Automatic Pipeline Washer

Kleen Flo
Automatic Pipeline Wash Control

Kleen Flo Wash Control   Wash: 20
Product of E-Zee Milking Equipment LLC   Milk: 45

Wash Mode Ready

START   STOP   NO ALARM   MENU

Milk   Off   Wash

Installation, Operation & Maintenance Manual

Kleen Flo Wash System

Installation, Operation & Maintenance Manual

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Installation

Main Power

Determine a location to install the Kleen Flo Wash Controller. Avoid mounting it above the wash vat.
The provided Surge Protector should be used for any extended use and is mandatory to install on the final Installation.
The flat rotating power plug makes it easy to install in sealed flip-up AC outlet cover available at most electric stores.
(Note the flip-up AC outlet cover should be one that covers BOTH power plug and surge protector. The 120VAC 15 amp service provided at installation should be dedicated for the Wash Controller ONLY.)

Use the Surge Protector provided and install it as shown.

The flip-up AC outlet cover should be one that covers BOTH power plug and surge protector.

The 120VAC 15 amp service provided at installation should be dedicated for the Wash Controller ONLY.

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Function Testing

With the rotary switch in the middle "Off" position, it should appear as shown.

With the rotary switch turned to the left position "Milk", it should appear as shown.

With the rotary switch turned to the right position "Wash", it should appear as shown.

Optional Temperature Input Simulators are available.

Good for testing the Inputs and for Demonstrating the System's

Temperature operation. Part #____40117_____
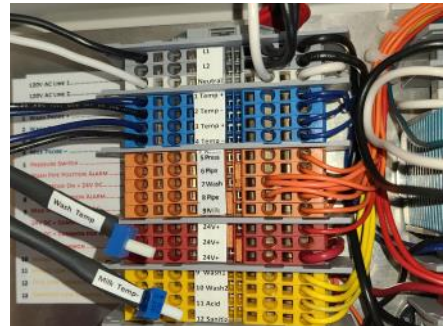
Go to the *Output / Input* test screen in the *Main Screen* to check the outputs. For all chemical pumps and auxiliary outputs, touch and hold the **OUTPUT** buttons one by one and check inside box to verify the button pressed matches the relay you are activating indicated by a green LED by the output relay. All the other outputs, touch to activate and touch again to deactivate. If not deactivated they will turn off after 30 seconds. If all outputs test ok, touch "Main" button to get back to Main Screen.
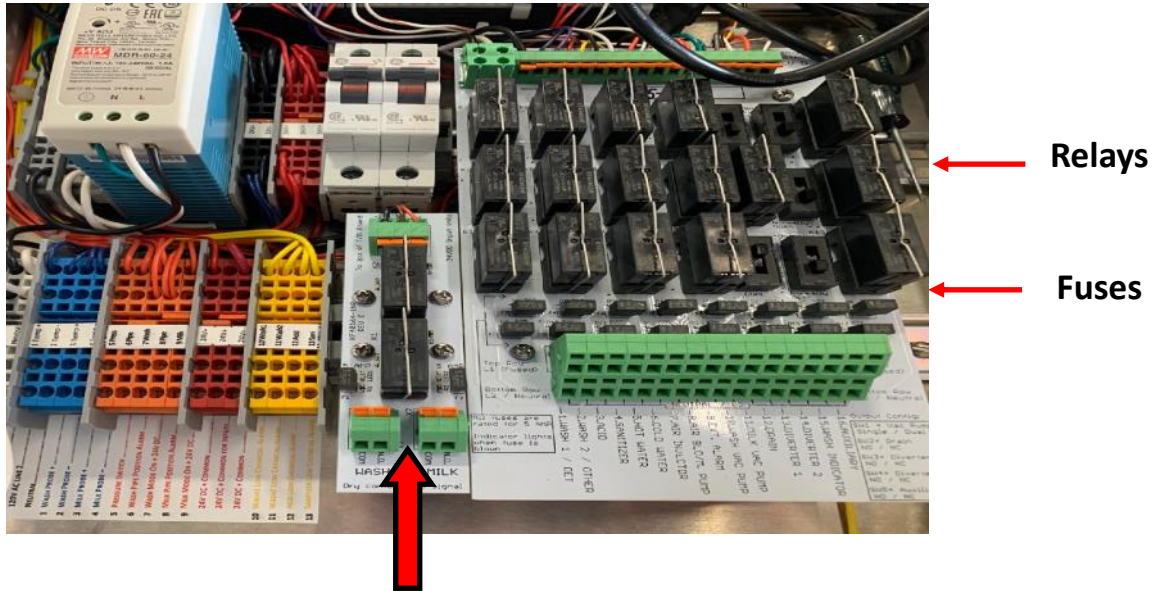

NOTE: Drain output must be tested (touched) before Diverter outputs are tested, otherwise the output indicators will be activated, but not the actual output.

You can now wire outputs following local electrical codes.

Input/Output Devices

Connect the input devices into the input terminals as shown in the illustration below.

Dry Contact Output

Dry Contact Output

Wash contacts close when Wash Vacuum Pump is activated.

Milk contacts close when Milk Vacuum Pump is activated.

See page 5 under "Vacuum Pump" for slide switch position

Note: You can get 120 VAC power for the output of the dry contact relays from the hot L1. It is protected by the circuit breaker there. Get the neutral power from the terminals marked neutral on the left side of the 24V power supply.

Relay Outputs

There are16 relays and all of them are wired for 120 VAC outputs for the wash system. Relay #15 (Wash Indicator) is wired to kill power to the outputs during the *Milk* mode for the Drain Valve, Diverter 1 & 2 Relay Outputs. Relay #15 is only active during *Wash*. There is a Auxiliary #16 relay that can be used for an optional Device.

All Outputs are Fused for 5 Amp Outputs

Fuses will show a Red LED near it when it has blown, but the device must be active (Output turned on & device connected)to show it's blown.

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Output Slide Switch Selection

Vacuum Pump

The Slide Switch on I/O Board should be in "Single " position for using the same Output for Wash & Milk.

If using a separate Output for Wash & Milk the slide Switch needs to be in the "Dual" position.

Drain Valve, Diverter Valves and Auxiliary Configurations

The Kleen-Flo Wash Controller can be selected for Normally Open (NO) or Normally Closed (NC) Valves by changing the position of the Slide Switch. NO = Drain Valve Open, needs power to close. NC = Drain Valve Closed, needs power to Open.

There is Timer Board beneath the I/O Board that will turn power off to these devices shortly after the cycle ends. The Timer Board is activated by the Drain Valve Signal and is factory set at 15 minutes.

Delay Timers for the Diverters, will send the wash water to the drain. The Run Timers will return it to the Vat/Sink to re-circulate the wash water.
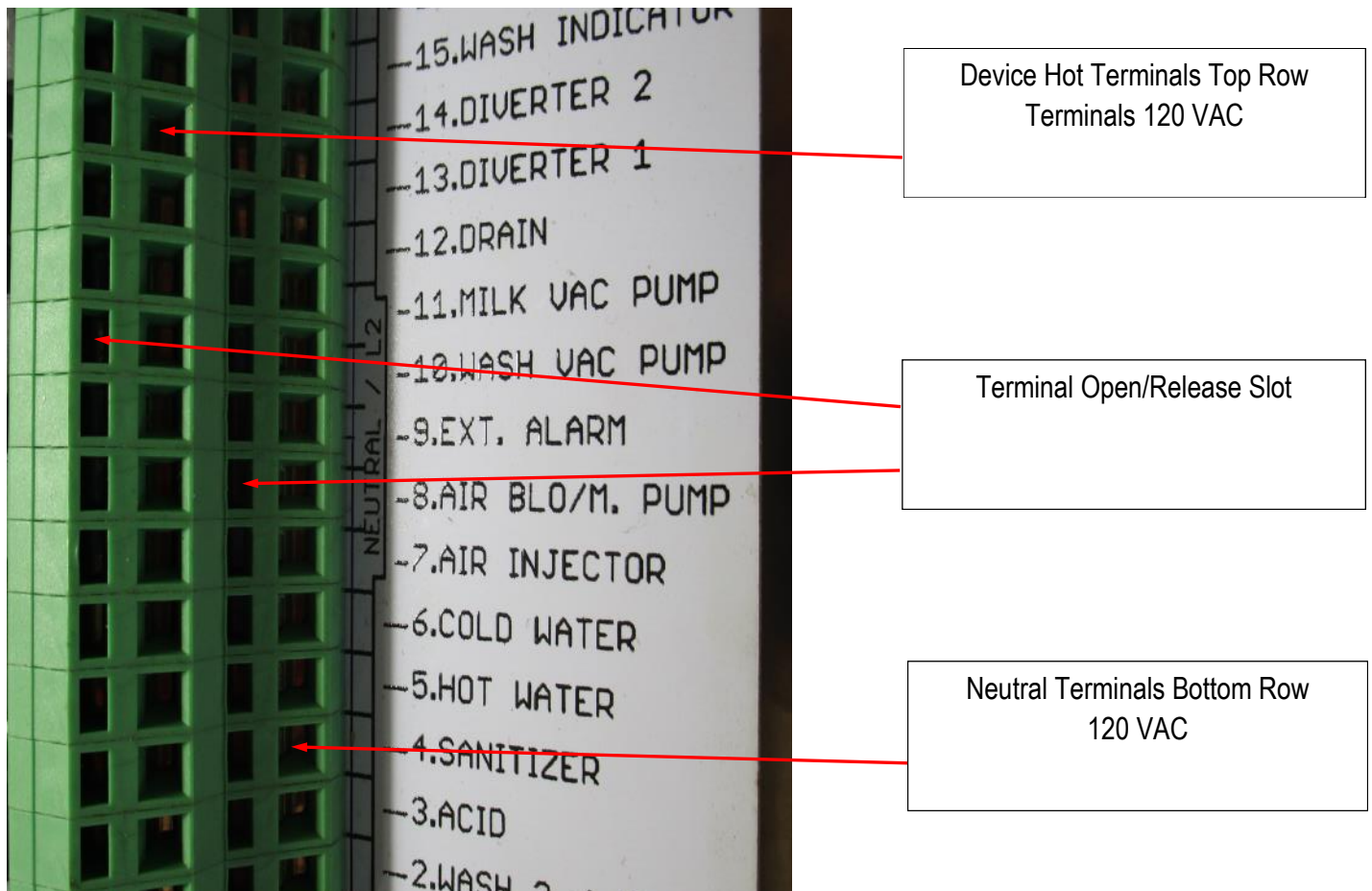
All Timers are set in the Formulas.
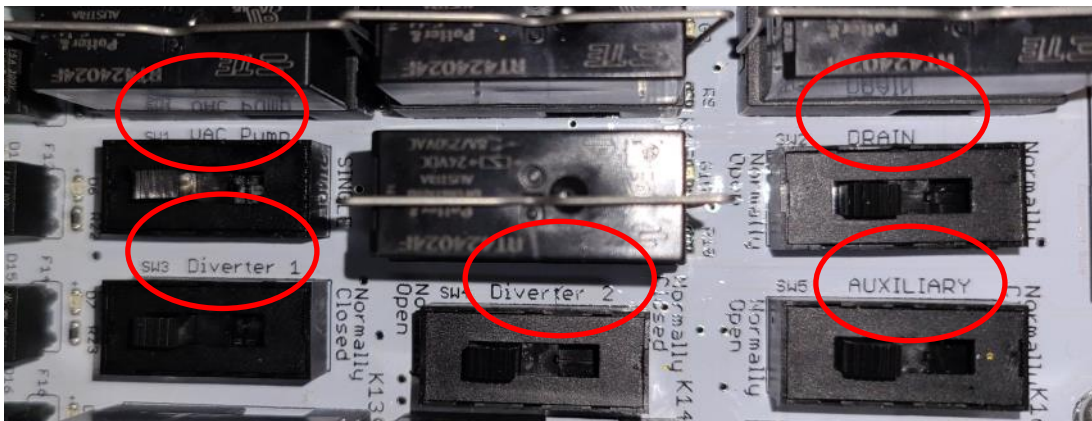
Connecting Output Devices

There are 16 fused outputs for the wash controller devices to connect to, as illustrated below. See Page 7 for more details on the connections.

Insert flat blade screw driver into smaller slot to open and release the wire contact. Insert wire for device and connect other wire to device to the neutral terminal below it.

Note: The neutral needs to be lined up with the output you are using, as the relays are double pole and break each leg of power to your output device. **Make sure you are attached to the correct neutral for that Relay Output or the Device will not power up.**

Device Hot Terminals Top Row Terminals 120 VAC

Terminal Open/Release Slot

Neutral Terminals Bottom Row 120 VAC

Terminal labels visible in image:
- 15. WASH INDICATOR
- 14. DIVERTER 2
- 13. DIVERTER 1
- 12. DRAIN
- 11. MILK VAC PUMP
- 10. WASH VAC PUMP
- 9. EXT. ALARM
- 8. AIR BLO/M. PUMP
- 7. AIR INJECTOR
- 6. COLD WATER
- 5. HOT WATER
- 4. SANITIZER
- 3. ACID
- 2. WASH

Output Connections

Output Terminals

16	Auxiliary Device/ 5th Chemical Option/2nd Air Injector/3rd Water Valve/3rd Diverter/Time Fill Signal/other Devices
15	Wash Mode Indicator
14	Diverter 2
13	Diverter 1
12	Drain Valve
11	Milk Vacuum Pump
10	Wash Vacuum Pump
9	External Alarm
8	Air Blow/ Milk Pump/ Drain Time/End of Milk
7	Air Injector
6	Cold Water
5	Hot Water
4	Sanitizer
3	Acid
2	Wash 2 / 4th Chemical Option
1	Wash 1 / Detergent

Input Connections

Note: All orange and yellow inputs (with the exception of the safety switch), the other wire of the input device needs to get its 24V common from the red terminals.

Input Terminals		
Blue	1 & 2	Wash Temperature Sensor
Blue	3 & 4	Milk Temperature Sensor
Orange	5	Pressure/Fill Level Switch
Orange	6	Safety Switch Common for Wash Mode Pipeline Position
Orange	7	Wash Mode On Main SW 24VDC + for Safety/Remote Switch
Orange	8	Safety Switch Common for Milk Mode Pipeline Position
Orange	9	Milk Mode On Main SW 24VDC + for Safety/Remote Switch
Yellow	10	Detergent Wash 1 Chemical Low
Yellow	11	Detergent Wash 2 Chemical Low
Yellow	12	Acid Chemical Low
Yellow	13	Sanitizer Chemical Low
Red		24 VDC Positive +
Red		24 VDC Positive +
Red		24 VDC Positive +

If removing Jumpers keep them available if needed because of a Safety SW failure.

Jumpers

Safety Switch Connection

You will need to use a DPDT Switch like the Honeywell Limit Switch, or something similar.

Part # 78495

Wash Mode

The controller has an input for "Pipe" in wash mode that currently has an **orange** push-in jumper across terminals 6 and 7 (shown above) . **You must remove this jumper if wiring in a Safety switch**. Run a 4-conductor cable use 2 of the conductors and connect to the safety switch's contact that makes them connect for the **WASH** position of the milk pipe. Then connect these to terminals 6 and 7 (orange terminal blocks).

Milk Mode

The controller has an input for "Pipe" in milk mode that currently has an **orange** push-in jumper across terminals 8 and 9 (shown above) . **You must remove this jumper if wiring in a Safety switch**. Use the remaining 2 conductors and connect to the safety switch's contact that makes them connect for the **MILK** position of the milk pipe. Then connect these to terminals 8 and 9 (orange terminal blocks).

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Programming System Settings

From the main menu touch "Systems Settings" and the screen below left will appear.

If you want to run different wash formulas, touch "Formula Cycle Settings' and the screen on right will appear.

To set the desired sequence, touch the "Formula 1 (or 2 or 3) Preset" to enter the number of washes for each formula want to use. Note: most of the time a 3rd formula is not used.

Important: Make sure "Cycle Wash Selected" button is Green when done.
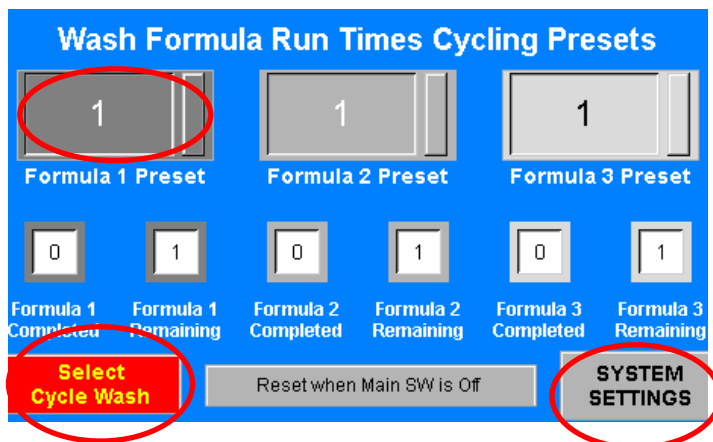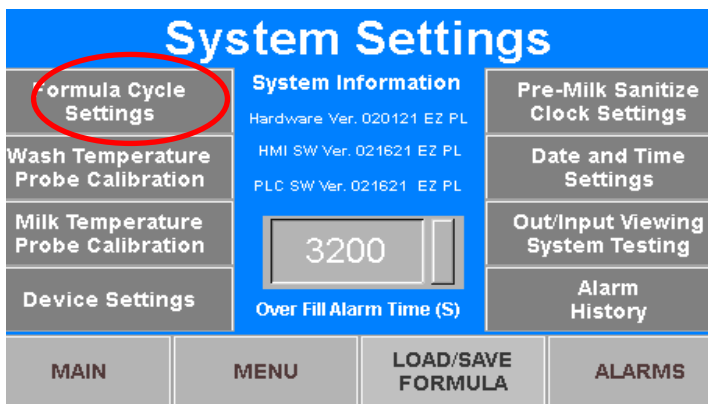
Touch the "Systems Settings" button to exit and then touch the "Device Settings" button and the screen below will appear.
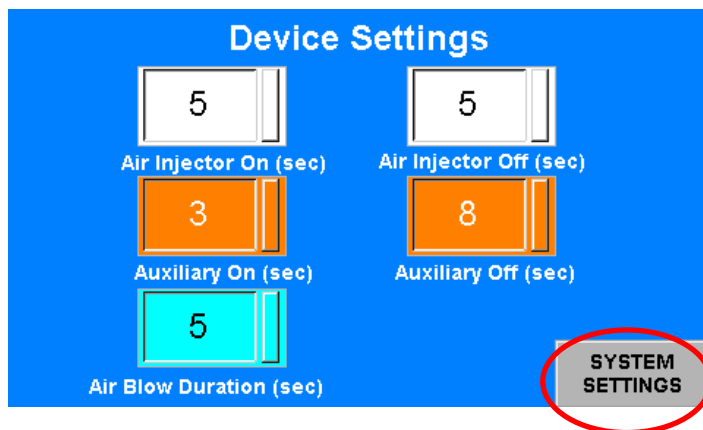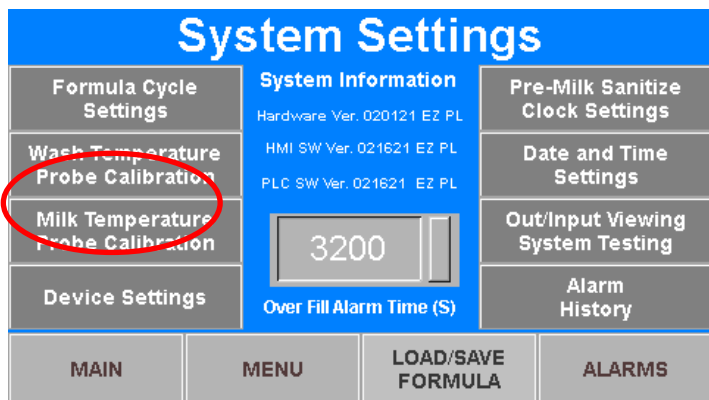
Set the On/Off timer for the air injector.

Auxiliary timers can be used for a 2nd air injector. If the auxiliary timer is used for a device that requires constant power, set the On time at "1" and the Off time at "0".

Air Blow Duration timer set for the amount of time needed to clear the milk line.

Touch "System Settings" button then touch "Main" button and you will be back to the main menu and ready to start a wash.

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Programming System Settings - continued

Setting Pre-Milk Sanitize
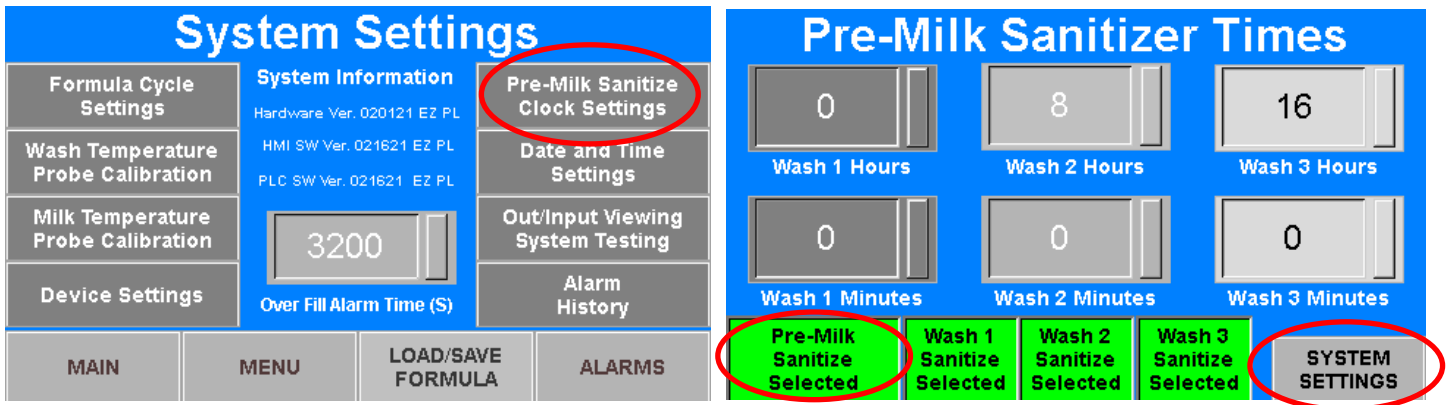
Note: All Timers are in 24 HR Format

Touch "Pre-Milk Sanitize" to get the screen above right.

Touch "Select Pre-Milk Sanitize" to sanitize on pre-set times.

A Popup Screen will appear type "000" then touch "ENT"

Touch "Select Wash 1 (or 2 or 3) Sanitize" for each of the daily washes you want
to sanitize and set your times for activation.

When done touch "Systems Settings" to get back to the "Systems" Setting screen.

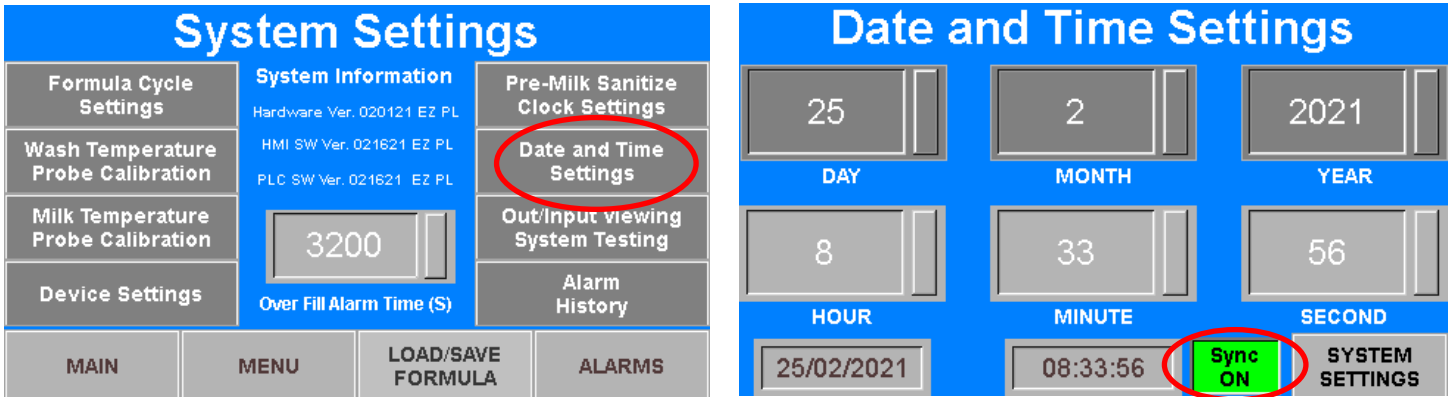Touch "Select Pre-Milk Sanitize" to activate timed sanitizing before milking.

Red Button = Not Activated

Green Button = Activated

Programming System Settings - continued

Setting the Date & Times

Touch "Date and Time Settings" and the screen below right will appear.
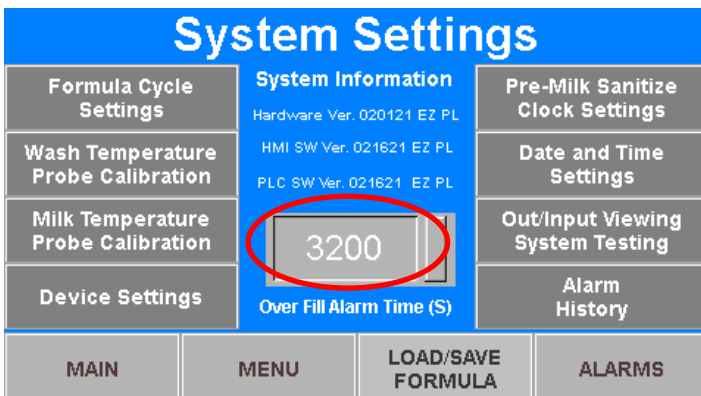

Now enter current date and time.

Important: Touch "Sync RTC" it should now be **Green**.

When done touch "System Settings".

Setting Overfill Alarm

Touch Over Fill Alarm "Time" in center of screen to adjust time.

Enter in approximately 300 seconds longer than your longest fill time.

Example: Fill time is 8 minutes or 480 seconds add 300 seconds and set for 780 seconds

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Programming System Settings - continued

Wash Probe Temperature Sensor

The wash sensor thermocouple comes with a 4-ft lead that connects to a transmitter puck mounted in a waterproof enclosure. This transmitter takes the thermocouple temp signal and converts it to a 4-20Ma signal to wire over to the Kleen Flo Wash Controller.

White wire from Sensor (+24 VDC) to Blue terminal #1.

Black wire from Sensor (-24 VDC) to Blue Terminal #2.

System Settings with a Wash Temp Probe　　　　**System Settings with No Wash Temp Probe**

Wash Temperature Probe

Wash Temp: 5471°F

See the Manual for Settings with (out) Probe and the Settings for Formula (s)

Hot Off | Cold Off | Water Valve Off Delay: 6

250 — Wash Temp Max Scale | 0 — Wash Temp Min Scale | Water Valve On Delay: 6

120 — Low Temp Alarm Delay (s) | 10 — Temp Deadband | Wash Temp Offset: 0

Note* With no Wash Temperature Probe connected or failure Set Max Scale to "0" & Min Scale to "20" degrees.

SYSTEM SETTINGS

Wash Temperature Probe

Wash Temp: 25 °F

See the Manual for Settings with (out) Probe and the Settings for Formula (s)

Hot Off | Cold Off | Water Valve Off Delay: 6

0 — Wash Temp Max Scale | 20 — Wash Temp Min Scale | Water Valve On Delay: 6

120 — Low Temp Alarm Delay (s) | 10 — Temp Deadband | Wash Temp Offset: 0

Note* With no Wash Temperature Probe connected or failure Set Max Scale to "0" & Min Scale to "20" degrees.

SYSTEM SETTINGS

Calibrating the Wash Temperature Sensor

1.　Run a Warm Water Wash Cycle and measure it with the thermometer at the sink.

2.　If the temperature shown in the display's *Wash Temp* Screen does not match the actual temperature, RETURN through the "Menu" to the "System Settings" to the "Wash Temperature Probe Calibration" and change the "Wash Temp Offset " value.

3.　Enter the difference between the temperatures (Example: if the displayed temperature is 150°F and the actual temperature 145°F, resulting in a difference of 5°, you would change it to "-5".)

Note: With no Wash Temperature Probe connected or Sensor Failure, set Max Scale to "0" & Min Scale to "20" degrees and Low Temp Alarm Delay to "1200". You also must disconnect the Sensor Wires from Blue Input Terminals 1 & 2.

Programming System Settings - continued

Milk Probe Temperature Sensor

The Milk sensor thermocouple comes with a 4-ft lead that connects to a transmitter puck mounted in a waterproof enclosure. This transmitter takes the thermocouple temp signal and converts it to a 4-20Ma signal to wire over to the Kleen Flo Wash Controller.

White wire from Sensor (+24 VDC) to Blue terminal #3.

Black wire from Sensor (-24 VDC) to Blue Terminal #4.

System Settings with a Milk Temp Probe   **System Settings with No Milk Temp Probe**

Calibrating the Wash Temperature Sensor

1. Run a Cold Water Wash Cycle, measure it with the thermometer at the return line to the sink.

2. If the temperature shown in the display's *Milk Temp* Screen does not match the actual temperature, RETURN through the "Menu" to the "System Settings" to the "Milk Temperature Probe Calibration" and change the "Milk Temp Offset" value.

3. Enter the difference between the temperatures (Example: if the displayed temperature is 38°F and the actual temperature is 33°F, resulting in a difference of 5°, you would change it to "-5".)

Note: With no Milk Temperature Probe connected or Sensor Failure, set Max Scale to "0" & Min Scale to "20" degrees You also must disconnect the Sensor Wires from Blue Input Terminals 3 & 4.
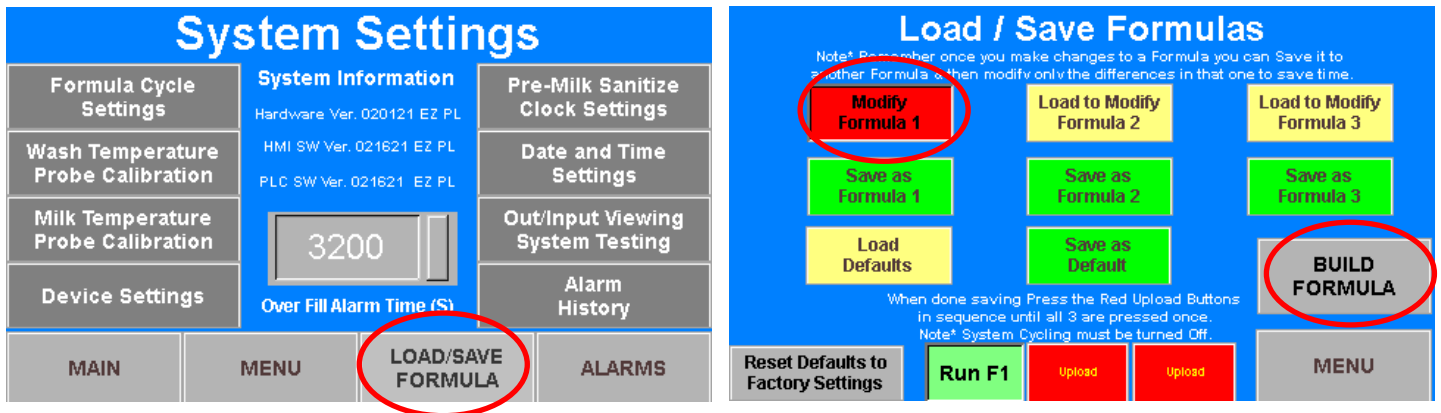
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Building Formulas

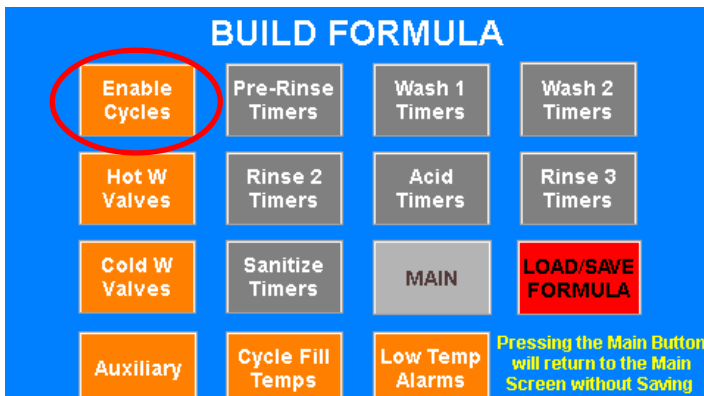Touch "Load/Save Formula" on the Systems Settings screen and the screen below will appear.

If a Password Popup Screen appears type "000" then touch "ENT"

Touch "Load to Modify Formula 1" to make it turn Red. Next touch "Build Formula" and the screen below will show.
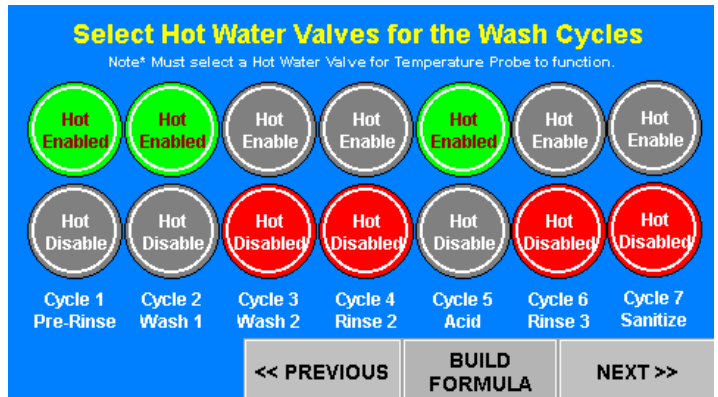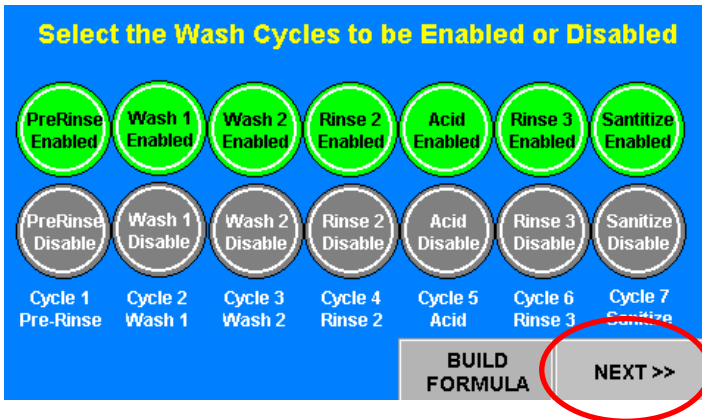
Next touch the orange "Enable Cycles".

Passwords

Main Settings & Timers	000
Save as Formula 1	111
Save as Formula 2	222
Save as Formula 3	333
Save as Default Formula	000

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Building Formulas - continued

After you touch "Enable Cycles" the Screen below will appear.

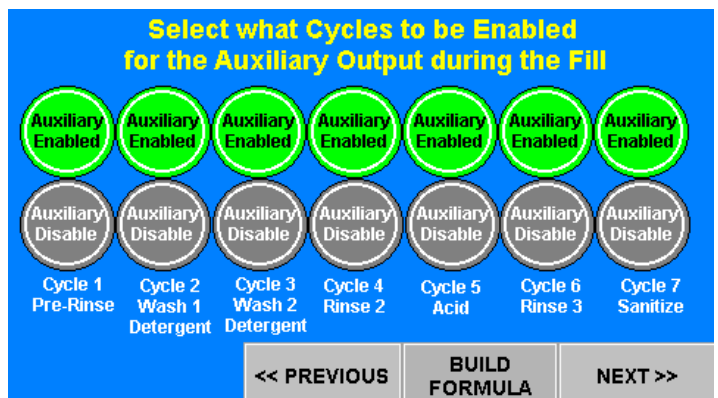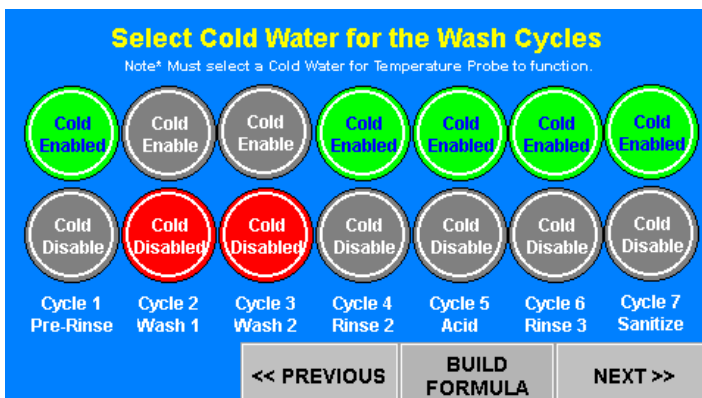Select the Wash Cycles to be Enabled or Disabled.

Then touch "NEXT".

Select the Hot Water Valves to be Enabled or Disabled.

Then touch "NEXT" and select the Cold Water Valves in the same manner.

Then touch "NEXT" and select the Auxiliary Output for a 3rd Water Valve (if needed) in the same manner.

Building Formulas - continued

Touch "NEXT" in the Auxiliary Output Setting Screen then the screen below will appear.

If not using a wash temperature sensor make sure all settings are defaulted to 25 degrees.

If using a wash temperature sensor refer to Wash Probe Temperature Sensor on page 14.

Touch "NEXT" and the screen below will show up.

If not using a wash temperature sensor make sure all settings are defaulted to 0 Degrees.

If using a wash temperature sensor refer to Troubleshooting on page 24.

When done touch "BUILD FORMULA" to get to the screen on the next page.

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Building Formulas - continued

After you touch "BUILD FORMULA" you will get the screen below.
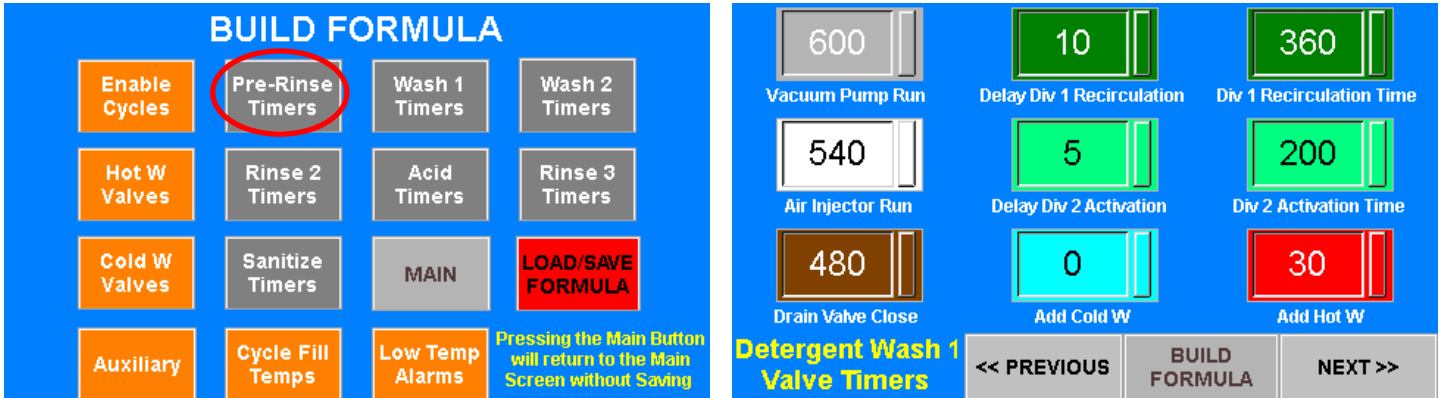
Next touch the grey "Pre-Rinse Timers" and the screen below will show.
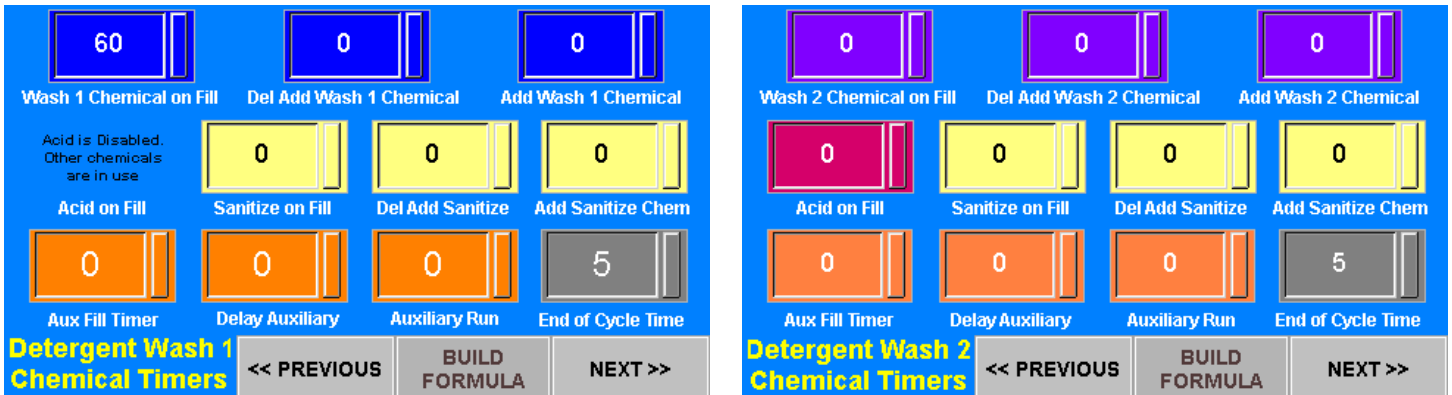

Go through the above Timers and set the appropriate time settings for devices used in this cycle. Touch the "NEXT" button and repeat this step for all Timers in cycles you have enabled. When all your cycle timers have been set, touch "BUILD FORMULA".

There is option to have Wash 1 or Wash 2 do an Acid Chemical instead of the normal Detergent or Sanitize mix.

There is a safety feature that removes the "Acid Timer" a Time Value is entered into the Detergent or Sanitize in those 2 Cycles and vice-versa if Time is entered into the "acid Timer" it removes the Detergent and the Sanitize timers.

Building Formulas - continued

You will now be back at the BUILD FORMULA screen
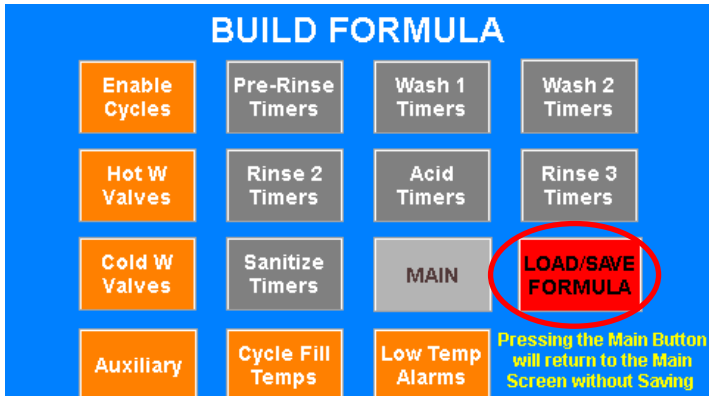
Now touch the "LOAD/SAVE FORMULA" button and the screen below will appear.
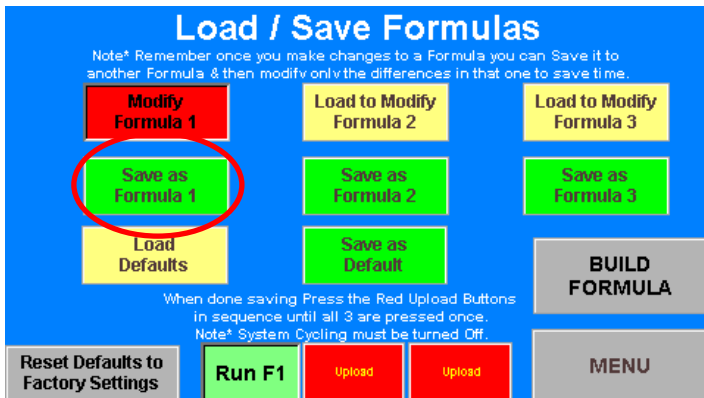
Now touch "Save as Formula 1" button. It will now ask for a Password. Use "111" then "ENT".

Passwords

Main Settings & Timers	000
Save as Formula 1	111
Save as Formula 2	222
Save as Formula 3	333
Save as Default Formula	000

Building Formulas - continued

After you touch "BUILD FORMULAS" and the program is done uploading, it will look like the screen below left.

IMPORTANT: Touch the red "Upload" buttons in sequence until all 3 are pressed once. When touching buttons they will change color. Just make sure you have touched all 3 buttons when they say "Upload" and the button is red.

REPEAT STEPS ABOVE FOR SAVING EACH FORMULA

We suggest you save Formula 1 to Formula 2 & 3 so that you do not have repeat the common timer settings. Then you only need to change the timers that you want to be different.

To save the formula to 2 and 3, touch the "Load to Modify Formula 1" button again, then touch "Save as Formula 2". It will ask for a Password use "222" to save. Repeat the same steps for Formula 3 and use "333' when prompted for a password.

Now touch the "Menu" button and the screen below will appear.
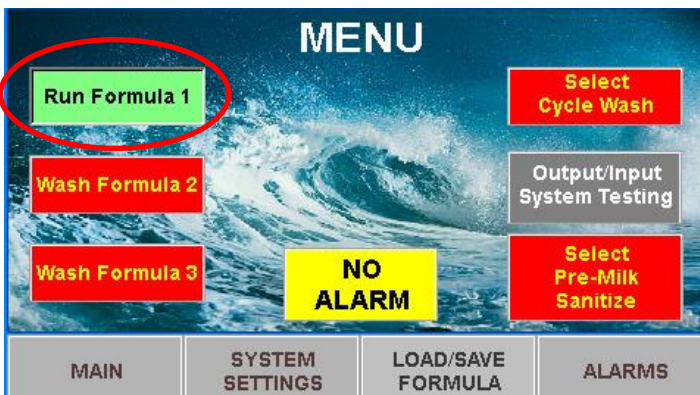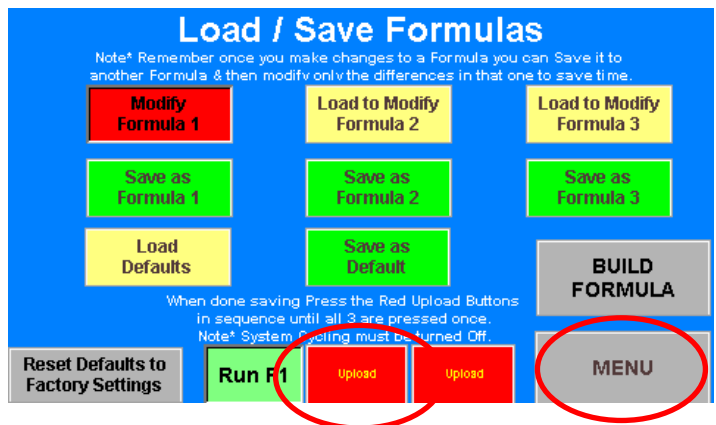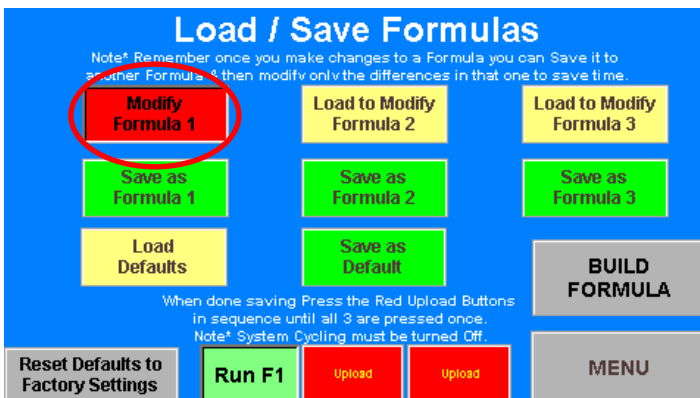
| Main Settings & Timers	000
Save as Formula 1	111
Save as Formula 2	222
Save as Formula 3	333
Save as Default Formula	000

The wash formula you want to use first should be highlighted in green and say "Run Formula 1, 2 or 3"

Alarms & Alarm History

During an Active Alarm the *Current Alarm* Screen will come on and display a code description of what's wrong.

An Active Alarm will pop up on the *Main* Screen as shown at right. The 0000 Trigger line will display date and time the alarm occurred and what caused it to be tripped. Also, the **ACTIVE ALARM** button will flash yellow / blue and the external output for the audible / flashing strobe will sound off.

Touching the **ACTIVE ALARM** button will shut off the external alarm. The active alarm will disappear from the *Current Alarm* Screen, then will appear in the *Alarm History Window Level 4*, with an XXXX Recovery line showing when the alarm was acknowledged.
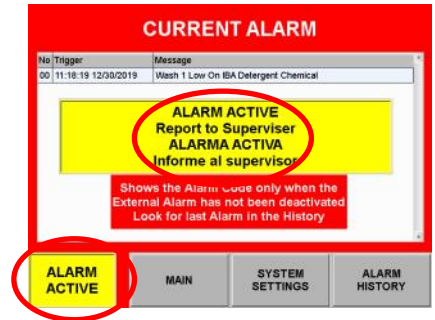
If a second alarm is active, it will not show up until the first alarm is acknowledged and is removed from the *Current Alarm* Screen. Then when you press the **ACTIVE ALARM** button to deactivate it, and if another alarm is present, it pops up on the *Current Alarm* Screen and so on each time you press the button if further alarms are present.

If the screen is blank and no codes are shown, it's because the alarm has been deactivated from the *Current Alarm* Screen. If the **ACTIVE ALARM** button is flashing, the *Alarms History* Screen will show a list of the most recent alarms.

At any time, you can view what alarms occurred by pressing the **ALARMS HISTORY** button to display the last 100 alarms.

If the yellow button at bottom left shows as a **NO ALARM** button, the alarm is not active and the problem went away.

The *Current Alarm* Screen will remain until you exit or return to the *Main* Screen to alert you that an alarm took place.

There are 12 possible Alarm Codes which can appear on the Controller. These are listed below.
See the following page for Possible Causes and Actions to be taken.

1	Check Milk Pipe Position	7	Sanitize Low On Chemical
2	Wash Temperature Too Low	8	Sink Fill Switch Stuck On
3	Milk Temperature Too High	9	All Formulas are Set at Zero
4	Wash 1 Low On Chemical	10	Over Fill of Wash Sink
5	Wash 2 Low On Chemical	11	Wash Temp Sensor Failure
6	Acid Low On Chemical	12	Milk Temp Sensor Failure

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| #	Alarm Message	Possible Cause	Action
1	MILK PIPE WRONG POSITION	1. Switch not installed, but will be used. 2. Switch is not activated. 3. Switch is not wired properly. 4. Switch is faulty. 5. Switch will not be used, but Jumper not in.	1. Remove Orange Jumper & install Limit Switch. 2. Correct milk line position. 3. Inspect wiring. 4. Replace switch. 5. Install Orange Jumper in Pipe to Wash Input.
2	WASH TEMPERATURE SENSOR FAILURE	1. Sensor was not installed, but will be used. 2. Sensor not enabled for Wash. 3. Sensor is open (or shorted).	1. Disable Sensor Input (See Page #124). 2. Install Temp Sensor and enable as per Page #24 3. Inspect wiring. Replace sensor.
3	MILK TEMPERATURE SENSOR FAILURE	1. Sensor was not installed, but will be used. 2. Sensor not enabled for Wash. 3. Sensor is open (or shorted).	1. Disable Sensor Input (See Page #15). 2. Install Temp Sensor and enable as per Page #15. 3. Inspect wiring. Replace sensor.
4	FILL SWITCH STUCK ON	1. Switch closed before fill started. 2. Switch is faulty. 3. Switch stayed closed.	1. Inspect wiring. 2. Replace switch. 3. Replace switch.
5	OVER FILL OF WASH SINK	1. Fill Time Alarm time was set too short. 2. Water valves are not working properly. 3. Fill Switch not activating. 4. Water Supply issue.	1. Change setting to longer time. 2. Inspect wiring to valves. Use Test Mode. 3. Replace or repair Fill Switch. 4. Inspect water-supply system.
6	WASH TEMP TOO LOW	1. Cycle Fill Temp set too high. 2. Cycle Low Temperature was set too high. 3. Diverter 1 Timer set too long for Chemical Cycle. 4. Water is not hot enough. 5. Not holding water.	1. Change setting to lower temperature. 2. Change setting to lower temperature. 3. Change setting to shorter time. 4. Check hot water supply. 5. Check Drain Valve.
7	MILK TEMP TOO HIGH	1. Alarm Temp Set too low. 2. Plate Cooler water off. 3. Milk not cold enough. 4. Milk Temp Alarm Delay set too short.	1. Change setting. 2. Turn on Plate Cooler Water. 3. Check Cold water supply to Plate Cooler. 4. Check Milk Temp Alarm Delay and set longer.
8	WASH 1 LOW ON CHEMICAL	1. Out of Chemical in that Drum. 2. Chemical Probe Reed is bad or float is stuck.	1. Replace Chemical Drum or refill it. 2. Replace or repair Chemical Probe.
9	WASH 2 LOW ON CHEMICAL	1. Out of Chemical in that Drum. 2. Chemical Probe Reed is bad or float is stuck.	1. Replace Chemical Drum or refill it. 2. Replace or repair Chemical Probe.
10	ACID LOW ON CHEMICAL	1. Out of Chemical in that Drum. 2. Chemical Probe Reed is bad or float is stuck.	1. Replace Chemical Drum or refill it. 2. Replace or repair Chemical Probe.
11	SANITIZER LOW ON CHEMICAL	1. Out of Chemical in that Drum. 2. Chemical Probe Reed is bad or float is stuck.	1. Replace Chemical Drum or refill it. 2. Replace or repair Chemical Probe.
12	ALL FORMULA CYLES ARE SET AT ZERO	1. Check Formula Settings are not at "0".	1. Must have a Wash Formula Programmed & enabled and if Cycle Wash is enabled more than one Formula selected.

Troubleshooting

Note: The following settings are pre-set from the factory

System Settings with NO Wash Temp Probe

For wash formula settings with no wash temperature probe connected or Sensor Failure , you **MUST** set the Cycles to 25.

Touch "System Settings" button, then touch "Load/Save Formula",.
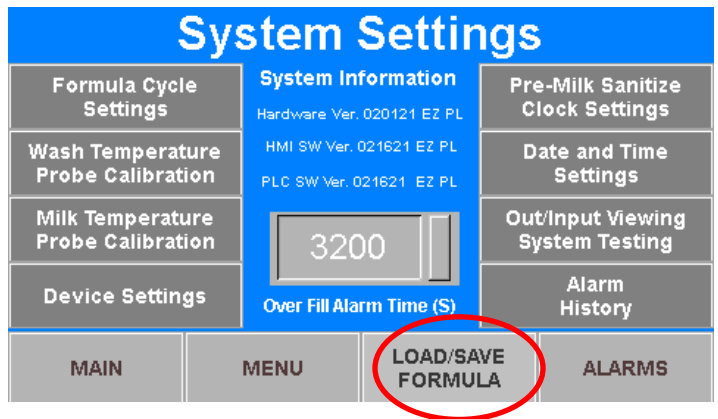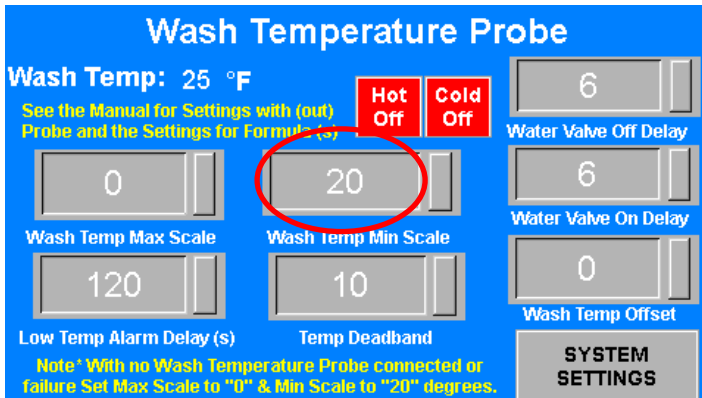
Go to active wash formula. Touch the "Build Formula" button, then touch the orange "Cycle Fill Temps".
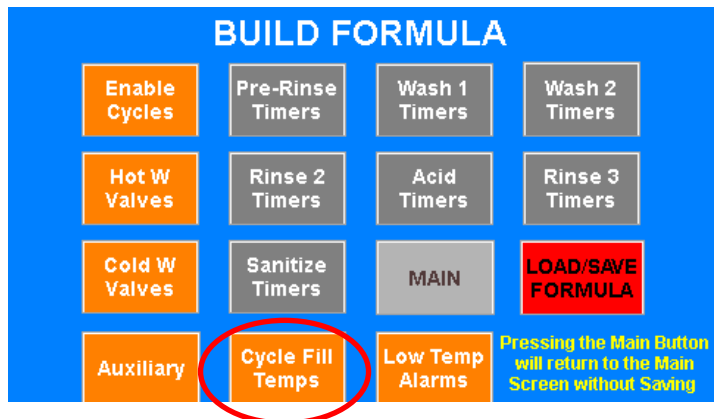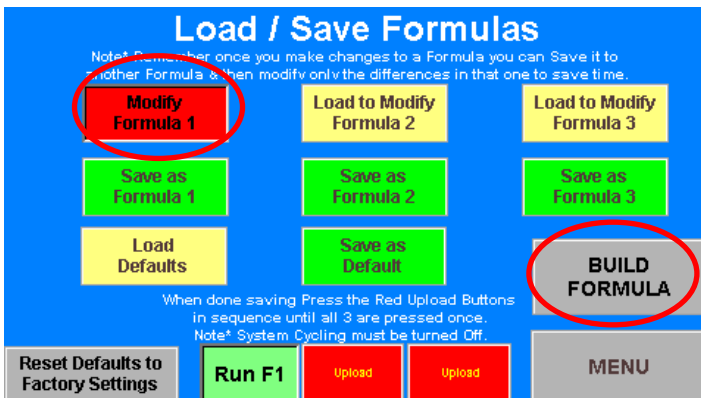
Change all "Fill Temp" buttons to 25 as shown. Touch "Build Formula". You will then be back at the "Build Formula" screen. Then press next and set all the alarm temps to "0".

Follow the instructions on pages 201 and 22 to save the changes.

Important: As mentioned on page 22, you must cycle through all the "Upload" buttons to save the changes.
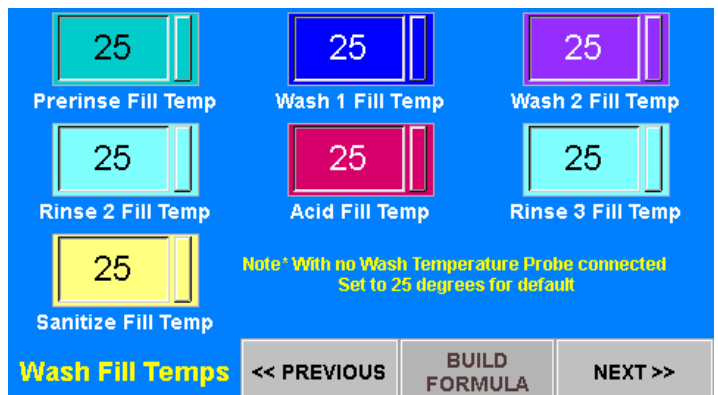
Output Internal Wiring

Output Relay Coil Connections to the Delta CPU

	I/O Board Inputs # Top	DELTA OUTPUT	WIRE COLOR
1	Wash Chemical 1 Pump	Y2 CPU	Blue
2	Wash chemical 2 Pump	Y3 CPU	Violet
3	Acid Chemical Pump	Y0 Output Module	Red
4	Sanitize Chemical Pump	Y1 Output Module	Yellow
5	Hot Water Valve	Y0 CPU	Black
6	Cold Water Valve	Y1 CPU	White
7	Air Injector	Y4 Output Module	Orange
8	Milk Pump / Air Blow V.	Y7 Output Module	White / Blue
9	External Alarm	Y4 CPU	White / Red
10	Wash Vacuum Pump	Y2 Output Module	Brown
11	Milk Vacuum Pump	None Milk / Wash Sw	Orange
12	Drain valve	Y3 Output Module	Green
13	Diverter Valve 1	Y5 Output Module	Gray
14	Diverter Valve 2	Y6 Output Module	White / Black
15	Valve Power Wash Mode	None Timer Board NO	Orange
16	Auxiliary	Y5 CPU	White / Orange

Input Internal Wiring

Input Terminal Connections to Delta CPU Inputs

| TERMINAL #	INPUT	CPU	WIRE COLOR
1 & 2	Wash Temperature Sensor	24(-)VDC & CPU V10	Blue
3 & 4	Milk Temperature Sensor	24(-)VDC & CPU V11	Blue
5	Fill Level Switch DPST	X0 CPU	Orange
6	Safety Switch Pipeline Position Wash	X1 CPU	Orange
7	Wash Main SW Wash Mode	X3 CPU	Orange
8	Safety Switch Pipeline Position Milk	I/O Board Input #11	Orange
9	Milk Main SW Milk Mode	X2 CPU	Orange
10	Detergent Wash 1 Chemical Low	X4 CPU	Yellow
11	Detergent Wash 2 Chemical Low	X5 CPU	Yellow
12	Acid Chemical Low	X6 CPU	Yellow
13	Sanitizer IChemical Low	X7 CPU	Yellow

Timer Board Wiring

Timer Setting: Set dip switches as follows: 1, 2 and 3 OFF, #4 ON. Set timing knob to around 5 Minutes.

The green from #12 on the I/O Board (Drain) to the TRG terminal on Timer Board.

The red and black to 24VDC power supply to – (black) and + (red) wires.

The orange wire from I/O Board #15 to NO.

The orange wire from Washer input #7 (Wash) to C.
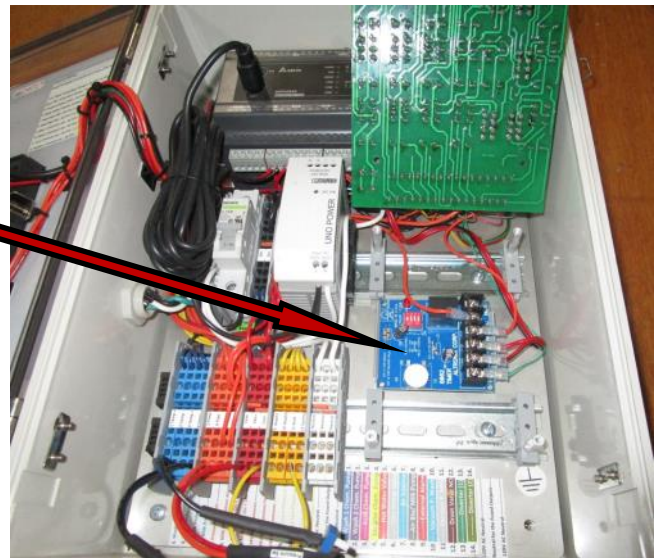
Wash Cycle Time and Advancement

On the Main Display the Wash Cycle will show that it is "Filling" and also will count down the Cycle Time Remaining for the cleaning portion of that Cycle. At the end of the longest Timer Set (Vacuum Pump) an End of Cycle Timer will count down the remaining time left before the next Cycle Starts. Output #8 can then run the Air Blow or Milk Pump and can be used for the Signal to a Smart Relay for additional steps.


Rapid Advancement

In order to use this feature, select the desired wash Cycle and press the Start Button.

Note: You must push the skip buttons on the cycles that you don't want to check.

You can advance the Cycle in 30 second increments by using the Progress bar of the Cycle displayed. Press and hold the Progress Bar for 5 seconds, continue to press and hold progress bar to advance through the Cycle until the desired segment is reached. This will speed the up the Testing of your Formula Settings. You can also do the same in the Out/Input Viewing Screen. There you will be able to see all the Device activations and can also advance the Fill by touching the Fill Level Switch Input .
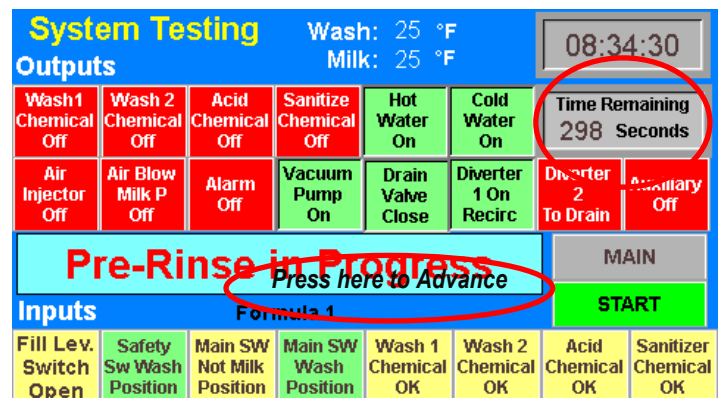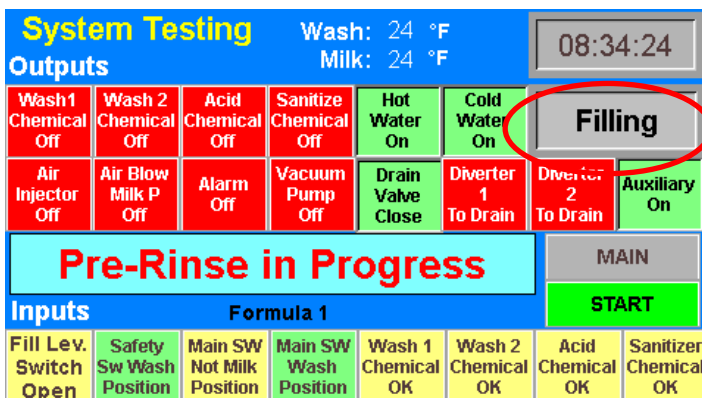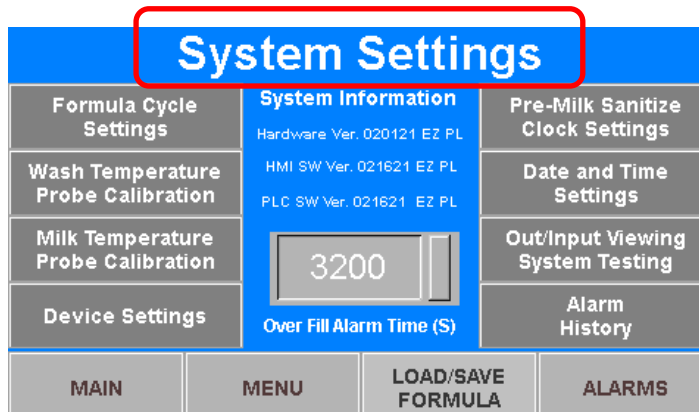
Saving Screen Information

Overview

There is a hidden Picture button provided for downloading to a SD Card, it can take Screen Shots of System Settings, Formula Settings and Alarm History. This function can be used to keep for your records or keep inserted on the back of the HMI Touch Screen. It creates a File Folder Date Stamped and saves it as a "PNG" picture file that you can Upload and save to your laptop or Desk top PC for future reference.   You can save the File on a Cell Phone, Computer or Tablet later for your records to go back over the settings or Alarms if needed. The SD Cards and Adapters are readily available online.

Procedure

1. Insert the USB on the backside of the HMI, there is a slot there. You will here a loud "Beep" acknowledging you are connected.
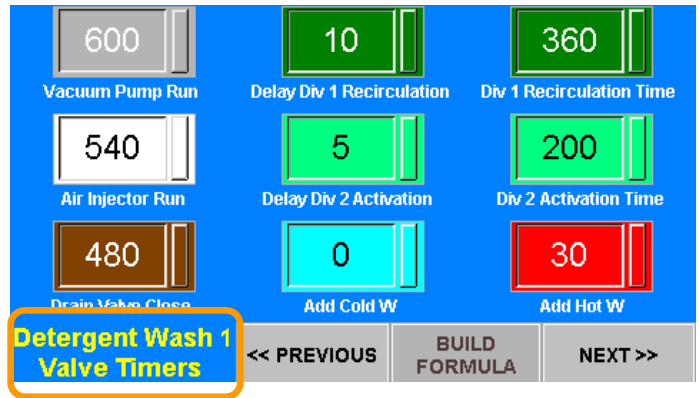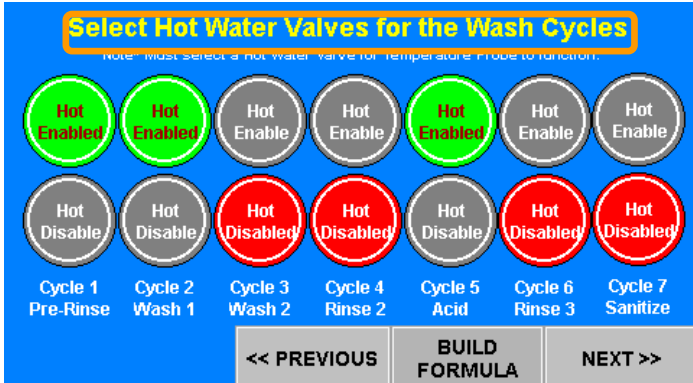

2. Press the center of the Screen Name to take make it Beep to take a Screen Shot of the Setting (s).

Saving Screen Information - continued

3. A Popup will appear saying "Screen capture completed", press "OK".

4. Go to the next Screen you want to save and repeat Step 2 to do the same for the rest of the System Screens you wish to send to the SD Card. Below are some other Screen examples. **Press the areas highlighted in ORANGE.**
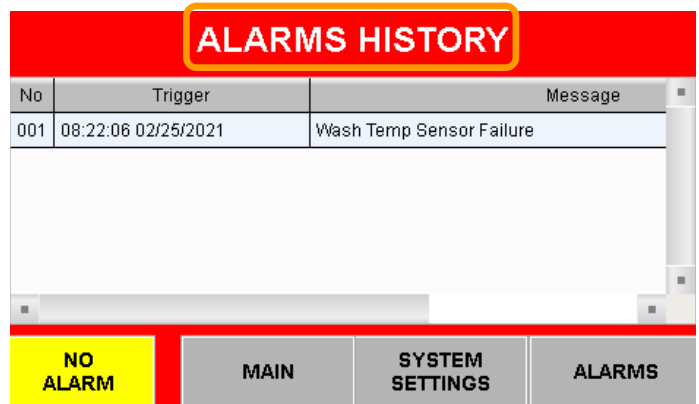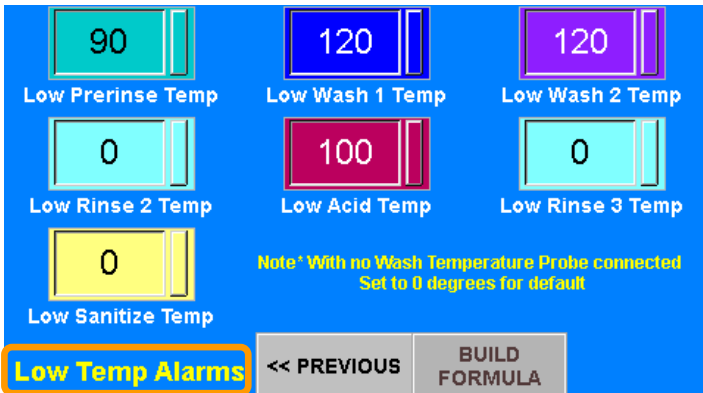
6. For the Formulas Screen Shots save the Main Formula 1 Screens and on the other Formulas only the Screens Shots that are different. The Formula Screens do not identify what Formula you saved but scrolling through the Screen Shots later the Formula Screen Shots that are similar with the Heading Name will be on the end of the list.

We recommend to start with saving your System Settings, then Formula 1 and then Formula 2 and 3 if different.

The SD Card can be uploaded to your Phone, Tablet or Computer and then be put back in the HMI ready for the next time you need it.

Wash Formula Settings

The following eight pages are a way to have a written means to record your customer's settings if not using the SD card method of taking screen shots of your settings. The "Formula Cycle" pages also have detailed information on what the setting/timer's function is. The PLC stores the memory, in case you need to replace the PLC, make a record of these settings.

Circle or mark the "Enabled Settings" for each that cycle you have programed

Formula Defaults	Formula 1	Formula 2	Formula 3

Wash Build Formula Settings/Timers Cycle 1 Pre-Rinse	DEFAULT Settings	Formula #1 Settings	Formula #2 Settings	Formula #3 Settings
1 **Wash Fill Temp** (what you want water temperature to fill at. Both Hot/Cold Water Valves must be selected for the Fill Temperature to work and the Low Temperature Alarm to be active. "25" is the default number that must be entered when not using a Wash Temperature Probe)	25			
2 **Low Temp Alarm** (active during Fill & Wash, the System Setting for the Wash Probe has a Delay Timer to set when it will be active. Set for temperature you want it to alarm too. Temperatures below this will make the Diverter 1 automatically switch it to the Drain if on. Alarm will not be active if only one water valve is selected)	0			
3 **Vacuum Pump Run** (use this also for maximum time for the Cycle to determine the rest of the timers settings)	300			
4 **Delay Diverter Valve 1 Recirculation** (this timer setting keeps diverter 1 power off so it sends wash water to drain)	0			
5 **Diverter Valve 1 Recirculation Time** (returns the Wash water back to the Wash Vat after the Delay timer setting)	0			
6 **Air Injector Run** (Timers in the Device System Settings set the On /Off times. This Cycle Run Time normally is normally set for shorter time than the Vacuum Pump Timer)	260			
7 **Delay Diverter Valve 2 Activation** (this timer keeps diverter 2 power off so it sends wash water to drain)	0			
8 **Diverter Valve 2 Activation Time** (or send to Holding Tank to use water elsewhere after the Delay timer setting)	0			
9 **Drain Valve Close** (closed on fill and the time after Fill Switch, normally set shorter time than Vacuum Pump Timer)	240			
10 **Add Cold W** (add more cold water after fill level switch starts, works the Wash Temp Probe if installed)	0			
11 **Add Hot W** (add more hot water after fill level switch starts, works with the Wash Temp Probe if installed)	0			
12 **Auxiliary Fill Timer** (You can make this a 5th Chemical or another water source or run yet another device during the Fill process.	0			
13 **Delay Auxiliary Timer** (When the Fill Level switch activates, this time will delay the Auxiliary Output from turning on the Auxiliary Run Timer)	0			
14 **Auxiliary Run Timer** After the Fill Level switch activates and the Delay Auxiliary Timer has expired, this time will turn on the Auxiliary Output. The times set in Device settings for Auxiliary On and Auxiliary Off will switch the output On and Off as long as the Auxiliary Run Timer is running. Can be used for a 2nd Air Injector. If the On/Off Timers in the Device Settings are 0,the output will stay On solid for the set amount of time	0			
15 **End of Cycle** (timer for Air Blow Off or Milk Pump or Draining time before next cycle after the last Timer expires in the cycle which should be the Vacuum Pump)	5			

Note* If using a Wash Temperature Probe and are not using Formula #3, we recommend setting that Cycle up to work incase of a Temperature Probe Failure. See below on the Settings

Select the main Formula 1 and save it as Formula 3. Then go in Formula 3 and select the Water Valves for the Cycle for the ones you want Hot, Cold or Blended Warm Water for each Cycle, set all the Wash Fill Temps to "25"and the Low Temp Alarms to "0".

Wash Build Formula Settings/Timers **Cycle 2 Wash 1**	DEFAULT Settings	Formula # 1 Settings	Formula # 2 Settings	Formula # 3 Settings
1 **Wash Fill Temp** (what you want water temperature to fill at. Both Hot/Cold Water Valves must be selected for the Fill Temperature to work and the Low Temperature Alarm to be active. "25" is the default number that must be entered when not using a Wash Temperature Probe)	25			
2 **Low Temp Alarm** (active during Fill & Wash, the System Setting for the Wash Probe has a Delay Timer to set when it will be active. Set for temperature you want it to alarm too. Temperatures below this will make the Diverter 1 automatically switch it to the Drain if on. Alarm will not be active if only one water valve is selected)	0			
3 **Vacuum Pump Run** (use this also for maximum time for the Cycle to determine the rest of the timers settings)	600			
4 **Delay Diverter Valve 1 Recirculation** (this timer setting keeps diverter 1 power off so it sends wash water to drain)	120			
5 **Diverter Valve 1 Recirculation Time** (returns the Wash water back to the Wash Vat after the Delay timer setting)	360			
6 **Air Injector Run** (Timers in the Device System Settings set the On /Off times. This Cycle Run Time normally is normally set for shorter time than the Vacuum Pump Timer)	540			
7 **Delay Diverter Valve 2 Activation** (this timer keeps diverter 2 power off so it sends wash water to drain)	0			
8 **Diverter Valve 2 Activation Time** (or send to Holding Tank to use water elsewhere after the Delay timer setting)	0			
9 **Drain Valve Close** (closed on fill and the time after Fill Switch, normally set shorter time than Vacuum Pump Timer)	480			
10 **Add Cold W** (add more cold water after fill level switch starts, works the Wash Temp Probe if installed)	0			
11 **Add Hot W** (add more hot water after fill level switch starts, works with the Wash Temp Probe if installed)	0			
12 **Wash 1 Chemical on Fill** (during water filling in Wash Sink/Vat before fill level switch starts the cycle)	60			
13 **Delay Add Wash 1 Chemical** (after fill level switch starts the time to delay adding in more chemical)	0			
14 **Add More Wash 1 Chemical** (timer for adding more chemical after Delay Add Chemical timer has expired)	0			
15 **Acid Chemical on Fill** (during water filling in Wash Sink/Vat before fill level switch starts the cycle) Will disappear the Wash 1 & Sanitize Timers if used and disappear if they have time entered	0			
16 **Sanitizer Chemical on Fill** (during water filling in Wash Sink/Vat before fill level switch starts the cycle)	0			
17 **Delay Add Sanitizer Chemical** (after fill level switch starts the time to delay adding in more chemical)	0			
18 **Add Sanitizer Chemical** (timer for adding more chemical after Delay Add Chemical timer has expired)	0			
19 **Auxiliary Fill Timer** (You can make this a 5th Chemical or another water source or run yet another device during the Fill process.	0			
20 **Delay Auxiliary Timer** (When the Fill Level switch activates, this time will delay the Auxiliary Output from turning on the Auxiliary Run Timer)	0			
21 **Auxiliary Run Timer** After the Fill Level switch activates and the Delay Auxiliary Timer has expired, this time will turn on the Auxiliary Output. The times set in Device settings for Auxiliary On and Auxiliary Off will switch the output On and Off as long as the Auxiliary Run Timer is running. Can be used for a 2nd Air Injector. If the On/Off Timers in the Device Settings are 0,the output will stay On solid for the set amount of time	0			
22 **End of Cycle** (timer for Air Blow Off or Milk Pump or Draining time before next cycle after the last Timer expires in the cycle which should be the Vacuum Pump)	5			

Wash Build Formula Settings/Timers Cycle 3 Wash 2	DEFAULT Settings	Formula # 1 Settings	Formula # 2 Settings	Formula # 3 Settings
1 **Wash Fill Temp** (what you want water temperature to fill at. Both Hot/Cold Water Valves must be selected for the Fill Temperature to work and the Low Temperature Alarm to be active. "25" is the default number that must be entered when not using a Wash Temperature Probe)	**25**			
2 **Low Temp Alarm** (active during Fill & Wash, the System Setting for the Wash Probe has a Delay Timer to set when it will be active. Set for temperature you want it to alarm too. Temperatures below this will make the Diverter 1 automatically switch it to the Drain if on. Alarm will not be active if only one water valve is selected)	**0**			
3 **Vacuum Pump Run** (use this also for maximum time for the Cycle to determine the rest of the timers settings)	**600**			
4 **Delay Diverter Valve 1 Recirculation** (this timer setting keeps diverter 1 power off so it sends wash water to drain)	**120**			
5 **Diverter Valve 1 Recirculation Time** (returns the Wash water back to the Wash Vat after the Delay timer setting)	**360**			
6 **Air Injector Run** (Timers in the Device System Settings set the On /Off times. This Cycle Run Time normally is normally set for shorter time than the Vacuum Pump Timer)	**540**			
7 **Delay Diverter Valve 2 Activation** (this timer keeps diverter 2 power off so it sends wash water to drain)	**0**			
8 **Diverter Valve 2 Activation Time** (or send to Holding Tank to use water elsewhere after the Delay timer setting)	**0**			
9 **Drain Valve Close** (closed on fill and the time after Fill Switch, normally set shorter time than Vacuum Pump Timer)	**480**			
10 **Add Cold W** (add more cold water after fill level switch starts, works the Wash Temp Probe if installed)	**0**			
11 **Add Hot W** (add more hot water after fill level switch starts, works with the Wash Temp Probe if installed)	**0**			
12 **Wash 2 Chemical on Fill** (during water filling in Wash Sink/Vat before fill level switch starts the cycle)	**60**			
13 **Delay Add Wash 2 Chemical** (after fill level switch starts the time to delay adding in more chemical)	**0**			
14 **Add More Wash 2 Chemical** (timer for adding more chemical after Delay Add Chemical timer has expired)	**0**			
15 **Acid Chemical on Fill** (during water filling in Wash Sink/Vat before fill level switch starts the cycle) Will disappear the Wash 1 & Sanitize Timers if used and disappear if they have time entered	**0**			
16 **Sanitizer Chemical on Fill** (during water filling in Wash Sink/Vat before fill level switch starts the cycle)	**0**			
17 **Delay Add Sanitizer Chemical** (after fill level switch starts the time to delay adding in more chemical)	**0**			
18 **Add Sanitizer Chemical** (timer for adding more chemical after Delay Add Chemical timer has expired)	**0**			
19 **Auxiliary Fill Timer** (You can make this a 5th Chemical or another water source or run yet another device during the Fill process.	**0**			
20 **Delay Auxiliary Timer** (When the Fill Level switch activates, this time will delay the Auxiliary Output from turning on the Auxiliary Run Timer)	**0**			
21 **Auxiliary Run Timer** After the Fill Level switch activates and the Delay Auxiliary Timer has expired, this time will turn on the Auxiliary Output. The times set in Device settings for Auxiliary On and Auxiliary Off will switch the output On and Off as long as the Auxiliary Run Timer is running. Can be used for a 2nd Air Injector. If the On/Off Timers in the Device Settings are 0,the output will stay On solid for the set amount of time	**0**			
22 **End of Cycle** (timer for Air Blow Off or Milk Pump or Draining time before next cycle after the last Timer expires in the cycle which should be the Vacuum Pump)	**5**			

Wash Build Formula Settings/Timers Cycle 4 Rinse 2	DEFAULT Settings	Formula # 1 Settings	Formula # 2 Settings	Formula # 3 Settings
1 **Wash Fill Temp** (what you want water temperature to fill at. Both Hot/Cold Water Valves must be selected for the Fill Temperature to work and the Low Temperature Alarm to be active. "25" is the default number that must be entered when not using a Wash Temperature Probe)	**25**			
2 **Low Temp Alarm** (active during Fill & Wash, the System Setting for the Wash Probe has a Delay Timer to set when it will be active. Set for temperature you want it to alarm too. Temperatures below this will make the Diverter 1 automatically switch it to the Drain if on. Alarm will not be active if only one water valve is selected)	**0**			
3 **Vacuum Pump Run** (use this also for maximum time for the Cycle to determine the rest of the timers settings)	**300**			
4 **Delay Diverter Valve 1 Recirculation** (this timer setting keeps diverter 1 power off so it sends wash water to drain)	**0**			
5 **Diverter Valve 1 Recirculation Time** (returns the Wash water back to the Wash Vat after the Delay timer setting)	**0**			
6 **Air Injector Run** (Timers in the Device System Settings set the On /Off times. This Cycle Run Time normally is normally set for shorter time than the Vacuum Pump Timer)	**260**			
7 **Delay Diverter Valve 2 Activation** (this timer keeps diverter 2 power off so it sends wash water to drain)	**0**			
8 **Diverter Valve 2 Activation Time** (or send to Holding Tank to use water elsewhere after the Delay timer setting)	**0**			
9 **Drain Valve Close** (closed on fill and the time after Fill Switch, normally set shorter time than Vacuum Pump Timer)	**240**			
10 **Add Cold W** (add more cold water after fill level switch starts, works the Wash Temp Probe if installed)	**0**			
11 **Add Hot W** (add more hot water after fill level switch starts, works with the Wash Temp Probe if installed)	**0**			
12 **Auxiliary Fill Timer** (You can make this a 5th Chemical or another water source or run yet another device during the Fill process.	**0**			
13 **Delay Auxiliary Timer** (When the Fill Level switch activates, this time will delay the Auxiliary Output from turning on the Auxiliary Run Timer)	**0**			
14 **Auxiliary Run Timer** After the Fill Level switch activates and the Delay Auxiliary Timer has expired, this time will turn on the Auxiliary Output. The times set in Device settings for Auxiliary On and Auxiliary Off will switch the output On and Off as long as the Auxiliary Run Timer is running. Can be used for a 2nd Air Injector. If the On/Off Timers in the Device Settings are 0,the output will stay On solid for the set amount of time	**0**			
15 **End of Cycle** (timer for Air Blow Off or Milk Pump or Draining time before next cycle after the last Timer expires in the cycle which should be the Vacuum Pump)	**5**			

Wash Build Formula Settings/Timers **Cycle 5 Acid**	DEFAULT Settings	Formula # 1 Settings	Formula # 2 Settings	Formula # 3 Settings
1 **Wash Fill Temp** (what you want water temperature to fill at. Both Hot/Cold Water Valves must be selected for the Fill Temperature to work and the Low Temperature Alarm to be active. "25" is the default number that must be entered when not using a Wash Temperature Probe)	25			
2 **Low Temp Alarm** (active during Fill & Wash, the System Setting for the Wash Probe has a Delay Timer to set when it will be active. Set for temperature you want it to alarm too. Temperatures below this will make the Diverter 1 automatically switch it to the Drain if on. Alarm will not be active if only one water valve is selected)	0			
3 **Vacuum Pump Run** (use this also for maximum time for the Cycle to determine the rest of the timers settings)	600			
4 **Delay Diverter Valve 1 Recirculation** (this timer setting keeps diverter 1 power off so it sends wash water to drain)	120			
5 **Diverter Valve 1 Recirculation Time** (returns the Wash water back to the Wash Vat after the Delay timer setting)	360			
6 **Air Injector Run** (Timers in the Device System Settings set the On /Off times. This Cycle Run Time normally is normally set for shorter time than the Vacuum Pump Timer)	540			
7 **Delay Diverter Valve 2 Activation** (this timer keeps diverter 2 power off so it sends wash water to drain)	0			
8 **Diverter Valve 2 Activation Time** (or send to Holding Tank to use water elsewhere after the Delay timer setting)	0			
9 **Drain Valve Close** (closed on fill and the time after Fill Switch, normally set shorter time than Vacuum Pump Timer)	480			
10 **Add Cold W** (add more cold water after fill level switch starts, works the Wash Temp Probe if installed)	0			
11 **Add Hot W** (add more hot water after fill level switch starts, works with the Wash Temp Probe if installed)	0			
12 **Acid Chemical on Fill** (during water filling in Wash Sink/Vat before fill level switch starts the cycle)	60			
13 **Delay Add Acid Chemical** (after fill level switch starts the time to delay adding in more chemical)	0			
14 **Add More Acid Chemical** (timer for adding more chemical after Delay Add Chemical timer has expired)	0			
15 **Auxiliary Fill Timer** (You can make this a 5th Chemical or another water source or run yet another device during the Fill process.	0			
16 **Delay Auxiliary Timer** (When the Fill Level switch activates, this time will delay the Auxiliary Output from turning on the Auxiliary Run Timer)	0			
17 **Auxiliary Run Timer** After the Fill Level switch activates and the Delay Auxiliary Timer has expired, this time will turn on the Auxiliary Output. The times set in Device settings for Auxiliary On and Auxiliary Off will switch the output On and Off as long as the Auxiliary Run Timer is running. Can be used for a 2nd Air Injector. If the On/Off Timers in the Device Settings are 0,the output will stay On solid for the set amount of time	0			
18 **End of Cycle** (timer for Air Blow Off or Milk Pump or Draining time before next cycle after the last Timer expires in the cycle which should be the Vacuum Pump)	5			

Wash Build Formula Settings/Timers Cycle 6 Rinse 3	DEFAULT Settings	Formula # 1 Settings	Formula # 2 Settings	Formula # 3 Settings
1 **Wash Fill Temp** (what you want water temperature to fill at. Both Hot/Cold Water Valves must be selected for the Fill Temperature to work and the Low Temperature Alarm to be active. "25" is the default number that must be entered when not using a Wash Temperature Probe)	25			
2 **Low Temp Alarm** (active during Fill & Wash, the System Setting for the Wash Probe has a Delay Timer to set when it will be active. Set for temperature you want it to alarm too. Temperatures below this will make the Diverter 1 automatically switch it to the Drain if on. Alarm will not be active if only one water valve is selected)	0			
3 **Vacuum Pump Run** (use this also for maximum time for the Cycle to determine the rest of the timers settings)	300			
4 **Delay Diverter Valve 1 Recirculation** (this timer setting keeps diverter 1 power off so it sends wash water to drain)	0			
5 **Diverter Valve 1 Recirculation Time** (returns the Wash water back to the Wash Vat after the Delay timer setting)	0			
6 **Air Injector Run** (Timers in the Device System Settings set the On /Off times. This Cycle Run Time normally is normally set for shorter time than the Vacuum Pump Timer)	260			
7 **Delay Diverter Valve 2 Activation** (this timer keeps diverter 2 power off so it sends wash water to drain)	0			
8 **Diverter Valve 2 Activation Time** (or send to Holding Tank to use water elsewhere after the Delay timer setting)	0			
9 **Drain Valve Close** (closed on fill and the time after Fill Switch, normally set shorter time than Vacuum Pump Timer)	240			
10 **Add Cold W** (add more cold water after fill level switch starts, works the Wash Temp Probe if installed)	0			
11 **Add Hot W** (add more hot water after fill level switch starts, works with the Wash Temp Probe if installed)	0			
12 **Auxiliary Fill Timer** (You can make this a 5th Chemical or another water source or run yet another device during the Fill process.	0			
13 **Delay Auxiliary Timer** (When the Fill Level switch activates, this time will delay the Auxiliary Output from turning on the Auxiliary Run Timer)	0			
14 **Auxiliary Run Timer** After the Fill Level switch activates and the Delay Auxiliary Timer has expired, this time will turn on the Auxiliary Output. The times set in Device settings for Auxiliary On and Auxiliary Off will switch the output On and Off as long as the Auxiliary Run Timer is running. Can be used for a 2nd Air Injector. If the On/Off Timers in the Device Settings are 0,the output will stay On solid for the set amount of time	0			
15 **End of Cycle** (timer for Air Blow Off or Milk Pump or Draining time before next cycle after the last Timer expires in the cycle which should be the Vacuum Pump)	5			

Automatic Pipeline Washer *Rev 2.25*

Wash Build Formula Settings/Timers Cycle 5 Sanitize	DEFAULT Settings	Formula # 1 Settings	Formula # 2 Settings	Formula # 3 Settings
1 **Wash Fill Temp** (what you want water temperature to fill at. Both Hot/Cold Water Valves must be selected for the Fill Temperature to work and the Low Temperature Alarm to be active. "25" is the default number that must be entered when not using a Wash Temperature Probe)	25			
2 **Low Temp Alarm** (active during Fill & Wash, the System Setting for the Wash Probe has a Delay Timer to set when it will be active. Set for temperature you want it to alarm too. Temperatures below this will make the Diverter 1 automatically switch it to the Drain if on. Alarm will not be active if only one water valve is selected)	0			
3 **Vacuum Pump Run** (use this also for maximum time for the Cycle to determine the rest of the timers settings)	600			
4 **Delay Diverter Valve 1 Recirculation** (this timer setting keeps diverter 1 power off so it sends wash water to drain)	120			
5 **Diverter Valve 1 Recirculation Time** (returns the Wash water back to the Wash Vat after the Delay timer setting)	360			
6 **Air Injector Run** (Timers in the Device System Settings set the On /Off times. This Cycle Run Time normally is normally set for shorter time than the Vacuum Pump Timer)	540			
7 **Delay Diverter Valve 2 Activation** (this timer keeps diverter 2 power off so it sends wash water to drain)	0			
8 **Diverter Valve 2 Activation Time** (or send to Holding Tank to use water elsewhere after the Delay timer setting)	0			
9 **Drain Valve Close** (closed on fill and the time after Fill Switch, normally set shorter time than Vacuum Pump Timer)	480			
10 **Add Cold W** (add more cold water after fill level switch starts, works the Wash Temp Probe if installed)	0			
11 **Add Hot W** (add more hot water after fill level switch starts, works with the Wash Temp Probe if installed)	0			
12 **Sanitize Chemical on Fill** (during water filling in Wash Sink/Vat before fill level switch starts the cycle)	60			
13 **Delay Add Sanitize Chemical** (after fill level switch starts the time to delay adding in more chemical)	0			
14 **Add More Sanitize Chemical** (timer for adding more chemical after Delay Add Chemical timer has expired)	0			
15 **Auxiliary Fill Timer** (You can make this a 5th Chemical or another water source or run yet another device during the Fill process.	0			
16 **Delay Auxiliary Timer** (When the Fill Level switch activates, this time will delay the Auxiliary Output from turning on the Auxiliary Run Timer)	0			
17 **Auxiliary Run Timer** After the Fill Level switch activates and the Delay Auxiliary Timer has expired, this time will turn on the Auxiliary Output. The times set in Device settings for Auxiliary On and Auxiliary Off will switch the output On and Off as long as the Auxiliary Run Timer is running. Can be used for a 2nd Air Injector. If the On/Off Timers in the Device Settings are 0,the output will stay On solid for the set amount of time	0			
18 **End of Cycle** (timer for Air Blow Off or Milk Pump or Draining time before next cycle after the last Timer expires in the cycle which should be the Vacuum Pump)	5			

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