

INSTALLATION AND MAINTENANCE **Controller HMI interface for the MCF/DCF Single Unit**

DESCRIPTION

This filter system is equipped with one or two pneumatic double acting cylinders, or a magnetically couple drive, piloted by individual 4-way solenoid valves. The linear type cylinder provides force to move the cleaning disc while a second rotary type cylinder actuates the purge valve. The system is controlled by a microcontroller which is housed in a NEMA 4 enclosure with added power isolation. An HMI touch panel display is used to communicate with the controller.

SPECIFICATIONS

SERVICE REQUIREMENTS :

Air : minimum 60 psig (4 bar), maximum 116 psig (8 bar) at 2.5 CFM (70.79 dm^3/min). Clean, dry, non-lubricated.

Electrical : 120 V AC or 240V AC (factory set) at 50/60 Hz, Single phase supply

CONNECTIONS : Air : 1/2" NPTI

INSTALLATION INSTRUCTIONS

- 1) Connect the air supply line (customer supplied) to the air filter/regulator port (1/2" NPTI) mounted on the control panel.
- 2) Connect the incoming single-phase electrical supply to the panel mounted disconnect switch inside the automation enclosure. Please refer the unit wiring diagram for the proper terminal connections for the line and neutral wires. Ground connects to the ground \perp terminal bar in the panel.

INSTALLATION CHECKLIST

Complete this checklist before operating the system :

- 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 is factory set at 120 volts or 240 volts (single phase VAC).
- Verify that the incoming air supply is in specified limits. Improper pressure will cause serious damage to the filter systems. The proper pressure is factory set at minimum 60 psig (4 bar), maximum 116 psig (8 bar) at 2.5 CFM (70.79 dm^3/min). Clean, dry, non-lubricated.
- Verify that the input power wiring is attached correctly to the main disconnect switch mounted inside the enclosure.

START-UP VERIFICATION and OPERATION

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

- 1) Turn the main 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) Touch the ON/OFF button (lower left hand corner of screen). The status box on Image 1 will change from OFF to ON.
- 3) Touch the Clean button. The status box should show CLEAN. At this time, the pneumatic drive assembly will send the cleaning disc down the length of the element and return the disc to the top. After the cycle is complete the status box will return to ON.
- 4) Touch the PURGE button. The status box should now show PURGE. The cleaning disc will stroke and the purge valve will open. After purging is complete the purge valve will close and the cleaning disc will return to the top. After the cycle finished the status box will return to ON.

MAIN SCREEN

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

- The **ON/OFF** power button – See warning box on the next page. 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.
- CLEAN** button – Allows the operator to initiate a manual cleaning sequence. When the button is touched, CLEAN will be displayed in the status box.
- PURGE** button – Allows the operator to initiate a purge sequence. When the button is touched, PURGE will be displayed in the status.
- Parameter Adjust Screen Button** – Touching this button will display the Parameter Adjustment screen (Image 3). This is where changes can be made to the clean and purge sequences.

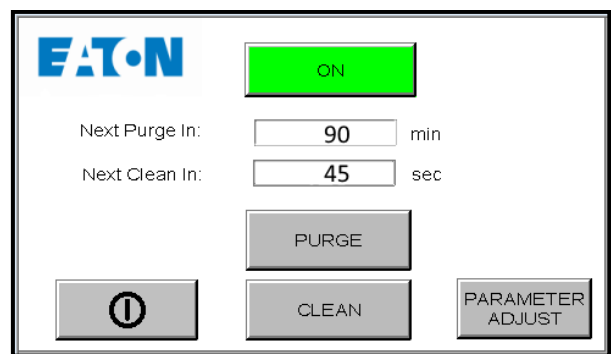


Figure 1: Display showing main screen

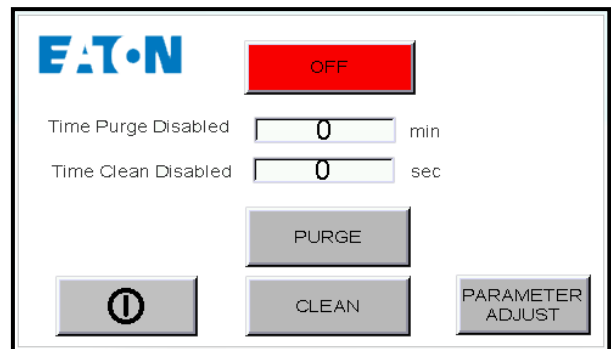


Figure 2 : Display showing main screen with Time Purge and clean disabled

ON	Controller is On
CLEAN	Cleaning Cycle is running
PURGE	Purging cycle is running
HIGH DP	Fault due to high DP
VALVE FAULT	Fault due to Valve failure
CYLINDER FAULT	Fault Due to linear actuator failure
OFF	Controller is Off (See warning box below)

Table 1: Status states that can be display on main screen.



WARNING: When turned off via HMI, 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. Follow proper electrical safe work procedures.

FAILURE TO FOLLOW THIS WARNING may LEAD TO DEATH OR SEVERE INJURY.

PARAMETER ADJUSTMENTS

Parameter adjustments can be made by touching the button at the right of the field you want to change. The numeric keypad will appear and allow you to enter a new number. The range that can be entered is displayed.

Below is a description of each button function on the Parameter Adjustment screen (Image 3).

- A. Clean Interval (s)** – The Clean Interval is the amount of time between cleaning strokes. Clean strokes will automatically occur based on this. Units are in seconds and it is preset to 45 seconds. **Setting this value to zero (0) will disable the timed clean function.**
- B. Clean Duration (s)** – The Clean Duration is the amount of time the linear actuator will be energized to allow the cleaning disc to travel along the element. This time will be dependent on air and process pressure. Units are in seconds and is preset to five seconds.
- C. Purge Interval (m)** – Sets the amount of time between automatic purge intervals. Units are in minutes and it is preset to 90 minutes. **Setting this value to zero (0) will disable the timed purge function.**
- D. 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 and IS preset to 0.7 seconds.
- E. Main Screen button** – Touching this button will return the user to the Main Screen (Image 1).

CUSTOMER INTERFACE

- A. SYSTEM GENERAL FAULT (RL1)** - This relay is energized during normal operation. It will de-energize to indicate power loss, system is OFF, purge 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.
- B. SYSTEM CLEAN IN PROCESS (RL2)** - This relay is energized during the Cleaning process. See electrical schematic for connection details.
- C. SYSTEM PURGE IN PROCESS (RL3)** - This relay is energized during the Purging process. See electrical schematic for connection details.
- D. DIFFERENTIAL PRESSURE SWITCH** - The system will purge from high DP when a DP switch is supplied.
- E. REMOTE CLEAN** - Supplying a momentary 24VDC signal to this input will start a clean sequence. See electrical schematic for connection details.
- F. REMOTE PURGE** - Supplying a momentary 24VDC signal to this input will start a clean sequence. See electrical schematic for connection details.

FAULT MESSAGES

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

- A. HIGH DP** – When properly equipped DP switch initiates more than 2 cleanings due to differential pressure within 30 minutes, a fault is set and the message HIGH DP will flash on the display. Possible causes: plugged element, incorrect clean settings, incorrect purge settings or insufficient inlet pressure to properly clean the element.
- B. VALVE FAULT** – When properly equipped ROTARY SWITCH detects that a position of the drain valve is not in the proper

state, see the LIMIT SWITCH section below for more information. Possible causes may include a poor air supply, faulty actuator, faulty solenoid valve or failed limit switch.

- C. CYLINDER FAULT** – When properly equipped linear switch detects that a disc position is not in the proper state, see the REED SWITCH section below for more information. Possible causes for the fault may include a poor air supply, faulty actuator, faulty solenoid valve, failed reed switch or insufficient clean duration.

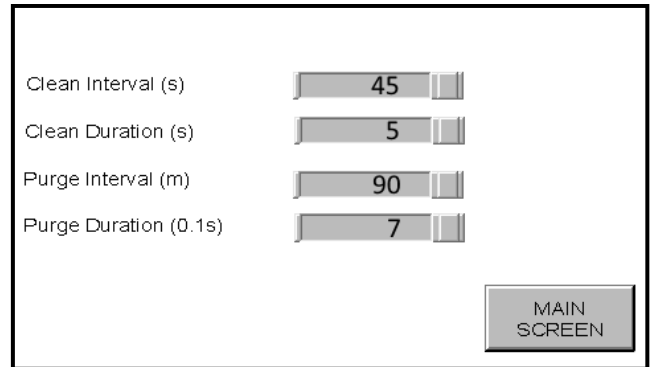


Figure 3 : Display showing parameter adjustment screen

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 (1/6th of a turn) of the hex-adjusting nut changes the setting by approximately 2 PSID (0.14 bar).

Optional VALVE LIMIT SWITCH

Limit switches are provided on the valve actuator when the valve limit switch option is ordered. The valve limit switch will provide feedback on the position on the drain valve. If this option is provided the main screen will show a Purge Valve Status box which allows the operator to see the status of the valve (Image 4). A status state called VALVE FAULT will be displayed in yellow if a fault is detected with any of the limit switches (Image 5). If the valve status shows an OPEN or CLOSED fault, possible causes may include a poor air supply, faulty actuator, faulty solenoid valve or failed limit switch.

If the stealth purge unit is ordered to include a limit switch on the flush valve then second Flush Valve Status box will be shown on the main page.

PURGE VALVE OK	Purge Valve is working properly
PURGE VALVE OPEN	Purge Valve failed in the Open position
PURGE VALVE CLOSED	Purge Valve failed in the Closed position
FLUSH VALVE OK	Flush Valve is working properly
FLUSH VALVE OPEN	Flush Valve failed in the Open position
FLUSH VALVE CLOSED	Flush Valve failed in the Closed position

Table 2 : Status states of the valve status boxes.

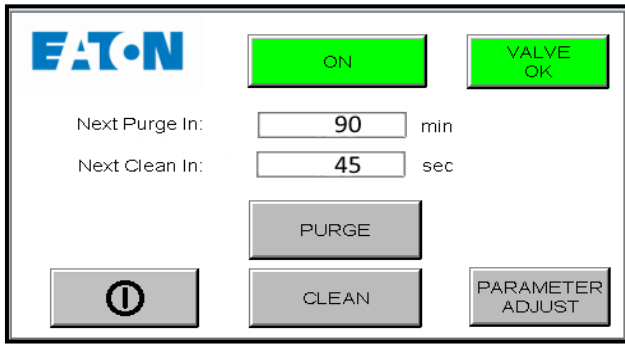


Figure 4 : Display showing main screen with the valve status box

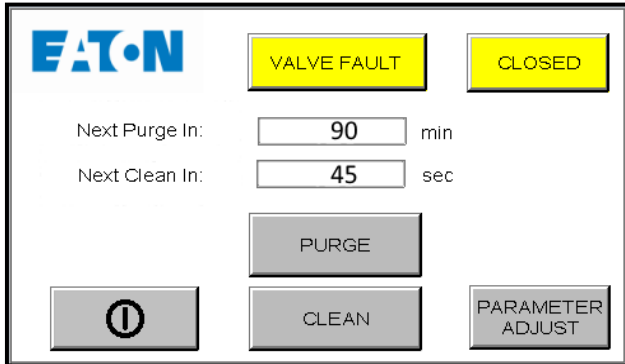


Figure 5 : Main screen showing the valve status box with fault.

Optional STEALTH PURGE

If the Stealth Purge option is ordered, the linear type cylinder is equipped with a magnetic reed switch and a second rotary type cylinder actuates a flush valve.

STEALTH PURGE OPERATION SEQUENCE

- 1) The Clean Duration begins the linear actuator stroke and drives the cleaning disc to the bottom of the housing.
- 2) When the actuator reaches the end of its stroke, the magnetic reed switch is closed indicating to the PLC that the purge sequence may begin. If the reed switch does not close, a CYLINDER FAULT is set by the PLC and the sequence is aborted.
- 3) The Purge Duration starts and both purge valve and flush valves open.
- 4) After the Flush Duration the flush valve will close.
- 5) The purge chamber is allowed to drain for the remaining purge time.
- 6) The purge valve closes and Fill Duration allows the purge chamber to slowly refill and equalize pressure.
- 7) The linear actuator then strokes the cleaning disc back to the top of the housing.

STEALTH PURGE PARAMETERS

- A. **Clean Duration (s)** -The Clean Duration is the amount of time the linear actuator will be energized to allow the cleaning disc to travel along the element. This time will be dependent on air and process pressure. Units are in seconds and is preset to five seconds.
- B. **Purge Duration (s)**- Determines the amount of time that the purge valve is open during the purge sequence.
- C. **Flush Duration (s)**- The amount of time that the flush valve will open during the purge sequence. This is determined by the program and is 60% of the Purge Duration. For the factor preset it is 2.1 seconds (3.5 seconds x 60%).
- D. **Fill Duration (s)**- The amount of time between when the purge valve closes and the cleaning disc actuates. This is determined by the program and is equal to the greater of 2 seconds or the Purge Duration. For the factor preset it is 3.5 seconds (3.5 seconds > 2 seconds).

Optional REED SWITCH

One or two magnetic reed switches are provided on the linear actuator if one or two optional linear actuator switches are ordered. A reed switch is also included as part of the stealth purge unit. The reed switch will provide feedback on the position of the cleaning disc. If this option is provided the system status screen will show a linear actuator status box, which allows the operator to see the status of the linear actuator.

The main screen will show a Cylinder Status box which allows the operator to see the status of the cylinder (Image 6). A status state called CYLINDER FAULT will be displayed in yellow if a fault is detected with any of the reed switches. If the actuator status shows an SHORT fault if the bottom read switch is not reached within the Clean Duration. If an second switch is provided the actuator status will show a STROKE fault if the actuator does not leave the upper position. Possible causes may include a poor air supply, faulty actuator, faulty solenoid valve or failed limit switch. Possible causes for the fault may include a poor air supply, faulty actuator, faulty solenoid valve, failed reed switch or insufficient Clean Duration.

CYLINDER OK	Linear actuator is working properly
SHORT	Linear Actuator failed to reach the bottom switch within clean duration
STUCK	Linear actuator failed to leave the bottom switch
STROKE	Linear actuator failed to leave the top switch
RETURN	Linear actuator failed to return to the top switch

Table 3 : Status states of the linear actuator status box

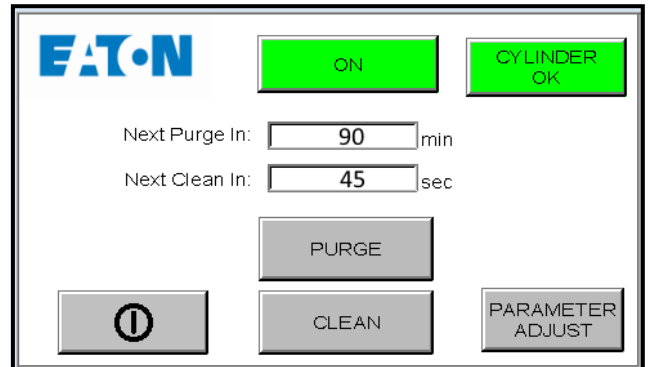


Figure 6 : Main screen with the cylinder status box

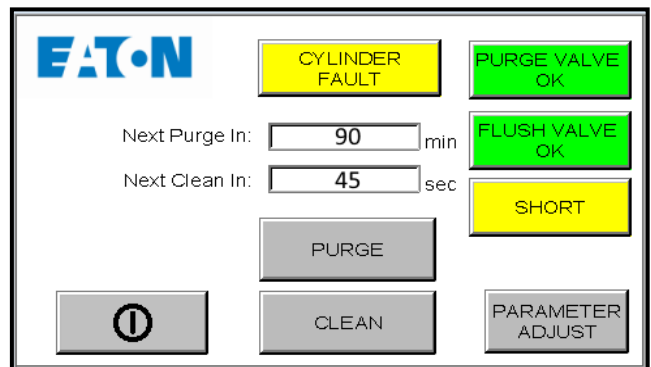


Figure 7 : Main screen with limit switches on purge and flush valves and reed switch on the linear actuator with fault.

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.

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