

BOSCH SHP65TL5UC REPAIR INSTRUCTIONS



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1 SAFETY

1.1 General hazards

Don't use the dishwasher until it is completely installed. When opening the door on an uninstalled dishwasher, carefully open the door while supporting the rear of the unit. Failure to follow this warning can cause the dishwasher to tip over and result in serious injury.

In some conditions, hydrogen gas can form in a hot water system that has not been used for weeks. Hydrogen gas is explosive. Before filling a dishwasher from a system that has been off for weeks, run the water from a nearby faucet in a well ventilated area until there is no sound or evidence of gas.

Temperatures required for soldering and sweating will damage the dishwasher's base and water inlet valve. If plumbing lines are to be soldered or sweated, keep the heat source at least 6 inches (152.4 mm) away from the dishwasher's base and water inlet valve.

Removing any cover or pulling the dishwasher from the cabinet can expose hot water connections, electrical power and sharp edges or points. Handle with care. Always wear gloves and safety glasses.

1.2 Electrical shock / fire hazards

Don't allow electrical and water supply lines to touch. Don't work on an energized circuit. Doing so could result in serious injury or death. Only qualified electricians should perform electrical work. Don't attempt any work on the dishwasher electric supply circuit until you are certain the circuit is de-energized.

Make sure electrical work is properly installed. There should be no loose electrical connections. Ensure all electrical connections are properly made.

The customer has the responsibility of ensuring that the dishwasher electrical installation is in compliance with all national and local electrical codes and ordinances. The dishwasher is designed for an electrical supply of 120VAC, 60 Hz, connected to a dishwasher-dedicated, properly grounded electrical circuit with a fuse or breaker rated for 15 amps. Electrical supply conductors shall be a minimum #14 AWG copper only wire rated at 75°C (167°F) or higher.

This appliance must be connected to a grounded metal, permanent wiring system, or an equipment-grounding conductor must be run with the circuit conductors and connected to the equipment-grounding terminal or lead on the appliance. Don't use extension cords.

1.3 Plumbing / scalding hazards










Don't perform any work on a charged hot water line. Serious injury could result. Only qualified plumbers should perform plumbing work. Don't attempt any work on the dishwasher hot water supply plumbing until you are certain the hot water supply is shut off.

Use the supplied supply hose for water connections. Replacing the supply hose and connecting directly to the water inlet valve may damage the water inlet valve and cause a water leak if not done properly.

Check local plumbing codes for approved plumbing procedures and accessories. All plumbing should be done in accordance with national and local codes.

These instructions depict an installation method for stainless steel braided hose or PEX hot water supply lines. If using copper tubing or other material for water supply, defer to a licensed plumber for proper installation.

1.4 Safety warning symbols

Symbol	Meaning
	General warning information
	Danger of electric shock
	Risk of being cut
	Risk of crushing
	Hot surfaces
	Risk of explosion
	Strong magnetic field
	Non-ionizing radiation
	Risk of fire

1.5 Safety warning levels

Identification	Meaning
DANGER	Imminent danger which may result in death or serious injury if not avoided.
WARNING	Potentially imminent danger which may result in death or serious injury if not avoided.
CAUTION	Potentially imminent danger which may result in minor injury or damage to property if not avoided.

2 INSTALLATION

⚠ WARNING

Avoid Scalding or Electrical Shock Hazard!
Make sure the water supply and electrical supply are shut off before installation or service.

NOTE: The following installation instructions include excerpts from instructions packed with dishwashers and aren't a complete set of instructions. Follow the installation instructions included with dishwashers completely.

2.1 Pre-Install checklist

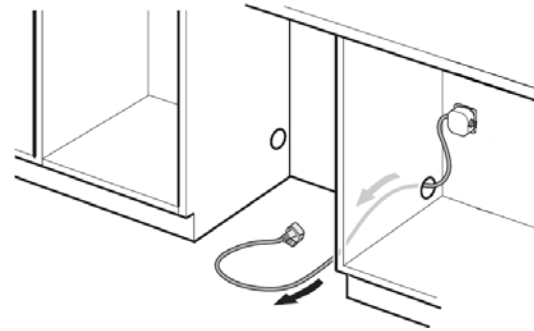
- Unpack and inspect dishwasher for shipment damage. Retain packing material until installation is successful. Remove packing material from inside the dishwasher.
- Inspect parts to ensure you have all the necessary materials.
- Flush household hot water supply for at least two minutes.
- Measure the enclosure area. The opening must be at least 34" (87 cm) high and 23-5/8" (60-61 cm) wide.
- The opening must be close enough to the sink for water line and drain hose plumbing access.
- Unit must be installed close enough to the sink so that drain hose length does not exceed 92" (234 cm) and a high loop is raised at least 33" (81 cm) above the floor.
- Wooden cutouts must be sanded smooth and metal cutouts must be covered by a protective gasket.
- Is your water heater set at 120°F (49°C) and does water pressure measure 15-145 psi (1-10 bar)?
- If installing in a corner, the dishwasher door must clear cabinet hardware.
- Determine mounting method based on dishwasher model and countertop type, whether top or side mount.

2.2 Electrical connection

Install the dishwasher according to the NATIONAL ELECTRICAL CODE in the United States or the CANADIAN ELECTRIC CODE C22.1-latest edition in Canada as well as any provincial/state or municipal or local codes that apply.

2.2.1 Electrical supply

The dishwasher is designed for an electrical supply of 120VAC, 60 Hz, connected to a (dishwasher) dedicated, properly grounded electrical circuit with a fuse or breaker rated for 15 amps. Electrical supply conductors shall be a minimum #14 AWG copper wire rated at 75°C (167°F) or higher.



2.2.1.1 Installations with receptacles (outlets)

If there is an existing outlet, a power cord can be used, as long as the outlet and cord each meet national and local codes. An optional power cord is available, which plugs into the power module and replaces the junction box with cord provided with the dishwasher (SMZPC002UC – service # **747210**).

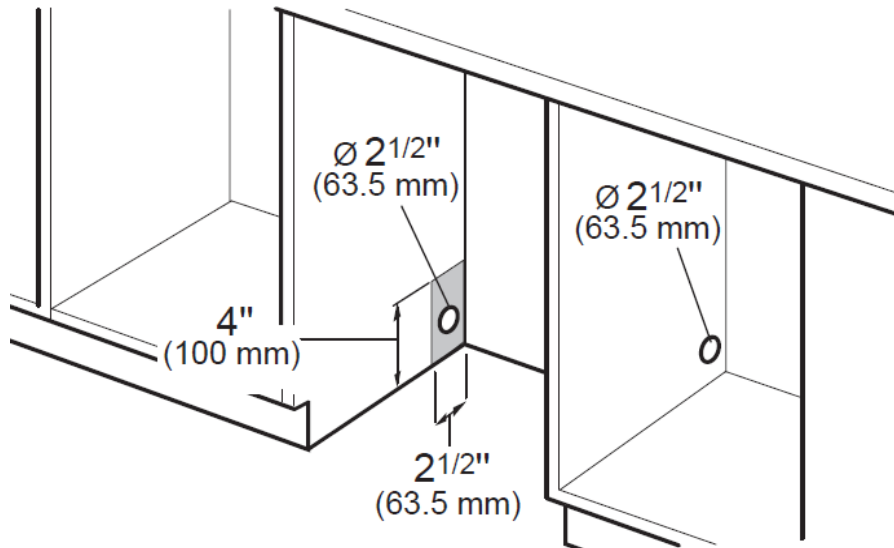


2.2.2 Electrical Installation



Turn power off at the fuse box. The dishwasher electrical supply junction box and dedicated receptacle must in an accessible cabinet adjacent to the dishwasher (i.e. do not mount the junction box or install a receptacle behind the dishwasher).

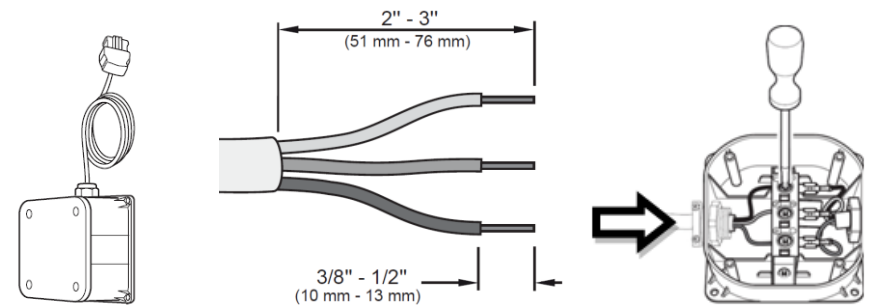
You will need a 2-1/2" (63.5mm) round cutout through the cabinet to pass the electrical, water and drain lines through. If the cutout is made through wood, sand it smooth. If the opening is made through metal, use the included protective grommet or other approved method to protect wiring from damage. Use the four (4) screws in the parts bag (or appropriate fasteners) to securely mount the junction box so it can be easily accessed.



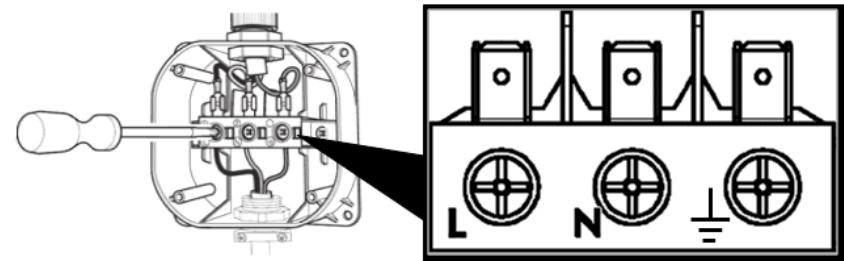
2.2.2.1 Hard-wire connections to supplied junction box

Connect the electrical supply as follows:

- Make sure the household receptacle meets the electrical supply requirements as well as national and local codes.
- First strip outer casing of electrical wire to expose 2" - 3" (51 - 76 mm) of inner wires, then strip 3/8" - 1/2" (10 - 13 mm) insulation from each wire.
- Insert the electrical wire through the provided strain relief in the junction box and tighten the nut to secure it.

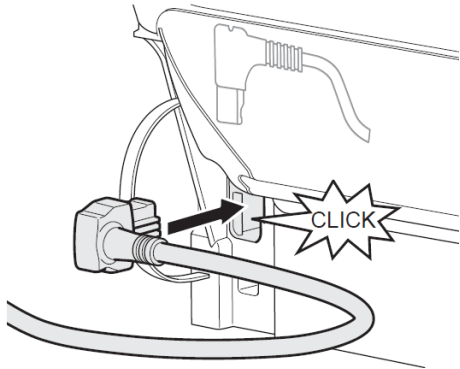


Attach wires to terminal block: black – **L** (hot), white – **N** (neutral) & green – \perp (ground). Unscrew terminal screws, *but don't loosen or remove them as they may become damaged.* Insert wires into terminals and tighten screws onto wires snugly, *but don't overtighten.* Attach cover to junction box with the four (4) screws.



2.2.2.2 Connections to power module

When completed with either method, plug the dishwasher power cord into the rear of the power module until it “clicks”.



⚠ WARNING

Avoid Electrical Shock Hazard

To avoid possible injury or property damage, care should be exercised when the dishwasher is installed or removed to reduce the likelihood of damage to the power cord.

2.3 Water connection

Install according to national and local codes.

2.3.1 Hot Water Supply

The hot water heater should be set to deliver approximately 120° F (49° C) water to the dishwasher. Water that is too hot can cause some detergents to lose effectiveness. Lower water temperatures will increase run times. The hot water supply pressure must be between 15 - 145 psi (1 - 10 bar).

2.3.2 Installation

- Install an easily accessible shut-off valve (not supplied) in the hot water supply line. If using a solder joint instead of a compression fitting, be sure to make all solder connections before connecting the water supply line to the dishwasher.
- Make sure there are no sharp bends or kinks in the water line that might restrict water flow.
- Always use the appropriate seal when making plumbing connections.
- Before connecting the water supply line to the dishwasher, flush the incoming water line for approximately 5 minutes to clear any foreign material.
- Attach the hot water line to the supply hose and route it behind the unit toward the hot water connection, using the base side straps to secure the hose. Make sure the line doesn't contact any moving parts. Don't overtighten fittings.
- After connections have been made, turn the hot water supply on and check for leaks.

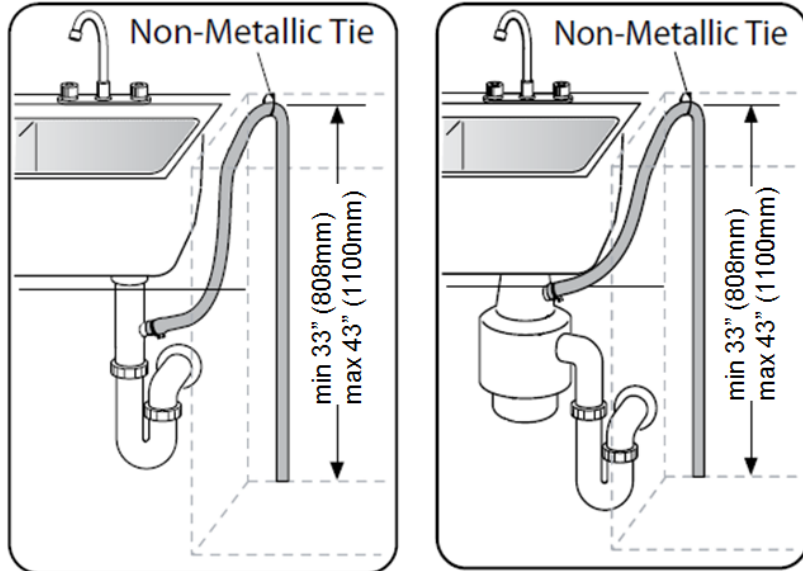
2.4 Drain hose connections

Plumbing installations will vary - refer to local codes. The maximum length of the drain hose (with drain extension kit **SGZ1010UC** / service # **663105**) is 150" (381 cm). Make sure a high loop is raised at least 33" (81 cm) above the floor.

2.4.1 The four basic drain connections

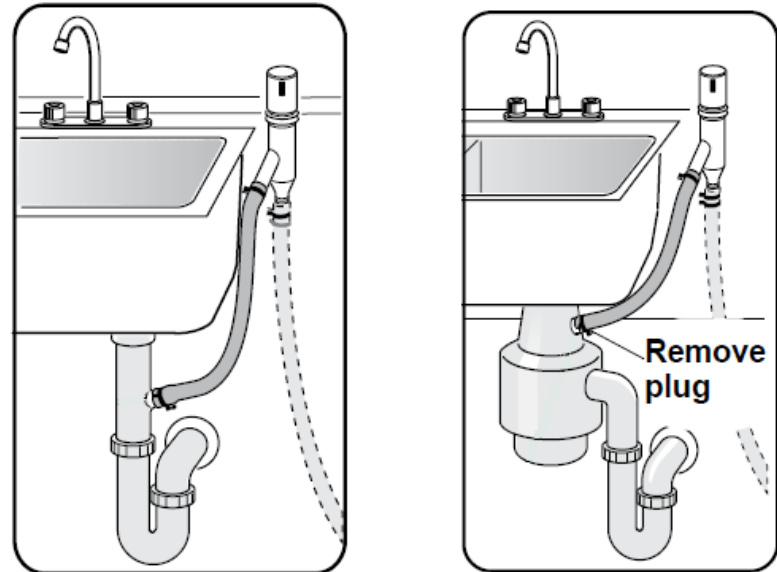
There are four (4) basic connections (shown below and on next page). You will need a 1-1/4" diameter hole to pass the drain hose through the cabinet.

1. Directly to sink drain, without air gap
2. Directly to garbage disposal, without air gap
3. Directly to sink drain, with air gap
4. Directly to garbage disposal, with air gap



CAUTION: To avoid drain hoses getting clogged, use only drain extension hose kit **SGZ1010UC** (service # **663105**).

CAUTION: *Always* use a non-metallic tie to support the drain hose to provide the high loop. A metallic tie can be heated by hot water and melt / cut a hole in the drain hose, causing leaking.



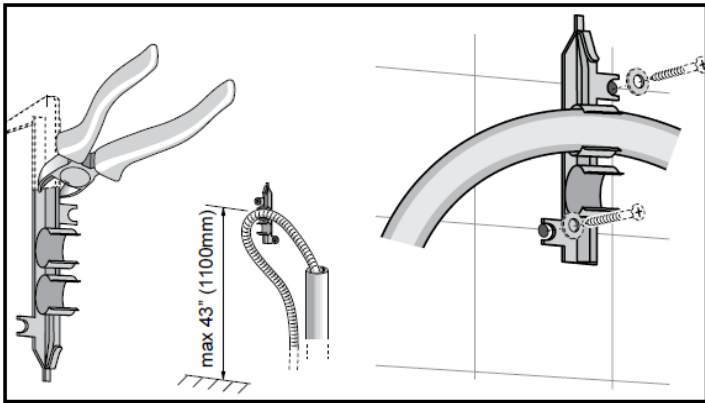
TIP: Make sure the garbage disposal plug is removed before installation. Plugs have been left in, preventing draining.

Drain hose has its own adapter – connect directly to plumbing connection and secure with supplied hose clamp.

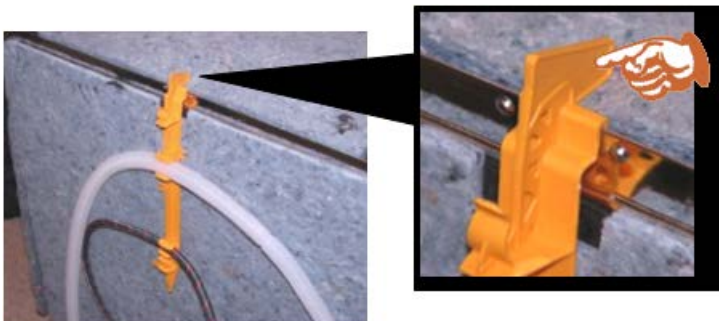
CAUTION: For installations with a Johnson Tee, the Johnson Tee must be installed in the wall behind the dishwasher, no more than 50" (at its maximum height) above the floor. The connection must be 3/4" minimum – 1/2" must not be used. Dishwasher drain hose extensions must not be used.

2.4.2 Drain hose support bracket

A bracket is provided to support the drain hose behind the dishwasher. It is be used to provide the high loop for proper draining.



⚠ TIP: The bracket extends above the top of the dishwasher to insure it's removed (from the dishwasher) and used to create a high loop. The dishwasher cannot be installed under a countertop with the bracket still attached.

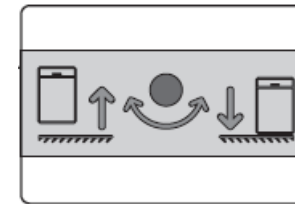


2.5 Leveling dishwashers

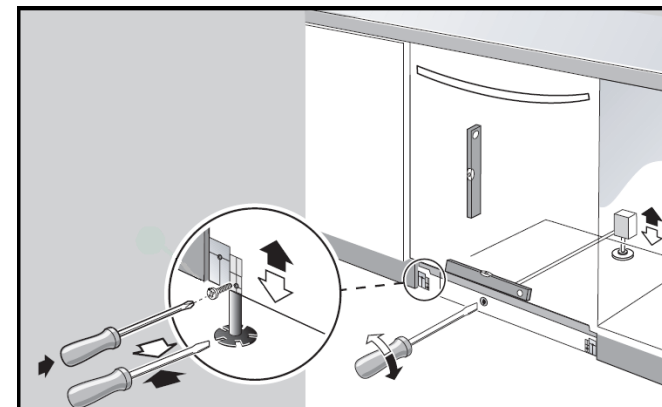
- Using a level, level the dishwasher horizontally by turning the front feet clockwise to raise it or counter-clockwise to lower it.



- Using a level, level the dishwasher vertically by turning the center screw (for the rear foot) to raise or lower the back.



- Once the dishwasher is level, screws can be used to lock the feet in position.

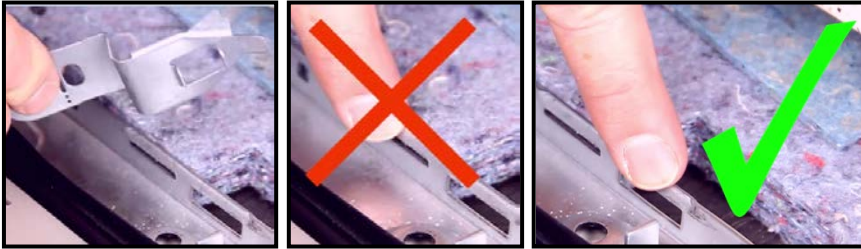


2.6 Attaching mounting brackets

Top mounting is used for countertops made of wood or other materials that can be easily drilled. Side mounting is used for countertops made of marble, granite, or other hard materials that cannot be easily drilled.

2.6.1 Attaching mounting brackets to dishwashers

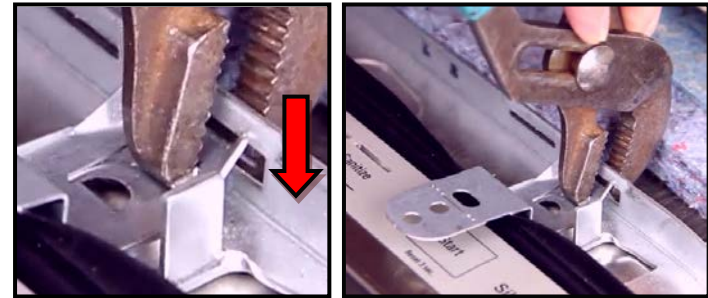
- Mounting brackets have a tab to be inserted into tank flange slots. Use the taller slots on the outside of tanks, not the shorter slots inside of those “outside” slots.



- Insert the bracket tab into the correct slot and snap the bracket down into the tank.



- Crimp the bracket tab downward with pliers to fix the bracket in place.



2.7 Installing toe kicks

Depending on the model, toe kicks may or may not have mounting brackets. Toe kicks without mounting brackets are screwed directly into the dishwasher base.

- For dishwashers with mounting brackets, slide brackets into dishwasher base and fasten with supplied screws.



- Tilt top of toe kick up behind outer door and drop bottom of toe kick in place next to mounting brackets or dishwasher base.
- Fasten toe kick in place with two (2) supplied Phillips #2 screws.
- Snap decorative plastic screw caps over screw heads.

3 OPERATION

3.1 Control layout



SHP68T5



SHE53T5

3.2 Using controls

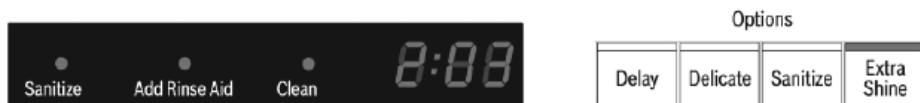
Press the *On / Off* button to turn on the dishwasher. The light over the last selected wash cycle will display. To use a different wash cycle, press its cycle button. Choose any desired options by pressing their buttons. To start any wash cycle, press the *Start* button.



3.2.1 Digital display

3.2.1.1 Front fascia panel display

The front fascia panel digital display shows the status at each point during the wash cycle, shows when the wash cycle has completed and displays a reminder to add rinse aid.



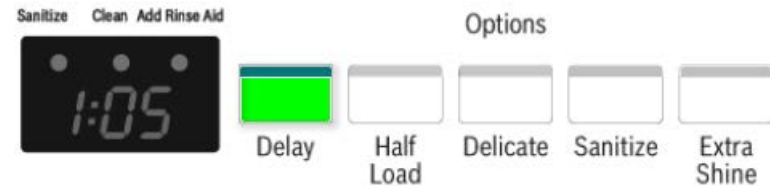
3.2.2 Features

The *Sanitize* light in the display comes on after the *Sanitize* option was chosen with *Heavy*, *Auto* or *Normal* cycles when the cycles have finished, showing dishes have been sanitized according to NSF standards. The *Sanitize* option isn't available with *Delicate*, *Speed60* or *Rinse* cycles.

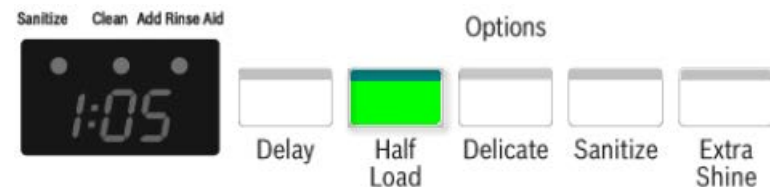


The *Add Rinse Aid* light in the display shows rinse-aid needs to be added.

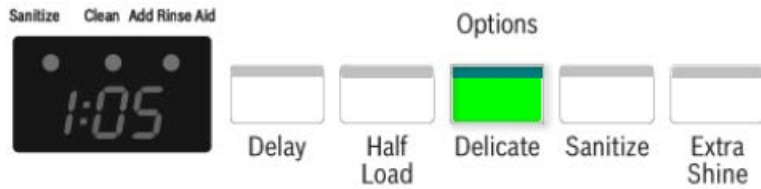
Delay is similar to *Delay Start*, allowing wash programs to be started later, anywhere from 1 – 24 hours.



Half Load shortens wash programs by directing water to the top rack, saving time and energy. It's useful for small, lightly soiled loads (up to around 1/2 of the dishwasher capacity).

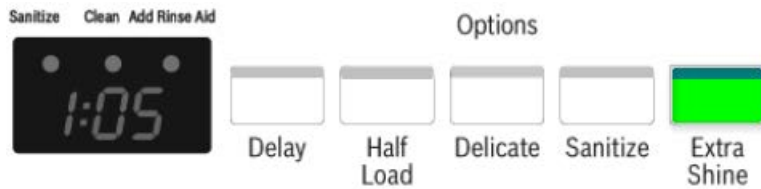


The *Delicate* option can be chosen only with *Heavy*, *Auto* and *Normal* cycles. It's best used for lightly soiled items.



TIP: The dishwasher automatically defaults to *Auto* when turned off and back on. If the *Sanitize* option was used in the last cycle, the dishwasher will default to *Auto* with the *Sanitize* option selected.

The *Extra Shine* option can be chosen with any wash cycle except *Rinse*. It raises the rinse temperature and extends the drying time to further enhance drying.



3.3 Resetting the dishwasher

To reset the dishwasher or cancel a wash cycle, press and hold the *Start* button for about three (3) seconds until **the** display shows "0:01". Close the door and wait about one minute for the dishwasher to stop draining and for the display to show "0:00". Turn the dishwasher off (by pressing the *On / Off* button) after it stops draining.

3.4 Interrupting a cycle

To **interrupt** a wash cycle, press the *On / Off* button to turn the dishwasher off. To resume the wash cycle, press the *On / Off* button again to turn the dishwasher on.

3.5 Changing basic settings

Intensive Drying feature can be turned on or off, **End of Cycle Tones** can be changed and **rinse-aid dosage** can be changed using dishwasher controls.

NOTE: For SHP / SHX / SHV models with hidden controls, the door must be opened before changing settings and closed after changing settings.

3.5.1 Intensive Drying ("Extra Dry")

Intensive Drying provides a higher temperature during the final rinse to improve drying. It may cause a slightly longer running time.

Press the *On / Off* button to turn the dishwasher on. While pressing and holding the "A" button (*below*), press and hold the *Start* button until the display shows "d:00". Release both buttons.



Press the "C" button (*above*) to turn **Intensive Drying** on or off ("d:01" = *On* and "d:00" = *Off*). Press the *Start* button to save the setting.

3.5.2 End of Cycle Tones (SHX / SHV models)

Press the *On / Off* button to turn the dishwasher on. While pressing and holding the “A” button (*below*), press and hold the *Start* button until the display shows “d:00”. Release both buttons.

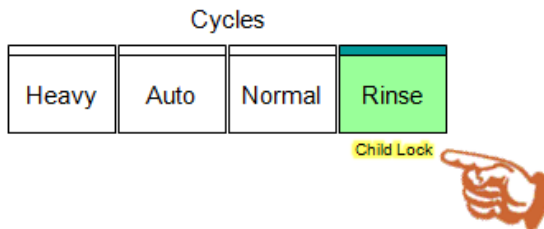


Press the “A” button (*above*) until the display shows “b:02”. Press the “C” button (*above*) repeatedly to make the tone louder or softer (“b:00” = *Off* and “b:03” = loudest). Press the *Start* button to save the setting.

3.5.3 Child Lock (selected models)

3.5.3.1 To activate the child lock:

Press the *On / Off* button to turn the dishwasher on. Press any wash cycle, then press the *Start* button to start the cycle. Press and hold down the button with “*Child Lock*” printed underneath it for approximately four (4) seconds until the display reads “CL”. As long as the display shows “CL”, the wash cycle won’t be changed or reset if any button is pressed.



3.5.3.2 To deactivate the child lock:

Press and hold the “*Child Lock*” button for around 4 seconds until the display no longer reads “CL”.

3.5.4 Changing rinse-aid settings (selected models)

The amount of rinse aid dispensed can be set from “r:00” (*off*) to “r:06” (*max.*).

Press the *On / Off* button to turn the dishwasher on. While pressing and holding the “A” button (*below*), press and hold the *Start* button until the display shows “d:00”. Release both buttons.



Press the “A” button (*above*) until the display shows “r:05”. Press the “C” button (*above*) repeatedly to scroll through the settings below:

- “r:00” = dispenser is *Off*
- “r:01” = lowest setting
- “r:02” = low setting
- “r:03” = medium setting
- “r:04” = medium-high setting
- “r:05” = high setting
- “r:06” = highest setting

Press the *Start* button to save the setting.

3.5.5 Displays affected by “0” rinse-aid settings

If the *rinse-aid* setting on the control is set at “r:00” (“none”), dishwashers will raise drying temperatures and lengthen wash cycles to compensate for not using rinse-aid. When customers complain about longer cycle times, check the *rinse-aid* setting on the control – if it is “r:00”, change it to a desired setting.

3.6 Dishwasher set up

Many dishwasher settings can be changed on the fascia panel and will be stored in memory until changed again.

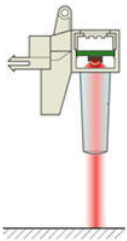
3.6.1 Explaining settings

3.6.1.1 Auto Power Off

To save energy, the *Auto Power Off* feature turns the dishwasher off 1 minute after the wash cycle ends. It can be turned off or changed to turning off the dishwasher two (2) hours after the cycle ends.

3.6.1.2 Info Light (selected models)

A **red** or **blue** light (*LED*), depending on the model, shines on the floor to indicate the dishwasher is running. The door shouldn't be opened until the light has gone out.



3.6.2 To enter mode to change settings

Press the *On / Off* button to turn the dishwasher on. While pressing and holding the “**A**” button (*below*), press and hold the *Start* button until the display shows “**d:00**”. Release both buttons.



3.6.3 To select and change settings

To select the setting to be changed, press button “**A**” to scroll through possible selections (*see chart below*). To change the value of the chosen setting, press button “**C**” repeatedly until the desired value is chosen.

Setting	Value	Description
Hot water connection	A:00 – A:01	<i>On or off</i> Factory setting: A:00 = Off
Water hardness	H:00 – H:07	8 ranges Factory setting: H:04
Extra Dry	d:00 – d:01	<i>On or off</i> Factory setting: d:00 = Off
Rinse-aid	r:00 – r:06	6 ranges & <i>none</i> Factory setting: r:05
End of Cycle Tone	b:00 – b:03	3 ranges & <i>off</i> Factory setting: b:02
Language	L:01 – L:23	23 languages Factory setting: L:01 = German
Auto Power Off	P:00 – P:02	P:00 – Dishwasher doesn't turn off automatically P:01 – Dishwasher turns off after 1 minute P:02 – Dishwasher turns off after 2 hours Factory setting: P:01
Emotion Light (selected models)	E:00 – E:01	<i>On or off</i> Factory setting: E:01 = On
Time Light (selected models)	S:00 – S:01	<i>On or off</i> Factory setting: S:01 = On
Info Light (selected models)	I:00 – I:01	<i>On or off</i> Factory setting: I:01 = On

3.6.4 To exit and save settings

Press the *Start* button.

3.7 Sales demo mode (showroom)

3.7.1 Preparing dishwashers

Do **NOT** disconnect drain pumps when using sales demo programs. Dishwasher controls run safety checks – if drain or heat pumps are disconnected, dishwashers will **NOT** run.

No disconnections are needed – just add one (1) gallon of water (with bacteria stat) to dishwasher tanks. Heat pumps will run and lights will light when program buttons are pressed. Drain pumps do not run. It's not necessary to plug drain hoses, but it's a good practice to prevent any possible water leakage.

3.7.2 Entering the sales demo mode program

- If the dishwasher needs to be reset, turn it on and off again. The dishwasher must be off to enter the program.
- While pressing and holding both the “B” and “C” buttons (*below*), press and hold the *On / Off* button (to turn the dishwasher on) until the display shows “P0”. Release all buttons.
- To enter the sales demo mode program, press the “B” button repeatedly until the display shows “P7”.



3.7.3 Running the sales demo mode program

- Press the “C” button (*below*) to start the customer service test program. The display will show “1:23”.
- To run the sales demo mode program:
 - *For front button models* – open and close the door.
 - *For top button models* – close, then open, then close the door (i.e. close the door twice and open it once).




3.7.4 Exiting the sales demo mode program

- For top button models (*only*), open the door.
- Reset the sales demo program by pressing and holding the *Start* button for three (3) seconds. The display will show “0:01”.
- Turn the dishwasher off to exit the program.



4 COMPONENTS

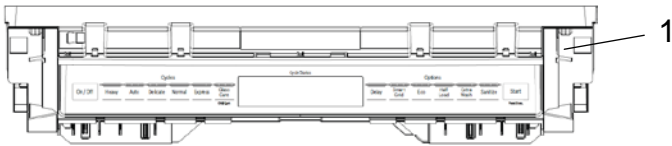


HINT:  = A video is available on QF. There is no link for this icon – clicking onto it doesn't take you to the video.

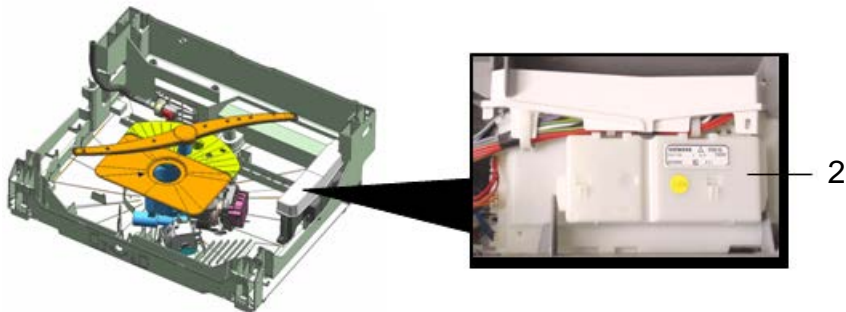
4.1 Operating and power modules

4.1.1 Descriptions

Dishwashers have two control modules, an operating module (with display, lights & buttons) in the fascia (control) panel and a power module in the base on the right side. The power module controls the BLDC drain and heat pumps.



1. Operating module (in fascia panel).
2. Power module (in base).



The wire harness connected to the control module is a separate harness.

4.1.2 Capa-Touch (Series 500/800)

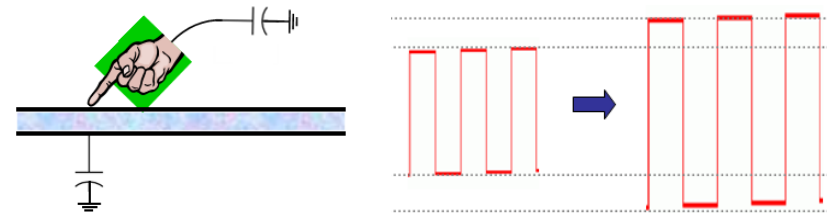
Series 500 / 800 operating modules don't have physical buttons, using *Capa-Touch* (capacitive touch) buttons.

There are 14 buttons, with a sensor underneath each one. The capacitance over each button sensor is calibrated to the fascia panel.



Fascia panels use “dielectric” plastics, which do not conduct electricity, but become polarized in an electric field. Positive (“+”) charges move toward the field and negative (“-”) charges move away from the field, making fascia panels store charges like plates of a capacitor.

Human fingers have an innate capacitance, which change the button capacitance. When a finger touches a button, the sensor senses a larger capacitance, measured by the control.

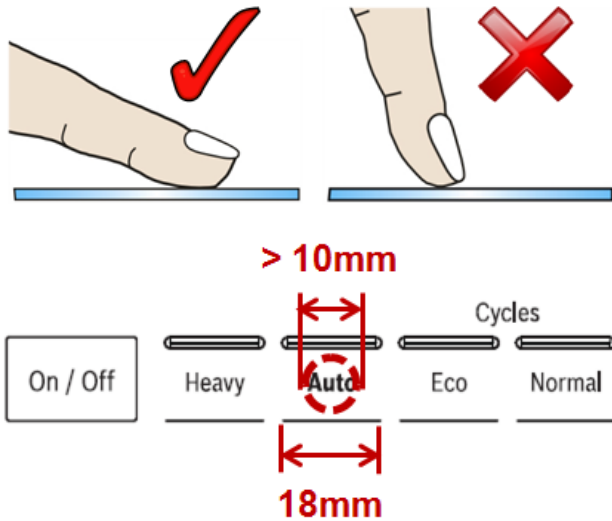


- The capacitance is affected by fascia panel trim, printing, thickness and materials. To insure a consistent response, each operating module has software programmed to adjust to it's panel.

- Any film on the display will affect button capacitance and operation, so it's critical displays are wiped clean.
- Because the system is based on human finger capacitance, it doesn't detect well when gloves are worn.
- A tone sounds whenever a button is touched, confirming a button has been touched. This tone cannot be disabled and alerts customers when buttons have been pressed accidentally.
- To be able to turn dishwashers on, displays are always "live" ("hot"), with a bias voltage of 14.4 VDC. When the "on/off" button is pressed, the entire operating module turns on.



HINT: To insure button operation, the user's finger pad should be used instead of the finger tip. The button needs a capacitive surface of at least 10mm and the finger pad provides a much larger surface area.



CAUTION: Using harsh cleaners can damage capacitive touch displays.



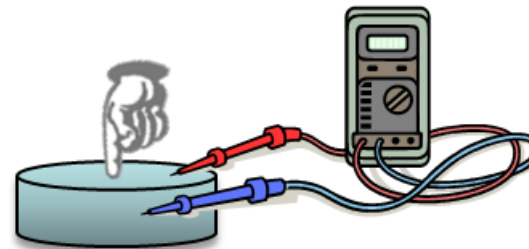
CAUTION: Not wiping water from capacitive touch displays can cause buttons to activate. Displays should be dry-wiped whenever possible. If liquid cleaners are used or if liquids are spilled on displays, displays must be dried off immediately afterward.



4.1.3 Piezo-electric (SHE8PT / SHX8PT)

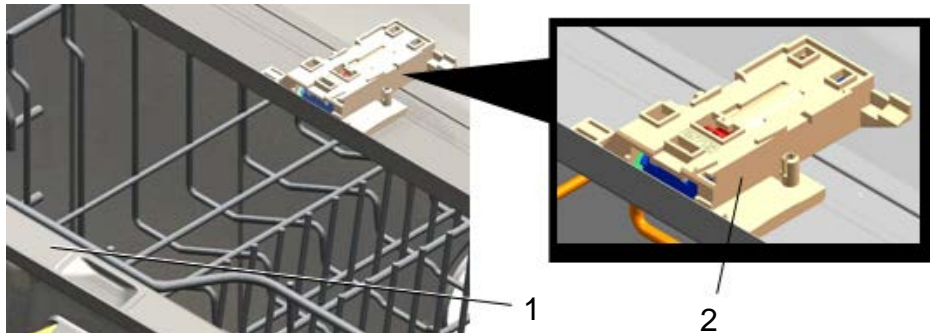
Unlike capacitive touch buttons, these buttons work on a piezo-electric principle. Piezo-electric materials (e.g certain crystals) respond to pressure, producing a small electric current when pressed. Piezo-electric sensors are widely used as pressure sensors.

Sensors don't get squeezed down, but respond to higher pressures.

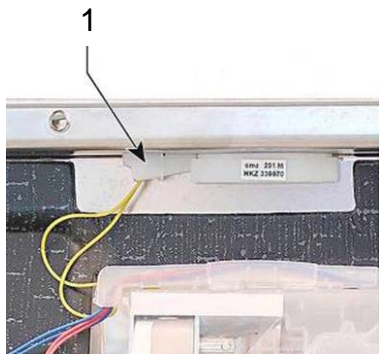
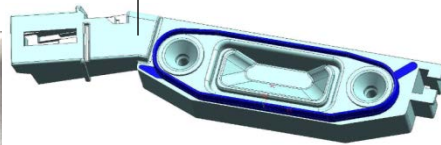


4.2 Door latch

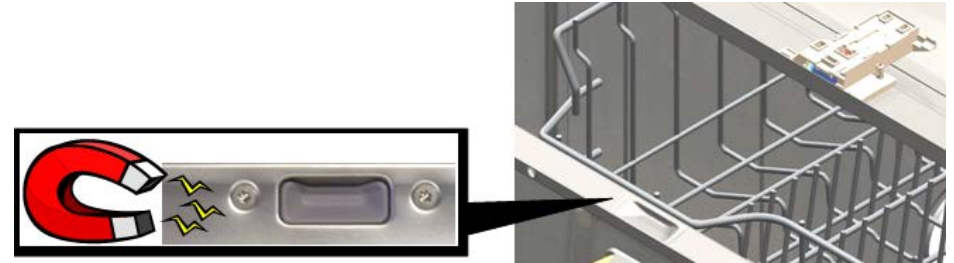
The door latch on top of the tank has a magnet sensed by a Hall-effect sensor in the door to determine if the door is open or closed. The Hall-effect sensor is held by two T-10 Torx screws and the door latch is held by two crimped tank tabs.



1. Hall effect sensor
2. Door latch



The dishwasher won't start if the door isn't closed securely or if the door latch is misaligned. Push the door closed until the door latch closes (i.e. until the latch clicks). If the dishwasher starts, educate the customer on closing the door securely.



If the dishwasher won't start when the door has been securely closed, check the door latch with a magnet. Hold the magnet over the Hall Effect sensor (located just left of the left screw) – if the dishwasher starts, the sensor didn't sense the door latch magnet.

Occasionally a door can catch on the door seal and not close securely. If the door, door latch or door seal is misaligned, realign it. If the door latch is broken, replace it.

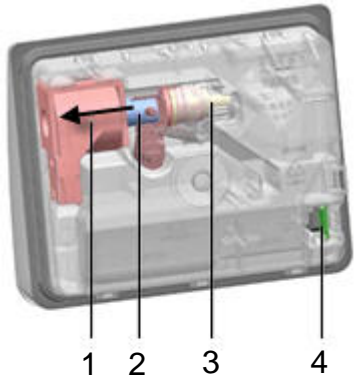
4.3 Dispenser



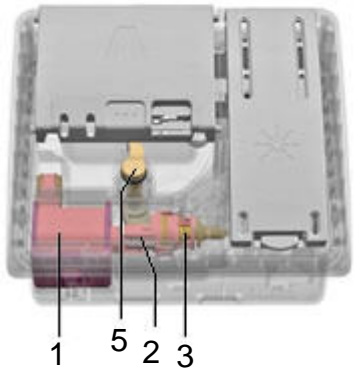
The dispenser, located in the middle of the inner door, reliably dispenses detergent and rinse-aid.



During each wash program, the dispenser operates twice, once to dispense detergent and again to dispense rinse-aid.



1. Coil
2. Actuator
3. Rinse-aid pump
4. Optical rinse-aid sensor
5. Cover release lever



The coil (1), powered by 165 VDC pulses from the control, moves the detergent cover actuator (2) to the left. A plastic link turns, rotating the detergent cover release lever (5), which opens the detergent cover.

A mechanical link between the coil actuator and rinse-aid valve prevents rinse aid from being dispensed when the coil is 1st actuated. After the detergent cover has opened, the link moves and latches in place, allowing the rinse-aid pump to dispense rinse aid.

Each 165 VDC control pulse dispenses 1 ml of rinse aid – the total amount depends on the dispenser setting. A vent equalizes internal pressure to dispense rinse-aid accurately.

The actuator is “reset” when the detergent door is opened so the detergent cover opens first the next time the coil is activated.

Detergent tablets dissolve more slowly if there’s moisture left in the detergent dispenser. Two plastic ribs in the detergent cup prevent detergent tablets from “sticking” to the cup.



CAUTION: Inner door edges are sharp! Cover inner door edges and remove dispenser carefully.

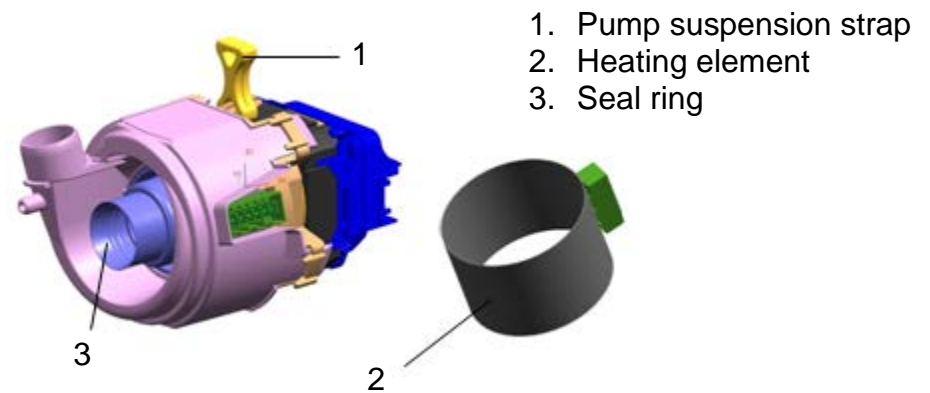
4.4 Heat pump

4.4.1 Heat pump basics

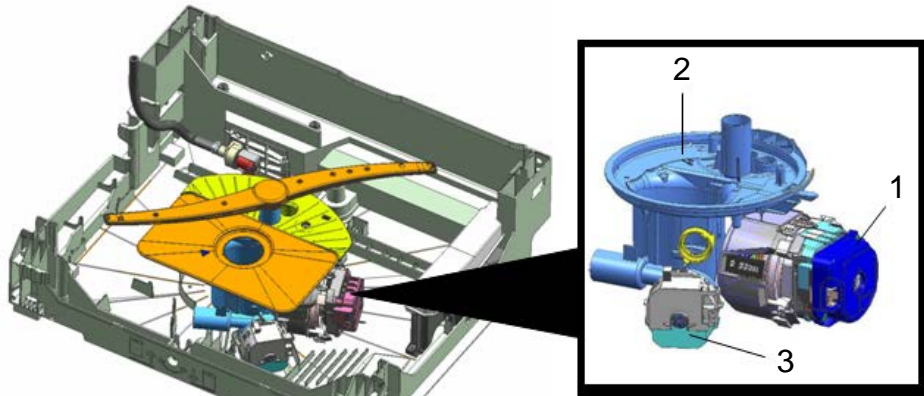
The heat pump contains the heating element, motor speed sensor, two temperature sensors (NTC’s), motor and pump (head). The component parts aren’t available separately.

There’s no flow-through heater, flow switch or Hi-Limit cutout – the heat pump uses a flow-through heated cylinder. The 120 VAC, 1200W heater cylinder provides more heating surface area and heats water faster (~ 2°F / minute).

The pump impeller is driven by a 3-pole BLDC motor controlled by the power module.



1. Pump suspension strap
2. Heating element
3. Seal ring



1. Heat pump
2. Sump
3. Drain pump

- The dishwasher won't run if the heat pump is disconnected or disabled.
- The heat pump is best accessed by pulling out the dishwasher and placing it on it's back.
- The motor and pump are isolated from each other to eliminate leaking or binding and the need for a shaft seal.
- Depending on the model and wash cycle, heat pumps speed up to provide more water pressure (for intensive cycles) or slow down to provide less water pressure (for delicate cycles). This is determined by the wash cycle software, not the aqua sensor, so it doesn't matter how clean or dirty the water is.
- There are two terminal connectors:
 - 6-pin heater terminal on the side of the pump
 - 3-pin motor terminal at the end of the motor
- **Ratings:** 3-pole BLDC, 110-120 VAC, 150 Hz, 1200W thick film heater, < 80W motor, class F insulation, 5-blade impeller with guide wheel.

4.4.2 Heat pump operation

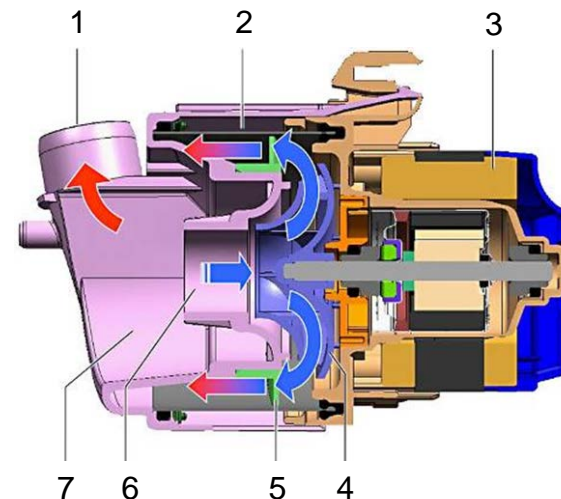
The impeller draws water into the pump and circulates it inside the cylindrical heating element. The guide wheel directs the water through the pump outlet to the water switch to be directed to the spray arms.

While water is being circulated, the BLDC (Brushless DC) motor senses the pump status based on the current (amp) draw of the motor windings:

- No water
- Too little water (*cavitating*)
- Proper water level
- Pump blockage

Safety-related issues, such as "heating without water" or "water too hot", are detected and evaluated.

If the pump is blocked, the pump tries several times to loosen the blockage. If unsuccessful, the wash cycle ends and an error code is stored in memory.



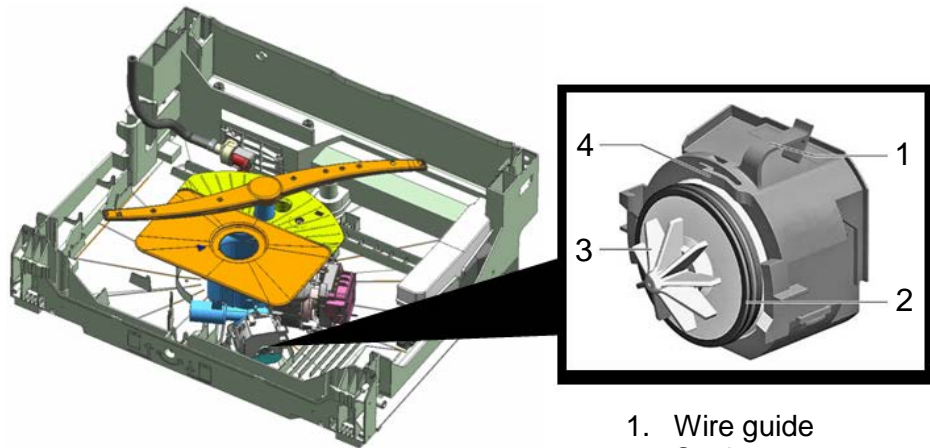
1. Outlet to water switch
2. Heating cylinder w/ NTC's
3. BLDC motor
4. Impeller
5. Guide wheel
6. Inlet from sump
7. Pump housing

4.5 Drain pump

4.5.1 Drain pump basics



The BLDC (Brushless DC) 9-vane drain pump has variable speed and direction. The power control module controls pump speed and direction, detects end of draining and blocked rotor and corrects locked rotor conditions.



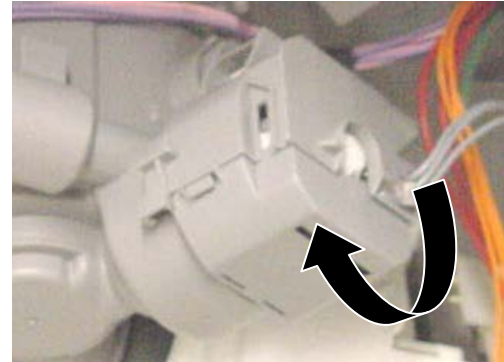
1. Wire guide
2. Seal
3. Impeller
4. Pump lock

- The dishwasher won't run if the drain pump is disconnected or disabled.
- The drain pump is best accessed by pulling out the dishwasher and placing it on its back.
- Ratings: 3-pole BLDC, 54 VAC, 55 Hz, 2500 – 3500 RPM, 0.1 - 0.32 A, 10 – 25 W, class F insulation, 9-vane impeller.

- Resistances as follows:

- 1 – 2: 80.5 Ω (@ 68 °F)
- 2 – 3: 80.5 Ω (@ 68 °F)
- 3 – 1: 80.5 Ω (@ 68 °F)

To remove the drain pump, rotate it clockwise and pull it out.



4.5.2 Drain pump operation

The impeller draws water from the sump and pumps it through the non-return valve into the drain hose.

While water is being pumped, the BLDC (Brushless DC) motor senses the pump status based on the current (amp) draw of the motor windings:

- No water (*i.e. idle – not pumping*)
- No pressure build-up (*missing pump cover*)
- Pump blockage
- Blocked or kinked drain hose

If there is too little water in the sump, pumping is stopped.

If there is no drain pump cover in the sump, water pressure cannot build up and the pump cannot pump. An error code is stored in memory.

The motor senses if the pump is blocked. Using brief, intermittent bursts, the pump tries several times to loosen the blockage.

If draining is disrupted by a blockage or kink in the drain hose, draining is stopped and an error code is stored in memory.

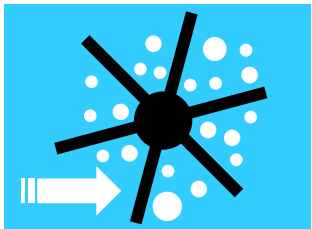
4.5.3 Solving installation issues

Often improper installations, not drain pump issues, cause dishwashers to not drain properly.

- ☑ Must have drain hoses with high loops (min. 33" high) or drains with air gaps.
- ☑ To avoid damaging drain hoses, place high loops inside cabinets near customer drain connections, not next to dishwasher tanks.
- ☑ Drain hoses are 92" long and can be up to 150" long (with **SGZ1010UC** / service # **663105**) extension.
- ☑ Run drain hoses through left or right straps at rear of dishwasher bases.
- ☑ Make sure drain hoses aren't kinked.

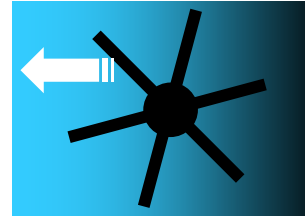
4.5.4 Cavitating

Cavitating may occur in any type of pump when impellers spin faster from low inlet / outlet pressure, creating air pockets around impellers. Cavitating pumps can be noisy. Air gaps / high loops keep water contacting pump outlets, preventing air pockets from forming.



4.5.5 Siphoning

Siphoning may occur in any type of drain pump when low water flow allows a siphon (suction) to develop, pulling waste water back into the pump. Sump check valves along with air gaps / high loops prevent siphons from being created.



4.5.6 Johnson Tee applications

For installations with a Johnson Tee, the Johnson Tee must be installed in the wall behind the dishwasher, no more than 50" (at its maximum height) above the floor. The connection must be $\frac{3}{4}$ " minimum – $\frac{1}{2}$ " must not be used. Dishwasher drain hose extensions must not be used.



1

1. Johnson Tee

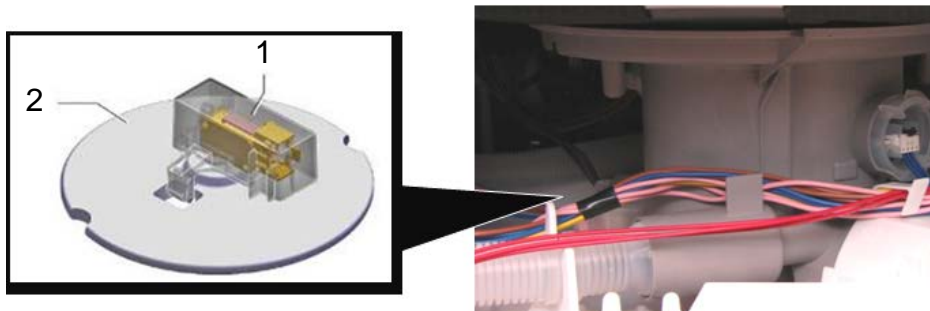
4.6 Safety systems

Several safety systems in dishwashers guard against leaking. Leaking water is directed into the base where it's detected by the float switch, which stops the wash cycle, turns off the water valve (if it's on) and turns on the drain pump.

Even when the dishwasher is off, the float switch detects water, turning on the drain pump and generating an error code (e.g. E:15). The dishwasher cannot be run until the leaky part is fixed, the water is removed from the base and the control is reset.

4.6.1 Float

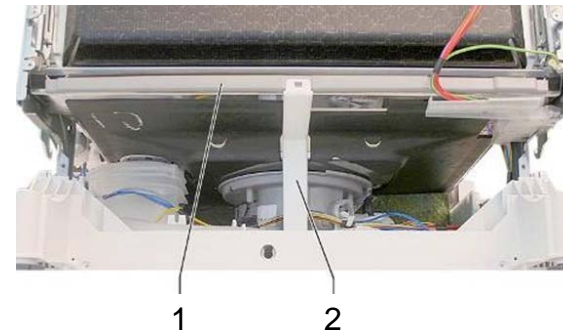
The float is a safety device, located next to the sump, which activates if there's too much water in the base. If water collects in the base, a styrofoam float rises and engages a microswitch, stopping the wash program and starting the drain pump.



1. Float assy. w/ microswitch
2. Float

4.6.2 Overflow channel

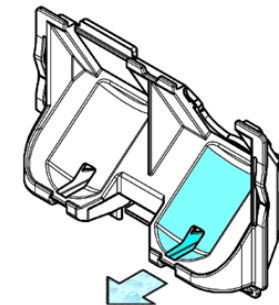
The overflow channel (gutter) directs any water escaping past the door into the base where it's detected by the float switch.



1. Overflow channel
2. Support / drain tube

4.6.3 Water inlet valve

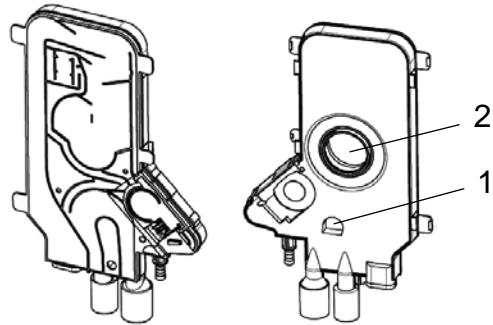
The mount for the water inlet valve has a channel to direct any leaking water to the base where it's detected by the float switch.



4.7 Water inlet / condensation system

The time-fill water inlet system lies next to the left side of the tank. It doesn't fill water into the bottom of the tank through the sump, but into the left side of the tank, near the bottom.

A vent on the left side of the tank aids water flow and allows condensation to exit during drying.



1. Water inlet (to tank)
2. Vent (to tank)

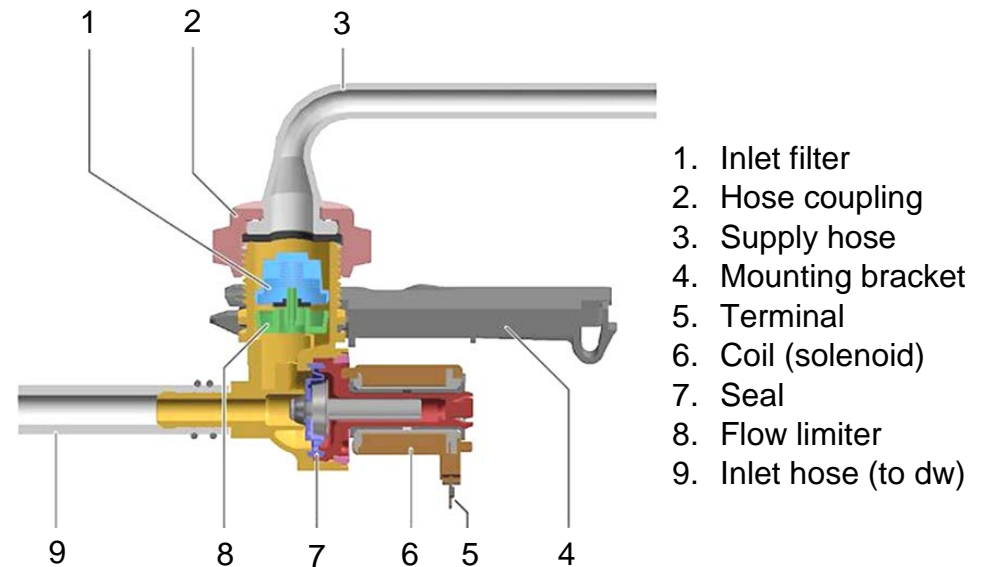
There are two hoses connected to the water inlet system, the water inlet hose (from the water supply hose) and drain hose. The total drain hose length is 92" (~ 7.67'), including the portion inside the dishwasher.

4.7.1 Water inlet valve

A plastic mounting bracket secures the hot water inlet valve on the rear of the base. A hot water supply hose is supplied with dishwashers and threaded onto the inlet valve.



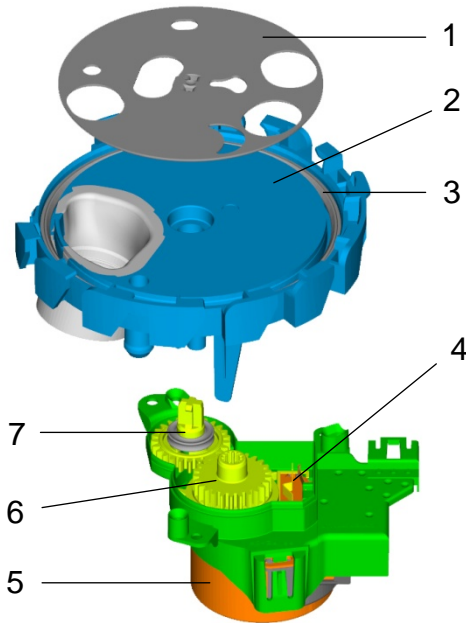
Inlet valves have a flow limiter to keep the incoming water pressure to specified levels, regardless of the water supply pressure.



1. Inlet filter
2. Hose coupling
3. Supply hose
4. Mounting bracket
5. Terminal
6. Coil (solenoid)
7. Seal
8. Flow limiter
9. Inlet hose (to dw)

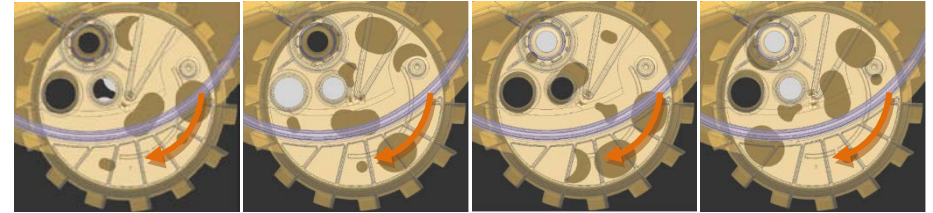
4.8 Water switch

Mounted underneath sumps, water switches consist of a motor-operated disk with seven holes, which rotates under three sump ports (upper / lower spray arms, top sprinkler) to provide precise water control.



1. Disk
2. Housing
3. Seal (to sump)
4. Pulse generator
5. Drive motor
6. Gear with cam
7. Gear with shaft

Water switch disks do **not** rotate continually, but counterclockwise (ccw) based on the wash program and water clarity (i.e. directed by the control and aqua sensor). When water is clear, the water switch directs water to the upper or lower spray arm. When water is dirty, the switch directs water to both spray arms.



To both
spray arms /
top sprinkler

To lower
spray arm

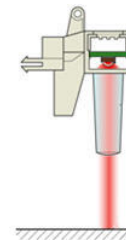
To upper
spray arm /
top sprinkler

To upper
spray arm

Motor ratings: 110 – 127 VAC, 60 Hz, synchronous, 4.8 RPM (ccw), class E insulation.

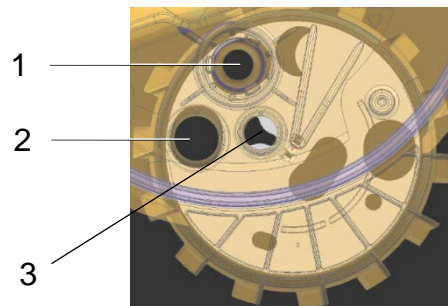
4.9 Info Light (selected models)

A **red** or **blue** light (*LED*) shines on the floor to show the dishwasher is running. The door shouldn't be opened until the light has gone out, showing the dishwasher wash cycle has completed.



Info lights can't be seen from the side – the only light seen is a warm glow on the floor.

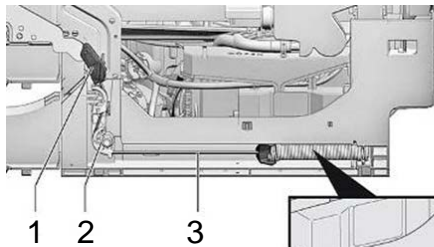
1. To lower spray arm
2. To upper spray arm
3. To top sprinkler



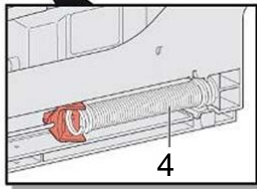
Water shown directed
to both spray arms /
top sprinkler

4.10 Door spring

The door spring mechanism uses a “sliding” pulley and cord to provide proper tension and enable self-closing. The fixed sliding pulley is attached by two screws (including one inside the bottom pulley). The cord slides on the pulley, using the friction between it and the cord to provide better control.



1. Cord holder
2. Sliding pulley
3. Cord
4. Door spring

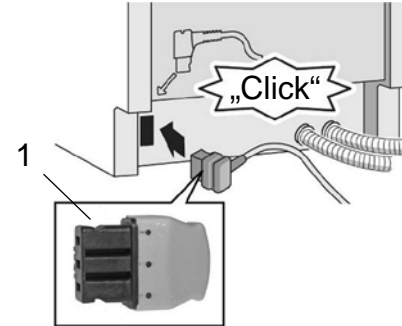


The spring slides into a slotted pocket in the side of the base and connects to the cord. Springs are color coded for specific tensions.



4.11 Terminal box

All dishwashers have terminal boxes with covers, conduit / cord exits and dishwasher cords. The dishwasher cord plugs into the power module, accessed through the left rear of the dishwasher base.



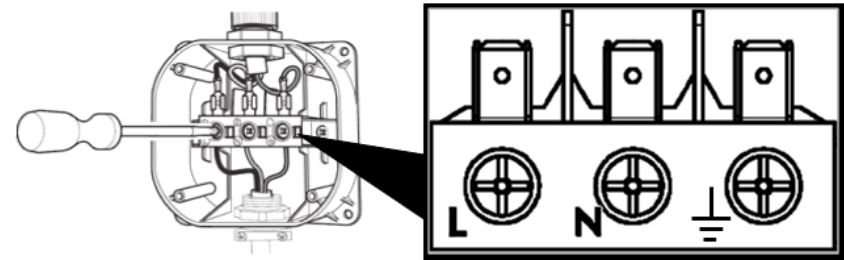
NOTE: The plug has notches which keep it plugged into the power module.

1. Notch

4.11.1 Terminal block



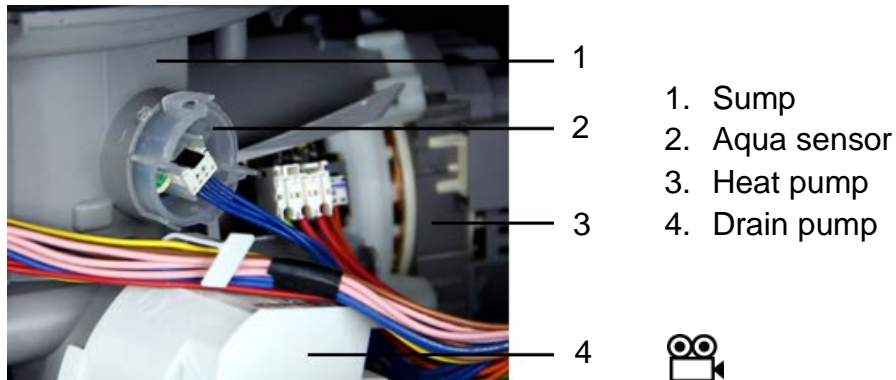
Terminal blocks clearly show line (L), neutral (N) & ground (\perp) connections. Dishwasher cords have spade terminals which connect to terminals on the terminal block.



NOTE: An optional power cord is available, which plugs into the power module and replaces the junction box with cord provided with the dishwasher (SMZPC002UC – service # 747210).

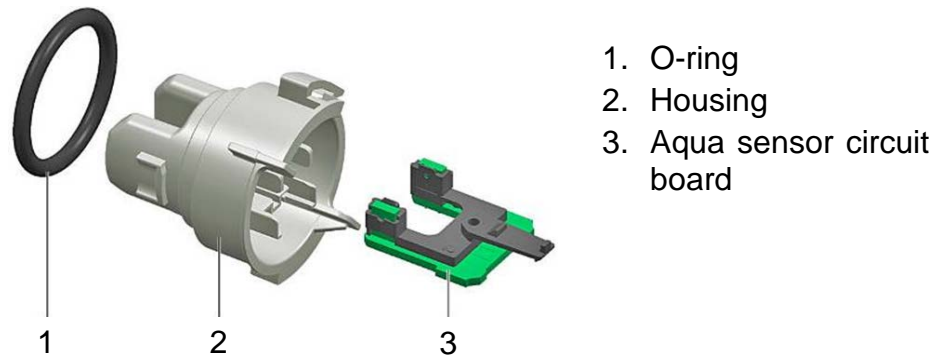
4.12 Aqua sensor

The one-piece aqua sensor, located above the drain pump, senses water cleanliness and allows the dishwasher control to shorten wash / rinse cycles to save energy.



If the water is clean, the aqua sensor shortens wash and rinse cycles. If not, the aqua sensor keeps the original cycles.

Dishwashers still operate if aqua sensors fail, defaulting to the longest / hottest wash cycle. Customers may notice wash cycles lasting longer or dishwashers using more water.

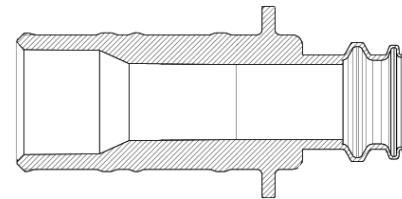


4.13 Drain hose

Dishwashers use a drain hose connected to the water level control and exiting the rear of the dishwasher near the water inlet valve.



The drain hose connects directly to the customer drain system without an adapter.

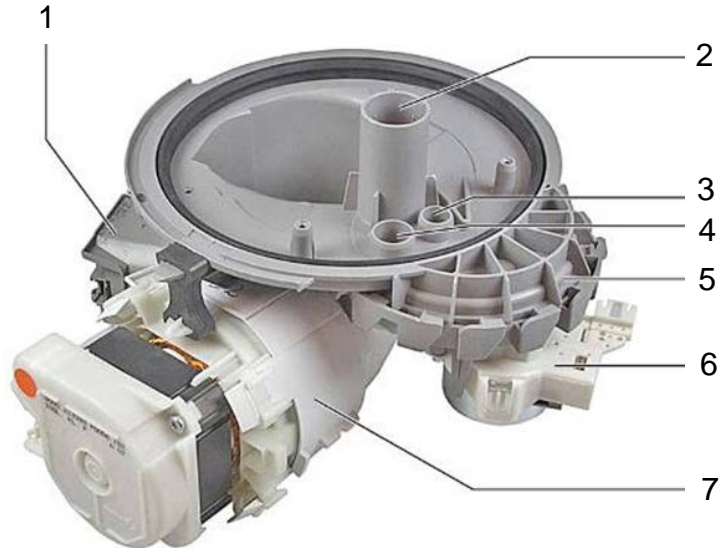


Straps in the rear corners of the base hold the drain and inlet (supply) hoses in place.



4.14 Sump

Filtered water drains into the sump, where it is pumped through the water switch into the spray arms or drained out. The sump provides attachment positions for the heat pump, drain pump, water switch, aqua sensor and backflow valve.



1. Drain pump
2. Outlet to lower spray arm
3. Outlet to top sprinkler
4. Outlet to upper spray arm
5. Water switch
6. Water switch motor
7. Heat pump

The inside of the sump has a couple of caps / covers to enhance water flow.



1. Aqua sensor
2. Drain pump cover
3. Suction cap

4.14.1 Suction cap

The suction cap provides proper water flow through the sump when the heat pump is running, prevents air or dirt from being drawn into the pump and provides access to the heat pump impeller. It should not be removed.

4.14.2 Drain pump cover

The drain pump cover directs waste water through the drain pump. Without it, the drain pump cannot build up any pressure.

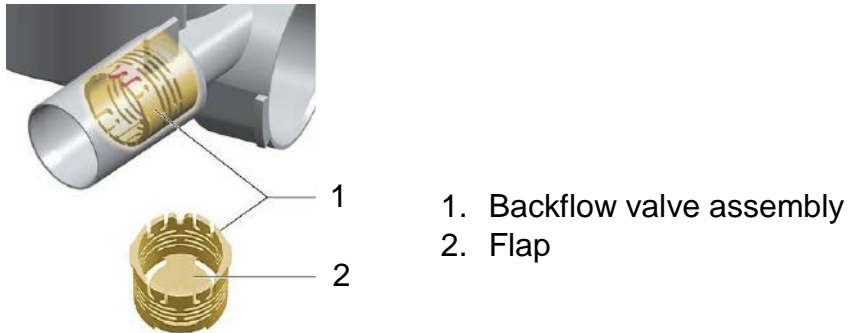
Customers may remove the drain pump cover for cleaning, but must reinstall it. If the cover is not correctly attached, water cannot be pumped out.



TIP: Snap in the drain pump cover tightly to avoid drain pump cavitating.

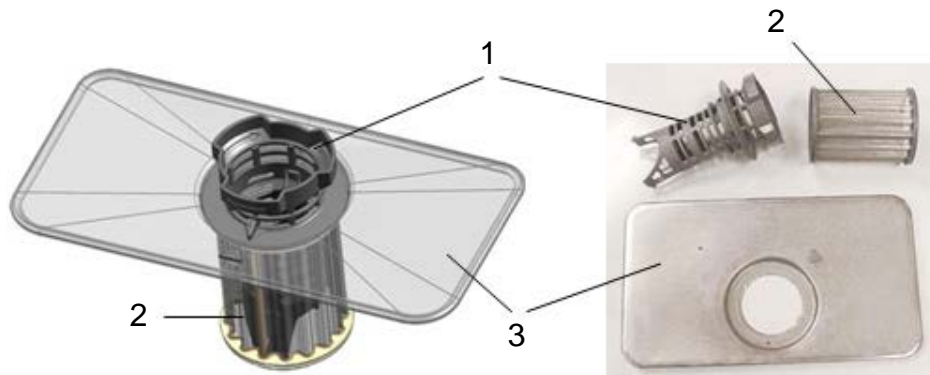
4.14.3 Backflow valve

The backflow valve is located inside the sump at the outlet to the drain hose. It prevents waste water from entering the sump.



4.15 Sump filters

The sump contains several types of filters: a filter screen, coarse filter and micro filter.

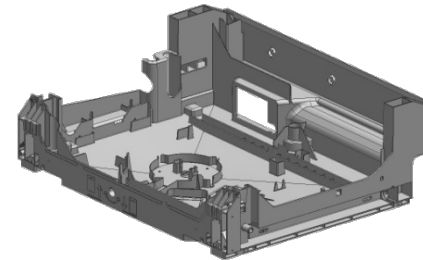


- 5. Coarse filter
- 6. Microfilter
- 7. Filter screen

4.16 Tank with base and sump

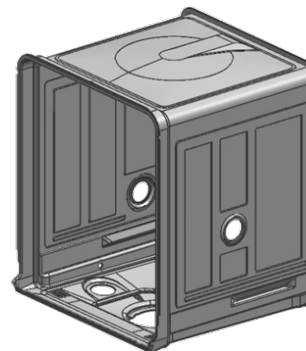
4.16.1 Base

The plastic assembly is cast into one piece and contains mounting provisions for all parts mounted to it.



4.16.2 Tank

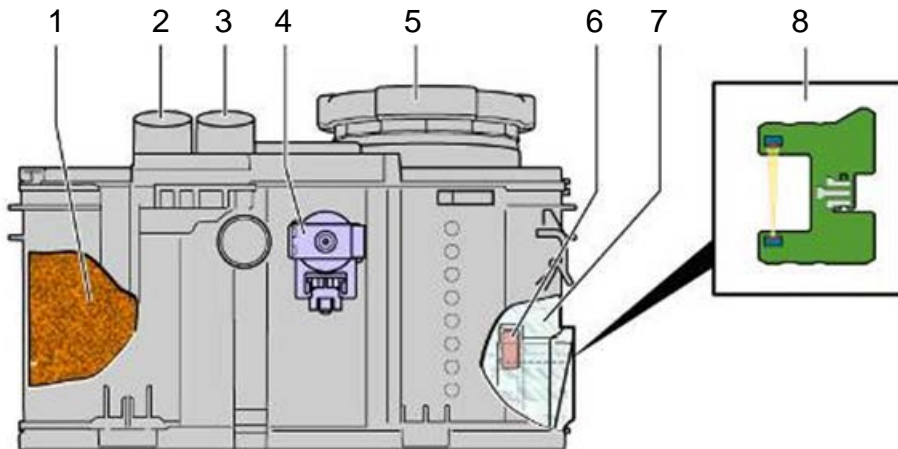
The ss tank isn't available as a service part. The top, bottom and sides are made from 304 ss alloy and the back is made from 430 ss alloy.



4.17 Water softener (selected models)

The water softener (*ion exchanger*) consists of a container with fine-grained, synthetic resin beads. The beads use dishwasher softener salt to make soft water by replacing calcium and magnesium ions in hard water with sodium ions.

Soft water provides better washing results, allows less detergent to be used and helps prevent water spots from forming on dishes and glassware.



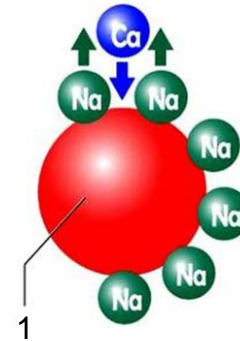
- | | |
|-------------------------|-----------------------|
| 1. Ion exchanger | 2. Water inlet |
| 3. Water outlet | 4. Regeneration valve |
| 5. Salt dispenser cover | 6. Float (optional) |
| 7. Salt dispenser | 8. Low salt sensor |



TIP: With soft water, regardless of dishwasher brand / type, glassware can become permanently cloudy from water stealing minerals from them – especially with hotter water and longer wash cycles. To reduce this possibility, customers should be told to not pre-rinse / pre-wash dishes and to wash fine glassware using delicate wash cycles.

4.17.1 Softening

The synthetic resin beads have a negative charge (“-“), which attracts positively charged (“+”) calcium (*Ca*) and magnesium (*Mg*) ions of hard water in the softener. These ions have a stronger positive charge than the sodium (*Na*) ions on the beads and knock them off. The sodium ions replace them in the water, making soft water.

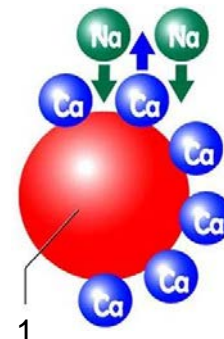


1. Synthetic resin bead

When the sodium (*Na*) ions have been used up, the softener must be regenerated.

4.17.2 Regeneration

To make the softener available for softening, concentrated salty brine (sodium chloride) flows from the salt dispenser. The large surplus of sodium ions from the brine displace the calcium and magnesium ions and attach to the beads.

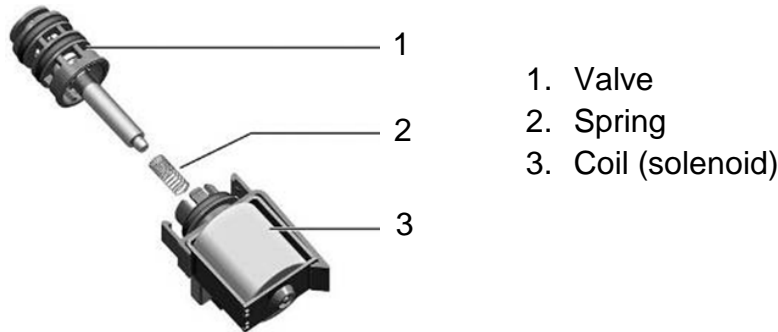


1. Synthetic resin bead

4.17.3 Regeneration valve

The 2-way regeneration valve directs hard water into the softener and salty brine from the salt dispenser to the softener (for regenerating).

- When the valve isn't energized, hard water flows into the softener to be softened.
- When the valve is energized, water flows into the salt dispenser to become a salty brine. The valve directs the brine to the softener to regenerate the beads with sodium ions. The brine solution is then pumped out.



Coil ratings: 120-127 VAC, 60 Hz, 660 Ω resistance.

4.17.4 Salt capacity

- Fine-grained salt – 1.3 kg
- Coarse-grained salt – 0.9 kg



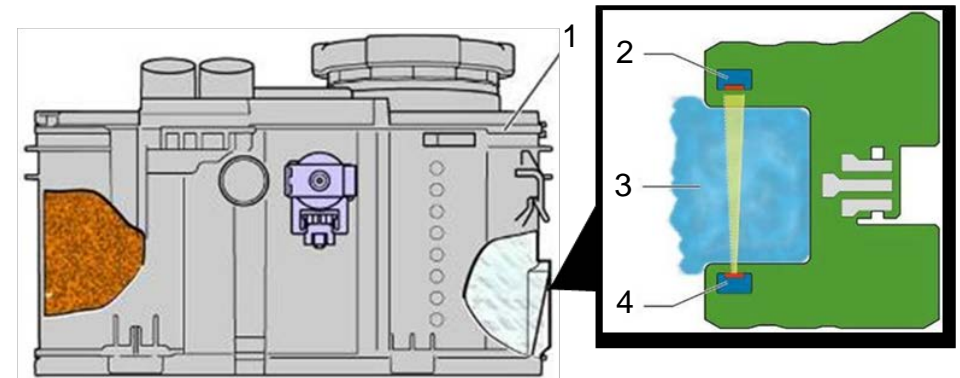
TIP: Must use granulated softener salt specifically made for dishwashers, not pellet salt for whole house water softeners.

4.17.5 Low salt detection

The transmitter LED sends a beam of light into the salt dispenser. Any salt present will block the beam. When the salt is gone, the receiver photocell detects the beam and the power module generates an “Add salt” message on the dishwasher display.

Depending on the coarseness of the salt, there may be leftover salt and the softener may regenerate after the “Add salt” display has appeared.

It's not necessary to add water to the salt dispenser the 1st time the dishwasher is being run.



1. Water softener
2. Transmitter
3. Salt
4. Receiver (photocell)

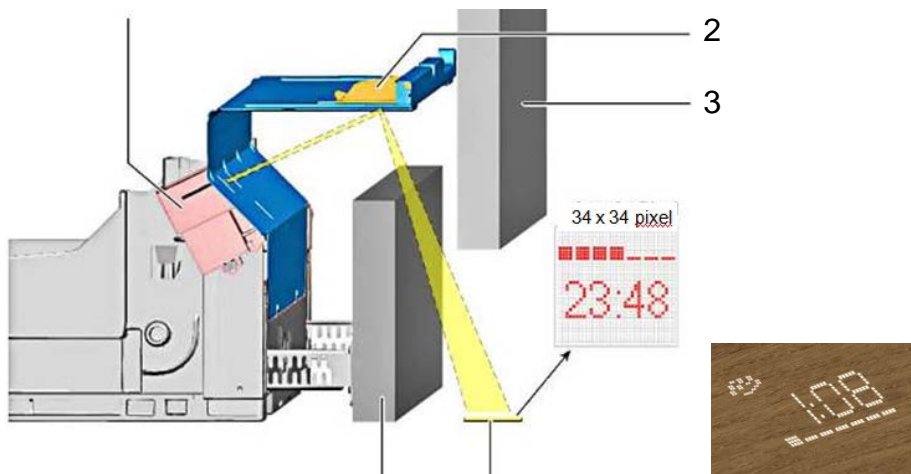


TIP: The low salt detector cannot sense salt pellets. Granulated salt suitable for dishwashers must be used.

4.18 Time Light (selected models)

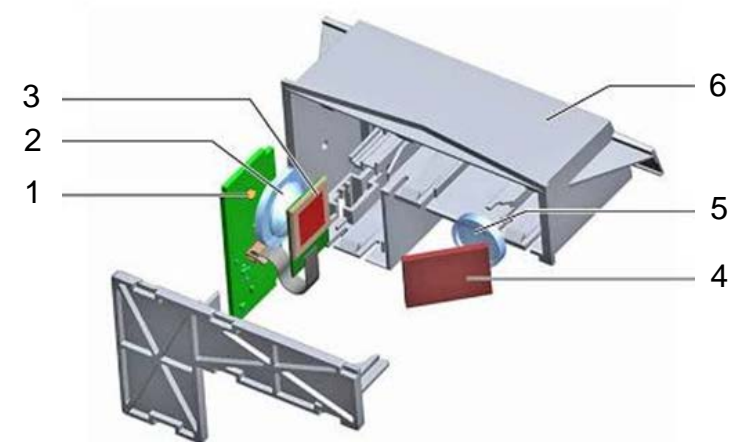
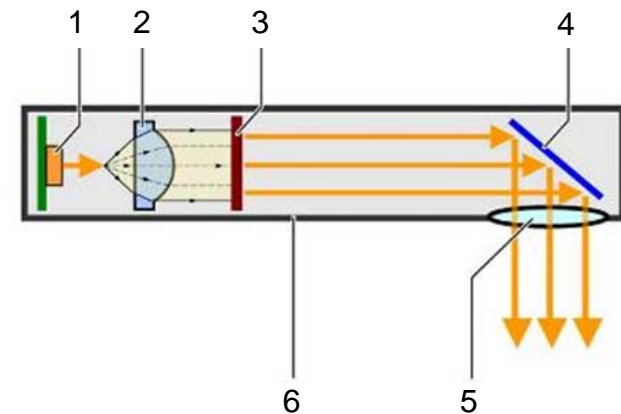
The *Time Light* goes beyond the *Info Light*, showing the remaining time and wash cycle progress onto the floor. A small projector is mounted onto the rear of a special base cover – its LCD screen is reflected off of two mirrors onto the floor.

The display has a resolution of 34 x 34 pixels.



1. Projection module (*attached to base cover*)
2. Deflection mirror (*attached to base cover*)
3. Outer door
4. Floor (projection surface)
5. Toe kick

Light from an LED shines through a lens and is spread uniformly across an LCD screen. The image from this screen is reflected by the deflection mirror through a projection lens to the floor.

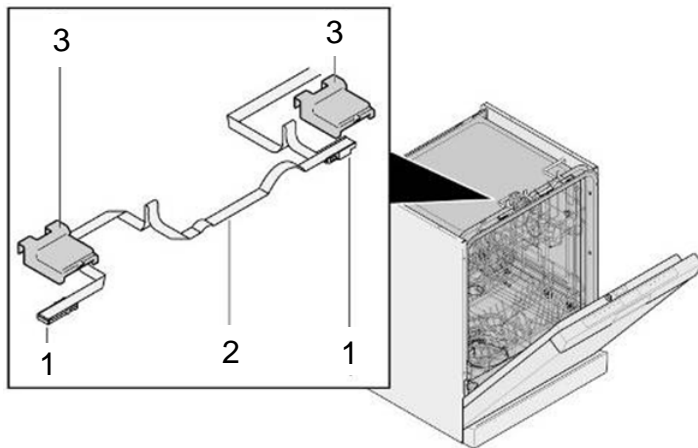


1. LED (*Light Emitting Diode*)
2. Spreading (*dispersing*) lens
3. LCD screen (*Liquid Crystal Display*)
4. Mirror
5. Projection lens
6. Housing

4.19 Emotion light (selected models)

The *Emotion Light*, located at the top of the dishwasher above the cutlery drawer, lights up the inside of the dishwasher. It's blue or white light provides a soothing glow.

It comes on whenever the door is open whether the dishwasher is on or not. The light is off when the door is closed and will turn off whenever the door has been left open for 60 minutes or more.



1. LED's
2. Ribbon cable
3. Covers

Rating: 13.5 VDC

4.20 Operation

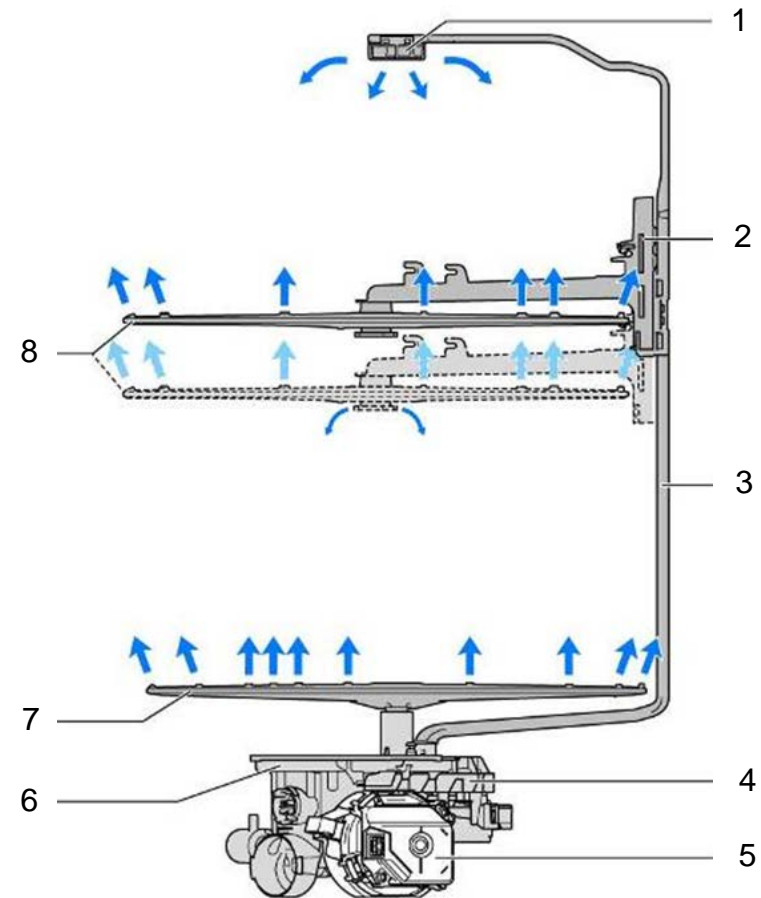
4.20.1 Water spray system

The spray system consists of 3 spraying levels: lower / upper spray arms and a top sprinkler. Water is supplied to the upper spray arm and the top sprinkler by the fill tube at the rear of the tank.

The fill tube has 2 separate water channels so the upper spray arm and top sprinkler can be operated separately.

The upper spray arm is attached by its feed tube directly to the upper rack. The feed tube has an adjustable coupling to allow it to move up and down as the upper rack is raised or lowered.

The lower spray arm is connected by directly to the sump. It has a nozzle underneath it to clean the sump filters and to rinse food debris into them.



- | | |
|-----------------------------|--------------------|
| 1. Top sprinkler | 5. Heat pump |
| 2. Upper spray arm coupling | 6. Sump |
| 3. Feed tube | 7. Lower spray arm |
| 4. Water switch | 8. Upper spray arm |

4.21 Serial label (warranty information)

The serial label, located on the right side of the inner door, contains the dishwasher model, serial and index (KI) #'s.



4.21.1 Understanding the FD # (customer serial #)

This is the serial # used for customer and warranty repairs, commonly known as the “FD #”. It’s located under the model #.

FD9303 00001

The FD # shows the production date:

- The first 2 #'s represent the year: 93 = 2013
- The next 2 #'s represent the month: 03 = March
- The next 5 #'s represent the unit made that month: 00001 = 1st dishwasher made that month

4.21.2 Understanding the 17-digit factory serial

This is a more detailed serial # used by the factory for analysis of returned units. It’s located in the bottom right corner of the label.

10 3 03 0090424 00001 3

This serial aids the factory in researching and verifying parts of the dishwasher.

- The first 2 #'s represent a factory code: **10** = New Bern dishwasher
- The 3rd # represents the last digit of the year: **3** = 2013
- The next 2 #'s represent the month: **03** = March
- The next 7 #'s represent the model: **0090424** = SHX7PT55UC
- The next 5 #'s represent the unit made that month: **00001** = 1st dishwasher made that month
- The last # represents a check digit = **3** in this case (is dependent on all preceding #'s)

5 REPAIR

⚠ WARNING

Avoid Scalding or Electrical Shock Hazard!
Make sure the water supply and electrical supply are shut off before installation or service.


5.1 Access

5.1.1 Repair access chart

Use the following chart to determine how to access parts.

Part serviced	Front serviceable - no removal needed	Side / front / rear serviceable - pull out dishwasher	Bottom serviceable - pull out & flip dishwasher
Control / display	X		
Base mounted control		Right side	
Door latch sensor	X		
Door latch		Front	
Dispenser	X		
Water valve		Rear	
Filters / spray arms / fill tube / sump	X		
Hinges		Both sides	
Lower door seal	X		
Fascia panel	X		
On/off switch	X		
Terminal block	Under sink		
Drain pump		Front	X
Float		Front	X
Water inlet system		Left side	
Heat pump			X
Aqua sensor		Front	X



HINT:  = A video is available on QF. There is no link for this icon – clicking onto it doesn't take you to the video.

5.1.2 Front access



- Many parts such as door latch Hall Effect sensors (1), dispensers (2), controls (3), and fascia panels (4) are accessed from the front.
- Removing the outer door is needed for dispenser and bottom front access.
- The inner door and base cover must also be removed for bottom front access for parts such as aqua sensors, drain pumps and floats.

5.1.2.1 To remove outer door

Removing the outer door is needed for front access and for bottom access / flipping dishwashers upside-down. For most dishwashers, the short bottom six (6) screws hold outer doors.

Tools needed: T20 Torx screwdriver.

1. Remove six (6) short T-20 Torx inner door screws below fascia panel – three per side (*below, left*).
2. Carefully pull bottom of outer door out from dishwasher until top door tabs clear, then pull door down until it releases from dishwasher (*below, right*). Take care to not scratch outer door.



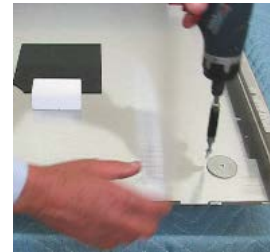
TIP: Outer doors with foam door guards don't need door guards removed unless doors are being replaced.



5.1.2.2 To remove door handle (SHX models)

Tools needed: T20 Torx & flat blade screwdrivers.

1. **Remove outer door** – section 5.1.2.1.
2. To remove handles from outer doors, remove two (2) screws and washers from the inside of the door (*below*).

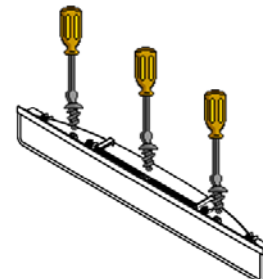


3. Unscrew endcap set screws to separate endcaps from the handle.

5.1.2.3 To remove pocket door handle (certain SHP models)

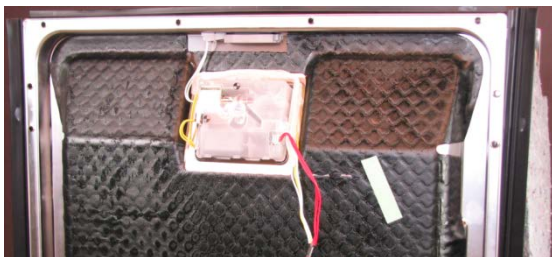
Tools needed: T20 Torx & flat blade screwdrivers, pliers & gloves.

1. **Remove outer door** – section 5.1.2.1.
2. Unscrew three (3) screws on the inside of the outer door attaching the pocket handle to the fascia panel (*below left*).
3. Carefully pry door flanges away from the tabs on the top and bottom of the dispenser.




WARNING: Removing / installing outer doors can cut fascia panel wire harnesses (i.e. to on/off switch, control or dispenser), causing short circuits that can damage controls or cause electric shock.

- Remove / install outer doors carefully to insure harness wires and insulation aren't cut.
- After removing outer doors, check wires and insulation to make sure they're not cut or pinched.



- Carefully push the pocket handle out of the outer door (i.e. push from the inside of the door).

 **CAUTION:** Outer door edges (at the handle cutout) are sharp! Use gloves and remove pocket handle carefully.

5.1.2.4 To remove fascia panel

Fascia panels and outer doors are both removed by removing inner door screws. For most dishwashers, the top four (6) screws hold the fascia panel, except for the two (2) small screws holding the door latch (Hall Effect) sensor.

Tools needed: T-20 Torx screwdriver.

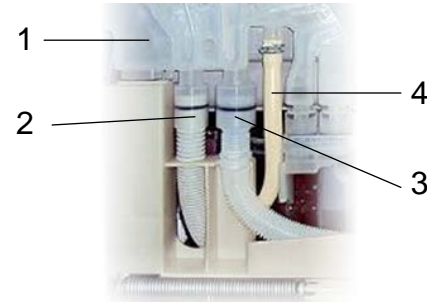
- Remove fascia panel by removing six (6) long fascia panel screws from top of inner door (*below left*). If needed, remove outer door first (section 5.2.1.1).
- Lift fascia panel out from door. Be careful to not damage wire harnesses. The *slightly* longer six (6) fascia screws are different than the shorter six (6) outer door screws, so don't mix screws when removing both fascia panel and outer door (*below right*).



5.1.3 Side access

5.1.3.1 Left side access

The water inlet control (with condensation vent), water inlet hose, sump hose and drain hose are accessible from the left side.



- Water inlet control
- Drain hose
- Sump hose
- Water inlet hose

5.1.3.2 Right side access (power module)

The power module is accessible from the right side.



5.1.4 Bottom front access

Bottom front access is needed for parts such as aqua sensors, drain pumps and floats. The outer door, inner door and base cover must be removed.

Follow these instructions to prepare dishwashers for bottom front access.

5.1.4.1 Bottom front access

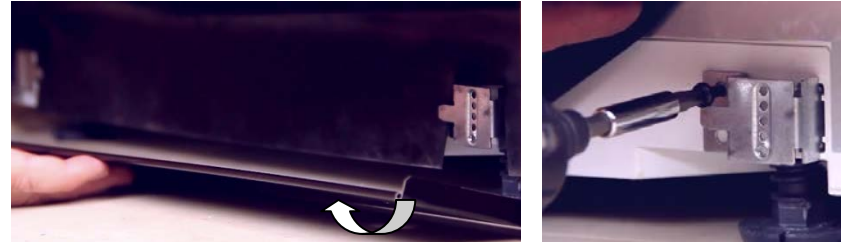
Tools needed: T20 Torx & #2 Phillips screwdrivers and pliers.

1. **Remove outer door** – section 5.1.2.1.
2. **Remove toe kick** – section 5.1.4.2. Pull dishwasher out enough to clear hinges.
3. **Remove base cover** – section 5.1.4.3. This eliminates disconnecting and reconnecting all wire harnesses.
4. **Remove overflow trough and support** – section 5.1.4.5.
5. **Remove inner door** – section 5.1.4.6.
6. **Remove lower door seal** – section 5.1.4.7.

5.1.4.2 To remove toe kick

Tools needed: T20 Torx & #2 Phillips screwdrivers.

1. Where necessary for access, **remove outer door** – section 5.1.2.1.
2. Remove decorative screw caps and save for reuse.
3. Remove two (2) Phillips #2 screws and tilt bottom of toe kick out and up from dishwasher (*below*). Depending on the model, there may or may not be mounting brackets.



TIP: Removing toe kicks aren't necessary for left / right side access, rear access or for flipping dishwashers upside-down.

5.1.4.3 To remove base covers



Tools needed: T20 Torx & #2 Phillips screwdrivers and pliers.

1. **Remove toe kick** – section 5.1.4.1.
2. **Remove outer door** – section 5.1.2.1.
3. Remove base insulation (on models with insulation).
4. Remove two (2) base cover screws.
5. Tilt top of base cover forward and lift up until slots clear base (*below*).



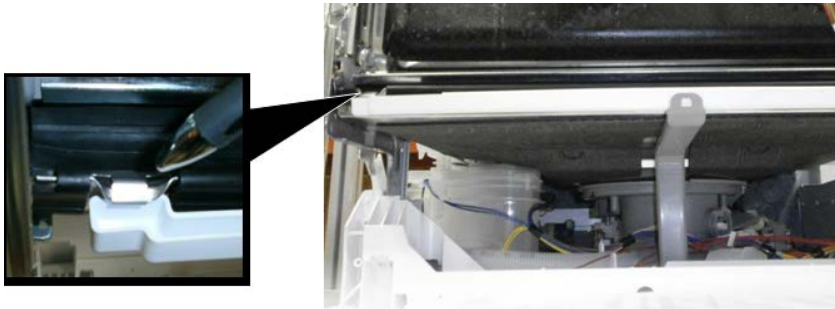
5.1.4.4 To reinstall base cover

1. To reinstall base cover, insert slots onto base.
2. Tilt top of base cover toward base and fasten with two (2) screws.

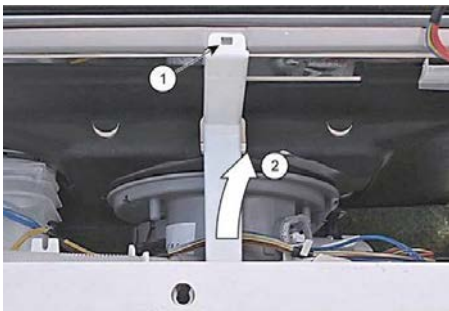
5.1.4.5 To remove overflow trough (channel)

Tools needed: #2 Phillips & small flat blade screwdrivers.

1. **Remove base cover** – section 5.1.4.3.
2. Pry off clips at each end of channel (*below*).



3. Carefully pry support from tab on channel and lift support out and away from dishwasher (*below*).

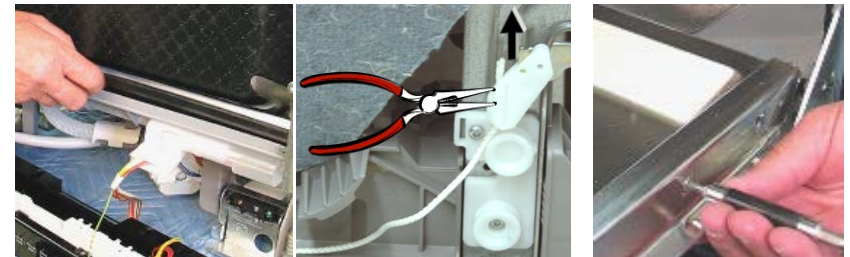


5.1.4.6 To remove inner door

Inner doors rarely need to be removed for repairs, but need to be removed to access the lower door seal and door hinge lever.

Tools needed: T20 Torx & #2 Phillips screwdrivers, pliers & gloves.

1. **Remove outer door** – section 5.1.2.1.
2. **Disconnect & pull out dishwasher** – section 5.1.5.1. Pull dishwasher out enough to clear hinges.
3. **Remove fascia panel** – section 5.1.2.2. This eliminates disconnecting and reconnecting all wire harnesses.
4. If replacing inner door, **remove dispenser** – section 5.3.1.
5. If the lower door seal sticks to the inner door, separate the seal from the door by hand (*below left*).
6. Disconnect door springs from hinge levers (*below center*). For easier removal, pull the cord over the bottom pulley first to release spring tension.
7. Remove two (2) hinge screws on both sides of inner door (*below right*). The bottom screws also hold the lower door seal.



CAUTION: Inner door edges (at the hinge) are sharp! Use gloves, cover door edges and remove inner door carefully.



TIP: When replacing an inner door – dishwashers **cannot** be identified since their serial labels are attached to the inner doors being replaced:

1. Have customers write their model and serial #'s in their Use & Care manuals.
2. Legibly write the model and serial #'s on the ss surface (near the bitumen at the dispenser) of the replacement inner door using a fine tip black permanent marker.



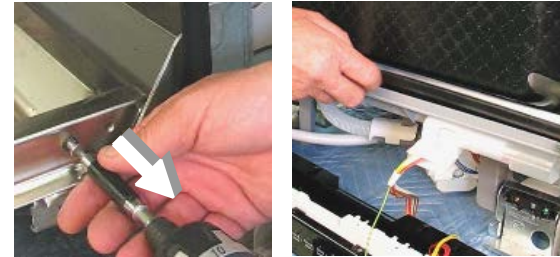
5.1.4.7 To remove lower door seal



The lower door seal is attached by two of the four inner door screws. It is removed along with the inner door.

Tools needed: T20 Torx & #2 Phillips screwdrivers, pliers & gloves.

1. **Remove inner door** – section 5.11. The lower door seal will be loose since it's two (2) screws were removed when the inner door was removed (*below left*). If the seal sticks to the inner door, separate the seal from the door by hand (*below left*).
2. Remove lower door seal (*below right*).



CAUTION: Inner door edges (at the hinge) are sharp! Use gloves, cover inner door edges and remove lower door seal carefully.

5.1.5 Pulling out dishwashers

Follow these instructions to pull out dishwashers for side or bottom front access.

5.1.5.1 Disconnect & pull out dishwasher

Tools needed: #2 Phillips screwdriver and pliers or wrench.

1. Remove base insulation (on models with insulation).

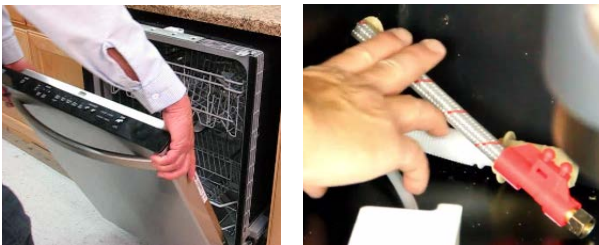
2. Disconnect dishwasher mounting brackets (*below left*).
3. Turn off water and disconnect water line at the water supply (*below right*).



4. Turn off electricity and disconnect electric supply by unplugging power cord from the customer outlet (*below left*).
5. Disconnect drain line at the customer connection (*below right*).



6. Slide dishwasher out completely (*below left*) and carefully pull out water supply hose, drain hose and power cord (*below right*).



5.1.6 Flipping dishwashers

Follow these instructions to flip dishwashers upside-down or on their backs for bottom access. Bases must be removed.

5.1.6.1 To flip dishwasher for bottom access

Tools needed: T20 Torx, # 2 Phillips and flat blade screwdrivers.

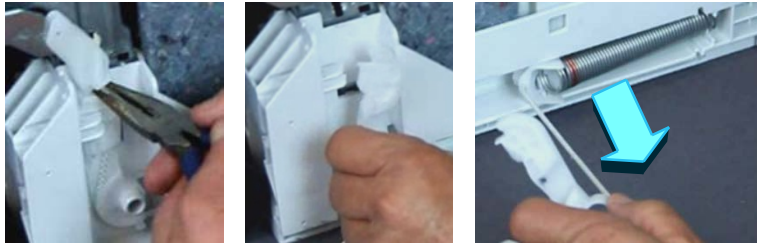
1. **Disconnect & pull out dishwasher** – section 5.1.5.1.
2. **Remove base cover** – section 5.1.4.3.
3. Remove base insulation (on models with insulation).
4. Remove all water from dishwasher sump and hoses.
5. Slide dishwasher out completely (*below left*).
6. Remove both racks (*below right*).



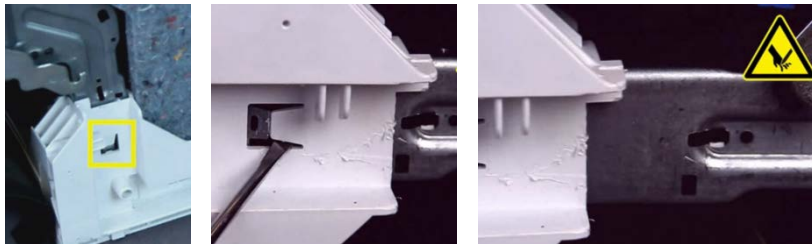
7. **Remove water inlet control** – section 5.8.
8. Remove the two (2) rear base screws (*below*).




9. To release the door spring tension, disconnect the door spring cord from the door hinge lever (*below left*). Then remove the door spring and cord from the base (*below center and right*).



10. Unlatch the front base latches from both hinge levers and slide the base off of the hinge levers (*below*).



 **CAUTION:** Door plate edges are sharp! Use gloves, cover door plate edges and remove base carefully.

11. Place a pad or cardboard on the floor and carefully flip the dishwasher upside-down or on it's back.

12. Carefully remove the base from the dishwasher tank (*below*).



13. Once the base is removed, whether the dishwasher is upside-down or on it's back, all bottom accessible parts are accessible (*see below*).



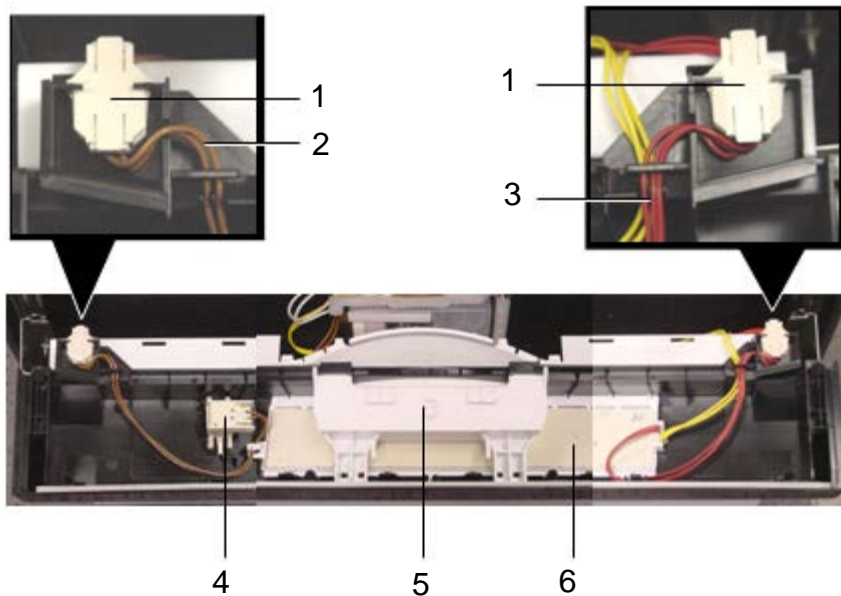
5.2 Controls

5.2.1 Fascia panel mounted controls (front button models)

Controls are easily removed from fascia panels by prying plastic tabs.

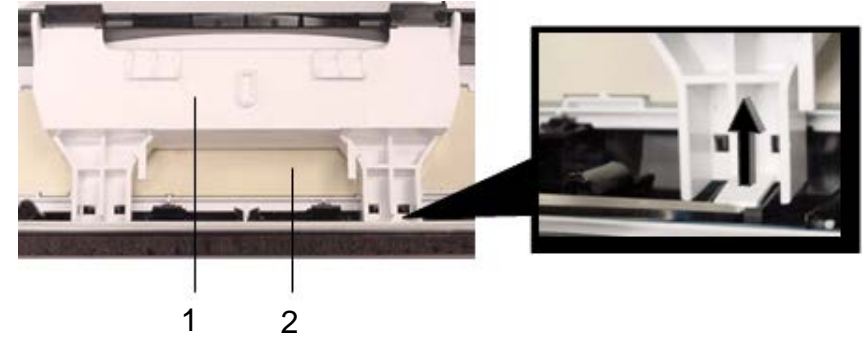
Tools needed: T-20 Torx & flat blade screwdrivers.

1. **Remove fascia panel** – section 5.1.2.2. If needed, remove outer door first.
2. Disconnect short wire harnesses from control and on/off switch (see below).



- | | |
|---------------------------|--------------------------|
| 1. Connector | 2. On/off switch harness |
| 3. Control jumper harness | 4. On/off switch |
| 5. Handle tray | 6. Control |

3. Remove handle trays (1) before removing controls (2). To remove handle trays, carefully pry in plastic clips.



4. Remove controls by carefully prying clips from one side to the other (below left) and gently lifting controls up as you pry clips.



5. When reassembling fascia panels to doors, make sure fascia panel tabs enter outer door slots.

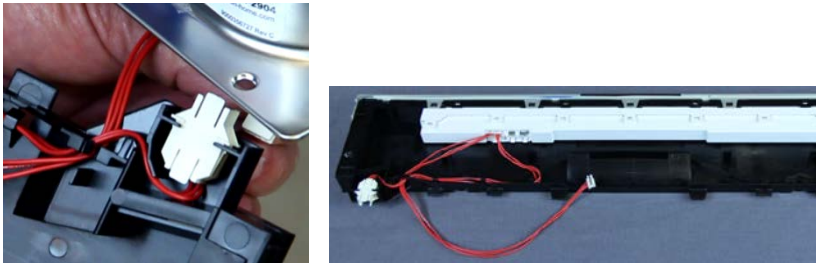
CAUTION – 80% of all controls returned for analysis check out OK. Most control issues are due to loose connections and error codes for other parts.

5.2.2 Removing Integra controls (SHP / SHX / SHV)

Controls are easily removed from fascia panels by prying plastic tabs.

Tools needed: T-20 Torx & flat blade screwdrivers.

1. **Remove fascia panel** – section 5.1.2.3. If needed, remove outer door first.
2. Disconnect short wire harnesses from control and on/off switch (see below). Models with touch screens won't have an on/off switch and harness (i.e. you'll only be disconnecting one harness).



3. Remove controls by carefully prying clips from one side to the other (below left) and gently lifting controls up as you pry clips.
4. When reassembling fascia panels to doors, make sure fascia panel tabs enter outer door slots.

⚠ CAUTION – 80% of all controls returned for analysis check out OK. Most control issues are due to loose connections and error codes for other parts.

5.2.3 Installing Integra controls (SHP / SHX / SHV)

Using the following procedure will make controls (operating modules) easier to install and will insure they're securely mounted – with all four (4) plastic latches properly latched.

1. Place the operating module vertically (upright) in the fascia panel (below).



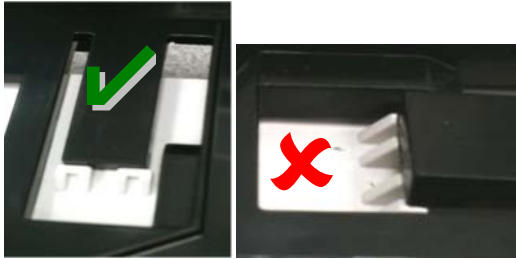
2. Apply even downward pressure at the center of the operating module (below left).
3. Apply downward pressure on the operating module moving outward from it's center (below right).



4. Check the back of the fascia panel to insure all four (4) plastic latches are properly placed and snapped into place (below).



- a. Correct placement (*below left*)
- b. Wrong placement (*below right*)



5.2.4 Base mounted power module (control)

Power modules are located in the base on the right side of dishwashers, not behind fascia panels. So:

- Dishwashers must be pulled out to change controls.
- Dishwashers must be pulled out to measure voltages & resistances (at the control).



5.2.4.1 To remove base-mounted power modules

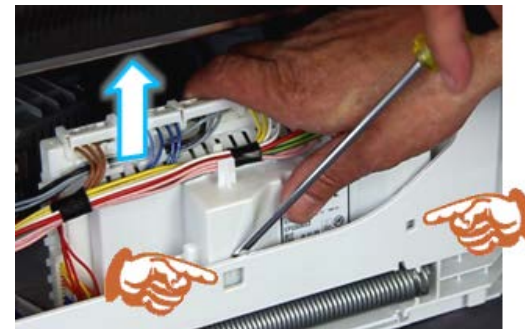


Tools needed: # 2 Phillips and flat blade screwdrivers

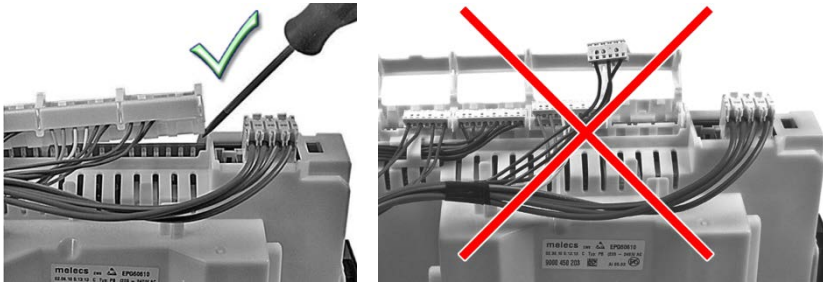
1. **Disconnect & pull out dishwasher** – section 5.1.5.1.
2. Unplug power supply cord from rear of power module (*below left*).
3. Lift off tank fleece insulation from right side of dishwasher.
4. Lift off cover from power module (*below right*).



5. Two plastic base tabs hold the power module in place. To remove power module, gently pry base tabs until they clear module (*below left*) and lift the module up from the base. If necessary, gently pry up the rear of the power module (*below right*).

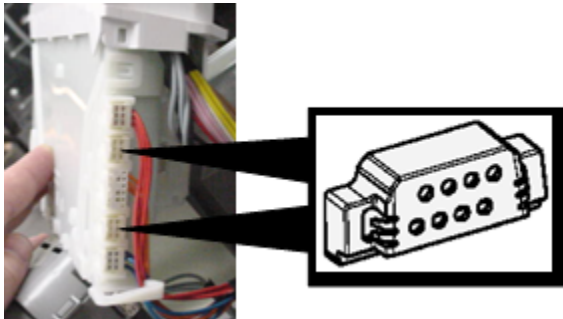


6. Disconnect top / side wire harnesses from power module (*below*), making sure to remove the harnesses with their caps, not individually.



TIP: Check error codes *before* replacing power modules. Many good power modules are replaced and faulty parts aren't replaced, causing repeat calls.

Not all terminals are used. To protect power modules, two plugs are used to cover unused terminals.



CAUTION – 80% of all controls returned for analysis check out OK. Most control issues are due to loose connections and error codes for other parts.

5.3 Dispenser

Although many dispenser components can be replaced, it's quicker to replace the entire dispenser.



5.3.1 To remove dispensers



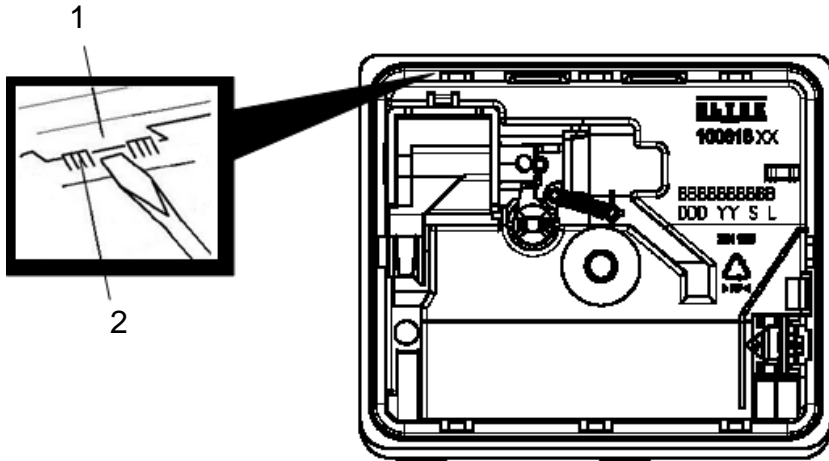
Dispensers are easily removed from inner doors by removing outer doors.

Tools needed: T20 Torx, flat blade screwdrivers & gloves.

1. **Remove outer door** – section 5.1.2.1.
2. Disconnect wire harnesses from dispenser after noting connector locations (*below left*).
3. Remove cable guide (*below right*).



- Carefully pry inner door flanges (1) away from the tabs (2) on the top and bottom of the dispenser (see below).



- Carefully push the dispenser in through the inner door (i.e. toward the dishwasher tank).



CAUTION: Inner door edges are sharp! Use gloves, cover inner door edges and remove dispenser carefully.

5.3.2 To install dispensers

- Where necessary, bend back inner door flanges so they can snap into dispenser tabs.
- To aid installation, coat dispenser seal with rinse-aid.
- Carefully push the dispenser out through the inner door (i.e. from inside the dishwasher toward the front of the dishwasher).



- Snap inner door flanges onto or into dispenser tabs.
- Reconnect dispenser wire harnesses.
- Replace or reinstall vapor barrier – section 5.4.3.
- Replace cable guide.
- Replace outer door.

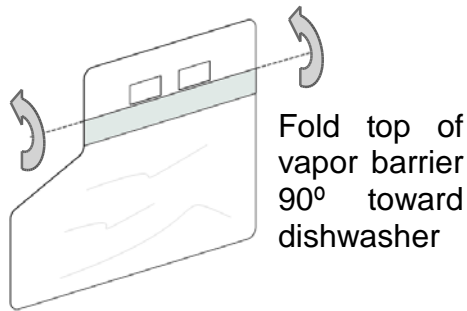
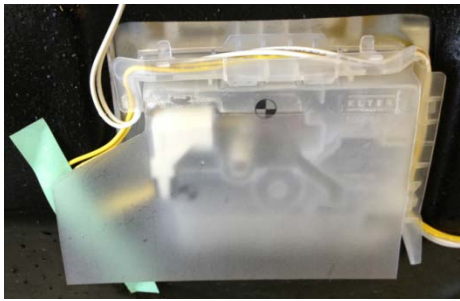


CAUTION: Inner door edges are sharp! Use gloves, cover inner door edges and install dispenser carefully.

5.3.3 To reinstall vapor barriers (SHP / SHV)

Vapor barriers are factory installed with dispensers to protect them from the unlikely event water gets inside dishwasher doors. Vapor barriers *must* be installed on replacement dispensers, whether using existing or replacement barriers.

Vapor barriers have a two-sided adhesive strip for installing them onto the front of dispensers. The portion of the barrier above the adhesive strip is folded over (at a 90° angle) and held in place on top of the dispenser by the cable guide. The barrier has a crease for folding the top of it over.



For replacement vapor barriers, zip off the cover tape from the vapor barrier adhesive strip, fold the top of the barrier at a right angle toward the dishwasher, place the strip onto the dispenser and press the strip over its entire length until it sticks.

For existing vapor barriers, carefully remove them from old dispensers (to avoid removing adhesive), place the strip onto the dispenser and press the strip over its entire length until it sticks.



CAUTION: Not replacing vapor barriers could allow water to damage dispensers.

5.4 Door latch

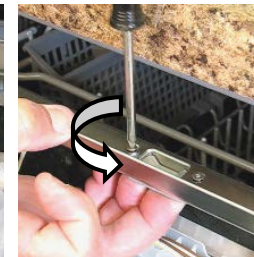
The door latch is mounted on top of the tank and contains a magnet, not a microswitch. A Hall-effect sensor in the door senses the magnet when the door is closed.

Confirm whether the latch is misaligned before replacing the latch or sensor. Check the sensor with a magnet to confirm if it's properly sensing the latch (see section 6.3.1.1).

5.4.1 To remove door latch Hall Effect sensor

Tools required: T10 Torx, T20 Torx & flat blade screwdrivers.

1. **Remove outer door** – section 5.1.2.1.
2. **Remove fascia panel** -- section 5.1.2.2.
3. Disconnect wire harness from sensor (*below left*).
4. To remove sensor, open door and remove (2) T-10 Torx screws from the top center of the door (*below center*).



5.4.2 To remove door latch

Tools needed: Flat blade screwdriver and pliers.

1. **Disconnect & pull out dishwasher** – section 5.1.5.1.
2. Remove door latch by carefully prying tank tabs and lifting the latch up and away from the tabs (*below*).



HINT: When replacing a door latch:

- Make sure the door latch is aligned, is held securely and the sensor detects the door latch magnet.
- Misaligned latches can prevent dishwashers from starting. If the dishwasher won't start, check the door latch alignment.

5.5 Water valve

Access the water valve from the rear of the dishwasher base by pulling out the dishwasher.



5.5.1 To remove water valve

Tools needed: Flat blade screwdriver and pliers.

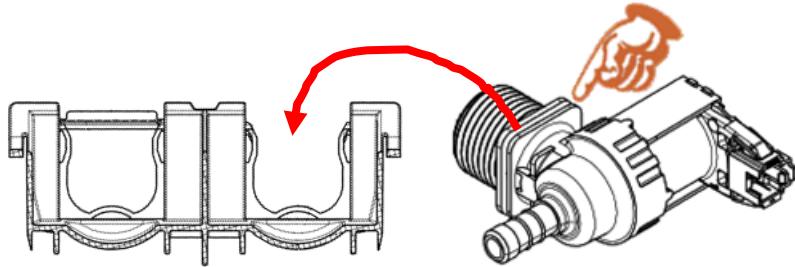
1. **Disconnect & pull out dishwasher** – section 5.1.5.1.
2. To gain slack to pull out water valve, loosen hose clamp from water inlet hose and pull water inlet hose from water inlet control (*below*).



3. Push up latch and carefully pull water valve and mounting bracket up and away from base (*below left*).



- Slide water valve up and out of mounting bracket. When installing new water valve, slide valve flange over bracket sides and snap valve into bracket (*below*).



- Loosen hose clamp and disconnect water inlet hose from rear of valve.
- Disconnect wire harness from water valve (*below*).



- Unscrew supply hose from water valve.
- Remove any water from sump & base.



CONNECTION HINTS:

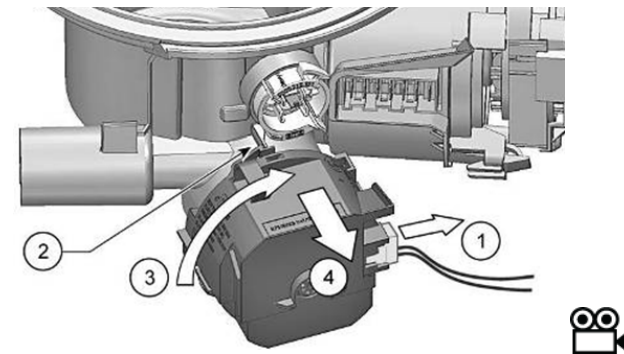
- Water connection 3/8" NPT female. Inlet water pressure range 5 - 120 psi (0.3 – 8.27 bars).
- When reconnecting the water supply to the water valve, don't overtighten the elbow fitting. Hand tighten snugly.
- Do not use Teflon tape on water fittings as it can keep hose seals from seating properly to prevent leaking.

5.6 Drain pump

Access the drain pump from the front of the dishwasher base by removing the base cover.

Tools needed: T20 Torx & #2 Phillips screwdrivers and pliers.

- Remove parts for bottom front access** – section 5.1.4.1.
- Disconnect wire harness from drain pump (*below*).
- Remove the drain pump by lifting the latch, rotating the pump clockwise and pulling the pump out (*below*).



5.7 Aqua sensor

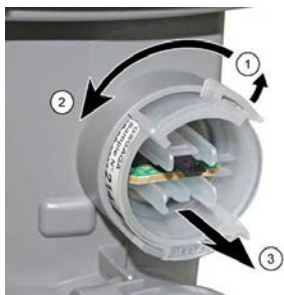
Access the aqua sensor from the front of the dishwasher base by removing the base cover.



5.7.1 To remove aqua sensor

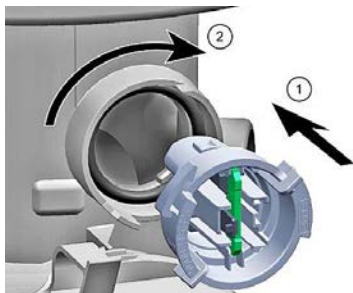
Tools needed: T20 Torx & #2 Phillips screwdrivers and pliers.

1. **Remove parts for bottom front access** – section 5.1.4.1.
2. If needed for access, **remove power module** – section 5.3.2.2
3. Lift up housing latch, twist aqua sensor counter-clockwise (ccw) and pull aqua sensor out from sump.



5.7.2 To install aqua sensor

1. Insert aqua sensor into sump with pc board vertical, then twist clockwise (cw).



TIP: Apply some rinse-aid onto the aqua sensor O-ring to lubricate it for easier installation.

5.8 Water inlet control

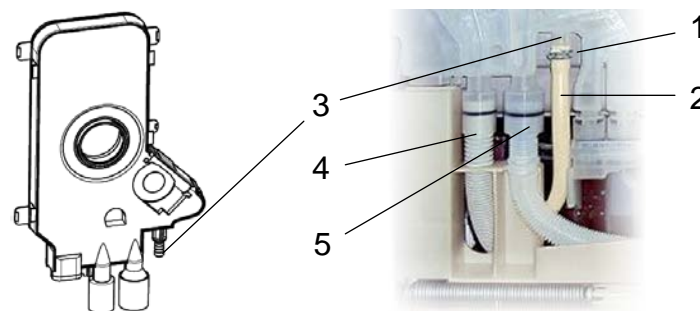
The water inlet control is easily accessed from the left side of the dishwasher. It includes a condensation vent, so there's no separate condensation tube. The water inlet, sump and drain hoses all connect to it.

Tools needed: T20 Torx & #2 Phillips screwdrivers and pliers.

1. **Disconnect & pull out dishwasher** – section 5.1.5.1.
2. Remove lower rack (*below left*). If more space is needed, remove the upper rack as well.
3. Unscrew condensation vent cap ccw (counterclockwise) from inside of tank (*below right*).



4. Loosen hose clamp (1) from water inlet hose (2) and pull water inlet hose from water inlet (3, *below*).
5. Pull out drain (4) and sump (5) hoses from water inlet control (*below*).



- Pull out water inlet control from tank.

5.9 Sump parts (inside tank)

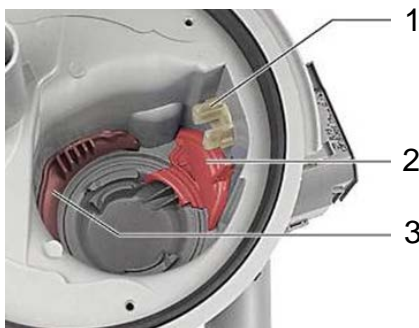
The inside of the sump is easily accessed for maintenance, cleaning drain / heat pump impellers and access to the drain pump cover and suction cap (“heat pump access cover”).

Tools needed: Flat blade screwdriver. 

- Pull out both racks (*below left*).
- Pull out lower spray arm (*below center*).
- Unscrew microfilter counterclockwise (ccw) and lift out microfilter and fine filter screen (*below right*).




- Carefully pop out drain pump cover (*2, below*).
- Carefully pop out suction cap (*3, below*).



- Aqua sensor
- Drain pump cover
- Suction cap



TIP: Snap in the drain pump cover ***tightly*** to avoid drain pump cavitating.

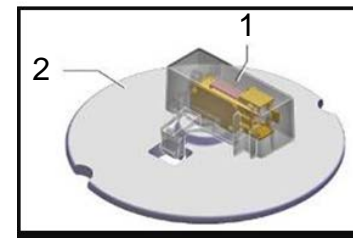
-  Loose drain pump covers have caused many service calls.

5.10 Float (safety system)

The float is easily accessed from the front of the dishwasher once the outer door and base cover are removed.

Tools needed: T20 Torx, #2 Phillips & small flat blade screwdrivers.

- Remove parts for bottom front access** – section 5.1.4.1.
- Unlatch float switch housing (*below*) and remove housing and float switch (microswitch).
- Lift float up and away from base.



- Float switch housing w/ microswitch
- Float

5.11 Door hinge levers

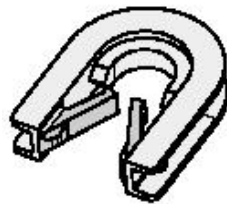


Tools needed: T20 Torx & #2 Phillips screwdrivers and pliers.

1. **Remove inner door** – section 5.11.
2. Remove right hinge ground wire.

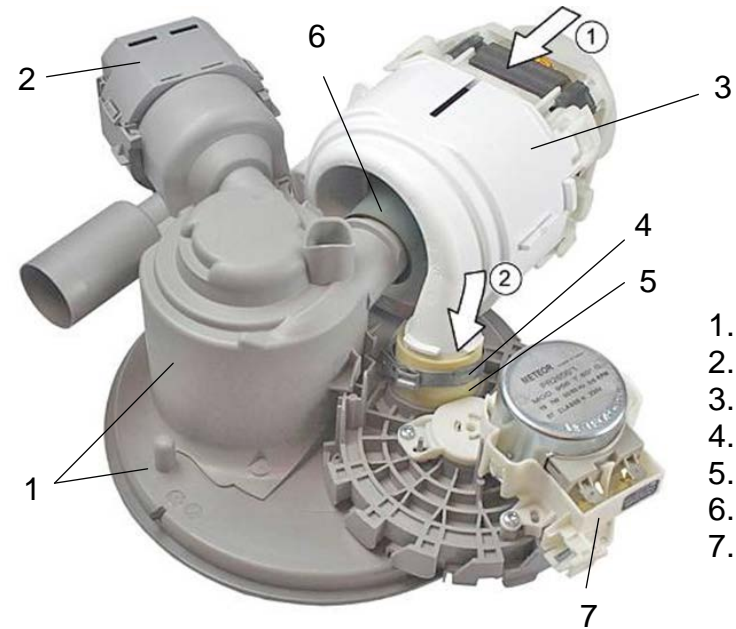


3. Pry open hinge bushing latches and lift hinge levers from hinge plates. Hinge bushings should be replaced after latches have been pried open.



5.12 Heat pump

The heat pump is best accessed from the bottom of the dishwasher by flipping it on it's back. Use the same process to access the water switch and the sump.

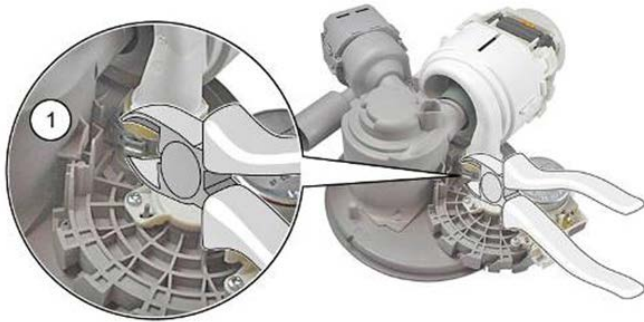


1. Sump
2. Drain pump
3. Heat pump
4. Clamp
5. Adapter
6. Seal ring
7. Water switch

Tools needed: T20 Torx, #2 Phillips & small flat blade screwdrivers and pliers.

1. **Flip dishwasher for bottom access** – section 5.1.6.1.

2. Remove hose clamp to separate pump from adapter (*below*).



3. Disconnect support strap (*below*).



4. To remove pump, slide pump off sump at seal ring. The seal ring can't be field removed from the heat pump.



5. Disconnect the two (2) pump wire harnesses (*below left*). To remove the small connector for the sensor harness with black wires, unlatch it from it's terminal (*below center*).
6. If necessary, remove the adapter by removing four (4) screws (*below right*).



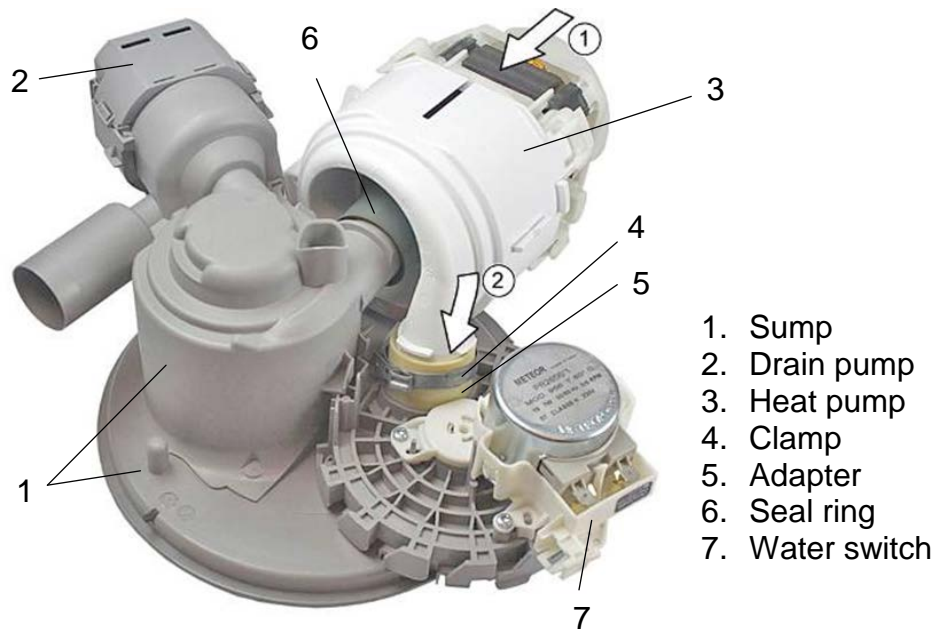
TIP: The replacement heat pump comes with motor, pump, seal ring and hose clamp.



NOTE: The motor can't be separated from the pump and the seal ring can't be field installed.

5.13 Water switch

The water switch is best accessed from the bottom of the dishwasher by flipping it on it's back. Use the same process to access the heat pump and the sump.

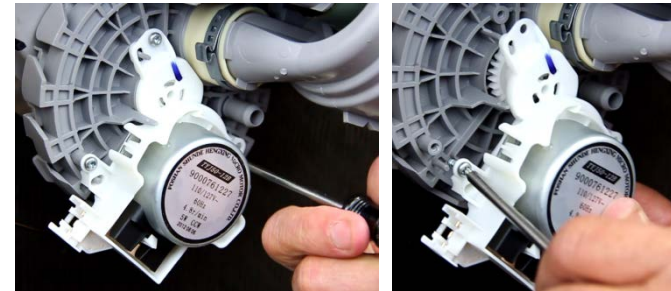


1. Sump
2. Drain pump
3. Heat pump
4. Clamp
5. Adapter
6. Seal ring
7. Water switch

Tools needed: T20 Torx, #2 Phillips & small flat blade screwdrivers and pliers.

1. **Flip dishwasher for bottom access** – section 5.1.6.1.

2. To remove water switch motor assembly, remove three (3) screws and lift it from the sump (*below*).



3. To gain access to remove water switch housing / disk, **remove heat pump** – section 5.12.
4. Use a small flat blade screwdriver to unlatch water switch housing from sump, rotate housing counter-clockwise and lift it out from the sump to remove it (*below*).



5. This is what the parts look like when removed.



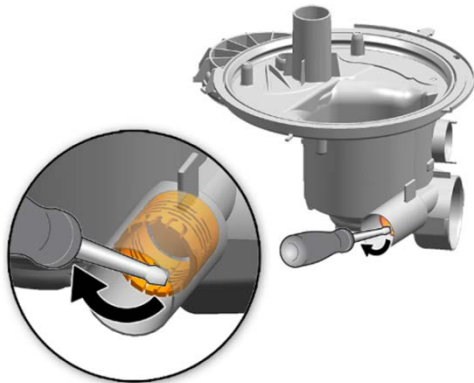
5.14 Backflow valve

The backflow valve is located in the sump connector to the drain hose.

5.14.1 Removing backflow valve

Tools needed: T20 Torx, #2 Phillips & small flat blade screwdrivers.

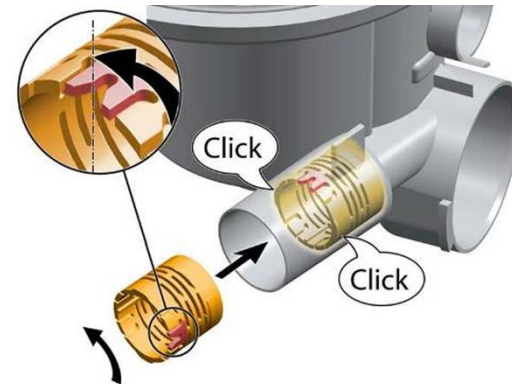
1. **Remove parts for bottom front access** – section 5.1.4.1.
2. Remove water completely from sump.
3. Using a small flat blade screwdriver, carefully work the backflow valve out from the sump, taking care to avoid scratching the sump to avoid any possibility of leaking.



TIP: To avoid leaking, do not scratch the inside of the sump outlet while using a flat blade screwdriver to remove the backflow valve.

5.14.2 Installing backflow valve

Carefully slide replacement valve into sump outlet until it clicks.



5.15 Sump

Replacing the sump requires access from underneath and inside the tank and requires removing several parts.

5.15.1 Removing sump

Tools needed: T20 Torx, #2 Phillips & small flat blade screwdrivers and pliers.

1. Remove water completely from sump.
2. **Flip dishwasher for bottom access** – section 5.1.5.
3. Disconnect drain hose from sump.
4. **Remove drain pump** – section 5.6.
5. **Remove heat pump** – section 5.12.
6. **Remove aqua sensor** – section 5.7.
7. **Remove water switch** – section 5.13.
8. **Remove backflow valve** – section 5.14.
9. **Remove sump parts (inside tank)** – section 5.9.

10. Lift sump from dishwasher tank.



CAUTION: Tank edges are sharp! Use gloves, cover tank edges and remove sump carefully.

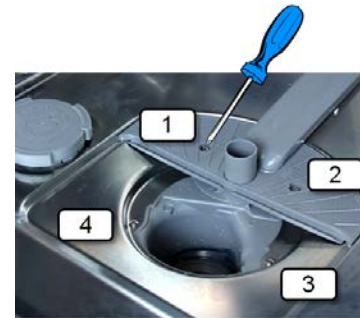
5.15.2 Installing sump

To make sure the sump is seated properly onto the tank, the following steps must be followed. The dishwasher must be right side up during sump installation.

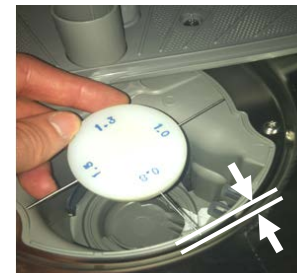


1. Install backflow valve.
2. Install aqua sensor.
3. Install water switch.

4. Do not reconnect heat and drain pumps until later.
5. Place the base right side up.
6. Lay the sump loosely onto the base where it would be in its final position. In other words, lay the sump onto the base right side up, centered under the tank cutout in a position to be reconnected to the heat pump and hose.
7. Lift the dishwasher onto the base and reconnect the base to the tank using the two (2) front and two (2) rear base screws.
8. Using one hand, carefully lift the sump up to the tank. Use the hand you won't be using to screw in sump screws.
9. Using your other hand, insert screws in the order shown below, starting at the top left screw and going cw (clockwise) around the sump to use the screws to raise the sump to the tank.



10. Use a gauge to check the clearance of the sump to the tank cutout. The clearance at all points around the sump must be 1mm or less.



11. Reinstall heat / drain pumps and drain hose.
12. Install parts into top of sump, including suction cap and drain pump cover.



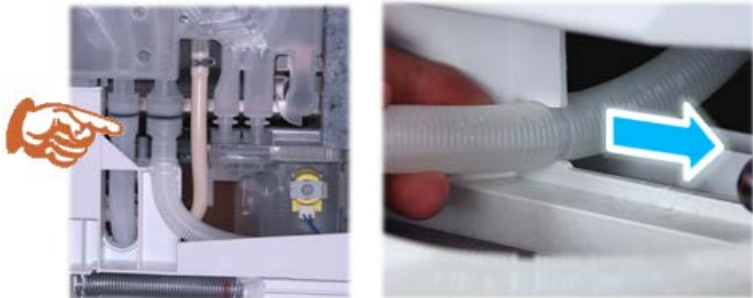
CAUTION: Tank edges are sharp! Use gloves, cover tank edges and install sump carefully.

5.16 Drain hose

5.16.1 Removing drain hose

Tools needed: #2 Phillips & small flat blade screwdrivers.

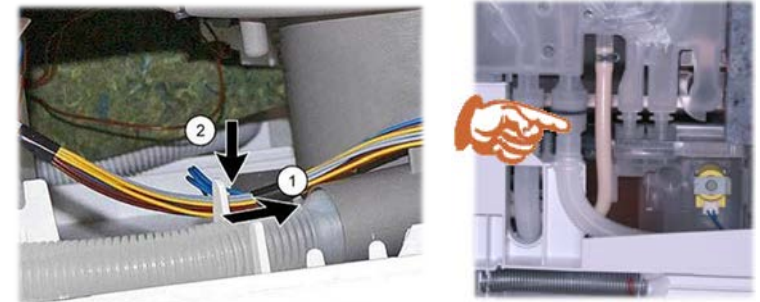
1. **Disconnect & pull out dishwasher** – section 5.1.5.1.
2. **Remove water valve** – section 5.5.1. Don't completely remove the valve, just remove the valve and support from the base so the hose can slide out.
3. Pull drain hose out from water level control (*below left*).
4. Slide the drain hose to the right to remove it from the base (*below right*). The hose is notched to be held by the base and can't be pulled straight out.



5.16.2 Removing sump drain hose

Tools needed: #2 Phillips & small flat blade screwdrivers.

1. **Disconnect & pull out dishwasher** – section 5.1.5.1.
2. Pull out the drain hose w/ O-ring from the sump (*below left*) and from the water level control (*below right*).



5.17 Info Light (selected models)

Tools needed: T20 Torx & small flat blade screwdrivers.

1. **Remove outer door** – section 5.1.2.1.
2. Disconnect wire harness from info light.
3. Remove the info light by carefully snapping it out from the right hinge plate.



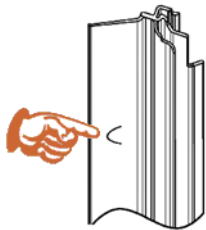
5.18 Side trim strips

Side trim strips aren't mounted with screws, but snap into slots in tank front flanges. No tools are needed unless the dishwasher needs to be pulled out for access.

5.18.1 Removing side trim strips

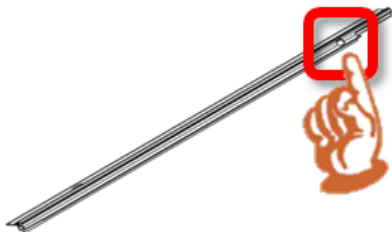
Tools needed: #2 Phillips screwdriver.

1. **Disconnect & pull out dishwasher** – section 5.1.5.1, if necessary for access.
2. Twist trim strips away from dishwasher tank flange. Tabs in trim strips snap into front tank flange slots (*below*).



5.18.2 Installing side trim strips

1. Align hole in bottom of each trim strip with the hinge screw (*below*). There is also a lip on the back of the hinge to help line up the holes.



2. Rotate trim strip into tank flange until the three (3) tabs snap into corresponding tank flange slots.

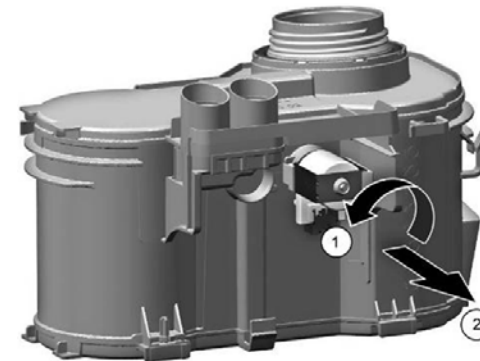
5.19 Water (salt) softener (selected models)

5.19.1 Removing regeneration valve

Removing the regeneration valve saves time and money compared to replacing the entire salt softener.

Tools needed: T20 Torx, #2 Phillips & small flat blade screwdrivers.

1. **Disconnect & pull out dishwasher** – section 5.1.5.1.
2. Remove water from the water level control and the water softener to prevent leaking.
3. To remove the valve coil, rotate it ccw (i.e. to the left) and pull it out from the softener (*below*). The valve body will remain in the softener.

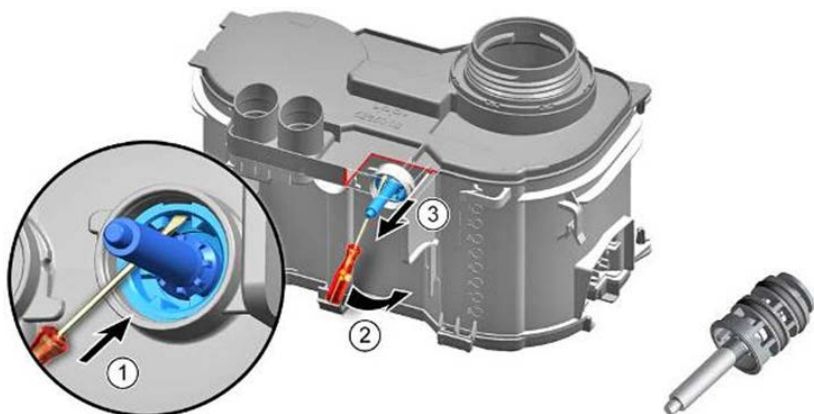




CAUTION: Take care to not lose the regeneration valve spring when removing the valve coil or body.



- To remove the valve body, place a small blade screwdriver into it and carefully pry it out from the softener (*below*).



5.19.2 Assembling regeneration valve

When assembling / reassembling the regeneration valve, line up the marks on the valve body and coil (*below*). When the marks are aligned, carefully press the body with spring into the coil until the parts come together.

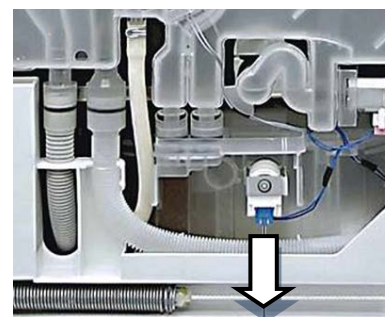


CAUTION: The regeneration valve body, spring and coil must be properly reassembled to avoid damage.

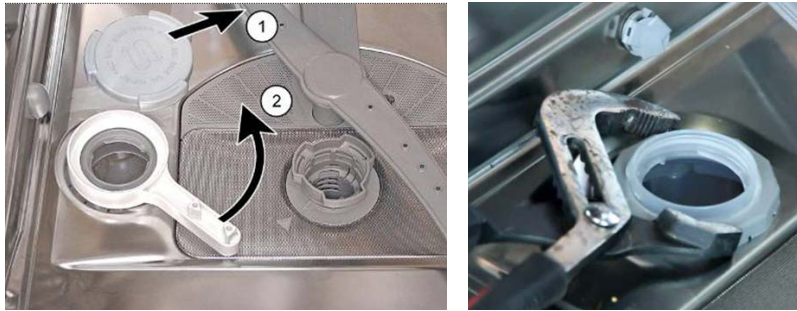
5.19.3 Removing water softener

Tools needed: #2 Phillips & small flat blade screwdrivers, along with special tool part # **341805**.

- Flip dishwasher for bottom access** – section 5.1.6.1.
- Disconnect regeneration valve wire harness (*below*).



3. Unscrew salt reservoir cap (*below*). Using special wrench **341805**, unscrew softener nut counterclockwise (ccw) (*below*). Carefully drop the softener down and away from the dishwasher.



If special wrench **341805** isn't available, unscrew the nut by hand. An adjustable wrench can be used to loosen the nut if special care is taken to not damage the plastic nut or the ss tank.



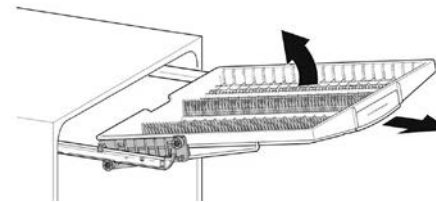
CAUTION: Tank edges (at the softener outlet) are sharp! Use gloves, cover tank edges and remove softener carefully.

5.20 Cutlery drawer (selected models)

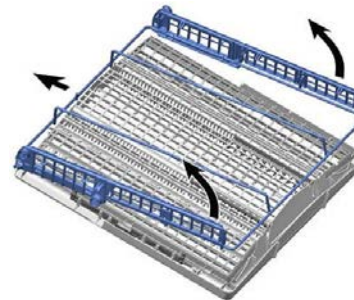
5.20.1 Removing and disassembling cutlery drawer

Tools needed: None

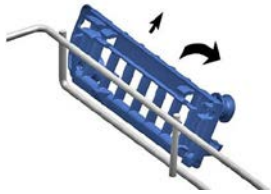
1. Open door and pull out cutlery drawer.
2. When drawer is fully extended, lift up drawer until front wheels clear rack slides and slide drawer off of rack slides.



3. To remove drawer from support, turn rack upside-down and lift support from drawer, taking care to not break plastic latches.



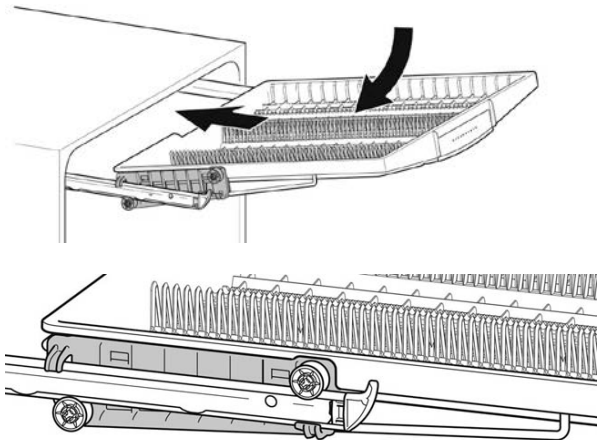
- To remove wheels, snap wheel assemblies off of the drawer support, taking care to not break plastic latches.



5.20.2 Installing cutlery drawer

Tools needed: None

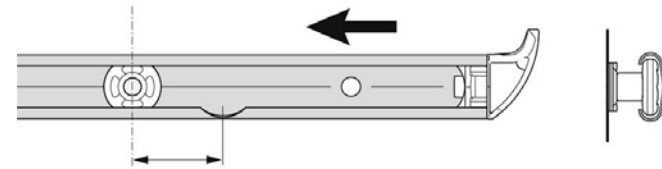
- Open door and fully extend both rack slides.
- Lift front of drawer, carefully slide wheels over slide front endcaps until wheels clear them and lower front of drawer until wheels fully engage rack slides (*below*).



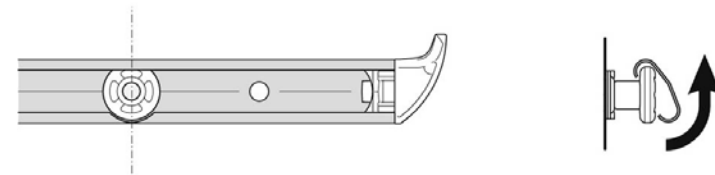
5.20.3 Removing rack slides (rails)

Tools needed: None

- Remove cutlery drawer** – section 5.23.1.
- Slide rack slides in toward dishwasher until round cutouts line up with tank wheels.



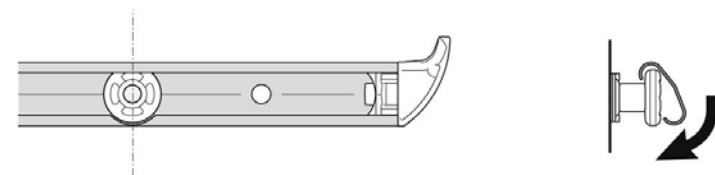
- Rotate bottom of rack slides in toward dishwasher (away from tank walls) and lift rack slides away from tank wheels.



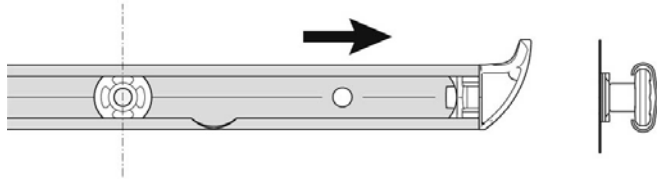
5.20.4 Assembling rack slides (rails)

Tools needed: None

- Rotate bottom of rack slides in toward dishwasher (away from tank walls) and hook tops of rack slides over tank wheels. Line up round cutouts of rack slides with tank wheels and rotate bottoms of rack slides down.



2. Move rack slide cutouts away from tank wheels.

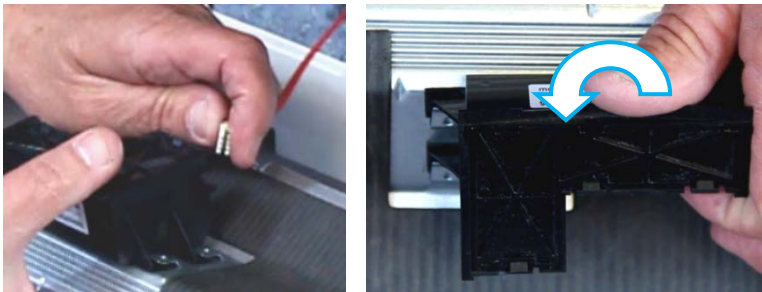


5.21 Time Light (selected models)



Tools needed: T20 Torx & #2 Phillips screwdrivers and pliers.

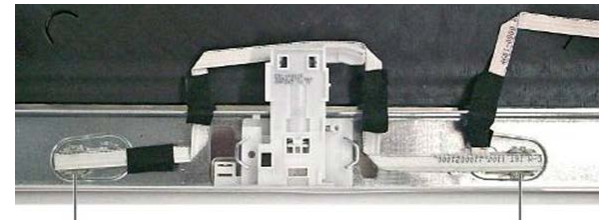
1. **Remove outer door** – section 5.1.2.1.
2. **Remove toe kick** – section 5.1.4.2. Pull dishwasher out enough to clear hinges.
3. **Remove base cover** – section 5.1.4.3. This eliminates disconnecting and reconnecting all wire harnesses.
4. Disconnect harness from Time Light (*below left*).
5. Slide Time Light projector up from base cover, rotating it slightly ccw (counterclockwise) as you go (*below right*).



5.22 Emotion Light (selected models)

Tools needed: T20 Torx & #2 Phillips screwdrivers and pliers.

1. **Disconnect & pull out dishwasher** – section 5.1.5.1.
2. Open LED covers.
3. Carefully remove both LEDs with covers from the tank.
4. Carefully peel back the ribbon cable and disconnect the wire harness from it.



CAUTION:

Take care to not damage the delicate ribbon cable.

6 FAULT DIAGNOSTICS

6.1 Error codes (service / customer)

6.1.1 Entering the error code program

- If the dishwasher needs to be reset, turn it on and off again. The dishwasher must be off to enter the program.
- While pressing and holding both the “B” and “C” buttons (*below*), press and hold the *On / Off* button (to turn the dishwasher on) until the display shows “P0”. Release all buttons.
- Program “P0” is the error code program.



6.1.2 Viewing error code displays

- Press the “C” button (*below*) to start the error code program.
- The program shows *both* the storage location of the error code (“C:00 – C:07”) and the error codes themselves (“E:00 – E:30”):
 - To view storage locations, press and hold the “C” button.
 - To view error codes, release the “C” button.



6.1.3 Exiting the error code program

- Turn the dishwasher off to exit the program.



6.1.4 Error code / troubleshooting chart

Error Code	Description	Part	DW Symptoms (seen during wash cycles)	Solution
E:00	No errors		No errors	
E:01	Faulty pump relay	Power module	Wash cycle abruptly ends with <i>Sanitized</i> LED lit	Replace power module (located in base).
E:02	Faulty heater relay		Dishwasher runs without heating / heater error	
E:05	Faulty water switch relay		Water switch runs continually	
E:06	Door latch Hall sensor not detected	Hall sensor	DW won't run & <i>Clean</i> LED is flashing	Align door latch above Hall sensor (<i>inside inner door</i>)
	Defective door latch Hall sensor			Check continuity / connections between door switch (<i>q2</i>) and power module. With door closed, measure voltage across door latch Hall sensor connector. If > 10V, replace Hall sensor. If < 10 V, replace power module.
E:08	Heat pump detects low water level	Water inlet	Not heating	Check water supply & repair any leaks. Check for kinks in inlet hoses. Turn over pots / bowls collecting water.
				Check continuity between water inlet valve (<i>k2</i>) and power module. Measure voltage across water inlet valve terminals (<i>k2</i>) during step 1 of customer service test program. If $\approx 120V$, replace water inlet valve. If not $\approx 120V$, replace power module.
E:09	Faulty heater circuit (open - circuited)	Heat pump		Check continuity between heat pump heating element (<i>e1</i>) and power module.
				Measure heat pump heating element (<i>e1</i>) resistance, which should be $\approx 8.9\Omega$ @ room temp. If not, replace heat pump. If so, replace power module.

Error Code	Description	Part	DW Symptoms (seen during wash cycles)	Solution
E:11	NTC or NTC wiring harness error	NTC's (heat pump)	Not heating	Check continuity between NTC's and power module.
				Measure NTC resistances, which should be $\approx 10 \text{ k}\Omega$ between terminals 4-5 & 5-6 and $\approx 20 \text{ k}\Omega$ between terminals 4-6 @ room temp. If not, replace heat pump. If so, replace power module.
E:13	Incoming water too hot (> 75°C / 167°F)		Dishwasher runs without heat pump heating element running	Make sure water inlet temp is < 75°C / 167°F.
E:15	Float switch activated and dishwasher runs continually / can't be turned off	Float switch	Water doesn't fill and drain pump runs continually	Remove debris / obstructions from drain pump / drain hose. Remove water from base.
				Make sure float & float switch aren't stuck.
				Make sure water inlet valve isn't stuck "open".
				Check float switch and wire harness (to power module).
E:17	Faulty water softener regeneration valve	Water softener	Water softener doesn't regenerate	Check continuity between regeneration valve (<i>k1</i>) and power module.
E:20	Faulty heat pump motor winding	Heat pump	Wash cycle abruptly ends with <i>Clean / Sanitized</i> LED's lit	Check continuity between heat pump (<i>m2</i>) and power module.
				Measure heat pump resistance between any 2 terminals. If $\approx 15.2 \Omega$ @ room temp, replace power module. If not, replace heat pump.
E:21	Heat pump is blocked / clogged	Heat pump		Remove debris / obstructions from heat pump.
				If pump impeller is stuck, replace heat pump.

Error Code	Description	Part	DW Symptoms (seen during wash cycles)	Solution
E:23	Faulty drain pump	Drain pump		Check continuity between drain pump (m3) and power module.
				Measure drain pump resistance between any 2 terminals. If $\approx 80.5 \Omega$ @ room temp, replace power module. If not, replace drain pump.
E:24	Dishwasher won't drain		Remove garbage disposal plug.	Make sure the drain hose is < 150", includes a 33" high loop and is installed ≤ 50 " above the floor.
			Replace missing or reinstall loose drain pump cover.	
			E:25	Drain pump is blocked
Remove sump drain pump cover and confirm drain pump impeller is turning freely.				
Replace missing or reinstall loose drain pump cover.				
E:26	Faulty water switch	Water switch	Water switch runs continually	Check continuity between water switch (m5) and power module.
				Measure voltage to water switch. If $\approx 120V$, replace water switch. If not $\approx 120V$, replace power module.
E:28	Aqua sensor not properly calibrated	Aqua sensor	Aqua sensor doesn't run during wash cycle	Check continuity between aqua sensor (b5) and power module.
				Make sure aqua sensor is clean where it enters the sump.
				If electrical connections are good and the aqua sensor is clean, replace the aqua sensor.

Error Code	Description	Part	DW Symptoms (seen during wash cycles)	Solution
E:27	Under-voltage	Supply voltage	Low supply voltage	Check house wiring connections and if supply voltage is \approx 98 - 120VAC to power module harness connector.
E:29	Under / overvoltage		Low or high supply voltage	
E:30	Over-voltage		High supply voltage	
	House wiring isn't 120V		No power to dishwasher	
	Open "On/Off" OR "Start" switch	On / Off switch		Check "On/Off" switch & power module connections.
				Measure "On/Off" switch resistance. If it's ' ∞ ' Ω in "on" position, replace it.
				If no LED's flash when "On/Off" switch is pressed and the dishwasher door is open, replace operating module (in fascia panel).
	Detergent dispenser door jammed OR loose wiring connections	Dispenser	Dispenser not operating	Make sure dispenser detergent door isn't jammed.
				Check connections between rinse-aid dispenser, dispenser actuator (<i>q3</i>) and power module.
				Check dispenser actuator operation. If actuator operates, but doesn't open detergent dispenser cover, replace dispenser. If actuator doesn't operate, replace power module.
	No rinse-aid OR loose wiring connections	Dispenser	Rinse-aid LED is glowing	Refill rinse aid, if empty.
				Check connections between rinse-aid sensor (<i>b3</i>) and operating module.
				Measure voltage between outer most dispenser terminals. If \approx 13VDC, replace dispenser. If not, replace operating module.
	No rinse aid	Dispenser	No drying OR customers report display cycle times have increased quite a bit	Educate customer on using and refilling rinse aid.
	Rinse aid setting = 0			Set rinse aid setting to "4" if it is at "0".

Error Code	Description	Part	DW Symptoms (seen during wash cycles)	Solution
	<i>Extra Dry Heat</i> option hasn't been turned on			Activate <i>Extra Dry Heat</i> option, if it's not activated and is available on the dishwasher.
	Clogged spray arms or filters.		Washability issue (heat pump runs, but dishes still dirty)	Remove debris / obstructions from filter and spray arms.
	Spray arms not rotating			Make sure spray arms are properly attached and rotate freely.
				Make sure spray arms are properly aligned with the supply tube.
	Door is ajar		Dishwasher won't start	Educate customer on closing door securely.

6.1.5 Customer error codes

Dishwashers with digital displays have error codes seen by *customers*. Viewing the error code (*Display Failure Memory*) chart, the last two columns (under “*Customer Failure display*”) show error codes seen by customers in the digital display. The first two columns (under “*Customer Service Failure display*”) show error codes seen in the error code program. Error code displays are identical – the only difference being some service error codes (e.g. **E:08**, **E:16**) can’t be seen by customers.

6.1.6 Clearing error codes

To clear error codes, run the customer service test program.

6.1.7 Error code E:24 for drain obstructions

If a dishwasher doesn’t drain properly and / or shows an **E:24** error code, the problem usually is **not** with the control or drain pump. To solve the issue, (1) the control must be reset and (2) the obstructions generating the error code must be cleaned out.

6.1.7.1 To reset the control

1. With the door closed and the dishwasher turned on, press and hold the *Start* button for ~ five (5) seconds -- the display should show "01" or "00". Press the *On/off* button (turning the dishwasher off) and the control should be reset.
2. If step one (above) didn’t work, remove the toe kick and disconnect the drain pump harness from the drain pump. Make sure the connector isn’t touching anything – tape the connector if necessary. With the door closed, press the *On/off* button to turn the dishwasher on. You should hear the control turn on and control relays click on and off. Wait about 30 seconds with the power on, then press the *On/off*

button to turn the dishwasher off. With the power off, reconnect the drain pump harness and reinstall the toe kick. With the door closed, press the *On/off* button to turn the dishwasher on. The control should be reset.

6.1.7.2 Overly high drain connections

Error code **E:24** can occur for drain connections higher than 50” (1.27m). The only repair is for the customer to have their drain connection lowered, especially for Johnson Tee installations.



CAUTION:

For installations with a Johnson Tee, the Johnson Tee must be installed in the wall behind the dishwasher, no more than 50” (at it’s maximum height) above the floor. The connection must be ¾” minimum – ½” must not be used. Dishwasher drain hose extensions must not be used.

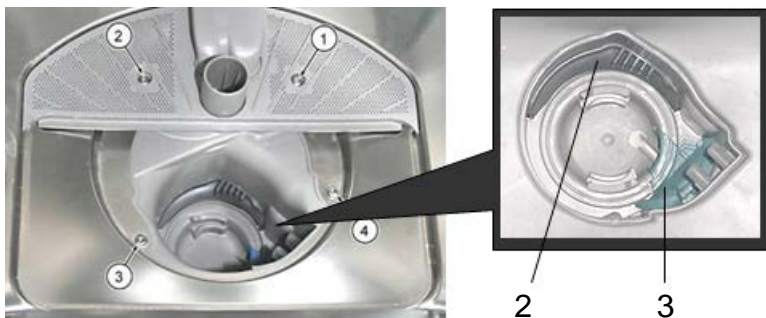
6.1.7.3 Clearing obstructions

With the dishwasher installed and drain hose connected, open the door to the dishwasher and remove the sump filter. Add water to the sump until it is filled. Then gently lift up on the safety float (1) until the float switch closes (~ ¼"). The drain pump should turn on and drain the water out.

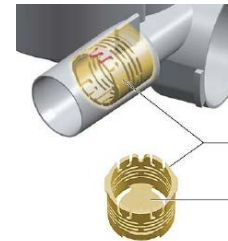


1. Safety float
2. Suction cap
3. Drain pump cover

1. If the drain pump turns on, but does not drain, check the internal and external drain hoses for kinks or obstructions. Make sure the drain pump cover (3) is properly snapped in place. If the drain hose is attached to a garbage disposal, make sure the disposal plug is removed and the disposal doesn't have any obstructions.



2. If the water drains out completely, release the safety float (1). If water flows back into the sump, the backflow (check) valve (4) may be stuck open. Clean out the backflow valve and sump. If necessary, replace the backflow valve.



4. Backflow (check) valve
5. Flap

3. If the drain pump doesn't turn on, remove the drain pump cover (3), check for obstructions and make sure the pump impeller turns freely.
4. Carefully remove the suction cap (2) from the sump and make sure the heat pump impeller turns freely (using a 5 mm nut driver).



TIP: Opening and closing the door bypasses the **E:24** error code, allowing the dishwasher to continue in the wash cycle (unless it is reset).

6.1.8 Error code E:25 for loose drain pump cover

If a dishwasher doesn't drain properly and / or shows an **E:25** error code, the problem could be the drain pump cover wasn't replaced properly (i.e. not completely seated and locked into position). Loose drain pump covers allow more water flow to the drain pump, increasing the pump load, drawing more current and causing an **E:25** error code.

The **Clean** light can come on, giving the impression the dishwasher finished its cycle when it actually didn't.

Occasionally **E:23** and **E:24** error codes can occur as well.



1

1. Drain pump cover



CAUTION – 80% of all controls returned for analysis check out OK. Most control issues are due to loose connections and error codes for other parts.

6.2 Customer service test program

6.2.1 Entering the customer service test program

- If the dishwasher needs to be reset, turn it on and off again. The dishwasher must be off to enter the program.
- While pressing and holding both the “B” and “C” buttons (*below*), press and hold the *On / Off* button (to turn the dishwasher on) until the display shows “P0”. Release all buttons.
- To enter the customer service test program, press the “B” button once – the display will show “P1”.



- Running the customer service test program clears error codes.
- Test steps can vary a bit, depending on the dishwasher model.

6.2.3 Exiting the customer service test program

- Reset the test program by pressing and holding the *Start* button for three (3) seconds. The display will show “0:01”.
- Turn the dishwasher off to exit the program.



6.2.2 Running the customer service test program

- Press the “C” button (*below*) to start the customer service test program.
- The program shows test step #'s (“S:00 – S:22”)
 - For test steps, including values to be checked, see *Viewing test program* 6.2.4.
 - To skip test steps, press the “B” button.
 - Only the following steps can be skipped.
 - **S:11** heating / circulating
 - **S:14** heating / circulating / moving water switch



6.2.4 Viewing customer service program

Function	Display	Remark				
	Display	Can be skipped	Time (s)	Value	Check / Measure	Remark

1.1 Customer Service Program

Preparation					Remove approx. 0.5 l water from salt dispenser.	Regeneration valve must be checked for leaks at appropriate customer specifications (see also steps with display S:04 + S:17)
CoilCheck	S:00	No	approx 20			Check the drain pump. Activate the drain pump and place the water switch in the top basket position.
Check flow sensor and flow controller	S:01	No	approx . 10-100			Add 50 ml (filling valve, drainage pump and circulation pump are activated in succession).
Pause	S:02	No	10			
Fill + pump	S:03	No	approx 100			Heat exchanger is overfilled, residual quantity in the pump sump is pumped off ==> heat exchanger full (contains 3.1 l water).
Pause	S:04	No	10		Visual inspection: water level in salt dispenser.	No change to water level ==> Regeneration valve leakproof.
Fill	S:05	No	approx 40	1,5 l	Check waterinlet amount	Within of 40s should the filling amount achieved. The heat exchanger will be overfilled.
Pause	S:06	No	10		Visual inspection: water level in appliance.	Water level on upper edge of fine mesh filter (= 1.5 l in pump sump).
Fill	S:07	No	approx 60	2,5 l		Total: 4 l in appliance
Circulate	S:08	No	15			Circulation pump must not "snorkel".
Dispense (detergent)	S:09	No	10			

Function	Display		Remark			
	Display	Can be skipped	Time (s)	Value	Check / Measure	Remark
Circulate + heat + calibrate AquaSensor	S:10	Nein	110			
Circulate + heat	S:11	Yes		40 °C		Increase of temperature during heating +2.5 °C/min
Pause	S:12	No	5			
Circulate + dispense (rinse aid)	S:13	No	60			Number of impulses = set value of dispensed rinse aid
Circulate + heat + change position of water switch	S:14	Yes	approx 480	65 °C		Increase of temperature during heating +2.5 °C/min. Change every 30 s roof shower head, top basket, bottom basket.
Pump off	S:15	No	45			Tightness test of outlet valve Water-level at heat exchanger is not supposed to falling off
Drain heat exchanger	S:16	No	60			Check outlet valve
Pause	S:17	No	10		Visual inspection: water level in appliance.	Water level must be over handle of coarse filter
Pump off + drain heat exchanger + fill + regenerate	S:18	No	approx 20			Drain the complete appliance
Pause	S:19	No	10		Visual inspection: water level in salt dispenser.	Water level in salt dispenser must be increased by several cm.
Pump off + drain heat exchanger + fill	S:20	No	approx 100	4 l		Rinse the brine solution out of the heat exchanger and pump sump.

Function	Display	Remark				
		Can be skipped	Time (s)	Value	Check / Measure	Remark
Pump off + drain (heat exchanger)	S:21	No	30			Drain the complete appliance
Check whether appliance was drained (activates circulation pump and drain pump)	S:22	No	approx 10-120			Self-check whether appliance was drained.
End of test programme	„0“ on display or „End LED“ is lit				Switch off main switch	Test has ended. When the appliance is next switched on, the normal rinse programme is displayed

1.2 Reset program

Reset					Perform reset	Is possible at any time by pressing the button "Start" for longer than 3 seconds

6.3 Troubleshooting

6.3.1 Dishwasher won't start

6.3.1.1 Door ajar or faulty / misaligned door latch

The dishwasher won't start if the door isn't closed securely or if the door latch is misaligned. Push the door closed until the door latch closes (i.e. until the latch clicks). If the dishwasher starts, educate the customer on closing the door securely.



If the dishwasher won't start when the door has been securely closed, check the door latch with a magnet. Hold the magnet over the Hall Effect sensor (located just left of the left screw) – if the dishwasher starts, the sensor didn't sense the door latch magnet.

Occasionally a door can catch on the door seal and not close securely. If the door, door latch or door seal is misaligned, realign it. If the door latch is broken, replace it.



TIP: If dishwashers won't start, check:

- Door latch, including alignment
- Heat pump
- Drain pump

6.3.1.2 Disabled or faulty pumps

If the dishwasher won't start, check if the following parts are disconnected or disabled. If they aren't connected, reconnect them. If faulty, replace them.

- Heat pump
- Drain pump

Dishwasher controls run safety checks – if drain pumps or heat pumps are disconnected, dishwashers will **NOT** run.

6.3.2 Protection of heater if there's no water

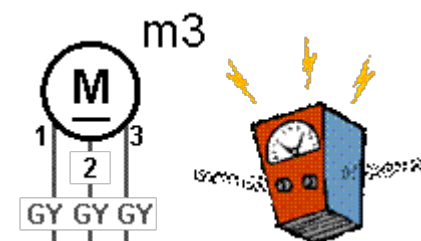
Two NTC's protect the heater. Both NTC's are checked by the control – if they overheat, the control shuts down the dishwasher (**E:08** error code). The dishwasher shuts down if only one NTC returns a signal (**E:12** error code) or if they show different values (**E:11** error code).

6.3.3 Drain pump terminal measurements

There is a single 3-pin connector, connecting to the 3-pole BLDC pump motor.

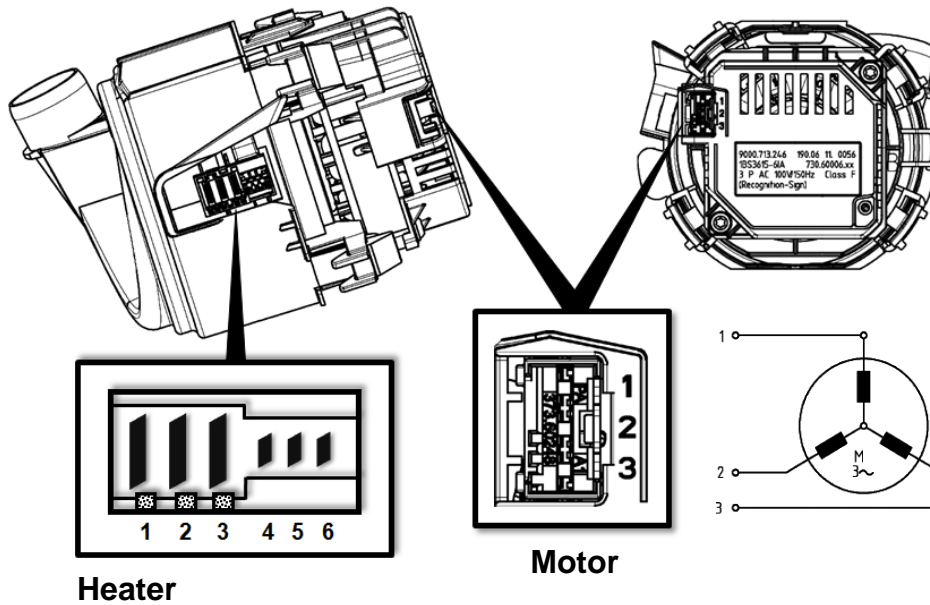
Resistances as follows:

- 1 – 2: 80.5 Ω (@ 68 °F)
- 2 – 3: 80.5 Ω (@ 68 °F)
- 3 – 1: 80.5 Ω (@ 68 °F)

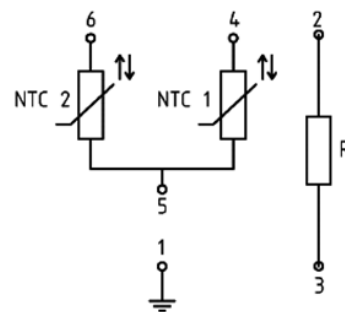


6.3.4 Heat pump terminal measurements

There are two connectors, 6-pin heater and 3-pin motor.



- 1 – Ground
- 2 – Heater line / hot (L)
- 3 – Heater neutral (N)
- 4 – NTC 1
- 5 – NTC common
- 6 – NTC 2



6.3.4.1 6-pin connector (heater / NTC's / pump ground)

The 6-pin connector on the side of the heat pump connects to the heat pump heater, heater NTC's and ground.

To check the 1200 W heater, measure the resistance between terminals 2 – 3. If the resistance = ∞ , the heater has failed and the heat pump must be replaced.

Heater resistance as follows:

2 – 3: ~ 8.9 Ω (@ 77 °F)

NTC resistances as follows:

4 – 5: ~ 10 k Ω (@ 77 °F)

5 – 6: ~ 10 k Ω (@ 77 °F)

4 – 6: ~ 20 k Ω (@ 77 °F)

6.3.4.2 3-pin connector (3-pole BLDC motor)

The 3-pin connector on the end of the heat pump connects to the 3-pole BLDC motor. The power module controls motor speed, starting and stopping.

Motor resistances as follows:

1 – 2: ~ 15.2 Ω (@ 68 °F)

2 – 3: ~ 15.2 Ω (@ 68 °F)

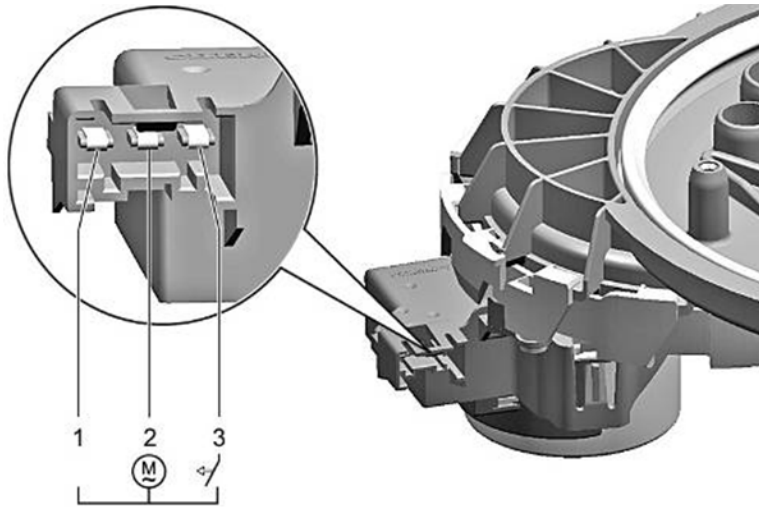
3 – 1: ~ 15.2 Ω (@ 68 °F)

6.3.5 Water switch terminal measurements

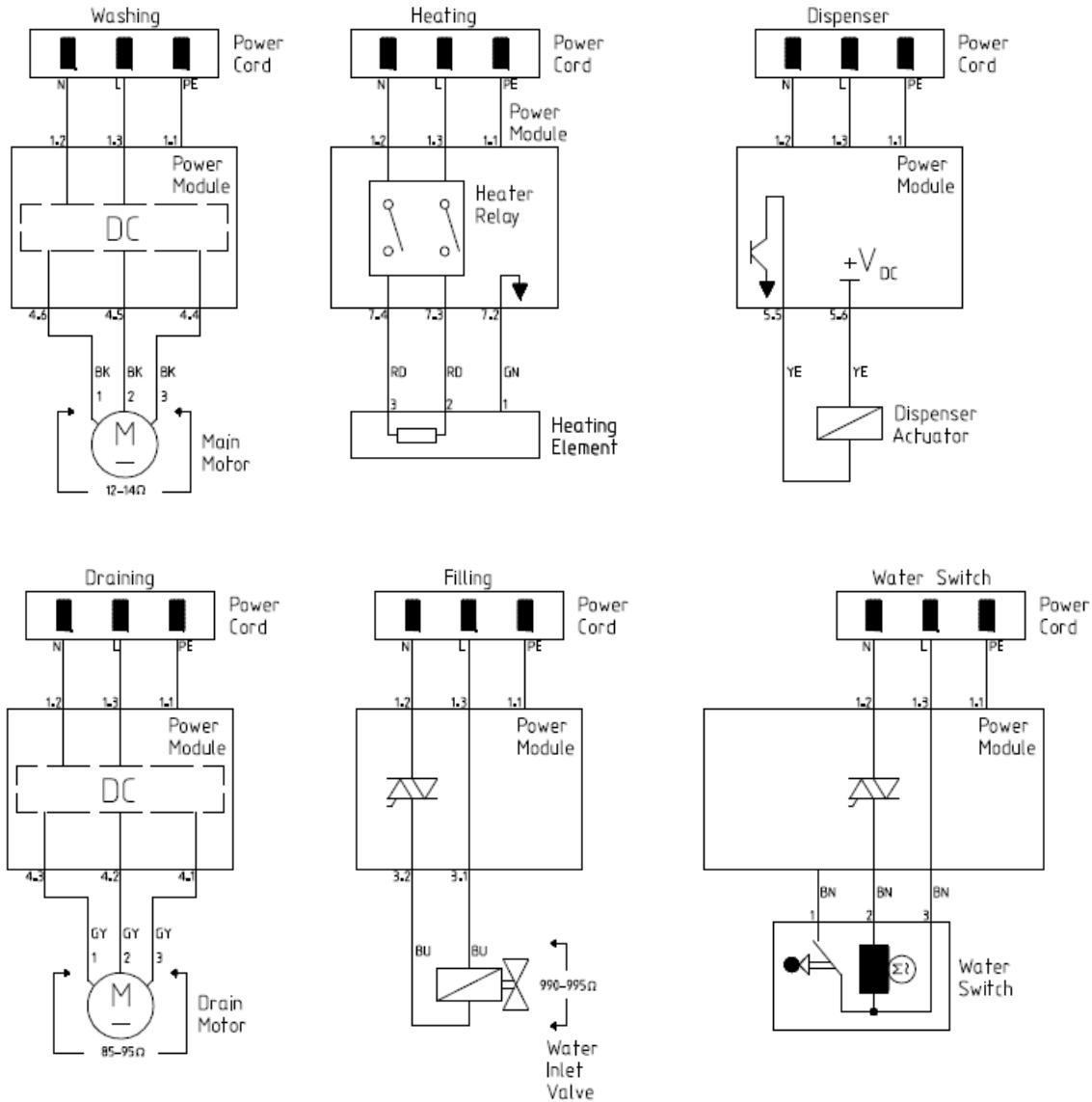
The 2-pin terminals connect to the single pole synchronous motor.

Motor resistance as follows:

1 – 2: ~ 1400 Ω (@ 68 °F)



6.3.6 Strip circuits



7 TECHNICAL SPECIFICATIONS

Dishwasher ratings – 120 VAC, 60 Hz, 12 A, 1450 W

Heat pump – 3-pole BLDC, 60 VAC, 150 Hz, 1200 W thick film heater, < 80W motor, class F insulation, 5-blade impeller with guide wheel.

Drain pump – 3-pole BLDC, 54 VAC, 55 Hz, 2500 – 3500 RPM, 0.1 - 0.32 A, 10 – 25 W, class F insulation, 9-vane impeller.

Water switch – 110 – 127 VAC, 60 Hz, synchronous, 4.8 RPM (ccw), class E insulation.

Dispenser – 165 VDC, 2.67 k Ω (coil), 80 ml rinse-aid capacity / 1 ml per setting (1–6).

Max drain hose length – 92” (without an extension kit), 150” (with extension kit **SGZ1010UC** / service # **663105**)

Heating rate – 2°F / minute

Noise ratings – Dependent on model

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