

# **Service Manual**

# WASHSMART<sup>™</sup> Washer

# Model:

WA1068GW



479637B

#### 479637B

The specifications and servicing procedures outlined in this manual are subject to change without notice.

The latest version is indicated by the reprint date and replaces any earlier editions. -

#### Fisher & Paykel Appliances Ltd

78 Springs Road, East Tamaki, PO Box 58546, Botany, Manukau, 2163 Auckland, New Zealand Phone: 09 273 0600 Fax: 09 273 0656 Email: <u>customer.care@fp.co.nz</u>

#### Fisher & Paykel Customer Services Pty Ltd

PO Box 798, Cleveland, QLD 4163 A.C.N. 003 3335 171 19 Enterprise Street Cleveland, QLD 4163 Australia Telephone: (07) 3826 9100 Facsimile: (07) 3826 9164 Email: : <u>customer.care@fp.com.au</u>

#### Fisher & Paykel Singapore Pte Ltd 150 Ubi Avenue 4 Sunlight Building #02-00 Singapore 408825 Telephone: 65 65470100 Facsimile: 65 65470123

# **FISHER & PAYKEL**



# **ELECTRONIC WASHING MACHINE**

Covering the following models		
Markets	Model Number	Product code
Australia and New Zealand	WA1068G1	93207
Australia and New Zealand	WA1068G1	93241
Australia and New Zealand	WA1068G1	93265

#### **GUIDE TO USING THIS MANUAL**

The model covered by this manual is listed on the front cover.

The front cover picture shows the type of product and may not necessarily be an exact image of the model covered by the manual.

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# 1 HEALTH & SAFETY

When servicing the WashSmart Washer, health & safety issues must be considered at all times. Specific safety issues are listed below with the appropriate icon.

4	Electrical Safety Ensure the mains power has been disconnected before servicing the washer. If the mains supply is required to be on to service the washer, make sure it is turned off when removing any electrical component or connection to avoid electric shock.
	Electrostatic Discharge An anti-static strap is to be used as electrical static discharge (ESD) protection when servicing electronic components.
	<b>Good Working practices</b> Ensure the work area is in a tidy and orderly condition at all times so as not to cause a hazard while service work is being completed. Always clean and tidy the washer and work area after service is completed.
OFF	Isolate Water Supply Turn off the water connection tap before servicing
	Water Leak Check Check for water leaks as part of the testing after the service has been completed.
	Insulation test Megger test to check insulation Warning: short together the phase and neutral pins on the plug so not to damage any electronic circuitry.
	Sharp Metal Edges When working around cut sheet metal edges, use appropriate gloves or protection to eliminate the change of receiving a laceration.

# 2 INSTALLATION

With 685 WashSmart being an extra large machine the installation process becomes critical for trouble free operation. Every product will have an installation instruction attached to the lid to guide the installer through a step by step process which finishes with the running of the installation test program.



## 5 INSTALLATION TEST CYCLE



LEAVE THESE INSTRUCTIONS WITH THE CUSTOMER

# **3** SPECIFICATIONS

## 3.1 Dimensions

Height to lid	
Open	1433mm
Closed	954mm
Height to console	1050mm
Width	685mm
Depth	700mm
Inlet hose length	1200mm
Drain hose length	1000mm
Packed weight	65.5kg
Unpacked weight	56.5kg

Note: The exact height of a WashSmart<sup>™</sup> is dependent on how far the feet are inserted into the base of the machine.

## 3.2 Maximum Capacity (AS/NZS 2040.2:2005)

Dry Weight: 10kg

## 3.3 Water Fill Temperature (Approximate Factory Settings)

Supply	Water Fill Temp*
Hot	60°c
Hot / Warm	46°C
Warm	39°C
Warm / Cold	33°C
Cold Plus	20°C
Cold	Supply temperature

Recommended hot water inlet temperature 65 °C (Maximum)

\*Dependent on hot and cold supply temperatures and water pressures

## 3.4 Wash Motor

Electronically commutated 36 pole direct drive 3 phase brushless DC motor. Motor Resistance @20°C (68°F):  $19.5\Omega + - 10\%$  ( $39\Omega + - 1.95\Omega$  phase to phase)

## 3.5 Pump Motor

The motor is a fully electronically controlled 325V, 3 phase, 6 pole brushless DC motor. The speed of the motor will vary depending on whether it is draining or re-circulating the water.

Motor Resistance @20°C (68°F):  $8.1\Omega$  +/- 10% per phase (16.2 $\Omega$  +/- 10% phase to phase)Maximum Wattage:200WNominal Wattage:60WDrain Speed:2500rpmRecirculation Speed:2000 rpm

Head Height	Drain Speed	Flow Rate
4ft (Nominal)	2500rpm	23.6 litres per minute
8ft (Maximum)	3400rpm	15 litres per minute

## 3.6 Water Valves

Supply	Operation Mode	Voltage	Resistance	Flow Rate
Cold	Digitally Operated	24VDC	64Ω @20°C (68°F)	10 litres per min. max
Hot	Digitally Operated	24VDC	64Ω @20°C (68°F)	10 litres per min. max

Note: The flow rate will vary slightly depending on supply pressure.

#### Water Supply

- For the best operating conditions the hot water temperature should be approximately 60°C.
- The hot water temperature should not exceed 65°C or cold-water temperature 35°C. Temperatures above these may cause the machine to fault or cause damage to the machine.
- If there is an uncontrolled water-heating source (e.g. a wet back or solar heating) a tempering device should be fitted. This will ensure the hot water temperature remains within safe limits. For the most suitable type of tempering device we recommend contacting a local plumber or plumbing supply merchant.
- Inlet Water Pressure 5psi (35kPa) to 150psi (1MPa) static.
- The water supply flow rate should be greater than 6 litre per minute (assumes ½ inch diameter pipes).

Note: If using a header tank, then the outlet of the header tank must be at a height of at least 2 metres above the top of the console of the clothes washer.

- Minimum flow rate from the tap, supplying the washer, should be greater than 6 litres/min (assumes 1/2 inch diameter pipes).
- Minimum height of taps to clear the top of the machine is 1150 mm.

## 3.7 Thermistor

NTC-type temperature sensor (Thermistor) Resistance 10,000Ω @ 25°C

## 3.8 Lid Lock

Resistance:  $63\Omega + 10\% @ 20\%$ Note: Normally low voltage, potentially 230V if harness is grounded to the cabinet!

## 3.9 Cabinet

Front & Sides Pre-painted steel Rear Panel Zinc alum

## 3.10 Lid

ABS plastic with Pre-painted steel top

## 3.11 Top Deck

ABS plastic

#### 3.12 Inner Bowl

Stainless steel:

Grade 430

## 3.13 Bowl base and balance ring

Polypropylene

Inner Bowl Weight	
14.25kg – 14.75kg	

Inner Bowl Speed		
Fast Spin	1,000 to 1,100 RPM	
Medium Spin	700 RPM	
Slow Spin	300 RPM	
Stir Speed	25 RPM	

Note: Fast spin speed is dependent on the degree of OOB load and therefore may set the spin speed lower than the maximum of 1100RPM.

## 3.14 Outer Bowl

Aluminium insert over-moulded with polypropylene

## 3.15 Console

ABS plastic

## 3.16 Fascia

IML (In-mould Label) Polycarbonate/PET

## 3.17 Neck Ring

Polypropylene

## 3.18 Agitator

Agitator:PolypropyleneFabric Softener Dispenser:PolypropyleneAgitator Bolt:POM Duracan SF15 Natural

## 3.19 Energy / Water Rating

#### **Energy Rating**

4 Stars For more information contact www.energyrating.gov.au

#### Water Rating

3.5 Stars (WELS Water Efficiency Labelling and Standards) For more information contact http://www.waterrating.gov.au

## 3.20 Electric Supply

Operating Voltage: 230V AC 50Hz Current: 10amps

## 3.21 User Guide

User Guide:

P/No 424204

## 3.22 Control Panel



## 3.23 Important Screw / Bolt Torque Settings

Below are the important screw torque settings on the CleanSmart<sup>™</sup> washer. These settings must be adhered to. For all other screws and bolts that are not listed, we recommended that they are tightened sufficiently without being over-tightened.

Screw / Bolt	Torque (Nm)
Pump hood to cap to outer bowl	3Nm
Pump housing to outer bowl	3.5Nm
Rotor bolt to shaft	8Nm
Stator to Outer bowl	6Nm
Nut Bearing to Shaft	20Nm
Agitator Bolt	4Nm
Spline Driven to Inner Bowl Base	1.5Nm
Nozzle Inlet to Top Deck	0.8Nm
Hinge to Top Deck	0.8Nm
Inlet Valve Assembly to Top Deck	1.3Nm
Console to Top Deck	1.6Nm
Lid Lock to Top Deck	0.8Nm
Top Deck to Wrapper	1.6Nm
Suspension bracket to wrapper	1.6Nm
Base to Wrapper	1.6Nm

## 4 THE WASHSMART<sup>™</sup> WASH

The 685 WashSmart<sup>™</sup> washing machines use a dual-action wash to give excellent wash performance while taking great care of your clothes. We call this the *Eco Active*<sup>™</sup> wash. The two parts to the *Eco Active*<sup>™</sup> wash are:

#### **Detergent Activating Wash**

WashSmart<sup>™</sup> fills at the selected water temperature, with just enough water so that the clothes are saturated. This concentrated detergent solution is then re-circulated through the wash. This thoroughly dissolves and activates the detergent.

#### **Agitation Wash**

After the Detergent Activating Wash, the WashSmart<sup>™</sup> fills I with just enough cold water to suspend the clothes in solution. Agitation will then begin, moving soil away from the clothes.

Note: the detergent activating wash is the only time during the cycle that hot water is used when the machine is completely full the water will be lukewarm). If you need hot water during the agitation part of the wash, select the ALLERGY cycle.





# 5 CONTROL PANEL



- 1. Power On/Off button.
- 2. Key Lock
- 3. Program Buttons
- 4. Delay start +
- 5. Water Level
- 6. Wash Temperature
- 7. Spin Speed
- 8. Options
- 9. Wash Advance
- 10. Start Pause
- 11. Lid Lock Indicator.
- 12.7 Segment LED Display.

## 6 TECHNICAL OVERVIEW

This Service Manual contains information on the Product Specifications, Diagnostic Mode, Detailed Fault Codes and the disassembly and re-assembly instructions for the 685 WashSmart<sup>™</sup> washing machines.

## 6.1 Electronics

#### 6.1.1 Motor Control Module

The Motor Control Module used in this washer is similar to other washers in its physical size and shape and colour; however the electronics has different software to control the unique aspects of this machine.

Therefore the Motor Control Module is specific to this machine and is not interchangeable with any other.

The identifier label (68 P9ND) stands for 685 WashSmart<sup>™</sup>, P9 Phase 9, ND Non Dispensing.

## 6.2 Stand By Mode



If the machine has not received any instructions for 10 minutes after being switched on at the power point, or after completing the cycle, it will automatically go into a low power "Stand By" mode. The control panel will be blank as if it was powered off at the wall.

Before entering the Diagnostic or Option Adjustment mode, the machine must be removed from the Stand by mode. To do this touch the **POWER** button or turn the machine off then back on at the mains supply.

## 6.3 Out of Balance Detection – 'Bump Detect'

The Out of Balance detection is undertaken with electronic sensing, known as 'Bump Detect'. 'Bump Detect' is software written into the Motor Control Module, which looks at specific feedback from the Motor.

No fault codes are associated with 'Bump Detect', and there are no hard and fast tests that can be carried out.

If a machine continually goes into an out of balance condition, then the following need to be checked in the given order.

- 1. Even distribution of the clothes load.
- 2. That the machine is level using a sprit level both side to side, front to back and stable on the floor, refer to installation section 2
- 3. That the feet have the rubber inserts fitted and the cabinet base is clear of the floor.
- 4. Check the bias spring fitted in the left rear corner of the neck ring is mounted correctly and not stretched.
- 5. Check the weight of the inner bowl. Bowl weight.
  - 14.25kg -14.75kg

• If all the above are correct them turn on the Out Of Balance recovery, Refer to **Out of Balance Recovery** section. Before turning on this function you will need to judge the availability of water as it can / will increase the water usage.

Note: If the OOB problem persists after checking the above, we would then recommend replacing both the suspension rods and the rotor. It is highly unlikely that the Motor Control Module will be the cause.

## 6.4 Water temperature Sensing

The thermistor for sensing the water temperature is located in the inlet valve compartment and fits into a port in the inlet elbow; this is connected directly to the motor control module.

For details of adjusting the wash temperature refer to Wash Temperature Settings: section.

#### Specifications

NTC-type temperature sensor (Thermistor) Resistance  $10,000\Omega @ 25^{\circ}C$ 

## 6.5 Water Valves

The water valve assembly incorporates a dual valve block that is joined by a common valve body.

Inlet coils **1** & **2** control the flow of water into the machine via the inlet nozzle.

- 1. Hot coil
- 2. Cold coil



Liquid or powered detergents

The detergent is added to the machine via the centre of the agitator, remove the softener cup and pour the liquid or power detergent down the centre of the agitator replacing the softener dispenser cup to prevent small articles becoming lost between the inner and outer bowls. Pre-dissolving powered detergent in warm water (before adding it to the machine) when washing in cold water will improve the performance of the detergent.

#### 6.5.2 Inlet Nozzle

The nozzle is designed to ensure excellent rinse water distribution at all water pressures.

An internal piston within the nozzle moves with the amount of water pressure against it. When the water pressure is high, more holes in the nozzle are exposed. When the pressure is low, fewer holes of the nozzle are exposed.

## 6.6 Water Level Measurement

The 685 WashSmart<sup>™</sup> is fitted with a pressure sensor, which can control the fill to any water level. The pressure sensor is incorporated within the Motor Control Module and cannot be removed. The pressure tube connects from the Motor Control Module to the air bell at the bottom of the outer bowl, and is part of the harness assembly. Care must be taken when removing or refitting the pressure tube to the pressure sensor too much force can damage this device.





#### 6.6.1 Auto Water Level

The machine automatically selects the appropriate water level for the load when AUTO Water Level is selected, and will choose the precise water level for the clothes load the correct water level is critical to the performance of the wash.

During fill the machine pauses occasionally to sense the water level. The machine checks if the water level is correct by using a series of 2 different agitate strokes. A slow stroke to sense the load and an agitate stroke to mix the load. If the machine detects that the water level is too low it will fill with more water and check the level again.

- When washing an unusual load, e.g. large bulky garments, pillows, it is recommended that the water level is manually selected.
- Manually select the water level if there is already water in the bowl.

So now there are an infinite number of water levels that 685 WashSmart<sup>™</sup> can choose depending on the weight and type of the clothes being washed.

#### 6.6.2 Manual Water Level

The agitator has 5 levels marked on its stem that can be used to help the user select the correct water level. Select the correct water level by using the mark nearest to the top of the clothes.

The levels marked on the agitator are a guide for the clothes and do not correspond exactly to the water level.

Occasionally water may be added during agitation. This is to maintain the water level due to the release of air trapped in the garments.

*For example:* If the garments sat between the medium and high marks on the agitator, choosing a medium water level would be better than choosing a high water level. Alternatively additional garments could be added so that the garments were brought closer to the high mark.



## 6.7 Motor

#### **6.7.1** Stator

The stator has 36 poles with the windings being Aluminium and is Identified by the printed marking **AL 60 190T** it looks the same as a copper Stator but is  $19.5\Omega$  per winding.



**Curved pole tips** 



#### **Testing the Stator**

If the stator needs to be tested first test the resistance of the windings from the harness end that is connected to the Motor Control Module. (Refer to Section 7.2).

#### Note: Ensure that the Rotor and bowl are stationary when measurements are made.

#### Testing the stator from the console

The resistance of each individual winding is approximately  $19\Omega$ , however when testing the stator from the console we are testing across two sets of windings therefore the resistance should be approx.  $39\Omega$  +/- 10%.

To test all windings you will need to measure across:

- Red & Blue
- Blue & Yellow
- Yellow & Red

If the meter shows an incorrect reading then it is recommend testing the stator from underneath the machine, as there may be a fault in the wiring harness. To test the stator, both rotor and stator need to be removed. (Refer to Sections 11.20 and 11.21).

Note: Two clamp plates are used to secure the Stator, one on each side. The four bolts are tightened to a torque of 5Nm. The plastic bolt for securing the Rotor requires a 5/8" (16mm) socket and should be tightened to 8Nm.

#### **Testing the Stator**

After removing the Stator, it can now be tested.

Test points are: R / B B / Y Y / R

The value should be approximately  $39\Omega$  +/- 10% across any of the two windings.



#### 6.7.2 Rotor

The rotor has 48 blocks of individual magnets moulded into a black housing, as opposed to earlier machines having 16 blocks, containing 3 magnets in a white moulding.

The rotor is not interchangeable with any previous phase or series of machine.

The rotors can physically be interchanged, however electrically they are **incompatible**.

If the black rotor is fitted to earlier machines, fault code 240 will occur. Conversely a motor stall fault will occur if a white rotor is fitted to the WashSmart<sup>™</sup> machine.



## 6.8 Smart Pump

SmartPump<sup>™</sup> provides a more flexible and efficient pumping system than a conventional pump/diverter valve combination. SmartPump<sup>™</sup> can be diverted quickly; it reacts faster and is better controlled. In addition, SmartPump<sup>™</sup> has the capability of pumping to a much higher head whilst maintaining a constant volume flow rate regardless of pump efficiency degradations due to age.

#### 6.8.1 Hood and Cap

The hood and cap form the top of the pump housing, which must seal to the outer bowl. The hood and cap filters out objects that cannot pass through the pump system.



Cap including integrated seal

#### 6.8.2 Flapper Valve

A diverter valve has been integrated into the pump cavity and operates automatically with a change in pump direction. This change of direction moves a flapper valve, which diverts the water to the drain hose or to the recirculation hose. The valve is sealed off against the port face with water pressure.

## **6.8.3** Impeller (non-field serviceable)

The impellor imparts rotational energy into the water and keeps sand away from the shaft seal.





#### 6.8.4 Rotor and Stator

The rotor and stator magnetically interact with each other in order to convert electrical energy into rotational movement of the rotor

#### Rotor

The rotor assembly is a complete unit that is permanently fixed into the pump housing. The resulting cavity is charged with water, which acts as a lubricant. In the event of a failure of the rotor, the whole assembly must be replaced.

Note: Contained within the rotor cavity are seals and bearings that are non field serviceable. The bearings provide a low friction wear surface for the rotor shaft to run on, and the seals eliminate grit from the rotor and bearing cavity



#### 479637B

#### Stator & Shield

The Stator is mounted to the base of the pump housing together with the shield & cap. The harness connector inserts into the underside of the motor. Care must be taken to isolate the machine from the mains power before servicing the pump, and it is important that the harness connector cover has been refitted after reassembly.



#### 6.8.5 Pump Housing

The pump housing is bolted with 4 bolts, directly to the outer bowl. It contains the volute shape and flapper sealing faces and also provides a structure to attach the stator and rotor assemblies too.



## 6.8.6 SmartPump<sup>™</sup> Spare Parts

The following spare part service kits are available for SmartPump™.



Seal (SmartPump™) Housing P/N 479420

Flapper (SmartPump<sup>™</sup>) P/N 420403



Pump Assembly (SmartPump™) Kit P/N 479417





Note: The pump assembly is supplied with the connector removed from the stator shield. The cover must be fitted in place after the wiring harness has been attached.

#### 6.8.7 SLR Feature

SLR stands for Simplified Leak Recirculation. This feature has been added so that should the flapper not completely seal against the housing of the pump when draining, water can bypass through this hole and back into the pump, avoiding re-circulating back into the bowl and on to the washed load.

It is important that this hole remains clear, and it should be checked whenever the pump is serviced.



#### 6.8.8 Testing the Pump Stator

#### SmartPump<sup>™</sup> Wiring Diagram



The stator resistance can either be tested from the harness at the motor controller or at the connections to the stator itself.

# 479637B6.8.9 Testing SmartPump<sup>™</sup> Stator from the Console

The resistance of each individual winding is approximately  $8.1\Omega$  +/- 10%, however when testing the stator from the console we are testing across two windings, therefore the resistance should be approximately  $16.2\Omega$  +/- 10%.

To test all windings you will need to measure across:

- Red and White
- White and Blue
- Blue and Red



If the meter shows an incorrect reading, we would recommend testing the stator from underneath the machine, as there could be a fault in the wiring harness. To test the stator it will need to be removed from the machine (refer to Section 11.16).

#### 6.8.10 SmartPump<sup>™</sup> Test Routine

Use the following procedure to test the SmartPump<sup>™</sup>. It is equally important to test both the drain and recirculation modes. In diagnostic mode the lid lock is disabled, which allows the technician to visually inspect both aspects of the pump.

- 1. Enter diagnostic mode. (Refer to Section 8.)
- 2. If the inner bowl is empty of water, activate either or both of the water valves until the inner bowl is approximately 1/4 full with water. (Refer to Section 8.2.)
- 3. While in diagnostic mode, set the pump to Recirculation Mode (refer to Section 8.3), run for at least 1 minute and observe the following:
  - Ensure that a good flow rate is being delivered through the portal of the hose.
  - Ensure that a good pattern of flow is being delivered. If a poor flow rate is apparent, firstly check that the neck ring is fitted correctly and is not obstructing the flow of water. Secondly, remove the neck ring and check the shape and location of the recirculation nozzle is as expected. If no faults are found, the pump must be inspected. To access the pump cavity, (refer to Section 11.15).
  - Ensure that no leaks are occurring from either the recirculation hose where it attaches to the outer bowl (to do this the top deck will need to be lifted, refer to Section 11.11), or no leaks where it attaches to the SmartPump<sup>™</sup>.
  - Ensure that no water is exiting from the drain hose. If it is, this indicates that water is bypassing. For the description of bypassing, refer to Section 6.8.11 below.
- 4. Again, whilst in diagnostic mode, set the machine to drain (refer to Section 8.3), run for at least 1 minute or until all the water has been drained, and observe the following:
  - Ensure that a good pattern of flow is being delivered. If a poor flow rate is apparent the pump must be inspected. To access the pump cavity, refer to Section 11.15.
  - Ensure there are no leaks from where the drain hose exits from the cabinet or at the pump housing.
  - Ensure no water is exiting from the recirculation hose. Again, this would indicate that bypassing is occurring.

#### 6.8.11 Bypassing

Bypassing is the term given to water that either flows from the recirculation hose when the pump is draining, or from the drain hose when the pump is re-circulating. No water at all should exit from the opposing hose. The flapper valve not sealing against the face of the pump cavity, or a poor fit of the hood and cap can generally cause bypassing.

If bypassing occurs, the pump (including the SLR Feature (refer to Section 6.8.7) must be inspected. To access the pump cavity (refer to Section 11.15).

## 6.9 Lid Lock

WashSmart<sup>™</sup> uses the same lid lock mechanism that is used on previous machines, and is locked during the complete cycle.

The Lid Locked indicator located above the start pause button will light when the lid is successfully locked.

To unlock the lid at any time, press START/PAUSE



If the lid is left open the machine will be unable to lock it, the cycle will be halted the machine will beep.

If this occurs, ensure that the lid is closed, and press the **START/PAUSE** button.

If the lid-lock fails in the closed position, the locked lid can be forced upwards and out of the lock. *Note: This is the only time in which we would recommend doing this.* 

If the lid lock harness is damaged, the complete lid lock assembly will need to be replaced.

If the power supply is cut during the spin cycle, the machine will keep the lid locked until the rotor has ceased to turn (3 to 10 seconds). Only then will it release the lid from the lock. The motor acts like a generator and allows the lock to stay energised under the bowls inertia.

In a brown out situation (where power is lost only momentary), the machine will restart at the start of whichever section of the cycle it was on and continue the wash.

The lid is locked throughout the complete cycle.

Eco-Active	Locked
Agitate	Locked
Spray Rinse	Locked
Deep Rinse	Locked
Spin	Locked

## 6.10 Neck Ring

The neck ring has four bump pads fitted to protect the cabinet from damage, is used to restrain the re-circulating nozzle and is clipped into place on the outer bowl.

It is important that the neck ring is secured correctly to the outer bowl by all 13 clip points; that the four buffer pads are mounted at the four points on the neck ring to cushion any neck ring to wrapper collisions, if any are missing it could affect bump detect (out of balance detection).



A bias spring is located at the left rear corner of the neck ring and connects to the suspension rod.



## 6.11 Inner and Outer Bowl

The outer bowl is the assembly to which the motor, pump system, suspension rods, etc are mounted. Within the outer bowl there is the inner bowl and the wash plate. During spin, the wash plate and inner bowl have to be coupled together and turn as a single unit. In agitate; the wash plate and inner bowl are free to rotate independently.

The inner bowl is free to move in a vertical direction with the position of the inner bowl being determined by the water level. At the base of the inner bowl is fully enclosed and sealed buoyancy chambers, that when the machine is filling with water floats the inner bowl upwards and disengages the driven spline from the drive spline. This action frees the inner bowl from the wash plate and allows the wash plate to move freely in both directions.

When the water drains the inner bowl settles back down onto the drive spline and re-engages the driven spline, thus allowing the wash plate and inner bowl to turn as one unit. The floating bowl is also used to detect the correct water level for the size of the clothes load.

The point at which the bowl starts to float is determined by the water level and the size of the load. The greater the load, the more water is needed before the inner bowl will float. By detecting the point at which the bowl floats, the machine can determine whether the correct water level for the particular clothes load has been reached.

#### 6.11.1 Detection of Inner Bowl Float off Point – Bowl Check

During detergent activation and fill the inner bowl will rotate to ensure that the clothes are evenly saturated with water. When the chosen water level is reached, and before the agitate cycle is started, the machine will carry out inner bowl float checks (bowl check). The inner bowl will stop and commence a number of small agitate type actions. During these actions the machine determines if the

inner bowl has floated, if it has the machine then determines the correct water level has been reached. If the inner bowl has not floated, the machine will continue filling and check again later. The water level at which the inner bowl floats is not necessarily the same as the final water level.

#### 6.11.2 Detection of Inner Bowl Re-Engagement – Bowl Check

After the water has drained, the inner bowl will sink down and re-engage onto the drive spline. To ensure the inner bowl has re-engaged correctly, the machine will carry out a bowl re-engage test sequence (bowl check). Bowl check consists of a series of short agitate type actions before the spin cycle starts. A sound may be heard as the inner bowl re-engages.

#### 6.11.3 Inner Bowl

FabricSmart™





## 6.11.4 Balance Ring

The inner bowl for 685 WashSmart<sup>™</sup> has a top balance ring, which has 2 internal chambers instead of just one as on SmartDrive<sup>™</sup> bowls. Both chambers are ½ filled with water. The physical appearance of the balance ring changes to a square profile.

#### 6.11.5 Inner Bowl Base

The bowl used on the 685 WashSmart<sup>™</sup> becomes flat bottomed with 6 cavities, 3 of which are water filled, optimising stiffness and weight ratio. The inner bowl bearing is carbon fibre filled nylon for extra stiffness and low wear.

#### IMPORTANT

It is important that the inner bowl for 685 Washers is only used on the 685 models.



**Bowl Base Assembly** 

## 6.12 Suspension Rods

The suspension rods on 685 WashSmart<sup>™</sup> need to be more robust than the suspension rods used on SmartDrive<sup>™</sup> and AquaSmart<sup>™</sup> machines. The top bracket has eyelets to which lugs on the front underside of the top deck slide into to fasten it down.

A rubber washer sits midway down the rod, this helps detergent residue from running down the rod and into the grease filled damper.

Eyelets to which the front of the top deck attach





#### IMPORTANT

It is important that these suspension rods are used only on 685 WashSmart™ machines. Conversely, rods from a SmartDrive™ or AquaSmart™ washer should not be fitted to 685 WashSmart™.

## 6.13 Agitator

The agitator design differs from conventional designs in that it is made of very flexible plastic that bends and flexes as the clothes are moved around the bowl. The agitator action is similar to that of a fish moving through the water, so the side-wards motion is translated to forward thrust. This is not only more forgiving on the clothes but helps to slowly move the clothes around the bowl in a toroidal motion, i.e. a vertical circular motion. The fins at the top of the agitator pull the clothes on the surface of the water inwards and then push them downwards. The bottom fins then push the clothes towards the outside of the bowl again and back up to the surface.

The agitator also features guides on the side to help the user choose the correct water level for each load size. The guides relate to the level that the dry clothes come up to, which relates back to the correct water level. The agitator also gives the user information when measuring detergent, to ensure that they dose correctly for the load size.

## 6.14 Lint Removal System

The machines self cleaning lint removal system works by continuous water circulation, resulting in the separation of lint from the wash water. As the agitator moves, the specially designed vanes on the bottom create turbulence. The agitator acts as a centrifugal pump, circulating the wash water.

As a result of the agitator action, lint and wash water are sucked into the agitator stem and down to the base where they are directed into the cavity between the inner bowl and outer bowl. The extruded holes of the inner bowl are shaped to allow the wash water to flow back into the bowl, but prevent the lint from following. The lint then floats to the surface of the water between the inner and outer bowl and remains there until it is flushed out the drain at the end of the wash cycle.



Automatic Lint Removal System

## 6.15 Control Panel

The three core components of the control panel are the console, the IML facia, the PCB and housing. A new look that differs from existing machines has been created, using capacitive touch buttons driving a 7 segment LED display. The fascia provides a sleek look with no protruding buttons making it easier to clean.

#### Console:

The console, which is made from ABS that has a high gloss finish, is the housing to which the facia and PCB housing attaches. Lugs at the base of the console locate into the top deck. With the console being secured to the rear of the top deck by two screws.



#### **IML Fascia**

IML fascia utilises both 1st and 2nd surface IML (In-Mold Label) technology to achieve the glossy finish and perception of depth.

- No lens.
- No light pipes.
- No separate buttons
- Easy to scratch

#### **Display Assembly**

The PCB, which contains the capacitive touch buttons and 7 segment LED display, is assembled onto the fascia and covered with the plastic housing, the PCB is supplied separately.

The display housing is clipped into the display bracket housing which is then clipped into the consoles lower edge, and secured with five screws along the top.



# 7 VOLTAGE AND RESISTANCE READINGS FROM THE CONTROLLER

## 7.1 Voltage Readings



1. Water Valves Varies between 13 – 22V DC Note: Accurate voltages can only be obtained by using a True RMS multimeter.

- 2. Supply voltage 230V AC
- 3. Wash Motor No accurate readings are possible.
- 4. Pump Motor No accurate readings are possible.
- 5. Display Module



6. LID LOCK



7. Thermistor



## 7.2 Resistance Readings



- 1. Water Valves 64 Ω +/- 10%
- 2. Wash Motor

 $39\Omega$  across any two windings



3. Pump Motor



4. Lid lock



5. Thermistor



# 8 DIAGNOSTIC MODE



With the console On Press & Hold Key Lock and Wash Temp for 3 Sec. Diagnostic

#### To enter the **DIAGNOSTIC MODE:**

- 1. Turn the mains on at the supply point and on at the console.
- 2. Press and hold the **KEYLOCK** and **WASHTEMP** buttons. Keeping them pressed for at least 3 seconds, after which time two beeps will sound.

Diagnostics mode can be entered while the product is running.

While in Diagnostics mode the following I/O's can be operated.

	I/O	Select	Then Press
Toggle	Hot Valve	Regular Cycle	Temperature Button
	Cold Valve	,	Spin Button
	Hot Bowl Flag	Heavy Cycle	Options Button
Toggle	SmartPump Drain	Hand Weeh Cycle	Temperature Button
	SmartPump Recirc		Spin Button
Toggle	Recycle (on/off)		Temperature Button
	Restart (on/off)	Easy Iron Cycle	Spin Button
Recycle / Restart to EEPROM			Options Button
Smart To	ool Opto Download	Start/Pause Button	

## 8.1 Diagnostics Levels

Allows various information, to be extracted from the machine while in diagnostics, which can be used in both the static, machine idle, and dynamic, machine running, mode. There are a total of 45 different levels associated with the WashSmart washer, the most relevant service levels are listed in the accompanying table.

While in diagnostics use the "delay start + &/or water level" buttons to select the diagnostics level required

E.g. If diagnostics level 09 (fill level in mm) is selected, after 1 second the information that corresponds to level 09 is displayed in the 7segment display

479637B

E TO GO		TIME	TO GO	
09		3	08	
lay Start		Dela	ay Start	
(+)		$\overline{\mathbf{\cdot}}$	(+)	
More	1 second later	Less	More	shows 308mm

Level	Diagnostic info Displayed	Level	Diagnostic info Displayed
d 00	Last User Warning	d 08	Bowl speed
d 01	Last User warning cycle Count	d 09	Water level
d 02	Last User warning cycle Position	d 10	Bowl float
d 03	Fault Code	d 11	Fill level
d 04	Fault code cycle count	d 19	Pump Speed (RPM)
d 05	Fault cycle position	d 20	HVDC
d 06	Current Temperature	d 21-22	Display SW Version
d 07	Cycle count	d 24-25	M/C SW Version

#### 8.1.1 Level d 00, Last User Warning

The Last User Warning is displayed as a number in the LED display. Use the chart in section 8.9 to identify the last user warning.

## 8.1.2 Level d 01: Last User Warning Cycle Count

The cycle count at which the last user warning occurred is displayed via the screen which will display the 100's, 10's & 1's when all 3 segments are on and the 10,000's & 1,000's when only 2 segments are on with the displayed output toggling between the 2 screens every 2 seconds.

E.g. For a cycle count of 1010 cycles



## 8.1.3 Level d 02: Last User Warning Wash Cycle Position

The Wash Cycle position of the last user warning is displayed via the screen

Output Displayed on Screen	Cycle Position	
00		
01	Agitation	
02	Agitation	
03		
04	Dinco	
05	Rinse	
06	Spin	

# 479637B8.1.4 Level d 03: Fault Code of Last Fault (if within the last 8 Wash Cycles)

Sometimes referred to as the detailed fault code. The fault data is output via the display this will relate to a fault code as detailed in section 9. If **000** is displayed then there has been no fault codes occur in the last 8 cycles.

#### 8.1.5 Level d 04: Cycle Count at Last Fault

The cycle count at which the last fault occurred is displayed via the screen which will display the 100's, 10's & 1's when all 3 segments are on and the 10,000's & 1,000's when only 2 segments are on with the displayed output toggling between the 2 screens every 2 seconds.

E.g. For a cycle count of 1010 cycles



#### 8.1.6 Level d 05: Cycle Position at Last Fault

The Wash Cycle position of the last fault is displayed via the screen.

Output Displayed on Screen	Cycle Position	
00		
01	Agitation	
02		
03		
04	Dinco	
05	Rinse	
06	Spin	

## **8.1.7** Level d 06: Water Temperature (Degrees C)

The Wash Temperature at the thermistor in <sup>o</sup>C is displayed via the screen which is multiplied by 2

## 8.1.8 Level d 07: Cycle Count

The total number of Wash Cycles is displayed via the screen which will display the 100's, 10's & 1's when all 3 segments are on and the 10,000's & 1,000's when only 2 segments are on with the displayed output toggling between the 2 screens every 2 seconds.

E.g. For a cycle count of 1010 cycles



Represent 100's, 10's & 1's.& 10,000's & 1,000's =01,010 cyclesNote: The wash cycle count is only incremented at the end of the spin cycle.

#### 8.1.9 Level d 08: Bowl Speed (RPM)

The current bowl speed displayed in (RPM) via the screen with the thousands digit ignored. E.g. for fast spin of 1,009rpm the screen will display 009 leaving out the 1,000's.

Medium spin of 660rpm will display as 660 and slow spin of 330rpm as 330.

#### 8.1.10 Level d 09: Water Level

The current water level is displayed in millimetres via the screen.

#### 8.1.11 Level d 10: Bowl Float

The level at which the bowl floated is displayed in millimetres.

#### 8.1.12 Level d 11: Fill Level

The target fill water level displayed in millimetres.

#### 8.1.13 Level d 19: Pump Speed

The pump speed is displayed in (RPM) via the display and must be multiplied by 10.

#### **8.1.14** Level d 20: The High Voltage DC

This will display in the screen the actual high voltage DC rail in the motor controller.

**8.1.15** Level d 21: Display software Version

Major display software version number

#### 8.1.16 Level d 22: Display software Version

Minor display software version number

#### 8.1.17 Level d 24: Motor Controller software Version

Major motor controller software version number

# **8.1.18** Level d 25: Motor Controller software Version EEPROM common map version number

#### 8.2 Water Valve Test

The inlet water valves can be activated while in diagnostics mode.

#### 8.2.1 Hot Valve

Select the "**Regular**" cycle then press the **Wash Temp** button to activate the hot valve. To deactivate the hot valve, press the **Wash Temp** button again.

#### 8.2.2 Cold Valve

Select the "**Regular**" cycle then press the **Spin** button to activate the cold valve. To deactivate the cold valve, press the **Spin** button again.

Each valve may be activated in turn to make all valves on at once. This is also good to use when installing machines as it takes the shock out of the fittings and seals and allows checking for leaks on the inlet hoses, at both machine and tap ends.

Caution: Do not leave the machine unattended when the valves are operating.

## 8.3 Pump Test

#### 8.3.1 Drain

Enter diagnostic mode to activate the drain-pump, select the **Hand Wash** cycle then press the **Wash Temp** button. To deactivate the pump, press the **Wash Temp** button again.

#### 479637B 8.3.2 Recirc

The recirc can be activated while in diagnostics, fill the inner bowl with enough water to float it off the spline drive, once the bowl is floating turn off the water valves and activate the pump in the recirc mode.

Select the **Hand Wash** cycle then press the **Spin** button. To deactivate the pump, press the **Spin** button again

## 8.4 Recycle, Restart & Hot Bowl Flag

## 8.4.1 Hot Bowl flag

If the machine has been filled utilising the hot water valve (i.e. warm or hot fill) and has not had a cold rinse, the electronics will not allow the machine to spin up too a fast spin speed. It will only allow the spin speed to reach 670 RPM.

To remove the Hot Bowl flag, Select the "**Heavy**" Cycle and ensure the Hot Bowl flag is activated, indicated by the Soak LED being on, touch the **Options** button to unset the flag (LED off). Alternatively this flag can also be removed by putting the machine through a complete final rinse.

## 8.4.2 Restart Feature

The 685 WashSmart<sup>™</sup> leaves the factory with the **RESTART** set to **ON**; which is indicated in

diagnostic mode by selecting the **"Easy Iron"** cycle and ensuring that the No Spin LED, is on. To deactivate the **RESTART** feature, touch the **"Spin Speed"** button which will turn the No Spin LED off.

When servicing the machine, it is more convenient to deactivate the RESTART feature. This will allow any fault in the system to show up immediately it occurs.

With the RESTART feature on: (Factory Default setting)

- 1. If a fault occurs in the machine, the diagnostic system will detect it. However, instead of displaying a fault code immediately, the machine will try to recover.
- 2. If the fault was only of a temporary nature, the machine will continue and finish the cycle.
- 3. If there is a continuous fault the machine will try to RESTART a number of times. This process could take up to 8 minutes depending on the type of fault. After this, if the machine still cannot restart, the fault code is displayed and the machine will beep continuously. The number of retries will depend on the fault that it has detected, however the maximum number or retries for any one fault is 32 times.

NOTE - This feature is designed as a service aid only and should be left ON in the customer's home. To return to normal operation, and to reset the RESTART feature to the factory setting, switch the machine off at the wall or disconnect from the mains supply.

To identify that the RESTART feature has been activated, refer to the Restart / Recycle table.

## 8.4.3 Recycle Feature

At the end of servicing, the machine may require an extended test where the machine can be left to complete a number of wash cycles. By turning the **RECYCLE** feature on, the machine will continuously repeat the wash cycle until the **RECYCLE** feature is turned off.

This is indicated in diagnostics mode by selecting the "**Easy Iron**" Use cycle and ensuring that the Cold Wash Temp LED is off.

To toggle this feature touch the "Wash Temp" button this will turn the Cold Wash Temp led on or off.

# NOTE - This feature is designed as a service aid only and should be OFF, in the customer's home. To return to normal operation, and to return the recycle feature to the factory setting, switch the machine off at the wall or disconnect from the mains supply.

To identify that the RECYCLE feature has been activated, refer to the Restart / Recycle table.

#### 8.4.4 **Restart / Recycle Table**

The WashSmart uses the "Wash Temp Cold" and the "No Spin" LED to indicate the Status of the Restart and Recycle features.

The table below explains the state the machine is in when the machine is powered off at the console but on at the mains supply.

Led's: Off (Factory Default)	Restart on		
	Recycle off		
Wash Temp & Spin LED:	Restart off		
Flashing.	Recycle on		
Week Tomp I ED: Fleeking	Restart on		
wash Temp LED. Flashing.	Recycle on		
Spin LED: Flaching	Restart off		
Spin LED. Flashing	Recycle off		

#### 8.4.5 Restart / Recycle Features Permanently Programmed

It is possible for the Restart Feature to be disabled, or the Recycle Feature to be enabled, or a combination of both to be permanently programmed into the memory of the electronics so that in the event of a power cut the electronics will remember the setting.

The factory settings are:

- Restart is enabled (No Spin LED on)
- Recycle is disabled (Cold Wash Temp LED off)

If a machine is encountered with the Restart/Recycle features not set to the factory defaults, the machine must be re-programmed using the following steps;

Enter **DIAGNOSTIC MODE**; turn the power on at the power point and on at the console. 1.

Press and hold the **KEYLOCK** and **WASHTEMP** buttons for at least 3 seconds.

- Select "Easy Iron" Cycle and reset the restart and recycle to their factory settings. 2.
- To save the settings to the EEPROM touch the "Options" Button 3.

#### 8.5 Data Download

To activate the data download, enter the diagnostic mode; Turn the power on at the power point and on at the console.

and **WASH TEMP** buttons for at least 3 seconds. Press and hold the **KEYLOCK** 

Then press the START/PAUSE button. The **Delay Start** LED will be on and flickering.



Data LED

Place the download pen over the LED and follow the instructions supplied with the data download program.
# 8.6 Installation Test

Correct installation of the WashSmart washer is very important for the performance of the machine especially the dynamics of the spin cycle. To aid with the installation an install procedure P/No 421700 is attached on the top of the lid of each machine, as part of the procedure there is an installation test routine that checks the water inlet hot & cold, drain and low speed spin of the machine. The test routine takes approximately 3 to 10 minutes depending on the supply water pressure.



#### To enter the **INSTALLATION TEST**:

Turn the power on at the power point and machine on at the console.

Press and hold the **"KEYLOCK"** and **"OPTIONS"** buttons for at least 3 seconds, after which time two beeps will sound and the LED display goes blank.

Press the **START PAUSE** button to start the test, which will take approximately 3 and 10 minutes, at the end of the test if all functions are working correctly the machine will sound end of cycle beeps and turn off, if there has been an issue encountered the machine will display the appropriate user warning at test end.

# 8.7 Showroom Mode

This feature is designed for in store demonstration purposes. So the machine can draw attention to itself and the different functions can be demonstrated. In this mode it cannot be started.



To select demonstration mode:

Turn the machine on at the mains supply and off at the console.

Press and hold the **KEYLOCK** & **WASH ADVANCE** buttons for 3 seconds.

To return to normal operation, the mains supply must be switched off.

# 8.8 Size setting

When a motor control module is replaced the machine when powered on will display fault code 9 (required to be size set).



To set the size:

Turn the mains on at the supply point and off at the console.

Touch and hold the **KEYLOCK** and the **Spin** buttons for 3 seconds until the LED display shows the current setting of "- - -"or "685".

To select the size touch the More 🕑 Button until "685" is displayed in the LED screen.

To save the setting power off the console with the **Power** button, your selection is automatically saved.

# 8.9 User Warnings

There are a number of user warnings, which are generally caused by the user or poor installation. These warnings should be able to be corrected by the user.

The machine signals user warnings by displaying a warning in plain text. Where multiple words are displayed one word at a time with 1 second pause between changing from one word to the other along with a rippling set of 5 beeps which are repeated every 6 seconds. This is the same tone that is heard when the machine is first plugged into the mains power.

Most of this information is available to the user in the Use and Care manual.

Code		Description
01	No Taps	no eap
02	Wash level Overloaded	too FUL
03	Out of Balance	out OF BAL
04	Suds Lock	Sud LOC
05	No Hot	NO hoł
06	No Cold	no Ela
07	Agitator Overloaded	too FUL
08	Lid Lock	LI d LOC
09	Lid Open	LI d OPN

The last user warning is also logged into diagnostics level d 00 which will be displayed as a number from 01 through 09.

### **8.9.1** 01 No Taps (no water)

Possible causes:

- 1. The taps are not turned on.
- 2. The inlet hoses may be kinked.
- 3. The inlet hose filters at the tap end may be blocked.
- 4. The inlet valve filter screens may be blocked.
- 5. The flow rate of the supply water is too slow. The product requires a minimum flow rate of 6 litres per minute.
- 6. The drain hose is too low or the drain hose is pushed into the standpipe too far and the water is siphoning out of the machine.

### 8.9.2 02 Wash Level Overloaded (too full)

Possible causes:

- 1. The product is overloaded.
- 2. The user has selected the wrong water level for the load.
- 3. The inner bowl assembly is jammed to the agitator with a foreign object that may be caught under the agitator skirt.
- 4. The spline drive and driven teeth are locked together with dirt, detergent or lint.
- 5. The spline drive and driven teeth are damaged / broken.

### 8.9.3 03 Out of Balance

Possible causes that need to be checked in the following order

- 1. Even distribution of the load.
- 2. The feet have the rubber inserts fitted and the cabinet base is clear of the floor.
- 3. The machine is correctly installed, level front to rear & side to side and does not rock on the floor.
- 4. The bias spring is fitted between the top of the neck ring and the rear left hand suspension rod.
- 5. The suspension is not catching or bouncy. If so, replace all four-suspension rods.
- 6. The weight of the inner bowl. The balance ring and bowl base of the inner bowl contain water. The most accurate way is to check the weight of the inner bowl (Refer to Section 6.3).
- 7. The holes in the inner bowl are not blocked and have been punched through.

# **8.9.4** 04 Suds Lock

This warning is generated if the machine senses too much drag on the inner bowl.

Possible causes:

- 1. Too much detergent generally causes this. If so, dissolve the suds by flushing water through the machine and re-test.
- 2. The pump is partially blocked, or the drain hose is kinked.
- 3. A garment or foreign object is restricting the movement of the inner bowl.
- 4. The main bearings are tight.

# **8.9.5** 05 Insufficient Hot Water (no hot)

Possible causes:

- 1. The hot water is not connected or the tap is turned off.
- 2. The flow rate is too low. The product requires a minimum flow rate of 6 litres per minute.
- 3. The hot water temperature is too low. The water temperature needs to be 60<sup>o</sup>C for a hot wash.
- 4. The hot water inlet hose is connected to the cold water supply.
- 5. That there are kinks in the inlet hose.
- 6. The filter in the hot inlet hose at the tap end is blocked.
- 7. The filter screen in the hot inlet valve of the machine is blocked.
- 8. Thermistor resistance is out of range. Resistance is  $10k\Omega @ 25 ^{\circ}C$ . Replace if well outside of this range.

# Note: If the machine is set to controlled cold, hot water may be required to achieve the set temperature of 20 °C.

# 8.9.6 06 Insufficient Cold Water (no cold)

Possible causes:

- 1. The cold water is not connected or the tap is turned off.
- 2. The flow rate is too low. The product requires a minimum flow rate of 6 litres per minute.
- 3. The cold water inlet hose is connected to the hot water supply.
- 4. That there are kinks in the inlet hoses.
- 5. The filter on the cold inlet hose at the tap end is blocked.
- 6. The filter screen in the cold inlet valve of the machine is blocked.
- 7. Thermistor resistance is out of range. Resistance is  $10k\Omega @ 25 °C$ . Replace if well outside of this range.

# 8.9.7 07 Agitate Overload (too full)

Possible causes:

- 1. The product is overloaded.
- 2. The user has selected the wrong water level.
- 3. The inner bowl assembly is jammed to the agitator with a foreign object that may be caught under the agitator skirt.
- 4. The spline drive and driven teeth are locked together with dirt, detergent or lint.
- 5. The spline drive and driven teeth are damaged / broken.

# 8.9.8 08 Lid Lock (Failure)

This warning is generated if the electronics has detected that the lid lock has not closed. Possible causes:

- 1. The tang on the lid is bent or broken.
- 2. The lid-lock assembly has failed. If the lid is closed and the tang is ok, replace the lid-lock assembly.

# 8.9.9 09 Lid Open

This warning is generated if the lid has not been closed. Possible causes:

- 1. The tang on the lid is not bent or broken.
- 2. The lid is open, close it and then press the start/pause button.
- 3. The lid-lock assembly has failed. If the lid is closed and the tang is ok, replace the lid-lock assembly.

# 8.10 Customising

Nearly all the WashSmart washer options can be customised to the preferred settings of the user. E.g. if a user wants to program the machine to always have the Eco option selected or use a cold wash temperature you can program this permanently.

**NB.** Only options that are available for the cycle selected can be customised.

- 1. Touch the POWER button to turn on the console.
- 2. Touch and hold the button of the wash cycle you wish to customise for 3 seconds.
- Touch and hold the button of the option you want to customise, E.g. REGULAR for 3 seconds. You will hear a beep and the display will show "SEt" with the LED above the wash cycle button flashing.
- 4. Select your preferred setting, and any other options you wish to customise for this cycle.
- Touch the button of the wash cycle you are customising again,
   E.g. REGULAR, to store your customised cycle (a long beep will sound to confirm the changes have been saved).



Customising a wash cycle, e.g. Regular cycle

# 8.11 **Preset options adjustment**

This is used to adjust the wash temp setting, the controlled cold setting, the out of balance recovery, the end of cycle beeps and to reset the washer to the factory defaults. In this mode only 4 of the program cycles are selectable REGULAR, Heavy, EASY Iron and Allergy.

#### To enter options adjustments mode

- 1. Turn the machine on at the supply and off at the console.
- 2. Touch and hold the KEYLOCK and START/PAUSE buttons for 3 seconds. You will hear 3 quick beeps. The delay start LED will flash, indicating that you have entered the mode.
- 3. Use the buttons on the control panel to make your changes to the pre-set options.
- 4. After the necessary adjustments have been entered touch the power button to save.



#### Wash Temperature Settings:

- 1. Enter Option Adjustment mode.
- 2. Select the **REGULAR** will cycle.
- 3. Select the wash temp you want to adjust e.g. WARM by using the WASH TEMP button. The LED display will show the current setting.
- 4. Touch the MORE 🕑 button to increase or decrease the desired temperature (the temp scrolls around).

Each increment is equal to approximately 0.5°C



Adjusting the temperature setting, e.g. increasing the WARM wash temperature

#### **Controlled Cold Setting:**

- 1. Enter Option Adjustment mode.
- 2. Select the **REGULAR** we cycle.
- 3. Select the cold wash temp using the WASH TEMP button.
- 4. The LED screen displays the temperature adjustment. The default setting is "tAP".
- 5. Touch the MORE button until "**0**" is displayed this indicates that the cold temperature is set to 20°C. Each of the remaining settings equals approximately a 0.5°C temperature increase or decrease from this point. (Excluding "tAP")



Setting the controlled cold

#### **Out of Balance Recovery**

- 1. Enter Option Adjustment mode.
- 2. Select the **HEAVY** cycle.
- 3. Touch the MORE button to turn AUTOMATIC RECOVERY on or off.



Out of balance recovery routine

#### End of Cycle Beeps:

- 1. Enter Option Adjustment mode.
- 2. Select the EASY IRON Cycle.

3. Touch the MORE button to increase the number of beeps or for no beeps to sound at the end of the cycle.



Modifying the number of beeps to signal the end of cycle

#### **Factory Reset:**

This resets any customisation and option settings back to the factory defaults

- 1. Enter Option Adjustment mode.
- 2. Select the ALLERGY cvcle.
- 3. The LED display will show "rst". Touch and hold the START/PAUSE button until the machine powers off to reset the washer.

To exit without resetting, touch the POWER button.



Changing the washer settings back to the factory default

#### **FAULT CODES** 9

#### 1. Motor Control Module Fault

The Motor Control Module has encountered an error when writing to an EEPROM address. Motor Control Module. Primary Source:

Action: Replace Motor Control Module.

#### 9. Size Error

The Motor Control Module has found a fault with the size setting. Primary Source: Motor Control Module. Action: Replace Motor Control Module.

#### 10. **Temperature Sensor (Thermistor) Error**

The temperature sensor may be open circuit. Primary Source: Thermistor Secondary Source: Motor Control Module Action:

- 1. Check the connection of the thermistor to the Motor Control Module.
- 2. Check resistance of temperature sensor. Resistance should be  $10k\Omega @ 25^{\circ}C \text{ or } 12.5k\Omega @ 20^{\circ}C.$  Replace if faulty.
- 3. Replace Motor Control Module.

#### 12. **Flood Protection Error**

The Motor Control Module has detected the water level to be above the flood level and tried to pump the excess water out. After pumping for 30 seconds, the pump has been unable to

lower the water level below the flood level. The water valves may have stuck on and are letting water in at a flow rate that is higher than the pump can handle, or the pump may be blocked and cannot drain the excess water. Note: Under extremely high flow rate conditions the machine may overfill during the "top-up" routine in agitate.

Primary Source:	Water Valves.
Action:	If the water valves are on continuously, check that the water valves
	turn off mechanically, by removing power to the machine.
Secondary Source:	Pump system.
Action:	Check the pump for blockages and drain hose for correct height and
	kinking
Tertiary Source:	Motor Control Module.
Action:	If water valves are being driven on electrically, replace Motor Control
	Module.

#### 21 Water Valve Over Current

The Motor Control Module has detected that the water valve circuit is drawing to high a current.

Primary Source:	Water valves.
Action:	Check that the resistance of the water valves are 61-64 $\Omega$ @
20°C.	
Secondary Source:	Motor Control Module

Action: Replace the Motor Control module.

#### 26. Detergent Valve Fault

The Motor Controller module has detected that the detergent valve (purple clip) is faulty. It determines this by measuring voltages from the valve diagnostic circuit. The most likely cause is that the valve harness has not been connected correctly or the valve is open circuit.

Primary Source:	Wiring.
Action:	Check the valve harness is correctly fastened to the valve or the pins
	are not heat healwards

Secondary Source:	Detergent Valve.
Action:	Check the valve coil is not faulty (i.e. not open circuit – See 1.8).
Tertiary Source:	Motor Controller module.
Action:	Replace the Motor Controller module.

#### 27. Fabric Softener Valve Fault

The Motor Controller module has detected that the fabric softener valve (yellow clip) is faulty. It determines this by measuring voltages from the valve diagnostic circuit. The most likely cause is that the valve harnesses has not been connected correctly or the valve is open circuit.

Primary Source:	Wiring.
Action:	Check the valve harness is correctly fastened to the valve or the pins
	are not bent backwards.
<b>Secondary Source:</b>	Fabric Softener Valve.
Action:	Check the valve coil is not faulty (i.e. not open circuit – See 1.8).
Tertiary Source:	Motor Controller module.
Action:	Replace the Motor Controller module.

#### 36. Water Leak Fault

The Motor Control Module has needed to top up the water level more than 4 times during agitate. This is excessive, as normally only one or two top ups are required to replace the air that has escaped from a full load during agitate. The most likely cause is that the machine is siphoning. The other alternative is that the machine has developed a leak.

Primary Source:	Pump System.
Action	1) Check the height of the drain hose outlet Minimum 850mm,
	maximum 1200mm.
	2) Check that the hose guide is fitted and check that the hose does
	not protrude more than zonim beyond the guide.

Secondary Source: Mechanical.

37.

Action:

- 1) Check the pressure tube connections on the outer bowl and Motor Control Module.
- 2) Check that the drive shaft seal and the pump housing seal have not developed a leak.

#### Tertiary Source: Action:

Motor Control Module. Replace Motor Control Module.

#### No change in the water level (Pump Blocked Error)

While draining, the water level reading from the pressure sensor has not changed for over 3 minutes. There are four likely reasons for this fault.

- 1) The drain hose or the pressure switch hose has been squashed or kinked and the pump out rate has been dramatically reduced.
- 2) The pump is partially or fully blocked.
- 3) The pump is not operating due to Motor Control Module, wiring or pump failure. This fault could also appear if the machine is pumping to an unusually high head of drain hose or into an extended length of drain hose.
- 4) A diverter valve fault or blockage, water level is not altering as the diverter is stuck in the recirculation mode, giving the module the appearance the pump is not lowering the water level.

#### Primary Source: Pump System.

Action:

- 1) Check that the drain hose has not been kinked.
- Check the length of the drain hose and try to reduce the length if excessively long. A 1 metre extension hose of the same diameter fitted to the existing drain hose is the maximum allowable length.
- 3) Check for open circuit windings in the pump. (*Note: Pumps are fitted with a thermal cut-out, which will reset on cooling.*)
- 4) If the bowl is empty of water, remove the pump from the pump housing and check that it is not blocked. Also check the drain hose is not blocked.
- 5) If the bowl contains water, then service the pump from the top of the machine by removing the top deck and inner bowl. Bail out the water, remove the pump cap and hood and clear the restriction.

Secondary Source: Wiring.

Action:

Action:

- 1) Check the pump harness is connected correctly to the pump.
- 2) Check continuity of the pump harness.

Tertiary Source: Motor Control Module.

Activate the pump by operating the machine in spin mode. Check the pump is rotating. If it is not operating and the Primary and Secondary checks have been performed, then replace the Motor Control Module.

#### 38. Pressure Sensor Fault

The Motor Control Module has detected and recorded an empty water level while agitating. The water level must have been greater than empty for the machine to start agitating initially.

Primary Source:	Mechanical.
Action:	Check the pressure tube is attached and has not been cut.
Secondary Source:	Motor Control Module.
Action:	Replace the Motor Control Module, if the pressure tube shows no
	sign of being faulty.

#### **39. Pressure Tube Fault**

The Motor Control Module has detected a fault with the pressure tube.		
Primary Source:	Mechanical.	
Action:	Check that the pressure tube is not blocked with water or dirt, is not kinked and it attached securely.	
Secondary Source:	Motor Control Module pressure sensor.	
Action:	Replace the Motor Control Module.	

#### 40. Bowl Dis-engage Fault

While carrying out a bowl check, the Motor Control Module has found that the bowl is not engaged even though the pressure sensor indicates that the bowl is empty. The Motor Control Module continues to check for 2 minutes, after which time it displays this fault. The first two areas to check are the clutch and the pressure tube. If these two appear correct, then the fault could be in the pressure sensor in the Motor Control Module.

Primary Source: Mechanical.

Action:

- 1) Check that there are no clothes or other foreign objects preventing the clutch from re-engaging. Excessive suds can stop the bowl rotating.
- 2) If the machine is empty of water, carry out a clutch disassembly procedure and check the spline drive.
- 3) Next check that the pressure tube has not come off and that it is not kinked.

Secondary Source: Motor Control Module.

Action: Replace Motor Control Module.

#### 41. Temperature Sensor Fault (Thermistor)

The temperature sensor is measuring temperatures above 110°C. This fault is most likely due to a short circuit in the sensor line.

**Primary Source:** Temperature Sensor (Thermistor).

Action:

- 1) Check the connection from the thermistor the Motor Control Module, especially check for a short circuit.
- 2) Check the resistance of the thermistor. Resistance should be 10kΩ
   @ 25°C or 12.5kΩ @ 20°C. Replace if faulty.
- 3) Replace the Motor Control Module.

#### 45. Display Memory Check Fault

On power up, the display has checked its memory against a known reference and found differences.

Primary Source:	Display Module.
Action:	Replace Display Module.

#### 46. Display Memory EEPROM Check

The Display has detected a problem with its internal EEPROM.Primary Source:Display Module.Action:Replace Display Module.

#### 49. Cold Valve or Cold Valve & Hot Valve Faulty

The Motor Control Module has measured a voltage from the valve diagnostic circuit (or both the valve and pump diagnostic circuit) that indicates that the cold valve or both the hot and cold valves are open circuit. The most likely cause is that the valve harness has not been connected correctly or the valve(s) is open circuit.

It could also indicate that there is a problem with the pump or pump system. It also can be caused by a failure of the Motor Control Module pump drive while the pump is running. This will manifest as fault code 249 which can change to fault code 49 when power to the machine is removed then reapplied.

Primary Source: Wiring.

Action:	Check the valve harnesses are correctly fastened to the valves and
the Motor	Control Module, or the pins are not bent backwards. If possible, test
the	harness for continuity between the valve end of the harness and the
Motor	Control Module end of the harness.

Secondary Source:	Water Valves.
Action:	Measure the resistance of the Hot and Cold valve coils.

Tertiary Source Water Valv	es:	Motor Cont	rol Module.
Action:	Replace	the Motor	Control Module.

Tertiary Source: Pump System.

Action: Measure the resistances of the pump stator windings from the controller end of the pump harness. The resistance between each pair of terminals should measure approximately 16.2 $\Omega$ . If an open circuit is detected, the reading should then be taken directly from the pump stator, as the fault may be in the harness. Carry out any corrective action as and if required.

If the reading is correct or otherwise, follow procedures for Fault Code 249, as a problem in the pump or pump system such as a blockage or restriction may have contributed to the failure.

Note: If a fault has been found in the pump system, after correcting the fault, it is also likely that the Motor Control Module will need to be replaced.

#### Quaternary Source Pump System: Motor Control Module.

Action: Replace the Motor Control Module.

#### 50. **Hot Valve Coil Faulty**

The Motor Control Module has measured a voltage from the valve diagnostic circuit that indicates the hot value is faulty. The most likely cause is that the value harness has not been connected correctly or the valve is open circuit. See fault 49 for service procedure.

#### 56. **Bowl Check No Valid Fault**

While carrying out a bowl check, the machine has not been able to determine a valid bowl status and so the Display flags this fault. This fault differs from fault code 40 in that a valid bowl status could not be determined.

Primary Source: Action:	Loading. Remove items until the remaining ones can move freely, or rearrange
	the load so that the clothes are evenly distributed around the bowl, or select a higher water level. If the load was to one side of the bowl or too heavy, it can be possible for the agitator to bind in one direction
	when trying to sense bowl float.
Secondary Source:	Mechanical.
Action:	1. Check the machine is not siphoning.
	2. Check that there are no clothes or other foreign objects preventing the clutch from re-engaging, and that there aren't any defects with the clutch mechanism.
	3. Check that the pressure tube has not come off and that it is not kinked.
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#### Tertiary Source: Motor Control Module. Action: Replace the Motor Control Module.

#### 57. Brown Out During Display EEPROM Write Fault

The Display has requested the Motor Control Module to perform an EEPROM write. Prior to writing, the Motor Control Module has tested the 15 Volt supply and found that it is below the safety level for writing EEPROM and has reported this to the Display. This may be due to transients at the time of writing or due to a faulty Motor Control Module.

Primary Source: Motor Control Module.

Action: Replace Motor Control Module.

#### 58. **Pressure Transducer at Maximum Adjustment**

When the pause or delay start is pressed to start the SmartDrive®, the Display Module has checked the memory and found the count greater than expected. Primary Source:

Motor Control Module.

**Replace Motor Control Module** 

#### **60**. Motor Control Memory Check Fault

Action:

On power up, the Motor Control Module has checked its memory against a known reference and found differences.

Primary Source: Motor Control Module.

Action: Replace Motor Control Module.

#### 68. Pressure Transducer Error – Count Too High

The pressure transducer has measured a water level far above what the machine should physically be able to measure. This suggests that the pressure sensor has been disconnected from the motor controller, damaged or not actually placed on the PCB. **Primary Source:** Motor Control Module. **Action:** Replace Motor Control Module.

**103.** Slave Display Comms Time out

#### 104. See Fault Code 106

#### 105. Comms Error Time Out

These faults are reported when the Display Module detects an error in the communications between the Display Module and the Motor Control Module. Can also occur when the display is changed with the power still on.

Primary Source:Display Module.Action:Replace Display Module.Secondary Source:Motor Control Module.Action:Replace Motor Control Module.

#### **106.** Display Module to Motor Control Module Communications Error

These faults are reported when the Display Module detects an error in the communications between the Display Module and the Motor Control Module.

Primary Source:Display Module.Action:Replace Display Module.Secondary Source:Motor Control Module.Action:Replace Motor Control Module.

#### **107. Motor Control Module Reset Error**

The Display Module has detected that the Motor Control Module has reset when it should not have. This can be due to a Motor Control Module supply disturbance or microprocessor failure.

Primary Source:Motor Control Module.Action:Replace Motor Control Module.

#### **108.** Comms CRC Error – See Fault Code 106

#### **112.** Motor Current Sense Too High

The motor current sense circuit is faulty.Primary source:Motor Control Module.Action:Replace Motor Control Module.

# Interpretation Smart Pump Current Sense Fault The pump current sense circuit within the motor control module is faulty. Primary source: Motor Control Module. Action: Replace Motor Control Module.

#### **133. Repetitive Current Trip**

The Motor Control Module has detected excess current in the motor or electronic switches. This fault is a more severe occurrence than fault code 132 but has identical fault sources and fault service procedure.

#### 136. Motor Stall

The Motor Control Module has been unable to start the motor.

Primary Source: Wiring.

Action:	Measure/check the motor harness, connectors and motor for
	discontinuity. This can be done by taking a resistance measurement
	between phases of the motor harness at the Motor Control Module
	end. Nominal resistance should be around $39\Omega$ .

#### Secondary Source: Motor.

- Action: 1) Check free rotation of the agitator and bowl by rotating by hand. Bearings and seals may be seized.
- Tertiary Source: Motor Control Module.

Action:

If the primary and secondary checks pass inspection, then replace the Motor Control Module.

#### 137 Motor loss of a Phase

The Motor Control Module has detected the loss of one of the phases of the motor. Possible causes of this fault are: Faulty motor harness, an open circuit winding of motor or faulty motor controller.

Primary Source: Wiring

Action: Measure/check the motor harness, connectors and motor for continuity. This can be done by taking a resistance measurement between phases of the motor harness at the Motor Control Module end. Nominal resistance should be around  $39\Omega$ .

Secondary Source: Motor.

Action: Remove Stator and measure / check the resistance of each winding which is approximately  $19.5\Omega$ .

Tertiary Source: Motor Control Module.

Action: If the primary and secondary checks pass inspection, then replace the Motor Control Module.

#### 160. Bowl Engaged In Agitate

Action:

The bowl has re-engaged itself during agitate.

Primary Source: Mechanical.

- Check that the rotating bowl assembly is not jammed to the agitator with any foreign object that may be caught under the agitator skirt.
  - 2) Check that the clutch teeth are not locked together with dirt, lint, etc.
  - 3) Make sure the bowl is not overloaded with too many clothes.
  - 4) If none of the above appears to be at fault, then check the air bell at the bottom of the inner bowl for leaks.

Secondary Source: Installation (drain) set up Action: Check that the drain hos

Check that the drain hose is fitted into the drain caddy and extends no more than 20 mm from the end. Check if fitted to a stand pipe that the drain hose is not pushed down to far.

- Tertiary Source: Motor Control Module.
- Action: If the machine is empty of water at fault, it is possible that the pump circuit is faulty and has caused a pump out during wash. This would cause the bowl to re-engage during agitate and the Motor Control Module to display this fault. Replace Motor Control Module.

#### 220. EEPROM Model Map Not Programmed

On power up, the Motor Control Module has detected a fault in its memory. **Primary Fault:** Motor Control Module. **Action:** Change Motor Control Module.

#### 221 Motor Control Module Fault

The motor control has encountered a RAM check error

- Primary Fault: Motor Control Module.
- Action: Change Motor Control Module.

#### 222 Motor Control Module Fault

The motor control has encountered a Stack errorPrimary Fault:Motor Control Module.Action:Change Motor Control Module.

#### 223 Motor Control Module Fault

The motor control has encountered a program counter errorPrimary Fault:Motor Control Module.Action:Change Motor Control Module.

			4/903/0
224	Motor Control Mo	dule Fault	
	Primary Fault:	Motor Control Module.	
	Action:	Change Motor Control Module.	
225	Motor Control Mo	dule Fault	
	The motor control ha	as encountered a clock error	
	Action:	Change Motor Control Module.	
226	MarchX Ram Che	ck Error	
	The motor control ha	as encountered a RAM error	
	Primary Fault:	Motor Control Module.	
000	Action:	Change Motor Control Module.	
230.	Wrong version detec	ut of Range	
	Primary Fault:	Motor Control Module is the wrong version.	
	Action:	Change Motor Control Module.	
232.	<b>COMMS</b> Timeout	5 Sec	
	Either the Display or	Motor Control Module has not responded in time.	
	Primary Fault:	Display Module fault. Replace Display Module	
	Secondary Fault:	Motor Control Module fault.	
	Action:	Replace Motor Control Module.	
233.	EEPROM Read Er	ror	
	Problem in reading the	he EEPROM data, coming from the Motor Control Module	
	Action:	Replace Motor Control Module.	
234.	Lid Lock Open Ci	rcuit	
	Check harness to Lic	d Lock, the connections at the Motor Control Module and lid lo	ck ends.
	Primary Fault:	Connectors on the harness at either end could be at fault.	
	Secondary Source:	Lid lock has failed to be activated.	
	Action:	Replace Lid Lock Assembly.	
	Tertiary Source:	Motor Control Module has not responded to the lid lo	ck being
	Action	Check the lid has a tang and is fitted correctly to activate th	e lid lock
		If this is all in order, the Motor Controller must be faulty a	nd needs
		replacing.	

#### 235. Lid Lock Short Circuit

Lid Lock fault, not activated when instructed to by the Motor Control Module. Primary Fault: Action: Lid Lock mechanism has jammed or failed. Check resistance across the connections, this should be 63 ohms +/-10% @ 20 °C. If faulty, replace the Lid Lock assembly.

#### 236. Incompatible EEPROM Version

Failed to start with fai	ult being immediately displayed
Primary Fault:	Motor Control Module is wrong one.
Action:	Fit correct Motor Control Module.

#### 237. Temperature Sensor Error

The electronics have picked up a continuity problem, the same as fault code 10.

- **Primary Fault:** The sensor has failed either in the harness or the connection to the thermistor.
- Action: Replace the thermistor (temperature sensor).

- Secondary Source: Motor Control module has failed to read the temperature. Check connections.
- Action: Replace Motor Control Module if the connections look fine and the fault still occurs.

#### 238. Lid Lock Open Circuit

Check Harness to Lic	Lock and connections at the Motor Control Module and lid lock ends.
Primary Fault:	Connector to the harness, either end could be at fault.
Action:	Replace Harness.
Secondary Source:	Lid Lock has failed to be activated.
Action:	Replace Lid Lock.
Tertiary Source:	Motor Control Module has not responded to the Lid Lock being activated.
Action:	Check the lid has a tang and is fitted correctly to activate the Lid Lock. If this is all in order, the Motor Control Module must be at fault and needs to be replaced.

#### 239. Lid Lock Short Circuit

Check Harness to Lic	Lock and connections at the Motor Control Module and lid lock ends.
Primary Fault:	Connector to the harness, either end could be at fault.
Action:	Replace Harness.
Secondary Source:	Lid Lock has failed activated.
Action:	Replace Lid Lock.
Tertiary Source:	Motor Control Module has not responded to the Lid Lock being activated.
Action:	Check the lid has a tang and is fitted correctly to activate the Lid Lock. If this is all in order, the Motor Control Module must be at fault and needs to be replaced.

#### 241. Function Time Out

A fault has occurred	with the Display Module.
Primary Fault:	Display Module has failed.
Action:	Replace Display Module.
Secondary Fault:	Motor Control Module has failed.
Action:	Replace Motor Control Module.

#### 243. Stepper Test Failure

The Motor Control Module has attempted a motor step test and found the motor has not stepped to the correct position.

Primary Source:	Wiring.
Action:	Check the continuity of the Motor Harness and that the connectors
	are correctly applied to the Motor and Motor Control Module.
Secondary Source:	Motor.
Action:	Check continuity of motor phases. Check the bridge terminal on the
	stator is not open circuit or burnt. Replace Stator.
Tertiary Source:	Motor Control module.
Action:	Replace the Motor Control Module.

#### 245. Smart Pump Stall

This fault is normally as a result of the pump stalling during its normal operation.

Primary Source:	Pump stator winding open circuit.
Action:	Check the resistance of the pump stator. Resistance per Phase:
	8.1Ω +/- 10% (16.2Ω +/- 10% across any two phases).
Secondary Source:	Pump System.
Action:	1. Check that the drain hose has not been kinked.

2. Check the length of the drain hose. A 1 metre extension hose of the same diameter fitted to the existing drain hose is the maximum allowable length.

- 3. Check that the machine is not pumping to a head that exceeds the pump's limits (2.4 meters is maximum head height).
- 4. Remove the inner bowl and check that the pump hood hasn't been fitted around the wrong way.
- 5. Check for lint streaming from the pump hood that may be blocking the cap inlet.
- 6. Remove the pump hood and cap. Check for lint, grit and debris.
- 7. Check for free movement of the flapper and that the impeller hasn't come off the rotor.
- 8. Check for free movement of the flapper (replace if broken).
- 9. Check for lint and foreign objects in the ports of the pump housing.

Tertiary Source: Action: Motor Control Module. Replace Motor Control Module.

#### 246. Wash Boost / Bleach Valve Fault

The Motor Controller module has detected that the Bleach valve (red clip) is faulty. It determines this by measuring voltages from the valve diagnostic circuit. The most likely cause is that the valve harness has not been connected correctly or the valve is open circuit.

Primary Source:Wiring.Action:Check the valve harness is correctly fastened to the valve or the pins<br/>are not bent backwards.

<b>Secondary Source:</b>	Bleach Valve.
Action:	Check the valve coil is not faulty (i.e. not open circuit – See 1.8).

Tertiary Source:Motor Controller module.Action:Replace the Motor Controller module.

#### 247. Smart pump Flapper Fault

The Motor Control Module has registered a drop in the water level during the recirculation phase of the wash cycle. Water is being drained instead of recycling. The most likely cause is that the flapper is stuck in the drain position.

Primary Source:Flapper valve.Action:Check for free movement of the flapper valve (replace if broken or damaged).

#### 248 SmartPump Top Up Fault

More than 6 attempts have been made to top-up the water level in the bowl during recirculation.

Primary Source:	Poor Flapper Seal.
Action:	1. Clean any foreign objects out of the pump, concentrating especially on the flapper and drain/re-circulating port areas.
	2. Remove the flapper to ensure no foreign objects exist below and around the flapper.
	3. Check the flapper damage, especially the lip seals. If damaged, replace.
Secondary Source:	Cap not tight, warped, damaged (worn).
Action:	1. Check that the hood/cap is tight. If loose and screws are difficult to tighten, foreign objects could be in the screw boss. Remove pump fully and inspect/ replace if in doubt.
	2. Check the cap is not warped or it is not excessively worn in the area where it contacts the flapper. Replace the cap if warped or worn.
Tertiary Source:	Damaged Pump Housing Port.
Action:	Check that there is no excessive wear to the pump housing port caused by foreign objects. Replace pump if necessary.

Quaternary Source:Motor Control Module.Action:Replace Motor Control Module.

#### 249. SmartPump Timeout Fault (No change in water level)

While draining, the water level reading from the pressure sensor has not changed for 3 minutes. This fault will generally be caused by a problem with the pump system, from either a blockage or restriction in the pump system. This will also flag if the machine is By-Passing (refer to section 6.8.11).

Primary Source: Pump System.

Action:

1. Check that the drain hose has not been kinked.

- 2. Check the length of the drain hose. A 1-metre extension hose of the same diameter fitted to the existing drain hose is the maximum allowable length.
- 3. Check that the machine is not pumping to a head that exceeds the pump's limits (2.4 meters is maximum head height).
- 4. Remove the inner bowl and check that the pump hood hasn't been fitted around the wrong way.
- 5. Check for lint streaming from the pump hood that may be blocking the cap inlet.
- 6. Remove the pump hood and cap. Check for lint, grit and debris.
- 7. Check for free movement of the flapper and that the impeller hasn't come off the rotor.
- 8. Check for free movement of the flapper (replace if broken).
- 9. Check for lint and foreign objects in the ports of the pump housing.

# Secondary Source: Motor Control Module.

Action: Replace Motor Control Module.

#### 250. SmartPump Loss of Sync

This fault is normally as a result of the pump not starting and is usually caused by an object that has got into the pump, and is either under or on top of the impeller, which is causing the motor to stall when trying to start.

**Primary Source:** Pump stator winding open circuit.

**Action:** Check the resistance of the pump stator. Resistance per Phase:  $8.1\Omega$  +/- 10% (16.2 $\Omega$  +/- 10% phase to phase).

Secondary Source: Pump System.

Action:

- 1. Check that the drain hose has not been kinked.
- 2. Check the length of the drain hose. A 1 metre extension hose of the same diameter fitted to the existing drain hose is the maximum allowable length.
- 3. Check that the machine is not pumping to a head that exceeds the pump's limits (2.4 meters is maximum head height).
- 4. Remove the inner bowl and check that the pump hood hasn't been fitted around the wrong way.
- 5. Check for lint streaming from the pump hood that may be blocking the cap inlet.
- 6. Remove the pump hood and cap. Check for lint, grit and debris.
- 7. Check for free movement of the flapper and that the impeller hasn't come off the rotor.
- 8. Check for free movement of the flapper (replace if broken).
- 9. Check for lint and foreign objects in the ports of the pump housing.

Tertiary Source: Motor Control Module.

Action: Replace Motor Control Module.

#### 252. Bridge Test Failure

The Motor Control Module has tested the motor bridge electronics and sensed current when there should not have been any.

Primary Fault: Motor Control Module

Action: Replace Motor Control Module

#### 253 Smart Pump Over Current

The motor control Module has detected that the smart pump is drawing high current.

Primary Fault: Pump stator winding short circuited

Action:	Check the resistance of the pump stator at the motor controller end
of the	harness, resistance per Phase: $8.1\Omega$ +/- 10% (16.2 $\Omega$ +/- 10%
	If faulty recheck the pump stator resistance at the Smart Pump. If
	resistance is correct replace harness assembly but it still faulty replace pump.

#### 254 Motor Control Version to Old

The Motor Control Module software version is too old for the display to support.Primary Fault:Motor Control ModuleAction:Replace Motor Control Module

# **10 WIRING DIAGRAM**

Resistance Table			
Valves	64Ω @ 20°C / 68 °F		
Pump	16.2Ω		
Lid Lock	63Ω +/- 10% @ 20°C / 68 °F		
Thermistor	10KΩ @ 20°C / 68 °F		
Stator	39Ω +/- 10%		



# 11 SERVICE PROCEDURES

Note: Prior to carrying out any service procedures, ensure that the machine has been isolated from the mains supply.

# 11.1 Removal of Lid

- (a) Open the lid and then release the hinge arm locking tabs.
- (b) Carefully lift off vertically.

# NB. As the hinge assembly is sprung loaded ensure the lid is in the vertical position

(c) The hinge arm assembly can then be removed from the hinge

#### Reassembly

Refit in reverse manner, ensuring that the hinge arm, locking tabs have clipped into the home position.





# 11.2 Accessing Components in Console Area

- (a) Remove the two screws at the rear of the console that secure the console to the top deck.
- (b) Tilt the console forward.
- NB. It is not necessary to remove the lid to access the console area.

Reassembly:

Refit in the reverse manner.

# 11.3 Removal of Display Module

- (a) Follow procedures for accessing components in console area (refer to Section 11.2).
- (b) Disconnect the wiring harness from the motor control module.
- (c) Remove the 5 screws securing the display housing bracket to the console.
- (d) Remove the display housing bracket by pivoting it away from the console.
- (e) Release the display harness from the 3 retaining clips.
- (f) Unclip the display housing from the control panel.
- (g) Remove the display

#### Reassembly:

NB; Before assembling ensure there is no dirt trapped between the fascia







and the display module as the dirt could cause intermittent capacitive touch operation.

Refit in the reverse manner.





# 11.4 Removal of motor Control Module

- (a) Follow procedures for accessing components in console area. (Refer to Section 11.2).
- (b) Disconnect all wiring harnesses to the Motor Control Module.
- (c) Remove the pressure tube by squeezing on the legs of the spring clip. Pull gently on the tube to slide it off the spigot.
- NB: If too much force is used on removal or reinsertion, damage to the pressure transducer may occur.
- (d) Remove module retaining screw. \_\_\_\_
- (e) Pull the tab on the top deck harness clamp towards the front to release the Motor Control Module.
- (f) Lift the Motor Control Module upwards at the front and out.

#### Reassembly:

Refit in reverse manner.

NB: When refitting the pressure tube to the pressure transducer ensure that the pressure tube is clear of any water droplets before operating the machine on a fill cycle. If the bowl is full of water, drain the water then blow down the tube before reconnecting. Ensure that the module retaining screw is refitted.



#### 11.5 **Removal of Inlet Valve Assembly**

- (a) Follow procedures for accessing components in console area (refer to Section 11.2).
- (b) Remove the screw securing the valve body to the top deck.
- (c) Disconnect wiring harness from each coil.
- (d) Depress tab from the rear of the console and slide valve assembly upwards from the top deck

Reassembly: Refit in reverse manner.

NB: The wires that are connected to the valve assembly from the motor control module must be in the notch of the partition wall as they will foul and jam between the console and the partition.

#### 11.6 **Removal of Thermistor**

- (a) Follow procedures for accessing components in console area (refer to Section 11.2).
- (b) Disconnect thermistor-wiring harness from the Motor Control Module.
- (c) Slide the body of the thermistor out of the port in the elbow.

Reassembly:

Refit in reverse manner, ensuring when refitting the thermistor that the thermistor is pushed until it comes to a stop against the wall of the elbow.

#### 11.7 Removal of the Cord Set

- (a) Follow procedures for removal of Inlet Valves Assembly. (Refer to Section 11.5).
- (b) Disconnect the mains harness from the Motor Control Module.
- (c) Slide the strain relief to the left and slide out.

Reassembly: Refit in reverse manner.



#### **Raising the Top Deck** 11.8







- (a) Remove the lid. (refer to section 11.1)
- (b) Remove the four screws from the rear of the machine that are used to secure the top deck to the cabinet.
- (c) Raising the rear of the top deck up approximately 10mm gently slide it forward 10mm to release it from the front suspension holding clips
- (d) Raise the top deck.
- (e) Ensure that the pad wear brackets remain in place clipped into the suspension bracket

# 11.9 Removal of Lid Lock

- (a) Follow procedures for accessing components in console area. (Refer to Section 11.2).
- (b) Disconnect lid lock wiring harness from the Motor Control Module.
- (c) Remove Motor Control Module from the top deck (Refer to Section 11.4) leaving all remaining harnesses and pressure tube connected.
- (d) Remove wiring cover from the rear of the top deck.
- (e) Remove the lid. (refer to section 11.1)
- (f) Remove the four screws from the rear of the machine that are used to secure the top deck to the cabinet.
- (g) Raising the rear gently slide the top deck forward to release the front holding clips
- (h) Lift the top deck upwards and remove the screw securing the lid lock to the underside of the top deck.
- (h) Move the front of the lid lock downwards and outwards.
- (i) Raise the right hand corner of the top deck upwards slightly to allow the wiring harness to be removed.

#### Reassembly:

Refit in the reverse manner.

### 11.10 Removal of Top Deck

- (a) Disconnect the mains cord from the mains socket.
- (b) Ensure the water taps are turned off
- (c) Disconnect the water inlet hoses from the rear of the machine.
- (d) Remove the lid. (refer to section 11.1)
- (e) Follow the procedure for accessingcomponents in the console area. (Refer to section 11.2)









- (f) Follow the procedure for removal of Inlet Valve Assembly. (Refer to Section 11.5)
- (g) Follow the procedure for removing the Motor Control Module. (Refer to section 11.4).
- (h) Follow the procedure for removal of Cord Set. (Refer to section 11.7)
- (i) Remove the four screws from the rear of the machine that are used to secure the top deck to the cabinet.
- (j) Raising the rear gently slide the top deck forward to release the front holding clips.
- (k) Lift the top deck clear.

# 11.11 Removal of Neck Ring

- (a) Follow procedures for raising the top deck (refer to Section 11.8).
- (b) Unclip the bias spring from the left rear suspension rod
- (c) Unclip the neck ring from the outer bowl assembly.

Reassembly:

- a. Prior to fitting the neck ring, ensure the recirc nozzle is fitted to the outer bowl correctly.
- b. Fit the neck ring to the outer bowl, ensuring that all the clips are engaged.

*NB: The top of the recirc nozzle must be dry* before fitting the neck ring. If any water is present, a capillary action may take place which will cause water to run down the outside of the bowl and onto the floor.

# 11.12 Removal of the Agitator

- (a) Lift lid.
- (b) Remove fabric softener dispenser.
- (c) Release the agitator bolt by turning counterclockwise.
- (d) Lift agitator out and clear.

#### Reassembly:

Refit in the reverse manner.

The top of the nozzle must be dry before refitting the neck ring







# 11.13 Removal of Inner Bowl

- (a) Follow procedures for removal of the Neck Ring (Refer to Section 11.11)
- (b) Follow procedures for removal of the Agitator. (Refer to Section 11.12).

(c) Lift inner bowl upwards and clear of machine.

Note: If the inner bowl is tight on the shaft pressure may need to be placed on the top of the shaft, while at the same time jiggling the inner bowl upwards.

Reassembly: Refit in the reverse manner.

# 11.14 Removal of Clutch Mechanism (Spline Drive / Spline Driven)

- (a) Follow procedures for removal of Inner bowl. (Refer to Section 11.13).
- (b) Remove the 3 screws securing the spline driven to the inner bowl.

Reassembly:

Refit in the reverse manner. Ensure that the screws are tightened sufficiently with out over tightening.



# 11.15 Removal of Pump Hood & Cap (Impeller & Flapper Inspection)

- (a) Follow procedures for removal of neck ring (refer to Section 11.11).
- (b) Follow procedures for removal of low profile agitator (refer to Section 11.12).
- (c) Remove the inner bowl by lifting the inner bowl upwards and clear of machine.

Note: If the inner bowl is tight on the shaft, pressure may need to be placed on the top of the shaft, while at the same time jiggling the inner bowl upwards.

(d) Remove the two bolts securing pump cap to the outer bowl.



Note: It is important that the screw bosses are kept free of grit. If the bosses have any grit, this can reduce the travel of the screw, which will lead to a poor fit of the cap, which in turn will cause bypassing (refer to Section 6.8.11). Bypassing can cause water on the floor, especially if the water dribbles from the recirc nozzle on to a spinning bowl. Grit in the bosses introduces stress in the plastic when the screw is fitted, which can lead to the cracking of the boss, which may in turn cause leaking.

(d) The impeller and flapper area of the pump can now be inspected.

Reassembly:

Refit in reverse manner.

NB: There are features on the hood and cap that make it difficult to fit in the incorrect position. Ensure the orientation of these parts is correct before fitting.



# 11.16 Removal of Stator (SmartPump<sup>™</sup>) – Testing / Inspection Purposes Only

Note: The stator is not available as a separate spare part; use this procedure for inspecting and testing the stator only.

- (a) Tilt the rear of the machine carefully against the wall ensuring that the machine is stable and locked in position; take necessary precautions not to damage the wall or the machine.
- (b) Disconnect the earth harness by sliding connector apart.
- (c) Remove the three screws holding the Stator assembly to the pump Housing.
- (d) Lower the stator assembly.
- (d) Unclip the wiring harness cover by releasing the two tabs from the topside of the stator shield and unplug the harness from the stator.
- (e) The stator can now be electrically tested. If a fault is shown and the stator needs to be visually inspected, the shield cap can be removed.

Reassembly:

Refit in reverse manner.

Note: Alignment arrows are moulded into the stator shield and the rotor housing to aid in the refitting process.



# 11.17 Removal of Pump Housing

- (a) If the bowl is full of water, drain or bail as much of the water as possible from the machine prior to continuing. To assist with bailing the water, the inner bowl can be removed. (Refer to Section 11.13).
- (b) Tilt the rear of the machine carefully against the wall ensuring that the machine is stable and locked in position; take necessary precautions not to damage the wall or the machine.
- (c) Remove the hose clamps from the Drain & Recirculation Hoses. Carefully remove the two hoses while holding a container under the pump and hoses to catch the remaining water trapped in the hoses and pump.
- (d) Undo the 4 screws holding the pump to the outer bowl. The pump can now be removed from the bowl by pulling down ward on the two port tubes.

Reassembly:

- (a) Fit the Housing Pump O-ring to the Outer Bowl. When replacing or refitting the pump housing, a new O-ring must be fitted.
- (c) Refit the Pump Housing.

# Note: This should be done with the Pump Cap & Hood in place, but it is not essential.

- (c) Press the pump to its home position as much as possible by hand, and then use the bolts to evenly torque the pump down.
- (d) Tighten the pump bolts to a torque of 3.5Nm.

Note: If the bolts happen to strip when refitting the pump housing, refer to the Pump Housing – Stripped Pump Housing Procedure (refer to Section 12.1).







# 11.18 Removal of Recirculation Hose

- (a) If the bowl is full of water drain or bail as much of the water as possible from the machine prior to continuing. To assist with bailing the water, the inner bowl can be removed. (Refer to Section 11.13).
- (b) Follow procedures for removal of neck ring (refer to Section 11.11).
- (c) Lift the recirculation hose upwards and out of its position on the outer bowl.
- (d) Tilt the rear of the machine carefully against

the wall ensuring that the machine is stable and locked in position; take necessary precautions not to damage the wall or the machine.



- (e) Depress the two ends of the clip and slide the clip away from the pump housing.
- (f) The hose can now be removed.

#### Reassembly:

Refit in the reverse manner, ensuring that the lug on the drain pipe lines up with the lug on the pump, that the hose is pushed fully on and that the recirc hose clip faces away from the cabinet.

#### Clip must face away from cabinet



# 11.19 Removal of outer bowl from the Cabinet

- (a) Follow procedures for removal of the Top Deck. (Refer to Section.11.10).
- (b) Follow procedures for removal of Inner bowl. (Refer to Section 11.13).
- (c) Thread the drain hose back into the cabinet.
- (d) Remove the screw securing the drain hose fixture to the cabinet.
- (e) Press tab and rotate fixture carefully so remaining tabs clear the cabinet.
- (f) Remove all four-suspension rods, by unscrewing the screws used to fix them to the top edge of the wrapper, 1 from each rear suspension bracket and 2 from each front suspension bracket, lift upwards on the top suspension bracket. Start with the suspension rod that attaches to the drain hose / wiring harness assembly, and then do the opposing corner.

# NB: The pressure tube linkage will need to be unclipped from the suspension rod first.

(g) With the suspension rods removed from the cabinet carefully lift the outer bowl assembly





out of the cabinet, taking care not to cut the drain hose on any sharp edges of the cabinet.

Reassembly: Refit in reverse manner.

# 11.20 Removal of Rotor

- (a) Tilt the rear of the machine carefully against the wall ensuring that the machine is stable and locked in position; take necessary precautions not to damage the wall or the machine.
- (b) Using 16mm socket, loosen the Rotor bolt. As the Rotor bolt is loosened, the Rotor will withdraw off the base of the main shaft.

NB: Place the Rotor in a plastic bag as the Rotor has very strong magnets and can attract fine metal objects.

Reassembly

Refit in reverse manner. Tighten the Rotor bolt to a torque of **8Nm**.

# 11.21 Removal of Stator

- (a) Follow procedures for removal of Rotor. (Refer to Section 11.20).
- (b) Unscrew the four bolts securing the Stator to the outer bowl.
- (c) Lift Stator off the base of the outer bowl and clear of the shaft.
- (d) Disconnect the wiring harness from the terminals.

#### Reassembly:

(a) Connect the wires to the Stator before locating the Stator on to the outer bowl. Ensure that the correct colour wire is fitted to the correct terminal. The Stator is marked RBY (Red, Blue and Yellow).



- (b) Ensure that the stator clamp plates are flat and that there is a small amount of grease fully covering the plates on the Stator side of the plates.
- (c) Fit the four bolts and only tighten to a torque of **5Nm**.

Note: The Stator should have a slight radial movement of approximately 0.5 – 1mm when correctly tightened, and should have a maximum axial (rocking movement) of 0.5mm.



# 12 SPECIALISED SERVICE PROCEDURES

# **12.1 Pump Housing - Stripped Bolt Procedure**

On the pump housing there are four bolt holes. These positions are used when the housing is assembled to the base of the outer bowl in the factory.

On servicing, should any of these 4 bolts strip in the outer bowl, the two 'blanked off' holes at each end should also be used.

It is important that both the holes at either end, are used otherwise the pump housing will not completely seal to the outer bowl.

Place the pump housing upside down on a block of timber or other such suitable surface. Using a sharp 7mm drill bit, drill out the blanked off holes at either end of the pump.

Place the pump housing on the outer bowl. Secure using the two new positions and the non striped mounting holes. Ensure the bolts are tightened to **3.5Nm**.

Note: It is essential that if using the alternate screw positions, that the two bolts are used, otherwise the pump housing will not seat correctly and a leak will develop.





Drill hole in the centre position

# 12.2 Blocked Pump Procedure

It is possible to clear a blockage/obstruction from the pump without having to drain the water from the machine or disturbing the pump. If, however, there are concerns over the condition of the water and there may be a risk of infection, e.g. from hepatitis etc, then bail the water from the machine first. To assist in removing water from the machine, remove the inner bowl.

After removing the low profile agitator, the inner bowl, the pump hood and the cap, the impeller and flapper can easily be accessed for servicing. Use this procedure to clear any foreign objects from the machine.

Note: The impeller is not a field replaceable item, and if it is damaged, the entire pump assembly must be replaced.

- (a) Follow procedures for removal of pump hood & cap (refer to Section 11.15).
- (b) Spin the impeller by hand (it should be free to turn in both directions). If there is any resistance, try and locate the object. If the object can be located, remove and recheck for free movement of the impeller. Also ensure that the ports, flapper, chamber and SLR feature (refer to Section 6.8.7) are clean and free of lint or other obstructions

Note: If there appears to be a foreign object trapped under the impeller and it cannot be freed by using the above procedure, it may be possible to clean out under the impeller area by holding it under running water while spinning the impeller. To do this the pump housing must be removed from the machine. If this fails to clear the obstruction, then the pump will have to be replaced. To remove the pump housing, (refer to Section 11.17.)

- (c) Refit the pump hood and cap ensuring the correct orientation.
- (d) If there is water in the machine, enter diagnostic mode and run the pump (refer to Section 8.3) to drain the remaining water from the machine.
- (e) After the water has drained, check for any other objects in the bowl.

On completion of service we recommend carrying out the SmartPump<sup>TM</sup> test routine (refer to Section 6.8.10).

# 12.3 Shaft & Bearing Replacement

Procedures described in this section as well as section 12.4 are only carried out by using the Bearing Removal Tool Kit, part number 502009.

The contents of the kit are as follows:



#### THREADED SHAFT M12 Bearing Removal Tool Kit 502009

Note: The extractor mandrel was designed for the older shaft with the external thread, however will work with the shaft on this machine with the internal thread.

- (a) Follow procedures for Removal of Outer Bowl from Cabinet. (Refer to Section 11.19).
- (b) Lay the outer bowl on its side before removal of the shaft. This ensures that the shaft does not fall directly onto the floor.

Note: The shaft can only be removed towards the inside of the outer bowl. Remove the shaft. If the shaft is difficult to remove, use a puller and a mandrel. Refit the thick Stator motor clamp plate onto the outer bowl and secure with the four Stator mounting bolts. The Stator clamp plate may be used to hold the legs of the puller in place.

# SHAFT REMOVAL



**WARNING**: Make sure the Stator clamp plate is flat before reusing. If in doubt, replace.

(c) Remove the outer bearing using the bearing removal tool.

**WARNING:** Do not remove the bearings with a hammer and drift as serious damage to the bearing housing or outer bowl may result. Use the bearing removal tool as illustrated.

- (d) Remove the seal with the aid of a screwdriver handle levering from side to side.
- (e) Remove inner bearing using the bearing removal tool. Insert the threaded rod and extractor washer up from the bottom of the outer bowl. Place the collar and large locating spigot on the threaded rod and extract the bearing.



**BEARING REMOVAL** 





Note: The outer bearing will be proud of the housing by approximately 3mm.

# 12.4 Shaft & Bearing Assembly

(a) The bearings must be inserted separately with the **inner bearing fitted first** and pulled down with the bearing tool onto the shoulder in the bearing housing.

**IMPORTANT**: There must be no gap between the bearing outer race and the shoulder of the aluminium extrusion. Remove the insertion tool at this point and check that the inner bearing is fully home.

(b) Fit the bearing spacer and press in the outer bearing using the bearing tool. Check the spacer has no end float but has slight sideways movement to allow for shaft insertion.

# **BEARING INSTALLATION**



- (c) Ease the shaft through the bearings from inside of the outer Bowl. Take care the shaft is fitted with the threaded retaining nut section facing downwards in the direction of the base.
- (d) Fit the shaft retention nut. Use the spline tool and spanner to tighten the shaft retention nut.
- (e) Invert the outer bowl. Take care not to damage the shaft or flooring. Fit the assembly thimble sleeve onto the shaft before fitting the seal. Lubricate the seal outside diameter with liquid detergent and then slide into position by pressing down on both sides of the seal.

Note: The seal should be flush with the lip on the base of the outer bowl.

# 13 SOLVING WASH PROBLEMS

Listed below are possible causes and solutions to some common wash problems.

#### Creasing:

- Was the washer or dryer overloaded?
- Selecting the Easy Iron cycle will minimise creasing.
- Try not to leave wet clothes in washing machine or laundry bowl.

#### Linting:

- Was the washer overloaded?
- Wash lint-givers (e.g. towels, flannel sheets) separately from lint collectors (e.g. synthetics).
- Have you used enough detergent to hold lint in suspension?
- Over-drying in dryer can cause a build-up of static electricity causing items to collect lint.
- Try using a Conventional cycle.

#### Poor soil removal:

- Did you use enough detergent for load size or amount of soil? (Note: Hard water requires more detergent than normal or soft water situations).
- Are you using a good quality detergent?
- Is the washing machine overloaded?
- Separate heavily and lightly soiled garments.
- Use a wash temperature appropriate to soil type e.g. blood and mud are better washed in cold water, while oily soils are better in warmer water.

#### **Residue detergent**

- Is the washing machine overloaded?
- Using too much detergent for the size of the load.
- Is your cold water less than 20°C? Select CONTROLLED COLD temperature option (rather than cold directly from the faucet).

#### Dye transfer:

- Remember to separate colours and whites.
- Wash non-colourfast items separately and select Colours cycle.
- Remember to remove items from washer as soon as the wash is finished.

#### Tangling:

- Separate larger items from smaller items.
- Use the Easy Iron cycle to wash shirts.
- Wash sheets using the Sheets cycle.
- Try washing smaller load sizes.

#### Black or grey marks on clothes:

- A build-up caused by detergent can flake off and mark clothes. Remove clothes and put through a "Clean Me" cycle.
- Are you using enough detergent for the amount of dirt?

# 14 NOTES