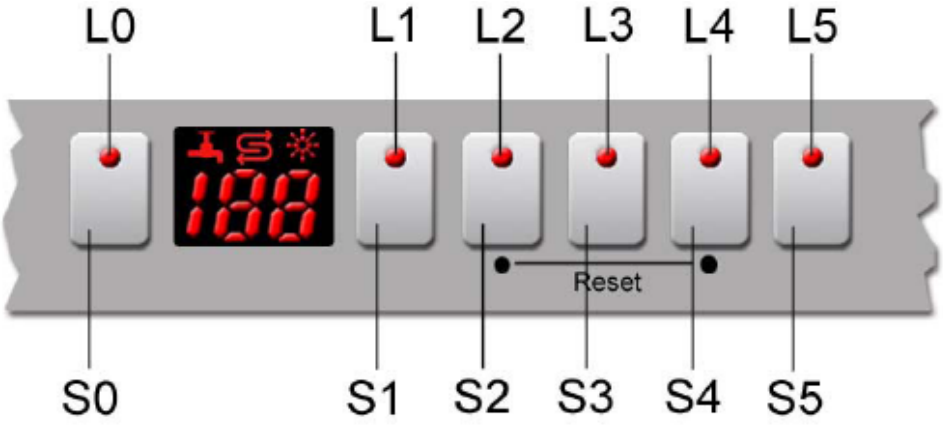
E = Water diverter

F = Info light (optional)

Start up the customer service program before replacing any modules.

Components may be electrostatic!
Instructions on electrostatic hazards are to be observed before a module is replaced.

4.8 IGV 4408.0 operation



4.8.1 LEDs

- Program selection
- Check water intake (optional)
- Clear rinse fill-up display
- Salt refill indicator
- 2½ digit display

4.8.2 Buttons / program selection

Pre-set time (PST)

The time-setting button enables the starting time to be postponed by up to 19 hours (setting between 0h and 19h). The button must be pressed for at least one second.

Saving time (optional)

The rinsing program operation time can be shortened with the „time saver“ function. The consumption of water and energy is raised so that the best results can be achieved while at the same time reducing the operation time.

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.

Vario speed (optional)

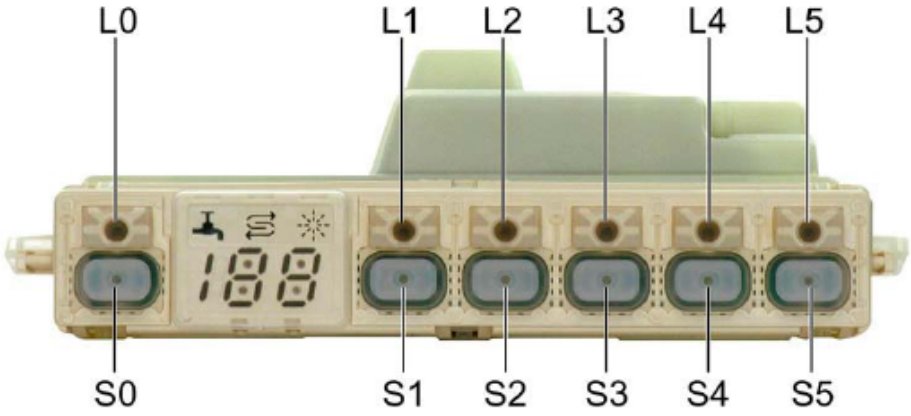
The “Vario speed” function reduces the program running time with a higher water and energy consumption. This is achieved by using more water in the rinse cycle and with water points with two-basket function.

Intensive 70° / Power 75°

The program comprises a pre-rinse at 50°, a washing cycle at 70°, two intermediate rinses, a clear rinse at 70° and a drying cycle.

4.9 Construction components

4.9.1 Module



Tap closed

If the level is not reached after 6 minutes in the filling position:

- The „check water intake“ LED will be activated (optional)
- The program will be discontinued (pumping for 60 sec.)
- The program will be re-started.

The procedure will be repeated twice if the level is still not reached. The controls will then remain in this position until the filling level has been reached. The remaining time which is still left will be maintained.

Regeneration electronics system

On comparing the degree of water hardness set in the appliance, the electronics system determines what quantity of water is possible before the water softener is exhausted.

The quantity of water used is calculated. Regeneration is carried out after the maximum number of rinses possible has been reached.

The discharge behaviour of the regeneration electronics system can be seen in the description under initial operation / replacing the electronics unit.

Warm water recognition

If the water running in for the rinse with a rinsing agent has a temperature exceeding 45°C, the heat exchanger is not filled for the drying stage. In order to guarantee the difference in temperature essential for condensation, the temperature for the rinse with a rinsing agent is raised to 72°C, thus increasing the dishes own heat.

Memory electronics system

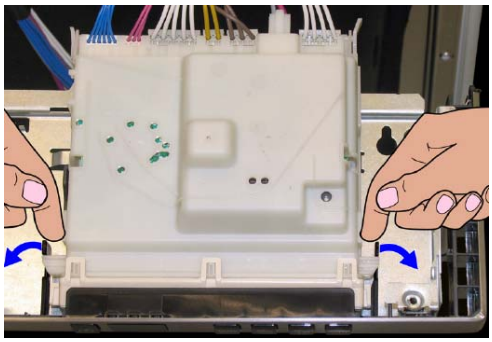
The electronics system has a memory store which registers the last program selected. Should no other program be selected on program start-up, the program selected last will operate.

Power cut

The electronics system has a mains cut-off store which ensures that a rinsing program that has been commenced when a power failure occurs will be continued.

4.9.2 Disassembling the module

1. Remove the furniture front (if fitted).
2. Remove outer door.
3. Loosen the support plate and tilt it forwards.
4. Press the two catches on the module holder outwards and remove the module from the control panel frame.
5. Remove plugs from the module; plugs are coded.



The program buttons are to be taken out of the old module and inserted in the new module before the module is replaced.

4.9.3 Mounting the module

1. Connect plugs from the cable harness to the module.
2. Push the module into the control panel frame until the module is held firmly in place by the two catches.
3. Mount the support plate.
4. Attach outer door.
5. Attach furniture front (if fitted).

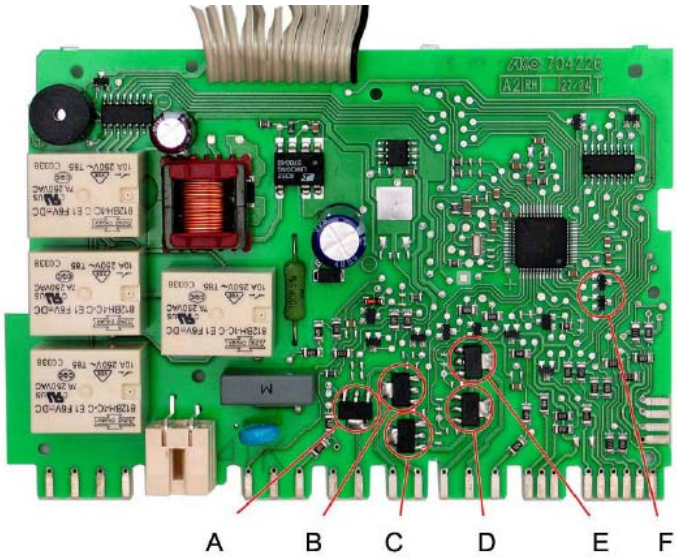
4.9.4 Sensors

All of the signals leaving the door switch, the level switch, the NTC sensor and the refill switches are recorded and evaluated by the microprocessor at the respective point in time.

4.9.5 Activating the consumers

Consumers such as valves, detergent and clear rinse dispensers (actuators) are activated by means of triacs (see photo). The circulation pump, the evacuation pump and the continuous flow heater are activated with relays.

When a module is replaced due to a defective triac it is essential to check the component selected too.



A = Dispenser actuator

B = - - -

C = Regeneration valve

D = Filling valve

E = Water diverter

F = Info light (optional)

Start up the customer service program before replacing any modules.

Components may be electrostatic!
Instructions on electrostatic hazards are to be observed before a module is replaced.

5. Explanation of the rinsing instructions

5.1 Coding instructions for an electronics system with G controls IG 4...

Subsequent to an exchange of the electronic controls which are installed as a standard, the controls have to be coded again with the appliance programs (see table).

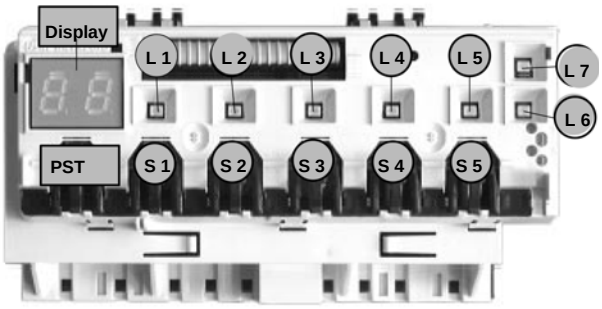
Note: In the case of appliances with 3 or 4 programs/buttons, the control system must be programmed prior to fitting the panel cover.

1. **Instruction**
   Press the buttons S2, S3, S4 and S5 simultaneously, keep them pressed and activate the main switch. The L2 to L5 LEDs will blink as long as the S2 to S5 buttons are being pressed.
   Subsequent to releasing the buttons S2 to S5, the current coding will be indicated as a code on the display (see code chart).
2. **Setting the type of code**
   By pressing the S2 button the various variant codes (see chart) can be set.
3. **Storing the coding**
   On switching off the appliance, the variant/code is stored.

Code table

Code indication in the display	S0	S1	S2	S3	S4	S5	Button Coding
20	PST	Intensive 70°	Normal 65°	ECO 50°	Rapid 35°	Pre-wash	0
21	PST	UB	Normal 65°	ECO 50°	Rapid 35°	Pre-wash	1
22	PST	Normal 65°	ECO 50°	Rapid 35°	Pre-wash		2
23	PST	UB	Normal 65°	ECO 50°	Pre-wash		3
24	PST		Normal 65°	ECO 50°	Pre-wash		4
25	PST	Normal 65°	ECO 50°	Gentle 40°	Rapid 35°		5
26	PST	Normal 65°	ECO 50°*	Rapid 35°	Pre-wash		6
27	PST	Intensive 70°	Normal 65°	ECO 50°*	Rapid 35°	Pre-wash	7

PST = Pre-set time UB = Upper basket rinse *= Energy label A-B-D



Program symbols

Intensive 70° ECO 50° Gentle 40°

Normal 65° Rapid 35° Pre-rinse

5.2 Customer service test program: G controls (with heat exchanger)

No.: 5600 009 884 (Abbreviations see see “Abbreviations / terms” on page 36)

INDEX	Function	Temperature	Time [s]	Sensor	Filling volume DB / UB
0	P		30		
1	PF			F1	
2	F				3.9 / 3.3
3	C + H + TR1 + TR2	max. 72°C			
4	C + H + D	max. 72°C	120		
5	C + H	65°C			
6	C + H + RE	max. 72°C	120		
7	P		60		
8	R + DR		60		
9	P + DR		30		

The customer service special program has been selected if the S2 and S4 buttons are pressed when switching on the dishwasher at the main switch.
The following will be indicated on the control panel:

- LEDs L2 and L4 are flashing.
- As long as both the S2 and S4 buttons are kept pressed after switching on the appliance, the variant coding will be indicated.
  e.g. : 20 = variant 0
  21 = variant 1, and so on.
- The respective LED will light up when one of the program buttons is pressed.
- On pressing the S3 button, the display and the fault indicator LEDs will also light up.
- On pressing the pre-set time button, an 8h will light up in the 7-segment display.

The customer service program is started when the S2 and S4 buttons are pressed. No pre-set time is possible, and the customer service special program is ended when the main switch is switched off.

- The error number is indicated on the display:
  1 = aqua sensor defect **(Note: Indication even if there is no aqua sensor!)**
  2 = heating error
  3 = fault combination of fault 1 + fault 2
  4 = filling error
  5 = fault combination of fault 1 + fault 4
  8 = NTC fault (interruption or short circuit)
  9 = fault combination of fault 1 + fault 8

In the case of a fault combination, the figures are added accordingly.

The upper basket function is activated for the entire program procedure. The next step in the program can be started when the S3 button is activated. If the heating stage is skipped, a heating fault will be indicated. **(Exception: In the filling stage it is only possible to continue to the next stage by means of the filling switch F1)**

5.2.1 Intensive 70° with heat exchanger (G controls)

	INDEX	Function	°C	Time	Sensor	Filling volume	Ignore	Ignore	Ignore	Ignore	Ignore	UB
						Rinsing volume* DB/UB	with CW	with WW	on n.RE.	on RE.	on TR	off
Start	0	P		15								
	1	PF			F1							
	2	F				3.9 / 3.3						
Pre-wash	0	ME + C										
	1	C + H	50°C									
	2	C		120								
	3	C + TR1		30								
	4	C + PF			F1						X	
	5	C + P		30							X	
	6	P		30							X	
	7	PF			F1						X	
	8	F				3.6 / 3.0					X	
Cleaning	0	ME + C										
	1	CR + C										
	2	C + H + RE	max. 72°C	120					X			
	3	C + H + D	max. 72°C	120								
	4	C + H + R	max. 72°C			0.1			X			
	5	C + H	68°C	930								
	6	C + H	68°C									
	7	C + PF			F1					X		
	8	C		540								X
	9	C + P		30								X
	10	P		30								X
	11	P + DR + R				1.2*			X			X
	12	PA		5					X			X
	13	P + DR + R				1.2*			X			X
	14	PA		5					X			X
	15	P + DR + R				1.2*			X			X
	16	PA		5					X			X
	17	P + DR		30					X			X
Intermediate rinse	0	PF			F1							X
	1	F				3.6 / 3.6						X
	2	C		60								X
	3	C + PF			F1							X
	4	C		180								X
	5	P + C		20								
	6	P		40								
	7	PF			F1							
	8	F				3.6 / 3.0						
	9	C		60								
	10	C + PF			F1							
	11	C		180								
	12	P + C		20								
	13	P		40								
Rinse with a rinsing agent	0	PF			F1							
	1	F				3.6 / 3.0						
	2	ME + C										
	3	C + H	55°									
	4	C+H+TR1+TR 2	max. 72°C									
	5	C + H + D	max. 72°C	120								
	6	C + HP	69° (+2°)									
	7	C + H	max. 72°C	120			X					
Drying	0	PA		180								
	1	F				2*		X				
	2	F				0.8*		X				
	3	PA		720								
	4	DR		10								
	5	P		45								
	6	PF			F1			X				
	7	P		30								

5.2.2 Normal 65° with heat exchanger (G controls)

	INDEX	Function	°C	Time	Sensor	Filling volume	Ignore	Ignore	Ignore	Ignore	Ignore	UB
						Rinsing volume* DB/UB	with CW	with WW	on n.RE.	on RE.	on TR	off
Start	0	P		15								
	1	PF			F1							
	2	F				3.9 / 3.3						
Pre-wash	0	C		600								
	1	C + TR1		30								
	2	C + PF			F1						X	
	3	C + P		30							X	
	4	P		30							X	
	5	PF			F1						X	
	6	F				3.6 / 3.0					X	
Cleaning	0	ME + C										
	1	CR + C										
	2	C + H + RE	max. 72°C	120					X			
	3	C + H + D	max. 72°C	120								
	4	C + H + R	max. 72°C			0.1			X			
	5	C + H	65°C	1030								
	6	C + H	65°C									
	7	C + PF			F1					X		
	8	C		540								X
	9	C + P		30								X
	10	P		30								X
	11	P + DR + R				1.2*			X			X
	12	PA		5					X			X
	13	P + DR + R				1.2*			X			X
	14	PA		5					X			X
	15	P + DR + R				1.2*			X			X
	16	PA		5					X			X
	17	P + DR		30					X			X
Intermediate rinse	0	PF			F1							X
	1	F				3.6 / 3.6						X
	2	C		60								X
	3	C + PF			F1							X
	4	C		180								X
	5	P + C		20								
	6	P		40								
	7	PF			F1							
	8	F				3.6 / 3.0						
	9	C		60								
	10	C + PF			F1							
	11	C		180								
	12	P + C		20								
	13	P		40								
Rinse with a rinsing agent	0	PF			F1							
	1	F				3.6 / 3.0						
	2	ME + C										
	3	C + H	55°C									
	4	C+H+TR1+TR2	max. 72°C									
	5	C + H + D	max. 72°C	120								
	6	C + HP	69°C									
	7	C + H	max. 72°C	120								
Drying	0	PA		180								
	1	F				2*						
	2	F				0.8*						
	3	PA		720								
	4	DR		10								
	5	F		45								
	6	PF			F1							
	7	P		30								

5.2.3 ECO 50° with a heat exchanger (G controls)

	INDEX	Function	°C	Time	Sensor	Filling volume	Ignore	Ignore	Ignore	Ignore	Ignore	UB
						Rinsing volume* DB/UB	with CW	with WW	on n.RE.	on RE.	on TR	off
Start	0	P		15								
	1	PF			F1							
	2	F				3.9 / 3.3						
Pre-wash	0	ME + C		120								
	1	CR + C										
	2	C + H + RE	max. 72°C	120					X			
	3	C + H + D	max. 72°C	120								
	4	C + H + R	max. 72°C			0.1			X			
	5	C + H	50°C	1275								
	6	C + H	50°C	105								
Cleaning	7	C + H	50°C									
	8	C		720								
	9	C + PF			F1					X		
	10	C		600								X
	11	C + P		30								X
	12	P		30								X
	13	P + DR + R				0.8*			X			X
	14	PA		5					X			X
	15	P + DR + R				0.8*			X			X
	16	PA		5					X			X
	17	P + DR + R				0.8*			X			X
	18	PA		5					X			X
	19	P + DR		30					X			X
	20	DR + R				0.6*			X			X
	21	DR		5					X			X
Intermediate rinse	0	DR + C		10								X
	1	P		30								X
	2	PF			F1							X
	3	F				3.6 / 3.6						X
	4	C		60								X
	5	C + PF			F1							
	6	C		240								
	7	C + P		20								
	8	P		40								
	9	DR + C		10								
	10	P		30								
Rinse with a rinsing agent	0	PF			F1							
	1	F				3.6 / 3.0						
	2	ME + C										
	3	C + H	55°C									
	4	C+H+TR1+TR2	max. 72°C									
	5	C + H + D	max. 72°C	120								
	6	C + HP	69°C									
	7	C + H	max. 72°C	120			X					
Drying	0	PA		180								
	1	F				2*		X				
	2	F				0.8*		X				
	3	PA		720								
	4	DR		10								
	5	P		45								
	6	PF			F1			X				
	7	P		30								

5.2.4 Gentle 40° with a heat exchanger (G controls)

	INDEX	Function	°C	Time	Sensor	Filling volume	Ignore	Ignore	Ignore	Ignore	Ignore	UB
						Rinsing volume* DB/UB	with CW	with WW	on n.RE.	on RE.	on TR	off
Start	0	P		15								
	1	PF			F1							
	2	F				3.9 / 3.3						
Pre-wash	0	C		600								
	1	C + TR1		30								
	2	C + PF			F1						X	
	3	C + P		30							X	
	4	P		30							X	
	5	PF			F1						X	
	6	F				3.6 / 3.0						
Cleaning	0	ME + C										
	1	CR + C										
	2	C + H + RE	max. 72°C	120					X			
	3	C + H + D	max. 72°C	120								
	4	C + H + R	max. 72°C			0.1			X			
	5	C + H	40°C	400								
	6	C + H	40°C									
	7	C + PF			F1					X		
	8	C		300								X
	9	C + P		30								X
	10	P		30								X
	11	P + DR + R				1.2*			X			X
	12	PA		5					X			X
	13	P + DR + R				1.2*			X			X
	14	PA		5					X			X
	15	P + DR + R				1.2*			X			X
	16	PA		5					X			X
	17	P + DR		30					X			X
Intermediate rinse	0	PF			F1							X
	1	F				3.6 / 3.6						X
	2	C		120								X
	3	C + PF			F1							X
	4	C		120								X
	5	P + C		20								
	6	P		40								
Rinse with a rinsing agent	0	PF			F1							
	1	F				3.6 / 3.0						
	2	ME + C										
	3	C + H	50°C									
	4	C+H+TR1+TR 2	max. 72°C									
	5	C + H + D	max. 72°C	120								
	6	C + HP	55°C									
	7	C	max. 72°C	120								
	8	C + H		120			X					
Drying	0	PA		180								
	1	F				2*		X				
	2	F				0.8*		X				
	3	PA		720								
	4	DR		10								
	5	P		45								
	6	PF			F1			X				
	7	P		30								

5.2.5 Fast 35° with a heat exchanger (G controls)

	INDEX	Function	°C	Time	Sensor	Filling volume	Ignore	Ignore	Ignore	Ignore	Ignore	UB
						Rinsing volume* DB/UB	with CW	with WW	on n.RE.	on RE.	on TR	off
Start	0	P		15								
	1	PF			F1							
	2	F				3.9 / 3.3						
Cleaning	0	ME + C										
	1	CR + C										
	2	C + H + RE	max. 72°C	120					X			
	3	C + H + D	max. 72°C	120								
	4	C + H + R	max. 72°C			0.1			X			
	5	C + H	30°C									
	6	C + H	max. 72°C							X		
	7	C + PF	max. 72°C	30	F1							X
	8	C		30								X
	9	C + P		30								X
	10	P				1.2*			X			X
	11	P + DR + R		5					X			X
	12	PA				1.2*			X			X
	13	P + DR + R		5					X			X
	14	PA				1.2*			X			X
	15	P + DR + R		5					X			X
	16	PA		30					X			X
Intermediate rinse	0	PF			F1							X
	1	F				2.8 / 2.8						X
	2	C + PF			F1							X
	3	P + C		20								
	4	P		40								
Rinse with a rinsing agent	0	PF			F1							
	1	F				3.6 / 3.0						
	2	ME + C										
	3	C + H	50°C									
	4	C+H+TR1+TR 2	max. 72°C									
	5	C + H + D	max. 72°C	120								
	6	C + HP	55°C									
	7	C + H	max. 72°C	60								
	8	C + H	max. 72°C	120			X					
Drying	0	P		45								
	1	PF			F1			X				
	2	P		15								

5.2.6 Pre-rinse with a heat exchanger (G controls)

	INDEX	Function	°C	Time	Sensor	Filling volume	Ignore	Ignore	Ignore	Ignore	Ignore	UB
						Rinsing volume* DB/UB	with CW	with WW	on n.RE.	on RE.	on TR	off
Start	0	P		15								
	1	PF			F1							
	2	F				3.9 / 3.3						
Drying	0	C		600								
	1	C + PF			F1							
	0	C + P		30								
	1	P		30								

5.2.7 Recovery stages for G controls

Incoming water hardness level	Number of rinses between recovery (ECO 50°C)	Softener capacity	Range setting
[°d]		[l]	
0 ... 6	22	286	0
7 ... 8	11	143	1
9 ... 10	8	104	2
11 ... 12	5	65	3
13 ... 16	4	52	4*
17 ... 21	3	39	5
22 ... 30	2	26	6
31 ... 50	1	13	7

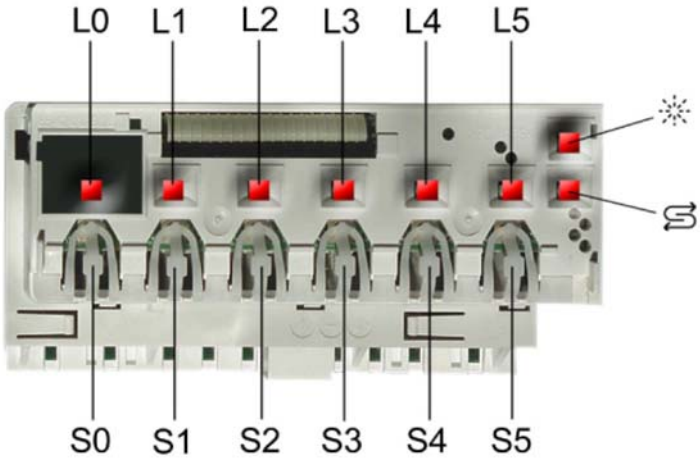
* = Factory setting

5.2.8 Abbreviations / terms

C = Circulate
CR = Check regeneration
CW = Cold water
D = Dispenser - cleaning agent/rinsing agent
DB = Double basket rinse
DR = Drain rinse (heat exchanger)
F = Filling
H = Heating
HP = Heating plus (temperature increase of 2°C)
ME = Measure the inflow temperature
P = Pumping
PA = Pause
PF = Pre-fill (by means of F1 – level switch)
R = Rinse (softener)
RE = Regeneration/recovery
TR1 = Measure turbidity
TR2 = Calibrate the turbidity sensor
UB = Upper basket rinse
WW = Warm water

5.3 H controls operation

The electronics system comprises two modules installed in a cabinet. The control/output modul is connected to the operating/indicating module by means of a flat cable.



5.3.1 Function

LEDs

- Program selection
- Clear rinse fill-up display
- Salt refill indicator
- End of program

5.3.2 Buttons / program selection

Intensive 70°

The program comprises a pre-rinse at 50°, a washing cycle at 70°, two intermediate rinses, a clear rinse at 69° and a drying cycle.

Normal 65°

The program comprises a pre-rinse cycle, a washing cycle at 65°, two intermediate rinses, a clear rinse at 70° and a drying cycle.

ECO 50°

The program comprises cleaning at 50°, an intermediate rinse, rinsing with a rinsing agent at 66°, and drying.

Rapid 35°

The program comprises cleaning at 35°, an intermediate rinse, rinsing with a rinsing agent at 55°, and no drying.

Pre-wash

The program only comprises a cold rinse for the dishes.

5.3.3 Program reset

With the appliance switched on, press the S2 button and the S4 button simultaneously for 3 seconds. The water will be pumped off for approx. 1 minute. The cleaning agent compartment should then be closed, so that the dispensing device is also reset.

5.3.4 Special functions

Setting the hardness range

Keep the S3 button pressed and switch on the appliance. The LED for fill-up salt will blink. The fault is indicated by means of the program LEDs (see chart). The setting rises once every time the S3 button is pressed. If the appliance is switched off, the setting is stored.

	°dH	°fH	°Clarke	mmol / l	LEDs		
					L2	L3	L4
0	0 - 6	0 - 11	0 - 8	0 - 1.1	O	O	O
1	7 - 14	12 - 25	9 - 18	1.2 - 2.5	●	O	O
2	15 - 21	26 - 37	19 - 26	2.6 - 3.7	●	●	O
3	22 - 35	38 - 60	27 - 44	3.8 - 6.2	●	●	●

Series setting = 2

5.3.5 General instructions on the controls

Tap closed

The appliance stops operating 6 minutes into the program procedure (filling position interrogation). The remaining operating period is indicated as before in the display. The controls remain in this position until the filling level has been reached.

Regeneration electronics system

The electronics system uses the water hardness level setting of the dishwasher to determine how many rinses are possible before the softening unit is exhausted.

The number of rinses carried out is counted. Regeneration is carried out after the maximum number of rinses possible has been reached.

Warm water recognition

If the water which is taken into the dishwasher for a clear rinse is warmer than 45 °C, the temperature in the clear rinse cycle will be heated up to 72 °C, hence raising the temperature of the dishes themselves.

Memory electronics system

The electronics system has a memory store which registers the last program selected. Should no other program be selected on program start-up, the program selected last will operate.

Power cut

The electronics system has a mains cut-off store which ensures that a rinsing program that has been commenced when a power failure occurs will be continued.

Sensors

All of the signals leaving the door switch, the level switch, the NTC sensor and the refill switches are recorded and evaluated by the microprocessor at the respective point in time.

Consumers

Consumers such as valves, detergent and clear rinse dispensers (actuators) are activated by means of triacs. The circulation pump, the evacuation pump and the continuous flow heater are activated with relays.

R5 = Filling level

R6 = Filling level

TY6 = Drain valve heat exchanger

TY7 = Dispenser actuator

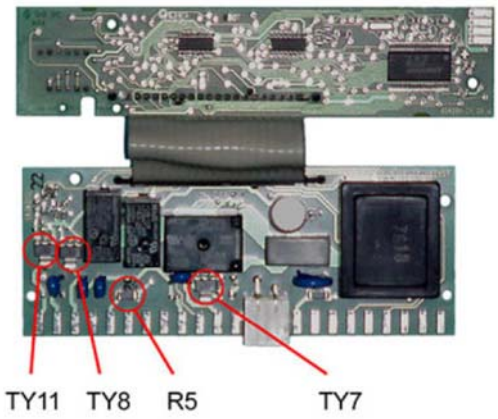
TY8 = Regeneration valve

TY9 = Filling valve

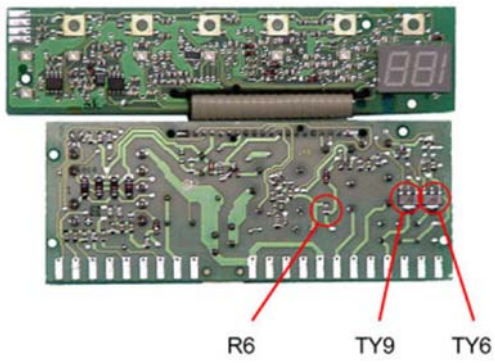
TY11 = Actuator top basket valve / Water diverter

When a module is replaced due to a defective triac it is essential to check the component selected too.

Face



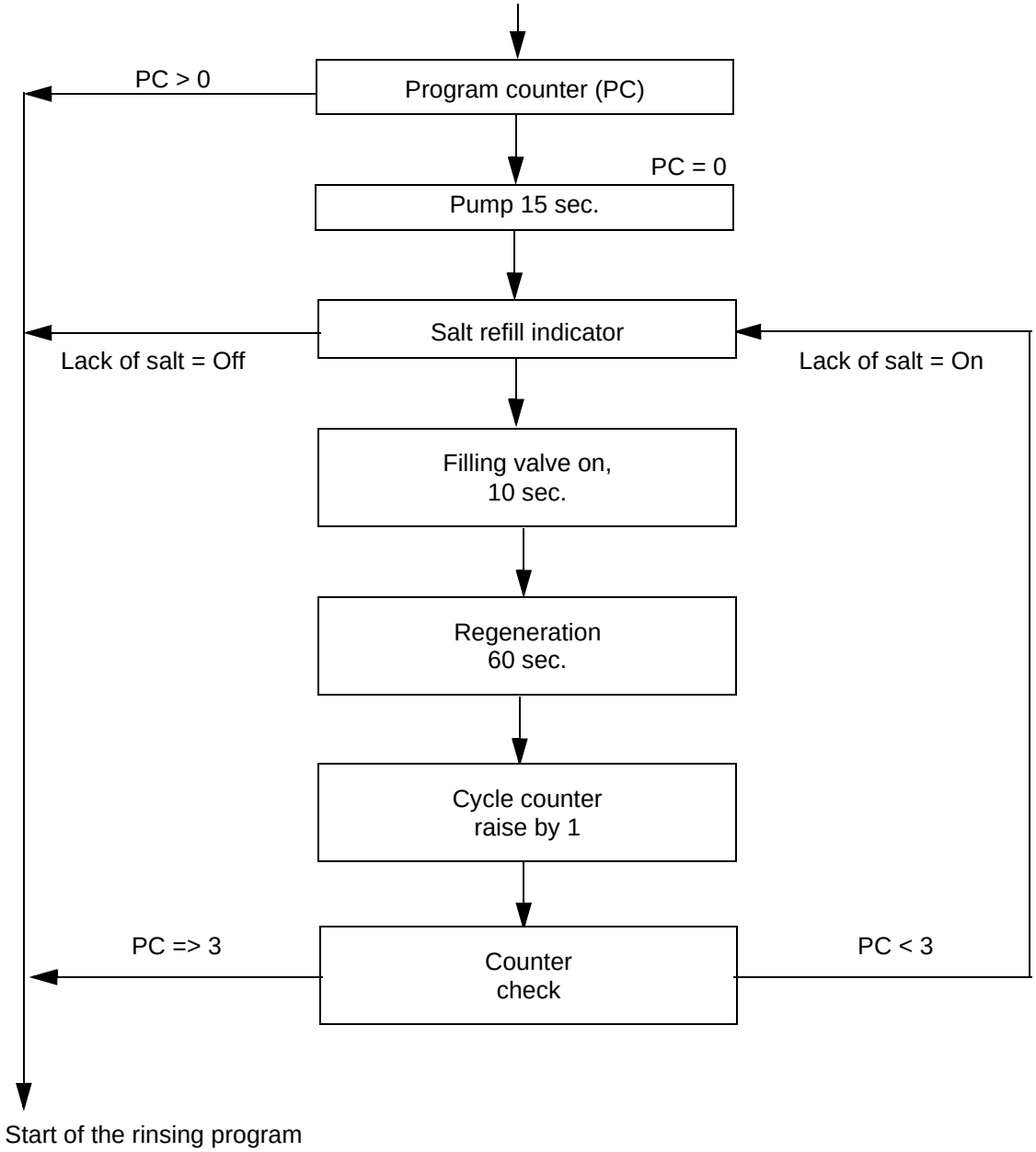
Rear



Procedure for initial start-up - appliances without a heat exchanger

In the case of initial operation or electronics exchange, the following program procedure is to be observed.

Program counter = 0!



5.4 Coding instructions for an electronics system with H controls

Subsequent to an exchange of the electronic controls which are installed as a standard, the controls have to be coded again with the appliance programs (see table).

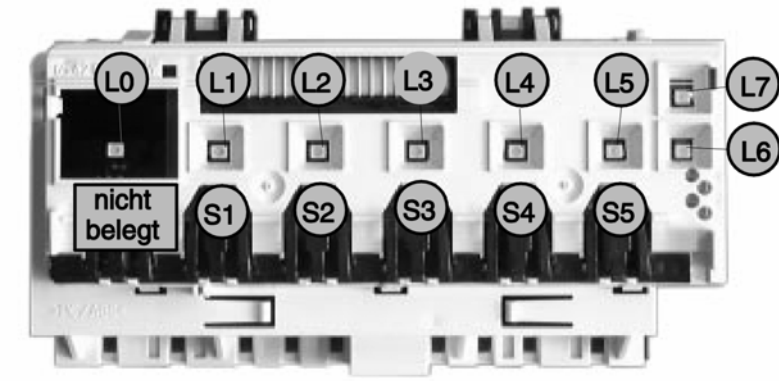
Note: In the case of appliances with 3 programs/buttons, the control system must be programmed prior to fitting the panel cover.

1. **Instruction**
   Press the buttons S2, S3, S4 and S5 simultaneously, keep them pressed and activate the main switch. The L2 to L5 LEDs will blink as long as the S2 to S5 buttons are being pressed.
   Subsequent to releasing the buttons S2 to S5, the current coding will be indicated as a binary code (see code chart) on the LEDs L2, L3 and L4.
2. **Setting the type of code**
   By pressing the S2 button the various variant codes (see chart) can be set.
3. **Storing the coding**
   On switching off the appliance, the variant/code is stored.

Code table

Coding	S1	S2	S3	S4	S5	LED 2	LED 3	LED 4
0	Intensive 70°	Normal 65°	ECO 50°	Rapid 35°	Pre-wash	O	O	O
1		Normal 65°	ECO 50°	Rapid 35°	Pre-wash	X	O	O
2		Normal 65°	ECO 50°	Pre-wash		O	X	O
3						X	X	O

LED off = O LED flashing = X



Program symbols

Intensive 70°

ECO 50°

Normal 65°

Rapid 35°

Pre-rinse

5.5 Customer service test program: H controls (without heat exchanger)

No.: 5600 009 888 (Abbreviations see “Abbreviations / terms” on page 36)

INDEX	Function	Temperature	Time [s]	Sensor	Filling quantity DB / UB
0	P		30		
1	PF			F1	
2	F				3.9
3	C + H + D	max. 72°C	120		
4	C + H	65°C			
5	C + H + RE	max. 72°C	120		
6	P		60		
7	R		60		
8	P		30		

The test program has been selected if the S2 and S4 buttons are pressed when switching on the dishwasher at the main switch.

The following will be indicated on the control panel:

- LEDs L2 and L4 blink.
- As long as both the S2 and S4 buttons are kept pressed after switching on the appliance, the variant code will be indicated as a binary code by means of the L2, L3 and L4.
  e.g. L2 always on = variant 1
  L2 + L3 always on = variant 3, and so on.
- The respective LED will light up when one of the program buttons is pressed.
- On pressing the S3 button, the fault indicators and the end LEDs will also light up.

The customer service program is started when the S2 and S4 buttons are pressed. The customer service test routine ends when the main switch is switched off.

- The fault is indicated by means of the program LEDs:

  L2 always on = heating fault
  L3 always on = filling fault
  L4 always on = NTC fault (interruption or short circuit)

The next step in the program can be started when the S3 button is activated.
(Exception: In the filling stage it is only possible to continue to the next stage by means of the filling switch F1).

5.5.1 Intensive 70° without a heat exchanger (H controls)

	INDEX	Function	Temperature °C	Time	Sensor	Filling volume
						((Rinsing volume)
Start	0	P		15		
	1	PF			F1	
	2	F				3.9
Pre-wash	0	C + H	50°C			
	1	C		120		
	2	C + P		30		
	3	P		30		
	4	PF			F1	
	5	F				3.6
Cleaning	0	C + H	max. 72°C	90		
	1	C + H + RE	max. 72°C	120		
	2	C + H + D	max. 72°C	120		
	3	C + H + R	max. 72°C			0.1
	4	C + H	max. 72°C	1275		
	5	C + H	68°C	25		
	6	C + H	68°C			
	7	C		600		
	8	C + P		30		
	9	P		30		
	10	P + R				1.2*
	11	PA		5		
	12	P + R				1.2*
	13	PA		5		
	14	P + R				1.2*
	15	PA		5		
	16	P		30		
Intermediate rinse	0	PF			F1	
	1	F				3.6
	2	C		240		
	3	C + P		20		
	4	P		40		
	5	PF			F1	
	6	F				3.6
	7	C		240		
	8	C + P		20		
	9	P		40		
Rinse with a rinsing agent	0	PF			F1	
	1	F				3.6
	2	C + H	55°C			
	3	C + H + D	max. 72°C	120		
	4	C + H	71°C			
Drying	0	P		60		
	1	PA		780		
	2	P		15		

5.5.2 Normal 65° without a heat exchanger (H controls)

	INDEX	Function	Temperature °C	Time	Sensor	Filling volume
						((Rinsing volume)
Start	0	P		15		
	1	PF			F1	
	2	F				3.9
Pre-wash	0	C	50°C	600		
	1	C + P		30		
	2	P		30		
	3	PF			F1	
	4	F				3.6
Cleaning	0	C + H	max. 72°C	90		
	1	C + H + RE	max. 72°C	120		
	2	C + H + D	max. 72°C	120		
	3	C + H + R	max. 72°C			0.1
	4	C + H	65°C	1275		
	5	C + H	65°C	25		
	6	C + H	65°C			
	7	C		600		
	8	C + P		30		
	9	P		30		
	10	P + R				1.2*
	11	PA		5		
	12	P + R				1.2*
	13	PA		5		
	14	P + R				1.2*
	15	PA		5		
	16	P		30		
Intermediate rinse	0	PF			F1	
	1	F				3.6
	2	C		240		
	3	C + P		20		
	4	P		40		
	5	PF			F1	
	6	F				3.6
	7	C		240		
	8	C + P		20		
	9	P		40		
Rinse with a rinsing agent	0	PF			F1	
	1	F				3.6
	2	C + H	55°C			
	3	C + H + D	max. 72°C	120		
	4	C + H	71°C			
Drying	0	P		60		
	1	PA		780		
	2	P		15		

5.5.3 ECO 50° without a heat exchanger (H controls)

	INDEX	Function	Temperature °C	Time	Sensor	Filling volume
						((Rinsing volume)
Start	0	P		15		
	1	PF			F1	
	2	F				3.9
Cleaning	0	C		120		
	1	C + H + RE	max. 72°C	120		
	2	C + H + D	max. 72°C	120		
	3	C + H + R	max. 72°C			0.1
	4	C + H	50°C	1275		
	5	C + H	50°C	105		
	6	C + H	50°C			
	7	C		1275		
	8	C		105		
	9	C + P		30		
	10	P		30		0.8*
	11	P + R				
	12	PA		5		0.8*
	13	P + R				
	14	PA		5		0.8*
	15	P + R				
	16	PA		5		
	17	P		30		
Intermediate rinse	0	C + R				0.6*
	1	P		30		
	2	PF			F1	
	3	F				3.6
	4	C		300		
	5	C + P		20		
	6	P		40		
	7	C + R				0.6
	8	P		45		
Rinse with a rinsing agent	0	PF			F1	
	1	F				3.6
	2	C + H	55°C			
	3	C + H + D	max. 72°C	120		
	4	C + H	71°C			
Drying	0	P		60		
	1	PA		780		
	2	P		15		

5.5.4 Fast 35° without a heat exchanger (H controls)

	INDEX	Function	Temperature °C	Time	Sensor	Filling volume
						((Rinsing volume)
Start	0	P		15		
	1	PF			F1	
	2	F				3.9
Cleaning	0	C + H	max. 72°C	90		
	1	C + H + RE	max. 72°C	120		
	2	C + H + D	max. 72°C	120		
	3	C + H + R	max. 72°C			0.1
	4	C + H	30°C			
	5	C + P		30		
	6	C		30		
	7	P + R				1.2*
	8	PA		5		
	9	P + R				1.2*
	10	PA		5		
	11	P + R				1.2*
	12	PA		5		
	13	P		30		
Intermediate rinse	0	PF			F1	
	1	F				2.8
	2	C		60		
	3	C + P		20		
	4	P		40		
Rinse with a rinsing agent	0	PF			F1	
	1	F				3.6
	2	C + H	50°C			
	3	C + H + D	max. 72°C	120		
	3	C + H	55°C			
	4	C + H	max. 72°C	60		
Drying	0	P		60		

5.5.5 Pre-rinse without a heat exchanger (H controls)

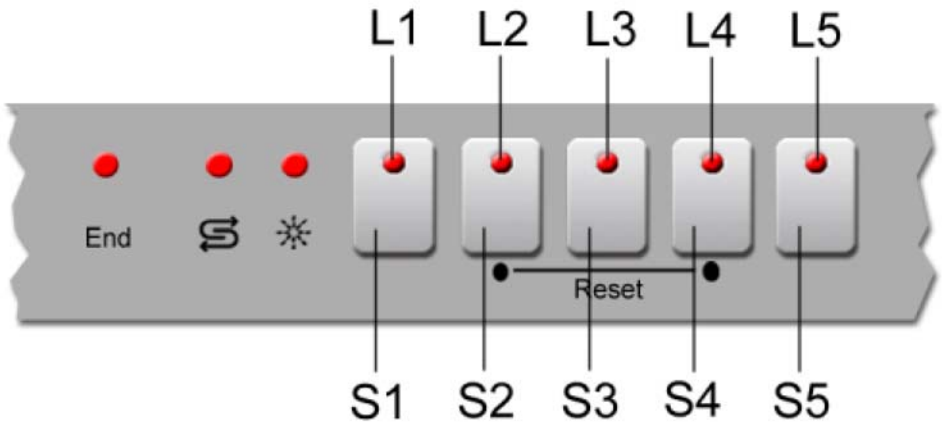
	INDEX	Function	Temperature °C	Time	Sensor	Filling volume
						((Rinsing volume)
Start	0	P		15		
	1	PF			F1	
	2	F				3.9
Pre-wash	0	C		600		
	0	C + P		30		
	1	P		30		

5.6 Trouble shooting

H controls / Module

Customer information	Cause	Remedy
Program time too long	• Alternating rinsing technology • Energy saving	• Advise the customer and give information on consumption data and alternate rinsing.
Component is not actuated	• Triac on the module does not switch properly, smoke traces may be visible on the module.	• Before replacing the module, always measure the connected consumers (valves, actuators, etc.). Observe safety instructions.
Scorched connections	• Connector plug	• The plug repair set (spare-part no. 43 48 79) can be used for defect electronic control connections.

5.7 W controls operation



5.7.1 Function

LEDs

- Program selection
- Clear rinse fill-up display
- Salt refill indicator
- End of program

Buttons / program selection

Intensive 70°
The program comprises a pre-rinse at 50°, a washing cycle at 70°, three intermediate rinses, a clear rinse at 70° and a drying cycle.

Normal 65°
The program comprises a pre-rinse cycle, a washing cycle at 65°, two intermediate rinses, a clear rinse at 69° and a drying cycle.

ECO 50°
The program comprises cleaning at 50°, an intermediate rinse, rinsing with a rinsing agent at 62°, and drying.

Gentle 40°
The program comprises a pre-rinse cycle, a washing cycle at 40°, an intermediate rinse, a clear rinse at 55° without a drying cycle.

Rapid 35°
The program comprises cleaning at 35°, an intermediate rinse, rinsing with a rinsing agent at 55°, and no drying.

Pre-wash
The program only comprises a cold rinse for the dishes.

5.7.2 Program reset

With the appliance switched on, press the S2 button and the S4 button simultaneously for 3 seconds. The water will be pumped off for approx. 1 minute. The cleaning agent compartment should then be closed, so that the dispensing device is also reset.

5.7.3 Special functions

Setting the hardness range

Keep the S3 button pressed and switch on the appliance. The LED for fill-up salt will blink. The fault is indicated by means of the program LEDs (see chart). The setting rises once every time the S3 button is pressed. If the appliance is switched off, the setting is stored.

	°dH	°fH	°Clarke	mmol / l	LEDs		
					L2	L3	L4
0	0 - 6	0 - 11	0 - 8	0 - 1.1	O	O	O
1	7 - 16	12 - 29	9 - 20	1.2 - 2.9	●	O	O
2	17 - 21	30 - 37	21 - 26	3.0 - 3.7	●	●	O
3	22 - 35	38 - 60	27 - 44	3.8 - 6.2	●	●	●

Series setting = 2

5.7.4 General instructions on the controls

Tap closed

The appliance stops operating 6 minutes into the program procedure (filling position interrogation). In the control, the selected program LED lights up constantly. The controls remain in this position until the filling level has been reached.

Regeneration electronics system (optional)

The electronics system uses the water hardness setting of the dishwasher to determine how much water can be used before the water softening unit is exhausted.

The quantity of water used is calculated. Regeneration is carried out after the maximum number of rinses possible has been reached.

Please note If the new control unit is used for appliances with a mechanical hardness level setting (adjusted on the salt box), the hardness level is to be set at the highest setting on the electronics unit. The hardness level will still be adjusted mechanically.

Warm water recognition

If the water running in for the rinse with a rinsing agent has a temperature exceeding 45 °C, the heat exchanger is not filled for the drying stage. In order to guarantee the difference in temperature essential for condensation, the temperature for the rinse with a rinsing agent is raised to 72 °C, thus increasing the dishes own heat.

Setting the buzzer (from FD8012)

Press the S3 button and the main switch simultaneously with the door open. The LED above button 3 will blink. The buzzer can be activated or deactivated by pressing the S3 button. If the appliance is switched off, the setting is stored.

Memory electronics system

The electronics system has a memory store which registers the last program selected. Should no other program be selected on program start-up, the program selected last will operate.

Power cut

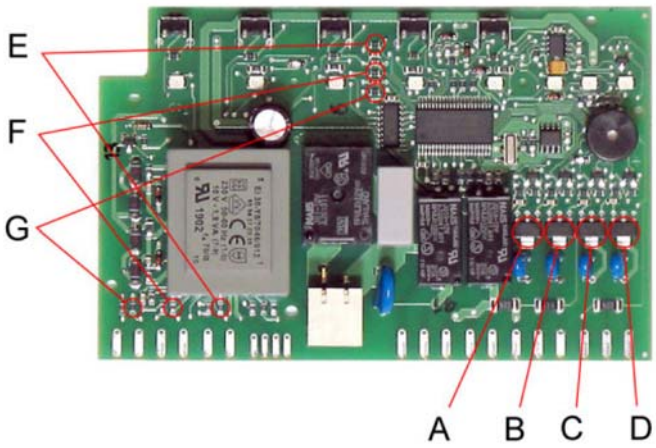
The electronics system has a mains cut-off memory which ensures that a rinsing program that has been commenced when a power failure occurs will be continued.

Sensors

All of the signals leaving the door switch, the level switch, the NTC sensor and the refill switches are recorded and evaluated by the microprocessor at the respective point in time.

Consumers

Consumers such as valves, detergent and clear rinse dispensers (actuators) are activated by means of triacs. The circulation pump, the evacuation pump and the continuous flow heater are activated with relays.



A = Dispenser actuator

B = Drain valve heat exchanger

C = Filling valve

D = Regeneration valve

E = R106, R108 clear rinse fill-up

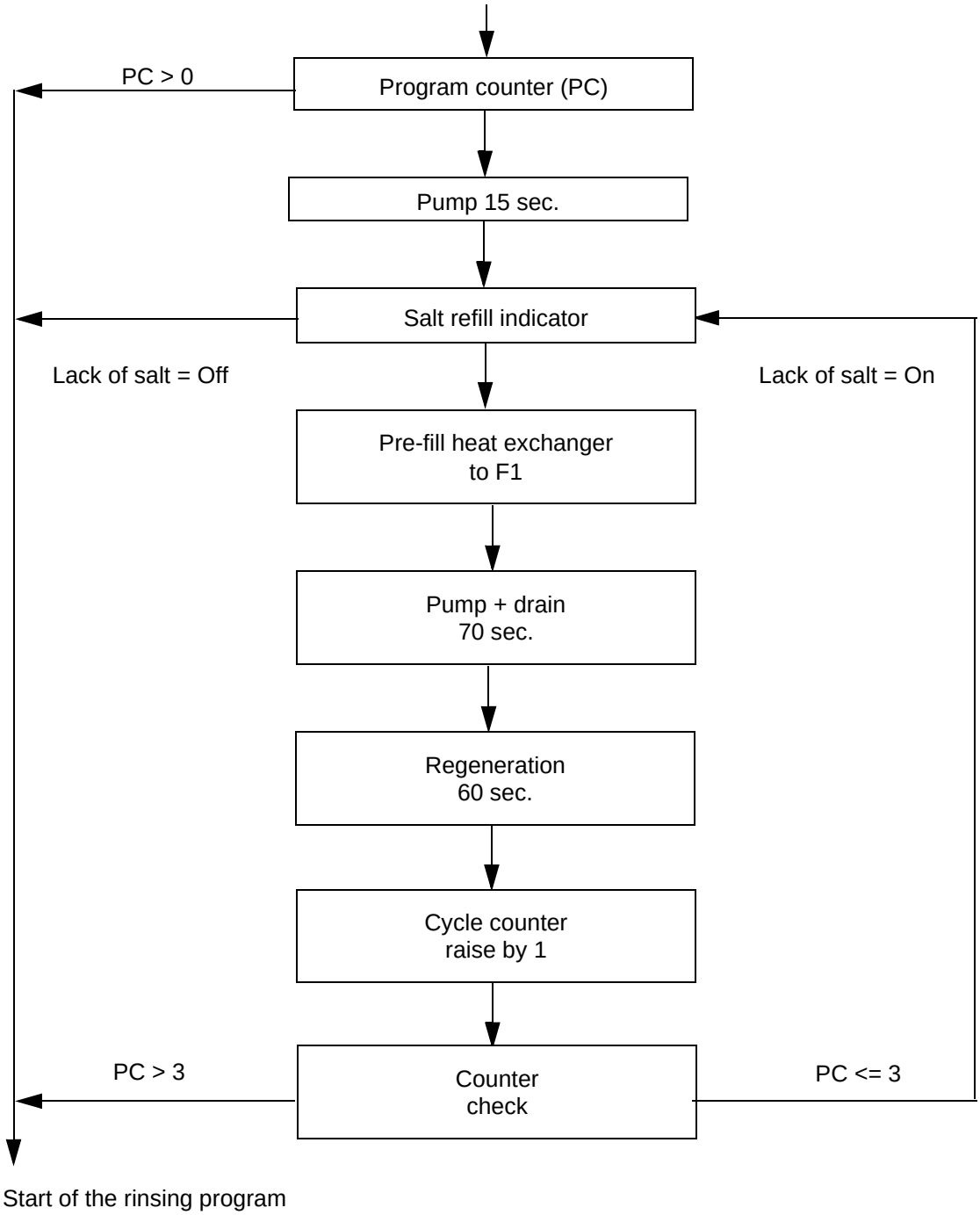
F = R100, R102 NTCl

G = R112, R114 Lack of salt

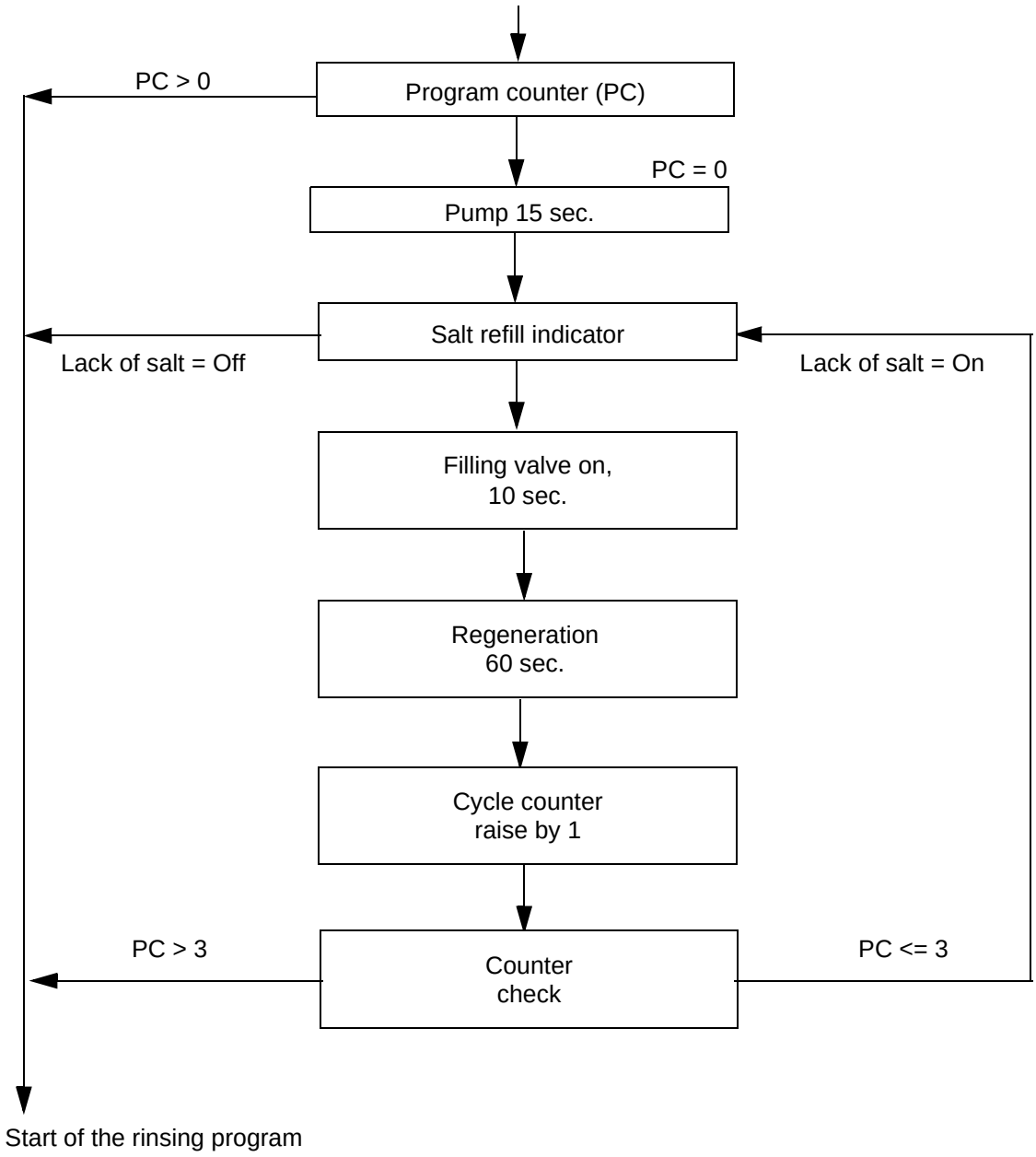
5.8 Initial operation / electronics exchange

In the case of initial operation or electronics exchange, the following program procedure is to be observed. (Program counter = 0!)

Procedure for initial start-up - appliances with a heat exchanger



Procedure for initial start-up - appliances without a heat exchanger



5.9 Coding instructions for an electronics system with W controls
(IGV 449.2)

Subsequent to an exchange of the electronic controls which are installed as a standard, the controls have to be coded again with the appliance programs (see table).

Note: In the case of appliances with 3 programs/buttons, the control system must be programmed prior to fitting the panel cover.

1. **Instruction**
   Press the buttons S2, S3, S4 and S5 simultaneously, keep them pressed and activate the main switch. The L1 to L4 LEDs will blink as long as the S2 to S5 buttons are being pressed.
   Subsequent to releasing the buttons S2 to S5, the current coding will be indicated as a binary code (see code chart) on the LEDs L1, L2 and L3.

2. **Setting the type of code**
   By means of pressing the S2 button, the various types of codes according to the program coding (see table) can be set.
   Every time the S2 button is pressed the new code will be stored.

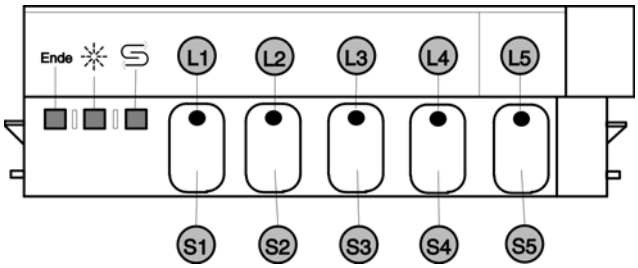
3. **Storing the coding**
   The new coding can be stored by means of switching off the appliance.

Code table

Coding	S1	S2	S3	S4	S5	LED 1	LED 2	LED 3
0	Normal 65°	ECO 50°	Pre-wash			O	O	O
1	Normal 65°	ECO 50°	Pre-wash			X	O	O
2	Normal 65°	ECO 50°	Quick	Pre-wash		O	X	O
3	Intensive 70°	Normal 65°	ECO 50°	Quick	Pre-wash	X	X	O
4	Normal 65°	ECO 50°	Gentle	Quick	Pre-wash	O	O	X
5	Intensive 70°	Normal 65°	ECO 50°	Gentle	Quick	X	O	X
6	Intensive 70°	Normal 65°	ECO 50°	Gentle	Pre-wash	O	X	X
7						X	X	X

LED off = O LED flashing = X

-



Program symbols

Intensive 70°

ECO 50°

Gentle 40°

Normal 65°

Rapid 35°

Pre-rinse

5.10 Customer service test program: W controls (IGV 449.2)

INDEX	Function	Temperature	Time [s]	Sensor	Filling volume DB / UB
1	P		30		
2	PF			F1	
3	F				3.9* / 4.5**
4	C + H + D	max. 72°C	120		
5	C + H	65°C			
6	C + H + RE	max. 72°C	120		
7	P		60		
8	R + DR		60		
9	P + DR		30		

* for a width of 45 cm, ** for a width of 60 cm
(Abbreviations see page see “Abbreviations / terms” on page 36

The customer service program is selected if, with the door open, the S1 and S3 buttons are pressed when switching on the dishwasher at the main switch.

The following will be indicated on the control panel:

- LEDs L1 and L3 blink.
- As long as both the S1 and S3 buttons are kept pressed after switching on the appliance, the variant coding will be indicated as a binary code by means of L1, L2 and L3.
  e.g.: L1 always on = variant 1
  L1 + L2 always on = variant 3, and so on.
- The respective LED will light up when one of the program buttons is pressed.
- On pressing the S2 button, the fault indicators and the end LEDs will also light up.

Activate the S1 and S3 buttons once again in order to start the customer service program.
The special customer service program ends when the main switch is switched off.

The fault is indicated by means of the program LEDs:

L1 always on = variant 1

L1 always on = heating fault

L2 always on = filling fault

L3 always on = NTC fault (interruption or short circuit)

The next step in the program can be started when the S3 button is activated.
(Exception: In the filling stage it is only possible to continue to the next stage by means of the filling switch F1)

5.10.1 Normal 65° with a heat exchanger (W controls)

	INDEX	Function	Temperature °C	Time (s)	Sensor	Filling volume	Ignore	Ignore
						((Rinsing volume)	with CW	with WW
Start	0	P		15				
	1	PF			F1			
	2	F				3.9		
Pre-wash	0	C		600				
	1	C + PF			F1			
	2	C + P		30				
	3	P		30				
	4	PF			F1			
	5	F				3.6		
Cleaning	0	C + H + RE	max. 72°C	120				
	1	C + H + D	max. 72°C	120				
	2	C + H + R	max. 72°C			0.1		
	3	C + H	65°C	1030				
	4	C + H	65°C					
	5	C		540				
	6	C + P		30				
	7	P		30				
	8	P + DR + R				1.2		
	9	PA		5				
	10	P + DR + R				1.2		
	11	PA		5				
	12	P + DR + R				1.2		
	13	PA		5				
	14	P + DR		30				
Intermediate rinse	0	PF			F1			
	1	F				3.6		
	2	ME + C						
	3	C + H	55°C		F1			
	4	C		180				
	5	C + P		20				
	6	P		40				
	7	PF			F1			
	8	F				3.6		
	9	C		60				
	10	C + PF			F1			
	11	C		180				
	12	C + P		20				
	13	P		40				
Rinse with a rinsing agent	0	PF			F1			
	1	F				3.6		
	2	ME + C						
	3	C + H	55°C					
	4	C + H + D	max. 72°C	120				
	5	C + H	69°C					
	6	C + H	max. 72°C	120			X	
	7	C		15				
Drying	0	P		45				
	1	PA		180				
	2	PF			F1			X
	3	PA		720				
	4	DR		5				
	5	P		45				
	6	PF			F1			X
	7	P		30				X

* calculated quantity of water

5.10.2 ECO 50° without a heat exchanger (W controls)

	INDEX	Function	Temperature °C	Time (s)	Sensor	Filling volume	Ignore	Ignore
						(Rinsing volume)	with CW	with WW
Start	0	P		15				
	1	PF			F1			
	2	F				3.9		
Cleaning	0	C		120				
	1	C + H + RE	max. 72°C	120				
	2	C + H + D	max. 72°C	120				
	3	C + H + R	max. 72°C					
	4	C + H	47°C	1275		0.1		
	5	C + H	47°C	105				
	6	C + H	47°C					
	7	C		720				
	8	C		600				
	9	C + P		30				
	10	P		30				
	11	P + DR + R				0.8		
	12	PA		5				
	13	P + DR + R				0.8		
	14	PA		5				
	15	P + DR + R				0.8		
	16	PA		5				
	17	P + DR				0.6		
	18	DR + R				0.6		
	19	DR		5				
Intermediate rinse	0	C + A		10				
	1	P		30				
	2	PF			F1			
	3	F				3.6		
	4	C		60				
	5	C + PF			F1			
	6	C		240				
	7	C + P		20				
	8	P		40				
	9	C + A		10				
	10	P		30				
Rinse with a rinsing agent	0	PF			F1			
	1	F				3.6		
	2	ME + C						
	3	C + H	55°C					
	4	C + H + D	max. 72°C	120				
	5	C + H	69°C					
	6	C + H	max. 72°C	120			X	
	7	C		15				
Drying	0	P		45				
	1	PA		180				
	2	PF			F1			X
	3	PA		720				
	4	DR		5				
	5	P		45				
	6	PF			F1			X
	7	P		30				X

5.10.3 Fast 35° with a heat exchanger (W controls)

	INDEX	Function	Temperature °C	Time (s)	Sensor	Filling volume	Ignore	Ignore
						(Rinsing volume)	with CW	with WW
Start	0	P		15				
	1	PF			F1			
	2	F				3.9		
Cleaning	0	C + H + RE	max. 72°C	120				
	1	C + H + D	max. 72°C	120				
	2	C + H + R	max. 72°C			0.1		
	3	C + H	30°C					
	4	C + H		30				
	5	C + P		30				
	6	P		30				
	7	P + DR + R				1.2		
	8	PA		5				
	9	P + DR + R				1.2		
	10	PA		5				
	11	P + DR + R				1.2		
	12	PA		5				
	13	P + DR		30				
Intermediate rinse	0	PF			F1			
	1	F				3.6		
	2	C + PF			F1			
	3	P + C		20				
	4	P		40				
Rinse with a rinsing agent	0	PF			F1			
	1	F				3.6		
	2	ME + C						
	3	C + H	50°C					
	4	C + H + D	max. 72°C	120				
	5	C + H	55°C					
	6	C + H	max. 72°C	60				
	7	C + H	max. 72°C	120			X	
	8	C		15				
Drying	0	P		45				
	1	PF			F1			X
	2	P		15				

5.10.4 Pre-rinse without a heat exchanger (W controls)

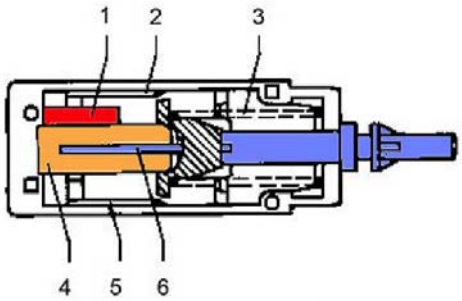
	INDEX	Function	Temperature °C	Time (s)	Sensor	Filling volume	Ignore	Ignore
						((Rinsing volume)	with CW	with WW
Start	0	P		15				
	1	PF			F1			
	2	F				3.9		
Drying	0	C		600				
	1	C + PF			F1			
	0	C + P		30				
	1	P		30				

6. Construction components

6.1 Actuator

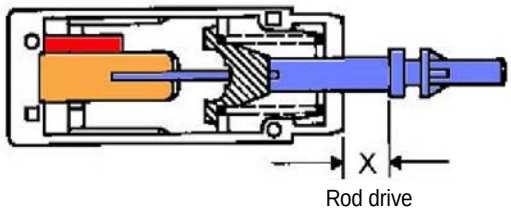
The thermohydraulic system comprises a metal cylinder with a push rod. The cylinder is filled with a substance which greatly expands when heated. A PTC serves as a source of heat (Positive Temperature Coefficient), and this makes direct contact with the metal cylinder. Subsequent to switch-off of the heat source, a strong compression spring returns the push rod back to its original position.

Construction



1 PTC
2 Contact
3 Compression spring
4 Alternating cylinder
5 Contact
6 Rod

Actuator activated



After voltage has been applied to the PTC, it heats up and transmits the heat to the metal cylinder which is filled with wax. The wax expands and presses the push rod out of the cylinder to the outside. The push rod transmits the mechanical movement to the release mechanism of the detergent and clear rinse agent dispensers. If the source of heat is switched off the volume of wax will be reduced on cooling down. The compression spring returns the push rod back to its original position.
The release period is approx. 2 min.; the resetting time is approx. 3 min.

Technical data

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

6.2 Aqua sensor

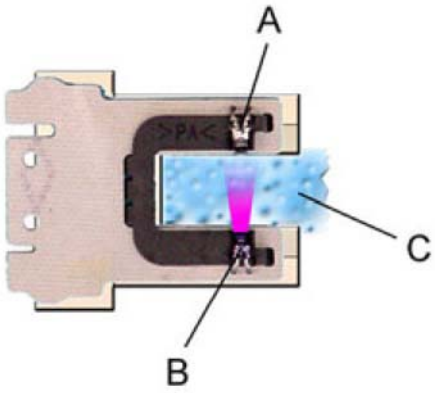
The infrared light diode and the photo diode are arranged opposite in a U-shaped transparent casing on a circuit board. The infrared diode transmits its infrared light through the water flowing in the U-shape onto the light-sensitive basis of the photo diode which then becomes conductive.

From a certain level of water cloudiness, the light of the infrared diode will not be sufficient to make the photo diode conductive.

The failed voltage signal is recognized by the microcomputer. Depending on the type of program, a change of water will be carried out after a pre-rinse or the washing temperature will be adjusted.

If the water does not become too cloudy it will remain in the rinsing cavity for the rinsing cycle. The aqua sensor is calibrated in each programme sequence in which it is active.

If it is not possible to carry out calibration, a firmly-installed program is executed and an error is stored on the module.



A = Photo diode
B = Infrared diode
C = Rinse water

6.3 Flow sensor

The flow sensor is integrated in the water intake device. It registers the volume of water flowing in.

It comprises a casing, a turbine (1) with permanent magnets (4) and a circuit board with a Reed switch (2).

The water sets the turbine (1) in motion. The magnets (4) fastened to the turbine (1) switch a Reed switch (2) twice for each rotation.

The impulses generated are counted by the electronic system. They cannot be measured.

Technical Data:

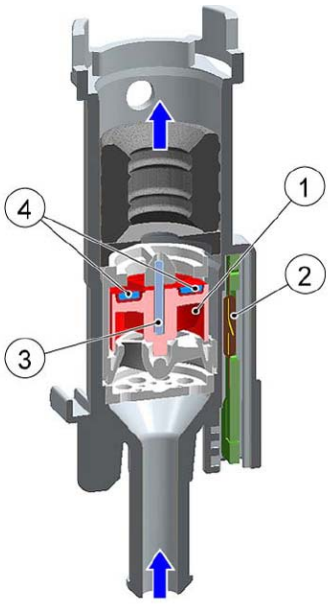
Hydraulic data

Minimal flow rate	0.8 l/m
Maximum flow rate 4.0 l/m	
Nominal flow rate	2.5 l/m

Electrical data

Output signal	Square signal
Switching current	max. 5 mA

Nominal output signal at 2.5 l/min
Flow rate: 208 impulses / litre

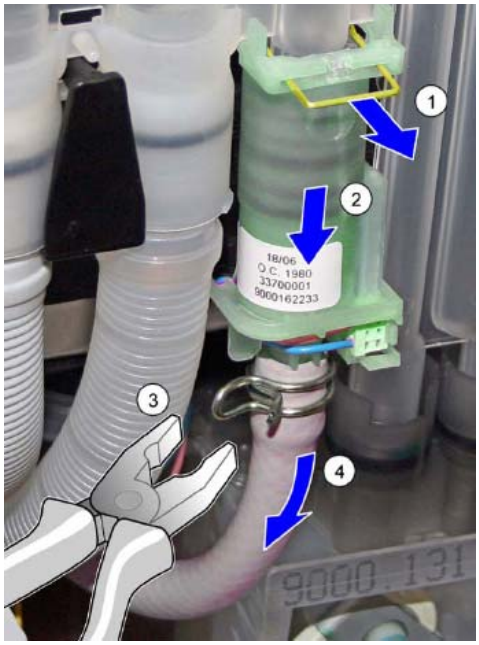


1 = Turbine
2 = Reed switch
3 = Axis
4 = Permanent magnets

Soak the hose in hot water (do not use a detergent or any similar lubricant!) to make it easier to replace the flow sensor.

6.4 Axial flow sensor

6.4.1 Disassembly

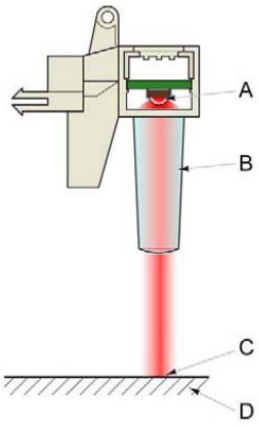


1. Remove the left-hand side panel.
2. Remove the safety clamp (1).
3. Pull the water intake flow sensor (2) downwards.
4. Remove the hose clamp (3).
5. Pull off the water intake hose (4).
6. Remove the connector plug of the Reed switch.

6.4.2 Assembly

1. Mount the water intake hose (4) onto the flow sensor (2).
2. Fasten the hose clamp (3).
3. Connect the connector plug of the Reed switch.
4. Mount the flow sensor (2) onto the water intake hose and fasten it with a safety clamp (1).
5. Install the left side panel.

6.5 Info light (optional)



The fully-integratable models are fitted with a program status display (info light) which is visible from the outside and provides users with additional information.

The info light comprises an LED (A) and a fibre optic cable (B). The fibre optic cable focuses the light which is projected as a spot of red light (C) on the background (D) in front of the dishwasher while the program is in operation.

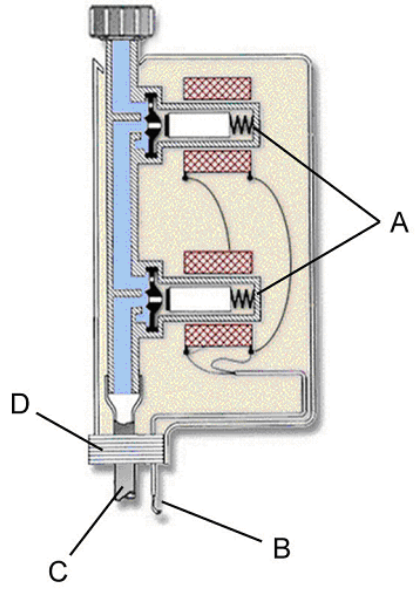
The info light is fastened on the hinge plate between the inner door and the outer door and is regulated by the module.

6.6 Aqua Stop System

The valve system comprises two series-connected, parallel-activated electrical solenoid valves, the filling valve and the safety valve. The safety function can be released with the safety level chamber or electrically by means of the float in the base pan. The flow of water is then stopped mechanically. An electric solenoid valve which is enclosed in a casing is attached to the water tap. From the valve the water supply hose is lead to the integrated water intake device and the electric trip line for the solenoid valve is lead to the base pan through a leak water hose attached to the valve casing in the power room.

Technical Data:

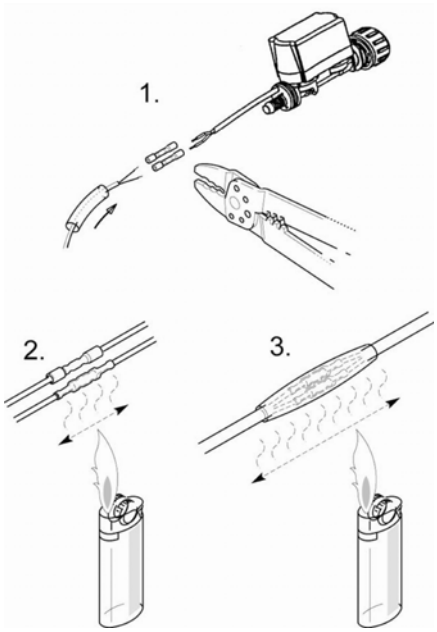
Nominal voltage	230-240 V
Frequency	50 Hz
Resistance	2 kΩ
Flow rate	2.75 l/min
Water pressure	0.5 - 10 bar



A = Solenoid valves
B = Trip line
C = Supply hose
D = Leaking water hose

6.6.1 Disassembly

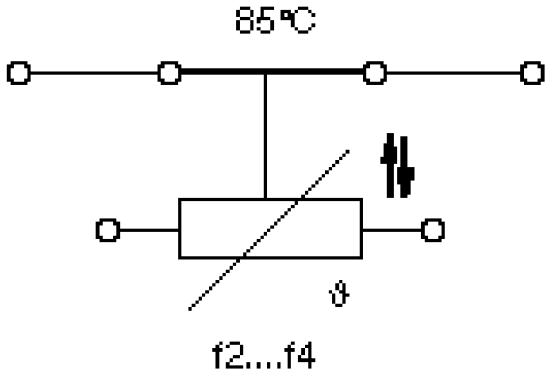
1. Open the casing and remove the supply hose.
2. Cut through the electric connection cables.
3. Strip the ends of the wires; push shrinkdown plastic tubing over the cable and connect the electric cables with the insulating bushing (1).
4. After mounting heat up the connectors until the shrinking process has commenced and the hot-melt adhesive squeezes out of the ends of the connectors (2).
5. Push the shrinkdown plastic tubing over the connectors and warm it up too until the shrinking procedure has been completed (3).



6.7 Temperature safety system (NTC)

The temperature cut-out switch (>85°C) is combined with the NTC sensor. In the event of a fault the heater will be switched off when the water temperature reaches 85°C (clocked).

Temperature °C	Resistance in kΩ	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



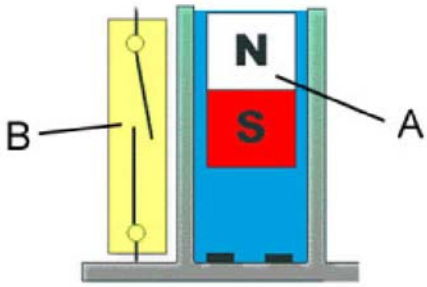
6.8 Salt and clear rinse agent display

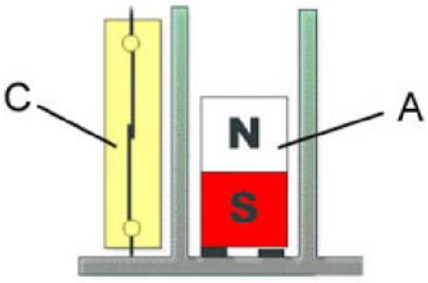
The reservoir is equipped with a float which has an integrated permanent magnet. This uses the magnetic field to activate a reed switch which is attached to the outside of the reservoir. This switch in turn activates the lamps of the fill-up displays in the control panel.

A = Permanent magnet

B = Reed switch open

C = Reed switch closed

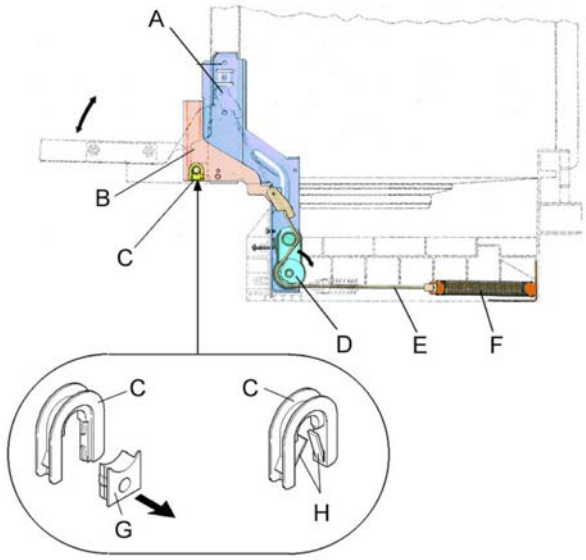




6.9 Hinge

6.9.1 Disassembly

1. Unscrew the outer door, the base, the angle plate, and the side walls.
2. Detach the traction rope from the hinge lever.
3. Unscrew the hinge lever from the inner door.
4. Unscrew the hinge plate from the cavity frame.
5. Unscrew the fixing screw from between the hinge and the base pan.
6. Lift the hinge plate clear of the frame; and pull the hinge upwards.
7. Remove the spring compressor.



A Hinge plate
B Hinge lever
C Bearing bush
D Spring compressor
E Traction rope
F Traction spring
G Retaining piece
H Supporting lobes

Two-piece hinge bearing bush
Open the bearing bush, disengage the retaining piece using screwdriver.

One-piece hinge bearing bush
Open the bearing bush, bend out the supporting lobes using a screwdriver. The bearing bush also needs to be renewed after it has been removed.

6.9.2 Assembly

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

6.10 Dispensing device

The triggering mechanism is controlled by an actuator. When first triggered, the cover of the detergent dispenser is opened, and at the same time the trigger catch snaps into the socket on the rinsing agent lever, enabling a dosing plunger for the rinsing agent to be raised next time the actuator is triggered.

Note!
To remove the dispenser, leave the upper basket in the appliance, close the door, then press the unlatched dispenser inwards.
Sharp edges! Use protective gloves.

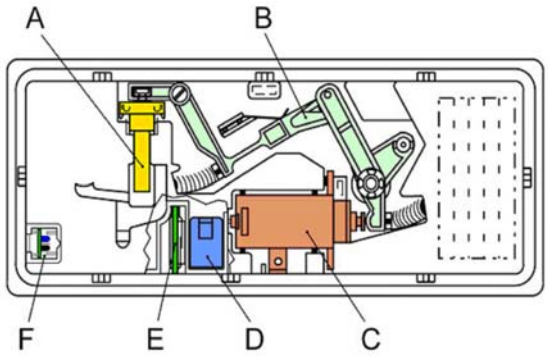
Before installing the dispenser, align the holding flaps to the middle to ensure that all supporting cams snap in securely.

Before installing, lubricate the seal using cleaning agent.

Technical data

Rinsing agent fill quantity	120 ml
Setting 1-6	each 1 ml
Capacity	max. 45 g

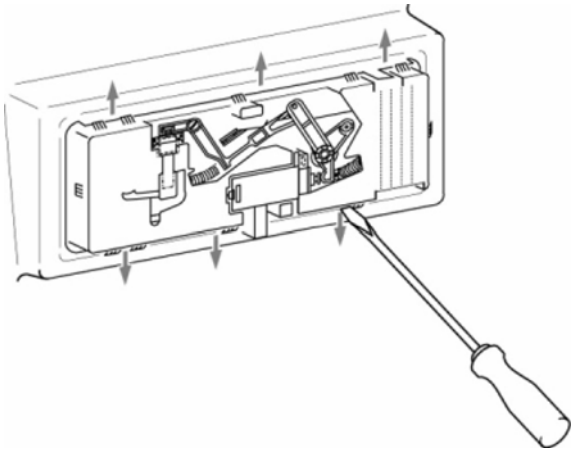
For further technical data, see the actuator.



A Dosing plunger
B Socket
C Actuator
D Float magnet
E Dry reed contact (optional)
F Optical sensor (optional)

Disassembly

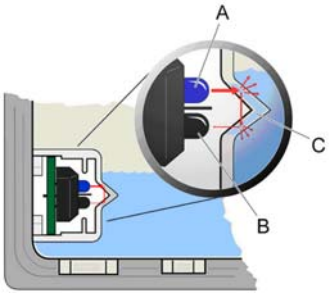
1. Screw off the outer door.
2. Disconnect the electrical connections.
3. Use a screwdriver to lift the holding flaps that are stamped out of the inner door clear of the supporting cams.
4. Before installing the dispenser, align the holding flaps to the middle to ensure that all supporting cams snap in securely.
5. Before installing, lubricate the seal using cleaning agent.



6.11 Visual clear rinse fill-up sensor

The visual clear rinse fill-up sensor comprises a transmission and a receiving diode.

The transmission diode sends a light beam to the receiving diode via a prism. If the reservoir is filled up, the light beam will be dispersed in the prism. The receiver signal will therefore be weaker than the sender signal.

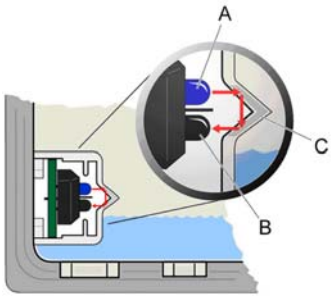


A Transmission diode

B Receiver diode

C Prism

If the reservoir is empty the light beam will be reflected in the prism. The receiver signal is the same as the sender signal.



The module will evaluate the signal received and will activate the fill-up LED.

6.12 Water softener

6.12.1 Disassembly

1. Unscrew the outer door, the base plate, the angle plate, and the side walls.
2. Detach the traction rope from the hinge lever and unscrew the screws between the base pan and the hinges.
3. Unscrew the rinse cavity on the back wall of the base pan.
4. Disconnect the door wiring harness at the plug connection in the base pan.
5. Remove the electrical connections from the regeneration and drain valves. Screw off the fastening nut between the salt box and the rinsing vessel.
6. Suction the brine out of the reservoir with a suction syringe.
7. Lay the appliance on its rear side and carefully pull out the base pan.
8. Remove the catch from the level sensor casing and the softening unit.
9. Separate the circulation pump with the rubber bearing from the base pan.
10. Pull the base pan off further until the softening unit can be removed from the plug connections on the water supply and the level sensor casing; remove the Reed switch.

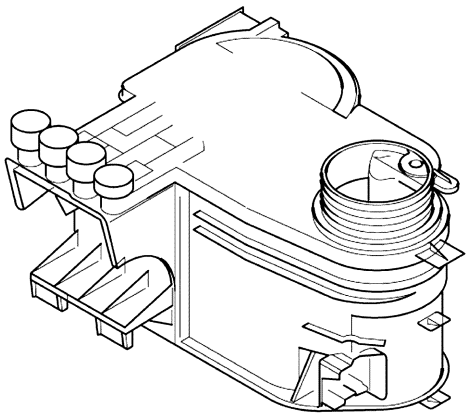
Salt container

Filling capacity

Fine-grained salt	approx. 1.3 kg
Coarse-grained salt	approx. 0.9 kg

The following must be carried out before the softening unit is installed:

1. Put the seal onto the filler neck of the salt box.
2. Insert the sealing rings into the plug connections.
3. Put the rubber cap onto the bearing connection in the base pan for the pump cavity.
4. Insert the switch rod for activating the safety level switch.
5. Put the rubber mounting onto the circulation pump.



6.12.2 Assembly

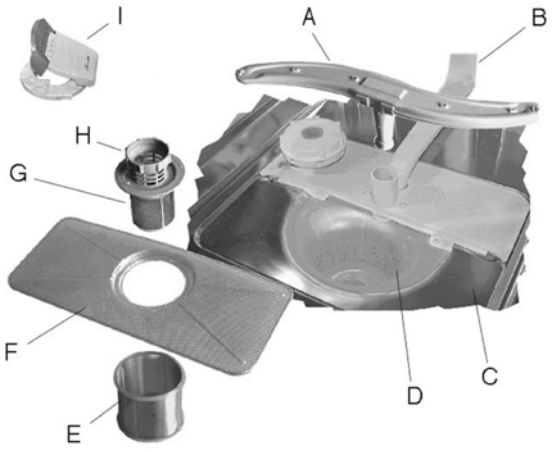
1. Insert water softening system
2. Engage reed switch.
3. Push base pan onto the tank.
4. Put the rubber mounting onto the circulation pump.
5. Screw tight the fastening nut between the salt box and the rinsing vessel.
6. Connect the electrical connections from the regeneration and drain valves.
7. 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.

6.13 Sieve system

The sieve system comprises a fourfold filter system (a course filter, fine sieve cylinder, a fine flat sieve and a micro-fine sieve). The pump cavity, where the micro-fine sieve is located, is covered by the flat fine sieve. The flat fine sieve and the combined coarse and fine sieve cylinder are attached to the bottom of the pump cavity by means of a bayonet catch.

Sieve system

A Lower spray arm
B Feed pipe to upper spray arm
C Rinse cavity
D Pump cavity
E Micro-fine sieve
G Fine sieve
H Coarse sieve
D Pump cavity
F Flat sieve
I Hinged lid (optional)

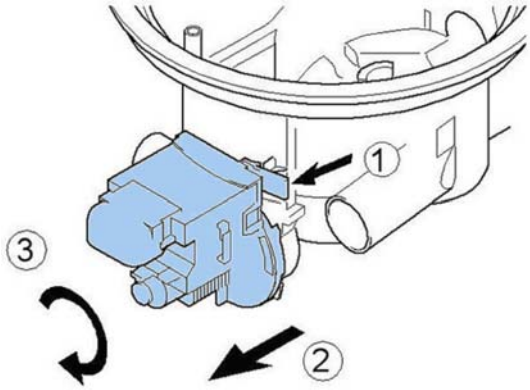


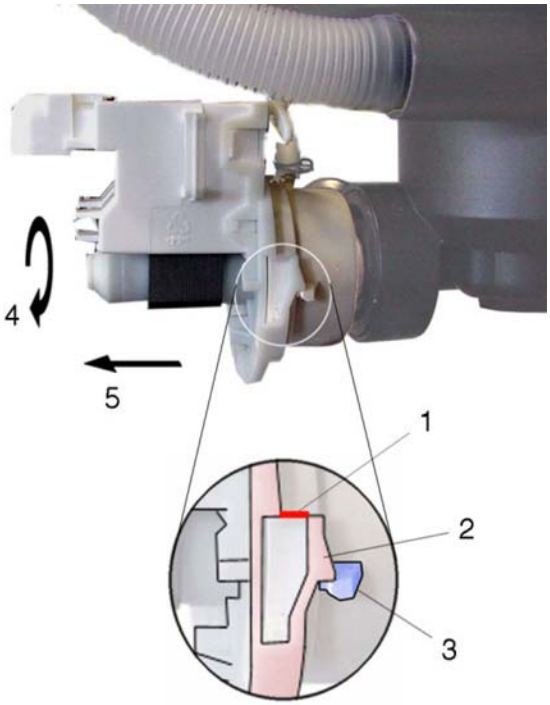
6.14 Rinse water pump

In order to reduce running noises, the pump has soft bearings between the pump cavity and the discharge hose.

In order to achieve a better cleaning of the fine sieve, the water is circulated and pumped out alternately 3 times for 5 sec. This means that water flows through the sieve in both directions (alternating pumps).

After the drying phase the pump will be activated alternately 3 times for 5 seconds and there will be a break of 5 sec. (sputter pumping). This step is required to deaerate the pump.





Disassembly

1. Remove the base cover and the base sheet. The detergent water pump is engaged in the pump cavity on the front.
2. Cut through the link (1) on the catch (2).
3. Press the catch (2) over the locking device (3) and turn the pump downwards at the same time.
4. After approximately a quarter of a turn (4) it will be possible to pull the pump off (5).

Technical Data:

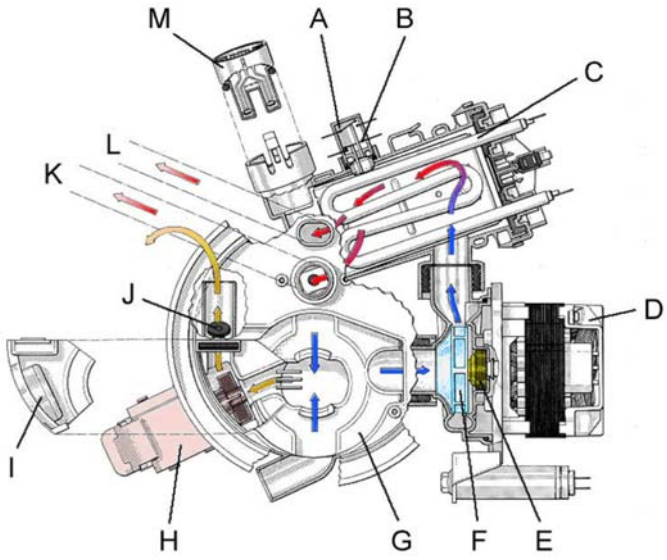
Nominal voltage	230 - 240 V
Frequency	50 Hz
Resistance	110 - 260 Ω
Delivery height	0.9 m
Delivery performance	10 l/min

6.15 Rinsing and pump system

The circulating pump and the discharge pump as well as the continuous flow heater are connected to the pump cavity by means of plug connections. The continuous flow heater is also screwed to the pump cavity in such a manner that no pressure can occur.

The sieve system comprises a fourfold filter system (a course filter, fine sieve cylinder, a fine flat sieve and a micro-fine sieve). The pump cavity, where the micro-fine sieve is located, is covered by the flat fine sieve. The flat fine sieve and the combined coarse and fine sieve cylinder are attached to the bottom of the pump cavity by means of a bayonet catch. The rinse water which flows into the pump cavity is sucked up by the circulation pump and forced into the continuous flow heater.

If the pressure is sufficient, the push-button for the heater is actuated by means of the flange membrane. A series-connected thermostat with a cut-off temperature of 85 °C prevents overheating.



A	NTC / Temperature control	H	Drain pump
B	Temperature control	I	Cover of the impeller *
C	Continuous flow heater	J	Non-return flap
D	Circulation pump	K	To lower spray arm
E	Junction kit	L	To upper spray arm
F	Charging valve		
G	Pump cavity		

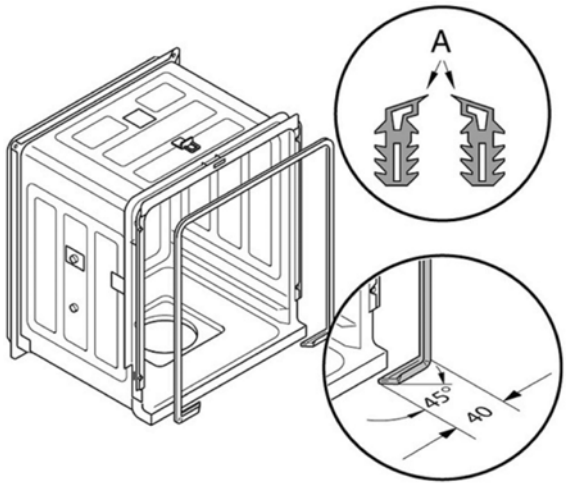
For dishwashers with mechanical controls this temperature control switch is combined with a 65ºC thermostat and for dishwashers with electronic controls it is combined with an NTC (negative temperature coefficient) sensor so that it comprises one component part. The surface of the sensing element makes direct contact with the rinse water. The aqua sensor is positioned at the exit of the continuous flow heater and has its sensor in the flow of the rinse water in order to determine how dirty the rinse water is. The direct fitting of the discharge pump onto the pump cavity means that the impeller and the non-return flap are accessible when the cover in the rinse cavity is removed.

6.16 Door seal

The new seal must be fitted before it is installed:

- The length of the seal must fit around the circumference of the cavity.
- Cut the ends of the seal at a 45° angle.
- Allow the seal to rest 40 mm on the base of the cavity (splashproof stop for the bottom corners).
- Press the seal in evenly without any kinks.

Before installation, make sure that the sealing lip is in the correct position. It must point towards the centre of the dishwasher cavity; otherwise there will be leaks around the door.



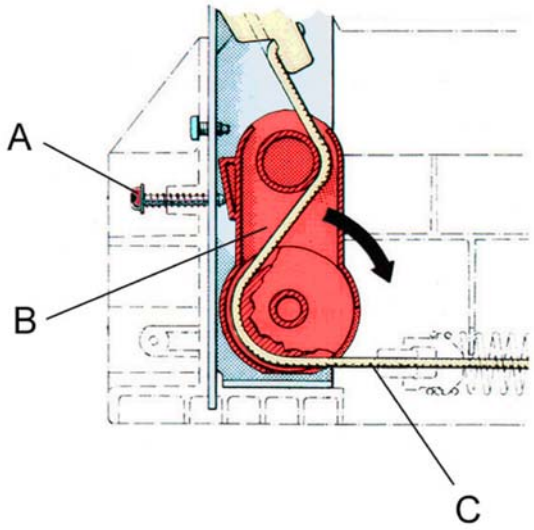
6.17 Door spring

The weight of the front of the unit is balanced with the door springs. The door springs are located on the right and on the left side below the base pan. The traction force is transmitted to the door hinge with a cable (C) drawn over a deflection pulley (B). With the adjusting screw (A) supplied (for built-in appliances only) the traction force of the spring can be increased with the deflection pulley (B).

A Adjusting screw

B Spring clamp (deflection pulley)

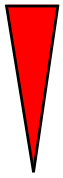
C Traction rope



For very heavy unit doors (e.g. marble) the traction force of the springs which are installed as a standard and the maximum initial load of the spring clamp will not be sufficient.

In this case stronger door springs (see chart) can be used.

If the unit doors are extremely lightweight, the door springs may also be replaced with lighter ones.

Spring power	Colour dot	Spare-parts no.	Maximum unit door weight
max.  min.	light pink	427107	approx. 8 kg  1 kg
	blue-violet	427104	
	yellow-green		
	beige	437216	

The door springs are marked with a coloured dot on the rear.

Only <u>pairs</u> of door springs may be replaced!

Maximum unit door weight is about 8 kg.

6.18 Circulation pump (SICASYM)

The circulation pump is operated by means of a single-phase alternating current motor.
Switching the two motor windings with the motor capacitor is either activated by an electronic unit or a relay on the motor connection or by the module. During the start-up phase the two windings (in series with the capacitor) are parallel to one another direct on the power supply and generate an extremely powerful starting force.

After switch-over the two windings will be in series (behind one another), i.e. the two windings are each supplied with half of the power supply. The motor will then be optimally adjusted to the pump (in operation) and, besides requiring very little power – for label AAA – it will also make very little noise, since the windings are supplied with half of the power supply in operation.

Technical data

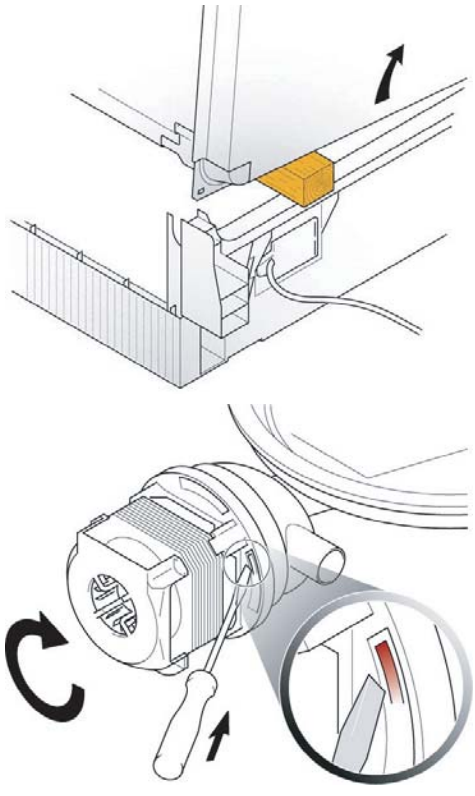
Designation	Setting	Unit
Nominal voltage	230 - 240	V
Frequency	50	Hz
Resistance	Ha approx. 40-54 Hi approx. 45-70	Ω Ω
Delivery height	3.0 - 4.0	m
Delivery performance	17 - 63	l/min
Starting current	1.3 - 2.2	A
Operating current	0.3 - 0.4	A

6.18.1 Disassembly

1. Remove the side panels and the base sheet.
2. Remove the 2 screws (at the front and the rear) connecting the stainless steel shell and the plastic base pan on the right-hand side.
3. Raise container on the right side and tilt to the left and secure the container with an approx. 4 cm thick object.
4. Use a screwdriver to press the catch on the right-hand side of the circulation pump to the inside and turn the pump clockwise. You will then be able to remove the pump.

INFO! ***The gasket must be lubricated with detergent prior to installation.***

INFO! ***When a motor is replaced the spacer ring which is placed on the motor shaft must be used again for the new motor as the impeller wheel will otherwise become sluggish or blocked!***



6.18.2 Assembly

INFO! ***Leakages***
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.

1. Rotate pump to the left into the pump housing until the catch engages.
2. Tilt container back into base pan.
3. Screw stainless steel container to the base pan.
4. Screw on base plate and side panels.

6.18.3 Removing the slide ring seal

1. Remove circulation pump.
2. Loosen fan impeller, locking the rotor with a pen or screwdriver.
3. Remove pump housing.

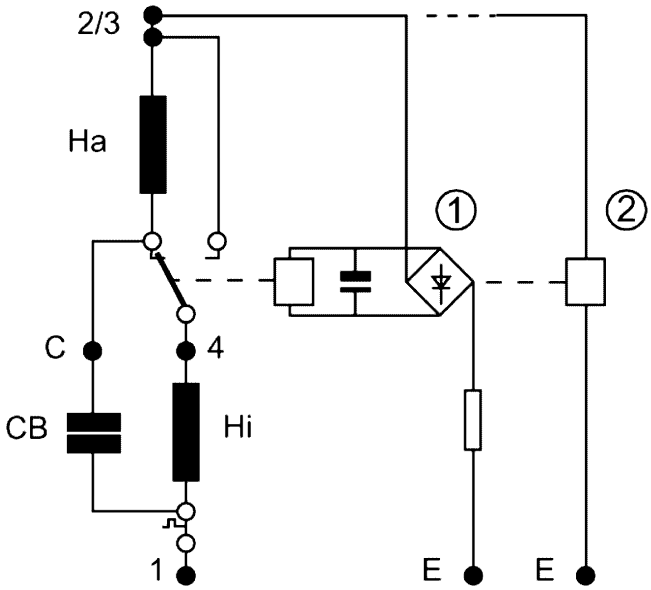
6.18.4 Inserting the slide ring seal

INFO! ***Sluggish or blocked fan impeller***
Ensure that the spacer ring is re-attached to the motor shaft.

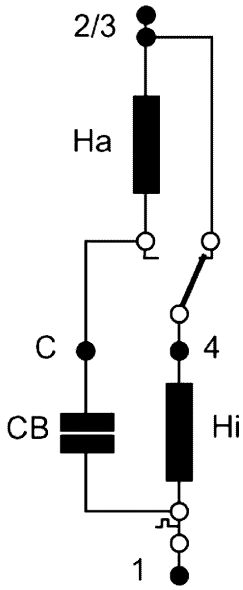
1. Press slide ring seal into the pump housing.
2. Manually rotate fan impeller firmly onto the motor shaft.
3. Attach sealing ring.
4. Install circulation pump.

Circuit diagram

Operation:



Start:



6.19 Combined detergents (3 in 1), according to the model (See rapid guide for key configuration)

Detection

Drying results will not be as good when a combined detergent (e.g. 3 in 1 detergent) is used. In order to improve the drying results, a special program sequence which uses less water in the intermediate rinse cycles is activated. The clear rinse temperature is also raised by 3K (the same temperature as for power drying). With the water which is saved the heat exchanger is filled up a second time in the drying cycle to enhance the drying results.

The special program cycle is activated if:

- the electronic system detects that the level of clear rinse agent is too low;
- the clear rinse fill-up display is deactivated.

The additional “Intensive drying” function can still be activated if wished; it will however have no effect on the clear rinse temperature.

The maximum temperature rise is 3K.

Application area

3 in 1 detergents may be used up to a water hardness level of 21°dH (37°fH, 26°Clarke, 3.7mmol/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.

6.20 Water points

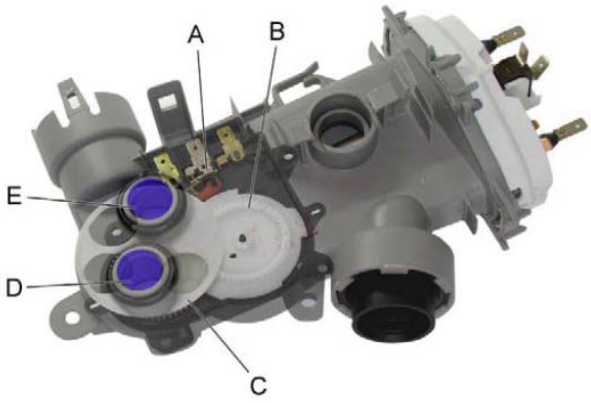
The water points are responsible for alternate rinsing and for different rinsing pressures.

They consist of a synchronous motor with gears, cam disc (B), microswitch (A) and locking disc (C).

The synchronous motor is activated with 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 transmission and hence also the cam disk and the slide.

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.



Alternate rinsing | Two-in-one | Change between two-in-one or top basket throttled

INFO! ***The water points are integrated in the continuous flow heater and can only be replaced as a full unit with the continuous flow heater.***

Type of rinse		**Water pressure**
Alternating rinse	Top basket or bottom basket	high
Two-in-one	Top basket and bottom basket	medium
Top basket	Throttled / two-in-one	low

Technical data

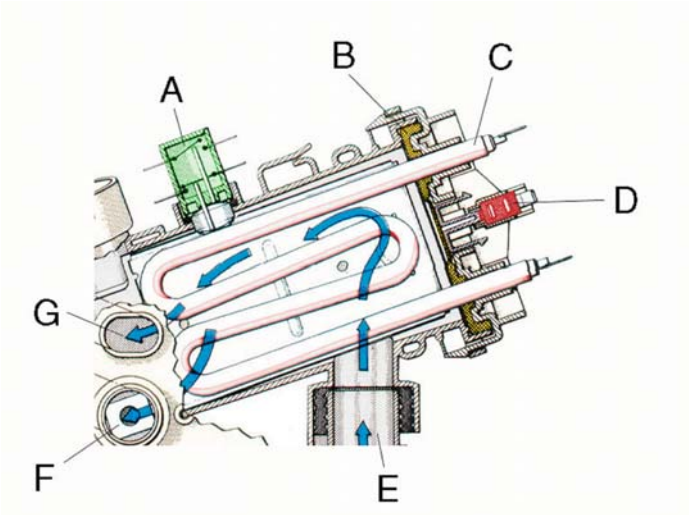
Designation	**Setting**	**Unit**
Nominal voltage (synchronous motor)	230 - 240	V
Frequency	50 / 60	Hz
Resistance	approx. 9.3	kΩ

6.21 Continuous flow heater

The continuous flow heater is installed in the spray arms water circuit. When rinse water flows through, a rubber membrane located on a flange is activated that switches the heater's safety pressure switch. If the pressure falls, the heating is turned off. The heating position is overridden, thus avoiding the dry appliance being heated.

6.21.1 Disassembly

1. Unscrew the outer door, the base plate, the angle plate, and the side walls.
2. Detach the traction rope from the hinge levers.
3. Unscrew the screws between the base pan and the hinges.
4. Unscrew the rinse cavity on the back wall of the base pan.
5. Disconnect the door wiring harness at the plug connection in the base pan.
6. Lay the device on its rear side and carefully pull out the base pan. Release the lock from the level sensor case and the water softening unit.
7. Separate the circulation pump with the rubber bearing from the base pan.
8. Open the base pan enough for the continuous flow heater to be unscrewed from the pump cavity. Unscrew the continuous flow heater.
9. Release the lock on the pump cavity and lift the continuous flow pump away from the pump cavity/ circulation pump plug connections.



A Klixon / NTC ; 85 °C safety switch
B Membrane
C Heater
D Safetey pressure switch
E From the circulation pump
F To the lower spray arm
G To the upper spray arm

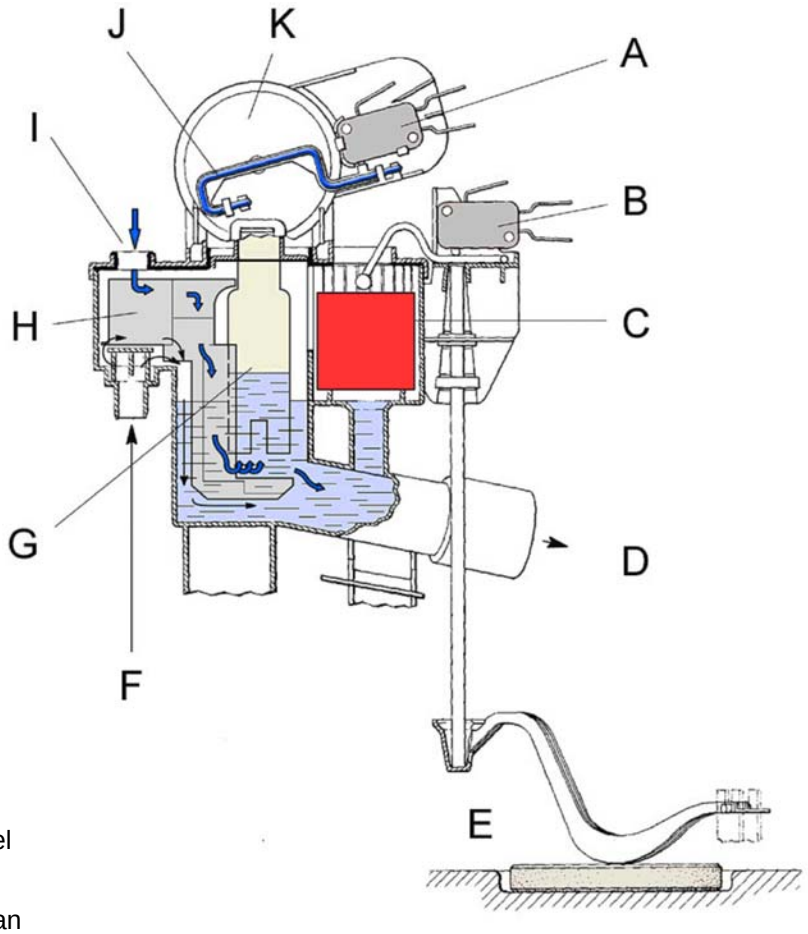
Technical data

Nominal voltage	230 - 240 V
Frequency	50 Hz
Power	2150 W
Resistance	ca. 22 Ω

6.21.2 Assembly

The continuous flow heater is assembled in reverse order.

6.22 Equipotential system with a safety function



A	Level switch
B	Safety level switch
C	Float for safety level
D	To the pump cavity
E	Float in the base pan
F	From the discharge for appliances **with** heat exchanger From the softener for appliances **without** a heat exchanger
G	Air chamber
H	Throttle cup in appliances with a heat exchanger
I	From overflow channel
J	Switch lever
K	Level pressure gauge

Should functional defects in the dishwasher control system or in the structural elements occur, resulting in an over-filling of the machine, the valve combination will be closed by means of the safety system, thus blocking off the water supply.

The discharge pump is switched on by means of the safety level switch. Pumping will continue until the filling level has once again been reached.

Any leaks occurring within the machine are collected in the base pan. Leaks in the supply hose are guided to the base pan by means of the leakage water hose.

Once a set level in the base pan has been reached, the float activates the safety level switch by means of a switch lever, which then switches off the filling and safety valve electrically.

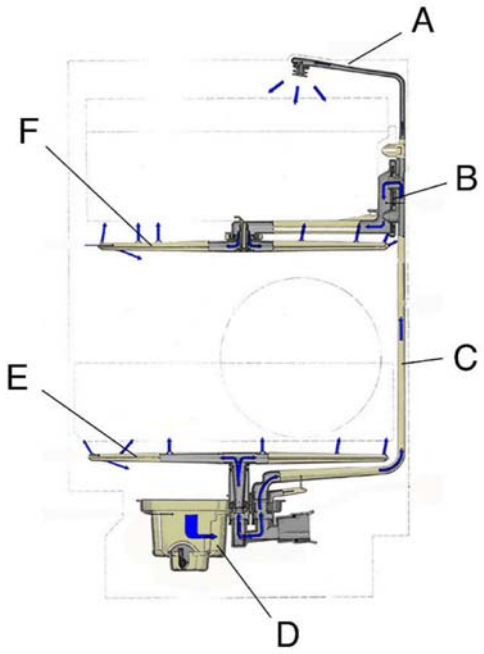
At the same time the discharge pump is switched on; the rinse water is removed from the rinsing container and the discharge pump switches onto continuous operation.

6.23 Rotary spray system

The rotary spray system consists of three spray levels, the lower and upper spray arm and a top spray.
The water supply to the upper spray arm and the top spray is brought through the inlet pipe attached to the inside of the container rear wall. This pipe is connected by a direct connection with the flow heater under the pump cavity at one of its two outlets.

The upper spray arm is directly fastened with its inlet pipe to the upper basket. The connection to the inlet pipe is through a variable coupling. The water entry is adapted to the spray arm using this variable coupling. The connection to the inlet pipe is through a variable coupling.

The lower spray arm with its bearing is connected directly through the pump cavity at the second outlet of the flow heater. The valve for the upper basket wash cycle is located in this outlet.



A	Top spray	D	Pump cavity
B	Coupling	E	Lower spray arm
C	Inlet pipe	F	Upper spray arm

7. Fill system

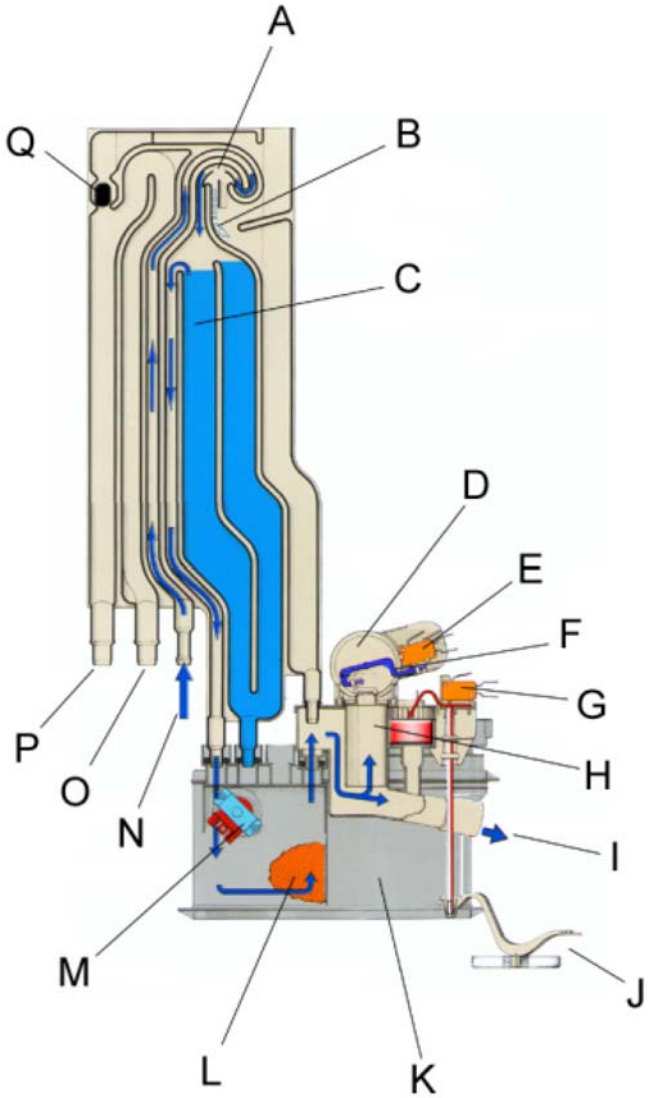
7.1 Intake of water with heat exchanger

After the fill solenoid is opened, the water flows to the integrated inlet over the free flow line into the regeneration chamber. When the regeneration chamber has been filled the water will flow through the overflow channel in the softening equipment and as soft water into the level sensor and the pump cavity.

Once the static level has been reached the signal transmitted by the equipotential pressure switch is picked up by the electronics system and the circulation pump is switched on again. The equipotential pressure switch is reset when the circulation pump commences operation. Dynamic filling continues until the level switch is re-activated; the rinsing level will then have been reached.

The water quantities of the wash cycles which have already run are registered by the electronic and determine the timing for regeneration of the softener. Before each regeneration step the electronic system checks whether the capacity of the softener is still sufficient for a complete “normal program sequence”.

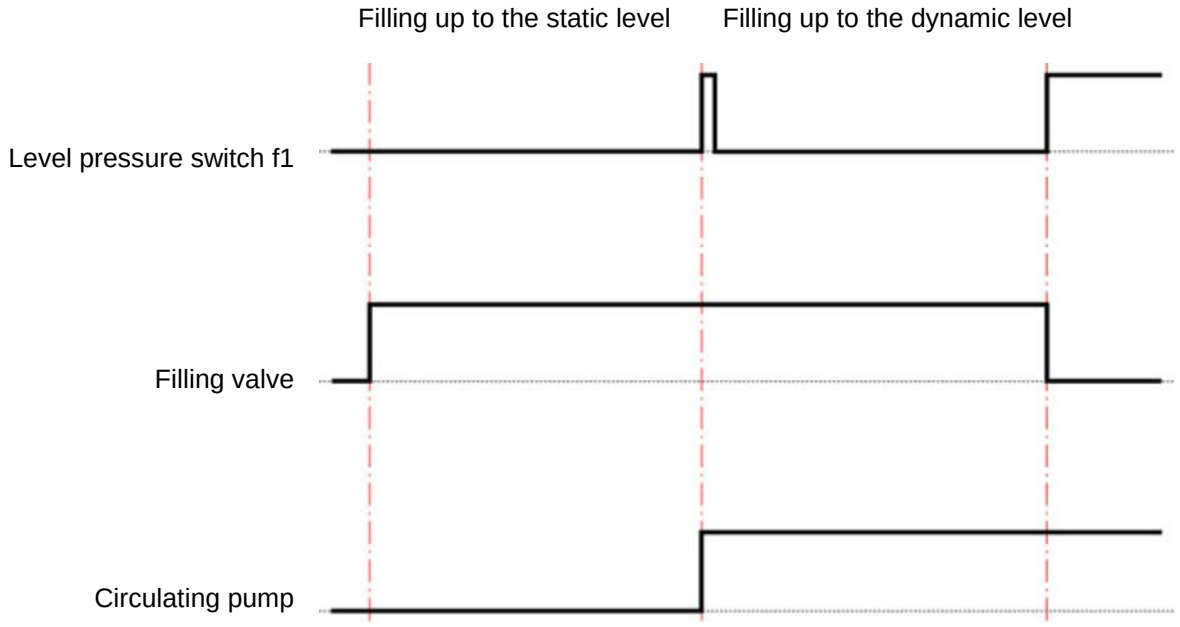
If not, regeneration is done. Regeneration and rinsing through the water softener is carried out in the washing cycle. During regeneration the regenerating valve on the softener is opened. The reservoired quantity of water flows across the valve into the salt container, is enriched with salt, and flows as brine through the softener into the pump cavity. This is done in three cycles, each with a determined quantity of water.



A	Free flow line
B	Leaking water
C	Regeneration chamber
D	Level pressure gauge
E	Level pressure switch f1
F	Switch lever
G	Safety pressure switch
H	Level air chamber
I	To pump casing
J	Float in the base pan
K	Salt container
L	Ion exchanger
M	Regeneration valve
N	Water inlet
O	From discharge pump
P	To discharge hose
Q	Discharge hose ventilation valve

7.1.1 Filling procedure for appliances without a heat exchanger

After the static level has been reached the module will be selected by the level switch, will move into the next position and the circulation pump will be switched on again. The level pressure switch is reset when the circulation pump commences operation. Dynamic filling continues until the level switch is re-activated; the rinsing level will then have been reached.



7.2 Regeneration with heat exchanger

After the fill solenoid is opened, the water flows to the integrated inlet over the free flow line into the softener and then as softened water into the heat exchanger. After the regeneration chamber is filled the water flows through the overflow channel into the throttle cup of the level sensor. The pressure built-up in the pressure socket causes the level switch to open the heat exchanger drain valve. The electronic system determines the time between the open command of the fill solenoid and the closing of the level switch (f1). From this time the additional fill time of the fill solenoid is calculated.

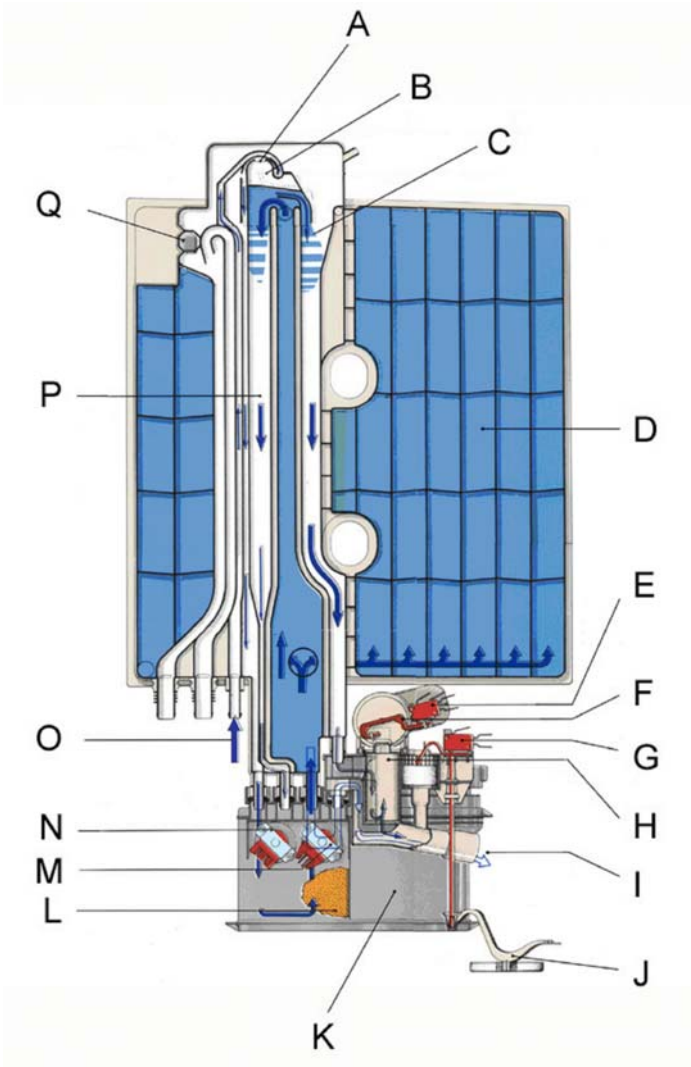
The recirculation pump is turned on time-delayed, the drain valve stays open until the heat exchanger is fully emptied.

The water quantities of the wash cycles which have already run are registered by the electronic and determine the timing for regeneration of the softener.

Before each regeneration step the electronic system checks whether the capacity of the softener is still sufficient for a complete “normal program sequence”. If not, another regeneration is done.

Regeneration and rinsing through the water softener is carried out in the washing cycle. During regeneration the regenerating valve on the softener is opened. The reservoired quantity of water flows across the valve into the salt container, is enriched with salt, and flows as brine through the softener into the heat exchanger. This is done in three cycles, each with a determined quantity of water.

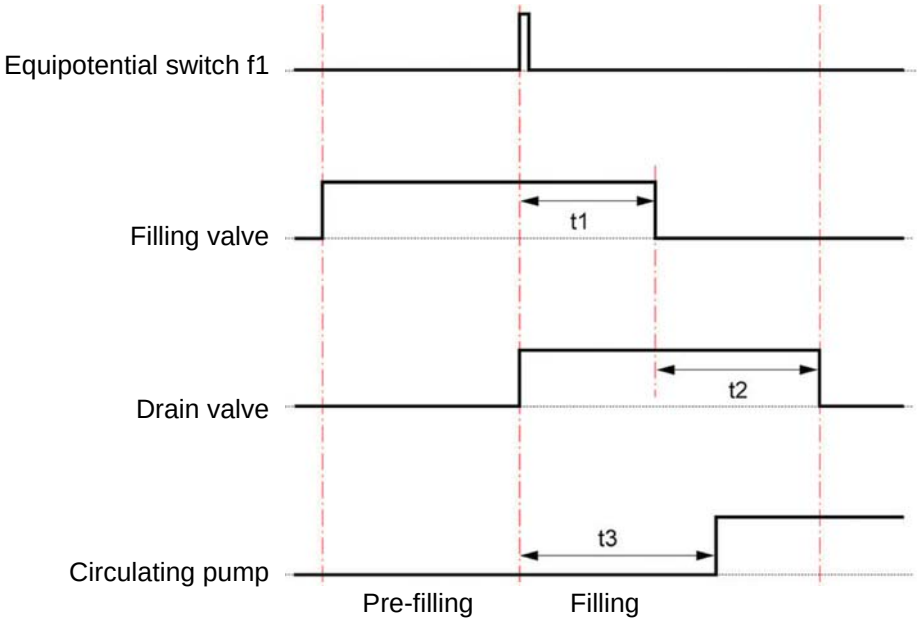
A	Free flow line
B	Leaking water
C	Overflow channel
D	Heat exchanger
E	Level pressure switch f1
F	Switch lever
G	Safety pressure switch
H	Level air chamber
I	To pump casing
J	Float in the base pan
K	Salt container
L	Ion exchanger
M	Drain valve heat exchanger
N	Regeneration valve
O	Water inlet
P	Regeneration chamber
Q	Discharge hose ventilation valve



7.2.1 Filling procedure for appliances with a heat exchanger

The electronic determines the time between the open command of the fill solenoid and the closing of the level switch (f1). From this time the additional fill time of the fill solenoid is calculated. For every initial fill-up in a rinsing program, 200 ml more water than the standard water volume will be filled in.

On initial intake of water for the washing program, this volume of water is used to balance the water which is lost when the dry dishes are wet. This ensures that the circulation pump runs concentrically and water is saved when the dishwasher is filled up again. The recirculation pump is turned on time-delayed, the drain valve stays open until the heat exchanger is fully emptied.



t1 = refill time calculated
t2 = drain-off valve stopping performance time
t3 = circulation pump switch-on delay

8. Remedying faults for all of the series 45 cm

Should your dishwasher develop a fault, please check up on the following before contacting our customer service (*see, too, the relevant section in the instructions for use)

8.1 Controller / module

= Start up the customer service program before replacing any modules.

Customer information	Cause	Remedy
Program time too long	• Alternating rinse technology, energy saving.	• Advise customer, see Consumption rates or Alternate rinsing technology.
Component is not actuated	• Triac on the module does not switch properly, smoke traces may be visible on the module. • Regulator controller / power supply unit charred by humidity in the module.	• Before replacing the module, always measure the connected consumers (valves, actuators, etc.). • With the module also the sealing strip 298550 has to be renewed.
Scorched connections	• Connector plug. • Cable harness charred / cable torn.	• To repair defective connections on the electronic controls, use plug repair set 435654. ***INFO! Replace defect cable in the cable harness with universal cable 435802.*** ***Use the extraction tool to remove the defect cable from the connector shell.***

8.2 Discharge

Customer information	Cause	Remedy
The pump can be heard but it transports no water or only a little water.	• Sieve system blocked. • Trap in the air intake device (pump cavity) clogged. • Non-return valve in the discharge has got caught. • Discharge hose blocked.	• Advise the customer; observe instructions on cleaning the sieves in the user manual. Clean the sieve. • Advise the customer. Clean the trap in the air intake device of the pump. • Remove the non-return valve. Check the valve and its position for dirt and clean if necessary. • Remove the obstruction (do not forget the dishwasher hoses). Obstruction in the region of the water intake hose connection; remove both discharge hoses to check.
Buzzing noise from the pump.	• Pump mechanically blocked (foreign matter or pump damaged).	• Clean pump, remove if necessary. In order to improve the dishwasher's capacity to retain foreign matter, it is recommended that the additional sieve 428216 be installed in the coarse sieve.
Pump not working.	• Refer also to the sections on buzzing noises from the pump or pump can be heard in operation. • Water tap was closed during the drying cycle, heat exchanger was not yet filled, equipotential switch waiting for filling. • Pump is not activated.	• Advise the customer. Wait for the program to be completed and only then close the tap. (refer to the aqua stop if present). • Activate the pump (test program) and check according to flow diagram. Observe safety instructions!
Dishwasher pumps off briefly, circulates, pumps off, ...	• Alternating pumping (detergent water pump and circulation pump are activated alternately).	• Advise the customer.

8.3 Smell

Customer information	Cause	Remedy
Burnt smell.	• Connection cable improperly extended.	• Advise the customer; observe instructions in the user manual.
	• Socket burnt (due to poor contact).	• Consult the customer; the socket and the connection cable must be replaced.
	• Winding damage or faulty insulation on the consumers.	• Check the consumers (test program) and check according to flow diagram. Observe safety instructions.
	• Poor electric connection or leakage path on electrical components (inspect edge connectors).	• Rectify leakage paths and contact resistances; observe leaks, high-current cables may not be extended.
Smell of chemicals.	• Detergent or clear rinse.	• Advise the customer. The customer specifies on chemicals; possibly replace the product (with lemon aroma) or recommend an air freshener.
	• Binding agent of the noise reduction devices (fleece, insulation mats).	• Explain about new odour to customer.
	• Steaming of electrical components or circuit boards.	• Advise the customer.
Smell of rotting.	• Permanent insufficient dispensing of detergent.	• Advise the customer; observe dosing instructions.
	• Deposits under the cover of the sieve, in the pump cavity or in the area of the sealing. The smell comes from the sink drainpipe (the siphon may be extremely soiled or evacuated).	• Advise the customer to clean the machine or use a more powerful program. Possibly refer customer to a plumber.
	• Dishwasher not properly connected to the siphon.	• Connect properly if possible; if necessary refer customer to a plumber.

8.4 Noises

Customer information	Cause	Remedy
Knocking noises in the pipes when water is being taken in	• Improper installation or cross section of the water pipes (usually only occurs with appliances fitted with an aqua-stop valve since the valve is connected direct onto the tap).	• Advise the customer and refer him to a plumber (have a pressure reducer installed).
Clattering noises during the rinsing cycle	• Spray arm knocking on the dishes.	• Advise the customer; observe dosing instructions.
Alternating noises in the washing program	• Alternating rinsing technology (55 sec. top basket rinsing, 5 sec. to change, 60 sec. for the bottom basket in cycles) of the water diverter. • Alternating pumping (detergent water pump and circulation pump are activated alternately).	• Advise customer; load the dishwasher properly. If necessary replace the bottom spray arm with larger jets (see “Water points” on page 73). • Advise the customer.

The next few charts deal with food or sandy residues which may impair the rinsing results.
These are:

- Lime deposits (analyse with 10% hydrochloric acid in the diagnosis suitcase)
- Starch deposits (analyse with iodine solution in the diagnosis suitcase)
- Water-soluble residue or regenerating salt residue (analyse with distilled water in the diagnosis suitcase)
- Discolouration / colour deposits (e.g. tea, tomato juice, coffee, lipstick, etc.) (analyse with sodium hypochlorite bleach in the diagnosis suitcase)
- Residual detergent (analyse with distilled water in the diagnosis suitcase)
- Water-insoluble deposits / damage to dishes rinsed

8.5 Food or sandy deposits

Customer information	Cause	Remedy
Residual food or sandy deposits	• Coarse, micro or fine sieve clogged; sieve not engaged in the pump cavity.	• Advise the customer; sieve and care.
	• Spray arm jets, top spraying nozzle blocked.	• Clean parts if necessary, instruct customer on inserting the proper sieve.
	• Spray arm bearing stiff (dirt in the region of the bearing).	• Cleaning.
	• Foreign matter in the region of the discharge hose connections to the water inlet (discharge channel).	• Advise the customer; cleaning.
	• Trap in the pump cavity partially blocked.	• Cleaning.
	• Discharge hose bent.	• Connect the discharge hose properly.
	• No detergent dispensing or insufficient dispensing, wrong program selected.	• Advise the customer; observe the dosing instructions of the detergent, use program with a higher temperature; check the dispenser, see “Dispensing device” on page 64.
	• Dishes not arranged properly (large dishes, e.g. pots, in the bottom basket), avoid contact points, rows of spikes bent.	• Advise customer, align the rows of spikes (see instruction manual).
	• Spray arm blocked by dishes or cutlery.	• Advise the customer.

Customer information	Cause	Remedy
Residual food or sandy deposits	• Snorting noises; circulation pump does not run smoothly, too little water in the dishwasher (attention in the case of alternating rinse technology).	• Check the functioning of the equipotential transducer (carry out a filling procedure).
	• Non-return valve leaking; dirty water flows back into the dishwasher.	• Remove the non-return valve, check the valve and its position for dirt and clean if necessary.
	• Dishwasher does not circulate.	• Check the circulation pump, see “Circulation pump (SICASYM)” on page 70.
	• Dishwasher does not heat up.	• Check the heating circuit in accordance with the circuit documents; observe the circuit breaker on the continuous flow heater (see “Continuous flow heater” on page 74) (the circulation pump can only build up sufficient pressure if there is enough water in the dishwasher).
in the top basket	• Dishwasher only rinses dishes in the bottom basket.	• Obstruction of the rinsing cycle of the top basket. It is essential to observe that in some steps in the program, rinsing will only take place in the bottom basket. Check with the help of the customer service program and diagnosis aids.
in the bottom basket	• Dishwasher only washes dishes in the top basket. For dishwashers with a top basket valve in the FD 7809 to FD 7811 production period, the float of the top basket valve may get caught between the continuous flow heater and the pump cavity.	• Replace the continuous flow heater.

8.6 Lime deposits

Customer information	Cause	Remedy
Lime deposits on the dishes, starch	• Hardness level incorrectly set or raw water hardness > 50 °dH. Check the residual heat in the washing and clear rinse cycles. • Does not regenerate. • Valve for raw water does not open -> filling with raw water only.	• Set the hardness level; advise the customer; use detergents containing phosphate. • Set the regenerating position and carry out a function check (observe the emptying of the regeneration chamber). Check the regeneration valve carefully (mechanical – valve stern; electrical – selection / coil). • Check the raw water valve (mechanical – valve stern; electrical – selection / coil).

8.7 Starch deposits

Customer information	Cause	Remedy
Lime deposits on the dishes	• Insufficient detergent (unsuitable detergent). • Wrong program selected (program selected too weak). • Dishwasher connected to a warm water supply -> inlet water temperature too high.	• Advise the customer; use a detergent with enzymes. • Advise the customer; select the right program. • Check the warm water connection (target: less than 60 °C). Advise the customer, if necessary connect the dishwasher to a cold water supply.

8.8 Water-soluble or regeneration salt residue on the dishes

Customer information	Cause	Remedy
Water-soluble residue	• Lime deposits on the dishes.	• Advise the customer.
	• Top of the salt dispenser not closed (check the screw of the top, regeneration chamber slowly emptied).	• Advise the customer, rectify leak.
	• Leaking regeneration valve (regeneration chamber is slowly emptied).	• Check the valve and its seating.
	• Regeneration valve permanently activated.	• Electrical check on the basis of circuit documents.
	• Commencing cloudiness of glass: can only apparently be wiped off.	• See damage to dishes, page 91.
	• Detergent water carried over.	• See residual food.
	• Combined product.	• Advise the customer.

8.9 Discolouration / residual colour

Customer information	Cause	Remedy
Residual colour	• Too little detergent used.	• Advise customer, increase the quantity of detergent.
	• Plastic becomes discoloured, for example by tomato deposits, tea, coffee, etc.	• Use a detergent with chlorine bleaching. If the dishwasher becomes discoloured recommend a cleaning agent for the machine.
	• Detergent very lumpy, cleaning effect and dissolving properties diminish	• Advise the customer, store the detergent in a sealed container in a dry place.
	• Program selected not powerful enough (if the program is too short and the temperature too low there will not be sufficient contact with the oxidation bleach).	• Advise the customer; use a more powerful program.
Rainbow-coloured smearing	• Silicate deposits on glasses only (cannot be removed).	• No remedy possible (glass damaged).
	• Clear rinse agent excessively dosed (can be rinsed off with water).	• Reduce the dispensing setting.
Silver cutlery becomes tarnished	• Discolouration occurs as a result of sulphur compounds contained in the air and in various food left-overs.	• Advise the customer; after use silver cutlery must immediately be rinsed.

8.10 Residual detergent

Customer information	Cause	Remedy
Residual detergent	• Detergent dispenser lid blocked by dishes (does not fully open up).	• Advise the customer, dishes not well loaded.
	• Detergent dispenser lid does not fully open up.	• Renew the spring of the dispenser.
	• Unsuitable program selected.	• Advise the customer.
	• Tabs used in the quick or short program.	• Tabs take too long to dissolve.
	• Tabs not used properly (make sure that they are used in the dispenser or in the cutlery basket).	• Advise the customer, observe instructions for use of tabs.
	• Spray arm jets blocked (sieves locked).	• Advise the customer.
	• Dispenser in the spray shadow (large pot or similar vessel loaded at the bottom left).	• Advise the customer.
	• Check the pumping out procedure, non-return valve.	• See residual food.
	• Detergent very lumpy, cleaning effect and dissolving properties diminish.	• Advise the customer.

8.11 Damage to rinsed dishes

Customer information	Cause	Remedy
Commencing or already present, irreversible (not rectifiable) cloudiness of glass	• Degree of hardness set too high, residual hardness in washing or clear rinse cycle <5 °dH.	• Optimise the setting after measuring.
	• Glasses not dishwasher-proof (glasses usually only suitable for use in a dishwasher).	• Advise the customer.
	• Program selected too strong.	• Advise the customer, use the most gentle program possible when rinsing glasses (low temperature < 50 °C).
	• Reaction time of steam in drying process too long.	• Advise customer; do not switch on the appliance and only take out the dishes after a few hours, e.g. leave them in overnight.
Mechanical damage (scratch or fracture)	• Scratches due to contact points / areas with other dishes.	• Advise the customer, avoid contact points when loading the dishwasher.
Dishes faded	• Dishes not dishwasher-proof.	• Advise the customer; use dishwasher-proof dishes.
Rust on cutlery	• Cutlery not dishwasher-proof (knife/knife blade steel is usually not very resistant to corrosion).	• Use dishwasher-proof cutlery (larger proportion of chrome/nickel, at least 18/8 or 18/10).
	• Rust film: rust caused by corroding dishes or dishwasher baskets.	• Advise the customer. Do not rinse any rusty items such as old pots in the dishwasher.

8.12 Drying results

Customer information	Cause	Remedy
Does not dry properly.	• No clear rinse in the dispenser.	• Advise the customer.
	• Appliance connected to a hot water supply; appliance is suitable for hot water, but it is not recommendable.	• Advise the customer; point out the function of the heat exchanger; if necessary connect the appliance to a cold water supply.
	• Dishwasher does not heat up.	• Check the heating circuit in accordance with the circuit documents; observe the circuit breaker on the continuous flow heater (the circulation pump can only build up sufficient pressure if there is enough water in the dishwasher).
	• Program without drying selected.	• Advise the customer. The rapid program is without a drying cycle. The degree of drying option is set too low.
	• The clear rinse has dissolved too quickly for tabs with an integrated clear rinse agent.	• Advise the customer, the tabs are not suitable for this program.
	• Plastic dishes.	• Plastic materials hardly store heat and they have a hydrophobic surface which is difficult to wet. This results in the formation of drops during the drying cycle.
	• Combined detergents (2 in 1 / 3 in 1).	• Advise the customer; recommend separate detergent products (clear rinse and detergent separate).

8.13 Circulating pump

Customer information	Cause	Remedy
Circulation pump does not start up.	• After a long service life the set of seals may stick to the pump wheel.	• It is essential that the set of seals be renewed.

9. Technical data IG 4... and IGV 4...

9.1 General technical data

Dimensions

Height	82.0 cm
Width	44.8 cm
Depth	57.0 cm
Voltage / Frequency	230 V / 50 Hz
Connected load	2.3 kW
Filament energy consumption	2.15 kW
Fuse protection	10 / 13 A

Dispensing device

Rinsing agent fill quantity	120 ml
Setting 0-6	each 1 ml
Detergent filling quantity	45 g

Circulating pump

Nominal voltage	230 - 240 V
Frequency	50 Hz
Resistance	Ha ca. 44 - 57 Ω Hi approx. 50 - 55 Ω
Delivery height	3.9 - 4.1 m
Discharge	25 - 30 l/min
Starting current	2.4 A
Operating current	0.31 A

Water diverter

Nominal voltage	230-240 V (synchronous motor)
Frequency	50 / 60 Hz
Resistance	approx. 9.3 kΩ

Recovery / discharge / natural water valve

Nominal voltage	230 - 240 V
Frequency	50 Hz
Resistance	2 kΩ
Flow rate	2.75 l/min.
Water pressure	0.5 - 10 bar

Actuator

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

Continuous flow heater

Nominal voltage	230 - 240 V
Frequency	50 / 60 Hz
Output	2150 W
Resistance	ca. 22 Ω

Aqua Stop Valve

Nominal voltage	230 - 240 V
Frequency	50 Hz
Flow rate	2.75 l/min.
Water pressure	0.5 - 10 bar

Energy label data

Energy category	A
Washing performance	A
Drying performance	A

Volume (Permanent Rinse system)

Temperature	Resistance in kΩ	Tolerance
25	48.4	7.9
30	38.5	7.1
50	16.5	6.2
60	11.0	5.6
65	9.1	5.6

Klixon / NTC

85 °C safety switch

Salt container - filling capacity

Fine-grained salt	approx. 2 kg
Coarse-grained salt	approx. 1.5 kg
Salt tablets	approx. 0.7 kg

Rinse water pump

Nominal voltage	230 - 240 V
Frequency	50 Hz
Resistance	110 - 260 Ω
Delivery height	0.9 m
Delivery performance	10 l/min

9.2 Consumption data IG 459 to .4

9.2.1 Appliance with heat exchanger

	Intensive 70°	Auto 55-65°	Normal 65°	ECO 50°	Gentle 40°	Rapid 35°	Pre-wash
Time in min.	109	100-140	104	155	75	30	20
Power consumption in kWh	1.35	0.75-1.05	1.15	0.8	0.65	0.5	0.1
Water consumption in litres	20	12-18	17	13	14	10	4

9.2.2 Appliance without heat exchanger

	Intensive 70°	Auto 55-65°	Normal 65°	ECO 50°	Gentle 40°	Rapid 35°	Pre-wash
Time in min.	103	95-140	98	155	71	30	20
Power consumption in kWh	1.40	1.00-1.35	1.20	0.8	0.70	0.5	0.1
Water consumption in litres	20	11-18	17	13	14	10	4

The data indicated may deviate upwards or downwards. The figures are those resulting from laboratory tests in accordance with EN 50242 for the start of a series.

9.3 Consumption data IGV 449. ... and IGV 445. ...

9.3.1 Appliance with heat exchanger

	Intensive 70°	Auto 55-65°	Normal 65°	ECO 50°	Gentle 40°	Rapid 35°	Pre-wash
Time in min.	109	100-140	104	140	75	30	20
Power consumption in kWh	1.35	0.95-1.25	1.15	0.8	0.65	0.5	0.1
Water consumption in litres	20	12-18	17		11		
With Aquasensor	17		14		11		

9.4 Consumption data IGV 459.5

9.4.1 Appliance with water diverter and heat exchanger

	Intensive 70°	Auto 55-65°	Normal 65°	ECO 50°	Gentle 40°	Rapid 45°	Rapid 35°	Pre-wash
Time in min.	109	95-145	104	140	75	30	30	20
Power consumption in kWh	1.35	0.95-1.30	1.15	0.80	0.65	0.65	0.5	0.1
Water consumption in litres	20	11-18	17	10	14	10	10	4

The data indicated may deviate upwards or downwards. The figures are those resulting from laboratory tests in accordance with EN 50242 for the start of a series.

9.5 Consumption data IG 448... (G controls)

9.5.1 Appliance with water diverter and heat exchanger

	Intensive 70°	Auto 55-65°	Normal 65°	ECO 50°	Gentle 40°	Rapid 35°	Pre-wash
Time in min.	103	100-135	98	155	71	30	20
Power consumption in kWh	1.4	1.0-1.3	1.2	0.8	0.7	0.5	0.1
Water consumption in litres	20	12-18	17	13	14	10	4

9.5.2 Appliance with water diverter without heat exchanger

	Intensive 70°	Auto 55-65°	Normal 65°	ECO 50°	Gentle 40°	Rapid 35°	Pre-wash
Time in min.	103	95-140	98	155	71	30	20
Power consumption in kWh	1.40	1.00-1.35	1.20	0.8	0.70	0.5	0.1
Water consumption in litres	20	11-18	17	13	14	10	4

The data indicated may deviate upwards or downwards. The figures are those resulting from laboratory tests in accordance with EN 50242 for the start of a series.

9.6 Consumption data IG 448... (H controls)

9.6.1 Appliance with water diverter and heat exchanger

	Intensive 70°	Auto 55-65°	Normal 65°	ECO 50°	Gentle 40°	Rapid 35°	Pre-wash
Time in min.	103	100-135	98	155	71	30	20
Power consumption in kWh	1.4	1.0-1.3	1.2	0.8	0.7	0.5	0.1
Water consumption in litres	20	12-18	17	13	14	10	4

9.6.2 Appliance with water diverter without heat exchanger

	Intensive 70°	Normal 65°	ECO 50°	Rapid 35°	Pre-wash
Time in min.	105	102	140	29	13
Power consumption in kWh	1.5	1.3	0.95	0.6	0.12
Water consumption in litres	22	22	12	14	4

The data indicated may deviate upwards or downwards. The figures are those resulting from laboratory tests in accordance with EN 50242 for the start of a series.