

Service Manual

DishDrawer™



Models:

DD24D

DD24S

DD60D

DD60S

care

PRODUCTS

Brands Fisher & Paykel
DCS

Standard Double Models	Description	Product Codes – Markets
DD24DCB6	Double, Prefinished Black	88531 - US
DD24DCW6	Double, Prefinished White	88526 - US
DD24DCX6	Double, Prefinished Brushed Stainless	88527 - US
DD24DDFX6	Double, Designer, Brushed Stainless	88532 - US
DD24DI6	Double, Integrated	88529 - US
DD60DCB6	Double, Prefinished Black	80576 - NZ/AU
DD60DCHB6	Double, Prefinished Black, Water Softener	89227 - GB
DD60DCHW6	Double, Prefinished White, Water Softener	89240 - DK
DD60DCHX6	Double, Brushed Stainless, water softener	89225 - GB 89241 - DK 89234 - EU
DD60DCM6	Double, Iridium Stainless	80591 - NZ/AU
DD60DCW6	Double, Prefinished White	80588 - NZ/AU
DD60DCX6	Double, Brushed Stainless	80589 - NZ/AU
DD60DDFHX6	Double, Designer, Brushed Stainless, Water Softener	89228 - GB 89236 - EU 89243 - DK
DD60DDFM6	Double, Designer, Iridium	80592 - NZ/AU
DD60DDFX6	Double, Designer, Brushed Stainless	80593 - NZ/AU
DD60DI6	Double, Integrated	80590 - NZ/AU
DD60DIH6	Double, Integrated, Water Softener	89226 - GB 89235 - EU 89242 - DK

Standard Single Models	Description	Product Codes – Markets
DD24SCW6	Single, prefinished, white	88519 - US
DD24SCX6	Single, prefinished, Brushed Stainless	88520 - US
DD24SCB6	Single, prefinished, Black	88524 - US
DD24SI6	Single Integrated	88522 - US
DD24SDFX6	Single, designer, Brushed Stainless	88525 - US
DD60SCHW6	Single, Prefinished White, Water Softener	89229 - GB 89244 - DK
DD60SCHX6	Single, Brushed Stainless, Water Softener	89230 - GB 89237 - EU 89245 -DK
DD60SIH6	Single, Integrated, Water Softener	89231 - GB 89238 - EU 89246 - DK
DD60SCHB6	Single, Prefinished Black, Water Softener	89232 - GB
DD60SDFHX6	Single, Designer, Brushed Stainless, Water Softener	89233 - GB 89239 - EU 89247 - DK
DD60SCHLI6	Single, Integrated, Long Door	89248 - DK
DD60SDFM6	Single, Designer, Iridium Stainless	80601 - NZ/AU
DD60SDFX6	Single Designer, Brushed Stainless	80602 - NZ/AU
DD60SI6	Single, Integrated	80596 - NZ/AU
DD60SCB6	Single, Prefinished Black	80583 - NZ/AU
DD60SLX6	Single, Brushed Stainless	80597 - NZ/AU
DD60SCM6	Single, Iridium Stainless	80600 - NZ/AU
DD60SLFX6	Single, Long Door	80603 - NZ/AU
DD60SCHW6	Single, Water Softener, Prefinished White	89173 - TW
DD60SCHX6	Single, Water Softener, Brushed Stainless	89174 - TW
DD60SIH6	Single , Water Softener, Integrated	89175 - TW

Tall Tub Double Models	Description	Product Codes – Markets
DD24DDFTX6	Double Designer, Brushed Stainless Tall Tub	88502 - US
DD24DTI6	Double Integrated, Tall Tub	88504 - US
DD24DCCTX6	Double Curved Door, Curved Handle, Tall Tub	88518 - US
DD24DCTX6	Double, Brushed Stainless, Tall Tub	88511 - US
DD24DCHTX6	Double, Brushed Stainless, Water Softener	88528 - US
DD24DHTI6	Double, Integrated, Water Softener	88530 - US
DD24DCTW6	Double, Tall Tub, Prefinished White	88514 - US
DD24DCTB6	Double, Tall Tub, Prefinished Black	88509 - US
DD24DUT	Double, Tall Tub	88542 - DCS US

Tall Tub Single Models	Description	Product Codes – Markets
DD24SDFTX6	Single, Designer, Tall Tub, Brushed Stainless	88503 - US
DD24STI6	Single Integrated, Tall Tub	88505 - US
DD24SCTX6	Single, Brushed Stainless Steel	88512 - US
DD24SCCTX6	Single Curved Door, Curved Handle, Tall Tub	88513 - US
DD24SCTW6	Single, Tall Tub, Prefinished White	88515 - US
DD24SCTB6	Single, Tall Tub, Black	88510 - US
DD24SCHTX6	Single, Brushed Stainless, Water Softener, Tall Tub	88521 - US
DD24SHTI6	Single, Integrated, Water Softener, Tall Tub	88523 - US
DD60SHTI6	Single, Integrated, Tall Tub, Water Softener	89271 - GB 89273 - EU 89275 - DK
DD60SDFHTX6	Single, Designer, Brushed Stainless, Tall Tub, Water Softener.	89272 - EU 89274 - DK 89270 - GB
DD60SDFTX6	Single, Designer, Brushed Stainless, Tall Tub	80644 - NZ/AU
DD60SDFTM6	Single, Designer, Iridium Stainless, Tall Tub	80645 - NZ/AU
DD60STI6	Single Integrated, Tall Tub	80646 - NZ/AU
DD24SUT	Single, Tall Tub	88541 - DCS US

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 versions.

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1 SERVICE REQUIREMENTS

1.1 Health & Safety

Note: When servicing the DishDrawer™, Health and Safety issues must be considered at all times. Specific safety issues are listed below with their appropriate icon. These are illustrated throughout the service information to remind service people of the Health and Safety issues.

1.1.1 Electrical Safety



Ensure the mains power has been disconnected before servicing the DishDrawer™. If the mains supply is required to be on to service the DishDrawer™, make sure it is turned off when removing any electrical component or connection to avoid electrical shock.

1.1.2 Electrostatic Discharge



An anti-static strap is to be used as electrical static discharge (ESD) protection when servicing electronic components.

1.1.3 Good Working Practices



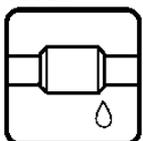
Ensure the work area is in a tidy and orderly condition at all times so as not to cause a hazard while service work is being completed. Always clean and tidy the DishDrawer™ and work area after service is completed.

1.1.4 Isolate Water Supply



Turn off the water connection tap before servicing.

1.1.5 Water Leak Check



Check for water leaks as part of the testing after the service has been completed.

1.1.6 Insulation Test



Megger test to check insulation.

Warning: Short together the phase and neutral pins on the plug so as not to damage any electronic circuitry.

1.1.7 Solvent and Excessive Heat Damage



Solvents and excessive heat can damage plastic surfaces.

1.1.8 Sheet Metal Edges



When working around cut sheet metal edges use appropriate gloves or protection to eliminate the chance of receiving a laceration.

1.1.9 **Diagnostics**



While in diagnostics some safety devices are bypassed. Ensure you do not run components unattended. They may overheat, flood, burnout or cause water damage.

1.2 **Specialised Tools**

For servicing this product specialised tools are required.

1.2.1 **Static Strap**

To be used as ESD (electrostatic discharge) protection when replacing or handling electronic components.

1.2.2 **Fisher & Paykel Smart Tool**

Handheld palm computer supplied in a protective case with F&P diagnostics software and service information loaded:

Part Number 813141 (includes light pen Part Number 425930).

Smart Tool Software is available to download from service website "Cool Blue World" for laptop / pocket PC's. Refer to list of compatible devices on the web site.

www.cbw.fp.co.nz

2 DIMENSIONS & SPECIFICATIONS

2.1 Dimensions

Standard Product	Product Size (mm)	Product Size (inches)	Minimum Cavity Size (mm)	Minimum Cavity Size (inches)
Height (double)	819.5 - 879.5	32 ¹ / ₄ inch – 34 ⁵ / ₈ inch	822.5 - 882.5mm	32 ⁵ / ₁₆ inch – 34 ³ / ₄ inch
Height (single)	409mm	16 ¹ / ₈ inch	412mm	16 ¹ / ₄ inch
Width	595mm	23 ⁷ / ₁₆ inch	600mm	23 ⁵ / ₈ inch
Depth	570mm	22 ⁷ / ₁₆ inch	580mm	22 ⁷ / ₈ inch
Drawer Open (inc cabinet)	1090mm	42 ⁷ / ₈ inch		

Tall Tub Product	Product Size (mm)	Product Size (Inches)	Minimum Cavity Size (mm)	Minimum Cavity Size (Inches)
Height (Double)	863.5 – 923.5	34inch – 36 ³ / ₈ inch	864 -926.5	34 inch – 36 ¹ / ₂ inch
Height (Single)	453mm	17 ³ / ₁₆ inch	456mm	17 ¹⁵ / ₁₆ inch
Width	595mm	23 ⁷ / ₁₆ inch	600mm	23 ⁵ / ₈ inch
Depth	570mm	22 ⁷ / ₁₆ inch	580mm	22 ⁷ / ₈ inch
Drawer Open (inc cabinet)	1090mm	42 ⁷ / ₈ inch		

2.2 Specifications

2.2.1 Electrical

Market	Voltage	Frequency	Current Double / Single
NZ/AUS/GB/EU/DK	230/240V AC	50/60 Hz	10 A / 5 A max
USA/TW	110/120V AC	60 Hz	10.6 A / 5.3 A max

2.2.2 Components

Component	Specifications	Comments
Controller – 2 types	120V 230V	US, TW, 110V NZ/AU NZ, AU, GB, EU, DK
Water Inlet Valve	24V DC 65+/- 10 Ohms per coil 2.5litres/min (0.65 US gal/min)	All markets
Dispenser coils	24V DC per coil 65+/- 10 Ohms per coil	
Rinse Aid tank capacity	50mls (approximately 25 washes) 3.05 cubic inches	
PCB Mains Filter – 2 types	230V AC 110V AC	NZ, AU, GB, EU, DK US, TW, 110V NZ/AU
Motor Drain speed Wash speed	80V DC 3 Phase Brushless 4200 RPM 2300 - 2850 RPM	Pump out rate 5 litres / min.
Stator	8.0 +/- 5 Ohms (per winding), 16 ohms phase to phase from the controller connector	

Component	Specifications	Comments
Heater Plate 230V Water Heater Track Power Supply Resistor	230V AC 50 Ohms +/- 4 Ohms 98 Ohms +/- 7 Ohms	NZ, AU, GB, EU, DK
Heater Plate 110V Water Heater Track Power Supply Resistor	120V AC 24 Ohms +/- 3 Ohms 24 Ohms +/- 3 Ohms	US, TW 110V NZ/AU
Temperature Sensor	12000 Ohms @ 20°C (68°F) 8300 Ohms @ 30°C (86°F) 3000 Ohms @ 60°C (140°F)	Located on the heater Plate
Fusible Link	268 – 302°C (514 – 576°F)	Located on the heater plate
Water Inlet Hose	1000Kpa / 145 P.S.I. 1561 mm from LHS 1344 mm from RHS	Pressure rating Length from chassis edge (viewed from the front)
Water pressure	1 MPa (145 psi) max, 0.1 MPa (14.5 psi) min 1 MPa (145 psi) max, 0.03 MPa (4.3 psi) min	Water softener models Non water softener models
Drain Hose	2011mm from LHS (79 inches) 1794 mm from RHS (71 inches)	Length from chassis edge (viewed from the front)
Power Cord	1776 mm from LHS (69 Inches) 1559 mm from RHS (61 Inches)	Length from chassis exit (viewed from the front)
Drying Fan	24V brushless DC motor 0.27A Approximately 2 to 3 Meg Ohms	Polarity sensitive Meter +ve to red wire, -ve to black wire
Diverter Valve Softener Assy	24V DC Coil 65 +/- 10 Ohms Coil	
Brine Pump Assy	24V DC Coil 65 +/- 10 Ohms Coil	
Water Softener	500 grams Salt Capacity Approximately 14 regenerations 290+/- 10ml Resin	
Lid Actuator	24 V DC Approximately 30 Ohms	
Hall Sensor	4.13, and 3.43 mOhms measured +ve in centre, -ve to outside	
LCD	LCD has back light	5 volt rail between pins 2 & 5

2.2.3 Performance

Europe, GB, IE (Per Tub)

Energy	Wash	Dry
A	A	A
0.64 kWh/cycle	8 litres/cycle	

USA

Based on 4 wash loads per week

Product	Energy
Single	160 kWh/year
Double	314 kWh/year

NZ, Australia

Based on 7 wash loads per week, using normal eco programme

Product	Energy	Water
Single	141 kWh/year – 3 star	7.4 Litres/wash – 3.5 star
Double	282 kWh/year – 3 star	14.7 Litres/wash – 3.5 star

2.2.4 Wash Profiles

2.2.4.1 Europe, Great Britain, Ireland

EU Wash Profiles																				
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Incoming Water 15°C																				
Wash Cycle	D	F	Pre 1	D	F	Main Was	D	F	Post 1	D	F	Post 2	D	F	Post 3	D	Dry	Time (min)	Fills (L)	Fan run on (min)
Heavy				1	1	57	3	1	4	3	1	4	3	1	18	3	30	130	12.8	120
2800rpm						3.2			3.2			3.2			3.2					
						70°C									65°C					
Heavy Eco				1	1	41	3	1	4	3	1	4	3	1	14	3	45	125	10.7	120
2800rpm						3.2			2.5			2.5			2.5					
						60°C									55°C					
Normal				1	1	32	3	1	3	3	1	3	3	1	19	3	25	99	12.8	120
2650rpm						3.2			3.2			3.2			3.2					
						65°C									65°C					
Normal Eco	1	1	12			42	3	1	30	3	1	25	3				40	162	8*	30
2400rpm			2.5			Fill valve 12s*			2.5			2.5								
			42°C			54°C						59°C								
Delicate				1	1	26	3	1	4	3	1	4	3	1	15	3	30	96	10	120
2300rpm						2.5			2.5			2.5			2.5					
						50°C									60°C					
Delicate Eco				1	1	24	3	1	7	3	1	3	3	1	10	3	30	91	10	120
2300rpm						2.5			2.5			2.5			2.5					
						45°C									50°C					
Fast				1	1	26	3	1	2	3	1	10	3				5	56	7.5	120
2500rpm						2.5			2.5			2.5								
						55°C						50°C								
Fast Eco				1	1	16	3	1	2	3	1	10	3				1	42	7.5	30
2500rpm						2.5			2.5			2.5								
						45°C						45°C								
Rinse	1	1	7	3														12	3.2	0
2300rpm			3.2																	

2.2.4.2 Australia, New Zealand

Australia/New Zealand Wash Profile

Wash Cycle		D	F	Pre 1	D	F	Pre 2	D	F	Wash	D	F	Post 1	D	F	Post 2	D	Dry	Time (min)	Total Water	Fan run on
Heavy @2800rpm	Time (min) Temp (°C) Fill (L)	1	1	15 45°C 3.2	3	1	5 3.2	3	1	41 70°C 3.2	3	1	3 3.2	3	1	15 65°C 3.2	3	30	130	16	120
Heavy Eco @2800rpm	Time (min) Temp (°C) Fill (L)	1	1	10 35°C 2.5	3	1	5 2.5	3	1	31 60°C 2.5	3	1	3 2.5	3	1	10 55°C 2.5	3	45	125	12.5	120
Normal @2600rpm	Time (min) Temp (°C) Fill (L)							1	1	38 50°C 2.7	3	1	8 2.7	3	1	25 60°C 2.7	3	30	114	8.1	120
Normal Eco @2400rpm	Time (min) Temp (°C) Fill (L)							1	1	29 39°C 2.55	3	1	10 2.3	3	1	35 41°C 2.35	3	40	127	7.2	30
Delicate @2300rpm	Time (min) Temp (°C) Fill (L)				1	1	5 2.5	3	1	26 50°C 2.5	3	1	3 2.5	3	1	15 60°C 2.5	3	30	96	10	120
Delicate Eco @2300rpm	Time (min) Temp (°C) Fill (L)				1	1	10 2.5	3	1	21 45°C 2.5	3	1	3 2.5	3	1	10 50°C 2.5	3	30	91	10	120
Fast @2500rpm	Time (min) Temp (°C) Fill (L)							1	1	26 55°C 2.5	3	1	2 2.5	3	1	10 50°C 2.5	3	5	56	7.5	120
Fast Eco @2500rpm	Time (min) Temp (°C) Fill (L)							1	1	16 45°C 2.5	3	1	2 2.5	3	1	10 45°C 2.5	3	2	43	7.5	30
Rinse @2500rpm	Time (min) Temp (°C) Fill (L)	1	1	7 2.5	3														12	2.5	0

2.2.4.3 Canada, U.S.A.

United States / Canada

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Wash Cycle		D	F	Prewash 1	D	F	Prewash 2	D	F	Main Wash	D	F	Post Rinse 1	D	F	Post Rinse 2	D	F	Post Rinse 3	D	Dry	Fan Run on	Time (min)	Water (L)
Heavy @2800rpm	Time (min) Fill (L) Temp	1	1	12 3.2	3	1	5 3.2	3	1	36 2.5 55°C/131°F 2750rpm 65°C/149°F 2650rpm 65°C/149°F 2500rpm	3	1	3 2.5 2800rpm	3	1	3 2.5 2800rpm	3	1	20 2.5 74°C/ 165 F @ 2400rpm	3	28	120	132	16.4
Heavy Eco @2800rpm	Time (min) Fill (L) Temp	1	1	5 2.5	3	1	5 2.5	3	1	31 2.5 65°C/149°F	3	1	3 2.5	3	1	3 2.5	3	1	15 2.5 65°C/149°F	3	25	120	112	15
Normal @2800rpm	Time (min) Fill (L) Temp	1	1	8 3	3	1	3 3	3	1	46 3 60°C/140°F	3	1	2 3	3	1	10 3 58°C/137°F	3				25	120	115	15
Normal Eco @2400rpm	Time (min) Fill (L) RPM				1	1	5 2.5	3	1	30 2.5 50°C/122°F	3	1	3 2.5	3	1	10 2.5 50°C/122°F	3				22	120	87	10
Delicate @2300rpm	Time (min) Fill (L) Temp				1	1	5 2.5	3	1	21 2.5 50°C/122°F	3	1	3 2.5	3	1	15 2.5 55°C/131°F	3				25	120	86	10
Delicate Eco @2300rpm	Time (min) Fill (L) Temp				1	1	5 2.5	3	1	19 2.5 45°C/113°F	3	1	3 2.5	3	1	12 2.5 50°C/122°F	3				16	120	72	10
Fast @2500rpm	Time (min) Fill (L) Temp							1	1	26 2.5 55°C/131°F	3	1	2 2.5	3	1	10 2.5 50°C/122°F	3				5	120	56	7.5
Fast Eco @2500rpm	Time (min) Fill (L) Temp							1	1	11 2.5 45°C/113°F	3	1	3 2.5	3	1	9 2.5 45°C/113°F	3				2	30	38	7.5
Rinse @2300rpm	Time (min) Fill (L) Temp	1	1	7 2.5	3																		12	2.5

3 TECHNICAL OVERVIEW

1.1 Chassis

The DishDrawer™ chassis is one complete assembly composed of 5 steel metal components locked together by a proprietary riveting process. The chassis exterior is made of a lacquered electro-galvanised material.

Unlike most other dishwashers, the chassis assembly is a load carrying structure designed to impart stiffness to the product and to ensure deflection is minimised.

The feet of the double cabinet are assembled into the chassis by means of four steel inserts that are clinched in place to form a permanent threaded connection.

The tub extends 520mm ($20^{15/32}$ ") out of the cabinet by travelling along two rigidly attached slides on either side of the tub.

1.2 Drawer Fronts

Prefinished drawer fronts are formed from a painted, brushed or Iridium finish stainless steel blank. The drawer fronts are attached to the tub by means of formed hooks and two pins that are inserted through either side of the tub.

On the integrated model, the front panel supplied on each drawer is the mounting panel for the joinery finished drawer front. The joinery finished drawer front is supplied by the customer.

3.1 Electronics

In the DD24 / DD60 (Phase 6) electronic controller, the functions of controlling the motor as well as controlling the user interface console are combined into a single 16-bit micro controller on the main printed circuit board.

This micro controller also controls a transformerless 85w switch mode power supply. This power supply utilises a large dropping resistor on the heater plate in conjunction with phase control of the mains voltage in order to produce a variable voltage supply for the motors, solenoids and drying fan. From this the controller can supply voltages from 5V to 85V to the various components in the DishDrawer™.

A separate 24volt dc power supply on the PCB mains filter board (located within the mains filter housing in the lower left corner of the chassis) supplies power to the microcontroller and LEDs in the electronic controller.

An isolation relay is mounted on the PCB mains filter and will disconnect power to major components when signalled to by the controller under certain fault conditions. Once the fault has been cleared, it will require the power to be disconnected from the product for the isolation relay to reset.

NOTE: - With power supplies of this nature, all components, regardless of supply voltage, should be treated as live to earth, i.e. at supply voltage.

The user interface comprises a printed circuit board for front controls and a touch switch panel for internal controls.

The electronics can connect to a computer service tool via an optical light pen for fault finding and product information.

The element is switched by one single pole relay. Overheat protection is provided by a thermal fuse in series with the water heater track on the heater plate. In an over-heat situation, this gravity fuse drops off and disconnects the water heater element from the supply voltage.

A non-serviceable fuse is mounted within the controller to provide additional safety protection.

3.1.1 Tub Home Sensor

The tub home sensor determines when the tub is closed. The tub home sensor consists of an infrared sender and receiver mounted on the right side of electronic controller. When the tub is fully closed, infrared light is transmitted from the sender through a light pipe on the side of the tub, through a prism mounted in the chassis trim, then back through the other light pipe to the receiver. If the tub is not fully closed, the circuit is not complete and the appliance will not operate.

3.1.2 Touch Switches

Two touch switches are used on the secondary control panel. The one on the left is used to select the required wash cycle and the one on the right is used to turn the ECO option on or off. (ECO times are not necessarily shorter than non-ECO times, but will use less energy.) They are capacitive touch switches and are supplied with an analogue signal from the controller that will change in the presence of an earthed mass (i.e. customer's finger).

3.2 Motor

The motor is a fully electronically controlled 80V, 60w, 3 phase, 6 pole brushless DC motor, running on wash at between 2300-2850rpm depending on the cycle selected, and at approximately 4200 rpm on drain.

3.2.1 Rotor

The rotor is a four-pole permanent magnet rotor with a graphite bearing at each end of the vertical shaft. At the lower end of the rotor shaft is the drain impellor and at the upper end is the wash impellor.

The rotor can only be placed in one position within the motor housing (refer to Section 8.14 for fitting instructions).

3.2.2 Spray Arm

The spray arm is shaped for most efficient water flow. The holes are positioned for best penetration into the wash load, with the water jets angled to ensure the spray arm rotates at the most efficient speed. The pressure of the water being pumped from the spray arm produces enough downwards pressure to ensure the spray arm does not lift off the rotor. There is a flap valve moulded into the top of the spray arm. This lets air escape through the spray arm when the DishDrawer™ is filling with water.

3.3 Wiring Cover

The wiring cover protects the customer from all electrical components in the motor area underneath the tub. All electrical components, regardless of voltage, should be treated as live with respect to earth. It also serves to protect the motor assembly, drain and fill hoses from damage when opening and closing the drawers. The wiring cover acts as a cosmetic part of the product. The centre of the cover is made from rubber to prevent the transmission of noise from the motor to other components.

3.4 Lid System

3.4.1 Lid Operation

The lid is a single piece of polymer plastic with a diaphragm/seal co-injection moulded into it. The centre of the lid can move relative to the seal. Each side of the lid is clipped into a yoke, which is in turn connected to a worm drive lid actuator assembly containing a small brushed DC 24 volt motor.

When the product is first plugged in and switched on at the wall, the lid motors are powered up to ensure that the lid is fully raised. At the beginning of each wash cycle, both lid motors are powered up to pull the lid down onto the tub in approximately 2 to 3 seconds. The lid remains down for the duration of the cycle and is only lifted when the DishDrawer™ beeps to signal the end of the cycle, or if the customer pauses it to gain access to the tub.

3.4.2 During a Power Failure

If power to the DishDrawer™ fails with the lid down, the tub can still be forced open manually if access is required. It is very difficult however to close the tub again without raising the lid. The lid actuators can be wound up manually with the tub fully removed. Failure to raise the lid before closing the drawer can result in the lid seal being damaged.

3.5 Tub

The tub is the main cavity where all the wash activity occurs. The tub is a polymer plastic receptacle that houses the basket ware that includes adjustable cup racks and basket with fold down tines along with a wash pump and spray arm at the base. The tub also has guide vanes around its walls which direct falling water from the wash cycle in a clockwise direction around the filter plate. This clears the filter plate of food particles and washes them into the sump where they are trapped by the drain filter or pumped out during the drain cycle.



3.6 Filling

3.6.1 Water Inlet

The tub of the DishDrawer™ fills by a single water inlet hose. Hot water connection is recommended for USA and Japanese products, and a cold water connection recommended for the Australasian, UK and European products. From the connection to the water supply tap in the kitchen, the inlet hose enters the cabinet of the dishwasher at the base, onto a dual water valve.

On double models, each tub is supplied water independently via one of the dual valve coils and a fill hose that runs through a customised link assembly at the back of each tub and travels along the base of the tub under the wiring cover to the front. At the front of the tub, the fill hose connects to the water softener (if fitted) then to the detergent dispenser, which directs water into the tub.

Depending on the market and cycle chosen, the product fills through the pre-rinse section of the dispenser for the pre-rinse cycles and secondly through the main wash section for all other cycles.

In a double product, the controller allows only one inlet valve to operate at a time. This has been done to reduce EMC emissions. The top tub has priority. This restriction does not apply in diagnostics mode.

3.6.2 Dispensing Detergent and Rinse-aid

The dispenser is mounted in the front wall of the wash tub.

The detergent dispenser consists of two detergent chambers, one for pre wash and the other for the main wash.

The detergent dispenser door is opened manually for detergent loading and then manually closed ready for the detergent to be transported to the wash tub by the inlet water. To enable each detergent chamber to be dispensed separately, an inlet water diverter valve controlled by the electronics is required.

Additionally, a positive displacement pump unit and storage tank is incorporated within the dispenser to supply rinse aid. The rinse aid dispensed volume can be adjusted by the customer in option adjustment mode. A glowing red light on the tank filler cap indicates an empty rinse aid tank. The pump frequency is 1 Hz, and makes a slight beeping sound.

3.6.3 Amount of Water

The tub fills with approximately 2.5 litres / 0.8 US gallons of water, almost level with the base of the spray arm. Once this level is reached, the wash pump (which has load-sensed the fill via the electronics) becomes primed and pumps the water through the spray arm causing it to rotate. The load on the wash pump is constantly monitored throughout the wash cycle and the water level adjusted if necessary. If the wash pump loses prime, the electronics will top up the water level by opening the fill valve for approximately 5 seconds. It will do this up to 3 times before carrying on regardless.

3.6.4 Flood Protection

A flood sensor mounted on the side of the mains filter housing provides flood protection. If a flood is detected, the drain pump will run and an F1 fault code will be signalled to the customer

3.7 Heating

3.7.1 The Heating Element

The heater plate is a porcelain enamelled steel plate with a thick film resistive circuit printed onto the dry side. A gravity thermal fuse is mounted on the heater plate in series with the heating element. A large dropping resistor is also printed onto the heater plate which forms part of the controllers power supply. The element is clamped in place by a locknut and supports the motor at the base of the tub.

3.7.2 Heating the Water

The heater plate is positioned beneath the filter plate. A flow through water heating system is created during the wash cycle by allowing water to flow through the filter plate, over the surface of the element and into the wash pump.

3.7.3 Maintaining the Temperature

A printed circuit board with a temperature sensitive thermistor is mounted on the heater plate. Sensor components are unserviceable and if they fail a new heater plate is required.

3.7.4 Overheat Protection

The heater plate is only activated during the wash cycles. It is not used for drying. The temperature is monitored by the thermistor. If a failure occurs with the electronic control of the heater plate, overheat protection is effected by the thermal fuse on the heater plate.

The thermal fuse consists of a gravity fuse in series with the water heater track that will melt at a relatively low temperature, 268 – 302°C (514 – 576°F) and disconnect the power to the element. This fuse does not isolate the dropper resistor and so does not remove power from the controller.

3.8 Motor and Heater Plate Locknuts

There are two locknuts holding the heater plate and motor housing assembly into the base of the tub to form a watertight seal. They do this by compressing two seals, one between the heater plate and tub, and the other between the heater plate and the motor assembly.

When reassembling the motor, it is important that a motor shim is placed between the inner locknut and the inner element seal.

The outer locknut has locations that hold the drain hose, fill hose and wiring loom in place.

Another function of the larger outer locknut is to support and clip the wiring cover.

3.9 Drain Cycle

The drain pump is a self-priming centrifugal pump that only pumps when the motor is rotating in the drain direction (anti-clockwise). It has a five bladed impellor pushed into a spline on the lower end of the rotor shaft.

The drain pump housing, which incorporates an inlet and outlet pipe, is welded to the motor housing, hence captivating the motor. The inlet pipe plugs straight into the drain sump in the tub and is sealed there by a small 'O' ring. The outlet pipe has a non-return flap valve to prevent soiled water returning to the tub.

The drain hose is an extruded blow moulded hose that is routed over the link assembly and exits out of the base of the product and is connected to a domestic drain.

The pump speed during the drain cycle is approximately 4200 rpm. In hardware output diagnostics test mode it is set to the same speed to aid diagnosing drain problems.

On a double product, the drain motor on the tub which is not being used will run for a short time during the final drain phase of a wash cycle. This is to remove any drain water that may have back flowed in to the unused tub. This concurrent drain will not happen if the unused tub is open. If the user presses the power button after water has been placed in the tub, the product will initiate a "power off" drain and empty the tub.

3.10 Filter Plate

The filter plate is a stainless steel disk positioned below the dish rack and spray arm and completely encompasses the base of the tub.

3.10.1 The Filter System

The tub has vanes that swirl the water around and over the filter plate. At the front of the tub, located as part of the filter plate, is the drain filter. Large soils collect in the drain filter and only smaller soils flow through its micro-mesh filter, eliminating re-depositing of soil during the wash. The drain filter should be regularly checked and cleaned.

3.10.2 Removing and Cleaning the Drain Filter and Filter Plate

The drain filter can be emptied with the dish rack in place by removing the cutlery basket and opening the plastic section of the dish rack. The filter plate is removable for cleaning by removing the dish rack and spray arm and unlocking the locknut by turning it anti-clockwise. Turning it too far will also release the rotor and may allow it to be lifted out with the filter plate.

3.11 Drying Cycle

Immediately after water from the final hot rinse has been drained from the tub, the drying cycle begins.

The drying fan draws air through the vent in the rear into the tub where it absorbs water from the dish load. The moisture-laden air is then mixed with a larger quantity of ambient air (drawn from the kitchen), to minimise the amount of vapour visible when air is exiting from the bottom of the drawer front.

A flap valve is located in the fan housing. This is closed to prevent moist air from entering the space behind the door panel during the wash, reducing the possibility of damage to the controller and LCD. It opens whenever the fan is running.

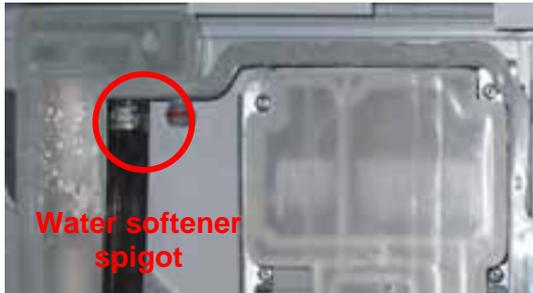
The fan runs continuously during the drying cycle for various times depending on the program selected, and will restart if the tub is opened and closed again. After the wash program is complete (when the appliance beeps and the LCD shows 00), the lid drives up, and the fan continues to run for anything up to 120 minutes depending on the program, but will not restart if the tub is opened or if a button is pressed.

3.12 Water Softener (Where Fitted)

The Water Softener uses a softening material (resin) to prevent most of the elements that cause hard water from being present in the wash water. The resin can only treat a limited amount of water before it needs to be regenerated. Regeneration is achieved by pumping salty water (brine) through the resin, and flushing away the hard elements to the drain. The process of delivering softened water, and regeneration of the resin, is controlled by the electronic controller.

3.12.1 Delivering Softened Water

Supply water arrives from the inlet valve, then through an inline strainer to remove large deposits. The strainer is attached to the water softener by an inlet spigot.



NOTE: The strainer is a replaceable part, and must be replaced if blocked.

In the water softener, the water passes through an air break and a diverter valve. It is then either directed through the resin to the dispenser as softened water, or directly to the dispenser, then into the tub. The electronic controller measures the volume of treated soft water, and adds an appropriate amount of non-treated hard water, to deliver a mix that is at the required hardness according to a pre-determined schedule. Water is treated according to its supply hardness. The customer is able to select one of 5 supply hardness settings in option adjustment mode.

3.12.2 Regeneration

Regeneration is triggered when the amount of water that has been treated since the last regeneration nears the capacity of the water softener. The quantities treatable for each of the five settings of supply hardness have been predetermined, and are stored in the electronic controller. When triggered, immediately after filling for the main wash, the brine pump is activated and delivers a volume of salty water into the resin, at an amount appropriate to the hardness setting. The frequency of the pump is 3 Hz, and makes a slight rattling sound. Later in the wash cycle, the resin is flushed with supply water, and the by-products of regeneration are delivered into the wash water, and drained with it away as waste. During the flush, the fill valve turns on and off alternately for 5 seconds for a number of times depending on the hardness setting. Normal treatment of incoming water then resumes.

3.12.3 Salt

The customer is required to fill the salt tank with dishwashing salt from time to time. Salt is used in the water softener by mixing it with water to produce the salty water (brine) used in regeneration. When the salt level is low, a salt level detector causes a glowing red LED to appear in the salt bung, and a "Salt" symbol appears in the LCD, if one is fitted. When this happens, the customer should remove the salt bung, and using the salt container provided, pour salt into the salt reservoir until salt can be seen at the opening. The "Salt" symbol on the LCD will disappear and the red light will not be visible when the salt tank bung is replaced. In areas where the supply water is moderately hard, 21 dH (degrees of hardness) or 375 parts per million, water softener setting 3) the salt reservoir will need to be filled about once a month, and in harder areas more frequently. Delivery of treated water from one fill of the salt reservoir:

- 240 litres at 30 – 100 ppm from 375 ppm supply water (setting 3)
- 144 litres at 30 – 100 ppm from 625 ppm supply water (setting 5)

4 OPTION ADJUSTMENT MODE

To enter this setup mode, press **POWER**, then hold the **ECO** touch switch and **KEYLOCK** button simultaneously for 5 seconds, ensuring that **ECO** is pushed first. Once the setup mode is entered, a beep is emitted and the LCD displays the letters rA. Pushing the **START/PAUSE** button allows the user to scroll through and change the following options:-

- Rinse Aid Setup (rA).
- Water Supply Hardness Setup (hd) – only available on water softener models.
- Auto Power Option (AP).
- End of Cycle Beeps (EC).
- Closed Drawer Option (Ld).
- Clean/Dirty Dish Symbol (dS).

Note: there is no dry enhancement mode for DD60 / DD24.

Integrated:- On an Integrated DishDrawer™, where there is no display, the user can still tell which option they have chosen by using the lights showing on the integrated badge as follows:-

- Rinse Aid Setup (red LED above Start/Pause button).
- Water Supply Hardness (green LED above Start/Pause button) – only available on water softener models.
- Auto Power Option (orange LED above Start/Pause button).
- End of Cycle Beeps (green LED above Start/Pause button and ECO LED is red).
- Closed Drawer Option (red LED above Start/Pause button and ECO LED is red).
- Clean/Dirty Dish Symbol (no ILEDs above buttons, ECO LED is red).

Note: there is no dry enhancement mode for DD60 / DD24.

Push **POWER** at any time to exit this setup mode.

4.1 Rinse Aid Setup (rA)

The current rinse aid setting is shown using the red LEDs on the touch switch panel.

The amount of rinse aid dispensed into a rinse cycle can be varied to suit the level of hardness of the local water supply. It can be set to 1 - 5 dispensing levels.

(1 = approx 0.5mls ($\frac{1}{10}$ teaspoon) of rinse aid, 5 = approximately 2.5mls ($\frac{1}{2}$ teaspoon) of rinse aid.

Push **KEYLOCK** to advance to the rinse aid setting. Once the desired setting is achieved, push **POWER** to exit. The rinse aid index is stored in EE memory, so even with the power removed the rinse aid level is retained.

4.2 Water Supply Hardness Setup (hd)

The current supply hardness setting is shown using the red LEDs on the touch switch panel. One of five settings should be selected according to the known hardness of the supply water.

DishDrawer Setting	Grains per Gallon (gpg)	Parts per Million (ppm)
No LED	0-6	0-100
1 LED	6-14	100-250
2 LED	14-20	250-350
3 LED	20-26	350-450
4 LED	26-32	450-550
5 LED	32-36	550-625

Note: No LED = Water Softener turned off, continuous bypass of softener

Push **KEYLOCK** to advance to the water softener setting. Once the desired setting has been achieved, push **POWER** to exit.

Selection of a setting affects how the electronic controller diverts supply water, how much water is treated, and how much salt is used in regeneration, in a manner that optimises the performance of the water softener.

Note: On an integrated DishDrawer™, when the user turns on or turns off one of the following options, it is indicated by the red wash cycle LEDs on the secondary control panel. If an option is turned on, then all the LEDs turn on, and if an option is turned off, all the LEDs turn off.

4.3 Auto Power Option (AP)

The automatic power up sequence that occurs when the tub is opened can be turned on or off using the **KEYLOCK** button. If the scrubbing brush symbol is showing on the LCD, then the auto power up sequence will occur when the tub is opened. If the scrubbing brush symbol is not showing, then the DishDrawer™ will not automatically power up when the tub is opened (and the customer will need to push the power button each time they want to use the DishDrawer™). Push **POWER** to exit when the desired setting has been selected.

4.4 End of Cycle Beeps (EC)

The six beeps that occur at the end of every cycle can be turned on or off using the **KEYLOCK** button. If the scrubbing brush symbol is showing on the LCD, then the end of cycle beeps are activated. If the scrubbing brush symbol is not showing, then the end of cycle beeps are deactivated. Push **POWER** to exit when the desired setting has been selected.

4.5 Closed Drawer Option (Ld)

The closed drawer option can be turned on or off using the **KEYLOCK** button. If the scrubbing brush symbol is showing on the LCD, then the closed drawer option is selected and it will keep the DishDrawer™ locked at all times by bringing the lid down when the drawer is closed. When this mode is selected, the customer needs to push the power button to lift the lid whenever they want to open the drawer. When they close the drawer again the lid comes down automatically after 30 seconds and locks the tub closed. If the scrubbing brush symbol is not showing, then the closed drawer option is deactivated. Push **POWER** to exit when the desired setting has been selected.

4.6 Clean/Dirty Dish Symbol (dS)

(Only displayed on prefinished models with LCD)

The clean/dirty dish symbol can be turned on or off using the **KEYLOCK** button. If the scrubbing brush symbol is showing on the LCD, then the clean/dirty dish option is selected. This means the clean/dirty dishes symbol will remain in the LCD display at the end of the cycle until the power button is pressed to clear it. If the scrubbing brush symbol is not showing, then the clean/dirty dish symbol will disappear when the drawer is first opened at the end of a cycle. Push **POWER** to exit when the desired setting has been selected.

4.6.1 Option Adjustment Quick Reference Charts

Rinse Aid Setting (rA):

(Alters the amount of rinse aid dispensed.)

Press and hold **ECO**, then press **KEYLOCK** for 5 seconds.

rA will be displayed (integrated: Red LED above start/pause button showing).

Press **KEYLOCK**.

The rinse aid setting will advance on the secondary control panel LEDs with each press.

Press **POWER** to exit and save selected setting.

Water Softener Supply Hardness Setup (Hd) (where a water softener is fitted):

(Alters the water softener setting depending on water supply hardness.)

Press and hold **ECO**, then press **KEYLOCK** for 5 seconds.

rA will be displayed.

Press **START/PAUSE** once.

Hd will be displayed (integrated: Green LED above start/pause button showing).

Press **KEYLOCK**.

The water softener setting will advance on the secondary control panel LED's with each press.

Press **POWER** to exit and save selected settings.

Auto Power Option (AP):

(Powers up automatically when the drawer is opened.)

Press and hold **ECO**, then press **KEYLOCK** for 5 seconds.

rA will be displayed.

Press **START/PAUSE** twice.

AP will be displayed (integrated: Orange LED above start/pause button showing).

Press **KEYLOCK**.

Turns auto power on and off. Scrubbing brush or secondary control panel LEDs showing = AP on. Scrubbing brush or secondary control panel LEDs not showing = AP off.

Press **POWER** to exit and save selected setting.

End of Cycle Beeps (EC):

(Six beeps at the end of every cycle.)

Press and hold **ECO**, then press **KEYLOCK** for 5 seconds.

rA will be displayed.

Press **START/PAUSE** three times.

EC will be displayed (integrated: Green LED above start/pause button, and ECO light is red).

Press **KEYLOCK**.

Turns end of cycle beeps on and off. Scrubbing brush or secondary control panel LEDs showing = EC on. Scrubbing brush or secondary control panel LEDs not showing = EC off.

Press **POWER** to exit and save selected setting.

Closed Drawer Option (Ld):

(Lid closes automatically every time the drawer is closed.)

Press and hold **ECO**, then press **KEYLOCK** for 5 seconds.

rA will be displayed.

Press **START/PAUSE** four times.

Ld will be displayed (integrated: Red LEDs above start/pause button and ECO light is red).

Press **KEYLOCK**.

Turns closed drawer option on and off. Scrubbing brush or secondary control panel LEDs showing = Ld on. Scrubbing brush or secondary control panel LEDs not showing = Ld off.

Press **POWER** to exit and save selected setting.

Clean/Dirty Dish Option (dS):

(Clean dishes symbol stays on at end of cycle until cleared by pressing power.)

Press and hold **ECO**, then press **KEYLOCK** for 5 seconds.

rA will be displayed.

Press **START/PAUSE** five times.

dS will be displayed (on integrated models, no light above buttons and ECO light is red).

Press **KEYLOCK**.

Turns clean/dirty dish option on and off. Scrubbing brush showing, or secondary control panel LEDs showing = dS on. Scrubbing brush or secondary control panel LEDs not showing = dS off.

Press **POWER** to exit and save selected setting.

5 DIAGNOSTICS

5.1 DishDrawer™ Diagnostics

DishDrawer™ diagnostics can only be entered in Power Off mode, i.e. when there is no display on the LCD, or the badge LEDs are off.

Note: If the product has been powered off at the wall due to a fault code error, once power is turned back on wait 30 seconds before trying to enter diagnostics, as the product will be doing a self check in this time, and will not allow diagnostics to be entered.

Diagnostics are entered by holding the **KEYLOCK** and **START/PAUSE** buttons simultaneously for 5 seconds. Ensure that **KEYLOCK** is pushed first.

There are currently four levels of diagnostics. To move to the next level, press **POWER**. To enter a level, press **START/PAUSE**. Once a level has been entered, pressing **POWER** will exit diagnostics completely. If no level is entered, then the display will cycle through the four levels and exit after the last. On entering diagnostics mode, the first level is the display/download mode.

5.1.1 Optical LED Download / Fault Display

In this mode all LEDs and LCD segments (except keylock) are illuminated.

An infrared optical data download is available here to download all EE data to a PC or Palm PC via the lower tub-home sensor light pipe. Hold the reader pen over the lower tub-home sensor light pipe and press **START/PAUSE** to initiate the download. A short beep indicates the start and finish of download.

The PC or Palm PC uses Smart Tool software (available on CBW) to view the fault log and usage history data.

A wash log for the Phase 6 DishDrawer™ is available in Smart Tool. Progress of the current wash program is logged to EE after each wash command completes. This log is reset when a new wash program starts.

Item	Description
Wash program	Current or most recent wash program (number as for fault log)
Wash command	Current or most recent wash command (as for fault log)
Fill time	Length (seconds) of longest fill time
Longest fill	Number of the longest fill during this program
Drain time	Length (seconds) of longest drain time
Longest drain	Number of longest drain during this program
Maximum temperature	Highest temperature reached during this program
Time to temperature	Time taken to reach highest temperature from start of maximum temperature wash
Maximum temperature wash	Number of wash command which reached highest temperature
Water softener capacity	Litres of water that can be softened before regeneration required
Water softener hardness	Hardness index set by user
Rinse aid setting	Rinse aid index set by user
U3 retries	Number of U3 retries during this program

The last two faults are displayed on the LCD (secondary control panel LEDs for integrated models) during the optical download. The current fault code is displayed first followed by the previous fault code. To read the fault code on the secondary display for integrated products, refer to Section 6.1 on fault codes.

5.1.2 Clearing Fault Logs

While in diagnostic mode, to clear the current fault code press the **KEYLOCK** button until a beep is sounded. This action moves the current fault into the previous fault while clearing the current fault. To clear the previous fault code, press **KEYLOCK** once more until the beep is sounded.

Warning: Once a fault code has been cleared, it is permanently removed from memory and cannot be recovered.

Press **POWER** to advance to the next level.

5.1.3 Hardware Output Diagnostic Test Mode

This level tests all the hardware outputs and inputs. The LCD display shows **HO**.

Press **POWER** to skip hardware diagnostics and advance to the next level.

Press **START/PAUSE** to enter hardware diagnostics.

Once hardware diagnostics has been entered, letters in the LCD display indicate the current hardware output being tested. For integrated models, the LEDs on the touch switch panel indicate the hardware output being tested, using binary encoding, as shown in the table below.

Different combinations of outputs can be switched on or off together, but the controller will prevent higher current drawing components such as the wash pump and the lid motors being turned on together.

Press **START/PAUSE** to advance to the next hardware output.

Press **KEYLOCK** to turn the currently displayed output on or off. If the scrubbing brush symbol (green LED above start/pause button on integrated models) is displayed, then that output has been switched on, and if it is not displayed then that output is off.

Press **POWER** to exit at any time (all outputs will be switched off on exit).

The LCD display and touch switch panel LEDs are illuminated to correspond to a particular hardware device. The following table details the display order of the test.

LCD	LEDs On				Hardware Output
	Norm	Fast	Deli	Rinse	
bL	Off	Off	Off	<u>On</u>	Backlight.
Er	Off	Off	<u>On</u>	Off	Element relay (turns off after 5 seconds).
Ld	Off	Off	<u>On</u>	<u>On</u>	Lid motors (will run for 10 seconds).
dd	Off	<u>On</u>	Off	Off	Detergent diverter valve.
FU	Off	<u>On</u>	Off	<u>On</u>	Fill water valve.
P1	Off	<u>On</u>	<u>On</u>	Off	Motor wash direction 2300-2850 rpm (will not run if the tub is open).
P2	Off	<u>On</u>	<u>On</u>	<u>On</u>	Motor drain direction 4200 rpm (times out after 255 seconds).
rd	<u>On</u>	Off	Off	Off	Rinse aid dispenser (dispenses according to current user setting).
dF	<u>On</u>	Off	Off	<u>On</u>	Drying fan.
LE	<u>On</u>	Off	<u>On</u>	Off	Rinse aid and salt tank LEDs.
C1	<u>On</u>	Off	<u>On</u>	<u>On</u>	Water softener diverter valve.
C2	<u>On</u>	<u>On</u>	Off	Off	Water softener brine pump.
C3	<u>On</u>	<u>On</u>	Off	<u>On</u>	Water softener brine valve.
°C	<u>On</u>	<u>On</u>	<u>On</u>	Off	Displays current water temperature.
°E	<u>On</u>	<u>On</u>	<u>On</u>	<u>On</u>	Displays controller rail voltage.

(C3 is used in the factory to empty the water softener before the product is packed.)

WARNING: Take care when running individual components not to overload them. It is advisable to place some water in the tub before turning the element on.

NB: No fault codes will come up while in diagnostics mode.

Tub Home Sensor Test: At any time during HO test mode, the Keylock symbol on the LCD display (Keylock LED on integrated badge) indicates the tub position. On = closed, off = open.

5.1.4 Fast Test Cycle

WARNING : Only run this cycle if connected to the water supply. This level runs an 8-minute fast test cycle.

Press **POWER** to skip fast test cycle and advance to the next level. Press **START/PAUSE** to enter fast test cycle.

Once the fast test cycle is selected, the DishDrawer™ goes into standby mode and 8 minutes will be showing on the display. The test cycle is started by pressing **START/PAUSE**, and the following components are run during the 8 minute cycle that follows: - Lid motors, fill valve, wash motor, element, drain motor, drying fan.

Press **POWER** to exit at any time.

The test sequence in fast cycle mode performs 33 tests. The number of any failed test is displayed on the touch switch panel LEDs. The test sequence continues even if a test fails. If there are multiple failures the LEDs will change during the test.

LED Display H N F D R E	Test ID	Test Description / Probable Cause
0 0 0 0 0 X	1	Uncontrolled load on PSU (PSU volts < 30 with PSU on and no devices turned on)
0 0 0 0 X 0	2	Unrealistic zero crossing time, mains frequency non standard
0 0 0 0 X X	3	Uncontrolled load on PSU (volts dropped when PSU turned off and no devices on)
	4	Unused
0 0 0 X 0 X	5	Detergent diverter not connected
0 0 0 X X 0		Fill valve not connected
0 0 0 X X X		Water softener bypass valve not connected
0 0 X 0 0 0		Rinse Aid pump not connected
0 0 X 0 0 X		Water softener brine pump not connected
0 0 X 0 X 0		Fan not connected
0 0 X 0 X X	11	Detergent diverter solenoid low resistance (shorted?)
0 0 X X 0 0		Fill valve solenoid low resistance (shorted?)
0 0 X X 0 X		Water softener bypass valve solenoid low resistance (shorted?)
0 0 X X X 0		Rinse Aid pump solenoid low resistance (shorted?)
0 0 X X X X		Water softener brine pump solenoid low resistance (shorted?)
0 X 0 0 0 0	16	Fan low resistance (shorted?)
0 X 0 0 0 X	17	Lid motor 1 no current (not connected?) in down direction
0 X 0 0 X 0		Lid motor 1 no current (not connected?) in up direction
0 X 0 0 X X		Lid motor 2 no current (not connected?) in down direction
0 X 0 X 0 0		Lid motor 2 no current (not connected?) in up direction
0 X 0 X 0 X	21	Lid motor 1 excessive current in down direction
0 X 0 X X 0		Lid motor 1 excessive current in up direction
0 X 0 X X X		Lid motor 2 excessive current in down direction
0 X X 0 0 0	24	Lid motor 2 excessive current in up direction
	25-29	Unused
0 X X X X 0	30	Motor FET A phase high side "shorted"
0 X X X X X		Motor FET B phase high side "shorted"
X 0 0 0 0 0		Motor FET C phase high side "shorted"
X 0 0 0 0 X		Motor FET A phase low side "shorted"
X 0 0 0 X 0		Motor FET B phase low side "shorted"
X 0 0 0 X X	35	Motor FET C phase low side "shorted"
X 0 0 X 0 0	36	Motor phases AB no current (not connected?)
X 0 0 X 0 X		Motor phases BC no current (not connected?)
X 0 0 X X 0	38	Motor phases CA no current (not connected?)
X 0 0 X X X	39	Motor phases AB current excessive (shorted winding?)
X 0 X 0 0 0		Motor phases BC current excessive (shorted winding?)
X 0 X 0 0 X	41	Motor phases CA current excessive (shorted winding?)

5.1.5 Continuous Cycle Test Mode

In this level the DishDrawer™ can be run continuously in any wash cycle. Once the cycle has finished, the DishDrawer™ automatically restarts the same wash cycle.

Press **POWER** to skip continuous cycle. As this is the last level, doing this will exit diagnostics. Press **START/PAUSE** to enter continuous cycle.

Once selected, the LCD segments turn on and off to indicate the DishDrawer™ is in continuous cycle and the cycle starts straight away (for integrated models the LED above the start/pause button will be orange instead of green to indicate the DishDrawer™ is running in continuous cycle). It will run the last cycle that had been selected prior to going into diagnostics mode.

If it is wished to run a different cycle, it will be necessary to exit diagnostics, turn the DishDrawer™ on as normal, and select the cycle required. Then turn the DishDrawer™ off again, re-enter diagnostics and restart the continuous cycle mode as above.

Press **POWER** to exit at any time.

5.1.6 Cycle Count Retrieval

(Not available on integrated or flat door models.)

To display the cycle count on the LCD screen, pause the DishDrawer™ while running a continuous cycle. The two bytes of the cycle count will be displayed alternately.

To calculate the total DishDrawer™ cycle count, use the formula below.

Cycle Count = Low byte + (200 x High byte).

The first byte displayed is the low byte

E.g. Low byte = 156
 High byte = 2
 Cycle count = 156 + (200 x 2) = 556.

Note: the cycle count can also be retrieved in optical download mode (refer to Section 5.1.1).

5.1.7 Temperature & Voltage Display Mode

(Not available on integrated or flat door models.)

During a wash cycle, the current water temperature or the power supply rail voltage of the controller can be displayed on the LCD instead of the time remaining. To enter temperature/voltage display mode, start a wash cycle as normal. Initiate a keylock by pressing and holding the **KEYLOCK** button for 4 seconds.

Once in keylock mode, press and hold **START/PAUSE** for 8 seconds to enter temperature display mode. The display now alternates between a °C symbol and the water temperature. Pressing **START/PAUSE** again changes the display to alternate between an °E symbol and the power supply rail voltage of the controller.

To cancel temperature/voltage display mode, press the **POWER** button.

5.1.8 Show Off / Showroom Wash Mode

This mode initiates a shop show off display and wash operation demonstration.

With the DishDrawer™ powered up and turned on, the show off mode is entered by pressing and holding the **ECO** and **POWER** buttons simultaneously for 5 seconds. Ensure that **ECO** is pressed first.

The DishDrawer™ is now in the show off mode and cycles through all of the LED & LCD segments.

Pressing the **POWER** button now puts the DishDrawer™ into the showroom wash mode. Before running this mode, the tub should be filled with water until it is almost touching the underside of the spray arm. The showroom wash is started by pushing the **START/PAUSE** button whereby the following cycle is run:

- The lid is pulled down.
- The wash motor starts and runs for 4 minutes.
- The wash motor stops.
- The lid is lifted.
- The display counts down to zero throughout this cycle.
- The DishDrawer™ turns off at the end of this cycle.

The DishDrawer™ is still in the showroom wash mode however, and it can be re-run by pushing **POWER** and then **START/PAUSE**. Once show off/showroom wash mode has been initiated, the mains power supply must be removed to exit out.

Playing Tunes

Once in showroom mode, holding the **START/PAUSE** button down for 3 seconds will start a tune playing. Pressing the **START/PAUSE** button again will toggle the tune between Bach and the Star Spangled Banner. This feature is not widely known about, may not be present in all models and may be removed in future products.

5.2 Diagnostics Quick Reference Charts

5.2.1 Fault Display/Download Mode

Press and hold **KEYLOCK**, then press **START/PAUSE** for 5 seconds.
 All LEDs & LCD segments except Keylock are illuminated.
 Press **START / PAUSE**.
 This initiates a pen data download via the lower tub-home light pipe. At the same time, the current and then the previous fault code will be displayed in the LCD screen and on the secondary control panel LEDs. To read the fault code on the secondary display, refer to Section 6.1 on fault codes.
 Press **KEYLOCK**.
 This will clear the current fault code. Note: If Keylock is pressed again, the previous fault code will be removed. Pressing Keylock also toggles the wash icons on the LCD on and off.
 Press **POWER** to exit.

5.2.2 Hardware Output Test Mode

Press and hold **KEYLOCK**, then press **START/PAUSE** for 5 seconds.
 All LEDs & LCD segments except Keylock are illuminated.
 Press **POWER** once.
 HO will show in the display (integrated: Heavy, Normal, Fast, Delicate, Rinse LEDs showing).
 Press **START/PAUSE**.
 Scroll through the following outputs using Start/Pause. Turn the outputs on and off using the **KEYLOCK** button.
 Press **POWER** to exit.
Note: Scrubbing brush symbol = output on. No scrubbing brush symbol = output off (on integrated models a green LED above the start/pause button is used in place of the scrubbing brush).

LCD Display	Norm LED	Fast LED	Deli LED	Rinse LED	Hardware Output
bL	Off	Off	Off	<u>On</u>	Backlight
Er	Off	Off	<u>On</u>	Off	Element Relay on for only 5 seconds
Ld	Off	Off	<u>On</u>	<u>On</u>	Lid Motors (will run for 10 seconds)
dd	Off	<u>On</u>	Off	Off	Detergent Diverter Valve
FU	Off	<u>On</u>	Off	<u>On</u>	Fill Water Valve
P1	Off	<u>On</u>	<u>On</u>	Off	Motor Wash direction (2300-2850 rpm) only if tub closed
P2	Off	<u>On</u>	<u>On</u>	<u>On</u>	Motor Drain direction (5000 rpm) only for 255 seconds
rd	<u>On</u>	Off	Off	Off	Rinse Aid Dispenser (dispenses current setting)
dF	<u>On</u>	Off	Off	<u>On</u>	Drying fan
LE	<u>On</u>	Off	<u>On</u>	Off	Rinse Aid and Water Softener LEDs
C1	<u>On</u>	Off	<u>On</u>	<u>On</u>	Water Softener Diverter Valve
C2	<u>On</u>	<u>On</u>	Off	Off	Water Softener Brine Pump
C3	<u>On</u>	<u>On</u>	Off	<u>On</u>	Water Softener Brine Valve
°C	<u>On</u>	<u>On</u>	<u>On</u>	Off	Displays current water temperature.
°E	<u>On</u>	<u>On</u>	<u>On</u>	<u>On</u>	Displays controller rail voltage

Tub Home Sensor test: - keylock symbol on = tub closed, off = tub open

5.2.3 Fast Test Cycle

Press and hold **KEYLOCK**, then press **START/PAUSE** for 5 seconds.
All LEDs & LCD segments except Keylock are illuminated.
Press **POWER** twice.
FC will show in the display (integrated: Heavy, Normal, Delicate, Rinse LEDs showing).
Press **START/PAUSE** twice.
The 8 minute fast test cycle will start.
Press **POWER** to exit.

5.2.4 Continuous Cycle

Press and hold **KEYLOCK**, then press **START/PAUSE** for 5 seconds.
All LEDs & LCD segments except Keylock are illuminated.
Press **POWER** three times.
CC will show in the display (integrated: Heavy, Normal, Rinse LEDs showing).
Press **START/PAUSE**.
The last cycle that had been selected prior to going into diagnostics mode will be run continuously.
Press **POWER** to exit.

5.2.5 Temperature & Voltage Display Mode

(Not available on integrated or flat door models.)

Start a wash cycle running.
Press & hold **KEYLOCK** for 4 seconds.
Keylock will be activated.
Press & hold **START/PAUSE** for 8 Seconds.
LCD will now alternate between °C symbol and the water temperature.
Press **START/PAUSE**
LCD will now alternate between °E symbol and the controller's rail voltage.
Press & hold **KEYLOCK** for 4 seconds.
Keylock is deactivated.
Press **POWER** to exit.

6 FAULT CODES AND POOR PERFORMANCE

Faults are displayed on the LCD (not fitted on integrated or flat door models) and on the touch switch panel.

There are nine F (fatal) faults, which are displayed along with a spanner in the LCD (if fitted). An F fault will usually require the assistance of a qualified service person.

In addition, there are 3 U (user) faults.

U1 is displayed on the LCD as a “no tap” symbol. The customer can usually rectify a U1 fault.

U3 fault is not displayed to the customer, but is recorded in the fault history and displayed on the Smart Tool. It is logged if the motor senses primes in less than 20 seconds because water was left in the tub from a previous fill, or because it has filled too quickly. The product will drain and refill up to 5 times before logging the fault and continuing on with the cycle.

A U4 fault indicates an F fault with the other tub that has disabled the power supply.

In the integrated and flat door models, where an LCD is not available, the presence of a fault is indicated by a red centre (Start/Pause) LED on the badge, with the fault number indicated by the red LEDs on the touch switch panel.

Once a fault is repaired, it can be cleared by pressing the **POWER** button. If the fault is still present, then it will not clear.

A fatal or user fault is accompanied by a continuous pulsating beep, which can be turned off by pressing the **POWER**, **START/PAUSE**, or **KEYLOCK** buttons. This also stops the drain pump running for an F1 fault.

The last two faults are logged into EE memory.

If a tub is forced open, the product simply pauses as if someone had pressed the start/pause button.

Except for U4, F1, F3, F8 and F9, the other tub can still be used on a double product.

Once the fault has been cleared for an F3, F8 or F9 fault, the power needs to be disconnected and reconnected to reset the isolation relay before the product can be used again.

6.1 Fault Code Description Chart

The following chart is a quick reference guide for fault codes. To read a fault code on an integrated model, refer to the LED Display column on the chart. The LED that has activated on the secondary display indicates which fault code has occurred. To make diagnostics easier, a test handle can be made for use on integrated products using a cut down handle and a DD60/DD24 PCB LCD. This will not be able to be used on DD603 products, or a DD603 test handle used on DD605/DD60/DD24 products.

Fault Code	LED Display	Fault	Possible Causes
F1	Rinse LED.	The bottom controller flood sensor detector has been activated for more than six seconds.	<ul style="list-style-type: none"> • Lid not closing. • Overfilling. • Foaming. • Not draining. • Lid seal damaged. • Dispenser or water softener or their seals leaking. • Damaged water inlet or drain hoses. • Leaking heater plate or motor seals, or drain o-ring seals. • Yoke jammed or broken. • Inlet hose to inlet valve connection loose. • Inlet valve body leak. • Heater plate damage (chipped enamel). • Dry F1 – PCB mains filter, harness or connectors, electronic controller.
F2	Delicate LED.	The controller has not sensed the motor rotating.	<ul style="list-style-type: none"> • Foreign object has jammed the rotor. • The rotor has failed. • Hall sensor connector or wiring fault at hall sensor or controller. • The hall sensor has failed. • Motor stator winding or connection open circuit. • The electronic controller has failed. • PCB mains filter has failed.
F3	Delicate and Rinse LEDs.	The water temperature has been sensed as greater than 85°C (185°F).	<ul style="list-style-type: none"> • The incoming water is greater than 85°C (185°F). • The element has failed closed circuit. • The temperature sensor on the heater plate has failed. • The electronic controller has failed.
F4	Fast LED.	No temperature increase has been sensed for about 4 hours while the element is on.	<ul style="list-style-type: none"> • The element is not connected. • The element has failed open circuit. • The temperature sensor has failed. • The electronic controller has failed.
F5	Fast and Rinse LEDs.	Lid motor current too high during start.	<ul style="list-style-type: none"> • Lid jammed up or down. • The electronic controller has failed.

Fault Code	LED Display	Fault	Possible Causes
F6	Fast and Delicate LEDs.	Lid motors ran but did not reach stall current.	<ul style="list-style-type: none"> • Lid actuator off yoke or slide. • Yoke off lid. • Faulty lid actuator.
F7	Fast, Delicate and Rinse LEDs.	No lid motor current detected.	<ul style="list-style-type: none"> • Lid actuator not connected. • PCB mains filter and controller connectors. • Faulty PCB mains filter. • Faulty electronic controller.
F8	Normal LED.	Earth leakage fault.	<ul style="list-style-type: none"> • Test for earth leakage. • Connectors and earth connections fitted correctly. • Damaged harnesses. • Water damaged harness, connector, or controller.
F9	Normal and Rinse LEDs.	Power supply / controller fault	<ul style="list-style-type: none"> • Caused by F3, F8 or F9 faults. • Check coils and motor windings. • Check lid actuators. • Check controller for signs of damage. • Check PCB mains filter and controller connectors. • Check heater plate, harness and connectors. • Replace electronic controller. • Replace PCB mains filter.
U1	Heavy and Rinse LED.	Machine has failed to prime with water within approximately 3 minutes.	<ul style="list-style-type: none"> • The water supply is not turned on. • Low water pressure. • Blocked water softener if fitted. • The inlet valve has failed. • The machine is siphoning. • The spray arm is not in place, or the flapper is jammed. • Excessive foaming - using tablets (not EU/GB), liquid detergent or spilled rinse aid. • The motor has failed. • Rotor not fitted correctly or faulty. • The electronic controller has failed.
U3	Not displayed to customer.	Water filled too quickly, or tub failed to drain.	<ul style="list-style-type: none"> • Not draining completely from previous fill. • Excess water pressure. • Faulty fill valve.
U4	Heavy and Fast LEDs.	Advisory only – the other tub has a fault and has disabled the power supply.	<ul style="list-style-type: none"> • Diagnose and repair the fault in the other tub.

6.2 Fault Code Problem Solving Charts

The following charts can be used as a guide to help locate faults in a DishDrawer™.

F1 Flood detected

The bottom controller flood detector circuit has been activated.

The product will abort the wash program, log the fault, start the drain pump, and report to the user.

Neither tub can be used until the fault is cleared.

PRIMARY ACTION

- Determine if a flood actually occurred? Is there water in the base of the machine?

SECONDARY ACTION

If water in base.

- Determine where the water has come from, check the following:
Check for the lid not closing (lid actuators), overfilling (spray arm correctly fitted and flapper shutting off, rotor correctly fitted) or foaming (rinse aid spill or wrong detergent (liquid or tablets) used, not draining (rotor or motor housing damaged, drain hose blocked / crushed), lid seal damaged, dispenser or water softener seals leaking, damaged fill or drain hoses, tub leaking around heater plate or motor seals, drain hose o-ring at connection to motor, yoke pegs broken or yoke jammed at front or rear, oversize dishes, inlet hose connection to water inlet valve leak (washer not fitted, connection not tight) water inlet valve not shutting off.
- Mop up water in the chassis base before attempting to restart.

TERTIARY ACTION

If no water in base

- Check the chassis harness connection to the PCB mains filter.
- Check for corrosion/dirt around the flood sensor on the side of the mains filter housing.
- Replace the PCB mains filter.

F2 Motor not rotating

The controller has not sensed the motor rotating.

The product will pause the wash program, log the fault, and report to the user.

PRIMARY ACTION

- Check the rotor is free to turn.
- Check that power is available at controller (e.g. do the lid actuators run in diagnostics).

SECONDARY ACTION

- Check whether the rotor is not moving or is vibrating in diagnostics.
- If vibrating, check the hall sensor is properly fitted, check that the motor stator connections are OK. If not moving, check the connections at the controller and the motor.
- Check the resistance of the motor windings.

TERTIARY ACTION

- Check if a replacement hall sensor solves problem.
- Check if a replacement controller solves problem.
- Check if a replacement PCB mains filter solves problem.

F3 Water temperature measurement exceeds 85 degrees Celsius

The water temperature is sensed at greater than 85 degrees C / 185 degrees F.

The product will abort the wash program, log the fault, report to the user, and disable the power supply.

Note: The isolation relay will be disabled. Power to the product will need to be disconnected then reconnected for it to become fully functional again.

PRIMARY ACTION

- Check the incoming water temperature is not too hot.
- Check the temperature reading in diagnostics, and if 199, ensure the power connector is properly fitted to the controller and the connector on the heater plate is correctly fitted.

SECONDARY ACTION

- Check the resistance between pins 1 and 2 of the controller power connector is about 10K at approximately 25°C / 77°F ambient room temperature.
- If not (provided the harnesses are ok and the connectors are correctly fitted), replace the heater plate (bad temperature sensor).

TERTIARY ACTION

- Check that the temperature reading in diagnostics is the same as the temperature of the water in the tub. If the tub water temperature is obviously below 85°C / 185°F, replace the controller.

F4 Element has been on too long (about 4 hours) and water has not reached required temperature

The element has been on too long (about 3 hours) and the water has not reached the required temperature.

The product will abort the wash program, log the fault and report to the user.

PRIMARY ACTION

- Check that the controller power connector and the heater plate connectors are properly fitted and the harness is not damaged.
- Check the resistance between pins 1 and 2 of heater plate PCB, and if open circuit, replace the heater plate.

SECONDARY ACTION

- Check the resistance between pins 1 and 2 of the controller power connector is about 10K at approximately 25°C / 77°C ambient room temperature.
- If not (provided the harnesses are OK and the connectors are correctly fitted), replace the heater plate (bad temperature sensor).

TERTIARY ACTION

- Replace the controller.

F5 Lid motor current(s) too high during start

Lid actuator is jammed up or down.

The product will abort the wash program, log the fault and report to the user.

PRIMARY ACTION

- Check for dishes, cutlery or cups and glasses preventing lid from closing.
- Check the lid actuators in diagnostics.
- Check the yokes are moving freely and are not jammed at the front or the rear (physical inspection).

SECONDARY ACTION

- Replace the lid actuators.

TERTIARY ACTION

- Replace the controller.

F6 Lid motors ran but did not reach stall current

Lid actuators ran but did not reach stall current.

The product will pause the wash program, log the fault and report to the user.

PRIMARY ACTION

- Check that the lid actuators are properly connected to the yokes and the slide mounting bracket.
- Check that the yokes are clipped into the lid.
- Run the lid actuators in diagnostics.

SECONDARY ACTION

- Replace the lid actuators.
- Replace the controller.

F7 No lid motor current detected

No lid actuator current detected.

The product will abort the wash program, log the fault and report to the user.

PRIMARY ACTION

- Check that the lid actuator connectors are properly fitted.

SECONDARY ACTION

- Check that the controller is receiving power (use diagnostics to run the wash or drain pump).
- If not, check the harnesses.

TERTIARY ACTION

- Replace the PCB mains filter.
- Replace the controller.

F8 Earth leakage fault

Earth leakage fault.

The product will disable the power supply, log the fault, lock out the user and report to the user.

Note: The isolation relay will be disabled. Power to the product will need to be disconnected then reconnected for it to become fully functional again.

PRIMARY ACTION

- Test for earth leakage (using a Megger).

SECONDARY ACTION

- Check that the connectors are properly fitted and earthing (grounding) connectors are fitted.

TERTIARY ACTION

- Check for physically damaged harnesses.
- Check for water damage to the harnesses, connectors, PCB mains filter and controllers.
- Check the heater plate tracks for water, damage.

F9 Power supply/controller fault

Power supply/controller fault.

The product will disable power supply, log the fault, lock out the user and report to the user.

Note: The isolation relay will be disabled. Power to the product will need to be disconnected then reconnected for it to become fully functional again.

Once powered up, wait 30 seconds before trying to enter diagnostics, as product will be doing a self check.

PRIMARY ACTION

- Check the previous fault in diagnostics, and if it was F3, F8, then this F9 is a consequential fault - fix the previous fault.
- Check dropper resistor on the heater plate that it is intact, measure between pins 4-5 on the "POWER" connector (P101) replace heater plate if open circuit. plate (refer to Section 8.18).
- Check wiring harness connections at controller, check harness isn't too short and has pulled contact away from P205 or P101 connector on controller (refer to Section 8.1).
- Check the lid actuators resistance and that they are properly connected (refer to Section 8.1).
- Check the controller for damage, signs of overheating or fluid leaking.
- Check the drying fan - Polarity sensitive, meter +ve to red wire, -ve to black wire, (around 2-3 MΩ). Check fan torque by running in diagnostics and check fan torque by trying to stop with your finger, fan normally draws 120 mA, if faulty can draw up to 160 mA, If able to stop fan easily with no torque from fan, and fan will not restart, replace fan assembly **and** fit new controller, as a faulty fan will have damaged the controller.
- If the fault occurred immediately after power on and you are unable to enter the diagnostics after the 30 second time frame, check **all** solenoid coils, lid actuators, heater plate, motor stator windings for damage, overheating and correct resistances. Check drying fan resistance, which will only show a dead short (a damaged fan may show correct resistance) for 120V products the fan may give off a burnt smell if faulty. Replace controller but leave fan connector unplugged, power product back on and check all components, if everything operates correctly and no F9 fault is showing, could be a possible fan related fault, replace fan assembly.
- Check the PCB mains filter for dry joints
- If all components, coils, heater plate and fan are OK, **only then** replace the controller.

SECONDARY ACTION

Important Check that the solenoid coils, fan and motor winding resistances are OK **before** replacing a controller.

- If the fault is on the top controller and the bottom controller works, check the top controller chassis and power harnesses are properly connected, are not damaged and no wires are loose (controller may not be receiving power from bottom tub).
- If OK, replace the top controller.
- If the fault is on the top controller and the bottom controller does not work, check the chassis connector on the bottom controller is properly fitted and the harness is not damaged. Check the connectors on PCB mains filter is properly fitted.
- Check the heater plate harnesses are properly connected / undamaged.
- If still not OK, replace the bottom controller.

TERTIARY ACTION

- If a single product, and harnesses and resistances are OK, replace the controller. If replacing the controller does not fix the fault, replace the PCB mains filter.

U1 (“No Tap” symbol) - Wash pump has not primed.

The fill valve has been open for more than 180 seconds and the wash pump has not primed. The product will pause the wash program, log the fault, report to the user, and restart when the start/pause button is pressed.

PRIMARY ACTION

No water in the tub:

- Check that the tap is turned on.
- Check for kinked inlet hose, blocked inlet hose filter.
- Check harness connections to water inlet valve.
- Check for a blocked pipe interrupter in the water softener (if fitted).

Not enough water in the tub:

- Is the water pressure sufficient (above 30kPa or 4.3psi)?

Too much water in the tub:

- Is the spray arm correctly fitted?
- Is the spray arm flapper shutting off?
- Is the rotor correctly fitted?
- Check for foaming - spilled rinse aid or wrong detergent (liquid detergent, or tablets).

SECONDARY ACTION

- Check the rotor wash (top) impellor is not loose on the shaft.
- Check the fill valve operation (using diagnostics).
- Check the motor operation (using diagnostics).

U3 Filled too quickly or failed to drain

This fault is not displayed to the customer, but it is recorded in the fault history and can be seen by Smart Tool.

If the motor senses prime too soon (in less than 20 seconds), it will drain and refill up to 5 times, then continue the wash program regardless, and log the fault.

PRIMARY ACTION

- Not draining completely from previous fill, test in diagnostics.
- Check for:
 - A blocked drain or kinked drain hoses.
 - Blocked drain sump inlet / outlet pipes.
 - Blocked drain filter.
 - Faulty rotor.
 - Faulty connection to the motor.
 - Faulty hall sensor.

SECONDARY ACTION

Filling too quickly. Check for:

- Excess water pressure.
- Faulty water inlet valve.

U4 This fault is advisory only. The other tub has a fault and has disabled the power supply.

This fault is advisory only. The other tub has disabled the power supply.

PRIMARY ACTION

- Diagnose and repair the fault displayed on the other tub.

6.3 Poor Dry Performance

Poor Dry Performance			
	Question	Yes	No
1	Is the customer complaining of plastic items not drying?	Advise customer that due to plastics having a low thermal mass, these items give inherently bad drying performance.	Go to Question 2.
2	Is the customer using rinse aid?	Go to Question 3,	Advise customer that the use of rinse aid will improve dry performance.
3	Is the customer using Fast or Eco cycles?	Advise customer that due to lower final rinse temperatures, dry performance is comprised when using Fast and Eco cycles (there is less residual heat for drying at the end of cycle).	Go to Question 4.
4	Is the rinse aid setting high enough for the water hardness in the area?	Go to Question 5.	Turn the rinse aid up to a higher setting.
5	Using diagnostics, test the rinse aid dispenser. Is it dispensing the correct amount of rinse aid?		Replace dispenser.

6.4 Poor Wash Performance

Customers Complaint - Food particles left on dishes	
Cause of problem (1).	Spray arm has stopped rotating.
How to resolve the problem.	a) One of the dishes / cutlery / utensils has fallen through the basket and jammed the spray arm. Remove the obstruction. b) The filter plate, drain filter, or drain filter access panel is not installed correctly and is causing the spray arm to jam.
Cause of problem (2).	The product is being over loaded or incorrectly loaded with dishes.
How to resolve the problem.	Advise customer of correct loading.
Cause of problem (3).	The customer is selecting the wrong wash cycle for the soil level on the dishes.
How to resolve the problem.	Advise the customer about reduced water temperatures (up to 20°C / 70°F lower) and wash times when using Fast and Eco cycles.

Customers Complaint - Coffee/Tea stains left in cups	
Cause of problem (1).	Not enough detergent is being used. To remove these stains requires a stronger concentration of detergent in the water. More detergent is also required in hard water areas, as minerals in the hard water reduce the effectiveness of the detergent. There are also detergents available with a built in water softening agent which will work up to moderate hardness levels.
How to resolve the problem.	Fill the main-wash detergent cup to the top and for best results also fill the pre-wash detergent cup. Run on normal or heavy cycles, not Eco. Use a detergent with a water softening agent.
Cause of problem (2).	The product is being over loaded, which is preventing water reaching the cups on the upper cup racks.
How to resolve the problem.	Advise the customer of correct loading.

Customers Complaint - Dishes have blotchy marks on them that look like water stain marks, not food	
Cause of problem.	Not enough rinse aid being used. The water is not soft enough during the final rinse and therefore hard water droplets containing impurities are drying on the dishes instead of running off during the dry cycle.
How to resolve the problem.	Confirm that the customer is using rinse aid. The rinse aid may need to be turned up to a higher setting (4 or 5 lights), and for optimum dry performance, run the DishDrawer™ on normal or heavy cycles, not Eco. Check that the rinse aid dispenser is dispensing correctly in diagnostics.

Customers Complaint - Glasses & cutlery have a cloudy white film on them and/or plates have a white chalky film on them	
Cause of problem.	Hard water and not enough detergent being used. Minerals from the water are building up on the dishes or the water softener is not set to the correct water hardness level, or is faulty.
How to resolve the problem.	Once this film forms on the dishes it cannot be removed by normal running in the dishwasher. The dishes will need to be cleaned by soaking them in an acidic solution (such as white vinegar and water). Where a Water Softener is not fitted in the product: To prevent the build up re-occurring, the customer will need to fill both the main-wash and pre-wash detergent cups to the top with a power detergent, and we would recommend running on normal cycles, not Eco . There are detergents available to be used with hard water that have a softening agent built in. These powders will work up to moderately hard water. In problem areas with very hard water, the customer may need to use a detergent additive designed for use in hard water areas, or fit a household water softener to the incoming water supply. Where a Water Softener is fitted: Set the water softener for the correct local water supply hardness. Check that the water softener is functioning correctly in diagnostics.

Customers Complaint - Glasses & cutlery have a cloudy white film on them and/or plates have a white chalky film on them

C1 Water Softener Diverter Valve

In hardware output diagnostics test mode:

FU – turn the fill water valve on

P2 – turn the motor drain on

C1 – water softener diverter valve

On – water bypasses the resin tank

Off – water flows through the resin tank

C2 Water Softener Brine Pump

Turn the brine pump on in diagnostics mode. Observe a small quantity of water (approximately 30 ml per min.) flowing out the bottom of the dispenser (drop the dispenser door down to observe this.) Observe a change in the water level (approximately 120ml per 4 min.) in the salt reservoir. The reservoir should pump dry of water in this time.

Note: - Fill the salt reservoir with salt (and then water if not already) before performing this test.

Pipe Interrupter (Air Break) Function

A critical component in the performance of the water softener is the pipe interrupter air break (PI). There is a certain amount of spray leakage from the PI, which is used to provide water to the salt reservoir.

If the spray is inadequate, there will be insufficient water in the salt reservoir to make brine.

If there is too much spray, then the excess bypasses the water softener and defeats the softening process by pouring untreated water straight into the tub.

To check that the amount of spray is appropriate:-

Fill the salt reservoir with water.

- In diagnostics mode, turn on the fill water valve and the motor drain. Water will flow out of the dispenser into the tub, as well as out of the water softener overflow into the tub.
- Observe the flow from the water softener overflow (beside the dispenser). There should be a trickle (25-100 ml per minute). With experience you can guess what is appropriate. If the trickle is outside these rates, replace the water softener, as the PI is faulty.

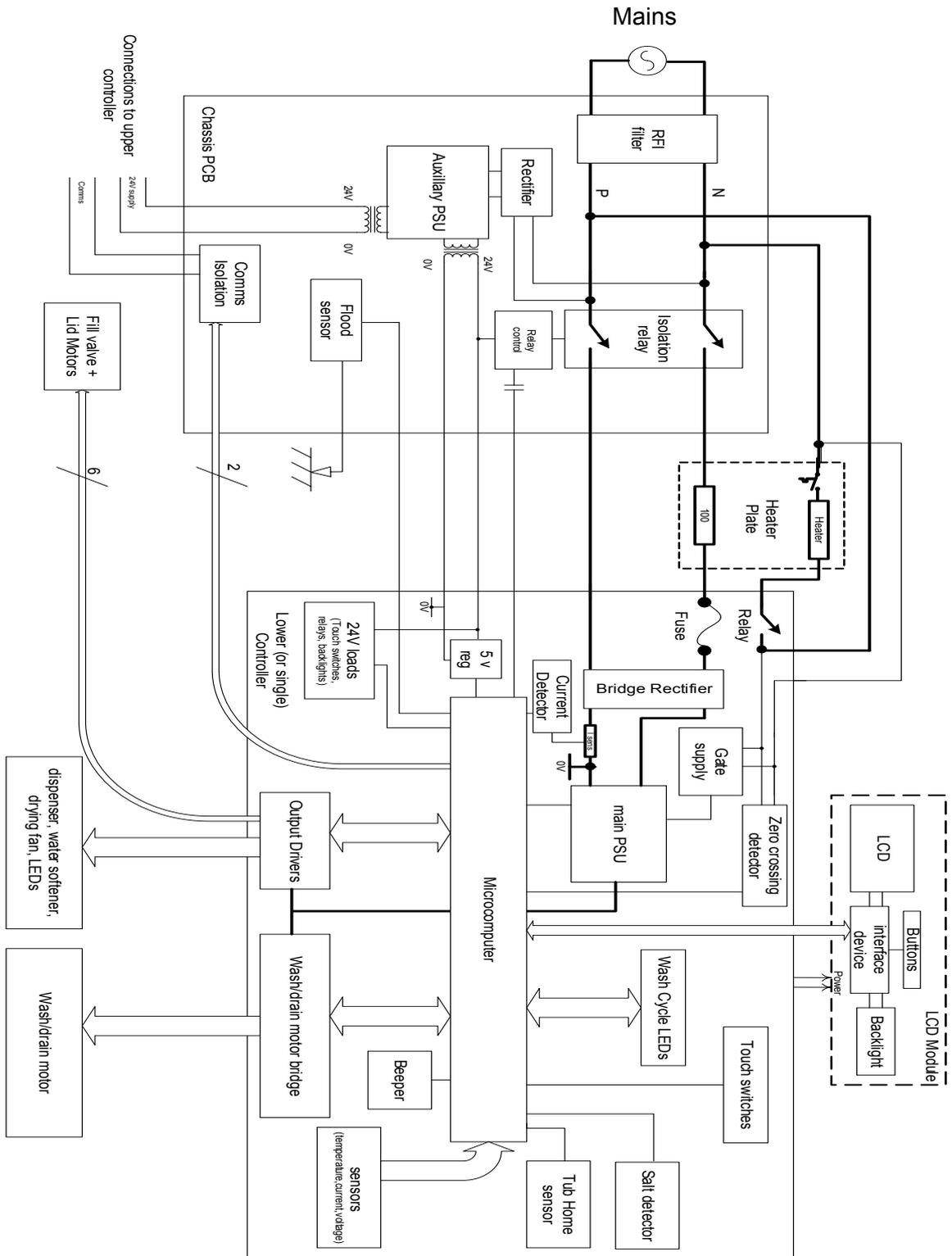
To check that there is water in the salt reservoir, remove the drawer front and observe the level of water in the tank. (A quick way to check that there is water in the salt reservoir is to remove the salt bung and test the water level by placing your finger down through the opening.)

Detergent or Rinse Aid in the Water Softener

If detergent or rinse aid is poured in to the salt reservoir it will destroy the water softener. This could also happen if the salt bung is left off or falls out. Evidence of this could be white streaks through the resin.

7 WIRING DIAGRAMS

7.1 Power Distribution Concept



8 SERVICE PROCEDURES

CAUTION:- Due to the use of an electronic switch mode power supply, all internal components, regardless of supply voltage, should be treated as live to earth (i.e. equal to the mains supply voltage) when power is supplied to the DishDrawer™.

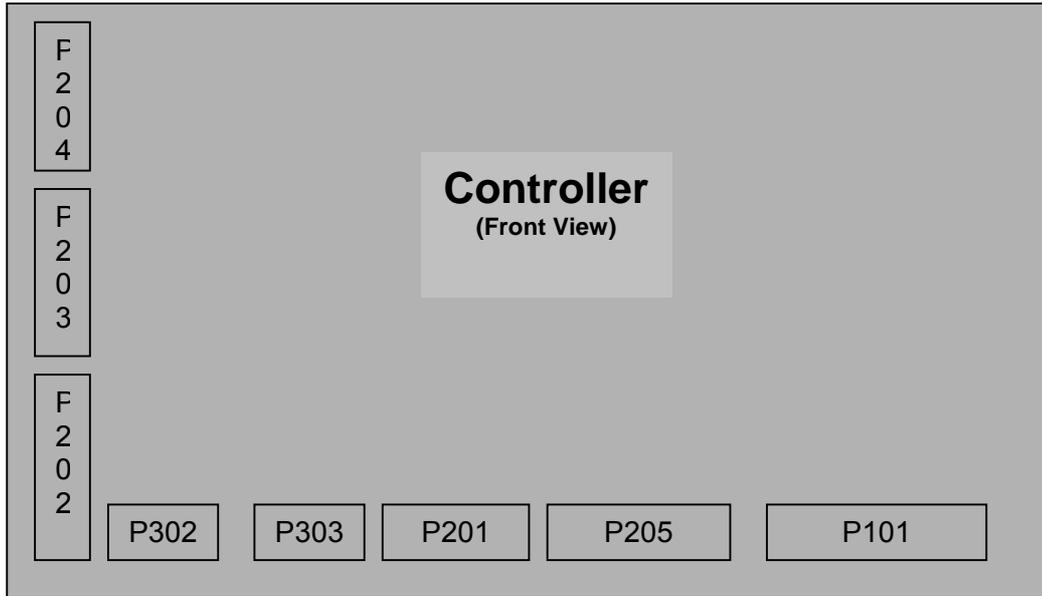
8.1 Component Testing

Device	Connector	Pin Pair	Description
Fill valve	P205	10 – 11	65 +/- 10 ohm
Lid motor	P205	6 – 7	Check if open or short circuit
Lid motor	P205	8 - 9	Check if open or short circuit
Rinse aid pump	P204	1 - 2	65 +/- 10 ohm
Detergent diverter	P204	3 - 4	65 +/- 10 ohm
Fan	P203	1 - 2	Check if open or short circuit Note: Run in diagnostics and check fan torque.
Water softener bypass valve	P202	1 – 2	65+/- 10 ohms
Water softener brine pump	P202	3 – 4	65+/- 10 ohms
Temperature sensor	P101	1 - 2	12000 Ohms @ 20°C (68°F) 8300 Ohms @ 30°C (86°F) 3000 Ohms @ 60°C (140°F)
Motor phases	P201	1 – 2 2 – 3 1 - 3	8.0 +/- 5 Ohms (per winding), 16 ohms phase to phase from the controller connector
Dropper resistor	P101	4 - 5	98 Ohms +/- 7 Ohms NZ/AU/EU/UK 24 Ohms +/- 3 Ohms US/TW
Element	P101 and Power Plug	6 to Neutral	50 Ohms +/- 4 Ohms NZ/AU/EU/UK 24 Ohm +/-3 Ohms US / TW

NOTE: Pins are counted right to left on connectors P101, P205, P201, P303, P302.

Connectors P202, 203, 204 – pin 1 is at the bottom of the connector.

Connector Location

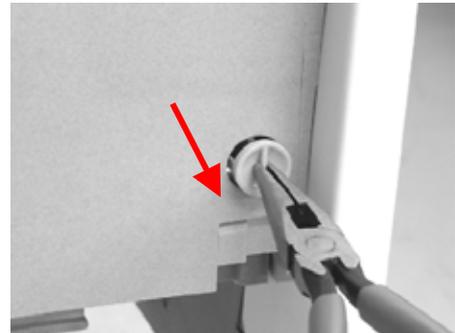


Connector	Harness
P101	Power
P205	Chassis
P201	Motor
P303	LCD/Badge
P302	Comms
P202	Water Softener
P203	Fan
P204	Dispenser

8.2 Drawer Front



1. Open the drawer.
2. Locate the drawer pins on either side of the tub.
If the pins cannot be accessed, remove the tub from the slide first (refer to Section 8.6).
3. Use pliers to pull on the pin and remove it. Support the drawer front with your hand while doing this to prevent it dropping onto the floor.
4. With both pins removed, the bottom of the drawer front can now be eased downward slightly.
5. Pull the drawer front down to free it from the handle and the top locating slots in the tub.
6. Remove the earth wire from the tab on the drawer front. (If it is an integrated model, it will be necessary to unplug the integrated badge from the badge isolator.)



Refit in reverse manner, ensuring the earth wire is reconnected, drawer slides are fully forward and the pins secure through the hooks on the front end of the slides.

Note: When reinserting the pins, ensure that the dividing web is vertical as shown.

8.3 Handle and LCD Display



1. Remove the drawer front (refer to Section 8.2).
2. Disconnect the LCD wire harness from the controller.
3. The handle slides onto the flange at the top of the tub. Push the handle from the right to the left to release it.
4. The handle may now be lifted clear by pulling it forwards.
5. The LCD display is held in place by a wedge with a spring tab. Without lifting the tab, slide the wedge downwards using your finger tips to release. The LCD assembly can now be removed.
6. The wiring harness can now be unplugged from the LCD circuit board.

Refit in reverse manner.

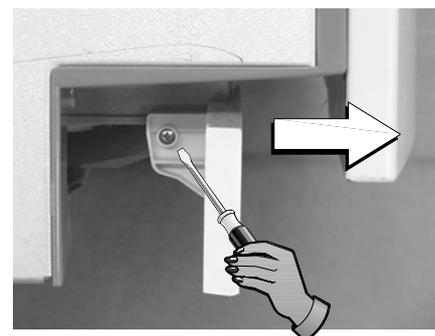


8.4 Toe Kick Removal



1. Partly open the bottom drawer.
2. Loosen the right and left hand toe kick screws.
3. Slide the toe kick towards the front of the tub until it comes off the mounting rails.

Refit in reverse manner.

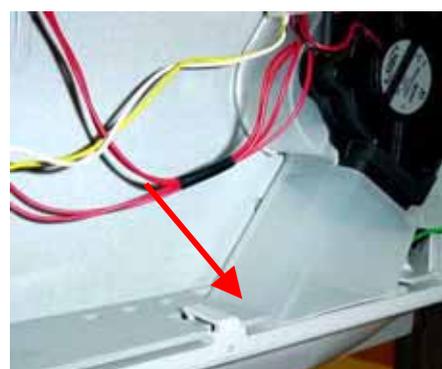


8.5 Lower Tub Cowling



1. Remove the lower drawer front (refer to Section 8.2).
2. Remove the toe kick (refer to Section 8.4).
3. Release the centre clip as shown and slide the cowling forward.

Refit in reverse manner.



8.6 Tub Removal



1. Open the drawer.
2. Removing the drawer front (refer to Section 8.2) makes it easier to slide the tub clips back (optional).
 - Top tub: Depress the right-hand tub clip and push it back about 30mm (1 inch). Repeat for the left-hand side.
 - Bottom tub: Remove the toe kick (refer to Section 8.4) and cowling (refer to Section 8.5), both optional.
3. If the cowling has not been removed, the tub clips need to be pushed back about 130mm (5 inches) so that the slide clears the cowling when the tub is lifted off.
4. Lift the tub off the slides and push the runners back into the product.
5. Releasing the wire from the centre clip on the link assembly allows the tub to be moved further from the chassis (optional).
6. If the tub is being turned over for servicing, rotate it counter clockwise, remembering to remove the baskets first. Removing the handle will prevent it from being damaged.



Refit in reverse manner.

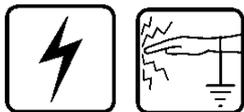
8.7 Drying Duct - Top Tub Only



1. Open the drawer and remove the drawer front (refer to Section 8.2).
2. Use pliers to gently release the plastic clips while pulling the duct down.



8.8 Drying Fan and Flap Valve



1. Remove the drawer front (refer to Section 8.2).
2. With a small bladed screwdriver, carefully release the small plastic clips holding the rinse aid indication LED in place in the dispenser and remove the LED.
3. Release the rubber tabs securing the fan.
4. Disconnect the wire harness from the electronic controller.
5. The drying fan will now come free.



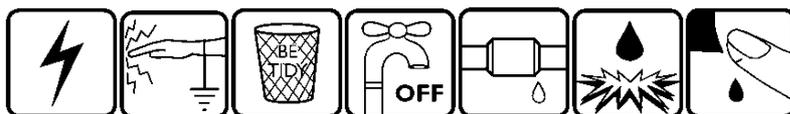
Refit in reverse manner.

Note: The fan housing flapper can be replaced by removing the cover and lifting the flapper out of the housing.

To remove the cover, use a small screwdriver to depress the 2 clips at the rear, and slide it forward.



8.9 Water Softener (Where Fitted)



1. Remove the drawer front (refer to Section 8.2).
2. Disconnect the wiring loom connections to the water softener diverter valve, brine pump and salt level detector, and remove the dispenser wiring loom connection to the electronic controller.
3. Use a flat blade screwdriver to open the salt level indicator LED cover, and remove the LED from the water softener.
4. Unclip the fill hose to strainer and remove the dispenser hose from the water softener.
5. Remove the four T10 torx drive screws securing the water softener to the tub.
6. The water softener can now be removed from the product.



To refit:

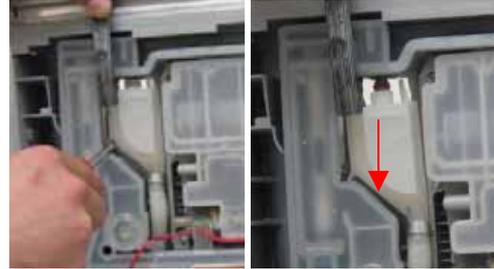
1. Place the overflow 'O' ring on the water softener and lubricate the tub overflow with a water-soluble lubricant e.g. Glycerol or similar.
2. Place the salt tank 'O' ring in the tub. Lubricate the salt tank flange on the water softener. Pass the dispenser wiring loom through the water softener and plug it into the electronic controller.
3. Place the water softener in the tub and apply enough pressure to seat the 'O' rings.
4. The overflow should sit almost flush with the inside of the tub. The salt tank should be recessed by approx 1mm (1/32 inch) from the inside of the tub.
5. Refit the screws, strainer, hoses, harness connectors and LED.



8.10 Strainer (Where Fitted)



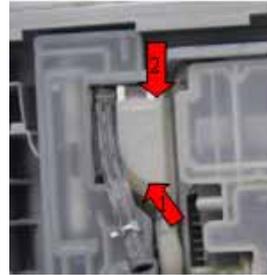
1. Remove the drawer front (refer to Section 8.2).
2. Remove the water softener hose from detergent dispenser spigot.
3. Place screwdriver under clip and use lever action to disengage the clip.
4. When clip is disengaged, the strainer can be pushed down off the water softener spigot.
5. After removing the hose clamp, the strainer can now be removed from the DishDrawer.



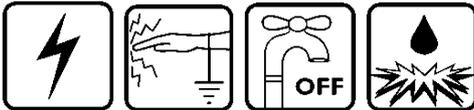
Refitting:

Fit new strainer & position hose clamp.

1. Manoeuvre strainer into place.
2. Slide into spigot using a force applied in direction 1. Lock into place, and ensure correct fitting by pushing in direction 2.
3. Fit dispenser hose to detergent dispenser spigot.



8.11 Detergent Dispenser



1. Remove the drawer front (refer to Section 8.2).
2. Disconnect the two wiring loom connections from the dispenser coils. **Note:** Push back the locking tabs to allow the connectors to release.
3. With a small bladed screwdriver, carefully release the small plastic clips holding the rinse aid indication LED in place and remove the LED.
4. Use pliers to release the clamp and remove the fill hose from the dispenser.
5. While holding the dispenser, unscrew the six T10 Torx drive screws securing the two brackets to the dispenser.
6. The dispenser can now be removed from inside the tub.
7. To open up the dispenser door fully, first open the door using the release catch, then squeeze the top sides of the door together. This will release the door to the fully open position. This can be done with the dispenser in place.



Refit in reverse manner ensuring the dispenser gasket is located correctly.

8.12 Electronic Controller



1. Remove the drawer front (refer to Section 8.2) and the handle (refer to Section 8.3) (optional).
2. Disconnect all the wiring connectors on the controller.
3. Use a flat blade screwdriver to release the clip on the right-hand side of the controller by firmly pushing it in towards the tub. Do not lever against the clip or there is a risk of breaking it.
4. The bottom of the controller can now be lifted out to an angle of about 45°, at which point the top of the controller will come free.

Refit in reverse manner, ensuring the controller is located correctly in behind the tub flange at the top.

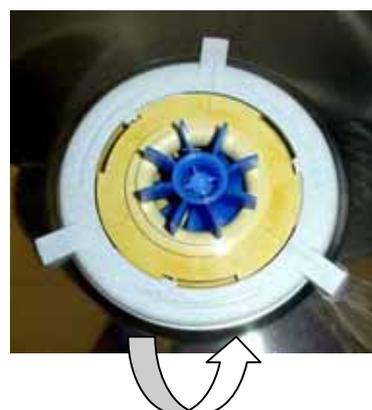


8.13 Filter Plate



1. Remove the lower racks and baskets from the tub.
2. Remove the drain filter assembly.
3. Rotate the filter plate locknut anti-clockwise to release the filter plate from the rotor assembly.
Note: Over-rotating the locknut will also release the rotor.
4. Lift the filter plate clear.

Refit in reverse manner, ensure the 3 legs are locked correctly.



8.14 Rotor



1. Remove the filter plate (refer to Section 8.13).
2. Rotate the rotor locking ring anti-clockwise to release it from the motor housing and lift out.
3. The rotor assembly is not serviceable and if damaged should be replaced.

Refit in reverse manner, taking care to align the 4 legs on the rotor with the slots in the motor housing. The rotor can only be placed in one position.

The short leg goes into the middle slot indicated by the arrow on the motor housing.



8.15 Wiring Cover



1. Remove the drawer front (refer to Section 8.2).
2. With the drawer opened, remove the tub (refer to Section 8.6).
3. Carefully release the four wiring cover clips, two on each side, from the front lower section of the tub, taking care not to damage them (Fig 1).
4. Release the four clips on the underside of the tub that attach the wiring cover to the motor assembly outer lock nut (Fig 2).
5. Pull the tub fully open and lift it up at the front (this makes it easier to remove the wiring cover from the rear of the tub).
6. The wiring cover may now be carefully moved forward and downward to release it from the rear of the tub.

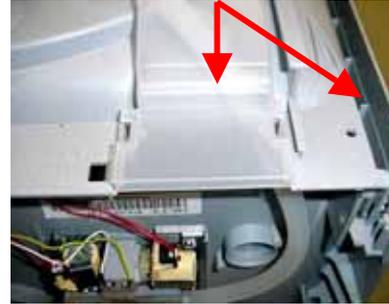


Fig 1



Fig 2

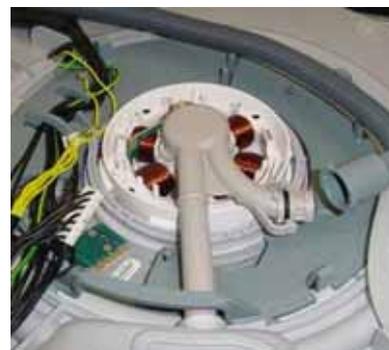
To reassemble, first ensure that the wiring harnesses, drain hose and fill hose are located in their correct positions, then refit in reverse manner.

Note: It may be found easier to remove and rotate the tub anti-clockwise before removing the wiring cover.

8.16 Tub Disconnection



1. Remove the drawer front (refer to Section 8.2).
2. Remove the wiring cover (refer to Section 8.15).
3. Disconnect the fill hose from the dispenser, or water softener if fitted (water may drip).
4. Disconnect the chassis harness plug from the controller.
5. Remove the wiring cover and the element connector cover.
6. Disconnect the element harness plug and earth wire from the element plate.
7. Unclip the drain hose cuff from the motor assembly, taking care not to misplace the non-return flap valve.
8. Unclip the drain hose, fill hose and the wiring loom from the under side of the tub.
9. Remove the tub.



Refit in reverse manner.

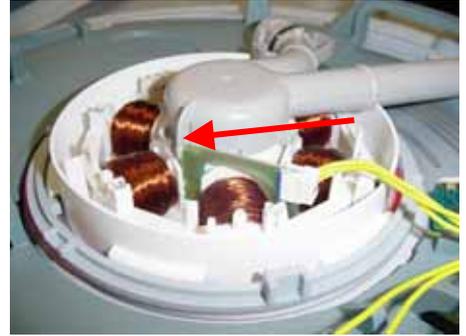
Note: When replacing a fill hose, drain hose or wiring harness, transfer the link support clip markings from the old parts to the new.

8.17 Hall Sensor

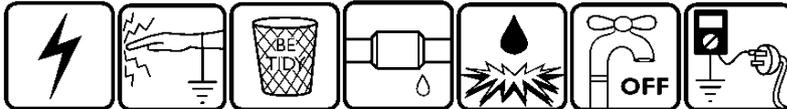


1. Remove the wiring cover (refer to Section 8.15).
2. Unplug the wiring connection from the hall sensor.
3. Gently press the hall sensor locking tab in the direction shown and lift the hall sensor out.

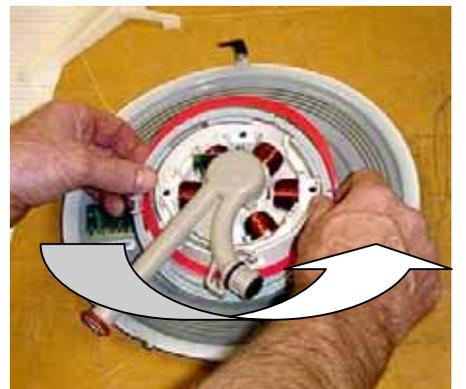
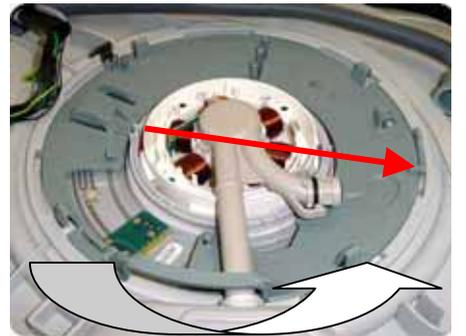
Refit in reverse manner and ensure the hall sensor is properly clipped in.



8.18 Heater Plate and Motor Assembly



1. Remove the baskets and rotor assembly (refer to Section 8.14).
2. Remove the wiring cover (refer to Section 8.15).
3. Remove the element connector cover and the element wiring connector.
4. Remove the drain hose and the heater plate earth wire.
5. While lifting the locking tab (indicated) on the outer locknut, rotate the outer locknut anti-clockwise until it comes free of the tub tabs, then remove it.
6. Take care not to damage any motor wiring as the locknut is turned, or the flap valve slot when the locknut is removed.
7. Lift the rear of the heater plate and motor assembly clear of the tub and slide the drain spigot out of the tub drain area.
8. Remove the inner locknut and motor shim to release the motor assembly from the heater plate.
9. Take care with the seals between the motor assembly and the heater plate, and the heater plate and the tub. These seals and their corresponding sealing surfaces must be clean and the seals correctly placed during reassembly.
10. Check both the drain hose 'O' ring and the drain spigot 'O' ring for damage and replace them if necessary. Lubricate before reassembly.
11. Replace the flap valve.



Reassemble in reverse manner, ensuring all the locking ring tabs are engaged.

8.19 Lid



1. Remove the tub assembly (refer to Section 8.6).
2. On the right-hand side of the lid, Insert a flat blade screwdriver into the slots between the lid flange and the yoke as in Fig 1. Twist the screwdriver while pulling down on the lid to disengage the clip. Repeat for each clip on both yokes. **Note:** Do not pull on the lid seal.
3. Pull the lid down 10mm (3/8") on one side.
4. Pull the opposite side of the lid down until it is clear of the yoke. The high side of the lid can then be pulled to the bottom of the yoke slots. The lid is now free to be removed from the chassis on an angle as per Fig 2.



Fig 1

To reassemble.

1. Angle the lid into the chassis, ensuring the lid is the correct way around. The word "Front" is printed on the top of the lid and should be at the front of the product.
2. Engage the T-Rib on the high side of the lid into the bottom of the yoke slots. Swing the opposite side of the lid up past the yoke until it sits into the bottom of the yoke slots. Note that the T-Ribs make the lid wider so some force is required to push past the yoke.
3. Clip the lid into place. Start by pushing one corner of the lid up until it clicks. Next clip the diagonal corner up.
4. The lid is now assembled and should look like fig 3 and not like fig 4.



Fig 2



Fig 3



Fig 4

8.20 Yoke



1. Remove the lid (refer to Section 8.6).
2. Release the lid actuator from the bottom of the yoke by pushing with your thumb against one of the locking tabs. **Note:** Tall Tub models use an adaptor between the yoke and lid actuator.
3. Slide the front of the yoke downward at an angle until it moves out of the track in the rear of the trim, and is clear of the chassis flange as shown.

Refit in the reverse manner taking care that the yoke is the correct way around.

Note:

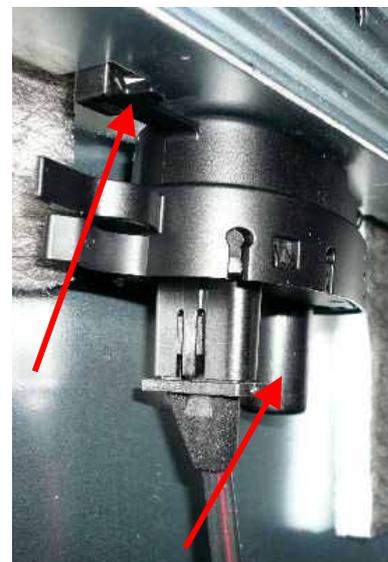
- There are both left hand and right hand yokes.
- Do not bend the yoke when refitting it.
- Locate the rear end below the chassis tab at the rear of the chassis first, then slide the front up in behind the trim to ensure the front yoke peg locates correctly in the track behind it.



8.21 Lid Actuator



1. Remove the tub (refer to Section 8.6).
2. Remove the lid actuator harness plug by releasing the clip on the lid actuator.
3. Release the lid actuator from the bottom of the yoke by pressing with your thumb against one of the locking tabs.
4. For a right-hand lid actuator, carefully release the clip at the rear of the lid actuator and slide the lid actuator towards the rear of the chassis to release it from the slide rail.
5. For a left-hand lid actuator, the clip is in front of the lid actuator, and once released, the lid actuator will slide towards the front of the chassis to release it from the slide rail.
6. The lid actuator can now be removed by dropping it down through the slot in the slide mounting bracket.



Refit in reverse manner.

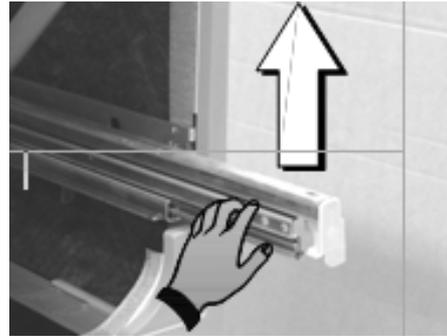
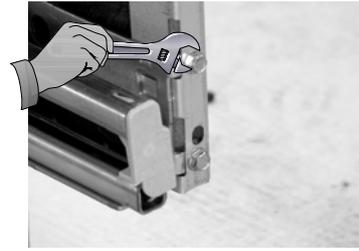
When reconnecting the lid actuator to a yoke, ensure the lid and yoke assemblies are in the fully raised position. To line up the lid actuator connecting arm with the yoke, it may need to be wound up or down manually.

Note: It is important that all the clips on the lid actuator case are done up and that none are broken.

8.22 Slide Rail Replacement



1. Remove the lid actuator from the slide rail (refer to Section 8.22).
2. Bottom slide rails only. Remove the lower chassis trim (refer to Section 8.27) to gain access to the screws. Remove the two hex drive screws securing the slide mounting bracket at the front.
3. Tap the slide rails from underneath at the front. This will knock the slide rail up and free from its location in the chassis.
4. The slide runner may now be pulled forward to release it from its location in the rear of the chassis.



Refit in reverse manner.

Take care to ensure the chassis is square before tightening these screw.

8.23 Mains Filter Cover and PCB Mains Filter



1. Remove lower tub (refer to Section 8.6)
2. Release the clips on the mains filter cover and lift it off.
3. Disconnect all wiring to the PCB mains filter.
4. Remove the earth screw through the wire and the mains filter housing to the chassis.
5. Use a screwdriver to release the clips holding the circuit board inside the housing and lift it out.

Refit in reverse manner.



8.24 Water Inlet Valve



1. Remove the mains filter cover (refer to Section 8.23).
2. Partially lift the inlet valve up out of the housing.
3. Disconnect the inlet hose connection.
Caution: Water will drip.
4. You can now slide the water valve up out of the housing.
5. Remove the connectors. Mark which hose goes to the top on a double product. Undo the black clips by pushing the ends apart sideways. Remove the fill hoses.



Refit in reverse manner.

8.25 Fill Hose, Drain Hose, Wiring Harness Replacement



1. Remove the wiring cover (refer to Section 8.15).
2. Disconnect the component you need to replace (e.g. fill hose, drain hose, wiring harness) from the tub.
3. Undo the link clips and chassis clips.
Do this one clip at a time, marking the position of the hoses and harness at each clip and re-closing it after the component is removed to keep the other two components in their correct positions. The faulty component can now be disconnected from the chassis end and removed.



Refit in the reverse manner, ensuring the link and chassis clips are clamping the components in their correct location.

8.26 Link Support Wire Position

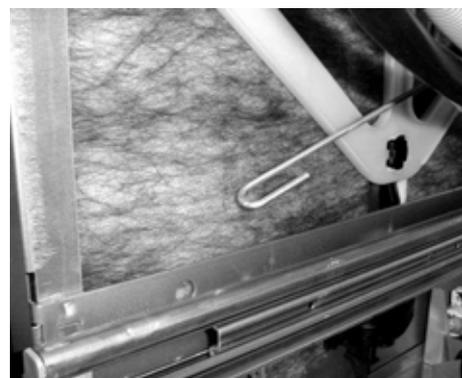


If latches are resetting, this can be caused by the link support wire being positioned too low and allowing the hoses and harness to get between the tub and the latch.

To check the position of the wire:

1. Remove the tub (refer to Section 8.6), and remove the centre link clip from the wire.
2. Swing the wire to the left hand side of the chassis.
It should rest approximately 15mm (3/4") above the slide mounting bracket.

If not, carefully bend the wire while supporting it at the rear so as not to stress the mounting bracket.



8.27 Front Trim Replacement



1. Bottom tub only:- Remove the toe kick (refer to Section 8.4) and cowling (refer to Section 8.5).
2. Remove the drawer front (refer to Section 8.2), handle (refer to Section 8.3) and tub (refer to Section 8.16).
3. Remove both the left hand and right hand yokes (refer to Section 8.20). This is to prevent damaging the locating tab at the front of each yoke where it slides up into the rear of the trim.
4. Remove the trim by releasing the trim clips with long-nose pliers.



Refit in reverse manner.

NOTES