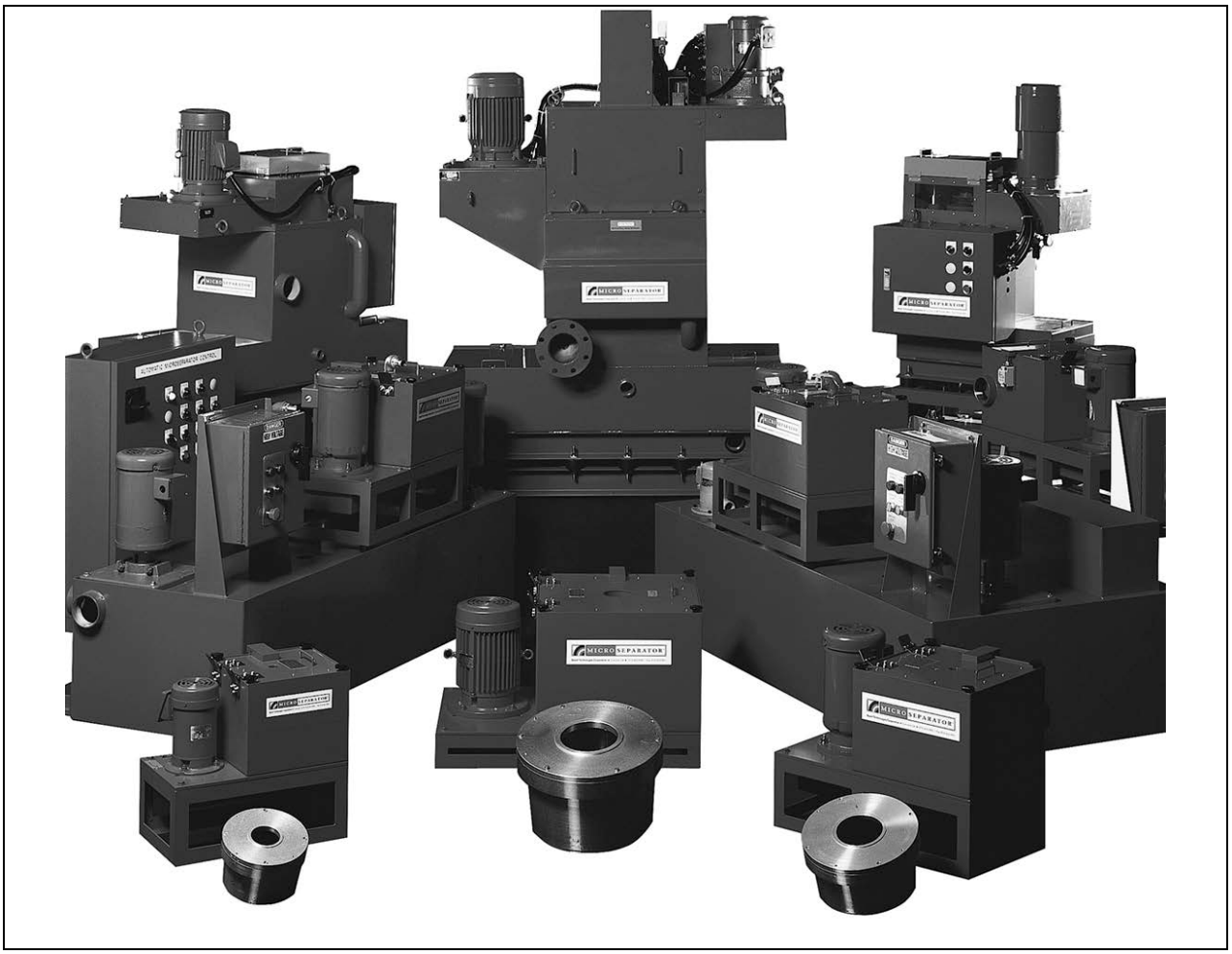
MICRO SEPARATOR®

CF 55 M-2-CE

Operations and Maintenance Manual



Industrial centrifuges available in manual clean, full automatic, portable skids, tank systems and custom built systems to suit process requirements.

BAZELL TECHNOLOGIES

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SPECIFICATIONS

Model	CF 55 M-2
Motor	2 HP (1.5KW), 3 ph 208-230/460 V, 6.5-6.2/3.1 FLA, 60 Hz, 1725 RPM, TEFC, 4 pole Frame D90D, Induction Motor
Solids Discharge	Manual
Nominal Capacity	12 US GPM
Rotor Volume	430 Cu. In., 1.75 Gal.
Construction Material	
Centrifuge Cabinet	304 Stainless Steel
Stand	Mild Steel
Centrifuge Rotor	304 Stainless Steel
Centrifuge Liner	Buna N (Neoprene)
Shipping Data	
Length	42 in. (1067 mm.)
Width	30 in. (762 mm.)
Height	52 in. (1321 mm.)
Volume	37.9 cu. ft. (1.1 cu. m.)
Weight	500 lb. (226.8 kg.)
Operating Temperature Limit	194 F (90 C)
Piping Connections	
Inlet	1.0 in. Hose Barb
Outlet	3.0 in. NPT Female
Drain	1.25 in. NPT Female (2)

Microseparators™ Serial # _____

In Service Date _____

COMPANY PROFILE

Bazell Technologies is a closely held California Corporation devoted exclusively to the manufacture of world-class industrial fluid clarification systems. Founded in 1983, the Company pioneered the application of fully automated basket centrifuges in a wide variety of industrial applications. Today, the Company operates internationally, solving complex fluid clarification problems for many of the world's leading industrial companies.

The staff of Bazell Technologies Corporation collectively possesses almost 100 years of centrifuge experience. The Company's technical staff is made up of a team of process industry professionals with expertise in the areas of chemical, mechanical, and electrical engineering.

In addition to being a tier one major equipment supplier to the automotive industry, the Company is an industry leader in other key markets including aerospace, computer component, scientific and consumer optics, metalworking, commercial laundry, wire and cable, sporting goods, and the general industrial manufacturers who supply those industries.

The Company's modern facilities in the San Francisco Bay area continue to expand rapidly in response to the ever-increasing demand for its technologies. The market-leading growth rate of the Company confirms a business strategy calling for the highest quality solutions backed by experienced industrial professionals committed to total customer satisfaction.

SAFETY INFORMATION

- All personnel responsible for operating the Microseparators™ should be required to read the instruction manual and know where to find a copy when needed for reference.
- Operators must make certain the rotor has come to a complete stop before cleaning or disassembly procedures begin.
- Always disconnect the power source before working on or near the Microseparators™ rotor or motor.
- Motor controls should conform to instructions given later in the manual. Motor controllers must be securely and adequately grounded according to NEC and local codes of the specific area.
- Do not over tighten cabinet knob bolts or rotor cover bolts as damage may eventually occur to the female threads. If thread damage occurs, do not operate the centrifuge until corrective actions have been taken. DO NOT OPERATE THE CENTRIFUGE WITHOUT SECURING BOTH THE KNOB BOLTS AND THE COVER BOLTS.
- The cover limit switch must be wired per the instructions in the wiring diagrams. Do not run the Microseparators™ unless this switch is wired correctly and operational.

RECEIVING AND INSPECTION

As soon as possible upon receipt of shipment, machine should be uncrated and packing list checked. Any shortages should be reported to the selling dealer immediately. If damage has occurred during transit, file a claim with the carrier and notify Bazell Technologies of such actions as soon as possible.

APPLICATIONS

The manual Microseparators™ is a liquid/solid separator with a broad range of industrial applications. Over 30,000 of these machines have been distributed worldwide over the past twenty-five years. Microseparators™ can be found cleaning up water, oil, and water soluble coolants of solids like aluminum, carbides, glass, steel, paint pigment, sand, ceramics, and tank scale, to name only a few. Now that you have purchased your first Microseparators™ you have at your disposal the ability to test the machine on other applications in your facility. Your Microseparators™ sales professional will be glad to assist you in determining the appropriate model and specification to suit your application.

INSTALLATION GUIDELINES

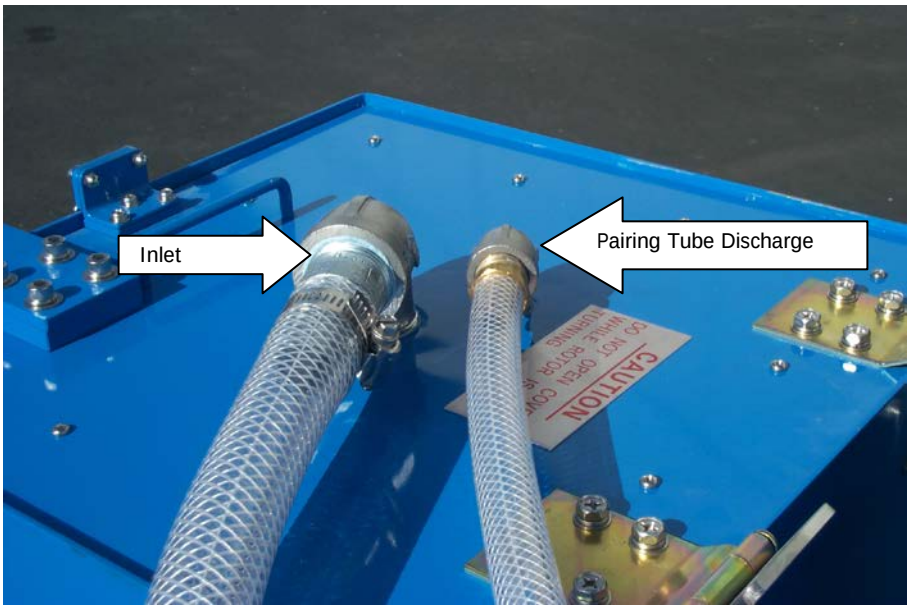
The Microseparators™ CF Series modules may be installed permanently or used portably with castors. The guidelines that follow pertain to either type of installation. Please pay careful attention to the inlet, outlet, and drain conditions.

HEIGHT AND POSITION

The Microseparators™ should be positioned as close to the process as possible. Elevation of the outlet must be high enough to permit the free fall of clean liquid back to the process sump. Allow enough clearance between the end of the outlet piping and the top of the sump liquid to periodically check the outlet flow rate with a bucket. Flow meters should NOT be relied upon in most applications.

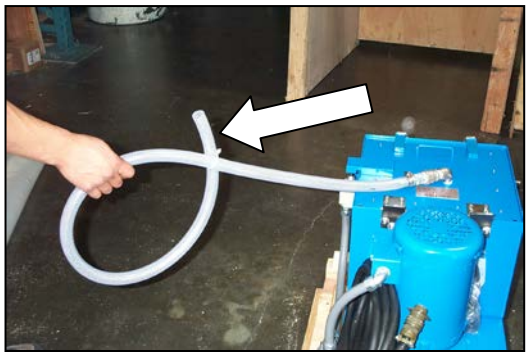
INLET

The inlet at the top of the cabinet of the Microseparators™ is a 1 in. NPT female half coupling open directly to the centrifuge rotor. The centrifuge is designed to operate at up to 12 GPM. Flow rates above this may damage the bearings of the machine. Installation should be planned so that the flow rate to the machine is PERMANENTLY set and cannot be altered by the operator. The operator should only have the ability to turn the process liquid on or off. This is easily accomplished by using the two ball valves supplied. Sufficient clearance must be allowed for opening the cabinet.

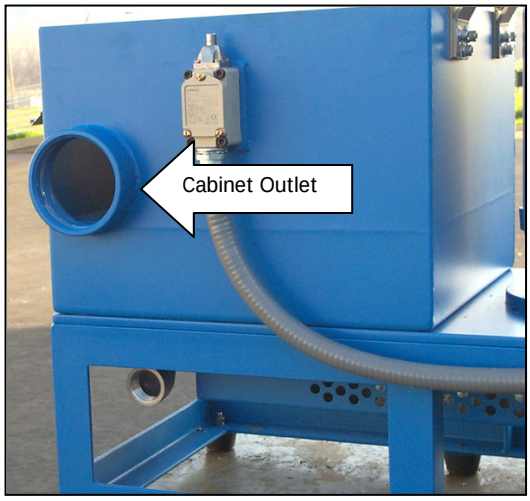


OUTLET PIPING (CABINET AND PARING TUBE)

Clean liquid will exit the Microseparators™ via the paring tube (¾ in. hose). Use the provided hose to supply clean liquid to the process. Refer to the Process Flow Diagram later in the manual (PFD-50-3).



Effluent discharge piping outlet piping (Clean feed) will also provide clean liquid to the process. This outlet must not be reduced, obstructed, or submerged. Outlet piping should be flexibly connected (i.e. FERNCO type fitting with hose clamps) to the centrifuge outlet on the side of the cabinet. Piping solidly to the machine is not recommended, as minor vibrations are present due to rotating machinery. Effluent discharge piping outlet piping MUST discharge to atmosphere, not below the surface of the process liquid. Slope outlet piping downward one foot for every four feet of pipe (1/4).



Sump Agitation

In almost every case, some form of agitation must be present for the system to work properly. The sump may need to be modified to get the proper agitation. This might involve removing weir's or baffles that obstruct the movement of solids and liquids. Your salesperson will be happy to assist and advise.

Electrical Requirements

See Bazell Technologies electrical prints attached. Refer also to the motor nameplate for the voltage and full load current requirements in sizing of overloads. Controllers, breakers, fuses, wire size and conduit should follow NEC, NFPA, as well as local codes, if any, governing the specific conditions of the installation. Minimum fuse or breaker size should be 20 amp at 600 V, 3 phase power supply. Minimum wire size should be # 12 AWG. While starting, a higher than normal in-rush current will be experienced. This high starting power requirement is due to acceleration of the centrifuge rotor to full speed and will endure for 3-5 seconds depending on operating conditions. The overload condition is sufficiently short to permit the use of standard starting equipment.

Be sure to complete the wiring of the cover limit switch so that the motor will be disconnected if cover is removed. DO NOT OPERATE THE MICROSEPARATORS™ WITH THIS DEVICE DISABLED.

Foundation Requirements

The CF Series modules are supplied complete with a substantial mounting frame constructed of angle with a lower mounting plate for accessories. When the Microseparators™ is in operation while equipped with castors, the castor brakes should be locked to prevent movement of the module.

INITIAL START UP

Before beginning operation of your Microseparators™ Model CF 55 Module, the following steps should be followed closely to ensure proper operation.

Instruction Manual - This entire manual must be thoroughly read and understood by all operators before operation. Improper use of this machine may cause damage to the machine, cause personal injury and or void warranty.

Castors - If ordered as a portable module, fasten castors provided to machine frame with bolts provided. Attach swivel casters at the end opposite control panel, rigid casters below control panel.

Preliminary checks - The Microseparators™ module should be taken to each sump to be cleaned and check for the following:

Elevation: In order for the Microseparators™ to operate properly, the clean liquid outlet (effluent) MUST be above the sump wall, with outlet piping in a downward direction at all times. There must not be any rises in the outlet piping.

- Attach outlet hose to the module. We recommend using flexible hose, 3", with quick disconnect coupling for portable operation.
- Check that the outlet hose is of sufficient length to reach sump.
- Check that the outlet hose flows downward at all times.
- Check that the return end of outlet hose is above sump liquid level. NEVER submerge end of outlet pipe under liquid level.

Air: If machine was supplied with air operated pump, check for availability of dry, compressed air (100 PSI). Be sure air source line has appropriate disconnect for pump air inlet. Review air operated pump manual.

Electrical: See electrical prints later in this manual. Check the following:

- If unit was supplied with male fitting at the end of the power cord, check for proper fit at power source. Typically, the male fitting is not provided.
- Site the unit where it is to be positioned during regular use.
- Be sure power cord is of sufficient length to reach source at this position.
- Check control panel for any loose wiring.
- Be sure that main breaker on control panel is off (open).
- Attach power cord to source.
- Check that voltage supplied is appropriate for machine set up. Check overload relays for proper sizing according to motor nameplate ratings.
- Check that ground (E) is continuos with frame.
- Close (turn on) panel breaker.
- Check transformer secondary for 100 - 110 volts.
- Close control panel.
- Push CENTRIFUGE START push-button and immediately push STOP (jog). Observe motor rotation, should be counter-clockwise looking down. Adjust at SOURCE if necessary. If pos-

sible the source receptacle should be dedicated for the Microseparators™ so the rotation will be consistent for each use.

- If supplied, push PUMP START push-button and immediately push STOP (jog). Observe motor rotation and adjust at SOURCE if necessary. Be sure to read and understand entire pump manual prior to operating. **If pump if self priming centrifugal be sure to fill the impeller housing before starting. Severe seal damage could occur.**

Follow these steps carefully to insure safe and reliable operation.

- Make sure that centrifuge rotor is properly assembled and in place on spindle as described in "Operation" section of instruction manual.
- "Jog" centrifuge motor and observe direction of rotation. Correct direction is shown by an arrow on the cover of the cabinet. If backwards, rewire for correct rotation.
- Start the centrifuge and enter the feed liquid. Place a five-gallon bucket beneath the outlet or the inlet piping and check to see that the maximum flow rate of 12 GPM is not exceeded. See following sections.
- Check to be sure that the flow rate to the machine cannot be changed by the operator. Ideally, if valve is used to control the flow rate, the handle should be removed once set.
- Check the ¼" drain opening. No liquid should be noticeable. If liquid is exiting the drain, the maximum recommended flow rate is being exceeded and should be reset AT ONCE.

FLOW RATE CHECK

The 50 Series Microseparators™ have a maximum flow rate of 12 GPM on water. Flow rates in excess of the maximum will overflow the rotor case and potentially shorten bearing life. The importance of maintaining flow at or below this value cannot be overestimated. Periodically, flow rate should be checked manually to insure that the proper rate is being maintained. The most accurate and simple method for verification utilizes a watch and bucket. The following table is provided as a quick reference for measuring flow rate by this method.

	CONTAINER SIZE (GALS) 1	CONTAINER SIZE (GALS) 5
FLOW RATES GPM	TIME TO FILL CONTAINER (SECONDS)	TIME TO FILL CONTAINER (SECONDS)
5	12.00	60.00
10	6.00	30.00
12	5.00	25.00
15	4.00	20.00

SETTING THE MICROSEPARATORS™ FLOW RATE

A very important step to perform initially and to check at least monthly is the flow to the Micro-separators™ centrifuge. If the flow rate is too low there will be insufficient cleaning of the coolant, if it is too high, separation efficiency will suffer and potentially damage can be done to the machine.

Step One

Close the 1" ball valve on the inlet feed line. Remove the hose clamp retaining the inlet hose and disconnect from the hose barb.

Note: Flow can also be checked, from the Out-let discharge.

Step Two

Place the end of the 1" feed hose over a five-gallon bucket. Open the feed valve and agi-tation control valve. Using a wristwatch with second hand, note the time to fill the bucket. Set the feed valve to provide approximately 12 GPM.

CLEANING FREQUENCY CALCULATION

The manual Microseparators™ is designed exclusively for the separation of solid particles entrained in a liquid media. In as much as manual cleaning is required, the volume of solids present controls the cleaning interval, thus the cleaning interval may be calculated as

$$\text{Cleaning Interval (In minutes)} = \frac{\text{Rotor Volume (Gal.)}}{\text{Feed Rate (GPM) x Percent Solids}}$$

The Microseparators™ is designed for ease of cleaning. The average time required is approximately ten minutes from shut down to start up.

OPERATION

1. Siting the Module. The CF 55 module should be sited with the following considerations:
   a: Outlet hose should reach over the edge of process sump. The end of the outlet hose must remain at least 2" above sump liquid level.
   b: Elevation. The outlet piping MUST slope downward, without rises.
   c: Inlet/suction hose reaches module without stressing or kinking hose.
   d: Electrical outlet is sufficiently close.
   e: Compressed air (air operated pump only) is sufficiently close.
2. LOCK the caster brakes.
3. Attach outlet hose.
4. Attach suction hose to pump. Be sure inlet end of hose is on or near the sump bottom.
5. Be sure main disconnect on control panel is off. Be sure centrifuge cover is closed and cover bolts are secured.
6. Connect control panel power cord to appropriate voltage 3 phase power supply following all in-plant, local and NEC safety rules and regulations.
7. Turn on power at main breaker on CF 55 panel.
8: Push START push-button and allow machine to achieve full speed (3 - 5 seconds).
If excessive vibration is present, stop machine and clean the rotor (See Rotor Cleaning Procedures). If vibration persists, consult your Microseparators™ professional.
9. Open fully on/off ball valve located behind control panel.
10. Push START push-button for pump, if supplied. Or, if air operated pump is being used, attach compressed air line and open air regulator.
11. If flow rate adjustment is necessary, use flow control valve, located horizontally beneath machine, to adjust flow to 12 GPM or less. Use on/off valve, located vertically beside machine, only to shut off flow during cleaning.
12. Check pump suction for position. Suction should be at or near sump bottom and positioned in dirty area. Agitation of sump bottom to move solids towards pump suction may be necessary. Agitation can be manual by an operator with a rake or similar tool. A more automated form of agitation is to move solids with re-circulated sump liquid across sump bottom towards centrifuge pump suction.

Caution: If liquid is observed escaping from lower case drains, located on the underside of machine, the maximum flow rate is being exceeded or the effluent pipe is restricted. Reduce flow rate immediately or bearing damage could occur

13. Shut down. The feed pump and Microseparators™ drive motor are stopped by pressing the E Stop push button. Either device could be restarted separately without affecting the other. Clean centrifuge rotor by following instructions in the following sections. Always clean rotor before extended centrifuge downtime, i.e. end of production day, weekends, etc.

Note: During operation you will notice that some air has been entrained in the outlet liquid. This is normal. The liquid leaving the outlet should appear quite clean until the rotor is largely full of solids. At this point, little or no sludge space remains in the rotor and the outlet liquid appears to be as dirty as the inlet liquid.

TIMER FUNCTIONS

Timer 1 – Timer 1 controls the latch release on the cover interlock switch. Once the STOP button is pushed the timer is energized and will release the cover switch at the end of the cycle.

WARNING – Minimum setting for this timer is 3 minutes. Setting this timer below 3 minutes can release the cover interlock before the rotor has coasted to a complete stop.

Timer 2 – Timer 2 controls the pump delay. When the START button is pushed the timer is energized. At the end of the cycle the pump motor starter (MS2) will energize starting the feed pump.

ROTOR CLEANING PROCEDURES

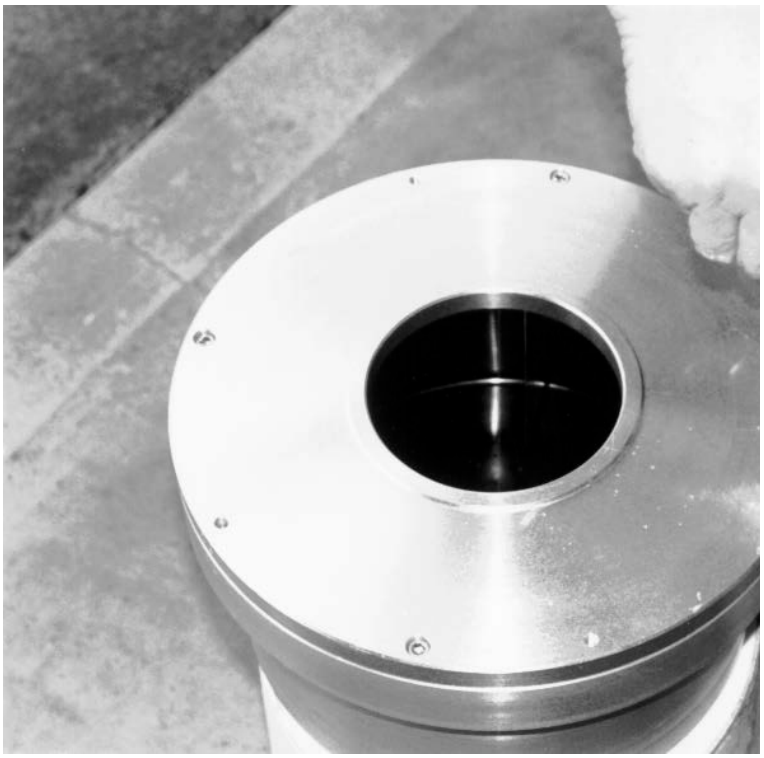
The following cleaning sequence should be followed each time the rotor is cleaned. The average time required to clean the rotor is eight to ten minutes from shut down to start up. The cleaning procedure can be speeded up by utilizing a spare rotor liner. If the rotor is full and requires cleaning more than two to three times per shift, you may wish to consider a larger model Microseparator™.

To initiate the cleaning sequence, first turn off power the Microseparators™ and allow the rotor to come to a complete stop. Remove the four knob bolts on the cover of the outer case and swing open the case cover on the hinges provided. The rotor liner has the capacity to be filled to at least a position equal to the opening in the top of the rotor cover. You can stop the Microseparators™ and look inside the liner and see the sludge build up inside the liner. If it is not full, restart and operate until full or until the end of the shift.

Safety Issue	Do not attempt to remove the rotor until it has come to a complete stop.
Step One	With the cover opened, lift the rotor off the drive shaft. Pour any remaining fluid in the rotor back into the process tank.

Step Two

Set the rotor down on a work surface and, using the hand tool provided, remove the four hex head cap screws securing the rotor cover to the rotor body.



Step Three

Remove the rotor cover from the rotor body. If the cover does not remove easily, use two of the cap screws as jacking screws in the holes noted at right. The jacking holes are threaded while the fastening holes are not.

Step Four Remove the rotor liner from the wall of the rotor by pulling inward on the rotor liner and lifting out of the rotor body.

Step Five Discharge the sludge to an appropriate container. Clean the liner to the extent that all of the large material is removed. It is not necessary to wash out the liner to create a scrubbed clean condition. Also clean the vanes on the bottom of the rotor cover removing as much of the sludge as possible.

Step Six

Using a rag, clean the upper surface of the rotor body to create a clean surface for the cover to seat properly.

Step Seven

On the bottom of the rotor cover there is an important O-Ring, which allows the cover to seal against the rotor body. Using a rag, also wipe this surface clean.

Tip

If your Microseparators™ stops collecting sludge, check this O Ring for integrity and replace if necessary.

Step Eight

After cleaning of the rotor liner and cover, replace the rubber liner by pressing the liner in from the center while holding the wall of the liner away from the wall of the rotor. This allows air to escape. Use this “burping” procedure every time the liner is cleaned.

Tip

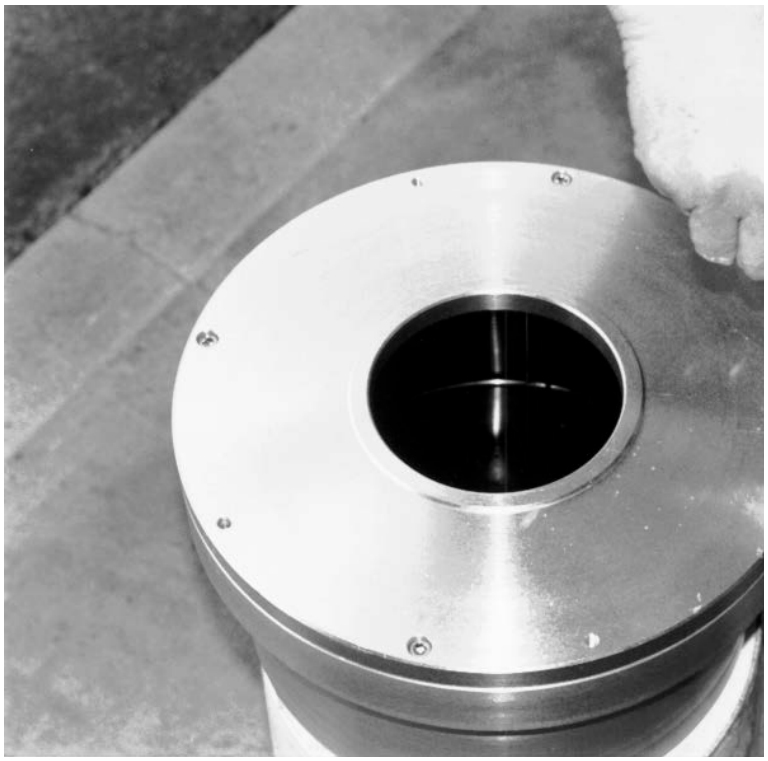
Air left at the bottom of the liner will cause the liner to swell during rotation and can cause damage to the liner.

Step Nine

Replace the rotor cover on the rotor body by positioning the locating hole over the locating pin.

Step Ten

Replace the fasteners removed earlier. DO NOT OVER TORQUE FASTENERS. After fully seating the fastener, rotate not more than 1/8 turn.
Replace the rotor assembly on the rotor shaft and turn to insure the rotor is properly seated. Replace the case cover knob bolts and restart.



Tip

IF FLUID IS LEAKING FROM THE BOTTOM DRAIN REFER TO FLOW RATE INFORMATION IN INSTALL-ATION SECTION AND FOLLOW STEPS TO SET THE FLOW RATE TO THE PROPER VALUE. Periodically inspect this area. It should be clean and dry. DO NOT PIPE OR PLUG THESE HOLES.

MAINTENANCE

The Microseparators™ is designed for long, continuous, maintenance free operation. Lubrication is not required due to the use of sealed, lubricated bearings. V-Belt replacement should be an annual event in cases of fairly continuous use, i.e. 2000 hours per year.

Periodically, the lower cabinet area should be inspected during removal of the rotor for cleaning. If evidence exists of process liquid in the lower cabinet, care should be taken to make certain that the drain is free and clear and that the maximum recommended flow rate is not being exceeded. This condition will eventually cause bearing failure if not corrected.

V-BELT REPLACEMENT

- Turn power off and allow rotor to come to a complete stop. Disconnect main power from machine and lock out.

- Loosen nuts, Item #20, Fig. 4, and slide motor towards the rotor cabinet to relieve tension on the belt. Remove belt guard, (Item #27 Fig. 4).

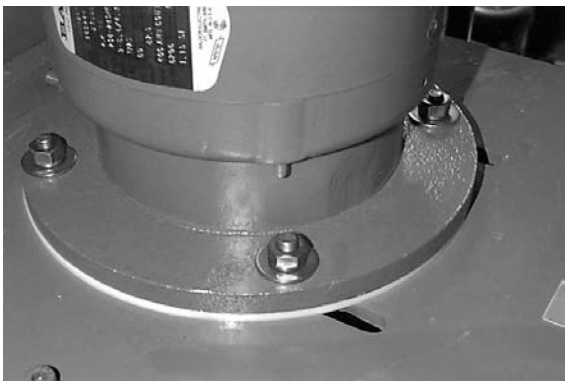
- Replace belt and tighten by forcing the motor position away from the rotor cabinet to achieve the proper belt tension. Tighten the motor mount nuts. Alignment is important for good service life. No unusual alignment techniques are required. An accurate straight edge placed flush against the pulley on the rotor shaft permits adequate visual alignment.

BEARING REPLACEMENT

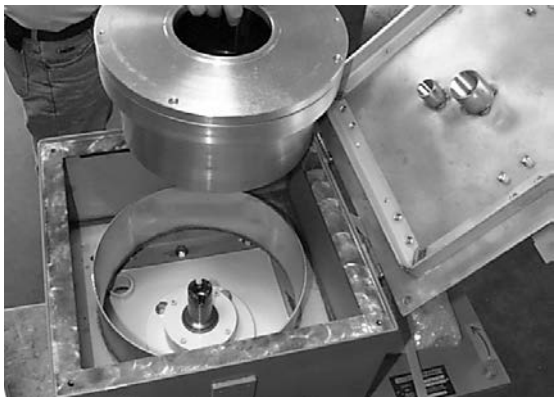
(Refer to figure #5 in the Operation & Maintenance Manual.) Disconnect main power and lock out for safety.

Step 1 Remove the belt guard from the bottom of the machine using a 17mm socket, exposing the pulley on the spindle shaft. (Belts are removed here for identification of this pulley and mounting bolts.)

Step 2 Loosen the motor mounting bolts (Item 20 in Figure 4) and slide motor towards the rotor cabinet to relieve tension on the drive belts. Remove belts.



Step 3 Open cover assembly to the machine. Remove rotor to expose the bearing housing assembly.

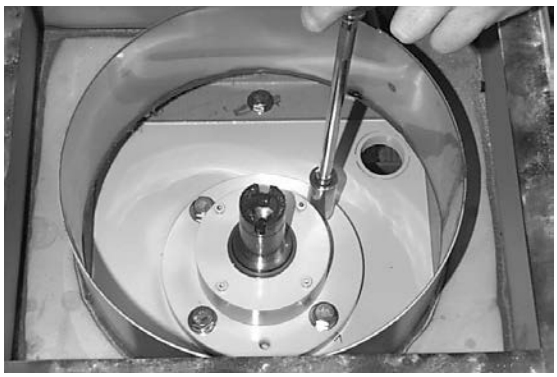


Step 4 With the rotor now removed, the spindle shaft and bearing housing are exposed. To remove the housing, you will need a 17mm socket.

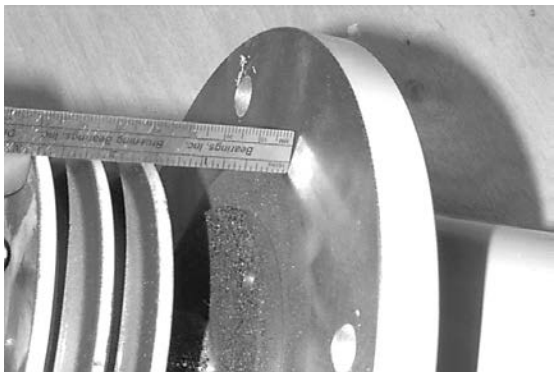
Step 5 Remove nuts (Item 25) with a 17mm socket.

Step 6 Before removing the housing assembly, mark the location of the housing in four locations using a felt pen. This will allow you to replace the housing in the proper location later. It is important to keep this assembly centered in order to prevent the rotor from dragging or scraping against the dam in the cabinet.

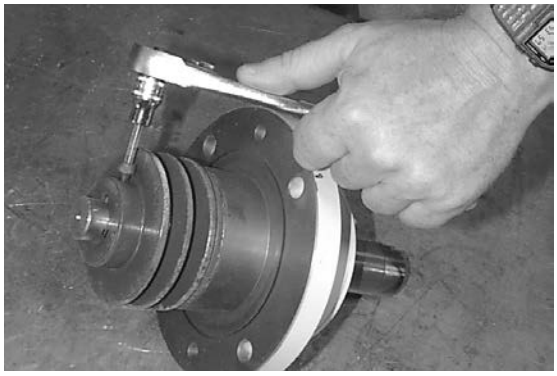
Step 7 Remove the four bolts (Item 20), washers (22), and lock-washers (21) from the top of the bearing housing. These bolts are threaded into the base of the cabinet frame. The bearing housing can now be removed.



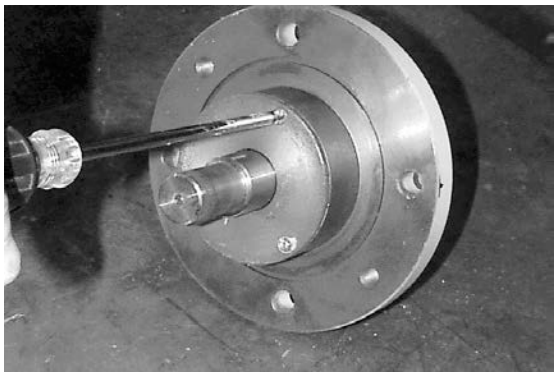
Step 8 Measure and record the distance of the pulley from the bottom of the housing. This will allow you to reset it at the proper height and prevent the misalignment of the drive belts.



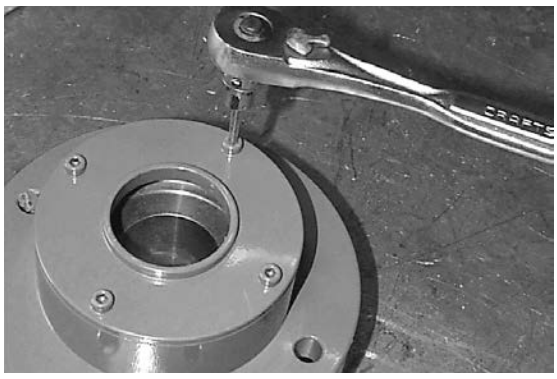
Step 9 Using a 5mm hex wrench, loosen the socket head cap screw (Item 28) and remove the pulley (Item 1).



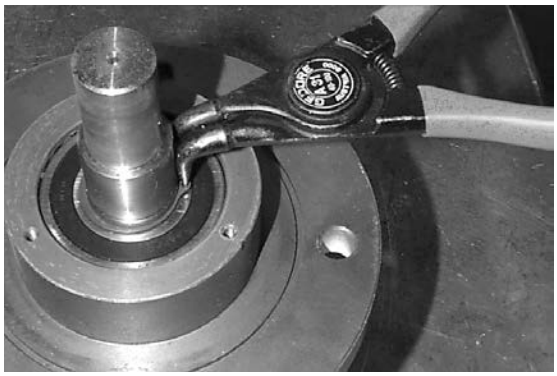
Step 10 Remove the 3 flat head cap screws (Item 26) from the bottom bearing cover and remove cover (Item 5).



Step 11 Remove the 3 socket head cap screws (Item 17) from the upper bearing cover and remove cover (Item 18).



Step 12 Remove snap ring (Item 4). Spindle shaft is now ready to be pressed out. To remove, press the shaft from the bottom side of the housing out through the top of the housing. *The shaft cannot be removed by pushing down from the top.* Remove the lower bearing, Item 7, which will be left in the housing. Remove the upper bearing, Item 19, which will come out on the shaft.



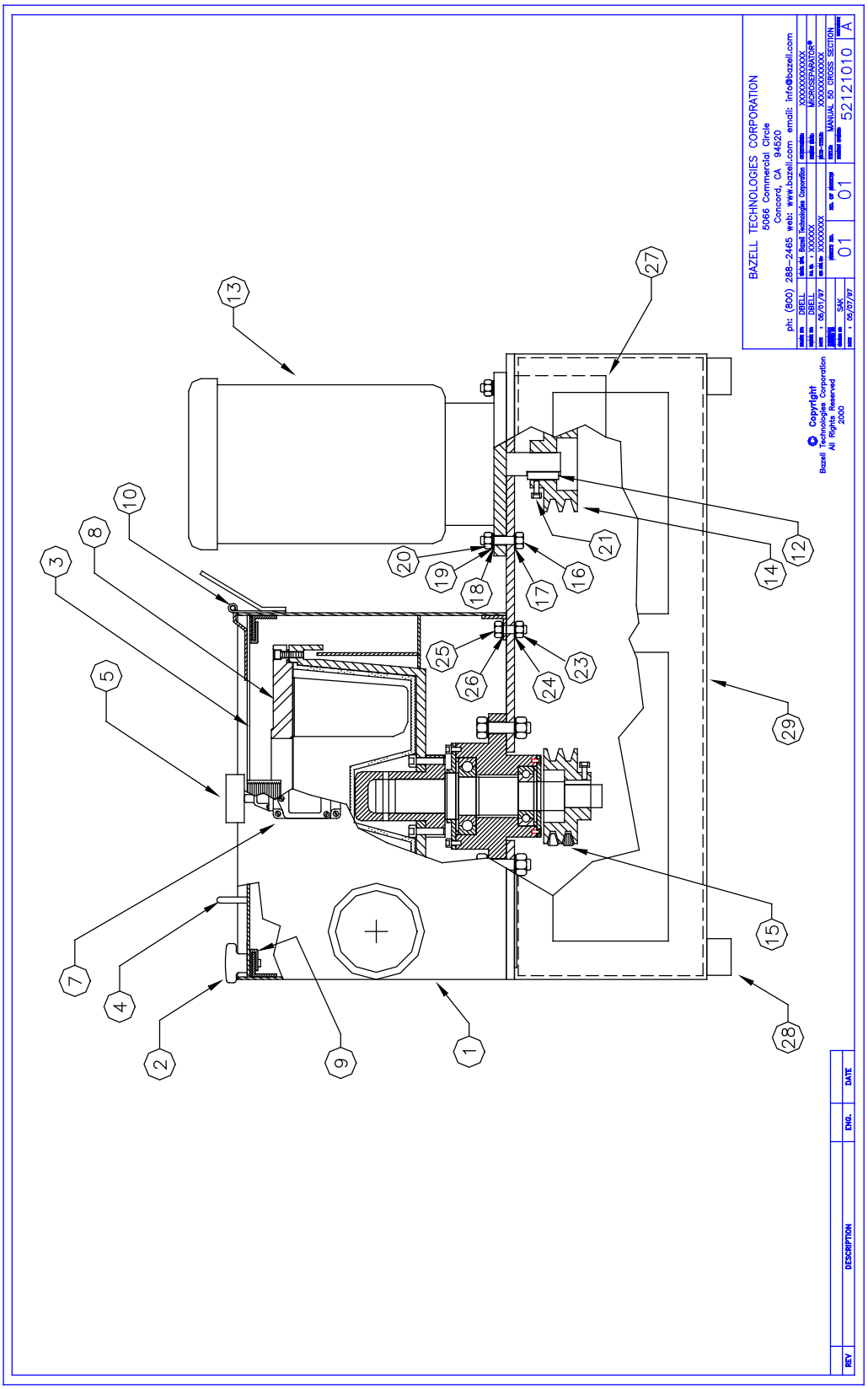
Step 13 The disassembled spindle shaft will look similar to the picture at the right. The bearings are a press fit on the shaft and a slip fit into the housing. It is recommended that both bearings be changed at the same time if the housing is disassembled.

Reverse all procedures to reassemble.

NOTE: Spin rotor and verify that is rotates freely. If there is any rubbing, the housing will have to be realigned by loosening the fasteners in Steps 6 and 7.

MICROSEPARATORS™ CROSS SECTION FIGURE 4

DRAWING# 52121010

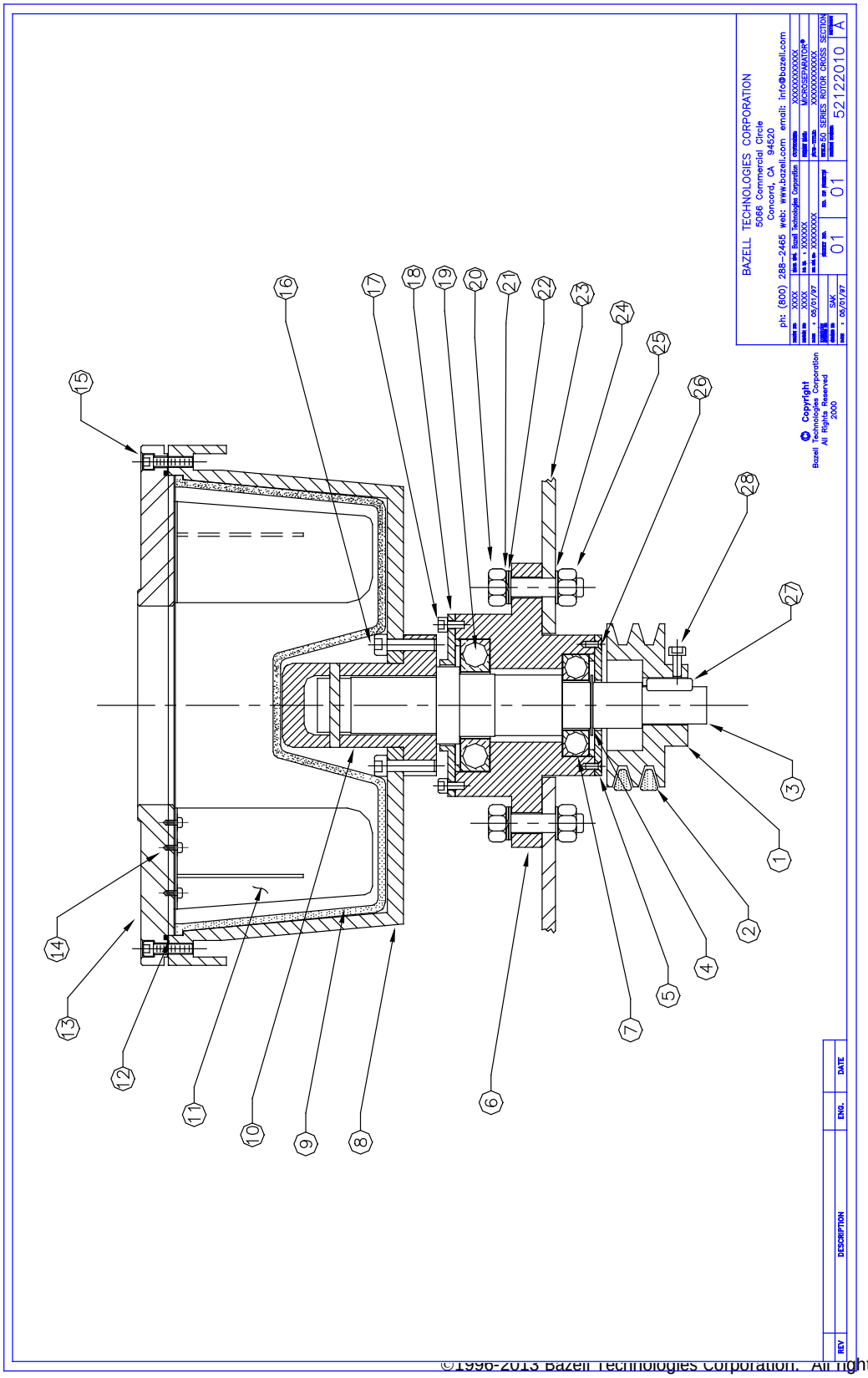


PARTS LIST FIGURE 4 - DRAWING# 52121010

ITEM #	QTY	PART #	DESCRIPTION	MATERIAL/ SPECIFICATION
1	1	2050750	Cabinet	304 Stainless
2	4	2050815	Cover Bolt	Steel/Plastic
3	1	2050718	Cover Assy Complete Incl Items 1,2,3,4,5,7,9,10	304 Stainless Steel
4	1	2050703	Handle	Steel
5	1	2050751	Actuator Assembly	Steel
7	1	508-D4BL-3CRB-A	Safety Interlock	NEMA 4
8	1	2050140	Rotor Assy Complete	See Fig 5
9	4	4000001	Rubber Gasket	Buna N
10	2	2050704	Hinge	Steel
12	1	3080740	Key	Steel
13	1	5110050	Motor, 2 HP	90 L Frame
14	1	2050204	Pulley	A2-106
15	2	2050203	V-Belt	A-37
16	4	8111045	Hex Head Cap Screw	Steel
17	4	7411000	Flat Washer	Steel
18	4	7411000	Flat Washer	Steel
19	4	7311000	Lock Washer	Steel
20	4	7211000	Nut	Steel
21	1	8220615	Socket Head Cap Screw	Steel
23	13	7220000	Nut	304 Stainless
24	13	7320000	Lock Washer	304 Stainless
25	13	8121035	Hex Head Bolt	304 Stainless
26	13	7420000	Flat Washer	304 Stainless
27	1	2050702	Belt Guard	Steel
28	6	2050705	Vibration Dampner	Buna N
29	1	2050720	Base Frame	Steel

ROTOR AND DRIVE ASSEMBLY CROSS SECTION FIGURE 5

DRAWING# 52122010



PARTS LIST FIGURE 5 - DRAWING# 52122010

ITEM #	QTY	PART #	DESCRIPTION	MATERIAL/ SPECIFICATION
1	1	2050208	Pulley	A2-80
2	2	2050203	Belts	A-37
3	1	2050209	Spindle Shaft	Steel
4	1	9210030	Snap Ring	Steel
5	1	2050120	Bearing Cover (Lower)	CI
6	1	2050201	Bearing Housing	CI
7	1	1336206	Bearing (Double Sealed)	6206
8	1	2050141	Rotor Body	304 SS
9	1	2050113	Rotor Liner	Buna N
10	1	2050143	Spindle Drive Bushing	304 SS
11	4	2050115	Vane	304 SS
12	1	4327020	O Ring	Buna N
13	1	2050142	Rotor Cover	304 SS
14	12	8420408	Phillips Head Cap Screw	304 SS
15	4	8220620	Socket Head Cap Screw	304 SS
16	4	8210830	Socket Head Cap Screw	Steel
17	4	8210510	Socket Head Cap Screw	Steel
18	1	2050117	Bearing Cover (Upper)	CI
19	1	1336208	Bearing (Double Sealed)	6208
20	4	8111045	Hex Head Cap Screw	Steel
21	4	7311000	Lock Washer	Steel
22	4	7411000	Flat Washer	Steel
23	1	2050752	Base Plate	Steel
24	4	7411000	Flat Washer	Steel
25	4	7211000	Hex Nut	Steel
26	4	8310410	Flat Head Cap Screw	Steel
27	1	3070728	Key	Steel
28	1	8210615	Socket Head Cap Screw	Steel

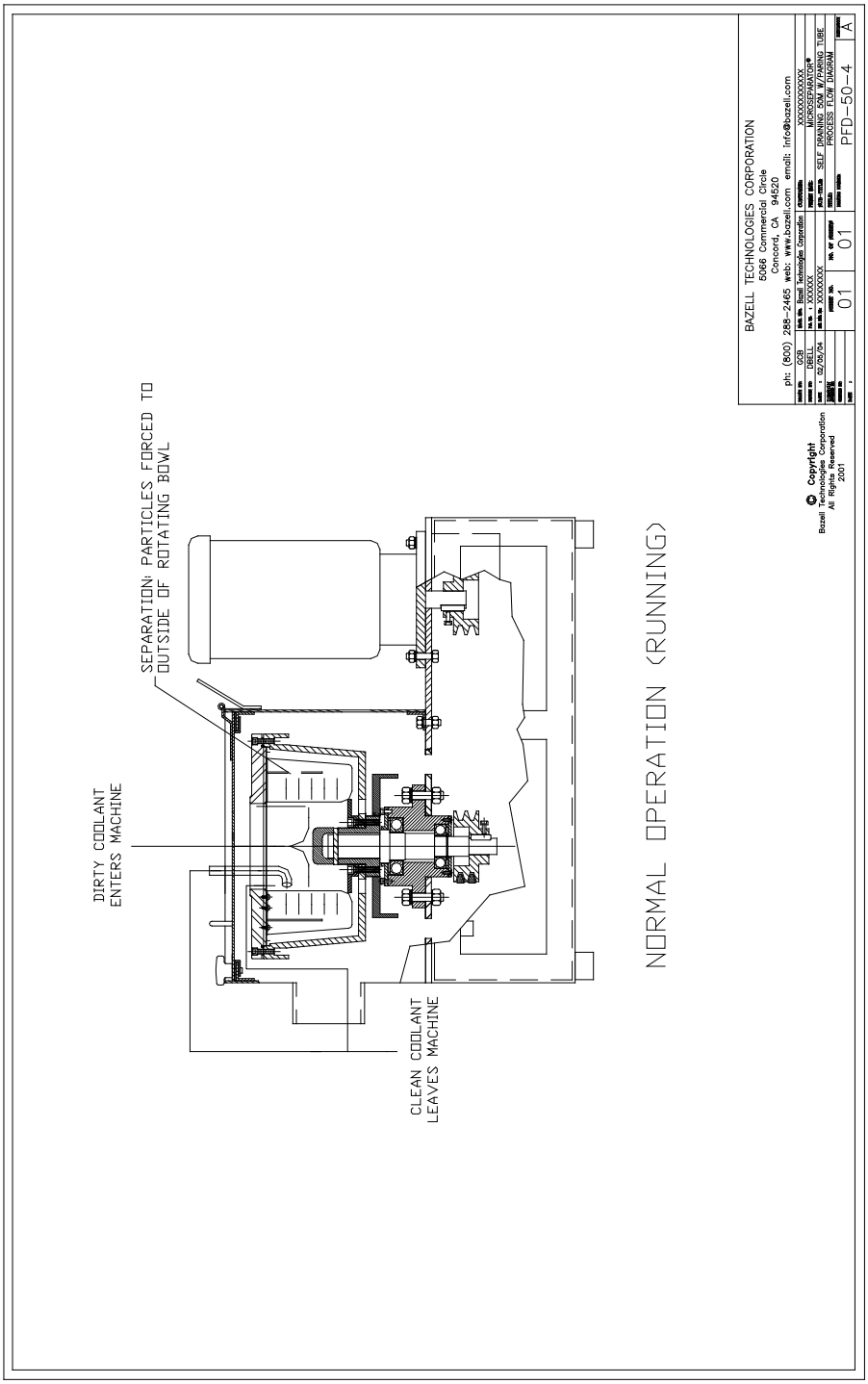
Please Note: The following items are available as complete assemblies:

2050140 Rotor Assembly (Complete) Includes items 8,9,10,11& 13

2050200 Spindle Assembly (Complete) Includes items, 5,6,7,18,and 19

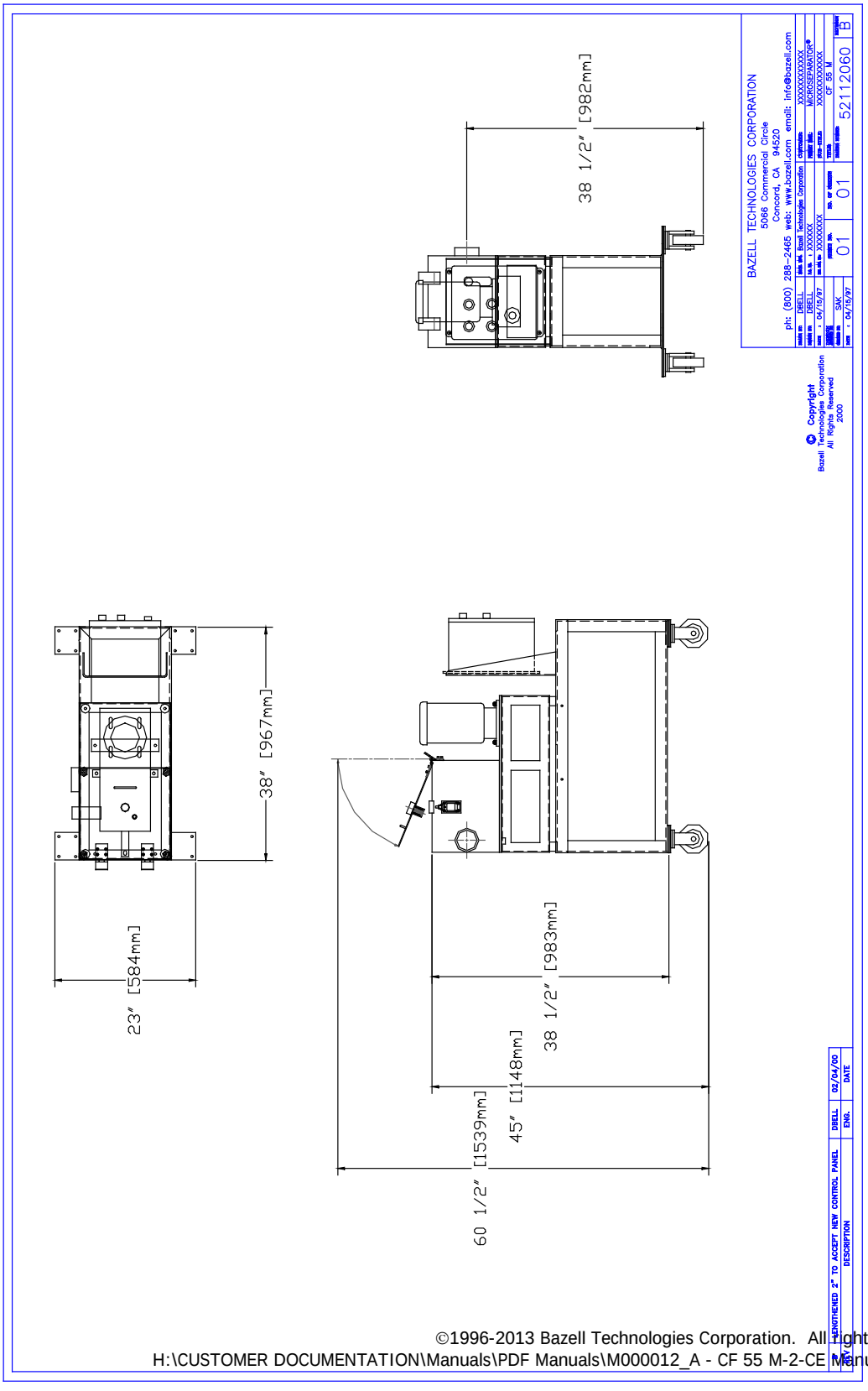
PRINCIPLE OF OPERATION

DRAWING# - PFD-50-4



MICROSEPARATORS™ OUTLINE DIMENSION DETAIL

DRAWING # 52112060



WARRANTY

The Microseparators™ is warranted by Bazell Technologies to the original purchaser against defects in workmanship or materials under normal use (rental use excluded) for one year after date of purchase.

Any part which is determined to be defective in material or workmanship and returned to an authorized service location, as Bazell Technologies designates, shipping costs prepaid, will be repaired or replaced at Bazell Technologies option, provided written notice of the alleged defect is received within one year from date of shipment.

Excluded from the foregoing guarantee are damages caused by ordinary wear and tear, erosion or corrosion, misuse, abuse, or improper handling by the purchaser or any third party.

Bazell Technologies makes no additional warranties, expressed or implied, whether of merchantability, or otherwise, other than stated above. Bazell Technologies shall not be responsible for any indirect, special, or consequential damages, nor for any claim arising out of the sale or use of its equipment, beyond the remedy stated above.

Equipment, parts, or accessories manufactured by others carry the guaranty of the manufacturer only. Any warranties or claims which differ from the foregoing are unauthorized by Bazell Technologies and become the warranty solely of the party making them, unless specifically authorized in writing by an officer of Bazell Technologies. Bazell Technologies liability in all events is limited to the purchase price paid.

Bazell Technologies will make a good faith effort for prompt correction or other adjustment with respect to any product that proves to be defective within warranty. For any product believed to be defective within warranty, first write or call the dealer from whom the product was purchased. The dealer will give additional directions. If unable to resolve satisfactorily, write to Bazell Technologies at the address below, giving dealers name, address, date and number of dealer's invoice, and describing the nature of the defect. If the product was damaged in transit, address your claim to the responsible carrier.

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