

**DESCRIPTION**

The automatic AFR tubular unit consist of up to eight stations connect to an inlet and outlet manifold in a circular configuration. This filter system is equipped with two pneumatic double acting actuators piloted by individual 4-way solenoid valves. A rotary type actuator provides force to index a flow diverter assembly from station to station while a second rotary type actuator actuates the drain valve. The system is controlled by a PLC which is housed in a NEMA rated enclosure. An HMI touch panel display is used to communicate with the controller.

**Reference**

Reference Control Philosophy (DOQ0000149-EN) and Sequence Diagram (DOQ0000150-EN) for additional details on full-auto control programming. For Semi-Auto options, reference Logic Diagram (DOQ0000158-EN).

**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.  
Electrical: 120 VAC / 240 VAC (factory set) at 50/60 Hz.

**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 unit frame leg.
- 2) Connect the incoming single-phase electrical supply 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  $\equiv$  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 is factory set at 120 volts or 240 volts (single phase VAC)

**START-UP VERIFICATION and OPERATION**

The drain valve is in the online process condition by system default. The unit will be filtering if process fluid is present regardless of controller status. 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 will change from OFF to ON (Image 2). If the flow diverter is not in the home position, the pneumatic drive index assembly will index the flow diverter until it reaches home position. The status box in Image 1 will read HOMING (see Table 1).
- 3) Touch the **BACKWASH** button. The status box should show **BACKWASHING**. At this time, the pneumatic drive assembly will index the flow diverter to the first station. The butterfly valve on the drain will open for the backwash duration time, allowing the station to clean, and then close. The flow diverter will now index to the next station. After the system cycles thru each station and the flow diverter reaches the home position the status will return to ON.

**MAIN SCREEN**

The top of the main screen (Images 1 & 2) will display the status states of the Filter (Table 1). When the timed backwash function is activated it will show a countdown to the next cleaning cycle in minutes. If a manual or differential

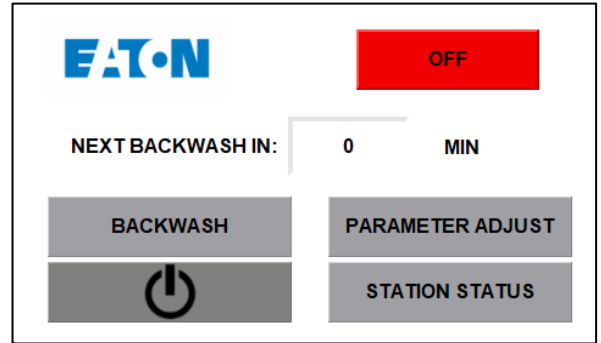


Image 1: Display showing Main Screen OFF state

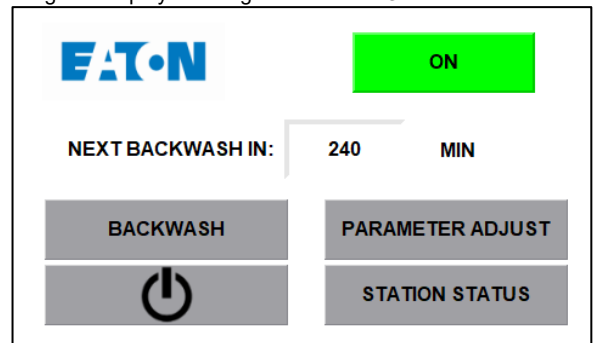


Image 2: Display showing Main Screen ON state

ON	Controller is ON
BACKWASHING	Backwashing Cycle is running
HIGH DP	Fault Due to High DP
HOMING	Diverter was not in-home position at startup and is searching for the Home Position.
HOME LOST	Diverter cannot find the home position.
STATION LOST	Diverter cannot find station position.
HOME STUCK	Diverter cannot leave the home position
STATION STUCK	Diverter cannot leave a station position.
OFF	Controller is Off (See warning box below)

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




**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.**

pressure clean cycle is performed the time interval will reset to the Backwash Interval time setting. If the Backwash Interval time setting is set to zero, this timer will be disabled and "0 min" will be displayed (Image 5).

Below is a description of each button function on the main screen (Image 1 & 2).

- A. The **ON/OFF**  power button – See warning box on the first 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.
- B. **BACKWASH** button – Allows the operator to initiate a manual backwash sequence. When the button is touched, BACKWASHING 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 backwash sequence parameters (Image 3).
- D. **STATION STATUS** button – Touching this button will display the station adjustment screen. This is where stations may be enabled or disabled. (Image 6).

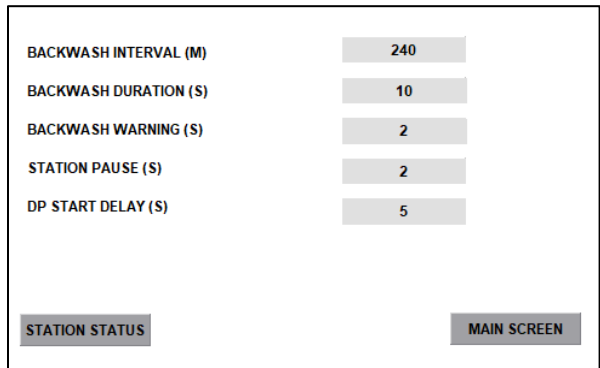


Image 3: Display showing Backwash Parameters

### PARAMETER ADJUSTMENTS

Parameter adjustments can be made by touching the button at the right of the field you want to change. The numeric keypad (Image 4) will appear and allow you to enter a new parameter. The range that can be entered will be displayed.

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

- A. **BACKWASH INTERVAL (M)** – The Backwash Interval is the amount of time between automatic backwashing cycles. Backwash strokes will automatically occur based on this. Units are in minutes and it is preset to 240 minutes. Range is 0-1440 minutes. **Setting this value to zero (0) will disable the timed backwash function. (See Image 5).**
- B. **BACKWASH DURATION (S)** – The Backwash Duration is the amount of time each station backwashes during a backwashing cycle. Units are in seconds and it is preset to 10 seconds. Range is 0-30 seconds.
- C. **BACKWASH WARNING (S)** – Backwash Warning is the delay between the backwash sequence request and the start of valves actuation. The backwash in process relay (RL2) is energized during this period. Units are in seconds and is preset to 2 seconds. Range is 0-90 seconds.
- D. **STATION PAUSE (S)** – Station Pause is the pause between stations during the backwashing cycle. Units are in seconds and it is preset to 2 seconds. Range is 0-30 seconds.
- E. **DP START DELAY (S)** – DP Start Delay is the amount of time the signal from the differential pressure switch must be present prior to initiating a backwashing cycle. Units are in seconds and is preset to 5 seconds. Range is 0-30 seconds.
- F. **MAIN SCREEN** button – Touching this button will return the user to the Main Screen (Image 1 & 2).
- G. **STATION STATUS** button – Touching this button will display the station adjustment screen. This is where stations may be enabled or disabled (Image 6).



Image 4: Numeric keypad (general representation)

### STATION STATUS

The Station Status screen (Image 6) allows the operator to place stations online and offline. Pressing the 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 the PARAMETER ADJUST button will take the user to the parameter adjust screen.

If an AFR unit is supplied with blank stations, instead of the full allotment of eight, the blank station can be turned off in the Station Status screen. The backwashing cycle will still advance to each station position but will not open the drain valve for the backwash duration on the stations that are turned off.

### 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. The System Fault Relay (RL-1) will be de-energized when a fault is present.

- A. **HIGH DP** – When the system initiates four cleaning cycles due to differential pressure within 60 minutes, a fault is set, and the message **HIGH DP** will be indicated on display. Clean sequences will occur as

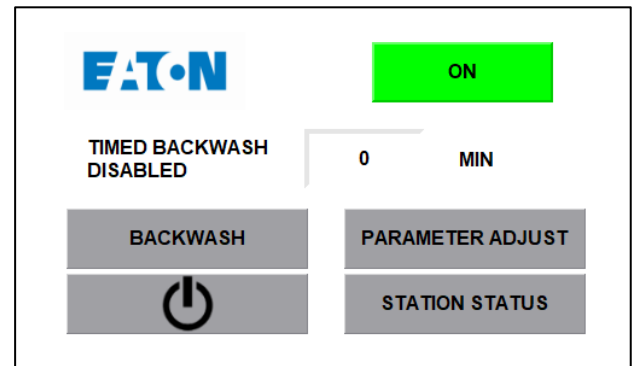


Image 5: Display showing Main Screen Timed Backwash Disabled

normal. Possible causes: plugged elements, insufficient clean duration or insufficient inlet pressure to properly clean the element.

- B. **HOME LOST** – When the diverter cannot find home position. Possible causes: no air supply, limit switch malfunction, actuator shaft packing, actuator shaft wear plate. Cycle the PLC OFF and back ON to clear the error.
- C. **STATION LOST** - When the diverter valve moves but cannot find it next station position. Possible causes: limit switch malfunction. Cycle the PLC OFF and back ON to clear the error.
- D. **HOME STUCK** - When the diverter valve does not move from the home position. Possible causes: no air supply, limit switch malfunction, actuator shaft packing or actuator shaft wear plate. Cycle the PLC OFF and back ON to clear the error.
- E. **STATION STUCK** – When the diverter valve does not move from a station position. Possible causes: no air supply, limit switch malfunction, actuator shaft packing or actuator shaft wear plate.

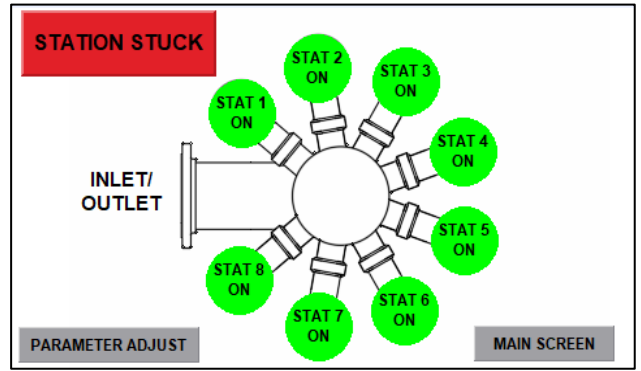


Image 6: Station Status

### 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 sequences. 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. **SYSTEM FAULT RELAY (RL1)** – This relay is energized during normal operation. It will de-energize to indicate power loss, system is OFF or if an excess differential pressure condition exists (if there are four differential pressure clean sequences in 60 minutes). See electrical schematic for connection details.
- B. **BACKWASH IN PROCESS RELAY (RL2)** – This relay is energized when the system is cleaning (backwashing). Reference the electrical schematic for contact connections.
- C. **REMOTE BACKWASH START** – Use a momentary normally open dry contact across the remote start terminals to initiate a backwash. Reference the electrical schematic for contact connections.

#### 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 starting 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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