SERVICE MANUAL

WASHING

Z3

Z6

Customer Care - EMEA
Training and Operations Support
Technical Support

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Washing machines with electronic control system

EWM0931x

Technical and functional characteristics

KASAI

Z3 & Z6

Contents

1 Purpose of this manual

The purpose of this manual is to provide service engineers who are already in possession of the basic knowledge required to repair household washing machines with information regarding washing machines fitted with the EWM0931x electronic control system.

Previous platforms (electronic/mechanical) used a safety pressure switch that checked the minimum water level in the tub, below which the supply to the heating element was interrupted.

The electronic appliances currently manufactured (ENV06, EWM0931x platform), use a heating element with thermal fuses (inside its branches) for safety, which open and interrupt the power in the case of an overtemperature caused by the water level being too low.
The built-in NTC probe contacts have a pitch of 2.5 mm.

The manual deals with the following topics:

- General characteristics
- Control panel and compatibility between the wash programmes and options
- Setting: Demo, Diagnostics
- Alarms
- Technical and functional characteristics
- Accessing the various components

Warning:
The selector on this platform is not fitted with an ON/OFF switch, to cut off the power supply to the appliance, the plug must be removed from the power socket.

Low consumption mode

In order to reduce electricity wastage when the cycle is not running, appliances in this platform offer two ways of enabling low consumption mode:

- Stand-By
- Stand-Off

Stand-By – Triggered after five minutes, during programme selection (after the washing machine not receiving any commands from the buttons or the selector dial) and at the end of the wash cycle. All LEDs are turned off (the Display also, if present), with the exception of the green LED on the START/PAUSE button, which flashes at a very low rate to signal that the appliance is powered, but is in low power consumption mode. The appliance exits Stand-By mode when any of the buttons are pressed. The control panel lights up and displays the status of the appliance (last programme selected or end of programme) before Stand-By mode was entered.

Stand- Off – The appliance is in “Stand – Off” (virtual off) mode when the selector dial is set to “OFF” or “0” (zero). Indeed this position leads to the cancelling of any programme that might have been selected and the LEDs being turned off, along with the Display, if present.
While the main board and the components upstream of the door safety interlock remain powered.

The plug must be removed from the mains socket to cut the power to the appliance.

To ensure the appliance is always in a **safe state**, even when turning the selector dial to the OFF position (to cancel a programme in progress), with a high water level and the motor in motion, this will only result in the user interface (control panel) being turned off, while the main board remains powered to keep the door safety interlock locked until safety conditions are achieved.

2 WARNINGS

- **Any work on electrical appliances must only be carried out by qualified personnel.**
- **Before servicing an appliance, check the efficiency of the electrical system in the home using appropriate instruments. For instance, please refer to the instructions provided/illustrated in the Electrolux Learning Gateway portal (http://electrolux.edvantage.net).**
- **On completing operations, check that the appliance has been restored to the same safe condition as when it came off the assembly line.**
- **If the circuit board has to be handled/replaced, use kit ESD (Code 405 50 63-95/4) to avoid static electricity from damaging the circuit board, see S.B. No. 599 72 08-09 or consult the course "Electrostatic charges" at the address (http://electrolux.edvantage.net) on the Electrolux Learning Gateway portal.**
- **This platform is not fitted with an ON/OFF switch. Before accessing internal components, remove the plug from the mains socket to interrupt the power supply.**
- **Perform resistance measurements, rather than direct voltage and current measurements**
- **When replacing the heating element, replace it with one that has the same characteristics (2 thermal fuses) in order not to compromise the safety of the appliance.**
  It is strictly forbidden to remove/exchange NTC probes between one heating element and another.

- **Always empty the water drainage circuit before laying the side.**
- **Never lay the appliance on its right side (electronic control system side): water might leak from the detergent drawer and could drip onto the electrical/electronic components, possibly causing them to burn.**
- **When replacing components, please refer to the code shown in the list of spare parts relating to the appliance.**
- **Having removed the back panel, take care with the edges of the body, which can be sharp.**
- **This appliance is not fitted with a user accessible filter, in the case of a call in relation to cleaning it, please refer to sect. 13.6.4.1 page 67**

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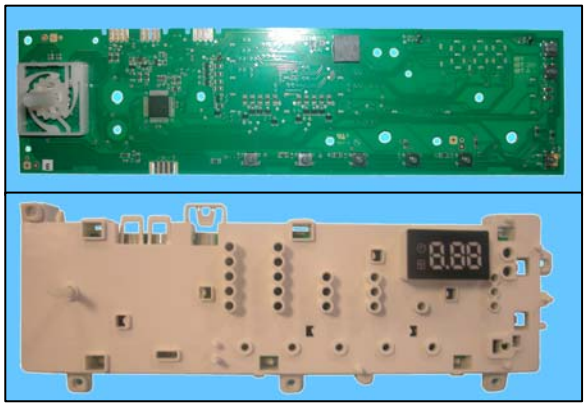
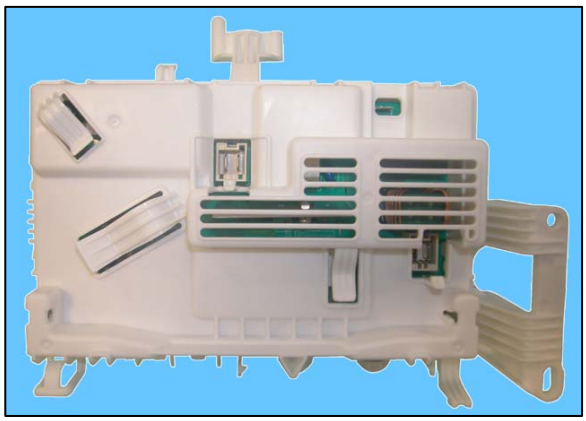
3.1 General characteristics

The EWM0931x electronic control system consists of two circuit boards:

- Control/display board in a plastic casing fitted to the control panel (the figure illustrates the individual board and the board assembly consisting of board, casing and diffuser).

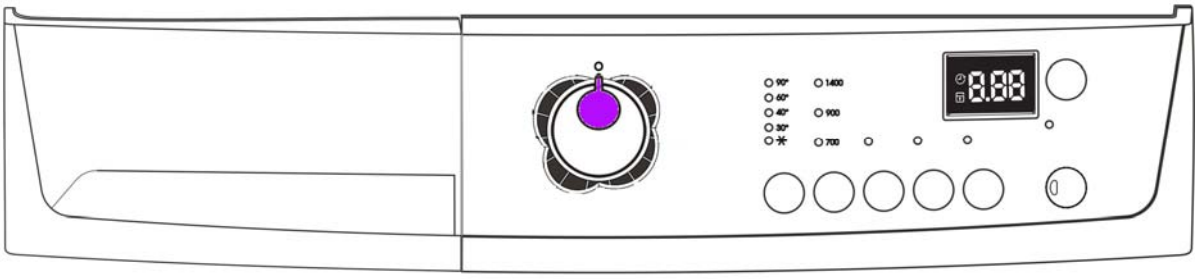


- Main board, located at the rear of the appliance. It powers the electrical components and receives commands from the display board.



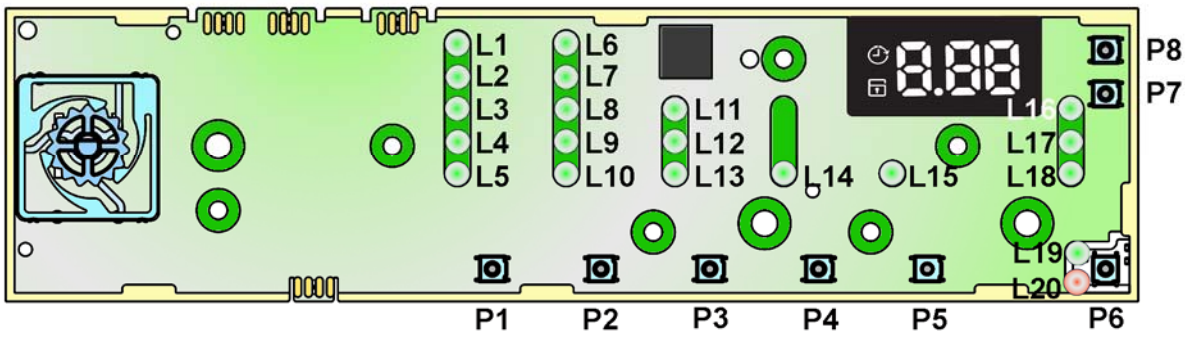
Programme selector	▪ 15 Positions without main switch (incorporated in the circuit board)
No. of buttons	▪ Maximum 7 (3 options + 1 start/pause + 1 delayed start + 1 Spin + 1 Temperature)
No. of LEDs	▪ Maximum 14 (13 green LEDs + 1 red LED)+ 1 display
Serial port	▪ DAAS-EAP communication protocol up to 230400 baud
Power supply voltage	▪ 220/240V ▪ 50/60 Hz (configurable)
Washing type	▪ Traditional
Rinsing system	▪ Traditional
Motor	▪ Collector, with tachometric generator (Universal)
Spin speed	▪ 600 ÷1,400 rpm
Anti-unbalancing system	▪ AGS
Water fill	▪ 1 Solenoid valve with 1 inlet – 2 outlets
Detergent drawer	▪ 2 Compartments: wash, conditioners
Control of water level in the tub	▪ Electronic/analogue pressure switch
Door safety device	▪ Traditional (with PTC)
Heating element power rating	▪ 1750W with thermal fuses incorporated
Temperature control	▪ NTC probe incorporated in the heating element
Buzzer	▪ Traditional incorporated in the circuit board

3.2 Control panel

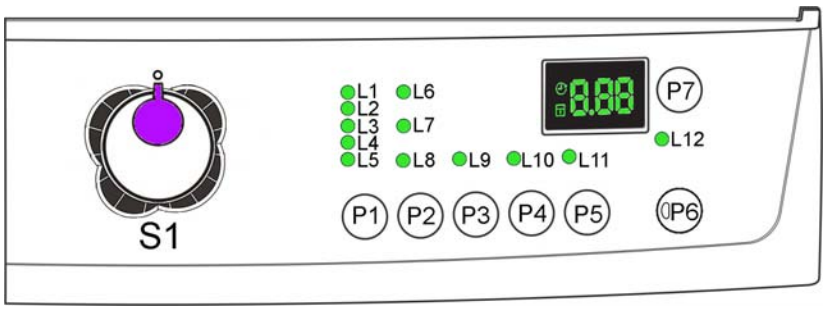


3.2.1 Display board

- Arrangement of the LEDs and buttons



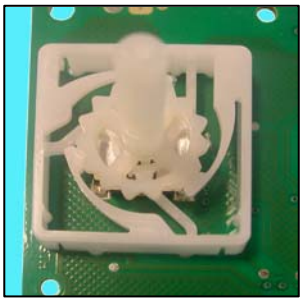
3.3 Control panel configuration



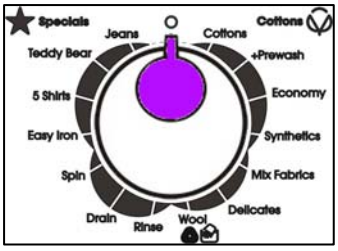
The wash programmes, the functions of the selector dial (where featured) and the individual buttons vary according to the model, since these are determined by the configuration of the appliance.

3.3.1 Programme selector (S1)

The selector is formed by a linear potentiometer. The fifteen positions are determined by a plastic structure fixed around the potentiometer.
There is no ON/OFF switch.
The first position is for the OFF function, where the current programme is cancelled and all the LEDs on the display board are turned off.
The plug must be removed from the mains socket to cut the power to the appliance.



The various positions of the selector may be configured in order to perform the various washing programmes (e.g. water level, drum movement, No. of rinses and the washing temperature to be selected according to the type of laundry).
The selector can be turned both clockwise and anti-clockwise.
For each programme, the compatible options and other parameters are defined.
The programme temperature is selected using the relevant button.



3.3.2 Programme configuration

The table below lists the parameters that can be used to define the washing programmes.

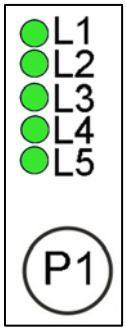
Types of fabric	Cotton/linen, Synthetic fabrics, Delicates, Wool, Hand-wash, Shoes, Jeans, Duvet, Silk.
Special programmes	Cotton/linen + pre-wash, Soak, Miniprogramme, Easy-Iron, Conditioner, Rinse, Drain, Spin, Economy.
Temperature	Normal, Minimum, Maximum: the initial temperature is the one proposed for the washing programme.
Spin	Normal, Minimum, Maximum.
Options (Normal/Possible)	Rinse Hold, Pre-wash, Extra rinse, Easy-Iron, Economy (energy label), Normal, Super quick, Reduced spin speed, No spin.
Programme phases	Pre-wash, Wash, Rinses, Spin, Delayed start.

3.3.3 Buttons and LEDs

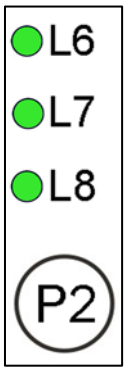
The functions of each button are defined by the configuration of the appliance.

- **Button No. 1:** TEMPERATURE CONTROL
  this button is configurable and is related to LEDs (L1-L5).
  By pressing it in sequence it is possible to select the washing temperature from the values listed below: 90°C, 60°C, 40°C, 30°C, 20°C and Cold cycle.

  The initial temperature set for each programme is configurable.
  The temperature of 50°C is not envisaged.

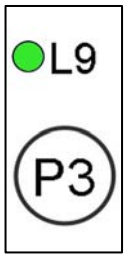


- **Button No. 2:** SPIN SPEED SETTING
  this button is configurable and is related to LEDs (L6-L8).
  By pressing it in sequence it is possible to select the desired spin speed or exclude it with the rinse hold option.



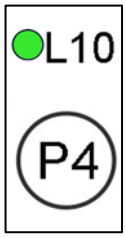
- **Button No. 3:** This button is configurable and is related to LED (L9).
  Depending on the configuration of the appliance, it can perform the function of:

  super quick, easy-iron, super rinse, rinse hold.



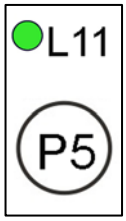
- **Button No. 4:** This button is configurable and is related to LED (L10);
  Depending on the configuration of the appliance, it can perform the function of:

  super quick, easy-iron, super rinse, rinse hold.

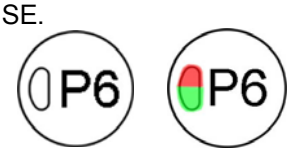


- **Button No. 5:** This button is configurable and is related to LED (L11);
  Depending on the configuration of the appliance, it can perform the function of:

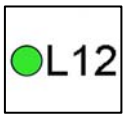
  super quick, easy-iron, super rinse, rinse hold.



- **Button No. 6:** This button is configurable and has the function of START/PAUSE.
  Pressing this button starts a washing cycle, or can pause a washing cycle already under way (there are two LEDs inside):
  - A **green** one which flashes when the appliance is in set-up, pause; it stays on when the cycle is under way and turns off when the cycle has ended;
  - A **red** one that flashes (150 ms off, 150 ms on) in the event of an alarm or incorrect selection, such as: an incompatible option, an incorrect temperature for the chosen programme or the rotation of the programme selector dial or the selection of an option while a washing cycle is under way.



- **L12 Door closed:** It lights up when the safety device prevents the door from opening and switches off when it can be opened. It flashes when the device is about to unlock the door (it should be noted with PTC delaying devices, which need one or two minutes to open).



- **Button No. 7:** This button is configurable and has the DELAYED START function. During the programme selection phase, it is possible a delayed start of between 30' and 20 hours (30' ☞ 60' ☞ 90' ☞ 2h ☞3h… ☞20h ☞0h) and the time is shown on the Display. During the last hour, the time decreases minute by minute.

3.3.4 Display

The display shows the following information.

- **- Duration of the washing programme**, which appears after it has been selected. This time corresponds to the time required for the maximum wash load for each type of programme. If an option is selected/deselected, the time is automatically updated. After the programme has started, the time decreases (and is updated) minute by minute.

- **- End of the programme** is indicated by **a permanently lit zero** (when the door can be opened).

- **- Appliance stopped with water in the tub**, after programmes with the RINSE HOLD option. This is displayed by **a permanently lit zero.** The LED indicating the door remains on and the LED on the START/PAUSE button is turned off. The washing machine continues to operate, rotating the drum once every 2 minutes.

- **- Delayed start**, selected using the relevant button. After the START/PAUSE button is pressed, the countdown starts and the delay time decreases hour by hour, from a delay of 2 hours up to 20 hours (☞ 30'☞ 60'☞ 90'☞ 2h☞ 3h...☞ 20h☞ 0h).

- During the last 2 hours, it decreases by 30 mins at a time.

  During delayed start, the icon remains permanently lit.

- **- Padlock:** when lit, it indicates that all the buttons are disabled to prevent children from altering, starting or pausing the cycle;
  To disable this function, a key combination needs to be pressed, which can be printed on the control panel or described in the instruction manual.

- **- Wrong choice of an option:** displayed by the message **"Err"**, when a function that is not compatible with the chosen programme is selected. the display duration is two seconds.

- **Alarm code**, indicates an error in the appliance operation; the START/PAUSE button flashes at the same time the code is displayed.

- **Buzzer**

The buzzer emits:

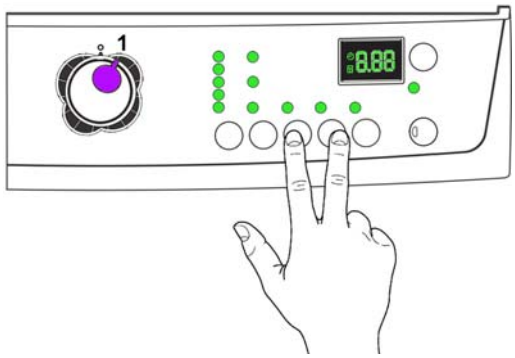
→ One **"beep"** when: selecting programmes, selecting an option, when the START/PAUSE button is pressed to start or pause the cycle.
→ Three **"beeps"** when: an option not compatible with the selected programme is chosen, or when a button is pressed or a dial is turned during a cycle.
→ A particular sequence of **"beeps"** for a two-minute duration when the cycle has terminated.
→ A particular sequence of three **"beeps"** to signal a malfunction with the appliance.

The Buzzer may be configured to sound:

- As in the aforementioned cases.
- Only at the end of the cycle.
- Only in the event of an alarm.

The volume has a factory preset level and cannot be changed by the user.

In models fitted with a buzzer, the buzzer can be enabled/disabled during programme selection, but alarm signalling remains enabled.



To enable/disable it, press the buttons simultaneously for 5 seconds. A short beep confirms that it has been enabled/disabled.

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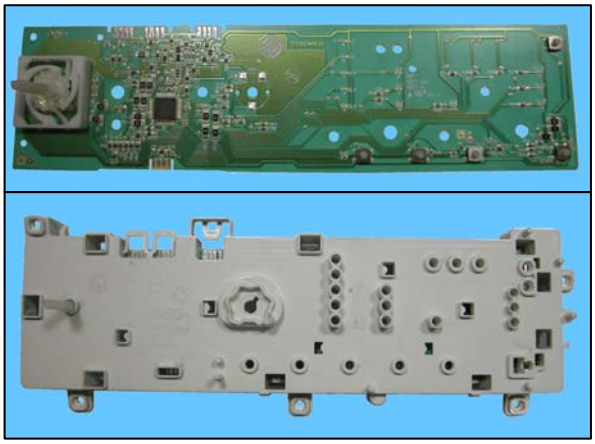
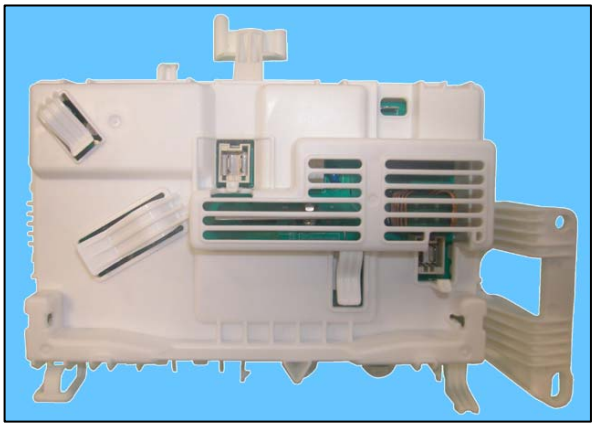
4.1 General characteristics

The EWM0931x electronic control system consists of two circuit boards:



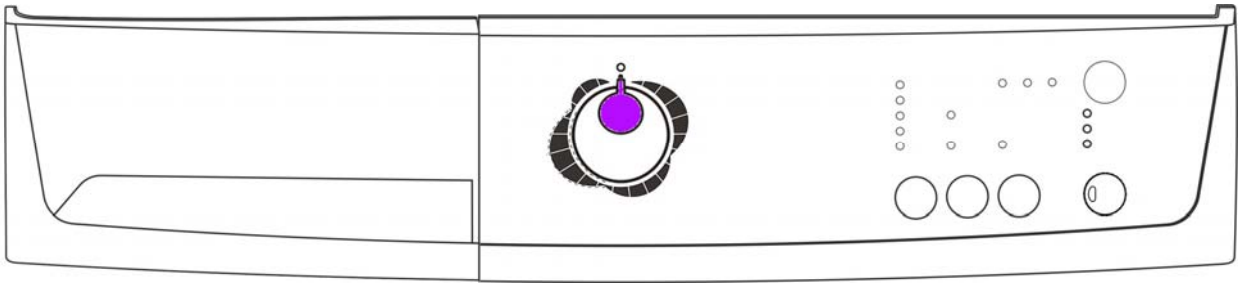
- Control/display board in a plastic casing fitted to the control panel (the figure illustrates the individual board and the board assembly consisting of board, casing and diffuser).



- Main board, located at the rear of the appliance. It powers the electrical components and receives commands from the display board.

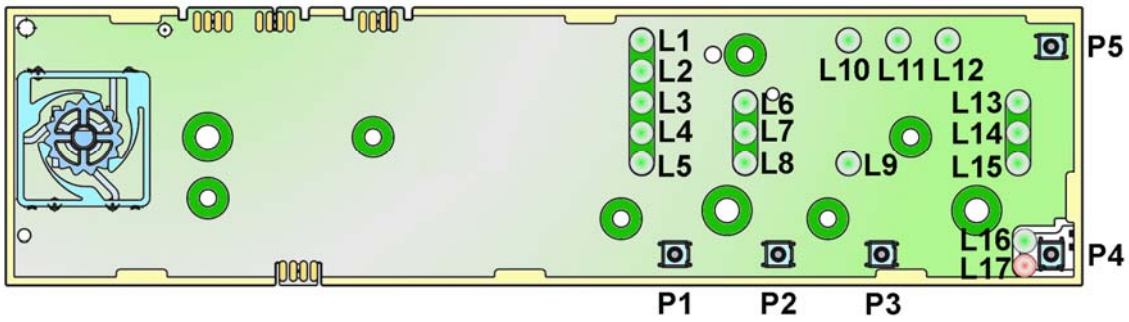
Programme selector	▪ 15 Positions without main switch (incorporated in the circuit board)
No. of buttons	▪ Maximum 5 (1 Spin/Temperature + 2 options + 1 start/pause + 1 delayed start)
No. of LEDs	▪ Maximum 16 (15 green LEDs + 1 red LED)
Serial port	▪ DAAS-EAP communications protocol up to 230400 baud
Power supply voltage	▪ 220/240V ▪ 50/60 Hz (configurable)
Washing type	▪ Traditional
Rinsing system	▪ Traditional
Motor	▪ Collector, with tachometric generator (Universal)
Spin speed	▪ 600 ÷1,400 rpm
Anti-unbalancing system	▪ AGS
Water fill	▪ 1 Solenoid valve with 1 inlet – 2 outlets
Detergent drawer	▪ 2 Compartments: wash, conditioners
Control of water level in the tub	▪ Electronic/analogue pressure switch
Door safety device	▪ Traditional (with PTC)
Heating element power rating	▪ 1750W with thermal fuse incorporated
Temperature control	▪ NTC probe incorporated in the heating element

4.2 Control panel

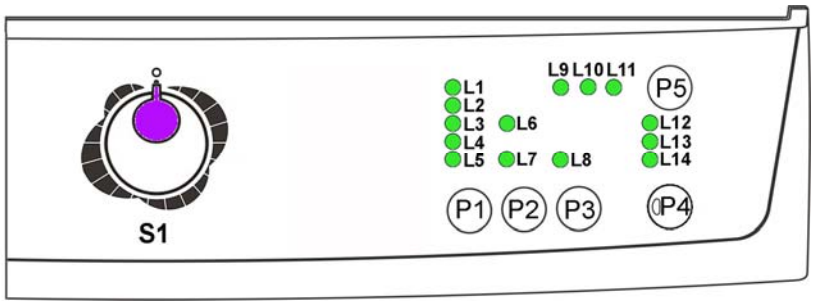


4.2.1 Display board

- Arrangement of the LEDs and buttons



4.2.2 Control panel configuration



The wash programmes, the functions of the selector dial (where featured) and the individual buttons vary according to the model, since these are determined by the configuration of the appliance.

4.2.3 Programme selector (S1)

See sect. N° 3.3.1 page 9

4.2.4 Programme configuration

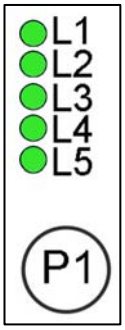
See sect. N° 3.3.2 page 9

4.2.5 Buttons and LEDs

The functions of each button are defined by the configuration of the appliance.

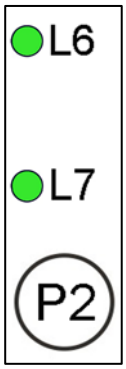
- **Button No. 1:** This button is related to LEDs (L1÷L5).

  Pressing the button in sequence alters the temperature of the washing cycle from 90°C to cold cycle.



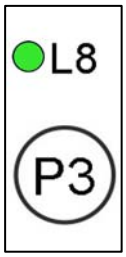
- **Button No. 2:** This button is configurable and is related to LEDs (L6 and L7). Depending on the configuration of the appliance, it can perform the function of:

  Super quick, easy-iron, super rinse, rinse hold, spin speed regulation.

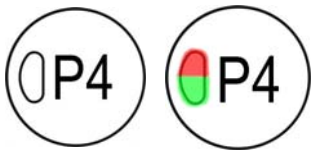


- **Button No. 3:** This button is configurable and is related to LED (L8). Depending on the configuration of the appliance, it can perform the function of:

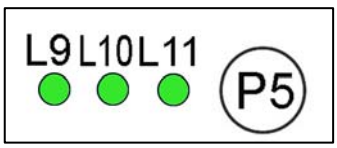
  super quick, easy-iron, super rinse, rinse hold.



- **Button No. 4:** This button is configurable and has the function of START/PAUSE.
  See sect. 3.3.3 Button 6 START/PAUSE on page 10



- **Button No. 5:** This button is configurable and is related to LEDs (L9÷L11),
  It performs the delayed start function.
  By pressing it in sequence it is possible to select from one of the three delayed start options: 3h-6h-9h with the related LED coming on.



- **Wash phase indicator LEDs**:

LEDs L12, L13, L14 are configurable and are used as indicators of the wash phases

Three combinations are envisaged:

First combination: The washing cycle phases are displayed and the “Extra Rinse” option can be selected by pressing a button;

Second combination: The washing cycle phases are displayed along with the status of the “Extra Rinse” option, when the latter can be selected by combination of buttons;

Third combination: The washing cycle phases are displayed, along with the status of the door and the “Extra Rinse” option can be selected by pressing a button.

Summary table of the three combinations

LED position	First combination	Second combination	Third combination
L12	Wash	Cycle in Progress	Cycle in Progress
L13	Rinses/Spin	Extra Rinse	Door
L14	End of Cycle	End of Cycle	End of Cycle

The meaning of each LED function is described in the following table.

Possible indications	
Wash	Lights up in selection mode if the programme includes the wash phase and during the wash cycle.
Rinses/Spin	Lights up in selection mode if the programme includes rinses and spin and during the execution of these phases.
Extra rinse	Lights up when this option has been memorised (if included in the cycle) and during rinses.
Cycle in progress	Lights up during execution of the cycle.
End of cycle	Lights up when the programme has completed and after the door has been unlocked.
Door closed	Lights up when the safety device prevents the door opening and switches off when the door can be opened. It flashes when the device is about to unlock the door (it should be noted with PTC delaying devices, which need one or two minutes to open).

5 COMPATIBILITY BETWEEN WASH PROGRAMMES AND OPTIONS

Programme	Temperature	Maximum Spin (*)	Delayed Start	Super Quick	Extra-rinse	Easy iron	Reduced spin speed	No spin	Rinse hold
Cotton	95°÷ 0° (40°)	1400 rpm	√	√	√	√	√	√	√
Cotton + pre-wash	95°÷ 0° (40°)	1400 rpm	√	√	√	√	√	√	√
Cotton + economy	60°, 40° (60°)	1400 rpm	√		√	√	√	√	√
Synthetic fabrics	60°, 0° (40°)	1200 rpm	√	√	√	√	√	√	√
Delicates	40°÷ 0° (40°)	700 rpm	√	√	√		√	√	√
Wool/Hand Wash	40°, 0° (30°)	1200 rpm	√				√	√	√
Jeans	60°, 0° (40°)	1200 rpm	√			√	√	√	√
Mini/Teddy Bear/Sport Light	30°	700 rpm	√				√	√	
Child	30°, 0° (30°)	700 rpm	√				√	√	
Shoes	30°, 0° (30°)	1000 rpm	√				√	√	
Blankets	40°, 0° (40°)	700 rpm	√				√		
5 Shirts	30°	900 rpm	√				√	√	√
Mix. 40°	40°	1400 rpm	√		√	√	√	√	√
Mix. 20° Oko	20°	1200 rpm	√		√		√	√	√
Soak	30°		√						
Rinses/Conditioner		1400 rpm	√		√	√	√	√	√
Spin		1400 rpm	√				√		
Drain									
Phases during which an option can be selected									
Selection	√	√	√	√	√	√	√	√	√
Wash cycle pause		√			√	√	√	√	√
Rinse cycle pause									√

The information is purely indicative.
(T°) The default temperature (in parentheses) is displayed by the cycle temperature LED, when selected (Z6 Styling).
(*) The default set speed when a cycle is selected, limited to that declared for the specific model.

5.1 Description of the options

- **Rinse hold**

→ Stops the appliance with water in the tub before the final spin cycle.
→ To drain the water, reset the programme and then select a drain or spin cycle.

- **Pre-wash**

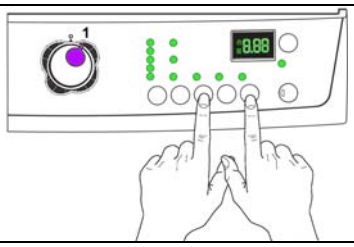
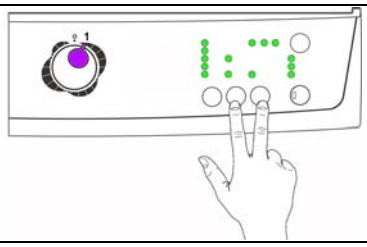
→ Adds a pre-wash phase at the start of the cycle with the water heated to 30°C (or cold, if selected).
→ Available in COTTON cycles, performs a short spin before advancing to the wash phase.

- **Economy/Energy label**

→ Modifies the structure of the COTTON 40÷90 - SYNTHETIC FABRICS 50/60 programmes to reduce energy consumption, guaranteeing wash performance levels.
→ Reduces the washing temperature
→ Increases the duration of the wash phase

- **Super rinse**

→ Adds **two** rinses in the COTTON cycle, adds **one** rinse in the SYNTHETIC FABRICS - DELICATES cycles
→ Cancels the end of wash spin and the first two intermediate spins.
→ The other intermediate spins are limited to 450 rpm with the final spin at maximum speed.

ENABLING SUPER RINSE	
Appliances that do not envisage this option associated with a button can enable it through a key combination (see instruction manual).	
Z3	Z6
	
During the selection phase, press the two buttons shown in the figure simultaneously for at least 5 seconds until the related LED comes on. This option also remains enabled during subsequent cycles. To disable it, press the two buttons simultaneously for at least 5 seconds until the related LED is turned off.	

- **Easy-iron**

→ In COTTON programmes:
  - Adds **three** rinse cycles
  - Eliminates intermediate spin cycles
  - Performs a pulse spin phase before the final spin
  - Adds an “untangling” phase after the spin cycle

→ In SYNTHETIC FABRICS programmes:
  - It reduces the heating temperature in 50/60°C cycles to 40°C
  - Increases the wash time
  - Prolongs the cooling phase at the end of the wash phase
  - Adds **one** rinse cycle
  - Adds an “untangling” phase after the pulse spin cycle

- **No spin**

→ It eliminates <u>all</u> the spin phases
→ It adds **three** rinses to the COTTON cycle and **one** to the SYNTHETIC FABRICS cycle.

- **Super quick**

→ Modifies the structure of the wash phase of the COTTON - SYNTHETIC FABRICS - DELICATES cycles for half-loads.

- **Delayed Start**

→ Adds a pause before the start of the programme. The delay time is indicated by LEDs or the Display (see page 11 or page 16 button 7/5, for Display or LED display, respectively).

→ To start the cycle immediately after having already set the delayed start time: press the Start/Pause button, cancel the delay time by pressing the relevant button, and press Start/Pause once more.

- **Reduced spin speed**

Z6 Styling

It can be linked to buttons with 2-5 LEDs, (the possible combinations are shown below):
- Maximum - Maximum declared spin speed.
- Reduction 1 - Reduction of the spin speed to between the maximum speed and the minimum speed (400 rpm).
- Reduction 2 - Reduction of the spin speed to between the speed of reduction 1 and the minimum speed (400 rpm).
- Automatic reduction - reduces the maximum speed for the programme by half, but not less than 400 rpm.
- No spin - excludes all spin cycles.
- Rinse hold - excludes only the final spin, but not the intermediate spins and ends the cycle with water in the tub.

A further spin reduction can be obtained by selecting the “Easy-Iron” option in cotton programmes when the selected programme envisages a spin speed of more than 900 rpm.

The following tables contain the possible configurations of the “Spin” button depending on the combination of LEDs.

Button with 5 LEDs						
Maximum spin speed (rpm)	600/700	800/900	1000÷1400	1000÷1400	1300÷1400	1400
Intermediate 1	500	700	900	900	1100	1200
Intermediate 2	400	500	700	700	900	900
Intermediate 3	No spin	No spin	No spin	500	700	700
Last selection	Rinse hold	Rinse hold	Rinse hold	No spin or Rinse hold	No spin or Rinse hold	No spin or Rinse hold

Button with 4 LEDs			
Maximum spin speed (rpm)	600/700	800/900	1000÷1400
Intermediate 1	500	700	900
Intermediate 2	400	500	700
Last selection	No spin or Rinse hold	No spin or Rinse hold	No spin or Rinse hold

Button with 3 LEDs			
Maximum spin speed (rpm)	600/700	800/900	1000÷1400
Intermediate 1	500	700	900
Intermediate 2	400	500	700

Button with 2 LEDs	
Intermediate 1	Automatic reduction
Intermediate 2	No spin or Rinse hold

Z3 Styling
It can be combined with buttons with 3 LEDs. The combination is the same as that described for the previous version.
The following tables contain the possible configurations of the “Spin” button depending on the combination of LEDs:

Button with 3 LEDs and “Rinse hold” option combined with this button				
Maximum spin speed (rpm)	600	700	800	900÷1400
Intermediate 1	400	500	600	700
Intermediate 2	No spin or Rinse hold	No spin or Rinse hold	No spin or Rinse hold	No spin or Rinse hold

Button with 3 LEDs and “Rinse hold” option not combined with this button					
Maximum spin speed (rpm)	600/700	800	900÷1000	1000÷1400	1300÷1400
Intermediate 1	500	600	700	900	1100
Intermediate 2	400	400	500	700	700

When a programme is selected, the LED corresponding to the configured spin speed comes on.
If the “Rinse hold” option is combined with another button and it is selected, all the LEDs will be turned off.

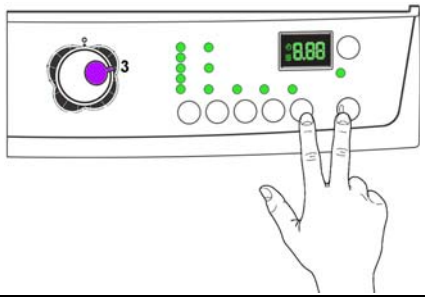
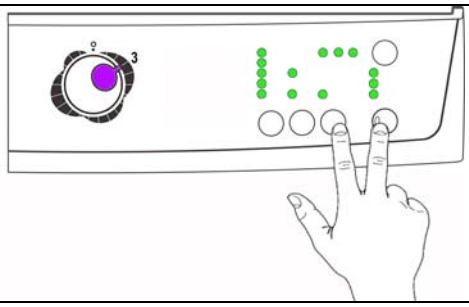
6 DEMO MODE SETTING

A special cycle allows demonstration of the operation of these appliances in shops, in a user interactive manner, without connecting them to the water mains:

- Interactive mode consists of selecting one of the programmes, adding any options and, once the start button has been pressed, the appliance will only perform certain of the phases of the programme, skipping those that cannot be performed (water fill, drain, heating).

The cycle unfolds as follows:

- The door lock is enabled as usual (door locked during operation, possibility of opening it at the end of the cycle or when paused).
- Motor: all low speed movements are enabled, the pulses and spin are disabled,
- The water fill solenoid valves and the drain pump are disabled.
- Display: displays all the phases of the programme very quickly.
- Alarms: for safety reasons, the E40 (door closed), E50 (motor) and E90 (communication between boards/configuration) families of alarms are enabled.

Z3	Z6
	

1. Set the selector dial to position 0 (zero).
2. Press the **START/PAUSE** button and the nearest **option button** simultaneously (as shown in the figure).
3. Holding down the buttons, switch the appliance on by turning the programme selector **three positions clockwise**.
4. Hold the buttons down until the LEDs start to flash (at least 3 seconds).

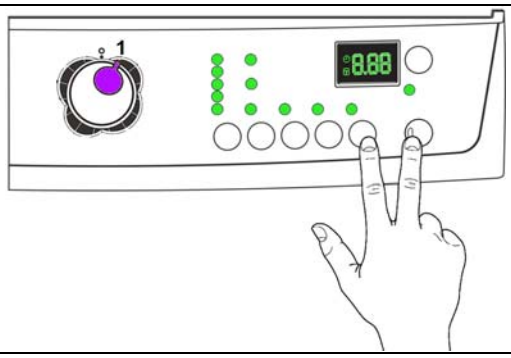
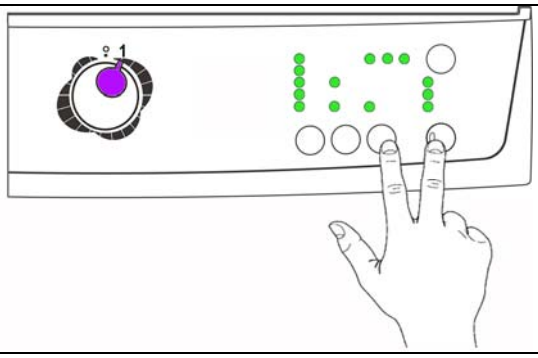
   Where a display is fitted, the message “DEM” is shown for 2 seconds.

6.1 Exiting DEMO mode

Unplug the appliance from the mains socket.

7 DIAGNOSTICS SYSTEM

7.1 Accessing diagnostics

Z3	Z6
	

1. Set the selector dial to position 0 (zero).
2. Press the **START/PAUSE** button and the nearest **option button** simultaneously (as shown in the figure).
3. Holding down the buttons, switch the appliance on by turning the programme selector **one position clockwise**.
4. Hold the buttons down until the LEDs start to flash (at least 2 seconds).

In the first position, the operation of the buttons and the related LEDs is checked; turning the programme selector dial **clockwise** runs the diagnostic cycle for the operation of the various components and reads any alarms.

7.2 Exiting the diagnostics system

→ To exit the diagnostics system, turn the selector dial to position 0, turn the appliance back on and return the dial to position 0.

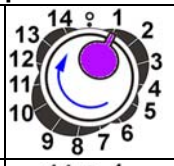
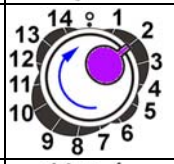
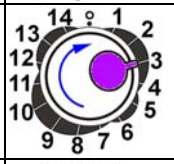
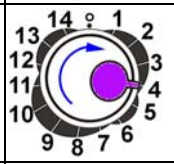
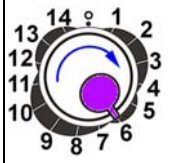
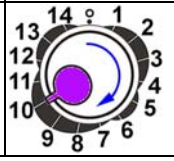
7.3 Diagnostic test phases

Irrespective of the type of electronic board and of the selector configuration, once the diagnostics system has been activated, turn the selector dial **clockwise** to run a check of the various components and read the alarms (as described in table 1)**.**

A selector control code is displayed at the same time : in Z3 stylings on the display for **two** seconds, before displaying the contents of the last column in the table below, whereas in Z6 stylings the code is displayed by the LEDs coming on for **three** seconds (see table 2).

All alarms are enabled in the diagnostic cycle.

TABLE 1

Selector position		Components activated	Working conditions	Function tested	When a Display is present
1		- All the LEDs come on in sequence. - Pressing a button turns on the corresponding group or LED.	Always active	User interface functions	
2		- Door locking device - Wash solenoid	Door closed Water level below anti-flooding level Maximum time 5 mins.	Water fill to wash compartment	 Water level in the tub (mm)
3		- Door locking device - Pre-wash solenoid	Door closed Water level below anti-flooding level Maximum time 5 mins.	Water fill directly to tub	 Water level in the tub (mm)
4		- Door locking device - Solenoid valve pre-wash and wash	Door closed Water level below anti-flooding level Maximum time 5 mins.	Water fill to conditioner compartment	 Water level in the tub (mm)
6		- Door locking device - Wash solenoid if the water level in the tub does not cover the heating element - Heating element	Door closed Water level above the heating element. Maximum time of 10 mins or up to 90°C. **(*)**	Heating	 Temperature in °C measured using the NTC probe
7		- Door locking device - Wash solenoid if the water level in the tub does not cover the heating element - Motor (55 rpm clockwise, 55 rpm anticlockwise, pulse at 250 rpm)	Door closed Water level above the heating element	Tub water leak check	 Drum speed in rpm/10
8		- Door locking device - Drain pump - Motor up to 650 rpm then at maximum spin speed (**)	Door closed Water level lower than anti-boiling level for spinning	Drain, calibration of analogue pressure switch and spin	 Drum speed in rpm/10
9	----	----	----	----	
10		- Reading/Deleting the last alarm	-----	----	

(*) In most cases, this time is sufficient to check heating. However, the time can be increased by repeating the phase without draining the water: switch for a moment to a different phase of the diagnostic cycle and then back to the heating check (if the temperature is higher than 80°C, heating does not take place).

(**) The check at the maximum speed occurs without checking the AGS (anti-unbalancing system) and garments must not be inserted in the appliance.

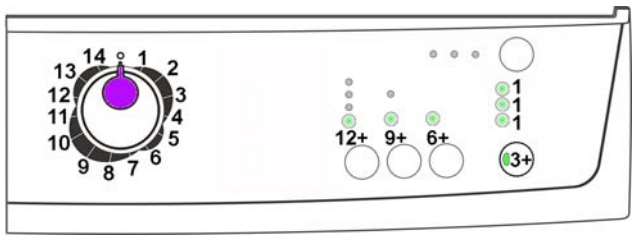
7.4 Selector efficiency check

During diagnostic testing, it is possible to check the efficiency of the selector, even on appliances with no display.

7.4.1 Programme selector

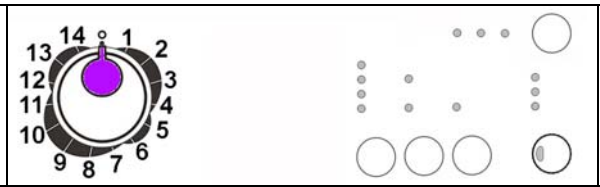
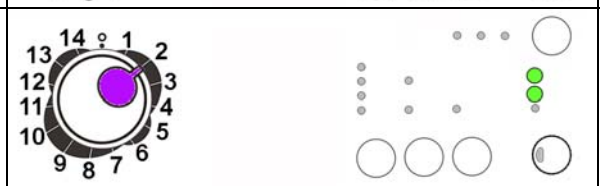
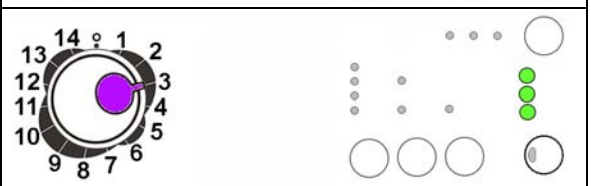
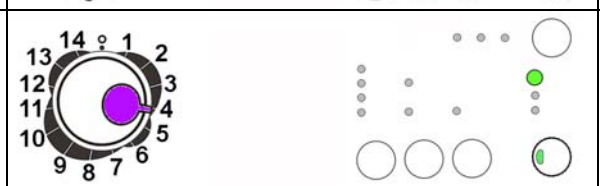
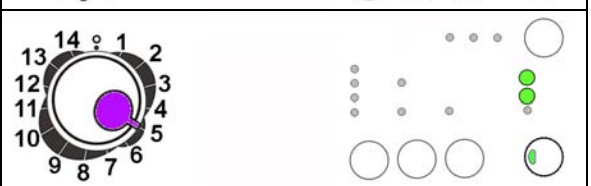
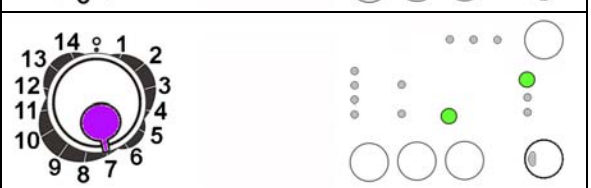
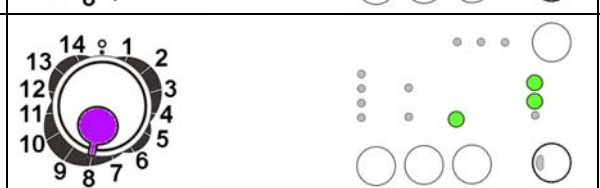
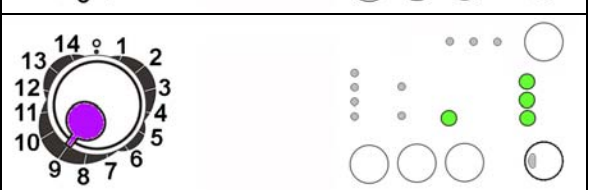
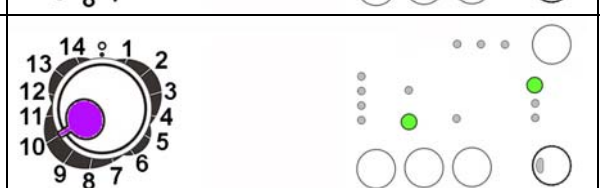
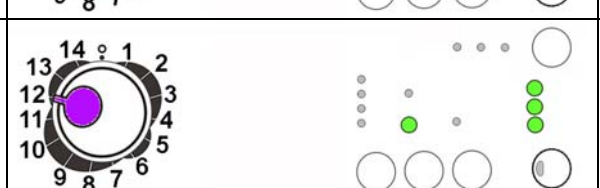
In the control panel illustrated below, the LEDs (lit) are linked to values.

By turning the dial, some of the LEDs come on, and summing the values with which they are linked gives the position of the dial (if the selector dial is efficient).



The table below includes all the possible selector control combinations:

TABLE 2

0		**1**	
2		**3**	
4		**5**	
6		**7**	
8		**9**	
10		**11**	
12		**13**	
14			

8 ALARMS

8.1 Displaying the alarms to the user

8.1.1 Z3 Styling

Alarms are displayed by the red LED on the START/PAUSE button flashing, and shown on the Display at the same time.

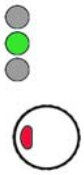
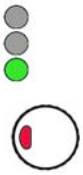
The alarms displayed to the user are listed below:

- **E10 - Water fill difficulty (tap closed)**
- **E20 - Drain difficulty (filter fouled)**
- **E40 - Door open**

8.1.2 Z6 Styling

Alarms are displayed by the red LED on the START/PAUSE button flashing along with one of the three LEDs above the START/PAUSE button.

The table below illustrates the various LED combinations.

E10		E20		E40	
Water fill difficulty (tap closed)		**Drain difficulty (filter fouled)**		**Door open**	

The aforementioned alarms (for both versions) can be remedied directly by the end user.

While the alarms listed below (for both versions):

- **EH0 – Voltage or frequency outside nominal values**

Are displayed to the user, but technical assistance is required to remedy them.

The alarms are enabled during the execution of the wash programme. With the exception of alarms associated with the configuration and power supply voltage/frequency, which are also displayed during the programme selection phase.

Generally, in an alarm sate (unless specified otherwise), it is possible to open the door if:

- The level of the water in the tub is below a certain level.
- The water temperature is less than 55°C.
- The motor has stopped.

Certain alarm conditions require a drain phase to be performed before the door can be opened for safety reasons:

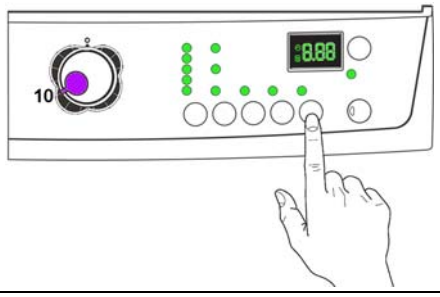
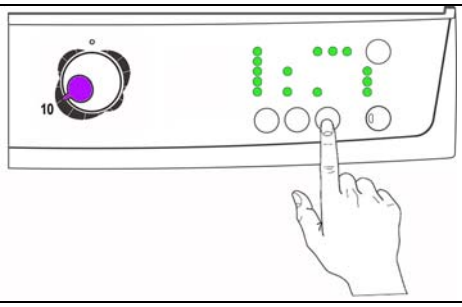
- Cooling water fill if the temperature is higher than 65°C;
- Drain until the analogue pressure switch is on “empty”, within a max. time of 3-minutes.

8.2 Reading the alarms

The last three alarms stored in the FLASH memory of the PCB can be displayed:

- Enter diagnostics mode.
- Irrespective of the type of PCB and the configuration, turn the programme selector dial **clockwise** to the **tenth position.**

- The last alarm is displayed.
- To display the previous alarms, press the button to the left of the START/PAUSE button in sequence (as shown in the figure).

Z 3	Z6
	

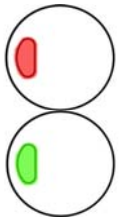
- To return to the last alarm, press the START/PAUSE button

8.2.1 Displaying the alarm

The alarm is displayed by a repeated flashing sequence of the START/PAUSE button red and green lights (0.5 seconds on, 0.5 seconds off with a 2.5 second pause between sequences).

- START/PAUSE button indicator with a red light → indicates the first digit of the alarm code (family)
- START/PAUSE button indicator with a green light → indicates the second digit of the alarm code (family internal number)

These two LEDs are present in all models.



Notes:

- The first letter of the alarm code **"E"** (Error) is not displayed, since it is the same for all codes.
- Alarm code families are expressed in hexadecimals; and therefore the letters:

→ **A** is represented by **10** flashes
→ **B** is represented by **11** flashes
→ ...
→ **F** is represented by **15** flashes

- Configuration errors are displayed by all LEDs flashing (user interface not configured).

8.2.2 Example of alarm display

If we take alarm E43 (problem with the door safety TRIAC) as an example; the following will be displayed:

- A sequence of four flashes of the START/PAUSE button red light indicates the first number E**4**3;
- A sequence of three flashes of the START/PAUSE button green light indicates the second number E4**3**.

START/PAUSE button red light			START/PAUSE button green light		
On/Off	Time (Sec.)	Value	On/Off	Time (Sec.)	Value
	0.5	1		0.5	1
	0.5			0.5	
	0.5	2		0.5	2
	0.5			0.5	
	0.5	3		0.5	**3**
	0.5			0.5	
	0.5	**4**		2.5	Pause
	0.5				
	1.5	Pause			

8.2.3 Behaviour of the alarms during diagnostic testing

All alarms are enabled during diagnostic testing of the components.

8.2.4 Rapid reading of alarms

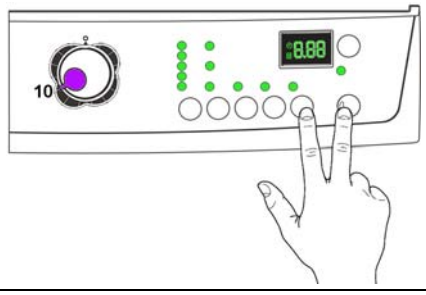
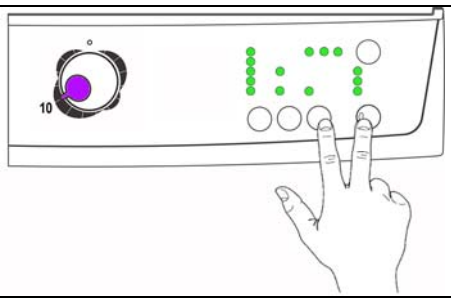
The last alarm can be displayed even if the programme selector is not in the tenth position (diagnostics) or if the appliance is in normal operating mode (e.g. during execution of the wash programme):

→ Press the **START/PAUSE** button and the nearest **option button** simultaneously (as if you were entering DIAGNOSTIC mode) for at least 2 seconds: the LEDs initially switch off, and then display the flashing sequence indicating the last alarm.
→ The alarm continues to be displayed for the amount of time required, and then the display returns to its normal operation.
→ The alarm reading system is as described in sect. No. 8.2.2 page 28.
→ While the alarm is being displayed, the appliance continues to perform the cycle or, if in the programme selection phase, it maintains the previously selected options in memory.

8.2.5 Deleting the last alarms

Before deleting the alarms, make a note of the last alarm on the “Service Order” form.

- Delete them after reading them, to check whether the alarms re-occur during the diagnostic cycle.
- Delete them after repairing the appliance, to check whether they re-occur during testing.

Z 3	Z 6
	

1. Select diagnostics mode, turn the programme selector to the **tenth** position (alarm reading).
2. Press the **START/PAUSE** button and the nearest **option button** simultaneously (as shown in the figure).
3. Hold down the buttons until the LEDs stop flashing and the display shows “E00” (at least 5 seconds).

N.B. With this operation all the alarms stored are deleted.

9 ALARM SUMMARY TABLE

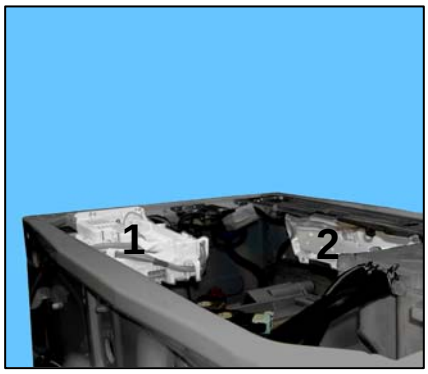
Alarm	Description	Possible fault	Machine status/action	Reset
E00	**No alarm**			
E11	**Water fill difficulty during washing**	Tap closed or water pressure too low; Drain pipe improperly positioned; Water fill solenoid valve faulty; Leaking from pressure switch water circuit; Pressure switch faulty; Wiring faulty; Main PCB faulty.	Cycle is paused with door locked	START/RESET
E13	**Water leaks**	Drain pipe improperly positioned; Water pressure too low; Water fill solenoid valve faulty; Pressure switch water circuit leaking/fouled; Pressure switch faulty.	Cycle is paused with door locked	START/RESET
E21	**Drain difficulty during washing**	Drain pipe kinked/fouled/improperly positioned; Drain filter clogged/fouled; Wiring faulty; Drain pump faulty; Pressure switch faulty; Main PCB faulty.	Cycle paused (after 2 attempts)	START/RESET
E23	**Faulty drain pump triac**	Wiring faulty; Drain pump faulty; Main PCB faulty.	Safety drain cycle - Cycle stops with door open.	RESET
E24	**Malfunction in drain pump triac sensing circuit (Incorrect microprocessor voltage input)**	Main circuit board faulty.	Safety drain cycle - Cycle stops with door unlocked	RESET
E31	**Malfunction in electronic pressure switch circuit (Pressure switch signal frequency out of limits)**	Wiring; Electronic pressure switch; Main PCB;	Cycle stops with door locked	RESET
E32	**Electronic pressure switch calibration error (The electronic pressure switch generates a signal with unstable frequency during the drain phase)**	Drain pipe kinked/clogged/improperly positioned; Solenoid valve faulty; Drain filter clogged/fouled; Drain pump faulty; pressure chamber; Pressure switch water circuit leaks; pressure switch; Wiring; main PCB;	Cycle paused	START/RESET
E35	**Overflow**	Water fill solenoid valve faulty; Pressure switch water circuit leaks; Wiring faulty; Pressure switch faulty; Main PCB faulty.	Cycle interrupted. Safety drain cycle. Drain pump continues to operate (5 min. on, then 5 min. off. etc.)	RESET
E38	**Internal pressure chamber is clogged (Water level does not change for at least 30 sec. of drum rotation)**	Motor belt broken; Pressure switch water circuit clogged.	Heating phase is skipped	ON/OFF RESET
E41	**Door open (After 20 sec.)**	Check whether the door is closed properly; Wiring faulty; Door safety device faulty; Main circuit board faulty.	Cycle paused	START/RESET
E42	**Problems with door lock Door still locked after 4' 25.**	Wiring faulty; Door safety device faulty; Electrical current leak between heating element and ground; Main PCB faulty.	Cycle paused	START/RESET
E43	**Faulty triac supplying power to door delay system**	Wiring faulty; Door safety device faulty; Main circuit board faulty.	(Safety drain cycle) Cycle blocked	RESET
E44	**Faulty sensing by door delay system**	Main circuit board faulty.	(Safety drain cycle) Cycle blocked	RESET

Alarm	Description	Possible fault	Machine status/action	Reset
E45	**Faulty "sensing" by triac on door delay system (wrong microprocessor input voltage)**	Main circuit board faulty.	(Safety drain cycle) Cycle blocked	RESET
E51	**Motor power triac short-circuited**	Current leakage from motor or from wiring; Main PCB faulty;	Cycle stops with door open (after 5 attempts)	ON/OFF
E52	**No signal from motor tachometric generator**	Wiring faulty; Motor faulty; Main circuit board faulty.	Cycle stops with door locked (after 5 attempts)	ON/OFF
E53	**Motor triac "sensing" circuit faulty (incorrect microprocessor input voltage)**	Main circuit board faulty.	Cycle blocked	RESET
E54	**Motor relay contacts sticking (voltage level high when the relay switches to OFF)**	Current leakage from motor or from wiring; Main PCB faulty;	Cycle blocked (after 5 attempts)	RESET
E62	**Overheating during washing (temperature higher than 88°C for more than 5 min.)**	Wiring faulty; Wash cycle NTC probe faulty; Heating element faulty; Main PCB faulty.	Safety drain cycle Cycle stops with door open	RESET
E66	**Heating element power relay faulty (inconsistency between sensing and relay status)**	Main PCB faulty;	Safety water fill Cycle stops with door closed.	ON/OFF RESET
E68	**Current leakage to ground (value of mains voltage different from main value)**	Current leakage between heating element and ground.	The heating phase is skipped	START/RESET
E69	**Heating element interrupted**	Wiring faulty; Wash heating element interrupted (thermal fuse open); Main PCB faulty.	----------	START ON/OFF RESET
E6A	**Heating relay sensing faulty**	Main circuit board faulty.	Cycle stops with door locked	RESET
E6H	**Heating element power relay faulty (inconsistency between sensing and relay status)**	Current leakage between heating element and ground. Main circuit board faulty.	Safety water fill Cycle stops with door closed.	ON/OFF RESET
E71	**Wash NTC probe faulty (short-circuited or open)**	Wiring faulty; Wash NTC probe faulty; Main circuit board faulty.	The heating phase is skipped	START/RESET
E74	**Wash NTC probe improperly positioned**	Wiring faulty; Wash NTC probe improperly positioned; NTC probe faulty; Main PCB faulty.	The heating phase is skipped	START/RESET
E83	**Selector reading error**	Main PCB faulty (Incorrect configuration data).	Cycle cancelled	START/RESET
E86	**Selector configuration error**	Display board	----------	START ON/OFF RESET
E91	**Communication error between main PCB and display**	Wiring faulty; Control/display PCB faulty Main circuit board faulty.	----------	RESET
E92	**Communication inconsistency between main PCB and display (versions not compatible)**	Incorrect control/display PCB; Incorrect PCB (does not correspond to the model).	Cycle blocked	ON/OFF
E93	**Appliance configuration error**	Main PCB faulty (incorrect configuration data);	Cycle blocked	ON/OFF

Alarm	Description	Possible fault	Machine status/action	Reset
E94	**Wash cycle configuration error**	Main PCB faulty (incorrect configuration data);	Cycle blocked	ON/OFF
E97	**Inconsistency between programme selector and cycle configuration**	Main PCB faulty (incorrect configuration data).	Cycle blocked	RESET
E9C	**Display board configuration error**	Display board	----------	START ON/OFF RESET
EC4	**AGS current sensor faulty.**	Main board faulty.	Spin speed reduced to safety speed of 150 rpm	RESET
EF1	**Drain filter fouled (drain phase too long)**	Drain filter clogged/fouled. Drain hose blocked/kinked/too high.	Warning displayed at the end of cycle.	START/RESET
EF2	**Overdosing of detergent (too much foam during drain phases)**	Excessive detergent dosing; Drain hose kinked/blocked; Drain filter clogged/fouled.	Warning displayed after 5 attempts or by the specific LED.	RESET
EF5	**Unbalanced load**	Final spin phase skipped.	----------	START/RESET
EF6	**Reset**	If it continues, replace the main board.	No action to be taken	----------
EH1	**Appliance power supply frequency out of limits**	Problems with the power supply network (incorrect/disturbed); Main PCB faulty.	Wait for nominal frequency conditions.	ON/OFF
EH2	**Supply voltage too high**	Problems with the power supply network (incorrect/disturbed); Main PCB faulty.	Wait for nominal voltage conditions.	ON/OFF
EH3	**Supply voltage too low**	Problems with the power supply network (incorrect/disturbed); Main PCB faulty.	Wait for nominal voltage conditions.	ON/OFF

10 TECHNICAL CHARACTERISTICS

10.1 Electronic control

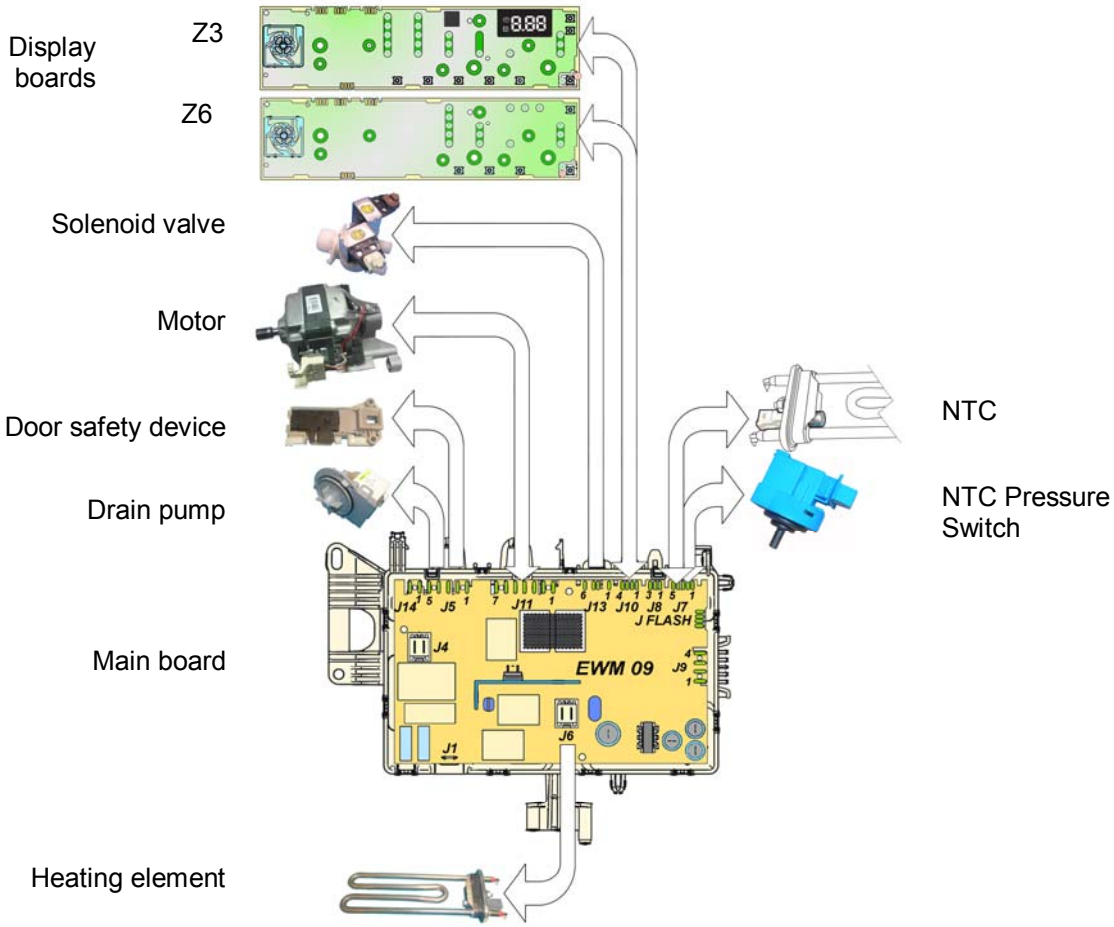


The electronic control consists of:

1. Main circuit board
2. Control/display circuit board

The control/display circuit board acquires the commands for cycle set-up. This board includes:
Buttons, LEDs, Display (where featured), programme selector and temperature control (where featured).
The commands acquired by the display board are sent to the main circuit board, which powers all the electrical components (solenoid valve, wash motor, drain pump, heating element and door safety device).

- It controls the temperature of the wash water via the NTC probe inserted in the heating element.
- It controls the motor rotation speed using the signal from the tachometric generator.
- It controls the level of water via the analogue pressure switch.



10.2 Washing unit

WASHING UNIT		
Type	Load capacity (cottons) Max.	Drum volume
P29	6 Kg	42 litres

The washing unit is suspended by two coil springs attached to two brackets secured to the cabinet.

Oscillations are dampened by two shock absorbers fixed to the lower crossbars.

Set-up

Balancing of the unit is achieved by means of a front counterweight consisting of cement bolted to the welded tub.

10.3 Welded tub assembly

The welded tub consists of:
- A rear casing assembly
- A front casing

Welded together.

The tub assembly incorporates: the drain circuit with the drain pump screw (a), the drain filter is inside the pump screw, not accessible to end users. The housing (b) holds the pressure chamber

For cleaning the filter, see sect. 13.6.4.1 page 67

The tub interior contains the drum assembly consisting of a STAINLESS steel casing to which the two flanges are seamed.

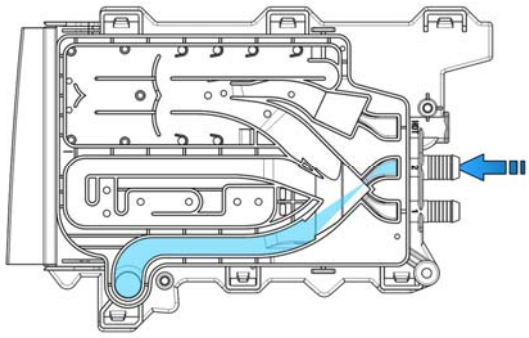
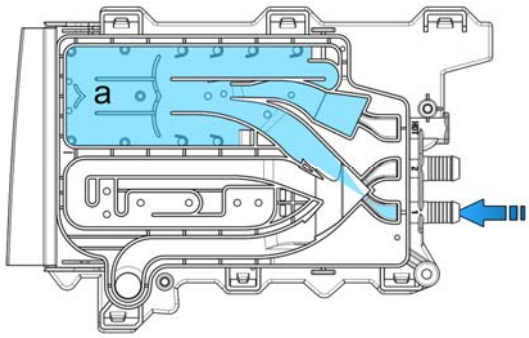
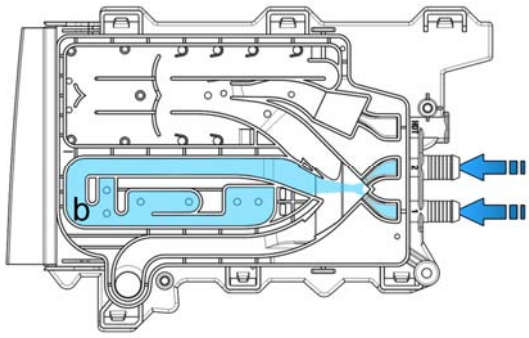
The drum interior has just a blade, pressure-fitted and locked to the drum by the fins:

(For further information see sect. 13.3.3 page 58)

10.4 Detergent drawer

New detergent drawer assembly, with a dispenser assembly incorporated at the front, which is inserted into the detergent inlet pocket of the porthole bellows seal.

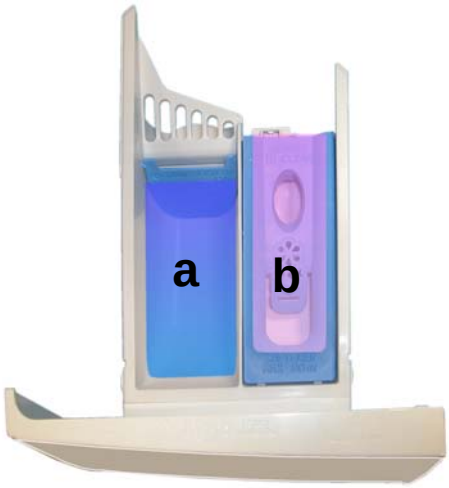
Operating principle of the conveyor.

Water fill directly to tub (pre-wash solenoid) • There is no pre-wash compartment. If necessary, the detergent must be introduced directly into the drum.	
Water fill to wash compartment (wash solenoid) • In all models: compartment “a” is used to hold the detergent loaded at the start of washing. • In the event of stains, mix stain removers with the washing detergent (for powder detergent).	
Water fill to conditioner compartment (pre-wash and wash solenoid valves) • In all models: compartment “b” is used to hold the conditioner, which is removed with the water from the last rinse.	

10.5 Detergent drawer

The detergent drawer is designed for use with: powder detergent or liquid detergent.

A flap has been fitted inside compartment **"a"** where the detergent is introduced, which can be flipped up or down.



To modify the position of the flap, pull the detergent drawer out (see page 51).

Flip it up to use powder detergent.

Position of the flap when the appliance leaves the factory (see figure).

Flip the flap down to use liquid detergent.

For further details, read the instruction manual.

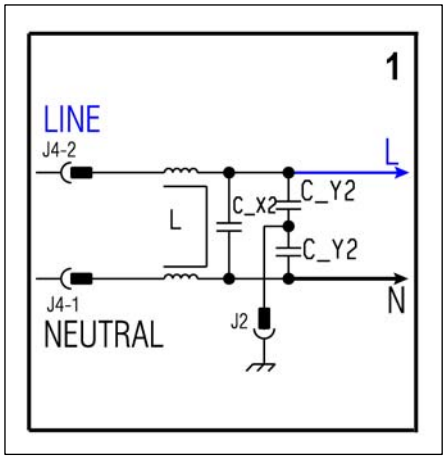
11 ELECTRICAL COMPONENTS

- **When replacing any of the components, please refer to the code shown in the list of spare parts relating to the appliance.**

11.1 Anti-noise filter

General characteristics
This is a device that is connected to the electricity power line input of the appliance and prevents the emission of radio frequency noise. It is incorporated into the main board.

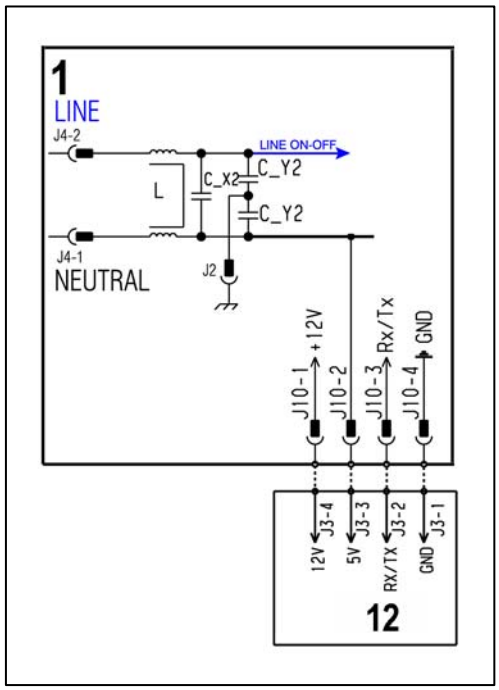
1. Main circuit board



11.2 Display board

The main circuit board (1) supplies the power supply voltage to the control and display board (13).
The selector dial is used to select programmes.
Selection of the options or start/pause is achieved using the buttons on the board (13).
The buzzer - where featured - is powered by the display board.

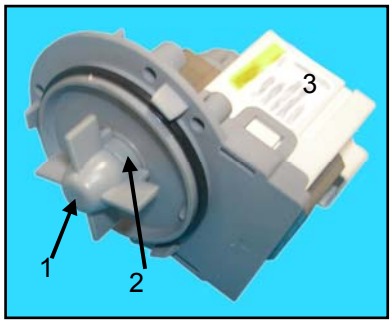
1. Main circuit board
12. Display board



11.3 Drain pump

	• **When replacing the pump, please refer to the code shown in the list of spare parts relating to the appliance.**

11.3.1 General characteristics

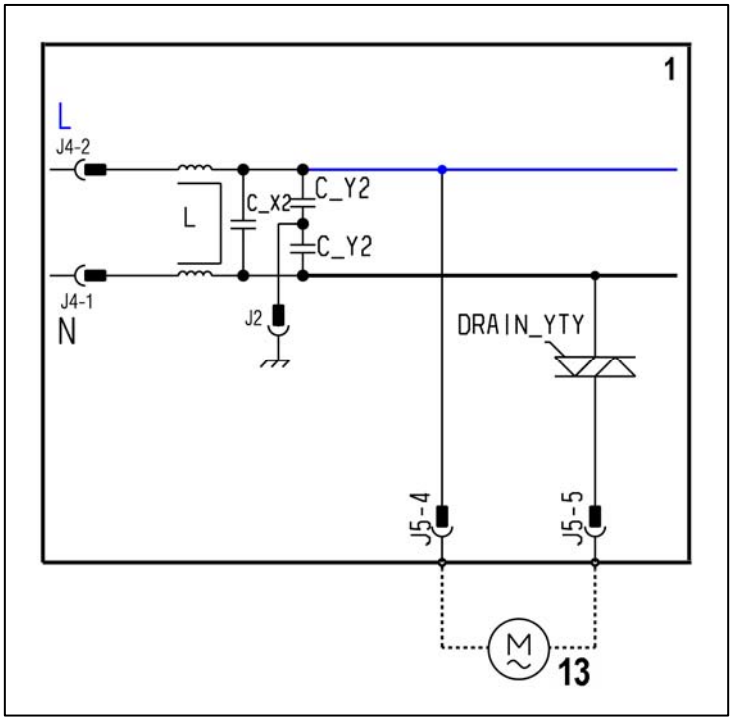


1. *Wheel*
2. *Rotor*
3. *Stator*

The pump, which drains the water at the end of the various wash cycle phases, is centrifugal and is actuated by a synchronous motor.
The rotor consists of a permanent magnet and the direction of rotation can be either clockwise or anticlockwise.
The rotor can turn by approximately a quarter of a revolution without turning the wheel. Consequently, if a foreign body is sticking the wheel, the rotor can perform small movements clockwise and anticlockwise until the foreign body is released.
The flow rate of these pumps is approximately 22÷25 l/min, and the maximum head is 90 cm.

Important!
In certain cases, synchronous pumps, when powered on empty (disconnected from the water circuit), may not start because their construction characteristics requires them to have an antagonist torque on the wheel to allow the rotor to move in one of the two directions.
Therefore pumps should only be tested once fitted to the appliance, after a little water has been filled.

The drain pump is powered from the main circuit board through a triac, as follows:
- For a maximum pre-determined period (and an alarm might be displayed);
- Until the electronic pressure switch closes on empty, after which the pump is actuated for a brief period or passes to the subsequent phase.

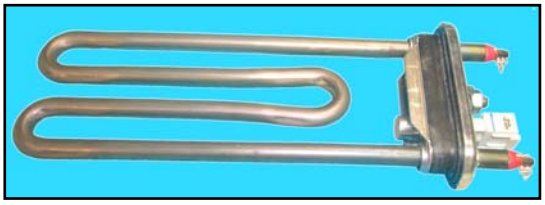


1. *PCB*
13. *Drain pump*

11.4 Heating element

	• **When replacing the heating element, please refer to the code shown in the list of spare parts relating to the appliance.** • **It is strictly forbidden to tamper with the heating element in any way!!! (e.g. replace the NTC probe, etc...)**

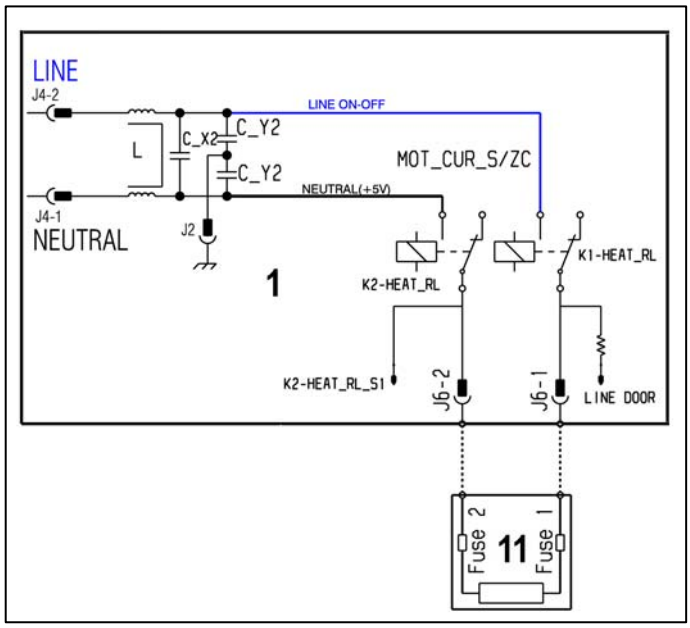
11.4.1 General characteristics



The wash water heating element is armoured, i.e. inserted inside a sealed tubular stainless steel casing.

It is powered by two relays (K1, K2) located on the circuit board. It is fitted with two thermal fuses which trip if the temperature of the heating element exceeds the values for which they were calibrated.

1. Main circuit board
11. Heating element

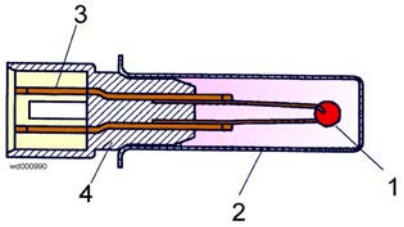


11.5 Temperature probe

	• **When replacing the heating element, please refer to the code shown in the list of spare parts relating to the appliance.** • **It is strictly forbidden to tamper with the heating element in any way!!!** **(e.g. replace the NTC probe, etc...)**

11.5.1 General characteristics

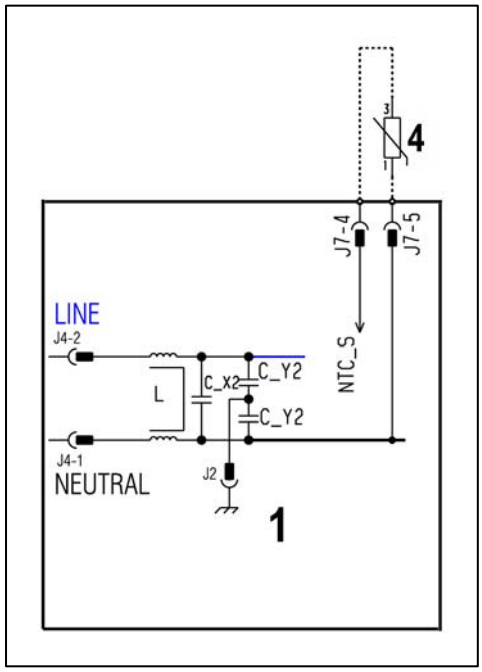
1. *NTC heating element*
2. *Metal capsule*
3. *Terminals*
4. *Plastic casing*



An NTC type probe is used to control the wash temperature: it is made in such a way that its internal resistance decreases as the temperature rises. This drop in resistance is detected by the electronic control which, when the desired temperature is reached, disconnects the heating element.

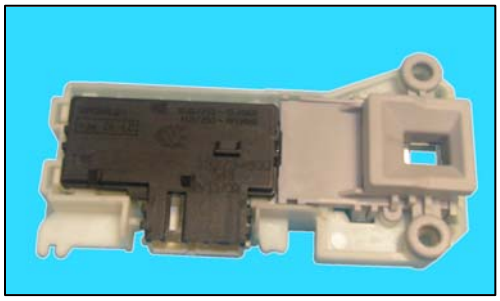
The temperature of the water is controlled by the circuit board by means of an NTC temperature probe incorporated in the heating element.

1. *Main circuit board*
4. *NTC probe*



11.6 Voltmetric door safety device with PTC

11.6.1 General characteristics



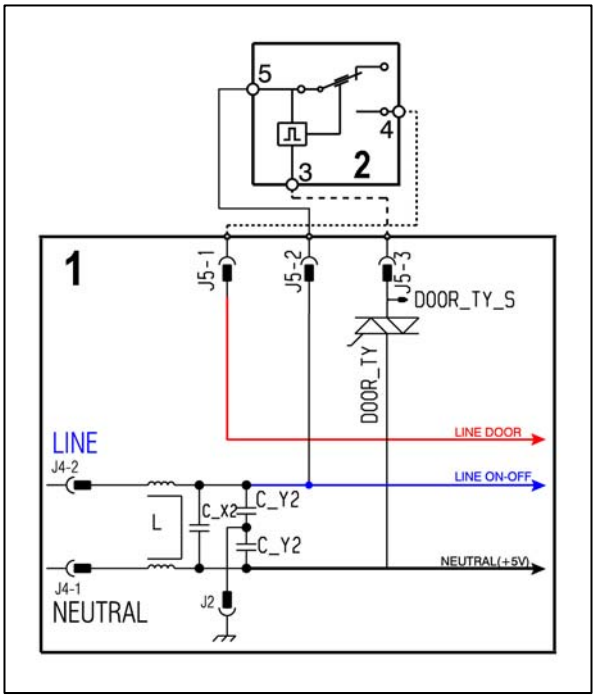
An electromechanical device is used as the door safety interlock, having the following functions:

- When powered, the voltmetric device closes the main switch which powers certain electrical components of the washing machine (only if the door is closed).
- During operation, the cursor remains mechanically blocked, preventing the door from opening when the appliance is running. Once the power supply is cut off, the door remains locked for 1-2 minutes to ensure that the drum has stopped before opening it.

In the applications analysed to this point, the door safety device was positioned after the anti-noise filter. Consequently, it powered all the electrical components of the appliance; in this platform, it only powered the solenoid valves and the motor.

- **Operating principle**

↳ Once the wash programme is started by pressing the start/pause button, the bi-metal PTC (contact 3) is powered by the triac on the circuit board (J5-3): after 2÷4 seconds, the switch (4÷5) powering the electrical components of the washing machine is closed.



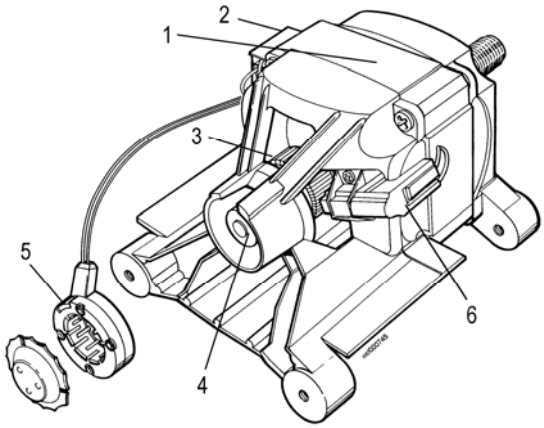
1. *Main circuit board*
2. *Door safety device - Traditional*

11.7 Motor

11.7.1 General characteristics

Collector motors are fitted on appliances with a spin speed of between 600 and 1400 rpm.

1. *Stator*
2. *Terminal board*
3. *Collector*
4. *Tachometric generator magnet*
5. *Tachometric generator coil*
6. *Brush*

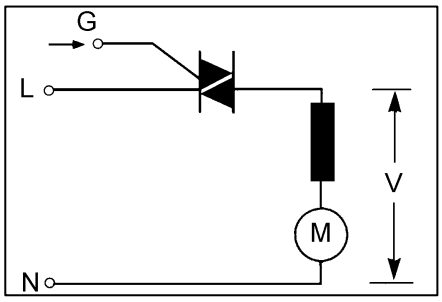


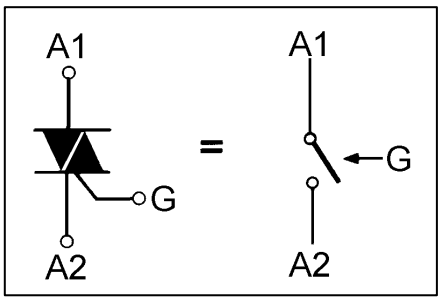
11.7.2 Operating principle

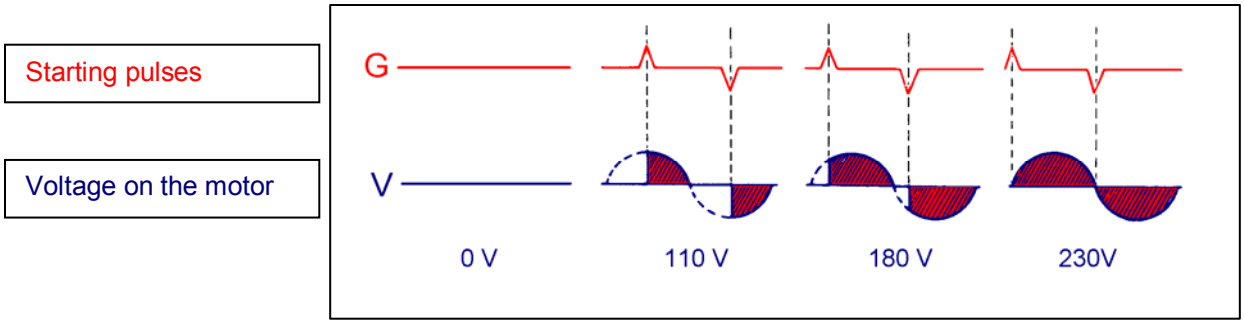
The stator winding is connected in series to the rotor winding (serial excitation).
Each section of the rotor winding is connected to a pair of collector blades (also referred to as a switching device).
The electrical contact between the collector and the fixed circuit is made by two static brushes on the collector blades.
The motor rotation speed is in proportion to the supply voltage, supplied by an electronic control.
This type of motor is also referred to as “universal” because it can be powered by either alternating or direct current.

11.7.2.1 Motor speed control

- This is achieved by an electronic control varying the voltage (V) applied to the motor.
- The method adopted is the “phase partialization” command of the TRIAC. The TRIAC is an electronic bidirectional switch. Closing of the circuit between A1-A2 (anodes) occurs when there are appropriate starting pulses on gate (G).



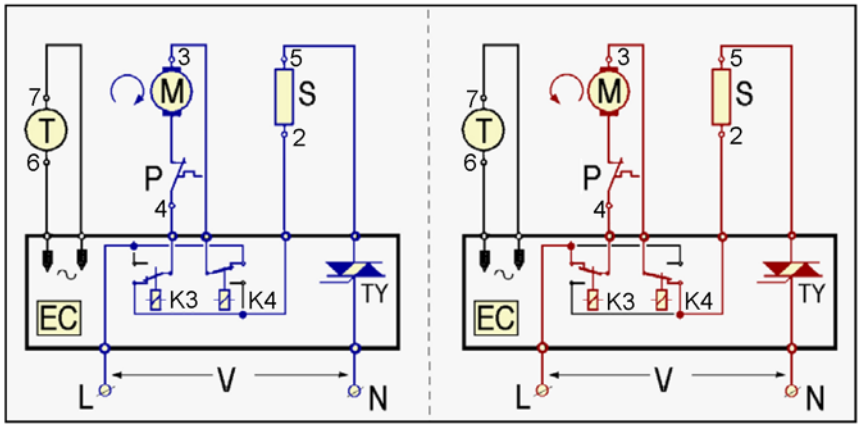




11.7.2.2 Direction of rotation of the motor

The direction of rotation of the motor depends on how the stator and rotor windings are connected to one another. This connection is made by the circuit board relay contacts.

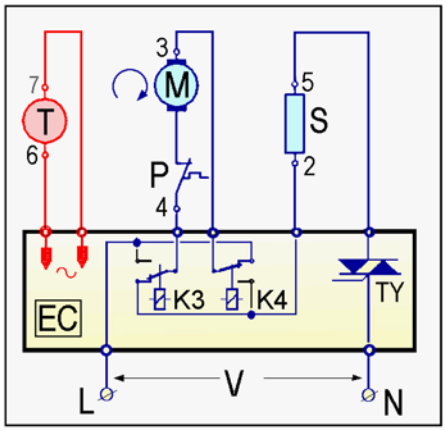
Clockwise rotation ***Anti-clockwise rotation***



EC *Electronic control*
P *Overheating cut-out (motor)*
S *Stator*
M *Rotor*
T *Tachometric generator*
TY *Triac*
K3,4 *Inversion relay*

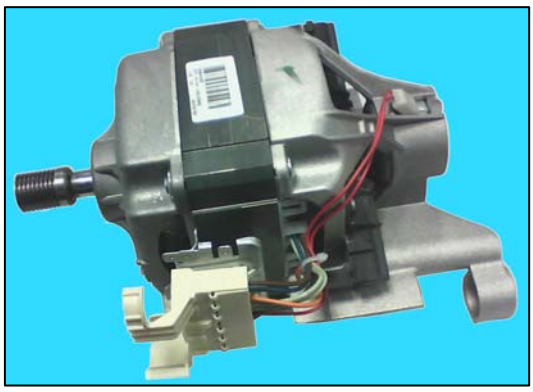
11.7.2.3 Tachometric generator

The speed of the collector motor, like all motors with serial excitation, depends on the load; so the speed decreases as the load increases. This makes it necessary for the power supply voltage to the motor, and therefore its speed, to be constantly controlled by an electronic speed control.
A tachometric generator, consisting of a magnet secured to the shaft and a coil, generates a voltage depending on the speed of the rotor, which is sent to the electronic control.
All the electronic controls have a protection system, which is more or less sophisticated, to avoid the operation of the motor in the event of a failure in the tachometric generator.

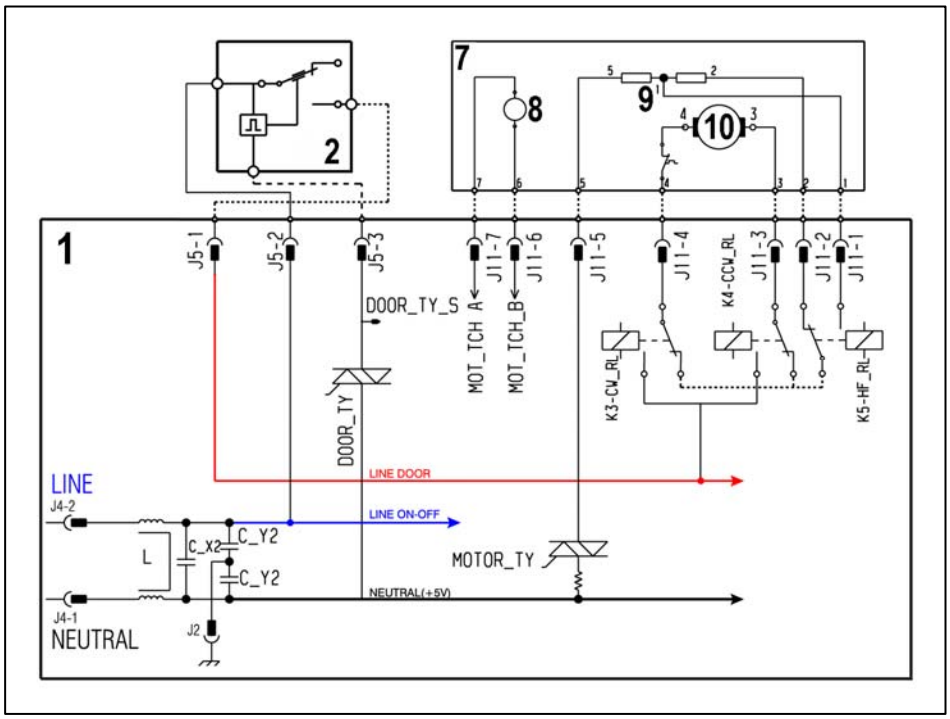


EC *Electronic control*
P *Overheating cut-out (motor)*
S *Stator*
M *Rotor*
T *Tachometric generator*
TY *Triac*
K3,4 *Inversion relay*

11.7.3 Motor power supply



The PCB powers the motor via a triac; changes in the direction of rotation are achieved by switching the contacts on the two relays (K3-K4), which change the connection between the rotor and the stator.
In certain models, a third relay (K5) is used to power the stator (full or half field) according to the spin speed.
The motor speed is controlled by the signal from the tachometric generator.
During the spin phases, the micro-processor performs the anti-foam and the anti-balancing check procedure.



1. *Main circuit board*
2. *Door safety device*
7. *Universal motor*
8. *Tachometric generator*
9. *Stator*
10. *Rotor*

11.7.4 Anti-foam control system

The anti-foam control procedure is performed using the electronic pressure switch.

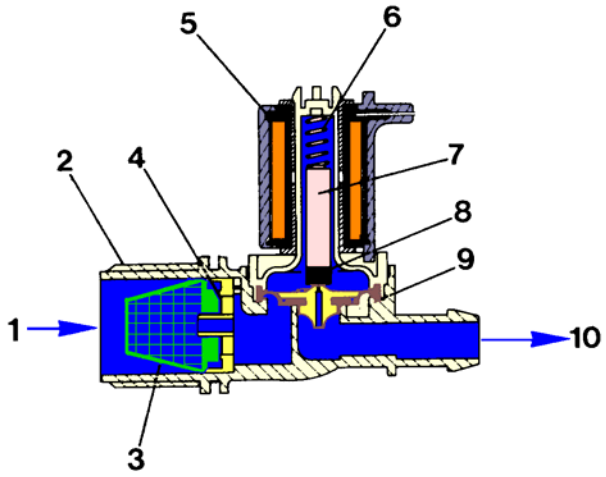
- **Spin with little foam:** if the pressure switch senses a “full” level, the spin phase is interrupted, the drain pump continues to operate and, when the pressure switch senses “empty”, the spin phase is resumed.
- **Spin with excess foam in the tub (critical situation):** this is recognised if the pressure switch senses full level on 5 occasions (five spin interruptions). If this occurs, the spin phase is skipped, and a one-minute drain cycle is performed with the motor stationary and, in the case of a washing phase, a supplementary rinse is added.

11.8 Solenoid valves

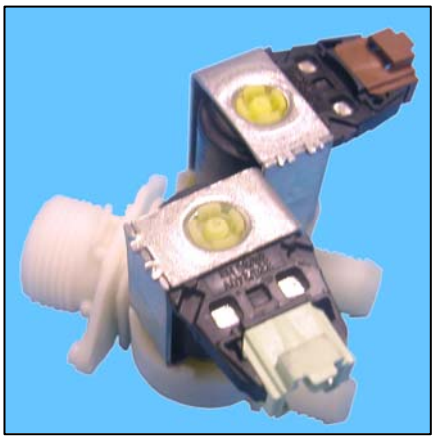
11.8.1 General characteristics

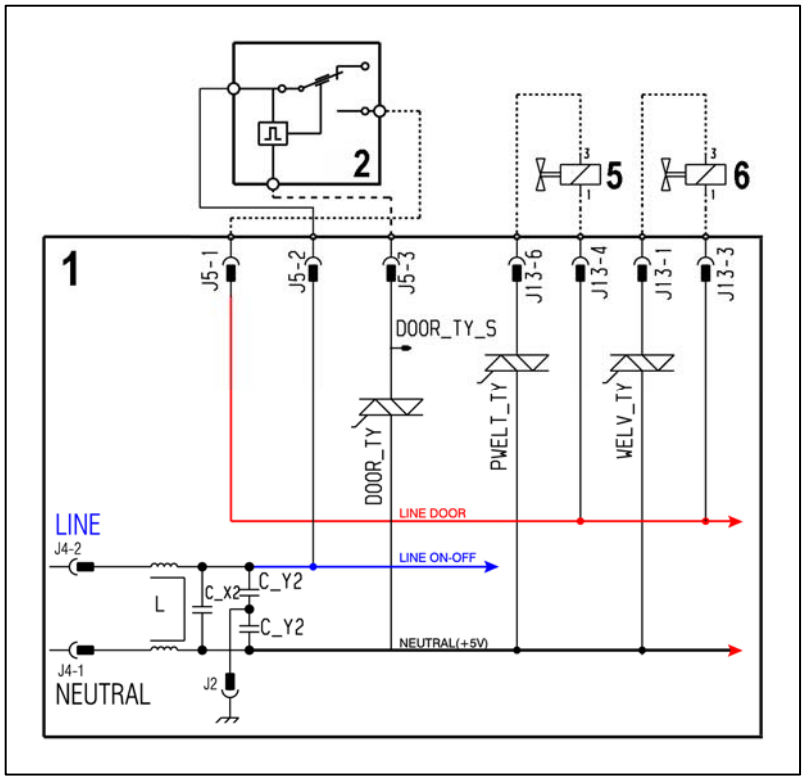
This component introduces water into the detergent drawer and is controlled electrically by the main circuit board via Triac. The level of water in the tub is controlled by the analogue pressure switch.

1. *Water inlet*
2. *Solenoid valve body*
3. *Filter*
4. *Flow reducer*
5. *Coil*
6. *Spring*
7. *Moving core*
8. *Rubber bush*
9. *Membrane*
10. *Water outlet*



When idle, the core, pushed by a spring, keeps the central hole of the membrane closed and so the latter hermetically seals access to the water inlet duct.
When the coil is powered, the core is attracted, releasing the central hole of the membrane and hence the valve opens.





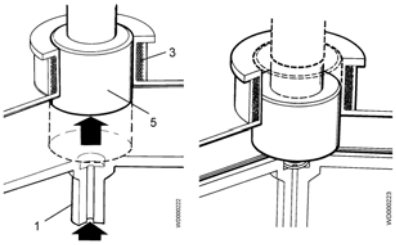
1. *Main circuit board*
2. *Door safety device*
5. *Pre-wash solenoid*
6. *Wash solenoid*

11.9 Tub water level control analogue pressure switch

11.9.1 General characteristics

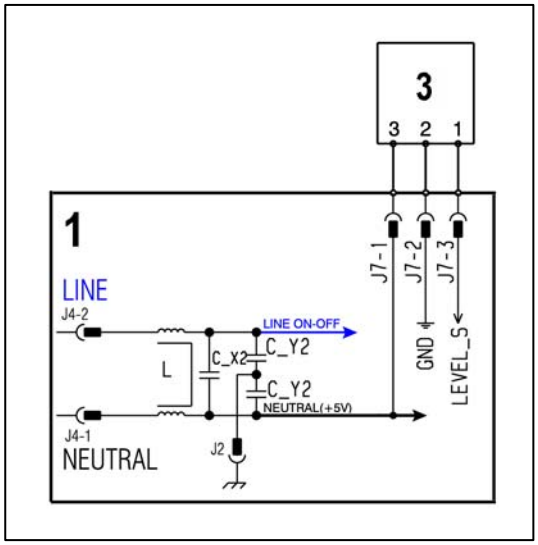
The electronic pressure switch is an analogue device that controls the water level in the tub, used in models with the electronic control system, and is connected directly to the main PCB.

1 Pipe
3 Oscillating coil
5 Core

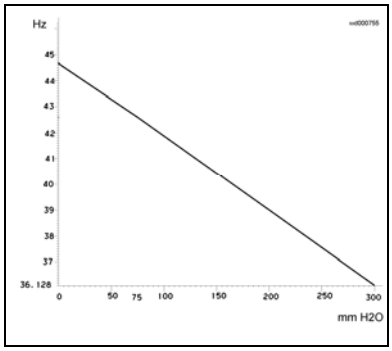


The pressure switch is connected by a pipe to the pressure chamber.
When water is introduced into the tub, this creates pressure inside the hydraulic circuit, causing the membrane to change position. This movement changes the position of the core inside the coil, thus altering the inductance and consequently the frequency of the oscillating circuit.
Based on the frequency, the PCB recognises how much water has been introduced into the tub.

1. *Main circuit board*
3. *Analogue pressure switch*

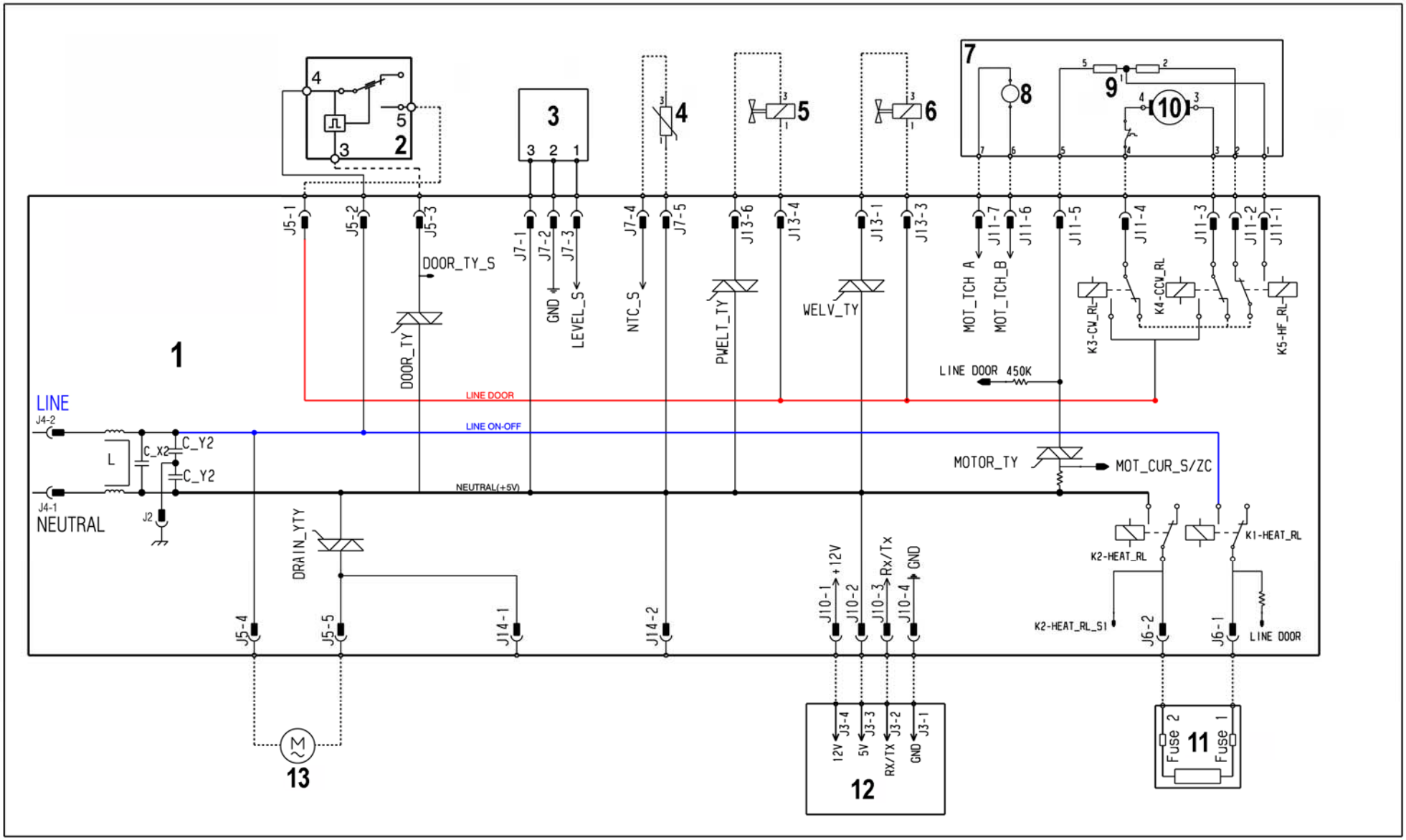


Change in operating frequency as a function of the quantity of water in the tub



12 MAIN ELECTRICAL CIRCUIT DIAGRAM

12.1 Diagram



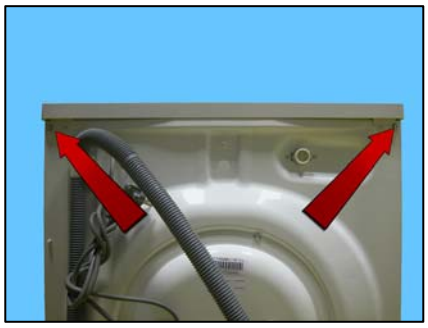
12.2 Diagram legend

Appliance electrical components	PCB components	
1. Main circuit board	DRAIN_YTY	Drain pump Triac
2. Door safety device	DOOR_TY	Door safety device Triac
3. Electronic pressure switch	PWELT_TY	Pre-wash solenoid Triac
4. NTC	WELV_TY	Wash solenoid Triac
5. Pre-wash solenoid	MOTOR_TY	Motor Triac
6. Wash solenoid	K1	Heating element relay
7. Universal motor	K2	Heating element relay
8. Tachometric (motor)	K3	Motor relay: clockwise rotation
9. Stator (motor)	K4	Motor relay: anti-clockwise rotation
10. Rotor (motor)	K5	Motor relay: half-field power supply
11. Heating element		
12. Display board		
13. Drain pump		

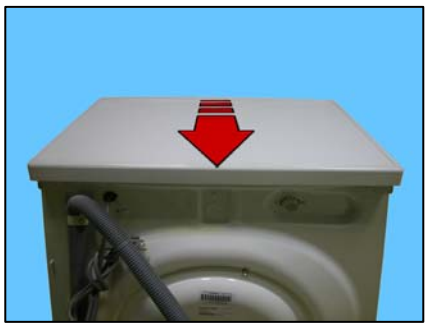
13 ACCESSIBILITY

13.1 Worktop

Remove the two screws securing it to the back panel.

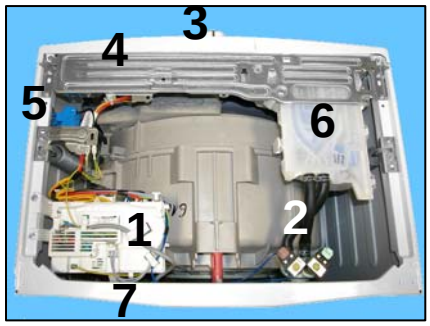


Push it towards the rear.



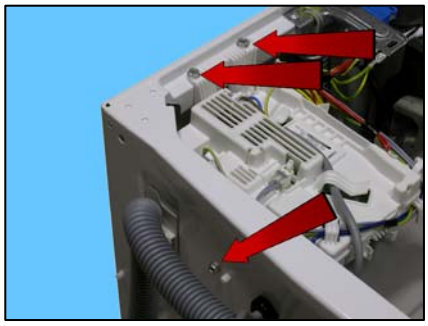
13.2 From the worktop, it is possible to access:

1. The main circuit board
2. The solenoid
3. The control panel
4. The display board/light diffuser/buttons/button spring assembly
5. The analogue pressure switch
6. The detergent drawer
7. The power cable clamp

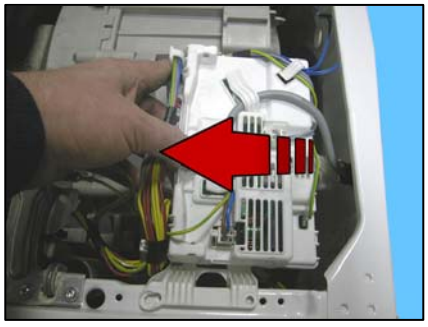


13.2.1 Main circuit board

Remove the worktop (see relevant section).
Remove the screws fixing it to the side of the cabinet and those fixing it to the rear.

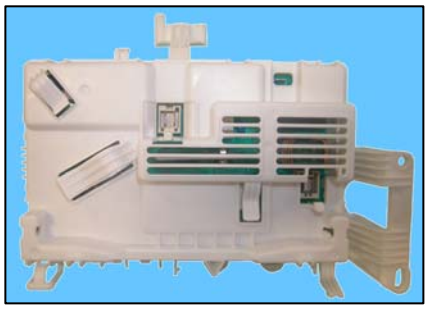


Move the board assembly to the left, so as to extract the catch from the back



Remove the cabling from the hooks and disconnect the connectors.

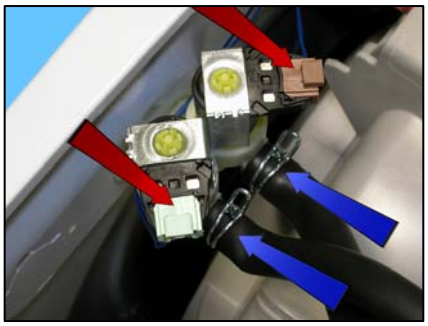
Remove the main board.



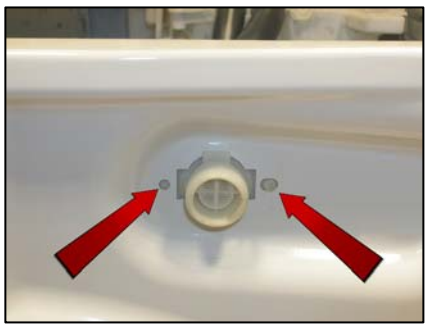
13.2.2 Solenoid valve

Remove the worktop (see relevant section).

Disconnect the connectors (red arrows)
Remove the pipes connecting the solenoid valve to the detergent drawer (blue arrows).



Unscrew the water fill pipe from the solenoid valve.
Push the two retainers indicated by the arrows towards the inside of the appliance.
At the same time, turn the solenoid valve to remove it.

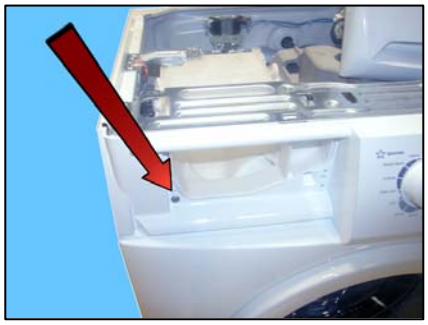


13.2.3 Control panel

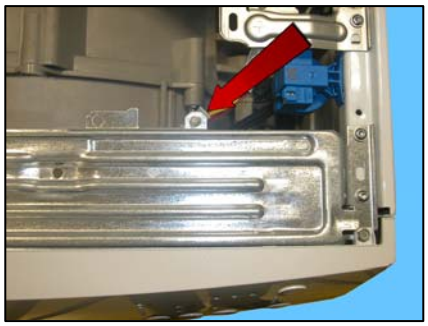
Remove the worktop (see relevant section).

Pull the detergent drawer out and at the same time press the right-hand side indicated by the arrow.

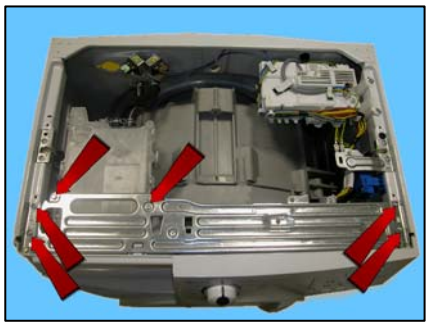
Remove the screw securing the control panel to the conveyor.



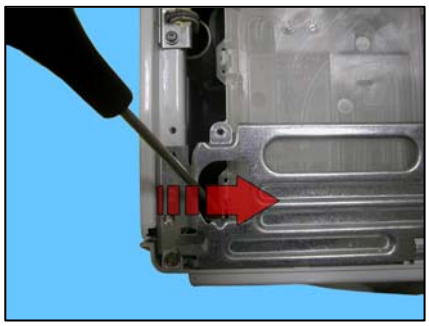
If necessary pull the clamp out



Remove the four screws securing the crossbar to the sides of the cabinet.
Remove the two screws securing the detergent drawer to the crossbar.



Release the anchor tab securing the detergent drawer to the crosspiece.

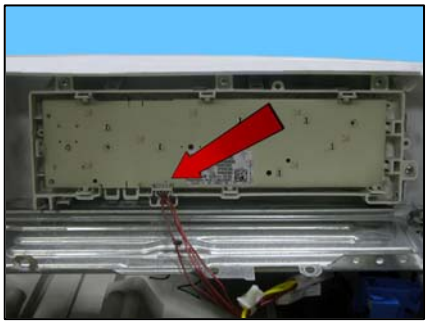


Raise both sides of the control panel so as to pull out the hooks securing it to the front panel.

Remove the control panel and position it as shown in the figure, making sure to introduce protection to prevent scratching.

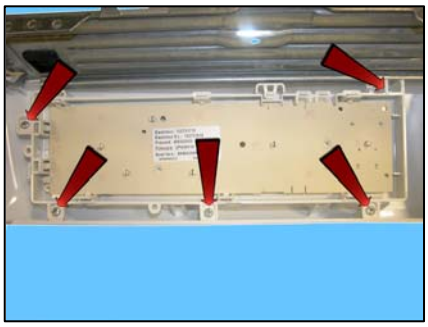
13.2.4 Display board/light diffuser/buttons/button spring assembly

Remove the worktop (see relevant section).
Remove the control panel (see relevant section).

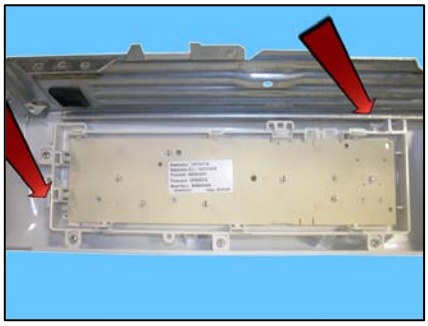


Rotate the control panel on itself
Remove the connector connecting the display board.

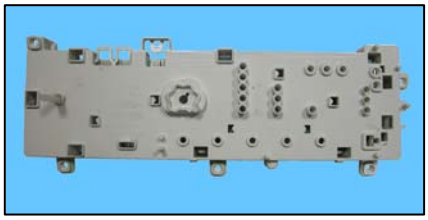
Remove the screws securing the display board assembly to the control panel.



Release the tabs fixing the display board assembly to the control panel.



Remove the display board assembly.



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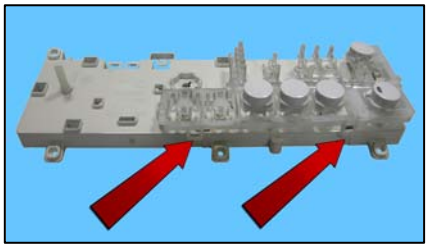
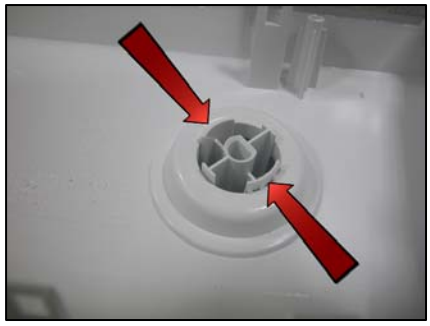
To access the button spring unit, release it from the board assembly.



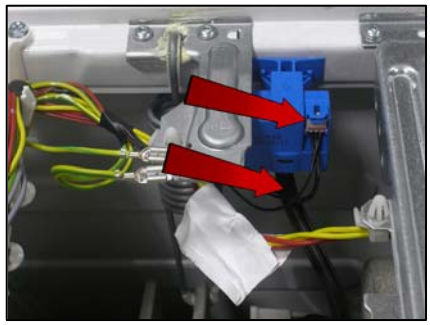
When refitting the display board assembly to the control panel, it is advisable to remove the dial from the control panel to make it easier to insert the dial selector pin.



Dial

To remove the dial:
Push in the two tabs fixing it to the control panel and remove it.

13.2.5 Analogue pressure switch



Remove the worktop (see relevant section).

Remove the connector.
Pull off the pipe connecting it to the pressure chamber

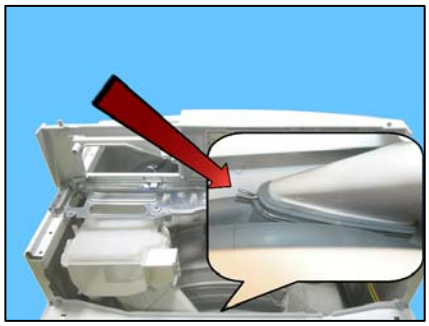
Push in the two tabs fixing it to the cabinet and remove it.

13.2.6 Detergent drawer

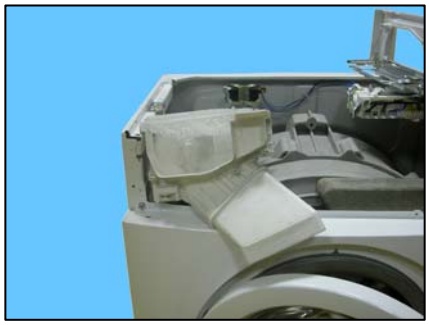
Remove the worktop (see relevant section).
Remove the control panel (see relevant section).

Pull off the pipes

Pull out the detergent dispenser from the bellows seal detergent inlet pocket.
(open the clamp if necessary, otherwise leave it closed)



Remove the detergent drawer.



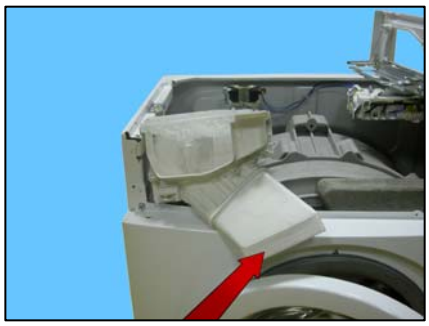
For reassembly.

After completing all the steps in the reverse order.

During insertion of the detergent dispenser into the pocket of the bellows seal:

Reposition the clamp in its seating in the pocket of the porthole bellows seal (close it if it is open).
Lubricate the inside of the pocket.

Also lubricate the outside of the detergent dispenser assembly, which should be inserted into the pocket.



First task to perform:
Gently insert the part of the detergent dispenser indicated by the arrow into the pocket of the bellows seal.

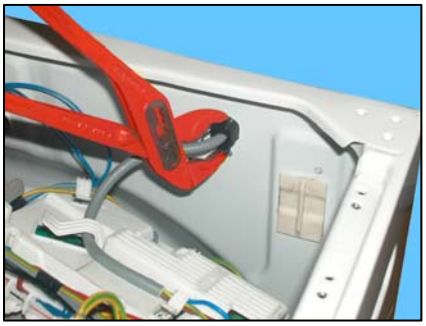
Second task:
With one hand inside the porthole, hold the bellows seal pocket form and gently insert the rest of the detergent dispenser.

Check the task has been performed correctly so as to avoid water leaks.

13.2.7 Power supply cable clamp

Remove the worktop (see relevant section).
Remove the main circuit board (see relevant section).

Squeeze it using a pair of pliers while at the same time pulling it out into the cabinet



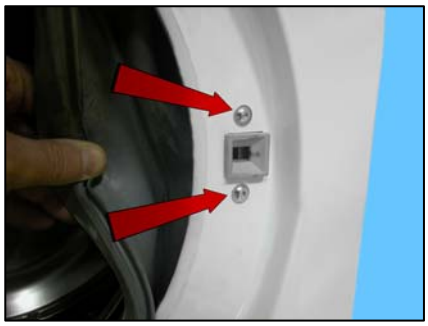
13.3 Accessing the front part

1. Door safety device
2. Door
3. Fixed blade
4. Bellows seal
5. Front panel

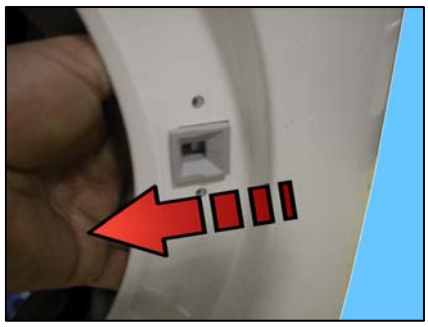
13.3.1 Door safety device (with incorporated flange)

Remove the plastic ring fixing the bellows seal to the cabinet.
Release the bellows seal from the cabinet and turn it inside out towards the inside of the drum.

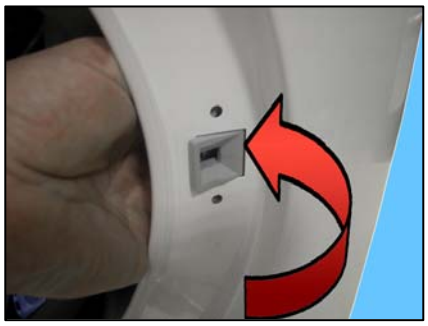
Unfasten the two screws fixing the door safety device to the front panel.



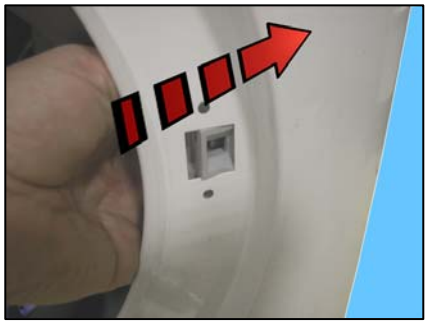
Take the device and move it to the left.



Turn it towards the inside (right-hand side of the flange).



Pull it out to the right and remove it.



Pull out the wiring protection from the door safety device.
Disconnect the connector.

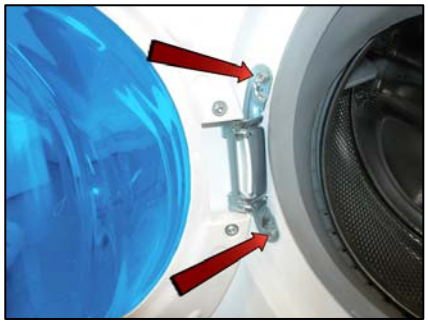
To reassemble the door safety device, repeat the same operations in reverse.

Before tightening the screws to secure the door safety device to the front panel, make sure the flange is positioned properly on the outside as indicated by the arrows.

Tighten the screws with a torque of 2.5 Nm.

13.3.2 Door

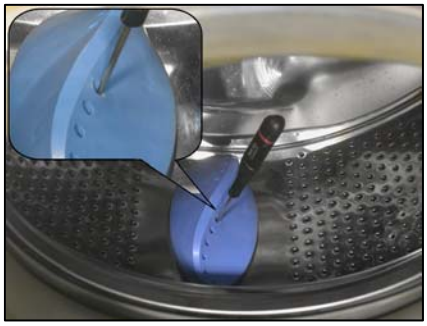
To replace the hinge, remove the screws fixing it to the cabinet.



Unfasten the screws joining the two front and rear door frames shown in the figure.

13.3.3 Fixed Blade

This blade is secured to the drum with slides and secured with blades carved into the drum.



To remove it from the drum:

Insert a screwdriver into the last hole, as shown in the figure.

Insert the screwdriver, with the handle tilted towards the left
Push the right-hand tab downwards.

Insert the screwdriver, with the handle tilted towards the right
Push the left-hand tab downwards.

When both tabs have been pushed down
Move the blade towards the front of the drum.

Before fixing the new blade
Insert a flathead screwdriver beneath the tabs and raise them a little.

Position the new blade inside the drum guides.
Push it towards the rear.

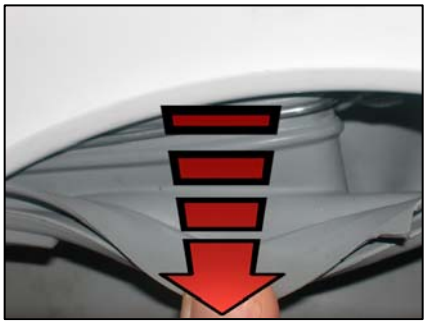
Insert the flathead screwdriver at a right angle to the blade, so as to position it at the centre of the two tabs.
Move to the left and right.

So that the tabs are moved upwards (as indicated by the arrows in the figure) and they are insert inside the blade, securing it to the drum (as shown in the figure).

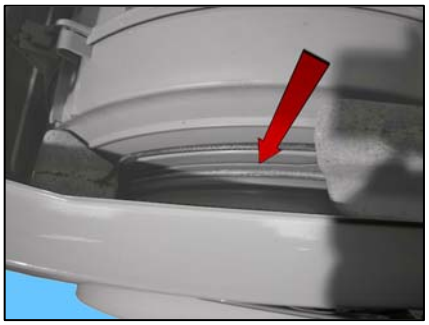
13.3.4 Door bellows seal

Remove the worktop (see relevant section).
Remove the control panel (see relevant section).

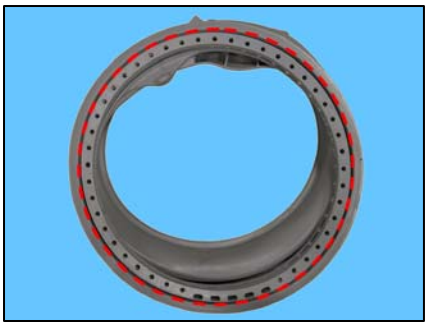
Remove the plastic ring to release the door bellows seal from the front panel.



Once the door bellows seal has been removed from its seat in the cabinet.
Remove the pocket from the detergent dispenser assembly.



Remove the snap ring fixing the seal to the tub.



Pull the door bellows seal out to remove it.

When reassembling the door bellows seal, lubricate it with soap.

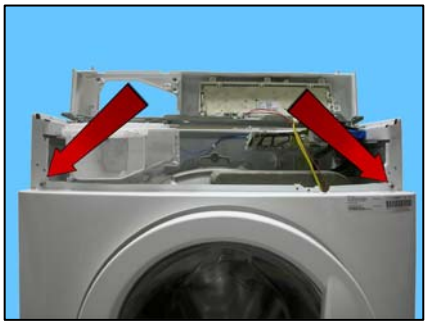
Align the seal and tub reference marks.

Reassemble the snap ring between the door bellows seal and the tub.
Thread the clamp onto the detergent inlet pocket (of the door bellows seal, see sect. 13.2.6 page 55).
Using soap, lubricate: the pocket and the detergent dispenser assembly and introduce it into the pocket (see sect. 13.2.6 page 55).
Reassemble the plastic ring between the door bellows seal and the cabinet.

13.3.5 Front panel

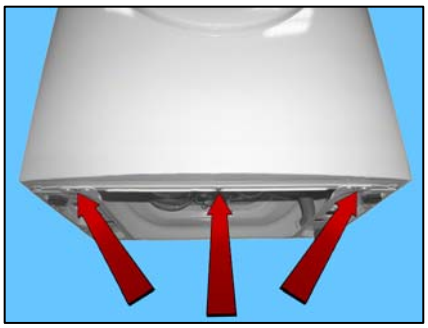
Remove the worktop (see relevant section).
Remove the control panel (see relevant section).
Remove the plastic ring and remove the door bellows seal from the front panel.
Unfasten the screws fixing the door safety device.

Unfasten the two screws fixing the front panel to the sides (indicated by the arrows).



Tilt the washing machine

Unfasten the three screws fixing the front panel to the base (indicated by the arrows).



Remove the front panel

When refitting the front panel, first tighten the two upper screws, then the three lower screws.

13.4 From the front panel, it is possible to access

1. Front counterweight
2. Pressure chamber
3. Welded tub assembly
4. Shock absorbers
5. Shock absorber pin
6. Tub suspension springs

13.4.1 Front counterweight

Remove the worktop (see relevant section).
Remove the control panel (see relevant section).
Remove the front panel (see relevant section).

Unfasten the five screws fixing it to the welded casing assembly.

When replacing the screws, take care to:
Tighten the screws with a torque of 15 Nm, if the welded tub assembly is new.
Align it with the existing thread and tighten the screws with a torque of 10÷12 Nm, if the welded tub assembly is not new.

13.4.2 Pressure chamber

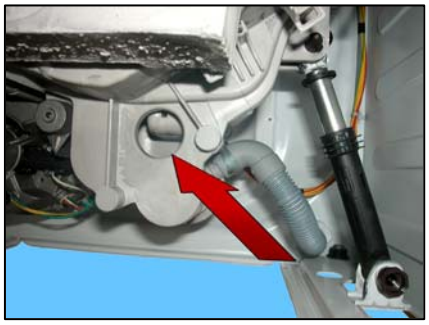
Remove the worktop (see relevant section).
Remove the control panel (see relevant section).
Remove the front panel (see relevant section).

Remove the pipe connecting to the analogue pressure switch.

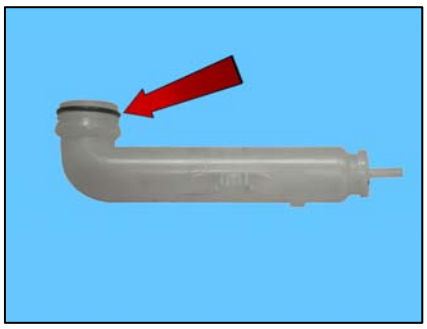
Remove it from the hook fixing it to the wash unit

Turn it and pull it out

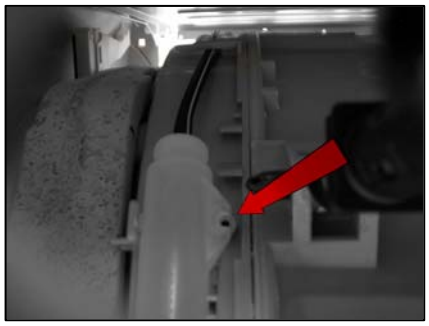
The hole into which the pressure chamber is inserted.
(This hole allows cleaning a section of the drain circuit)



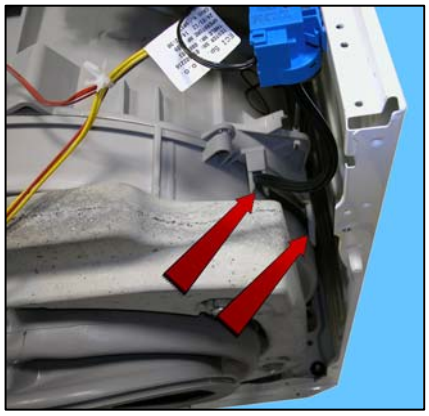
Replace the gasket each time the pressure chamber is worked on



If the hook fixing the chamber to the pressure tub breaks, it is possible to use a screw, Code 405 50 33-52/8 (AF/2P 5x16 TE/SP with a maximum length of 16 mm and no point to avoid puncturing the tub) and screw it into the eyelet indicated by the arrow (this is performed from the base of the appliance).
The tightening torque for the screws must be 1.5 Nm



Arrange the pressure switch pressure chamber pipe in the holders built into the welded tub

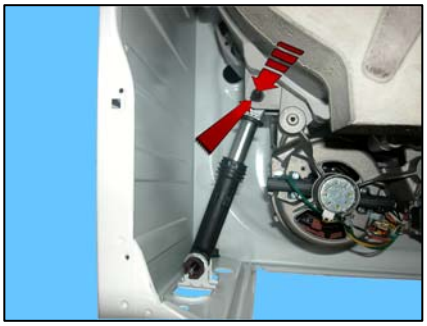


13.4.3 Welded tub assembly

Remove the worktop (see relevant section).
Remove the control panel (see relevant section).
Remove the detergent drawer.
Remove the front panel (see relevant section).
To remove the washing unit assembly, disconnect:
all the wiring connectors connecting the heating element, the NTC probe, the motor and the drain pump.
The analogue pressure switch pipe, the drain pipe.

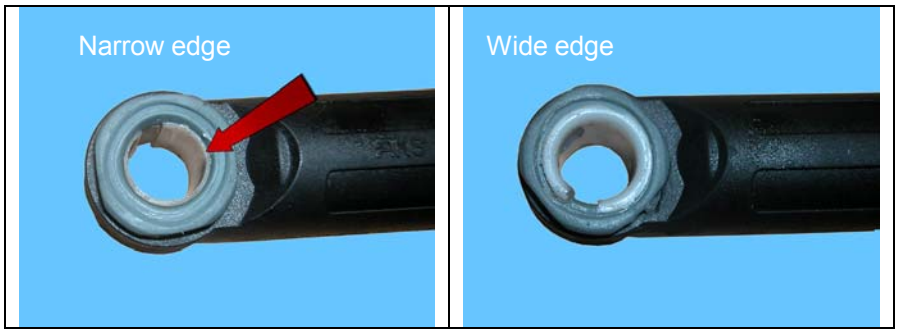
13.4.4 Shock absorbers

To remove the pins from their seats, press the locking tooth and at the same time remove it using pliers. Repeat the same operations for the other pins.
Remove the shock absorber from its seat.

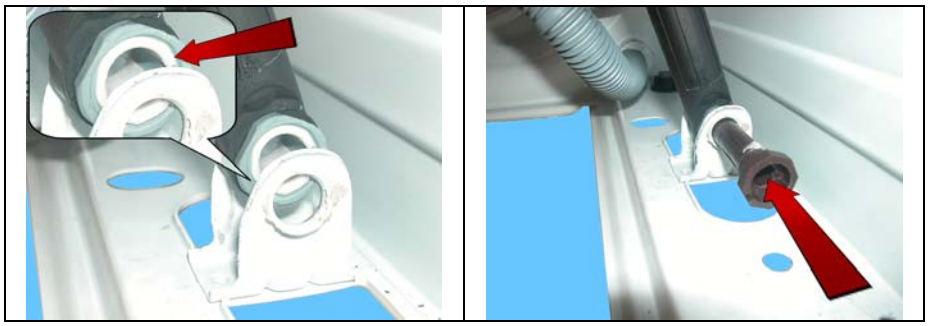


13.4.5 Shock absorber pin

Each end of the shock absorber has a bushing, which has a wider edge to avoid it becoming dislodged when the pin is inserted (see the two figures below).



When positioning the shock absorber inside the fastening (located in the base of the cabinet or in the tub), take care when positioning the bushing, so as to insert the pin from the part of the bushing with the widest edge.
Spare bushings are supplied, with Code 344 91 25-30/5



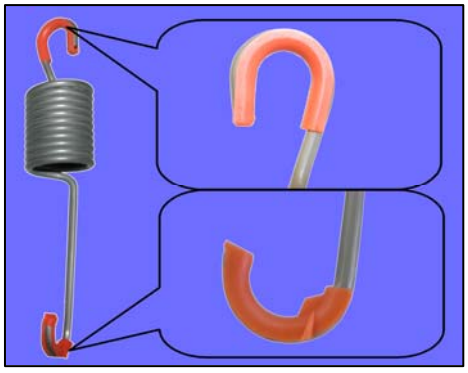
Insert the pin fixing the shock absorber to the crossbar, in the direction shown in the figure, since the hole in the support has a recess for insertion of the pin.

If inserting the pin proves difficult, grease it a little (Code 5026 24 16-00/6).

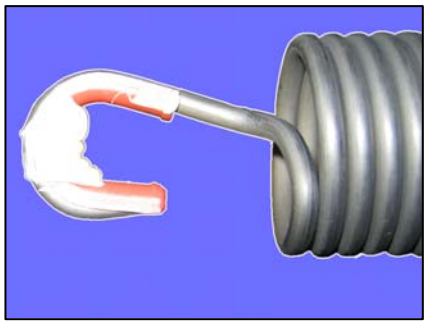
13.4.6 Tub suspension springs

When reattaching the springs (after repair work requiring their removal), make sure that the bushings shown in the figure are present on both ends.
Pay attention to the differences between the bushings (see enlarged details).
Spare bushings are available, the codes are those given below:

Upper bushing Code 405506251/9
Lower bushing Code 405506252/7



Lightly grease both ends of the spring, using grease, Code 5026 24 16-00/6



Arrange the spring as shown in the figure, with the short end attached to the bracket fixed to the cabinet and the long end to the tub (assembly of the spring in the opposite direction is strictly forbidden).

13.5 Back panel

Remove the screws fixing it to the rear section of the appliance, except for the one located in the lower section, which should only be loosened, so as to make closing simpler.

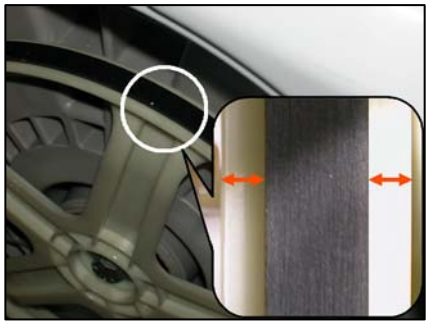
13.6 From the back panel, it is possible to access

1. Belt
2. Pulley
3. Motor
4. Drain pump
5. Heating element
6. Drain pipe

13.6.1 Belt

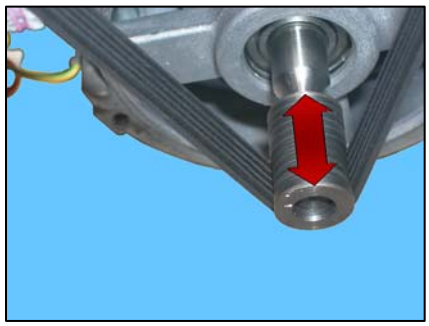
Remove the back panel (see relevant chapter).
Hold the belt, and by turning the pulley, remove it.

When reassembling:
Position the belt, and align it with the centre of the pulley (∅ 273mm) as shown in the figure.



Turning the pulley, check that the belt positions itself and remains in the centre of the pulley.

If necessary, adjust the position of the belt on the drive pulley, so that it is correctly positioned.



13.6.2 Plastic pulley

Remove the back panel (see relevant chapter).
Remove the belt (see relevant chapter).
Insert a retainer to secure the pulley in place.
Remove the screw fixing the pulley to the drum shaft.

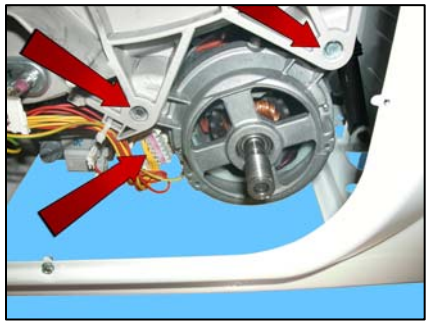
Tighten the screw with a torque of 60 Nm.

13.6.3 Motor

Remove the back panel (see relevant chapter).

Disconnect the wiring connector.
Unfasten the screws fixing it to the welded tub assembly.

Tighten the screws with a torque of 5 Nm.

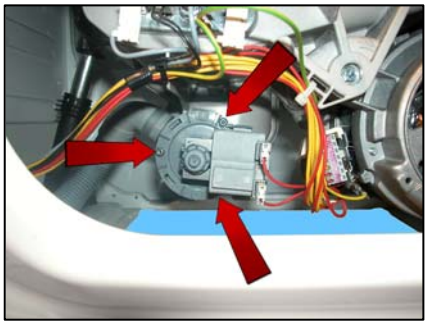


13.6.4 Drain pump

Remove the back panel (see relevant chapter).

Place a basin under the pump

Disconnect the wiring connectors.
Unfasten the three screws fixing it to the screw.



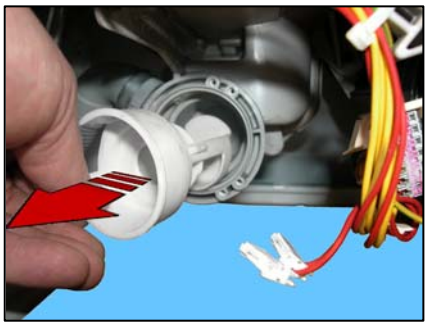
The screw is fitted with six slots for securing the pump in place. If one or more of the three slots are damaged, the other three can be used.

Tighten the screws with a torque of 1.5 Nm

13.6.4.1 Cleaning the filter

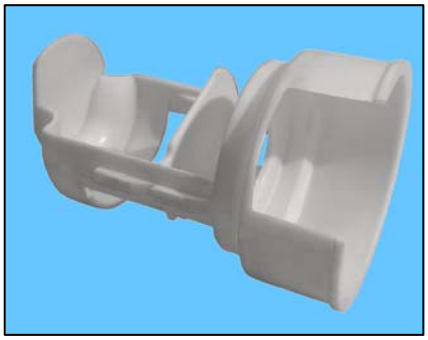
Remove the back panel (see relevant chapter).
Place a basin under the pump
Remove the drain pump (see relevant chapter).

Remove the filter



Clean the screw
(use a brush if necessary, and in the case of dirt that is difficult to get to, try from the pressure chamber).

Cleaning the filter



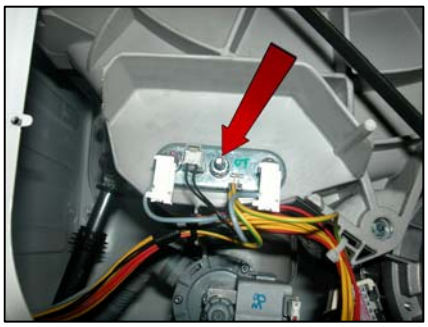
The sides of the filter have guides, aiding its insertion and preventing it from being inserted incorrectly.

Reposition the filter inside its seating.
Ensure the filter is fully inserted.

If the filter has not been inserted or if it has been positioned incorrectly, the appliance will report E21

13.6.5 Heating element

Remove the back panel (see relevant chapter).



Disconnect the wiring connectors (heating element and probe).
Remove the heating element flange fastening screw.

Tighten the nut with a torque of 4 Nm.

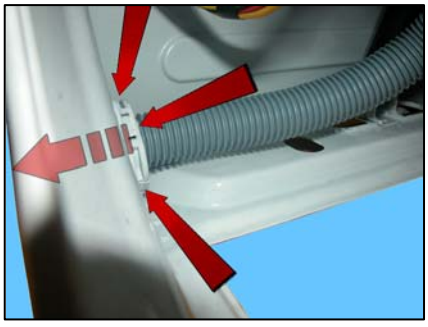
13.6.6 Drain pipe

Remove the back panel (see relevant chapter).

Using a pair of pliers, expand/break the clamp and remove the pipe from the screw.

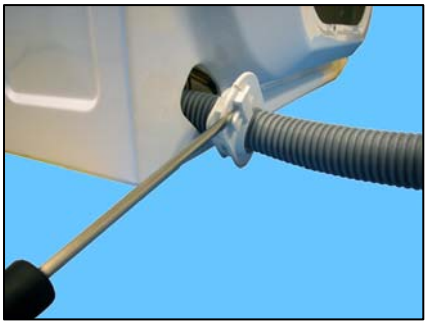
When reassembling, use a new clamp with the same characteristics.

The size of the clamp to be used is 29.5 mm.

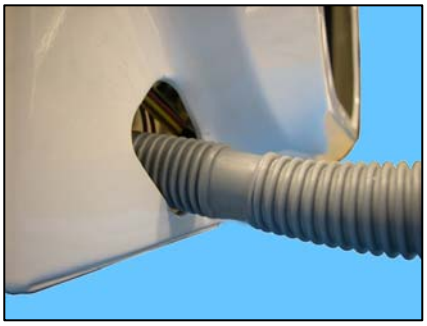


Remove the pipe fastener fixing it to the cabinet by pressing the three hooks (indicated by the arrows) and pulling it outwards at the same time.

Insert a screwdriver to open up the cabinet pipe fastener.

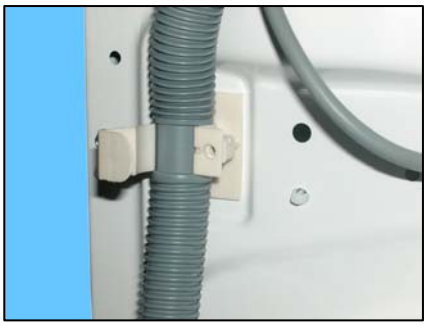


When refitting the pipe, make sure that the non-corrugated part.

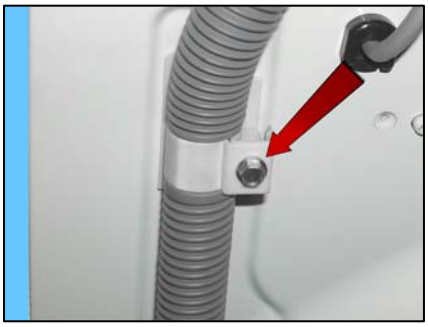


is inserted inside the pipe fastener seating.

The other non-corrugated section of the pipe must be positioned in the pipe fastener located in the upper area of the appliance.



Close the pipe fastener using a hex-head screw



Some of these operations may also be performed from the base of the appliance.

REVISION:

Revision	Date	Description	Written by	Approved by:
00	02/2012	Document creation	DMM	XX – 0X/201X