Dishwasher series DIVA - 911 ... ...

Basic features

Service Manual: H7-74-03

F.S. - Free-standing
B. I. - Partially integrated
F. I. - Fully integrated

Product identification
Code for the production numbers used for the various models (PNC)

						First 3 figures
Product line		**DISHWASHER**				911 xxx xxx
						4. Number
Group	DIVA **45** cm	9 place settings	6			911 **6** x x xxx
	DIVA **60** cm	12 place settings	9			911 **9** x x xxx
						5. Number
Structure		F.S. (45/60)	**1**			911X **1** x xxx
		B.I. (45/60)	**2**			911X **2** x xxx
		F.I. (45/60)	**3**			911X **3** x xxx
		F.S./B.I.(B.U.) convertible (45/60)	**4**			911X **4** x xxx
		F.S. „BIG 60“	**6**			911X **6** x xxx
		B.I. „BIG 60“	**7**			911X **7** x xxx
		F.I. „BIG 60“	**8**			911X **8** x xxx
						6. Number
Key typology & electro-mechanical function		1 key	**1**			9119 X **1** xxx
		2 keys	**2**			9119 X **2** xxx
		3 keys	**3**			9119 X **3** xxx
		4 keys / + keys	**4**			9119 X **4** xxx
Electronic function		EDW 1001-1100/ 1003	**5**			9119 X **5** xxx
		EDW 1500 / 1503	**6**			9119 X **6** xxx
		EDW 2000 / 2003	**7**			9119 X **7** xxx
		EDW 2500 / 2503	**8**			9119 X **8** xxx
		EDW 500 / 503	**9**			9119 X **9** xxx
						Last 3 figures
Product identification /customer/market)			**XXX**			911 9 X X **XXX**
Example	DIVA **electronic**	⇨	F.S.	EDW1001-1100	⇨	911 9 1 5 xxx
		⇨	B.I.	EDW1001-1100	⇨	911 9 2 5 xxx
		⇨	F.I.	EDW1003	⇨	911 9 3 5 xxx
		⇨	B.U.	EDW1001-1100	⇨	911 9 4 5 xxx
		⇨	F.S.	EDW1500	⇨	911 9 1 6 xxx
		⇨	B.I.	EDW1500	⇨	911 9 2 6 xxx
		⇨	F.I.	EDW1503	⇨	911 9 3 6 xxx
		⇨	B.U.	EDW1500	⇨	911 9 4 6 xxx
		⇨	F.S.	EDW2000	⇨	911 9 1 7 xxx
		⇨	B.I.	EDW2000	⇨	911 9 2 7 xxx
		⇨	F.I.	EDW2003	⇨	911 9 3 7 xxx
		⇨	F.S.	EDW2500	⇨	911 9 1 8 xxx
		⇨	B.I.	EDW2500	⇨	911 9 2 8 xxx
		⇨	F.I.	EDW2503	⇨	911 9 3 8 xxx
		⇨	F.S.	EDW500	⇨	911 9 1 9 xxx
		⇨	B.I.	EDW500	⇨	911 9 2 9 xxx
		⇨	F.I.	EDW503	⇨	911 9 3 9 xxx
		⇨	B.U.	EDW500	⇨	911 9 4 9 xxx

Responsible: Dieter Rutz
Email: dieter.rutz@kueppersbusch.de
Phone: (0209) 401-733
Fax: (0209) 401-743
Date: 02.03.2009

KÜPPERSBUSCH HAUSGERÄTE AG
Customer Service
Postfach 100 132
45801 Gelsenkirchen

Contents

1. General

1.1 Purpose of this service manual

The purpose of this Service Manual is to provide Service Engineers, who already have the basic knowledge necessary to repair household dishwashers, with information of a general nature regarding the new «DIVA» range of dishwashers.
The aspects described in this document relative to the structural and hydraulic characteristics and the basic circuits are common to all the appliances in the range, both with electromechanical and electronic control systems.
More detailed information regarding individual models may be found in the specific information documents for each specific functionality.

1.2 Introduction

New technology means dishwashers created with computer-aided design systems and built using modern industrial technnology.

Result
Drawing on our vast experience and resources, combined with the latest technical and structural techniques, we have produced this range of innovative appliances to meet the demands of a market that is constantly evolving.

1.2.1 Main features

1.2.1.1 Structure

- Modular conversion structure, in the following designs: - free-standing, semi-integrated, fully integrated.
- Monobloc load-bearing base in sound-absorbing plastic material.
- Two removable side panels.
- Styling variable to meet the various configurations requested.
- Simplification of free-standing and built-in installation.
- On built-in models, the rear foot can be adjusted from the front of the appliance.

1.2.1.2 Hydraulic system

- Newly-designed integrated hydraulic circuit.
- New integrated sump.
- New water softening system.
- Softening of regeneration water up to 90°F - 50°C.
- Optimization of the regeneration system with 5 > 10 levels of regeneration.
- Manual regulation of the regeneration level on electromechanical models, software regulation for electronic models.

1.2.1.3 Electrical characteristics

- New washing pump motor.
- New rinse water pump motor.
- New timer.
- New electronic boards.

1.2.1.4 Control and safety systems.

- Measurement of water temperature by means of thermostats or temperature sensors for electronic models.
- Measurement of water fill level by means of a pressure switch.
- Anti-overflow safety system using a pressure switch.
- Anti-leakage safety system using an anti-flooding device.
- Protection against overheating using a safety thermostat software for electronic models.
- Electrical door aperture safety system.
- Functional protection with constant monitoring of the software for electronic models.

1.2.1.5 Sound-proofing

- Improved silence thanks to the use of new materials and new construction technologies.

1.2.1.6 Service

- Easier access to components thanks to careful positioning, from the two removable side panels and from the frontal plinth.

Electronic models:

- Facilitation of repairs using diagnostics tests and trouble-shooting procedures.
- The washing parameters can be modified to improve washing performance.

1.3 General features

Power supply	➔	230 V / 50 Hz (limits 187÷254 V)
Total power absorption	➔	2300 W (heating element 2100 W)
Water connection	➔	Water supply min. /max.pressure 5 ÷ 80 N/cm²
Filling capacity	➔	12 place settings
Noise level	➔ ➔	db 50 / 56 (A) sound pressure (electromechanical models) db 46 / 50 (A) sound pressure (electronic models)
Class	➔	[AAA] - [AAB] (electronic models)

* Stated consumption [prog. BIO AAB]
Water - Energy - Duration of cycle ➔ 14 Lt - 1.10 KWh - 150 Min.
* Example of programme declared to the various consumer institutes (electronic model).

1.4 Field of application

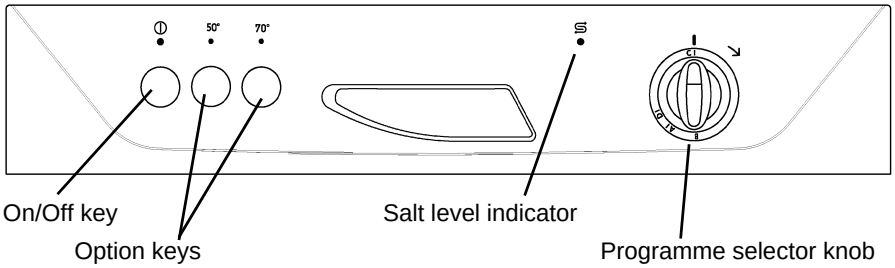
Washing system	➔	Continuous washing (electromechanical models)
	➔	Continuous washing / Impuls (electromechanical models)
Control system	➔	TIMER (electromechanical models)
	➔	Electronic board (electronic models)
Water fill level	➔	Pressure switch control (electromechanical models)
	➔	Pressure switch control + software (electronic models)
Water heating	➔	TUBE-ENCLOSED HEATING ELEMENT
Temperature control	➔	Pressure switch control (electromechanical models)
	➔	NTC-Temperature sensor (electronic models)
Drying	➔	NORMAL DRY (electromechanical models)
	➔	ACTIVE DRY (electronic models)
	➔	TURBO DRY (electronic models)
Safety systems	➔	WATERPROOFING/PROTECTION SYSTEM FOR ELECTRICAL COMPONENTS (electromechanical models)
	➔	FULLY WATERPROOF / TOTAL PROTECTION OF ELECTRICAL COMPONENTS & SOFTWARE (electronic models)
Alarms	➔	SOFTWARE SYSTEM WITH VISUAL DISPLAYS (electronic models)

1.5 Electronic control module

Performance:	➔	MAIN OPERATIONAL CONTROL (with built-in microprocessors)
Control elements / display	➔	MACHINE USER INTERFACE

1.6 Definition of stylings and functions

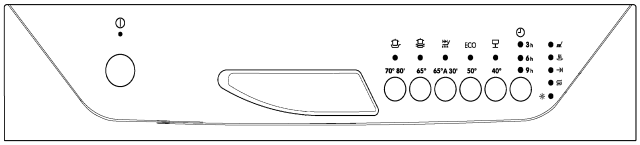
1.6.1 Control panel: DIVA_ELM [electromechanical models]

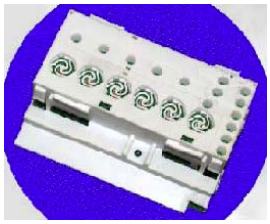


Description of the mode of operation

Structure	Mode of function	Control elements	Available programmes	Available optional functions
Free-standing / Built-in	Electromechanical	On/Off key 1 to 3 keys + Programme selector dial	3 to 6	[Temp.setting 70°C, 60°C, 50°C] - [Intensive] - [Bio/Eco] - [½ Charge]

1.6.2 Control panel: DIVA_ EDW1001





Control panel versions - Horizontal
- Vertical

Description of the mode of operation

Structure	Mode of function	Control elements	Available programmes	Available optional functions
Free-standing / Built-in	EDW_1001	On/Off key 3 to 6 keys / LEDs	3 to 6	[Delay / 9h] - [½C] - [Tablet (3/1)]

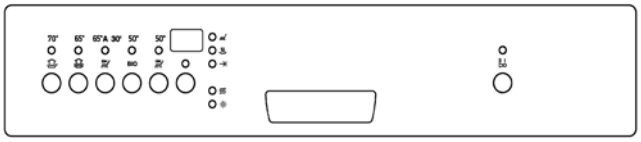
1.6.3 Control panel: DIVA_ EDW1003

Control panel version: top / horizontal

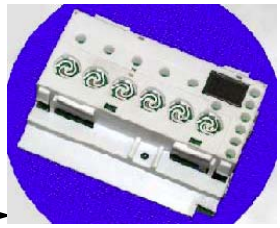
Description of the mode of operation

Structure	Mode of function electronic	Control elements	Available programmes	Available optional functions
Fully integratable	EDW_1003	On/Off key 3 to 6 keys / LEDs	3 to 6	[Delay / 9h] - [½C] - [Tablet (3/1)]

1.6.4 Control panel: DIVA_ EDW1500



Control panel versions - Horizontal

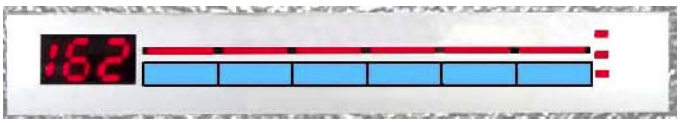


- Vertical

Description of the mode of operation

Structure	Mode of function	Control elements	Available programmes	Available optional functions
Free-standing / Built-in	EDW_1500	On/Off key 3 to 6 keys / LEDs + Display	3 to 6	[Delay / 19h] - [½C] - [Tablet (3/1)]

1.6.5 Control panel: DIVA_ EDW1503

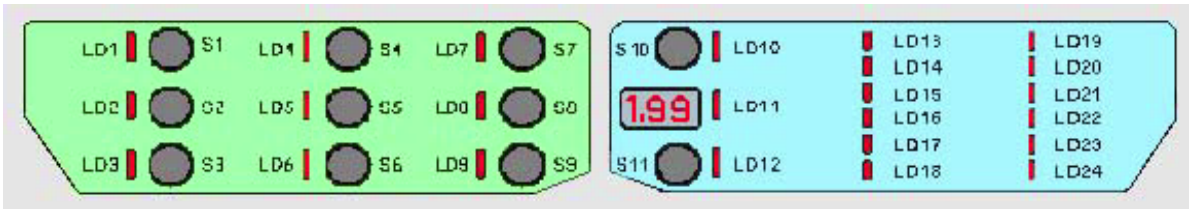


Control panel version: top / horizontal

Description of the mode of operation

Structure	Mode of function electronic	Control elements	Available programmes	Available optional functions
Fully integratable	EDW_1503	On/Off key 3 to 6 keys / LEDs + Display	3 to 6	[Delay / 19h] - [½C] - [Tablet (3/1)]

1.6.6 Control panel: DIVA_ EDW2000



Control panel version: front / vertical

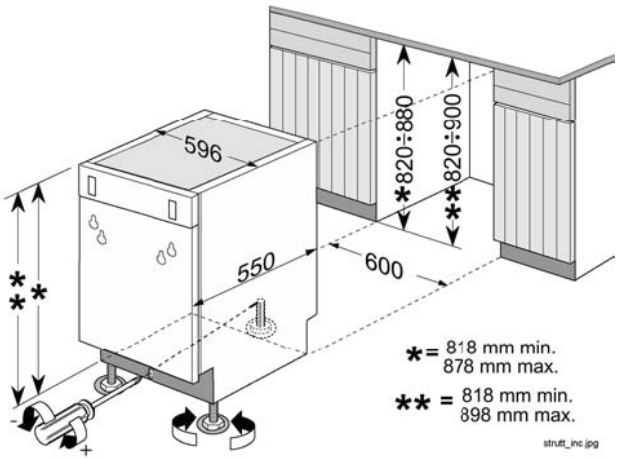
Description of the mode of operation

Structure	Mode of function electronic	Control elements	Available programmes	Available optional functions
Free-standing / Built-in	EDW_2000	On/Off key 11 keys / LEDs + Display	9	[Delay / 19h] - [½C] - [Tablet (3/1)]

1.7 Structural features

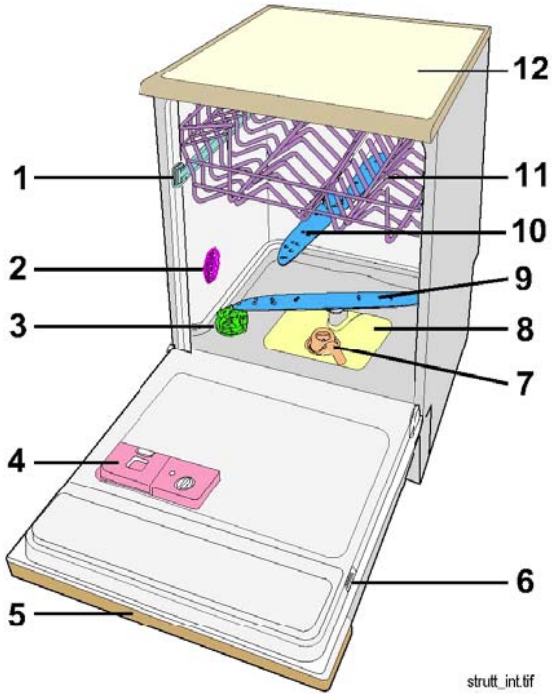
The dishwasher is designed in a modular conversion structure and the INTEGRATABLE Built-in variant offers considerable flexibility in the choice of version.

Structure: modular

	Version: integratable
	The dishwasher can be inserted beneath a sink or a pre-existing work-top in marble or wood, on condition that the dimensions of the compartment are as shown in the figure. The feet can be adjusted to a maximum of 80 mm. The rear foot is adjusted from the front of the appliance.

1.7.1 Features of the components in the interior

1. Upper basket rails
2. Water softening level selector
3. Salt container cap
4. Detergent/rinse-aid dispenser
5. Control panel
6. Serial number plate
7. Central filter (drain)
8. Main filter (washing)
9. Lower spray arm
10. Upper spray arm
11. Upper basket
12. Worktop (free-standing models only)



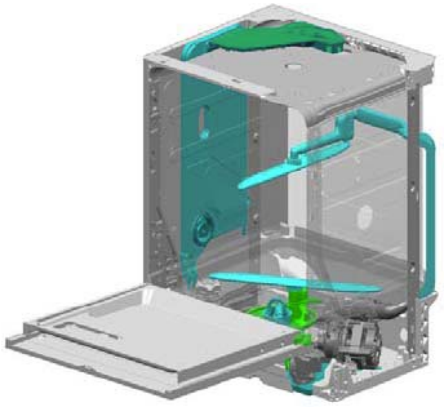
2. Structural characteristics

The appliance consists of four main assemblies:

BASE - DOOR AREA - RINSING CAVITY -
Hydraulic system

These four assemblies are enclosed in a cabinet designed with the following removable parts:

- a bottom front panel (with two screws)
- two side panels (with six screws)
- a worktop (for free-standing dishwashers), fastened to the structure with two rear screws.



2.1 Base

The specially-shaped base is moulded in sound-absorbing plastic material.

The base, which supports the body of the appliance, is fixed structurally to the tub.

The following components are located in the base:

- fill valve
- integrated terminal block, power cable and anti-interference capacitor
- washing pump capacitor
- anti-flooding device
- support system (rubber support blocks) for the washing pump
- counterweight (for free-standing dishwashers).

2.2 Door

The door consists of the following sub-assemblies:

2.2.1 Control panel

The control panel is in moulded plastic, and is secured to the inner door by six self-tapping screws.

The control panel may be customised for the various stylings, with different colours and silk-screened markings, or by the application of a transparent or stainless steel panel mask.

The following components are screwed or pressure-fitted to the inside of the control panel:

- timer or electronic board
- door aperture handle
- pushbutton array
- pilot lamp diffusers

2.2.2 Inner door

The inner door is in non-magnetic 304 stainless steel, and is secured by two lateral hinges (using four screws), which are secured to the two front uprights of the tub.

The following components are fitted to the interior of the inner door:

- door latch with a built-in door aperture microswitch
- integrated dispenser (detergent and rinse-aid)
- in the lower section, a seal with the bottom of the tub.

2.2.3 Door

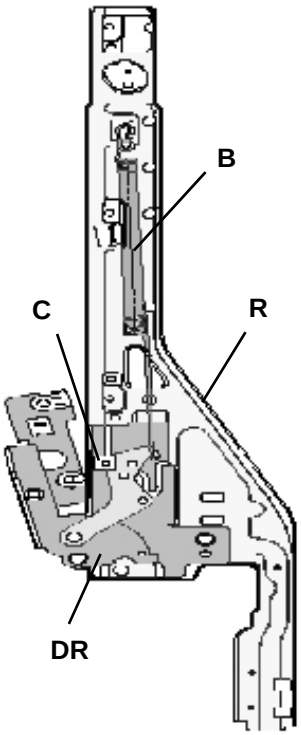
The door is in enamelled sheet steel, and is secured to the inner door by six screws around the perimeter and two lateral screws.

The doors of built-in appliances have holes, slots and shaped sections for application of an outer door in wood.

2.2.4 Door hinge

In galvanized pressed steel, with a series of mechanisms (springs, levers, spindles) which form the system of movement for aperture/closure of the door.

Secured externally to the two lateral uprights **D** by pressure-fitted couplings and screws with metric thread.



2.2.4.1 Properties & mode of operation

The door is opened and closed by means of a pair of “self-adjusting“ hinges (**A**) and a tensioning spring (**B**). The movement is self-balancing and features an automatic “braking” system.

The self-balancing system consists of a helical spring which is calibrated to a fixed setting.

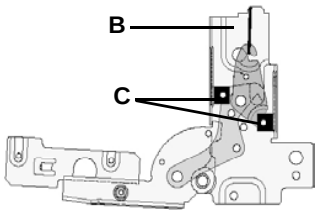
- The calibration depends on the overall weight of the door fitted to the appliance.
- The helical spring is secured to the upper extremity of the upright and to the hinge mechanism.

The automatic braking system consists of a mechanical clutch.

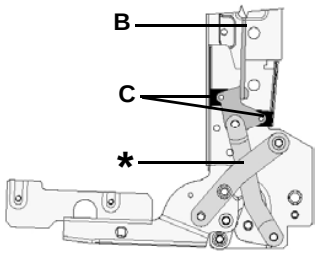
- The clutch consists of a sliding element **C** fitted to the hinge mechanism which, during aperture and closure of the door, slides vertically along the surface of the hinge.
- Some of the hinges have a double clutch (two sliding elements) in order to develop a greater braking effect so that the same balance is achieved when heavier door panels are mounted.

2.2.4.2 Use & setting

Dishwasher structure	Hinge (C)	Spring (B)	Panel/front weight	Door total weight
Built-in	double clutch	Normal (no mark)	2 - 7,5 kg	7.9 - 14.2 kg



Built-in	double clutch (*) variable pivot point	Normal (no mark)	2 - 7,5 kg	7.9 - 14.2 kg
(*) The hinge with double movements (opening and lifting the door simultaneously) makes it easier to instal the dishwasher, since there is no overlapping over the housing base; the base does not need to be cut out in order to enable the door panel to turn.				



2.3 Tub

The tub assembly consists essentially of a stainless steel tub and a series of sub-assemblies which form the load-bearing structure of the dishwasher.

Two basic tubs have been designed, to suit the type of drying to be performed by the dishwasher.

- The difference between the two lies in the presence or absence of a hole (*) in the rear section of the tub ceiling, to which the drying duct can be fitted.
- Other differences concern the type of soundproofing, which depends on the number and thickness of the tar-coated panels.

2.3.1 Structural characteristics

The tub is produced by press-forming, using two types of steel.

Magnetic stainless steel 430

- Side panels and back panel in one operation (pressed, punched, bent)
- Top tub ceiling (pressed, punched)

Non-magnetic stainless steel 304

- Bottom tub base (pressed, punched)

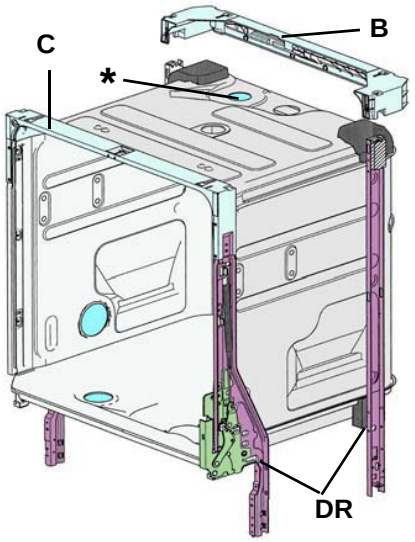
The side and rear panels are then crimped to the ceiling and the bottom of the tub.

A silicone-based adhesive is inserted between the parts to provide a seal.

Two ducts in 430 stainless steel (in the shape of an inverted “L”), welded around the internal perimeter of the front section of the tub to the ceiling and the two sides, are used as a seat for the perimetral door seal.

The tub is soundproofed by applying tar-coated panels, which are hot-glued on the external sides (all or some of the sides). These panels are of different thickness, according to the level of noise generated by the appliance.

2.3.2 Structurel sub-assemblies



The structure of the tub is completed by the installation of a number of additional components.

Lateral uprights **A**, which support the tub on all four sides; Three of these (the two rear uprights and the RH lateral upright) are inserted into the base.

- Two rear uprights, produced automatically using the “clinching” system (cold deformation welding).
- Two front uprights, secured manually using three screws.

Rear cross-member **B**, plain plastic, secured to the lateral uprights by two screws.

- The rear cross-member is a structural support for the side panels and work-top, and also supports the various hoses.

Front cross-member **C**, in enamelled sheet metal, pressure-fitted to the two lateral uprights and secured using two screws.

- The front cross-member is a structural support for the side panels and work-top, and also for the door closure mechanism.

Components built into the tub

The tub is then fitted with a number of functional components.

On the outside:

- On either side, the four supports for the upper basket guides.
- On the right side, the vertical manifold which ducts water to the upper spray arm.
- On the left side, the water fill tank.
- On the upper side, the drying duct and (if featured) the fan.
- On the bottom, the sump assembly and the water softening system.

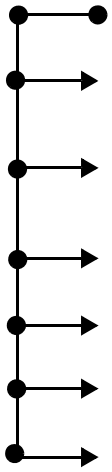
Internally:

- On either side, the two guides in which the upper basket slides.
- At the rear, the horizontal manifold which ducts water to the upper spray arm.

2.4 Hydraulic circuit

The hydraulic system is common to all versions of the dishwasher, since its specific water softening function consists of a number of specific components.

2.4.1 Hydraulic path



WATER INTAKE HOSE
- Water intake from the mains supply circuit.

FILL TANK
- Passage of water into and out of the appliance.
- Water deposit for regeneration.

SOFTENING SYSTEM
- Passage of water for softening process.
- Passage of water for regeneration process.

SUMP
- Collects water for the washing process and deposits for drainage.

FILTER GROUP
- Filters the washing water in circulation and retains any dirt.

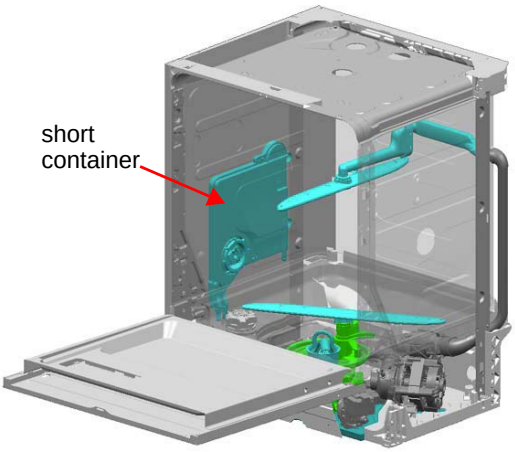
LOWER SPRAY ARM DUCT
- Ducts water to the lower basket.

UPPER SPRAY ARM DUCT
- Ducts water to the upper basket.

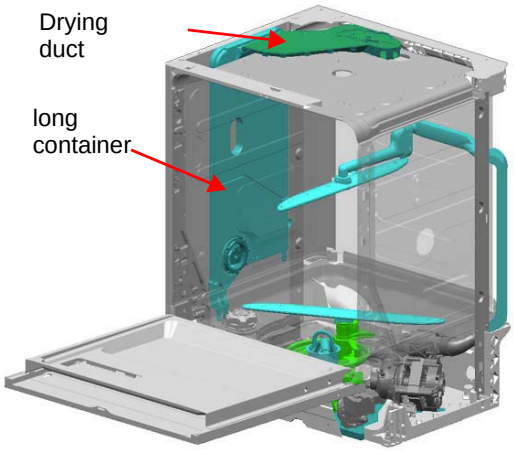
2.4.2 Differences in the hydraulic circuit according to the drying system

Although the functional principle of the hydraulic system is identical for all versions, the single exception is the fill tank, which differs according to the type of drying system.

TRADITIONAL



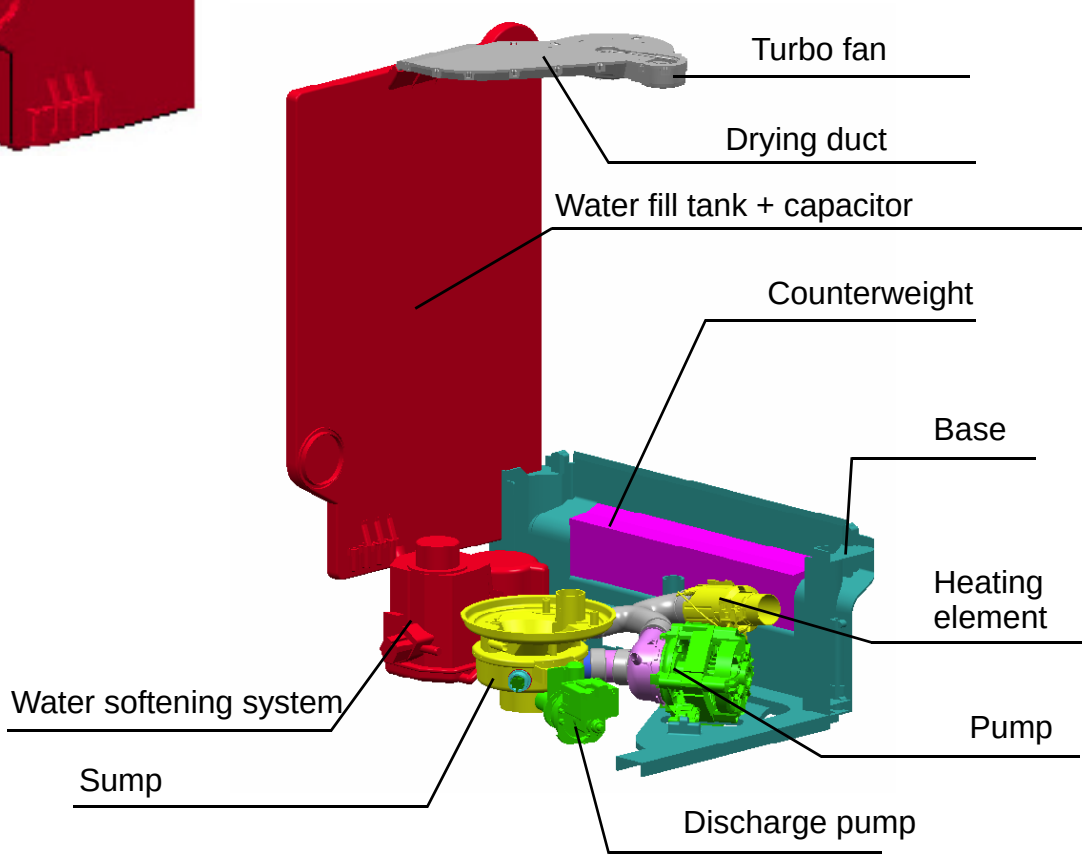
ACTIV & ACTIV_TURBO



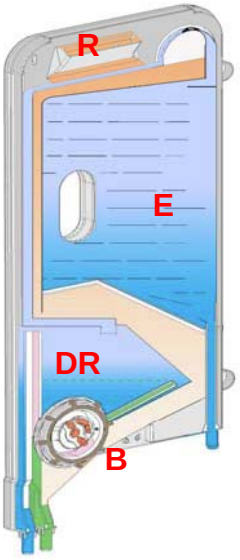
3. Features and functions of the hydraulic group

Short water fill tank

Long water fill tank



3.1 Water fill tank

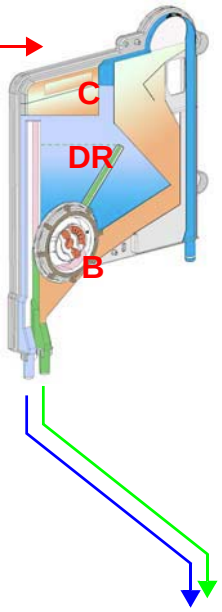


The water fill tank is a container in transparent moulded plastic consisting of two sections that are welded together.

- Inside the tank, special chambers and ducts define the path taken by the water during the fill phase.
- The fill tank is positioned in the left-hand section of the appliance, and is screwed into position from inside the tub using a fixing ring.
- The softener regulation system is built into the fixing ring, and is actioned by a knob.

The water fill tank is one of the main functional parts of the hydraulic circuit.

Types of container: **LONG** → **SHORT** →

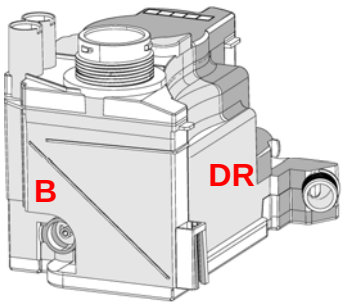


A Water fill chamber and regeneration volume
B Regulation system for softening circuit
C Steam venting chamber
D Steam circulation chamber
E Steam condensation chamber

The following functions are involved:

- WATER INTAKE SYSTEM
- WATER REGENERATION SYSTEM
- STEAM CONDENSATION

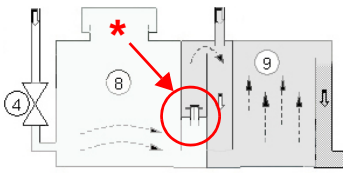
3.2 Water softening system



A monobloc container in transparent plastic divided into two sections containing salt and resin. The container is subdivided into two sections, which communicate through internal ducts and contain the salt and the resin. The container is positioned in the base of the appliance and screwed to the tub from the inside by a fixing ring.

- Connected to the water intake container with 2 O-ring connectors.
- Connected to the sump with a drain hose.

The following components are fitted externally to the container:



- The salt sensor (**A**)
- The regeneration solenoid valve (**B**)

A normally-closed separation valve (*) is installed inside the container, and serves to separate the two sections.

- The valve opens as a result of the pressure exerted by the water during the regeneration process, when the regeneration solenoid valve (4) opens.

Salt reservoir

The salt reservoir contains the salt used for regeneration, and is accessible for filling.

The salt sensor (**A**) indicates to the user that the salt reservoir requires topping up.

- The sensor consists of a reed sensor positioned externally to the reservoir, and a magnetic float inside the reservoir.
- The sensor is connected electrically to the SALT LED on the control panel in versions with electromechanical control; in electronic versions, it is connected directly to the PCB.

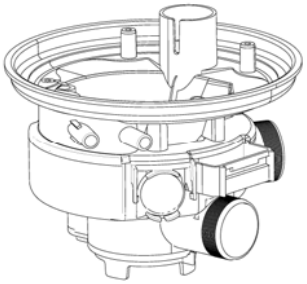
Resin reservoir

This sealed reservoir contains the resins (organic substances used to purify the water).

- The regeneration solenoid valve (**B**), when actioned, performs the regeneration process (cleaning of the resins).

3.3 Sump assembly

A container made of a single part of transparent plastic which is divided into 3 bonded parts showing the sections for **PRESSURE**, **RINSE** and **DRAIN OFF:**
The sump is located on the bottom of the tub, with a perimetral sealing ring, and is secured from the inside by four screws.



Pressure section (**A**)

- An integral part of the washing section, in which a double pressure chamber controls the level of the water.

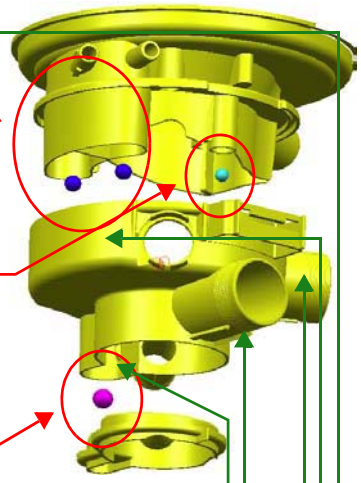
RINSE section (**B**)

- Located beneath the main stainless steel filter, this section collects the filtered water, which is then re-introduced (clean) into the circuit and ducted to the spray arms.
- Direct hydraulic connection to the lower spray arm.

Drain section (**C**)

- Located beneath the circular filter in the bottom of the sump, where the dirt is deposited before being drained.
- Housing for the drain filter.

Four ball valves built into the sump perform a number of specific functions.



Pressure switch pressure valves (2):

- Positioned inside the respective pressure chambers.
- In case of tilting of the appliance, the valves prevent the residual water in the sump from entering the connections of the two pressure switch tubes.

Detergent water pump ventilating valve:

- This valve is located internally, near the detergent water pump ventilator.
- During the water fill phase, the valve opens and maintains the drain circuit open so that the air is expelled. This enables the pump to fill with water and prevents cavitation.

Sump bottom valve:

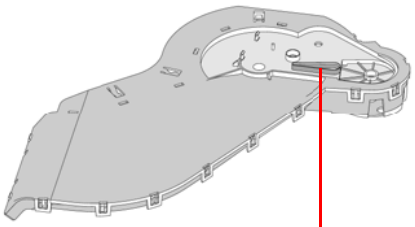
- Located internally, near the sump bottom.
- During the water fill phase, the valve closes to separate the drain section from the rinsing section.
- Opens during the drain phase, thus connecting the drain and rinsing sections.

The following connections are located externally:

- Hydraulic connection to the softener via a rubber hose
- Water connection to the detergent water pump via a rubber coupling.
- Hydraulic connection to the washing pump, via a rubber coupling
- Housing for the thermostat or temperature/turbidity sensor
- To the level and safety pressure switches, via two small hoses in different colours.

3.4 Drying duct

The drying duct is a moulded plastic container consisting of two sections which are pressure-fitted together.

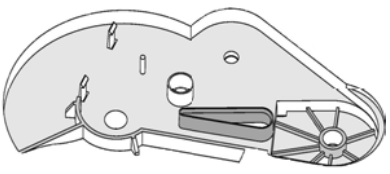


The drying duct is used in Active and Turbo drying.

- During the drying phase, the function of the duct is to transfer the steam in the capacitor of the water intake unit, where the steam condenses.
- The drying duct is positioned externally above the tub and fixed from the inside by a snap ring.

3.4.1 Drying duct + fan

Turbo drying is obtained by means of a fan located inside the drying duct.

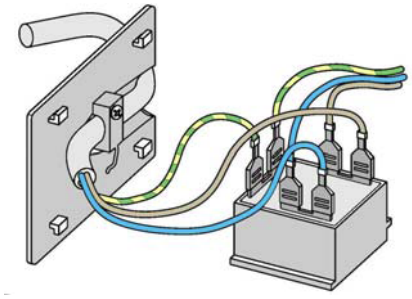


The fan consists of a small synchronous electric motor and an elastic drive belt which actions the suction fan blade.

When the fan is in operation, it creates a forced air movement.

4. Electrical components

4.1 Terminal block



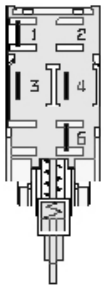
The terminal block consists of a junction box to which the power cable is connected; the wiring is then routed to the appliance's ON/ OFF switch.

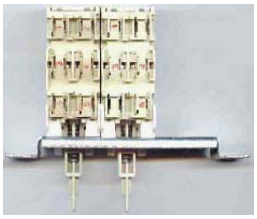
- The terminal block is pressure-fitted into a housing inside the base.
- A suppressor is built into the terminal block.

Suppressor:

- The suppressor is an electrical device designed to filter out radio interference.
- Correct operation of the suppressor requires that the appliance be connected to an efficient ground connection.

4.2 Push button array



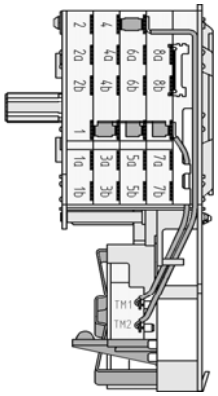


The pushbutton array consists of one or more modular buttons (maximum 4) in a single block (the individual buttons are pressurefitted into a metal support).
The pushbutton array is located inside the control panel and secured by two screws.

The pushbutton array performs two functions:

- Switch (two-pole) for the ON/OFF key.
- Deviator (single-pole/two-pole) for the Option keys.

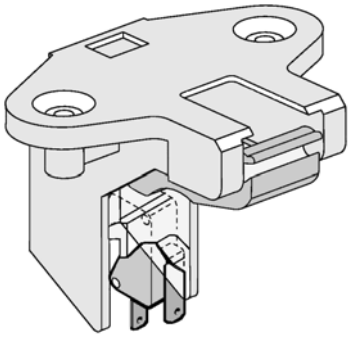
4.3 Timer



The timer is a timer-controlled electrical device which controls the duration and the execution of the operations that comprise the washing cycle.

- All the “user” components (solenoid valve, pump, heating element etc.) are connected electrically to the timer by means of a specific wiring harness.
- The signals to the user components are transmitted via the contacts (switching) fitted to a lateral support and actioned by a series of cammes.
- The movement of the cammes is transmitted by a synchronous motor via a series of levers and gears which, in turn, advance the timer from one step to the next.
- One complete rotation of the timer is subdivided into 58 steps. A specific time which varies from at least 5 seconds to not more than 24 seconds is specified for each of these steps.

4.4 Door latch



Closure of the door is performed by a mechanical locking/release system which also connects and disconnects the electrical components in the appliance.

- The latch is positioned inside the inner door in the upper section, and is secured from the exterior by two screws.
- The assembly consists of the latch, which also features a built-in microswitch.

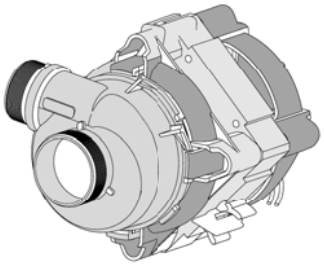
Latch:

- The latch is in plastic material in which a system of levers provides the mechanical action.

Microswitch:

- The microswitch is connected electrically (in series) to the ON/OFF switch, and opens or closes the contacts in order to connect or disconnect the machine from the power supply.
- The microswitch is pressure-fitted into a housing in the latch.

4.5 Rinse water pump



Single-phase asynchronous two-pole motor with a single direction of rotation.

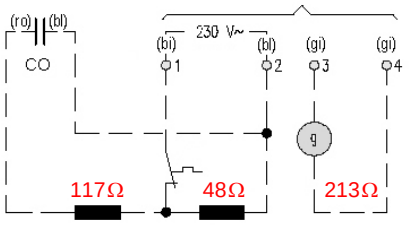
- Counter-clockwise rotation (seen from impeller side).
- The hydraulic group (pump scroll casing, sealing rings and impeller) is clamped to the motor shield, with an internal sealing ring.
- Secured to the base of the appliance by two supports in vibration-damping rubber.
- Connected to the sump by rubber couplings.

Washing pump with electronic control

Same functional characteristics, but with one exception:

Only difference:

- The pump is fitted with a tachymetric sensor (g) housed externally to the motor. The sensor is connected to the electronic control system in order to provide variable speeds of rotation.

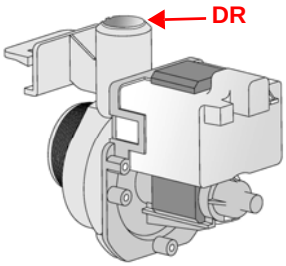


4.6 Condenser

Capacitance 3µF - operating voltage 450VL.

The capacitor is permanently connected to the windings of the washing pump, and is used to start up and maintain rotation in all operating conditions.

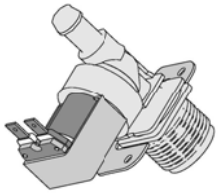
4.7 Discharge pump



Single-phase two-pole synchronous centrifugal motor.

- Rotation in both directions.
- Integrated hydraulic group (pump body and impeller).
- Secured to the sump by snap-on connectors and connected hydraulically via a rubber coupling.
- A diaphragm-type non-return valve (A) positioned on the outlet coupling reduces the quantity of water remaining in the sump at the end of the drain cycle and prevents water from entering the appliance from the drain system (in the sink).

4.8 Water fill solenoid valve



Traditional single-coil solenoid valve with one inlet and one outlet.

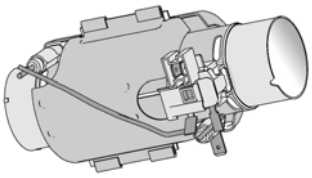
- Positioned in the lower rear section of the base. The outlet is connected via a tube to the water fill tank.
- The rated delivery flow of the solenoid valve is ~ 4 l./min.

Water fill solenoid valve

Integrated single-coil solenoid valve fitted upstream of the fill hose.

- The fill hose is coupled from the outlet in the lower rear section of the base to the water fill tank.
- The rated delivery flow of the solenoid valve is ~ 4 l./min.

4.9 Tube-enclosed heating element



The “enclosed“ heating element is used to heat the washing water. (The heating element is not activated during the drying phase).

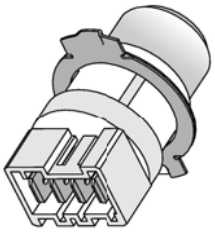
- Inserted into the delivery side of the washing pump and coupled with the duct which directs water to the upper spray arm.
- Standard version for all the appliances in the range.
- Heating power: 2100 Watts

Built-in safety devices:

- 1 bimetallic thermostat which automatically resets and is calibrated at 98°C.
- 1 thermostat fuse which does not automatically reset and is calibrated at 206°C.

Connected in series to the second branch of the heating element.
(If this fuse actuates, the heating element will be permanently disconnected).

4.10 Temperature thermostat



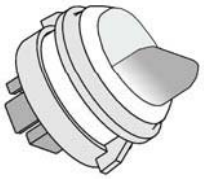
Used in versions with electromechanical control systems (timers) to control the temperature of the washing water.

- Positioned externally on the sump, in direct contact with the water.

Available in two versions: with one temperature or two temperatures:

- **1_Tº** ➔ for appliances with fixed-temperature washing (65°C).
- **2_Tº** ➔ for appliances with variable-temperature washing (50 - 65°C).

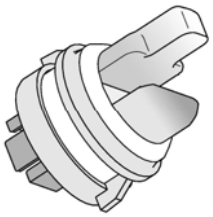
4.11 Temperature sensor



Used in versions with electronic control systems to control the temperatures of the washing water.

- Positioned externally on the sump, in direct contact with the water.
- Constantly transmits the temperature of the water to the electronic control system.
- Consists of an NTC sensor whose resistive value decreases as the temperature of the water increases.

4.12 Temperature sensor + clouding sensor



Used in versions with electronic control (high-end appliances) to control both the temperature and the turbidity of the washing water.

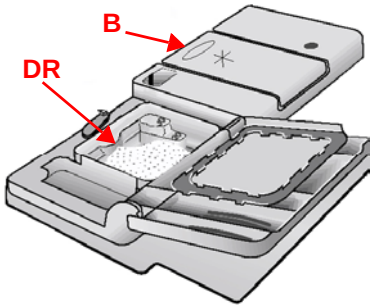
- Positioned externally on the sump in direct contact with the water.
- Fitted with an NTC sensor for control of the temperature.
- Fitted with an infra-red system for control of the turbidity of the water (i.e. the quantity of dirt in the water).
- Constantly transmits the two signals to the electronic control system for processing.
- By correctly combining the signals received from the two sensors (NTC and turbidity), the appliance is enabled to perform “automatic” washing cycles“ which automatically optimize the washing cycle according to the type of load, the quantity of the load and the degree of soiling.

Turbidity detection system

This consists of a reading process which takes place during the cycle according to the signals received from the turbidity sensor by the electronic control system. The signal is transmitted by the sensor and enables the control system to identify the status of the cycle.

1. Recognition during the pre-rinse cycle
   Determines whether or not the pre-rinse water is drained off.
   If the drain cycle is performed, the wash phase is performed at the normal temperature (65°C).
   If the drain cycle is not performed, the wash phase is performed at 50°C.
2. Recognition during the rinsing cycle
   Determines whether a second rinsing cycle is run.

4.13 Rinse-aid dispenser



Made of a plastic unit that is divided into two sections: a detergent dispenser (**A**) and a rinse-aid dispenser (**B**).

- Fitted to the interior of the inner door and secured by two screws.

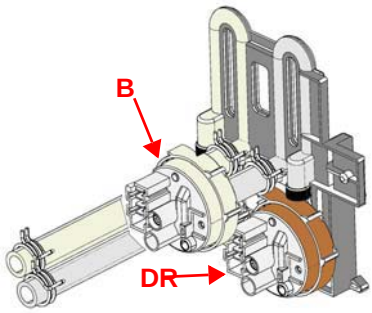
The dispenser uses a single electrical coil connected to a mechanical system and which performs both functions.

- When the coil is energized, it actions the mechanism via a series of levers, thus introducing the contents in sequence (first detergent, then rinse-aid).
- The dispenser is controlled by the timer (or PCB) at predetermined steps during the cycle to ensure correct dosing.
- A window to the side of the rinse-aid sector indicates the level of detergent (when the window is clear, the detergent requires topping up).

4.14 Water level pressure switch & anti-overflow pressure switch

These are two traditional pressure switches (pneumatic diaphragm type) connected to a special support which is in turn secured to the right-hand upright by two screws.

4.14.1 Water level pressure switch (A)



Determines the level of water introduced into the appliance.

Operating range: Intervention / Reset = 65 / 45 mm

Operating characteristics: Empty / Full = Contacts 1-2 / 1-3

4.14.2 Anti-overflow pressure switch (B)

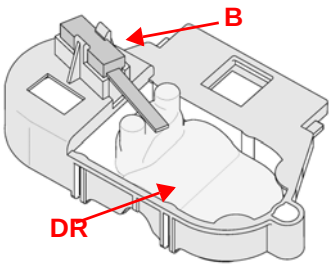
Ensures that the level of water in the appliance does not exceed the safety threshold (overflow from the door).

Operating range: Intervention / Reset 129/ 105 mm

Operating contacts: Empty / Full = Contacts = 1-2 / 1-3

- Connected electrically in series via contacts 1-3 to the detergent water pump.
- When actuated at Full (1÷3), the detergentwater pump switches on until the switch returns to Empty (1÷2).

4.15 Anti-flooding device



This mechanical/electrical safety device is activated if water is detected in the bottom of the appliance.

- The device consists of a plastic container which contains a sensor (floating type) and a microswitch.
- It is fitted into a special housing inside the base of the appliance.

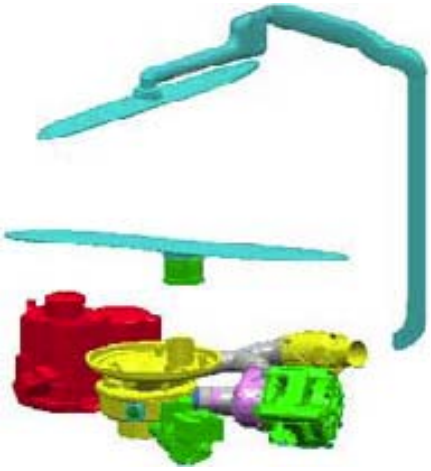
Sensor (A):

- Extra-light polystyrene sensor whose position (at rest or raised) determines the mechanical action of the microswitch.

Microswitch (B):

- This switch is connected in series to the fill solenoid, and opens or closes the contacts in order to connect or disconnect the solenoid valve electrically.
- When at rest (solenoid valve energized), the electrical contacts are closed.
- It is fitted into a special housing inside the base of the appliance.

5. Washing system



The washing system is of the traditional type in which the mechanical washing action is provided by the rotation of the washing pump. The pump ducts the water into the hydraulic circuit, thus actioning both spray arms simultaneously.

In order to obtain the washing result, the system also requires features such as heating of the water, change of the water, introduction of detergent and rinse-aid etc.

in order to be complete. All these functions are included in the washing cycle.

5.1 Description of the rinsing program

The washing programmes are known by commercial descriptions such as: *Vigorous*, *Normal*, *Short*, etc.

The rinsing programs which form the basis of the plan are based on a number of “rinsing cycles”, which are subdivided as follows: pre-rinse, wash, rinse, dry.

Each of these phases includes a number of “phase cycles” which determine the execution of the washing cycle in a logical sequence.

Each phase in the operation of the dishwasher has a specified duration and temperature which can be changed with extra keys. This makes different programmes available.

In other words, the functions performed during the washing cycle are variable according to the cycles defined.

For further details regarding the definition of the washing cycles, refer to the specific Service Notes for each model.

Basic progressive composition of the phases of the washing cycle

Washing phases	Phase cycles	Phase functions	Additional functions	(*) Variable functions
Pre-wash	Water intake Discharge		Washing the resins	
	Water intake	Wait for pressure switch		
	Wash			
	Heating	Wait for temperature		(0°C - 50°C)
	Discharge			
Wash	Water intake	Wait for pressure switch		
	Wash		Detergent	
	Heating	Wait for temperature		(50°C - 65°C)
	Discharge			
1. Rinsing	Water intake	Wait for pressure switch		(skip phase)
	Wash			
	Discharge			
2. Rinsing	Water intake	Wait for pressure switch		
	Wash			
	Discharge			
3. Rinsing	Water intake	Wait for pressure switch		
	Wash			
	Heating	Wait for temperature	Rinsing agent	(50°C - 65°C)
	Discharge		Regeneration	
Drying	Pause			
	Fan			(if featured)
STOP				

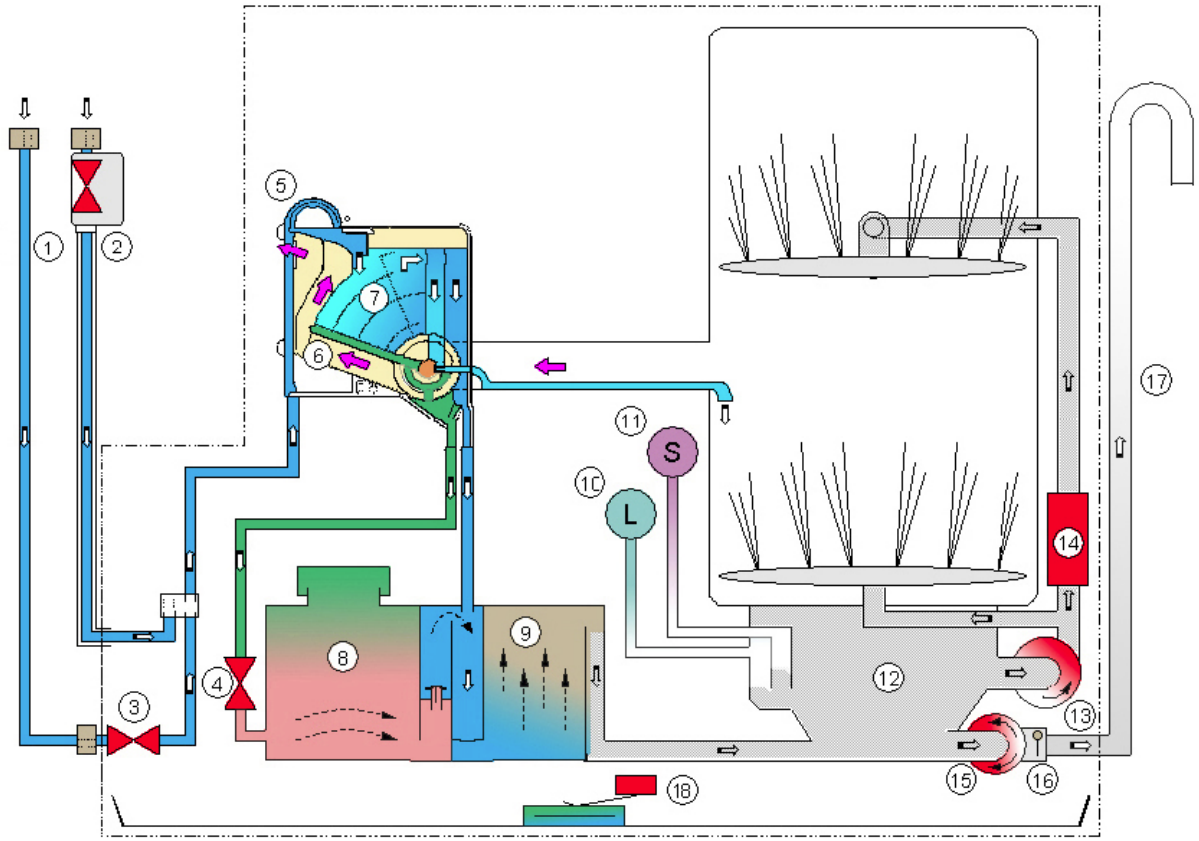
(*) The variable functions are optional, and are controlled by supplementary keys or by direct wiring connections according to the requirements of the specific market.

6. Hydraulic circuit

6.1 Water intake path “Short water intake unit”

From the solenoid valve (2/3), the water is ducted into the fill tank and across the air break (5) into the regeneration chamber (7) until the chamber is full.

- Once the chamber is full to overflowing, the water is divided into two parts through two separate channels:
- Part of the water passes through one channel directly to the softener (9) (resin container), from which the softened water continues towards the sump.
- A smaller quantity of water is collected in one of the channels for use in the “Blending” function (*this function is described in Section 6.6 Definition of the regeneration system*), where it is ducted directly into the tub through the steam venting ring.



1	Water inlet hose	10	Water level pressure switch
2	Water intake hose with an Aqua Stop	11	Anti-overflow pressure switch
3	Water fill solenoid valve	12	Sump assembly
4	Regeneration solenoid	13	Discharge pump
5	Air-Break	14	Tube-enclosed heating element
6	Steam condensation	15	Discharge pump
7	Regeneration chamber	16	Non-return valve
8	Salt container	17	Discharge pipe
9	Resin reservoir	18	Anti-overflow safety system

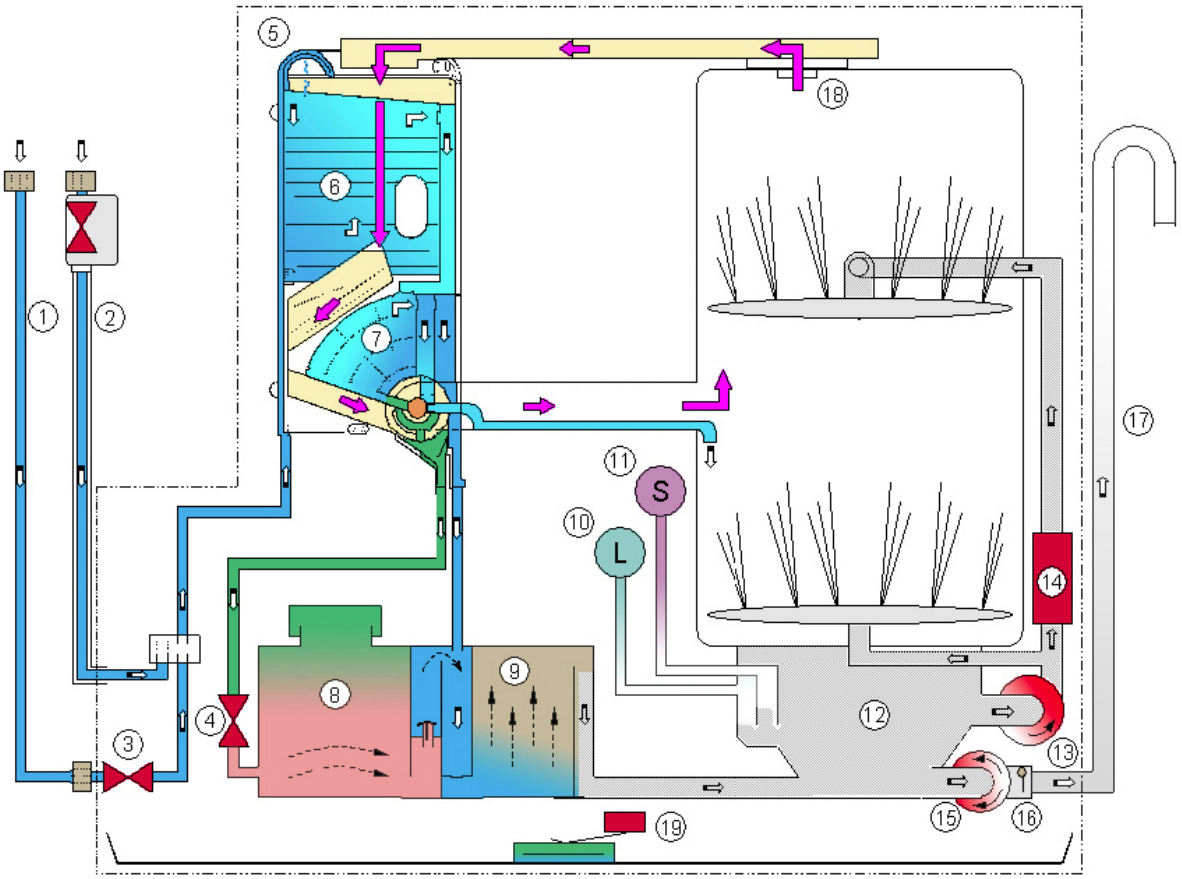
6.2 Water intake path “Long water intake unit”

From the solenoid valve (2/3), the water is ducted into the fill tank and across the air break (5) into the steam condenser (6) until the condenser is full.

- When the condenser is full to overflowing, the water is ducted through a channel into the regeneration chamber (7). In this case, too, once the overflow level is reached, the water is divided into two parts ducted through two separate channels.
- Part of the water passes through one channel directly to the softener (9) (resin container), from which the softened water continues towards the sump.
- A small quantity of water is collected in one of the channels for use in the “Blending” function (this function is described in the section “Description of the regeneration system“, where it is ducted directly into the tub through the steam venting ring.

Please note! The steam condenser (6), once full of water, remains filled. With each subsequent fill, the incoming water replaces the water previously present in the condenser.

The steam condenser (6) is drained through the fill hose (1/2) by a vacuum effect, after disconnecting it from the intake tap and laying it on the floor.



1	Water inlet hose	11	Anti-overflow pressure switch
2	Water intake hose with an Aqua Stop	12	Sump assembly
3	Water fill solenoid valve	13	Circulating pump
4	Regeneration solenoid	14	Tube-enclosed heating element
5	Air-Break	15	Rinse water pump
6	Steam condensation	16	Non-return valve
7	Regeneration chamber	17	Discharge pipe
8	Salt container	18	Drying duct / fan
9	Resin reservoir	19	Anti-overflow safety system
10	Water level pressure switch		

6.3 Water fill system - functional description

In all versions of the dishwasher (electromechanical and electronic), the water fill system is constantly controlled by the level pressure switch, which acts as a pressure sensor.

Definition of water level

The pressure switch is connected hydraulically to the sump, inside which an air trap (pressure chamber) is connected via a small tube in order to determine the level of water in the appliance.

In the water level circuit, the air pressure is proportional to the quantity of water present in the sump. When this pressure exceeds the pre-determined threshold, the pressure switch (which acts as a pressure sensor) switches the electrical contact to “full”.

In order to maintain this condition, the stability of the water level is ensured during operation (washing), which maintains the pressure switch closed on “full”.

It is therefore possible to ascertain with certainty that the status of the pressure switch - i.e. its position of “empty” or “full” - ensures that the cycle is performed correctly.

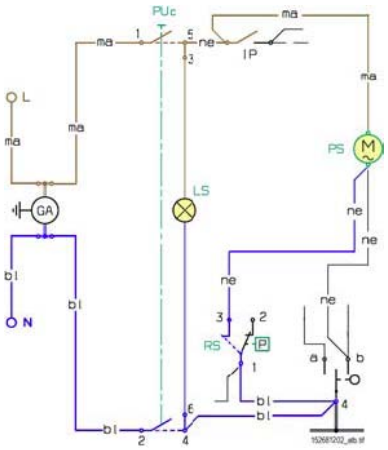
6.4 Anti-overflow safety level

In all dishwashers (electromechanical and electronic), the anti-overflow safety system is constantly monitored by the safety pressure switch (which acts as a pressure sensor) in order to prevent water from overflowing due to an excessively high level.

The safety pressure switch is connected pneumatically via a small tube to the sump, which contains a second pressure chamber (air trap), located adjacent to that of the level pressure switch. In the safety circuit, too, the air pressure is proportional to the quantity of water present in the sump.

Therefore, in case of a malfunction in the hydraulic circuit, and if the water level exceeds the predetermined safety threshold, the pressure switch intervenes by switching the electrical contact to „Full“.

Intervention of the anti-overflow device



The safety pressure switch switches over to “Full“, which immediately activates the detergent water pipe since this is connected downstream in the cycle. The detergent water pump remains on until the safety pressure switch switches back to “Empty“.

Versions with electromechanical control:

The washing cycle continues in any case.

- If the malfunction is caused by a temporary fault (leakage from the solenoid valve, excessive foam etc.) which ceases to exist during the cycle, the user is unlikely to be aware that the fault has occurred.
- If the fault persists, water will remain in the tub at the end of the cycle, and the drain pump will switch on and off alternately, since it is controlled by the pressure switch (which cycles between “Full“ and “Empty“.

The diagram shows the connections of the anti-overflow safety system.

Please note! If the appliance is switched <u>off</u> (using the ON/OFF switch) at the end of the cycle, the detergent water pump switches off.

In order to ensure that the anti-overflow safety device remains in operation even when the dishwasher is **<u>not</u>** <u>in use</u>, the machine must remain connected to the power supply and the ON/OFF switch must be set at **<u>on.</u>**

Versions with electronic control:

- If at the end of the cycle the door is opened or the <u>appliance is switched off</u>, the drain pump will be disactivated.
- In order to ensure that the anti-overflow safety device remains in operation even when the dishwasher is **<u>not</u>** <u>in use</u>, the machine must remain connected to the power supply, the ON/OFF switch must be set at **<u>on</u>** and the door must be **<u>closed.</u>**

Please note! For further details, refer to the service manuals relative to these dishwashers.

6.5 Water softening system

6.5.1 Softening process

This softening system is based on the use of resins (organic synthesis substances) and a chemical process of ion exchange.

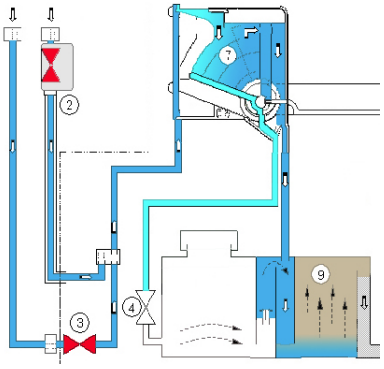
This exchange takes place rapidly, i.e. as soon as the water comes into contact with the resins.

The calcium and magnesium salts contained in the water are removed, while their sodium base is created.

The exchange process takes place during every fill phase, each time water is introduced into the circuit by energizing the solenoid valve.

Sofening circuit

The fill water from the solenoid valve (2/3), after filling the regeneration chamber (7), continues its path until it reaches the resin reservoir (9).



The water then slowly passes upwards through the resin bed, where it is softened; from here, the water continues its route towards the sump.

Obviously, after a certain period, the resins lose their softening power (i.e. are no longer able to perform the sodium exchange) because they are saturated with calcium and magnesium. In this case, it is necessary to regenerate the resins by introducing sodium chloride (salt).

6.5.2 Regeneration process

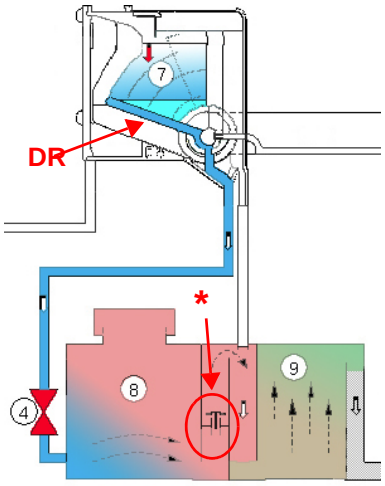
In order to regenerate the resins and restore their efficacy, it is necessary to use a salt (sodium-chloride) solution, which should be allowed to pass slowly through the resins or, preferably, left to soak the resins for a period.

In this case, too, the ion exchange takes place. The sodium contained in the salt solution eliminates the calcium and magnesium salts that have been deposited on the resins, which thus regain their softening capacity.

The regeneration phase is performed at a pre-determined point in the washing cycle by energizing the regeneration solenoid valve for a given time.

The quantities of water and salt used are optimized according to the level of regeneration selected by the user, which in turn depends on the hardness of the water coming from the mains.

Regeneration circuit



The volume of water utilized for the regeneration process depends on the degree of inclination of the separation baffle (A).

The water is ducted through the separation baffle via an internal channel which is open at one extremity.

The inclination of the separation baffle determines the quantity of water used: as the baffle moves towards the horizontal position, more water is used, since only the water above the overflow level is introduced.

When the regeneration solenoid valve (4) is energized, the volume of water contained in the regeneration chamber [7] (max. 280cc) descends downwards by the force of gravity until it reaches the salt box [8]. At this point the internal valve (*) opens, allowing the corresponding quantity of salty water to pass into the resin reservoir (9).

After draining, the internal valve (*), which is no longer pressurized, closes the circuit.

When the solenoid is de-energized, the salt solution remains in the resin reservoir until the subsequent resin washing procedure is performed.

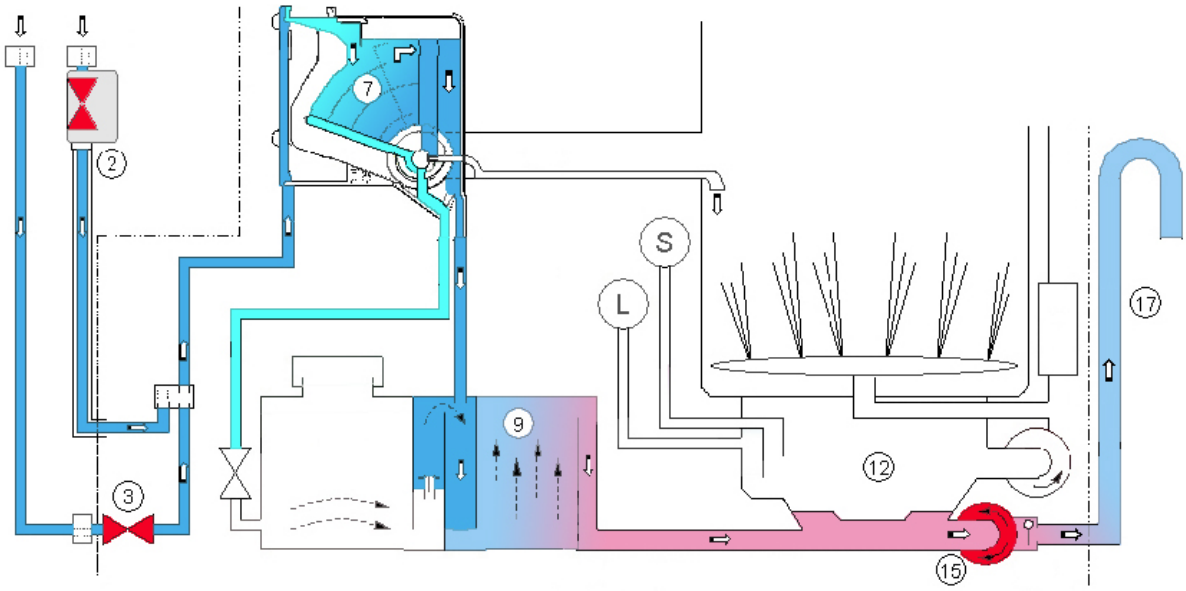
6.5.3 Washing the resins

On completion of the regeneration process, it is necessary to clean the softening circuit by washing the resins in order to remove any residual impurities.

The water in the resin reservoir (9), which contains alkaline salts (calcium and magnesium) and sodium chloride, must be cleaned before the subsequent fill phase in order to ensure that it does not come into contact with the dishes or the internal parts of the appliance, since it is corrosive.

In this case, too, the fill solenoid and the drain pump switch on simultaneously at a certain point in the cycle and for a pre-determined period, to circulate a quantity of water (about 2 litres) which flushes the softening circuit.

6.5.3.1 Resin washing circuit



During this phase, the two functions (fill and drain) are performed simultaneously.

Fill solenoid (2/3)

When the solenoid is energized, water is circulated through the resin reservoir (9) and from there to the sump.

Detergent water pump [15]

When the drain pump is switched on, the water ducted to the bottom of the sump (12) is immediately drained as it arrives, without coming into contact with the dishes.

6.5.3.2 Resin washing procedure

In all versions of the dishwasher (electromechanical and electronic), the resin washing procedure (duration 30 seconds approx.) is performed at the beginning of each washing cycle.

In effect, the salty water solution (regeneration water) remains deposited in the resin reservoir from the end of the last cycle until the beginning of the subsequent cycle.

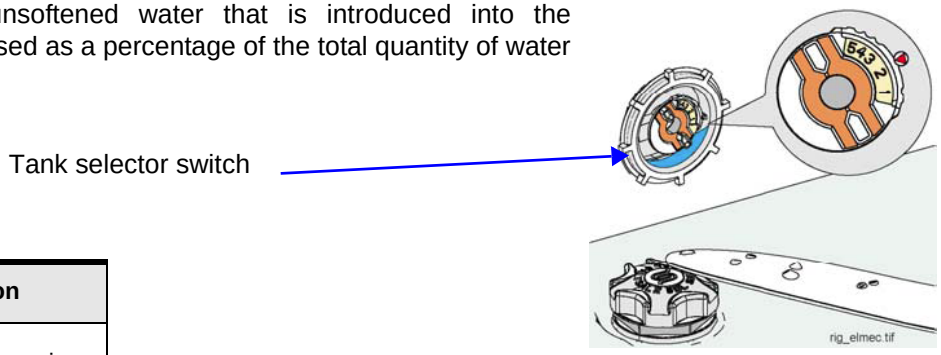
6.6 Definition of the regeneration system

In all versions of the dishwasher (electromechanical and electronic), regeneration of the softener (duration 3 minutes approx.) is performed towards the end of the cycle, during the drying phase.

6.6.1 BLENDING function

This function is performed inside the fill tank during the water fill phase which, depending on the position of the selector, automatically blends the softened water with the unsoftened water present in the appliance.

- In practice, the softened water is introduced into the appliance through the softening system, while the unsoftened water flows via an open by-pass duct directly through the steam venting ring.
- If the mains water supply is very soft, this function optimizes the hardness of the washing water in order to prevent the possibility of corrosion of glass recipients.
- The quantity of unsoftened water that is introduced into the appliance is expressed as a percentage of the total quantity of water utilized.



Blending function	
Selector switch position	Water mix
1	**20%**
2	**10%**
3 - 5	**--**

6.6.2 Selecting the level of regeneration for electromechanical versions

On electromechanical dishwashers, regeneration is performed during every washing cycle.

The level of regeneration is selected using the selector located inside the tub (on the left-hand side, near the steam venting ring).

- The quantity of water utilized depends on the position of the selector.
- The knob can be set to one of five different settings as shown in the table below.
- If the selector is set to (L1) or (L2), the Blending function is performed automatically, thus blending softened water with unsoftened water.

To select a different level of regeneration (according to the hardness of the mains water supply), open the door and adjust the position of the selector from inside the appliance as follows:

- Turn the selector until the correct level (1 - 10) is aligned with the marker.
- If the water is hard, turn the selector clockwise; if it is soft, turn the selector counter-clockwise.

Selection of the appropriate level of regeneration will ensure efficient washing.

Table of values

Setting	Hardness of treated water level		Selector switch position	Water mix	Use of regeneration salt
	°F (TH)	°D (dH)			
[L1]	0 - 8	0 - 4	**1**	**20%**	NO
[L1]	9 - 20	5 - 11	**1**	**20%**	YES
*** [L2]**	21 - 40	12 - 22	**2**	**10%**	YES
[L3]	41 - 60	23 - 34	**3**	**--**	YES
[L4]	61 - 80	35 - 45	**4**	**--**	YES
[L5]	81 - 90	46 - 50	**5**	**--**	YES
*[L2] = Factory setting					

6.6.3 **Selecting the level of regeneration** for electromechanical versions

For this line of models the regeneration process is carried out with the „Una tantum“ system.

Please note! More information is available in the service manuals relative to these dishwashers here.

7. Definition of the drying circuit

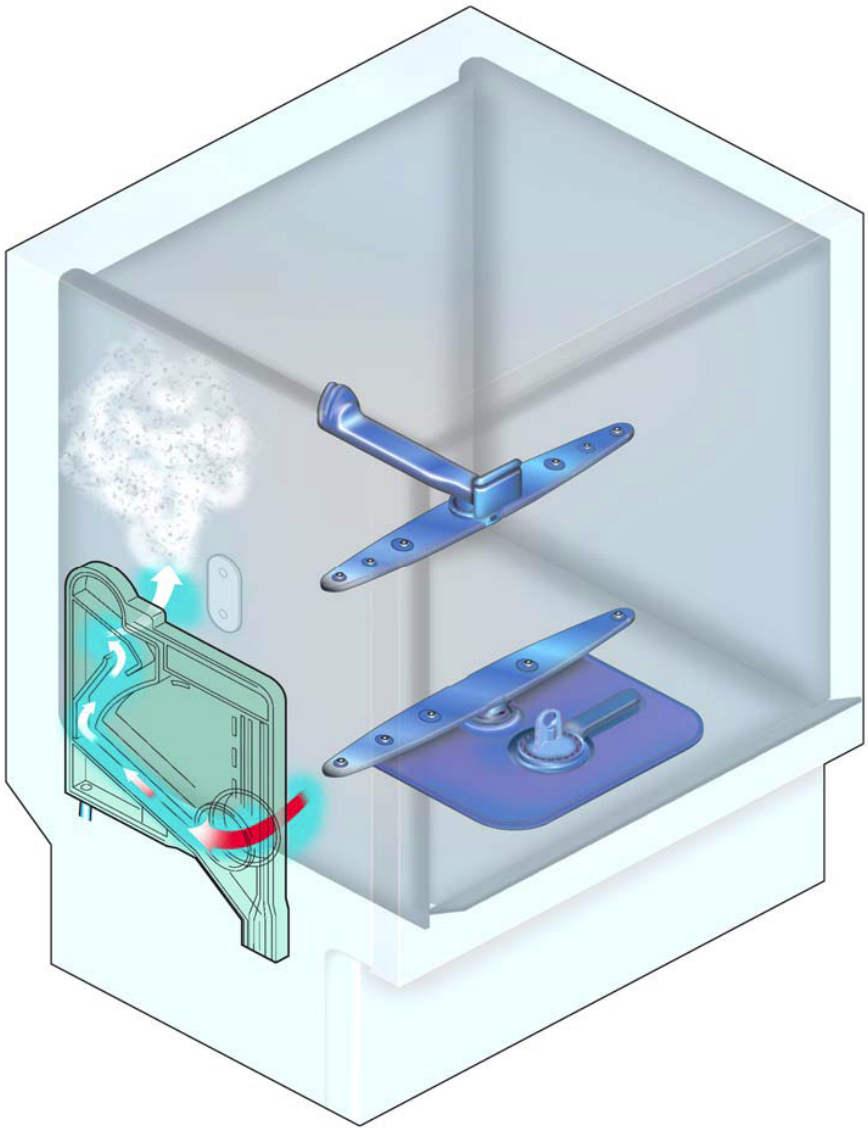
In these dishwashers, the dishes are dried by means of a steam condensation process.
Depending on the type of appliance, one of three drying systems is used:

- NORMAL-DRY DRYING
- ACTIVE DRY DRYING
- TURBO-DRY DRYING

7.1 NORMAL-DRY drying

The “Normal Dry” system is characterized by an integrated circuit which draws in and expels air to he exterior of the appliance. This is the classic, traditional drying system, based in the natural circulation of hot air.

The steam (hot, humid air) produced during the hot rinse enters from the lower section through the steam venting ring, and circulates slowly inside the chamber of the fill tank. Here, it is condensed and expelled from the upper section towards the exterior.



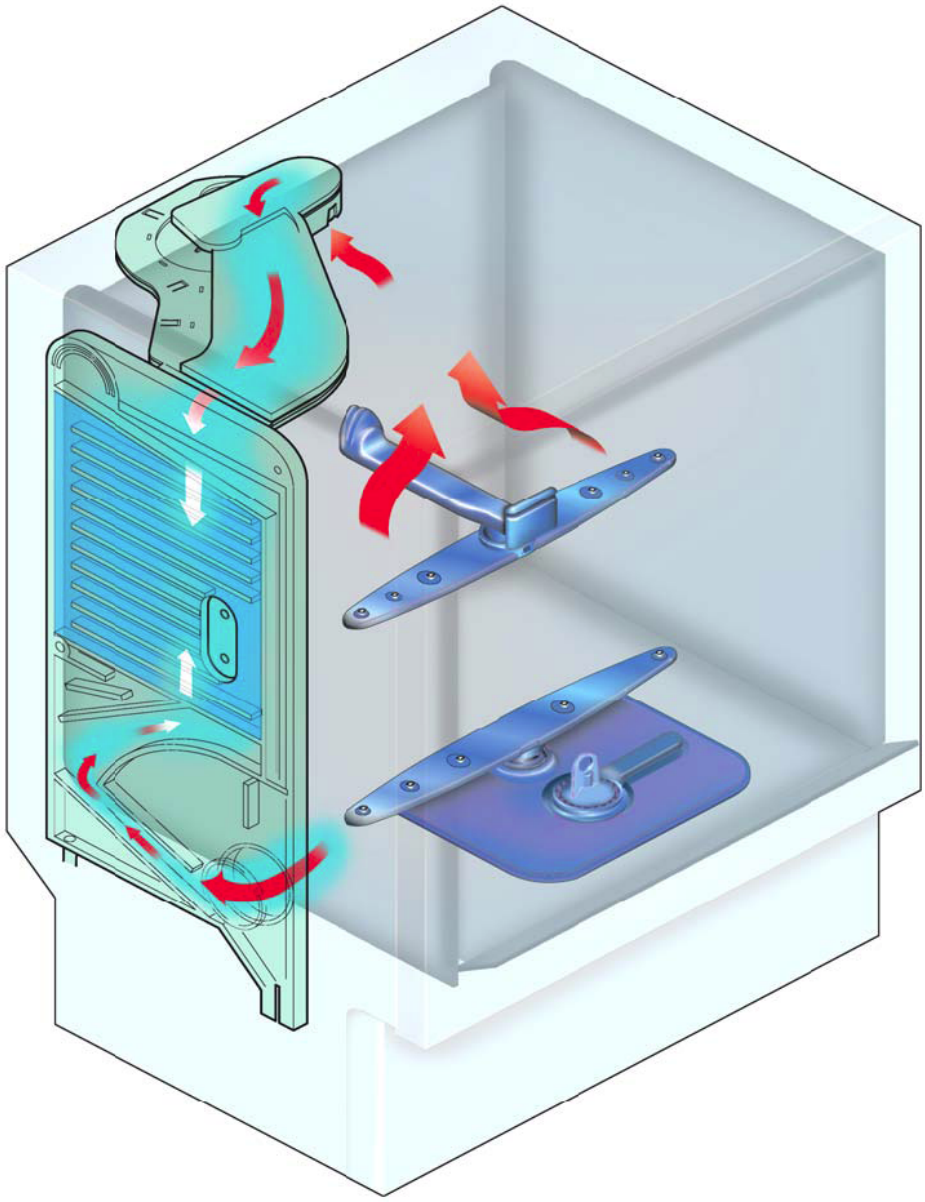
7.2 ACTIVE DRY drying

This system features an integrated closed cycle which returns the hot air from inside the dishwasher with a bi-directional convection movement to the cold panel without drawing in air from the outside. The system is a drying system based on the natural circulation of the hot air produced during the hot rinse, with the steam (hot, humid air) circulating inside the condenser of the water intake tank through two connector ducts, thus generating the process of condensation.

Part of the steam enters from the lower section through the steam venting ring and circulates slowly inside the chamber of the condenser. The remaining part of the steam circulates in the same way, entering from the upper section of the tub through the external upper duct, which communicates with the chamber of the condenser.

The condenser is a condensation chamber filled with water (cold wall) against which the hot air is ducted. This contact between the hot air and the cold wall generates the process of condensation. This forms a closed condensation circuit which does not expel steam to the exterior, from which the circuit is isolated.

The drying time is variable and pre-defined for each washing cycle.



7.3 TURBO-DRY drying

The “Turbo Dry” system is characterized by an integrated closed circuit in which the hot air is circulated in a mono-directional convection movement onto a cold wall; no air is drawn in from the exterior. This drying system is based on the forced circulation of the hot air produced during the hot rinse, where the steam (hot, humid air) is drawn in by the fan located inside the upper duct and then ducted towards the condenser in the fill tank, from where it returns to the tub via the steam venting ring.

The condenser is a condensation chamber filled with water (cold wall) against which the hot air is ducted. This contact between the hot air and the cold wall generates the process of condensation. This forms a closed condensation circuit which does not expel steam to the exterior, from which the circuit is isolated.

The fan is not switched on continuously, but pauses at intervals.

The drying time is variable and pre-defined for each washing cycle.