1 SAFETY

1.1 Pictograms

The following **pictograms** are used in the repair instructions:

DANGER

► Please observe handling regulations!

WARNING

► Please observe handling regulations!

Sharp edges:

► Wear protective gloves!

Electrostatic sensitive devices!

► Please observe handling regulations!

1.2 Safety instructions

DANGER

Danger to life by electric shock

► If the appliance is faulty, the housing or frame may be live!

► Electric shock may occur if live components are touched inside the appliance!

Measures:

► Repairs may be carried out by a qualified electrician only! The user may be put at risk and injured by improper repairs!

► Before commencing repairs, disconnect the appliance from the power supply!

► If tests have to be performed while the appliance is live, always use a residual-current-operated circuit-breaker! He is crucial for personal safety and appliance function.

► The protective conductor resistance values must never exceed the values specified in the standard!

► When repairs are complete, perform a test in accordance with VDE 0701 (via the connector, the safety test must be conducted as described in the circuit diagrams), or the corresponding national regulations!

► Check the protective conductor resistance, the insulation resistance and the auxiliary leakage current. The resistance values must never exceed the values specified in the standard!

► Also check for leaks.

2 INSTALLATION

2.1 Aligning the appliance

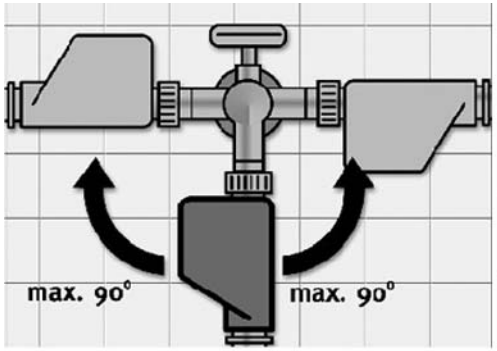
To ensure fault-free operation, the appliance must be aligned precisely via the height-adjustable feet. If the appliance is installed on a base, the appliance must be attached with the attachment kit, mat. no. 080451 for reasons of safety. If the appliance is built under, fit the VDE cover panel instead of the cover plate.

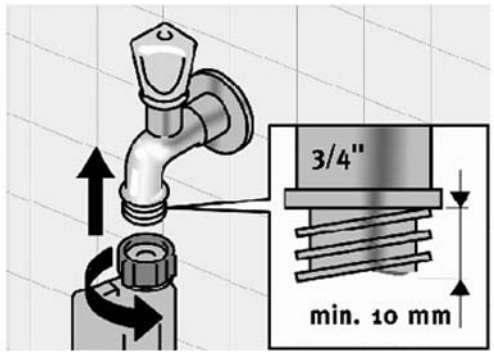
2.2 Water supply

The water connection (3/4 inch) requires a conventional water line with a water pressure of at least 1 bar (1 at.) (when the tap is turned on, the water flow rate must be more than 8 l/min.). If the water pressure is more than 10 bar (10 at.), a pressure reducing valve must be installed.

2.2.1 Aqua Stop version (optional)

If appliances feature Aqua Stop, the supply hose can be extended by 250 cm with the Aqua Stop extension or with a longer Aqua Stop hose (available from customer service, hose length 310 cm). The valve may be connected only as illustrated in the diagram. The valve must not be situated in water, but may be connected in protection zone 1 if the appliance is fused with a 30 mA FI circuit-breaker. In this case the socket of the appliance must be in protection zone 3 or higher.





2.2.2 Warm water version (optional)

The warm water appliances feature 2 valves. The warm water connection is red and may be connected to maximum 60 °C.

2.2.3 Aqua Secure supply hose (optional)

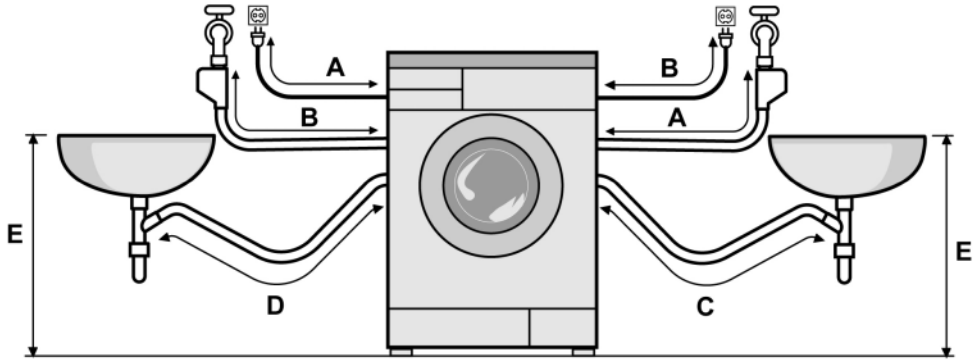
The Aqua Secure hose (hose length 150 cm) features a double supply hose and a mechanical valve. An Aqua Stop guarantee is not required. If the supply hose leaks, the mechanical valve is closed by a swelling sponge. If the valve closes, the complete hose must be replaced.

2.3 Water outlet

The waste water hose may be extended to 4 m (432060 2,20 m), but only if the hose is lying flat on the floor and has no more than one connection.

2.4 Electrical connection

Connect the appliance to a correctly installed earthed socket only. Comply with the specifications on the rating plate. A 3 m long connection cable (incl. earthed plug) is available from customer service (mat. no. 481580).

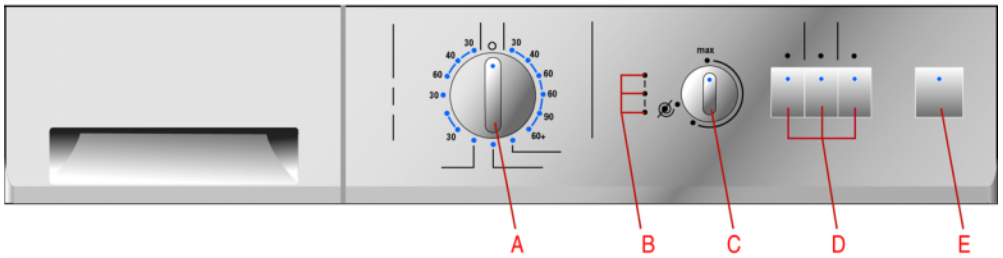


A	approx. 100 cm	**C**	approx. 135 cm	**E**	max. 100 cm
B	approx. 145 cm	**D**	approx. 90 cm		

3 OPERATION

3.1 Operation in general

The appliance features a programme selector, up to four optimizing buttons, a start button, a speed selector and a display for preselection of starting time. The remaining wash time is shown on the display. The programme sequence is indicated by the display.



3.2 Programme selector (A)

The programme selector with combined main switch has 16 positions. Special programmes, cottons/ coloureds programmes, easy-care programmes, delicates programmes and woollens programmes can be selected at different temperatures.

3.3 Speed selector (C)

The speed can be selected step less via the speed selector. “Without spin” can also be selected, the intermediate spin cycle runs, the washing remains in the last rinsing water.

3.4 LED displays (B)

Programme display: Ready, Active, End, - 3 LED displays

3.5 “Start” button (E)

This button is used to start the programme.

3.6 “Anti-crease” / “easy-iron” button (D)

Press this button to select a different spin profile (lower intermittent speed) and a longer loosening at the end of the programme. Creasing is reduced.

3.7 “Extra Wash” / “Super Wash” button (D)

Press this button to activate an additional rinse cycle. The programme duration is extended accordingly.

3.8 “Rapid wash / Short” button (optional) (D)

The washing time is reduced, this button should be pressed for lightly soiled washing.

3.9 “Intensive wash” button (optional) (D)

The washing time is increased, this button should be pressed for heavily soiled washing.

3.10 Signal (optional)

The acoustic signal signals:

► Actuation of the Option buttons

The signal for the “Option buttons” can be switched on and off. This requires that the programme selector is set to “coloureds 30 °C” and simultaneously that the “Start” button is pressed and hold down. When the signal sounds, the setting has been stored into the memory. The volume cannot be adjusted. When an additional function is switched on, a long acoustic signal sounds; when the function is switched off, the acoustic signal is short.

► Individual programme versions (e.g. malfunctions, operating faults, programme start, programme end)

The signal for the programme versions can be switched off before the programme starts and at the end of the programme or set to a different volume. This requires the “Intensive”(Quick) button is pressed and hold down. Release the button at the required volume, the setting has been stored into the memory.

4 COMPONENTS

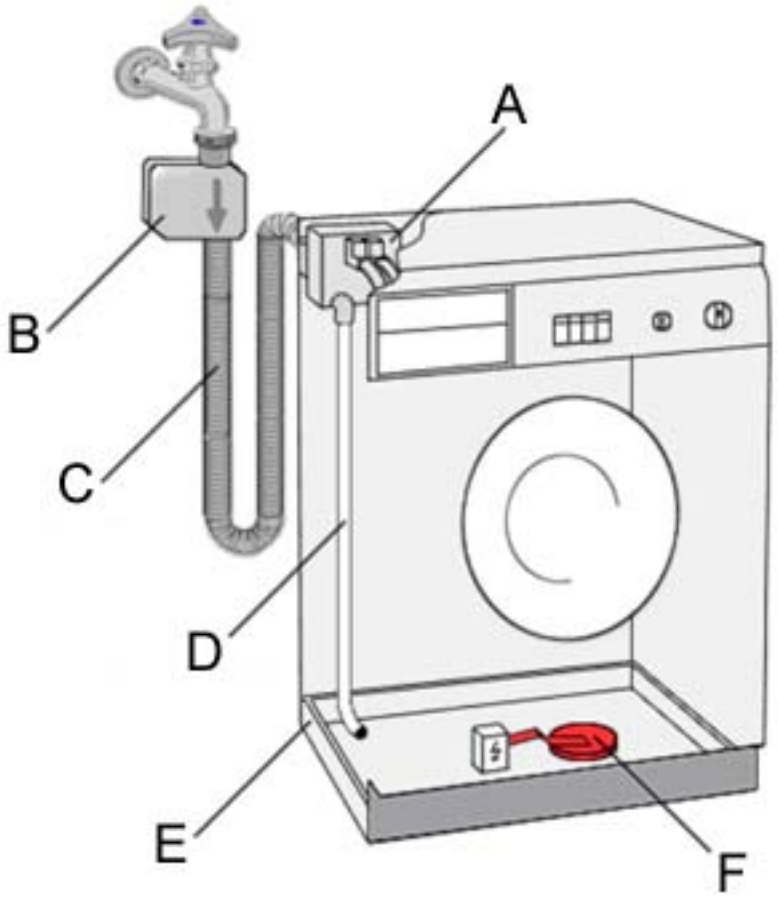
4.1 Aqua Stop valve

4.1.1 Function:

An electric solenoid valve which is enclosed by a housing is attached to the tap. The housing is connected to the appliance with a double supply hose. The double supply hose contains the water supply hose and electric control cable for the solenoid valve. The safety function is actuated via the float in the base pan. The water flow is then stopped mechanically.

4.1.2 Technical specifications:

►	Nominal voltage	230–240	V
►	Frequency	50	Hz
►	Resistance	4.13	kΩ ± 10 %
►	Flow rate	10	l/min ± 10%
►	Water pressure	1.0–10	bar
►	Water inlet temperature max.	max. 25	°C



A Equipment valve **B** Aqua-stop **C** Double inlet hose
D Leakage water hose **E** Drip tray **F** Soil float

4.2 Aqua Secure valve

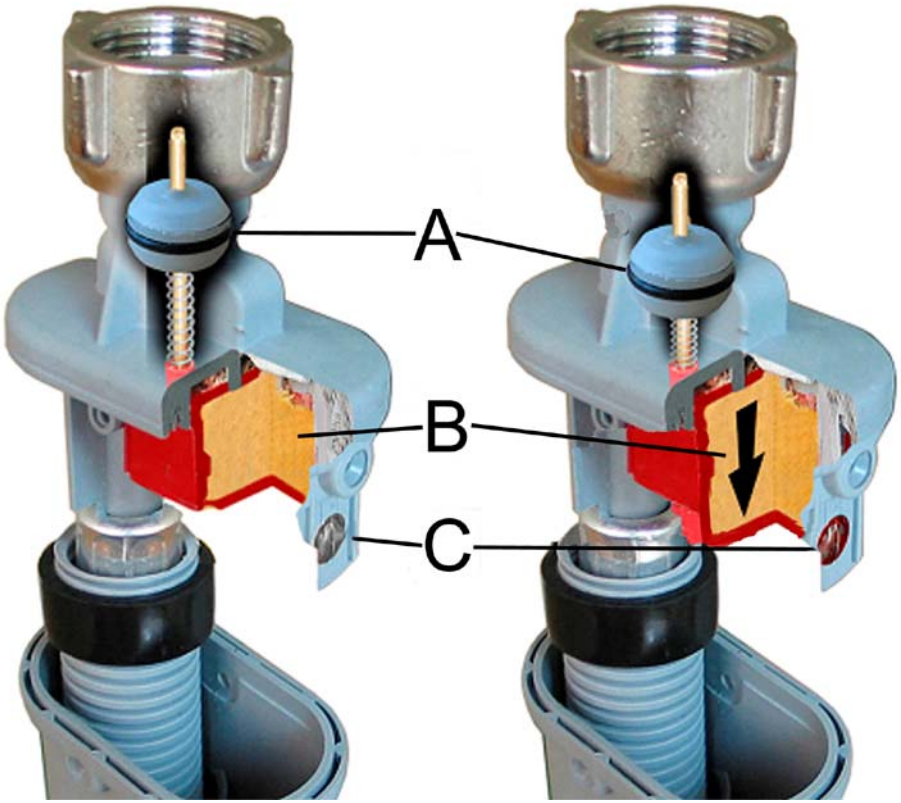
4.2.1 Function:

A mechanical valve which is enclosed by the Aquastop housing is attached to the tap. The housing is connected to the appliance with a double supply hose. If the inner hose leaks, the water flows through the double supply hose into the Aquastop housing. The safety function is actuated mechanically; a sponge expands which pulls down a plunger and closes the valve. The inspection window on the Aquastop housing turns red. The Aquastop hose must be replaced because the sponge does not contract when it dries.

In addition, the appliance has a float in the base pan; this float stops the water inflow if there is a leak in the appliance.

4.2.2 Technical specifications:

►	Flow rate	0.5–20	l/min
►	Water pressure	0.2–10	bar
►	Water supply temperature	5–93	°C
►	Air temperature	5–60	°C
►	Air humidity	30–95	%



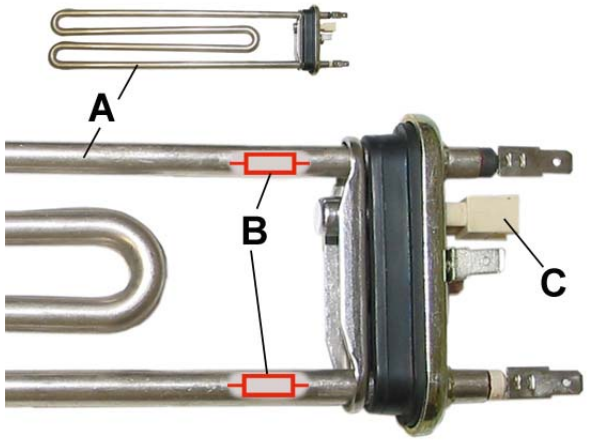
Not actuated Actuated

A Plunger
B Sponge
C Inspection window

4.3 Heater

4.3.1 Function:

The heating element **A** has two integrated fuses **B** (boil-dry protection). The fuses cannot be changed.



A Heating elements
B Integrated fuses
C NTC (resistance with negative temperature coefficient)

4.3.2 Technical data:

►	Nominal power	2000 W
►	Nominal voltage	230 VAC
►	Power tolerance	+5 % ..... –10 %
►	Resistance	see connection diagram

4.4 NTC

4.4.1 Function:

If the NTC value is outside the operating range (e.g. interruption or short-circuit), the programme continues cold without an error display. The test programme displays “NTC short circuit” or “NTC interruption”. The NTC is inserted into the heating flange and is sealed with the heater seal.

4.4.2 Technical data:

Operating range: from –5 °C to 103 °C

Temperature in °C	Resistance in kΩ
10	8.5–10.6
20	5.4–6.5
30	3.5–4.3
40	2.3–2.9
50	1.5–1.9
60	1.1–1.3
66	0.9–1.1
86	0.45–0.55

4.5 Detergent-solution pump

4.5.1 Function:

The detergent-solution pump features a thermal protection device. The thermal protection releases with to high power inputs.

If the delivery head of the pump used in the series is not adequate, a customer-service pump can be inserted up to a delivery head of 1.5 m:

Mat. no.: 144305 (230 V / **50 Hz**)

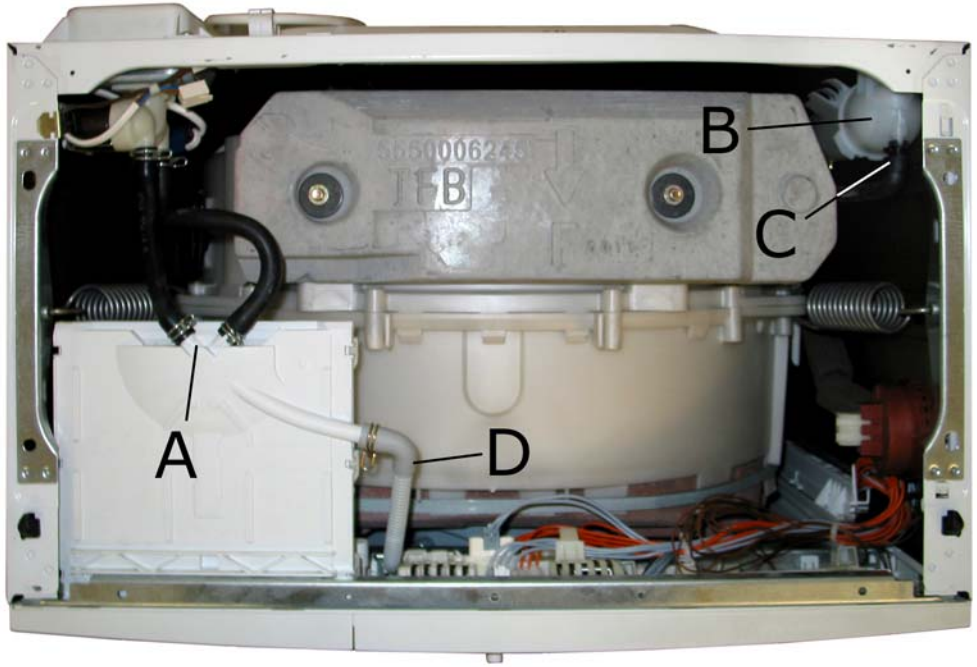
Mat. no.: 142152 (230 V / **60 Hz**)

(louder noises because the soft bearings in the pump are left out).

4.5.2 Technical specifications:

►	Nominal voltage	230–240	V
►	Frequency	50	Hz
►	Resistance	110–260	Ω
►	Delivery head	1.0	m
►	Delivery rate	18	l/min

4.6 Water flow



A Two-way detergent dispenser
B Return-flow container
C Drainage ventilation
D Cascade dispenser (Optional)

4.6.1 Two-way detergent dispenser

The internal supply hoses of the prewash and main wash valves are connected to the two-way detergent dispenser. If both valves are actuated, the water jets hit each other and the water runs into the middle fabric softener dispenser.

4.6.2 Cascade dispenser (optional)

The cascade dispenser dispenses 1/3 of the water, which runs in via the prewash valve, directly as clear water over the seal.

4.6.3 Container ventilation

Container ventilation is required for pressure compensation in the container. If a blockage occurs, the appliance cannot draw in adequate water because the pressure in the transmitter hose is increasing too sharply.

4.6.4 Drainage ventilation

The internal drainage ventilation prevents the appliance from draining itself (siphon effect).

4.6.5 Return-flow container

The water volume in the return-flow container ensures that the eco lock in the pump sump closes.

4.7 Grease-resistant seal

The grease-resistant seal mat. no.: 362172 (with cascade dispenser) and mat. no.: 360000 (without cascade dispenser) may be installed only if there is an unusually high grease load.

5 FUNCTIONS

5.1 See relevant component description

5.2 Power module

5.2.1 Description of function

The power module contains all the components such as microprosessor, relay and the power supply. It controls the washing programmes, monitors the temperature, determines parameters and actuates the motor, heater, detergent-solution pump, water inlet and safety devices.

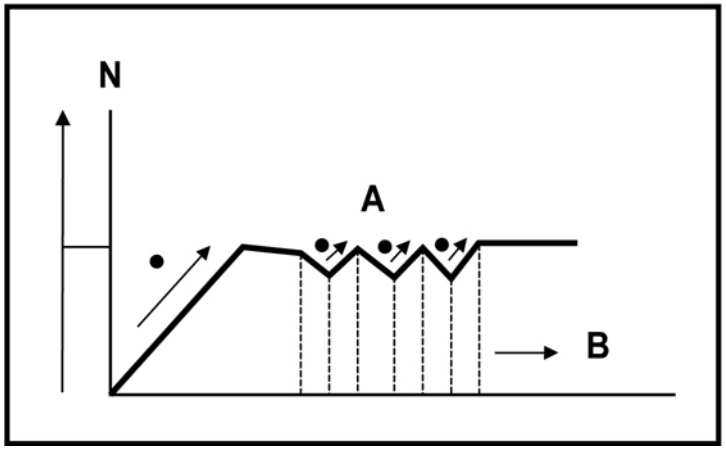
5.2.2 Load detection function

After the programme has started, the water supply times of the solenoid valves are added. Approx. 10 minutes after the programme has started, 2 load levels are detected and the remaining running time is recalculated:

5.2.3 Water inlet times

Water inlet times < 65 s = partial load

Water inlet times > 65 s = full load



A Load detection function

B Time

5.3 Power failure

5.3.1 Consequences

If there is a power failure, the programme selection is retained. When the power is restored, the programme section is restarted. All wash times are set to zero, a full load is always detected and the foam detection function is reset.

5.3.2 Power supply voltage measurement

If the voltage declines under 150 V, all loads will be switched off and the wash cycle halted. The timers keep on running. The door keeps on locked, if the level is ≥ then level 1.

If the minimum voltage of 170 V is supplied again, the loads will be switched on again and the wash cycle continues.

- ► Tolerated supply voltage: 195…253VAC (-15%...+10%)
- ► Tolerated frequency area: 45…..65 Hz

5.4 Motor / motor actuation

The motor is controlled (open-loop and closed-loop) by **phase control**.

The actual speed value of the **tacho generator** signal is compared with the required value of the electronics module.

The **direction of rotation** is changed by two deenergised **reversing relays**.

An integrated **protector** in the motor winding disconnects the motor in the event of an overload. The control does not disconnect the motor with a tacho generator fault but continues trying to restart the motor.

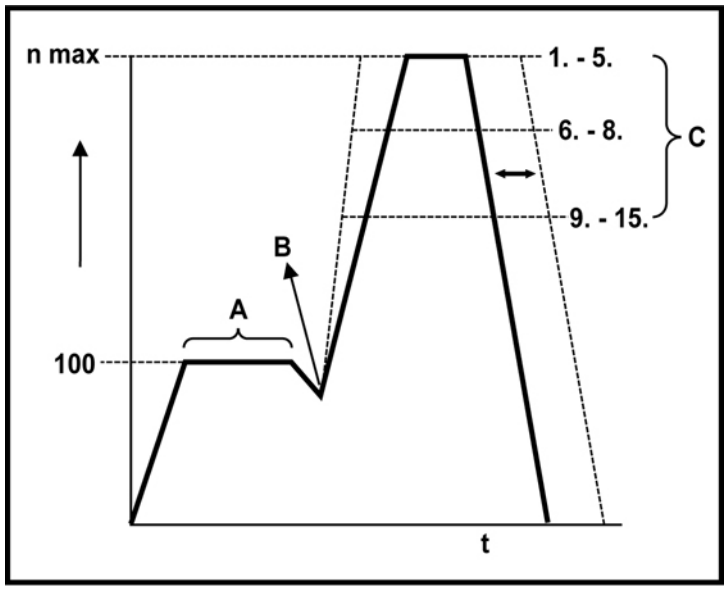
A **motor fault** is displayed only at the end of the programme.

For spin speeds > 1000 min^{-1} a **field reversal relay** is actuated from 800 min^{-1}. This clears part of the motor field winding and increases the speed.

The following **speeds** apply to the washing machine with empty drum:

►	Wool:	27 min^{-1}	+/– 5 %
►	Wet:	35 min^{-1}	+/– 3 %
►	Rinse:	50 min^{-1}	+/– 3 %
►	Wash:	50 min^{-1}	+/– 3 %
►	Spin:	Spin speeds	+/– 2.5 %
►	Measurement speed (unbalanced load): 100 min^{-1}		+/– 1 %

If an **unbalanced load** is **detected**, the speed is reduced in the final spin cycle as follows:



Before each spin speed acceleration, the imbalance is scanned for 20 seconds at 100min^{-1} **A**. The imbalance is scanned up to 15x (up to 2x for wool).

The **size of the load** is detected by reducing the speed to 75 min^{-1} **B** (long reduction time = large load, short reduction time = small load).

6 REPAIR

6.1 Diagnosis / Repair aids

6.1.1 General

Before repairing or testing the appliance, always start the customer-service test programme.

6.1.2 Test prod

Test probe mat. no.: 340730 (remove the components from the module before measuring the resistance)

6.1.3 Protective gloves:

Material no.: size 9 = 340728

size 10 = 340729

6.1.4 Unbalanced load detection

The termination of the spin cycle by the unbalanced load scan can be reset with the aid of a water-filled thermal bottle 341095. The thermal bottle must be filled with 1250 ml (overall weight: 1,5 kg).

6.1.5 Plastic side cutters

Plastic side cutters mat. no.: 340701 for repairs to the outer tub.

6.1.6 Drill bit

Drill bit (13.2 mm) mat. no.: 340700 for repairs to the friction dampers.

6.2 Spring piston damper - Exchange

The spring piston damper is a friction damper with integrated spring.

6.2.1 Removal

WARNING

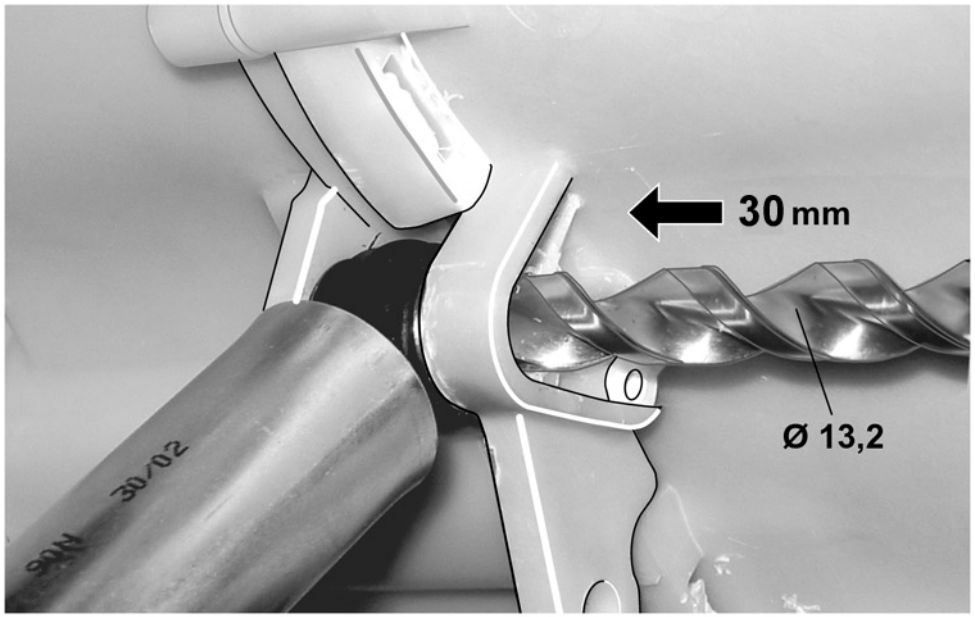
Possible damage of components.

► Remove components in the area of the damper support!

Required special tool: 13.2 mm drill bit Mat. Nr: 340700

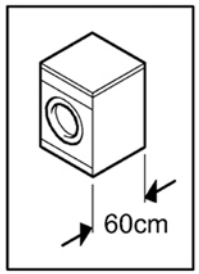
The dampers can be replaced without removing the outer tub.

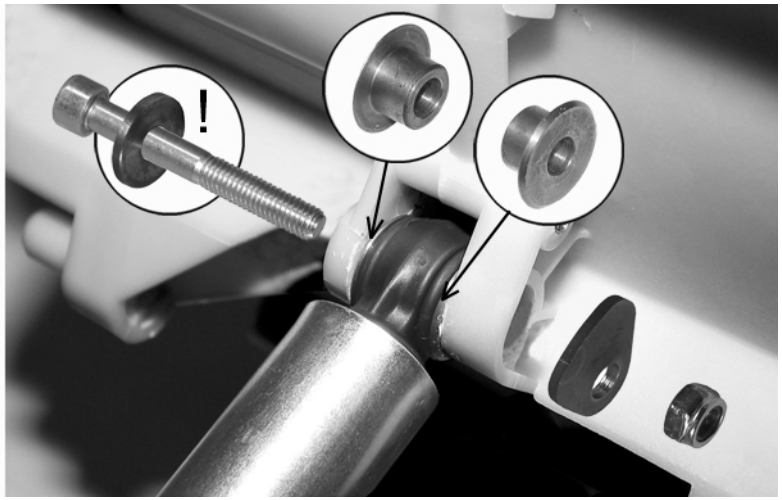
1. Drill plug-in spindle head 30 mm deep.
2. Press out the plug-in spindle towards the rear.



6.2.2 Installation

3. Insert bushings into the eye of the damper.
4. Insert damper into the support on the outer tub.
5. From the rear insert a screw with the flattened washer.
6. Insert screw with centring washer and secure with the hex lock nut.





6.3 Heater

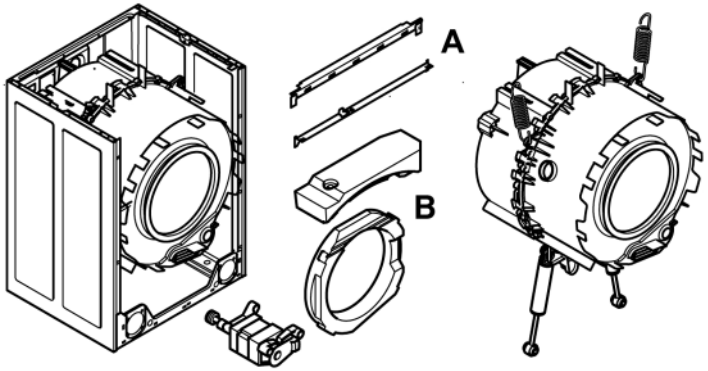
1. Remove front panel
2. Loosen the hex nut
3. Release the seal
4. Remove the heating element towards the front.
5. The NTC can be removed after removing the heater.

6.4 Outer tub

The tub consists of two glass fibre reinforced plastic shells.
These shells are screwed together and also locked in appliances ≤1400 min^{-1}.

6.4.1 Removing the outer tub:

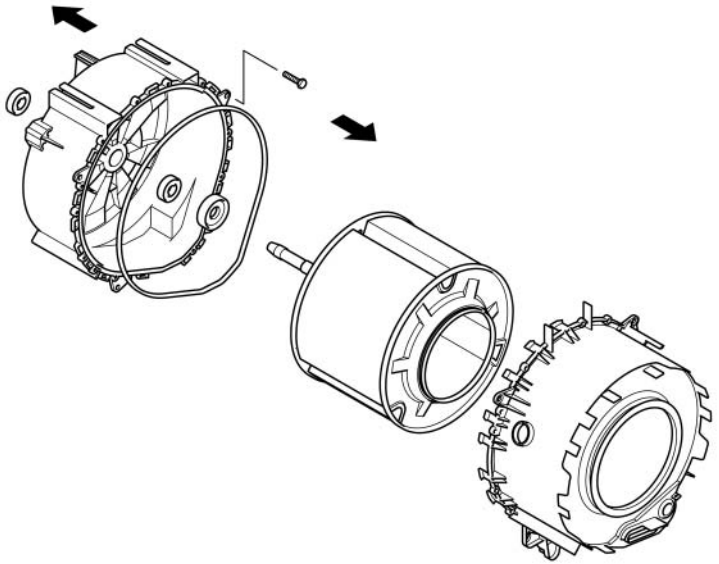
1. Remove the front panel, fascia and worktop.
2. Remove the two crossbars (a) and remove the detergent dispenser.
3. Disconnect all electrical and mechanical connections on the outer tub. Please use the assembly **mat. no. 17 4842** if the plastic holder for the motor cable harness breaks.
4. To reduce the weight, dismantle the motor, jacket weight and front weight (b).
5. Loosen the damper on the base plate
6. Lift the complete tub out of the washing machine housing



6.4.2 Dismantling the outer tub (in appliances < 1400 min-1):

1. Remove plastic clips with special side cutters (mat. no.: 340701) (Fig. 1).

2. Dismantle the tub

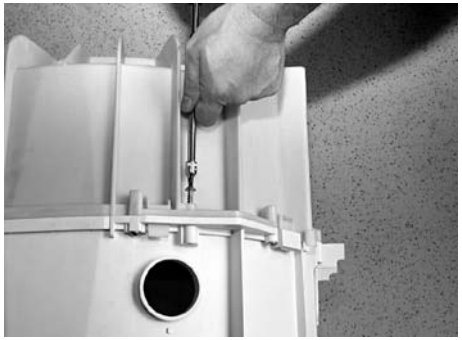


3. Carry out repairs (remove foreign objects, replace bearings)
4. Re-insert seal
5. Re-assemble tub and install with the kit, mat. no.: 483764

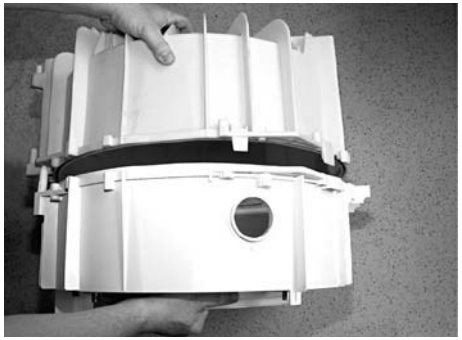
Removing the outer tub (in appliances > 1400 min^{-1}):

1. Remove filling and drainage hoses from the tub to prevent damage when drilling

2. Remove screws from the tub (tub is attached by screws only).



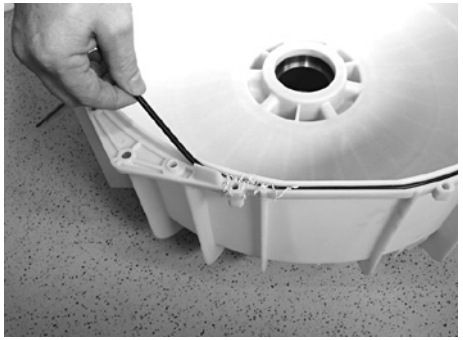
3. Dismantle the tub.



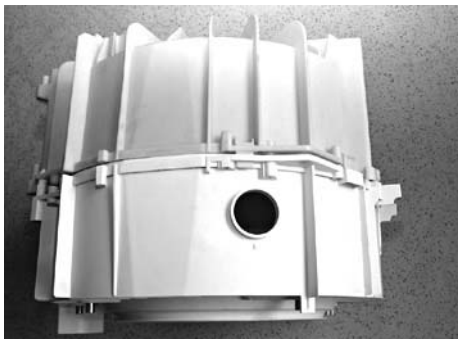
4. Carry out repairs (remove foreign objects, replace bearings).

5. Drill all countersunk holes to 5.3–5.5 mm Ø

6. Remove old seal, remove plastic shavings from the seal groove and insert new seal.



7. Re-assemble tub.

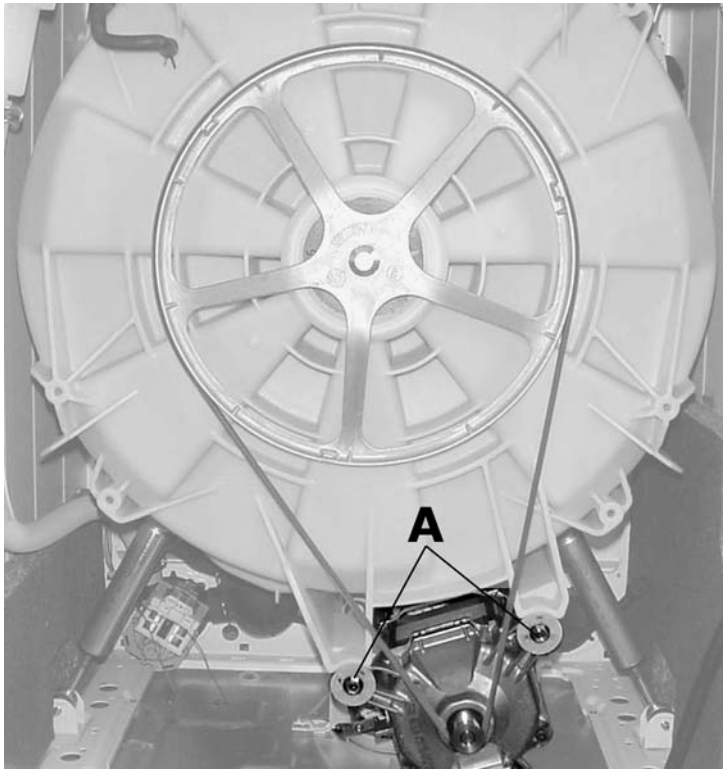


8. Insert 17 screws (M5x55) at the front of the tub and tighten in diagonally opposite sequence (torque approx. 3–4 Nm, do not compress plastic). (Fig. 5)

9. Insert and tighten the screw (M5x45) on the filling opening at the back of the tub. (Fig. 6)

6.5 Motor disassembly big rear panel

1. Remove the rear panel.
2. Remove the self-tensioning belt
3. Remove the two bolts **A** for attaching the motor.
4. Pull out the motor towards the rear.



6.6 Motor disassembly small rear panel

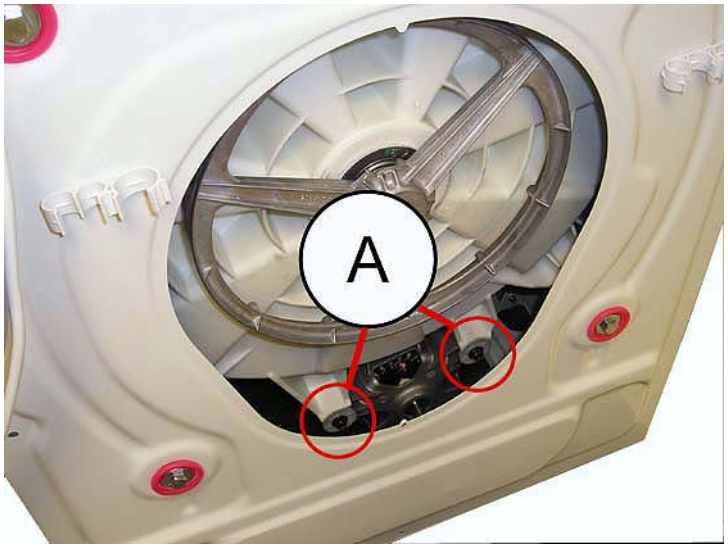
Sharp edges:

Wear protective gloves.

For machines of 600 rpm the motor have 3 supports in the outer tub, the other motors have 4 supports. The spare part tub have always 4 supports.

Disassembly:

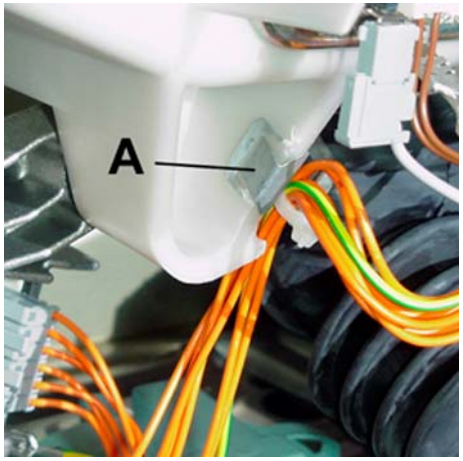
1. Remove the rear cover
2. Remove the self-tensioning belt
3. Remove the two bolts **A**



4. Remove the front panel
5. Pull out the motor towards the rear

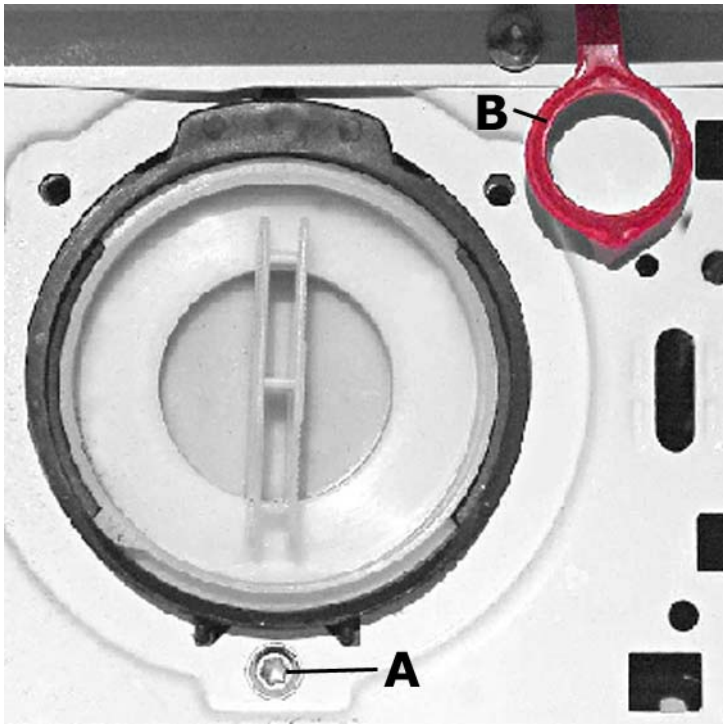
6.7 Renew plastic holder

Please use the assembly **A (mat. no. 174842)** if the plastic holder for the motor cable harness breaks.



6.8 Detergent-solution pump removal

1. Remove the front panel
2. Loosen and remove the hoses
3. Remove the electrical connections
4. Loosen the screw **A**.
5. Remove detergent-solution pump



A Mounting bolt.

B Emergency unlocking device (optional)

7 FAULT DIAGNOSTICS

7.1 Controller

Failure data	Reason	Remedy
Running times	Adjust the control to the influencing variables for the wash cycle.	Advise customer, see circuit diagrams
	Recognition of partial loading.	Advise customer, partial loading (water inlet time < 65s) could be detected because of low loading or little absorbent fabric. By water inlet times > 65 s full load is detected. The runtimes will be adjusted to the load. (see flow chart).
	Pressure reducer in Aqua Stop valve is defective.	Change Aqua Stop
Module is not functioning (dark)	Electrical component has a short-circuit or earth fault	Remove the component from the module; if the module functions, replace the removed component only.
	Button blocked (e.g. by packaging remnant, dirt, etc.)	Clean button; if required, replace fascia.
Appliance starts delayed or discontinues.	Frequency variations.	Advise customer There mustn’t occur frequency variations. If so the appliance can start delayed or discontinue.

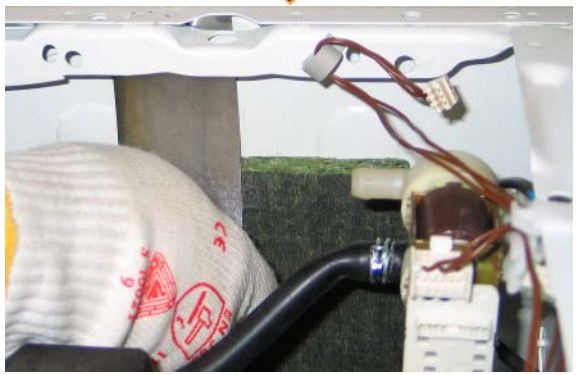
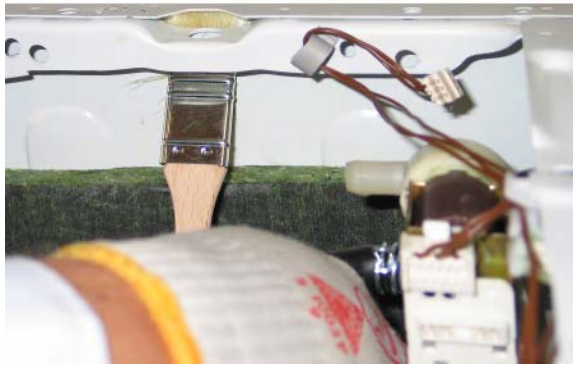
7.2 Does not heat up

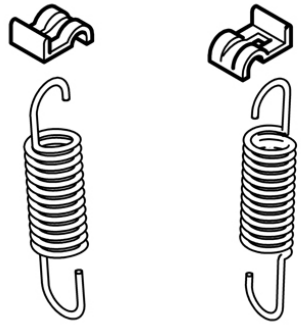
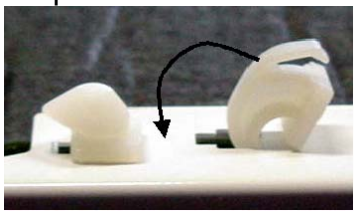
Fault details	Possible cause	Remedial action
Does not heat up or insufficiently.	NTC simulates an increase in temperature in a non-heating stage.	Check and if necessary replace NTC (see table of measured values) Heater has short circuit to frame and may have to be replaced

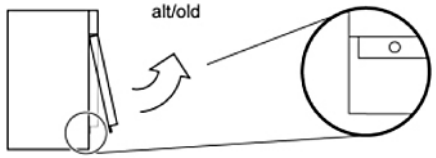
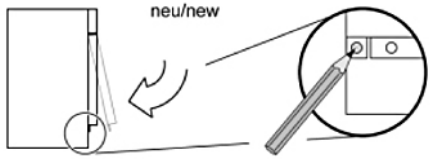
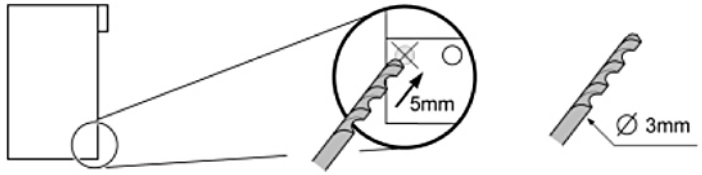
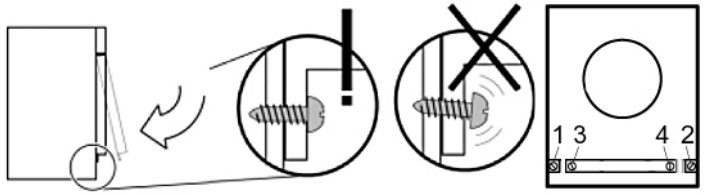
7.3 Drum does not rotate

Fault details	Possible cause	Remedial action
Drum does not rotate	Belt has come off	Check that belt is positioned correctly between belt pulley and motor pinion. Point out overload to customer. (If the drum is overloaded, the belt may come off)
	Carbon brushes worn.	Remove motor and check carbon brushes; if necessary, replace these
	Loose pulley: Between **FD8505** and **FD8512** in some 6 kg appliances was mounted a black seal on the bearing cross. This seal causes the loosening of the pulley. 	Dismount pulley, if present dismount seal and mount pulley again.

7.4 Standing behaviour / Noise

Failure data	Reason	Remedy
Crack noises (models with large rear wall)	Enamel residue between the cross beams of the drum suspension and the housing	Necessary material: Brush, Screeding compound Part No.: 341005; Grease Part No.: 160520 (push screeding compound over the entire length between cross beam and housings up to the upper edge)   Paint grease behind the cross beam.  Remove the surplus grease.

Failure data	Reason	Remedy
Clicking noises (in appliances with large rear panel)	Friction between the feather/spring and the housings. Up to FD 8409	Use the kit 495646. (From FD8409 on in mass production) Hang out the spring, put the spring support into the tie bar and restore a new spring. 
Vibration noise	The front panel oscillates	Insert plastic elements 187094 in the front panel beneath the plastic holder and tighten the screws on the fascia strip  167587 187094
Appliance stands not correctly. Front panel vibrates, appliance moves, knocking noises.	Fitting of the housing is not proper fixed. Inexactly unbalance control by 60 cm appliances with 1400 min^{-1}. (see TOM 58300000112628 with listed appliances)	Check all fittings, screws have be fixed tightened. Since FD8507 new process engineering in series. Update the process engineering via Notebook or by exchanging the control module. See TOM 58300000112628 and the list of the affected appliances.

Failure data	Reason	Remedy
Appliance stands not correctly. Front panel vibrates, appliance moves, knocking noises.	Possible reason: connection front panel	By problems with appliance stands, renew the front panel according to the instruction: Step1  Step2  Step3  Step4  **<u>The front panel bottom has to be fixed with 4 screws!</u>** Front panel 474541 is backward compatible in all appliances. With big back panel (From FD8407 in series). With small back panel (From FD8510 in series).

7.5 Running noise

Failure data	Reason	Remedy
Running noise during program or spinning sequence.	Loose pulley	See Loose pulley

7.6 Washing result

Failure data	Reason	Remedy
Washing is not clean	Detergent, load, programme selection, dosage, pretreatment	See general repair instructions 58300000002975.
	Does not heat up or insufficiently.	Test heating circuit with test programme; if required, replace defective component.
Does not wash clean or not clean enough (allergy sufferer)	Detergent, load, programme selection, dosage	See general repair instructions 58300000002975.
	Detergent, dosage, soft water area	Insert water level controller 187413 (3 l greater water consumption), does not help with zeolite deposits.
Liquid detergent leaks	Program with prewash was chosen	Use program without prewash or measuring cup
	Program with delayed start time chosen	Use Measuring cup. Consider directions in the operating manual.

8 TECHNICAL SPECIFICATIONS

8.1 Consumption rates

Programm	Load	Current in kWh **	Water **	Duration in min. **
Coloureds 40 °C *	5,0 kg*	0,95 kWh	49 l	1:58 h
	2,0 kg	0,50 kWh	32 l	1:10 h
Coloureds 60 °C	5,0 kg*	0,95 kWh	49 l	1:58 h
	2,0 kg	0,50 kWh	32 l	1:10 h
Cottons 90 °C	5,0 kg	1,90 kWh	56 l	1:58 h
Easy care 40 °C *	2,5 kg	0,40 kWh	50 l	1:15 h
Delicates 30 °C	2,0 kg	0,30 kWh	50 l	0:45 h
Wool 30 °C*	2,0 kg	0,30 kWh	35 l	0:50 h

* Test programmes in compliance with EN 60 456: 1999 and IEC 60456 Ed.3 1998: 02

** The consumption values and running times will deviate from the specified values depending on the water pressure, softness, inlet temperature, room temperature, type of laundry, quantity and selected additional functions.

The consumption values refer to series start-up. The running times are described in the programme overviews (circuit diagrams).