OPERATION AND
SERVICE GUIDE
O-200E
AUG. 1997

TRANS-O-FILTER©
OIL FILTRATION SYSTEMS

Refer to Bulletin O-104.

PORTABLE		STATIONARY				
MODELS	PRICE CODE NO.	MODELS	PRICE CODE NO.	CHAMBER OPERATING INSTRUCTIONS	FILTER SYS. & PUMPS PARTS LIST	
S1(718) ½B TS6-P	1405B	S1(718) ½S TS6	1416A	O-1580	P-6800 P-3975 P-3976	P-3300
S2(718) 1B TS9-P	1405B2	S2(718) 1S TS9	1416A2	O-1580	P-3975 P-3976	P-6300
S50(1) ½B TS3-P	1407B	S50(1) ½S TS3	1418A	O-2250	P-7450 P-7500	P-3200
S100(2) ½B TS6-P	1410B	S100(2) ½S TS6	1422A	O-2250	P-7450 P-7500	P-3300
S150(3) 1B TS9-P	1413B	S150(3) 1S TS9	1426A	O-2250	P-7450 P-7500	P-6300

SAFETY PRECAUTION

1. Read operating instructions thoroughly.
2. All personnel using and operating the filter should wear suitable protective clothing and goggles.
3. Do not perform service or replace cartridge unless electrical power supply is disconnected.

IMPORTANT

1. When valves are provided (special), note flow direction for open and closed position.
2. Close and open valves slowly (to avoid hydraulic shock) or shut pump off.
3. Do not operate filter with valves in throttle position.
4. Pump relief valve is factory set at 35 PSI. Do not readjust. Pressure excess may cause collapse of filter element.
5. When gauge shows 35 PSI, replace filter element.
6. Initial gauge pressure, with clean filter element, is a function of oil viscosity, pump flow rate, filter retention (1 or 50 micron) and style of filter element.

OPERATION

When using the filter for the first time on an oil sump or reservoir, it is sometimes necessary to replace the filter cartridge during the initial removal of the sludge which has accumulated over a period of time. Once the cleanup of the oil has been accomplished, continued periodic use of the filter will keep the system in clean condition and will extend the life of the filter cartridges. Each reservoir should be filtered as frequently as possible. This can be done without shutting down the machinery or removing the oil from the reservoir.

The filter should be permitted to pump eight to ten times the reservoir capacity to obtain thorough filtration of the oil. When the desired clarity has been reached, the filter should be advanced to the next reservoir. In this manner all reservoirs will be filtered on a scheduled program and the oil will be maintained at a constant, high clarity level.

NOTE: It is recommended that the Trans-O-Filter be used with oil at machine operating temperature. When operating the filter on cold oil, the high initial pressure may open the relief valve, or at least cause an artificially high pressure that will contribute toward premature opening of the relief valve before the filter cartridges are fully loaded with dirt. This practice is not harmful, but should be avoided whenever possible. When salvaging a drum of oil at room temperature, the above conditions will exist so the gauge pressure should be watched closely.

PRE-START-UP

1. Connect suction and discharge hoses.
2. Note valve arrangement and flow direction if unit was purchased with bypass piping.
3. Be sure drain valve is closed. Open vent valve to release trapped air after charging filter with oil or when draining the chamber prior to replacement of filter cartridges.
4. After an initial charge of oil in the filter, it may be necessary to add several gallons of oil to the reservoir to return to its original level. Following table shows approximate volumetric capacity of each model.
5. Pour one half pint of oil into suction hose and allow oil to drain into pump to lubricate gears before nergizing motor.
   DO NOT RUN PUMP DRY.

MODEL	S1(718)	S2(718)	S50	S100	S150
Make-up	2¾ gal.	5½ gal.	2½ gal.	5 gal.	7½ gal.

START-UP

FILTERING BY RECIRCULATION

1. Place both hoses in reservoir. Locate at opposite ends or at different depths to obtain maximum circulation across reservoir. To prevent pump cavitation, keep suction hose from touching bottom or side wall of tank.
2. Plug extension cord into convenient 115V outlet and switch toggle to "ON" position.
3. Filter to clarity by continuous recirculation.

TRANSFER PUMPING

1. Place suction hose in drum, place discharge hose in machine, or vice versa.
2. Transfer filter from drum to machine.

OIL SALVAGE

Extremely dirty oil may be reconditioned by filtering from one storage drum to another. This method assures that all the oil has passed through the filter. Two or three "passes" will remove all the sediment. Letting the oil settle for several hours and drawing oil only off the top will extend the life of the filter cartridges.

TO REPLACE FILTER CARTRIDGES (refer to attached specific instructions for filter chamber).

The positive displacement gear pump delivers the same flow rate through clean or dirty cartridges. Indicated gauge pressure, not flow rate, will determine whether or not the filter cartridges should be replaced. When the gauge pressure reaches approximately 35 PSI, the filter tubes are loaded with dirt and should be discarded. The pump relief valve automatically cuts in at this pressure and a small portion of the total flow is recirculated internally in the pump to maintain this maximum pressure.

1. Close inlet and outlet valves (if any included). Otherwise, pull hoses out of reservoir and drain as below).
2. Open vent valve and drain valve and drain oil into suitable receptacle. (After reassembly this oil may be returned to reservoir).
3. Remove clamp ring and cover.
4. Remove spring and seat assemblies and top deck of filter tubes. Remaining tubes may be removed by lifting with ''V'' post tube guide.
5. Wipe cover gasket and edges of shell with a clean cloth.
6. Reassemble filter with clean cartridges.
7. Close drain valve, place hoses in reservoir and turn motor on. Vent air after start-up.
8. Note: Model S1(718) has a single 7'' x 18'' cartridge and is released by unscrewing cap nut.

SUCTION STRAINER SCREEN is located in suction line to protect pump against damage from the larger foreign solids. Periodically remove the strainer element for cleaning and inspection. When strainer becomes plugged it will impede flow of oil to the pump, resulting in unusually loud pump operation, reduction of flow and pressure.

1. Loosen and remove nut in Y strainer for removal of screen.
2. Clean and replace screen.

TROUBLESHOOTING

1. Ruptured filter element. Relief valve set too high. Maximum gauge pressure should be 35 PSI. Reduce relief valve spring compression by counterclockwise rotation of adjustment screw under acorn nut on pump. Refer to Figure **A and Parts List.**

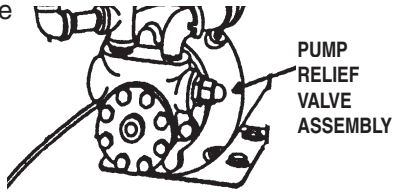

Figure A

2. **High initial pressure on gauge, caused by dense fil ter element, or high flow rate high viscosity oil, or extremely dirty oil. Pressure can be reduced by using pleated style filter element or increasing temperature of oil.**
3. **Air in discharge hose or light color of oil in discharge hose, caused by plugged suction strainer screen. Refer to instructions on cleaning and replacement.**

Unusual loud noise, caused by pump cavitation which is the effect of a plugged strainer screen, or end of suction hose is against bottom or sidewall of reservoir.

REPLACEMENT FILTER CARTRIDGES

These filters are normally provided with 5 micron filter cartridges. However, refer to filter model number and original order when requesting replacement cartridges, parts or information.

REPLACEMENT FILTER MEDIA

2 ½"x 10" depth wound cotton

MODEL	MICRON SIZE
5C10TC	5
10C10T	10
15C10T	15
30C10T	30
50C10T	50
75C10T	75
99C10T	100

7" x 18" pleated paper

MODEL	MICRON SIZE
PL718-1	1
PL718-5	5
PL718-10	10
PL718-20	20
PL718-30	30

4"x 18" depth wound cotton

MODEL	MICRON SIZE
1B18A4	1
3B18A4	3
5B18A4	5
10B18A4	10
20B18A4	20
30B18A4	30

3" x 10" pleated paper

MODEL	MICRON SIZE
PL310-1B	1
PL310-5B	5
PL310-10B	10

TO SERVICE GEAR PUMPS TS3, TS6 and TS9

GENERAL DESCRIPTION

The SERFILCO series TS3, TS6 and TS9 are compact highly efficient, positive displacement, rotary internal gear type pumps with a mechanical seal.

PUMPING PRINCIPLE

These pumps employ the internal gear principle which is based upon the use of a rotor, idler gear and a crescent-shaped partition that is cast integrally with the cover. Thus, only two moving parts comprise this efficient pumping element. Power is applied to the rotor and transmitted to the idler gear with which it meshes. The space between the outside diameter of the idler and the inside diameter of the rotor is sealed by the crescent partition . When the pump is started, there is an increase in volume as the teeth come out of mesh. This creates a partial vacuum, drawing the liquid into the pump through the suction port. The liquid fills the spaces between the teeth of the idler and rotor and is carried past the crescent partition to the pressure side of the pump. When the teeth mesh on the pressure side, the liquid is forced from the spaces and out through the discharge port.

SELECTION

The pumps are designed for working pressures up to 500 PSI and are required to develop 25" mercury vacuum at 0 PSI on factory test. While these pumps will develop as high as 27" of vacuum, it is sound engineering to avoid extreme vacuum whenever possible. Select pipe size to reduce line friction loss to a minimum. On transfer service, place pump as close to supply tank as conditions will permit, and eliminate the use of foot valves or check valves in the suction line whenever possible. Pumps are self priming and particularly suited to handle liquids of 35 SSU to 1000 SSU viscosity. It is important that the piping used in connecting the pump be clean and free of chips or scale.

SEAL (TS3 & TS6)

The seal is a device to prevent leakage between the stationary pump body and rotating drive shaft. A rotating lapped surface is attached to the shaft by an elastomer bellows. This rotating face is spring loaded to rub against a stationary lapped surface in the housing plug bushing. The clearance between these two surfaces is so minute that resistance to flow is great enough that fluid will not leak out and air will not be drawn in.

DISASSEMBLY OF SEAL

The seal assembly of the TS pumps may be changed without disassembly of the rest of the pump.

1. Place the pump in vise, shaft facing up, so that one jaw grips across the two ports. Do not tighten excessively as pump housing may be distorted.
2. Inspect shaft at keyway, flat or drive tang. Any burrs will interfere with removal of housing plug bearing assembly.
3. Remove housing plug with face type spanner wrench.
4. Remove the seal from shaft. The rubber boot will be bonded to the shaft, so it is necessary to push down on the seal to break this bond. Grasp the metal outer shell with any suitable device and pull the seal assembly upwards. The spring and washer should also be removed.
5. The TS3 pump assembly has a snap ring on the shaft to back up the seal assembly. Do not remove this snap ring unless you are completely disassembling the pump. TS6 pumps do not have a snap ring. A step on the shaft is used as the seal back up.
6. Remove stationary seal face from housing plug by pressing out from opposite side.
7. If damaged, remove the 'O'-ring from O.D. of housing plug.

DISASSEMBLY OF PUMP

Seal assembly must be removed before disassembly of pump. Also remove snap ring on shaft on TS3. Mark cover and body of the pump for proper reassembly. Remove cap screws, cover, idler and rotor from housing.

INSPECTION

Check pump housing, rotor idler gear, idler pin and crescent for wear, chipped or broken teeth. Housing bore and rotor O.D. may be checked for wear by positioning rotor in the housing and check for clearance in the bearing. The shaft must turn freely without any detectable side play. Any side play will require replacement of the housing, rotor or both. If both housing and rotor require replacing, it is economically advisable to replace the pump.

ASSEMBLY OF PUMP

The following must be carefully followed when pump is reassembled.

1. Clean all parts thoroughly using great care to eliminate all dirt.
2. Install rotor in pump body.
3. Apply gasket to cover. Use new gasket if old one is damaged.
4. Place idler gear on pin in cover assembly.
5. Place cover assembly with gear on pump. (Align matching marks for proper location.)
6. Install cover cap screws. Pull down gradually and alternate from a screw on one side to one on the opposite side.
7. Install snap ring on shaft.

ASSEMBLY OF SPRING

1. Clean all parts thoroughly using great care to eliminate all dirt.
2. Oil shaft with suitable lubricating oil.
3. Oil inside of new rotary seal assembly.
   a. Use plastic seal assembly tapered sleeve.
   b. Oil seal assembly sleeve.
   c. Place rotary seal assembly on sleeve. Tapered end of sleeve fits into spring end of assembly.

d. Place slotted end of sleeve on bench. Press down on carbon face of seal with your fingers and slide seal about mid-point on sleeve.
e. Place slotted end of tool over tang on pump shaft. Line up outside diameters of sleeve and shaft by eye.
f. Push seal down with your fingers so that it passes from the assembly sleeve to a position half way down the shaft.

4. Press stationary face into housing plug. Lapped surface must be up. Protect this lapped surface by covering it with a piece of paper when pressing down on face. Use your fingers for this operation.
5. Place new 'O'-ring on O.D. of housing plug, if required, and lubricate with oil.
6. Lubricate carbon face liberally with lube oil.
7. Reassemble housing plug into position over the pump shaft. Do not nick seal face by hitting pump shaft. Tighten the housing plug with spanner wrench. Rotating seal will automatically be positioned by this operation.
8. Check pump for free rotation by turning shaft with suitable wrench. There will be a definite resistance to turning because of the seal load. The pump must turn freely without binding.

TROUBLESHOOTING HINTS
WHAT TO LOOK FOR WHEN:
NO OIL IS DELIVERED

a. Suction lift too high for vapor pressures of liquid pumped. While these pumps will develop as high as 27 inches of vacuum, it is good engineering practice to reduce the vacuum to a minimum.
b. Bad leaks in suction line or port passages can be detected by submerging pressure line from discharge side of pump into a pail of oil, where the air will be seen in the form of bubbles.
c. Pump shaft not rotating. Coupling defective - tongue and groove or gear not engaged.

CAPACITY IS TOO LOW

a. Suction lift too high
b. Air leaks in suction line.
c. Suction line too small.
Can be detected by installing a vacuum gage directly at the pump suction. The maximum vacuum at the pump suction should never exceed 15 inches of mercury. It is necessary to keep below 15 inches, not because of the inability of the pump to handle a higher vacuum, but primarily because of the vaporization that is liable to take place at a higher vacuum. Vaporization caused by higher vacuums will generally result in capacity drop-off.
d. Pump speed too slow.
e. Strainer too small or obstructed.
f. Suction pipe or port not immersed deep enough in the liquid.
g. Piping improperly installed, permitting air pocket to form in pump.
h. Increased clearances or wear in the pump will sometimes cause the pump to deliver an insufficient supply of liquid.

PUMP WORKS SPASMODICALLY

a. Leaky suction lines.
b. Suction lift too high.
c. Air or vapor in liquid.
d. Coupling slipping on pump shaft.

PUMP WASTES POWER

a. Pressures too high.
b. Liquid more viscous than desired.
c. Suction or discharge lines obstructed.
d. Mechanical defects
End thrust on pump shaft. (These pumps are not designed to take end thrust toward the pump cover and extreme care must be taken to prevent thrust in this direction.)
Driving shaft and pump shaft misaligned.
The pump may be binding due to insufficient end clearance.
Pump shaft bent.
Misalignment within pump due to strains built up by bad piping or installation of pump into equipment.

PUMP IS NOISY

a. Machine or part of it is acting as a sounding board.
b. Misalignment or bad design of coupling.
c. Coupling set up too close to pump.
d. Vibration of pump.
Bent shaft
Worn pump
Inferior workmanship
e. Air leaks into suction side of pump
f. Suction lift so high that vapor forms within liquid.

PUMP LEAKS

a. Cover bolts need tightening, or cover gasket is defective.
b. See seal under service instructions.

HANDLE WITH CARE

If it becomes necessary to remove pump from your equipment to return to the manufacturer, plugs should be inserted in the ports to prevent foreign material from getting into the moving parts These pumps are precision-built and should be given every reasonable care.

SERFILCO®, LTD.
2900 MacArthur Blvd.
Northbrook, IL 60062-2005 U.S.A.
e-mail: sales@serfilco.com
847-509-2900
800-323-5431
FAX: 847-559-1995
www.serfilco.com