Dishwasher series EDW 503

Diva 45-60-BIG

Functionalities

Küppersbusch

THE HEART OF A GOOD KITCHEN

GB

Service Manual: H7-74-03F

F.S. - Free-standing
B. I. - Built-in
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
						4th figure
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
						5th figure
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
						6th figure
Key typologie & 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: 16.09.2010

KÜPPERSBUSCH HAUSGERÄTE AG
Customer Service
Postfach 100 132

Contents

1. General information

1.1 Purpose of this manual

The purpose of this manual is to provide service personnel (who already have the basic knowledge necessary for repairing dishwashers) with information on dishwashers equipped with the EDW503 electronic control system, which are produced in the Solaro (MI - Italy) factory.

The EDW503 control system consists of a main circuit board and a control/display board. Both boards are housed in a single plastic container.

It is used in some “DIVA” models.

This manual describes:

- General characteristics
- Control panel and programmes
- Technical characteristics
- Guide to diagnostics

For more detailed information regarding the hydraulic circuits and the structural characteristics of the appliances, refer to the Service Manual for presentation of the “DIVA” structure (H7-74-03, Basic features).

1.2 Precautions

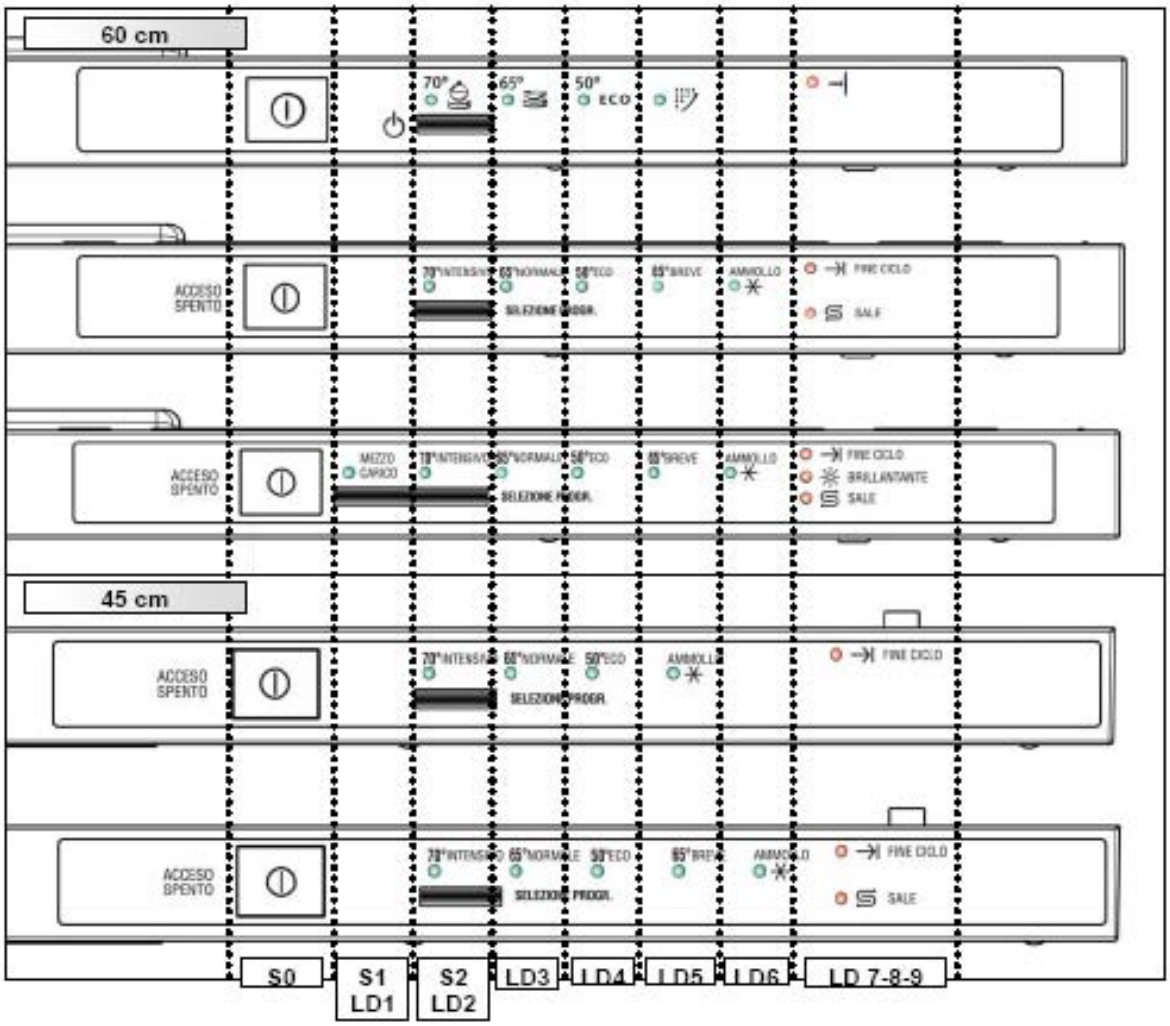
- Electrical appliances must be serviced only by qualified Service Engineers.
- Always remove the plug from the power socket before touching internal components.

1.3 General characteristics

Power supply	→	230 V / 50 Hz (limits 187-254 V)
Total power absorption	→	2200 W
Heating element	→	2000 W
Mains water supply	→	Pressure min./max. 5 - 80 N/cm²
Capacity	→	9 (45 cm) 12 (60 cm) place settings
Consumption (prog. BIO):		
- Water	→	14 litres
- Energy	→	0.8 kWh
- Duration of cycle	→	136' - 143' (45 - 60 cm)
Controls		
- ON/OFF	→	On/Off function button
- Programme selection	→	By button (max. 5 programmes)
- Option selection	→	By 1 button
- Display		Leds
Washing system	→	Continuous (2600 - 2800 rpm)
Water fill level control	→	Pressure switch + software
Water heating	→	Heating element enclosed in tube (2000 W)
Temperature control	→	NTC temperature sensor
Drying system	→	Active
Safety systems / Alarms	→	Total protection (hydraulic + software)

2. Control panel

2.1 Control panel



[S0]	On/Off button (always featured)
[S1]	Option selection button (only on some models)
[S2]	Programme selection button (sequence)
[LD1] – LED	Option Led activated (only on some models)
[LD2]- … - [LD6]	Washing programme LEDs
[LD7] … .. [LD9]	Indicator LEDs: “End of cycle” (always present), “SALT” and “RINSE AID” (only on some models).

2.1.1 On/Off button (S0)

All models feature this button and it is used to switch on and off the appliance: the switching off does not cause the cancellation of the current programme. When the appliance is switched on, only the End of cycle LED is on and in case, if featured, the Salt and Rinse aid LEDs.

2.1.2 Option selection button (S1)

The system used for selecting the wash programmes depends on the configuration of the model. They can be the “delayed start” or the “half load”: Switching off and on the dishwasher, the chosen settings are cancelled.

2.1.3 Programme selection button (S2)

The functions of the various buttons and LEDs depend exclusively on the software configuration of each appliance. With button S2 it is possible to scroll down sequentially all the available programmes: when the button is pressed, the LED relative to the chosen programme lights.

When the button S2 is activated for the first time, the last programme performed is shown. This button has also a Reset function.

2.2 Options

2.2.1 “1/2 load”

The 1/2 load option optimizes the washing cycle when only a small load is placed in the appliance.

When this button is pressed, certain parameters of the selected washing cycle are modified:

- Exclusion of Pre-wash (if featured)
- Reduction of the washing temperature
- Reduction of the duration of the programme

O R

2.2.2 Delayed start

This option enables the user to set a fixed start delay of the washing cycle.

To select the delayed-start time:

1. Open the door.
1. Switch the appliance on with the S0 button.
2. Press the S1 button to select the delayed-start time: LED LD1 lights up to show that the selection has been made.
   The time is reset when the relative button is pressed again: the LED LD1 switches off.
3. Select the programme pushing S2 button in sequence.
4. Close the door: the countdown starts.

2.3 Programm change

2.3.1 Cancelling a programme

To cancel a programme that has already started:

1. Press button S2 for at least 3 seconds.
   The LED of the current programme flashes.
2. Salt/Rinse-aid LEDs light up (if featured): the programme is cancelled and the appliance returns to preselection mode.
   The End of cycle LED flashes.
3. Select the new programme.

2.3.2 Interruption of a programme (pause)

If the door is opened, the appliance remains on (the power loads are deactivated).

- The Option LED remains on.
- Closing the door the programme starts, after a brief delay, from the point at which it was interrupted.

Important! If the appliance is switched off or if the door is opened for more than 30 seconds during the drying phase, the cycle is considered to have been terminated after the regeneration phase; when the appliance is switched on again, it returns to programme selection mode.

2.4 Power failure

The Power Failure function maintains the information relative to the cycle status even in the event of a power outage; when the power supply is restored, the cycle resumes from the point at which it was interrupted.

If the power failure occurs during the drying phase, the cycle is considered to have been terminated after the regeneration phase.

The Power Failure has been defined in the following way:

- When a Power Fail occurs, all loads switch off simultaneously to enable to save the data in EEPROM, through the energy stored in the supply condenser of the control board, and when the power is restored, the cycle restarts from the point at which it was interrupted.

2.5 Sequence of operation

Programme selection / Options

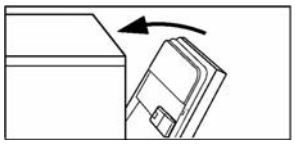
1. Open the appliance door to get access to the operating panel.
2. Switch on the appliance with button S0.
   - The *End of cycle* LED flashes every 2sec for 0.5sec.
   - Eventually, if featured, the Salt/Rinse aid LEDs light up.

3. Select the delayed start or the desired option (if featured) pressing button S1.
   - The LED LD1 lights up.

4. Select the desired programme pressing sequentially button S2.
   - The relative LED lights up.
   - If LD2 flashes, there is an alarm condition.
     Press button S2 to try and solve the problem. If it is not ok LD2 will flash again; see “Table of alarm codes” on page 22.

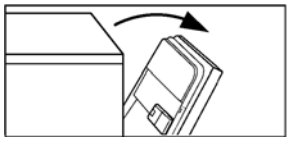
Start

5. Close the door. The cycle starts automatically after 3sec or at the end of the countdown (if the delayed start has been selected).



Execution of cycle

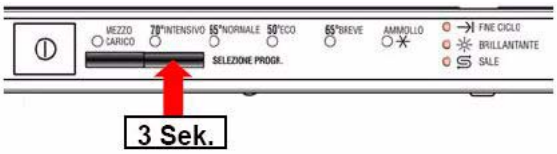
6. To interrupt a programme in progress:
   1. Open the door.
   2. To restart the cycle, close the door.



Note: Switching the appliance off and on, the programme restarts from the point at which it was interrupted. The remaining time is reduced every minute and is updated after each phase in the programme.

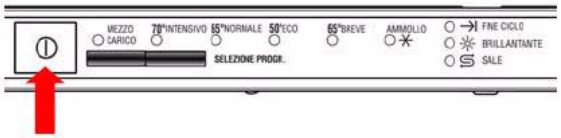
Cancelling the cycle

3. To cancel a programme in progress:
   - Open the door and press button S2 for about 3 seconds.
     The LEDs LD7 – 8 – 9 light up (if featured).
   - The LD1 – 2 LEDs switch off and the previous settings are cancelled.

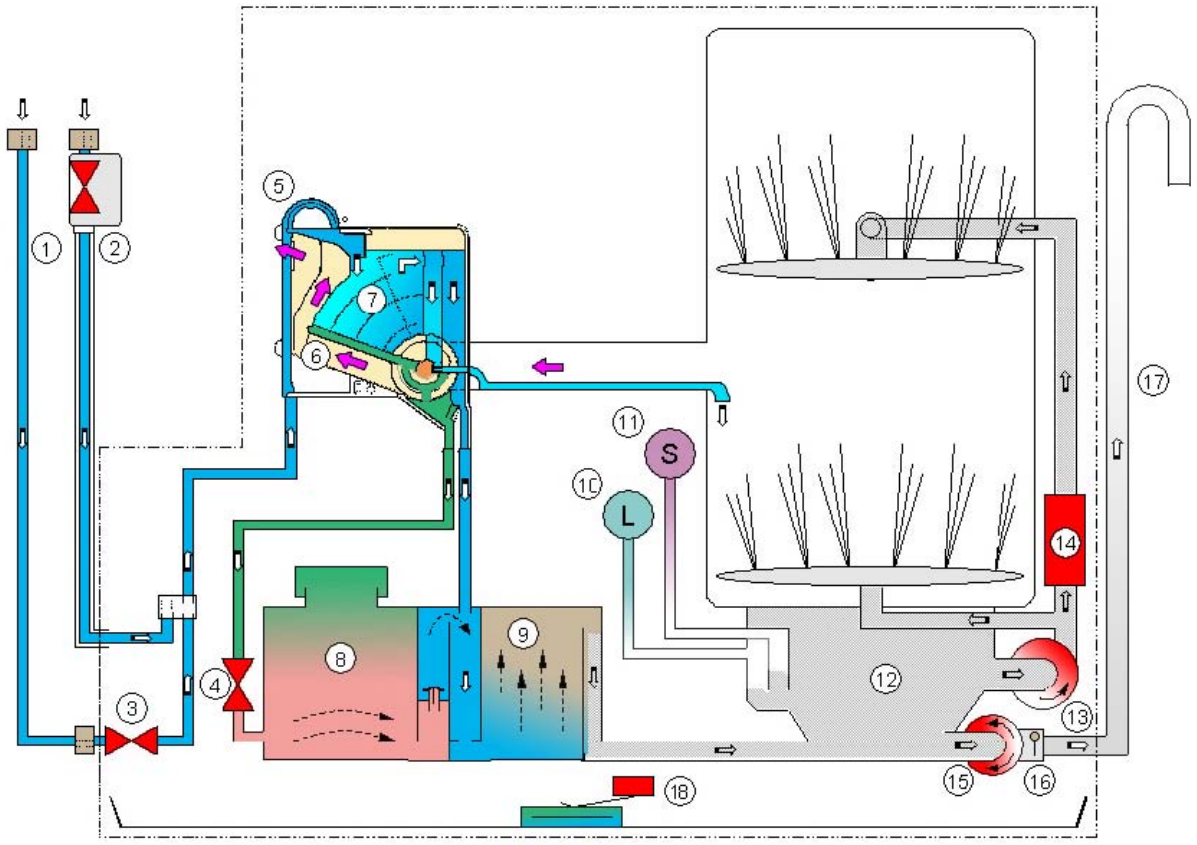


End of programme

4. At the end of the programme:
   - The buzzer emits a sound sequence.
   - The LED of the programme, the End of cycle LED and the Salt/Rinse aid LEDs are on, if featured.
5. Press button S0 to switch off the appliance.
   - All LEDs switch off.



3. Hydraulic circuit

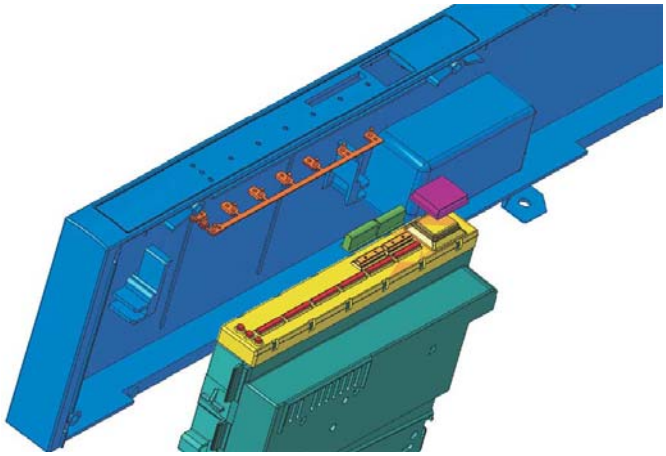


Key

1 - Fill hose	10 - Level pressure switch
2 - Fill hose with Aqua Stop	11 - Anti-overflow pressure switch
3 - Fill solenoid	12 - Sump assembly
4 - Regeneration solenoid	13 - Wash pump
5 - Air-Break	14 - Tube-enclosed heating element
6 - Steam condensor	15 - Drain pump
7 - Regeneration chamber	16 - Non-return valve
8 - Salt reservoir	17 - Drain hose
9 - Resin reservoir	18 - Anti-flooding device

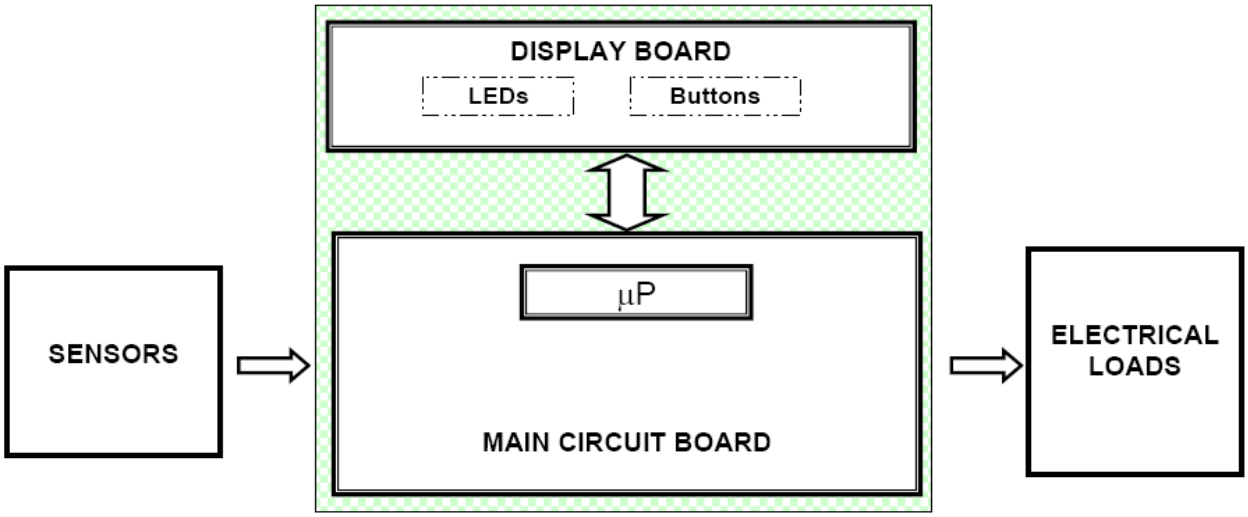
4. Electrical components and functions

4.1 EDW 503 Electronic control system



The EDW 503 control system consists of a main circuit board and a control/display board. Both boards are housed in a plastic container (fig. 1). The On/Off function is performed by the button S0.

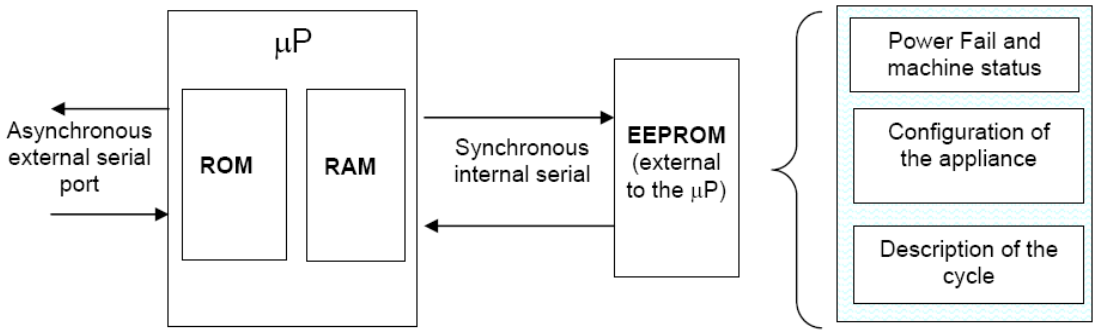
4.1.1 Functions of the circuit board



The circuit board

- receives signals relative to the cycle settings via the control/display board. The buttons and LEDs are also mounted on this board.
- powers all the electrical components (solenoid valves, washing pump, detergent/rinse aid dispenser, drain pump, heating element).
- controls the temperature of the washing water via an NTC sensor.
- monitors the status of the pressure switch and the rinse-aid/salt sensors.

4.1.2 Memory in the control system



The main circuit board features an EEPROM memory (external to the microprocessor) which stores in memory data relative to the configuration, description of the cycle, cycle status in case of a power failure, and any alarm conditions.
The configuration data (entered in the factory using a computer with a DAAS interface) determine the functionalities of the appliance (number and type of programmes, options, LEDs etc).

4.2 Specifications for actuators and sensors

4.2.1 Components

Type of component	Power available	Type of electronic control
Wash pump	Max. 250 W	Triac
Drain pump	Max. 100 W	Triac
Heating element	Max. 2100 W	Relay
Water fill solenoid	Max. 10 W	Triac
Regeneration solenoid	Max. 10 W	Triac
Detergent and rinse-aid solenoid	Max. 10 W	Triac

4.2.2 Sensors

Type of sensor	Type of electronic signal	Type of component
Salt sensor	Digital 5 Volt	Reed
Rinse-aid sensor	Digital 5 Volt	Reed
Temperature sensor	Analogue 5 Volt *	NTC
Level sensor	Digital - High voltage	Pressure switch
Door closure sensor	Digital - High voltage	Switch
Anti-flooding sensor	Digital - High voltage	Switch

4.2.3 NTC temperature sensor

NTC Comparative values	
Temperature °C	**Nominal value Ω**
10	9655
25	4850
60	1205
90	445

4.3 Power supply and programme selection

The main board is powered by the closure of contacts. The connectors used are B2 (neutral) and B1 (line).

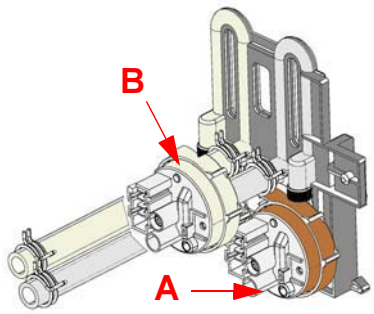
The control/display board (user interface) is powered at 220 V by the main board. When the door is closed, the main board detects the closure of the contacts of the switch (IP) across connectors C1-C3 and starts the washing programme.

When the door is opened, the power loads are disconnected from the power supply and the cycle is paused.

4.4 Fill circuit

4.4.1 Level and anti-overflow pressure switch

- The level of water introduced into the appliance is determined by the level pressure switch (A).
- The anti-overflow pressure switch (B) ensures that the level of water does not exceed the safety threshold (causing overflow from the door).



4.4.2 Fill system

The water fill solenoid valve is powered by the electronic board via the connector D7, by the door switch (IP) and the anti-flooding microswitch (DA).

The level of water in the sump is monitored by the pressure switch (RL). The electronic board constantly monitors the status of the pressure switch via a “sensing” line connected to connector D5:

- EMPTY if the contacts are closed on 1-2
- FULL if the contacts are closed on 1-3

4.4.3 Anti-flooding device

Intervention of the anti-flooding device causes the contacts of the microswitch (DA) to open, thus disconnecting the solenoid valve from the power supply.

4.4.4 Intervention of the anti-overflow system

If the anti-overflow pressure switch (PA) should intervene, the closure of the contact on FULL (1-3) powers the drain pump (PS). The pump remains in operation until the contact returns to EMPTY (1-2).

Important! If the door is opened or the appliance is switched off, the drain pump is deactivated.

4.5 Control of water fill phase

The quantity of water necessary to carry out the washing cycle is determined exclusively by the closure of the electrical contact of the pressure switch, which changes from EMPTY to FULL.

This system ensures that, if the pressure switch re-opens on EMPTY, further water is introduced until it returns to FULL.

The water fill phase consists of the following sub-phases:

4.5.1 Static fill

With the motor switched off, the fill solenoid valve is energized and water is introduced into the appliance until the pressure switch signal switches to FULL.

4.5.2 Dynamic fill

- The dynamic fill is obtained by switching on the washing pump whose rotation causes the pressure switch to switch to EMPTY. Subsequently, the fill solenoid valve is energized and water is introduced until the switch returns to FULL.
- The speed of rotation of the motor determines the quantity of water introduced, since the electronic control system switches on the washing pump at a rotation speed of 2600 - 2800 rpm.

4.5.3 Level stability control

The hydraulic circuit operates with maximum efficiency when the pressure switch signal remains stable on FULL. In practise, the quantity of water circulating in the sump allows the motor to run without speed fluctuations caused by cavitation.

When the pressure switch signals FULL, the fill solenoid valve switches.

4.6 Water fill time

The opening of the solenoid valve has a pre-set overall duration, which is subdivided into the various subphases of the fill.

4.6.1 Static fill time

T.S. = max 90 seconds: This is the maximum time within which the pressure switch must switch to FULL. If the FULL signal is not received from the pressure switch within this time, the electronic control system interrupts the washing cycle and the appliance enters alarm condition [1 0].

4.6.2 Dynamic fill time

T.D. = T.S. x 3: This is the maximum time allowed for the entire fill phase within which the pressure switch signal must stabilize on FULL.

- If the pressure switch signal does not stabilize on FULL within this period (T.S. x 3), the electronic control system switches off the fill solenoid (and the heating element, if switched on), and then allows the washing cycle to proceed until it is completed. In this situation, alarm condition [F 0] is stored in memory. This alarm code is not displayed to the user, but can be accessed by the Service Engineer using a specific procedure.
- If, during a 2600 rpm dynamic fill, the pressure switch never closes on FULL during the initial 60 seconds, the electronic control system interrupts the washing cycle and the appliance enters alarm condition [1 0].

4.6.3 Power supply interruption during water fill

If the water fill phase is interrupted by opening the door or due to a power failure, the contents of the counters are stored in memory; when the door is re-closed or when the power supply is restored, the water fill resumes from the point at which it was interrupted; the new counter values are added to those previously memorized.

4.7 Level stability during washing

Once the fill phase has been completed, the cycle proceeds to the washing phase. The washing phase is carried out using cold or heated water, and the status of the pressure switch is monitored constantly to ensure that the hydraulic system functions correctly. Water replenishment cycles may be performed if necessary.

- If the pressure switch returns to EMPTY during the washing phase, the fill solenoid is energized for a maximum time equivalent to T.S. x 3 (maximum allowable total fill time).
- If this time is exceeded, the washing cycle is completed, but no further supplementary fills are performed. In this situation, alarm condition [F 0] is stored in memory. This alarm code is not displayed to the user, but can be accessed by the Service Engineer using a specific procedure.

4.8 Washing system

The appliance features the classic washing system in which the mechanical washing action is obtained by the rotation of the washing pump which, by ducting water into the hydraulic circuit, actions the two spray arms simultaneously.

The washing pump is actioned by an asynchronous motor with a start-up capacitor (3µF - 450VL).

The washing pump rotates in a counter-clockwise direction (seen from the impeller side).

4.8.1 Control of the washing pump

The washing pump (PL) is powered by the electronic control (connector D3-D11).

4.9 Heating

The heating element is enclosed in a protective tube, and is used to heat the washing water (but does not switch on during the drying phase). The heating element is fitted to the outlet of the washing pump and connected to the duct which feeds the upper spray arm.

The heating element (RR) is powered by electronic control (connector A1) and by the level pressure switch (RL), which must be set to “FULL” (contact closed on 1-3).

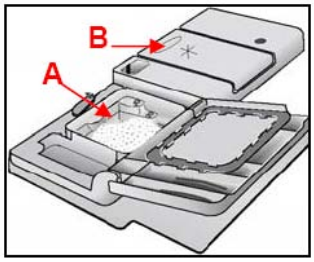
Two safety thermostats are fitted to the heating element:

- an automatic-reset thermostat which intervenes at 98ºC
- a thermostat with a thermal fuse (206ºC)

The temperature of the water is controlled by the main circuit board via an NTC sensor (ST) which is connected to connectors H1-H3.

4.9.1 Integrated detergent dispenser

The detergent dispenser is a plastic container consisting of two separate sections. The first (A) contains the detergent; the second (B) contains the rinse-aid.



The dispenser is of the single-coil type, and uses a single electrical coil, connected to a mechanical system, for both functions.

When the coil is energized, it actions the mechanism via a series of levers to introduce detergent in a determined sequence (first detergent, then rinse-aid).

When the coil is energized, it actions the mechanism via a series of levers to introduce detergent in a determined sequence (first detergent, then rinse-aid).

The coil of the detergent dispenser (DD) is powered by an electronic control via connectors E1-E3 at certain points during the cycle, thus ensuring correct dosage.

Some models feature a rinse-aid sensor whose reed contact (SB) is connected to connectors G3-G4 on the circuit board. The absence of rinse-aid causes the contact to close, which lights the corresponding LED (on the display board).

4.9.2 Drain

The drain pump (PS) is powered by connectors C1-D1 and via the contacts of the switch door (IP).

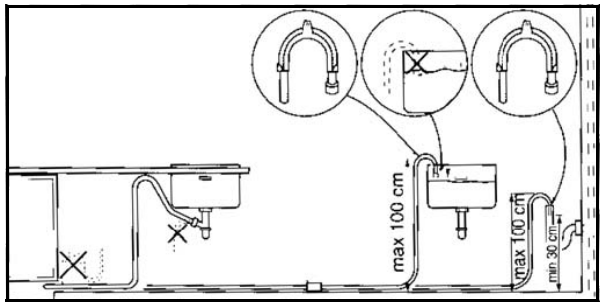
At the end of the drain phase, a control procedure is performed to check that the contact of the level pressure switch is open on EMPTY. If this is the case, the appliance proceeds to the subsequent phase.

If, as a result of a problem in the drain phase, the pressure switch contact remains closed on FULL (i.e. if there is water in the hydraulic circuit), the drain phase is repeated.

On completion of this second drain phase, the status of the pressure switch is again checked. If it is still closed on FULL, alarm [i20] is generated (failure to drain). The time-out for each of these two phases is 120 seconds.

Note The washing programmes always begin with a drain phase.

4.10 “Siphon” effect



If the drain tube is incorrectly positioned, the so-called “siphon effect” may occur, in which case an alarm is displayed iF0 (see “Table of alarm codes” on page 22).

The problem is particularly likely to occur during execution of the “declaration cycle”: although the drain pump shuts down at the end of the (partial) drain phase, water continues to be expelled from the machine because the drain tube is incorrectly positioned. When this occurs, water loaded by the fill solenoid during the next phase is directly expelled, so the “full contact” on the pressure switch does not close before its “time out”.

Thus, if alarm iF0 occurs, it is a good idea to make sure the drain tube is correctly positioned as shown in the instruction manual.

4.11 Regeneration system

Regeneration of the water softening system, which takes around **4 min**, is usually performed at the start of the drying phase.

Every time regeneration is performed (with activation of regeneration solenoid 4), the accumulation chamber is completely emptied of its contents (about 230 cc of water).

Regeneration is controlled by the electronic control system “Ad Hoc”, i.e. not at each washing cycle, but rather at intervals determined by the level of regeneration selected:

- If level [1] is selected, regeneration is never performed and the SALT LED (if featured) always remains unlit.
- If level [10] is selected, regeneration is performed twice during each cycle; first at the end of the washing phase, and then at the beginning of the drying phase.

The regeneration solenoid (ER) is powered by connectors D9-C1 on the main board and by the contacts of the door switch (IP).

Some models may feature a salt sensor, whose Reed contact (SS) is connected to G1-G2 connectors of the board.

When there is no salt, the contact closes and the relative LED lights up (on display board).

4.12 Resin washing

Washing of the resins contained in the softening system is performed at the beginning of each washing cycle. In practise, the solution of salty water (regeneration water) remains deposited in the resin container from the end of the last completed cycle until the subsequent cycle.

If the regeneration level is set to [10], washing of the resins is performed once at the beginning of the washing cycle and then again immediately after the regeneration process performed at the end of the washing phase:

The regeneration sequence is as follows:

a. Drain (30 seconds)

b. Water fill to correct level

c. Drain (10 seconds)

d. Water fill (15 seconds)

e. Complete drain

4.12.1 “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 level of regeneration is set to between 1 and 4, it is advisable to activate the BLENDING function to mix softened water with unsoftened water.

This function optimizes the consumption of salt thus preventing the possibility of corrosion of glass recipients due to excessively soft water.

When the BLENDING function is activated, the percentage of unsoftened water introduced into the dishwasher is 15%.

The BLENDING function is activated using the selector knob located inside the tub, on the left side, in the vicinity of the steam venting grille:

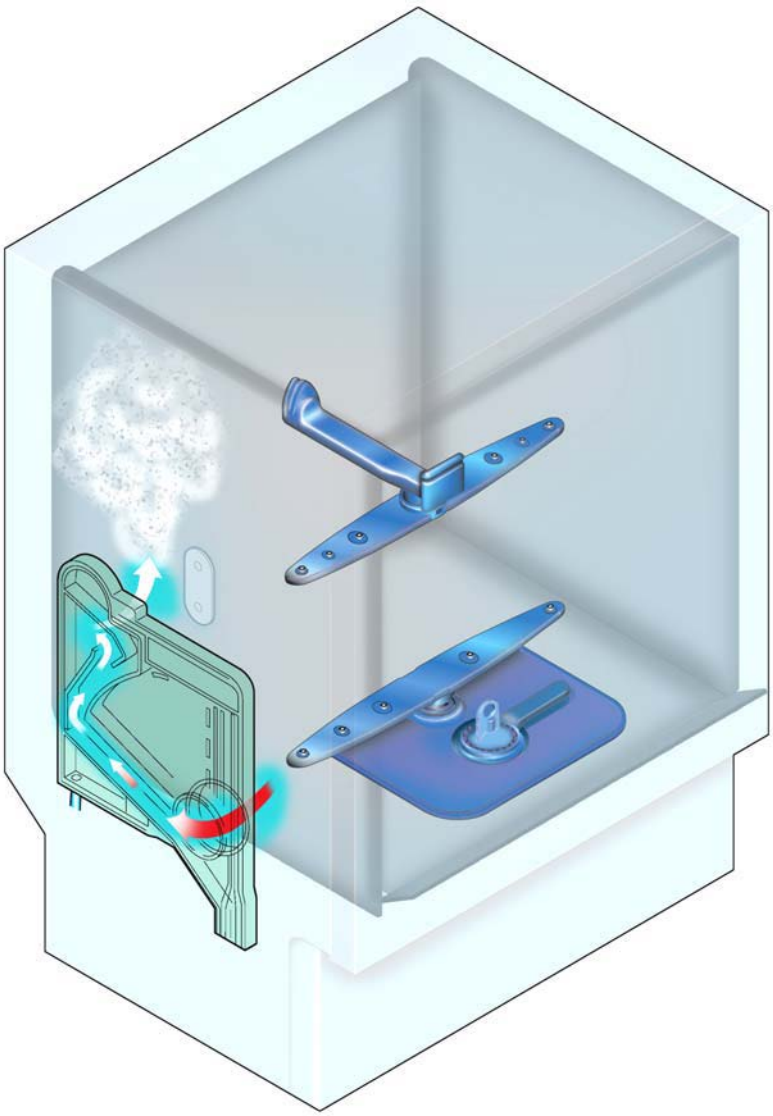
Position of selector

- pos. 1 = blending enabled.
- pos. 2 = blending disabled.

5. Drying

In these dishwashers, the dishes are dried by means of a steam condensation process. The drying system is based on the circulation of the hot air produced during the hot rinse, in which the steam circulates inside the condenser of the fill tank.

The steam (humid hot air) produced during the hot rinse, enters from below through the steam venting grille and circulates slowly inside the chamber of the fill tank where it condensates and then exits through the upper part.



6. Alarms

When an abnormal situation occurs that may interfere with machine functioning, the main board activates a safety system which in most cases interrupts the washing cycle. The last three alarm situations are stored in memory.

Using a special procedure, service personnel can display all the alarms stored in memory. The user is only shown four of the alarms in progress. The END OF CYCLE LED flashes repeatedly.

6.1 Table of alarm codes

Type of alarm	No. of flashes of end-of-cycle LED	Displayed to the user	Description of the alarm condition	Machine status	Possible causes
i10	**1**	**yes**	**Water fill time-out** (The pressure switch does not close on FULL after 90 sec. static fill, or never closes on “FULL” during the initial 60 sec of the dynamic fill at 2800 rpm)	The drain pump switches on, then the cycle stops.	Tap closed; water mains pressure too low; fill solenoid / wiring faulty; hydraulic circuit of pressure switch obstructed; level pressure switch / wiring faulty; circuit board faulty (solenoid triac shortcircuited).
i20	**2**	**yes**	**Water drain time-out** (The pressure switch does not return to EMPTY after two drain phases lasting 120 seconds) (**)	The drain pump switches on, then the cycle stops.	Drain circuit obstructed/blocked; drain pump interrupted or jammed (foreign bodies); level pressure switch blocked on FULL (1-3); hydraulic circuit of pressure switch obstructed; wiring faulty; circuit board faulty.
i30	**3**	**yes**	**Intervention of anti-flooding system** (the drain pump switches on)	The cycle is interrupted and the drain pump switches on.	Water leakage from the tub - sump and various connections (pump, upper spray arm duct etc.); floating sensor blocked mechanically; microswitch faulty; fill solenoid blocked mechanically; circuit board faulty (solenoid triac short-circuited); wiring faulty.
i50	**5**	**yes**	**Motor triac short-circuited** (the washing pump runs uncontrolled at maximum speed)	Water fill to level (if necessary), deactivation of the other actuators, cycle interrupted. The washing motor runs at maximum speed and the alarm is displayed.	Circuit board faulty

Type of alarm	No. of flashes of end-of-cycle LED	Displayed to the user	Description of the alarm condition	Machine status	Possible causes
i60	**6**	**no**	**Heating time-out** (the check takes place every 3 minutes: the temperature must increase by a certain amount at each step)	The programme continues to the end without heating (the washing result will probably be unsatisfactory)	Heating element faulty; intervention of safety thermostats (open); wiring faulty; NTC sensor (poor thermal contact); insufficient water circulating in the tub; washing pump faulty (impeller stripped); circuit board faulty.
i70	**7**	**no**	**NTC sensor short-circuited or open**	The programme continues to the end without heating (the washing result will probably be unsatisfactory)	NTC sensor faulty; wiring short-circuited / open; circuit board faulty.
i80	**8**	**no**	**Communication error between the microprocessor and the EEPROM**	Machine inoperative: no selection possible. (*)	Circuit board faulty
i90	**9**	**no**	**Problems with software configuration**	The fault occurs when switching on: no selection possible. (*)	Circuit board faulty (software configuration incorrect).
ib0	**11**	**no**	**Problems with the turbidity meter** [if featured] (Calibration Time-out)	The programme continues as if a “heavy soiling” condition had been detected.	Turbidity sensor faulty; sensor wiring faulty; circuit board faulty.
id0	**13**	**no**	**Problems with the washing motor: no signal from the tachometric generator** (washing pump powered, but no signal from the generator)	The heating element is switched off. If the fault persists after the time-out, the washing pump operates at maximum speed and the alarm code is stored in memory (the cycle continues).	Motor winding interrupted / short-circuited; motor jammed (foreign bodies); wiring to washing motor faulty; motor capacitor faulty; Tachometric generator interrupted / short-circuited; circuit board faulty.
iF0	**15**	**no**	**Water replenishment time-out** (3 times during the T.S. time-out)	The cycle continues until the next phase without supplementary fills and without heating. The error is cancelled on completion of a drain phase.	Dishes upside-down; central filter clogged; excessive foam; leaks from the sump-pressure switch coupling; pressure switch faulty / false contacts.

(*) If it is not possible to access diagnostics mode, switch the appliance off and then on again to check that this is not caused by a temporary fault. Before replacing the circuit board, check that it is correctly powered by controlling the following:

- Continuity of the power cable
- Correct operation of the suppressor
- Closure of the door switch contacts
- Continuity of the wiring between connectors on the circuit board and the suppressor.

7. User mode

With this procedure it is possible to:

- Modify the regeneration level selection (depending on the water hardness)
- Activate or deactivate the buzzer signalling.

7.1 Regeneration selection

1. Press button S0 to switch on the dishwasher.
   - Cancel any selected cycles pressing button S2 for at least 3 sec.
   - The End of cycle LED flashes.
   - If featured, the Salt/Rinse aid LED light up.
2. Press and hold down button S2 (the relative LED lights up) until:
   - LED L2 starts flashing.
   - LED L3 ligths up steadily.
   - Salt/Rinse aid LEDs (if featured) switches off.
3. Wait till LED L3 switches off.
   - The regeneration level is displayed by the End of cycle LED which flashes and pauses at intervals.
4. Press button S2 to increase the regeneration level according to the following values:

Level	No. flashes of End-of-cycle LED	Water fill between regeneration procedures	Time regeneration solenoid opens	Position of tank selector	Hardness of water treated	
	No.	Litres	Sec.	No.	° F (TH)	° D (dH)
1	1 L	- - -	0	1	0 > 7	0 > 4
2	2 L	130	240	1	8 > 18	4 > 10
3	3 L	94	240	1	19 > 25	11 > 14
4	4 L	70	240	1	26 > 32	15 > 18
* 5	5 L	53	240	2	33 > 39	19 > 22
6	6 L	37	240	2	40 > 50	23 > 28
7	7 L	20	240	2	51 > 64	29 > 36
8	8 L	15	240	2	65 > 75	37 > 42
9	9 L	10	240	2	76 > 90	43 > 50
10	10 L	3	2x240	2	91 >125	51 > 70
*** "5" = Level set by factory**			**Position of tank selector: "2"**			

7.2 Buzzer

The buzzer is a device which generates acoustic signals to indicate the End of cycle and eventually an Alarm situation. These signals can be excluded through a button combination:

1. Press button S0 to switch the appliance on.
   - Cancel any selected cycles pressing button S2 for at least 3 sec.
   - The End of cycle LED flashes.
   - If featured, the Salt/Rinse aid LED light up.
2. Press and hold down button S2 (the relative LED lights up) until:
   - LED L2 starts flashing.
   - LED L3 ligths up steadily.
   - Salt/Rinse aid LEDs (if featured) switches off.
3. Press button S2, before LED L3 switches off.
   - LED L2 lights up.
   - LED L3 flashes.
4. Wait till LED L2 switches off.
   - The End of cycle LED indicates if the function is activated or not.
5. Press button S2.
   - The End of cycle LED indicates the new function state.

8. Service mode

With this procedure it is possible to access the Service Diagnostics System. Once this mode is accessed, it is possible to:

- read and cancel the alarms.
- control the operation of the various components of the appliance.

8.1 Activating the Service diagnostics mode

1. Press and hold down button S2.
2. Press button S0 to switch the appliance on.
   - LED L2 flashes.
   - LEDs L3 and L4 light up.
3. Once this mode is accessed, it is possible to:
   - read and cancel the alarms.
   - control the operation of the various components of the appliance.
   - start the Service diagnostics mode.

8.2 Reading the alarms and activating the individual components

1. After accessing the diagnostics mode:
2. Wait till LEDs L3 and L4 switch off.
3. Press button S2.
   - The End of cycle LED shows the first alarm memorised with a flashing sequence.
4. Press button S2 other two times to display the other two memorised alarms.
   - The End of cycle LED displays the alarms.
5. From the fourth activation the test of the single components starts according to the defined sequence:
   - 4th actuation: regeneration solenoid
   - 5th actuation: drain pump
   - 6th actuation: water fill solenoid and washing pump (water up to level)
   - 7th actuation: heating (only if water up to level)
   - 8th actuation: washing pump
   - 9th actuation: detergent/rinse-aid dispenser
   - 10th actuation: drying fan
   - 11th actuation: it starts again from the first alarm

Note **The components are powered with door closed. If button S2 is not pressed for 60 seconds, the diagnostics terminate automatically.**

8.3 Cancelling alarm codes from memory / test of LEDs

It is good practise to cancel the alarm memorised:

- after reading the alarm code, to check whether it is repeated during the diagnostics test.
- after repairing the appliance, to check whether it is repeated during the testing cycle.

To activate the function, after entering the diagnostics mode:

1. Press button S2, before L3 and L4 switch off.
   - LED L3 flashes.
   - LEDs L2 and L4 light up.
2. Wait till LEDs L2 and L4 switch off.
3. Press button S2.
   - All LEDs flash and the buzzer sounds.

8.4 Functional testing cycle

This is an abbreviated washing programme (50 min) which allows the Service Engineer to test all the functions that comprise a traditional washing cycle; in effect, the system simulates a normal cycle.

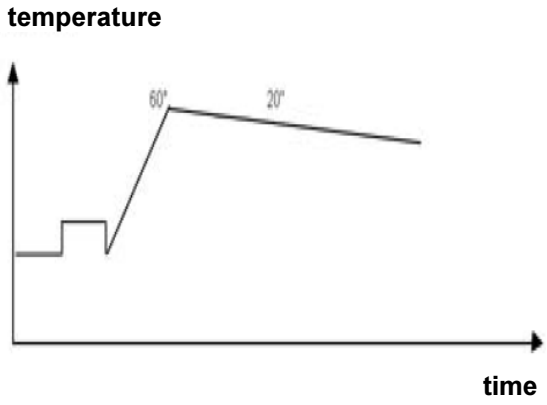
8.4.1 Selecting the cycle

To activate the function, after accessing the diagnostics mode:

1. Press button S2 twice, before L3 and L4 switch off.
   - LED L4 flashes.
   - The LEDs L2 and L3 light up.
2. Wait till the LEDs L2 and L3 switch off.
3. Press button S2 to activate the diagnostics cycle.
   - L4 switches off.
   - LED L2 flashes for the whole duration of the cycle.

8.4.2 Cycle phases

Phase	Duration
Water fill, Turbo activation	30''
Continuous washing, dispenser opening	45''
Drain	dilution
Water fill	---
Continuous washing	60''
Drain	dilution
Water fill	---
Controlled washing 2600 rpm, heating at 60°C	
Controlled washing 2600 rpm, maintaining at 60°C	1200''



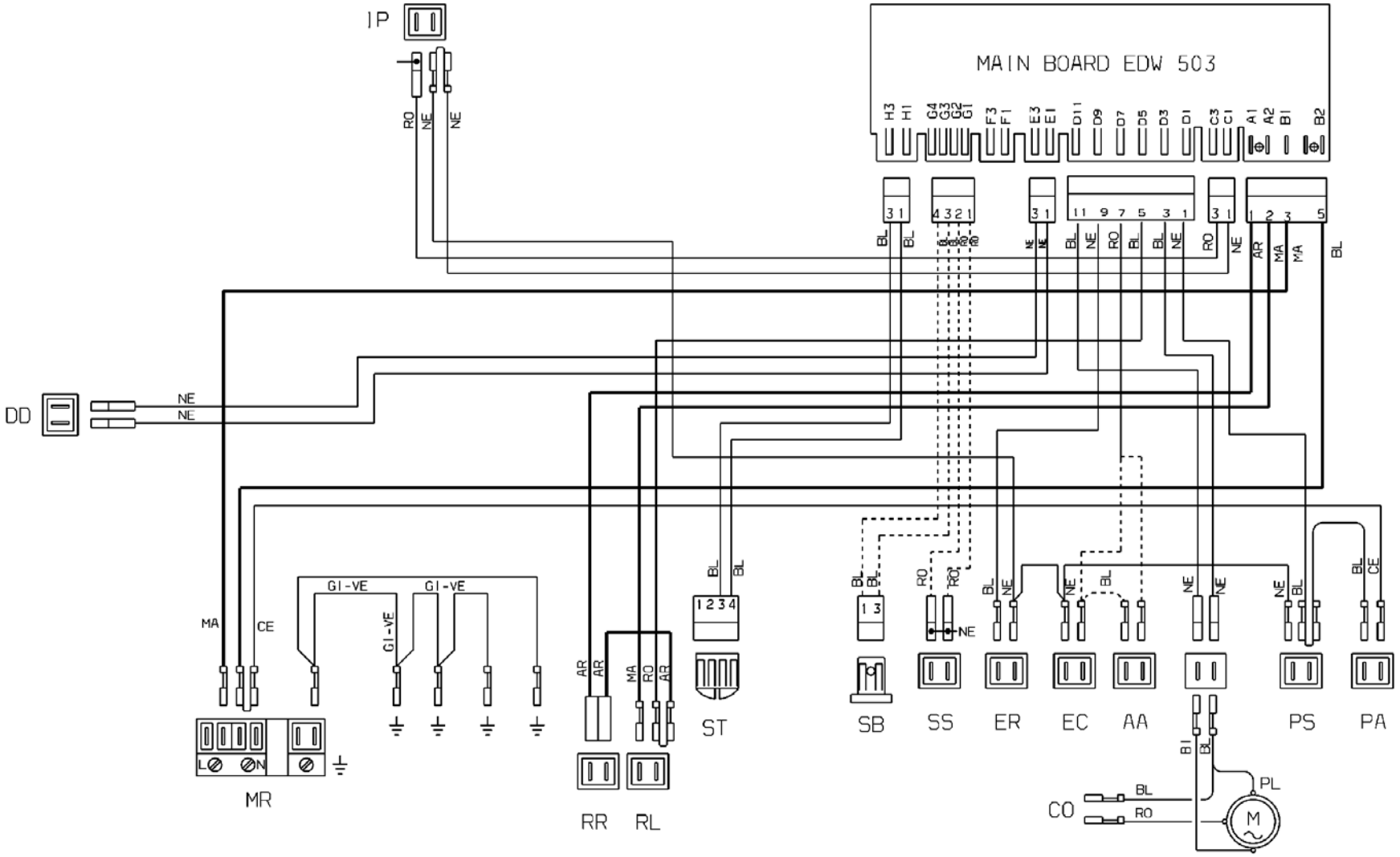
Note: At the beginning of the subsequent programme (i.e. after the test cycle), the resins are washed. The overall duration of the test cycle is about 50 minutes.

8.5 Exiting Service and User modes

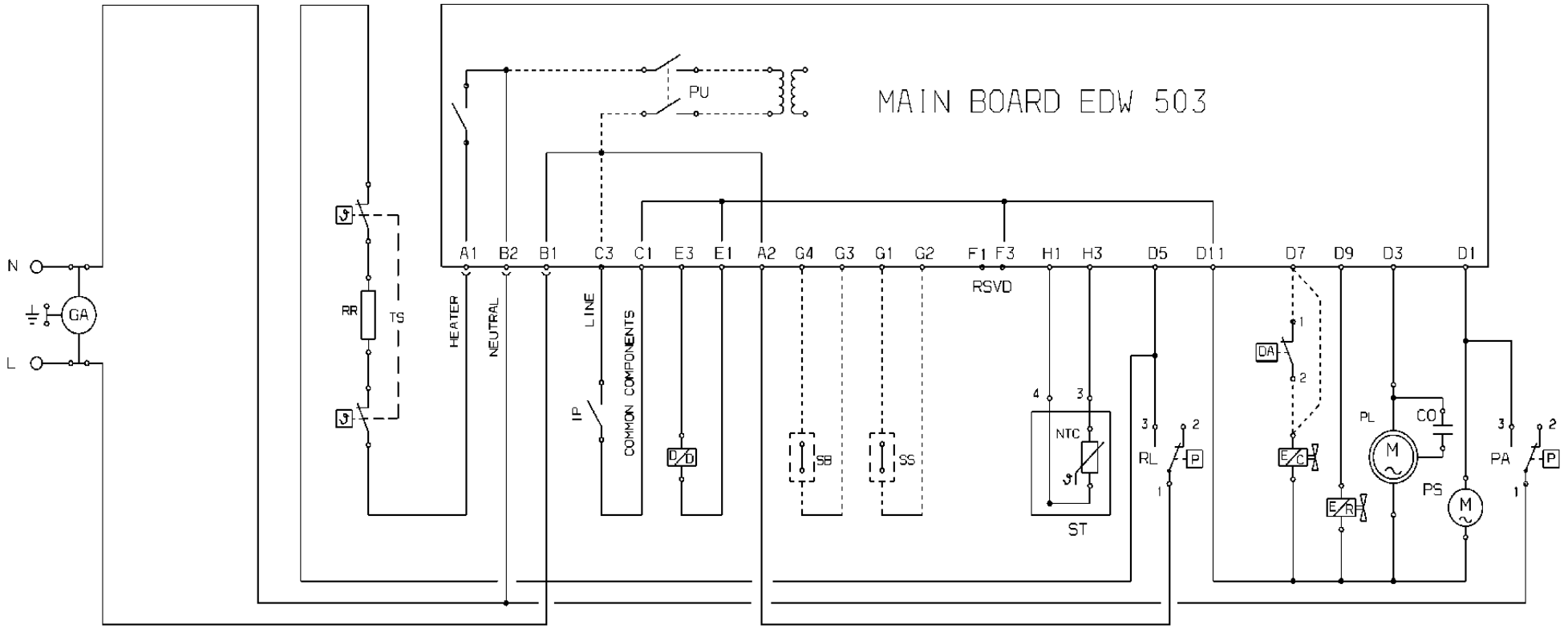
To exit these modes, press button SO and switch the appliance off or wait 60 seconds: the appliance returns to selection mode.

9. Electrical functions

9.1 Electrical circuit diagram



9.2 Basic circuit diagram



9.2.1 Key to circuit diagram

AR	=	Orange
BI	=	White
BL	=	Blue
CE	=	Light blue
GI-VE	=	Yellow-Green
MA	=	Brown
NE	=	Black
RO	=	Pink
VI	=	Lilac
DA	=	Anti-flooding device
CO	=	Capacitor
DD	=	Detergent/ Rinse-aid dispenser
EC	=	Fill solenoid
ER	=	Regeneration solenoid
GA	=	Suppressor
IP	=	Door switch
MR	=	General terminal block
MV	=	Fan motor
PL	=	Washing pump
PS	=	Drain pump
PU	=	Pushbutton array
PR/RL	=	Level pressure switch
PA	=	Anti-overflow pressure switch
RR	=	Heating element
SB	=	Rinse-aid sensor
SS	=	Salt sensor
Turbidity	=	Turbidity sensor
ST	=	Temperature sensor
TAC/T	=	Tachometric generator
TS	=	Safety thermostat
Main Board	=	Main board
User Interface	=	Display board

9.3 Table of programmes

The table below lists the phases of the programmes for this type of appliance. As these can be configured differently, refer to the relative documentation for the specific cycles available for each model.

Programmes		Pre-wash			Wash					1st Cold Rinse			2nd Cold Rinse			Hot rinse			
Type	Programme	Heating (temperature)	Wash time after heating (min.)	Type of wash	1st heating in °C	Wash time after heating (min.)	2nd heating in °C	Wash time after heating (min.)	Type of wash	Wash time (minutes)	Wash time (minutes)	Type of wash	Wash time (minutes)	Wash time (minutes)	Type of wash	heating in °C	Wash time after heating (min.)	Type of wash	Cycle time (minutes)
IC	Intensive	55°C	10'	ctrl	55°C	5'	68°C	14'	ctrl	2x3' (<65°C)	-	ctrl	5' <60°C	-	PW1	69°C	--	ctrl	130'
NC	Normal 3 rinses	---	6'	ctrl	50°C	4'	68°C	8'	ctrl	---	4'	ctrl	5' <60°C	---	PW1	69°C	--	ctrl	115'
E1	Energy label Marilyn F45	---	7'	ctrl	15,5' <69°C	26'	---	---	ctrl	5' (<65°C)	---	PW1	---	2'	3x3s at 2800	16' <69°C	--	PW1	136'/143' 45/60 cm
Q4	Soak	---	8'	PW1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	12'
Q5	Short 30 min.	---	---	---	14,5' <65°C	---	---	---	ctrl	---	---	---	5' <60°C	---	PW1	9' <69°C	---	ctrl	31'

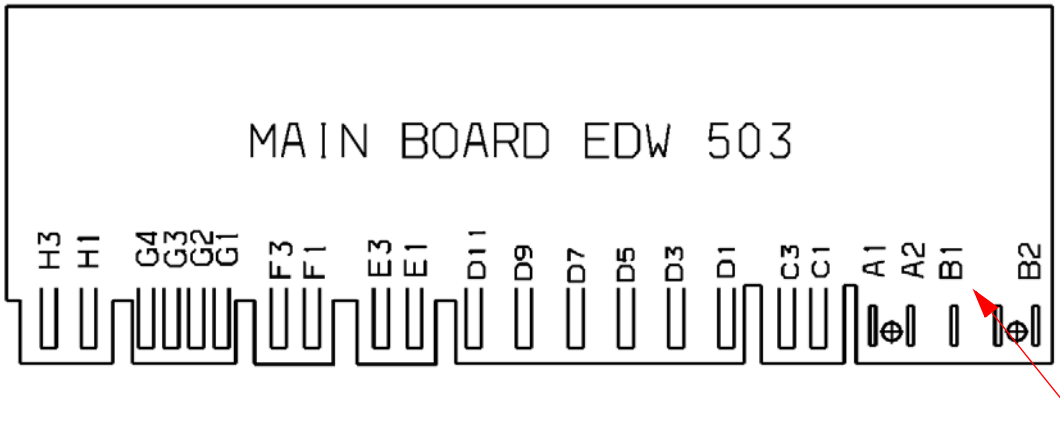
Note: The overall times for the programmes (duration) are approximate, and do not take into consideration the extra rinse, which may be selected as an option. The various phases do not include the times for regeneration/washing of the resins which, being performed "Ad Hoc", are not carried out at every cycle.

ctrl = washing at a constant speed of 2800 rpm. PW = Pulsed washing 1600 > 2800 rpm.

9.4 Checking the efficiency of the components

In order to facilitate the control procedure for the components to be tested, a TEST PROCEDURE has been created which indicates the point to which the probes of the tester should be applied and the correct theoretical value for each component tested.

- Remove the door and detach all the connectors from the main board.
- Connect the probes of the tester to the appropriate points on the connector. Compare the ohmic reading with the theoretical value.



Note: **Care should be taken relative to the position of connector "B1" - "B2": if this connector is replaced in the incorrect position (back-to-front), the appliance will *not function* since the power supply will be disconnected.**

9.5 Measurement points on the board wiring connectors

LIST OF COMPONENTS	PROBE CONTACTS	CORRECT VALUES		NOTES
(RR) - heating element + (TS) - safety thermostat	A1⇔ D5	⇒	25 Ω ± 8%	connected in series (2100W)
(PR) - level pressure switch	D5 instead of A1 ⇔ A2	⇒	infinite 0 Ω	on “Empty” (1-2) on “Full” (1-3)
(PA) - anti-flooding pressure switch	D1 ⇔ B2	⇒	infinite 0 Ω	on “Empty” (1-2) on “Full” (1-3)
(IP) - door micro switch	C1 ⇔ C3	⇒	0 Ω	door closed
(DD/DB) - integrated dispenser	E1 ⇔ E3	⇒	1.500 Ω ± 8%	OK
(SB) - rinse-aid sensor	G3 ⇔ G4	⇒	infinite 0 Ω	with rinse-aid without rinse-aid
(SS) - salt sensor	G1 ⇔ G2	⇒	infinite 0 Ω	with salt without salt
(ST) - temperature sensor	H1 ⇔ H3	⇒	4850 Ω ± 5% 1205 Ω ± 5%	(at 25ºC) (at 60ºC)
(ER) - regeneration solenoid	C1 ⇔ D9	⇒	6 K Ω± 8%	OK
(EC) - fill solenoid + (AA) - anti-flooding device	D7 ⇔ C1 instead of D11	⇒	3.800 Ω ± 8%	connected in series
(PL) - wash motor	D3 ⇔ D11 to the 2 motor wires (bl) / (ro)	⇒	50 Ω ± 8% 180 Ω ± 8%	start-up winding auxiliary winding
(PS) - drain motor	D1 ⇔ C1	⇒	180 Ω ± 8%	OK

10. Quick guide to the special functions

The table below briefly describes how each of the special functions available to the user and to the Service Engineer can be used.

	Function	Activation of the function				Starting the function		Displaying of the function	Short description / Notes
		Button	LED	Button	LED	LED	Button	LED	
USER (*)	Regeneration	S0 (On/ Off) .. S2 (for 3 s)	L2 flashes; L3 on with steady light	⇒	⇒	L2 flashes; the End-of-cycle LED flashes to indicate the level.	S2	The End-of-cycle LED flashes to indicate the new regeneration level.	Pressing button S2 the no. of flashes increases: ……..[1]……..[2]…….[3]……...[4]……..[5]…….. [6]……..[7] …….[8]……..[9]……[10] °F… >7 ….. >18 …….>25 ….. >32 ….. >39 ….. >50 ….. >64 ….. >75 ….. >90 ... >125 °D… >4 ……. >10 ……. >14 ….. >18 ….. >22 ….. >28 ….. >36 …. >42 …. >50 …. >70
	Buzzer			S2, before L3 switches off	L3 flashes; L2 on with steady light	L3 flashes	S2	L3 flashes; the End-of-cycle LED is on to indicate if the function is activated/not activated.	Pressing S2 twice: on = buzzer activated, off = deactivated
SERVICE	Alarm reading and components check	[S2] .. S0 (On/Off)	L2 flashes; L3 and L4 on with steady light	⇒	⇒	L2 flashes	S2	The End-of-cycle LED flashes to indicate the type of alarm memorized. L3 is on [4] [5] [6]	Pressing button S2 for other 2 times the other 2 memorised alarms are displayed flashing…
							S2	L3 is on	…from the fourth activation of button S2, the single components activate: [4] [5] [6] [7] [8] [9] [10] ER ☞ PS ☞ EV ☞ RR ☞ PL ☞ DD ☞ MV
	Cancelling alarms		L2 flashes; L3 + L4 on with steady light	S2, before L3 + L4 switch off	L3 flashes; L2 + L4 on with steady light	L3 flashes	S2	All LEDs and digits flash for 30 sec	It is advisable to cancel the alarms after each operation.
	Functional testing cycle			S2 (for two times), before L3 + L4 switch off	L4 flashes; L2 + L3 on with steady light	L4 flashes	S2	L2 flashes	The cycle starts automatically.

In order to memorize the functions or exit diagnostics mode, switch the appliance off turning the knob to On/Off position. In most cases the memorization or the exit is automatic after 60 seconds (in this case the appliance goes to pre-selection mode).

(*) To activate the “user” functions no cycle has to be selected (the appliance must be in pre-selection mode).