

**SPECIFICATIONS**

**SERVICE REQUIREMENTS:** Air: minimum 60 psig (4 bar), maximum 116 psig (8 bar) at 5.0 CFM (140 dm<sup>3</sup>/m). Clean, dry, non-lubricated. Supply air must be 5 PSIG (0.3 bar) greater than inlet pressure for pressure transmitters (optional) to read properly.

Electrical Controller: 115 VAC / 230 VAC (factory set) at 50/60 Hz.  
Motor: 220/380/480/575 V 50/60 Hz – 3 Phase. ¼ Horse Power Motor Load is 1.1 full load amps at 220VAC, 0.6 full load amps at 480VAC

**CONNECTIONS:** Air: ¼” NPTI

**INSTALLATION INSTRUCTIONS**

- 1) This filter system is equipped with one motor per station that rotates a shaft that provides force to move the cleaning disc while a rotary type cylinder actuates the purge valve. Connect the air supply lines (customer supplied) to the inlet port (1/4” NPTI) of the solenoid stack mounted on the control panel.
- 2) Connect the incoming single-phase electrical supply for the controller to the panel mounted disconnect switch inside the automation enclosure. Please reference the units wiring diagram for the proper terminal connections for the line and neutral wires. Ground connects to the ground  $\perp$  terminal mounted on the face of the switch.
- 3) Connect the incoming three-phase electrical supply for the motors to the panel mounted disconnect switch inside the automation enclosure. Please reference the units wiring diagram for the proper terminal connections for the line and neutral wires. Ground connects to the ground  $\perp$  terminal mounted on the face of the switch.

**INSTALLATION CHECKLIST**

Complete this checklist before operating the system:

- Verify that the input power wiring is attached correctly to the main disconnect switch mounted inside the enclosure.
- Verify that the incoming automation electrical supply is the proper voltage. Improper voltage will cause serious damage to the filter’s electrical systems. The proper voltage for the controller is factory set at 115 volts or 230 volts (single phase VAC).
- Verify that the incoming motor electrical supply is the proper voltage. Improper voltage will cause serious damage to the filter’s electrical systems. The proper voltage is factory set at 220, 380, 480 or 575 volts (three phase VAC).

**START-UP VERIFICATION and OPERATION**

Before circulating fluids through the filter system, start the system dry and verify the following:

- 1) Turn the controller power switch to the ON position (located on the enclosure door). Along with the illumination of the GREEN (power status) light, the display should show the main screen (image 1).
- 2) Turn the motor power switch to the ON position (located on the enclosure door).
- 3) Touch the **ON/OFF** button (lower left hand corner of screen). The status box on Image 1 will change from OFF to ON. The motor will also begin to start up one at a time. This prevents a large power surge, which would result from trying to start all the motors at one time. After all the stations have been sequentially started, they all run independent of each other.
- 4) Touch the **Purge** button. The status box should now show PURGE. The optional purge header butterfly valve will open, the purge valve for the first station will open. After the purge duration the first station purge valve will close and this sequence will continue for all remaining stations. The optional header flush valve will flush the purge header. After the cycle is complete the status box will return to ON.

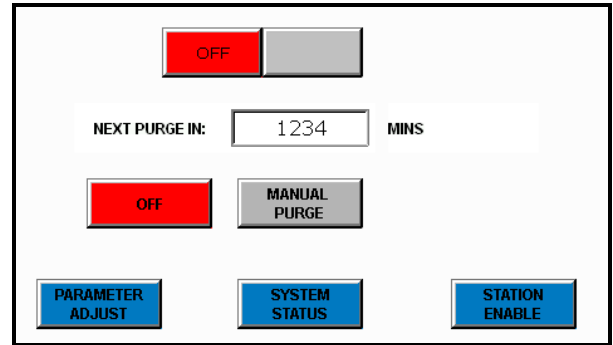


Image 1: Display showing main screen

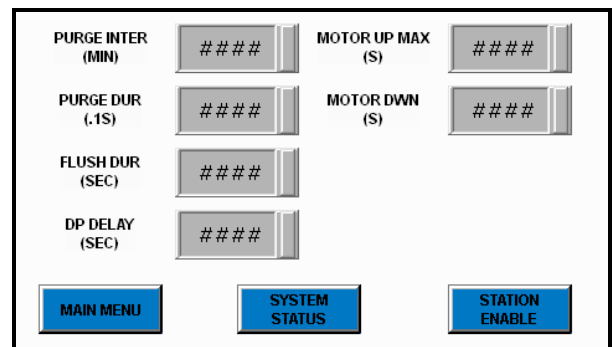


Image 2: Display showing parameter adjustment screen

<b>ON</b>	Controller is On
<b>DP</b>	DP switch has hit it set point
<b>PURGE</b>	Purging Cycle is running
<b>EXCESS DP</b>	Fault Due to High DP
<b>FAULT</b>	Fault Due to Purge header valve or motor failure. Check system status screen.
<b>OFF</b>	Controller is Off (See warning box below)

Table 1: Status states that can be display on main screen. (For the Siemens’s Controller the states have their own display box that is grayed out when not in use. )



**WARNING:** When the PLC is off, only the PLC control is disabled. The green power light will still be illuminated to indicate that all electrical circuits are powered. Use caution when working on the system in this mode to prevent electrical shock. The ON/OFF button is not intended to be a replacement for following proper lockout procedures.

**FAILURE TO FOLLOW THIS WARNING MAY LEAD TO DEATH OR SEVERE INJURY.**

## BUTTON DESCRIPTIONS

### MAIN SCREEN

Below is a description of each button function on the main screen (Image 1).

- A. **ON/OFF** button – See warning box to the right. Turns the PLC ON and OFF. In the event of power failure, the operator will have to turn the system back ON. To reset the system and clear all error messages, turn the system OFF and back ON.
- B. **MANUAL PURGE** button – Allows the operator to initiate a purge sequence. When the button is touched, PURGE will be displayed in the status box.
- C. **PARAMETER ADJUST** button – Touching this button will display the parameter adjustment screen. This is where changes can be made to the purge sequences and motor timers.
- D. **STATION ENABLE** button – Touching this button will display the station adjustment screen. This is where stations may be turned on or off.

### PARAMETER ADJUSTMENT SCREEN

Below is a description of each button function on the Parameter Adjustment screen (Image 2).

- A. **Purge Interval (min)** – Sets the amount of time between automatic purge intervals. Units are in minutes. **Setting this value to zero (0) will disable the timed purge function.**
- B. **Purge Duration (0.1S)** – Determines the amount of time that the purge valve is open during the purge sequence. Units are in 0.1 seconds.
- C. **Flush Duration (s) (optional)** – The flush time determines the amount of time the flush valve is open at the end of purge sequence to flush the purge header.
- D. **DP Delay (sec)** – The DP Delay is the amount of time the system will pause after reaching the DP set point before beginning the purge sequence. While system is running the DP Delay, DP will be display in the statue of the main screen. This time will be dependent on air and process pressure. Units are in seconds.
- E. **Motor Up Max. (s)** – The maximum amount of time that the motor will run in the up direction. Used to change the cleaning disc to the down direction if the proximity switch is not sensed in the allotted time.
- F. **Motor Down (s)** - The maximum amount of time that the motor will run in the down direction. Used to change the clean disc to the up direction after the allotted time.
- G. **Main Screen** button – Touching this button will return the user to the Main Screen (Image 1).

### STATION ENABLE SCREEN

The Station Enable screen (Image 3) allows the operator to place stations online and offline. Pressing the ON/OFF button for the station to be modified will enable and disable that station. Pressing the Main Screen button will return to the Main screen and pressing Next Screen or Previous Screen button will cycle to the next or previous set of stations.

### SYSTEM STATUS SCREEN

The System Status screen (Image 4 and Image 5) tells the operator the status of the individual stations or valves. Pressing the Main Screen button will return to the Main screen and pressing Next Screen or Previous Screen button will cycle to the next or previous set of stations.

For the Siemens controller (Image 4) the System Status screen will only display an OK and FAULT message. The motor will show OK when the motor is running either up or down or the station is disabled. If there is a fault in the over current the motor will display FAULT. The valve will display OK if it is working and either in the open or closed position. The FAULT will be display if a PHV Fault is detected see Fault Messages below.

For the Allen-Bradly controller (Image 5) the System Status screen will display more detail information on the statuses of the motors, valves and proximity switches. Each station will display its own status for its motor or proximity switch.

The motor status will show UP if the cleaning disc is going up and DOWN if the cleaning disc is going down. TRIP will be displayed if there is an over current fault. The motor status will show OFF if the station or controller is turned off.

The Prox status will show OK if it is working normally. If an OPEN or SHORT is display it mean that a fault was detected. The Prox status will show OFF if the station or controller is turned off.

The valve status will show OPEN if the valve is open and CLOSED if the valve is closed. FAULT will be display if a PHV Fault is detected see Fault Messages below. The valve status will show OFF if the valve is disabled or the controller is turned off.

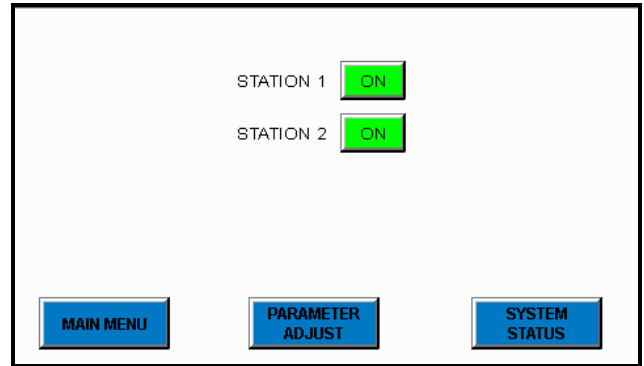


Image 3: Station Enable screen

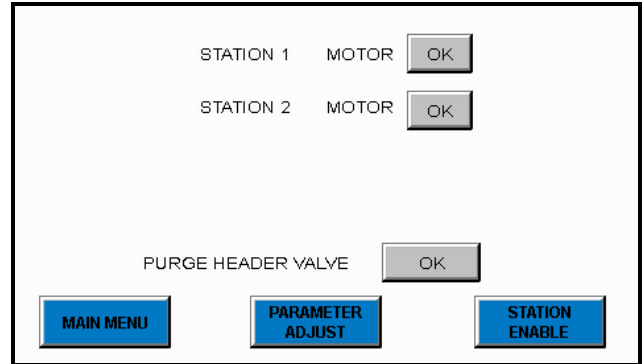


Image 4: System Status with an Siemens controller

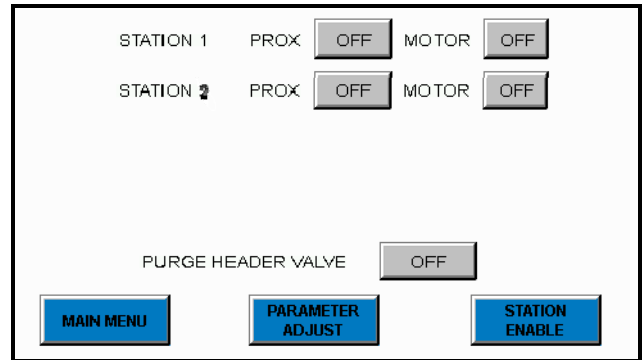


Image 5: System Status with an Allen-Bradley controller

## OPERATION

There are two distinct components to a DCF-2000 control system. The first is the control of the individual motors to produce the reciprocating motion of a cleaning disc required to keep the filter screen clean and move debris to the bottom of a station tube for purging. The second component is the actual purge cycle itself which moves the debris out of the system using system operating pressure and opening valves in a prescribed sequence.

## RUN CYCLE

The cleaning disc of an individual station is constantly cleaning the element in both directions of a reciprocating stroke. Controlling this motion uses both a sensor to determine the position at the top, and a timer to determine how far down to run the disc. The motors are initially started in the upwards direction. This lets the controller find the cleaning disc for the first time and reset the timers. A delay is performed at each end of the cycle. This allows the motors to fully stop, preventing a "slam into reverse," possibly damaging the motor. As the motor starts in the downward direction, a timer starts timing its stroke down. When the timer times out, it stops the motor for another delay. When the motor is started in its upward direction, another timer starts. This timer is the backup or watchdog timer. It is set at slightly longer than the down timer is set at. Its purpose is to act as a safety in the event of a sensor or motor failure. If the backup timer times out before the sensor "sees" the cleaning disc, it acts as the turnaround point and sends out an alarm signal. The program is configured to run off this backup timer in the event of a sensor failure so that the unit will continue to clean the screen. However, this will run the cleaning disc assembly off the screw mechanism each cycle causing a premature drive nut failure if not corrected.

## PURGE CYCLE

A purge cycle is used to move debris out of the DCF-2000 filter to disposal or reclamation. A purge cycle may be initiated three ways.

- 1) The first is on a timed basis, roughly coinciding with the amount of time it takes to fill the hemispherical bottom of a station. This is the normal mode of purge operation.
- 2) The purge may also be manually initiated. This is done by pressing the MANUAL PURGE button. A manual purge may assist in clearing additional debris loading due to process variances, on startup for instance.
- 3) A purge cycle may also be initiated by excessive differential pressure sensed by the optional differential switch. The DCF-2000 normally operates "flatline" or with constant, low, differential pressure. High differential pressure is an indication that the filter is not functioning correctly. This could be caused by a system upset, worn out cleaning discs, or even the motors stopping for some reason.

The purge cycle is essentially a sequence of valves opening and closing to move the debris out of each station, then to move it downstream to waste or reclaim. Each station is purged individually to allow the filter to remain on-line with no interruption to outlet flow. The cleaning disc continues to operate normally and independent of the purge cycle.

Upon initiation of a purge cycle the status of the controller changes to PURGE. This gives a visual indication that the system is cleaning and alerts personnel around the filter that valves will be actuating.

The purge header control valve is actuated open. It is given time to fully open before checking the purge header control valve safety switch, verifying an open valve. This switch must be verified open before proceeding with station purging. If this switch indicates that the purge header control valve has not opened, the cycle will be aborted and the PHV Fault is activated. If the cycle were to continue under these conditions the process fluid could be diluted or contaminated by the flush portion of the cycle.

After the purge header control valve has been verified open, the first station purge valve will open for a short period of time, then close. This allows the system pressure to push the debris out of the vessel into the purge header. Each station is sequentially purged for the same period, with a delay between stations, until all stations have been purged. Next the optional flush valve opens for a predetermined time to push the debris into the drain or to reclamation. It then closes. The purge header control valve closes next, finishing the cycle. The purge interval timer is reset, and the controller status returns to ON and timing starts toward the next timed cycle.

## FAULT MESSAGES

Below is a description of each fault message on the Eaton HMI operator interface. To reset the system and clear all fault messages and outputs, turn the system OFF and back ON.

- A. EXCESS DP** – When the system initiates more than 2 purging due to differential pressure within 30 minutes, a fault is set and the message **HIGH DP** will flash on the display. Possible causes: plugged elements, insufficient purge frequency or insufficient inlet pressure to properly clean the element.
- B. PHV FAULT** – When equipped, the purge header valve is monitored using a limit switch. A fault is set in the event of valve failure. Possible causes: Poor air supply, faulty actuator, faulty solenoid valve or failed limit switch. Note: The purge sequence is disabled when this fault is present.
- C. OVER CURRENT** – Over current fault or "trip" is set when a short-circuit or excessive load is present for the motor. Possible causes: wiring issue, high or low voltage issue, the clean disc being jam in place.
- D. OPEN** – When the proximity switch is not sensed within the time limit set in the Motor Up Max setting. Possible causes: Time limit is too short. Motor or switch has malfunctioned.
- E. SHORT** – When the proximity switch is continuously being sensed. Possible causes: Motor or switch has malfunctioned.

## Optional DIFFERENTIAL PRESSURE SWITCH ADJUSTMENT

The differential pressure switch senses a difference in pressure between the inlet and outlet piping. When the factory pressure preset has been reached, it triggers a cleaning sequence. The factory preset is 15 PSID (1 bar).

To adjust the preset, remove the DP switch cover and turn the hex-adjusting nut. Turn it clockwise to decrease the allowable differential pressure between the inlet and outlet piping. Turn the hex nut counterclockwise to increase the allowable differential pressure between the inlet and outlet piping. One flat turn (1/6<sup>th</sup> of a turn) of the hex-adjusting nut changes the setting by approximately 2 PSID (0.14 bar).

## CUSTOMER INTERFACE

- A. GENERAL FAULT (RL1)** – This relay is energized during normal operation. It will de-energize to indicate power loss, system is OFF, purge header valve failure or if an excess differential pressure condition exists (purge is disabled if there are more than two differential pressure purge sequences in 30 minutes). See electrical schematic for connection details. The contact rating is 7A at 30 VDC or 110 VAC.
- B. REMOTE PURGE START** – Supplying a momentary 24VDC signal to input I:0/15 will start a purge sequence.
- C. PURGE IN PROCESS** – Output O:0/6 will be set during the purge sequence.

#### **WARRANTY**

All products manufactured by Seller are warranted against defects in material and workmanship under normal use and service for which such products were designed for a period of eighteen (18) months after shipment from our factory or twelve (12) months after start up, whichever comes first. OUR SOLE OBLIGATION UNDER THIS WARRANTY IS TO REPAIR OR REPLACE, AT OUR OPTION, ANY PRODUCT OR ANY PARTS OR PARTS THEREOF FOUND TO BE DEFECTIVE. SELLER MAKES NO OTHER REPRESENTATION OR WARRANTY, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. WE SHALL NOT BE LIABLE FOR CARTAGE, LABOR, CONSEQUENTIAL DAMAGES OR CONTINGENT LIABILITIES. OUR MAXIMUM LIABILITY SHALL NOT IN ANY EVENT EXCEED THE CONTRACT PRICE FOR THE PRODUCT.

If you are interested in ordering spare parts or having service performed on your filter, please contact Customer Service.

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