

Service Manual

DishDrawer™ Dishwasher



Models:

DD605

DS605

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PRODUCTS

Brands Fisher & Paykel
DCS
John Lewis
DeLonghi

Double Models	Description	Product Code – Market
DD605	Double, Prefinished, Black	80375 NZ, 80379 NZ 110V, 88464 US
DD605	Double, Prefinished, White	80377 NZ, 80392 AU, 88462 US
DD605	Double, Prefinished, Brushed Stainless	80095 NZ, 80381 NZ 110V, 80394 AU, 88465 US
DD605M	Double, Prefinished, Iridium Stainless	80386 NZ, 80399 AU
DD605H	Double, Prefinished, Water Softener, Black	88835 GB
	Double, Prefinished, Water Softener, White	88836 GB, 89206 DK, 88983 TW, 89205 DL GB
	Double, Prefinished, Water Softener, Brushed Stainless	88837 EU, 88838 GB, 88839 DK, 88466 US, 88985 TW
DD605FD	Double, Flat Door, D-Handle, Brushed Stainless	80384 NZ, 80397 AU, 88468 US
DD605MFD	Double, Iridium Stainless, Flat Door, D-Handle	80388 NZ, 80402 AU
DD605FDH	Double, Flat door, D-Handle, Water Softener, Brushed Stainless	88843 EU, 88844 GB, 88845, DK, 89114 TW, 89203 JLP GB
DD605I	Double, Integrated	80390 NZ, 80404 AU, 88846 EU, 88469 US
DD605IH	Double, Integrated, Water Softener	88847 EU, 88848 GB, 88849 DK, 88470 US, 88987 TW
DD224P5	Double, Flat door, Brushed Stainless	88479 DCS US
FB6011TD	Double, Prefinished, Brushed Stainless	88980 JP

Single Models	Description	Product Code – Market
DS605	Single, Prefinished, Black	80376 NZ, 80380 NZ 110V, 88471 US
DS605	Single, Prefinished, White	80378 NZ, 80393 AU, 88463 US
DS605	Single, Prefinished, Brushed Stainless	80364 NZ, 80382 NZ 110V, 80383 NZ NUT, 80395 AU, 80396 AU NUT, 88472 US
DS605M	Single, Prefinished, Iridium Stainless	80387 NZ, 80400 AU, 80401 AU NUT
DS605H	Single, Prefinished, Water Softener, Black	88850 GB, 88473 US
	Single, Prefinished, Water Softener, White	89207 DK, 88851 GB, 88989 TW
	Single, Prefinished, Water Softener, Brushed Stainless	88852 EU, 88853 GB, 88854 DK, 88991 TW
DS605FD	Single, Flat Door, D-Handle, Brushed Stainless	80385 NZ, 80398 AU, 88475 US
DS605MFD	Single, Iridium Stainless, Flat Door, D-Handle	80389 NZ, 80403 AU
DS605FDH	Single, Flat door, D-Handle, Water Softener, Brushed Stainless	88858 EU, 88859 GB, 88860 DK, 89115 TW
DS605I	Single, Integrated	80391 NZ, 80405 AU, 80406 AU 110V, 80407 AU NUT, 88861 EU, 88476 US
DS605IH	Single, Integrated, Water Softener	88862 EU, 88863 GB, 88864 DK, 88477 US, 88993 TW
DS124P5	Single, Flat door, Brushed Stainless	88480 DCS US
FB6011D	Single, Prefinished, Brushed Stainless	88981 JP

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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



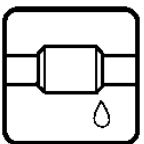
Ensure the work area is in a tidy and orderly condition at all times so as not to cause a hazard while service work is being completed. Always clean and tidy the DishDrawer™ and work area after service is completed.

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: P/N 813141 (includes light pen P/N 425930).

2 DIMENSIONS & SPECIFICATIONS

2.1 Dimensions

	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 / ₁₆ inch	822.5 - 882.5mm	32 ³ / ₈ inch
Height (single)	409mm	16 ³ / ₃₂ inch	412mm	16 ⁷ / ₃₂ inch
Width	595mm	23 ⁷ / ₁₆ inch	600mm	23 ⁵ / ₈ inch
Depth	570mm	22 ⁷ / ₁₆ inch	580mm	22 ⁷ / ₁₆ inch
Drawer Open (inc cab)	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
JAP	90/110V AC	50 Hz	11.6 A / 5.8 A max

2.2.2 Components

Component		Specifications
Controller – 2 types	US, TW, JAP, 110V NZ/AU NZ, AU, GB, EU, DK	120V 230V
Water Inlet Valve	All markets except Japan Japan only	24V DC 65+/- 10 Ohms per coil 2.5litres/min (0.65 US gal/min) 4 litres/min
Dispenser coils		24V DC per coil 65+/- 10 Ohms per coil
Rinse Aid tank capacity		50mls (approx. 25 washes)
PCB Mains Filter – 2 types	NZ, AU, GB, EU, DK US, JP, TW, 110V NZ/AU	230V AC 110V AC
Motor Drain speed Wash speed	Pump out rate 5 litres / min.	80V DC 3 Phase Brushless 4200 RPM 2300 - 2850 RPM
Stator		8.0 +/- 5 Ohms (per winding), 16 ohms phase to phase from the controller connector

Component		Specifications
Heater Plate NZ Water Heater Track Power Supply Resistor	NZ, AU, GB, EU, DK	230V AC 50 Ohms +/- 4 Ohms 98 Ohms +/- 7 Ohms
Heater Plate 110V Water Heater Track Power Supply Resistor	US, 110V NZ/AU	120V AC 24 Ohms +/- 3 Ohms 24 Ohms +/- 3 Ohms
Heater Plate 110V JP Water Heater Track Power Supply Resistor	Japan	100V AC 20 Ohms +/- 2 Ohms 19 Ohms +/- 3 Ohms
Temperature Sensor	Located on the heater Plate	12000 Ohms @ 20°C (68°F) 8300 Ohms @ 30°C (86°F) 3000 Ohms @ 60°C (140°F)
Fusible Link	Located on the heater plate	268 – 302°C (514 – 576°F)
Water Inlet Hose	Pressure rating Length from chassis edge (viewed from the front)	1000Kpa / 145 P.S.I. 1561 mm from LHS 1344 mm from RHS
Water pressure	Water softener models Non water softener models	1 MPa (145 psi) max, 0.1 MPa (14.5 psi) min 1 MPa (145 psi) max, 0.03 MPa (4.3 psi) min
Drain Hose	Length from chassis edge (viewed from the front)	2011mm from LHS 1794 mm from RHS
Power Cord	Length from chassis edge (viewed from the front)	1776 mm from LHS 1559 mm from RHS
Drying Fan	Polarity sensitive Meter +ve to red wire, -ve to black wire	24V brushless DC motor 0.27A approx. 2 to 3 Meg Ohms
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 approx. 14 regenerations 290+/- 10ml Resin
Lid Actuator		24 V DC approx. 30 Ohms
Hall Sensor		4.13, and 3.43 M ohms measured +ve in centre, -ve to outside
LCD	5 volt rail between pins 2 & 5	165 Ohms

599447A

2.2.3 Performance

Europe, GB, IE

AAA – wash performance, dry performance, energy usage.

0.64 kWh/cycle energy usage. (1 tub only)

8 litres / cycle water usage (1 tub only)

USA

Based on 4 wash loads per week

Single – 157 kWh/year,

Double – 308 kWh/year

NZ, Australia

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

Single

Energy – 3 star

- 135 kWh/year

Water – 3.5 star

- 7.4 litres/wash

Double

Energy – 3 star

- 270 kWh/year

Water – 3 star

- 14.7 litres/wash

2.2.4 Wash Profiles

2.2.4.1 GB, IE, EU

EU Wash Profiles

529291 EE DD EU +WS3 3_4_009

Incoming Water 15°C

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

* The fill valve open for 12seconds uses approx. 400ml of water. The water use is labelled at 8L.
24-Jul-07

2.2.4.2 NZ, Australia

Australia/New Zealand Wash Profile

Wash Profile 526283 EE DD NZ -WS0 1_6_005

Incoming @ 20°C

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 (min)
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 2.4	3	1	10 2.4	3	1	35 42°C 2.4	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+10m 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+5m 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

24 July 2007

2.2.4.3 USA

United States / Canada

529286 EE DD US -WS0 2_6_005

Incoming @ 49°C

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	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	3	1	3 2.5	3	1	20 2.5 74°C/ 165 °F	3	28	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	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	115	15
Normal Eco @2400rpm	Time (min) Fill (L) RPM				1	1	5 2.5	3	1	30 2.5 53°C/127°F	3	1	3 2.5	3	1	10 2.5 53°C/127°F	3				22	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	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	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	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	38	7.5
Rinse @2300rpm	Time (min) Fill (L) Temp	1	1	7 2.5	3																	12	2.5

Notes
23-Jul-07

3 TECHNICAL OVERVIEW

3.1 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 (20¹⁵/₃₂") out of the cabinet by travelling along two rigidly attached slides on either side of the tub.

3.2 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.

3.3 Electronics

In the DD605/ DS605 (Phase 5) electronic controller, the functions of controlling the motor as well as controlling the user interface console have been 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.

3.3.1 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.

3.3.2 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).

3.4 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.

3.4.1 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.

Note: In DD605 the rotor can only be placed in one position within the motor housing (refer Section 8.12 for fitting instructions).

3.4.2 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. There is a flap valve moulded into the top of the spray arm. This part lets air escape through the spray arm when the DishDrawer™ is filling with water. The DishDrawer™ fill levels are more consistent with the flap valve system.

3.5 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.

3.6 Lid System

3.6.1 Lid Operation

The lid is a single piece of polymer plastic with a static seal co-injection moulded into it. 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.

3.6.2 When Activated

At the beginning of each wash cycle, both lid motors are powered up to pull the lid down onto the tub in approx 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.

3.6.3 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.

3.7 Tub

The tub is the main cavity where all the wash activity occurs. The tub is a polymer plastic receptacle that has 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.

3.8 Filling

3.8.1 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 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. 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, firstly through the pre-rinse section of the dispenser for the pre-rinse cycle 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.

3.8.2 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.

3.8.3 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 approx. 5 seconds. It will do this up to 3 times before carrying on regardless.

3.8.4 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 a F1 fault code will be signalled to the customer

3.9 Heating

3.9.1 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.

3.9.2 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.

3.9.3 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.

3.9.4 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.

3.10 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.

3.11 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 approx. 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.

3.12 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.

3.12.1 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 soil flows through its micro-mesh filter, eliminating re-depositing of soil during the wash. The drain filter should be regularly checked and cleaned.

3.12.2 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.

3.13 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 it 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.

Note: Dry enhancement mode, available on DD603 products, is not available on DD605 products.

3.14 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.

Delivering Softened Water: - Supply water arrives from the inlet valve. In the water softener it passes through an air break and a diverter valve. It is then either directed through the resin to the dispenser, or directly to the dispenser, then into the tub. The electronic controller measures the volume of water treated, and adds an appropriate amount of non-treated 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.

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 to 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.

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 light 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), 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

4.1 How to Change Setup Options

4.1.1 Rinse Aid / Water Supply Hardness/Auto Power/End of Cycle Beeps/Closed Drawer Option/Clean/Dirty Dish Symbol

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 DD605.

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

Note: there is no dry enhancement mode for DD605.

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

4.1.2 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 (1/10 teaspoon) of rinse aid, 5 = approx. 2.5mls (1/2 teaspoon) of rinse aid.

Push **KEYLOCK** to advance 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.

4.1.3 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.

No LED	Water Softener turned off, continuous bypass of softener
1 LED	150-250 ppm water supply hardness
2 LEDs	250-350 ppm water supply hardness
3 LEDs	350-450 ppm water supply hardness
4 LEDs	450-550 ppm water supply hardness
5 LEDs	550-625 ppm water supply hardness

Push **KEYLOCK** to advance 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.

4.1.4 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.

4.1.5 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.

4.1.6 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.

4.1.7 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.

4.1.8 Option Adjustment Quick Reference Charts

Rinse Aid Setting (rA):-

(Alter 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. Diagnostics is 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 Display / Download Mode

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

Note: there is no LCD backlight on DD605 models

5.1.2 Optical LED Download / Fault Display

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 Smartool software, available on CBW, to view the fault log and usage history data.

Also a wash log has been added to the DD605 Smartool. 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
Longest fill	Number of the longest fill during this program
Drain time	Length (seconds) of longest
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

Note: in early production DD605 models, the pen download feature has been disabled because it was causing the product to go into a nuisance "pause" mode intermittently.

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.

5.1.3 Clearing Fault Logs

To clear the Current Fault 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.

5.1.4 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	Norm	Fast	Deli	Rinse	Hardware Output
bL	Off	Off	Off	<u>On</u>	Backlight (not fitted to DD605 products)
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.

Tube 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.

5.1.5 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 HNFDR 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?)

5.1.6 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.

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

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

Note: the cycle count can also be retrieved in optical download mode, (refer Section 5.1.2).

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 the **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 button 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 not fitted to DD605 products
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 ten 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 4 U (user) faults.

U1 is displayed on the LCD as a "no tap" symbol. U2 is restricted lid travel. The customer can usually rectify a U1 or U2 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 DD605 PCB LCD. This will not be able to be used on DD603 products, or a DD603 test handle used on DD605 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.
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.
FF	Normal, Fast, Delicate and Rinse LEDs.	Top tub not responding.	<ul style="list-style-type: none"> • Chassis harness or connectors. • Faulty top controller. • Faulty PCB mains filter.

U1	Heavy and Rinse LED.	Machine has failed to prime with water within approx. 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.
U2	Heavy and Dry LEDs.	Restricted lid travel, the lid has reached stall current too soon.	<ul style="list-style-type: none"> • Dishes or cups / glasses prevent the lid from closing. • Lid, lid actuators or yokes jammed.
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 approx. 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 approx. 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

- 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 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.

PRIMARY ACTION

- Check the previous fault, and if it was F3, F8 or F9, then this F9 is a consequential fault - fix the previous fault.
- If the fault occurred immediately after power on, check the solenoid coils and motor stator windings for damage, overheating and correct resistances.
- Check the lid actuators are properly connected.
- Check the controller for damage, signs of overheating or fluid leaking.

SECONDARY ACTION

Important - Check the solenoid coils 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.

FF Top Tub Not Responding

Top tub not responding.

PRIMARY ACTION

- Check the top controller works when swapped with the bottom controller and vice versa. Replace the top controller if it does not work in the bottom tub.

SECONDARY ACTION

- Check the chassis harnesses and connectors if the top controller works in the bottom tub and the bottom controller does not work in the top tub.

TERTIARY ACTION

- Replace 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).

U2 Restricted Lid Travel

Restricted lid travel. The lid has reached its stall current too soon.
The product will retry the lid 3 times, log the fault if the retries fail, then report to the user.

PRIMARY ACTION

- Check dishes, cutlery or cups are not projecting above the top of the tub.

SECONDARY ACTION

- Check the lid actuator connections and operation in diagnostics.
- Check the yokes for jamming at the front and rear.

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.
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.
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.

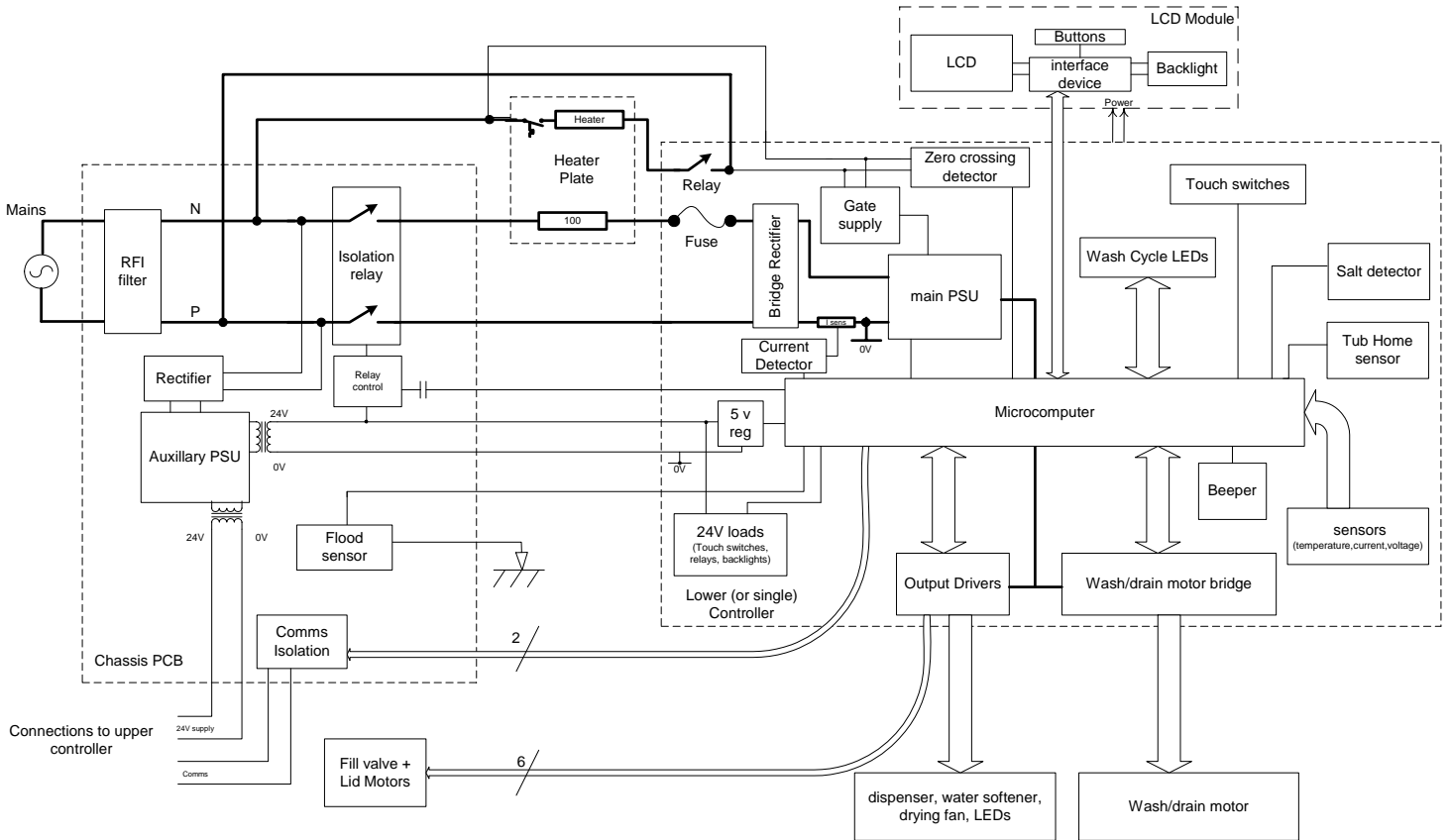
Customers Complaint - Glasses & Cutlery have a Cloudy White film on them and/or Plates have a White Chalky film on them	
Cause of problem.	Hard water and not enough detergent being used. Minerals from the water are building up on the dishes or the water softener is not set to the correct water hardness 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: 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. 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 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.

	<p>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</p> <p>C2 Water Softener Brine Pump Turn the brine pump on in diagnostics mode. Observe a small quantity of water (approx. 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.</p> <p>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.</p> <p>If the spray is inadequate, there will be insufficient water in the salt reservoir to make brine.</p> <p>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.</p> <p>To check that the amount of spray is appropriate:-</p> <p>Fill the salt reservoir with water.</p> <p>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.</p> <p>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.</p> <p>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.)</p> <p>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.</p>
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7 WIRING DIAGRAMS

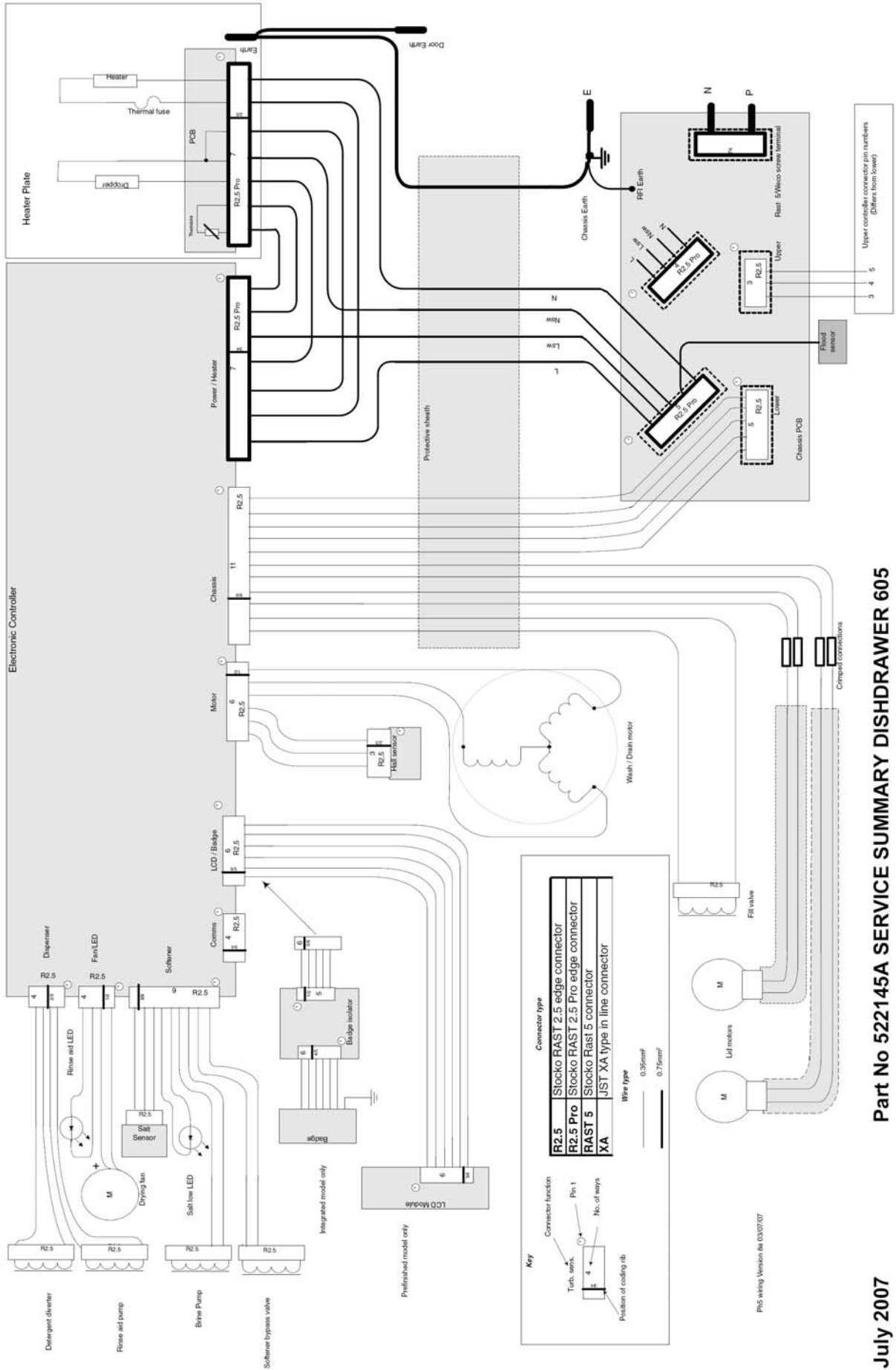
7.1 Power Distribution Concept

DD605 Power Distribution concept



7.2 Wiring Diagram

Phase 5 Dishdrawer Wiring Diagram (Lower drawer only shown)



Part No 522145A SERVICE SUMMARY DISHDRAWER 605

July 2007

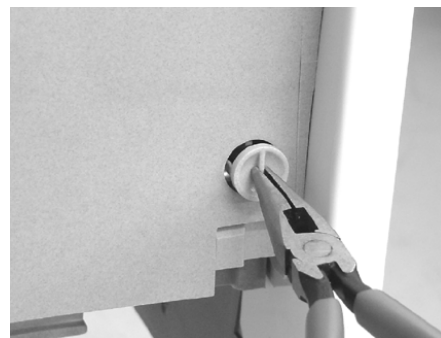
8 SERVICE PROCEDURES

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™.

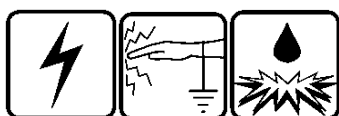
8.1 Drawer Front



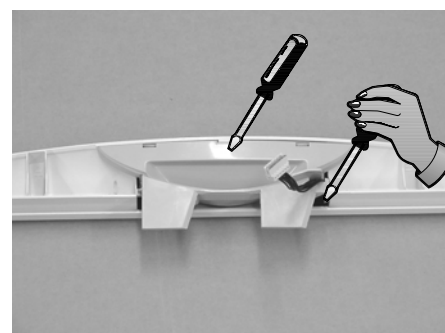
- 8.1.1 Open the drawer.
 - 8.1.2 Locate the drawer pins on either side of the tub.
If the pins cannot be accessed, remove the tub from the slide first (refer Section 8.3).
 - 8.1.3 Use pliers to pull on the pin and remove it. Support the drawer front with your hand while doing this to prevent it dropping onto the floor.
 - 8.1.4 With both pins removed, the bottom of the drawer front can now be eased forward slightly.
 - 8.1.5 Pull the drawer front down to free it from the handle and the top locating slots in the tub.
 - 8.1.6 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.)
 - 8.1.6 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.



8.2 Handle and LCD Display



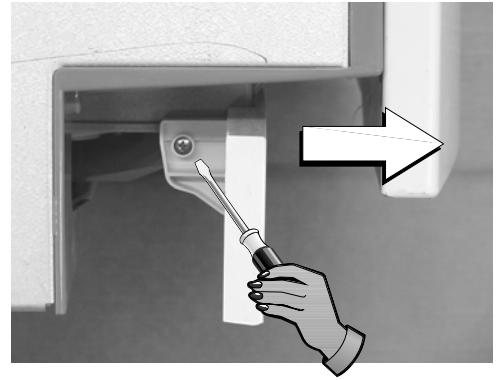
- 8.2.1 Remove the drawer front (refer Section 8.1).
- 8.2.2 Disconnect the LCD wire harness from the controller.
- 8.2.3 The handle slides onto the flange at the top of the tub. Push the handle from the right to the left to release it.
- 8.2.4 The handle may now be lifted clear by pulling it forwards.
- 8.2.5 The LCD display is held in place by a spring tab on one end and a clip in the centre. Use a small blade screwdriver to carefully release the tab and centre clip as shown. The LCD assembly can now be removed.
- 8.2.6 The wiring harness can now be unplugged from the LCD circuit board.
- 8.2.7 Refit in reverse manner.



8.3 Toe Kick Removal



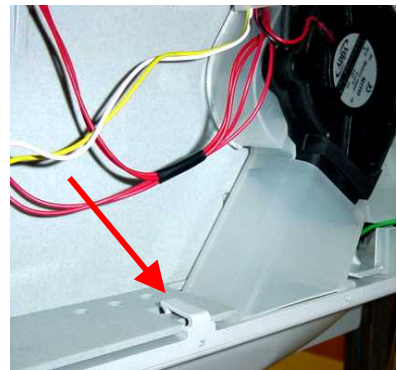
- 8.2.8 Partly open bottom drawer.
- 8.2.9 Loosen the right and left hand toe kick screws.
- 8.2.10 Slide the toe kick towards the front of the tub until it comes off the mounting rails.
- 8.2.11 Refit in reverse manner.



8.4 Lower Tub Cowling



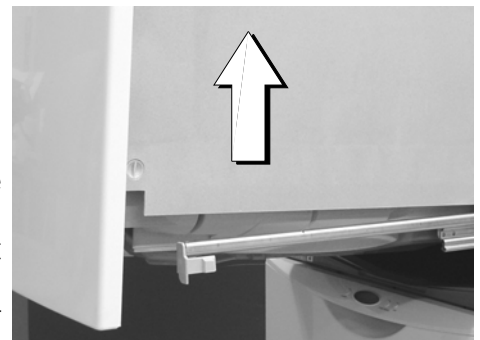
- 8.4.1 Remove the lower drawer front (refer Section 8.1).
- 8.4.2 Remove the toe kick (refer Section 8.3).
- 8.4.3 Release the centre clip as shown and slide the cowling forward.
- 8.2.4 Refit in the reverse manner



8.5 Tub Removal



- 8.5.1 Open the drawer.
- 8.5.2 Removing the drawer front (refer Section 8.1) makes it easier to slide the tub clips back (optional).
- 8.5.3 Top tub:- Depress the right-hand tub clip and push it back about 30mm (1 inch). Repeat for the left-hand side.
- 8.5.3 Bottom tub:- Remove the toe kick (refer Section 8.3) and cowling (refer Section 8.4), both optional.
If the cowling has not been removed, the tub clips needs to be pushed back about 130mm (5 inches) so that the slide clears the cowling when the tub is lifted off.
- 8.5.4 Lift the tub off the slides and push the runners back into the product.
- 8.5.5 Releasing the wire from the centre clip on the link assembly allows the tub to be moved further from the chassis (optional).
- 8.5.6 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.
- 8.5.7 Refit in reverse manner.



8.6 Drying Duct –top tub only



- 8.6.1 Open the drawer and remove the drawer front (refer Section 8.1).
- 8.6.2 Use pliers to gently release the plastic clips while pulling the duct down.



8.7 Drying Fan and Flap Valve



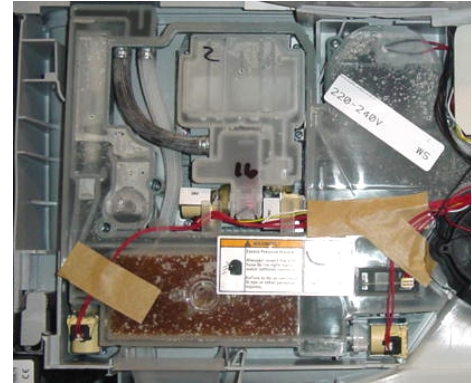
- 8.7.1 Remove the drawer front (refer Section 8.1).
- 8.7.2 With a small bladed screwdriver, carefully release the small plastic clips holding the rinse aid indication LED in place in the dispenser and remove the LED.
- 8.7.3 Release the rubber tabs securing the fan.
- 8.7.4 Disconnect the wire harness from the electronic controller.
- 8.7.5 The drying fan will now come free.
- 8.7.6 Refit in reverse manner.
- 8.7.7 The fan housing flapper can be replaced by removing the cover and lifting the flapper out of the housing.
- 8.7.8 To remove the cover, use a small screwdriver to depress the 2 clips at the rear, and slide it forward.



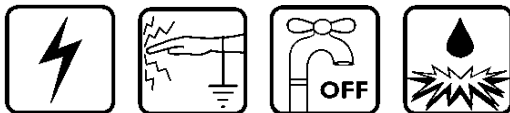
8.8 Water Softener (where fitted)



- 8.8.1 Remove the drawer front (refer Section 8.1).
 - 8.8.2 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.
 - 8.8.3 Use a flat blade screwdriver to open the salt level indicator LED cover, and remove the LED from the water softener.
 - 8.8.4 Unclip the fill hose and the dispenser hose from the water softener.
 - 8.8.5 Remove the four T10 torx drive screws securing the water softener to the tub.
 - 8.8.6 The water softener can now be removed from the product.
 - 8.8.7 To refit, place the overflow 'O' ring on the water softener and lubricate the tub overflow with a water-soluble lubricant e.g. Glycerol or similar.
 - 8.8.8 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.
 - 8.8.10 Place the water softener in the tub and apply enough pressure to seat the 'O' rings.
The overflow should sit almost flush with the inside of the tub.
The salt tank should be recessed by approx. 1mm from the inside of the tub.
 - 8.8.11 Refit the screws, hoses, harness connectors and LED.
- Important:** Whenever a water softener is replaced for a blocked pipe interrupter, replace the fill hose.



8.9 Detergent Dispenser



- 8.9.1 Remove the drawer front (refer Section 8.1).
 - 8.9.2 Disconnect the two wiring loom connections from the dispenser coils.
Note: Push back the locking tabs to allow the connectors to release.
 - 8.9.3 With a small bladed screwdriver, carefully release the small plastic clips holding the rinse aid indication LED in place and remove the LED.
 - 8.9.4 Use pliers to release the clamp and remove the fill hose from the dispenser.
 - 8.9.5 While holding the dispenser, unscrew the six T10 Torx drive screws securing the two brackets to the dispenser.
 - 8.9.6 The dispenser can now be removed from inside the tub.
 - 8.9.7 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.



8.10 Electronic Controller



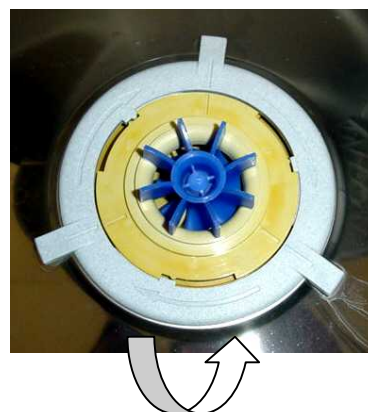
- 8.10.1 Remove the drawer front (refer Section 8.1) and the handle (refer Section 8.2) (optional).
- 8.10.2 Disconnect all the wiring connectors on the controller.
- 8.10.3 Use a flat blade screwdriver to release the clip on the right-hand side of the controller by firmly pushing it in towards the tub. Do not lever against the clip or there is a risk of breaking it.
- 8.10.4 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.
- 8.10.6 Refit in reverse manner, ensuring the controller is located correctly in behind the tub flange at the top.



8.11 Filter Plate



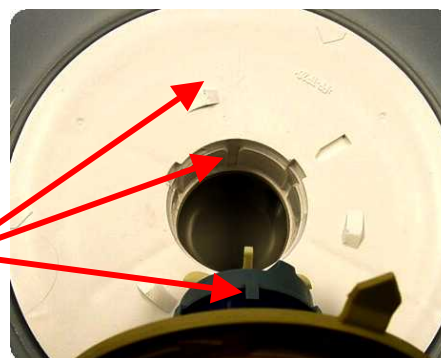
- 8.11.1 Remove the lower racks and baskets from the tub.
- 8.11.2 Remove the drain filter assembly.
- 8.11.3 Rotate the filter plate locknut anti-clockwise to release the filter plate from the rotor assembly.
Note: Over-rotating the locknut will also release the rotor.
- 8.11.4 Lift the filter plate clear.
- 8.11.5 Refit in reverse manner.



8.12 Rotor



- 8.12.1 Remove the filter plate (refer Section 8.11).
- 8.12.2 Rotate the rotor locking ring anti-clockwise to release it from the motor housing and lift out.
- 8.12.3 The rotor assembly is not serviceable and if damaged should be replaced.
- 8.12.4 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.

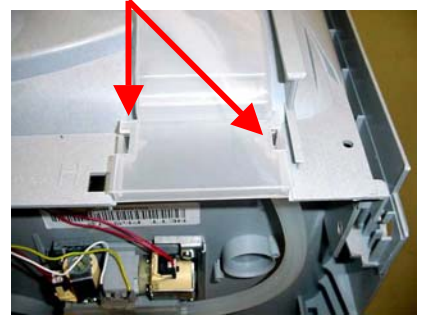


8.13 Wiring Cover

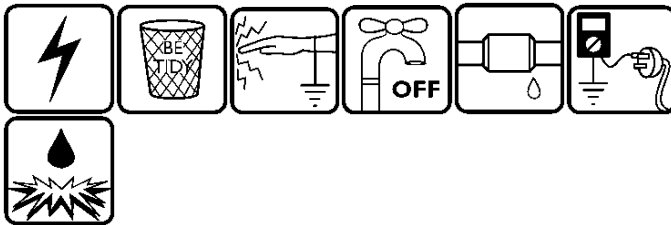


- 8.13.1 Remove the drawer front (refer Section 8.1).
- 8.13.2 With the drawer opened, remove the tub (refer Section 8.5).
- 8.13.3 Carefully release the four wiring cover clips from the front lower section of the tub, taking care not to damage them.
- 8.13.4 Release the three clips on the underside of the tub that attach the wiring cover to the motor assembly outer lock nut.
- 8.13.5 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).
- 8.13.6 The wiring cover may now be carefully moved forward and downward to release it from the rear of the tub.
- 8.13.7 To reassemble, first ensure that the wiring harnesses, drain hose and fill hose are located in their correct positions.
- 8.13.8 Then refit in reverse manner.

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



8.14 Tub Disconnection



- 8.14.1 Remove the drawer front (refer Section 8.1).
- 8.14.2 Remove the wiring cover (refer Section 8.13).
- 8.14.3 Disconnect the fill hose from the dispenser, or water softener if fitted (water may drip).
- 8.14.4 Disconnect the chassis harness plug from the controller.
- 8.14.5 Remove the wiring cover and the element connector cover.
- 8.14.6 Disconnect the element harness plug and earth wire from the element plate.
- 8.14.7 Unclip the drain hose cuff from the motor assembly, taking care not to misplace the non-return flap valve.
- 8.14.7 Unclip the drain hose, fill hose and the wiring loom from the under side of the tub.
- 8.14.8 Remove the tub.
- 8.14.9 Refit in reverse manner.

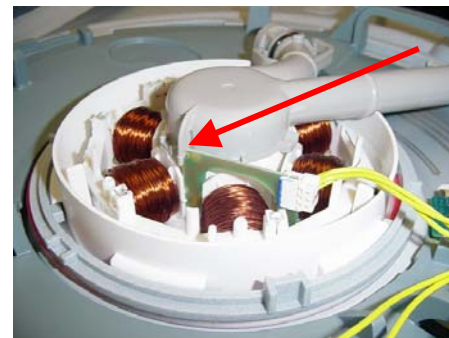
Note: When replacing a fill hose, drain hose or wiring harness, transfer the link support clip markings from the old parts to the new.



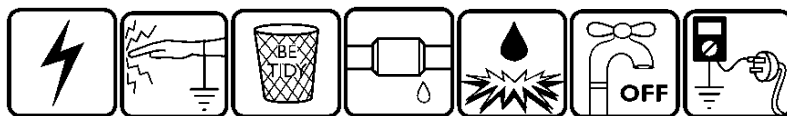
8.15 Hall Sensor



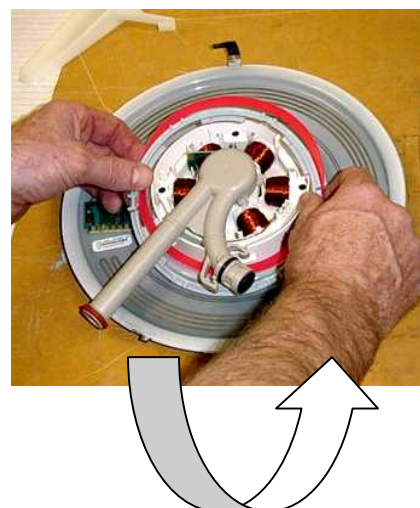
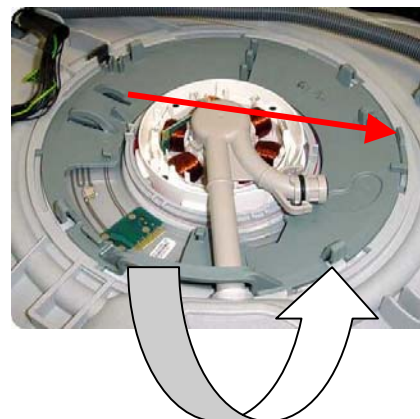
- 8.15.1 Remove the wiring cover (refer Section 8.13).
- 8.15.2 Unplug the wiring connection from the hall sensor.
- 8.15.3 Gently press the hall sensor locking tab in the direction shown and lift the hall sensor out.
- 8.15.4 Refit in reverse manner.



8.16 Heater Plate and Motor Assembly



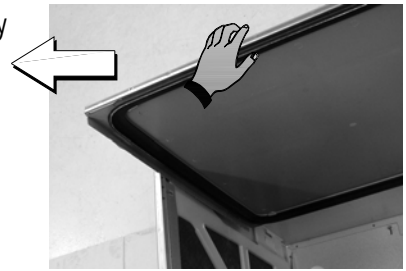
- 8.16.1 Remove the drawer front (refer Section 8.1), baskets, filter plate (refer Section 8.11) and rotor assembly (refer Section 8.12).
- 8.16.2 Remove the tub and turn it over by rotating it anti-clockwise (refer Section 8.5).
- 8.16.3 Remove the wiring cover (refer Section 8.13).
- 8.16.4 Remove the element connector cover and the element wiring connector.
- 8.16.5 Remove the drain hose and the heater plate earth wire.
- 8.16.6 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.
- 8.16.7 Take care not to damage any motor wiring as the locknut is turned, or the flap valve slot when the locknut is removed.
- 8.16.8 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.
- 8.16.9 Remove the inner locknut and motor shim to release the motor assembly from the heater plate.
- 8.16.10 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.
- 8.16.11 Check both the drain hose 'O' ring and the drain spigot 'O' ring for damage and replace them if necessary. Lubricate before reassembly.
- 8.16.12 Replace the flap valve.
- 8.16.13 Reassemble in reverse manner, ensuring all the locking ring tabs are engaged.



8.17 Lid



- 8.17.1 Remove tub assembly as per instructions in Section 8.5.
- 8.17.2 On the right-hand side of the lid, release the two tabs (one at the front, one at the rear) that clip the lid to the yoke, at the same time pulling the lid down. Repeat for the left-hand side.
- 8.17.3 The lid is now free to slide forward out of the chassis through the space provided in the trim.
- 8.17.4 Refit in the reverse manner taking care that the lid is fitted the correct way around. FRONT is printed on both sides on the top of the lid.



8.18 Yoke



- 8.18.1 Remove the lid (refer Section 8.17).
- 8.18.2 Release the lid actuator from the bottom of the yoke by pushing with your thumb against one of the locking tabs.
- 8.18.3 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.
- 8.18.4 Refit in the reverse manner taking care that the yoke is the correct way around.
- 8.18.5 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.

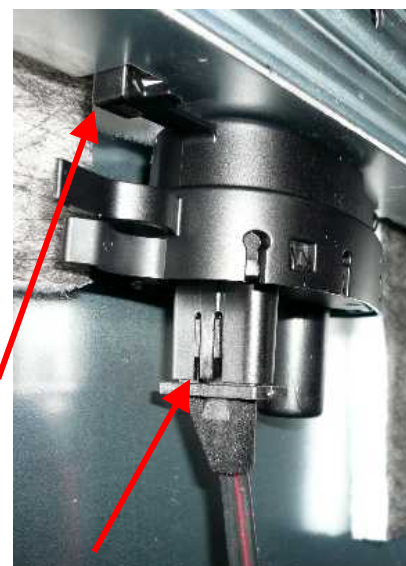


8.18 Lid Actuator



- 8.18.1 Remove the tub (refer Section 8.5).
- 8.18.2 Remove the lid actuator harness plug by releasing the clip on the lid actuator.
- 8.18.3 Release the lid actuator from the bottom of the yoke by pressing with your thumb against one of the locking tabs.
- 8.18.4 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.
- 8.18.5 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.
- 8.18.6 The lid actuator can now be removed by dropping it down through the slot in the slide mounting bracket.
- 8.18.7 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.

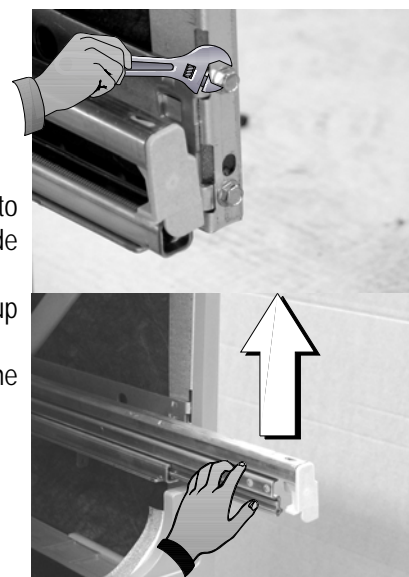
Note: It is important that all the clips on the lid actuator case are done up and that none are broken.



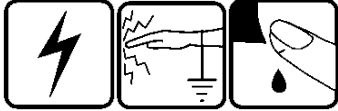
8.19 Slide Rail Replacement



- 8.19.1 Remove the tub (refer Section 8.5).
- 8.19.2 Remove the lid actuator from the slide rail (refer Section 8.18).
- 8.19.3 Bottom slide rails only. Remove the lower chassis trim (refer Section 8.24) to gain access to the screws. Remove the two hex drive screws securing the slide mounting bracket at the front.
- 8.19.4 Tap the slide rails from underneath at the front. This will knock the slide rail up and free from its location in the chassis.
- 8.19.5 The slide runner may now be pulled forward to release it from its location in the rear of the chassis.
- 8.19.6 Refit in reverse manner.
- 8.19.7 Take care to ensure the chassis is square before tightening these screws.



8.20 Mains Filter Cover and PCB Mains Filter



- 8.20.1 Remove lower tub (refer Section 8.5)
- 8.20.2 Release the clips on the mains filter cover and lift it off.
- 8.20.3 Disconnect all wiring to the PCB mains filter.
- 8.20.4 Remove the earth screw through the wire and the mains filter housing to the chassis.
- 8.20.5 Use a screwdriver to release the clips holding the circuit board inside the housing and lift it out.
- 8.20.6 Refit in reverse manner.



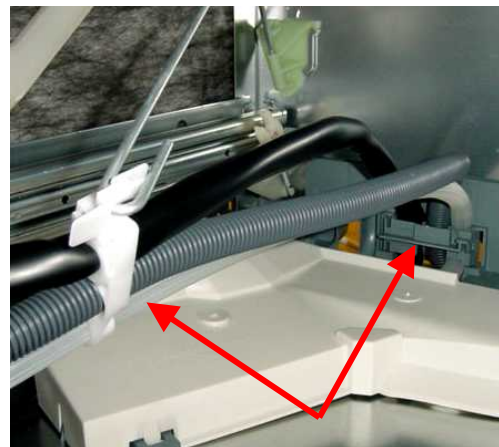
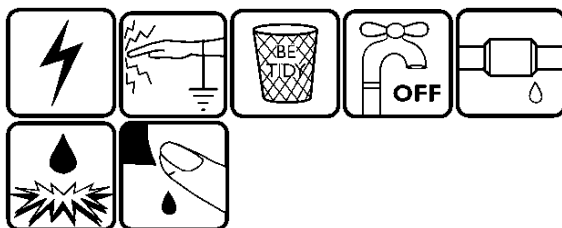
8.21 Water Inlet Valve



- 8.21.1 Remove the lower tub (refer Section 8.5).
- 8.21.2 Remove the mains filter cover (refer Section 8.20).
- 8.21.3 Partially lift the inlet valve up out of the housing.
- 8.21.4 Disconnect the inlet hose connection.
Caution; - water will drip
- 8.21.5 You can now slide the water valve up out of the housing.
- 8.21.6 Remove the connectors.
- 8.21.7 Mark which hose goes to the top on a double product.
- 8.21.8 Undo the black clips by pushing the ends apart sideways.
- 8.21.9 Remove the fill hoses.
- 8.21.10 Refit in reverse manner.



8.22 Fill Hose, Drain Hose, Wiring Harness Replacement



- 8.22.1 Remove the tub and turn it over by rotating it anti-clockwise (refer Section 8.5).
- 8.22.2 Remove the wiring cover (refer Section 8.13).
- 8.22.3 Disconnect the component you need to replace (e.g. fill hose, drain hose, wiring harness) from the tub.
- 8.22.4 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.
- 8.22.5 Refit in the reverse manner, ensuring the link and chassis clips are clamping the components in their correct location.

8.23 Link Support Wire Position



- 8.23.1 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.
- 8.23.2 To check the position of the wire, remove the tub, and remove the centre link clip from the wire.
- 8.23.3 Swing the wire to the left hand side of the chassis.
- 8.23.4 It should rest approx. 15mm (3/4") above the slide mounting bracket.
- 8.23.5 If not, carefully bend the wire while supporting it at the rear so as not to stress the mounting bracket.

8.24 Front Trim Replacement



- 8.24.1 Bottom tub only:- Remove the toe kick (refer Section 8.3) and cowling (refer Section 8.4).
- 8.24.2 Remove the drawer front (refer Section 8.1), handle (refer Section 8.2), and tub (refer Section 8.5).
- 8.24.3 Remove both the left hand and right hand yokes (refer Section 8.18). This is to prevent damaging the locating tab at the front of each yoke where it slides up into the rear of the trim.
- 8.24.4 Remove the trim by releasing the trim clips with long-nose pliers.
- 8.24.5 Refit in reverse manner.