

DESCRIPTION

The automatic multiplex tubular unit with external backwashing consist of multiple stations connect to an inlet, outlet, drain and backwash header. Each station has two pneumatic double acting cylinders piloted by a shared 4-way solenoid valve. For each station, one rotary type cylinder actuates a 3-way backwash valve between the process outlet and backwash headers, while a second rotary type cylinder actuates a 3-way drain valve between the process inlet and drain headers. The backwash header includes an automatic butterfly valve. The system is controlled by a microcontroller which is housed in a Nema 4 enclosure. 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 5.0 CFM (140 dm³/m). Clean, dry, non-lubricated.
Electrical: 115 VAC / 230 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 control panel.
- 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 115 volts or 230 volts (single phase VAC).

START-UP VERIFICATION and OPERATION

The drain and backwash valves are 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 on Image 1 will change from OFF to ON.
- 3) Touch the **Clean** button. The status box should show CLEAN. At this time, the first station's solenoid will energize and rotate the backwash and drain ball valves to the backwash and drain positions, taking the station offline from the process flow. Next the backwash header butterfly valve will open for the clean duration time and then close. After a delay, which allows the station to drain, the station solenoid will de-energize rotating the backwash and drain ball valves back to their online positions. The system will pause before going on to the next station. After the system cycles thru each station the status will return to ON.

MAIN SCREEN

The top of the main screen (Image 1) will display the status states of the filter (Table 1). When the timed clean function is activated it will show a countdown to the next cleaning cycle in minutes. If a manual or differential pressure clean cycle is performed the time interval will reset to the Clean Interval time setting. If the Clean Interval time setting is set to zero this timer will be disable and "0 min" will be displayed (Image 2).

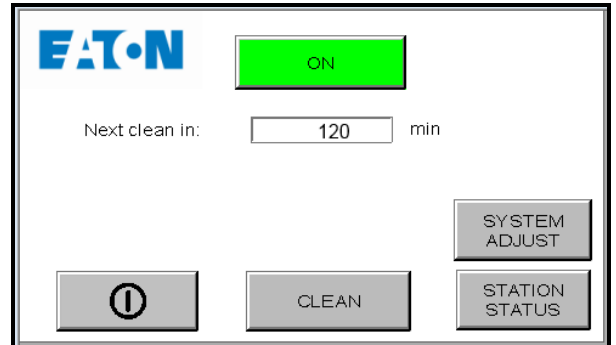


Image 1: Display showing main screen

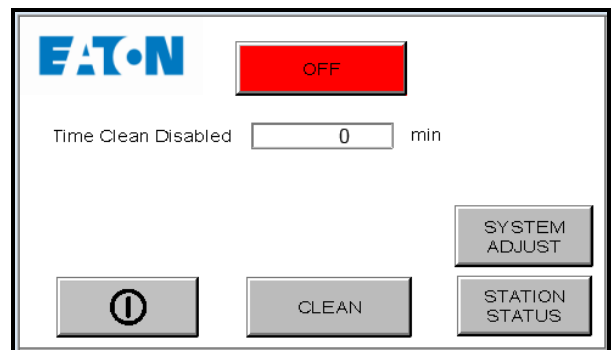


Image 2: Display showing parameter adjustment screen

ON	Controller is On
CLEAN	Cleaning Cycle is running
HIGH DP	Fault Due to High DP
OFF	Controller is Off (See warning box below)

Table 1: Status states that can be display on main screen. (For the Siemen'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.

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

- 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. **CLEAN** button – Allows the operator to initiate a manual cleaning sequence. When the button is touched, CLEAN will be displayed in the status box.
- C. **SYSTEM ADJUST** button – Touching this button will display the parameter adjustment screen. This is where changes can be made to the clean and purge sequences.
- D. **STATION STATUS** button – Touching this button will display the station adjustment screen. This is where stations may be enabled or disabled.

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 5) will appear and allow you to enter a new number. The range that can be entered is displayed in red.

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

- A. **Clean Interval (m)** – The Clean Interval is the amount of time between automatic cleaning cycles. Clean strokes will automatically occur based on this. Units are in minutes and it is preset to 120 minutes. **Setting this value to zero (0) will disable the timed clean function.**
- B. **Clean Duration (s)** – The Clean Duration is the amount of time each station backwashes (cleans) during a cleaning cycle. Units are in seconds and it is preset to ten seconds.
- C. **Station Pause (s)** – Station Pause is the pause between stations during the cleaning cycle. Units are in seconds and it is preset to two seconds.
- D. **Clean Warning (s)** – Clean Warning is the delay between the clean 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 five 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 cleaning cycle. Units are in seconds and is preset to five seconds.
- F. **Clean Delay (s)** – Clean Start Delay is the amount of time between taking a station offline and opening the backwash valve. This delay allows the process fluid to drain from the filter body. Units are in seconds and is preset at four seconds.
- G. **Station Drain (s)** – The Station Drain duration is the amount of time between closing the backwash supply valve and placing the station back online. This delay allows the backwash fluid to drain from the filter body. Units are in seconds and is preset at four seconds.
- H. **Main Screen** button – Touching this button will return the user to the Main Screen (Image 1).

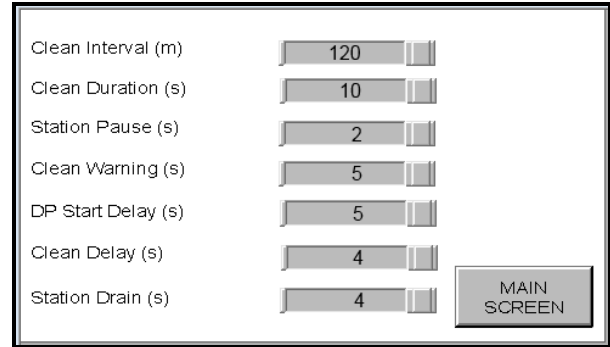


Image 3: Display showing parameter adjustment screen

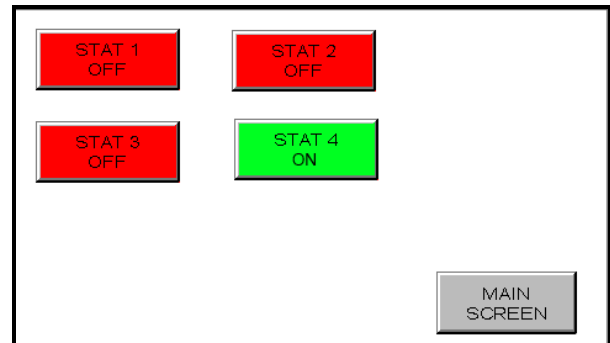


Image 4: Station Status screen

STATION STATUS

The Station Status screen (Image 4) 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 Next Screen or Previous Screen button will cycle to the next or previous set of stations.

FAULT MESSAGES

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

- 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 flash on the display. Possible causes: plugged elements, insufficient clean duration or insufficient inlet pressure to properly clean the element.

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).



Image 5: Numeric keypad

CUSTOMER INTERFACE

- A. **GENERAL FAULT (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 clean sequences in 60 minutes). See electrical schematic for connection details. The contact rating is 7A at 30 VDC or 110 VAC.
- B. **BACKWASH IN PROCESS (RL2)** – This relay is energized when the system is cleaning (backwashing). Reference the electrical schematic for contact connections. The contact rating is 7A at 30 VDC or 110 VAC.
- C. **REMOTE CLEAN START** – Use a momentary normally open dry contact across the remote start terminals to initiate a backwash. Reference the electrical schematic for contact connections.

Optional VALVE LIMIT SWITCH

Limit switches are provided on the valve actuators for each station's backwash (STAT 1 - BW) and drain (STAT 1 - DRN) valves as well as the backwash supply (BW SUPPLY) valve on the backwash header, when the valve limit switch option is ordered. The valve limit switch will provide feedback on the position of the valves. If this option is provided the main screen will show a Valve Statue button. A new status state called VALVE FAULT will be displayed in yellow if a fault is detected with any of the limit switches (Image 6).

The Valve Status screen (Image 7) allows the operator to see the status of the valves. A status for each valve will be displayed. 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.

OK	Valve is working properly.
OFF	Station is disabled
OPEN	Valve failed in the Open position
CLOSED	Valve failed in the Closed position

Table 2: Status states of the valve status screen.

To enable an OFF station, select the Station Status button from the main screen and then select the station that you wish to enable. 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.

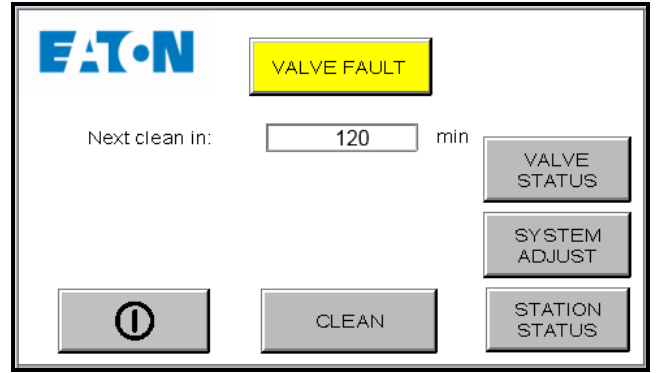


Image 6: Display showing main screen with the valve limit switch option.

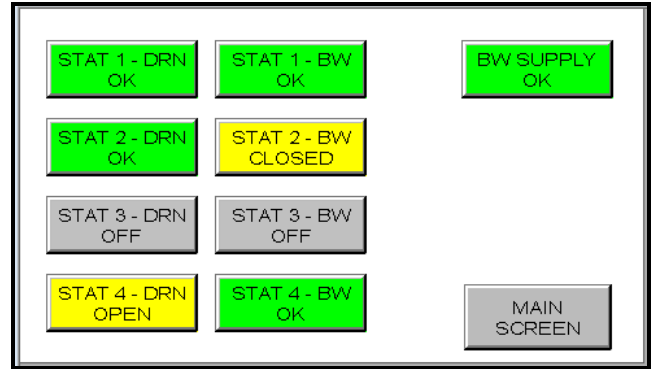


Image 7: Valve Status screen for the valve limit switch option.

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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