



# HMI Operator's Manual

## 2K System

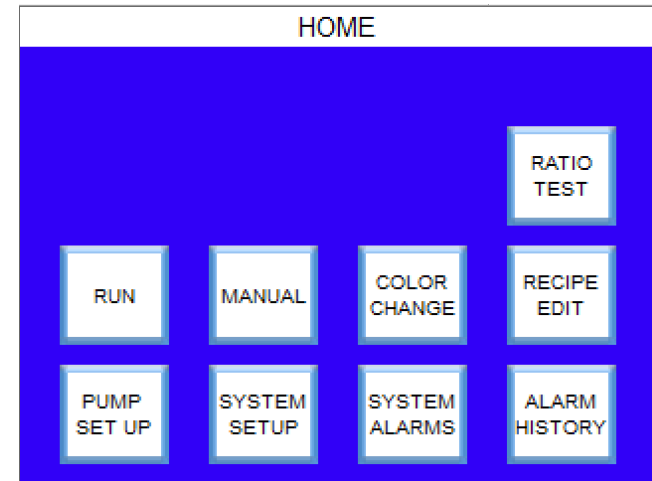
11/5/2018

AUTOQUIP INC

## HMI Operator's Manual 2K System

### HOME:

- RUN: Display live/current data about pump system. (MAIN)
- MANUAL: Manual operation of pumps and valves. (MANUAL CONTROL COLOR/CAT STACKS)
- COLOR CHANGE: Edit color change sequences. (COLOR CHANGE EDIT MAIN)
- RECIPE EDIT: Edit stored recipe information. (RECIPE EDIT)
- PUMP SETUP: Calibrate pump settings and pressure transducers. (PUMP SETUP MAIN)
- SYSTEM SETUP: Global system settings. (SYSTEM SETUP)
- SYSTEM ALARMS: Displays current status of alarm conditions. (SYSTEM ALARMS)
- ALARM HISTORY: Displays list of previous alarm events.
- RATIO TEST: Perform A/B ratio test (RATIO TEST)



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### MAIN:

- DESIRED RATIO: Displays current ratio setting from recipe.
- CURRENT RATIO: Displays actual ratio while triggered.
- DESIRED FLOW: Displays set total flow rate from other PLC or Robot.
- CURRENT FLOW: Displays actual total flow rate while triggered.
- DESIRED RECIPE: Displays selected recipe for next color change.
- CURRENT RECIPE: Displays currently loaded recipe.
- CURRENT VALVE: Indicates currently selected color valve for A pump.
- CURRENT CAT: Indicates currently selected catalyst valve for B pump.
- HOME: Displays Home screen.
- PREV SCREEN: Displays previous run screen.
- NEXT SCREEN: Displays next run screen.
- ALARM SILENCE: Silence active alarm horn for 5 minutes.
- TRIGGER ON: Indicates current trigger state.
- COLOR CHANGE ACTIVE: Indicates a color change is active & what color change step is currently active.

MAIN

DESIRED RATIO	12.34 : 1	DESIRED FLOW	12345	DESIRED RECIPE	-12
CURRENT RATIO	12.34 : 1	CURRENT FLOW	-12345	CURRENT RECIPE	-12
		CURRENT VALVE:	-12345	CURRENT CAT:	-12345
HOME					
PREV SCREEN	NEXT SCREEN	ALARM SILENCE	TRIGGER ON	COLOR CHANGE ACTIVE	

## HMI Operator's Manual 2K System

### RUN:

- TOTAL:
  - SET: Desired total flow rate.
  - ACTUAL: Actual total flow rate.
- PUMP A/B:
  - INPUT PSI: Current input pressure reading.
  - OUTPUT PSI: Current output pressure reading.
  - SET: Desired pump flow rate.
  - ACTUAL: Actual pump flow rate
- HOME: Displays Home screen.
- PREV SCREEN: Displays previous run screen.
- NEXT SCREEN: Displays next run screen.

RUN

T O T A L	SET		
	12345		
P U M P A	INPUT PSI	SET	
	-123	-123	
P U M B	OUTPUT PSI	ACTUAL	
	-123	123	
P U M P	INPUT PSI	SET	
	-123	-123	
P U M B	OUTPUT PSI	ACTUAL	
	-123	123	

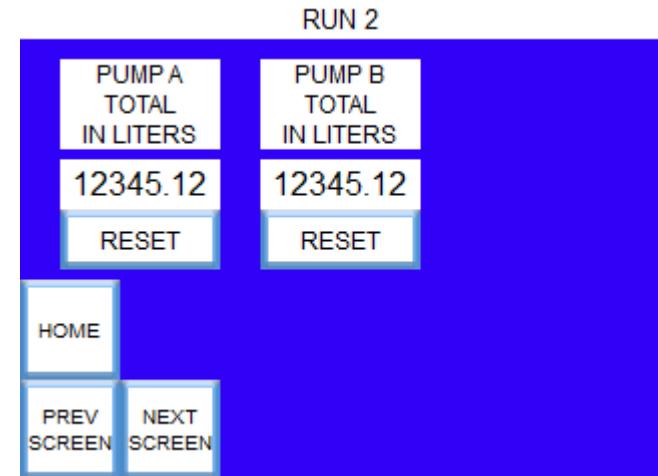
  

HOME	
PREV SCREEN	NEXT SCREEN

## HMI Operator's Manual 2K System

### RUN 2:

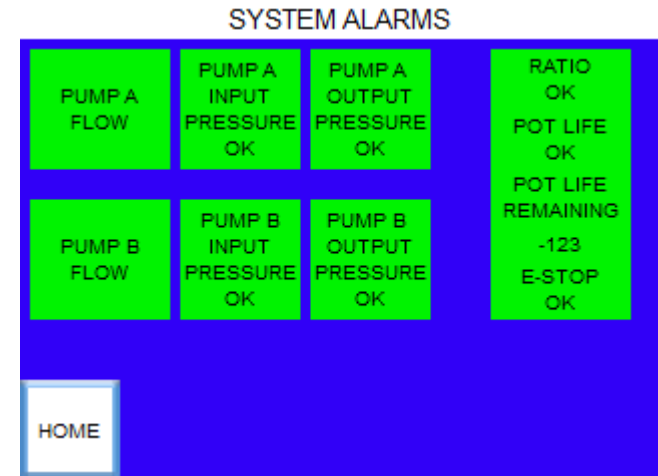
- PUMP A/B TOTAL IN LITERS: Displays current totals dispensed for each pump since last reset, in liters.
- RESET: Clears current pump totals to zero.
- HOME: Displays Home screen.
- PREV SCREEN: Displays previous run screen.
- NEXT SCREEN: Displays next run screen.



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### SYSTEM ALARMS:

- Displays current state of fault alarms. Alarm explanations at end of manual.
- PUMP A FLOW: Pump A flow rate out of tolerance.
- PUMP B FLOW: Pump B no flow detected.
- PUMP A INPUT PRESSURE: Pump A low input pressure.
- PUMP A OUTPUT PRESSURE: Pump A high output pressure.
- PUMP B INPUT PRESSURE: Pump B low input pressure.
- PUMP B OUTPUT PRESSURE: Pump B high output pressure.
- RATIO: Ratio outside of tolerance.
- POT LIFE: Pot life expired.
- POT LIFE REMAINING: Displays pot life remaining in minutes.
- E-STOP: System stop enabled.
- HOME: Displays Home screen.

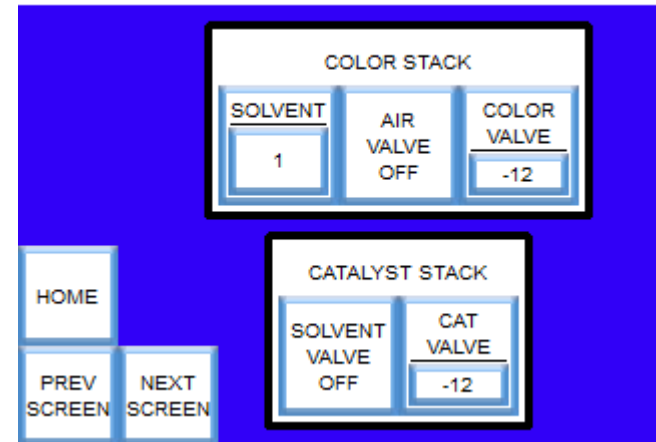


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### MANUAL CONTROL COLOR/CAT STACKS:

- These controls only work if the system is in Manual Mode.
- COLOR STACK:
  - COLOR VALVE: Enter the number of the corresponding color valve to enable. Only one color valve can be opened. Zero closes all color valves on the stack.
  - AIR VALVE: Toggles air valve on/off.
  - SOLVENT: Enables selected solvent valve. (o = OFF).
- CATALYST STACK:
  - SOLVENT VALVE: Toggles solvent valve on/off.
  - CAT VALVE: Enter the number of the corresponding catalyst valve to enable. Only one cat valve can be opened. Zero closes all cat valves on the stack.
- HOME: Displays Home screen.
- PREV SCREEN: Displays the previous Manual screen.
- NEXT SCREEN: Displays the next Manual screen.

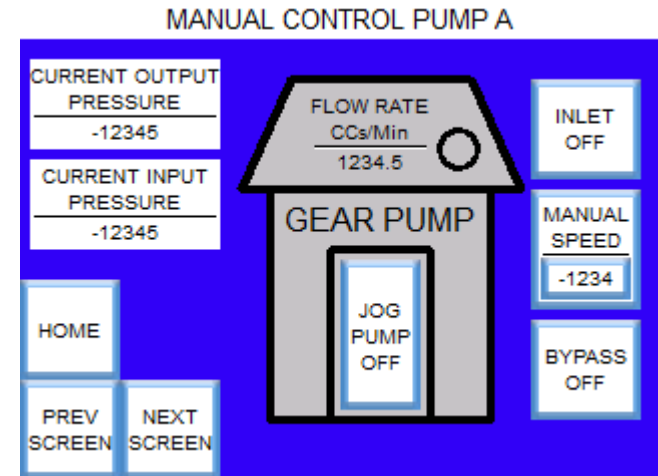
MANUAL CONTROL COLOR/CAT STACKS



## HMI Operator's Manual 2K System

### MANUAL CONTROL PUMP A:

- These controls only work if the system is in Manual Mode.
- **CURRENT OUTPUT PRESSURE:** Displays current output pressure.
- **CURRENT INPUT PRESSURE:** Displays current input pressure.
- **INLET:** Toggles inlet valve on/off.
- **MANUAL SPEED:** Speed in Hertz to run pump when Jog is pressed. (Nominally 1500 for gear pumps)
- **BYPASS:** Toggles bypass valve on/off.
- **JOG PUMP:** Runs pump forward at selected speed.
- **HOME:** Displays Home screen.
- **PREV SCREEN:** Displays the previous Manual screen.
- **NEXT SCREEN:** Displays the next Manual screen.

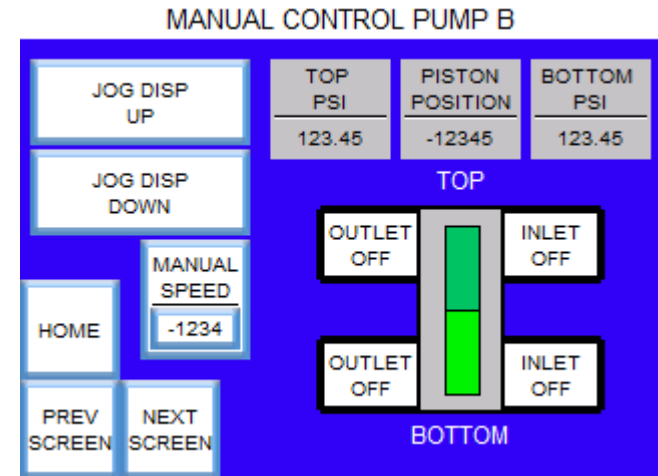




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### MANUAL CONTROL PUMP B:

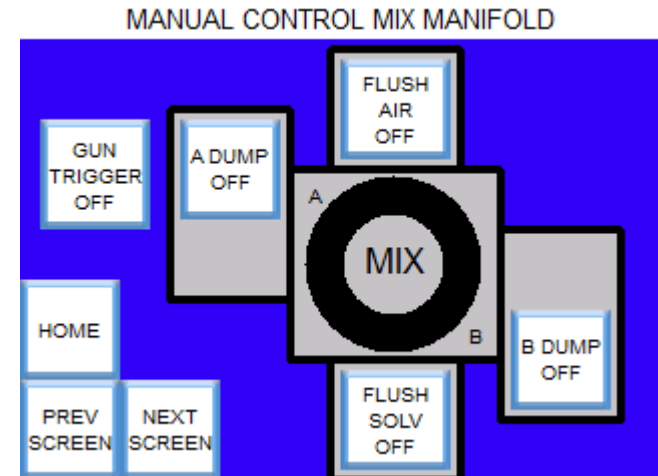
- These controls only work if the system is in Manual Mode.
- JOG DISP UP: Jogs pump up.
- JOG DISP DOWN: Jogs pump down.
- MANUAL SPEED: Speed in Hertz to run pump when Jog is pressed. (Nominally 8,000 for piston pumps)
- TOP/BOTTOM PSI: Displays the pressure at the top and bottom pressure transducers.
- PISTON POSITION: Displays current position of piston based on feedback from potentiometer.
- The layout of the inlet/outlet buttons on the screen reflect the location of the valves on the pump, when viewed from the front.
- INLET/OUTLET: Toggles inlet/outlet valve on/off.
- HOME: Displays Home screen.
- PREV SCREEN: Displays the previous Manual screen.
- NEXT SCREEN: Displays the next Manual screen.



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### MANUAL CONTROL MIX MANIFOLD:

- These controls only work if the system is in Manual Mode.
- GUN TRIGGER: Toggles the Gun Trigger Solenoid on/off.
- A/B DUMP: Toggles the a/b dump valves on/off.
- FLUSH AIR/SOLV: Toggles the air/solvent valves on/off.
- HOME: Displays Home screen.
- PREV SCREEN: Displays the previous Manual screen.
- NEXT SCREEN: Displays the next Manual screen.



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### PUMP SETUP MAIN:

- PUMP A/B TYPE: Select the type of pump installed.
  - 0 = NOT USED
  - 1 = 1.5 GEAR PUMP
  - 2 = 3.0 GEAR PUMP
  - 3 = 4.5 GEAR PUMP
  - 4 = 35 DISPENSER
  - 5 = 70 DISPENSER
- A/B PARAMETER: Displays pump A/B parameter screen.
- A/B CALIBRATE: Displays pump A/B calibrate screen.
- A/B PRESSURE 1 / 2: Displays pump A/B pressure transducer calibration screens. (1 = inlet/top, 2 = outlet/bottom)
- HOME: Displays Home screen.

PUMP SETUP MAIN

PUMP A TYPE	A PARAMETER	A PRESSURE 1
0 = NOT USED	A CALIBRATE	A PRESSURE 2
PUMP B TYPE	B PARAMETER	B PRESSURE 1
0 = NOT USED	B CALIBRATE	B PRESSURE 2
HOME		

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### PUMP A/B PARAMETERS EDIT:

- **OUTLET PRESSURE HIGH LIMIT:** High outlet pressure limit for fault condition.
- **INLET PRESSURE LOW LIMIT:** Low inlet pressure limit for fault condition.
- **PUMP STEPS PER REV:** Number of steps/pulses to complete one revolution of the stepper motor.
- **PUMP CCs PER REV:** Number of CC's dispensed for one complete revolution of the pump. (Pump B has up and down values)
- **PUMP/RATIO TOLERANCE:** Allowable deviation from setpoint before fault condition. (.1 = 10%)
- **SETUP:** Displays Setup Main screen.
- **PREV SETUP:** Display previous setup screen.
- **NEXT SETUP:** Display next setup screen.

### PUMP B PARAMETERS EDIT

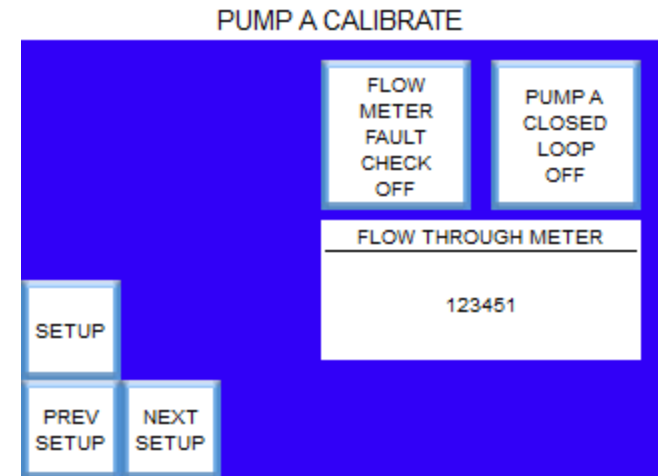
The screenshot shows a blue HMI screen titled "PUMP B PARAMETERS EDIT". It features several data entry fields and navigation buttons. The fields are arranged in a grid: "OUTLET PRESSURE HIGH LIMIT" with a value of -123, "PUMP CCs PER REV UP" with a value of 1.2345, "INLET PRESSURE LOW LIMIT" with a value of -123, "PUMP CCs PER REV DOWN" with a value of 1.2345, "PUMP STEPS PER REV" with a value of -1234, and "RATIO TOLERANCE" with a value of 1.23. On the left side, there are three buttons: "SETUP", "PREV SETUP", and "NEXT SETUP".

	OUTLET PRESSURE HIGH LIMIT -123	PUMP CCs PER REV UP 1.2345
	INLET PRESSURE LOW LIMIT -123	PUMP CCs PER REV DOWN 1.2345
SETUP	PUMP STEPS PER REV -1234	RATIO TOLERANCE 1.23
PREV SETUP		NEXT SETUP

## HMI Operator's Manual 2K System

### PUMP A CALIBRATE:

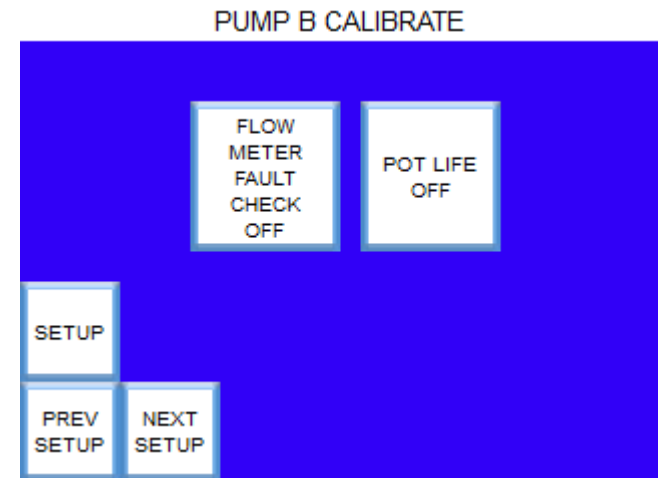
- FLOW METER FAULT CHECK: Toggles flow meter fault enables on/off.
- PUMP A CLOSED LOOP: Enables closed-loop function between pump and flow meter.
- FLOW THROUGH METER: Displays number of CCs detected by flow meter during the previous on-trigger, can be used for trouble-shooting/calibration.
- SETUP: Displays Setup Main screen.
- PREV SETUP: Display previous setup screen.
- NEXT SETUP: Display next setup screen.



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### PUMP B CALIBRATE:

- FLOW METER FAULT CHECK: Toggles flow sensor fault enables on/off.
- POTLIFE: Toggles pot-life fault checking on/off.
- SETUP: Displays Setup Main screen.
- PREV SETUP: Display previous setup screen.
- NEXT SETUP: Display next setup screen.



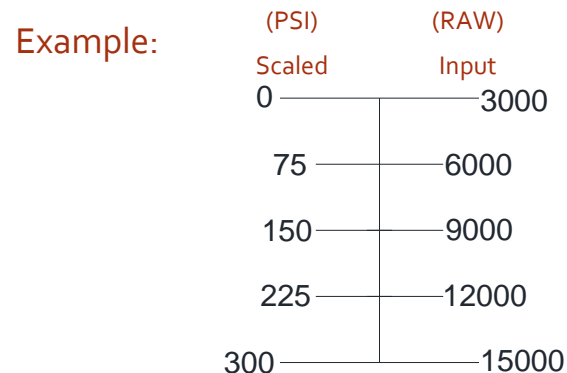
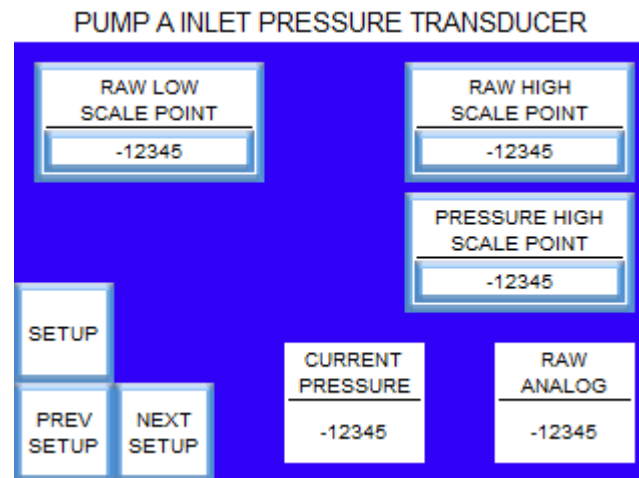
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### PUMP A/B PRESSURE TRANSDUCERS:

- RAW LOW SCALE POINT: Setting for raw input value when at zero psi.
- RAW HIGH SCALE POINT: Setting for raw input value when at PRESSURE HIGH SCALE POINT pressure.
- PRESSURE HIGH SCALE POINT: Current upper pressure used for scaling.
- CURRENT PRESSURE: Current input pressure value interpreted by scaling values entered.
- RAW ANALOG: Current raw input value from PT.
- SETUP: Displays Setup Main screen.
- PREV SETUP: Display previous setup screen.
- NEXT SETUP: Display next setup screen.



## HMI Operator's Manual 2K System

### RECIPE EDIT:

- RECIPE NUMBER: Recipe number to edit or view. (0 – 99)
- RECIPE RATIO: Ratio value for selected recipe. (0 – 100)
- FLOW METER: Flow meter calibration value to use for selected recipe. (0.000 – 1.000)
- POT LIFE: Pot life time of selected recipe.(0 – 400 minutes)
- RECIPE COLOR: Color valve used for selected recipe. (0 – 99)
- RECIPE CATALYST: Catalyst valve used for selected recipe. (0 – 99)
- CC SEQUENCE: Color change sequence to use for selected recipe. (0 – 4)
- ACCEPT EDIT: Accepts any changes made to the recipe.
- UPDATE RECIPE: Updates currently loaded recipe.
- HOME: Displays Home Screen.

RECIPE EDIT

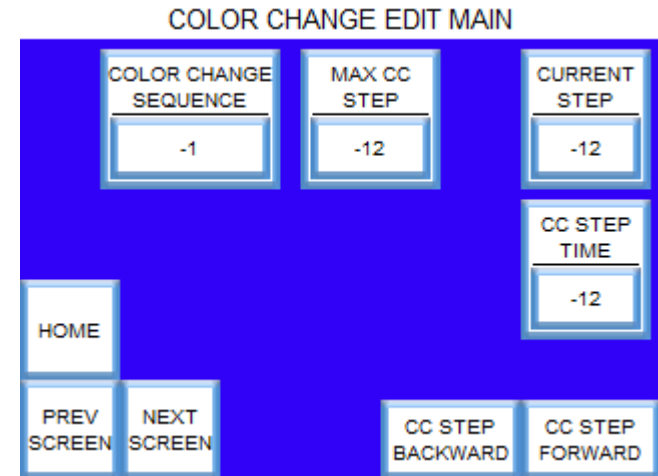
RECIPE NUMBER -12	FLOW METER 1.234	RECIPE COLOR -12	CC SEQUENCE -1
RECIPE RATIO 12.34	POT LIFE 123	RECIPE CATALYST -1	ACCEPT EDIT
HOME			UPDATE RECIPE



## HMI Operator's Manual 2K System

### COLOR CHANGE EDIT MAIN:

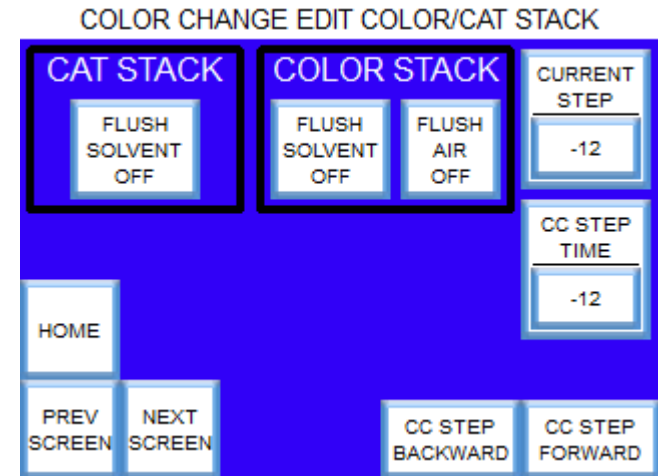
- COLOR CHANGE SEQUENCE:** Color change sequence to view/edit.
- MAX CC STEP:** Sets the max number of steps all sequences can run, not limited to selected sequence, also limits viewable steps. (Default = 50)
- CURRENT STEP:** Current step of selected sequence to view/edit.
- CC STEP TIME:** Time duration of selected step. (0 – 100 seconds)
- CC STEP BACKWARDS:** Saves current step configuration from all screens, steps back one step, then loads new step's configuration. (All step forward/backward buttons work like this)
- CC STEP FORWARD:** Saves current step configuration from all screens, steps forward one step, then loads new step's configuration. (All step forward/backward buttons work like this)
- HOME:** Displays Home screen.
- PREV SCREEN:** Go to previous CC screen.
- NEXT SCREEN:** Go to next CC screen.



## HMI Operator's Manual 2K System

### COLOR CHANGE EDIT COLOR/CAT STACK:

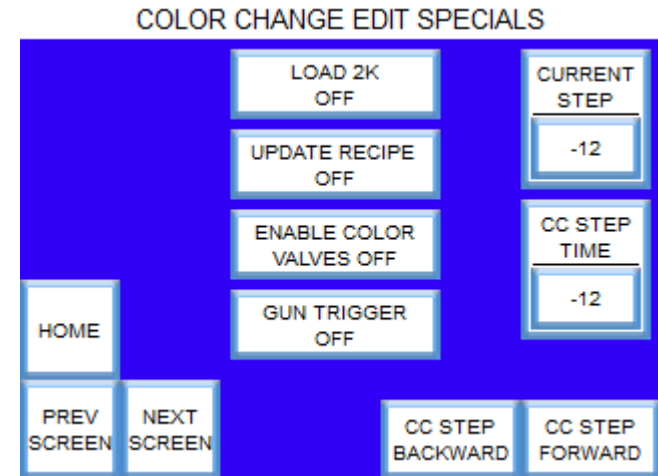
- **FLUSH SOLVENT:** Toggles stack solvent on/off during the currently selected step.
- **FLUSH AIR:** Toggles stack air on/off during the currently selected step.
- **CURRENT STEP:** Current step of selected sequence to view/edit.
- **CC STEP TIME:** Time duration of selected step. (0 – 100 seconds)
- **CC STEP BACKWARDS:** Steps back one step.
- **CC STEP FORWARD:** Steps forward one step.
- **HOME:** Displays Home screen.
- **PREV SCREEN:** Go to previous CC screen.
- **NEXT SCREEN:** Go to next CC screen.



## HMI Operator's Manual 2K System

### COLOR CHANGE EDIT SPECIALS:

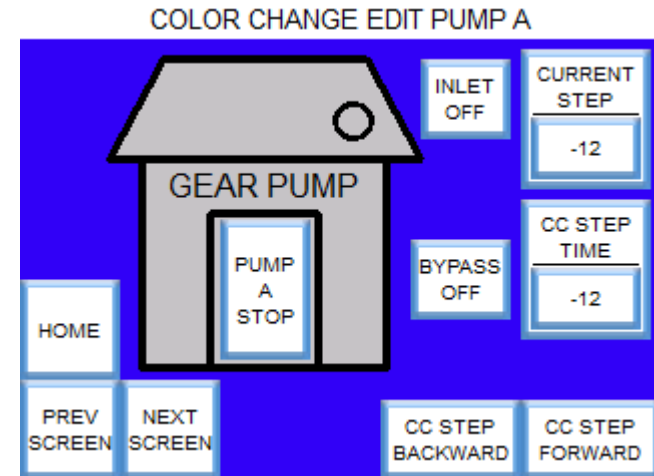
- LOAD 2K: Start loading the system with new recipe's selected color and catalyst at ratio, during the currently selected step.
- UPDATE RECIPE: Overwrites current recipe info with selected recipe info, during the currently selected step.
- ENABLE COLOR VALVES: Enables selected recipe's color and catalyst valves, during the currently selected step.
- GUN TRIGGER: Toggles gun trigger on/off during the currently selected step.
- CURRENT STEP: Current step of selected sequence to view/edit.
- CC STEP TIME: Time duration of selected step. (0 – 100 seconds)
- CC STEP BACKWARDS: Steps back one step.
- CC STEP FORWARD: Steps forward one step.
- HOME: Displays Home screen.
- PREV SCREEN: Go to previous CC screen.
- NEXT SCREEN: Go to next CC screen.



## HMI Operator's Manual 2K System

### COLOR CHANGE EDIT PUMP A:

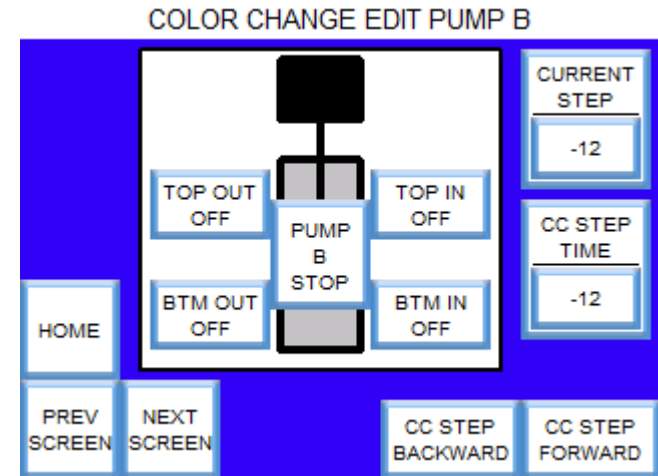
- INLET: Toggles the inlet valve on/off, during the currently selected step.
- BYPASS: Toggles the bypass valve on/off, during the currently selected step.
- PUMP A RUN/STOP: Runs the pump at Pump A CC Speed during step, speed set in System Settings.
- CURRENT STEP: Current step of selected sequence to view/edit.
- CC STEP TIME: Time duration of selected step. (0 – 100 seconds)
- CC STEP BACKWARDS: Steps back one step.
- CC STEP FORWARD: Steps forward one step.
- HOME: Displays Home screen.
- PREV SCREEN: Go to previous CC screen.
- NEXT SCREEN: Go to next CC screen.



## HMI Operator's Manual 2K System

### COLOR CHANGE EDIT PUMP B:

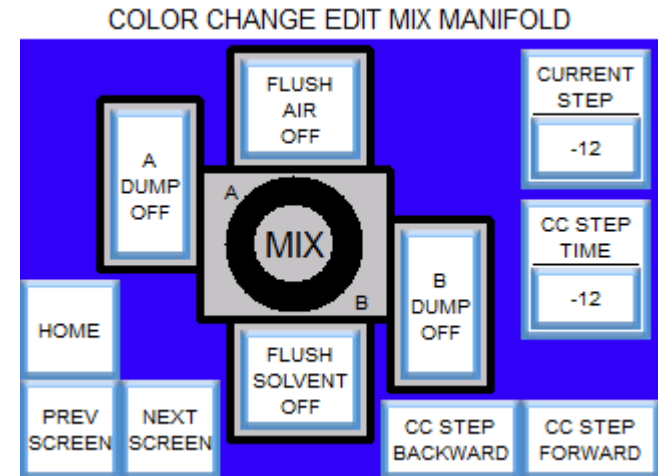
- TOP/BTM IN/OUT: Toggles valve on/off, during the currently selected step.
- PUMP B RUN/STOP: Runs the pump at Pump B CC Speed during step, speed set in System Settings.
- CURRENT STEP: Current step of selected sequence to view/edit.
- CC STEP TIME: Time duration of selected step. (0 – 100 seconds)
- CC STEP BACKWARDS: Steps back one step.
- CC STEP FORWARD: Steps forward one step.
- HOME: Displays Home screen.
- PREV SCREEN: Go to previous CC screen.
- NEXT SCREEN: Go to next CC screen.



## HMI Operator's Manual 2K System

### COLOR CHANGE EDIT MIX MANIFOLD:

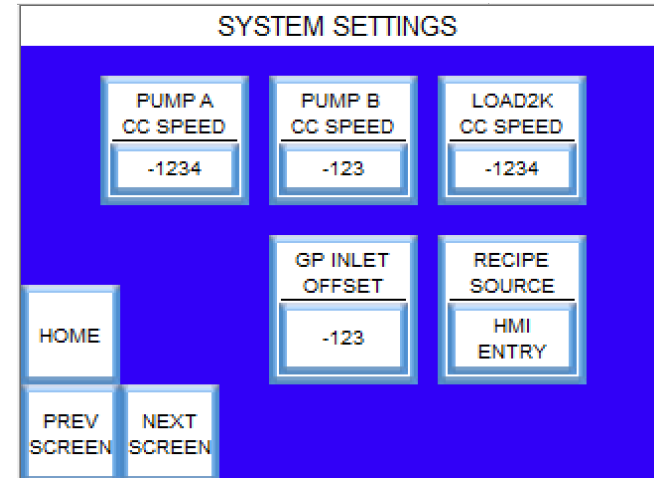
- A/B DUMP: Toggles A/B dump valve on/off, during the currently selected step.
- FLUSH AIR: Toggles mix manifold air on/off during the currently selected step.
- FLUSH SOLVENT: Toggles mix manifold solvent on/off during the currently selected step.
- CURRENT STEP: Current step of selected sequence to view/edit.
- CC STEP TIME: Time duration of selected step. (0 – 100 seconds)
- CC STEP BACKWARDS: Steps back one step.
- CC STEP FORWARD: Steps forward one step.
- HOME: Displays Home screen.
- PREV SCREEN: Go to previous CC screen.
- NEXT SCREEN: Go to next CC screen.



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### SYSTEM SETTINGS:

- PUMP A CC SPEED: Used during color change, sets speed to run the A pump in CCs/min.(0 – 1000)
- PUMP B CC SPEED: Used during color change, sets speed to run the B pump in CCs/min. (0 – 500)
- LOAD<sub>2</sub>K CC SPEED: Used during color change, sets total speed to run the pumps in CCs/min. (0 – 1000)
- GP INLET OFFSET: Sets the offset value for the fluid regulator. This value will be added to the output pressure detected by the pressure transducer on the outbound fluid side of the gear pump.
- RECIPE SOURCE: Sets the source for recipe selection. (HMI or PLC inputs)
- HOME: Displays Home screen.
- PREV SCREEN: Go to previous system screen.
- NEXT SCREEN: Go to next system screen.



## HMI Operator's Manual 2K System

### ANALOG IN SETUP:

- RAW ANALOG: Displays the current analog value from the PLC input.
- CURRENT FLOW: Current flow rate based on Analog In settings and current input.
- ANALOG IN LOW: Low-analog value that represents the minimum rate.
- ANALOG IN MIN RATE: Minimum rate at entered low-analog value.
- ANALOG IN HIGH: High-analog value that represents the maximum rate.
- ANALOG IN MAX RATE: Maximum rate at entered high-analog value.
- SETPOINT SOURCE: Sets the source for the setpoint flow rate. (Analog Input or Network Communication)
- HOME: Displays Home screen.
- PREV SCREEN: Go to previous system screen.
- NEXT SCREEN: Go to next system screen.

ANALOG IN SETUP

RAW ANALOG -12345	ANALOG IN LOW -12345	ANALOG IN HIGH -12345
CURRENT FLOW 12345	ANALOG IN MIN RATE -12345	ANALOG IN MAX RATE -12345
HOME	SETPOINT SOURCE	
PREV SCREEN	NEXT SCREEN	ANALOG INPUT



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### REGULATOR SETUP:

This screen can be used to troubleshoot or scale the analog signal from PLC to Electro Pneumatic Regulator.

- **CURRENT SET POINT:** Displays the current scaled value which is outputted as the pilot pressure in PSI to the fluid regulator.
- **PSI IN LOW SCALE:** This value is the base of the scale. It should remain set to "0"
- **PSI IN HIGH SCALE:** This value is the base top of the 0-100 scale. It should remain set to "100" unless a new or non 0-100 electro pneumatic regulator is installed into the system.
- **RAW OUTPUT:** Displays the current 4-20ma signal provided to the regulator.
- **ANALOG OUT LOW:** Signal supplied to regulator when low scale point is called. Can be adjusted so that the PSI which is commanded matched the PSI that is outputted.
- **ANALOG OUT MAX HIGH:** Signal supplied to regulator when high scale point is called. Can be adjusted so that the PSI which is commanded matches. Higher value will increase mA signal supplied to regulator.
- **HOME:** Displays Home screen.
- **PREV SCREEN:** Go to previous system screen.
- **NEXT SCREEN:** Go to next system screen.

ELECTRO REGULATOR SETUP		
CURRENT PSI SET POINT	PSI IN LOW SCALE	PSI IN HIGH SCALE
-12345	123	123
RAW OUTPUT ANALOG	ANALOG OUT LOW	ANALOG OUT HIGH
12345	12345	12345
HOME		
PREV SCREEN	NEXT SCREEN	

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### ALARM LIST:

- **PUMP A/B: LOW INLET PRESSURE:** The input pressure is lower than the INLET PRESSURE LOW LIMIT that is set in Pump Setup. Usually caused by a blockage or closed valve upstream. Cleared when reset button is pressed.
- **PUMP A/B: HIGH OUTLET PRESSURE:** The output pressure is higher than the OUTLET PRESSURE HIGH LIMIT that is set in Pump Setup. Usually caused by a blockage or closed valve downstream. Cleared when reset button is pressed.
- **PUMP A/B LOW FLOW:** No flow detected for 10 seconds from the pump flow sensor. Usually caused by a blockage or closed valve. Cleared when reset button is pressed.
- **PUMP A FLOW RATE TOLERANCE:** Pump A actual flow rate is outside of tolerance. The flow meter may require cleaning or the gear pump may be excessively worn. Cleared when reset button is pressed.
- **RATIO TOLERANCE FAULT:** Actual ratio is outside of tolerance. Cleared when reset button is pressed.
- **POT LIFE EXPIRED:** Pot life timer has expired. Cleared when pumps run for 10 seconds, or solvent from color stack is run through the pump for 20 seconds, or a color change has been performed.
- **E-STOP PRESSED:** The system stop button on the main control has been pressed. Cleared when system stop is off.
- **MOTOR DRIVE FAULT:** The control drive for a stepper motor has encountered a fault. Cleared when reset button is pressed.

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### ANALOG IN SETUP:

- RAW ANALOG: Displays the current analog value from the PLC input.
- CURRENT FLOW: Current flow rate based on Analog In settings and current input.
- ANALOG IN LOW: Low-analog value that represents the minimum rate.
- ANALOG IN MIN RATE: Minimum rate at entered low-analog value.
- ANALOG IN HIGH: High-analog value that represents the maximum rate.
- ANALOG IN MAX RATE: Maximum rate at entered high-analog value.
- SETPOINT SOURCE: Sets the source for the setpoint flow rate. (Analog Input or Network Communication)
- HOME: Displays Home screen.
- PREV SCREEN: Go to previous system screen.
- NEXT SCREEN: Go to next system screen.

ANALOG IN SETUP

RAW ANALOG -12345	ANALOG IN LOW -12345	ANALOG IN HIGH -12345
CURRENT FLOW 12345	ANALOG IN MIN RATE -12345	ANALOG IN MAX RATE -12345
HOME	SETPOINT SOURCE	
PREV SCREEN	NEXT SCREEN	ANALOG INPUT

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### RATIO TEST: (3068-00-41D)

A manual ratio test can be done to verify the accuracy of each pump, help to calibrate, or determine pump wear.

Before removing any lines make sure that fluid supply is off and be aware of possible line pressure.

To perform test replace the metal Mix Manifold outlet with the test outlet (3068-94-03A)

When using the ratio kit it is helpful to make sure that no air is in the lines and they are level so the measured fluid is accurate. That is the purpose for the check valve on the catalyst side.

Set flow rate to a desired amount below 250 ml per minute

Trigger gun or run beaker test and collect resin in one beaker and catalyst in the other beaker for 1 minute.

The sum of the two fluids should equal your set flow rate.

Procedure for adjustment is below.

The adjustments are made to the resin gear pumps only.

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### MANUAL RATIO TEST: (3068-00-41D)

3cc per rev pump

(Measured amount of resin in beaker) / (expected amount of fluid) = X

X = Value of adjustment

3\*X = new value for cc / rev pump

For a 1 minute 3:1 ratio at 300 cc/min

Example: 235 actual / 225 expected = 1.044

1.044\*3.0 = 3.13 cc/ rev

1.5cc per rev pump

(Measured amount of resin in beaker) / expected amount of fluid) = X

X = Value of adjustment

1.5\*X = new value for cc / rev pump

235 actual / 225 expected = 1.044

1.044\*1.5 = 1.56 cc/ rev

This value is the recorded amount of material metered per revolution of the pump. It will replace the value in Pump A Setup cc/s Rev

As the gear pump wears it may experience some blow by between the teeth and sides of the pump. When new pumps are replaced it is recommended that the cc/rev value is restored to its nominal 1.5 / 3.0 cc/rev value and reviewed.