OPERATION AND
SERVICE GUIDE
O-1015
DEC. 1996

SENTRY© DISC FILTRATION SYSTEMS

⚠ SAFETY PRECAUTIONS BEFORE STARTING PUMP

1. Read Operating Instructions for Disc System, Disc Chamber, Pump and instructions supplied with chemicals to be used.
2. Refer to Chemical Resistance Data chart for compatibility of materials with solution.
3. Note temperature and pressure limitations of equipment.
4. Personnel operating pump should always wear suitable protective clothing: face mask or goggles, apron and gloves.
5. Do not use piping as handles or steps.
6. Always close valves slowly to avoid hydraulic shock.
7. Ensure that all fittings and connections are properly tightened.
8. All external piping must be supported and aligned independently of the pump.
9. The suction pipe or hose should never be smaller than the suction port size. Where maximum flow is desired, pipe size should be at least one size larger. Suction pipe velocities should be as low as possible. An increase in suction pipe size will accomplish this. Suction pipe or hose should be as short and straight as possible with a minimum of pipe fittings. This is especially true when liquid being pumped is above ambient temperature. Refrain from using elbows or tees at the suction port. Always position suction inlet below the solution level and away from air agitation spargers.
10. Provide 1/4" diameter hole in suction and discharge lines just below solution level to act as a siphon break.

BEFORE CHANGING APPLICATION OR PERFORMING MAINTENANCE

1. Wear protective clothing as described in Item 4 above.
2. Flush pump & chamber thoroughly with a neutralizing solution to prevent possible harm to personnel.
3. Verify compatibility of materials as stated in Item 2 above.

DESCRIPTION

Filter chamber is rubber lined steel, slurry tank is polyethylene. Base is carbon steel coated w/2-part epoxy paint. Piping and valves are CPVC. Filter discs are polypropylene and require individual replacement filter pads. The discs and pads are alternately stacked. Filter media is sealed at center hole and O.D. edge collar of disc.

Pump may be seal-less magnetic drive, single mechanical seal or double mechanical seal. Refer to separate pump operating instructions.

PRE-START-UP

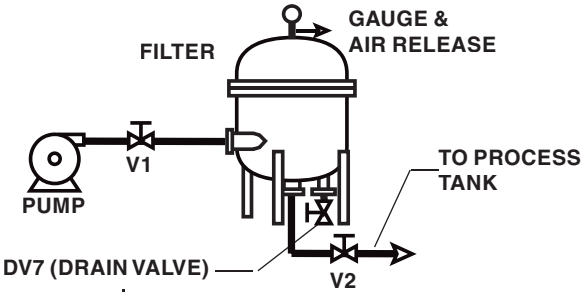
1. Check power source for correct voltage and phase and make connection to motor starter.
2. Install a proper motor starter with motor protection if not provided with system.
3. Screw into place any valves not installed due to crat-ing. Suction pipe or hose must be as short as possible and free of unnecessary bends, elbows, etc.
4. Tighten all union connections.
5. Inspect all pipe, fittings, filter chamber and pump for any damage due to shipping.
6. If pump assembly includes double water flushed mechanical seal, immediately connect water line to seal assembly. DO NOT start pump without providing water to seal housing.
7. With a single mechanical seal, no adjustment or water lubricant is required. Refer to pump service guide or care of mechanical seal. DO NOT start pump without having a flooded pump suction.
8. Check correct direction of rotation by jogging motor. If rotation is incorrect, switch any two of the three lead wires in terminal box or motor starter. Re-check rotation.
9. DO NOT manifold suction line with other equipment or use any bends right before pump inlet.

Refer to Bulletin F-404 and pump and chamber parts lists and operating instructions.

START-UP

BASIC SYSTEM

Includes single chamber with 2 flow control valves as well as valves on the vent and drain.

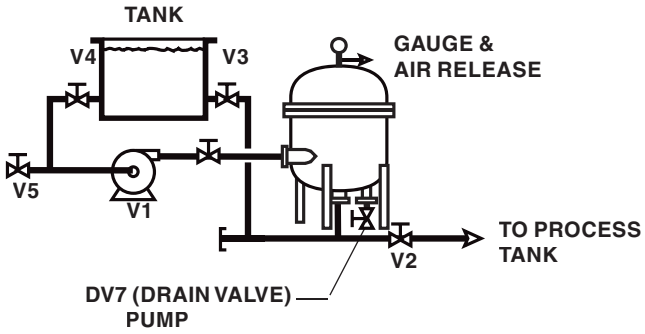


1. The pump installed on the system is not self-priming so it must be primed each time the system is put into operation or loses prime.
2. To prime the pump, flood the suction line and pump casing.
3. Open valve V1 approximately 50% and also open the chamber vent valve. The vent valve should be connected by hose back to the tank to prevent spillage.
4. Energize motor, again verifying correct direction of rotation.
5. Slowly open valve V1 to achieve desired flow rate.
6. Close vent valve when the chamber is completely purged of air.

SV3 SYSTEM

Includes basic system plus a 30 or 60 gallon slurry tank and 3 additional valves.

1. Priming of the pump is accomplished by using the slurry tank.
2. Close all valves, then open V1, V3, V4 and vent. Fill slurry tank with water or plating solution, allowing liquid to rise in filter chamber. The vent valve should be connected by hose to the slurry tank to prevent spillage.



3. Energize motor, again verifying correct direction of rotation.
4. Slowly open valve V5 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 V5 and V2 while slowly closing valves V4 and V3. Care should be taken to avoid loss of prime or over flow of slurry tank.
5. Close vent valve when the chamber is completely purged of air.
6. System is now primed, but filter pads may require precoating. Open valves V3 and V4 and close valves V2 and V5. Refer to **PRE-COAT PROCEDURE.** Note, after pre-coating it is only necessary to open valves V2 and V5 and close V3 and V4 since pump is primed and suction line is already dispelled of air. Transferring flow to plating tank is now a simple task.

PRE-COAT PROCEDURE – FILTER AID

Pre-coating the media with filter aid is highly recommended because it extends the life of the media and improves the filter efficiency. Always consult your chemical supplier regarding the proper filter aid to assure chemical com-patibility.

1. With pump operating and recirculating solution between slurry tank and filter chamber (valves V2 & V5 closed, V3 & V4 open), slowly add filter aid to the slurry tank in the prescribed amounts shown in chart. This step should take approximately 3 to 5 minutes. NOTE: It is recommended that the flow rate be reduced during pre-coating by throttling valve V1. A typical rate for water is 1 gallon per minute per sq.ft. of filter area. 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.

	DR60-3	DR78-3	DR105-3
Filter Aid Capacity (3 oz/ft²)	180 oz	234 oz	315 oz
Powdered Carbon Capacity (.5 oz/ft²)	30 oz	39 oz	52.5 oz
Sludge Capacity (ft³)	3.4	4.4	5.9

2. 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
   C. Missing bottom or top gasket
4. After pre-coating has been established, open valves V2 and V5 and close valves V3 and V4. System is now in 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 powered carbon in a separate container.
3. With pump operating and recirculating solution between slurry tank and filter chamber, recirculate until solution in slurry tank is CRYSTAL CLEAR. Then return to filtration cycle in same manner as when pre-coating with filter aid alone.

CARBON FILTER DISCS

Filter discs impregnated with activated carbon are also available and used totally or in conjunction with the cellulose discs to accomplish the proper degree of organic removal. Depending upon frequency and duration of carbon purification, the filter chamber may be charged with one or several carbon impregnated discs. Install the discs between the polypropylene support plates. Pre-coating is not recommended when using carbon discs. Install carbon discs at top layers of discs so removal and replacement is convenient.

FILTRATION TIPS

1. Record pressure gauge readings at beginning and end of filtration cycle. Also maintain a daily log of date/time and pressure readings. This will be valuable in establishing proper pre-coat and determining when the filter is ready for cleaning, i.e. when the pressure gauge shows an increase of 'X' PSI, it is time to service the filter. This data can also be used in conjunction with the pump flow curves to calculate approximate flow rates. Please Note: Maximum recommended pressure differential across the media is 25 PSI.
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: 120 GPM measured flow (7200 GPH) for a 2400 gallon tank is 3 turnovers per hour. At termination of filtration cycle, the flow rate should also be measured and converted to turnovers per hour. If one turnover per hour is decided the minimum desirable flow rate (40 GPM), then note gauge reading and service filter at appropriate pressure.
3. Powdered carbon will remove, by adsorption, undesirable as well as desirable organics. Apply carbon in 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 line is drawing air on an air agitated tank.
6. DO NOT OPERATE FILTER UNATTENDED. Pump seal failure, cracked hose, or some other unforeseen occurrence can result in solution loss or damage to equipment.
7. Provide a hole in the suction and discharge hoses just below the minimum solution level to serve as siphon

breakers. These are suggested as a protective measure to prevent accidental loss of solution. NOTE: Loss of prime while running will damage pump. CPVC piping for installation purposes is available on Bulletin A-213.

8. Never shut the filter off and start it up without first adding a small additional amount of filter aid per the Precoat Procedure to make certain that a cake has been redeposited in areas of the media where it may have fallen away from the support membrane.
9. Add additional filter aid (depending upon the amount and type of solids) by following the Precoat Procedure at periodic intervals so the surface of the filter remains porous. This will ensure that the flow rate will be maintained at its highest level.

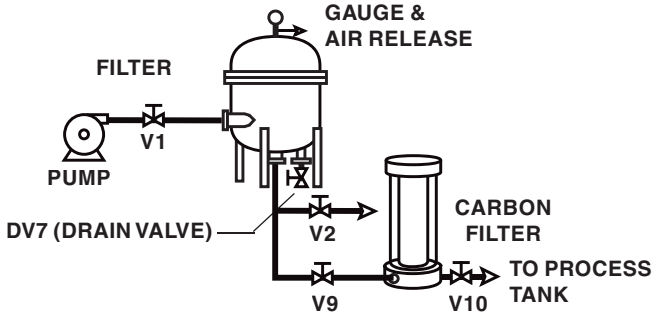
TO SERVICE FILTER, FILTER DISCS AND CARBON DISCS

1. Stop pump and close all valves. Open vent valve and drain valve (DV7). Allow solution to completely drain from tank. If this can not be accomplished by gravity flow, use the optional pump drain kit (O-2267) or the optional chamber blow-down kit (O-2276). To use the pump drain kit, connect the suction line to the drain valve, open drain valve and energize pump. To use the air blowdown kit, connect compressed air line to the pressure regulator installed on the tank's top flange. Close the vent valve and drain valve, and open valve V2. Pressurize the chamber until line at valve V2 is empty. Close V2 & open drain valve (DV7) to remove solution in sump. Please Note: Blow-down kit employs a locking pressure regulator, preset at 35 PSI to avoid over pressurization of system.
2. After chamber is completely drained, pump water through the system to completely flush the chemistry from the pump and chamber. After system is completely flushed, drain chamber as described above.
3. Insure that the chamber is completely drained, remove cover by loosening nuts on swing bolts and dropping bolts away from cover. Raise the cover with davit lift over the disc stack and swing the cover clear of the chamber.
4. Loosen disc hold-down nut with 4" spanner wrench. Remove disc and gasket.
5. The polypropylene discs can now be lifted out of the chamber one at a time, with the filter media on top of each disc. Please note, top disc is machined smooth to accept gasket. This disc must be on top when discs are reassembled back into chamber.
6. After the discs have been removed, the chamber should be flushed clean of filter aid and debris. Each disc should also be cleaned so that all the holes are open.
7. To install discs and media in chamber, slide one disc down over the center post so that the center hub rests on the bottom gasket. (The concentric grooves on the disc must face up.) Next, slide one piece of filter media down the center post. Continue this procedure, alternating between polypropylene disc and media until the top filter disc (as described in step #5) is installed. Please note, the chamber was initially filled with 10 micron cellulose filter discs. Consult your chemical supplier regarding the proper filter media for best results. A complete list of media available is included on Bulletin C-306. Also note, it is recommended that before the media is installed in the chamber, it should be pre-wetted to reduce the amount of air that is entrained in the paper media.
8. Place the top disc and gasket over the center post. Install the hold-down nut and tighten with spanner wrench.
9. Swing cover back over chamber and lower. Align cover slots to position swing bolts. Tighten nuts evenly around chamber, making sure to work on alternate sides of cover until all are tight.

OPTIONAL CARBON CHAMBER

DESCRIPTION

Carbon Purification Chambers offer a simple, low cost, effective method of removing organic impurities from plating baths and other chemical solutions. The carbon chamber is in series with your filter chamber which traps particulate matter. The granular activated carbon in the carbon chamber removes organic impurities. Partial flow of the filtered solution is diverted to the carbon chamber by the use of discharge valve V2 on the filter chamber and controlled by carbon inlet valve V9.



The quality of solution purification using granular activated carbon is dependent upon several factors such as: type of solution, temperature and amount of impurities in solution, type of carbon, depth of carbon and solution contact time (flow rate). Controllable factors are flow rate and type of carbon. A longer contact time between solutions and carbon requires a lower flow rate.

System performance should be established to determine optimum adsorbency versus flow rate relationship.

Three carbon chambers are available for use with Disc Filtration Systems

MODEL	TYPE	CARBON CAPACITY lbs.	SUGG. FLOW GPM	TRAP FILTER	PORT SIZE NPT
PL1(528P)CCS-1-G3	Single carbon canister	7.5	1-5	SF-03U10U	(3 req'd) 1"
PL3(528P)CCS-1½-G3A	Three carbon canisters	22.5	3-15	SF-03U10U (3 req'd)	1½"
PL3(548P)CCS-1½-G3A		42	6-15	SF-03U20U	1½"

The CC3 chamber has bottom hold-down bracket and the CC1 has a CPVC shell cemented into the base. This prevents solution and carbon from draining below the shell when the cover is removed.

Order carbon separately for initial and replacement use.

CARBON CANISTER START-UP

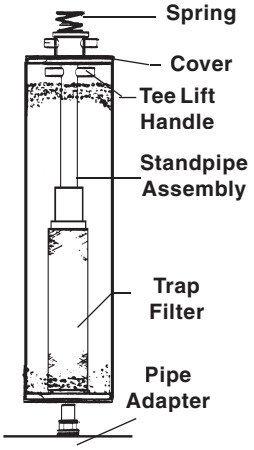
With filter system in operation, partially open carbon inlet valve V9 to allow solution to flow through the granular carbon. For each canister of carbon, approximately 1 - 2 gallons of solution are required to flush the carbon free of carbon powder (the result of abrasion when carbon is dry). Solution containing the carbon fines may be poured into the pre-coat tank and drawn through the filter for removal of the fines onto the pre-coated discs.

Once the carbon canister discharge runs clear of carbon fines, it will remain clear since the wetted carbon will not abrade.

TO REPLACE CARBON IN CANISTER

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

1. Shut off inlet valve V9 to carbon chamber. Open drain valve and allow canister to drain so that all of the solution is removed.
2. Remove top cover by loosening the tee handles and lift the cover straight up. Remove spring and canister cover. Lift canister straight up by grasping tee lift handle.
3. Drain and pour carbon into polyethylene bag for proper transporting and waste disposal.
4. Replace trap filter cartridge, 03U10U, approximately every 3-5 changes of granular carbon. Cartridge is removed by unscrewing tee handle.
5. Fill each canister with granular carbon (approximately 7.5 lbs. in 528 models and 14 lbs. in 548 models). Tap sides of shell while filling so that carbon will settle.
6. Lower canister into shell and insert hole in center of canister base over pipe adapter in chamber base. There is an "O"-ring seal that will prevent solution bypass.
7. Replace canister cover and spring on top of canister. Place cover on shell and tighten tee handles.



CARBON CANISTER ASSEMBLY

CARBON PURIFICATION TIPS

1. Bypass Purification Carbon Chamber is installed on filter discharge with valve V9 on carbon chamber inlet at full open position and valve V2 throttled to allow solution to flow through carbon chamber. Flow through carbon is adjusted to approximately 1-5 GPM per each 7.5 lb. canister. Continuous recirculation by this method should eliminate or significantly postpone batch treatment with powdered carbon.
2. Full Flow Purification: Valve V2 is closed and valve V9 is opened to provide suitable flow. A low flow rate will provide optimum adsorbency during transfer.
3. A regular analysis of carbon chamber discharge will establish ideal flow rate and indicate when carbon replacement is necessary.
4. A pressure gauge on carbon chamber inlet will permit valve adjustment for repeatedly obtaining identical flow rate.
5. Replacement carbon and filter screens should be ordered and placed in stock for immediate availability for bulk carbon chamber. Use 3 micron trap filter cartridge, SF-03U10U (10") for each carbon canister in model 528 and SF-03U20U (20") in model 548.

EQUIPMENT MAINTENANCE TIPS

1. Keep the overall unit clean and dry and avoid splashing any liquid on the motor or starter.
2. Check seals frequently for leakage. Repair immediately when necessary before the solution leakage causes additional damage to the pump or motor.
3. When the pump requires servicing, it is usually easier to remove the pump from the system so that repairs can be made. Refer to separate pump operating instructions.
4. Should damage occur to any of the piping, order replacement assemblies only, rather than the individual components, since all of the piping is socket welded at the factory with the exception of a few screwed connections used between the pump and slurry tank. You will find that these factory replacement assemblies will fit without additional cutting if ordered by serial number of the system.
5. Refer to parts lists provided to order replacements by part number and keep the suggested parts on hand as indicated on the parts lists, so that down-time can be kept to a minimum.

PIPE ASSEMBLY SERVICE GUIDE

The following suggestions are offered when servicing Sentry Disc Filtration Systems:

Sometimes solvent sealed piping contains some threaded connections out of necessity. Whenever possible, if pipe has to be removed from the system to service or repair a pump, filter or slurry tank, it is best if the pipe can be removed as a complete assembly. Pipe assemblies can be removed at any valve by removing the union nut at either end of the "true union" valve. The bulkhead fittings in the slurry tank will unscrew from inside the tank. The pump itself splits between the suction casing, which generally includes the inlet and outlet pipe connection, and the support casing which includes the impeller. When ordering pipe assemblies, designate the size of the pipe, such as 1", 1¼" 1½" or 2".

ELECTRICAL

If motor fails to start or runs at improper speed or stops after several minutes of operation, TURN MOTOR STARTER OFF. Check electrical source and compare with motor data plate. Also verify that motor is wired correctly per wiring diagram on inside cover of conduit box. Check ampere draw with motor running and compare with full load ampere rating on motor data plate. If greater than data plate rating, reduce flow from chamber by throttling discharge valve V1.

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