



**DOUGLAS**  
WASHING AND SANITIZING SYSTEMS

# RACK WASHERS

OPERATION MANUAL  
4X & PLC Controls



DougMac.com

Parts and Service 800-331-6870

We congratulate you on the purchase of your new Rack Washer.

To understand the proper operation and maintenance of your new machine, please read this manual carefully. A Reference Guide is mounted on the side of the machine for your convenience.

You have also received a Recommended Installation Guide. Please review this guide and confirm that the machine has been installed correctly.

If you have any questions or need any further information, now or in the future, please do not hesitate to contact us.



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**Please Note:** Specifications are subject to change without notice

# SAFETY

**Qualified installation personnel, individuals, firms, corporations, and companies are responsible for:**

- 🔥 Wear appropriate P.P.E. ie... hearing protection, thermal resistant gloves, and eyewear.
- 🔥 Know where the **exits** are.
- 🔥 Always turn off and drain the machine before entering. Allow a cool down period. Follow facility's L.O.T.O. procedure.
- 🔥 **Never** enter machine where flooring has been removed. – Fall Hazard.
- 🔥 Use non-permit required confined space guidelines for entering.
- 🔥 Push racks with both hands in an upright position. Keep hands on inside of rack. **Do not** hold rack on the outside vertical support tubes. Never strain yourself to move racks, if racks are too heavy unload some of the product first.
- 🔥 Be cautious around any wet floors – use mats to help reduce slip hazards.
- 🔥 Ensure float switches and level probes are well maintained and cleaned daily. Failure to do so can result in unintended heater startup and potential fire.
- 🔥 **Never** leave your machine idle (not in use) for more than 4 hours. This can result in water evaporating out of the rinse tank and damaging the rinse tank. Do not touch Rinse tank without a cool-down period.

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# IMPORTANT

## Pre-Installation

Qualified installation personnel, individuals, firms, corporations, and companies are responsible for:

- 💧 The installation or replacement of the gas piping and connection, installation, repair, or servicing of the equipment. Qualified installation personnel must be experienced in such work, familiar with all precautions required, and have complied with all requirements of state or local authorities having jurisdiction. Reference National Fuel Gas Code, NFPA 54 or latest edition or ANSI Z223.1 or latest edition, Section 1.4.
- 💧 The installation of electrical wiring from the electric meter, main control box, or service outlet to the appliance. Qualified installation personnel must be experienced in such work, familiar with all precautions required, and have complied with all requirements of state or local authorities having jurisdiction. Reference National Electrical Code, ANSI/NFPA 70 or latest edition. In Canada, Canadian Electrical Code Part I (Std. 22.1 or latest).
- 💧 The installation of gas heated units in Canada. Qualified installation personnel should comply with the Installation Codes for Gas Burning Appliances and Equipment, (CAN-I-B 149.1 and B-149.2) and any local codes or approvals.
- 💧 The installation of washers equipped with casters. These washers shall be made with a connector that complies with the Standard for Connectors for Movable Gas Appliances, ANSI Z2 1.69 or latest, and a quick-connect device that complies with the Standard for Quick-Disconnect Devices for use with gas fuel, ANSI Z2 1.41 or latest.
- 💧 Water and waste piping and connections shall comply with the International Plumbing Code, International Code Council (ICC) or the Uniform Plumbing Code, International Association of Plumbing and Mechanical Officials (IAPMO), and NSF/ANSI 3-2009. All water and waste piping must be sized in accordance with the associated installation drawings.
- 💧 **Douglas Machines Corp. highly discourages the use of tankless or demand water heating units as a hot water supply for our machines. They typically are not properly sized, nor can they meet the demand required by our machines.**

**Note:** A fixed restraint must be provided if casters are used in conjunction with a flexible connector for movable appliances. This restraint must secure the washer to a non-movable surface to eliminate stress on the connector. If the washer is moved, the restraint must be reconnected after the washer is returned to its normal position.

# Delivery

Upon delivery of your Douglas washer:

- 🔥 Inspect the machine for any external damage. Any evidence of damage should be noted on the delivery receipt and signed by you and the driver.
- 🔥 Remove packaging from the washer and check for any concealed damage. Carrier must be notified of damage immediately. Please retain packaging for inspection if claim is filed.

Douglas Machines Corp. cannot accept responsibility for lost or damaged merchandise suffered in transit. The carrier assumes full responsibility for delivery in good order; however, we are prepared to assist you in any action needed regarding shipping damage.

**Electrical Connections:** Upon receiving your machine, all wire connections in the electric panel, pump motor and electric heaters should be checked, including the wire nuts and lugs. Check connections monthly for the first six months and every 90 days after the first six months of operation.

# SAFETY PRECAUTIONS

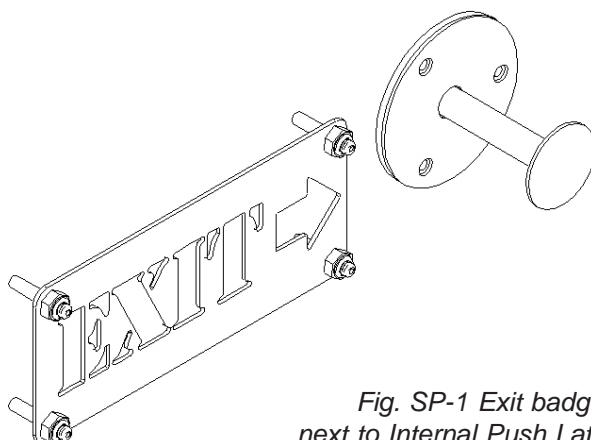
Important: All safety precautions must be adhered to as to avoid personal injury.

## Please Be Cautious!

1. Minimum PPE equipment to be used when operating or maintaining this equipment is safety glasses, hearing protection, and heat resistant gloves.
2. When using the spray off gun, please be cautious of potential hot water hazard. Do not spray in the direction of yourself or any other personnel. Only use for maintenance of the machine.
3. If machine is in “Wash” mode and stopped, allow 3 second ramp down time for spray arms before opening machine door.
4. Machine must be installed keeping in mind clearance for maintenance and in accordance with facility high foot traffic areas, railings, and any areas where a hazard could be created.
5. The cart/rack should be pushed from the end with the swivel casters and the operator’s hands should be positioned in the center to protect the operator’s hands from being pinched.
6. The cart path should have a level grade, when possible, any grade should be kept to a minimum. Floor surfaces should be smooth with slip resistance applied if possible.
7. Visibility should also be considered, eliminating any blind corners, stairways, or drop offs in the general area.
8. When removing the flooring and filters of the machine for maintenance of any kind, the machine **MUST** be turned off, drained, and lock out and tag out procedures followed. Proper fall hazard procedures must also be followed.

## EMERGENCY EGRESS

All machines are equipped with an interior door release to enable the opening of the door should it close while someone is inside the machine. The release is pressed which releases the latch and allows the door to open. Note Fig. SP-1 (right) showing the internal door release latch. All operators should be aware of this feature and how it works.



*Fig. SP-1 Exit badge next to Internal Push Latch*



# START UP

## 4X Controls – Initial Start Up

Important: Remember where your electrical disconnects are located.

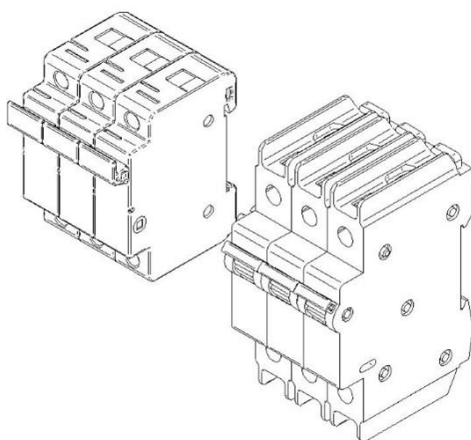
This will be the main and supplemental power coming to the machine. You will have two (2) separate electrical sources connected to the machine. Locate both.

**Note\* - All machines leaving the USA will be single point connection.**

Some of the following steps will be performed in the electrical panel enclosure. We recommend disconnection of all incoming power before doing any service in the electrical enclosure.

**Please Be Cautious!**

1. With the incoming electrical power disconnected or turned off, open the electrical panel enclosure. Turn all thermostats to the lowest or off position (turning knobs in the counterclockwise direction).
2. Locate and make sure the drain valve and pump petcock are in the closed position. The pump petcock will remain in the closed position unless service is needed on the pump.
3. Shut off all breakers going to the heaters, if electrically heated. Breakers will be marked WASH HEATER and RINSE HEATER. If machine is fitted with fuses and fuse holders, use appropriate disconnecting means to safely de-energize the Wash and Rinse heating circuits. See Fig. S-1 (below) to help identify what has been fitted in your machine.



*Fig. S-1 Left: Fuse Holder Right: Circuit Breaker*



4. With the electrical enclosure panel still open, turn the incoming power back on. Make sure the circuit breaker marked PUMP and circuit breaker marked 120v are in the on position (**BE VERY CAUTIOUS - THIS IS NOW AN ELECTRICALLY LIVE PANEL**).
5. Turn the on/off/fill switch to the fill position and release it. At this point the machine will start to fill. If it does not fill to the overflow drain located underneath the floor panels (see Fig-S2 below), reprogramming of the auto fill may be necessary (refer to section “Programming the PC Board” on page 13). You must also make sure the incoming water pressure is at a minimum 20psi (138 kPa) flow pressure not exceeding 30psi (207 kPa) flow pressure with a static pressure not exceeding 60psi (414 kPa) as stated in the Recommend Installation Guide. On machines equipped with PLC controls, simply turning the machine on will initiate the fill cycle and automatically fill to the correct level. No programming is necessary.

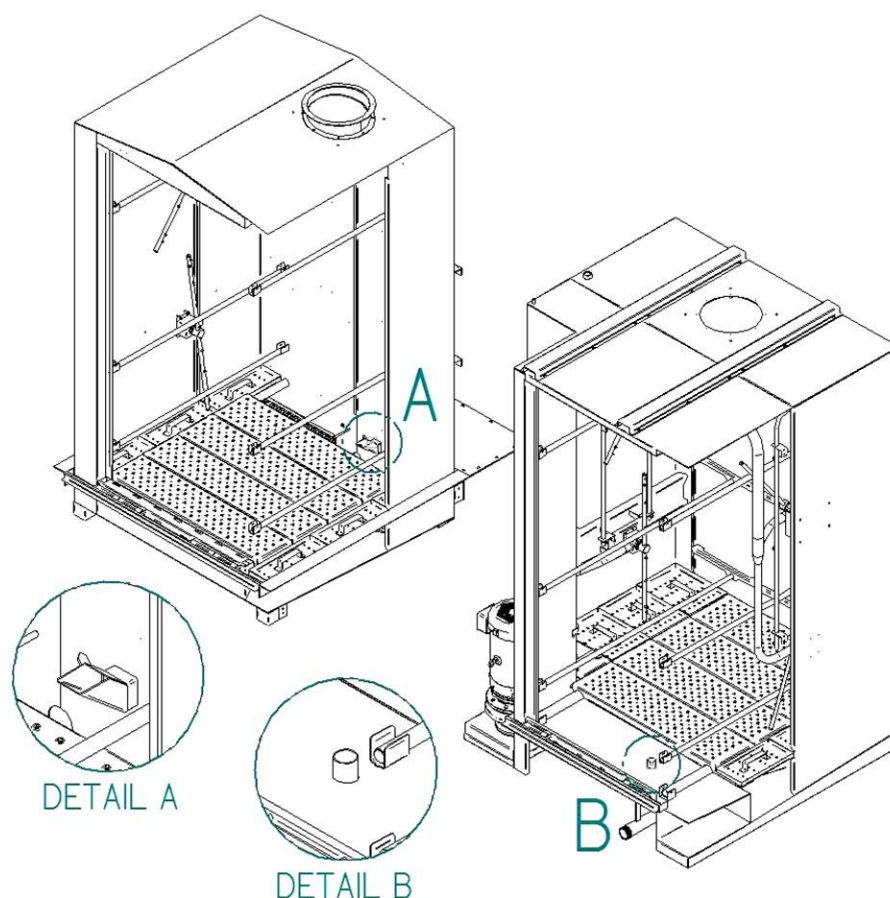


Fig. S-2 General Overflow Location – “DETAIL A” shows typical location for models ending “B” or “SPW” – “DETAIL B” shows typical location for all other rack washers

**Note:** Incoming water pressure exceeding 30psi (207 kPa) flow will void warranty on related items.

6. Select the Short Wash Cycle and push the Start Button; the wash pump should start running at this point. If the pump does not start running, check that all fuses (if applicable - refer to Fig-S1 on page 7) and all breakers marked PUMP and 120v are in the on position. With the pump running, check the pump rotation looking at the rear of the pump motor and observing the cooling fan to see if it is rotating clockwise. Another indication that the pump is rotating backwards is the wash pump pressure gauge reading under 35psi (241 kPa). If the pump is not rotating in the correct direction, reversal of electrical phases will be necessary. (Contact your electrician or Douglas Machines for details.)
7. Now it is time to fill the rinse tank. Push the Start Button; the machine will now run through a complete cycle. A complete cycle entails a four, six, or eight-minute wash time depending on the cycle selected. During this time, the wash pump will be active. Followed by a 30 second rinse time in which the pump will be inactive and the rinse solenoid valve open. And finally, a one-minute dwell and steam extraction time in which the machine cannot be restarted until this time as expired. Repeat the cycle two more times to ensure the rinse tank is full.

Please note that while the machine is in the rinse and dwell period you will not see any readings on the jet pressure gauge, as the rinse cycle operates strictly off the incoming water pressure to the machine, not the wash pump.

Failure to ensure the rinse tank is full of water may result in damage to the tank and heating components and may void the warranty of related items. Double check to ensure all heating circuits are off!

To ensure the rinse tank is filled, you need to hear water spraying inside the wash cabinet and the after the wash pump has stopped running. You may need to run more than one cycle to accomplish this.

**CAUTION:** Before proceeding to the next step, make sure you can hear water spraying in the cabinet after the wash pump stops running and the rinse light cycle is illuminated. If not, heater damage may occur, and the warranty will become void for related items.

8. Now it is time to set the thermostats. We are looking for an idle wash tank temperature of 160 °F (71 °C), and during operation a temperature of 150 °F (66 °C). The rinse temperature should be set to read 190 °F (88 °C) temperature. Turning the thermostat knobs in a clockwise motion and using top dead center as our indicator, increase the thermostat marked WASH to 160 °F (71 °C). Now, increase the thermostat marked RINSE to 190 °F (88 °C). Switch the WASH HEATER and RINSE HEATER breakers or fuse holders to the on/energized position. Allow 30 to 60 minutes for the machine to reach operating temperatures.

**Note:** There can be as much as 12 °F to 15 °F difference between the thermostat and the temperature gauge. Always set the thermostats to accommodate the desired temperature using the front panel gauges as your guide. **For Machine and Operator Safety DO NOT set Wash or Rinse water temperatures above 190 °F (88 °C).**

9. At this point your heat source should be engaged. If electrically heated, the wash and rinse heater contactors will be engaged. If gas heated, the burner or burners will fire. If steam heated, the steam solenoids will open. If you are not sure, or if the specific heat source is not on and the unit is not heating up, please refer to the Trouble Shooting Guide or contact Douglas Machines for assistance.
10. Now that everything is working fine. It is time to put the electrical enclosure panel and front panel back on the machine and start washing.

# START UP

## PLC Controls – Initial Start Up

Important: Remember where your electrical disconnects are located.

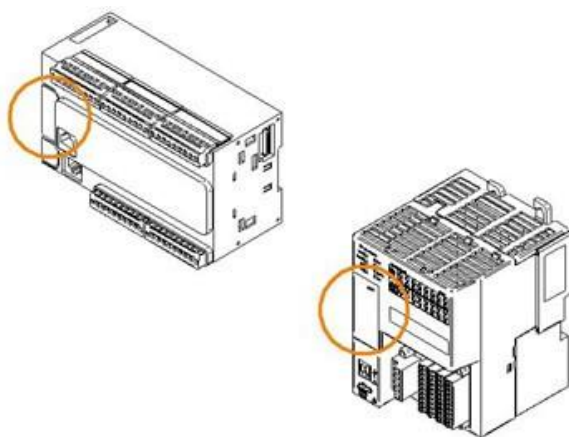
This will be the main and supplemental power coming to the machine. You will have two (2) separate electrical sources connected to the machine. Locate both.

**Note\* - All machines leaving the USA will be single point connection.**

Some of the following steps will be performed in the electrical panel enclosure. We recommend disconnection of all incoming power before doing any service in the electrical enclosure.

**Please Be Cautious!**

1. With the incoming electrical power disconnected or turned off, open the enclosure door located on the side of the machine by unlatching each quarter turn. Ensure the PLC is in the “Run” position. See Fig. S-3 (below).



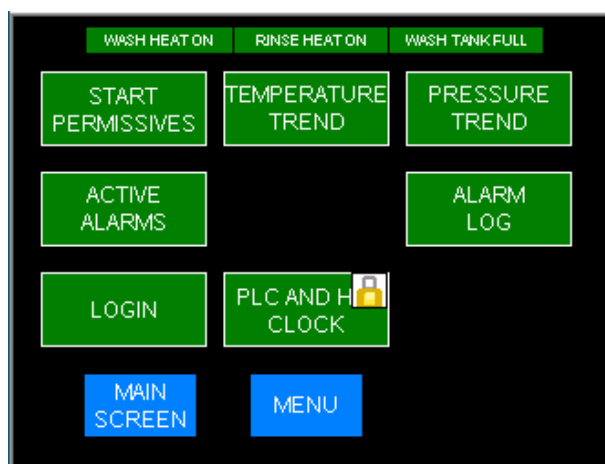
*Fig. S-3 Typical Run Switch Locations*

2. Locate and make sure the drain and pump petcock are in the closed position. The pump petcock will remain in the closed position unless service is needed on the pump.
3. Shut off all breakers going to the heaters, if electrically heated. Breakers will be marked WASH HEATER and RINSE HEATER. If machine is fitted with fuses and fuse holders, use appropriate disconnecting means to safely de-energize the Wash and Rinse heating circuits. See Fig. S-1 (Page 7) to help identify what has been fitted in your machine.

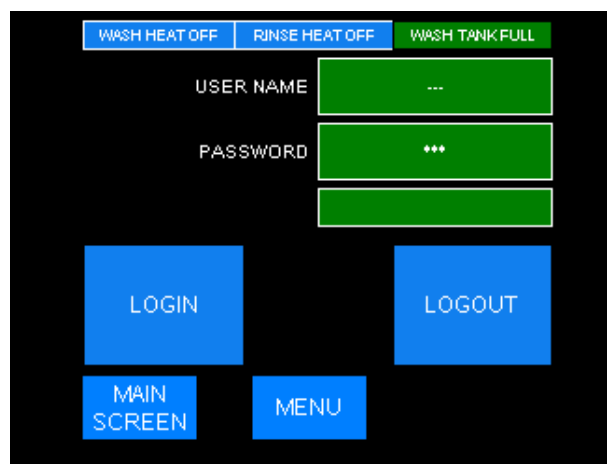
4. Check for all 120 V breakers/ fuse holders to be in the on or energized position. Make sure the breaker/ fuse holder for the wash pump is in the on or energized position. With the electrical enclosure panel cover still open, turn the incoming power back on. **(BE VERY CAUTIOUS - THIS IS NOW AN ELECTRICALLY LIVE PANEL)**. The PLC will boot up, verify the PLC is communicating with the I/O by checking the status lights on the PLC.
5. Once the HMI screen has booted up, you should see a black screen with one button labeled “MAIN SCREEN”, press the button and the machine will automatically start to fill.

**Note:** Incoming water pressure exceeding 30psi (207 kPa) flow will void warranty on related items.

If the machine does not start to fill and the HMI has an error on the screen, the machine setpoints will need to be adjusted. To modify the setpoints navigate to the “LOGIN” screen through the “MENU” screen. When at the “LOGIN” screen use the following credentials: Username – B and the Password – is the last 5 digits of your machine’s serial number. The serial number can be found on the machine’s label located on the front door. If the log in credentials are not working, please contact Douglas Machines Corp.

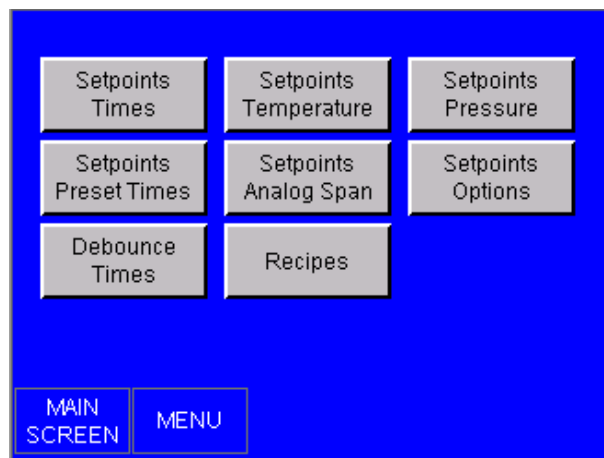
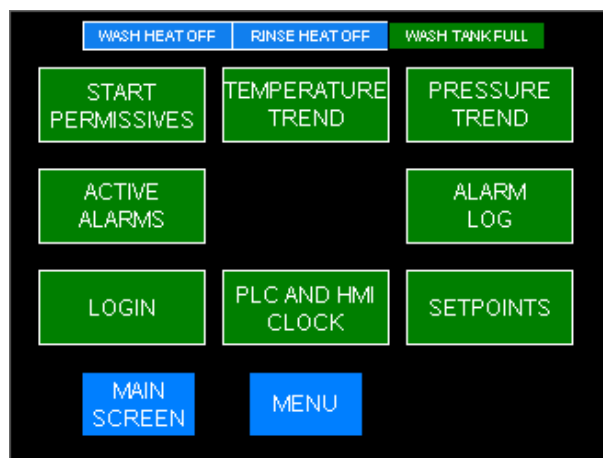


Menu Screen



Log In Screen

While “Logged In” the setpoint options will be available on the “MENU” screen. Here we will have the ability to modify various operating parameters:



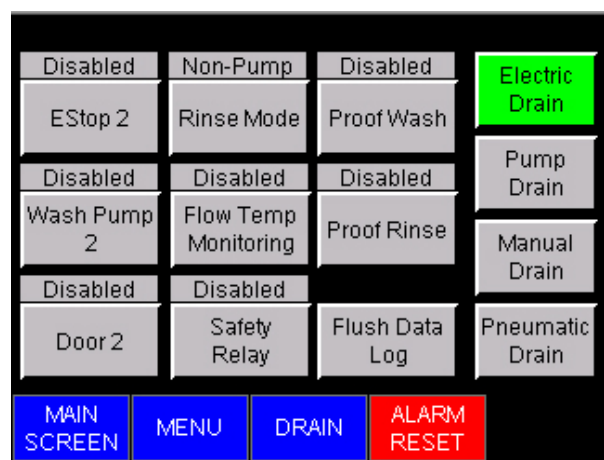
Menu Screens

If the error banner on the HMI says “CONFIGURATION MISMATCH” the “Setpoints Options” menu can change option functionalities to match the purchased options on your machine. If you need help determining which options are on your machine, contact Douglas Machines Corp. for help.

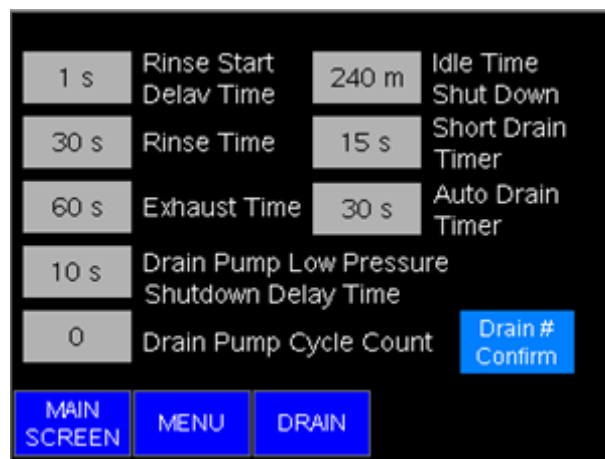
In the “Setpoints Options” screen make sure the “Flow Temp Monitoring” is enabled and that your drain and rinse options match your machine.

To the right are the rest of the factory presets that your machine should replicate upon arrival and start up. These can be navigated through the “Setpoints Menu”.

**Note:** “Idle Time Shut Down” does not completely shut down machine – only induces an “IDLE” state that disables, pumps, heating elements and filling of machine. “Rinse Time” should be set to at least 30 seconds to achieve NSF sanitization.

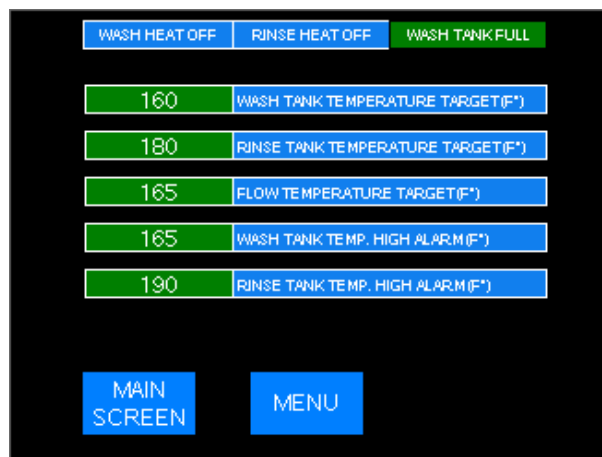


Setpoint Options

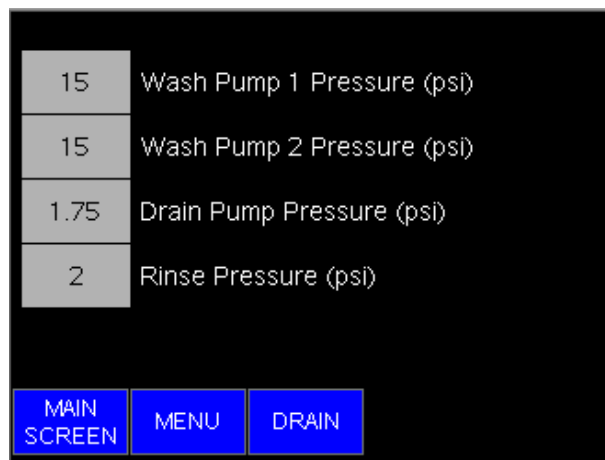


Setpoint Times

**For Machine and Operator Safety  
DO NOT set Wash or Rinse water  
temperatures above 190 °F (88 °C).**  
Rinse should not be set below 180 °F  
(82 °C) to achieve NSF Sanitization.



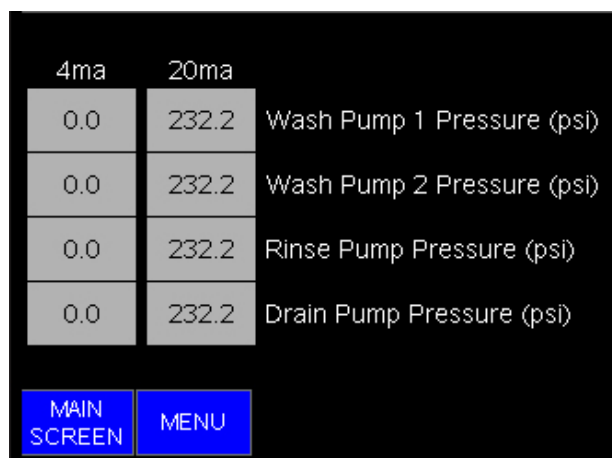
Setpoint Temperature



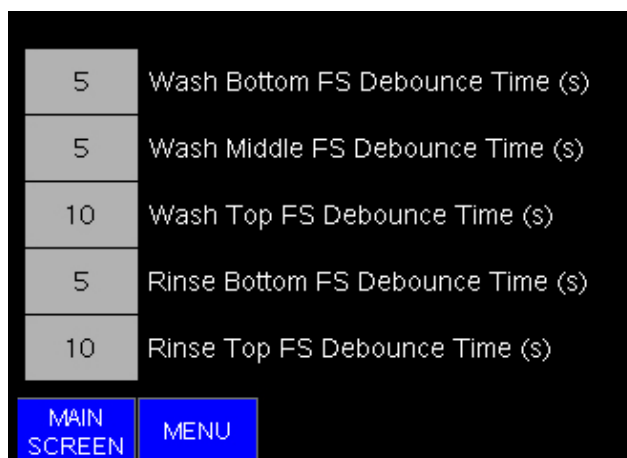
Setpoints Pressure



Setpoints Preset Times



Setpoints Analog Span



Debounce Times



Going back to the MENU" screen, the "PLC and HMI Clock screen can be accessed while "Logged In".

6. Select the Short Wash Cycle and push the Start Button; the wash pump should start running at this point. If the pump does not start running, check that all fuses, if applicable (refer to Fig. S-1 on page 7) and all breakers marked PUMP and 120v are in the on position. With the pump running, check the pump rotation looking at the rear of the pump motor and observing the cooling fan to see if it

PLC Current Time  
03:55:28  
01/01/2012  
Set PLC to New Time and Date

HMI Current Time  
14:46:33  
12/17/2020  
Set HMI to PLC Date and Time

New Time  
0 : 0 : 0

New Date  
0 / 0 / 0

MAIN SCREEN MENU DRAIN

*PLC and HMI Clock*

is rotating clockwise. Another indication that the pump is rotating backwards is the wash pump pressure gauge reading under 35psi (241 kPa). If the pump is not rotating in the correct direction, reversal of electrical phases will be necessary. (Contact your electrician or Douglas Machines for details.)

7. Now it is time to fill the rinse tank. Push the Start Button; the machine will now run through a complete cycle. A complete cycle entails a four, six, or eight-minute wash time depending on the cycle selected. During this time, the wash pump will be active. Followed by a 30 second rinse time in which the pump will be inactive and the rinse solenoid valve open. And finally, a one-minute dwell and steam extraction time in which the machine cannot be restarted until this time as expired. Repeat the cycle two more times to ensure the rinse tank is full.

Please note that while the machine is in the rinse and dwell period you will not see any readings on the jet pressure gauge, as the rinse cycle operates strictly off the incoming water pressure to the machine, not the wash pump. The pressure readout for the supply water is located above the machine in the incoming water supply circuit.

Failure to ensure the rinse tank is full of water may result in damage to the tank and heating components and may void the warranty of related items. Double check to ensure all heating circuits are off!

To ensure the rinse tank is filled, you need to hear water spraying inside the wash cabinet after the wash pump has stopped running. You may need to run more than one cycle to accomplish this.

**CAUTION:** Before proceeding to the next step, make sure you can hear water spraying in the cabinet after the wash pump stops running and the HMI displays “RINSING”. If not, heater damage may occur, and the warranty will become void for related items.

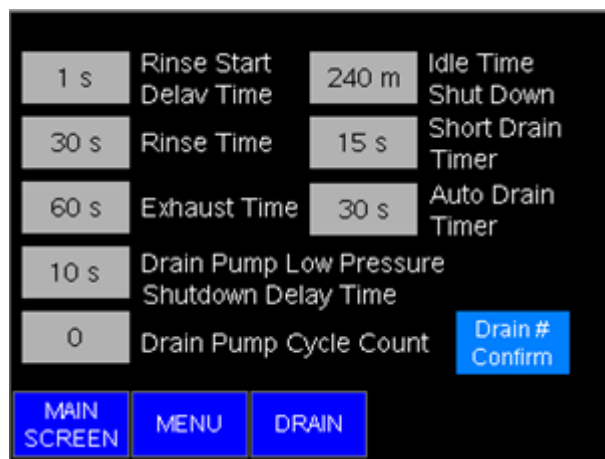
8. Switch the WASH HEATER and RINSE HEATER breakers (or fuse holders) to the on/energized position. Allow 30 to 60 minutes for the machine to reach operating temperatures. At this point your heat source should be engaged. If electrically heated, the wash and rinse heater contactors will be engaged. If gas heated, the burner or burners will fire. If steam heated, the steam solenoids will open. If you are not sure, or if the specific heat source is not on and the unit is not heating up, please refer to the Trouble Shooting Guide or contact Douglas Machines for assistance.
9. Now that everything is working fine, it is time to close and lock the electrical enclosure panel and start washing.

For Machines equipped with a “Pumped Drain” (see Fig. M-1 on page 24), additional setup will be required after completing the steps above.

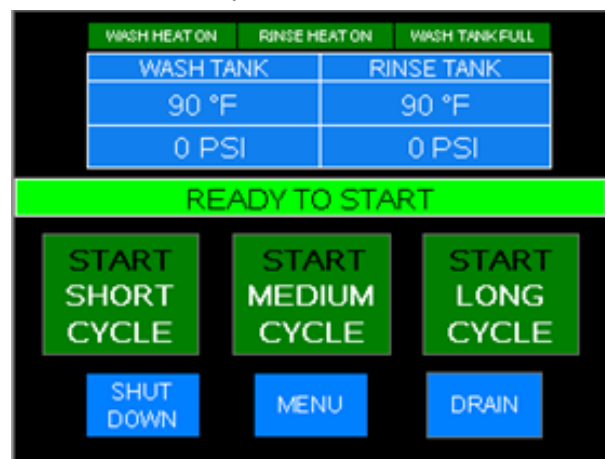
1. On the “Setpoints Times” screen, set the “Drain Pump Cycle Count” to 2
2. Run a “SHORT” cycle. Upon completion of the cycle the HMI status will notify the operator to “UNLOAD”. Open the door and inspect that the water level is not above the rinse jets. (The rinse jets are stationary and do not rotate like the wash spray arms.)

If the water level is above the rinse jets, the “Short Drain Timer” will need to be increased on the “Setpoints Times” screen. Increasing the “Drain Pump Cycle Count” could also require additional time be added to the “Short Drain Timer”.

3. Run a second “SHORT” cycle. After the machine has finished “EXHAUSTING”, the drain pump should continuously run



*Setpoint Times*

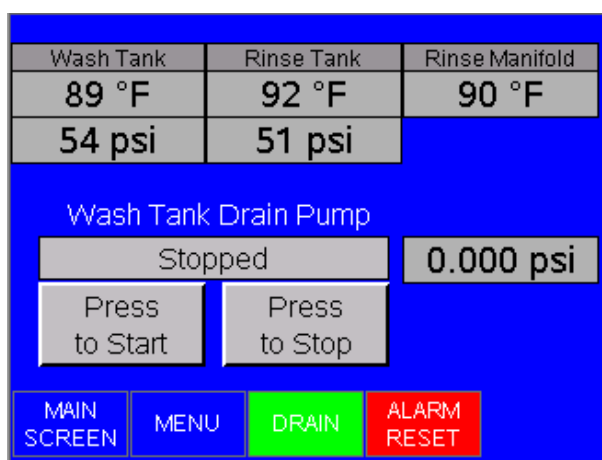


until the wash tank is completely drained. When the HMI prompts the operator to “UNLOAD”, open and close the door. The “STOP CYCLE” button on the bottom right of the “MAIN” screen should now say “DRAIN”.

4. Once on the “DRAIN” screen pay attention to the pump pressure readout towards the end of the drain cycle. This number needs to drop below the “Drain Pump Pressure” setpoint (1.75 PSI) on the “Setpoints Pressure” screen for the duration of the “Drain Pump Low Pressure Shutdown Delay Time” (10s) on the “Setpoints Times” screen for the drain pump to know when to stop pumping.

If the drain pump does not stop pumping because the pressure does not drop below the “Drain Pump Pressure” setpoint press the “Press to Stop” button and increase the “Drain Pump Pressure” setpoint on the “Setpoints Pressure” screen just above the pressure readout on the “DRAIN” screen.

Run the cycles again to ensure the “Drain Pump Pressure” setpoint has been calibrated correctly.



*Drain - Pump Option Enabled*

5. If draining between cycle counts is not required set the “Drain Pump Cycle Count” to 0.

For machines equipped with a “Motorized Drain Valve” (see Fig. M-1 on page 24), the “Auto Drain Timer” Setpoint may need to be calibrated on the “Setpoint Times” screen.

1. On the “Setpoints Times” screen set the “Drain Pump Cycle Count” to 2
2. Run a “SHORT” cycle two times, When the HMI status is “DRAINING” watch the water level in the wash tank. (You may need to remove the filters to see the actual water level).

3. If the wash tank still has water in it after the machine has finished draining the “Auto Drain Timer” setpoint will need to be increased.

1 s	Rinse Start Delay Time	240 m	Idle Time Shut Down
30 s	Rinse Time	15 s	Short Drain Timer
60 s	Exhaust Time	30 s	Auto Drain Timer
10 s	Drain Pump Low Pressure Shutdown Delay Time		
0	Drain Pump Cycle Count		Drain # Confirm
MAIN SCREEN MENU DRAIN			

*Setpoints Times*

Wash Tank	Rinse Tank	Rinse Manifold
89 °F	92 °F	90 °F
54 psi	51 psi	
WASH TANK DRAIN VALVE		
Closed		
PRESS TO CLOSE	PRESS TO OPEN	
MAIN SCREEN	MENU	DRAIN ALARM RESET

*Drain - Motorized Valve Option Enabled*

# OPERATION

## General Operation

1. With the machine turned on, filled to the overflow, and heated up to the correct operating temperatures, we will now be able to add detergent.

A non-foaming, non-caustic, aluminum safe type of soap must be used (unless the machine has been specifically manufactured for caustic use). Machines without a caustic upgrade package are designed to work with a chemical solution within a PH range of 5 - 9.5. Use of chlorine or bleach will void warranty, please contact Douglas Machines Corp. to determine what chemistry your machine is capable of running.

If the machine is fitted with an automatic soap dispenser, ensure the dispenser is turned on and filled up. If the machine is not equipped with an automatic soap dispenser, follow your detergent manufacturers' recommended specifications for application and concentration.

**Note:** Douglas Machines Corp. recommends the machine be operated with an automatic detergent dispenser equipped with a visual or audible alarm means to verify chemicals are being dispensed.

2. When loading the machine with bowls, buckets, or any similar type of object, all items should be facing the wash arms. The racks are pitched so that open end of the product should be facing down. Use of the "hold down" gate may be necessary for lighter products.

When loading sheet pans into a sheet pan rack, you will notice that the sheet pan rack is built with angled pan supports. Load the rack so that the face or open side of the sheet pan is facing towards the door of the unit.

If you are planning to wash cake pans and have purchased a cake pan rack, you will need to load the cake pans into the area built on the outside of the rack. The cake pans will need to be loaded with the open side of the pan facing out towards the wash arms. Some racks are adjustable to accommodate the depth of the cake pan.

If you are planning to wash smaller utensils, such as spoons, scrappers, and whisks, you will need to purchase a model specific utensil basket (contact Douglas Machines Corp. for details).

Scale Parts can also be loaded on specific scale parts racks. These racks are commonly adjustable for various sized scale heads. “Feeder Pans” should be placed on the top of the rack at an angle on the angled feeder pan section. The “Hoppers” or “Weigh Buckets” should be placed on the holding rods with bottom of the hopper open towards the inside of the rack.

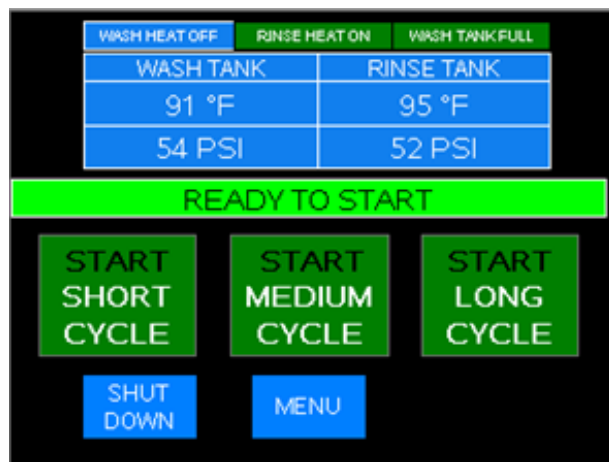
**Note:** Always push racks into the machine with hands placed on the inside cross members of the rack. DO NOT PUSH RACK INTO MACHINE WITH HANDS ON OUTSIDE VERTICAL COLUMNS OF THE RACK.

3. Once filled, the machine should be allowed to sit and reach operating temperatures before washing. This could take anywhere from 30-60 minutes. Add detergent and load. (See previous steps in General Operation). It is now time to start washing! Choose your desired wash cycle time by selecting the short (four (4) minute cycle), medium (six (6) minute cycle), or long (eight (8) minute cycle) button. Let the machine run through its entire cycle (wash, rinse, and dwell). If you open the door or hit the stop button any time during the cycle, the machine will shut off. When you restart the machine, it will not start from where it stopped, it will start from the beginning of the wash cycle. At this point you will be able to unload and then reload the machine.

**Note:** If machine is in “Wash” mode and stopped, allow 3 second ramp down time for spray arms before opening machine door.

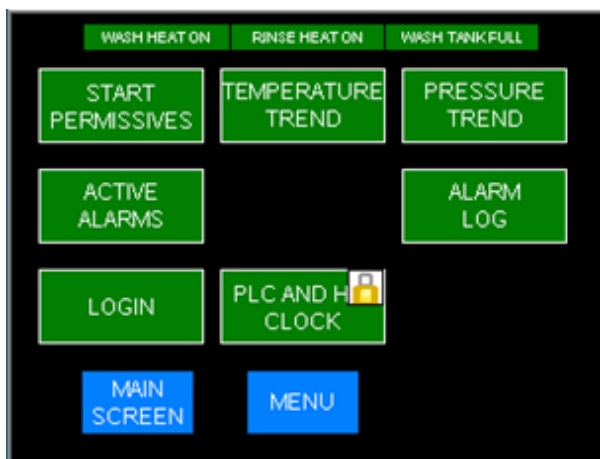
## PLC Operation

In addition to the “General Operation” described previously, machines fitted with PLC/ HMI offer additional benefits.



*Main Screen*

The HMI can communicate to the Operator various alarms or faults being triggered throughout operation. This allows for easier troubleshooting and accountability. To navigate to the alarms, go to the “MENU” screen, from there “ACTIVE ALARMS” or “ALARM LOG” can be selected.



*Menu*



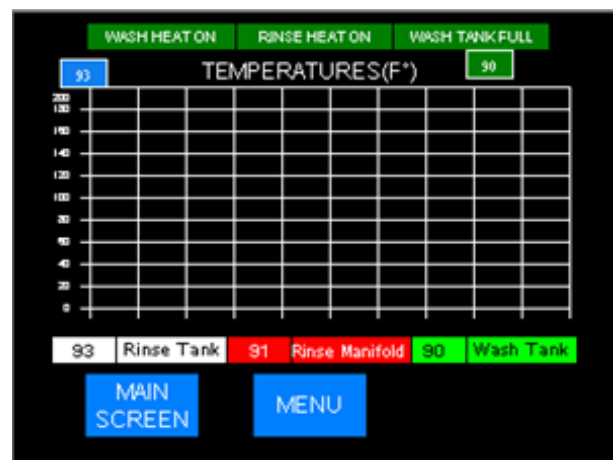
	Date	Time	Message	
	12/7/20	14:42:57	EStop	▲
▶	12/7/20	14:43:34	EStop	▲
				▼
				▼

MAIN SCREEN
MENU
DRAIN

### Alarm Log

## Start Permissives

Additionally, the PLC/ HMI offers Pressure and Temperature Trending Data that can also be accessed through the “MENU” screen.



### Temperature Trend

## DOCKING CART (IF EQUIPPED)

### General Information

The docking cart is designed to transport the machine wash racks and allow easy loading of the rack without the use of ramps or a machine pit.

The docking cart docks to the front face of the machine and can be secured with a hook ring type latch.

### Sequence Of Operation

1. Load empty wash rack onto docking cart.
2. Secure wash rack hook clamp.
3. Load product in wash rack.
4. Transport wash rack / cart to machine and open machine door.
5. Dock cart to machine and secure hook docking latch.
6. Release wash rack hook clamp.
7. Roll wash rack into machine and close door.
8. Run complete machine cycle and open machine door.
9. Roll wash rack out of machine onto docking cart.
10. Secure wash rack hook clamp.
11. Release hook docking latch from machine.
12. Remove rack / cart.
13. Close machine door.

# MAINTENANCE

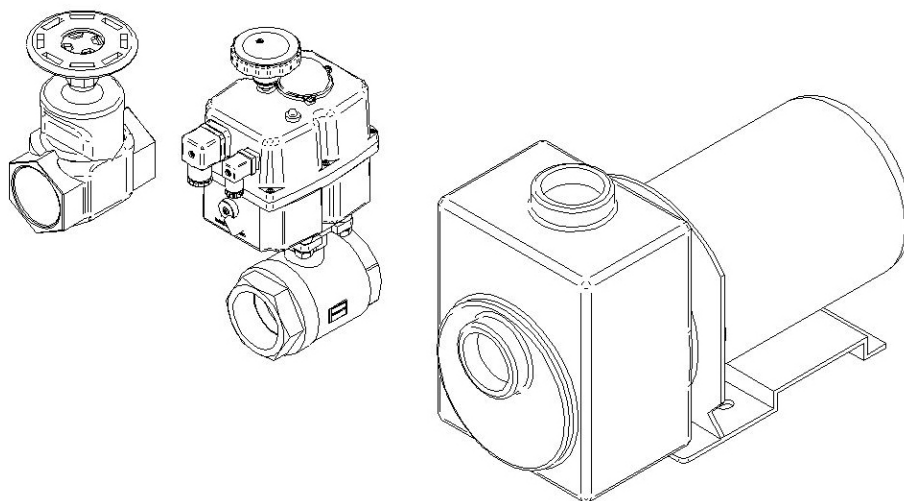
## Daily Maintenance

**Note:** As a precaution, you must disconnect or turn off all incoming power to the machine before proceeding with any maintenance.

Regular maintenance is essential in keeping your machine in good working order and operating at maximum efficiency. The following maintenance items are a minimum requirement. Frequency of maintenance is dependent on the number of hours the machine is in use and the amount and type of soil being removed.

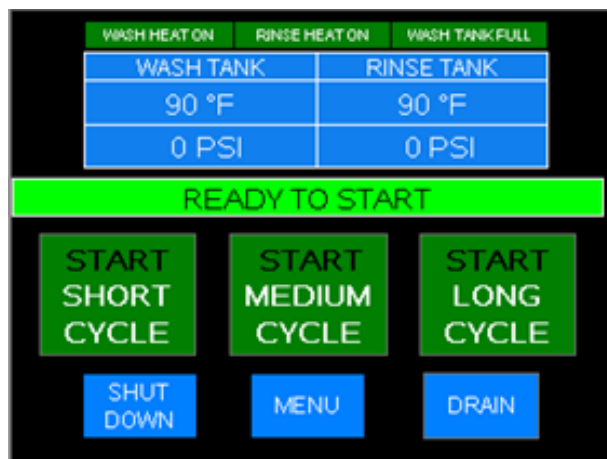
These daily maintenance items need to be done at the end of a regular shift, or if the machine is not cleaning to its normal standards.

1. Drain the machine by locating the manual gate valve (see Fig. M-1 below) to help determine what your machine is equipped with. The machine should never be drained or cleaned unless the power is in the OFF position. A cool down period should also be allowed before cleaning. If the machine is equipped with a motorized drain valve or pumped drain, ensure the machine is turned off on the front panel, then turn the drain open/close or on/off switch to the open/on position. Note: the electric drain valve will only operate when the power on the front panel is in the off position, to ensure the valve is never opened during operation.

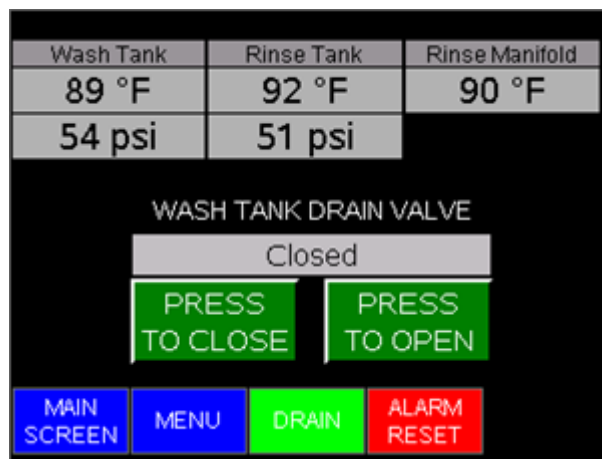


*Fig. M-1 - Left: Manual Gate Valve Middle: Motorized Drain Valve Right: Pumped Drain*

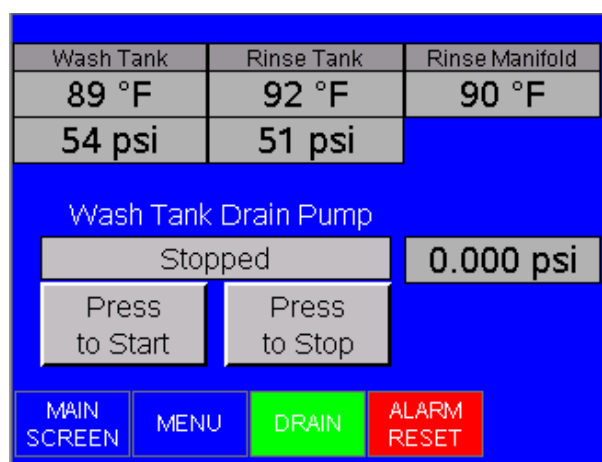
If your machine is equipped with a PLC/ HMI and a motorized drain valve or pumped drain the draining sequence will differ from what is described above. To drain the machine with the PLC/ HMI – Motorized Drain Valve or Pumped Drain combinations the machine will need to remain on until completely drained.



*Main - With Drain Option Enabled*



*Motorized Drain Valve*



*Pumped Drain*

**Note:** After the machine has been drained, you must disconnect / turn off all incoming power to the machine before proceeding with any maintenance.

2. Direct all debris toward and into the filter baskets. Remove and clean the filter baskets. With the filter baskets and floor panels removed, finish cleaning the wash tank reservoir. Use the spray off hose to clean the inside of the wash cabinet. Inspect the drain and overflow drain to ensure they are draining properly.

Direct all remaining debris into the open drain located in the bottom of the reservoir tank. If your machine is equipped with a pumped drain (see Fig. M-1) you will need to remove the debris by hand. Flushing the debris down the pumped drain pump may cause clogging.

3. Now you need to clean the low water probe or low water float switch. If your machine has a float switch you will also need to clean the high-level float switch located under the fill plate. The fill plate will be a solid insert located next to the perforated filter baskets. The low water probe or float will be a white plastic item mounted in the front vestibule of the machine, under the door or in the rear tank of the machine. It is 3/8" (9.5 mm) in diameter and 2 1/2" (6.35 cm) long with a 3/16" (4.8 mm) x 1/4" (6.35 mm) metal tip. The purpose of this probe is to prevent the heat source and pump motor from turning on unless the wash tank is full of water. Clean the metal tip of this probe with some sort of scouring pad. Clean the entire float switch if your machine is equipped with floats. Remove all scale and residue. Failure to do so may cause the heating source to remain on with no water in the reservoir, damaging heating components and may void warranty to related items. If your machine has an electric heater or heaters in the wash tank, it is now time to clean them. The heater coils will be located directly under or near the low water probe. Use a wire brush or scouring pad to clean the exposed heating coils on the heater or heaters. Direct all debris into the drain.
4. When the wash cabinet, filters, wash tank reservoir, low water probe, and electric heater or heaters (if applicable) have been cleaned, you can put the flooring and filters back in place.
5. Inspect all the spray jets and look for any that might be missing, obstructed, or worn out. If you find any missing or worn-out jets, contact Douglas Machines Corp. for replacement. If you find any jets obstructed, try to remove the obstruction by pulling it out or by forcing it back into the jet pipe. If you need to force it back into the jet pipe, you will need to remove the jet pipe end cap to remove the obstruction from the pipe.
6. Clean the outside of the machine. Use a stainless-steel cleaner or a soft cloth with a mild detergent to wipe down the outside of the machine.
7. Do not turn on the main power until you are ready to resume washing again. Never leave the machine on for longer than 4 hours between running cycles. Damage to the rinse components and or tank could occur.
8. Close the drain valve and check that the filters and floor panels are back in place. Turn the machine back on and allow it to fill and come back to operating temperature. The machine is now ready for use.

## Periodic Maintenance

1. Wash pump motor lubrication. You will find two (2) grease fittings on the top of the wash pump motor and one (1) at each end. You will need to grease these under normal conditions every 90 days. Use an electric motor bearing grease like Shell Dolum or Chevron Sill.
2. If you have purchased the steam extraction option, you may need to grease the 12" steam extraction fan bearings.

**Note:** Some of these fans are equipped with sealed bearings and do not require greasing. You will need to determine if your fan is equipped with the sealed bearings or if the bearings will need to be greased. Refer to your parts manual to identify the steam extraction fan and the grease fitting location. If greasing is required, it should be performed every 90 days. Use high temperature food grade grease such as Sentinel Slnth #2.

3. The removal of lime and or scale may be necessary at certain times. This will vary due to the condition of your water. If you are finding lime and scale building up on the interior walls of the machine, chances are they are also building up in the piping. This could impair washing ability. You will need to use a lime and scale removal chemical. Whatever you decide to use, be sure it is safe to use on stainless steel, bronze, and brass. If you have any questions on what to use or how to use it, do not hesitate to contact Douglas Machines Corp.
4. The Solenoid Valves should be checked periodically to ensure they are in good working condition, solenoids have a life span of about 1 million cycles.

# PROGRAMMING

## 4X Controls

### 1827 PC Board (4X Controls) Technical Information

The controller is an open circuit board construction located inside of the electrical panel. The board operates on nominal 120 VAC line.

The basic function of the board is to control the operation of the unit, including the wash, rinse, and fan/ dwell times as well as the auto-fill function.

The six relays on the board control six outputs. One relay control, two of the outputs, and the sixth relay is a master control relay.

Each output includes a “ready light” for the fan, heater contactor, wash pump motor contactor, and rinse solenoid valve.

Three blue potentiometers located near the center of the board set the wash times, Short, Medium, and Long. These values are adjustable. Standard wash times are four, six, and eight minutes.

### Routine Operations/Connections

Note that the Fill cycle activates the fill solenoid valve and waits until the water level in the machine reaches the pre-programmed level which should reach and be close to the overflow drain.

### Setting the Times

To set times on the 1827 PC board, several steps are required:

Open the main electrical enclosure. Locate the PC control board, a device approximately 8” x 5” with 6 relays and a transformer.

The timer settings are located to the right of the transformer and are ½” blue squares with a white dial. They are labeled Long, Medium, Short, and Rinse.

To decrease the time, turn the timer counterclockwise.



### Factory Settings

CYCLE	DURATION
Rinse	30 Seconds, Non-Adjustable
Steam Extraction	1 Minute, Non-Adjustable
Long	8 Minutes
Medium	6 Minutes
Short	4 Minutes

Note that the Rinse pot is fixed @ 30 sec. to ensure the NSF standard for sanitization.

### Programming the Auto Fill

Before starting, make sure there is no water in the machine and that the drain valve is closed.

Turn the Off/On/Fill switch to the on position, but make sure not to turn all the way to Fill.

Locate the Program button on the PC board (see diagram)

This black button is located on the right-hand side just below the Program LED and labeled with the letters PGM.

Push in the PGM button but do not hold the button down, as it will then execute a test Mode.

When the Program light located above the button begins to flash, turn the Off/On/Fill switch to the Fill position.

The solenoid valve then opens, and the machine begins to fill.

When the water reaches the overflow level, turn the Off/On/Fill switch again to the Fill position.

Observe that the Fill Time is set.

**Note:** once the unit has been programmed, the machine fill cycle operates as a “one time” fill and will not refill unless the machine is turned off and the water drained.

## TROUBLE SHOOTING

**Note:** Some of the following remedies may need to be performed in the electrical panel. **Before you perform any task in the electrical panel, please make sure all incoming power is disconnected or turned off.**

PROBLEM	THINGS TO CHECK
Machine will not turn on	<ul style="list-style-type: none"> <li>Incoming power turned ON</li> <li>Machine circuit breakers and/or fuses are in place &amp; turned on</li> </ul>
Machine will not heat up (gas heated)	<ul style="list-style-type: none"> <li>Machine is filled to the correct water level</li> <li>Low water probe is clean</li> <li>Gas supply is on</li> <li>Thermostats are set to desired temperature</li> </ul>
Machine will not heat up (electric)	<ul style="list-style-type: none"> <li>Machine is filled to the correct level</li> <li>Low water probe is clean</li> <li>Circuit breakers and/or fuses marked "Heaters" are on</li> <li>Thermostats are set to desired temperature</li> </ul>
Wash pump will not start	<ul style="list-style-type: none"> <li>Machine is filled to the correct water level</li> <li>Lower water probe is clean</li> <li>Door is in the closed position</li> <li>Circuit breakers and/or fuses marked "Wash Pump Motor" are on</li> </ul>
Wash pressure is low	<ul style="list-style-type: none"> <li>Machine is filled to the correct water level</li> <li>Filters are clear and in place</li> <li>All wash arms secured and end caps in place</li> <li>Confirm there is no excessive foam in the wash tank</li> <li>Pump is rotating in the correct direction</li> <li>Pressure gauge is functioning correctly</li> </ul>

PROBLEM	THINGS TO CHECK
Not Rinsing	<ul style="list-style-type: none"> <li>💧 Incoming water pressure is low</li> <li>💧 Door is closed and door sensor is functioning properly</li> <li>💧 Rinse solenoid valve is operating</li> </ul>
Rinse Temperature Is Not Hot Enough	<ul style="list-style-type: none"> <li>💧 Incoming water temperature (120° - 140° max.)</li> <li>💧 Incoming water pressure (no less than 20 psi and no more than 30 psi of flow)</li> <li>💧 Thermostat set to correct temperature (180° - 210° max)</li> <li>💧 Heat source is engaged</li> </ul>
Not Cleaning	<ul style="list-style-type: none"> <li>💧 Detergent level</li> <li>💧 Machine pressure (see door sticker for minimum pressure)</li> <li>💧 Wash temperature</li> <li>💧 Wash jets (clogged)</li> <li>💧 Water level</li> <li>💧 Filters clear</li> <li>💧 If rotary table, check if table is turning freely</li> </ul>

If you are experiencing any other problems or have any questions or concerns, please do not hesitate to contact the Service Department at 1-800-331-6870.

To aid in troubleshooting, the PGM LED also serves as an error code indicator. In case of error, the LED flashes on and off at ½ second on and ½ second off and then pauses for 3 seconds.

The flashing pattern continues if the controller is in Idle Mode. The number of times the LED flashes between 3 second pauses indicate the number of the error.

## Error Code Value Table

	PGM ERROR	INTERPRETATION
1	Watchdog timeout on filling to level probe	<ul style="list-style-type: none"> <li>When the controller is in either a Fill cycle or a Teach Fill cycle, there is a 15-minute time limit until the water level reaches the level probe.</li> <li>If the fill valve is on for 15 minutes, the valve shuts off and the Fill cycle aborts. The controller reverts to Idle Mode.</li> </ul>
2	Watchdog timeout on filling above the level probe	<ul style="list-style-type: none"> <li>When in a Fill cycle or a Teach Fill cycle, there is a 5-minute limit for which the fill valve may be on after the water reaches the level probe.</li> <li>This error could occur in a Fill cycle only if an incorrect time were stored in the EEPROM or read from the EEPROM.</li> <li>In Teach Mode, this could occur if the operator walked away from the machine while it was in Teach Mode. If this timeout occurs, the fill valve turns off and the machine returns to Idle Mode.</li> </ul>
3	Loss of master control relay during machine cycle	<ul style="list-style-type: none"> <li>This error could occur if the door were opened or if the motor overload trip during a cycle.</li> </ul>
4	Loss of water level during a machine cycle	<ul style="list-style-type: none"> <li>This could occur in two situations: <ul style="list-style-type: none"> <li>A) If the water in the machine drops during a cycle because a large container being washed is collecting wash water.</li> <li>B) The water level in the machine is very low and the wash water circulating in the pump and plumbing is enough to lower the water level below the probe.</li> </ul> </li> <li>The water level must be low for 5 seconds for the cycle to be aborted. The heater output will, however, be turned off immediately when the water level is below the probe.</li> </ul>

	PGM ERROR	INTERPRETATION
5	EEPROM read error	<p>💧 Data stored in the EEPROM is redundant, and the two redundant numbers are compared. If they don't match, a readerror is generated.</p> <p>💧 This error could occur if a Fill cycle is started, but a Teach cycle has not been done to program the Fill time. It should not occur, as Douglas will program a Fill time as part of the test procedure.</p> <p>💧 The error could also occur if installing a new board.</p>
6	Attempt to start a Fill cycle or Teach Fill cycle when the water level is already at the level probe	<p>💧 Ensure water level is below the low water probe before attempting to fill. Drain water below the probe and re-attempt.</p>
7	Attempt to start machine cycle without proper water level.	<p>💧 If unit has water and a clean, low water probe, see <i>LowWater Section</i>.</p>

1. Note that when one of these errors occurs, the controller reverts to Idle Mode.
2. Note that the error code flashes on the LED if it is in Idle Mode.
3. Note that as soon as a successful Machine cycle, Fill cycle, or Teach Fill cycle executes, the error LED goes out.
4. There is no need to reset anything by turning the machine off.
5. For example, if the operator were to try to fill the machine a second time and the water was already at the level probe, nothing would happen. The error would flash on the PGM LED, but if the cover were on the electrical box, no one would see it. If the start button were then pressed, the error LED would go out and a normal machine cycle would be executed.

## Troubleshooting Table for 1827 PC Board (4X Controls)

PROBLEM	LIKELY SOURCE OF PROBLEM	CORRECTIVE PROCEDURES
Wash pump will not start	Door	<ul style="list-style-type: none"> <li>Make certain that the door is closed.</li> <li>Make certain that the door is contacting the door switch or is within 1/8" of the door switch.</li> <li>Check to see if the door switch is faulty.</li> <li>If using a door switch, perform a continuity check.</li> <li>If using a Proximity door switch, jump out connections at PC board. Check operation.</li> <li>Check to see if the OK LED on the PC board is illuminated.</li> <li>See if the spring-loaded Stop button is stuck in, press it in again to make it return to an outward position.</li> </ul>
	Pump motor	<ul style="list-style-type: none"> <li>Check to see if the pump motor overload has tripped.</li> <li>Press the blue reset button located on the overload.</li> <li>See <i>Overloads</i> in the Reference Section.</li> </ul>
	Circuit breaker	<ul style="list-style-type: none"> <li>Check to see if the circuit breaker for the pump motor has tripped.</li> <li>Try resetting the breaker.</li> </ul>
	Pump motor fuses	<ul style="list-style-type: none"> <li>Check to see if any of the fuses or the pump motor is blown.</li> <li>Check all fuses</li> </ul>
	Water	<ul style="list-style-type: none"> <li>Check to see if there is water in the tank.</li> <li>Low water protection component may be preventing the Wash pump from running.</li> </ul>

PROBLEM	LIKELY SOURCE OF PROBLEM	CORRECTIVE PROCEDURES
Wash pump will not start (can't.)	Water (can't.)	<ul style="list-style-type: none"> <li>💧 If there is water in the tank and the pump motor will not start, the low water probe in the tank may not be sensing the water.</li> <li>💧 Clean the probe.</li> <li>💧 Check the level LED on the PC board. It should be illuminated.</li> <li>💧 If the PGM LED is flashing 7 times, it means that an attempt has been made to start a wash cycle without water to the level probe.</li> <li>💧 See <i>Low Water Circuit: Control Type</i>.</li> </ul>
Machine will not go into Rinse cycle	Door	<ul style="list-style-type: none"> <li>💧 Make certain that the door is closed.</li> <li>💧 Make certain that the door is contacting the door switch.</li> </ul>
	Rinse solenoid	<ul style="list-style-type: none"> <li>💧 Check to see that the rinse solenoid is being energized when the Wash cycle times out.</li> <li>💧 See <i>1827 PC Board: Routine Operation/Connections Table</i>.</li> </ul>
	Rinse LED	<ul style="list-style-type: none"> <li>💧 Check to see that the Rinse LED is illuminated on the PC board.</li> <li>💧 If it is, the problem is most likely the solenoid.</li> </ul>
Machine will not fill	Water	<ul style="list-style-type: none"> <li>💧 If there is already water in the machine and it is above the water probe, but the machine is not full, drop the water level below the probe.</li> <li>💧 Restart the Fill.</li> <li>💧 This condition will give an error code of 6 flash-es on the PC board PGM LED (located in the electric panel).</li> <li>💧 Ensure low water probe is clean.</li> <li>💧 It may be necessary to re-program Auto Fill time.</li> <li>💧 Refer to <i>1827 PC Board: Setting the Times</i>.</li> </ul>



PROBLEM	LIKELY SOURCE OF PROBLEM	CORRECTIVE PROCEDURES
Wash tank will not fill completely	Water pressure	<ul style="list-style-type: none"> <li>💧 If water pressure in the building has changed, the Fill cycle can be affected because the Fill cycle is timed.</li> <li>💧 Fill time may need to be reprogrammed.</li> <li>💧 See <i>1827 PC Board: Programming the Auto Fill</i>.</li> <li>💧 Proper water pressure to the machine is 60 psi static and 25 psi flow.</li> </ul>
	Auto fill power	<ul style="list-style-type: none"> <li>💧 If there is no power to the Auto Fill solenoid, refer to <i>1827 PC Board: Routine Operation/Connections</i>.</li> </ul>
Wash tank will not heat up	Low water	<ul style="list-style-type: none"> <li>💧 If there is no water in the tank, the low water protection component may be preventing the heaters or the gas burner from turning on.</li> <li>💧 Refer to <i>Low Water Circuit: 1827 PC Board</i>.</li> <li>💧 If there is water in the tank, the low water problem may need to be cleaned if it is not sensing the water level.</li> </ul>
	Wash T-stat power	<ul style="list-style-type: none"> <li>💧 Power to the Wash T-stat should be 120V + 10V from the PC board, J1-6 Wire # 16.</li> </ul>
	Wash contactor coil power	<ul style="list-style-type: none"> <li>💧 Power to the Wash contactor coil should be 120V + 10 V from the T-stat, Wire # 6.</li> </ul>
	Heater circuit breaker	<ul style="list-style-type: none"> <li>💧 If the circuit breaker for the heaters has tripped, try to reset the breaker.</li> </ul>
	Heater fuses	<ul style="list-style-type: none"> <li>💧 Check all heater fuses to see if any have blown.</li> </ul>
	Gas heat	<ul style="list-style-type: none"> <li>💧 Refer to the <i>Gas Heating: Maxon or Infrared: Troubleshooting</i>.</li> </ul>
	LED	<ul style="list-style-type: none"> <li>💧 Verify that the level and HTR LED's are illuminated on the PC board.</li> </ul>

PROBLEM	LIKELY SOURCE OF PROBLEM	CORRECTIVE PROCEDURES
Wash pump turns off during Wash cycle	Pump motor overload	<ul style="list-style-type: none"> <li>💧 If the pump motor overload has tripped, press the Reset button on the overload (blue button, located in the electrical panel).</li> <li>💧 Refer to <i>Overloads</i> in the Reference Section.</li> </ul>
	PGM LED on PC board	<ul style="list-style-type: none"> <li>💧 If the PGM LED on the PC board is flashing 4 times, it is indicating that there is not enough water in the machine.</li> <li>💧 Lower the water level below the level probe.</li> <li>Reprogram the Fill time.</li> <li>💧 Refer to <i>1827 PC Board: Programming the Auto Fill</i>.</li> </ul>
	Excess water pressure	<ul style="list-style-type: none"> <li>💧 When the Wash pump is started, the water pressure may be pushing against the door and causing the door switch to open.</li> <li>💧 In this condition, the OK LED on the PC board would not be illuminated.</li> </ul>
Rinse tank will not heat up	Heater circuit breaker	<ul style="list-style-type: none"> <li>💧 If the circuit breaker for the heaters has tripped, try to reset the breaker.</li> </ul>
	Heater fuses	<ul style="list-style-type: none"> <li>💧 Check all fuses in case any have blown.</li> </ul>
	Rinse T-stat power	<ul style="list-style-type: none"> <li>💧 Power to the Rinse contactor should be 120V +10 V from the T-stat Wire # 4.</li> <li>💧 <b>Note:</b> Rinse tank should always be full of water.</li> </ul>

# Thank You!

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