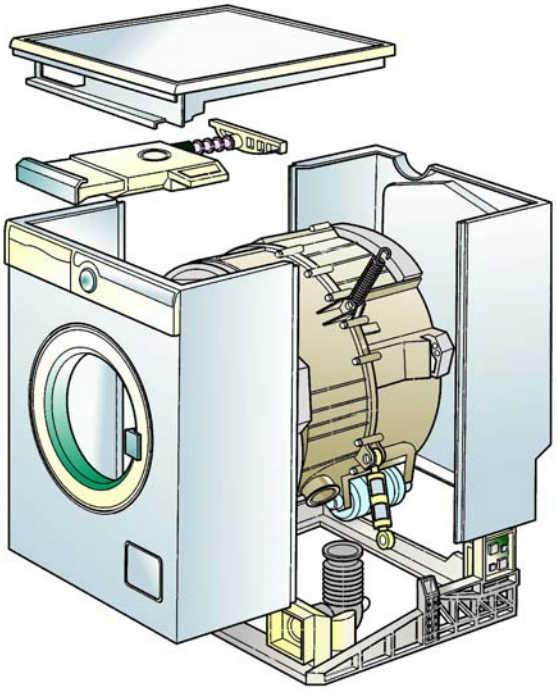
Electrolux DISTRIPARTS ORIGINAL

SERVICE MANUAL

LAUNDRY



© ELECTROLUX ZANUSSI S.p.A.
Spares Operations Italy
Corso Lino Zanussi,30
I - 33080 PORCIA /PN (ITALY)

Fax +39 0434 394096

Publication number
599 35 23-17

EN

Edition: 2002-05-02

Washing machines & Dryers
P6000 (Nexus) Series:

Structural characteristics, electrical components and accessibility

Production: ZP - Porcia Italy

TABLE OF CONTENTS

1 PURPOSE OF THIS SERVICE MANUAL

The purpose of this Service Manual is to provide Service Engineers, who already have the basic knowledge necessary to repair household washing machines, with information of a general nature regarding the P6000 (Nexus) range of washing machines.
More detailed information regarding specific models may be found in the Service Notes and Service Manuals (issued separately) for each specific model or functionality.
This information covers:

- Circuit diagrams
- Timer diagrams
- Exploded diagrams of spare parts
- Lists of spare parts
- Functions and diagnostics.

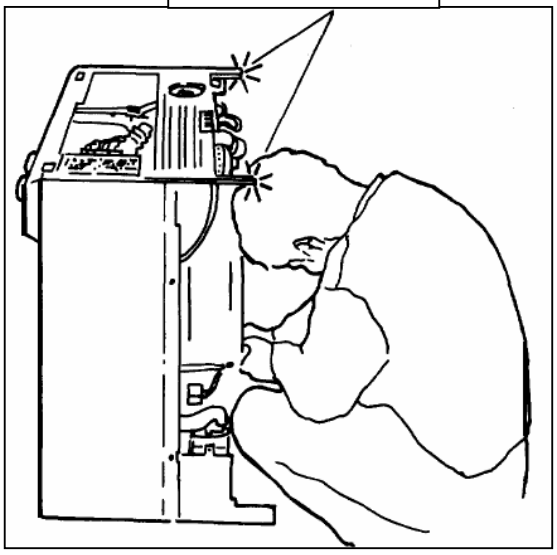
2 IMPORTANT NOTES

- Repairs to electrical appliances must be effected only by qualified personnel.
- Before accessing the components inside the appliance, always remove the plug from the power socket.
- Where possible, ohmic measurements should be effected rather than direct measurement of voltage and current.
- Functional operation of the appliance may be checked when the rear panel has been removed. However, under no circumstances must a spin cycle be performed with washing in the drum. In addition, spin tests without washing must be performed with care and for short periods only. The front panel alone is not sufficient to maintain the balance of the appliance during spinning.
- Certain metal components inside the appliance may have sharp edges. Care should be taken to avoid cuts or abrasions.
- Before laying the appliance on the floor, always drain any water by removing the filter or laying the drain hose flat on the floor.
- Never lay the appliance on its right side (i.e. timer / electronic control unit side); this would cause the water in the detergent dispenser to fall onto electrical components, thus damaging them.
- After removing the rear panel of the cabinet, the appliance should be laid down on the front panel only, preferably placing a sheet of cardboard on the floor to protect the paintwork.

- After removing the rear panel from the appliance, it is necessary to cover the two extremities of the upper cross-member with protective material, for example by wrapping them in a cloth or fitting the terminal section of the drain hose. This precaution is necessary because the edges of the brackets are sharp, and might otherwise cause injury to the head when working on the appliance from the rear.

- After repairing the appliance, always perform the final tests.

Important!



3 WASHING PRINCIPLES

3.1 Washing

The washing of the fabrics consists of transferring the dirt from the fabrics to the water, and is achieved using the following:

- detergent
- mechanical action
- temperature
- time

The washing operation comprises four phases:

1. Soaking (the fabrics must be completely soaked).
2. Dispersal of the dirt (which must be separated from the fabrics).
3. Suspension of the dirt (once removed from the fabrics, the dirt must not re-deposit, but must be held in suspension).
4. Elimination of the dirt by means of draining and rinses.

3.1.1 Results of the wash

In order to obtain satisfactory washing results, it is necessary to know:

- the nature of the fibres
- the nature of the soiling
- the hardness of the water
- the products used for the wash (detergent, conditioners, bleach etc.)

and then to select the appropriate washing cycles.

The results of the wash depend on a number of factors:

- type of fabric
- type of water
- type of soiling
- type and quantity of detergent
- temperature of the water
- efficiency of the rinses
- time and speed of the spin cycles

3.2 Fabrics

3.2.1 Natural and artificial fibres

NATURAL FIBRES	
ANIMAL FIBRES	Wool
	Special wool
	Silk
CELLULOSE VEGETABLE FIBRES	Cotton
	Linen
	Canapa
	Hemp
	Ramie
ARTIFICIAL FIBRES	
ARTIFICIAL CHEMICAL FIBRES	Viscosa rayon
	Cupro rayon
	Special rayons
	Rayon and polynosics
	Acetate rayon
	Triacetate rayon
SYNTHETIC CHEMICAL FIBRES	Polyammide fibres
	Polyurethane fibres
	Polyureic fibres
	Polyester fibres
	Polytechnical fibres

3.2.2 Washing the various types of fibres

3.2.3 Washing animal fibres:

- Neutral detergents
- Greater quantity of water
- Maximum temperature 40°C
- Minimum mechanical agitation, short times

Cellulose vegetable fibres:

- Alkaline (Base) detergents
- Bleach (if used): Sodium hypochlorite (NaClo)
- High water temperature (if OK for coloureds; for linen, if heavily soiled, bleaching is preferable to washing at high temperatures).
- Normal quantity of water
- Vigorous and prolonged mechanical action
- Spinning

Artificial chemical fibres:

- Neutral detergents
- Less mechanical action and minimum spinning
- Greater quantity of water
- Maximum temperature: 70°C (whites), 50°C (coloureds); bleach with a diluted solution of Sodium hypochlorite (NaClo) and hydrogen peroxide (H_2O_2)

Synthetic chemical fibres:

- Stronger detergents
- Maximum temperature 40-60°C
- Short wash
- Medium spin speed

3.2.4 International symbols for washing of fabrics

Labels marked with the following symbols are affixed to the garments, and provide valuable information relative to their treatment.

WASHING ACTION **NORMAL** **DELICATE**	95 Wash at 95°C	60 Wash at 60°C 60	40 Wash at 40°C 40 40	30 Wash at 30°C 30	Delicate hand-wash	DO NOT WASH

BLEACH	cl May be bleached in COLD water	DO NOT BLEACH

IRONING	Hot iron max 200°C	Medium iron max 150°C	Cool iron max 110°C	DO NOT IRON

DRY-CLEANING	A P P F F These symbols are used by the dry-cleaner to identify the correct solvent and cleaning process for each garment to be dry-cleaned	DO NOT DRY-CLEAN

DRYING	Normal temperature Reduced temperature Can be dried in a tumble-dryer	DO NOT DRY IN A TUMBLE-DRYER

3.3 Classification of soiling

The dirt in the fabrics consists essentially of:

- PROTEICN-BASED substances
- OXIDABLE substances
- GREASE
- VARIOUS substances
- CHEMICAL substances

Protein soiling (enzymatic) - sensitive to ENZYMES

Blood, Eggs, Chocolate, Grass etc.

Oxidable substances - sensitive to BLEACH

Wine, Tea, Coffee, Fruit etc.

Greasy soiling - sensitive to SURFACE-ACTIVE AGENTS

Oil, Butter, Salt etc.

Various types of soiling - sensitive to specific products

Rust, Chewing-gum, Mildew

Chemical soiling - sensitive to specific products

Ink, Mercury-Chrome, Deodorants, Paints

3.4 Mechanical action

The mechanical action of the appliance is produced by the combination of clockwise/anti-clockwise rotation of the drum, which agitates the wash load in the washing solution. This action tends to transfer the dirt from the fabrics to the washing solution (water + chemical products).

The mechanical action may be VIGOROUS or DELICATE:

- Vigorous drum movement in alternating directions (clockwise and anti-clockwise) is suitable for cotton and polyester fabrics.
- Delicate drum movement in alternating directions (clockwise and anti-clockwise) is suitable for wool and delicate fibres.

3.5 Duration of the washing cycle

Each washing cycle requires a minimum duration in order to guarantee satisfactory results. The duration of the cycle depends on the type of fabric, the type of soiling and the quantity of washing in the drum.

3.6 Water

Water is the most important element in the washing process, and is fundamental to the final result. Ideally, the water used for the wash should have the following composition:

- Clear and transparent, a low level of hardness, absence of manganese, low iron and mineral salt content.

The water may contain various substances (mineral and others) in varying quantities:
- Fe (iron), Mg (manganese), Si (silicon), Na (sodium), Ca (calcium), K (potassium).

Some of these substances, if they exceed a certain level or are present in combination, may lead to the formation of ferrous oxide, which causes the well-known phenomenon of "rust spots".
In addition, if present in excessive quantities in the water, some substances may react with the chemicals contained in the detergent, altering its characteristics and preventing it from performing with full efficiency.

During the heating phase, calcium and manganese - if present in excessive quantities - react at temperatures in excess of 60°C, producing calcareous substances that, suspended in the washing solution, may adhere to the fabrics.
These calcareous substances may precipitate, forming a scale build-up on the internal components of the appliance (tub, heating element, filter body etc.).

3.6.1 Formation of lime scale and ferrous oxide

As rain falls through the atmosphere, it dissolves the gases that it contains: when it comes into contact with carbon dioxide, the rain absorbs the gas and transforms it into droplets of dilute carbonic acid ($H_2O+CO_2 = H_2CO_3$).
When the carbonic acid falls onto calcareous rocks, it reacts with the limestone to form a solution of Calcium bicarbonate ($Ca(HCO_3)_2$.
The problems of rust spots deposited on the washing are due mainly to the presence of ferrous oxide in the water. It is difficult to determine the quantity of ferrous oxide originally present in the water and the quantity that forms by reaction. If a filter with a very fine mesh is installed on the tap supplying the appliance, ferrous residue will be deposited after only a few days. This is one of the major obstacles to achieving a satisfactory washing result.

3.6.2 Hardness of the water

According to current conventions, the hardness of the water refers to the concentration of calcium and magnesium ions. In general, a distinction is made between total hardness, permanent hardness, temporary hardness, alkaline (carbonate) and non-alkaline hardness.

The total hardness indicates the concentration of calcium and magnesium, while the temporary hardness refers only to magnesium and calcium bicarbonate, which precipitate when the water boils.

Permanent hardness is caused by all the salts which, after boiling, do not precipitate in the same way as carbonates, but instead remain suspended in the solution (thus including sulphates, chlorides and calcium and magnesium nitrates).

The alkaline (or carbonate) hardness refers to soluble bicarbonates, hydroxides and carbonates. The excess hardness with respect to the alkaline hardness is referred to as the non-alkaline (non-carbonate) hardness.

The hardness of the water is caused by soluble calcium (Ca) and magnesium (Mg) salts, expressed as calcium carbonate, measured in "°F", and calcium oxide, which is measured in "°D".

From a toxicological viewpoint, hard water does not appear to be harmful to human beings. On the contrary, it has been observed that the presence of calcium and magnesium helps to prevent certain illnesses such as hypertension and cardiac arrest.
However, at an industrial level, hard water may cause scale to form on mechanical parts due to the presence of carbonates, sulphates and alkaline-terrous metal silicates. This scale build-up can significantly reduce the efficiency of a machine. Especially at risk are components such as heat exchangers, boilers, domestic appliances (washing machines, dishwashers etc.), because the reaction is endothermic. In other words, the formation of carbonates is facilitated by an increase in temperature. In the dyeing industry, calcium and magnesium may cause certain colouring agents to precipitate, thus causing uneven distribution of the colour on the fabrics.

3.6.3 Total water hardness

Total hardness is the sum of the temporary hardness (caused by calcium and magnesium bicarbonates) and the permanent hardness (caused by sulphates, chlorides and calcium/magnesium nitrates).

- Hardness expressed in French degrees (°F) represents the quantity of calcium carbonate, in grammes, contained in 100 litres of water.
- Hardness expressed in German degrees (°D) represents the quantity of calcium oxide, again in grammes per 100 litres of water.

Conversion of °F - °D:

1 °D = 1,79 °F

1 °F = 0,56 °D

Classification of total water hardness expressed in °F and °D

	°F	**°D**
SOFT	0 – 14	0 - 7
AVERAGE HARDNESS	15 – 26	7 - 14
HARD	27 – 39	14 - 21
VERY HARD	> 40	> 21

Negative effects of hard water:

- Reduction in the effectiveness of anionic surface-active agents.
- Increase in the quantity of dirt re-deposited.
- Increase of residue deposited on the fabrics.
- Increase of scale formation on the heating elements.

Hard water may cause the formation of incrustation on mechanical parts, due to the presence of carbonates, sulphates and alkaline-terrous metal silicates. This may also lead to a considerable reduction in the efficiency of the appliance, since the reaction is endothermic; in other words, the increase in temperature favours the formation of carbonates.

The most important of the soluble salts present in water are calcium bicarbonate and magnesium bicarbonate. When the water is heated to over 60°C, these react and precipitate to form limescale (which deposits on the fabrics and causes stiffness).

Water softening mechanisms

Hard water can be softened in three ways:

SEQUESTRATION: soluble compounds such as TPF, polycarboxylics, citrates

PRECIPITATION: insoluble compounds such as soaps, sodium carbonate

ION EXCHANGE: insoluble compounds such as zeolites, lamellar silicates.

Water softeners are used only for washing temperatures in excess of 60°C, i.e. when the high temperature causes the calcium to precipitate.

3.7 Detergents

Modern detergents are less aggressive than those used in the past, partly for reasons of environmental protection and partly to prevent damaging the fibres. If used correctly, these offer an excellent protective treatment and a high level of washing power.
Detergents that contain no phosphates are far more sensitive to the reaction with calcium. When the door of a washing machine is opened, the user will immediately observe that the interior is clean and shiny if high-quality detergents have been used.

3.7.1 Composition of a detergent

- SURFACE-ACTIVE AGENTS (soap and active washing substances)
- ZEOLITES (water softeners)
- ALKALIS
- BLEACHING AGENTS
- OPTICAL WHITENERS
- OTHERS: Enzymes, stabilizing agents, CMC, colouring agents, perfumed essences, TAED, PVP, lipase, protease.

3.7.2 Functions of the principal components of a detergent

1. SOAP: A detergent that is soluble in water, composed of sodium or potassium salts, fatty acids (such as oleic or stearic). The main function of soap is to dissolve grease. During the washing cycle, the grease precipitates, creating insoluble calcium (Ca) and magnesium (Mg) salts which, if present in excessive quantities, tend to become attached to the fabrics (black balls).

2. SURFACE-ACTIVE AGENTS: synthetic substances with wetting and detergent properties, and able to reduce the surface tension thus facilitating the penetration of the washing solution into the fabrics to dissolve the dirt. These agents disperse and emulsify the dirt and grease, which are then held in suspension in the washing solution.

3. SILICATES: alkaline substances that improve the washing result, protecting the fabrics or dishes and the appliance itself from corrosion. Not aggressive to the skin.

4. ANTI-FOAM (regulator): the correct quantity of foam is necessary for the effectiveness of the mechanical action, and therefore influences the intensity of the wash (large quantities of foam reduce the mechanical action and vice versa). Anionic surface-active agents generally increase the quantity of foam.

5. ZEOLITES: Zeolite is an insoluble solid that absorbs or fixes calcium ions, replacing them with sodium ions (to reduce hardness), thus increasing the effectiveness of the detergent.

6. ALKALIS: alkalis make the washing solution alkaline, increasing the washing power and swelling the fibres so that the dirt is dissolved more easily. In addition, alkalis help to remove scale build-up from the appliance.

7. BLEACHES: bleaches are generally perborates (substances that generate active oxygen). Active oxygen is released during the washing phase between 60°C and 90°C, and requires the presence of stabilizers to ensure uniform action. The oxidizing power of the active oxygen released eliminates substances that stain the fibres.

8. OPTIC WHITENERS (also known as blueing agents): optic whiteners are organic chemical substances that can transform ultraviolet light into visible "BLUE" light (yellow + blue = white).

3.7.3 Functions of other components of a detergent

1. ENZYMES: Enzymes are proteins produced by living cells (animal and vegetable) and are able to transform organic materials with a high molecular weight, such as starches, proteins and fats, into more easily soluble products. These integrate with and facilitate the action of the detergent, eliminating protein-based dirt. Their direct action also facilitates the removal of other types of dirt. In order to give positive results, enzymatic products must be used at temperatures between 40°C and 60°C (maximum).

   At higher temperatures, the proteins contained in the enzymes (which are temperature-labile) are vulnerable to denaturing. Denaturation causes irreversible alterations in the structure, leading to the loss of the enzymatic action.

   Protease - which is present in enzymatic detergents - is equally active in the presence of fresh and old proteins alike.

   Enzymatic detergents are especially active in both the pre-wash phase and in separate soak cycles.

   In all soak processes, products containing enzymes able to dissociate the proteins improve the results of the wash considerably. In addition, enzymes vertically break down scale incrustations deposited on the appliance, thus helping to detach the alkalis present in the detergent.

2. STABILIZING AGENTS: These are chemical products designed to control the uniformity of the bleach by stabilizing the washing solution.

3. CMC: CMC is used to hold the dirt in suspension so that dirt particles are not re-deposited on the fabrics.

4. COLOURING AGENTS: These serve exclusively to make the product more attractive to the eye.

5. PERFUMED ESSENCES: Give the washing a pleasant fragrance.

6. TAED: TAED reacts with the perborate to form peracetic acid, which has strong bleaching and disinfectant properties even at low temperatures (reacting from a temperature of just 30°C). However, if the TAED content is excessive, coloured fabrics may fade. By itself, perborate reacts at temperatures in excess of 60°C, while perborate with TAED begins to react at 30°C.

7. PVP: An ingredient that prevents colour transfer.

8. LIPASE: Chemical substances (enzymes) that dissolve fats by hydrolization.

9. PROTEASE: Chemical substances that destroy proteins (casein, albumin, gelatin, blood protein, perspiration, food residue, fruit juice). These release albumin molecules, which become soluble in water.

3.7.4 Detergent quantities

- efficiency of the washing programme according to the load and the water hardness.

In order to perform its function completely and correctly, the appropriate quantity of detergent must be used, which depends on the quantity of water that is contained in the tub of the washing machine, the type of washing cycle, the type of fabrics, the type of soiling and the quantity of washing in the drum.

Small quantities of detergent will be insufficient for efficient washing. But excessive quantities of detergent will cause yellowing of the fabrics, since the final rinse will not be sufficient to remove all the excess detergent, traces of which will remain on the fabrics.

The detergent properties of the soap are considerably reduced when the water is hard. The harder the water, the greater is the possibility that calcareous soap will precipitate: **1 gramme of calcium bonds to 16 grammes of soap**, thus making the soap ineffective and reducing the washing power significantly.

The combination of calcareous soap forms lumps of fat which remain attached to the dirt. This fatty substance tends to deposit on the edges of the sink, on the bathtub and on the seals of the washing machine. It also deposits easily on the fabrics, turning them a greyish colour (stains); in addition, it considerably reduces the capacity of the fabrics for absorption.

The hardness of the water not only reduces the washing power of the detergent, but also reduces the softness, resistance and whiteness of the fabrics washed.
When hardening agents such as Ca (calcium) and Mg (magnesium) react with certain components of the detergent, the fabrics may become encrusted (calcium and detergent deposits) after a number of washes. These give the fabrics a greyish colour and make them rough to the touch, as well as reducing their capacity for absorption significantly. This phenomenon is especially noticeable in the case of terrycloth garments (shower robes, towels etc.), causing them to lose their particular properties and to wear out faster.

Quantities recommended by the producers

- Normal/concentrated detergent: 150 - 300 g. / 15 g. per 15l. H_2O
- *Obviously, appliances designed with reduced consumption in mind (energy label) and belonging to energy classes A, B, C and D are designed to wash using up to 50% less detergent than other appliances.*

Powder detergents	
PRE-WASH DETERGENTS:	→ WITH ENZYMES
COMPLETE DETERGENTS:	→ REDUCED-FOAM → EXTRA-FOAM (for hand washing)
SPECIAL DETERGENTS:	→ FOR DELICATE FABRICS AND WOOL → FOR COLOURED FABRICS

Liquid detergents
→ FOR HDLD COLOUR-FAST COLOUREDS
→ FOR SYNTHETIC FIBRES
→ LDLD FOR LOW-TEMPERATURE WASHING (DELICATES)
→ FOR WOOL AND DELICATE SYNTHETIC FIBRES
→ FOR HEAVY-DUTY HAND- OR MACHINE WASHING
→ FOR PRE-TREATMENT OF PERSISTENT STAINS

Compact detergents
→ EXCELLENT FOR ALL WASHES - THE QUANTITY DEPENDS ON THE BRAND

3.7.5 Washing additives

1. SOFTENER: (Cationic surface-active agent + fragrance): This additive is introduced automatically by the appliance during the final rinse. It softens the surface of the fabric, which thus remains soft to the touch and easier to iron. If used incorrectly before or during the wash, or if introduced too early into the tub by the water fill system, its action is rendered ineffective by the surface-active agents contained in the detergent.

2. BLEACH: (sodium hypochlorite) - Used for white fabrics, before the main wash cycle. 150 ml of bleach will be sufficient for a short, low-temperature wash. Care should be taken when bleaching: certain stains (blood, perspiration), if bleached before the enzyme-based function, may become permanently fixed to the fabric, giving an unsatisfactory washing result. In normal washes, the bleach must be introduced automatically by the washing machine during the first rinse, at the end of the washing phase and after the detergent has performed its functions, since it destroys the enzymes contained in the detergent. If the stains have already become permanent after a previous wash, they will be impossible to remove.

3. DELICATE BLEACH (hydrogen peroxide) - Oxygen is not as strong as chloride, especially if the water is very hard. It must always be used together with the detergent, both for hand washing and when using a washing machine. It may be used for pre-treatment, but always followed by a wash using detergent. It may be used at all temperatures and during the wash (together with detergent), or poured directly onto the fabrics.

3.7.6 Bleaching

Bleaching is generally performed after the wash (by hand or in a machine), except in the case of wine, tea or coffee stains etc.
Light-sensitive stains (tomato etc.), if appearing on the fabrics after the wash, may disappear when the fabric is exposed to sunlight for a time (action of the sun's rays).
If a white fabric is treated with a bleach and then exposed to sunlight, the optical effect may be cancelled, and yellowish stains may become noticeable. However, these will tend to disappear when the garment is no longer exposed to the sun.

Using bleaches

Various types of bleach exist to suit different conditions of use, since they remain active either within or in excess of certain temperatures.

- Hypochlorite: must always be used cold (during the 1st rinse)
- Peroxide: may be used above 60° during the washing phase
- Delicate bleach (solid): a teaspoonful should be added to the detergent. Suitable for all types of fabrics, including coloureds. Active at medium and high temperatures.
- Delicate bleach (liquid, i.e. hydrogen peroxide) should be introduced into the appropriate compartment.
- Active perborate: active at temperatures in excess of 60°C.

N.B. If hydrogen peroxide or sodium hypochlorite are used for bleaching, or in the presence of "activators" attached to the garments (ferrous accessories such as buttons, buckles, zips, hooks etc.), these may cause holes in the fabric or stiffness of the fibres due to re-deposited oxides which form the well-known "rust spots".

3.8 The function of the water temperature

The variety and quality of natural and synthetic fibres which comprise the fabrics, which are sometimes present in percentages that are not declared correctly on the labels, make it necessary in many cases to use a detergent whose washing action is effective at low temperatures. As a result, the consumer today tends to use washing programmes with a maximum temperature of about 60°C, partly due to increasing sensitivity to energy savings.
Manufacturers of detergents, in line with this trend, have modified the quality of their products to meet this need, and frequently emphasize these characteristics in their promotional activities.

- Temperature helps to dissolve the dirt (solvent effect)

- Temperature facilitates and accelerates the chemical reactions, especially when bleaching.

The "**CORRECT"** temperature in the various phases of the washing cycle:

- reduces the cohesion of the dirt
- facilitates the suspension of the dirt in the water
- facilitates the reaction of the alkalis (swelling the fabrics so that the dirt is dissolved more easily)

High temperatures do not facilitate the removal of all types of dirt; in fact, blood, egg-yolk, milk etc. are more easily removed if washed in cold water; if hot water is used, these stains adhere more strongly to the fibres and become more difficult to remove.

3.8.1 Using the correct temperature

The temperature of the washing solution is used to remove the dirt and to ensure hygiene.

HIGH TEMPERATURE = 80 - 90°C

Suitable for difficult soiling: cotton and linen (whites) with bleach, perborate and hydrogen peroxide.

AVERAGE TEMPERATURE = 50 - 60°C (most washing cycles)

Suitable for washing colour-fast fabrics: cotton and linen (coloured) with hypochlorite-Based bleaches.

LOW TEMPERATURE = 30 - 40°C

Suitable for washing wool, synthetic fabrics, other delicate fibres, and for soaking of fabrics soiled with blood or protein-based substances.

3.9 Washing machine programmes

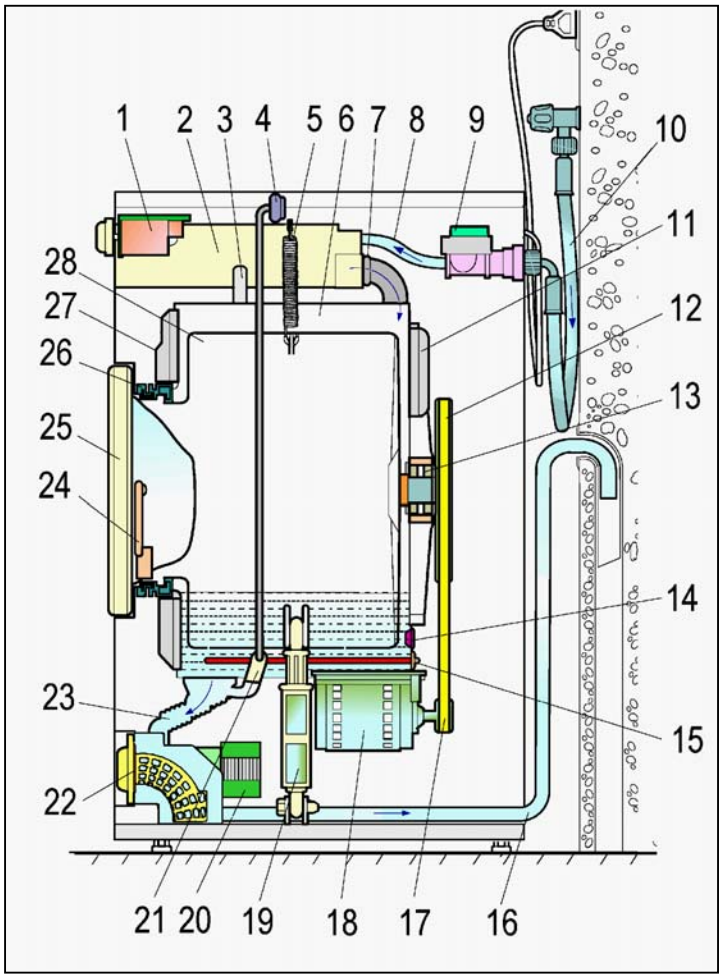
Pre-wash (not for wool and, in some cases, delicate fabrics)	1. Water fill with detergent introduced from the pre-wash compartment 2. Brief heating phase and hot wash (30 - 40°C) 3. Drain 4. (Brief spin)
Wash	1. Water fill with detergent introduced from the wash compartment 2. Heating and hot wash - 30÷90°C for cotton and linen - 30÷60°C for synthetic fibres - 30÷40°C for wool, silk and delicate fabrics 3. Maintenance phase (mechanical action after the heating phase) 4. Cooling water fill (in cotton cycles, reduces the temperature of the drain water, in synthetic cycles as an anti-crease cycle) 5. Drain 6. Brief spin (cotton/linen only)
1st rinse	1. Water fill (and, if selected, introduction of bleach for cotton/linen only) 2. Cold wash 3. Drain 4. Brief intermediate spin (if selected - cotton/linen only)
2nd (3rd) rinse	1. Water fill 2. Cold wash 3. Drain 4. Brief intermediate spin (if selected - cotton/linen only)
Final rinse (softener)	1. Water fill to softener compartment 2. Cold wash
(Rinse-hold)	1. In cotton/linen cycles, the programme generally passes to the subsequent phase; it stops with water in the tub (rinse-hold) only if this function has been selected (certain models only) 2. The cycle generally stops with water in the tub (rinse-hold) for synthetic, delicates and wool cycles if there is no rinse-hold button or selector. If these are featured (rinse-hold, delicate spin, anti-crease etc.), the cycle may stop or pass to the subsequent phase according to the option selected.
Final spin	1. Drain 2. Final spin - at maximum speed for cotton/linen - brief and at reduced speed for synthetics, delicates and wool (certain models only)
STOP	

Washer-dryers only:

Drying	1. Drying with heating at reduced power for cotton/linen; half-power for synthetic fabrics 2. Cooling phase
STOP	

4 FRONT-LOADING WASHING MACHINE

1. *Timer*
2. *Detergent dispenser*
3. *Steam venting hose*
4. *Pressure switch*
5. *Tub suspension spring*
6. *Tub*
7. *Detergent entry tube*
8. *Tube between solenoid and detergent dispenser*
9. *Water fill solenoid*
10. *Water fill hose*
11. *Rear counterweight*
12. *Drum pulley*
13. *Bearings*
14. *Thermostat*
15. *Heating element*
16. *Drain hose*
17. *Motor pulley*
18. *Motor*
19. *Damper*
20. *Drain pump*
21. *Pressure chamber*
22. *Drain filter*
23. *Tube between tub and filter body*
24. *Door safety interlock*
25. *Porthole door*
26. *Bellows seal*
27. *Front counterweight*
28. *Drum*



4.1 Traditional washing system

In a washing machine, the dirt in the fibres is removed by a combination of mechanical and chemical actions.

The solenoid valve ducts water through the detergent dispenser, where it collects the detergent and passes into the tub. The correct water level is controlled by one or more pressure switches.

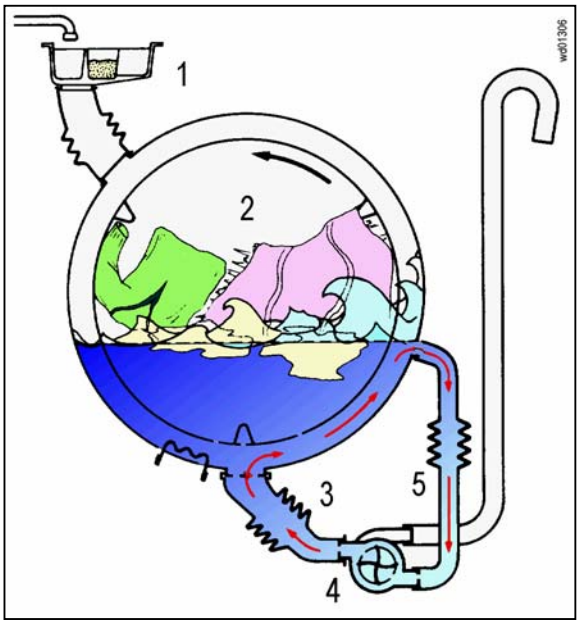
The fabrics loaded into the drum are maintained in constant movement by the rotation of the drum.
The particles of dirt, after being separated from the fibres of the fabric by the chemical action of the detergent and the temperature of the water, are removed by the passage of the water through the fibres.
This action is obtained by a continuous series of immersions and agitations of the fabrics in the washing solution.

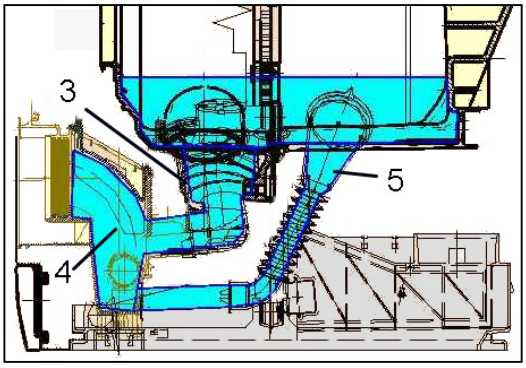
The heating element is switched on until the selected temperature is reached; the temperature of the water is controlled by thermostats or sensors.

At the end of the washing cycle, the dirty water is drained by the drain pump.

4.1.1 Recovery of detergent loss from the circulation hose

1. *Detergent dispenser*
2. *Drum*
3. *Tube between the tub and the filter body*
4. *Drain filter*
5. *Circulation hose*

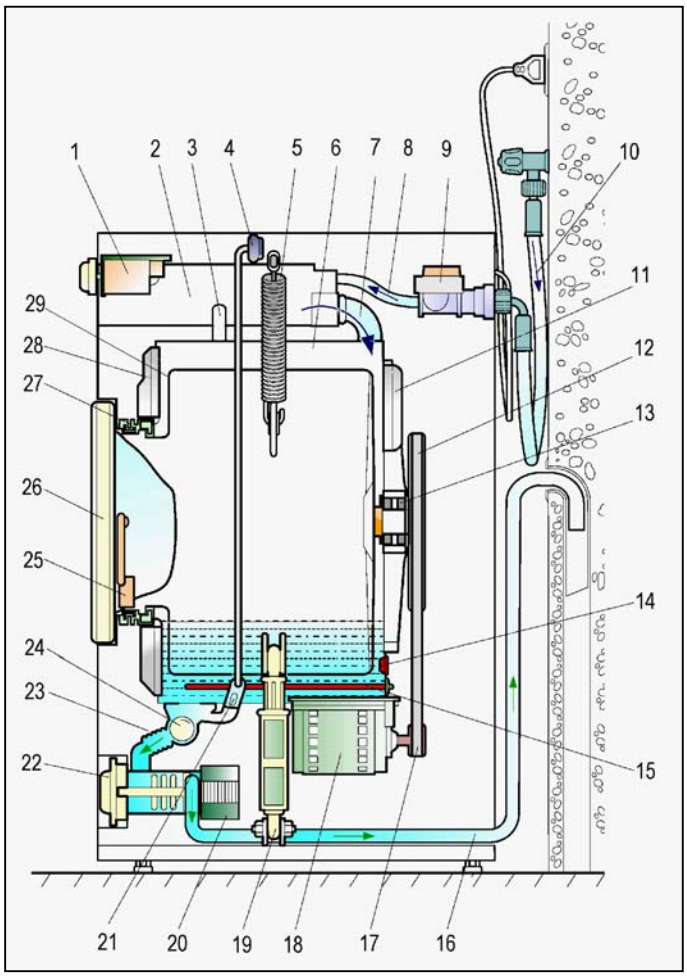




The water that passes through the re-circulation circuit during the movement of the drum - which acts as the impeller of a pump - prevents detergent residue from depositing in the lower section of the hydraulic circuit (filter body).

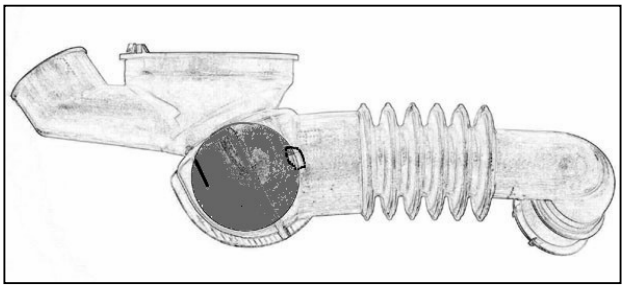
4.2 Drain circuit with "ECO-BALL" ball valve

1. *Timer*
2. *Detergent dispenser*
3. *Steam venting tube*
4. *Pressure switch*
5. *Tub suspension spring*
6. *Tub*
7. *Detergent entry tube*
8. *Tube between solenoid and detergent dispenser*
9. *Solenoid valve*
10. *Water fill hose*
11. *Rear counterweight*
12. *Drum pulley*
13. *Bearings*
14. *Thermostat / temperature sensor*
15. *Heating element*
16. *Drain hose*
17. *Motor pulley*
18. *Motor*
19. *Damper*
20. *Drain pump*
21. *Pressure chamber*
22. *Drain filter*
23. *Tub drain hose*
24. *Sphere (eco-ball)*
25. *Door interlock*
26. *Porthole door*
27. *Door seal*
28. *Front counterweight*
29. *Drum*



4.2.1 "ECO-BALL" ball valve

The "Eco-ball" valve consists of a sphere contained inside the tube that connects the tub to the filter body. Its purpose is to keep the washing water (contained in the tub) separate from the water in the drain circuit.

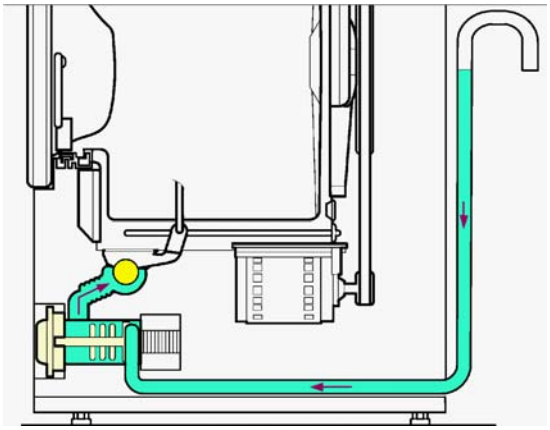


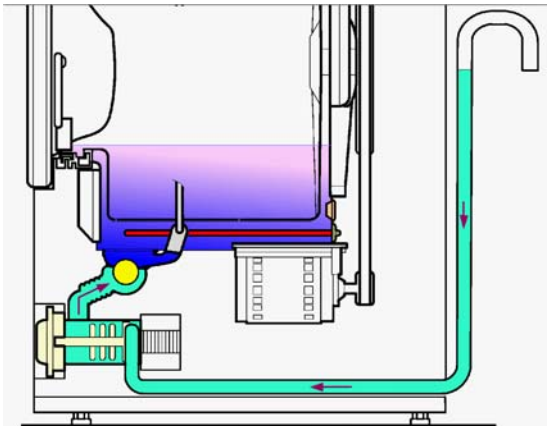
Advantages with respect to a conventional circuit:

- Energy savings: the water inside the drain circuit is not heated.
- The detergent does not deposit on the filter body, thus improving the quality of the wash (reduction in mechanical detergent losses).
- Better rinsing efficiency.

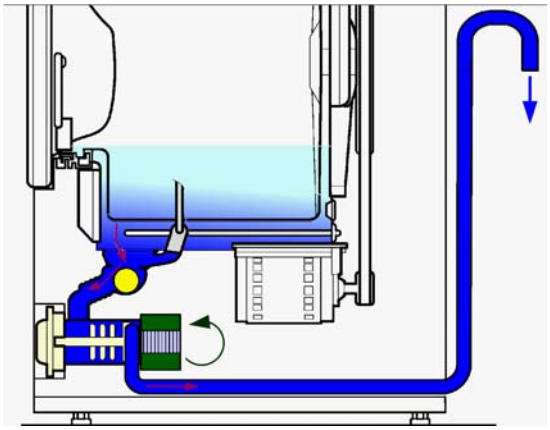
4.2.2 Ball valve: operating principle

- During the water fill and washing phases, the sphere is raised by the water contained in the drain circuit to the uppermost position, thus preventing water from passing between the tub and the filter body. To ensure correct operation of the system, it is important to ensure that the drain hose is always correctly connected to the corresponding support on the rear panel (at a height of at least 60 cm.).





- During the drain phases, the suction effect created by the operation of the pump causes the sphere to move downwards, thus allowing the water to flow through the drain circuit.

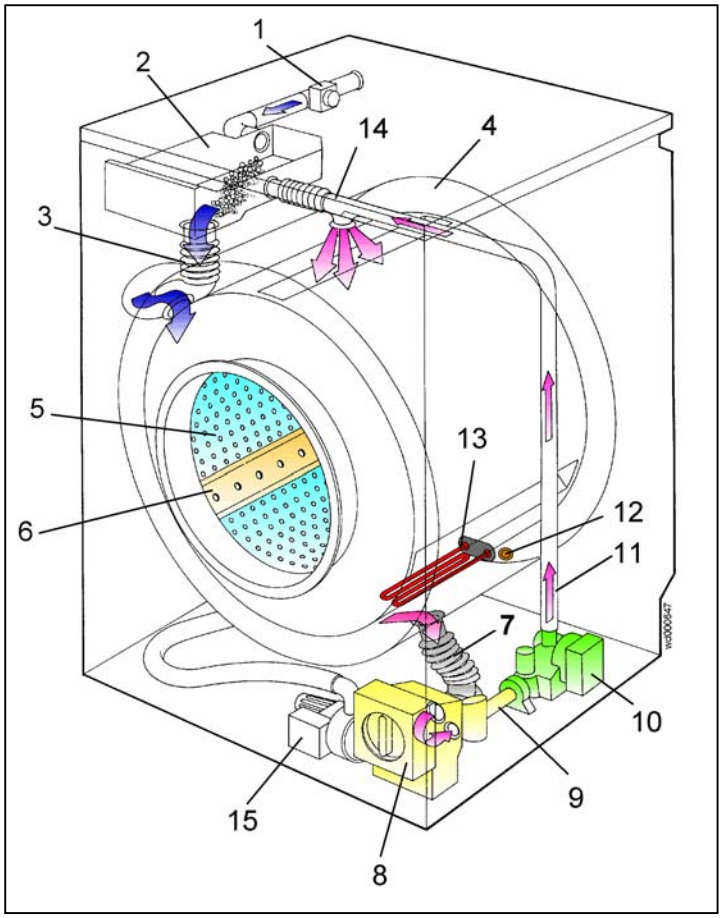


4.3 “JETSYSTEM” washing system

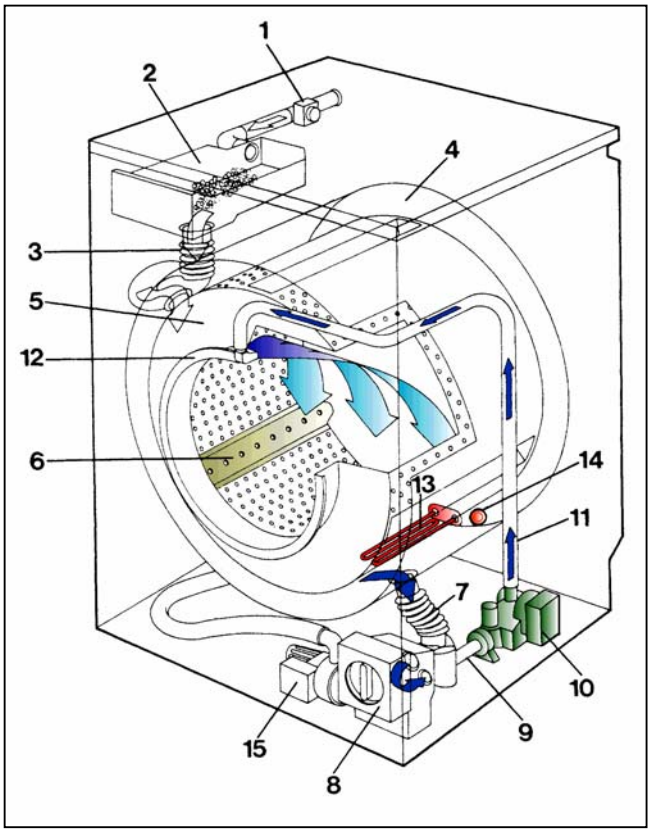
- In the "Jetsystem" washing system, considering that the removal of the dirt is performed solely by the water that passes through the fibres, the remaining part of the washing solution has been eliminated.
- In other words, this system is based on the possibility of washing the fabrics using only the water used to wet them; the quantity of water introduced into the appliance is therefore proportional to the type and quantity of the fabrics in the drum.
- The water is introduced by the solenoid valve; its level is controlled by a pressure switch.
- The water present in the bottom of the tub is circulated by a pump, which ducts it to the fabrics through an aperture in the bellows seal (or through an aperture in the upper section of the tub).
- The mechanical action is provided by the bi-directional rotation of the drum at low speed; the wash load is continuously rotated inside the drum by three drum lifters.

4.3.1 JETSYSTEM hydraulic circuit (first version)

1. *Water fill solenoid valve*
2. *Detergent dispenser*
3. *Tube from detergent dispenser to tub*
4. *Tub*
5. *Drum*
6. *Drum lifter*
7. *Tube between tub and filter body*
8. *Filter body*
9. *Tube between filter body and circulation pump*
10. *Circulation pump*
11. *Circulation tube*
12. *Thermostat*
13. *Heating element*
14. *Steam venting tube*
15. *Drain pump*

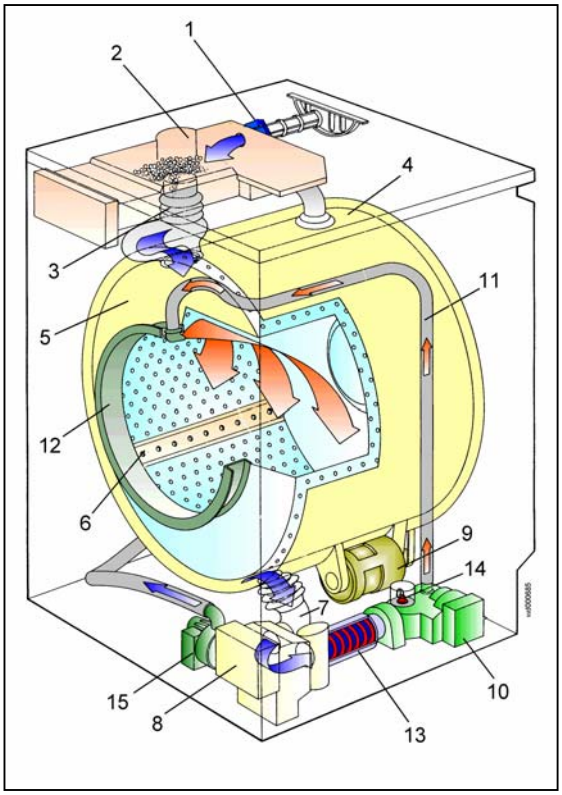


4.3.2 Jetsystem “DIRECT SPRAY” washing system (current production)



1. *Water fill solenoid*
2. *Detergent dispenser*
3. *Tube from detergent dispenser to tub*
4. *Tub*
5. *Drum*
6. *Drum lifter*
7. *Tube between tub and filter body*
8. *Filter body*
9. *Tube between filter body/circulation pump*
10. *Circulation pump*
11. *Circulation tube*
12. *Door seal*
13. *Heating element*
14. *Thermostat*
15. *Drain pump*

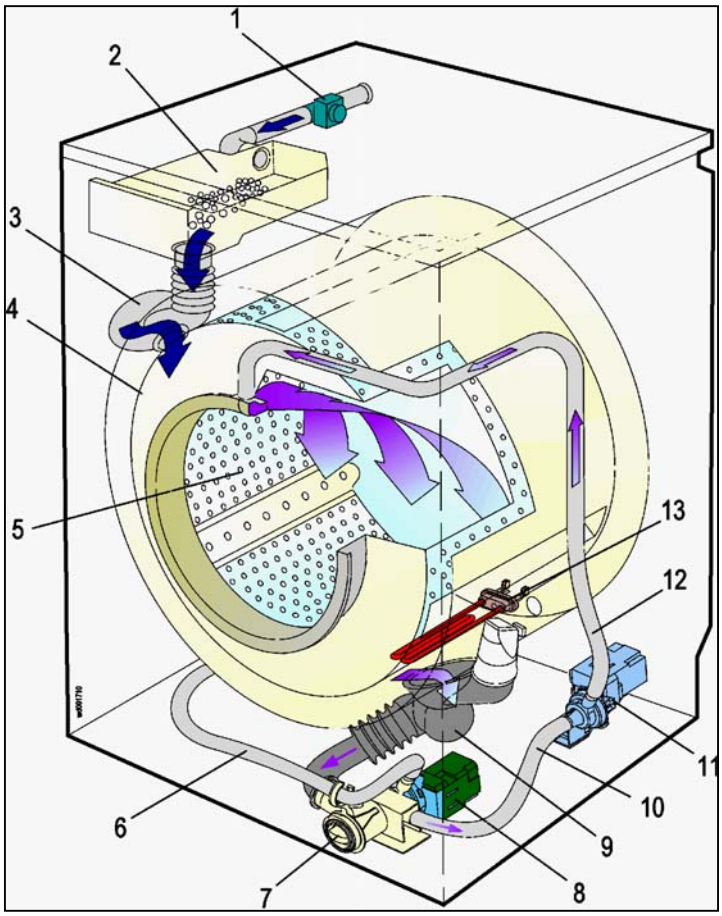
4.3.3 Circuit with heat exchanger (certain older models only)



1. *Water fill solenoid*
2. *Detergent dispenser*
3. *Tube from detergent dispenser to tub*
4. *Tub*
5. *Drum*
6. *Drum lifter*
7. *Tube between tub and filter body*
8. *Filter body*
9. *Motor*
10. *Circulation pump*
11. *Circulation tube*
12. *Door seal*
13. *Heat exchanger*
14. *Thermostat*
15. *Drain pump*

4.3.4 **“NEW JET” recirculation circuit–P63BD version (large door)**

1. *Water fill solenoid*
2. *Detergent dispenser*
3. *Tube from detergent dispenser to tub*
4. *Tub*
5. *Drum*
6. *Drain hose*
7. *Drain filter*
8. *Drain pump*
9. *Tube between tub and filter body*
10. *Circulation pump intake tube*
11. *Circulation pump*
12. *Circulation tube*
13. *Heating element*



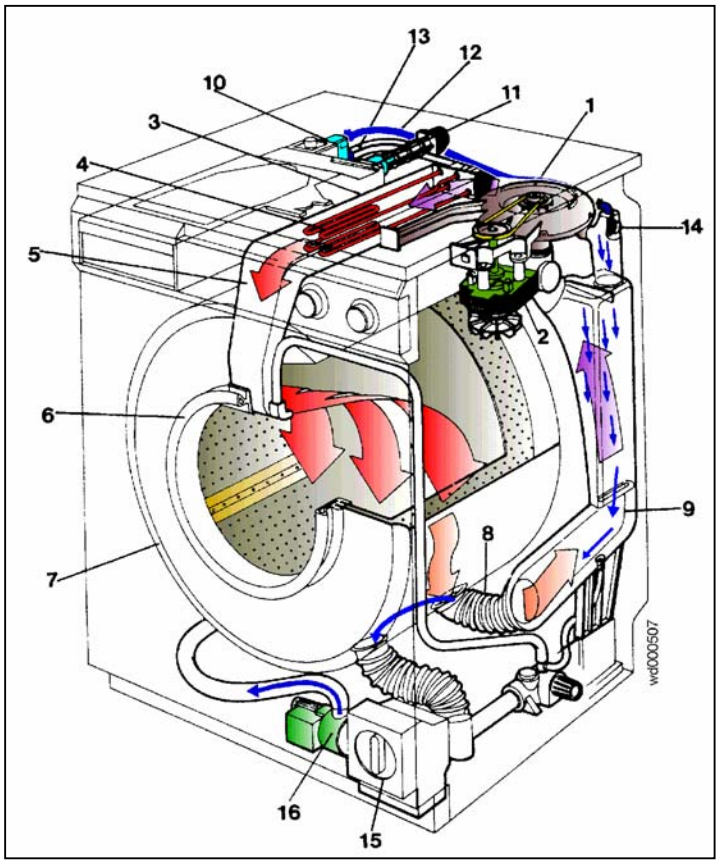
5 WASHER-DRYERS

5.1 Drying system

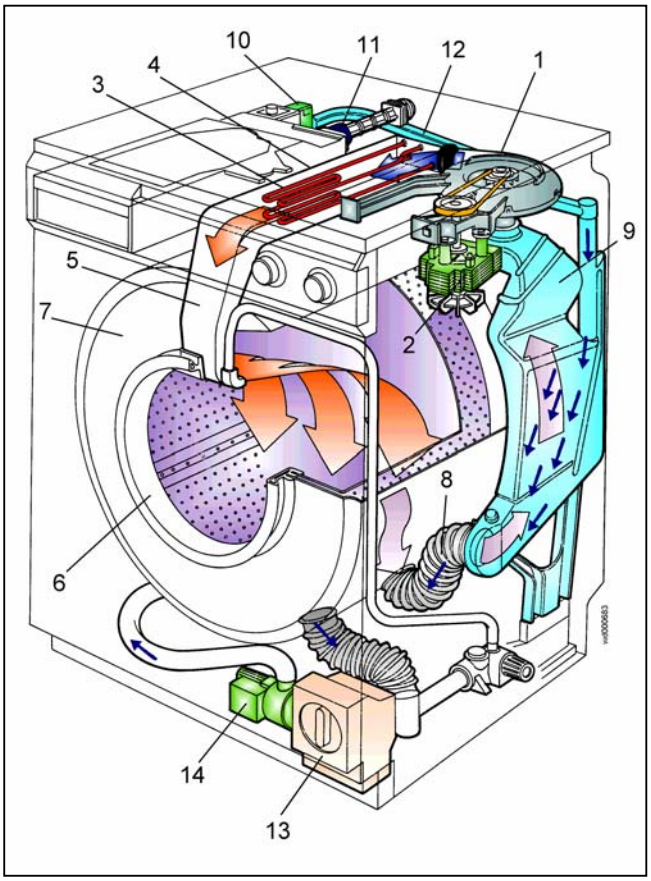
- The drying system is based on forced-air circulation with water-jet condensation. The maximum drying capacity is equivalent to half the maximum load of dry washing. If a full load is washed, two drying cycles are necessary. If a half-load is washed, the drying cycle can be programmed for automatic execution at the end of the washing cycle.
- During the drying phases, the drum rotates in alternate directions at low speed. The fan ducts the heated air from the heating elements to the inside of the tub, where it removes the humidity from the washing. The cold-water jet, coming into contact with the hot and humid air, generates a heat exchange and thus condenses the humidity. The cooled, dry air is ducted back to the fan, again heated by the heating element, and is then circulated back into the drum.
- In cycles for SYNTHETIC fibres, only one branch of the heating element is switched on (half power). In COTTON cycles, both branches are powered (full power).
- The cooling water and condensation are drained off by the drain pump.
- During the last few minutes of the drying cycle, the heating elements are switched off, while the fan continues to operate in order to complete the cooling phase.

5.2 Drying circuit (type "A" condenser)

1. *Fan*
2. *Fan motor*
3. *Heating element casing*
4. *Drying heaters*
5. *Duct*
6. *Door seal*
7. *Tub*
8. *Tube between tub and condenser*
9. *Drying condenser*
10. *Coupling*
11. *Water fill solenoid*
12. *Water fill hose to condenser*
13. *Steam venting tube*
14. *Air-break*
15. *Drain filter*
16. *Drain pump*

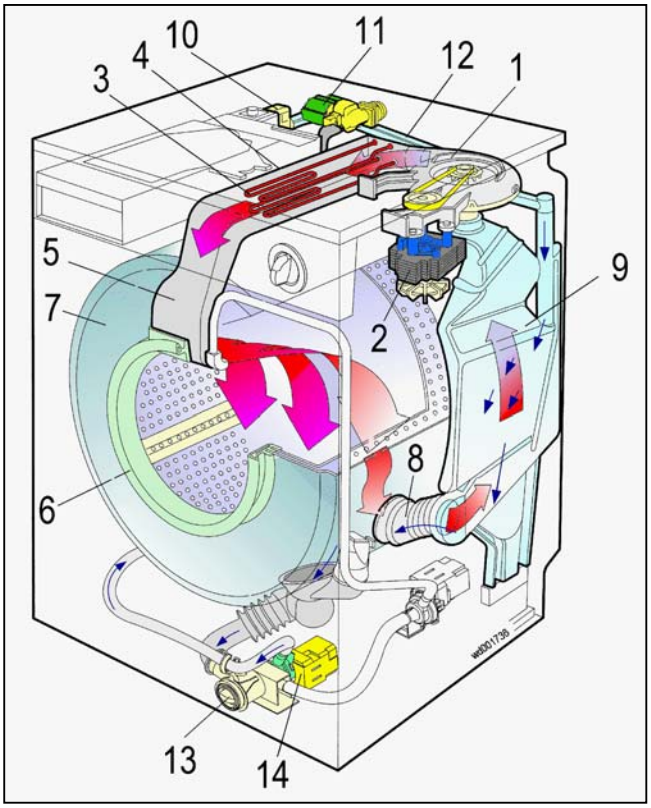


5.3 Drying circuit (type "B" condenser)



1. *Fan*
2. *Fan motor*
3. *Drying heaters*
4. *Heating element casing*
5. *Duct*
6. *Door seal*
7. *Tub*
8. *Tube between tub and condenser*
9. *Drying condenser*
10. *Coupling*
11. *Water fill solenoid*
12. *Condenser fill hose and steam vent*
13. *Drain filter*
14. *Drain pump*

5.3.1 “HP” version

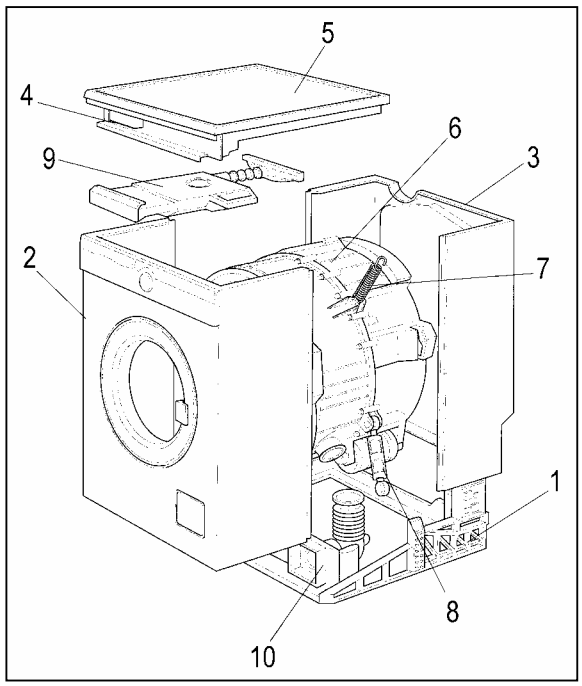


6 STRUCTURAL CHARACTERISTICS

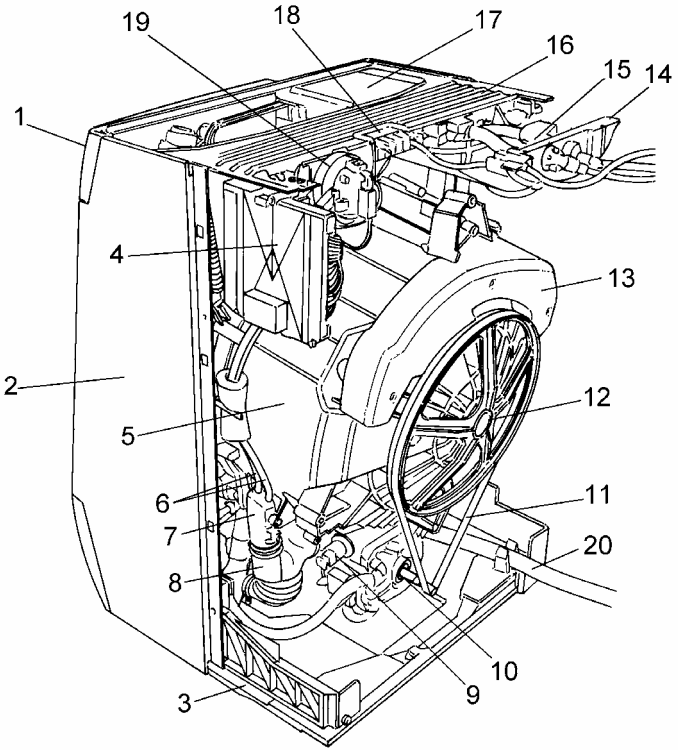
6.1 "NEXUS" technology

These appliances are produced using the NEXUS technology, a patented system consisting of five sub-assemblies:

- Base
- Cabinet
- Control panel support
- Washing group
- Work-top

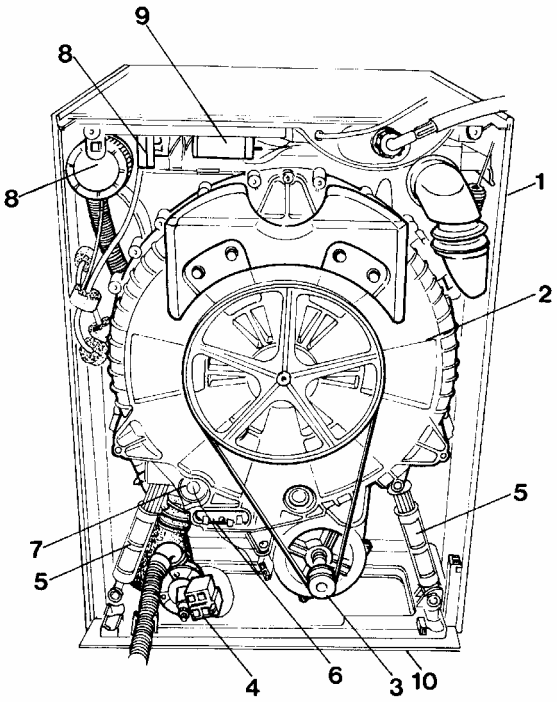


1. *Base*
2. *Front cabinet shell*
3. *Rear cabinet shell*
4. *Control panel support*
5. *Work-top*
6. *Washing group*
7. *Suspension spring*
8. *Damper*
9. *Detergent dispenser*
10. *Drain filter body*



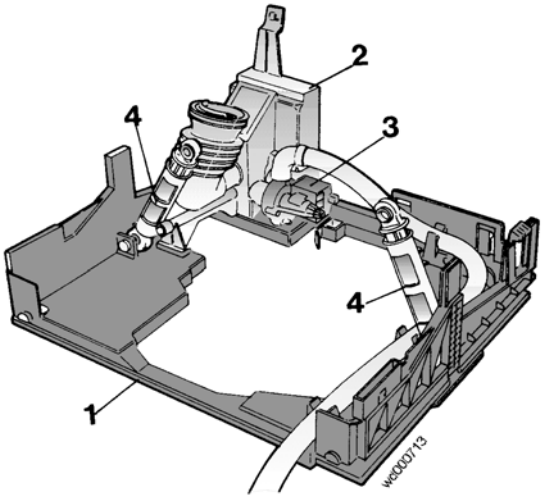
1. *Control panel*
2. *Front cabinet shell*
3. *Base*
4. *Main PCB*
5. *Tub*
6. *Pressure switch tubes*
7. *Pressure chamber*
8. *Tube between tub and filter body*
9. *Temperature sensor*
10. *Motor*
11. *Drive belt*
12. *Drum pulley*
13. *Rear counterweight*
14. *Cable clamp*
15. *Solenoid valve*
16. *Control panel support*
17. *Detergent dispenser*
18. *Main terminal block*
19. *Pressure switch*
20. *Drain hose*

6.1.1 Washing machine with 32 cm-depth cabine



1. *Front cabinet shell*
2. *Tub*
3. *Drum rotation motor*
4. *Drain pump*
5. *Damper*
6. *Heating element*
7. *Thermostat*
8. *Pressure switch*
9. *Capacitor/suppressor*
10. *Base*

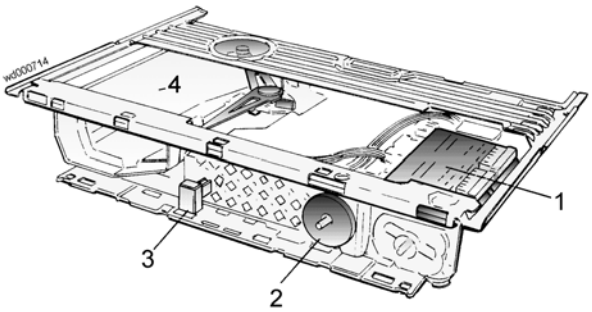
6.2 Base



1. *Base*
2. *Filter body*
3. *Drain pump*
4. *Dampers*

The base is built in "CARBORAN", a specially-developed plastic.
As well as the two cabinet shells, the filter body, drain pump, dampers and (if featured) the circulation pump and motor control system are all housed in the base.

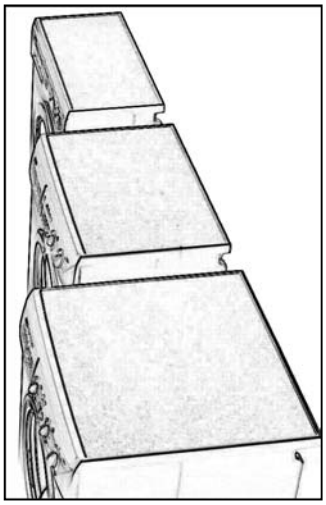
6.3 Control panel support



1. *Timer*
2. *Adjustable thermostat*
3. *Push-button*
4. *Detergent dispenser*

The control panel support (in galvanized sheet metal) is secured by a series of screws to the two cabinet shells.
Several components are fitted to the support: timer, adjustable thermostat, pushbuttons, capacitor, pressure switches, detergent dispenser and control panel.
Also secured to the support are the two suspension springs for the washing group.

6.4 Cabinet

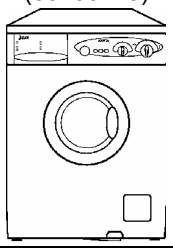
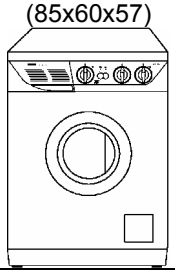
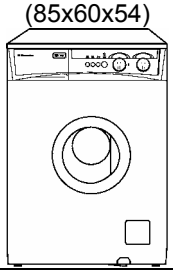
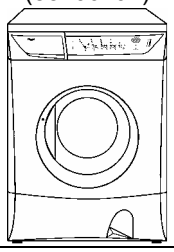
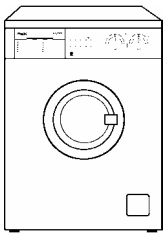
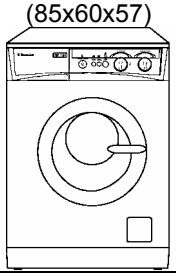
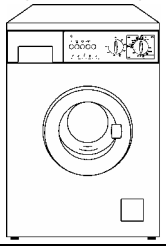
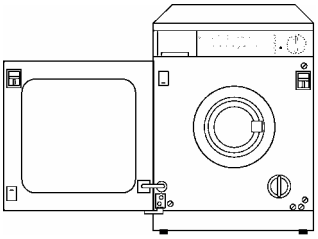
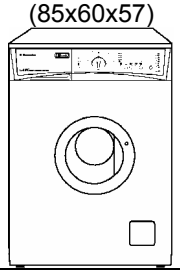
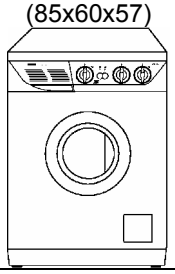
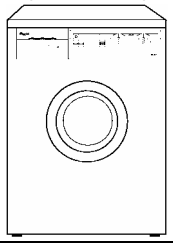
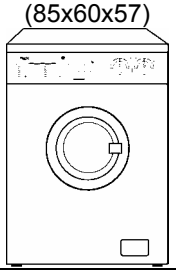
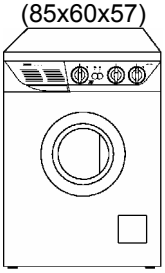
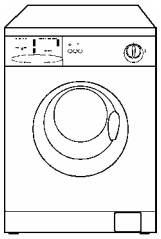
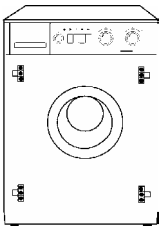
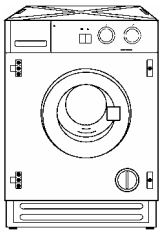


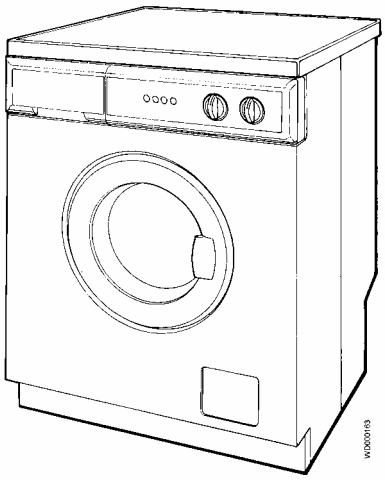
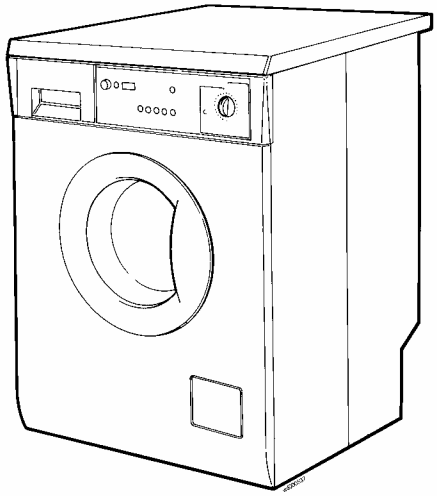
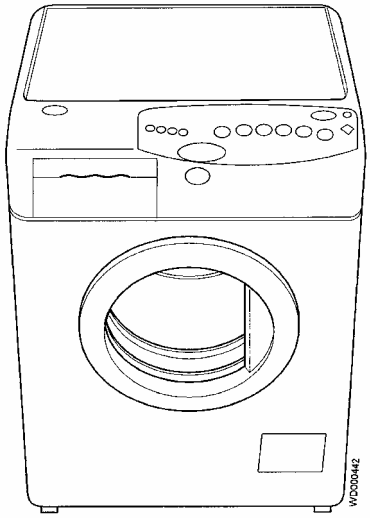
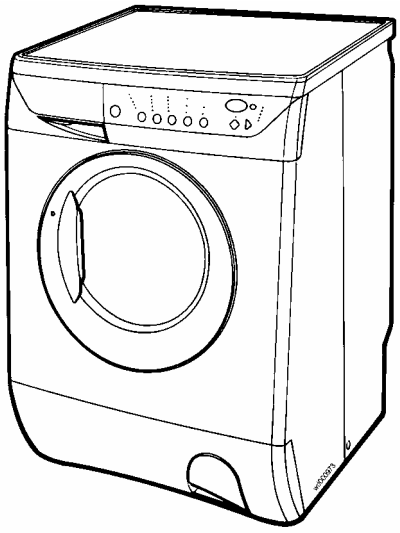
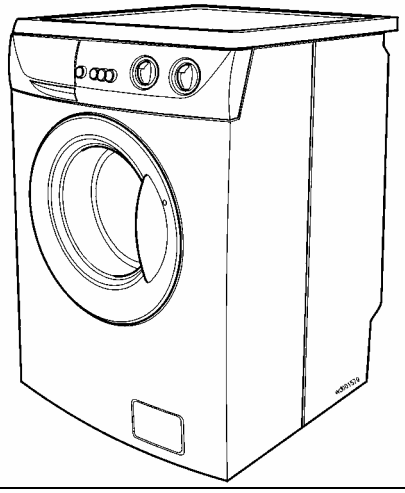
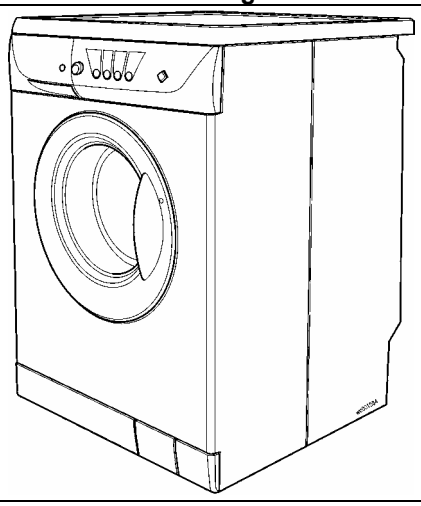
The cabinet consists of two half-shells in enamelled sheet metal, which are secured to a Carboran base. The support cross-member (in galvanized sheet metal) is screwed to the upper section of the cabinet. The work-top is screwed to the rear section of the cabinet shell.
Under-counter versions are fitted with tops in galvanized sheet metal.

The cabinets are available in a range of different versions that can be installed in any part of the home (bathroom, kitchen, etc.):

- 32cm (**P66**)
- 42/45cm (**P61**)
- 52/54cm (**P65**)
- 57/60cm (**P62**, without plinth)
- 57/60cm (**RIM**)
- 57/60cm (**P63**, with plinth)
- 62 cm (**NEAT**)

6.4.1 Types of cabinet

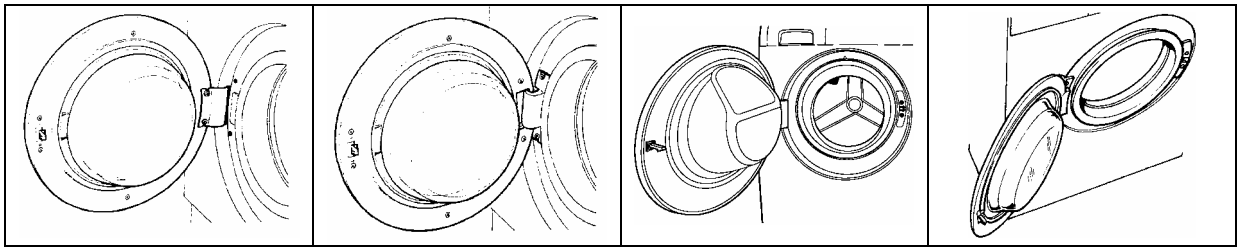
Types of cabinet and dimensions in cm (HxWxD) (the height includes the 3cm top, if featured))			
P61soft (85x60x45) 	**P63soft** (85x60x57) 	**P65soft** (85x60x54) 	**NEAT** (85x60x62) 
P61 square (85x60x42) 	**P63soft (large door)** (85x60x57) 	**P65 square** (85x60x52) 	**P63 double door** (85x60x57) 
P62 soft (85x60x57) 	**P63 soft** (85x60x57) 	**P66** (85x60x32) 	**RIM** (85x60x57) 
P62 square (85x60x57) 	**P63 soft (large door)** (85x60x57) 	**P66 built-in** (78x60x32) 	**P64 built-in** (82x60x54) 

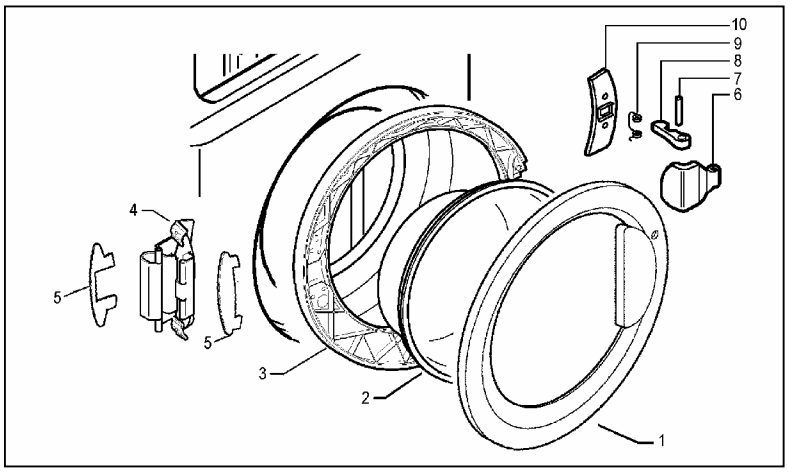
P63 square	P62 (P65) soft
	
P62 INPUT	**NEAT**(JETSY- IZ)
	
RIM	**P63 soft - large door**
	

6.5 Porthole door

Several types of porthole door may be fitted:
- standard (26 cm) or large (30 cm)
- angle of aperture (130° or 180°)
- alignment with front panel (flush or protruding)
- differently-styled surrounds
- type of aperture (various handles, or button on control panel)

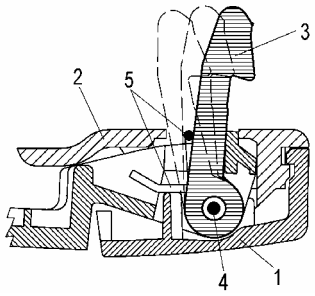
6.5.1 Examples of porthole doors



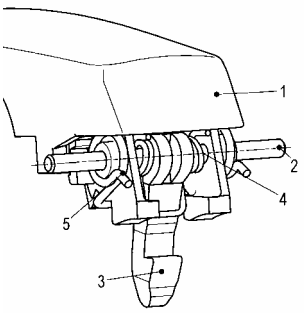


1. *Front surround*
2. *Door glass*
3. *Rear surround*
4. *Hinge*
5. *Masking plate*
6. *Handle*
7. *Hinge pin*
8. *Latch*
9. *Spring*
10. *Flange*

6.5.1.1 Handle assembly



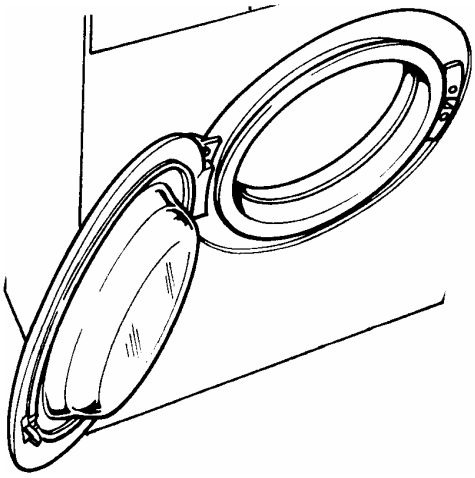
1. *Front surround*
2. *Rear surround*
3. *Latch*
4. *Hinge pin*
5. *Latch spring*

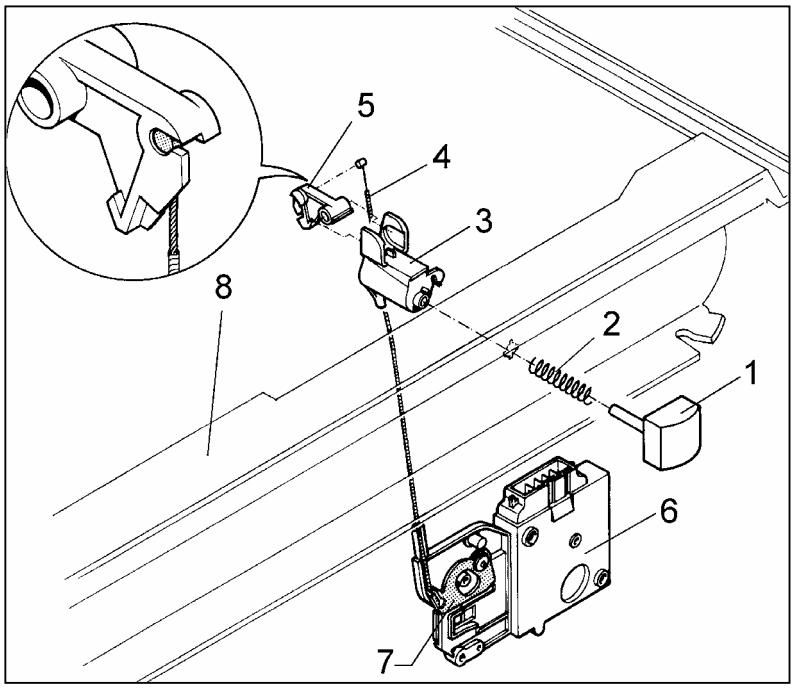


1. *Handle*
2. *Hinge pin*
3. *Latch*
4. *Latch spring*
5. *Handle spring (certain models only)*

6.5.2 Porthole door with button-actioned aperture

On certain models, the door can be opened by pressing a button on the control panel.
All models with the P66 (32 cm) cabinet are fitted with this feature.

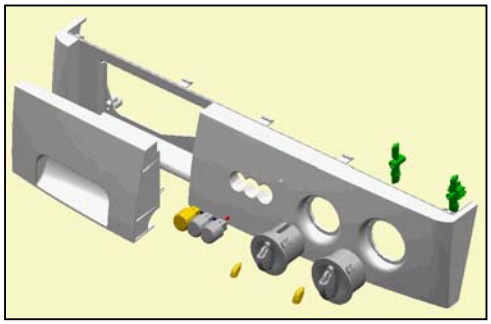




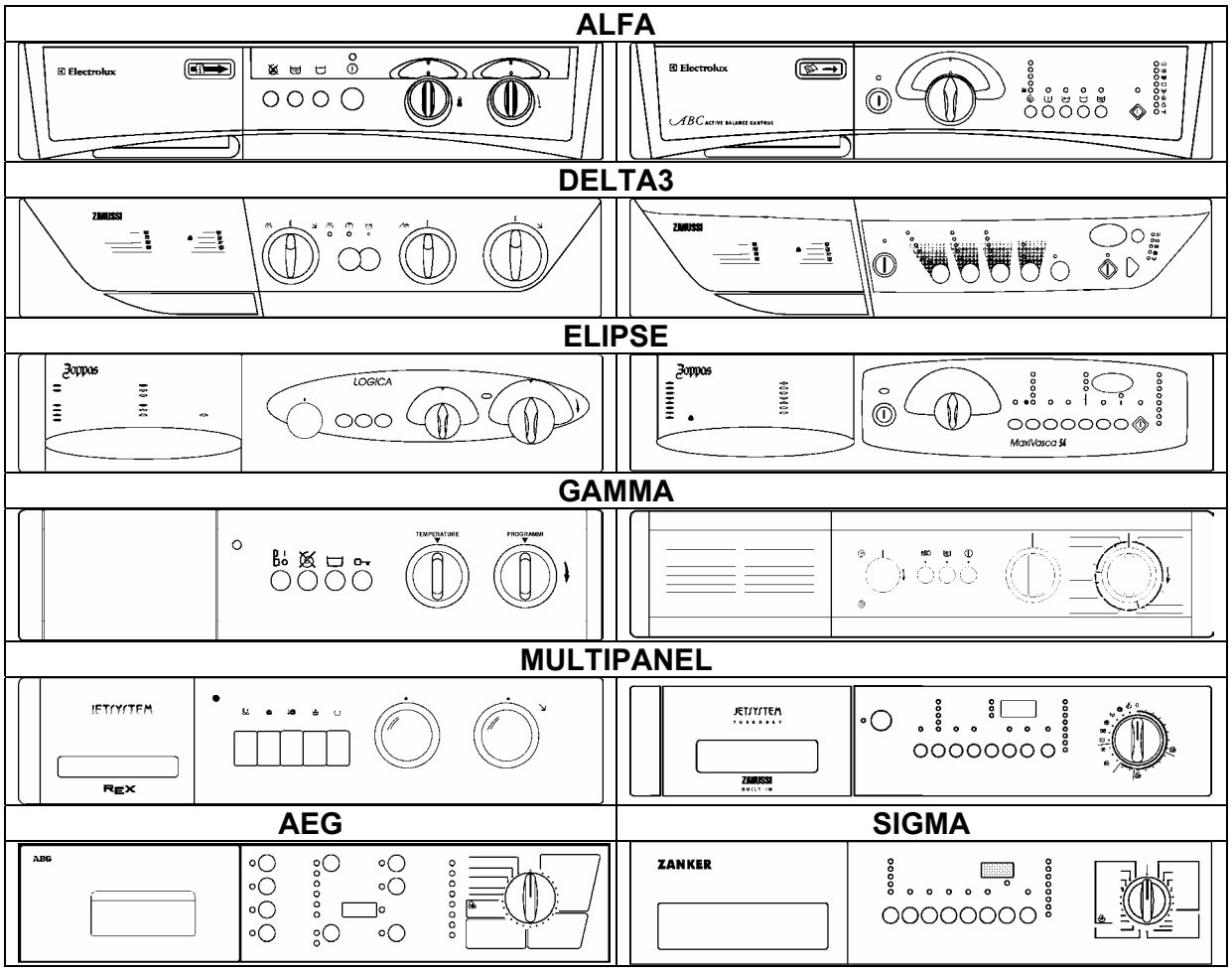
1. *Door aperture button*
2. *Spring*
3. *Support*
4. *Wire*
5. *Lever*
6. *Door safety interlock*
7. *Latch aperture lever*
8. *Control panel support*

6.6 Control panel

The plastic control panel is secured to the control panel support by anchor tabs and one or more screws.
The shape of the control panel depends on the styling and therefore the brand of the appliance.
Various types of control panels are available for each styling, each fitted with a different number of buttons and knobs.



6.6.1 Examples of control panels

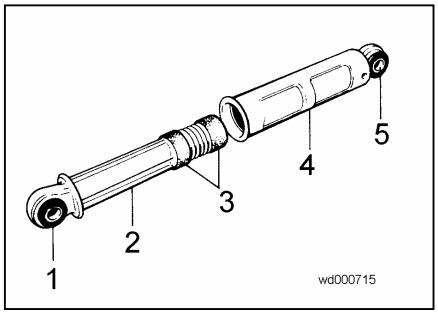


6.7 Washing groups

The washing group is suspended from the support cross-member by two helical springs.
The oscillation of the washing group is absorbed by the two dampers attached to the base.
Balancing of the washing group is provided by a front counterweight in cement and by a rear counterweight.
Some models are not fitted with the rear counterweight.

6.7.1 Damper

1. *Rubber vibration damper*
2. *Shaft*
3. *Shaft seals*
4. *Cylinder*



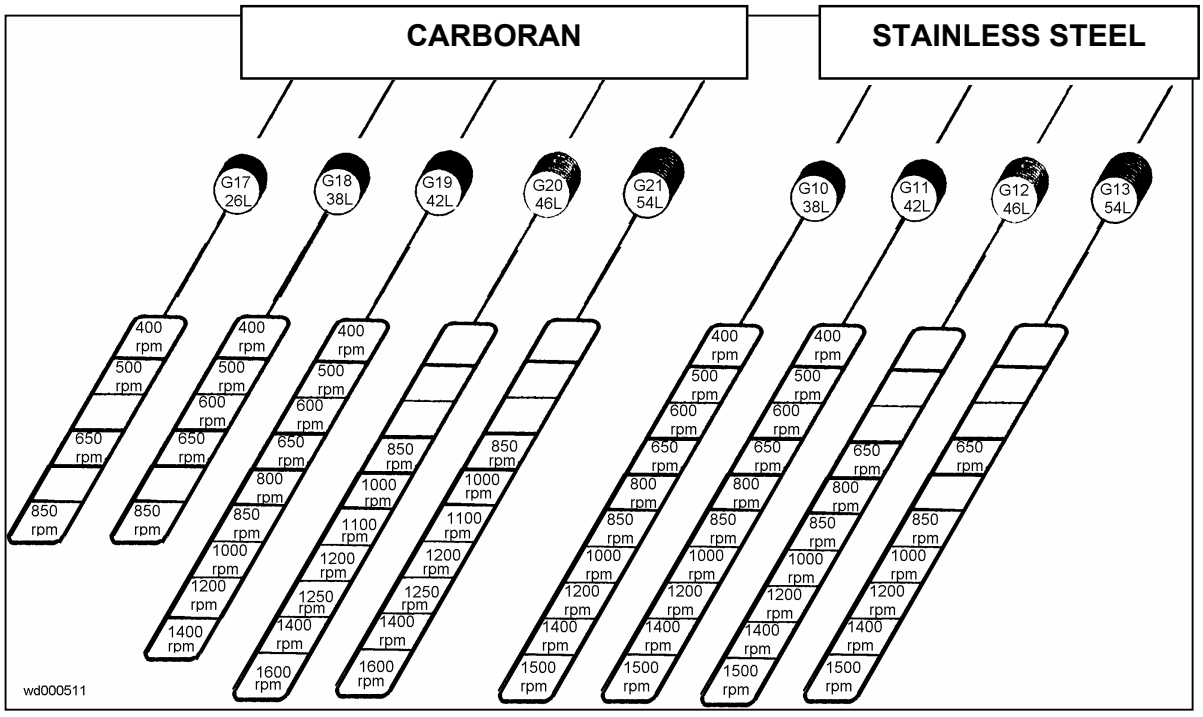
6.7.2 Types of washing groups

Appliances in the NEXUS range may be fitted with washing groups of varying dimensions and spin speeds.

CARBORAN			
Type	Load capacity (cotton)		Drum volume
	Rated	Max.	
G17	3 Kg	3,5 Kg	26 l
G18	4 Kg	4,5 Kg	38 l
G19	4,5 Kg	5 Kg	42 l
G20	5 Kg	5,5 Kg	46 l
G21	5,5 Kg	6,5 Kg	54 l

STAINLESS STEEL (not used for new models)			
Type	Load capacity (cotton)		Drum volume
	Rated	Max.	
G10	4 Kg	4,5 Kg	38 l
G11	4,5 Kg	5 Kg	42 l
G12	5 Kg	5,5 Kg	46 l
G13	5,5 Kg	6,5 Kg	54 l

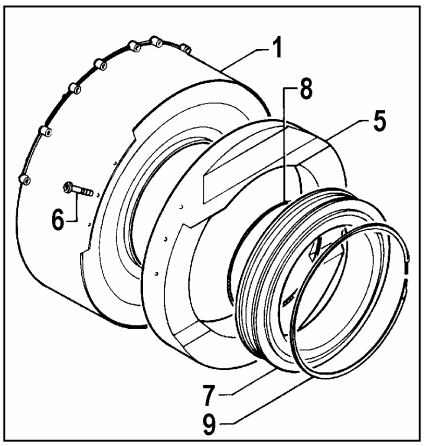
Spin speed	Residual humidity	Efficiency of spin
400	85 %	**F**
500	78 %	**E**
800	66 %	**D**
1000	60 %	**C**
1200	53 %	**B**
1400	52 %	**B**
1600	44 %	**A**

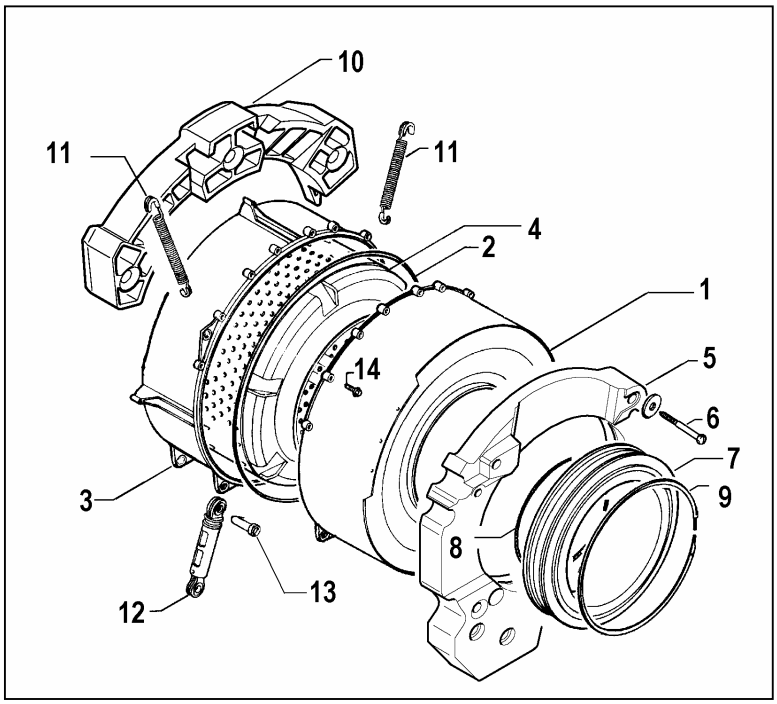


6.7.3 Washing group in Carboran

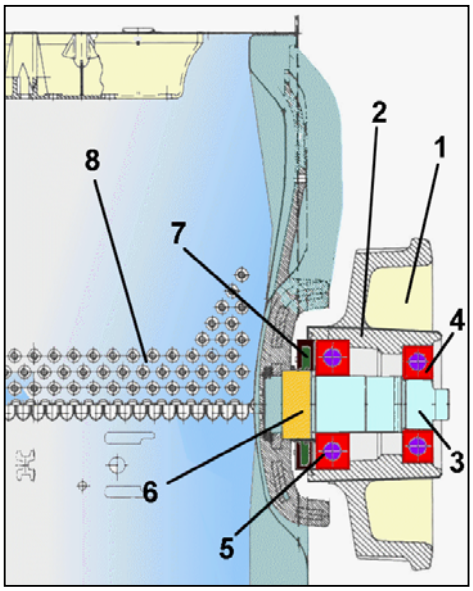
The tub consists of two half-shells in Carboran, secured together by a series of self-tapping screws.
The two counterweights are screwed to the half-shells.
The bellows seal is secured to the front half-shell by a metal elastic ring.

1. *Front half-shell*
2. *O-ring*
3. *Rear half-shell*
4. *Drum*
5. *Front counterweight*
6. *Counterweight anchor screw*
7. *Bellows seal*
8. *Ring securing the seal to the tub*
9. *Ring securing the seal to the cabinet*
10. *Rear counterweight*
11. *Washing group suspension springs*
12. *Damper*
13. *Damper hinge pin*
14. *Half-shell anchor screws*

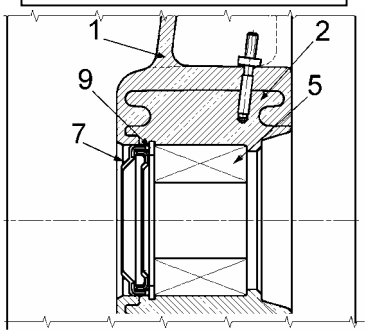




6.7.3.1

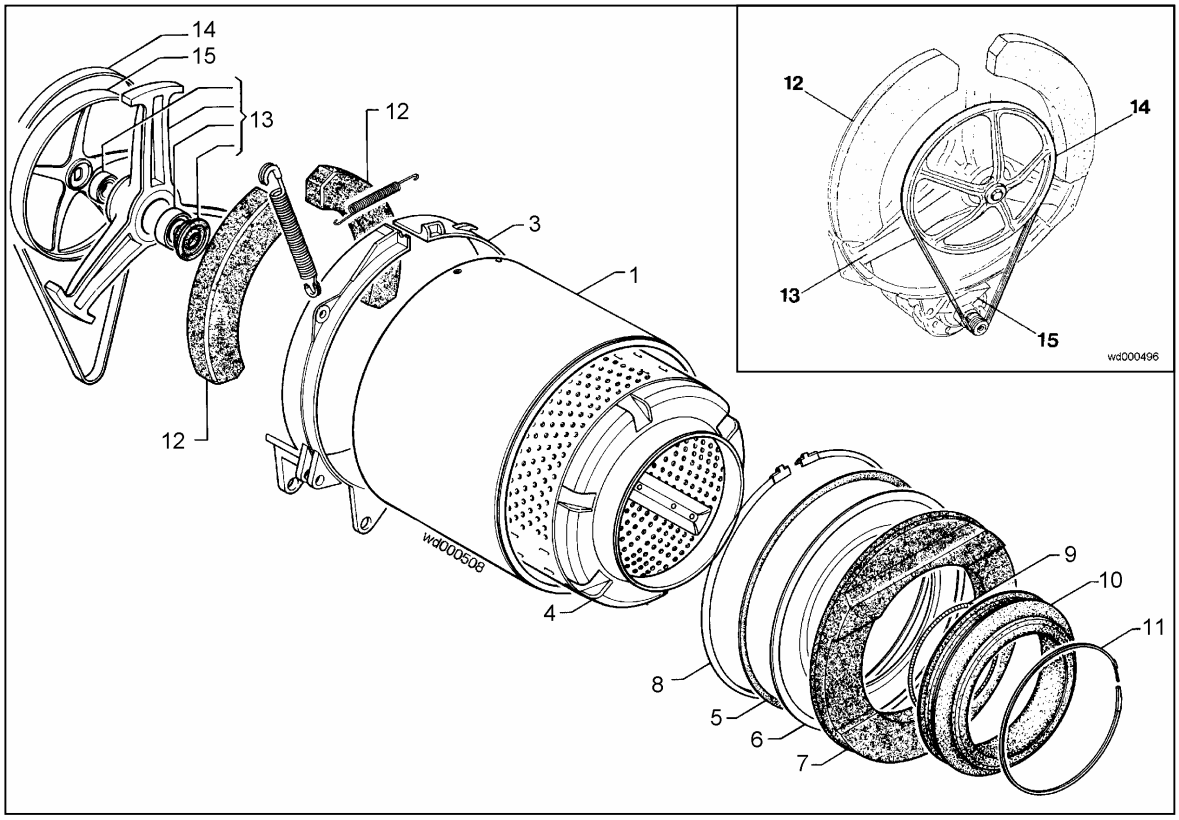


Single-bearing version

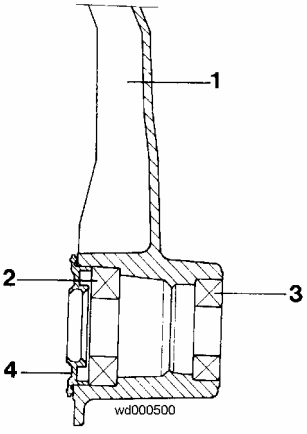
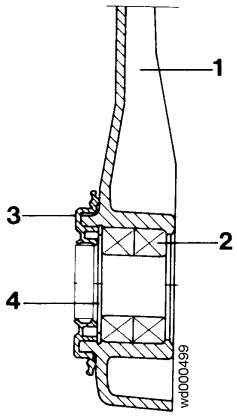


1. *Rear tub shell*
2. *Bearing support*
3. *Drum shaft*
4. *External bearing*
5. *Internal bearing*
6. *Drum shaft bushing*
7. *Drum shaft seal*
8. *Drum*
9. *Ring*

6.7.4 Stainless steel washing group

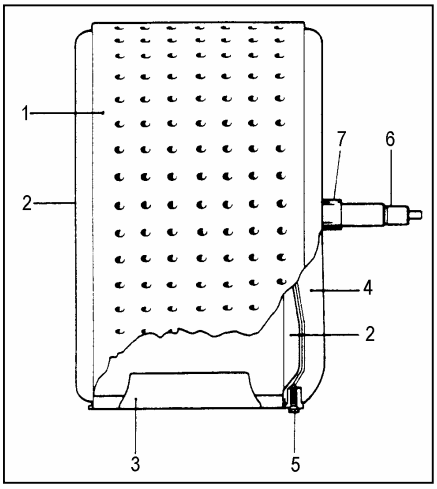


1. *Tub casing*
2. *Band spring*
3. *Tub support band*
4. *Drum*
5. *Flange seal*
6. *Front flange*
7. *Front counterweight*
8. *Retaining ring*
9. *Ring securing the seal to the tub*
10. *Bellows seal*
11. *Ring securing the seal to the cabinet*
12. *Rear counterweight*
13. *Tub spider*
14. *Idle pulley*
15. *Motor*

Spider with two bearings		Single-bearing spider	
1. Tub spider *2. Internal bearing* *3. External bearing* *4. Seal*		*1. Tub spider* *2. Bearing* *3. Seal* *4. Ring*	

6.7.5 Drum

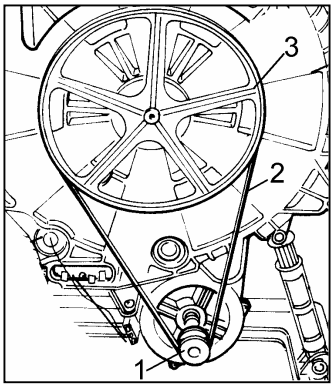
The drum consists of a stainless steel casing to which the two flanges are crimped.
Three Carboran lifters are pressure-fitted to the internal face of the drum.
The drum spider, in aluminium alloy, is secured to the edge of the drum by screws.
A brass bushing is pressure-fitted to the drum shaft.



1. *Drum casing*
2. *Flange*
3. *Drum lifter*
4. *Drum spider*
5. *Screws*
6. *Drum shaft*
7. *Drum shaft bushing*

Drum spider

6.7.6 Drum rotation drive belt



These appliances are fitted with elastic drive belts. The motor is mounted in a fixed position, and no regulation is possible.

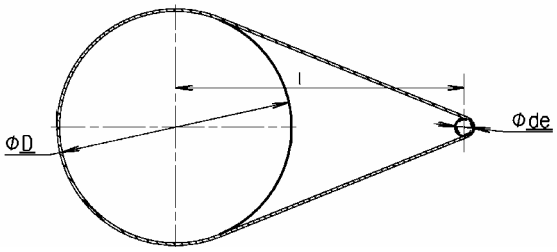
1. *Motor pulley*
2. *Elastic drive belt*
3. *Drum pulley*

Different types of drive belts, produced by various manufacturers and with different characteristics, are used in production:

- rubber belts (black)
- plastic belts (yellow)

The length marked on the drive belt (1217, 1280 etc.) is the working length based on the belt mounted on the pulleys, which is calculated according to the following parameters:

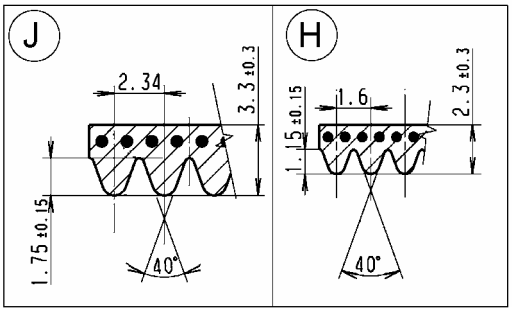
∅ **D** = diameter of drum pulley
∅ **de** = diameter of motor pulley
l = centre-line distance between the pulleys



For a given working length, the belts - which consist of different materials - have a different degree of elasticity. This means that, when not fitted to the appliance, their lengths may be different. It is normal that the length of a plastic belt not fitted to the pulleys is three or four centimetres greater than that of a rubber belt.

The belts are of the poly-V type, and are marked with two further parameters:

- shape of the drive belt (J / H)
- number of teeth (4, 5, 6, 8)



6.8 Detergent dispenser

6.8.1 Detergent dispenser with distribution levers

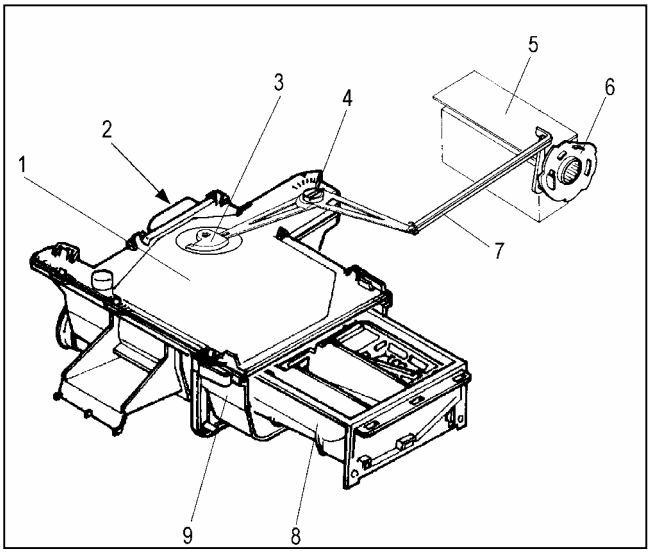
This type of detergent dispenser is used in models featuring:

- electromechanical timers
- hybrid timers
- MWM electronic control systems, which feature an electromechanical distributor for movement of the levers

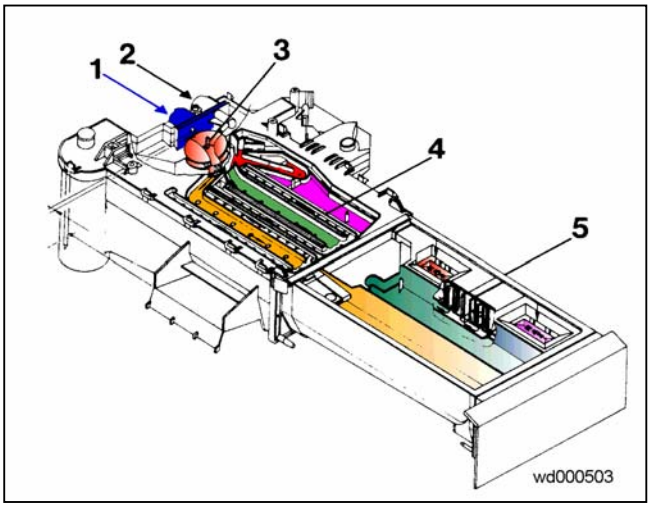
Two versions of this dispenser exist: one is larger, the other is of reduced size (ecological).

6.8.1.1 Operating principle

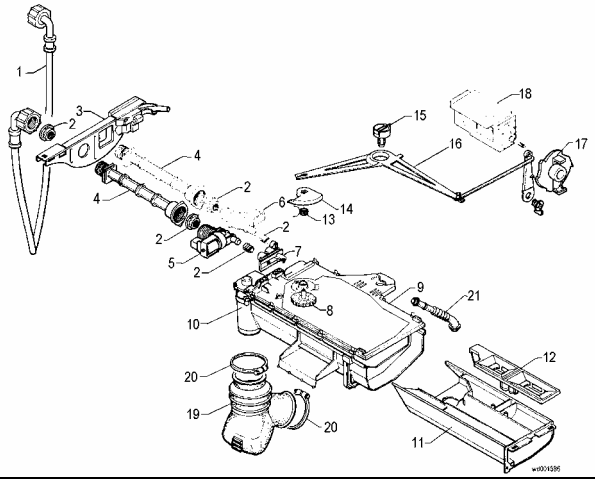
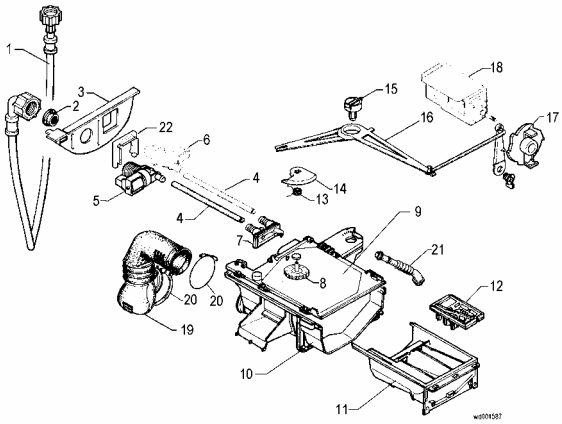
Irrespective of the shape of the detergent dispenser, the operating principle remains the same:
The water is ducted through the intake nozzle to the distributor. According to the position of the timer camme during the washing cycle, the distributor ensures that the water is ducted through only one channel of the feed duct, so that the detergent is removed from the appropriate compartment only.



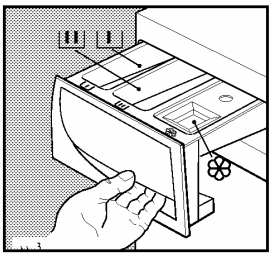
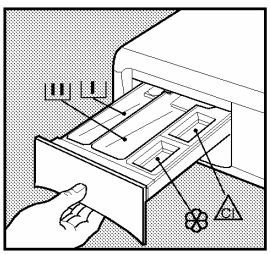
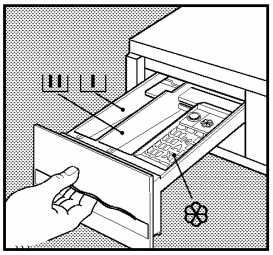
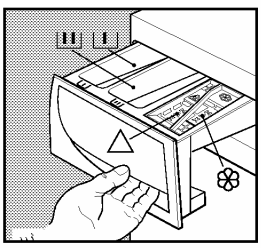
1. *Duct*
2. *Water intake*
3. *Distributor*
4. *Eccentric camme*
5. *Timer*
6. *Camme*
7. *Lever mechanism*
8. *Detergent drawer*
9. *Detergent dispenser*



1. *Cold water solenoid valve*
2. *Hot water solenoid valve (not all models)*
3. *Water distributor*
4. *Water distribution ducts*
5. *Detergent drawer*

"LONG" DISPENSER	"SHORT" DISPENSER (ecological)
	

1. Fill hose	*11. Detergent drawer*	*1. Fill hose*	*11. Detergent drawer*
2. Washer	*12. Siphon for additives*	*2. Washer*	*12. Siphon for additives*
3. Cable clamp	*13. Spring*	*3. Cable clamp*	*13. Spring*
4. Extension hose	*14. Distributor pin*	*4. Extension hose*	*14. Distributor pin*
5. Water fill solenoid (cold)	*15. Eccentric lever regulation camme*	*5. Water fill solenoid (cold)*	*15. Eccentric lever regulation camme*
6. Water fill solenoid (hot) (certain models only)	*16. Lever arm*	*6. Water fill solenoid (hot) (certain models only)*	*16. Lever arm*
7. Dispenser nozzle	*17. Camme*	*7. Dispenser nozzle*	*17. Camme*
8. Water distributor	*18. Timer*	*8. Water distributor*	*18. Timer*
9. Dispenser duct	*19. Detergent entry tube*	*9. Dispenser duct*	*19. Detergent entry tube*
10. Detergent dispenser	*20. Clip*	*10. Detergent dispenser*	*20. Clip*
	21. Steam venting tube		*21. Steam venting tube*
			22. Solenoid valve support

Detergent dispenser		Detergent dispenser	
3 compartments	**4 compartments**	**3 compartments**	**4 compartments**
			

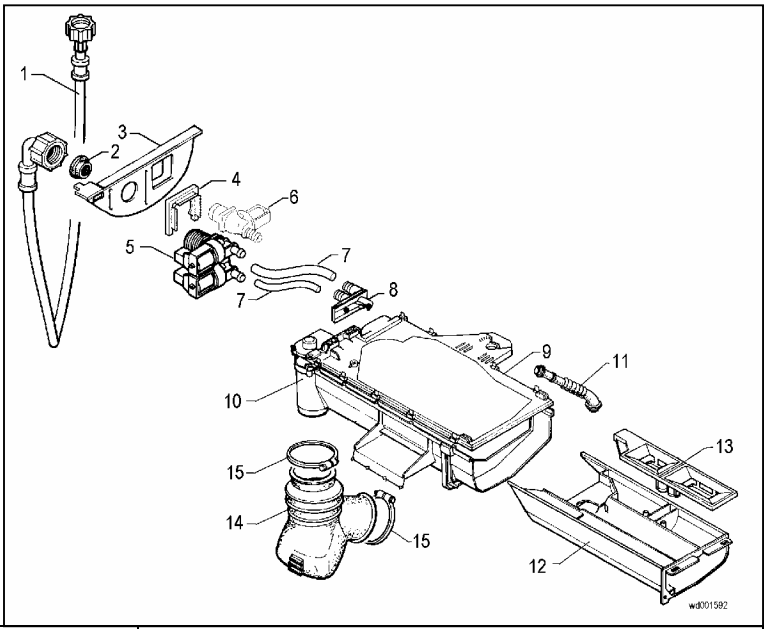
6.8.2 Detergent dispenser with multiple-outlet solenoid valve ("long" version)

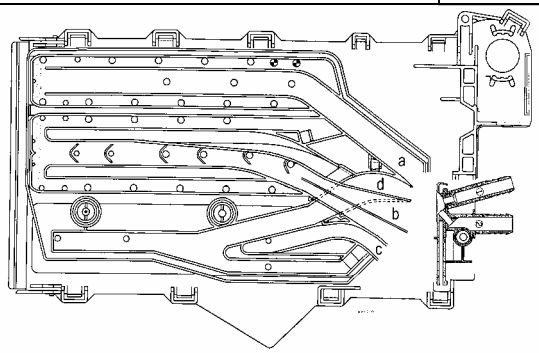
Various versions of this type of detergent dispenser are used in washers and washer-dryers featuring:

- EWM2000 control system
- EWM1000 control system

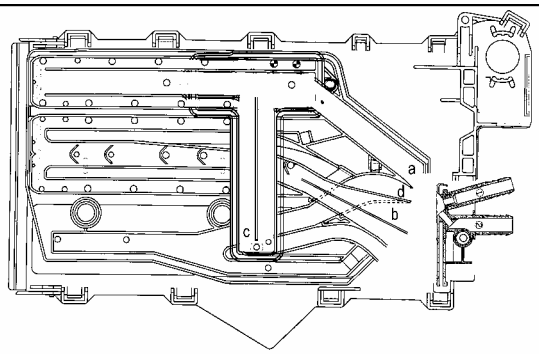
The water is ducted into the detergent compartment by a solenoid valve with one inlet and 2 or 3 outlets. Some models are fitted with a second solenoid valve for the introduction of hot water. The detergent drawer may consist of 3 or 4 compartments.

1. *Fill hose*
2. *Washer*
3. *Cable clamp*
4. *Solenoid valve support*
5. *Water fill solenoid (cold)*
6. *Water fill solenoid (hot) (certain models only)*
7. *Tube*
8. *Dispenser nozzle*
9. *Dispenser duct*
10. *Detergent dispenser*
11. *Steam venting tube*
12. *Detergent drawer*
13. *Siphon for additives*
14. *Detergent entry tube*
15. *Clip*

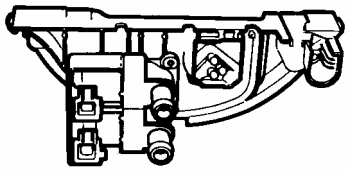
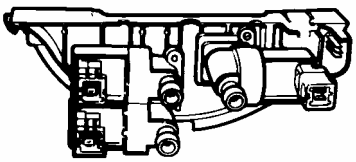
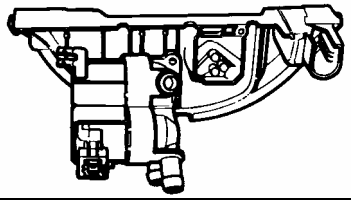




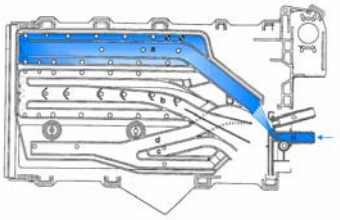
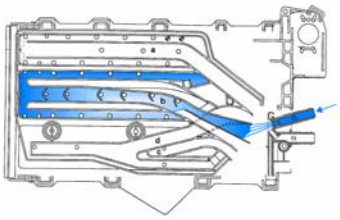
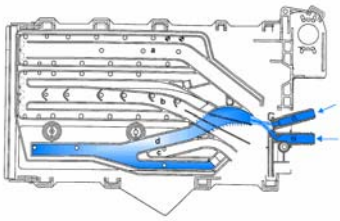
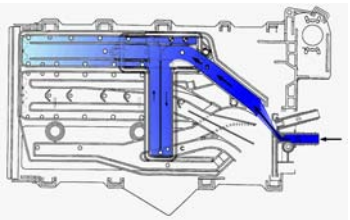
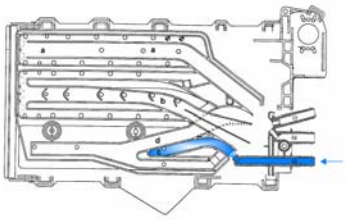
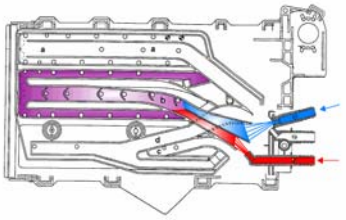
- Water duct with four compartments
- 2- or 3-way water inlet nozzle
- 3- or 4-compartment detergent drawer



- Water duct with four compartments and flow deviator
- 2-way water inlet nozzle
- 4-compartment detergent drawer

Combinations of solenoid valves		
2-way solenoid valve	2-way solenoid valve + solenoid valve for introduction of hot water	3-way solenoid valve
		

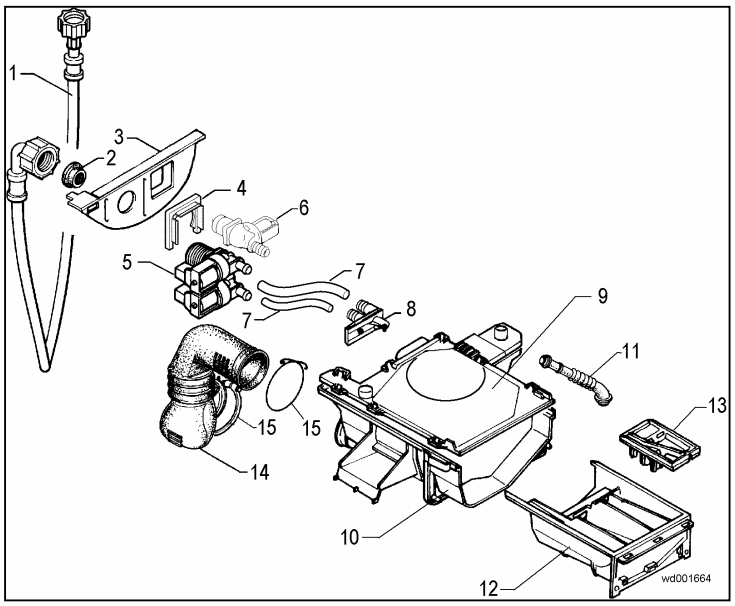
6.8.2.1 Principles of operation

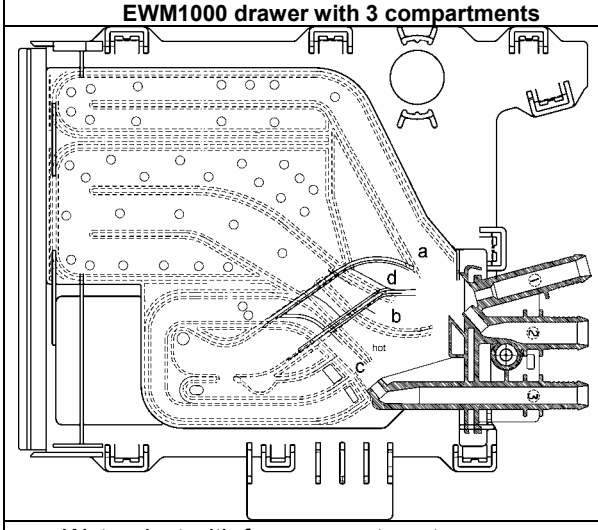
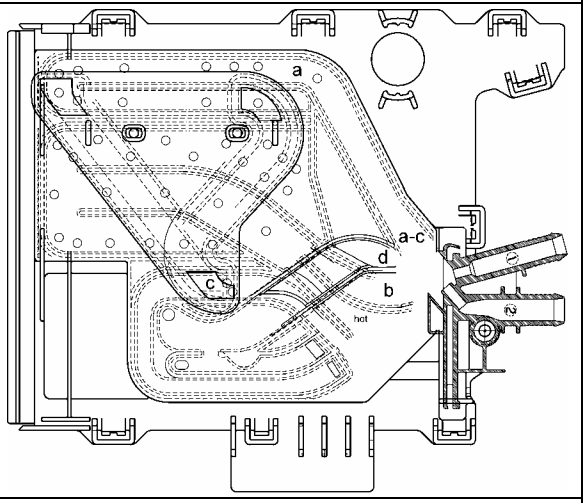
Water fill to pre-wash compartment (Pre-wash solenoid valve) • This version is used in models with **three compartments (EWM1000)** and **3 or 4 compartments (EWM2000)**. The detergent contained in compartment "a" is introduced at the beginning of the pre-wash phase. • In certain models featuring the "stains" option, compartment "a" may be used (as an alternative) to contain the stain-removal product, which is introduced during the wash phase.	
Water fill to wash compartment (Washing solenoid valve) • In all models, compartment "b" is used to contain the detergent, which is introduced at the beginning of the wash phase.	
Water fill to conditioner compartment (pre-wash and wash solenoid valves) • In all models, compartment "d" is used to contain the conditioner, which is introduced at the beginning of the final rinse.	
Water fill to pre-wash and bleach compartment (Pre-wash solenoid valve) • In **EWM1000** models with 4-compartment detergent dispensers, water is ducted into compartments "a" and "c", though not at the same time. • If the user selects the pre-wash option, water is ducted through compartments "a" and "c" at the beginning of the pre-wash phase. If this option has not been selected, water is ducted through the compartments at the beginning of the first rinse.	
Water fill to bleach compartment (Bleach solenoid valve) • In **EWM2000** models with 4 compartments, water is ducted through compartment "c" at the beginning of the final rinse.	
Hot water fill (Wash + hot water solenoid valve) • In models featuring the hot water solenoid valve (**EWM2000** only), the wash and hot water solenoid valves are actioned simultaneously to duct mixed water (hot and cold) through the wash compartment.	

6.8.3 Detergent dispenser with multiple-outlet solenoid valve ("short" version)

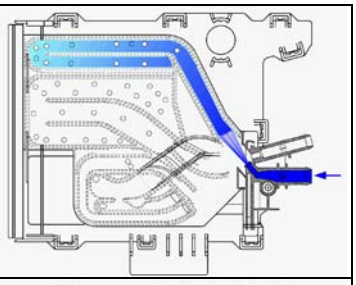
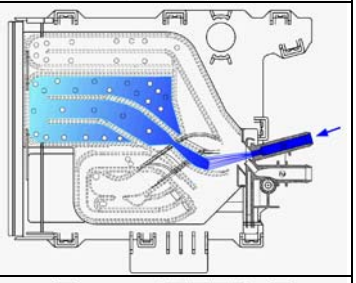
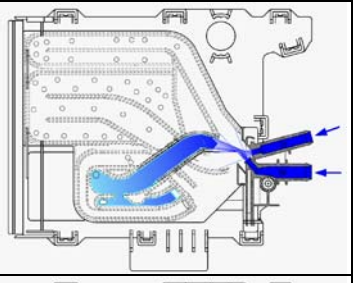
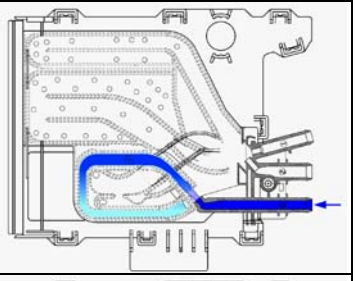
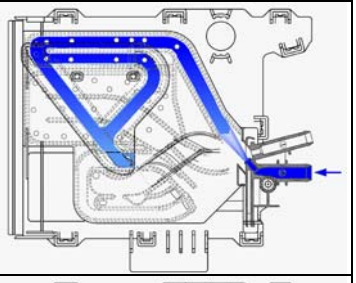
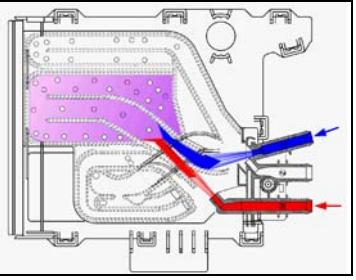
Various versions of this type of detergent dispenser are used in washers featuring:
- EWM2000 control system
- EWM1000 control system

1. *Fill hose*
2. *Washer*
3. *Cable clamp*
4. *Solenoid valve support*
5. *Water fill solenoid (cold)*
6. *Water fill solenoid (hot) (some EWM2000 models only)*
7. *Tube*
8. *Dispenser nozzle*
9. *Dispenser duct*
10. *Detergent dispenser*
11. *Steam venting tube*
12. *Detergent drawer*
13. *Siphon for additives*
14. *Detergent entry tube*
15. *Clip*



Version: EM2000 drawer with 3-4 compartments EWM1000 drawer with 3 compartments	**Version: EM1000 drawer with 4 compartments**
	
• Water duct with four compartments • 2- or 3-way water inlet nozzle • 3- or 4-compartment detergent drawer	• Water duct with four compartments and "fork" • 2-way water inlet nozzle • 4-compartment detergent drawer

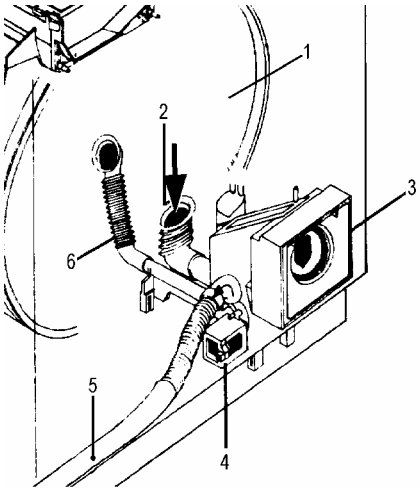
6.8.3.1 Operating principle

Water fill to pre-wash compartment (Pre-wash solenoid valve) • This version is used in EWM2000/1000 models with 3-compartment detergent dispensers. The detergent contained in compartment "a" is introduced at the beginning of the pre-wash phase. • In certain models featuring the "stains" option, compartment "a" may be used (as an alternative) to contain the stain-removal product, which is introduced during the wash phase.	
Water fill to wash compartment (Washing solenoid valve) • In all models, compartment "b" is used to contain the detergent, which is introduced at the beginning of the wash phase.	
Water fill to conditioner compartment (pre-wash and wash solenoid valves) • In all models, compartment "d" is used to contain the conditioner, which is introduced at the beginning of the final rinse. The pre-wash and wash solenoid valves are actioned simultaneously.	
Water fill to pre-wash and bleach compartment (Pre-wash solenoid valve) • In models (**EWM2000**) with 4-compartment detergent dispensers, water is ducted into compartment "c" by a special solenoid valve at the beginning of the first rinse.	
Water fill to pre-wash and bleach compartment (Pre-wash solenoid valve) • In models with 4 compartments (**EWM1000)**, water is ducted through compartments "a" and "c", though not simultaneously. • If the user selects the pre-wash option, water is ducted through compartments "a" and "c" at the beginning of the pre-wash phase. • If this option has not been selected, water is ducted through the compartments at the beginning of the first rinse.	
Hot water fill (Wash + hot water solenoid valve) • In models featuring the hot water solenoid valve (**EWM2000** only), the wash and hot water solenoid valves are actioned simultaneously to duct mixed water (hot and cold) through the wash compartment.	

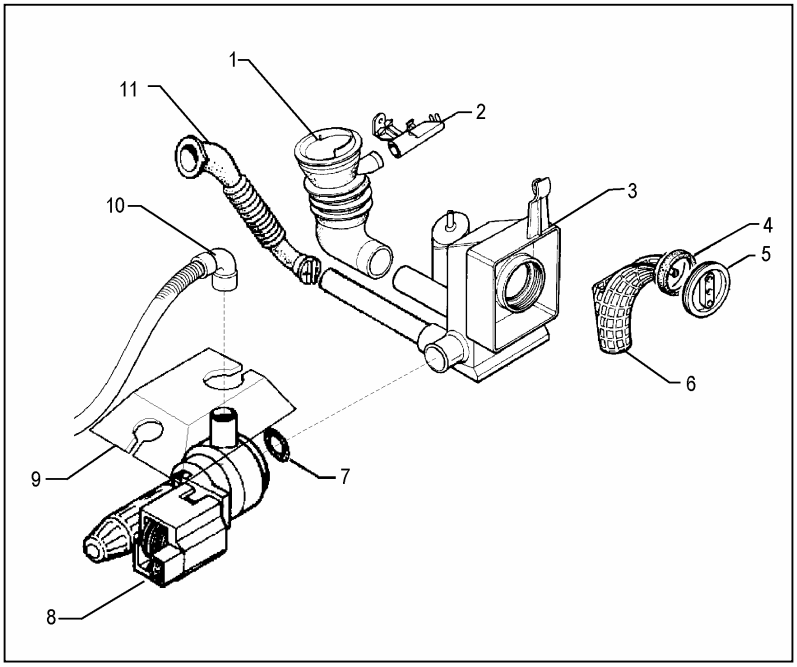
6.9 Drain/circulation circuits

The drain circuit differs according to the structure of the model and the washing system used.

6.9.1 Washers with traditional washing systems



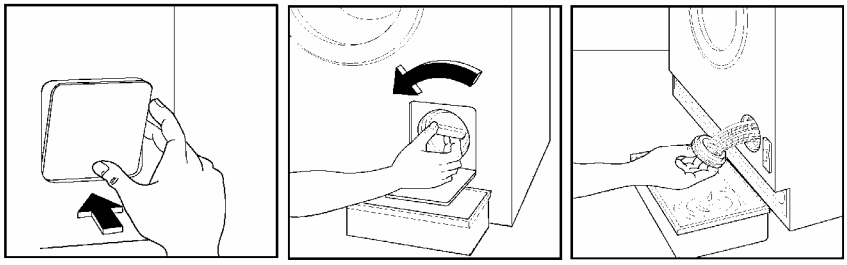
1. *Tub*
2. *Tube between tub and filter body*
3. *Filter body*
4. *Drain pump*
5. *Drain hose*
6. *Circulation tube*



1. *Tube between tub and filter body*
2. *Pressure chamber*
3. *Filter body*
4. *Washer*
5. *Cap*
6. *Drain filter*
7. *Washer (OR)*
8. *Drain pump*
9. *Pump cover*
10. *Drain hose*
11. *Circulation tube*

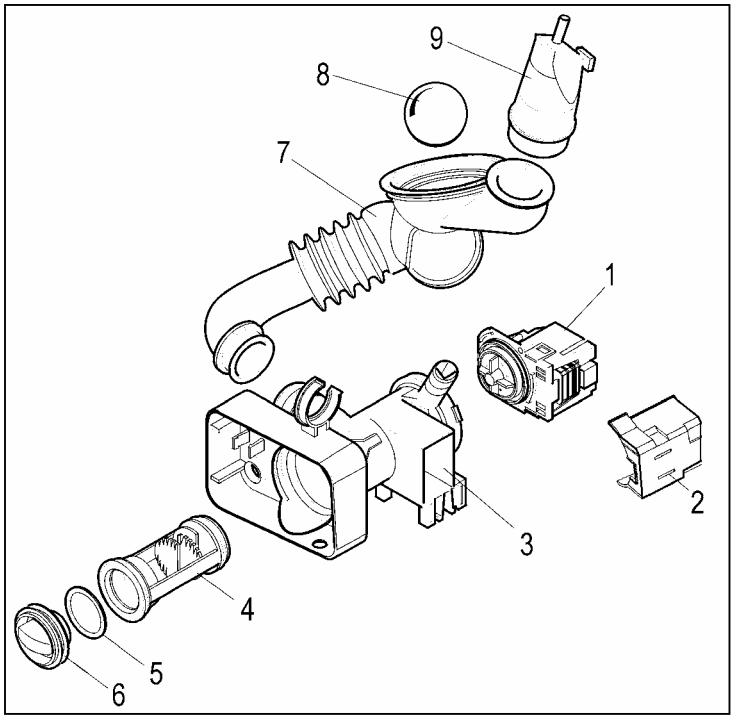
6.9.1.1 Drain filter

- The drain filter features a fine mesh which traps all objects. The filter mesh must be cleaned frequently.



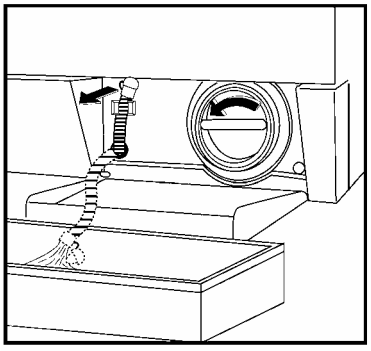
6.9.2 Washers with traditional washing system and “ECO-BALL” ball valve

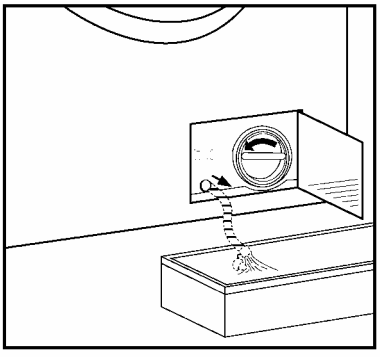
1. *Drain pump*
2. *Pump cover*
3. *Filter body*
4. *Drain filter*
5. *Washer*
6. *Filter knob*
7. *Tube between tub and filter body*
8. *Ball*
9. *Pressure chamber*

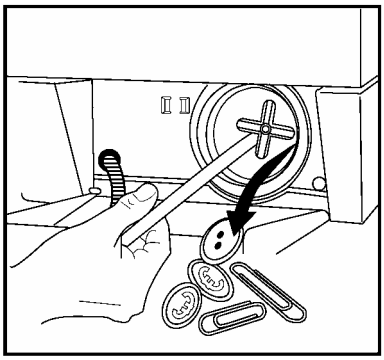


6.9.2.1 Drain filter

- This drain system is self-cleaning: the filter traps only objects of a certain size.
- The drain tube is used to empty the drain circuit.
- The pump impeller can be inspected after unscrewing the filter.

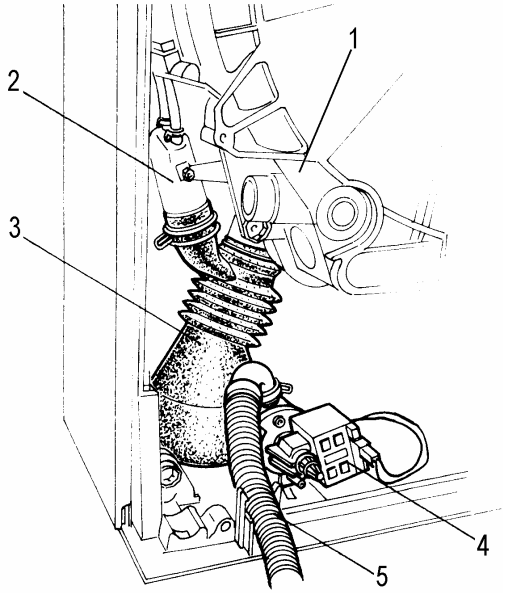






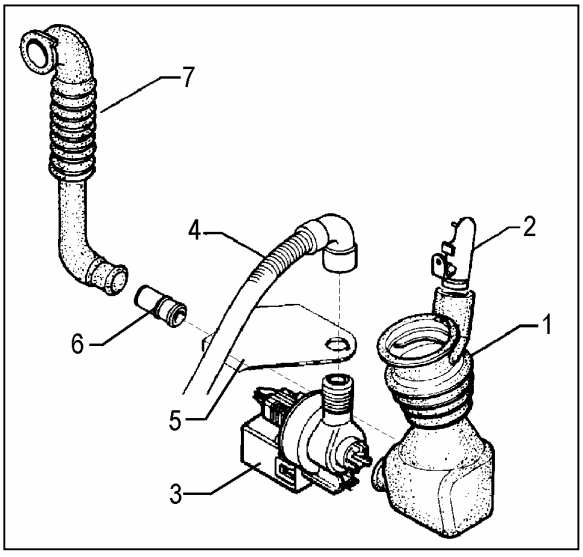
6.9.3 Washers with traditional washing system and “P66" (32 cm) cabinet

1. *Tub*
2. *Pressure chamber*
3. *Tube between tub and pump*
4. *Drain pump*
5. *Drain hose*



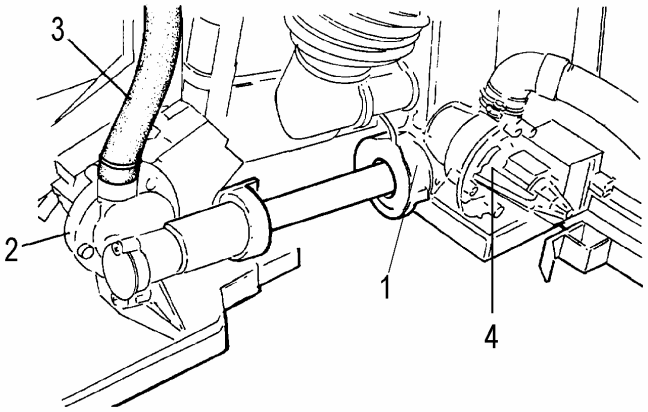
In these appliances, the drain circuit is self-cleaning: the siphon on the tube between the tub and the pump traps objects (coins, hair clips etc.) that might jam the pump.

1. *Tube between tub and drain pump*
2. *Pressure chamber*
3. *Drain pump*
4. *Drain hose*
5. *Pump cover*
6. *Coupling*
7. *Circulation tube*

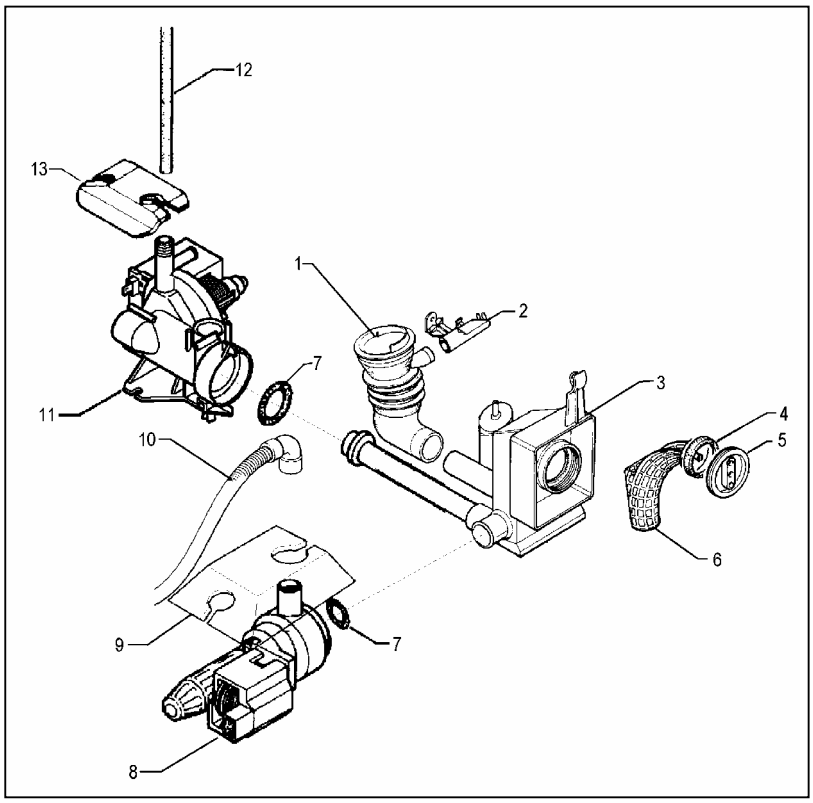


6.9.4 Jetsystem washing machines (with circulation pump)

1. *Filter body*
2. *Circulation pump*
3. *Circulation tube*
4. *Drain pump*

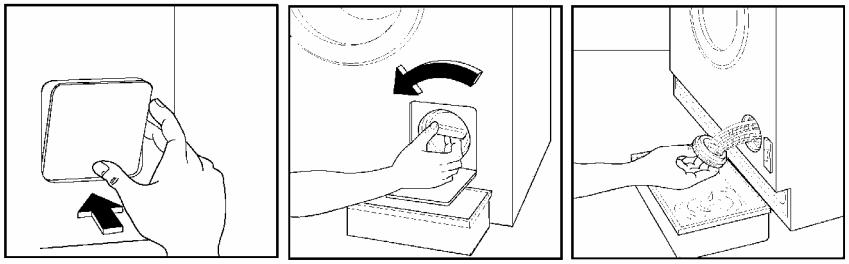


1. *Tube between tub and filter body*
2. *Pressure chamber*
3. *Filter body*
4. *Washer*
5. *Cap*
6. *Drain filter*
7. *Washer (OR)*
8. *Drain pump*
9. *Pump cover*
10. *Drain hose*
11. *Circulation pump*
12. *Circulation tube*
13. *Pump cover*



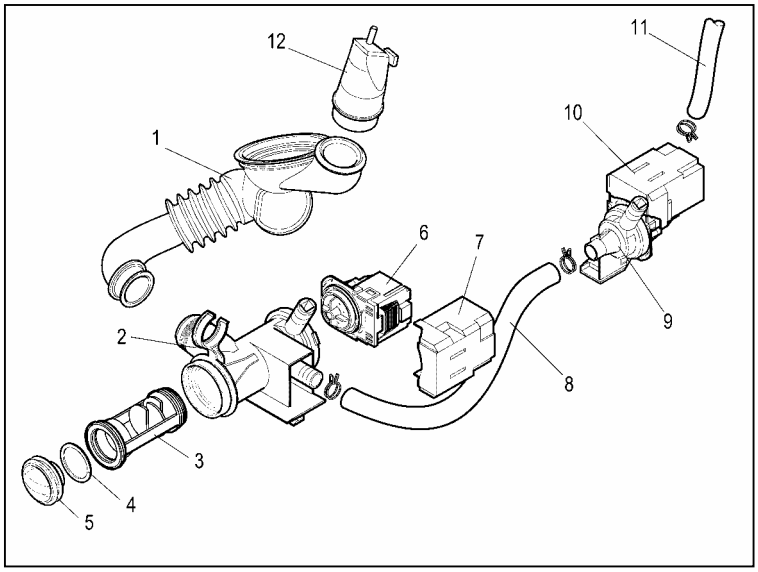
6.9.4.1 Drain filter

- The drain filter features a fine mesh which traps all objects. The filter mesh must be cleaned frequently.



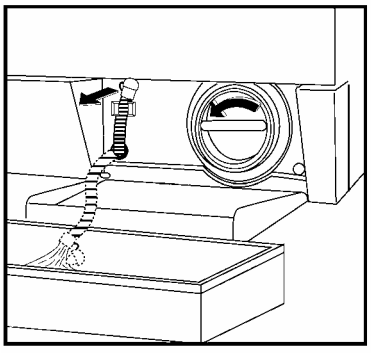
6.9.5 “NEW JET” circulation circuit (Circulation pump) – version P63BD

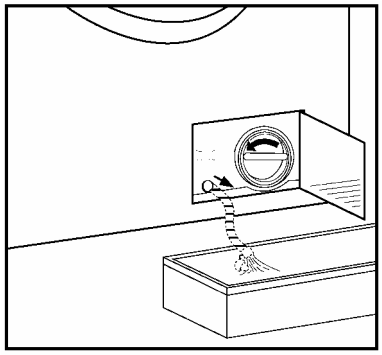
1. *Tube between tub and filter body*
2. *Filter body*
3. *Drain filter*
4. *Washer*
5. *Filter knob*
6. *Drain pump*
7. *Pump cover*
8. *Circulation pump intake tube*
9. *Circulation pump*
10. *Pump cover*
11. *Circulation tube*
12. *Pressure chamber*

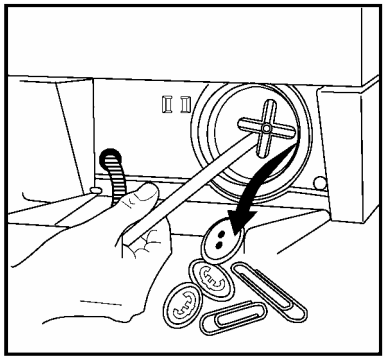


6.9.5.1 Drain filter

- This drain system is self-cleaning: the filter traps only objects of a certain size.
- The drain tube is used to empty the drain circuit.
- The pump impeller can be inspected after unscrewing the filter.

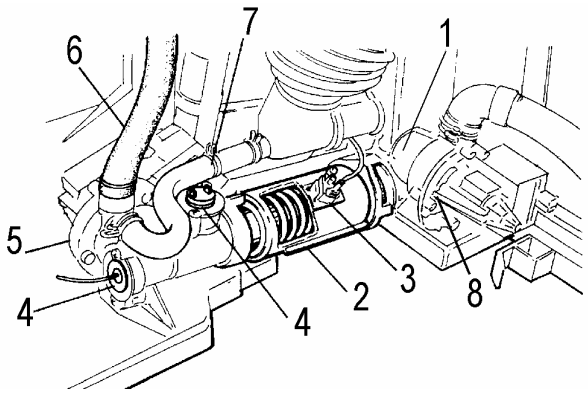




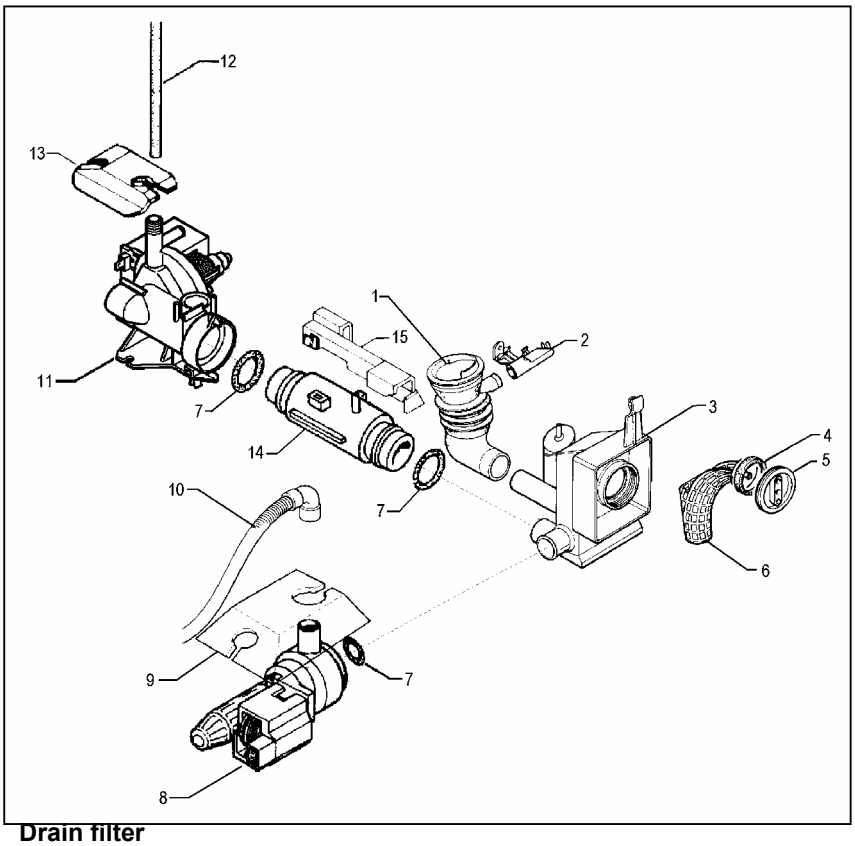


6.9.6 Jetsystem washing machines (Circulation pump) with Heat exchanger (featured on a few older models only)

1. *Filter body*
2. *Heat exchanger (Heating element)*
3. *Safety thermostat*
4. *Thermostats*
5. *Circulation pump*
6. *Circulation tube*
7. *Return tube*
8. *Drain pump*

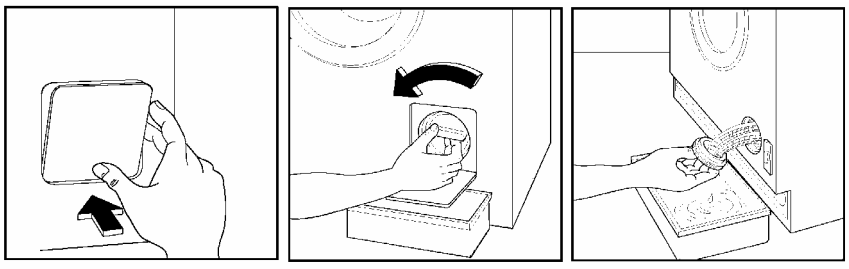


1. *Tube between tub and filter body*
2. *Pressure chamber*
3. *Filter body*
4. *Washer*
5. *Cap*
6. *Drain filter*
7. *Washer OR*
8. *Drain pump*
9. *Pump cover*
10. *Drain hose*
11. *Circulation pump*
12. *Circulation tube*
13. *Pump cover*
14. *Heat exchanger (Heating element)*
15. *Cover*



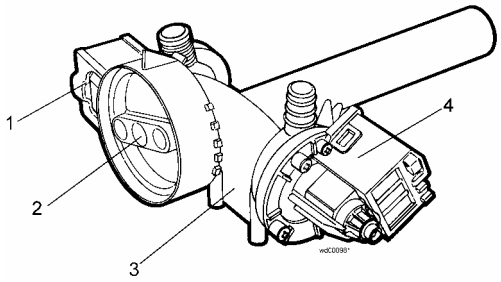
6.9.6.1 Drain filter

- The drain filter features a fine mesh which traps all objects. The filter mesh must be cleaned frequently.

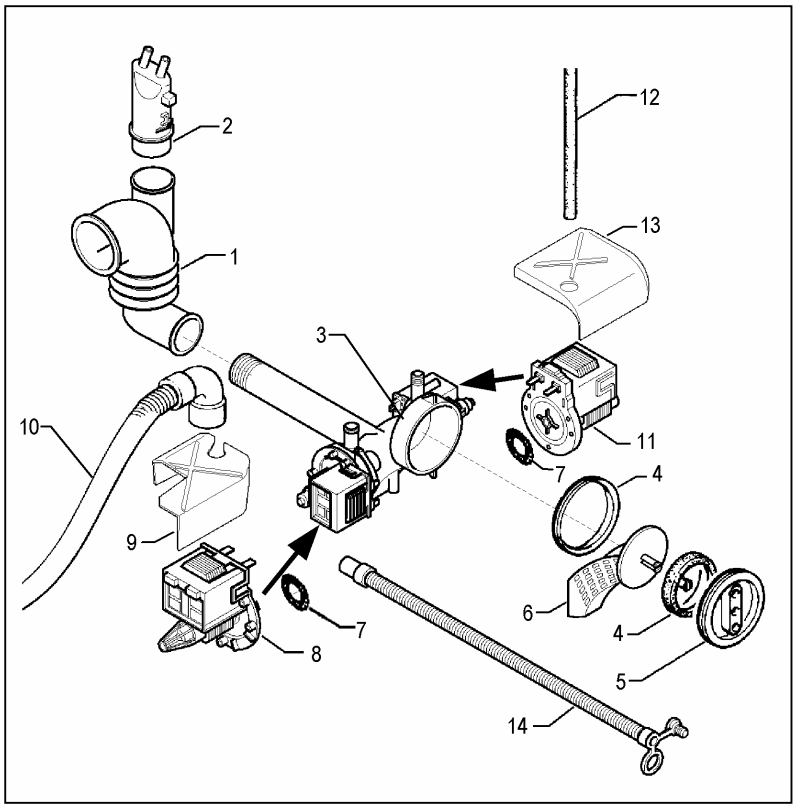


6.9.7 Jetsystem washing machines with NEAT cabinet (JETSY- IZ)

1. *Drain pump*
2. *Filter*
3. *Filter body*
4. *Circulation pump*

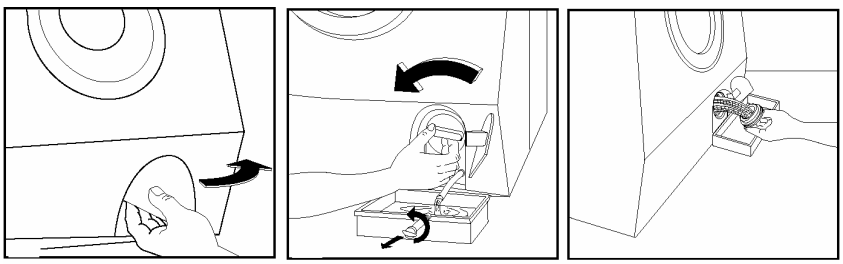


1. *Tube between tub and filter body*
2. *Pressure chamber*
3. *Filter body*
4. *Washer*
5. *Cap*
6. *Drain filter*
7. *Washer (OR)*
8. *Drain pump*
9. *Pump cover*
10. *Drain hose*
11. *Circulation pump*
12. *Circulation tube*
13. *Pump cover*
14. *Drain tube*

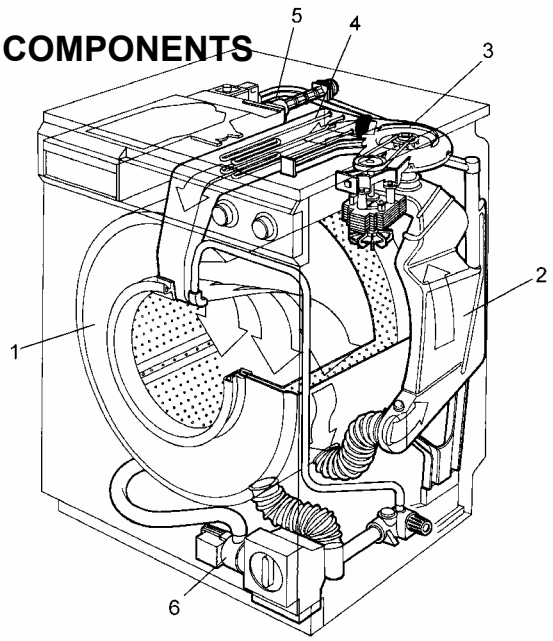


6.9.7.1 Drain filter

- The drain filter features a fine mesh which traps all objects. The filter mesh must be cleaned frequently.



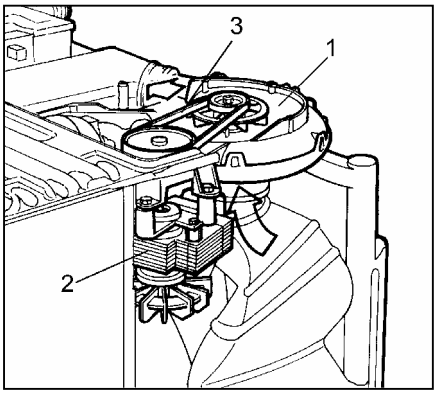
7 WASHER-DRYER COMPONENTS



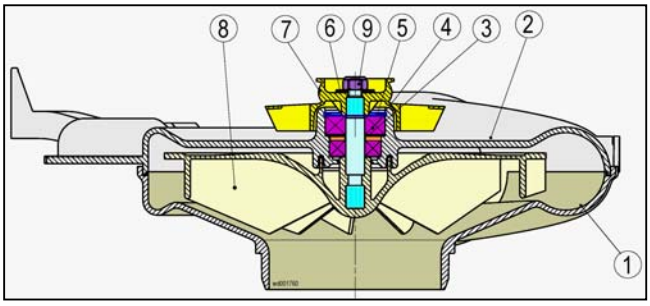
1. *Tub*
2. *Drying condenser*
3. *Fan*
4. *Drying heater casing*
5. *Cold water fill solenoid*
6. *Drain pump*

7.1 Fan assembly

The fan ducts the air from the condenser to the casing containing the heating elements. The fan is actioned by a drive belt attached to the fan motor.



1. *Fan*
2. *Motor*
3. *Drive belt*



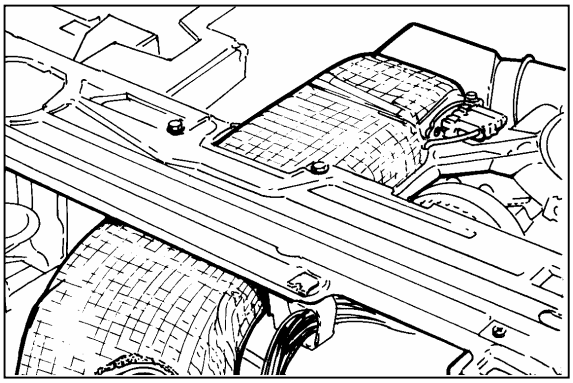
1. *Fan cover*
2. *Fan duct*
3. *Spacer*
4. *Bearings*
5. *"Seeger" rings*
6. *Spindle fastening*
7. *Pulley*
8. *Fan*
9. *Nut*

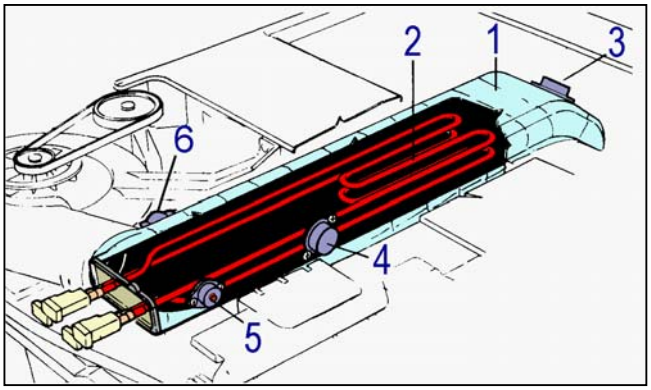
7.1.1.1 Delivery of the fan

⇨ standard version: 55 m^3 of air/hr
⇨ “High Performance” version: approximately 80m^3 of air/hr

7.2 Heater element casing

The heating element casing consists of two half-shells in aluminium alloy. The shells are joined together by screws and sealed with silicone.
The casing is insulated by two half-shells in basalt rock wool encased in a sheet of aluminium and secured by two straps. The air is heated by two heating elements.
During delicate drying, one of the heating elements is switched off. The casing is fitted with thermostats that control the temperature of the air.

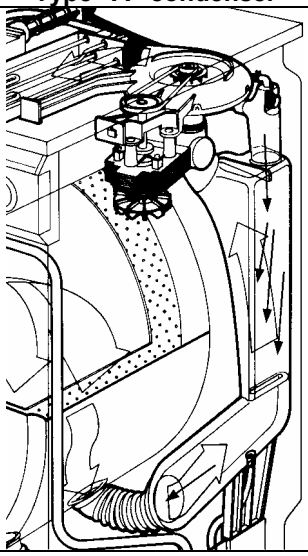
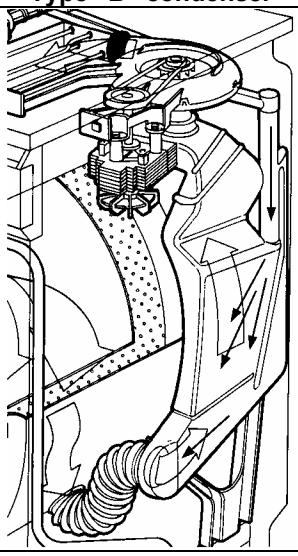
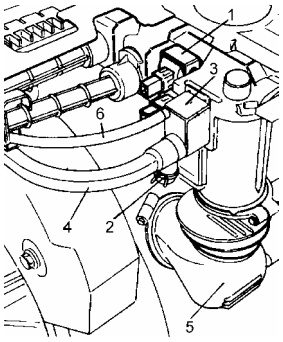
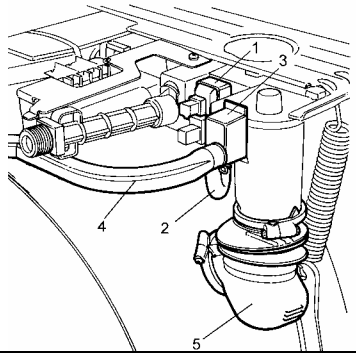
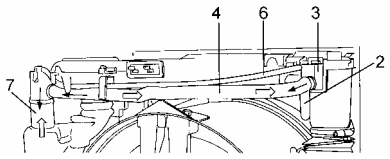
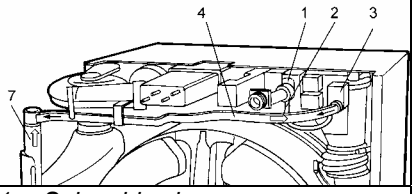




	"Standard" version with electro-mechanical timer	"Standard" version with electronic control system	"Mediterranean" version (electromechanical"	"High Performance" version (electronic control system)
1	*Heater element casing*	*Heater element casing*	*Heater element casing*	*Heater element casing*
2	*Drying heaters (700 + 700W)*	*Drying heaters (700 + 700W)*	*Drying heaters* (700 + 400 W)	*Drying heaters (1000 + 1000W)*
3	------	*NTC sensor for control of drying temperature*	*Manual-reset thermostat (normally-closed, opens at 140°C)*	*NTC sensor for control of drying temperature*
4	*Drying thermostat (normally-closed, opens at 106°C, re-closes at 90°C)*	*Full-power thermostat (only for appliances with MWM electronic control) (normally-open, closes at 85°C)*	*Drying thermostat (normally-closed, opens at 94°C, re-closes at 87°C)*	*Automatic-reset safety thermostat (normally-closed, opens at 110°C, re-closes at 94°C)*
5	*Manual-reset thermostat (normally-closed, opens at 150°C)*	*Manual-reset thermostat (normally-closed, opens at 150°C)*	------	*Manual-reset thermostat (normally-closed, opens at 150°C)*
6	*Automatic-reset safety thermostat (normally-closed, opens at 98°C, re-closes at 75°C)*	*Automatic-reset safety thermostat (normally-closed, opens at 98°C, re-closes at 75°C)*	------	------

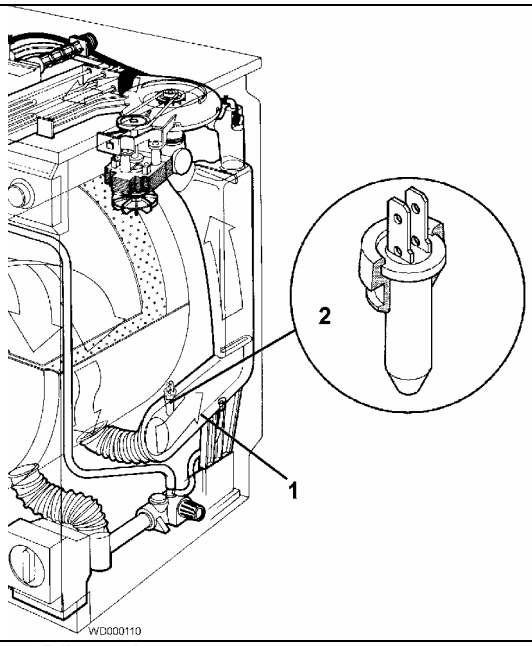
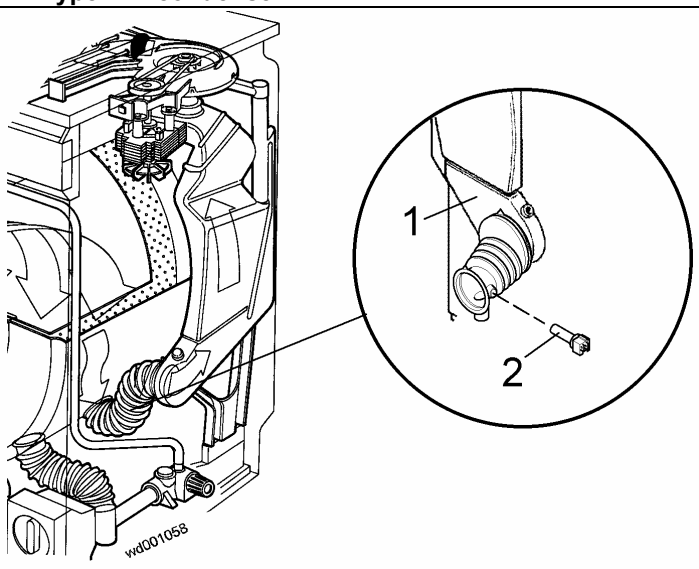
7.3 Drying condenser

The drying condenser consists of a plastic structure which is connected to the lower section of the tub by a rubber sleeve, and to the fan by a seal. The condenser is attached to the base of the appliance.
The humid air enters from the lower section of the condenser, while a jet of cold water is introduced from the upper section. The shape of the condenser is such as to create a turbulence between the flow of humid air and the jet of cold water. This condenses the humidity contained in the air. Therefore, the fan receives cold, dry air, which is then re-circulated and again heated. The cooling water and the condensation run down to the bottom of the tub, to be discharged by the drain pump.

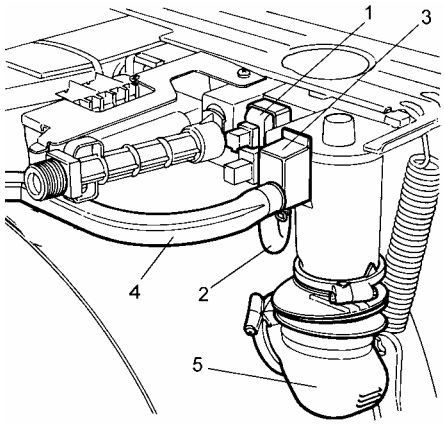
Type “A” condenser	Type “B” condenser
	
	
	
1. Solenoid valve *2. Tube from solenoid valve to coupling* *3. Coupling* *4. Steam venting tube (washing)* *5. Tube from detergent dispenser to tub* *6. Condensed water fill hose* *7. Drying condenser*	*1. Solenoid valve* *2. Tube from solenoid valve to coupling* *3. Coupling* *4. Condensed water fill hose and steam vent (washing)* *5. Tube from detergent dispenser to tub* *7. Drying condenser*

7.3.1 Determining the drying time (models with electronic control system only)

In certain models with electronic control (EWM2000/MWM), the user can select automatic drying cycles. In this case, the drying time is determined according to the desired degree of humidity.
The electronic control system utilizes an NTC sensor, fitted to the drying condenser, to calculate the drying time.

Type “A” condenser	
1. Drying condenser *2. NTC temperature sensor*	
Type “B” condenser	
1. Drying condenser *2. NTC temperature sensor*	

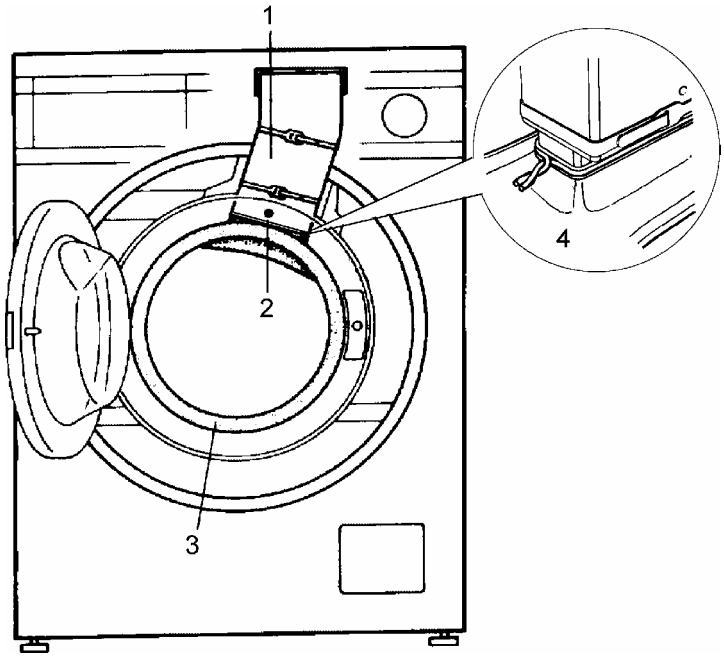
7.3.2 Condensation water fill



1. *Solenoid valve*
2. *Tube from Solenoid valve to Coupling*
3. *Coupling*
4. *Tube from Coupling to condenser*
5. *Siphon on Tube from detergent dispenser to tub*

The condensation water is delivered by a section of the cold water solenoid valve, whose delivery is 0.4 litres per minute.
The solenoid valve is connected by a hose to a coupling; the water is ducted from this coupling to the upper section of the condenser. A small hole inside the coupling allows a tiny quantity of water to flow to the bottom of the detergent dispenser. This ensures that there is always water inside the siphon on the hose between the detergent dispenser and the tub, thus preventing steam from being expelled from the tub and the detergent dispenser during drying.

7.4 Duct



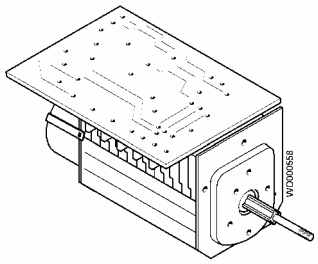
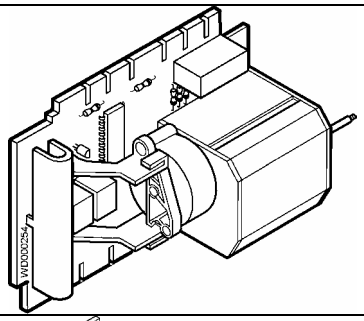
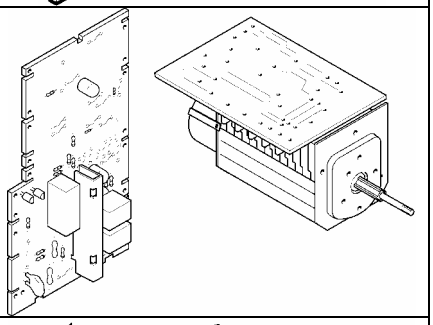
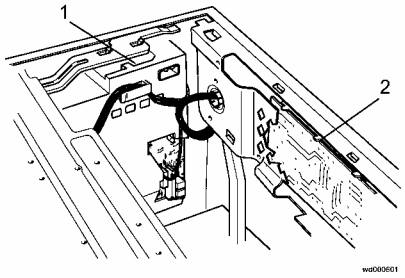
1. *Duct*
2. *Screw*
3. *Bellows seal*
4. *Wire clamp*

The front duct directs the hot air coming from the heating elements directly to the interior of the drum, passing through the bellows seal. The duct consists of two channels in aluminium alloy, joined together by screws and sealed with silicone. The duct, too, is insulated by two basalt rock wool half-shells encased in a sheet of aluminium and secured in position by two straps.
The duct is secured to the front cabinet shell by a screw; the seal between the duct and the bellows seal is provided by a steel wire clamp.

8 ELECTRICAL COMPONENTS

8.1 Control systems

The operation of the appliance depends on the type of control system used, since the control system governs the various operations comprising the washing cycle.

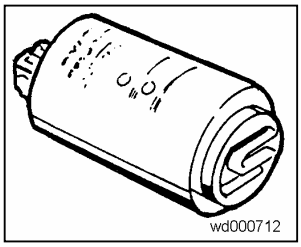
Types of control systems	
• **Electromechanical timers (F50-F51-F52-F53)**: the controls are actuated by the commutator contacts, which are actioned by a series of cammes. This movement is transmitted to the cammes by a synchronous motor via a series of gears and levers.	
• **Integrated hybrid timers (VD54-VD55-VS60-VS71-VS81)**: These consist of two components: an electromechanical timer and a control PCB. The control board is soldered directly to the connectors of the timer, and performs the following functions: - controls the washing programmes and the various options - powers the timer motor - powers and controls the drum rotation motor All the other components of the appliance are powered by the timer contacts.	
• **Hybrid timers (VA20, VA30J)**: These consist of two components: an electromechanical timer and a control PCB. The control board is fitted to the base of the appliance, and performs the following functions: - controls the washing programmes and the various options - powers the timer motor - powers and controls the drum rotation motor All the other components of the appliance are powered by the electromechanical timer.	
• **Electronic control systems:** → **EWM2000**: The main PCB (1), to which the microprocessor is fitted, powers the components of the appliance via a triac and a relay, and controls the various parameters for the functional control of the washing programme. The control/display board (2) acts as an interface between the user and the main PCB. This board is fitted with the various buttons for selection of the washing cycle options, and a series of LEDs. According to the model, programmes may be selected using the buttons or a programme selector knob. → **EWM1000**: The functions of the main PCB and the display board are integrated in a single PCB (2).	

For further details regarding the various functionalities, refer to the specific Service Manuals issued for each type of timer/electronic control system.

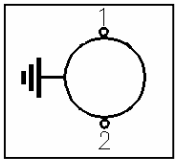
8.2 Suppressor

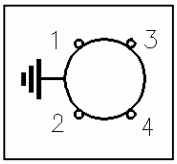
8.2.1 General characteristics

The suppressor is connected to the input of the appliances power line, and prevents radiofrequency disturbance from entering the power circuit.

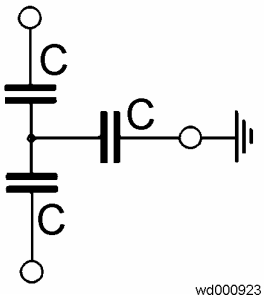


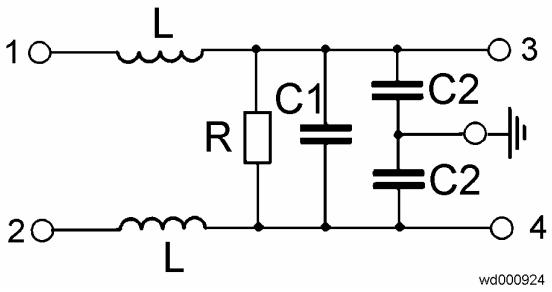
8.2.2 Electrical symbols





8.2.3 Circuit diagrams





8.2.4 Checking for efficiency

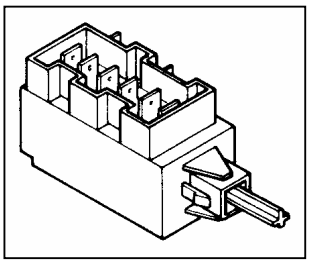
THE APPLIANCE GENERATES RADIOFREQUENCY DISTURBANCE:
- check the efficiency of the earth circuit

THE APPLIANCE IS INOPERATIVE:
- Use an ohmmeter to check that the component is not faulty:
  - across 1 - 3 about 0 Ω
  - across 2 - 4 about 0 Ω

THE ELECTRICAL SAFETY CUT-OUTS INTERVENE:
- use an ohmmeter (capacitance meter) to check that the component is not short-circuited across 3 - 4 (>500KΩ)
- check that there are no leaks to earth

8.3 Push-button

8.3.1 General characteristics



Single-button versions are used.
These differ as regards the number and functionality of the contacts:

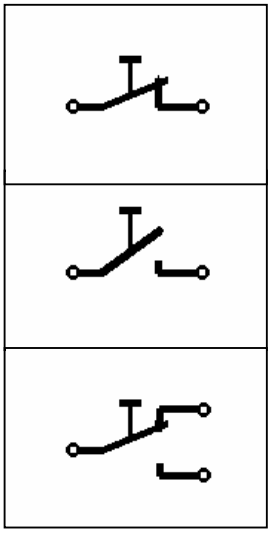
- switch
- deviator (single- or two-pole)

8.3.2 Electrical symbol

Normally-closed switch

Normally-open switch

Deviator



8.3.3 Checking for efficiency

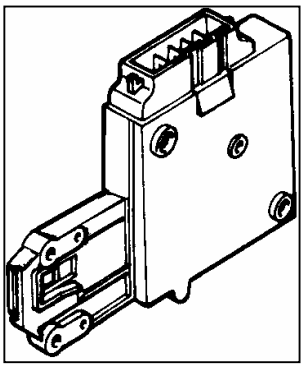
DOES NOT POWER THE APPLIANCE OR DOES NOT PERFORM THE SPECIFIC FUNCTION:

- Use a tester to check for correct closure (or aperture) of the various contacts.
- Press the button and check for switching of the contacts.

IMPOSSIBLE TO ACTION THE BUTTON

- Check that the spindle is not broken and that there are no other mechanical problems (friction/breakage of couplings to cross-member).

8.4 Door safety interlock (traditional version)



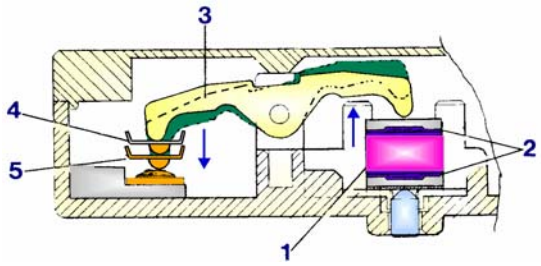
8.4.1 General characteristics

The electromechanical door safety device performs the following functions:

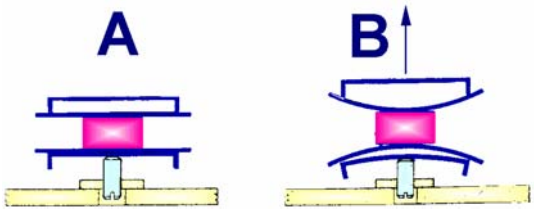
- When powered, the voltmetric safety interlock closes the contacts of the main switch that powers the electrical components of the appliance (only if the door is closed).
- During operation, the lever is blocked mechanically, preventing opening of the door when the appliance is in operation.
  When the power supply is disconnected, the door remains locked for 2-3 minutes to ensure that the drum comes to a stop before the door is opened.

In more complex versions, the safety interlock also performs the following functions:

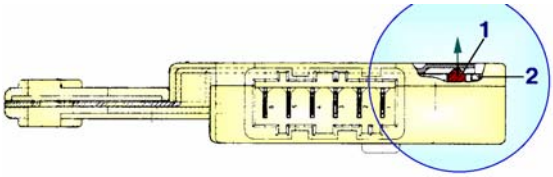
- By means of a pneumatic actuator it maintains the latch closed when there is water in the tub.
- It also acts as a support for the door aperture levers when aperture is effected using the pushbutton.
- The "door closed" pilot lamp may also be fitted using a special support.



1. *P.T.C.*
2. *Bi-metal strips*
3. *Contact in rest position*
4. *Contact closed*

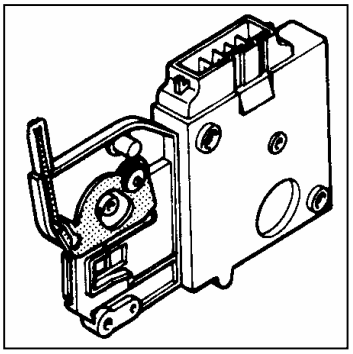


The PTC is a ceramic resistor whose internal resistance increases with the temperature.
In this device, the PTC is used to heat the bi-metal strips. The temperature deforms the two strips (from **A** to **B**), thus moving the lever which closes the contact of the main switch.
At the same time, the latch, which is actioned by the contact plate, moves outwards to block the lever in position. This procedure takes place within 5 seconds after power is supplied.
When the power supply is disconnected, the PTC cools (1 - 2 minutes), and the strips return to their original position, thus opening the contact and releasing the lever.



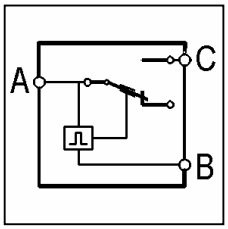
1. *Latch*
2. *Lever*

8.4.1.1 Version with door aperture system



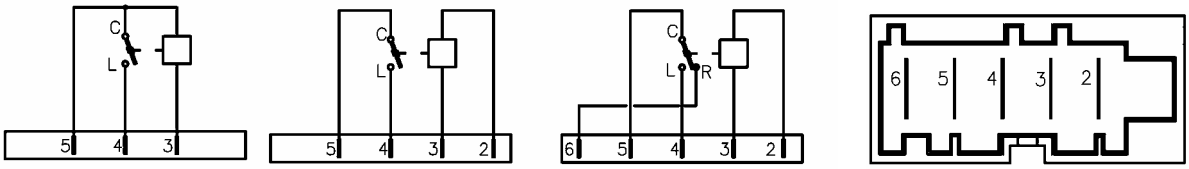
On certain models, the door can be opened by pressing a button on the control panel.
In this case, the safety device is fitted with a series of levers that release the latch.

8.4.2 Electrical symbol



A *Common contact*
B *PTC power supply contact*
C *Main switch contact*

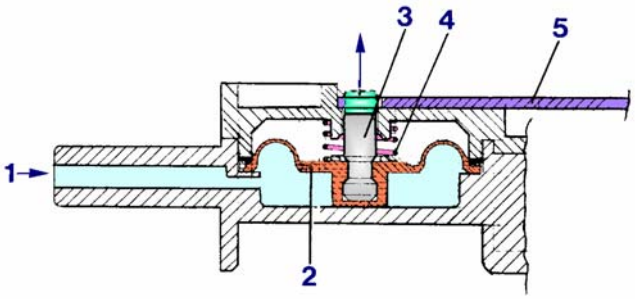
8.4.3 Circuit diagrams



Connector

8.4.4 Version with pneumatic device (certain models only)

1. *Air intake aperture*
2. *Membrane*
3. *Latch*
4. *Spring*
5. *Lever*



A tube connects the door delay device to the filter body. When the pressure on the membrane is greater than the force exerted by the counterspring (100 ± 30 column water mm), the latch remains extended, blocking the lever in position.

8.4.5 Checking for efficiency

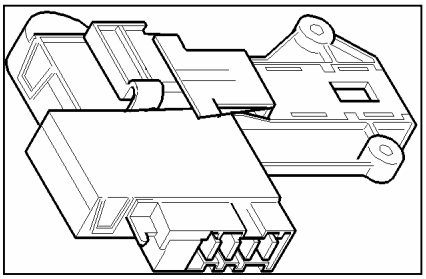
THE DOOR DOES NOT OPEN AT THE END OF THE CYCLE:
- Operate the washing machine so that the door delay device is powered for about 30 seconds.
- Switch off the appliance. The door should be released within about 2 minutes. If not, the door interlock is faulty.

THE APPLIANCE DOES NOT START AND/OR THE PORTHOLE DOOR IS NOT LOCKED:
- Operate the appliance for about 5 minutes.
- Switch off for 2 minutes.
- Switch the appliance on again. The appliance should start within no more than 5 seconds, and the door should be locked. If not, check that the device is correctly powered (wiring - main switch - timer), and replace if necessary.

8.5 Instantaneous door safety interlock

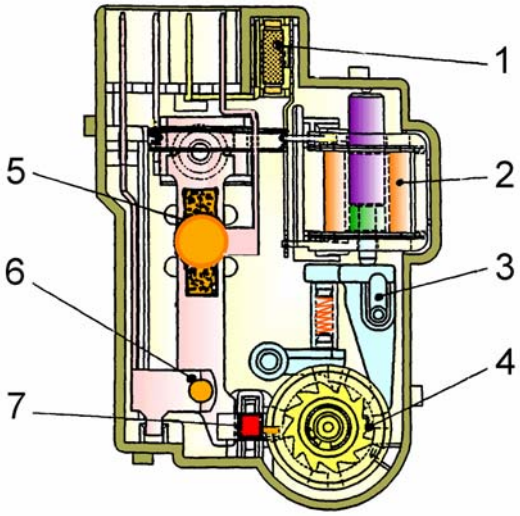
8.5.1 General characteristics

Certain models with electronic control systems feature an instantaneous door safety interlock. In this case, the door can be opened as soon as the drum comes to a stop.



8.5.2 Operating principle

1. *Solenoid protective PTC*
2. *Solenoid valve*
3. *Lever mechanism*
4. *Camme*
5. *Bi-metal PTC*
6. *Electrical contacts (main switch)*
7. *Locking latch*



- When the appliance is switched on by pressing the ON/OFF button, the bi-metal PTC is powered; the camme is in a position that prevents the locking latch from moving outwards.
- When the programme is started by pressing START/PAUSE, the main PCB sends a signal (duration 20 msec) to the solenoid (at least 6 seconds after switching on), which causes the camme to rotate one position. The latch which locks the lever of the door safety interlock is raised and, at the same time, the contacts of the main switch are closed, thus powering all the electrical components.
- At the end of the programme, the PCB sends two signals (at an interval of 200 msec) (duration 20 msec):
  - the first signal moves the camme by another position, though the latch is not released.
  - the second signal (which is sent only if the system functions correctly) moves the camme by a further position, which causes the latch to retract, thus releasing the device; at the same time, the contacts of the main switch are opened.

8.5.2.1 "Door open" conditions

The main PCB, before sending the door aperture signals, checks for the following conditions:

- The drum must be stationary (no signal from the tachymetric generator)
- The water level must not be higher than the lower edge of the door
- The temperature of the water must not be higher than 40º C.

8.5.2.2 Automatic release device

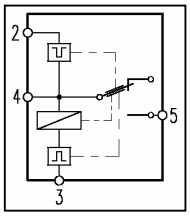
In the event of a power failure, or if the appliance is switched off using the ON/OFF switch, or if there is a fault in the solenoid valve, the bi-metal PTC cools within a period of between 55 seconds and about 4 minutes (at a temperature of 65°C), thus releasing the door.

8.5.2.3 Protective cut-out for solenoid valve

A PTC, connected in series to the solenoid valve, serves as a current limiter (i.e. overheating cut-out) in the following cases:

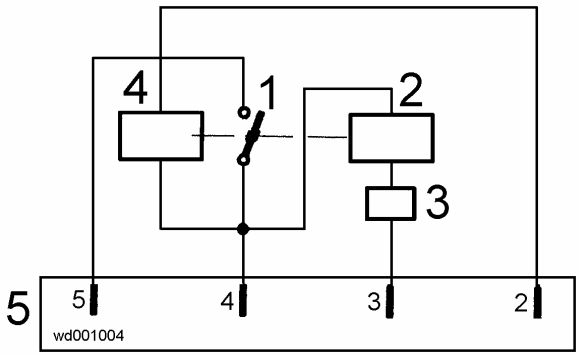
→ If the triac on the main PCB is short-circuited
→ If the START/PAUSE button is pressed repeatedly (more than 10 times)

8.5.3 Electrical symbol



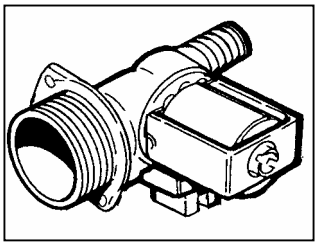
8.5.4 Circuit diagram

1. Main switch
2. Solenoid valve
3. PTC protective solenoid valve cut-out
4. Bi-metal PTC
6. Connector



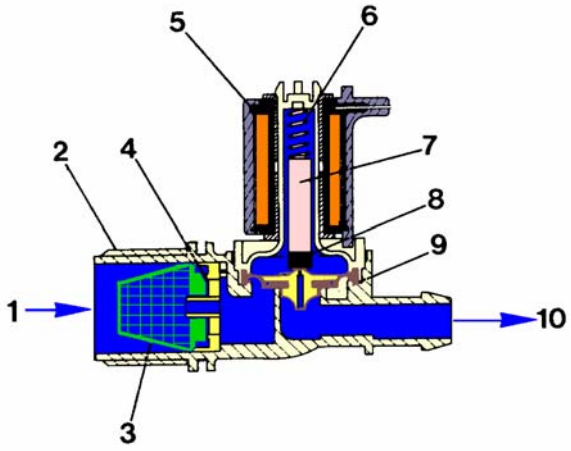
8.6 Solenoid valve

8.6.1 General characteristics



The solenoid valve ducts water through the detergent dispenser, and is controlled electrically by the pressure switch.

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



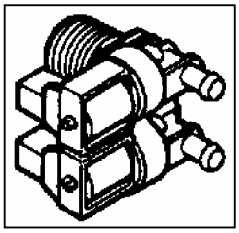
When at rest, the core, upon which pressure is exerted by a spring, holds the hole in the centre of the membrane closed; as a result, the membrane hermetically closes off access to the water intake duct.
When the coil is powered, it attracts the core, which therefore opens the small hole in the centre of the membrane, and the valve opens.

Various types of solenoid valve may be fitted:
→ solenoid valves with one inlet and one outlet
→ solenoid valves with one inlet and two or three outlets. In this case, each section of the solenoid valve is controlled by a coil.

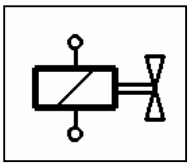
- **Cold water solenoid valve**
  The cold water solenoid valve is fitted to all models, and has a nominal delivery of about 6.5 - 9.5 litres per minute. The water pressure must be between 3 and 100 N/cm$^{2.}$

- **Hot water solenoid valve**
  The hot water solenoid valve is added to the cold water valve on models designed for hot water fill. Its nominal delivery is about 5 - 6 litres per minute.

- **Condensation solenoid valve**
  This solenoid valve, with one inlet and two or three outlets, is used in washer-dryers.
  One section is used for the introduction of cold water; the other, whose delivery is about 0.4 litres per minute, is used for condensation of the steam during the drying phase.



8.6.2 Electrical symbol



8.6.3 Checking for efficiency

WATER FILL CONTINUES WHEN THE APPLIANCE IS SWITCHED OFF:
- Solenoid valve jammed mechanically. Replace the solenoid valve

WATER FILL CONTINUES DURING THE WASHING CYCLE:
- Check the hydraulic circuit of the pressure switch and the pressure switch itself.

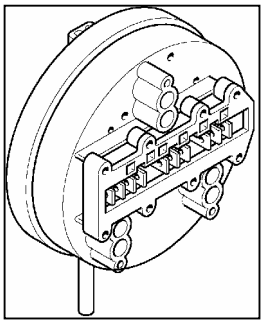
NO WATER FILL:

1. The solenoid valve vibrates (noise from the coil) but does not introduce water:
   - check the hydraulic circuit that supplies the solenoid valve (tap turned off, insufficient mains water pressure, fill hose kinked or obstructed).
   - Solenoid valve jammed mechanically. Replace the solenoid valve

2. The solenoid valve does not vibrate:
   - Check the coil winding (3500 - 4500 ohm); if faulty, replace the solenoid valve.
   - Solenoid valve jammed mechanically. Replace the solenoid valve
   - Check the hydraulic circuit of the pressure switch and the pressure switch itself
   - Check the timer and/or the main PCB for correct operation.

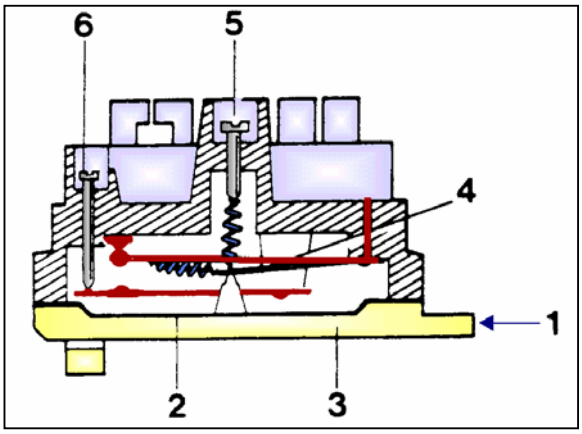
8.7 Pressure switch

8.7.1 General characteristics



The function of the pressure switch is to determine the quantity of water to be introduced into the tub. In other words:

- ⇨ It controls the water fill levels during the washing phases.
- ⇨ It acts as an anti-boiling safety device when connected in series to the heating element.
- ⇨ It can also act as an anti-overflow safety device if connected in series to the drain pump.
- ⇨ It can act as an anti-foam device during the spin phases.

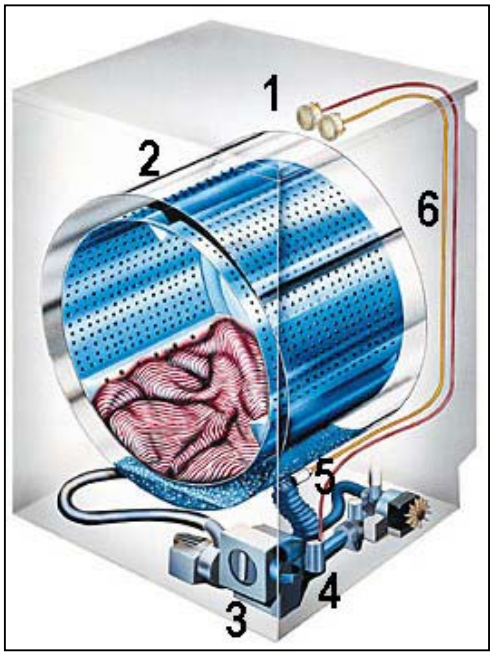


1. *Air inlet aperture*
2. *Diaphragm*
3. *Internal chamber*
4. *Contact strip (rapid cut-in)*
5. *Level regulation screw*
6. *Differential regulation screw*

The internal chamber is connected via a small tube to the pressure chamber. When water is introduced into the tub, the pressure in this chamber increases. When the pressure reaches a pre-determined level, the membrane causes the contact strip to trip (rapid-action), which switches the contact from "empty" to "full". Two regulation screws are fitted to the cover, one for the level, the other for the differential, i.e. the point at which the strip returns to the "empty" position when the level of water in the tub decreases.

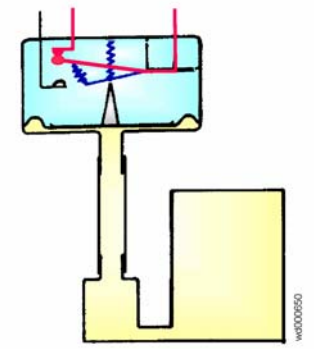
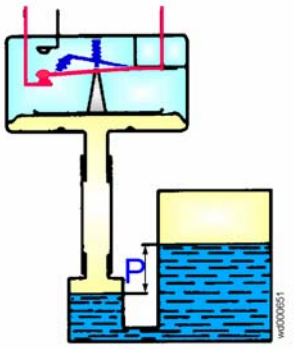
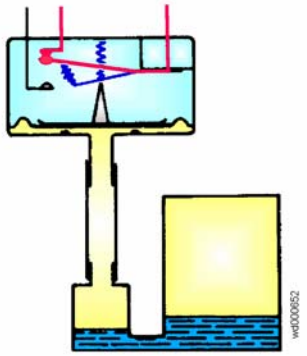
8.7.2 Pressure switch hydraulic circuit

1. *Pressure switches*
2. *Tub*
3. *Filter body*
4. *Pressure chamber on filter body*
5. *Pressure chamber on the tube between the tub and the filter body*
6. *Pressure switch tubes*

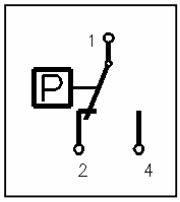


- Normally, all appliances are fitted with one or two pressure switches (in rare cases, an appliance may feature three pressure switches). Each pressure switch controls from one to three levels of water in the tub.
- The small tube from the pressure switches may be connected to the pressure chamber, which is located beneath the tub (this is the most common solution) or to that on the filter body.
- One or two pressure switches may be connected to the pressure chamber, depending on the model.

8.7.3 Operating principle

Tub empty	Water flows into the tub	Water is drained from the tub
As there is no water in the tub, there is no pressure on the diaphragm, which thus remains in the lower position due to the counterforce exerted by the spring. In this position, the contact is closed on "empty".	When the connection between the tub and the pressure chamber is interrupted by the water, the pressure between the pressure chamber and the internal chamber of the pressure switch increases. This increase continues until the diaphragm is raised sufficiently to action the switch (rapid-action). In this position, the contact is closed on "full".	As the level of water in the tub diminishes, the pressure exerted on the diaphragm is reduced. The diaphragm is pushed downwards by the counterspring until the switch resets (i.e. returns to the "empty" position).
		

8.7.4 Electrical symbol



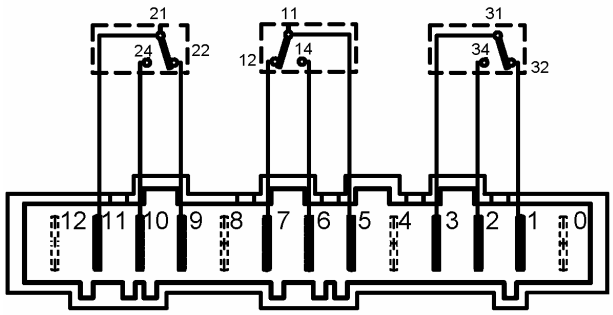
1. *Common contact*
2. *Contact closed on "empty"*
4. *Contact closed on "full"*

8.7.5 Circuit diagram

11-21-31: *"Common" contact*

12-22-32: *"Empty" contact*

14-24-34: *"Full" contact*



8.7.6 Checking for efficiency

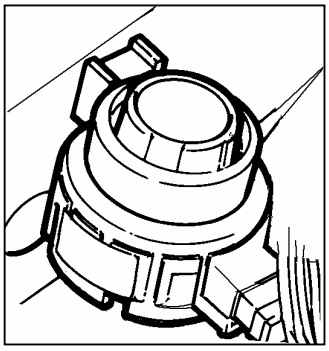
Correct operation of the pressure switch depends on the correct operation of its hydraulic circuit (tube and pressure chamber):

- Check for leaks (in which case too much water would be introduced, as the switch would not close on "full" or, in the event of microleakage, would return to "empty".
- Check for obstruction (in which case the contacts may be jammed on "full" or "empty").

After checking the hydraulic circuit:

- Introduce water into the tub to the highest level and check that the contacts close correctly on "full".
- Drain the water from the tub and check that the contacts close correctly on "empty".

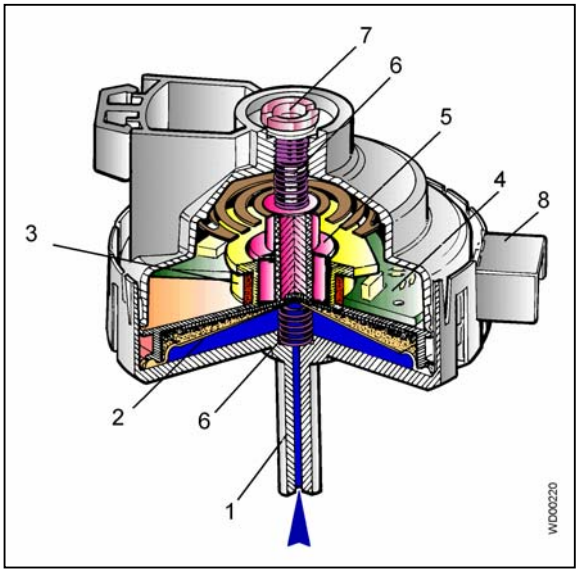
8.8 Analogue (electronic) pressure switch



8.8.1 General characteristics

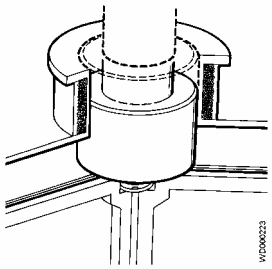
The electronic pressure switch is an analogue device whose function is to control the level of water in the tub; it is used in certain models with electronic control systems (EWM2000 - MWM1.5).
The electronic circuit is connected directly to the main PCB.

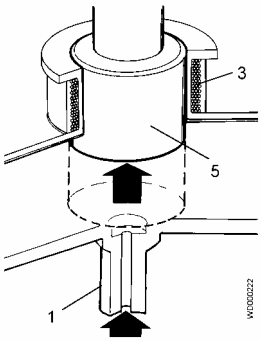
8.8.2 Operating principle



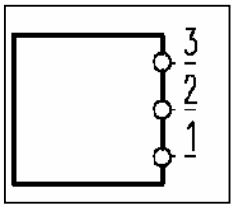
1. Air intake tube
2. Membrane
3. Coil
4. Electronic circuit (oscillator)
5. Core
6. Spring
7. Calibration spring
8. Connector

The pressure switch is connected via tube to the pressure chamber.
When water is introduced into the tub, this creates a pressure inside the hydraulic circuit that causes the membrane to change position. This movement of the membrane modifies the position of the core inside the coil, varying its inductance and thus the frequency of the oscillating circuit.
The PCB recognizes how much water has been introduced into the tub according to the frequency.

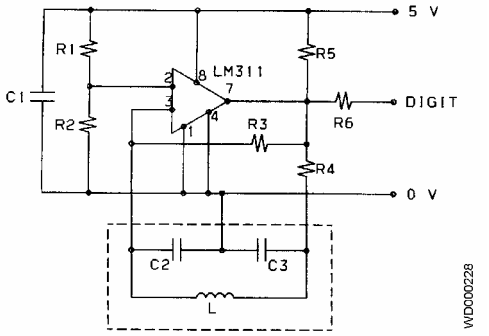
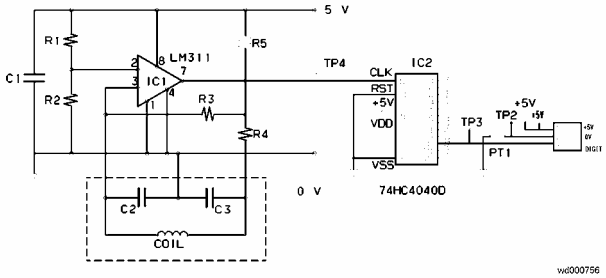
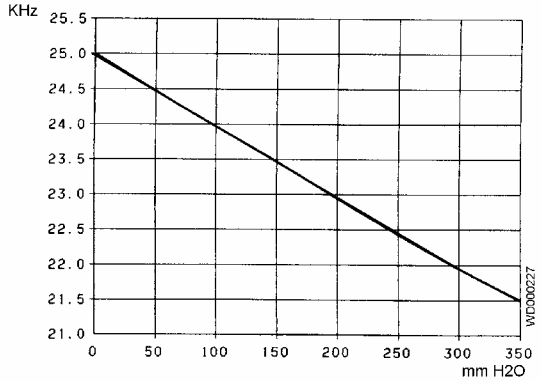
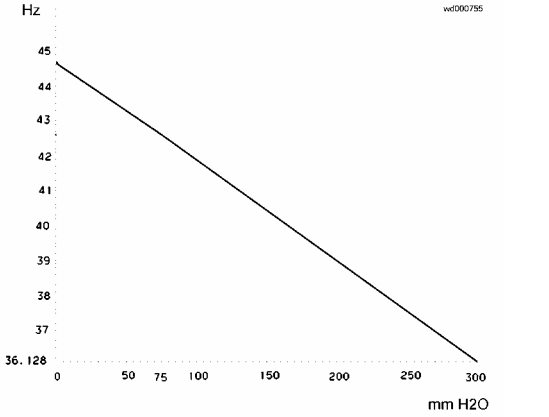




8.8.3 Electrical symbol



8.8.4 Circuit diagrams and operating frequency

Version for MWM1.5 control systems	Version for EWM2000 control systems
	
	

8.8.5 Checking for efficiency

In the event of a fault in the pressure switch, the operation of the appliance is immediately interrupted. Where possible, always read the alarm code.

Possible alarm codes caused by faults in the pressure switch:

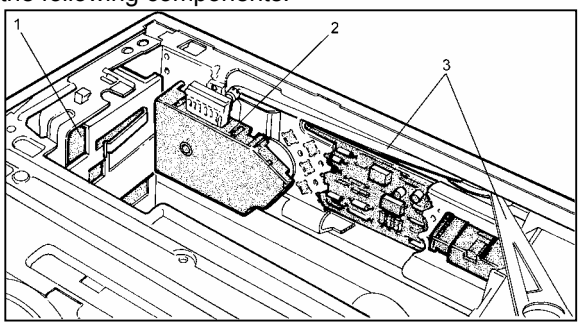
- **MWM 1.5**: E30, E32, E33, E36
- **EWM2000**: E31, E32,E33, E34, E35

8.9 Water distributor

8.9.1 General characteristics

The water distributor is used in models with MWM electronic control systems, and performs the following functions:

- It actions the levers in the detergent dispenser in order to duct water through the various compartments during the course of the washing cycle.
- Drawing power from the main PCB, it powers the following components:
  - ⇨ Cold water solenoid valve
  - ⇨ Circulation pump
  - ⇨ Drain pump

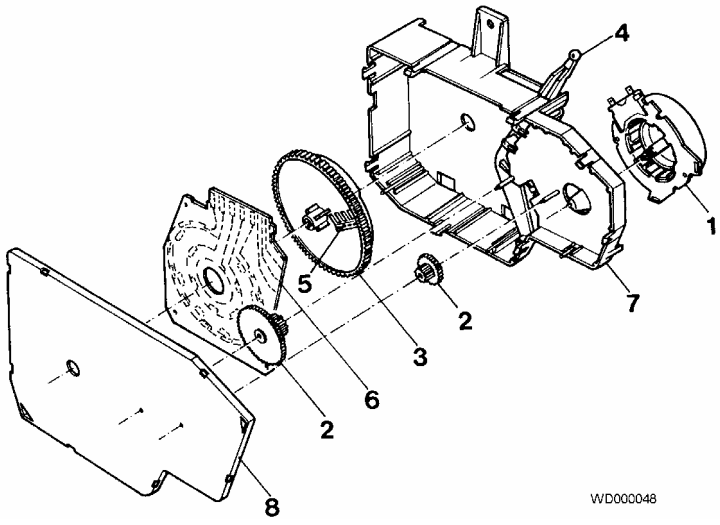


1. *PCB*
2. *Water distributor*
3. *Detergent dispenser lever system*

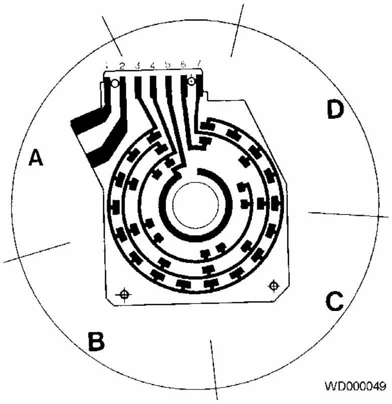
The water distributor is actioned and controlled by the electronic control system. The motor of the distributor is powered via a triac on the main PCB.
Before the motor is switched on, all the loads are disconnected from the power supply in order to reduce wear of the contacts.
The motor is powered only for the time necessary to move the levers from one position to the next.
During the washing programme, the distributor may perform several complete rotations in order to move to the positions necessary for the completion of the cycle.

8.9.2 Operating principle

1. *Motor*
2. *Gearwheel*
3. *Camme*
4. *Lever actioning arm*
5. *Brush contacts*
6. *Contact base*
7. *Casing*
8. *Cover*

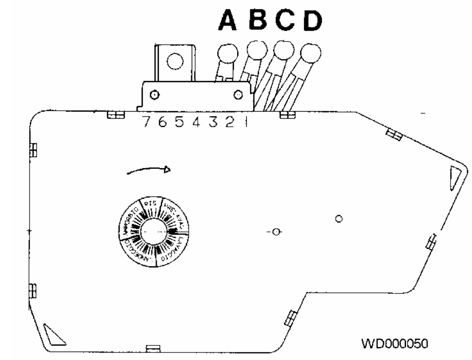


The motor (1), when powered, moves the camme (3) by means of the gears (2). The camme moves the arm that moves the lever actioning arm (4).
The camme is fitted with brush contacts (5) which slide in contact with the copper tracks on the contact base (6). The contacts close in different ways (see diagram) depending on the position of the camme.
The camme requires 15 seconds to perform one complete rotation. As the contact base is divided into 36 sections, passage from one position to the next requires about 0.4 seconds.



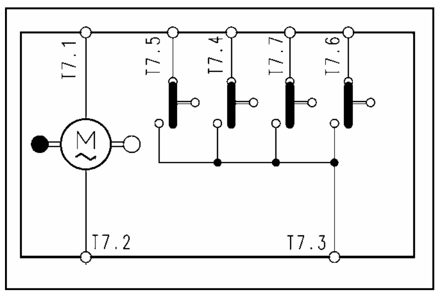
Contact base

A = Pre-wash
B = Wash
C = Bleach
D = Conditioner



Position of lever

8.9.3 Electrical symbol



8.9.4 Contact closure diagram

Vaschetta detersivo	a	a	a	a	a	a	a	b	b	b	b	b	b	b	b	c	c	c
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
T7.5-T7.3	■		■		■		■		■		■		■		■		■	
T7.7-T7.3	■				■				■				■				■	
T7.6-T7.3																		
T7.4-T7.3	■		■						■		■						■	

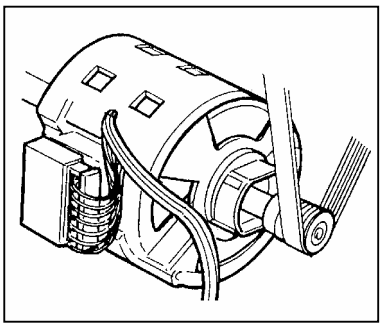
Vaschetta detersivo	c	c	c	c	c	d	d	d	d	d	d	d	d	d	d			
	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
T7.5-T7.3	■		■		■		■		■		■		■		■			
T7.7-T7.3			■				■				■							
T7.6-T7.3															■			
T7.4-T7.3	■						■		■									

15 sec

■ Contatto chiuso

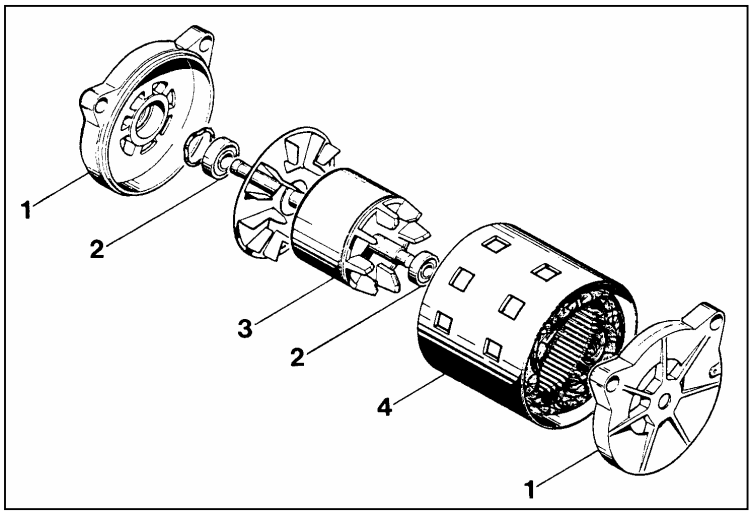
8.10 Induction (asynchronous) motors

8.10.1 General characteristics



The function of the motor is to rotate the drum at different speeds:
- ⇨ high speed for the spin phases
- ⇨ low speed for the wash phases

The primary characteristics of these motors is that they do not require a start-up current. Instead, the current in the rotor builds up by induction, hence the name "induction" motor. These motors are also termed "asynchronous" because the speed of rotation is not the same as the synchronization speed.



1. *Shield*
2. *Bearing*
3. *Rotor*
4. *Stator*

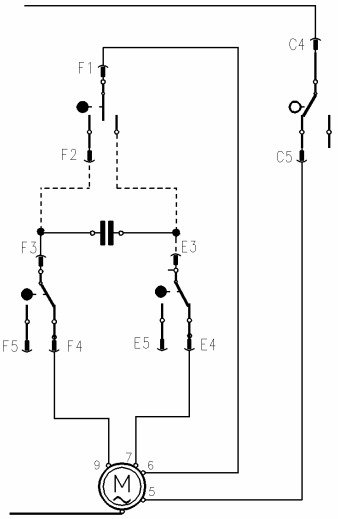
The rotor is of the "squirrel cage" type, in which the die-cast aluminium windings are housed in special grooves in the plate pack.
The starting torque of single-phase asynchronous motors is very low. This is offset by adding a start-up circuit which is phase-shifted by 90° with respect to the running circuit.
This 90° current phase shift is provided by a capacitor which is connected in series to the start-up winding. This generates a rotary field that is sufficient to create the starting torque.

The stator consists of four windings:
- ⇨ two high-speed two-pole windings for operation during spin phases: a start-up winding and a running winding, with the capacitor connected in series. High-speed rotation of the drum is always in the same direction (counter-clockwise).
- ⇨ two low-speed windings for operation during washing phases. These have 12 or 16 poles, and are identical in structural terms.

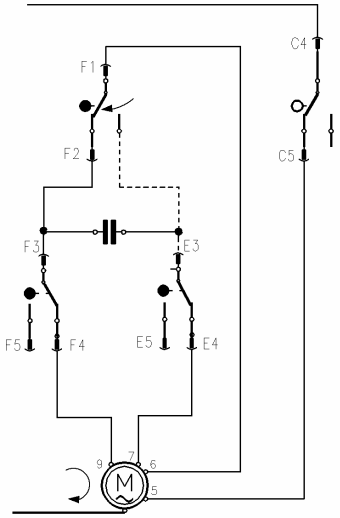
Type of motor	Capacitor (μF)	Motor speed (rpm at 50Hz)		Drum rotation speed (rpm)	
		Wash	Spin	Wash	Spin
2/12 poles	14	~ 400	~ 2800	~ 55	~ 400
2/16 poles	16/18	~ 300	~ 2800	~ 55	~ 500/550

8.10.2 Reversal of direction of rotation during washing

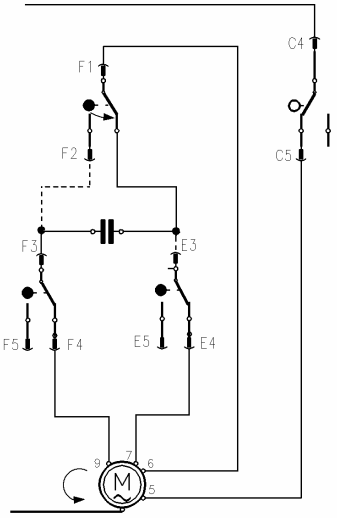
The windings are designed to provide rotation in both directions, depending on the way in which the capacitor is connected. Each functions alternately as a primary winding and start-up winding. When reverse rotation is required, the switching contact of the timer reverses the connection of the capacitor between the two windings, thus reversing the direction of rotation.



Motor stopped

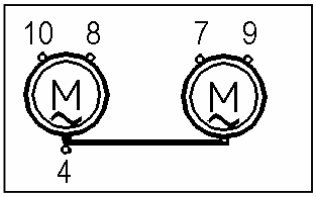


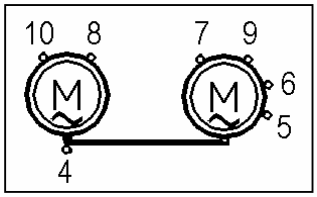
Clockwise rotation



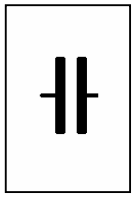
Counter-clockwise rotation

8.10.3 Electrical symbols





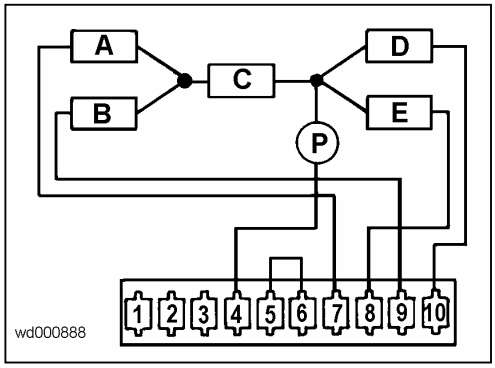
Motor



Capacitor

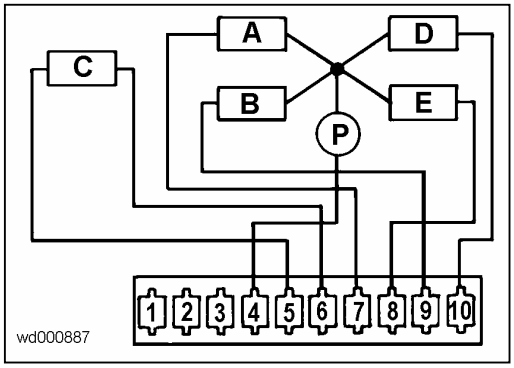
8.10.4 Circuit diagrams

Motor with traditional connection



A - **B** Low-speed windings
D - High-speed running windings
P - Overload cut-out

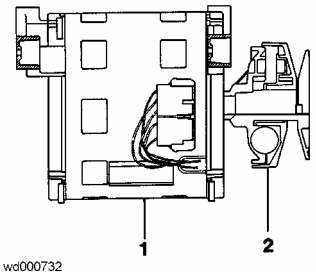
Motor with suppressor connection



C - Common low-speed winding
E - High-speed running winding

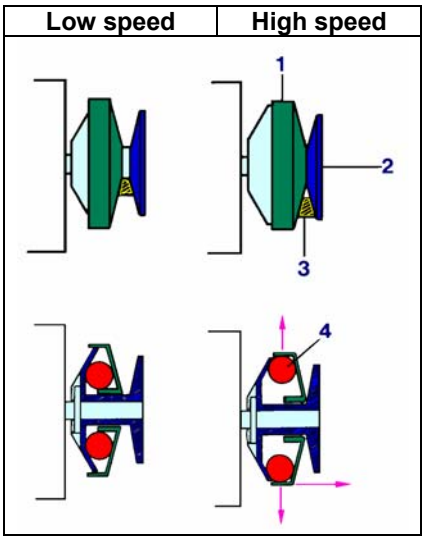
8.10.5 Motor with speed variator

On certain models, spin speeds from 600 to 800 rpm can be obtained using a motor fitted with a speed variator (the speed during the washing phase is always 55 rpm).



wd000732

1. *Motor*
2. *Speed variator*



The motor pulley consists of two disks: the first is attached to the motor drive shaft, while the second can move axially.
At high speeds, the increased rate of rotation of the shaft (two-pole winding), and the consequent thrust exerted by the centrifugal mass, causes the moving disk to change position.
As a consequence, the diameter of the pulley is modified, and the transmission ratio between the motor pulley and the drum pulley is altered. The drum will therefore rotate at 600 rpm with the 2/12 motor, or 800 rpm with the 2/16 motor.

1. *Moving disk*
2. *Fixed disk*
3. *Drive belt*
4. *Centrifugal mass*

8.10.6 Checking for efficiency

INOPERATIVE AT LOW SPEED :
- measure the resistance of the windings. If correct, check the capacitor.

INOPERATIVE AT HIGH SPEED:
- measure the resistance of the windings. If correct, check the capacitor.

INOPERATIVE AT HIGH SPEED AND LOW SPEED:
- measure the resistance of the windings. If correct, check the capacitor.

IRREGULAR OPERATION (motor overheating cut-out):
- operate the appliance until the problem occurs, then measure the resistance of the windings.

POWER LINE CUT-OUT INTERVENES:
- check whether any of the windings / components are connected to earth or inadequately earthed, using a tester with a minimum scale of 40 MΩ across each terminal and the casing (correct reading is ∞).

NOISE (Bearings-Magnetics-Drive belt):
- disconnect the drive belt to identify the source of the noise.

Checking for efficiency of the motor capacitor

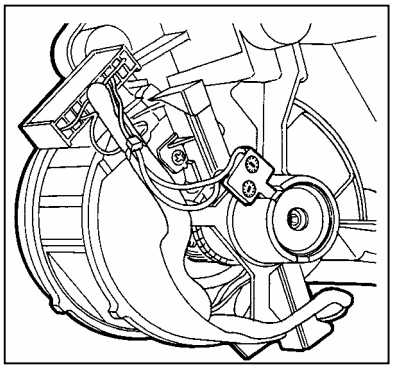
DOES NOT START UP IN LOW SPEED AND HIGH SPEED OPERATION (noise):
- use an ohmmeter (capacitance meter) to check that the capacitor is not faulty.

OCCASIONALLY FAILS TO START UP AT HIGH SPEED (inadequate capacitance):
- use an ohmmeter (capacitance meter) to measure the capacitance of the capacitor.

THE MOTOR DOES NOT START:
- use an ohmmeter (capacitance meter) to check whether the capacitor is short-circuited.

8.11 Commutator motor

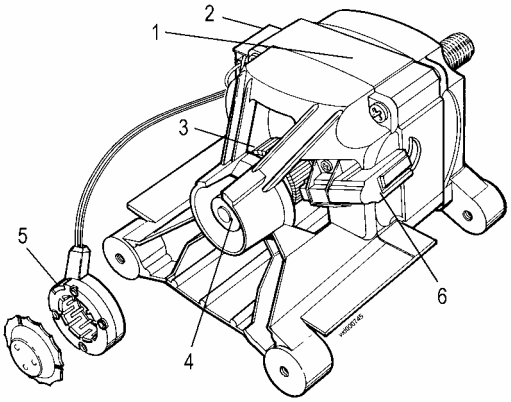
8.11.1 General characteristics



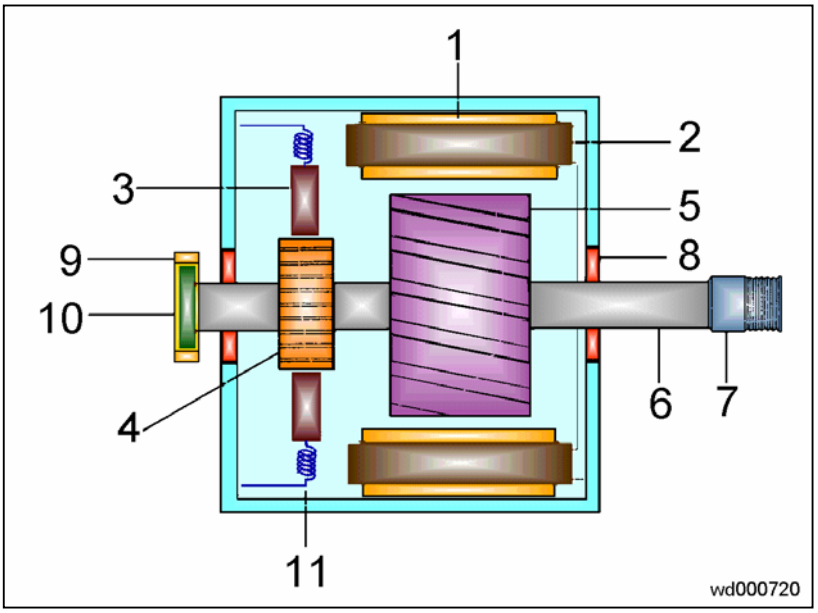
Commutator motors are fitted to appliances with spin speeds of between 600 and 1,600 rpm.
These motors are manufactured by:

- SOLE (formerly ZEM)
- FHP (formerly AEG)
- CESET

It is possible that motors produced by manufacturers other than the original manufacturer may have the same part number, but these are perfectly interchangeable.



1. *Stator*
2. *Terminal block*
3. *Commutator*
4. *Tachymetric generator magnet*
5. *Tachymetric generator coil*
6. *Brush*



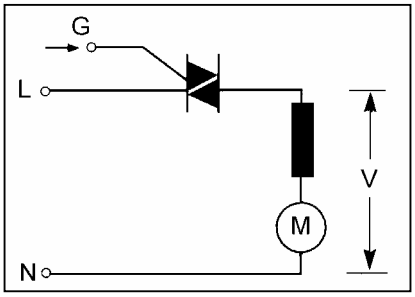
1. *Stator*
2. *Stator winding*
3. *Brush*
4. *Commutator*
5. *Rotor winding*
6. *Motor drive shaft*
7. *Pulley*
8. *Bearing*
9. *Tachymetric generator coil*
10. *Magnet*
11. *Spring*

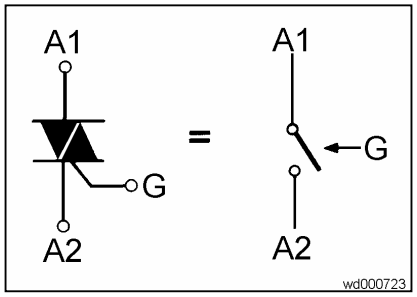
8.11.2 Operating principle

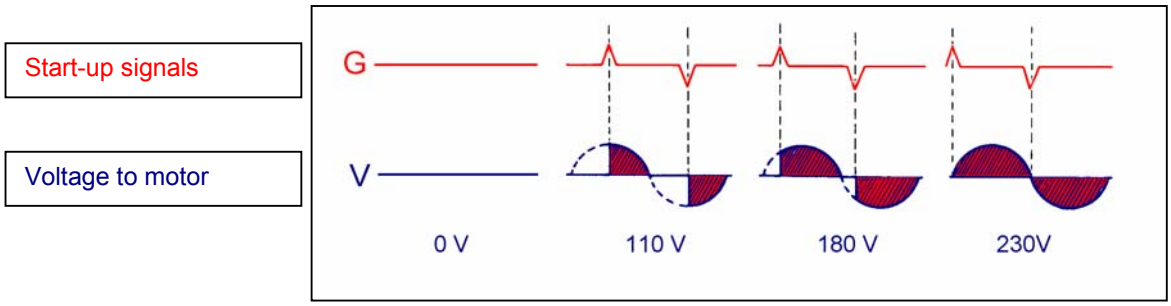
The stator winding is connected in series to the rotor winding (i.e. they are energized in series).
Each section of the rotor winding is connected to a pair of commutator plates (also called "commutators"). The electrical contact between the commutator and the fixed circuit is provided by two brushes which slide in contact with the commutator plates.
The speed of rotation of the motor is proportional to the power voltage supplied by an electronic control system.
This is also known as a "universal" motor, since it can be powered either by alternating or direct current.

8.11.2.1 Control of the speed of the motor

- Speed control is obtained by using an electronic control system to vary the voltage (V) applied to the motor.
- The technique used consists of a "phase division" performed by the Triac. A Triac is a bi-directional electronic switch. Closure of the circuit between A1 and A2 (anodes) takes place in the presence of the appropriate signals received by the gate (G).



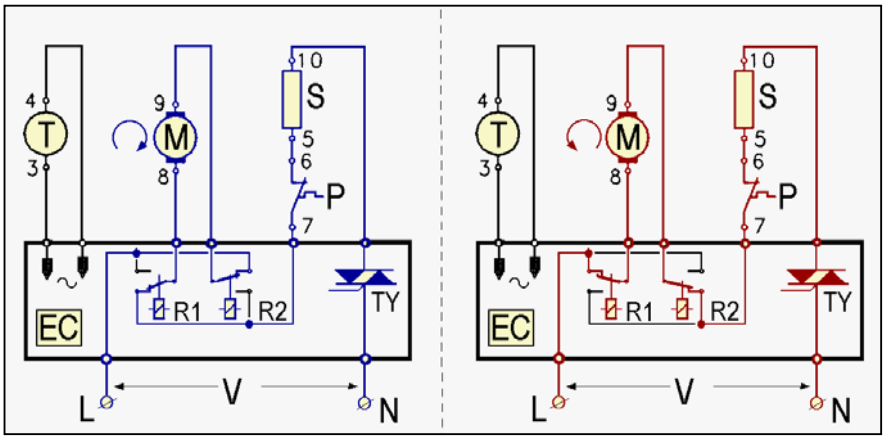




8.11.2.2 Direction of motor rotation

The direction of rotation of the motor depends on the way in which the rotor and stator are connected together. This connection is performed by two of the timer contacts or by the relays on the PCB.

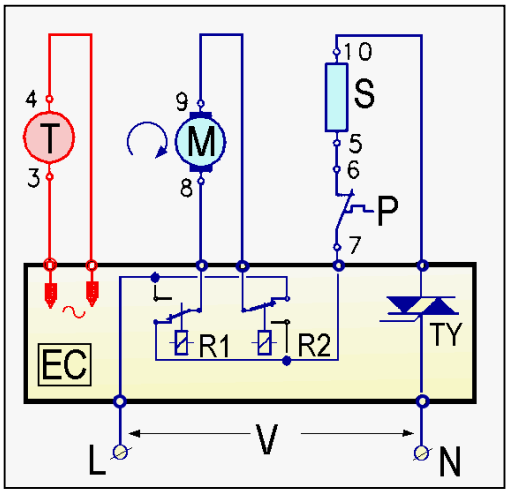
EC *Electronic control system*
P *Motor overload cut-out*
S *Stator*
R *Rotor*
T *Tachymetric generator*
TY *Triac*
R1,2 *Reversal relay*



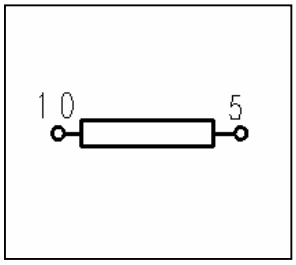
8.11.2.3 Tachymetric generator

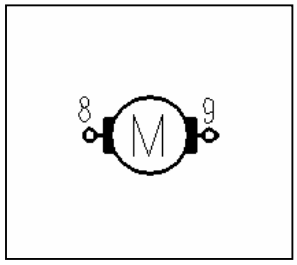
As in all motors powered in series, the speed of the commutator motor depends on the load. In other words, its speed diminishes as the load increases This makes it necessary to ensure that the power voltage to the motor, and therefore its speed, be constantly controlled by an electronic speed control system.
A tachymetric generator (consisting of a magnet fitted to the shaft and a coil) generates a voltage that depends on the speed of the rotor, which is transmitted to the electronic control system.
All electronic control systems feature a system of protection (which may be more or less refined) to prevent operation of the motor in the event of a fault in the tachymetric generator.

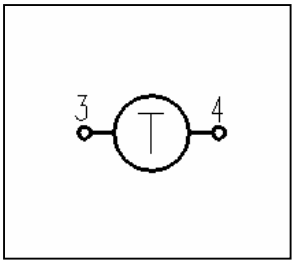
M *Electronic control system*
P *Motor overload cut-out*
S *Stator*
R *Rotor*
T *Tachymetric generator*
TY *Triac*
R1,2 *Reversal relay*

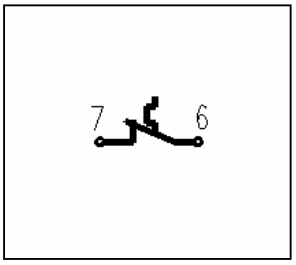


8.11.3 Electrical symbols

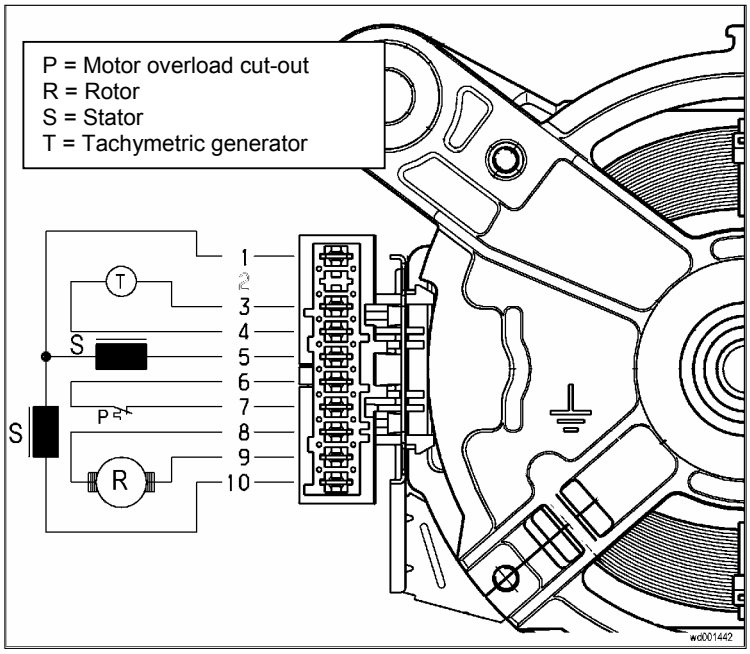








8.11.4 Circuit diagram



8.11.5 Checking for efficiency

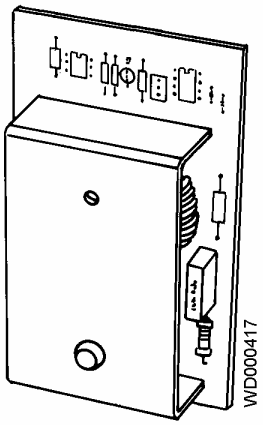
1. Check the connector blocks (wiring) and check for any bent or detached terminals.
2. Check for traces / residue / deposits of water or detergent and identify their source.
3. Check for any windings / components connected to mass or inadequately earthed using a tester with a minimum scale of 40mW across each terminal and the casing (correct reading is ∞).
4. Check the individual windings against the values shown in the table below:

Terminals on motor connector block	Components to be checked	SOLE motor [Ω]	F.H.P. motor [Ω]	CE.SE.T. motor [Ω]
3 - 4	Tachymetric generator winding	171 ÷ 196 469 ÷ 540	126 ÷ 147	64 ÷ 73
5 - 10	Stator winding (full range)	1.0 ÷ 2.2	1.0 ÷ 3.0	1.0 ÷ 2.0
6 - 7	Overload cut-out	0	0	0
8 - 9	Rotor winding (④)	1.5 ÷ 3.0	1.5 ÷ 3.0	1.5 ÷ 3.0
1 - 10	Stator winding (half range if terminal 1 is present)	0.5 ÷ 1.0	0.5 ÷ 1.5	0.5 ÷ 1.0

(④) excluding the resistance of the brushes

Notes:
- When checking the rotor winding, measurement should be effected around the entire surface, turning the spindle very slowly and checking for any short-circuits between visible plates. Also check the carbon brushes for wear.
- If noise is generated (bearings-magnet-belt), detach the drive belt from the pulleys and locate the source.

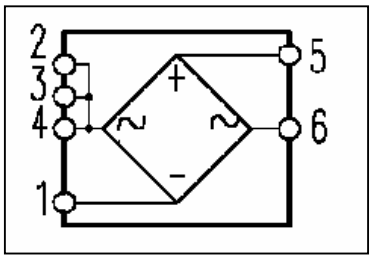
8.12 AC/DC converter



8.12.1 General characteristics

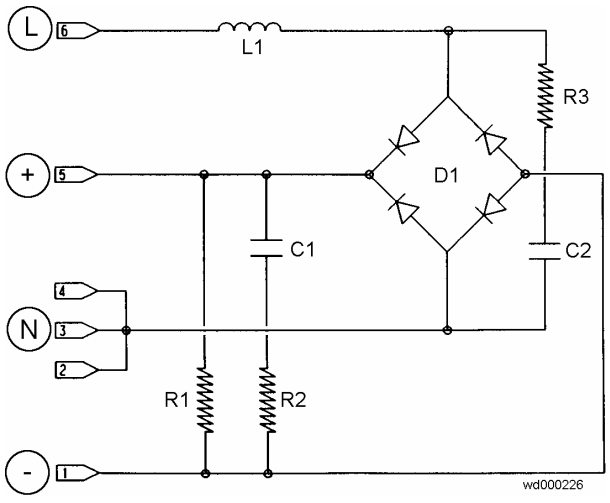
This component is fitted only to certain models with electronic control, and serves to convert the alternating current generated by the triac on the main PCB into direct current used to power the drum rotation motor.

8.12.2 Electrical symbol



8.12.3 Circuit diagram

L1 1.2 mH
R1 68 KΩ
R2-R3 100 Ω
D1 25A/400 - 600V
C1-C2 47nF



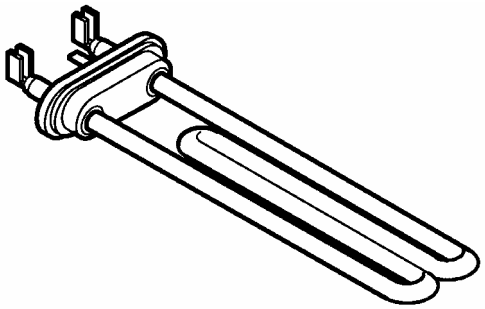
8.13 Heating element

8.13.1 General characteristics

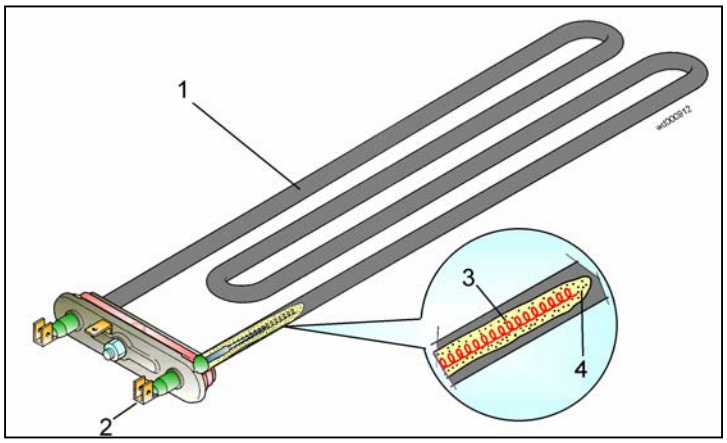
The heating element that heats the washing water is encapsulated, i.e. inserted into a watertight stainless steel tubular casing. Typical power ratings:

- 1500W
- 1950W
- 2500W
- 3000W

(some models may be fitted with heating elements with different power ratings)



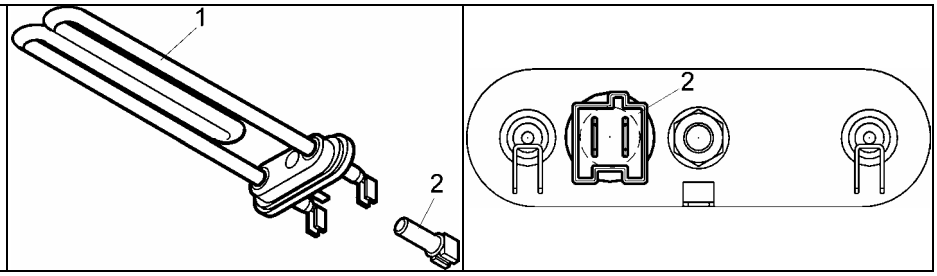
1. *Tubular casing*
2. *Connector*
3. *Filament heating element*
4. *Insulation*



8.13.1.1 Version with NTC sensor

In certain models with electronic control systems or hybrid timers, the temperature sensor is fitted to the heating element.

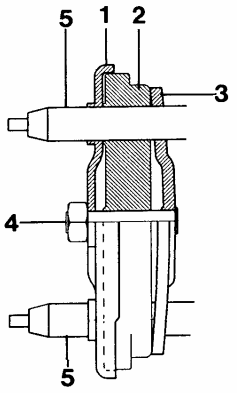
1. *Heating element*
2. *NTC sensor*



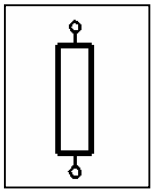
8.13.1.2 Seal

The seal between the tub and the heating element is provided by a seal which expands against the nut.

1. *Fixed flange*
2. *Washer*
3. *Moving flange*
4. *Nut*
5. *Heating element terminals*



8.13.2 Electrical symbol



8.13.3 Checking for efficiency

DOES NOT HEAT:

- check that the heating element is not broken: measure the resistance across the two terminals.

INTERVENTION OF ELECTRICAL SAFETY CUT-OUTS:

- use an ohmmeter to check that the heating element is not connected to mass and check for current leakage (40 MΩ)

WATER LEAKS:

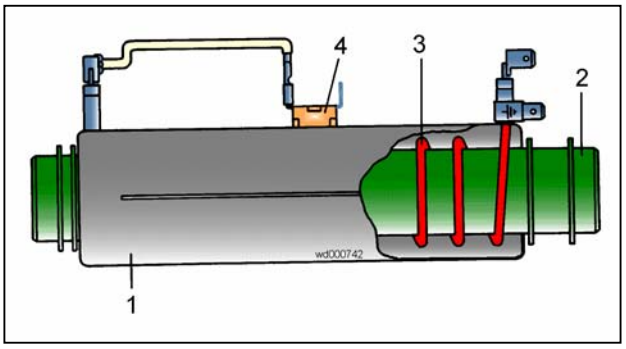
- check that the seal is correctly positioned and fitted.

VIBRATION OR METALLIC NOISE WHEN THE DRUM ROTATES:

- check that the heating element is correctly positioned inside the tub. If worn, replace the heating element.

8.14 Heat exchanger

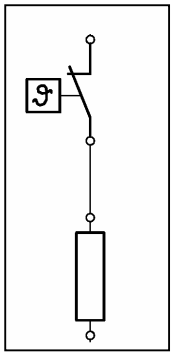
8.14.1 General characteristics



1. *External casing*
2. *Heat exchanger*
3. *Heating element*
4. *Thermostat*

In certain Jetsystem models, the water is heated by a heat exchanger (not recent models).
The heat exchanger consists of a cylindrical body in aluminium alloy, lined with a layer of "teflon" to prevent the formation of scale. The water to be heated flows through the heat exchanger.
The armoured spiral-shaped heating element is located inside the cylinder. A safety thermostat is positioned in close contact with the heat exchanger. The thermostat (normally-closed) is calibrated to intervene at a temperature of 220°C, and is connected in series to the heating element.
The external casing protects the heat exchanger unit.

8.14.2 Electrical symbol



8.14.3 Checking for efficiency

DOES NOT HEAT:
- check that the heating element is not broken: measure the resistance across the two terminals.
- check that the safety thermostat is normally closed.

INTERVENTION OF ELECTRICAL SAFETY CUT-OUTS:
- use an ohmmeter to check that the heating element is not connected to mass and check for current leakage (40 MΩ)

WATER LEAKS:
- check that the seal is correctly positioned and fitted.

NO RE-CIRCULATION/DOES NOT HEAT:
- check that the heat exchanger is not blocked.

8.15 Drying heater (washer-dryers)

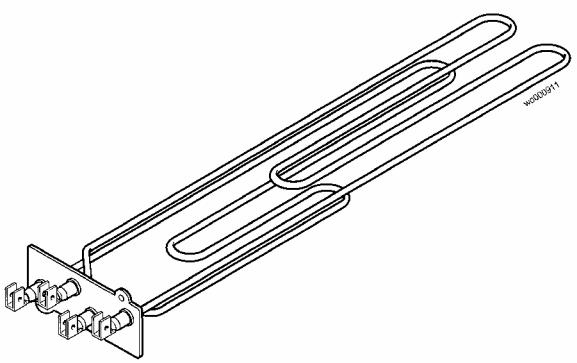
8.15.1 General characteristics

The armoured drying heater is inserted into a watertight stainless steel tubular casing, and consists of two branches:

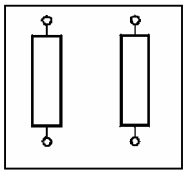
- when drying cotton fabrics, both heating elements are switched on (full power).
- when drying synthetic fabrics, only one element is switched on (half-power) to ensure delicate drying.

Typical electrical power ratings (depending on the model):

- 1000+1000W
- 700+700W
- 700+400W
- 550+550W



8.15.2 Electrical symbol



8.15.3 Checking for efficiency

DOES NOT HEAT:
- check that the heating element is not broken: measure the resistance across the two terminals.

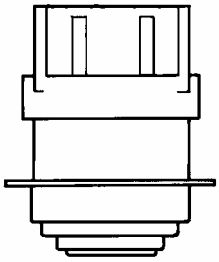
INTERVENTION OF ELECTRICAL SAFETY CUT-OUTS:
- use an ohmmeter to check that the heating element is not connected to mass and check for current leakage (40 MΩ).

8.16 Bi-metal thermostats

8.16.1 General characteristics

This type of thermostat, which exists in various versions with one or two contacts (normally closed or normally open) is utilized for a number of applications:

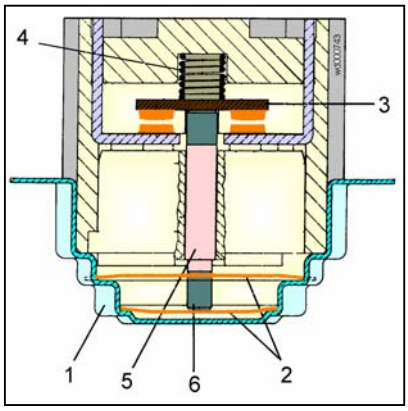
- control of the temperature of the washing water
- control of the temperature of the drying air
- as a safety device for overheating during washing and/or drying.



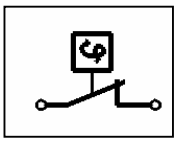
8.16.2 Operating principle

When the bi-metal disk reaches the temperature at which the thermostat has been calibrated, it trips, causing a lever to open (or close, depending on the version) the contacts.
During the cooling phase, the bi-metal disk returns to its original position at a pre-determined reset temperature.

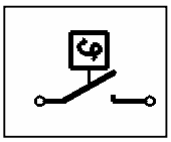
1. *Steel capsule*
2. *Bi-metal disk*
3. *Contact*
4. *Spring*
5. *High-temperature lever*
6. *Low-temperature lever*



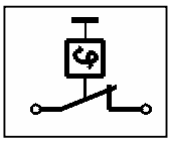
8.16.3 Electrical symbols



Normally-closed



Normally-open



Manual reset

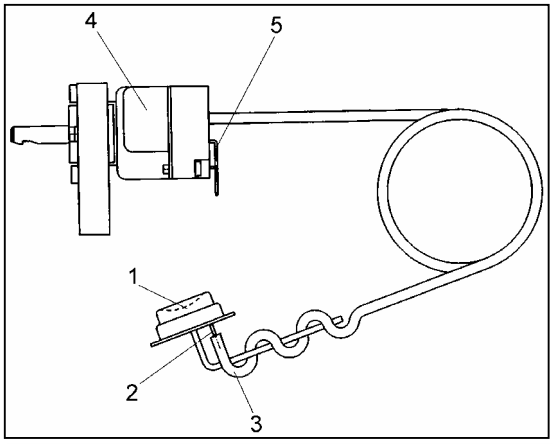
8.16.4 Manual-reset thermostat

In certain applications (such as washer-dryers), manual-reset safety thermostats are fitted. In this case, the bi-metal element, after tripping as a result of overheating, does not reset automatically to its original position when it cools.
It is necessary to press the corresponding button manually to reset the bi-metal element.

8.16.5 Checking for efficiency

1. Use a tester to check that, when cold, the contacts are in the correct position.
2. Heat the thermostat bulb and check for correct switching of the contacts.
3. Allow the thermostat to cool and check that the contacts return to their original position.

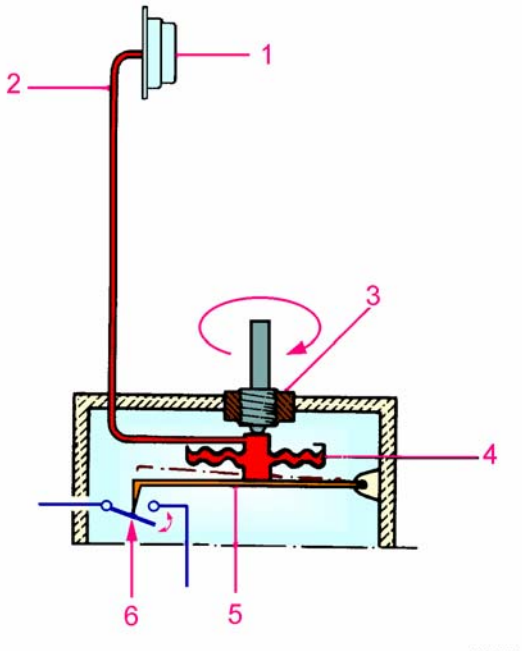
8.17 Adjustable thermostat



8.17.1 General characteristics

Thermostats are used to control and regulate the temperature of the washing water.
Some thermostats are based on the fluid expansion effect, and their intervention temperatures can be adjusted.

1. *Bulb*
2. *Capillary*
3. *Capillary sheath*
4. *Thermostat body*
5. *Contact*

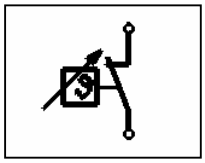


wd000744

Thermostats function according to the principle of the expansion of the fluid contained in the hydraulic circuit.
When the bulb is heated, the liquid in the capillary tube expands against the membrane.
The movement of the membrane actions a device that opens or closes the contacts. The spindle can be used to adjust the temperature at which switching of the contacts occurs (0-90°C).

1. *Bulb*
2. *Capillary*
3. *Regulation screw*
4. *Membrane*
5. *Rocker arm*
6. *Contact*

8.17.2 Electrical symbol



8.17.3 Checking for efficiency

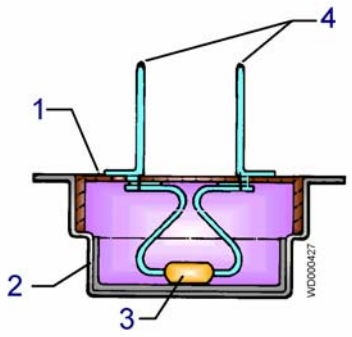
1. Use a tester to check that, when cold, the contacts are in the correct position (normally closed).
2. Heat the thermostat bulb and check for correct switching of the contacts.
3. Allow the thermostat to cool and check that the contacts return to their original position.
4. Check that the thermostat capillary is correctly secured to the tub and that the coils are present.

8.18 NTC temperature sensor

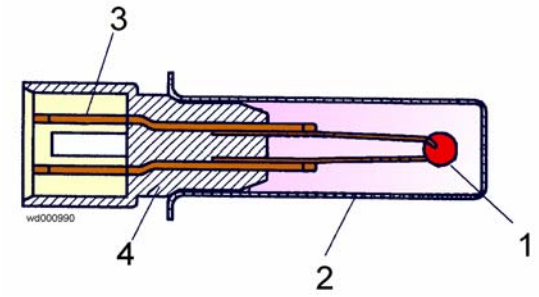
8.18.1 General characteristics

In certain models (i.e. those with hybrid or electronic timers), an NTC sensor is used to control the washing temperature. In these sensors, the internal resistance decreases as the temperature increases. This reduction in resistance is detected by the electronic control system which, when the desired temperature is reached, disconnects the heating element. Two types of sensor are produced; their shapes are different, but their characteristics are identical.
NTC sensors are used in electronic washer-dryers to control the temperature and to calculate the drying time.

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

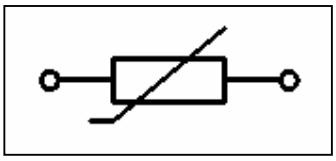


1. *NTC resistor*
2. *Metal capsule*
3. *Terminals*
4. *Plastic casing*



TEMPERATURE (ºC)	RESISTANCE (Ω)		
	Rated value	Maximum value	Minimum value
20	6050	6335	5765
60	1250	1278	1222
80	640	620	660

8.18.2 Electrical symbol



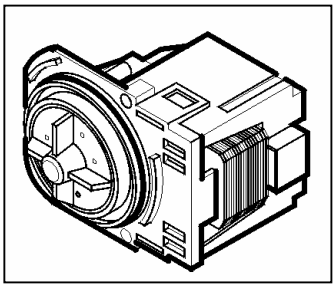
8.18.3 Checking for efficiency

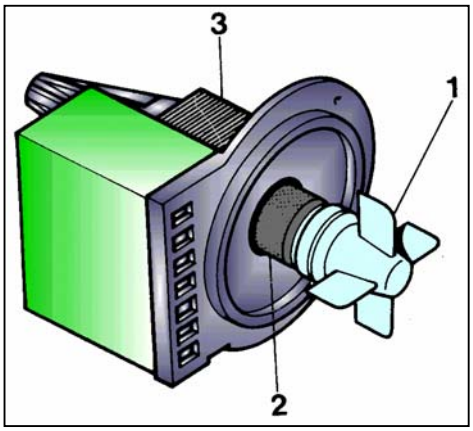
Use a tester to check that the resistance of the sensor corresponds to the temperature.

8.19 Drain pump

8.19.1 General characteristics

The function of the drain pump is to discharge the water at the end of each phase of the washing cycle. These centrifugal pumps are actioned by a synchronous motor.

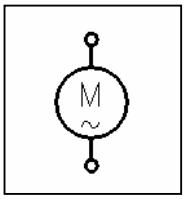




1. *Impeller*
2. *Rotor*
3. *Stator*

The rotor consists of a permanent magnet, and may rotate in either direction.
The rotor may rotate for approximately 15 minutes without actioning the impeller. As a result, if the impeller is jammed by a foreign body, the rotor may perform short clockwise and anti-clockwise movements until the blockage is removed.
These pumps have a delivery of about 22-25 litres per minute, and a maximum head of 90 cm.

8.19.2 Electrical symbol



8.19.3 Checking for efficiency

1. Check that the impeller is not jammed and check for slippage.
2. Check the resistance of the stator winding, which should be approximately 150/200 Ω.

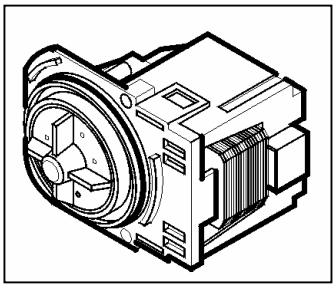
Important!

If caused to run empty (i.e. disconnected from the hydraulic circuit), synchronous pumps may fail to start up. This is because, due to their structural characteristics, they require a counter-torque on the impeller to allow the rotor to turn in one direction or the other.
For this reason, the pumps should be tested only when fitted to the appliance and after introducing a certain quantity of water.

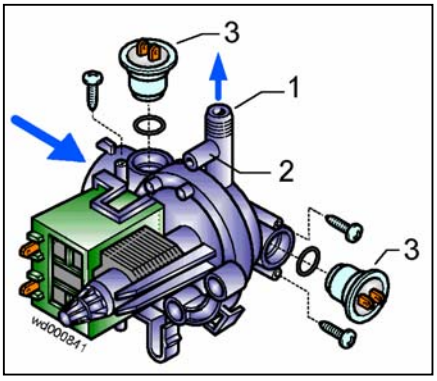
8.20 Circulation pump

8.20.1 General characteristics

Jetsystem models are fitted with a synchronous circulation pump which continuously circulates the water from the filter body into the tub through the bellows seal.

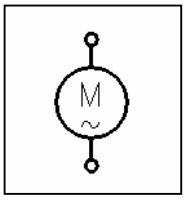


In certain models (those fitted with a heat exchanger, but not more recent models) the temperature control thermostats may be fitted to the circulation pump.



1. *Water circulation outlet (delivery 8,5 - 12.5 l/min)*
2. *Secondary outlet (if featured)*
3. *Temperature control thermostats (certain models only)*

8.20.2 Electrical symbol



8.20.3 Checking for efficiency

NO RE-CIRCULATION - POOR WASHING RESULTS

1. Check that the impeller is not jammed and check for slippage.
2. Check the resistance of the stator winding, which should be approximately 150/200 Ω.

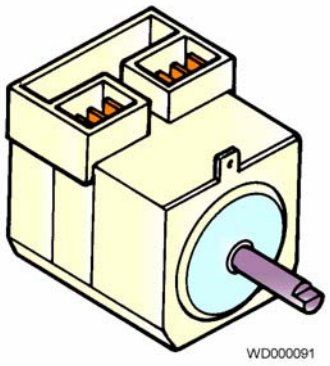
WATER IN THE BASE AND ON THE FLOOR
Check the seals on the duct/thermostat holes

Important!

If caused to run empty (i.e. disconnected from the hydraulic circuit), synchronous pumps may fail to start up. This is because, due to their structural characteristics, they require a counter-torque on the impeller to allow the rotor to turn in one direction or the other.
For this reason, the pumps should be tested only when fitted to the appliance and after introducing a certain quantity of water.

8.21 Drying timer (washer-dryers)

8.21.1 General characteristics

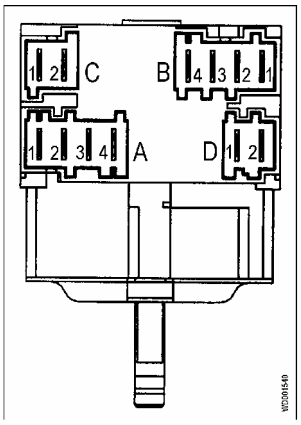


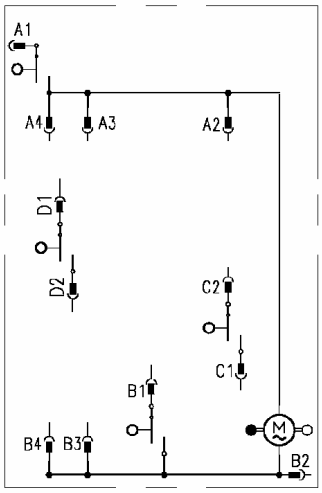
The timer is a timing device that powers the components needed for the drying cycle; it is used in models with electromechanical and hybrid timers.
Actuation is by the contacts, which are actioned by a series of cammes. The cammes are actioned mechanically by a synchronous motor.
The timer consists of two parts:

1. **cotton/linen drying**: both drying heaters are switched on alternately (full power)
2. **drying synthetic fabrics**: only one of the drying heaters is switched on (half power).

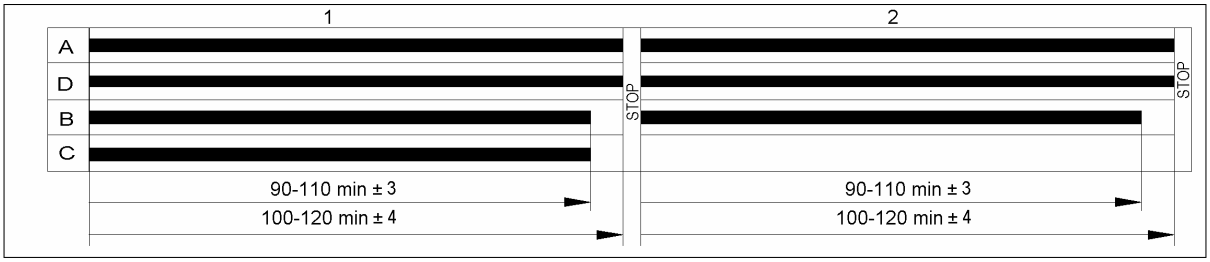
The drying phase, which depends on the timer code, generally lasts up to 120 minutes; the last 10-12 minutes are dedicated to the cooling phase.
***Important**: Do not attempt to turn the timer counter-clockwise!*

8.21.2 Circuit diagram





8.21.3 Contact closure diagram



8.21.4 Checking for efficiency

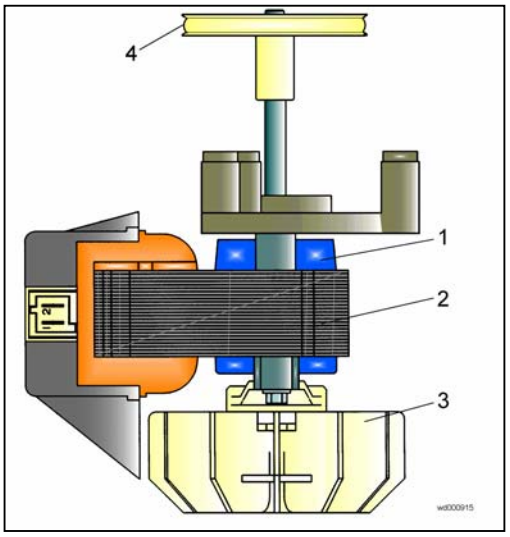
1. Check the timer motor windings for continuity.
2. Check that the contacts close as shown in the specific diagram relative to the timer.

8.22 Fan motor (washer-dryers)

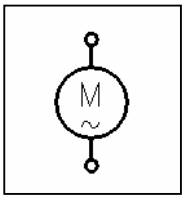
8.22.1 General characteristics

The motor which actions the air circulation fan for the drying phase is of the single-phase asynchronous type. The rotor is of the "squirrel cage" type. The velocity of the shaft is approximately 2,800 rpm at a voltage of 220-240V/50Hz.

1. *Rotor*
2. *Stator*
3. *Cooling fan*
4. *Pulley*



8.22.2 Electrical symbol



8.22.3 Checking for efficiency

FAN INOPERATIVE:
- Check that the rotor is not jammed.
- Check the pulley for slippage.
- Measure the resistance of the stator.

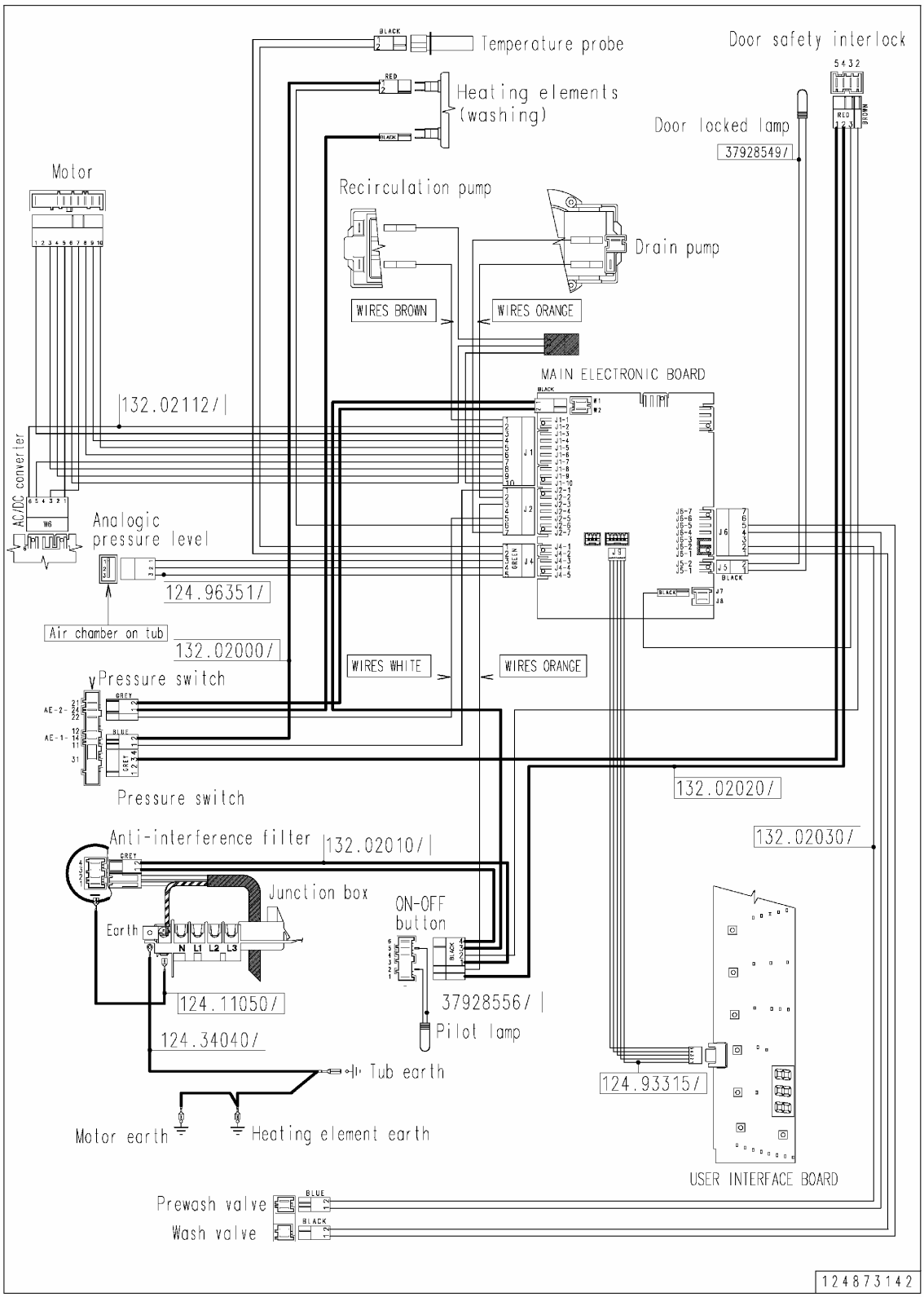
EXCESSIVE NOISE:
- Check for friction of the rotor.
- Check the bearings.
- Check the drive belt.

8.23 Circuit diagrams

Each model produced is accompanied by a wiring diagram and a basic circuit diagram.

8.23.1 Wiring diagram

An example of a wiring diagram is shown below. The wiring diagram may be used to check for correct connection of the wiring connectors to the various electrical components.



8.23.1.1 Wiring

Two types of wiring harness are used for the various models:

- Modular: the wiring harness consists of a series of sections fitted with connectors.
- Single: the wiring consists of a single main harness. There may be separate wires for connection to earth.

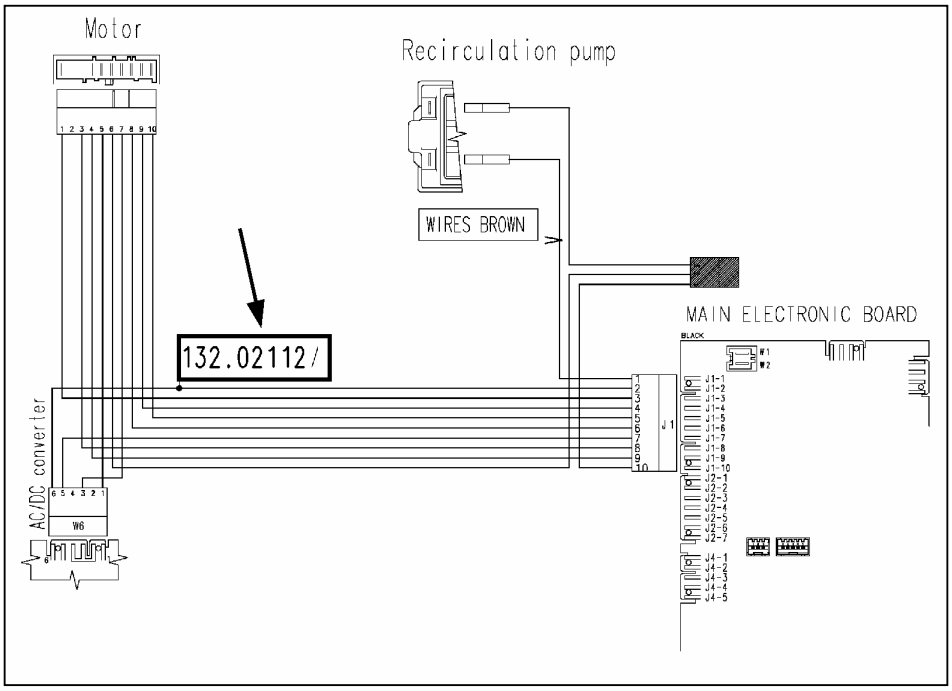
8.23.1.2 Part numbers for wiring

The various types of wiring harness are available as spare parts. The various codes are shown in the electrical components section under reference no. 999.

Example:

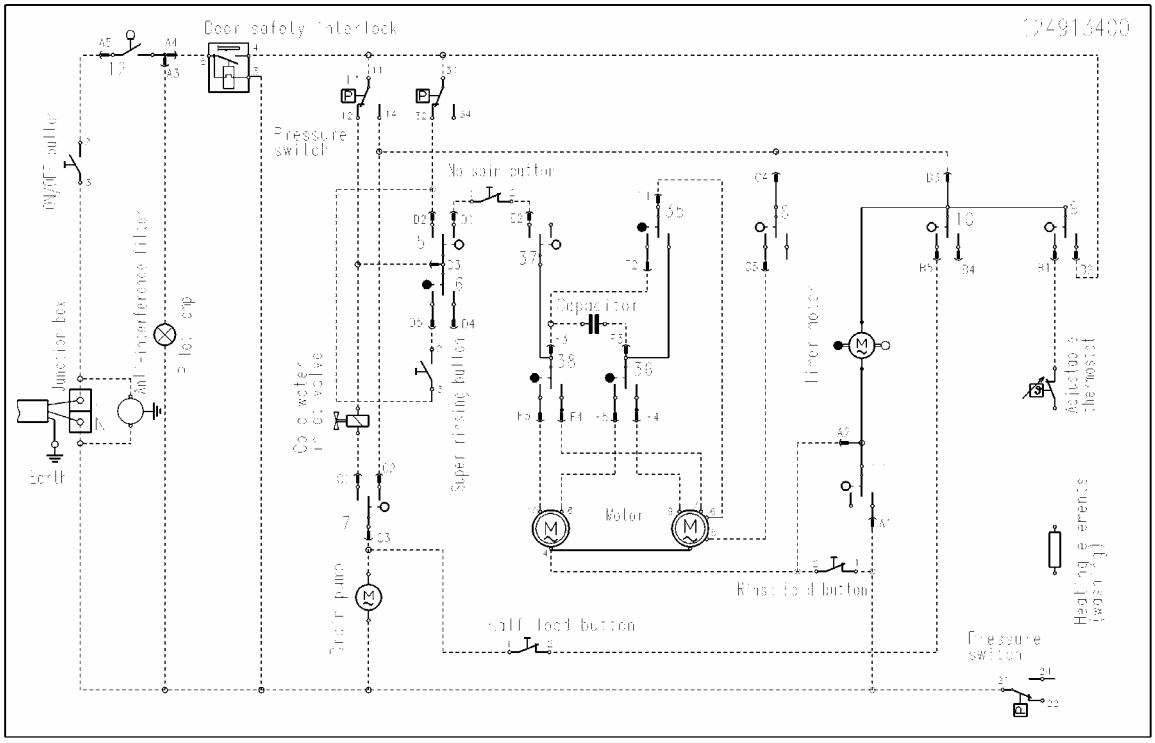
Position	Part number	Description
999	124 11 05-00 / 4	wiring
999	124 34 04-00 / 9	earth wiring
999	124 90 12-31 / 9	power cable, 2000x3x1.5
999	124 93 31-50 / 3	wiring, FLAT CABLE
999	124 96 35-10 / 1	wiring
999	132 02 00-00 / 7	wiring
999	132 02 01-01 / 3	wiring
999	132 02 02-01 / 1	wiring
999	132 02 03-00 / 1	wiring
999	**132 02 11-2**0 / 2	wiring

In order to identify the correct spare part, use the wiring diagram to identify the part number shown alongside the wiring to be ordered; this number corresponds to the first 8 digits of the part number shown in the list.
In the case of the wiring for the motor, for example, the wiring diagram shows code 132.02112, which corresponds to the first 8 digits of part number **132 02 11-2**0 / 2



8.23.2 Basic circuit diagram

An example of a basic circuit diagram is shown below. The circuit diagram should be used to check the appliance for correct operation in the diagnostics phase (in conjunction with the timer diagram, if present).

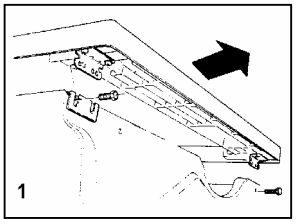


---------	Wire	5B	Timer connector
———	Internal connection to timer or component		Timer motor
4	Slow camme	34	Fast camme

9 ACCESS TO COMPONENTS

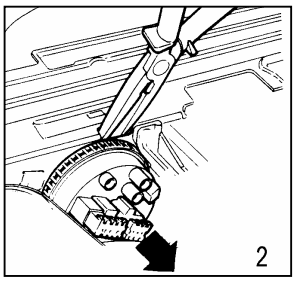
9.1 Work-top

a. Remove the two rear screws (1), push the work-top towards the rear of the appliance and detach.



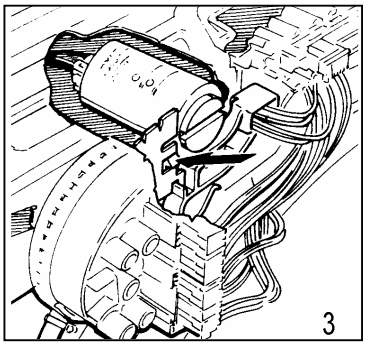
9.1.1 Pressure switch

a. Remove the work-top
b. Detach the wiring connectors
c. Press the anchor tabs (2) and pull towards the rear
d. Detach the pressure switch tube
e. To remove the second pressure switch (if featured, this is inside the cross-member), press the anchor tabs and push towards the front panel.



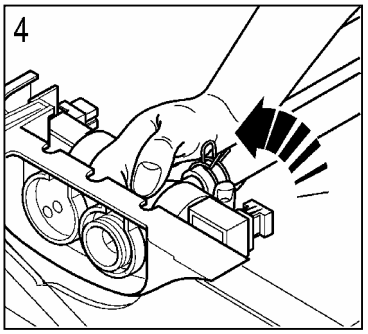
9.1.2 Suppressor/motor capacitor

a. Remove the work-top.
b. Detach the wiring support from the cross-member and move downwards (3).
c. Remove the suppressor/capacitor from its housing in the cross-member
d. Detach the wiring connectors.



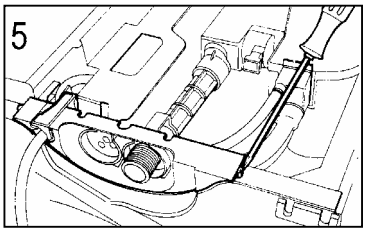
9.1.3 Solenoid valve (version fitted to the cabinet)

a. Remove the work-top
b. Unscrew the water fill hose from the solenoid valve
c. Detach the wiring connector.
d. Detach the solenoid valve from the support (4)
e. Remove the hose clamp and detach the solenoid valve from the hose

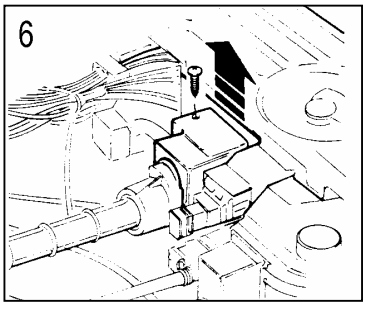


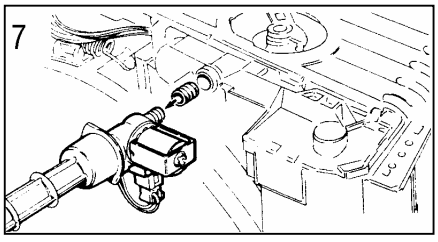
9.1.4 Solenoid valve (version fitted to detergent dispenser)

a. Remove the work-top
b. Unscrew the water fill hose from the extension/solenoid valve
c. Lift the rear cable clamp block and detach from the extension/solenoid valve (5)
d. Remove the screw and detach the solenoid valve support bracket from the detergent dispenser (6)
e. Extract the solenoid valve/extension assembly from the detergent dispenser (7)
f. Detach the wiring connector
g. Unscrew the solenoid valve from the extension.

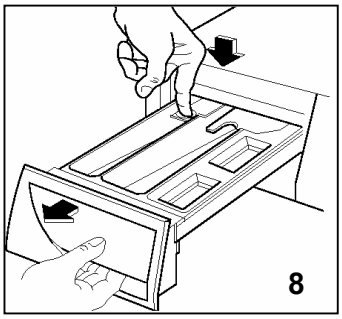


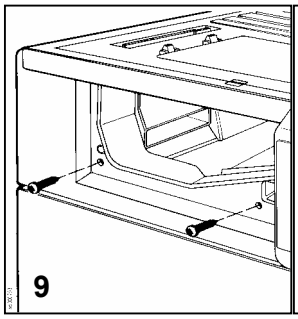
When re-assembling:
The seal between the solenoid valve and the detergent dispenser should be inserted before the solenoid valve and lubricated with soapy water or silicone oil to facilitate insertion.

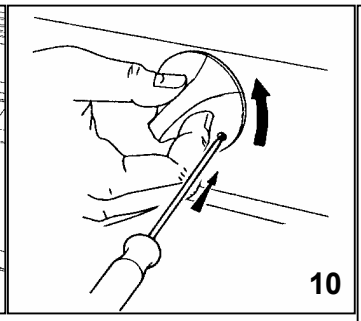


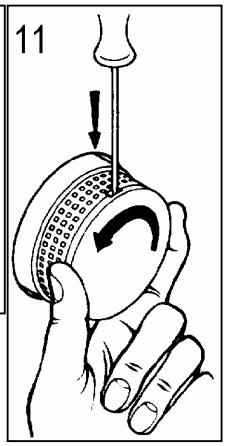


9.2 Control panel (standard version)





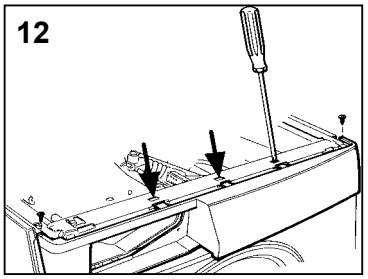


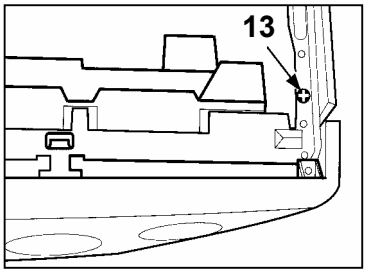


9.2.1 Control panel – versions for "soft" cabinet

a. Remove the work-top
b. Extract the detergent drawer (8)
c. Remove the screws that secure the control panel to the control panel support (9)
d. For models with knobs external to the control panel: release the knob cover by pressing the hole gently with a small screwdriver and turning the knob cover counter-clockwise (10)
e. Remove the screws which secure the control panel to the cross-member and release the anchor tabs from the support (12)
f. Release the control panel from the lower right-hand guide and remove. To facilitate its release, unscrew the screw which secures it to the cabinet and lift the control panel support slightly (13 or 14).
g. Remove the pilot lamp from its housing in the control panel and (for electronic models) disconnect the wiring connectors from the PCB.

***When re-assembling**: Ensure that the knobs/flanges are positioned correctly!*

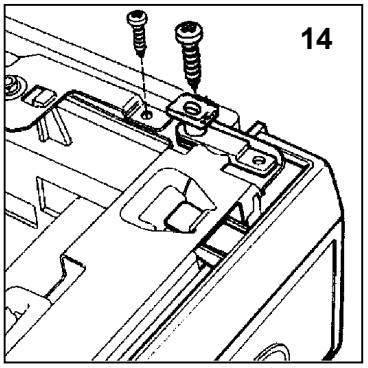


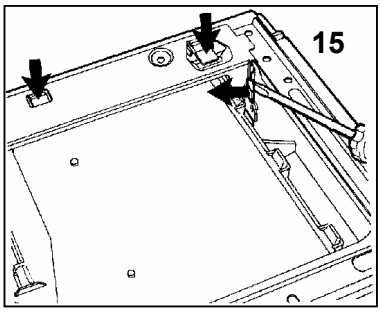


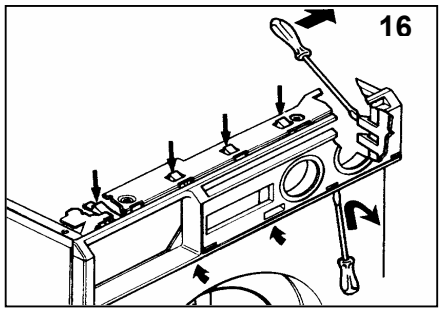
9.2.2 Control panel – versions for "square" cabinets

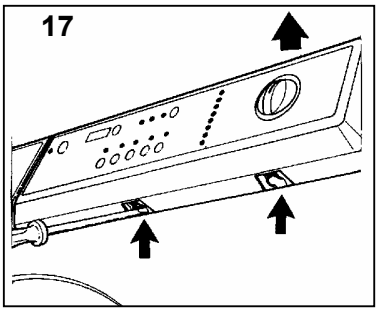
a. Remove the work-top
b. Extract the detergent drawer (8)
c. Remove the screws which secure the control panel to the control panel support (9)
d. For models on which the knobs are external to the control panel: release the knob cover by pressing the hole gently with a small screwdriver and turning the knob cover counter-clockwise (10-11)
e. Remove the front-mounted screws which secure the control panel support to the cabinet (13 or 14) and, if present, those that secure the control panel (12).
f. If present, remove the internal screw that secures the control panel to the support.
g. Release the tabs which anchor the control panel to the support (15-16) and remove the control panel. To facilitate this operation, lift the support to release the lower anchor tabs on the control panel (17).
h. Remove the pilot lamp from its housing in the control panel and (for electronic models) disconnect the wiring connectors from the PCB.

***When re-assembling**: Ensure that the knobs/flanges are positioned correctly!*



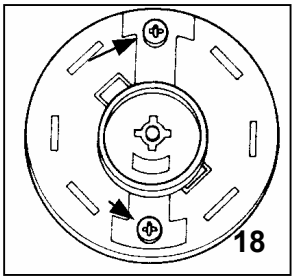






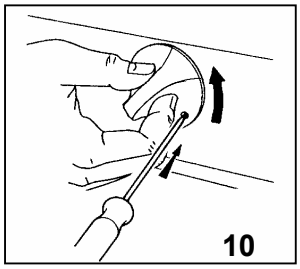
9.2.3 Timer

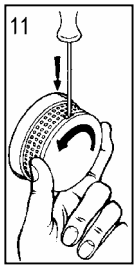
Version with internal knobs on control panel:



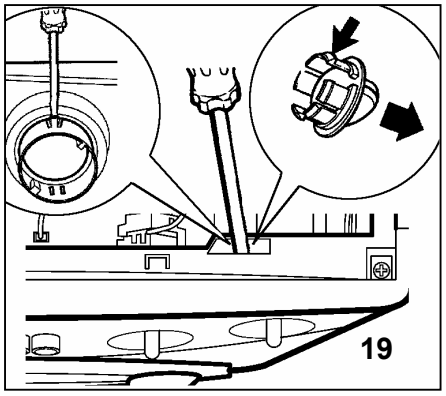
a. Remove the work-top.
b. Remove the control panel
c. If present, remove the screw that secures the knob-spindle (or coupling) and remove the knob.
d. Remove the two screws which secure the timer to the cross-member (18).
e. Detach the wiring connectors and remove the timer.

Version with external knobs on control panel:





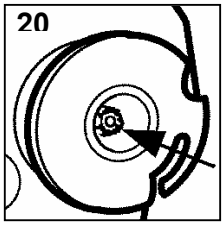
a. Remove the control panel
b. Remove the knob:
⇨ Release the knob cover by pressing gently in the hole with a small screwdriver and turning the knob cover counter-clockwise (versions 10-11).
⇨ Insert a screwdriver from the interior of the support cross-member (version 19) and remove the knob
c. Remove the screw which secures the knob-spindle (or coupling) and remove the knob (20)
d. Detach the programme flange from the camme (if featured).
e. Remove the two screws which secure the timer to the cross-member (18)
f. Detach the wiring connectors and extract the timer.

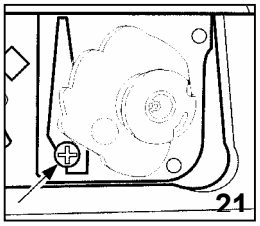


9.2.4 Water distribution camme

a. Remove the control panel and the timer.
b. Detach the camme from the cross-member.

9.2.5 Detergent dispenser lever mechanism feeler arm



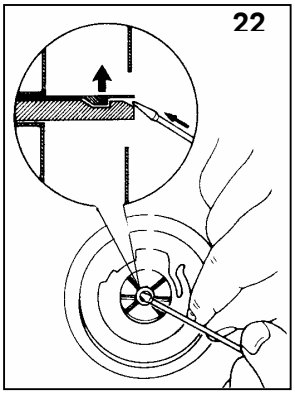


a. Remove the camme
b. Use a cross-head screwdriver to turn the latch 90°.
c. Detach the latch from the cross-member and remove the feeler arm.

9.2.6 Push-button

a. Remove the control panel
b. Using a screwdriver, widen the pushbutton anchor pin and remove the pushbutton.
c. Remove the pushbutton. Using pliers, close the anchor tabs which secure the button to the cross-member and push towards the interior of the appliance.
d. Detach the connector

9.2.7 Adjustable thermostat

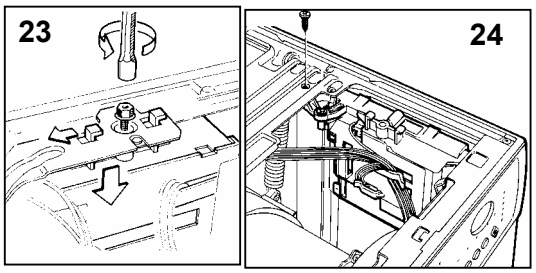


a. Remove the knob:
⇨ Remove the control panel (if internal)
⇨ Use a screwdriver from inside the support cross-member (if type 19)
⇨ Release the knob cover by pressing gently in the hole with a small screwdriver and turning the knob cover counter-clockwise (versions 10-11)
b. Remove the coupling from the thermostat spindle or remove the knob (22)
c. Detach the connectors
d. Detach the thermostat body from the plastic support and remove from the internal side
e. Detach the bulb from the tub (see Access to the thermostat: 9.5.3)
f. Remove the capillary from the retaining clamps
When re-assembling, secure the capillary using the original clamp and loop to form a number of spirals.

9.3 Electronic control systems

9.3.1 Main PCB (MWM-EWM2000)

a. Remove the top.
b. Remove the screws which secure the support to the board casing (23-24)
c. Detach the wiring from the supports
d. Extract the casing-PCB assembly
e. Detach the connectors

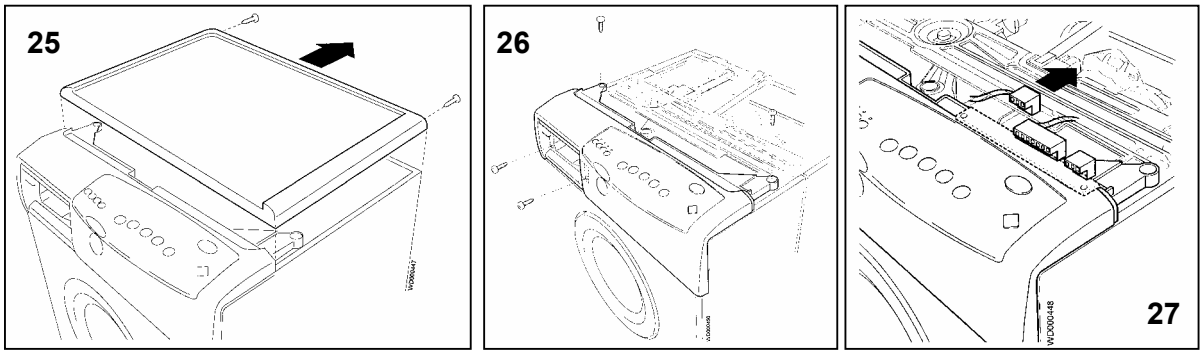


9.3.2 Control/display board

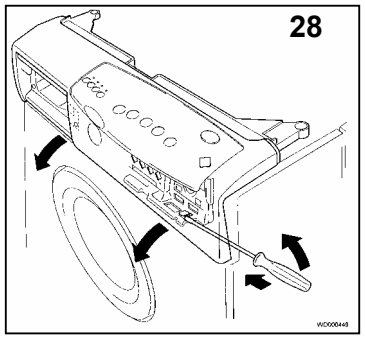
The way in which these boards are fastened depends on the styling version and the type of electronic control system (MWM user interface, EWM2000 or EWM1000 electronic board). To access the board:
a. Remove the control panel
b. Release the PCB casing from the control panel or remove the screws.

For further details, refer to the specific Service Manuals for the various types of electronic control systems.

9.3.3 Control panel – "input" version

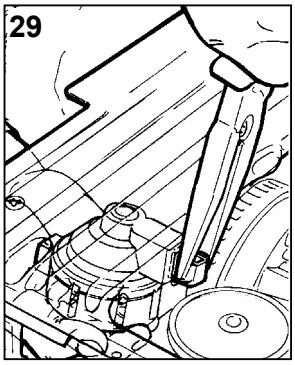


a. Remove the top (18)
b. Remove the detergent drawer
c. Remove the screws (19)
d. Detach the wiring connectors from the PCB (20)
e. Use a screwdriver to release the tab which anchors the the control panel to the support (21) and remove the control panel from the appliance.

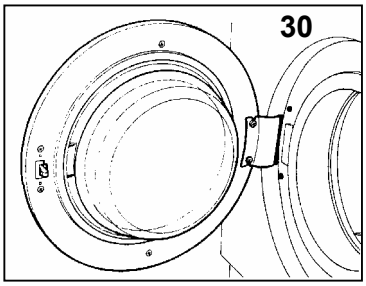


9.3.4 Electronic pressure switch

a. Remove the top
b. Press down the anchor tabs and release the pressure switch from the support.
c. Detach the connector
d. Detach the tube.



9.4 Access from the porthole door

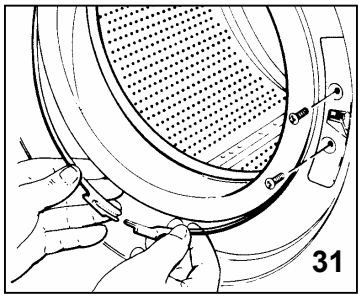


9.4.1 Porthole door

a. Remove the two screws which secure the door to the hinge (30)
b. Remove the screws which secure the surround-flange (if present) and detach the flange from the surround.
c. Remove the glass door panel.
d. Remove the handle-latch assembly

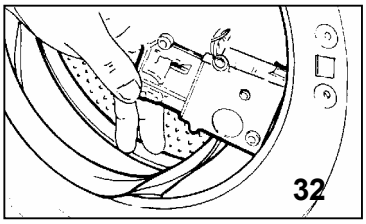
Re-assembly:

e. Position the handle assembly in its housing in the flange so that the spring exerts pressure correctly.
f. Refit the glass panel to the flange.
g. Replace the surround and the screws.



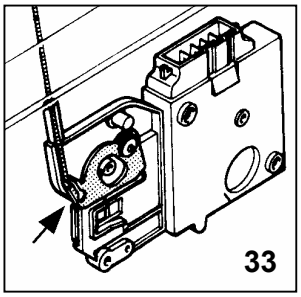
9.4.2 Porthole door hinge

a. Remove the porthole door.
b. Detach the seal front the front panel (31)
c. Remove the screws which secure the hinge to the front panel.
d. Remove the hinge.



9.4.3 Door safety interlock

a. Remove the seal from the front panel (31)
b. Remove the two screws which secure the door delay device to the front panel.
c. Remove the door delay device (32)
d. Remove the cover from the door delay device.
e. In models with button-actioned aperture (standard on P66 32cm models), detach the wire which controls door aperture.
f. Detach the wiring connectors (33)

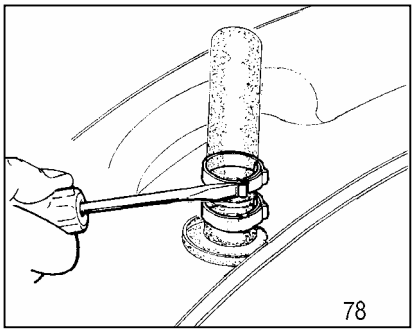


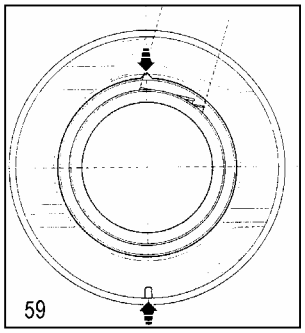
9.4.4 Bellows seal

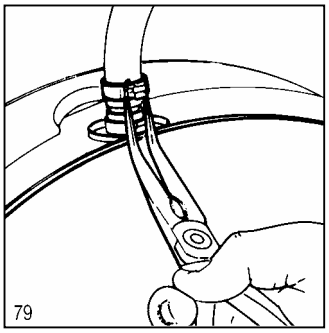
a. Detach the retaining ring and the seal from the front panel.
b. Remove the clamp and pull out the circulation tube (if featured) (78)
c. Remove the seal and the ring by pulling downwards (it is held in position by an elastic ring)

Re-assembly:

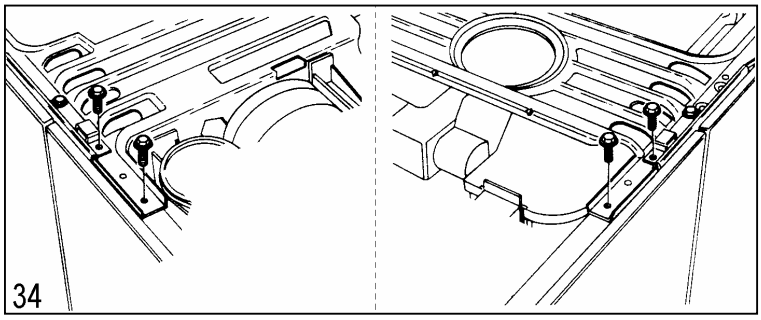
a. *Use soap and water to lubricate the seat of the seal where it comes into contact with the flange and the metal ring.*
b. *Fit the seal to the flange with the drainage hole at the bottom and the internal reference notch at the top (59).*
c. *Replace the metal retaining ring (check that the ring is in good condition, otherwise it should be replaced).*
d. *Replace the circulation hose and the hose clamp (79).*
e. *Fit the seal to the front panel and replace the clamp.*

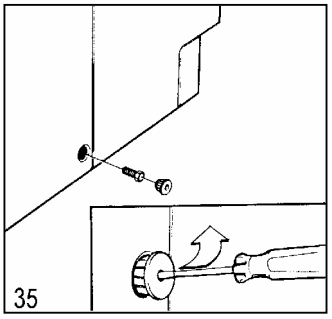


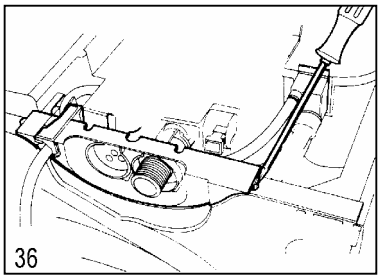




9.5 Rear cabinet shell

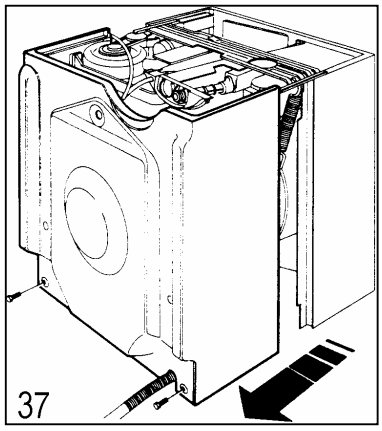






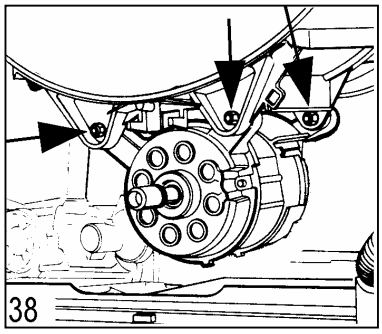
a. Remove the top
b. Remove the screws which secure the cabinet shell to the upper cross-member (34)
c. Remove the screw head masking caps and remove the lateral screws which secure the cabinet shell to the base (35)
d. Detach the wire clamp from the cabinet (36)
e. Remove the rear screws and slide the cabinet shell away from the base (37)

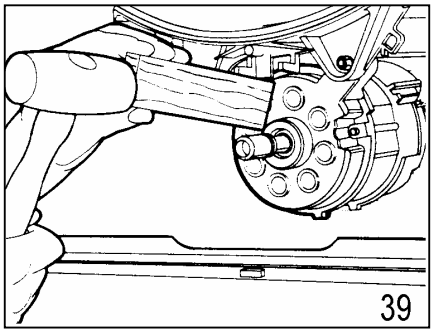
***N.B.**: After removing the rear cabinet shell, special care must be taken when moving the appliance. When the shell is removed, never lay the appliance on its sides or on its back, since this might damage the internal structure.*

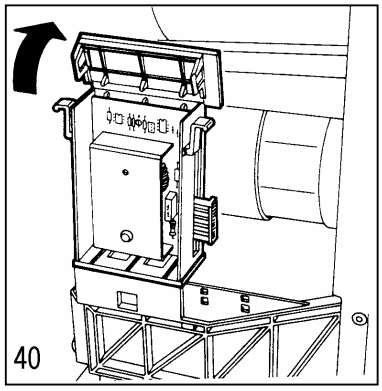


9.5.1 Motor

a. Remove the rear cabinet shell.
b. Detach the wiring connectors.
c. Remove the rear screws which secure the motor and loosen the front screws (38)
d. Loosen the motor from the supports (39)
e. Remove the front screws and remove the motor.





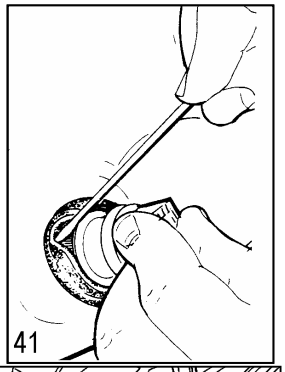


9.5.2 Electronic speed control system / AC/DC converter

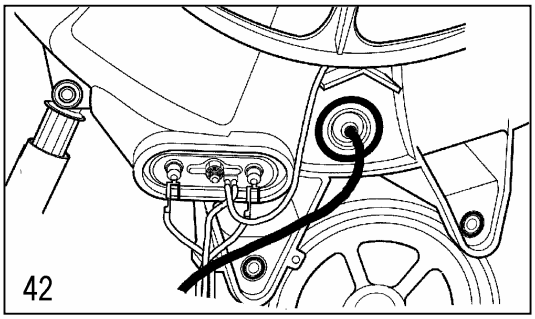
a. Detach the cable connectors
b. Press the two lateral anchor tabs and raise the cover of the casing (40).
c. Remove the electronic board.

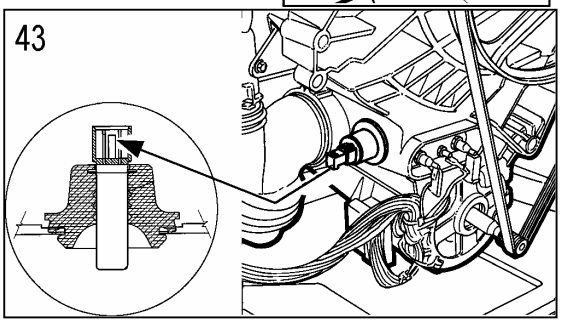
9.5.3 Thermostat/NTC sensor

a. Remove the rear cabinet shell.
b. Detach the drive belt from the pulleys (if necessary).
c. Detach the wiring connectors (fixed-temperature thermostats and NTC sensors)
d. Remove the thermostat/sensor from the sealing ring (41). Refer to section 9.2.7 for removal of the adjustable thermostat (42).



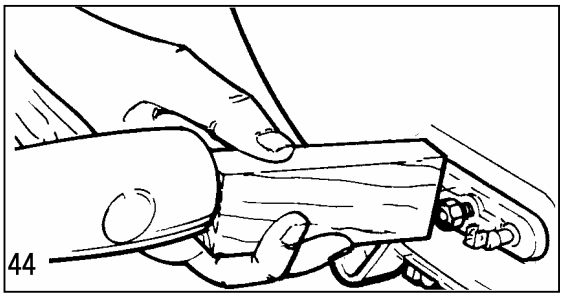
Re-assembling the NTC sensors (version with "long" bulb):
The sensor must be replaced with the groove in the connector base facing downwards (43).

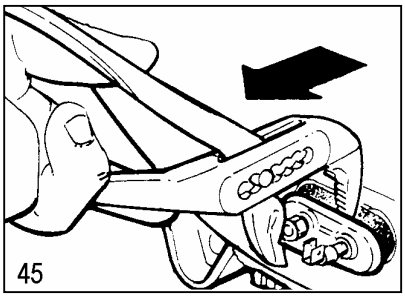




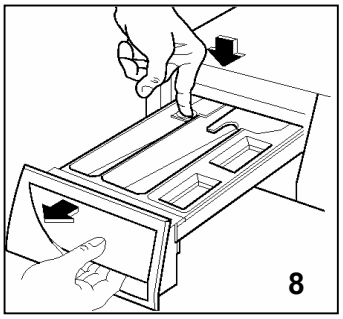
9.5.4 Heating element

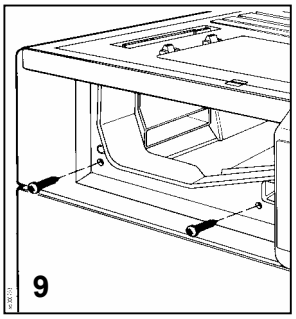
a. Remove the rear cabinet shell.
b. Detach the drive belt from the pulleys.
c. Detach the wiring connectors (42).
d. Remove the screw which secures the heating element flange.
e. Push the nut on the heating element flange towards the interior of the tub (44).
f. Remove the heating element (45).

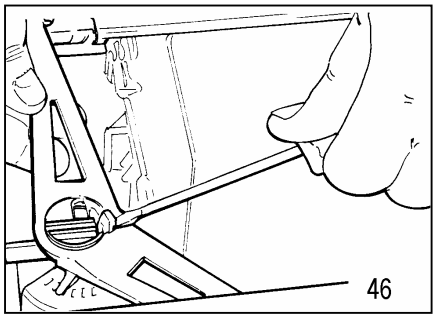




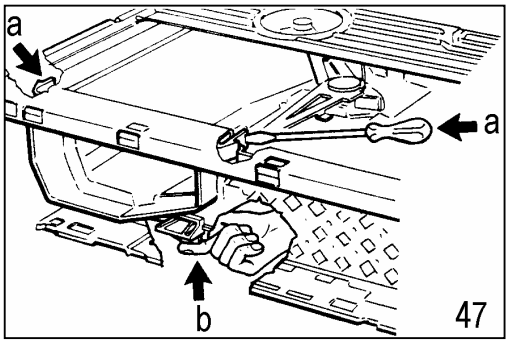
9.5.5 Detergent dispenser

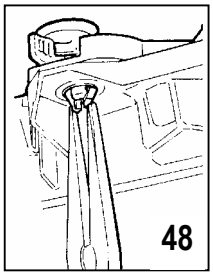


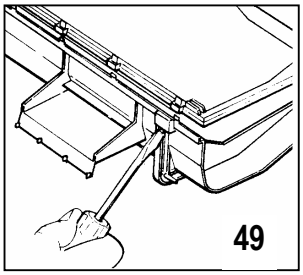




a. Remove the rear cabinet shell.
b. Unscrew the clamp and detach the tube from the detergent dispenser to the tub
c. Detach the steam venting tube from the tub (if present)
d. Extract the detergent drawer (8)
e. Remove the screw which secures the control panel to the detergent dispenser (9)
f. Remove the screws which secure the detergent dispenser to the cross-member
g. Remove the solenoid valve(s) (if fitted to the dispenser) or detach the tube(s) from the dispenser to the solenoid valve
h. Detach the lever mechanism (46), if present
i. Release the two lateral anchor tabs from the front cross-member (47a) and, at the same time, push the detergent dispenser towards the rear
j. Press down the lower anchor tab which secures the dispenser to the front cross-member (47-b)
k. Lower the washing group and pull the dispenser out







9.5.6 Removing the duct from the dispenser

a. Remove the dispenser
b. Remove the lever regulation pin (if present) by pressing the two anchor tabs (48)
c. Release the clamp and the anchor tabs for the duct from the lower part of the dispenser (49)

From inside the dispenser, the engineer can access:

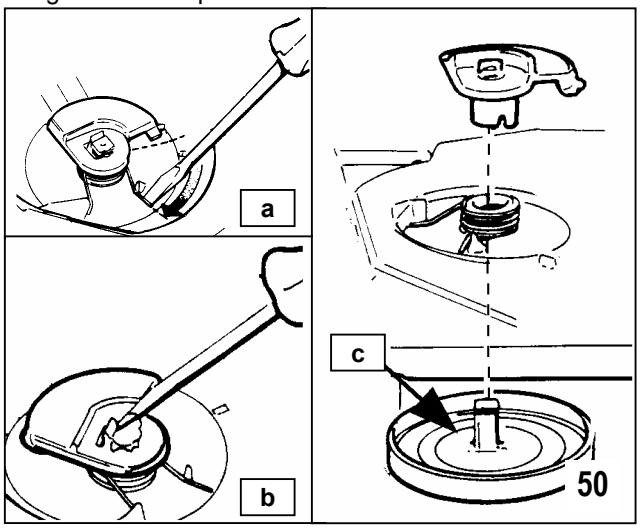
a. The water intake nozzle, which is removed by lifting from the dispenser
b. The steam venting tube
c. The water distributor

9.5.7 Water distributor

This operation may be performed without removing the dispenser:

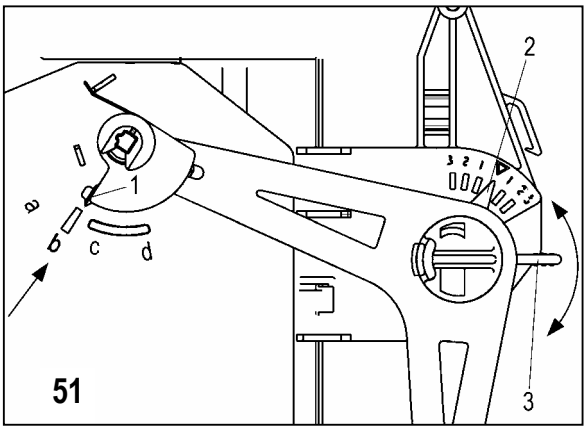
a. Remove the detergent drawer (8)
b. Release the spring (50a)
c. Release the anchor tab and slide out (50b)
d. Rotate and extract the distributor from inside the dispenser

***Note**: When re-assembling, the specific grease MUST be applied to the distributor (50c)*



9.5.8 Adjusting the dispenser levers

a. Turn the timer knob to the start of a programme in which water is ducted through the washing compartment
b. Check that the "1" is aligned with "b" on the dispenser. If not, lift pointer "2" and rotate the eccentric camme "3" until "1" is aligned with "b" (51)
c. Turn the timer knob to a programme in which water is ducted through the conditioner compartment and check that the "1" is aligned with the "d" on the dispenser

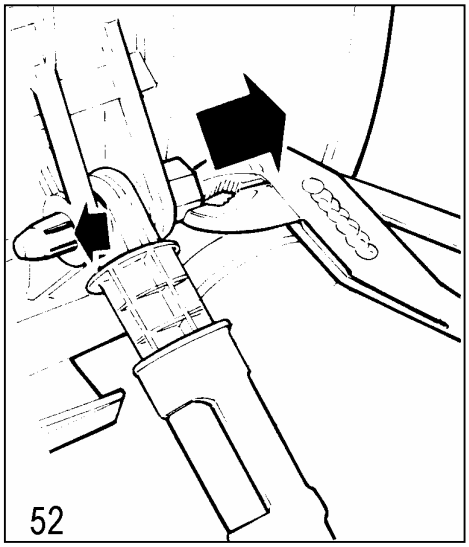


9.5.9 Damper

a. Remove the rear tub shell
b. Press the locking key and at the same time remove the pin using pliers (52)
c. Remove the damper from the support

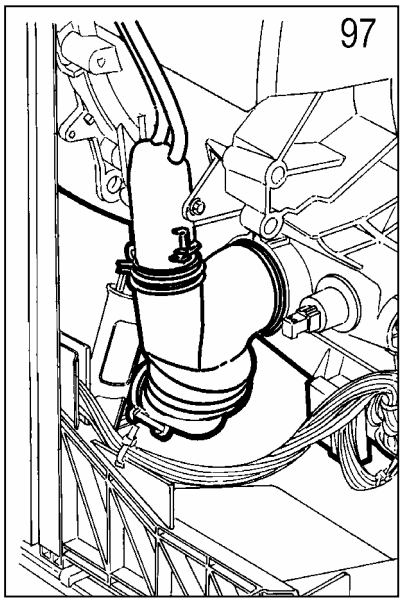
When re-assembling:

⇨ *Check that the pin is not damaged; if so, replace it.*
⇨ *Check that the anchor tabs protrude correctly.*



9.5.10 Drum pulley

a. Remove the rear tub shell
b. Detach the drive belt from the pulley
c. Block the pulley in position and remove the screw
d. Remove the pulley

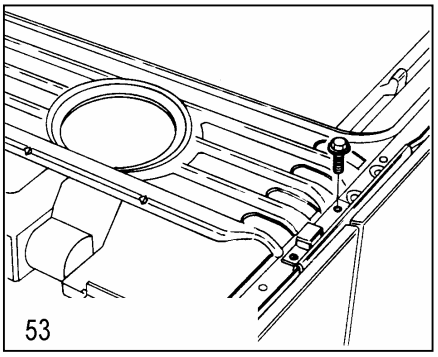


9.5.11 Pressure chamber

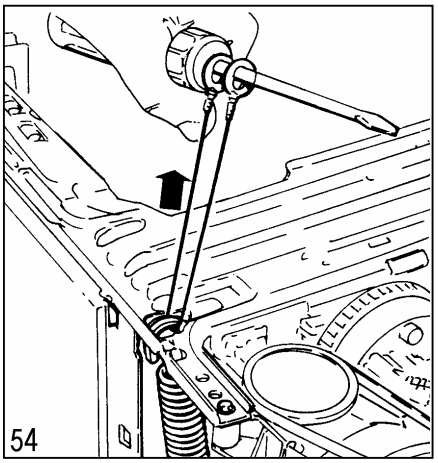
a. Remove the rear cabinet shell
b. Loosen the clamps and detach the pressure switch tubes from the pressure chamber
c. Remove the screw (if present)
d. Use pliers to widen the spring clip and detach the pressure chamber from the tub hose

When re-assembling: Check that the pressure chamber is clean and secure the tubes and clips firmly in their original positions.

9.6 Washing group (Carboran-inox)



a. Remove the fixing ring and detach the bellows seal from the front panel
b. Remove the rear shell
c. Remove the clamps from the tub suspension springs (53)
d. Detach the various hoses from the tub (dispenser-tub, steam venting hose, tub-manifold etc.)
e. Remove all the wiring connectors from the components fastened to the tub (motor, heating element, thermostats) and, if present, the bulb of the adjustable thermostat
f. Remove the motor to lighten the tub
g. Remove the fixing screws and remove the rear counterweight (only if featured)
h. Remove the two pins which secure the dampers to the tub
i. Lay the appliance face down (on a sheet of polystyrene or cardboard to prevent scratching the cabinet)
j. Use a piece of string or wire to detach the tub suspension springs from the cross-member
k. Remove the tub from the appliance



9.7 Drum and tub shells (Carboran)

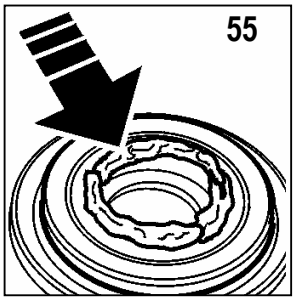
a. Remove the drum pulley and the motor
b. Remove the tub from the appliance
c. Remove the screws which secure the two shells together
d. Remove the drum

***Re-assembly**: It is advisable to replace the sealing ring between the two tub shells whenever the tub is opened. Connect the hoses to the tub in the correct positions.*

9.7.1 Drum shaft bearings

If it is necessary to replace the bearings, the engineer may:
- replace the rear tub shell complete with bearings and sealing ring
- replace the bearings and the sealing ring only

In the latter case:
a. Remove the tub and the drum from the appliance
b. First remove the external bearing, then the internal bearing with its seal



***When re-assembling**:*
- *In order to prevent damage to the bearing and the seal during re-assembly, use spacers of the appropriate diameter*
- *Pack the bearings with the specific grease all around the sealing ring (55).*
- *Check that the drum shaft bushing is undamaged, otherwise replace the drum spider or the drum itself.*

9.7.2 Drum spider

a. Remove the screws which secure the spider to the drum
b. Use two narrow chisels to remove the spider from the drum band

When re-assembling:
a. *Replace the spider on the drum ensuring that the fixing holes are correctly aligned*
b. *Insert the spider into the seat in the drum band and, if necessary, rotate it until the holes are correctly aligned*
c. *If the same screws are used, clean and apply thread fixing paste*
d. *Tighten the screws securely*

9.7.3 Front counterweight (Carboran tub)

⇒ **version with front-mounted fixing screws**

a. Remove the tub
b. Replace both the shell and the front counterweight to prevent the possibility of breakage due to vibrations

⇒ **version with fixing screws on the perimeter of the tub**

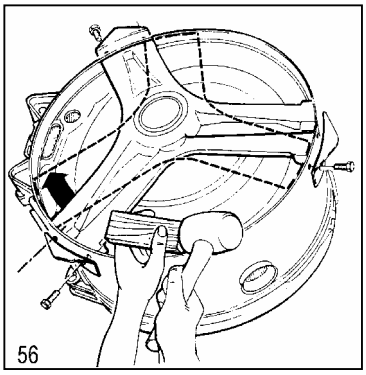
a. Remove the tub
b. Remove the fixing screws
c. Check that the seats of the tub screws are undamaged, otherwise replace the front tub shell

9.7.4 Rear counterweight (Carboran tub)

a. Remove the rear cabinet shell
b. Remove the screws which secure the counterweight
c. Remove the counterweight from the tub
d. Check that the expansion pins of the tub screws are undamaged, otherwise replace the rear shell also

9.8 Components of stainless steel tubs

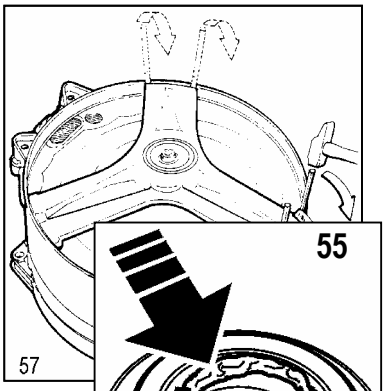
9.8.1 Tub spider



a. Remove the tub
b. Dismantle the pulley
c. Remove the screws which secure the spider to the tub
d. Remove the nut which secures the tub support band in position
e. Rotate the spider until it exits the fixing holes
f. Push the drum shaft inwards as far as possible
g. Remove the spider from the tub

Alternative method of removing the spider (after removing the tub):

a. Remove the pulley
b. Remove the screws which secure the spider to the tub
c. Push the drum shaft inwards as far as possible
d. Insert a small chisel between one of the lifters and the tub near the fixing holes, and tap gently with a hammer. If the lifter is secured by two screws, use two chisels. The chisels should be as thin as possible in order to avoid deformation of the edge of the tub.
e. Use the chisel(s) to lever the lifter off the tub spider
f. Repeat this procedure for the other lifter and remove the spider.



When re-assembling:

a. *Reposition the spider on the drum, ensuring that the holes are correctly aligned.*
b. *Insert the spider into its seat in the tub band and rotate if necessary to align the fixing holes.*
c. *If the same screws are used, clean and apply thread fixing paste*
d. *Tighten the screws securely.*

9.8.2 Drum shaft bearings

If it is necessary to replace the bearings, the engineer may:

- replace the tub spider assembly complete with bearings and sealing ring
- replace the bearings and the sealing ring only

In the latter case:

a. Remove the spider
b. First remove the external bearing, then the internal bearing with its seal

When re-assembling*:*

In order to prevent damage to the bearing and the seal during re-assembly, use spacers of the appropriate diameter

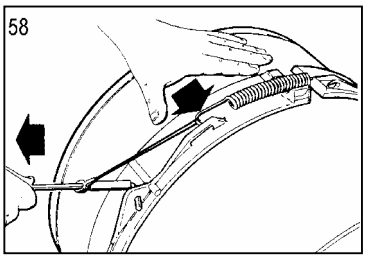
Pack the bearings with the specific grease all around the sealing ring (55).

Check that the drum shaft bushing is undamaged, otherwise replace the drum spider or the drum itself.

9.8.3 Tub support band

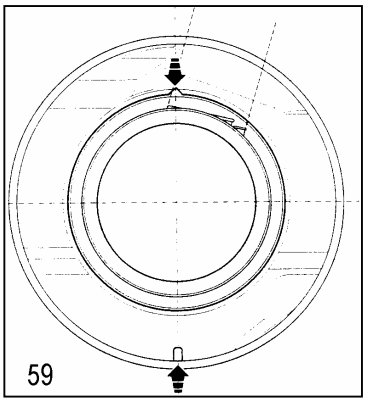
a. Remove the tub from the appliance
b. Release the retaining spring using a length of steel wire
c. Remove the two nuts which secure the band to the tub (near the motor)
d. Remove the support band

***Re-assembly**: First fit the two bolts which secure the band to the tub, then, using a length of steel wire, re-attach the retaining spring*



9.8.4 Drum

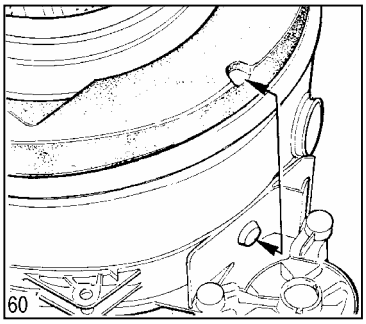
a. Remove the tub from the appliance
b. Remove the idle pulley
c. Remove the screw and remove the ring. Remove the front counterweight and the tub flange with its sealing ring
d. Remove the drum.

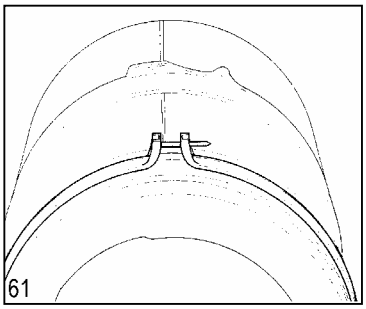


9.8.5 Replacing the stainless steel tub

a. Refit the bellows seal to the tub flange.
b. Position the counterweight on the flange, ensuring that the reference points on the counterweight are in alignment with those on the bellows seal (59).
c. After replacing the drum, position the flange-counterweight assembly on the tub, ensuring that the reference point on the counterweight is aligned with the indent in the support band (60)
d. Fit the retaining ring with the screw in alignment with the welded seam on the tub (61)
e. Tighten the ring fastening screw while tapping around the perimeter of the ring to ensure that it is firmly secured.
f. Replace the pulley
g. Replace the tub in the appliance.

Re-connect the hoses to the tub in their original positions.



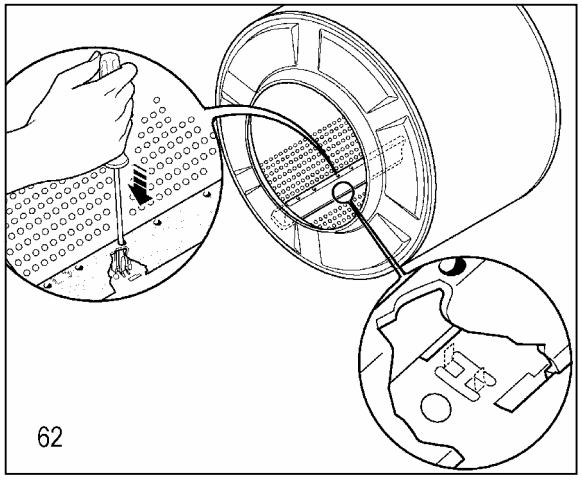


9.8.6 Rear counterweight

a. Remove the rear cabinet shell
b. Remove the screws which secure the counterweight in position
c. Detach the counterweight from the tub.

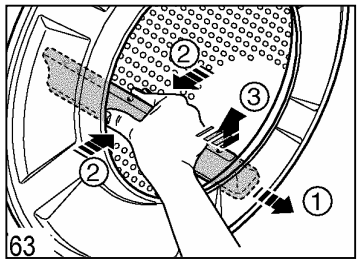
9.9 Drum lifter

The drum lifter can be removed from the interior for stainless steel tubs (G10-G11-G12-G13) and the type G17-G18-G19 Carboran tubs.
For type G20-G21 Carboran tubs, it is necessary to remove the drum before replacing the lifter.



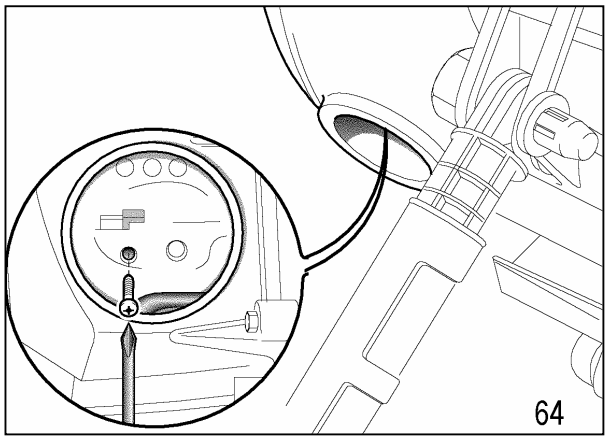
- **Removal**

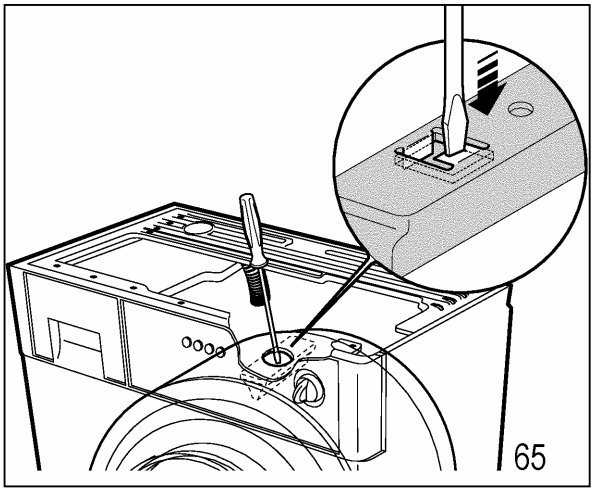
a. Insert a screwdriver into the following holes:
⇒ for G13 tubs, into the fourth hole in the lifter
⇒ for G10-G11-G12-G18-G19 tubs, into the third hole in the lifter
⇒ for G17 tubs, into the second hole of the lifter
b. Bend the drum anchor tabs as shown in the figure (62)
c. Pull the drum lifter towards the door of the appliance and detach from the drum (63)



- **Re-assembly (G10-G11-G12-G18-G19 tubs)**

a. Check that the anchor tabs are parallel with the drum band.
b. Insert the new lifter into the drum and push towards the rear of the appliance.
c. Detach the hose connecting the tub to the filter body
d. Tighten the screw through the hole in the tub to secure the lifter to the drum (64)





- **Re-assembly for G17 tubs (32 cm washing machines)**

a. Check that the anchor tabs are parallel to the drum band.
b. Insert the new lifter into the drum and push towards the rear of the appliance.
c. Detach the steam venting hose from the tub.
d. Using a screwdriver through the hole in the tub, bend the anchor tabs so that the drum lifter is firmly secured (65).

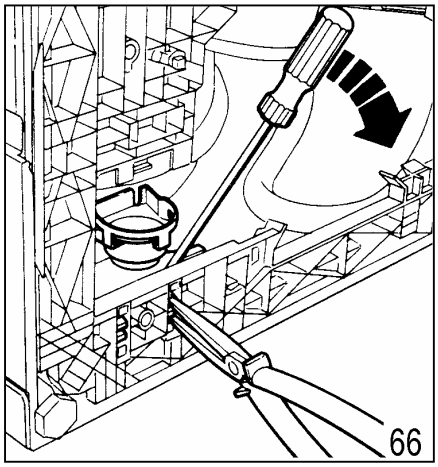
9.10 Access to the pumps/manifolds

Important!
Do not fit the circulation pump in place of the drain pump and vice versa.

9.10.1 Drain pump (standard version)

To access the drain pump, it is not necessary to remove the rear cabinet shell. The pump can be accessed from the base.

a. Detach the clamps which secure the filter body to the base and raise slightly (66)
b. Remove the drain pump
c. Detach the drain hose
d. Detach the wiring connectors

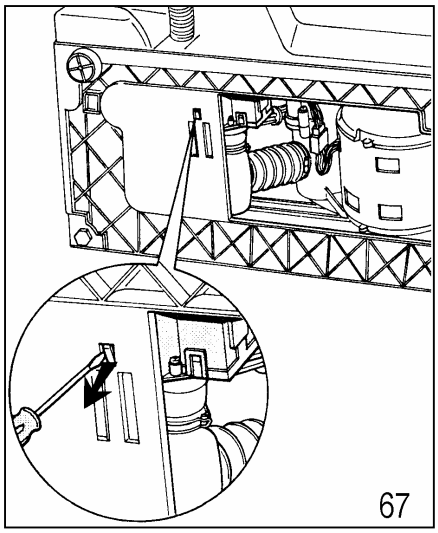


When re-assembling, ensure that the OR seal is fitted to the pump. To facilitate insertion, lubricate with vaseline or silicone oil. Check that the pump is correctly housed in its seat in the filter body.

9.10.2 Drain pump - models with P66 (32cm) cabinet

Access to the pump is from the base of the appliance:

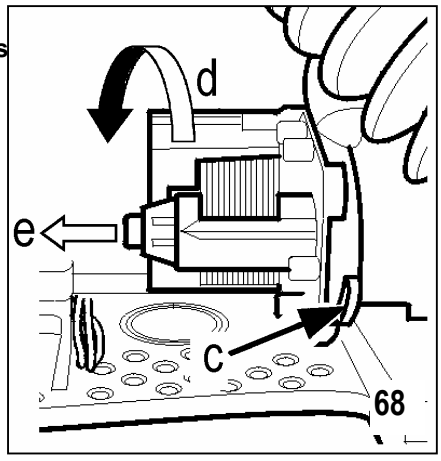
a. Slightly raise the clamp and remove the pump from the base (67)
b. Detach the drain hose and the hose between the pump and the tub
c. Detach the wiring connectors



9.10.3 Drain pump - models with RIM and P63 soft BD cabinets

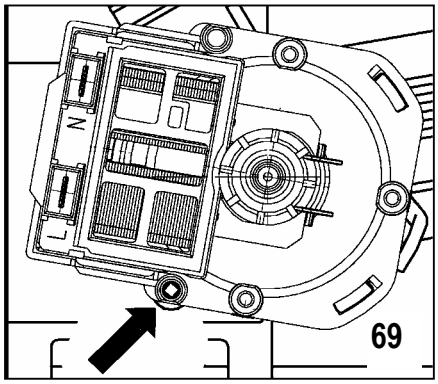
Access to the pump is from the base of the appliance:

a. Remove the cover
b. Detach the connectors
c. Press down the anchor tab (68c)
d. Turn the pump counter-clockwise (68d)
e. Remove the pump (68e)

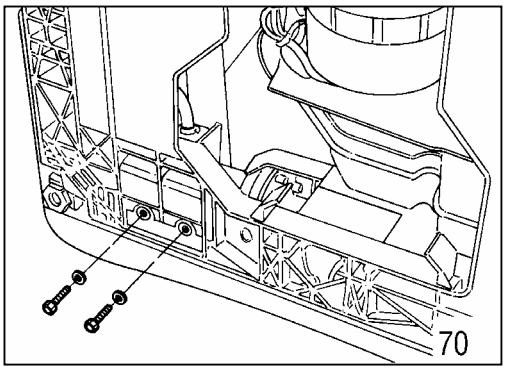


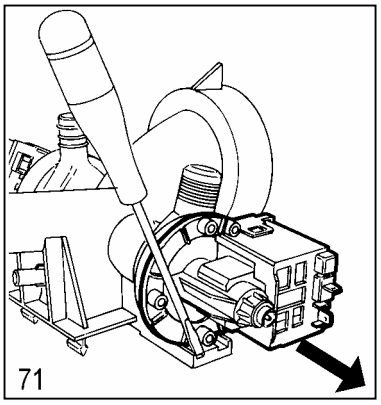
When re-assembling:

- *Insert the pump fully into its seat in the filter body before rotating it.*
- *Check that the anchor tab is undamaged. If so, use a 3.5x19 mm screw to secure the pump (69)*



9.10.4 Drain pump - models with Neat cabinet (Jetsy- IZ)



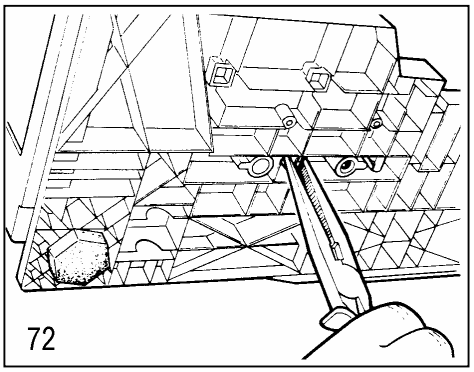


a. Lay the appliance face-down, remove the screws which secure the filter body and remove the filter from the base (70)
b. Detach the drain hose from the pump.
c. Press down the two anchor tabs and detach the pump from the filter body (71).
d. Detach the wiring connector.

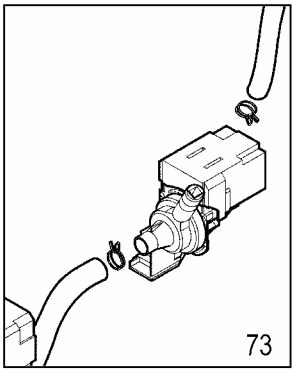
When re-assembling, ensure that the OR seal is fitted to the pump. To facilitate insertion, lubricate with vaseline or silicone oil. Check that the pump is correctly housed in its seat in the filter body.

9.10.5 Circulation pump (standard version)

a. Remove the rear shell
b. Disconnect the circulation hose (and, if present, the venting hose)
c. Lay the appliance face-down and remove the screw which secures the support to the base.
d. Bend back the two base anchor tabs and remove the pump (72)
e. Detach the pump from the filter coupling (or from the heat exchanger)
f. Detach the wiring connector
g. Detach the thermostat bulb (if present)



When re-assembling, ensure that the O-ring is fitted to the filter body coupling hose (or to the heat exchanger). Lubricate with vaseline to facilitate insertion.



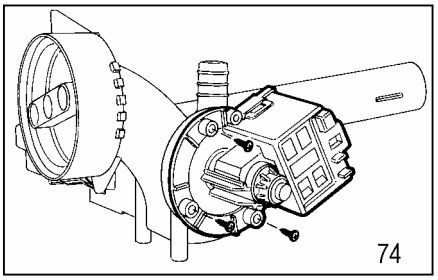
9.10.6 Circulation pump - “New Jet” version

Access to the pump is from the base of the appliance:

a. Remove the two screws which secure the pump to the base.
b. Detach the circulation pump assembly from the base.
c. Loosen the clamps and detach the hoses from the pump (73)
d. Detach the cover.
e. Detach the wiring connectors.
f. Remove the circulation pump assembly

9.10.7 Filter/pump assembly - models with Neat cabinet (Jetsy- IZ)

a. Lay the appliance face-down, remove the screws which secure the filter body (70) and detach the filter from the base.
b. Detach the hoses from the filter body and the pumps.
c. Detach the connectors.
d. Remove the filter/pumps assembly from the base.

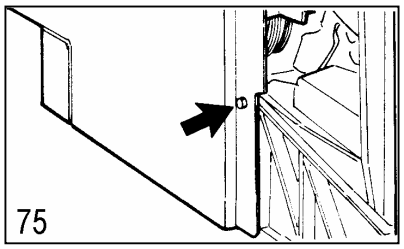


9.10.8 Circulation pump - models with Neat cabinet (Jetsy- IZ)

a. Remove the filter/pumps assembly from the base (9.10.7)
b. Remove the screws which secure the circulation pump (74)

9.10.9 Drain filter body (standard version)

a. Remove the rear cabinet shell
b. Lay the appliance face-down
c. Remove the circulation pump (if present)
d. Detach the hoses from the filter body
e. Remove the screws which secure the front shell to the base (75)
f. Raise the base in order to detach the filter body from the front shell
g. Release the tabs which anchor the filter body to the base (66)
h. Remove the drain pump
i. Remove the filter body



9.10.10 Heat exchanger (certain Jetsystem models only)

a. Remove the rear cabinet shell
b. Detach the circulation pump without detaching the hoses
c. Disconnect the heat exchanger from the filter body

Re-assembly: Ensure that the two seals (O-rings) are correctly positioned on the heat exchanger. Lubricate with vaseline to facilitate insertion.

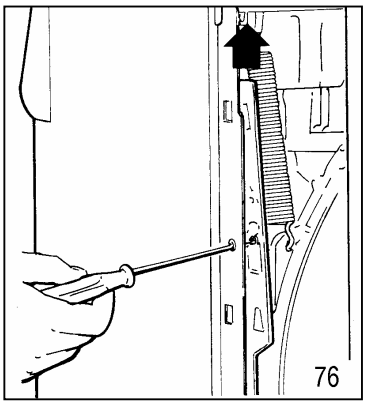
9.10.11 Base

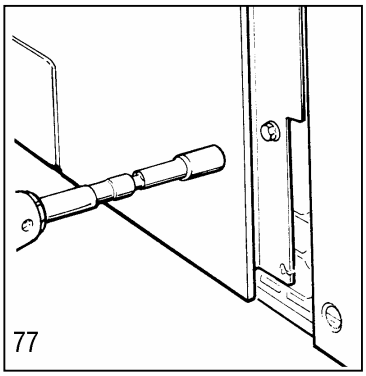
a. Remove the rear cabinet shell
b. Remove the pins which secure the dampers to the base
c. Cut the fixing ties and detach the wiring
d. Release the speed control unit casing (if present)
e. Detach the drying condenser (washer-dryers)
f. Lay the appliance face-down
g. Detach the drain hose
h. Remove the lateral screws which secure the front shell to the base (75)
i. Raise the base and remove the filter body
j. Remove the base

After re-assembly, connect the wiring correctly to the base and secure using new wiring ties.

9.11 Front cabinet shell

a. Remove the top
b. Remove the control panel
c. Remove the porthole door
d. Detach the bellows seal from the front panel
e. Remove the two screws which secure the door delay device to the front panel
f. Remove the rear shell
g. Detach the wiring support from the front shell
h. Detach the circulation hose (if present) from the front shell (76)
i. Replace the rear shell, leaving a gap of 1-2 cm in order to remove the lateral screws which secure the front shell to the base
j. Re-position the rear shell completely and re-tighten the screws which secure the upper cross-member to the rear cabinet shell
k. Re-tighten the screws which secure the rear shell to the base
l. Lay the appliance on its rear panel, preferably on a sheet of cardboard to protect the surface
m. Remove the screws which secure the upper cross-member to the front cabinet shell
n. Lift the cross-member and slide the front cabinet shell from the base





When re-assembling:

a. Replace the front cabinet shell and check that it is correctly inserted into the guides in the base
b. Place the appliance in the upright position, taking care not to damage the structure
c. Replace the screws which secure the upper cross-member to the front cabinet shell
d. Remove the screws which secure the upper cross-member to the rear cabinet shell
e. Slide the rear cabinet shell outwards about two centimetres
f. Tighten the lateral screws which secure the front cabinet shell to the base
g. Remove the rear cabinet shell and replace the internal components removed in previous steps
h. Replace the rear shell
i. Replace the porthole door, the door delay device, the bellows seal, the control panel and the top

The following components are attached to the front cabinet shell:

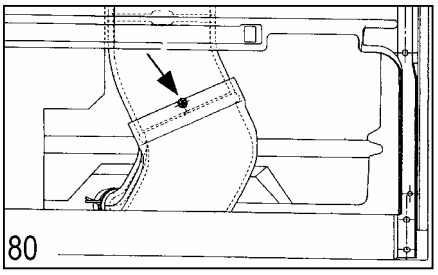
- *the support brackets for the feet (using two screws)*
- *the drain filter access panel*
- *on P63 and NEAT models, the lower plinth*

It is not necessary to remove the cabinet shell in order to access these components.

9.12 Access to specific washer-dryer components

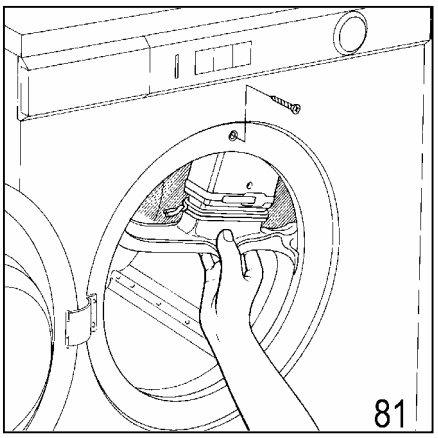
9.12.1 Bellows seal and drying duct

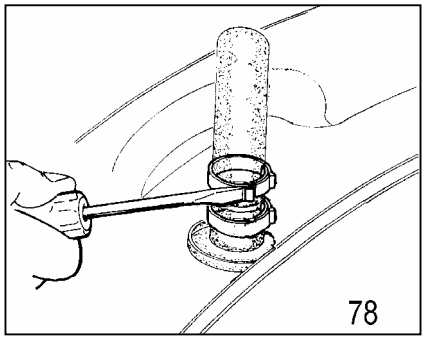
a. Remove the work-top
b. Remove the screw which secures the duct to the tank (80)
c. Open the porthole door, remove the screw which secures the duct to the cabinet, detach the duct from the heating element casing and pull the seal downwards (81)
d. Detach the seal from the front panel
e. Detach the circulation hose from the seal (Jetsystem models only) (78)
f. Remove the wire clamp which secures the seal to the duct and remove the seal (82)

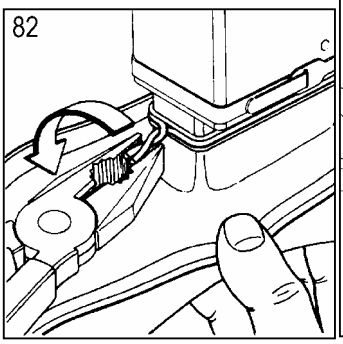


At this point, the duct can be accessed. To access the seal, proceed as follows:

g. Remove the seal and the ring by pulling downwards

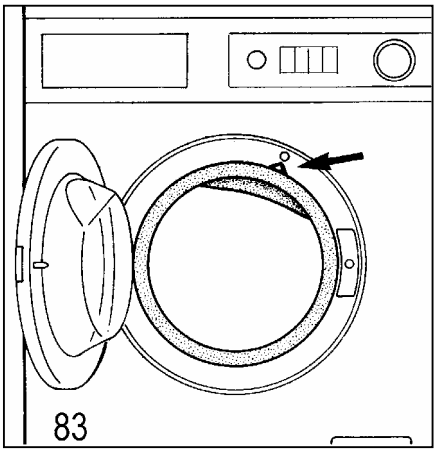




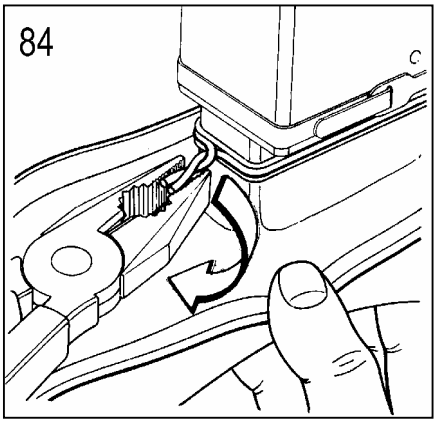


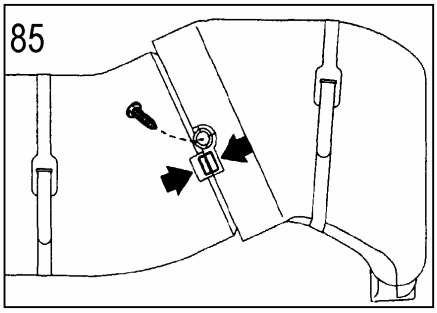
Re-assembly

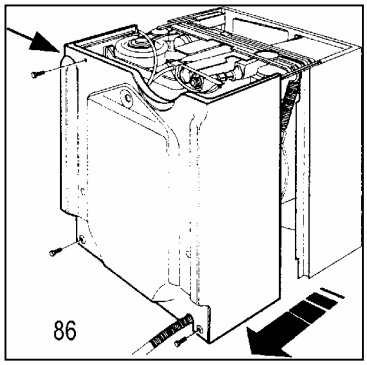
a. *Use soap and water to lubricate the seal seat where it comes into contact with the flange and the metal ring*
b. *Replace the seal, ensuring that the reference mark on the seal is aligned with the hole for the screw which secures the duct to the front panel (83)*
c. *Re-connect the circulation hose (if featured) with the hose clamp (79)*
d. *When replacing the wire hose clamp, ensure that it is correctly positioned in the groove in the seal, then proceed as shown in the figure (84)*
e. *Lubricate the seal with soap and water to facilitate insertion of the duct into the heating element casing.*
f. *Use pliers to re-close the two anchor tabs and tighten the screw (85)*
g. *Attach the seal to the front panel*
h. *Re-tighten the screw which secures the duct to the cabinet*
i. *Replace the ring which secures the duct to the cabinet using pliers to close in position*

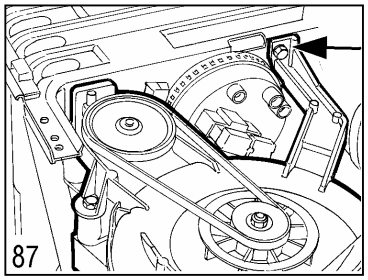


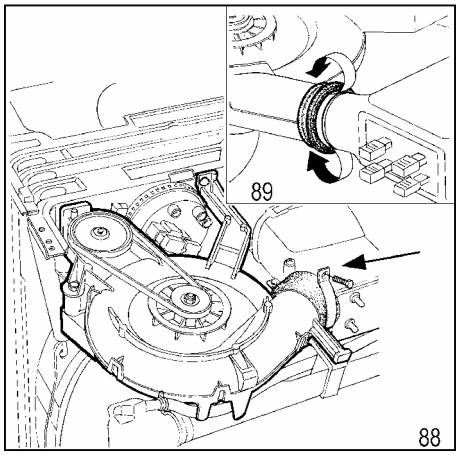
After fitting a new bellows seal, lubricate the external surface (which comes into contact with the porthole door) with silicone oil. This will ensure that the porthole door does not stick to the seal during the first few drying cycles.





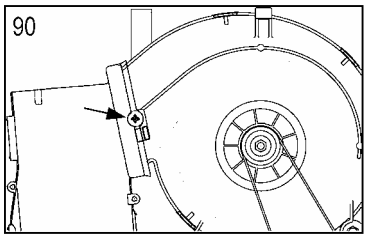






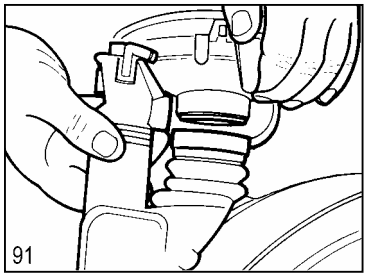
9.12.2 Rear cabinet shell

a. Remove the top
b. Remove the screws which secure the shell to the base and to the control panel support
c. Remove the screw which secures the fan to the shell (86)

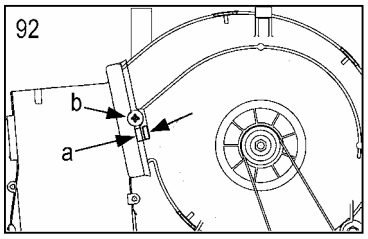


9.12.3 Motor-Fan assembly

a. Remove the rear cabinet shell
b. Remove the screw which secures the fan to the control panel support (87)
c. Detach the fan from the heating element casing:
⇨ Standard version: if present, remove the seal retaining clamp (88) and fold back the seal on the coupling between the fan and the heating elements (89)
⇨ High Performance version: remove the screw from the heating element casing (90)
d. Detach the fan from the drying condenser and from the cross-member (91)
e. Detach the wiring connector from the motor and remove the fan assembly

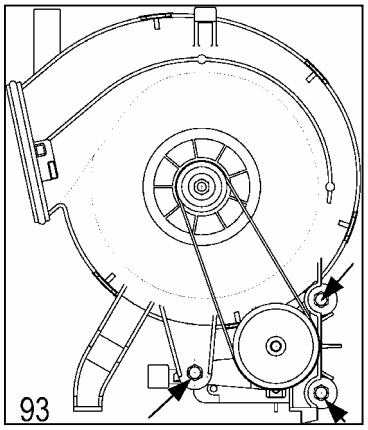


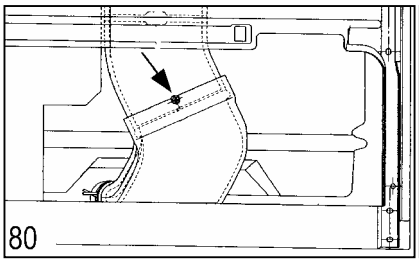
Re-assembly:
For the "High Performance" version, replace the sealing ring (OR) between the heating element casing and the fan; replace the fan assembly on the condenser, attaching to the cross-member; close the anchor tabs using pliers (92), then fully tighten the screw.

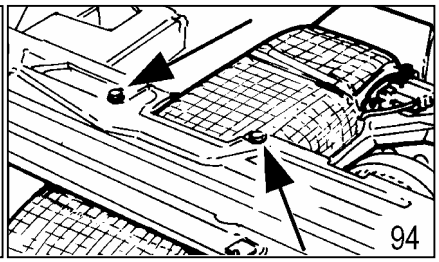


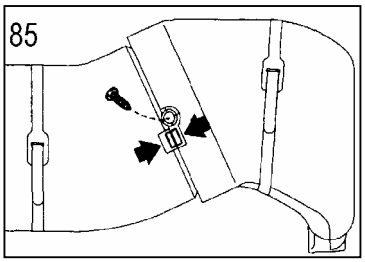
9.12.4 Motor / Fan

a. Remove the fan assembly
b. Detach the drive belt from the pulleys
c. Remove the three screws and separate the motor from the fan (93)





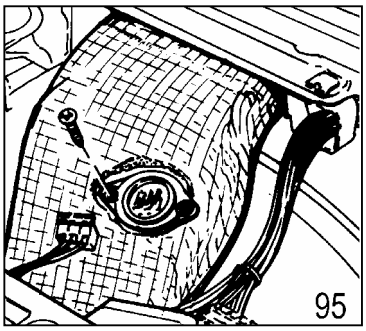




9.12.5 Drying heater casing

a. Remove the rear cabinet shell
b. Detach the connectors from the heating elements and from the thermostats
c. Detach the fan from the casing (9.12.3)
d. Remove the screws which secure the casing to the duct and the two screws which secure it to the cross-member
e. Remove the casing

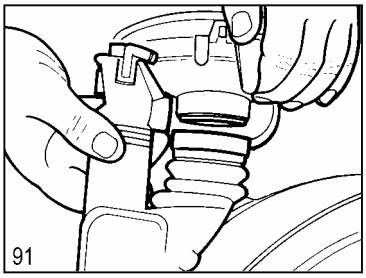
***When re-assembling**: Use pliers to close the two anchor tabs and tighten the screw (85)*



9.12.6 Drying heaters

a. Remove the rear cabinet shell
b. Remove the hose connecting the condenser to the dispenser coupling
c. Detach the connectors
d. Remove the screws which secure the heating element to the casing
e. Remove the heating element

***When re-assembling**: When inserting the heating element, ensure that it is correctly positioned in the support inside the casing.*

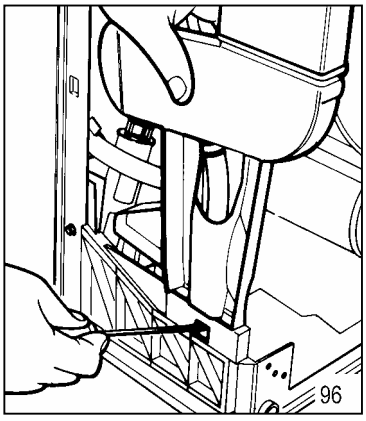


9.12.7 Drying and safety thermostats

a. Remove the heating element casing from the appliance
b. Remove the screws which secure the thermostat to the casing and remove the thermostat

9.12.8 Temperature sensor / Safety thermostat

a. Remove the work-top
b. Detach the connectors
c. Remove the screws which secure the component to the casing and remove the thermostat/sensor (95)



9.12.9 Drying condenser

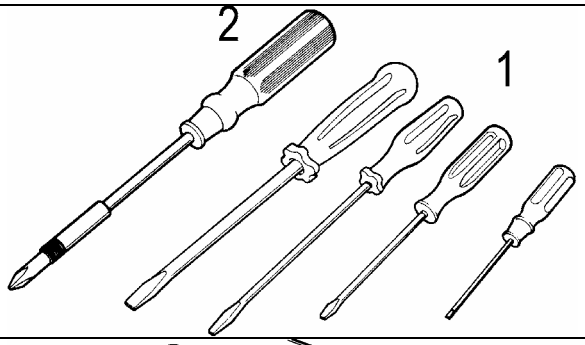
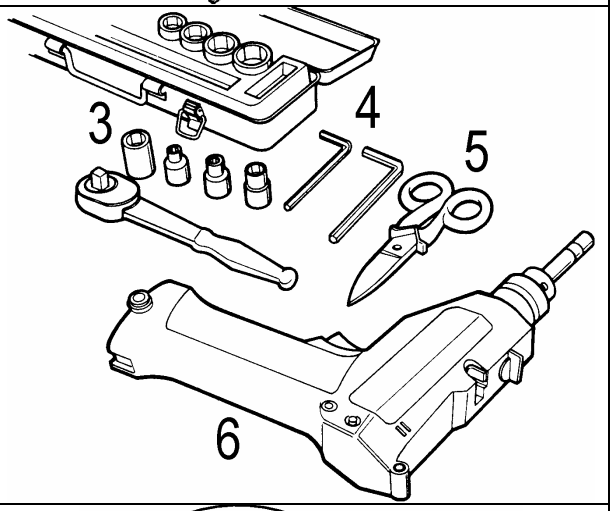
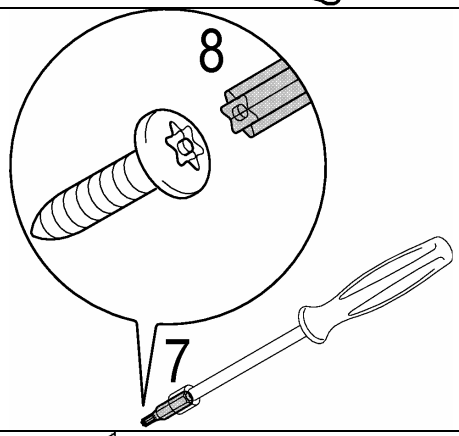
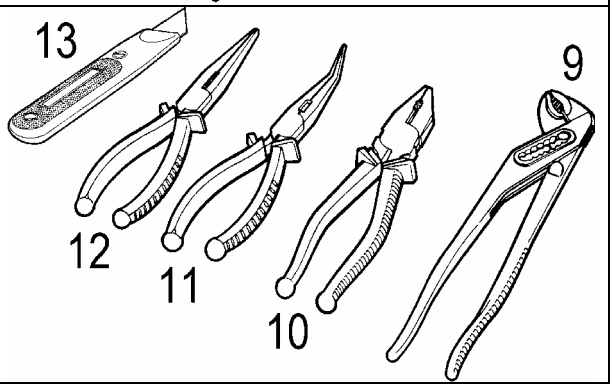
a. Remove the rear cabinet shell
b. Lift the fan and detach from the condenser (91)
c. Detach the upper hoses from the condenser
d. Detach the NTC sensor connector (if present)
e. Detach the condenser from the base
f. Loosen the clamp and detach the hose which connects the condenser to the tub (96)

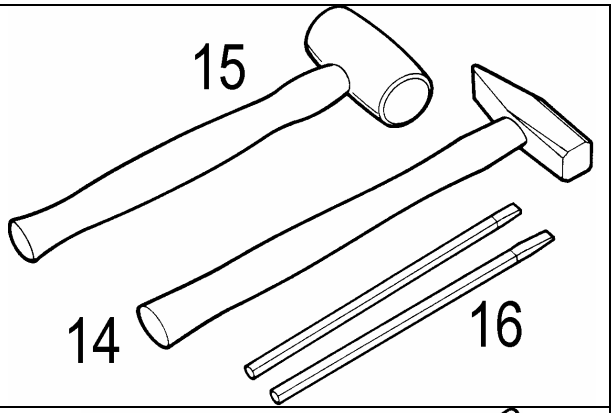
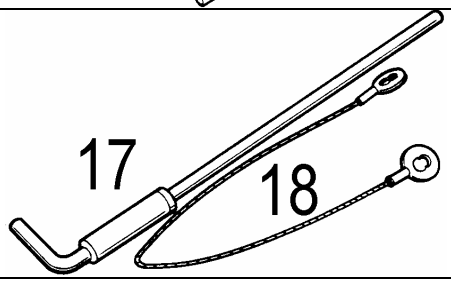
9.12.10 NTC sensor for control of drying times (models with electronic control)

a. Remove the rear cabinet shell
b. Detach the wiring connector
c. Remove the temperature sensor from the hose between the tub and the condenser or from the seal

10 TOOLS AND MATERIALS

10.1 Standard tools

1. Set of standard flat-head screwdrivers (small, medium, large) 2. Set of cross-head ("Phillips") screwdrivers	
3. Set of socket screws (7, 8, 10, 13, 15, 17mm) 4. Insulated scissors. 5. Allen keys (5-6 mm) 6. A battery-operated power screwdriver may also be used.	
7. “Torx” screwdriver(T30-T50) 8. “Torx” T20H insert *(to unscrew "Torx" T20 screws with central pin, also available as a tool under part number 5024880100/8).*	
9. Adjustable wrench 10. Standard pliers 11. Narrow-tipper pliers (curved) 12. Narrow-tipped pliers (straight) 13. Cutter	

14. Hammer (300 g approx.) 15. Plastic or rubber-head hammer 16. Two narrow-tipped chisels (mm 200x8)	
17. Steel wire 18. "L"-shaped lever *(used to detach the support band from stainless steel tubs)* *When replacing the bearings, use spacers of the appropriate diameter*	

10.2 Materials

- ⇨ soap and water
- ⇨ silicone oil
- ⇨ vaseline
- ⇨ thread-anchoring liquid for screws
- ⇨ grease for drum shaft seal (*part number 5026 24 16-00/6*)
- ⇨ grease for detergent dispenser distributor (*part number 5022 18 11-00/8*)
- ⇨ plastic wiring ties