SERFILCO

Space-Saver 'FM' Filtration Systems

Operation & Service Guide

Refer to Bulletin F-231

Refer to Parts List P-2310

O-2310

General Information

⚠ SAFETY PRECAUTIONS BEFORE STARTING PUMP

1. Read operating instructions and instructions supplied with chemicals to be used.
2. Refer to a chemical resistance data chart for compatibility of materials in pump with solution to be used.
3. Note temperature and pressure limitations of all system components.
4. Personnel operating the system should always wear suitable protective clothing, including but not limited to: Face shield, respirator, apron and gloves.
5. All piping must be supported and aligned independently of the system.
6. Always close valves slowly to avoid hydraulic shock.
7. Ensure that all fittings and connections are properly tightened.
8. Flush pump thoroughly with neutralizing solution to prevent possible harm to personnel from previous use.
9. ⚠To avoid electrical shock, never handle this equipment when wet or standing in water. When handling equipment for any reason, make sure power supply is disconnected. Refer to motor manufacturer operating instructions for proper wiring.
10. Do not grab unit by motor. During normal operation, motor becomes "hot to touch".
11. Keep power supply cord out of contact with hot, sharp, highly corrosive and other potentially damaging objects and solutions.

BEFORE CHANGING APPLICATION OR PERFORMING MAINTENANCE

1. Wear protective clothing as described in item 4 above.
2. Flush system thoroughly with a neutralization solution to prevent possible harm to personnel or equipment.
3. Verify compatibility of materials as stated in item 2 of Safety Precautions.

PRE-STARTUP

1. Review accompanying pump motor operating instructions to assure proper startup. Connect motor and/or motor starter to power source and check motor rotation as described in the pump operating instructions.
2. Never energize motor without flooding pump suction case with liquid.
3. Re-secure all hardware holding filter assembly and base together. These fasteners may have loosened during shipment.
4. All piping must be aligned and supported independently of the system. Use siphon breakers in the suction line to the pump and in the filter discharge to the tank. This is a necessary precaution limiting the amount of liquid which may be lost by siphoning. An effective siphon breaker is a small hole drilled in the suction and discharge lines inside of the tank approximately 2-4" below normal solution level.

Pump and Motor

Refer to the pump's operating and service quick guide for pump maintenance.

Refer to the system number for the correct pump supplied with the unit.

Pump	Bulletin	Operation & Service Guide
Series 'FE' Magnetic Coupled	P-518	O-2804
Series 'FE3' Magnetic Coupled	P-520	O-4060

Cartridge Systems

1. Make certain pump motor is de-energized and power is locked out.
2. Close suction and discharge piping valves.
3. Open chamber vent valve to release pressure from chamber.
4. Loosen tee handles on chamber cover.
5. Remove cover assembly.
6. Turning counterclockwise, remove the filter cartridge hold down caps.
7. The cross posts are threaded into the chamber base. Removal is not necessary when changing the cartridges. Grasp the end of the filter cartridge, and lift straight up to remove from chamber. Set aside for cleaning or disposal.
8. Insert new filter cartridges and tighten hold down caps making sure that the caps are firmly seated into the cartridges.
9. Replace cover assembly.
10. Tighten swing bolts in a diametrically opposed fashion till snug.
11. Open valves.
12. Make certain pump is primed.
13. Check all piping and fasteners. See "START-UP".

START-UP

1. Check power source for correct voltage and phase.
2. Verify correct pump rotation.
3. Make certain that all piping is properly supported and connected to the tank.
4. Prime pump according to pump operating instructions and energize motor.
5. Open air vent in cover to release air from filter chamber. Close vent valve when solution level rises to the top of chamber.
6. Check for leaks at pump, chamber and fittings.

⚠ **CAUTION:** Liquid may squirt from vent valve. Vinyl hose is supplied to direct flow or mist from vent valve to bucket or tank.

Carbon Bypass Chamber (optional)

A carbon purification chamber offers a simple, cost effective method of removing organic impurities from plating baths and other chemical solutions. The carbon chamber is in series with the filter chamber which traps particulate matter. The granular activated carbon in bypass chamber removes the organic impurities. Partial flow of the filtered solution is diverted to the carbon chamber by use of discharge valve on the filter chamber and controlled by the carbon inlet valve. System performance should be established to determine optimum adsorbency vs. flow rate relationship.

TO REPLACE CARBON IN CARBON CANISTER

NOTE: Be sure that all of the solution has been completely drained out of the chamber and canister before trying to remove the canisters. Failure to drain both the canisters and chamber will result in a loss of solution.

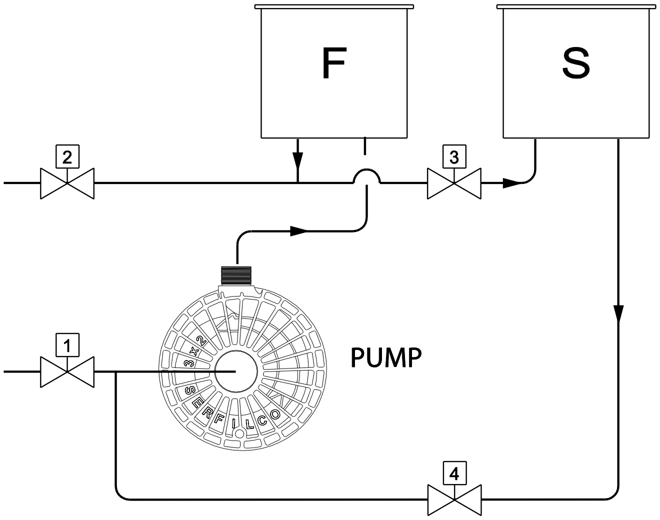
1. Make certain the pump motor is de-energized and power is locked out.
2. Close off inlet and outlet valve to carbon chamber. Open drain valve and allow the canister to drain so that all of the solution is removed.
3. Loosen tee handles on carbon chamber cover.
4. Remove cover assembly.
5. Remove canisters by grasping the tee handle inside the canister and pulling straight up.
6. Place the canister on a table or suitable support where the carbon can be conveniently discarded.
7. To replace the cartridge filter in the carbon canister, unscrew the standpipe assembly at the top end of the cartridge which can then be removed and replaced.
8. After replacing the cartridge filter, place the canister in a vertical position with the top up. Refill each canister with activated granular carbon. 7 lbs. for model (528). Tap the sides of the shell gently to settle the carbon.
9. Lower the canister into the shell and insert the hole in the center pipe over the pipe adapter in the base. There is an 'O'-ring seal that will prevent by-passing of the solution.
10. Replace the canister cover and spring. Place the cover on the shell and tighten the tee handles.

START-UP

1. Flush the carbon with a volume of water or process solution until the discharge runs clear. Take sample from the outlet to verify the quality of the discharge.
2. Open valve between the carbon chamber and filtration system. Bleed air from chamber by loosening the vent valve screw on the cover. Adjust outlet valve on the filtration system until the desired flow is obtained from the carbon chamber. Flow through carbon is adjusted to approximately 1-5 GPM per canister. Continuous recirculation by this method should eliminate or significantly postpone batch treatment with powdered carbon.
3. A regular analysis of the carbon chamber discharge will establish the ideal flow rate and indicate when carbon replacement is necessary. Carbon requires replacement when it no longer has its absorbency property.
4. A pressure gauge on the carbon chamber inlet will permit valve adjustment for repeatedly obtaining identical flow rate.

Disc Systems

Basic system with optional slurry tank and 4 valves.



1. Flooded suction line to the pump is the preferred piping arrangement, if the suction line is going up and over the tank.
2. Priming of the pump is accomplished by using the slurry tank.
3. Close all valves, then open V3 and V4 and vent. Fill slurry tank with water or plating solution. Allow liquid to rise in filter chamber by opening vent.
4. Energize motor, again verifying correct direction of pump rotation.
5. Slowly open valve V1 to one fourth open. Pump will draw air and solution from suction line, indicated by increase of liquid in slurry tank. Continue to slowly open valves V1 and V2 while slowly closing valves V4 and V3. Care should be taken to avoid loss of prime or overflow of slurry tank. Open vent to purge air from filter.
6. System is now primed, but filter pads require pre-coating. Turn valves V3 and V4 to open and valves V1 and V2 to close. Refer to "PRE-COAT PROCEDURE". Note: After pre-coating, it is only necessary to open valves V1 and V2 and close V3 and V4 since pump is primed. Transferring flow to plating tank is now a simple task.

PRE-COAT PROCEDURE - FILTER AID

1. With pump operating and recirculating solution between slurry tank and filter chamber, add 2 1/2-3 lbs. of filter aid for PPFMD22 systems and 3 1/2-4 1/2 lbs. for PPFMD33 systems. Note: System flow may be reduced by throttling valve V3 and is recommended. A typical rate for water is from 1 to 2 gallons per minute per sq. ft. of filter area (GSFM). It is also suggested to continuously vent air from chamber during pre-coat cycle since air can be injected via whirlpool effect and agitation of solution in slurry tank. Air will blind discs from pre-coating.

⚠ CAUTION: Insure vent hose goes into tank.

2. With solution recirculating between slurry tank and filter chamber, slowly add prescribed amount of filter aid. This step should take approximately 3-5 minutes.
3. Allow recirculation to continue until solution in slurry tank is CRYSTAL CLEAR. This assures proper deposit of pre-coat. If solution does not become clear, then check inside filter chamber for:
   - A. Omission of disc or filter pad.
   - B. Improper seal of disc column.
4. After pre-coat has been established, open valves V1 and V2 and close valves V3 and V4. System is now on filtration cycle.

PRE-COAT PROCEDURE - POWDERED CARBON

1. After pre-coating with filter aid, a mixture of powdered carbon and filter aid may be added to the existing pre-coat.
2. Dry mix equal parts of filter aid with carbon and recirculate until solution in slurry tank is CRYSTAL CLEAR. Then add to recirculating slurry tank in same manner as when pre-coating with filter aid alone.

FILTRATION TIPS

1. Record pressure gauge readings at beginning and end of filtration cycle. It will be valuable in determining establishment of proper pre-coat and when filter is ready for cleaning. Example: 6 PSI at beginning and 20 PSI at end of cycle (20 GPM).
2. Measure flow rate at beginning of filtration cycle, after pre-coating. This will be the maximum flow attainable. Record the resulting tank turnover per hour. Example: 40 GPM measures flow (2400 GPH) for a 1200 gallon tank is 2 turnovers per hour. At termination of filtration cycle, flow rate should also be measured and converted to

turnovers per hour. If one turnover per hour is decided the minimum desirable flow rate (20 GPM), then note gauge reading and service filter at appropriate pressure. 20 PSI per above example.

3. Powdered carbon will remove, by absorption, the undesirable and desirable organics. Apply carbon I the amounts recommended by the chemical supplier.
4. **Never** pre-coat until chamber is free of air and remains free. Vent continuously, if necessary.
5. Collection of air in the chamber indicates a loose hose or fittings on suction side of pump or that suction hose is drawing air on an air agitated tank.
6. After batch carbon treating, disperse filter aid to the solution surface in treatment tank, allow to settle 5-10 minutes. Filter solution back to tank by following liquid level with hose head only a few inches under the top of liquid. This allows maximum flow rate during transferring cycle. Be sure filter is properly pre-coated before starting the transfer cycle.
7. **DO NOT OPERATE FILTER UNATTENDED**. Pump seal failure, cracked hose, or some other unforeseen occurrence can result in solution loss or damage to equipment.
8. To prevent solution from accidently being pumped out to tank, position the suction hose at a minimum depth below the liquid level. The suction may be extended to the bottom of the tank if a "vacuum break" hole is provided a few inches below the solution level, when lowered to this point, will cause air to enter the pump suction and cause loss of prime.
9. Piping for the suction and discharge line with both siphon breaker opening and strainer for dispersion holes is shown on SERFILCO Bulletin A-202.
10. Never shut the filter off and start it up without first adding a small additional amount of filter aid to make certain that a cake has been re-deposited in any areas of media where it may have fallen from the support membrane.
11. Add additional filter aid depending upon the amount and type of solids, at periodic intervals so the surface of the filter remains porous, and the flow rate will be maintained at its highest level.

TO REMOVE FILTER DISCS

1. Stop pump and close inlet and outlet valves. Open vent valve and drain. If slurry tank is nearly empty, it will accept overflow when V3 is opened. Loosen cover tee handles and remove chamber cover.
2. Grab handle on top of disc stack. Gently rock the center post while pulling up. Carefully place the center post disc stack into a catch pan to collect any solution dripping from the disc stack.
3. Unscrew disc stack top plate counter clockwise from center post. Remove filter discs. Separate and discard filter paper, spent pre-coat, and contaminants.

TO REASSEMBLE FILTER DISCS

1. Check the two 'O'-rings that are on the bottom of the center post for cuts and nicks, replace if damaged.
2. Place filter disc paper onto center post base first then filter disc plate. Place filter paper on each filter disc. Filter paper goes between all filter discs except top filter disc. Number of filter discs that will fit into the chamber will vary depending on filter paper micron.
3. Check the (2) 'O'-rings under the disc stack top plate. Screw disc stack top plate clockwise onto center post. Top plate should be nearly flush with center post.
4. Lift center post with discs back into the chamber. Line up center post disk stack into chamber base center outlet. Rotate center post disc stack until it locks in place by the stop pin. Push center post disc stack until it is squarely sealed.
5. Check chamber cover 'O'-ring for cuts and nicks, replace if damaged. Align cover onto shell. Tighten chamber cover by tightening two diametrically opposite tee handles. Tighten remaining tee handles, keep the cover as even as possible.
6. Close drain, open outlet and inlet valves. As the solution rises in the chamber, air will escape at the vent valve. Close the vent valve when the solution appears without bubbles.