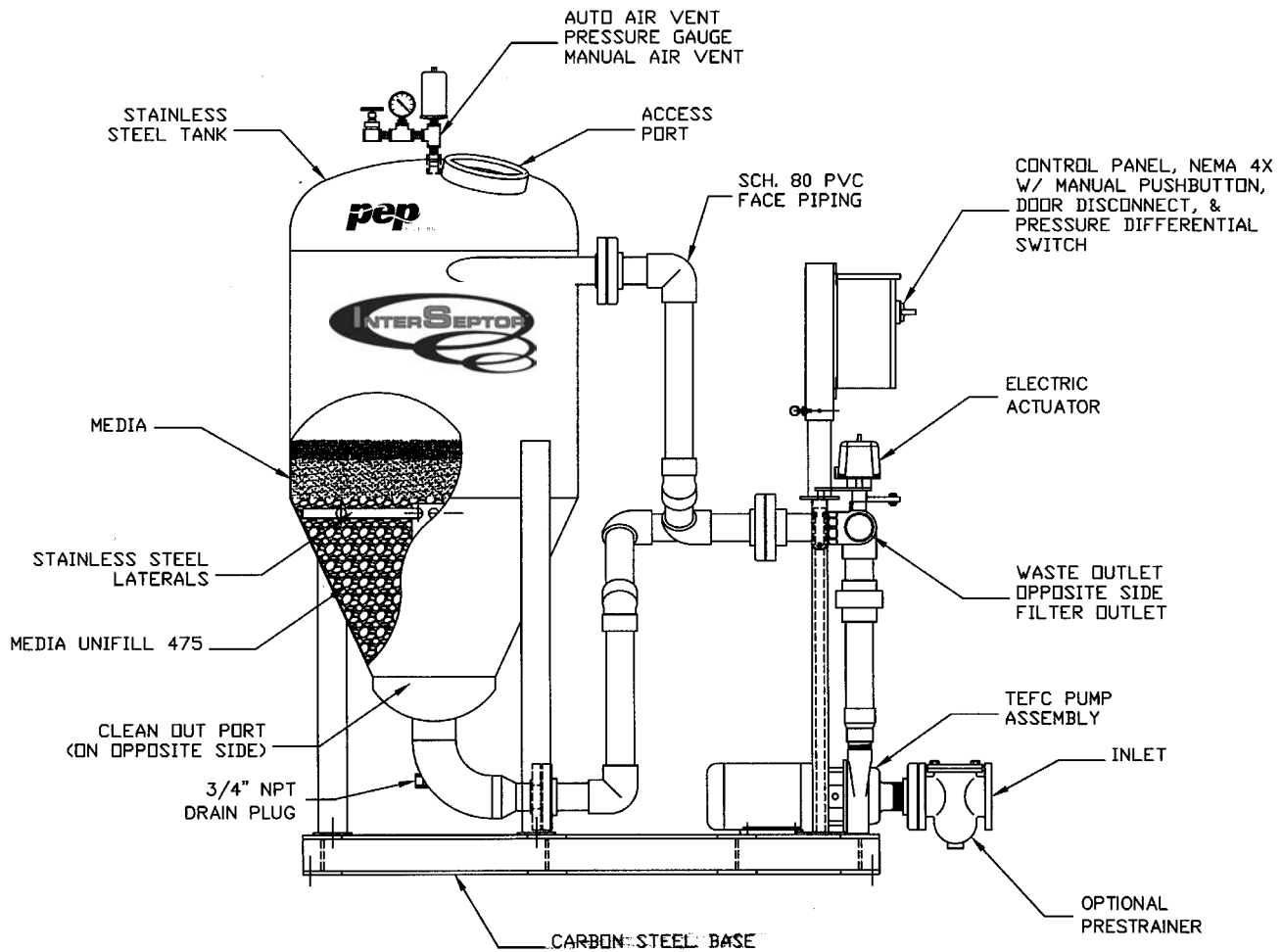


InterSeptor (IMF) Series Filter System Operating & Maintenance Manual

InterSeptor Series High Efficiency Media Filtration System



IMF Series Filter System Operating & Maintenance Manual



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GENERAL DESCRIPTION

PEP IMF series high efficiency filters are permanent media type units specifically designed to remove suspended particulates down to 0.45 micron from industrial and process water. IMF filters are suitable for both side-stream and in-line applications on pressurized systems. The standard pressure rating for IMF filter systems is 150 psig (1,050kPa). The filter vessel is constructed of 304 stainless steel to ASME Section VIII, Division I standards. Higher pressure ratings are available. The filter vessel internals are also constructed of 304 stainless steel. The filter vessel has a conical bottom with an annular ring under drain that is flush with the cone bottom. Because the under drain is flush with the filter vessel bottom, this unique design eliminates stagnant water below the under drain.

Filter Operation

Unfiltered system water is pumped to the IMF filter tangential inlet. Water enters the filter vessel in a swirling motion that separates the larger and heavier particles from the liquid and keeps them to the media bed perimeter. Water then flows through the media bed and suspended particles are trapped within the filter media. The resulting filtered water passes from the vessel through the radial bed fluidizers and annular ring under drain at the bottom of the filter and the filtered is returned to the system.

When trapped particles cause the pressure differential across the media bed to reach a pre-determined pressure of approximately 16 psig, the filter valves automatically reposition and the media is fluidized in reverse flow. The accumulated particulate exits the filter vessel via the tangential inlet and flows to a suitable drain. After which, the valves automatically reposition and filtration continues. Depending on backwash flow rate, the filter may backwash anywhere from 90 seconds to three minutes (field selectable).

Installation

Unpacking

Immediately upon receipt, the PEP IMF filter should be checked thoroughly to ensure that all required items have been received and the filter equipment is free from transportation damage prior to signing the bill of lading. The filter serial number is located on a label affixed to the top inside of the control panel enclosure. Check the serial number on the label with the invoice/packing list to assure they match.

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Rigging

The PEP IMF units should be lifted with a forklift or overhead crane.

Note: The lifting lugs located on either side of the filter vessel should be used when lifting the filter vessel only. The vessel must be empty of all water and media. If these units are lifted with an overhead crane, the filter vessel must be removed from the base and lifted separately. Lifting straps must be located below the base and should not come in contact with filter components (pump, face piping, control panel, etc.).

All PEP water filters should be anchored to the floor by means of anchor bolts. The IMF base has holes suitable for 1/2" anchor bolts.

After the unit has been installed, locate the pressure gauge and air relief valve (shipped inside the control panel) and install them on the top of the filter vessel.

Media Loading

Note: Never load filter media or gravel into a dry filter vessel. Fill the vessel with water approximately one foot above the stainless steel laterals before loading media. Refer to the drawing on the cover of this manual to see the location of the laterals. This will help to minimize dust and will also take some of the energy out of the media as it falls into the vessel, preventing possible damage to the internal piping. Media is loaded into the filter vessel through the top access port on the filter vessel

Four different types of media are supplied with the filter. The loading sequence is as follows: Unifill 475, Unigran 55, Unigran 85 and last, Unigran 20.

Refer to Table 6 for the recommended quantities of media for each filter model.

The specially manufactured spherical silica sand media used in PEP InterSeptor media filters is designed to remove suspended solids 0.5 micron and larger, over 90% by volume. The media will ship to the job site in 1/2 cubic ft. pails (50 lbs/23 kg) or 1 cubic ft. bags (100 lbs/46 kg) for ease of handling during the media loading process.

Actual quantities may vary slightly with vessel pressure ratings. Correct quantities will be noted on the shipping and inspection records for each system. Always check integrity of filter internals **before** loading media.

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Piping

The PEP IMF filter should be installed as follows:

1. Connect a feed water line from the system sump or piping to the connection labeled "Inlet" on the pump. If the inlet connection is located above the operating water level of the system sump, install a foot/check valve to prevent pump suction loss.
2. Connect the return line from the connection labeled "Outlet" to the system sump or piping.
3. A service valve should be installed on the inlet, outlet, and city water line (if city water is used for backwash) to allow filter servicing. For units using a backwash source other than the system matched pump, refer to the Backwash Flow Rate vs Time graph to determine the required backwash flow rate. Connect this line to the fitting labeled "City Water". The maximum city water backwash supply pressure on the IMF filters should never exceed the pressure rating of the filter vessel. If public or municipal water is used for backwash, a reduced pressure back-flow prevention or check valve is required in the line (refer to local codes).

Connect a backwash waste line to the connection labeled "Waste". This line carries the backwash wastewater to the drain. Do not put a valve in the backwash line and never reduce the backwash line size.

Note: If the drain is not large enough to handle the backwash flow rate, it may be necessary to use a backwash holding tank to collect the wastewater, and regulate the flow from the holding tank to drain.

4. All interconnecting piping, fittings, valves, or other accessories connected to the filter system (whether supplied by PEP or others) must be independently supported to eliminate stress on piping.

Check with local, county, or other government authorities to ensure compliance with applicable government or industry codes.

Note: The $\frac{3}{4}$ " (20 mm) drain plug on IMF units is located on the tank bottom outlet.

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Actuator Requirements

PEP IMF filters utilize electric actuators to control the valve action between the filtration and backwash cycles. The electric actuator is designed for 110 VAC control.

Wiring

IMF filters are supplied with a pump and automatic backwash controls and the following system components: NEMA 4X (IP32) control enclosure containing an on/off disconnect switch, motor overload protection, transformer to provide 110 VAC control voltage, adjustable backwash timer, 24 hour time clock, pressure differential switch to initiate backwash, valve actuator to reposition valves for backwash, and push button for manual backwash initiation. Units are provided with 460 VAC, 3 ϕ close-coupled pump/motor assembly.

IFM filter units configured for using city water backwash are provided with a magnetic motor starter.

The following recommendations conform to the 1993 national electric code. Check with local, county, or other government authorities for prescribed requirements.

Note: Refer to the pump/motor nameplate for horsepower and current draw.

Single and Three Phase Automatic Units

Install a separate power supply line with circuit breaker protection between the closest branch distribution panel and the control box. The full load current for standard single and three phase units is listed in Tables 4 & 5. The control box contents are pre-wired and include a service disconnect switch, thermal overload/short circuit protection, and a transformer to convert the power supply to single phase 110 VAC for controls (for pump motor voltages other than 110 VAC). Wire the power supply lines to the disconnect switch. All incoming power supply lines must connect to the door interlock disconnect.

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Operation And Maintenance

Initial And Seasonal Start-Up

Before initial start-up or after a shut down period, the IMF filter should be thoroughly inspected and cleaned.

Caution: Perform the first five of the following recommendations with power off. Refer to the Safety Precautions on Page 8, regarding the safeguarding of maintenance personnel from biological contaminants, prior to initial and seasonal start-up.

1. Loosen the bolts around the pump pre-strainer (if equipped) tank lid. Remove the lid, inspect the O-ring seal and lubricate. Clean debris from the pump pre-strainer basket. Prime the pump suction line by filling the strainer basket housing. Replace the basket, lid and bolts.
2. Turn the pump and motor shaft by hand to ensure free rotation (if possible).
3. On PEP filters, loosen the access bolts on access port lid, remove lid and lubricate the bolts as necessary.
4. Inspect the filter vessel internals and media pack. If the media pack is contaminated, remove the foreign material or replace the media, and re-install the top access port.
5. Open manual air relief valve on top of the filter tank. Start the pump motor briefly and check the arrow on the pump volute for proper rotation. Turn the pump motor off. Do **not** operate the pump for an extended period of time with the pump rotating backwards. Have a qualified electrician change leads to correct rotation.
6. With the air relief valve open on top of filter tank, check the shut-off valves in the filter inlet and outlet water lines to verify they are open. Make sure the pump is primed. Start the pump and allow the filter vessel to fill. Wait for all air in vessel to be released before closing the manual air relief valve.
7. Check the voltage and current of all leads on the pump motor. The current amp draw should not exceed the pump motor nameplate rating.
8. Check the unit for any unusual noise or vibration and contact your local PEP Representative if noise or vibration occurs.
9. Check the unit for any air or water leaks. Leaks must be repaired. Failure to do so could result in poor performance and/or personal injury.
10. Backwash the filter. After back washing the filter, check and record the inlet and outlet pressure gauge readings. The media should be back washed

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whenever the pressure drop across the filter (the difference between the two gauges) reaches approximately 16 psig.

After First Hour Of Operation

1. Open the air relief valve on top of the filter tank. Close the valve after the air has been purged from the system. Excessive air release represents a leak in the pump suction piping, and must be repaired. Air accumulation in the filter tank can result in an unsafe condition due to excessive pressure within the tank.
2. Check the unit for any unusual noise or vibration and contact your local PEP Representative if noise or vibration occurs.
3. Check unit for any air or water leaks.

Operation

During operation, PEP IMF filters should be inspected, cleaned and lubricated on a regular basis. The required services and recommended frequency minimums for each are summarized in the Operation and Maintenance Schedule in this manual.

Cold Weather Operation

IMF filters exposed to below freezing ambient temperatures require freeze protection. Installation in a heated indoor space is the best means of preventing the water from freezing in a filter. Where indoor installation is impractical because of filter location or space limitations, supplementary heat must be supplied through the use of electrical heat tape and insulation. The parts of the filter that must be heat traced and insulated are: pre-strainer tank, pump, piping, valves, pressure switch tubing, and filter vessel. The unit should be drained when shut down for any period of time. Refer to the Seasonal Shutdown section of the manual for recommendations.

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Seasonal Shutdown

The following services should be performed if the unit is shut down for a prolonged time period.

1. Shut off all electrical power.
2. Close the shut-off valves in the filter inlet and outlet water lines. For units using a backwash source other than the system, close the shut-off valve in the line from that source.
3. Drain all external piping to and from the filter.
4. Open the manual vent valves and the drain line to the filter tank and piping. After the water has drained, close the drain and vent.
5. Loosen the bolts that hold the filter access lid in place and remove the inspection port cover. Lubricate the bolt and replace the port gasket if necessary.
6. Inspect the filter vessel internals and media pack. If the media is contaminated, remove the foreign material and replace the media if necessary. Install the filter access port and secure the bolts.

Maintenance Procedures

Pump Pre-Strainer (if equipped)

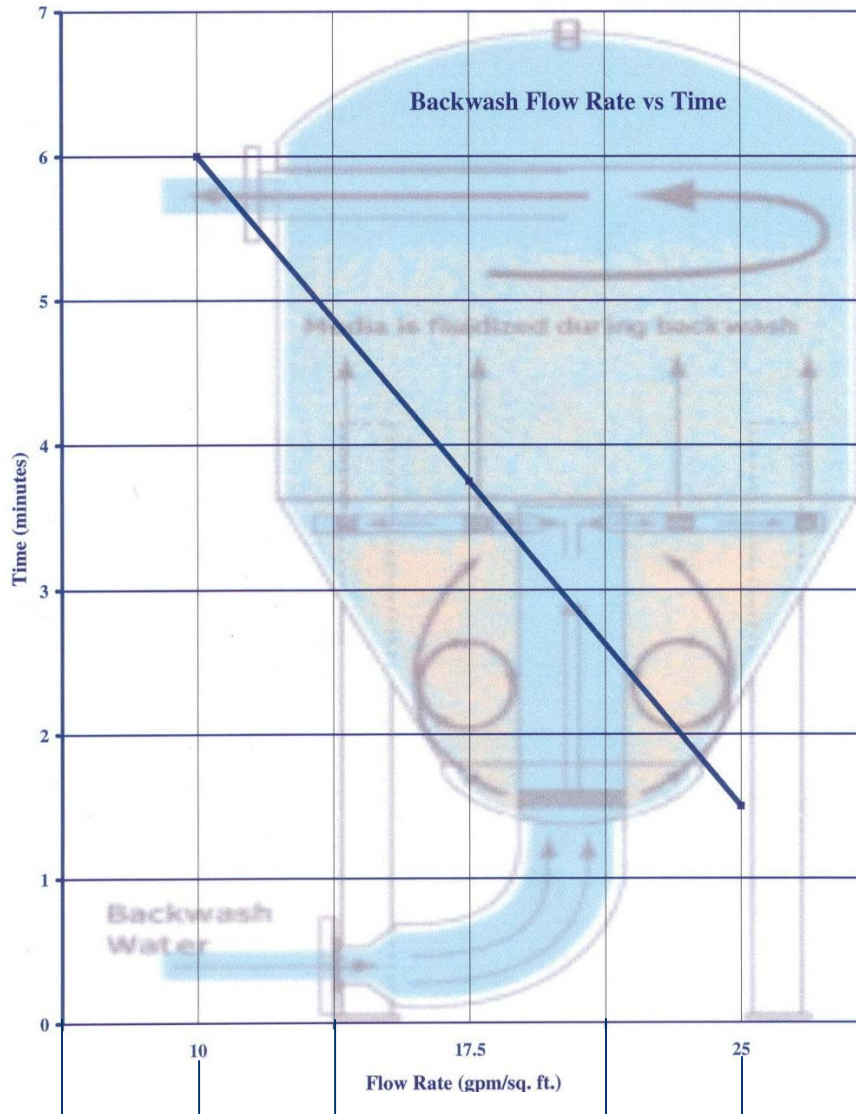
Warning: Disconnect all electrical power prior to performing pump maintenance. The filter pre-strainer basket on the pump inlet must be kept clean and free of debris. Shut off the power, close the valves, open the air relief valve, remove bolts and lid. Remove and clean the basket. Replace basket, lubricate O-ring, and tighten bolts.

Backwashing

The filter media will backwash when the differential pressure is reaches approximately 16 psig. The backwash cycle on automatic units can be manually initiated by pushing the button on the control panel until the valves change position.

The valves will then automatically reposition to filter mode after a preset interval (typically 90 seconds to six minutes, as determined by the backwash flow rate. **IMF filters should be back washed at least once every three days.**

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IMF 24 (gpm)	0	31.4	43.2	55	66.7	78.5
IMF 30 (gpm)	0	49.1	67.5	85.9	104.3	122.7
IMF 36 (gpm)	0	70.7	97.2	123.7	150.2	176.7

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Filter Tank

The filter tank internal components should be visually inspected annually or whenever back washing does not reduce the pressure of the filter tank to the starting media gauge pressure. On IMF filters, remove the access port on top of the tank to inspect internal components.

Note: Always use care and follow proper shutdown procedures. Remove and inspect the media. IMF filters have hand access ports located on the top and side bottom of the tank to facilitate media removal. Over a period of time, foreign matter may become embedded in the media pack that will not back wash. Contaminated media should be discarded. Load the filter vessel with the proper amount of new media, following the media loading instructions.

Water Treatment

Filtration is an effective way of reducing suspended particulates in fluids but is only one important component in an effective water treatment program. Dissolved solids originally present in water remaining after evaporation cannot be eliminated by filtration. Concentration of these dissolved solids increase rapidly and can cause scale and corrosion. In addition, airborne impurities and biological contaminants, including Legionella, may be introduced into the re-circulating water through the cooling equipment being filtered.

To control potential contaminants, a water treatment program must be employed. In many cases a simple bleed-off in the system may be adequate for control of scale and corrosion. The filter backwash typically constitutes a portion of the bleed. Biological contamination can be controlled through the use of biocides or other types of control and such treatment should be initiated at system start-up and incorporated into the total treatment system regime.

For specific recommendations on water treatment, it is recommended to consult with a water treatment specialist.

Factory Authorized Parts

PEP maintains a stock of replacement parts. Parts usually ship within one to three business days after receipt of order. In emergency situations, shipment can usually be made within 24 hours (if stock). **To expedite your parts order, please include the unit serial number and model when ordering parts.**

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Recommended Spare Parts

- O-ring/gasket for filter tank top access port and hand hole gaskets.
- O-ring seal/gasket for pump pre-strainer lid (if equipped).
- Seal kit for pump
- Transformer fuse

Safety Precautions

All electrical, mechanical and rotating machinery constitute a potential hazard, particularly for those not familiar with its design, construction, and operation. Accordingly, adequate safeguards should be taken whenever working with or near IMF filter systems.

Equipment operation, maintenance and repair should be undertaken by qualified personnel only. All such personnel should be thoroughly familiar with the equipment, the associated system and controls, and the procedures set forth in this manual. Proper care, procedures, and tools must be used in handling, lifting, installing, operating, maintaining, and repairing the IMF filter system.

For the protection of authorized service and maintenance personnel, the pump motor associated with this equipment should be installed with a lockable disconnect switch located in close proximity and within sight of the IMF filter. No service work should be performed on or near the pump motor without first ensuring that the pump motor has been electrically disconnected and locked out.

The re-circulating water system may contain chemicals or biological contaminants that could be harmful if inhaled or ingested. Accordingly, personnel exposed to the mist produced by water jets or compressed air (should these be used to clean portions or components of the IMF filter) should wear half-face respirators with HEPA filter cartridges, NIOSH/MSHA approved number TC-21C-142/TC-21C-182.

Warranty Policy

The PEP InterSeptor Series Media Filter vessel and internals are warranted to be free from defects in materials and workmanship for a period of 15 years after shipment. All other system components are warranted against defects in materials and workmanship for 12 months from date of startup or 18 months after shipment, whichever occurs first. Damage due to corrosion is not covered. Contact PEP Filters for further warranty information.

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OPERATION AND MAINTENANCE SCHEDULE

TYPE OF SERVICE	START-UP	MONTHLY	SEMI-ANNUALLY	SHUTDOWN	ANNUALLY
Inspect General Condition of Unit	X	X			
Check & Lubricate Clamp on Strainer Lid (if equipped)	X	X		X	X
Clean Basket in Pre-Strainer Tank (if equipped))	X	X	X	X	
Check Pump Shaft for Free Rotation	X		X		
Check Operation of Valves	X	X		X	
Check, Lubricate Clamp on Filter Tank Access Port	X			X	X
Inspect Media Pack	X			X	X
Check Pump Motor for Proper Rotation	X				
Prime Pump	X				
Check Motor Voltage & Current	X	X	X		
Check Pressure Gauge Readings (Top of Filter Tank & outlet)	X	X			
Check Unit for Unusual Noise or Vibration	X	X			
Check Unit for Leaks	X	X			
Drain Filter and Piping				X	

PART	IMF MODEL
Filter Tank	X
Valves & Linkage	X
Filter Inter-connection Piping	X
Pump Pre-strainer tank & basket (if equipped)	X
Pump	X
NEMA 4X Box (Auto only)	X
Filter Skid	X
Pressure gauges, air relief valves, & tees	X
Media (shipped separately)	X

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Table 2 Connection Sizes				
IMF Model	System Water Backwash			City Water Backwash
	Pump Inlet	Filter Outlet	Waste Outlet	Inlet City Water
IMF	Inches/mm			
24	2.5/63.5	2/50.8	2/50.8	2/50.8
30	2.5/63.5	2.5/63.5	2.5/63.5	2.5/63.5
36	3/76.2	3/76.2	3/76.2	3/76.2

Table 3 Filter Flow Rates			
IMF Model	Forward Flow gpm / lps	Minimum Backwash Flow Rate gpm / lps	Maximum Backwash Flow Rate gpm/lps
24	79/5.98	32/2.4	79/5.98
30	123/9.3	49/3.7	123/9.3
36	178/13.5	71/5.38	178/13.5

Table 4 Electrical Requirements (1ϕ, 60 Hz.)		
PUMP HP/KW	Voltage 1ϕ 60/50HZ	Full Load Current (Amps)
2/1.5	115, 208, 230	24, 13.2, 12
3/2.25	208, 230	18.7, 17

Table 5a Electrical Requirements (3ϕ, 60Hz)		
PUMP HP/KW	Voltage 3ϕ 60 HZ	Full Load Current (AMPS)
2 / 1.5	208, 230, 460, 575	7.5, 6.8, 3.4, 2.7
3 / 2.2	208, 230, 460, 575	10.6, 9.6, 4.8, 3.9
5 / 3.7	208, 230, 460, 575	16.7, 15.2, 7.6, 6.1

Table 5b Electrical Requirements (3ϕ, 50Hz)		
PUMP HP/KW	Voltage 3ϕ 50 HZ	Full Load Current (AMPS)
2 / 1.5	380, 415	3.4, 3.1
3 / 2.2	380, 415	5.2, 4.7
5 / 3.7	380, 415	8.0, 7.1

Table 6 Media Quantities for IMF Filters				
IMF Model	Unifill 475	Unigran 55	Unigran 85	Unigran 20
24	4	2	2	1
30	7	3	3	1.5
36	11	4	4	2

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<i>DESCRIPTION</i>	<i>PART NUMBER</i>
Filter Parts	
Gauge Kit (Includes: 4 way cross, pressure gauge, air vent & petcock)	A-Z-VNT-GA-IMF-100
Top Hand Hole Gasket 6 X 8 IMF 24 & 30	G-GSKT-06X08-NE-OVAL
Top Manway Gasket 11 X 15 IMF 36	G-GSKT-11X15-NE-OVAL

ACTUATOR-Filter Models	Unit or q
Electric Actuator IMF 24, 30, & 36	Q-ACT-E-0600-110-R600

PUMP PARTS:	
2½" Cast Iron Pre-Strainer w/ Basket IMF 24 & 30	P-STR-0250-FLG-CI125
2½" Stainless Steel Perforated Pre-Strainer Basket only	P-STR-0250-BSKT-125
3" Cast Iron Pre-Strainer w/ Basket IMF 36	P-STR-0300-FLG-CI125
3" Stainless Steel Perforated Pre-Strainer Basket Only	P-STR-0300-BSKT-125

Filter Model	Pump/Motor Assembly
3 HP IMF 24 79 gpm 220,460/3/60	R030-S009850-TC46036
3 HP IMF 30 123 gpm 460/3/60	R030-S014250-TC46036
5 HP IMF 36 178 gpm 460/3/60	R050-S019250-TC46036

Electrical Components	
Differential Pressure Switch	E-SWTC-DFP-150-165
Backwash Timers:	
backwash timer	E-TIMR-600-DIV
Replacement for Omron Backwash Timer	E-TIMR-600-OMR-REPLC
Syrelec (Conversion kit to SSAC)	E-TIMR-600-SYR
24 Hour Time Clock / Grasslin 60HZ only	E-CLCK-24H-120
24 Hour Time Clock 50HZ only	E-CLCK-24H-QTZ