



**ZERO GRAVITY  
FILTERS**  
Brighton, MI

**EASYS CLEAN 3-POD FILTER**  
**Operating and Maintenance Manual**

## EasyClean 3 pod Filter

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Version 2.0

Reference: Gen-V5.0 3-Pod

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## **Standard and Limited Warranty**

Seller warrants that title to goods sold hereunder is unencumbered at time of sale. All other warranties are expressly disclaimed including, but not limited to, merchantability, fitness for purpose, and all other warranties, express or implied. Seller expressly disclaims any liability for damages, actual, consequential, incidental or otherwise, for injury to property of buyer, its agent or third persons in custody of goods sold hereunder. Seller may determine to repair or replace any defects in goods of its own manufacture, which arise from defective materials or workmanship during the twelve (12) months, or (60) months on the filter elements, following the date of tender of delivery to the end purchaser if buyer gives seller timely written notice with a description of the basis for claim. Seller may refund amounts paid by buyer without other liability to buyer. The buyer acknowledges and agrees that the limitations of warranty, liability and remedy are fair and not unconscionable and the sole and exclusive remedies afforded at law with all other statutory and common law remedies being hereby waived. A claim under the warranty by the buyer for repair or replacement of goods shall be timely filed with the seller in accordance with the written procedures of the seller in effect at the time of any such claim.

## EasyClean 3 Pod Filter

### PACKING LIST

#### Contents:

1. (3) Filter pods connected to a common inlet and outlet manifold with differential pressure switch connected hydraulically to one of the pods.
2. (1) Control panel
3. (3) Filter elements, (3) O rings, and (9) stainless steel screws
4. Operating manual & installation guide

Please read the accompanying “**Installation Guide**” provided before installing filter to system.

## EasyClean 3 Pod Filter

### INSTALLATION GUIDE

#### POWER SUPPLY

The filter requires 110 VAC, single-phase supply at 5 Amps. A cable gland is provided on the base of the control panel for the incoming power supply. The connecting terminals are located in the bottom left hand corner of the control panel. Power is connected directly to the 2 Amp miniature circuit breaker (MCB), connections for neutral and ground are located adjacent to the MCB (see drawing #ZG10153).

#### CONTROL PANEL

The control panel should be mounted as close to the filter assembly as possible while leaving sufficient room for easy access to the controls and opening of the panel door. The control panel should be mounted in a dry location.

#### PNEUMATIC CONNECTIONS

An 80 psi, clean and dry compressed air supply should be made to the ¼” bulkhead connector (labeled 7) and a ¼” bulkhead connection (labeled 8) is provided for exhaust.

Run 5/32” pneumatic airlines from the control panel bulkhead fittings to the filter. Connect in accordance with the following:

<u>Bulkhead fitting on Control Panel</u>	<u>Connection on Filter</u>
1	Pod 1 Actuator
2	Pod 1 Actuator
3	Pod 2 Actuator
4	Pod 2 Actuator
5	Pod 3 Actuator
6	Pod 3 Actuator
7	Air Supply
8	Exhaust

#### DIFFERENTIAL PRESSURE (DP) SWITCH

The filter is supplied with a DP switch connected hydraulically and electrically to the filter, the operating range of this switch is from 2 to 45 psi (differential pressure). Should the differential pressure across the filter exceed 45 psi, damage may occur to the switch.

A cable connector is provided on the base of the control panel for the electrical lead from the DP switch to the control panel.

**NOTE:** On the dual indicator DP switch, the left set of terminals is related to the lower dial (backwash set point) and the right set of terminals is for the upper dial (high set point indication).

## PIPE CONNECTIONS

The filter's inlet and outlet connections are 1" NPT male. The backwash connection is a 1" NPT female which should be plumbed to a suitable drain or tank capable of handling the system's pressure. **To avoid excessive pressure drops, which could impair backwash effectiveness, do not run the backwash line more than 10 feet with the ID of the line no less than 3/4".**

## FILTER SUPPORT

The filter can be either supported by the pods or by the inlet and outlet manifolds.

## DIMENSIONS AND WEIGHT

Weight:        Dry = 90 lbs excluding elements and 64 lbs including elements  
                  Wet = 120 lbs (assuming water)

## OPERATING REQUIREMENTS

The EasyClean filter requires a minimum working pressure of 35 psi. This pressure will ensure that there is a minimum of 30 psi on the outlet of the filter at time of backwash, e.g. 10 psi differential pressure at backwash. Correspondingly, if a higher DP set point is desired, then a higher inlet pressure is required.

## PUMP

To achieve the above pressure, it is imperative that the correct pump be chosen to deliver the required flow at the required pressure. Please contact Zero Gravity Filters for assistance in pump selection.

## REGULATING VALVE

**A regulating valve must be fitted on the discharge of the filter**, enabling the user to balance the filter's pressure and flow rate.

## ISOLATING VALVES

It is recommended that inlet and discharge isolating valves be fitted to the filter for ease of maintenance.

## PRESSURE GAUGES

Pressure gauges must be fitted to the system to monitor both the inlet and discharge pressure of the filter. Gauges may be fitted between the pump and filter inlet and between the filter discharge and regulating valve. Alternatively, there are blanked off ports on the filter pod to which a 1/4" NPT gauge may be fitted.

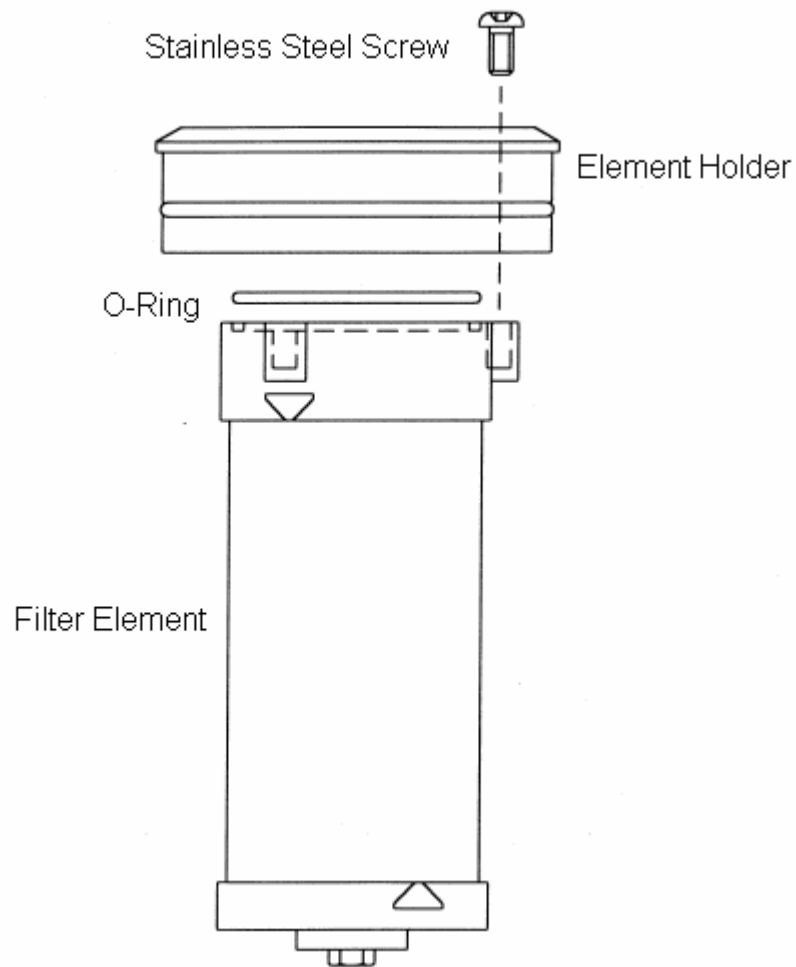
## INLET STRAINER

A coarse strainer must be fitted to the inlet side of the filter if particulates are greater than 1/4" in size.

## FILTER ELEMENT INSTALLATION

Once the filter has been installed per the Installation Guide and pressure tested, the filter elements can now be fitted by following the instructions below.

1. Undo the three ring nuts holding down the lid on each filter pod.
2. Remove the element holder from the filter pod.
3. Provided with the filter are two (2) small 'O' rings, and six (6) stainless steel countersunk screws.
4. Remove the filter elements from their packaging tubes.
5. Place one of the small 'O' rings into the groove on top of each filter element, see drawing below.
6. Using three of the screws provided, secure the filter element to the element holder as shown below.
7. Lightly grease the outer 'O' ring on the element holder and insert each filter element into the filter pod, ensuring that the element holder is fully seated onto the shoulder of the filter pod.
8. Replace lid to top of filter pod and hand tighten each ring nut.
9. Finally, tighten down each ring nut a further half-turn.



**CAUTION: WHEN FITTING ELEMENTS TO THE ELEMENT HOLDERS, THE ELEMENTS MUST BE HELD BY THE VERY TOP PORTION OF THE ELEMENT'S PLASTIC CAGE, ELSE DAMAGE MAY RESULT TO THE ELEMENT OR CAGE ASSEMBLY. ONCE FITTED, THE SCREWS MUST BE CHECKED FOR TIGHTNESS ONE HOUR AFTER OPERATION.**

# EasyClean 3 Pod Filter

## OPERATING MANUAL

### Description

The EasyClean 3 Pod Automatic Filter comprises three filter elements each housed in a separate filter pod, and connected by a stainless steel inlet and outlet manifold. The backwash sequence is controlled by a PLC contained in a wall mounted enclosure. The operation of the backwash sequence is accomplished by operating a system of pneumatically operated valves. A differential pressure (DP) switch is fitted on the side of one of the pods and connected hydraulically to that pod.

### Operating Parameters

Power Supply:	110 VAC, 5 Amp supply
Controls Supply:	24 VDC
Maximum Operating Pressure:	65 psi (higher pressures are available)
Maximum Differential Pressure:	45 psi
Static Test Pressure:	230 psi
Maximum Operating Temperature:	180° F (higher temperature ratings available)
Flow Rate:	see flow chart (Exhibit 1)
Micron Ratings:	20, 35, 50, 75, 100, 150, 200 and 400 micron.
Minimum Air Pressure:	80 psi
Maximum Air Pressure:	120 psi

### Materials Composition

#### Filter Material

Filter Pods:	Carbon steel
Manifolds:	1" stainless steel, schedule 40 with 1" NPT threads.
Filter Elements:	Stainless steel 304L, DTD 734 with glass filled polypropylene cages, stainless steel cages recommended for higher pressure and temperature applications.
Element Holders:	Glass filled polypropylene (stainless steel available), stainless steel screws.
3-Way Valves:	1" 3-way valve, 'T' ported, brass body, stainless steel 316 ball, and PTFE seats. Stainless steel 316 body is available.
Pneumatic Actuator:	Double acting, developing 156 Lb Ins at 80 psi. Manufactured by Bray, model DAB048.
DP Switch:	Two micro switches, brass wetted parts, fitted with visual setting indicator and Nitrile seals. Stainless steel wetted parts with Viton seals available.
'O' Rings:	Viton throughout.

## 1. COMPONENTS

### 1.1 FILTER PODS

Manufactured from either carbon steel or stainless steel, the filter consists of three pods each containing a filter element and joined by a common 1" inlet and outlet manifold.

### 1.2 THREE-WAY VALVES

Fitted on the inlet to each pod are pneumatically operated 3-way, 'T' ported valves. During backwash, the valves are operated sequentially to backwash each filter pod.

### 1.3 FILTER ELEMENTS

The filter elements are manufactured from stainless steel 304 and are made to different micron specifications. Element selection is dependent on the nature of the contaminant in the fluid to be filtered. As can be seen from the flowchart in Exhibit 1, the smaller the micron size the lower the flow rate through the filter. Correspondingly, this will also directly affect the clean differential pressure across the filter.

### 1.4 CONTROL PANEL

The filter's controls are contained in a separate wall mounted enclosure. The principal components of the control system are a Siemens PLC and 24 VDC transformer, Parker air solenoid valves, terminals, Allen-Bradley lamps and buttons, and a backwash counter. Connections between the panel and filter include pneumatic air lines and a 24 VDC electrical connection for the DP switch.

Fitted to the control panel are the following:

1. The Power Lamp (green) indicates that the 24VDC supply is connected to the PLC.
2. The Backwash Lamp (yellow) indicates that a backwash cycle is in progress.
3. The Fault Lamp (red) indicates an error has occurred, see Sections 2.5.2 and 5.0.
4. The Backwash Button initiates a manual backwash.
5. Reset Button for reset of any fault.
6. The MCB (miniature circuit breaker) is provided to allow the power supply to the PLC to be switched off and on easily and to break at any load exceeding 2 Amps. **Ensure that power is disconnected elsewhere before working on the panel.** The MCB is located in the bottom of the control panel (refer to drawing ZG10135).
7. The Backwash Counter counts the total number of backwash cycles and is not resettable . (Note that the counter advances 1 digit after a complete backwash of all three filter elements).

## 2.0 OPERATION GUIDELINES

Before operating the filter, ensure that it has been installed per the INSTALLATION GUIDE provided. Failure to do so could affect the filter's performance and void the filter's warranty.

### 2.1 FILTER OPERATION

The DP switch monitors the difference in pressure between the pod's inlet and outlet, and upon reaching a user determined DP set-point, an electrical signal will be sent from the DP switch to the control panel.

The operation of the valves during backwash is controlled by the PLC, which controls the opening and closing of each valve and for how long the valves are left open. Adjustments to the backwash cycle are made by altering the PLC's operating parameters. The control panel initiates the backwash sequence as follows:

The inlet ports of each pod are fitted with a three way 'T' ported valve, which is operated by a pneumatic actuator. The other port of the 'T' ported valve is connected to the backwash port. In the filtering mode the inlet port is open and the backwash port is closed. Fluid enters the pod through the inlet port of each valve and passes through the filter element. Debris with an equivalent spherical diameter greater than the micron rating of the filter is trapped on the outer surface of the elements.

When the differential pressure set point is reached, the control system operates the pneumatic actuator on the first pod and this pod is now in backwash mode while the other two pods are left on line. By operating the 'T' ported valve, the inlet port is closed and the backwash port is opened which allows a portion of the clean filtered fluid from the two pods left on-line to flow in a reverse direction through the element and exiting the pod through the backwash port and away to drain.

This reversal of flow has the effect of opening the spiral coils of the filter element and dislodging any trapped debris. The first pod remains in this position for the 'backwash duration', which is an adjustable set point on the PLC of the control system (see Controls Section). This duration can be adjusted depending on site conditions. When the backwash duration of the first pod has expired, the control system reverts the 'T' ported valve back to the filter position and then backwashes the second and third pod in sequence, as described above. Note: Only one pod at a time is cleaned while the other pods remain on line at any given time during the backwash sequence.

A short delay facility between pods is referred to as the 'pod interval time'. This interval is pre-set and is included to lengthen the overall time of the backwash. The default pod interval time is 1.5 seconds although this may be altered by reprogramming the PLC, please consult Zero Gravity Filters. When all pods have been backwashed, the filter reverts to filtering mode.

## 2.2 DIFFERENTIAL PRESSURE (DP) SWITCH

The difference in pressure between the filter's inlet and discharge operates a diaphragm, which in turn will open the normally closed electrical contacts within the switch. This in turn provides a signal to the control system which then initiates a backwash.

The DP set point may be adjusted by turning the adjusting nut located inside the switch cover. Turning this nut will alter the setting on the indicator located on the outside of the switch. This indicator is for reference only. The actual differential pressure at which the switch operates is determined by calculating the difference between the inlet and outlet pressure gauges.

It is imperative that the clean DP of the filter is ascertained prior to setting the backwash set point on the switch. To set the DP set point, determine the maximum acceptable DP that the filter can impose on the overall system and set the switch accordingly. Note, the closer the backwash set point is to the filter's clean DP, the more frequent the filter will backwash. It is usually necessary to try a number of settings until the best compromise is reached. **Maximum setting for the DP switch is 40 psi.**

The DP switch is factory set at approximately 10 psi. **Note: The filter requires a minimum of 30 psi on the clean water backwash supply for an efficient backwash.**

## 2.3 BACKWASH DURATION TIMER

The backwash duration is the length of time that each 3-way valve will remain in the backwash position and how long each pod is backwashed. This is how adjustments are made to achieve optimum backwash efficiency. The backwash duration can be set as low as 1 second without hindering backwash efficiency. The longer the duration, the longer the filter remains in backwash. Therefore, at some point, a full cleaning of the filtering elements will be impaired.

The objective when setting the backwash duration is to find the optimum balance between low backwash wastewater and full element cleaning. Full element cleaning is demonstrated when the filter returns to a clean DP as evidenced by comparing the inlet and discharge gauge pressures.

To alter the backwash duration, see section 2.5.1.

## 2.4 BACKWASH INTERVAL TIMER

The EasyClean filter is recommended to be operated with the DP switch provided. This ensures that backwashing follows the contaminant load on the filter, which will often be variable. The EasyClean has an additional advanced facility which takes over from the DP switch at times of low contaminant loading. This feature is called the backwash interval timer and is factory set to ten hours. This ensures that the filter does not spend excessive amounts of time inactive during conditions of low contaminant loading. This facility avoids the problems frequently encountered with mechanical equipment which remains static for long periods of time.

To alter the interval time, see section 2.5.1.

**Note:** Adjustments to both timers must be done when in filtration mode and not during a backwash. Therefore, it is advisable to initiate a manual backwash immediately after any alterations are made to ensure that the new settings have been registered in the PLC.

## 2.5 CONTROL SYSTEM

### EXPLANATION OF TERMS

PLC	Programmable Logic Controller. A Siemens LOGO! 24RCL is provided and is supplied from the 24VDC power supply within the panel. The power supply to the panel is an 110 VAC supply. To determine the program version that is installed on the PLC, depress the reset button three seconds and view the PLC's display.
Input	24VDC signals fed into the PLC from switches, buttons etc. The 24RCL has the capacity for 12 inputs.
Output	Information in the form of 24VDC signals which can power indicator lamps, solenoid valves, counters, and factory DCS feedback (i.e. Honeywell System). The 24RCL has the capacity for 8 outputs.

### I/O LIST

I <sub>1</sub>	Not Used
I <sub>2</sub>	Manual Backwash Button
I <sub>3</sub>	Differential Pressure Switch Contacts – Backwash set point
I <sub>4</sub>	Backwash Interval timer. Allows the user to instigate a backwash after a preset time interval (set to 10 hours as default).
I <sub>5</sub>	High Differential Pressure switch contacts – High set point
I <sub>6</sub>	Not Used
I <sub>7</sub>	Not Used
I <sub>8</sub>	Not Used
I <sub>9</sub>	Not Used

- I<sub>10</sub> Not Used
- I<sub>11</sub> Not Used
- I<sub>12</sub> Reset Button
  
- Q<sub>1</sub> Pod 1 Actuator
- Q<sub>2</sub> Pod 2 Actuator
- Q<sub>3</sub> Pod 3 Actuator
- Q<sub>4</sub> Pod 1 Actuator
- Q<sub>5</sub> Not Used
- Q<sub>6</sub> Not Used
- Q<sub>7</sub> Backwash Counter and Backwash Lamp
- Q<sub>8</sub> Common Fault Lamp

### 2.5.1 PROGRAM ADJUSTMENTS

The LOGO! program is simply a series of control statements contained within program segments or “Boxes”. Adjustments to timers within the program are made by gaining access to the appropriate box and changing the setting.

Most variables within the program are set at start up and should not be altered without reference to Zero Gravity Filters. Certain variables are adjustable at any time by the user and are outlined below.

<u>Box No.</u>	<u>Customer Variable</u>	<u>Function</u>	<u>Default</u>
B03	Yes	Backwash Duration. Sets time for which backwash valve remains open for each pod (and determines the amount of fluid used during backwash).	3.0 sec
B06	Yes	DP Debounce Time. Sets time for which DP switch contacts must remain open before backwash starts.	3.0 sec
B08	Yes	Backwash Interval Time. Sets interval between backwashes.	10.00 Hr
B34	Yes	Service Interval. Sets number of backwashes after which service interval is notified.	20,000
B31	Yes	The length of time allowed for the DP Switch contacts to close before indication of an alarm condition (see Section 2.5.2).	50 sec
B46	Yes	High DP Debounce Time. Sets time for which High DP switch contacts must remain open before alarm indication.	10.0 sec

Adjustments are made by following the sequence described below:

- Step 1 Press the blue ESC key on the front of the LOGO! Controller.
- Step 2 Select "Parameterize" option and press OK.
- Step 3 Use the up and down keys to arrive at the required box.
- Step 4 When the desired box has been located, press OK.
- Step 5 Use the left and right arrow keys to position the cursor over the required digit, and then use the up and down keys to change the value.
- Step 6 Once the correct value can be read, press OK. The up and down keys can be used to change another box if required. Finally, press ESC twice to return to the running program.

The time/date can be altered at step 2 above by selecting "Set Clock" and following similar steps as above.

Note:

T	=	actual time set
Ta	=	this facility allows the actual value of any particular timer to be observed while the program is running. This feature is useful in finding the optimum value for a setting.
Lim	=	the number value set
Cnt	=	the actual count reached

### **BACKWASH SEQUENCE**

Once a backwash (self cleaning cycle) has been initiated by either the backwash button, DP switch or interval timer the following sequence takes place:

1. The 3-way ball valve fitted on the Inlet to pod 1 is rotated, which shuts off the flow of fluid into that pod while simultaneously opening the backwash port.
2. Pod 1 is then backwashed for the length of time set on the duration timer
3. Once the duration time expires, the 3-way valve fitted on pod 1 is rotated back to the filter position.
4. All the time that Pod 1 is off line, Pod's 2 and 3 are filtering.
5. The same procedure is then carried out for pods 2 and 3 and finally pod 1 again.

Note: If the backwash sequence is initiated by the DP switch, there is a three second debounce time (pause) between receiving the DP signal and starting the backwash. This debounce time eliminates unnecessary backwashes due to possible pressure surges in the system.

### **2.5.2 FAULT CONDITIONS**

**DP Switch Contacts Still Open.** When the backwash is initiated by the differential pressure (DP) switch, the DP switch contacts will open to start the backwash. The contacts should close upon completion of the backwash cycle to indicate that the cleaning process is complete. If this is not the case and the DP contacts remain open for 50 seconds, the fault lamp will illuminate red and output Q8 will be energized. Also an error message will be displayed on the PLC stating:

**DP switch contacts  
Still open  
See manual**

To reset the fault lamp once the fault has been cleared, press the reset button on the front of the control panel. If the DP switch contacts have subsequently closed, then the fault lamp will turn off. If the fault lamp remains illuminated, then check for possible faults (see Section 5.1).

**High DP Switch Contacts Open.** A second set of contacts can be supplied to monitor the differential pressure across the filter and indicate an alarm condition if the DP exceeds the 'high' set point.

In normal operation, as the filter gets dirty the differential pressure across the filter will increase and will initiate a backwash at the user-defined set point. Upon initiation of the backwash, the differential pressure across the filter should continually decrease throughout the backwash sequence. However, if the differential pressure continues to increase, this may indicate a potential problem with the cleaning process.

The high DP set point is user-defined and if the DP across the filter reaches this set point for three (10) consecutive seconds, then the contacts will open and the fault lamp will illuminate red (see Section 5.1). Also output Q8 will be energized and an error message will be displayed on the PLC stating:

**High DP contacts  
open  
See manual**

To reset the fault lamp once the fault has been cleared, switch the power off and back on using the MCB in the control panel. If the DP switch contacts have subsequently closed, then the fault lamp will turn off. If the fault lamp remains illuminated, then check for possible faults (see Section 5.1).

**Service Required.** An internal counter totals all backwashes and gives a signal once a set point is reached. This counter is factory set at 20,000 cycles or backwashes. This is a useful facility to indicate that the filter should be serviced. When this set point is reached, the fault lamp will illuminate and the PLC display will read:

**Service Required**

To clear this indication, press and hold the reset button for thirty seconds.

### **3.0 FILTER START-UP**

Once the filter has been properly installed and after reviewing the filter's control system, the filter may be started by following the procedure below.

1. With inlet, discharge and backwash isolating valves closed, start any pumps serving the filter. Slowly open the inlet Isolating valve. Check and correct for any possible leaks.
2. Ensure that power is to the filter in accordance with the Installation Guide (the green LED should be illuminated). Ensure air to the control panel is at least 80 psi.
3. The discharge isolating valve may now be slowly opened and the regulating valve adjusted to give the desired flow rate and pressure combination.
4. A final, on-line backwash check should be performed. Manually initiate a backwash by depressing the manual backwash button, check that the backwash counter advances, backwash LED illuminates yellow, and that the indicators on the pneumatic actuators move according to the backwash sequence outline in Section 2.5.1.

## **4.0 RECOMMENDED MAINTENANCE**

Depending on the application, the filter elements may require to be removed for cleaning at regular intervals. In any case, the following preventative maintenance program should be followed (see section 6.0 for spare parts listing):

### **Every Six Months**

1. Visually inspect the following:
  - a. No leaking from filter pods
  - b. No leaking from valves
  - c. Illumination of GREEN power lamp
2. Push manual backwash button and observe the following:
  - a. Illumination of YELLOW backwash lamp
  - b. Operation of each 3-way ball valve by observing rotation of indicator on each actuator.
  - c. Increase of backwash count.
3. Record backwash count

### **Every Twelve Months**

1. Renew all O Rings
2. Visually inspect filter elements

## **4.1 REMOVAL, INSPECTION AND CLEANING OF FILTER ELEMENTS**

To remove the filter elements from the filter, perform the following procedure:

1. Take filter off-line, isolate, and drain.
2. Carry out the procedures outlined in the 'Installation Guide' for gaining access to the filter elements ("Filter Element Installation").
3. Remove each filter element in turn by gently lifting the element holder in each pod.

Once the filter elements are removed, perform the following cleaning procedure:

1. If the contaminant is loose, then a simple shaking motion in water will suffice.
2. If light scale has formed, then any proprietary stainless steel cleaner will clean the elements to a like new condition. Always follow-up by running water down the center of the filter element to ensure that no debris is lodged between the turns of the coil.
3. If the filter elements are heavily scaled, use a mild industrial acid and follow the product's safety precautions. Always follow-up by running water down the center of the filter element to ensure that no debris is lodged between the turns of the coil.

Once the elements are clean, examine closely for any damage to the filter elements and the support cage inside each element, finally check tightness of mounting screws. Refer to the 'Installation Guide' for instructions on replacing filter elements. Please refer to Section 6.0 for "O" ring part numbers.

## **4.2 REPLACEMENT OF FILTER ELEMENTS**

To replace the filter elements, follow the procedure below:

1. Lightly lubricate the “O” ring on each element holder with an appropriate lubricant. Ensure that each “O” ring is fitted properly within the groove on the element holder.
2. Insert filter elements into each pod.
3. Follow procedures outlined in the ‘Installation Guide’, entitled “Filter Element Installation”.
4. Restart any pump, open the valves to discharge, inlet, and backwash. Check filter performance.

## 5.0 FILTER DIAGNOSTICS

### 5.1 FAULT INDICATION

Listed below is a guide to the action required for the following faults indicated on the control panel.

INDICATION	REASON	ACTION
Fault lamp solid red and error message  DP switch contacts still open. See manual.	DP switch contacts still open after backwash.	Check operation of switch and pressure lines are clear.  Check electrical connection between switch and panel.  DP switch set point set to low.  Check actual DP across the filter. If too high after a backwash the filter elements may need manual cleaning or backwash duration time extended (see sections 2.3 and 4.1)
Fault lamp solid red and error message  High DP contacts still open. See manual	High DP switch contacts still open.	Check operation of switch and pressure lines are clear.  Check electrical connection between switch and panel.  High DP switch set point set to low.  Check air supply is on and all pneumatic lines are intact.  Check if flow rate or contaminate loading on filter has increased, if so, reduce flow rate, or consider coarser elements
Fault lamp solid red and error message  Service required See manual	Service interval has been reached.	Call supplier and arrange filter service and reorder supplies, see Section 6.0 for part numbers.

## 5.2 FAULT FINDING

Listed below is a guide to commonly asked questions regarding filter performance.

FAULT	POSSIBLE CAUSE	REMEDY
Excessive Backwash Frequency	Filter elements blocked or excessively fouled.	Clean and replace filter elements, see Section 4.1 and 4.2.
	DP switch set too low.	Raise DP switch set point, see Section 2.2.
	Flow rate has increased.	Check and regulate.
	Contamination has increased.	Check, and if possible, increase DP switch set point. If contamination load cannot be corrected, coarser elements may be required, see Section 1.3 and 2.2.
	Backwash interval timer too low.	Reset, see Section 2.4.
Continuous Backwash	See Excessive Backwash Frequency faults and remedies.	
	Broken electrical connections	Check all electrical connections between switch and control panel
	DP switch has failed.	Verify by removing the DP switch's electrical cover and check that contacts are being switched on rise and fall of DP. Replace switch if necessary.
Upon completion of backwash, DP is higher than clean DP	Filter elements blocked or excessively fouled.	Clean and replace filter elements, see Section 4.1 and 4.2.
	System pressure too low for effective backwash.	Check and regulate.
	Backwash duration set too low to give thorough clean.	Increase backwash duration time setting, see Section 2.3.
	DP switch set point set too high causing excessive blinding of elements.	Check and regulate, see Section 2.2.
Fluid flows from backwash line after end of backwash cycle	Backwash valve is failing to close or seat properly	Check that the valve is being instructed to close. Look for Output Q1, Q2 or Q3 depending on which pod is leaking.
		Check air supply to actuator.
		If valve is still passing, dismantle and check for an object jamming the ball valve or damaged seats. Call supplier for service kit or replacement.
Filter Leaking	"O" seals failed, worn, or missing.	Check and replace as necessary. See Spare Parts List, Section 6, for part numbers.

## 6.0 Spare Parts

Recommended spare parts for the EasyClean Duplex Automatic are as follows. Please call either your local Representative or Zero Gravity Filters for pricing.

<u>Part Description</u>	<u>Part Number</u>
Filter Element – Stainless Steel 316 Cage Assembly	660***
Element Holder – Glass Filled Polypropylene	9003-001
Element Holder – Stainless Steel 304	9003-002
Element Holder – Stainless Steel 316	9003-003
Carbon Steel Housing (w/o filter element)	7610-001
Stainless Steel 304 Housing (w/o filter element)	7610-002
Stainless Steel 316 Housing (w/o filter element)	7610-003
Siemens LOGO PLC – 24 VDC, with Program	3000-001
EPROM with Program	3010-001
24 VDC Siemens 1.3 A Transformer	3002-001
Parker Air Solenoid Valve	3100-002
DP Switch, visual indicator, 1 micro, brass	3200-001
DP Switch, visual indicator, 1 micro, stainless steel	3200-002
DP Switch, visual indicator, 2 micro, brass	3200-003
DP Switch, visual indicator, 2 micro, stainless steel	3200-004
DP Switch, visual indicator, 1 micro, stainless steel, Viton	3200-005
DP Switch, visual indicator, 2 micro, stainless steel, Viton	3200-006
1", 3-way 'T' ported valve and pneumatic actuator, brass	7510-001
1", 3-way 'T' ported valve and pneumatic actuator, st. st.	7510-002
1" Ball valve and pneumatic actuator, brass	7511-001
1" Ball valve and pneumatic actuator, stainless steel	7511-002
Eye Bolt Assembly (price per unit, 3 per pod)	7501-001
Complete Set of O rings – Buna (3 Total)	7500-001
Complete Set of O rings – EPDM (3 Total)	7500-002
Complete Set of O rings – Viton (3 Total)	7500-003

\*\*\* micron designation

Exhibit 1

# EasyClean Pressure/Flow Curve

