

# Colloid Mill

FORM NO.: 95-030028 REVISION: 08/2010

READ AND UNDERSTAND THIS MANUAL PRIOR TO OPERATING OR SERVICING THIS PRODUCT.



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# GENERAL INFORMATION

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## WAUKESHA CHERRY-BURRELL WARRANTY

Seller warrants its products to be free from defect in materials and workmanship for a period of one (1) year from the date of shipment. This warranty shall not apply to products which require repair or replacement due to normal wear and tear or to products which are subjected to accident, misuse or improper maintenance. This warranty extends only to the original Buyer. Products manufactured by others but furnished by Seller are exempted from this warranty and are limited to the original manufacturer's warranty.

Seller's sole obligation under this warranty shall be to repair or replace any products that Seller determines, in its discretion, to be defective. Seller reserves the right either to inspect the products in the field or to request their prepaid return to Seller. Seller shall not be responsible for any transportation charges, duty, taxes, freight, labor or other costs. The cost of removing and/or installing products which have been repaired or replaced shall be at Buyer's expense.

Seller expressly disclaims all other warranties, express or implied, including without limitation any warranty of merchantability of fitness for a particular purpose. The foregoing sets forth Seller's entire and exclusive liability, and Buyer's exclusive and sole remedy, for any claim of damages in connection with the sale of products. In no event shall Seller be liable for any special consequential incidental or indirect damages (including without limitation attorney's fees and expenses), nor shall Seller be liable for any loss of profit or material arising out of or relating to the sale or operation of the products based on contract, tort (including negligence), strict liability or otherwise.

## SHIPPING DAMAGE OR LOSS

If equipment is damaged or lost in transit, file a claim at once with the delivering carrier. The carrier has signed the Bill of Lading acknowledging that the shipment has been received from SPX FLOW in good condition. SPX FLOW is not responsible for the collection of claims or replacement of materials due to transit shortages or damages.

## WARRANTY CLAIM

Warranty claims must have a Returned Goods Authorization (RGA) from the Seller before returns will be accepted. Claims for shortages or other errors, exclusive of transit shortages or damages, must be made in writing to Seller within ten (10) days after delivery. Failure to give such notice shall constitute acceptance and waiver of all such claims by Buyer.

# SAFETY

Warnings, cautions and notes are contained in this manual. To avoid serious injury and/or possible damage to equipment, pay attention to these messages.

- WARNING** Hazards or unsafe practices which COULD result in severe personal injury or death and how to avoid it.
- CAUTION** Hazards or unsafe practices which COULD result in minor personal injury or product or property damage.
- NOTE** Important information pertaining directly to the subject.  
*(Information to be aware of when completing the task.)*

## WARNING

Stop Machinery to Clean,  
Service or Repair

## CAUTION

MILL PARTS HAVE SHARP EDGES.  
TO AVOID CUTTING INJURY, WEAR GLOVES  
AND HANDLE PARTS CAREFULLY.

## WARNING

To avoid electrocution, ALL electrical should be done by a registered Electrician, following Industry Safety Standards.  
All power must be OFF and LOCKED OUT during installation.

## WARNING

TO AVOID POSSIBLE SERIOUS INJURY, SHUT OFF AND DRAIN PRODUCT FROM MILL PRIOR TO DISCONNECTING PIPING.

## WARNING

TO AVOID SERIOUS INJURY, DO NOT INSTALL OR SERVICE MILL UNLESS ALL POWER IS OFF AND LOCKED OUT.

## CAUTION

To avoid possible injury;  
SHUT OFF and LOCK OUT all power; relieve system pressure before servicing.

33-62

REPLACEMENT LABEL 33-62



33-61

REPLACEMENT LABEL 33-61

Read and understand this manual prior to installing, operating or maintaining this mill.

# INTRODUCTION/SPECIFICATIONS

The Waukesha Cherry-Burrell Colloid Mill produces controlled, highly sheared, uniform dispersions and stable emulsions made up of uniform globules of moderate fineness.

A serrated conical stator and a serrated rotating cone make up the emulsifying head.

**Operating clearance** can be adjusted in .001-inch increments between .010 and .240 inches.

**Capacities** range from 6.6 to 33.3 GPM

**Viscosity range** is limited only by the maximum 150 psi feed pressure.

## SPECIFICATIONS

| MODEL | NOMINAL SPEED | PRESSURE               | NOMINAL CAPACITY TO                | INLET OUTLET | NOMINAL TEMP. RANGE |
|-------|---------------|------------------------|------------------------------------|--------------|---------------------|
| CM    | 3600 RPM      | to 150 psi<br>(10 bar) | 6.5 to 33.3 GPM<br>(25 to 126 l/m) | 2" San. IMDA | to 200° (93° C)     |

# INSTALLATION AND START-UP

## COLLOID MILL UNIT DIMENSIONS

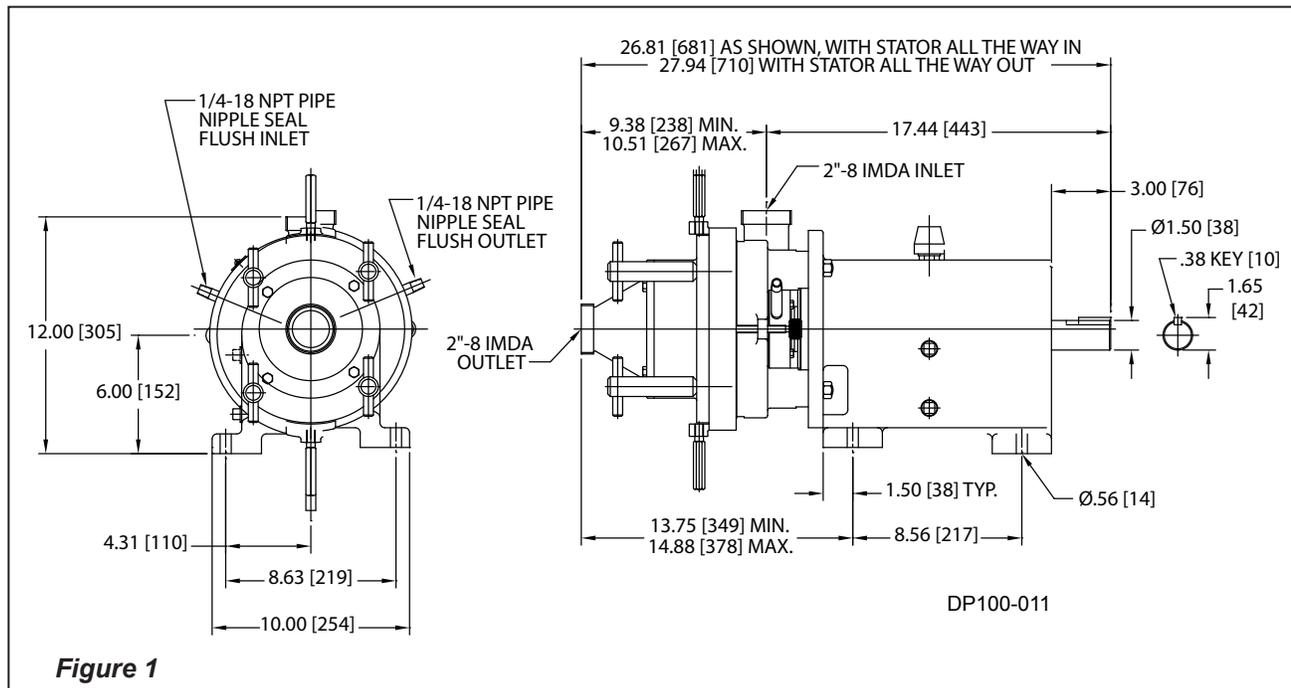


Figure 1

# INSTALLATION AND START-UP

## COLLOID MILL UNIT DIMENSIONS

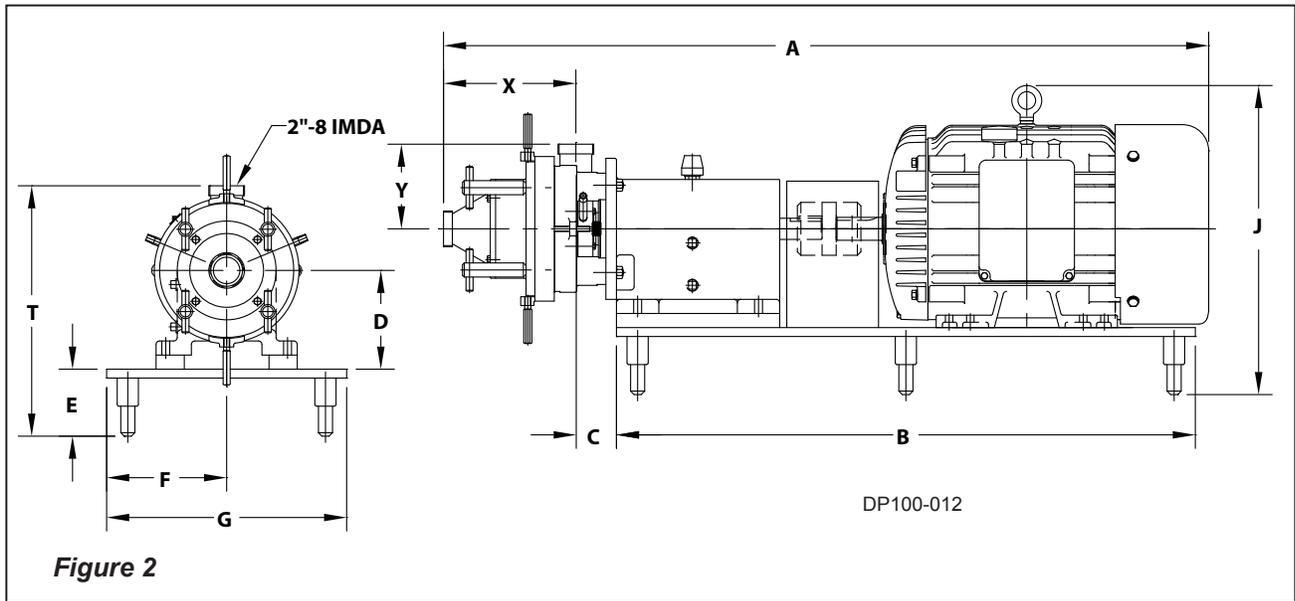


Figure 2

| UNIT SIZE | A     | B     | C    | D    | E    | F    | G     | J     | T     | X    | Y    |
|-----------|-------|-------|------|------|------|------|-------|-------|-------|------|------|
| 15 HP     | 51.57 | 41.00 | 2.88 | 6.25 | 4.75 | 8.50 | 17.00 | 17.69 | 17.00 | 9.40 | 6.00 |
| 20 HP     | 53.32 | 41.00 | 2.88 | 6.25 | 4.75 | 8.50 | 17.00 | 17.69 | 17.00 | 9.40 | 6.00 |
| 25 HP     | 54.20 | 41.00 | 2.88 | 7.00 | 4.75 | 8.50 | 17.00 | 21.90 | 17.00 | 9.40 | 6.00 |

**NOTE:** The pump is shimmed to "D" height.

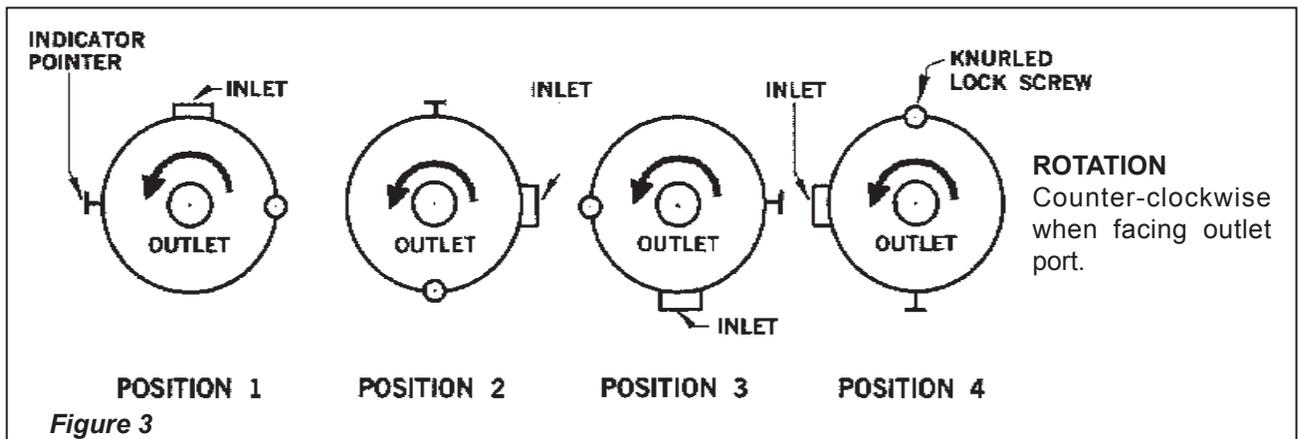


Figure 3

### 1. VARIATION OF INLET PORT

The mill is shipped from the factory with the inlet port as shown in Position 1.

For convenience, the inlet port can be relocated to any of the other three positions (see Disassembly Procedure). If Position 4 is used the calibrations at the pointer will be upside down. We suggest the use of a mirror.

### 2. OVERHEAD EQUIPMENT

Follow accepted engineering practice when connecting inlet and outlet with overhead equipment, piping or tubing. Use hangers to eliminate any weight, stress or strain on the mill. Remember, if direct connection is made with any overhead tank, expansion joints should be installed in the line. This will prevent mechanical loads on the mill which would damage it, or affect its operation.

# INSTALLATION AND START-UP

## 3. WIRING

3 Phase, 60 Cycle, 230-460 Volts. Follow wiring directions on motor. Check direction of rotation.

## 4. ROTATION

Counter-clockwise when facing outlet port. If run clockwise the rotor retaining nut may back off resulting in damage to the mill.

## 5. SEAL FLUSH

The mill is equipped with a face type seal which must be water cooled. The **IN** and **OUT** ports for introducing the water to the seal are located in the gland (1) They are 1/4-inch pipe nipples, but the **IN** hole is smaller than the **OUT** hole to prevent over-pressurizing. (Figure 4)

The **IN** port must be used and the flow of water must be throttled to produce a **flush of 1/2 to 1 quart per minute**. Flows in this range provide safe cooling without damage to lip seal.

It is recommended that a solenoid valve be used in the water line to turn on the water simultaneously with the mill. If the solenoid valve is not used the water flush line should be turned on before starting mill.

## 6. LUBRICATION

The mill is shipped with oil in the bearing case. The level should be checked at the oil level hole and if necessary, oil should be added through the oil fill hole.

Use Mobil oil DTE BB ISO Grade 220 R & O (Rust inhibited) gear oil. (Part No. 000140001+). If DTEBB is not available use S.A.E. 40 non-detergent mineral oil. The mill is shipped with a solid cap screw in the oil fill hole. This should be removed and replaced with the breather cap which is wired to the mill.

Frequency of lubrication is dependent upon temperature and moisture conditions. If room temperature is normal, 70° to 80° F. and water does not contact the bearing case, change oil every 240 operating hours. When temperature varies from hot to cold or mill is flushed out with water, condensation will occur in the bearing case necessitating more frequent oil changes. Normal operating temperature of the bearing case is 170° F. to 190° F.

## 7. METHOD OF FEEDING AND CAPACITY

The inlet and outlet ports are 2 inch sanitary male threads. The inlet port is located in the body—its position can be changed. (See variation of inlet port diagram; page 8). The outlet port is located in the cover of the mill. The mill must be fed with a pump. A Waukesha Cherry-Burrell positive displacement type pump is recommended. The capacity of the mill is 400 to 2000 gallons per hour (6.6 to 33.3 gallons per minute).

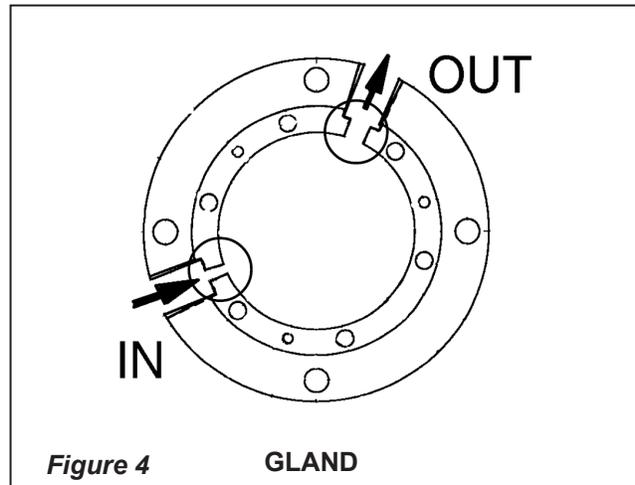


Figure 4

GLAND

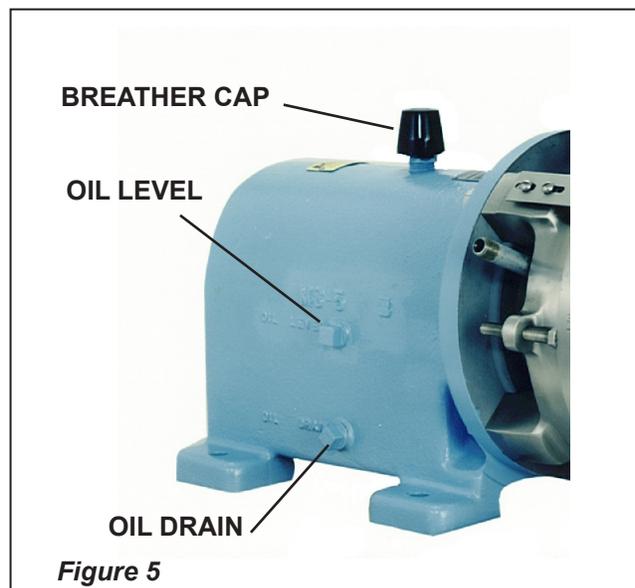


Figure 5

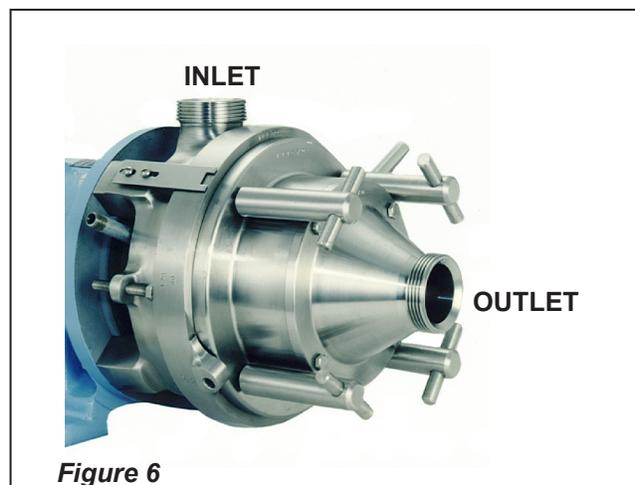


Figure 6

# COLLOID MILL TROUBLESHOOTING

| <b>PROBLEM</b>                         | <b>LIKELY CAUSE</b>                             | <b>SOLUTION(S)</b>  |
|--|---|---|
| Seals leaking                          | Exceeding 150 PSI pressure limitation of pump   | Open up gap reduce pressure   |
|  | Seal flush water improperly plumbed             | Connect flush water to IN/OUT ports as stamped on gland                                   |
|  | Water pressure too high                         | Adjust to 1/2-one quart per minute  |
|  | Seals misaligned on pins                        | Re-align seals to proper fit.   |
| Noisy operation / Excessive power draw | Loose rotor nut causing rotor to stator contact | Tighten nut to 75 ft-lbs.<br>Check mill rotation<br>(counterclockwise facing outlet port) |
| Inconsistent milling results           | Loose adjusting ring                            | Set gap and tighten knurled screw in hole. Tighten bolt and nut on opposite side.         |
|  | Worn rotor or stator                            | Replace worn parts  |

# MAINTENANCE

## CLEANING

### A. FLUSHING

In some instances the unit can be cleaned by merely flushing water through it while the mill is in operation. However, some of the water will remain in the bottom of the cone shaped stator. If this is not permissible it is then recommended that the unit be dismantled for cleaning.

### B. PARTIAL DISASSEMBLY:

**Caution:** Handle all parts carefully to avoid nicks and scratches which will be detrimental to operation of the mill.

1. Remove "T" handles.
2. Back out knurled lock screw.
3. Pull the cover/stator assembly outward. *Some resistance to stator movement will be encountered which is due to friction from the o-ring.*

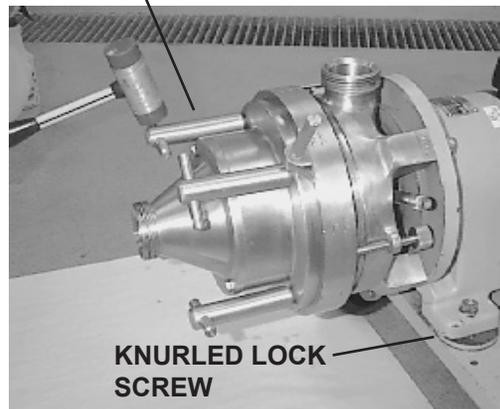
As soon as the o-ring is free, the cover and stator assembly can be easily removed. It is not necessary to remove adjusting ring. Disassembly to this point allows complete drainage.

**NOTE:** To prevent wearing of the faces between the adjusting ring and stator, it is recommended that these surfaces be lubricated occasionally with an approved silicone type lubricant.

### C. COMPLETE DISASSEMBLY:

1. Follow 3 steps outlined in B.
2. Remove cover capscrews and pull off cover, then remove the o-ring.
3. Pull stator off studs and remove o-ring.

T-HANDLE



KNURLED LOCK SCREW

Figure 7

O-RING ADJUSTING RING

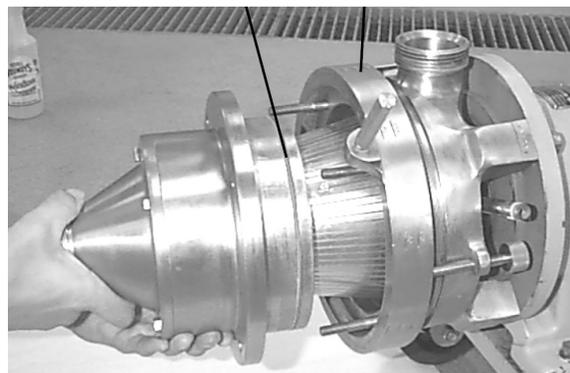


Figure 8

O-RING  
COVER

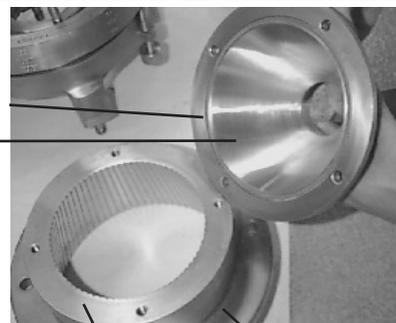


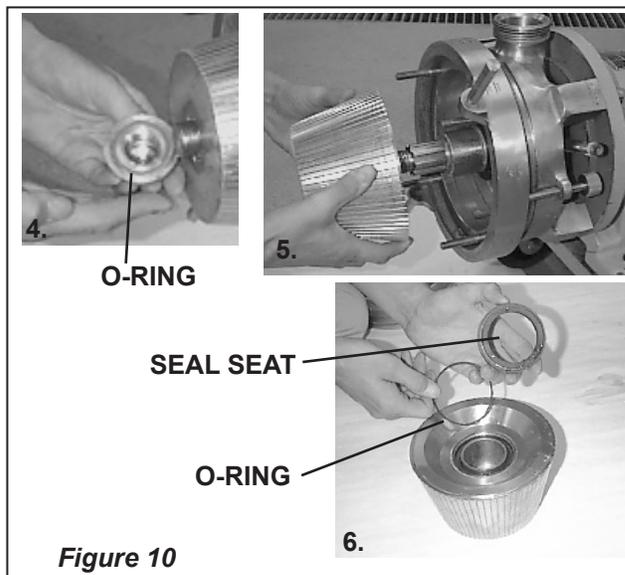
Figure 9 STATOR O-RING

# MAINTENANCE

4. Remove rotor retaining nut and disassemble o-ring.

5. Slide rotor off shaft, handle with care to avoid damage to rotor or seal seat which is contained in rotor.

6. Gently pull seal seat from back of rotor and remove o-ring.



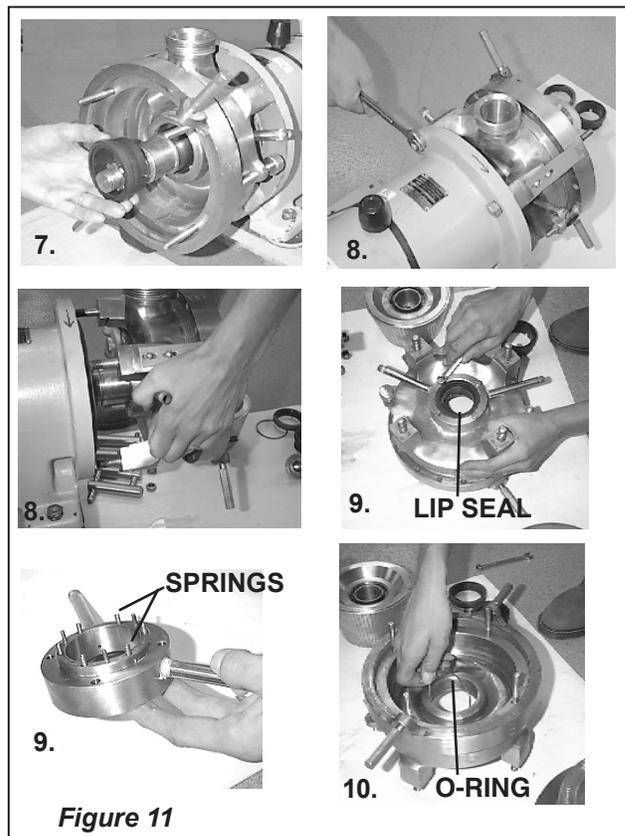
7. Remove seal assembly from shaft.

8. Remove four 1/2-13 hex nuts which secure body to bearing case and slide body off.

9. Remove four capscrews from gland on back side of body and disassemble gland. *There are six loose springs in the gland.* The gland lip seal can be pressed out if replacement is required.

10. Remove o-ring from inside body. Use o-ring tool if necessary.

**NOTE:** Clean and inspect all parts thoroughly. DO NOT reuse seal or seal seat if scratched, chipped or worn.



# MAINTENANCE

## D. ASSEMBLY

1. Apply a suitable lubricant to all o-rings and insert them in their respective grooves.

**NOTE:** Seal seat o-ring should be placed over seal seat and then seat inserted into rotor.

2. Follow disassembly procedure in reverse order to complete assembly. (Torque rotor nut to approximately 75 ft-lbs.)

3. Seal water to mill must be connected to gland connection marked **IN**. Inlet of gland contains the smaller hole. Outlet contains the larger hole. (See Figure 12).

### CAUTION

Flushing backwards can cause seal leakage and flush media will enter product zone.

## ADJUSTMENT AND CALIBRATION

The mill can be adjusted to have a clearance between the rotor and the stator from a minimum of .010 inches to a maximum of .240 inches in increments of .001 inches.

The body (1) and the adjusting ring (3) are calibrated as a unit and serialized, they must not be interchanged with other Waukesha Cherry-Burrell Colloid Mills. The stator is held firmly against the adjusting ring by "T" handles (Figure 14).

The clearance between rotor and stator is adjusted by turning the adjusting ring counter clockwise (when facing the outlet port) for increased clearance and clockwise to decrease the clearance. The adjusting ring is engraved with numerals indicating the clearance in increments of .010 inches. The indicator pointer indicates the desired clearance. For setting in between the increments of .010 the drill point spacing is equal to .001 clearance. Drill point spacing coincides with locking hole spacing. There are 18 locking holes in the ring, spaced 20° apart. (Figure 13)

Rotation of the ring by 20° (hole to hole distance) changes the milling clearance by .001 inches.

Example: to obtain 0.014 radial clearance, locate 0.010 punch mark under pointer. Turn ring counterclockwise four additional drill points {or locking holes}, and lock in place with knurled lock screw. (Figure 13) Tighten "T" handles to firmly hold stator against adjusting ring. Clearance will be 0.014 inches. Adjust lock bolt and tighten nut. (Figure 14)

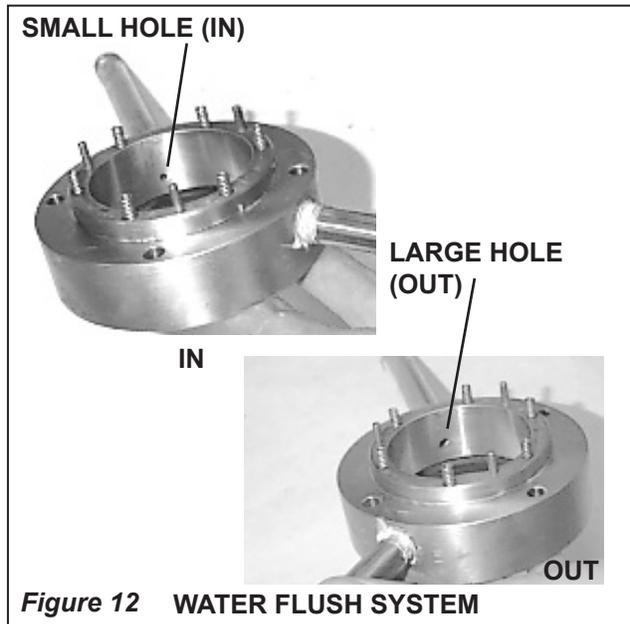


Figure 12 WATER FLUSH SYSTEM

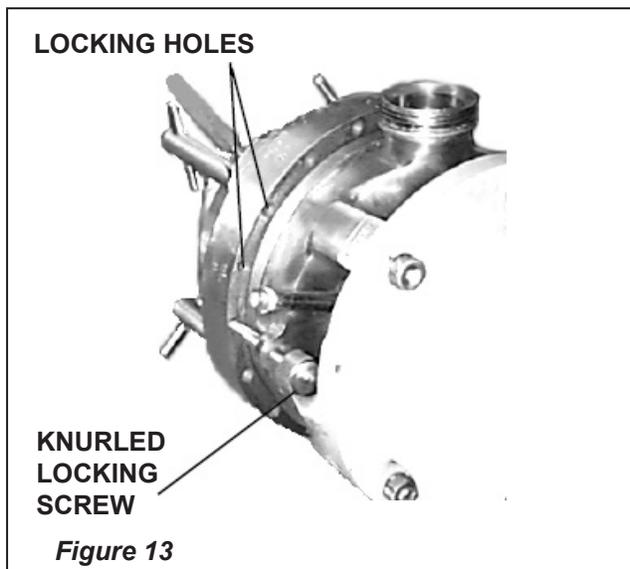


Figure 13

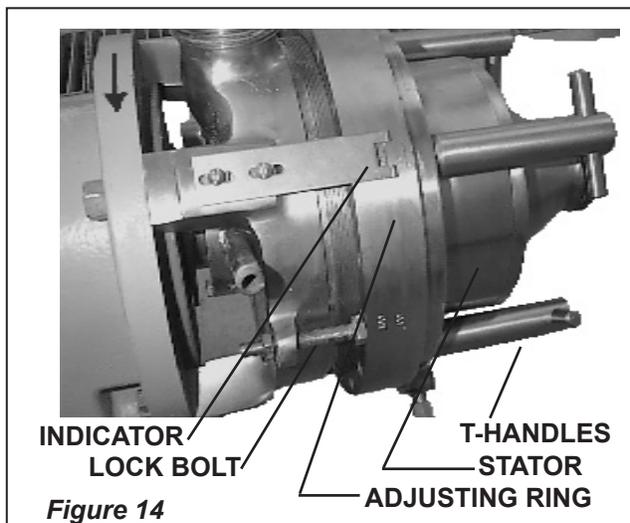


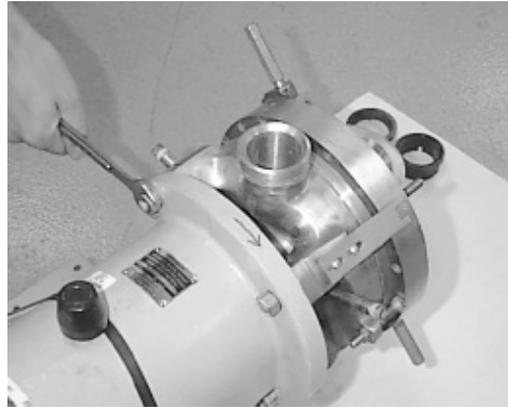
Figure 14

# MAINTENANCE

## FLUSH WATER SEAL REPLACEMENT

1. Disassemble as described in Maintenance, Item C, complete sanitary disassembly.

2. Remove four nuts. (Figure 15)



**Figure 15 REMOVE BODY NUTS (4)**

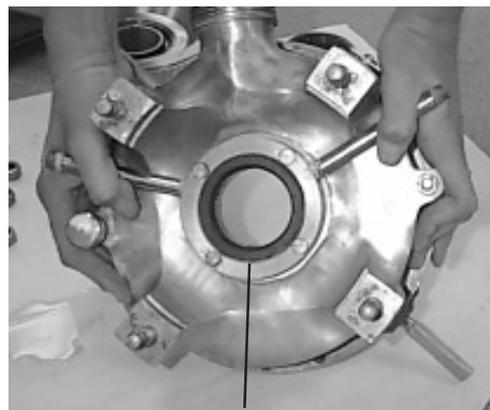
3. Slide body (1) forward off shaft. (Figure 16)



**Figure 16 REMOVE BODY**

4. Pull seal out with hook tool. Insert new water lip seal with lip facing in. (See Item 18, Figure 22)

5. Re-assemble in reverse order.



**Figure 17 REPLACE LIP SEAL**

Tools required for seal and/or bearing replacement:

- Assorted hand tools including soft hammer.
- Bearing puller or press.
- Hook tool for seal removal.
- Spanner wrench for bearing retainer nut removal
- Wrench GD0019000 for rotor nut..
- Anti-seize and seal lubricating grease.
- 2 quarts DTE BB Mobil oil or equivalent.

### CAUTION

To avoid cutting injury, wear gloves and handle parts carefully.

#### Service Preparation

1. Shut OFF and lock out all power.
2. Remove all product and flushing from mill.
3. Disconnect all piping to mill.
4. Remove pump anchor screws and slide gearcase off motor coupling.
5. Place mill on sturdy work surface.
6. Disassemble wet end of mill completely. (See Page 11 for Disassembly)
7. Drain oil from gear case. (Figure 18)

#### Front Seal Replacement (Figure 19)

1. Remove slinger. (Pull off)
2. Remove bearing retainer assembly (front seal inside) (Held in place with four (4) capscrews).
4. Note seal lip position and knock out old seal, place lubrication around new seal and press into bearing retainer. Replace gasket, if necessary. Lubricate seal lip and install bearing retainer and slinger.

#### Rear Seal Replacement (Figure 20)

1. Pull rear oil seal off drive shaft with hooked tool.
2. Place tape over shaft keyway and install new seal. (Lubricate seal lip before sliding onto shaft).

#### Bearing Replacement

1. Remove rear seal. Remove rear bearing retaining ring. Press drive shaft out through front of gear case (through rear bearing). (Figure 20)
2. Remove bearing locknut from shaft (counter-clockwise) and press front bearing off. (Fig. 19)
3. Press the rear bearing out of the front of gear case. (Fig. 20)
4. Clean and lubricate all parts thoroughly before reassembling. Do not unwrap new bearings until ready to install.
5. Lubricate inner races and press new bearings onto shaft. Tighten locknut on front bearing to 40 ft-lbs. (Fig. 21)
6. Lubricate outer races and press shaft assembly into case. Replace retaining ring and rear seal. (Fig. 17)
7. Replace mill assemblies. Torque rotor nut to 75 ft-lbs. Refill crankcase with 2 quarts Mobil DTE BB oil.

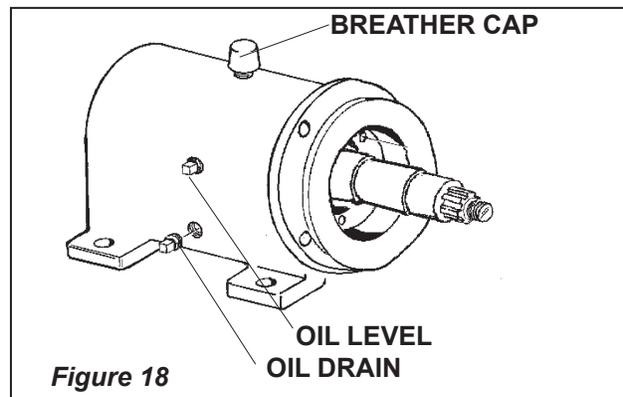


Figure 18

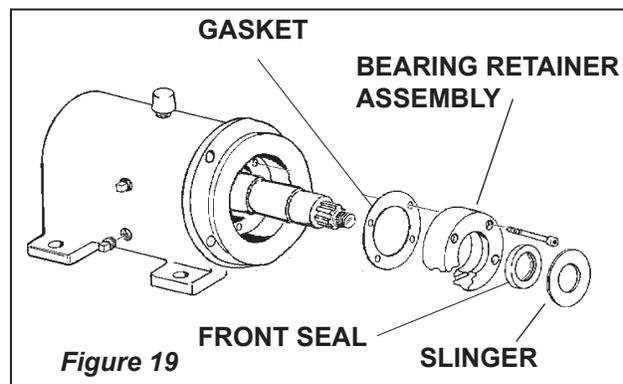


Figure 19

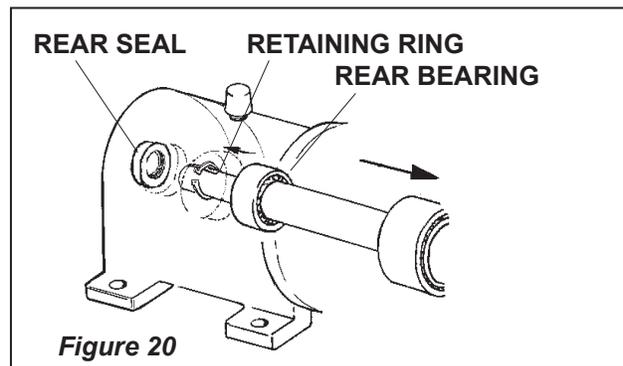


Figure 20

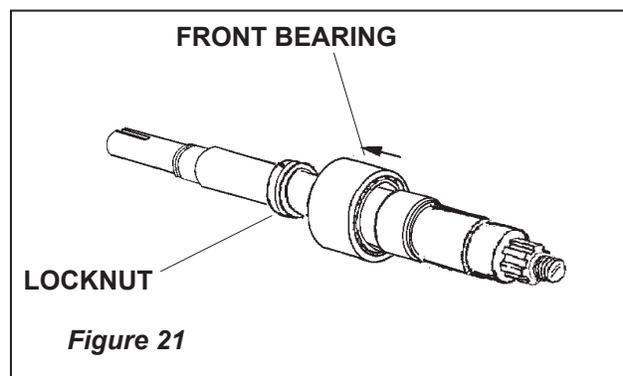
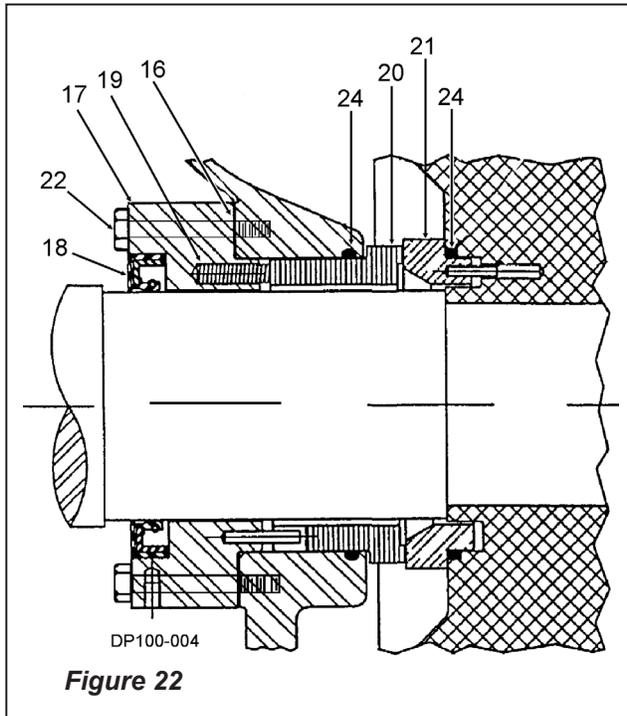


Figure 21

# MAINTENANCE

## SANITARY SEAL REPLACEMENT



**NOTE:** Use care at all times to avoid chipping or scratching seal or seat. Keep seal face areas clean and dry.

1. Install lip seal (18) into rear of gland plate (17).
2. Apply a small amount of sealant to one end of each of the six springs (19) and place in gland spring holes (17).
3. Apply gasket (16) to the sealing face of the gland plate (17).
4. Attach gland plate (17) to mill body using existing capscrews.
5. Install one o-ring (24) into groove in mill body.
6. Attach body to bearing case (4 nuts).
7. Lubricate o-ring (24) and small O.D. of seal (20) with a compatible lubricant and install seal into mill, aligning notches on the seal with pins in gland plate. Avoid grease type lubricants which can harden and bind the seal; use food grade lubricant when processing food products.
8. Lubricate remaining o-ring (24) with compatible lubricant and install on small O.D. of seat (21).
9. Install seat (21) (with pins and o-ring) into rear of rotor, aligning pins with holes in rotor.
10. Install rotor onto shaft, being careful to avoid damage to the seat (21) or seal (20). Tighten rotor nut to 75 ft-lbs.
11. Complete mill assembly. (Reverse steps 2 and 3 on page 13.)

## PARTS LIST SANITARY SEAL

| ITEM NO. | DESCRIPTION                       | QTY | PART NO.  |
|----------|-----------------------------------|-----|-----------|
| 16       | Gland Gasket                      | 1   | 0MS042G00 |
| 17       | Gland Plate                       | 1   | 0MS058200 |
| 18       | Gland Plate Seal                  | 1   | 0MS030200 |
| 19       | Spring                            | 6   | 0MS304200 |
| 20       | Stationary Seal, Carbon           | 1   | 0MS306003 |
|          | Stationary Seal, Silicon Graphite | 1   | 0MS306004 |
|          | Stationary Seal, Silicon Carbide  | 1   | 0MS306009 |
| 21       | Rotating Seat, Silicon Graphite   | 1   | 0MS014002 |
| 22       | Capscrew                          | 4   | 30-98     |
| 24       | Seal Seat & Body O-ring, FKM      | 2   | V70150    |
|          | Seal Seat & Body O-ring, Silicone | 2   | S75150    |

PL5081-CH11

KIT # 35379+ Convert single spring seal to multiple spring seal

# PARTS LIST

## COLLOID MILL GEAR CASE

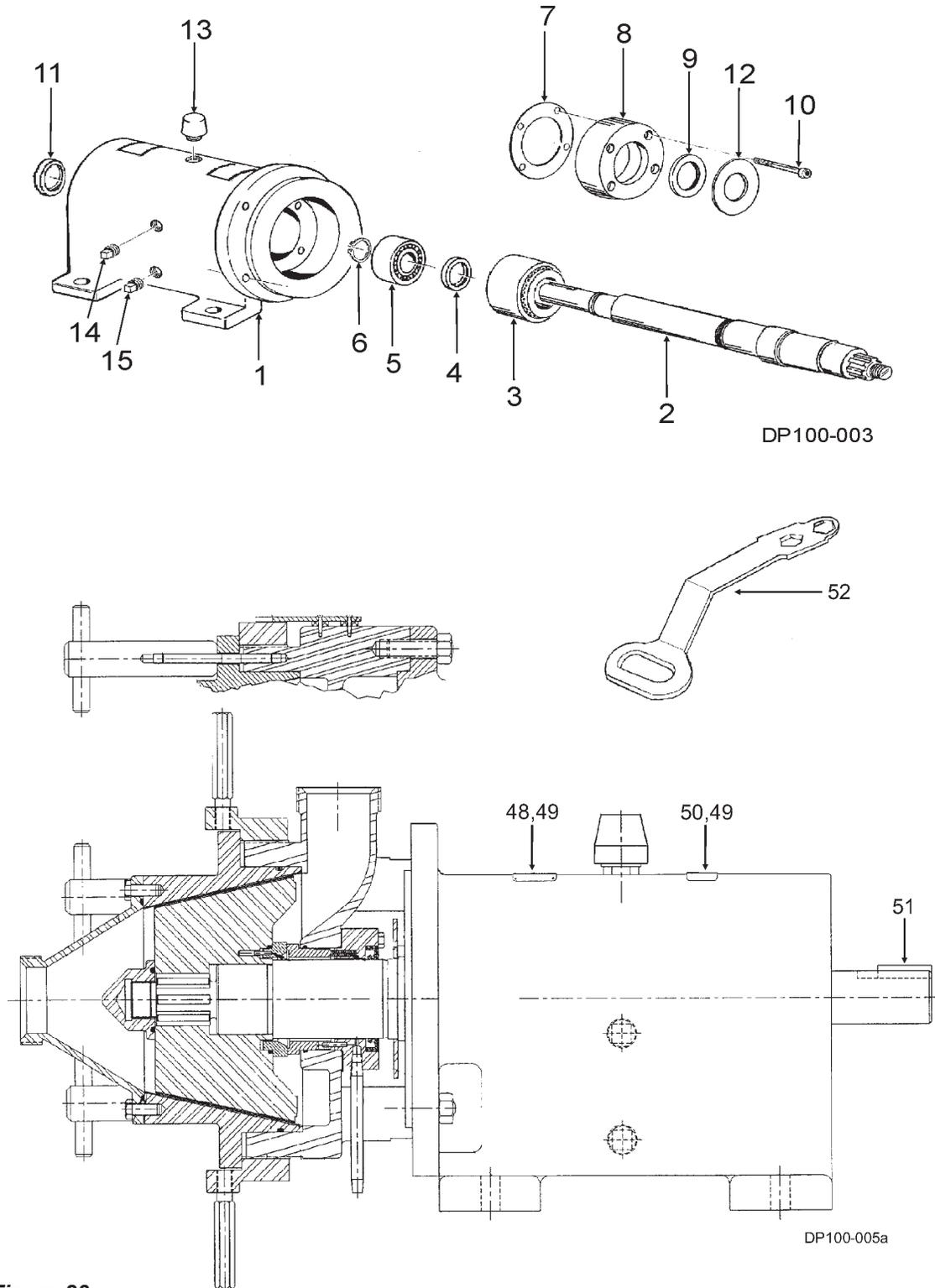


Figure 23

# PARTS LIST

## COLLOID MILL GEAR CASE

| ITEM NO. | DESCRIPTION                   | QTY | PART NO.  | NOTES |
|----------|-------------------------------|-----|-----------|-------|
| 1        | Gear Case                     | 1   | 0MS005000 |       |
| 2        | Drive Shaft                   | 1   | 0MS008000 |       |
| 3        | Front Bearing                 | 1   | 0MS036300 |       |
| 4        | Bearing Locknut               | 1   | 0MS036N00 |       |
| 5        | Rear Bearing                  | 1   | 0MS036000 |       |
| 6        | Retaining Ring                | 1   | BD0087R00 |       |
| 7        | Front Bearing Retainer Gasket | 1   | 0MS042B00 |       |
| 8        | Front Bearing Retainer        | 1   | 0MS080000 |       |
| 9        | Pump End Shaft Seal           | 1   | 0MS030100 |       |
| 10       | Capscrew                      | 4   | 30-274    |       |
| 11       | Drive End Shaft Seal          | 1   | 0MS030000 |       |
| 12       | Slinger                       | 1   | 0MS045000 |       |
| 13       | Breather                      | 1   | 115800    |       |
| 14       | Level Indicator               | 1   | 115799    |       |
| 15       | Drain Plug                    | 1   | 115798    |       |
| 48       | Nameplate, Sanitary           | 1   | 001061002 |       |
| 49       | RHDS                          | 6   | 30-355    |       |
| 50       | Caution Label, Yellow         | 1   | 33-62     |       |
| 51       | Key                           | 1   | 000037003 |       |
| 52       | Rotor Nut Wrench              | 1   | 109896    |       |

PL5081-CH12

# PARTS LIST

## COLLOID MILL FLUID HEAD

NOTE:  
Body rotor  
clearance starts  
at 0.101" and  
ends at 0.220"  
in increments of  
0.010"

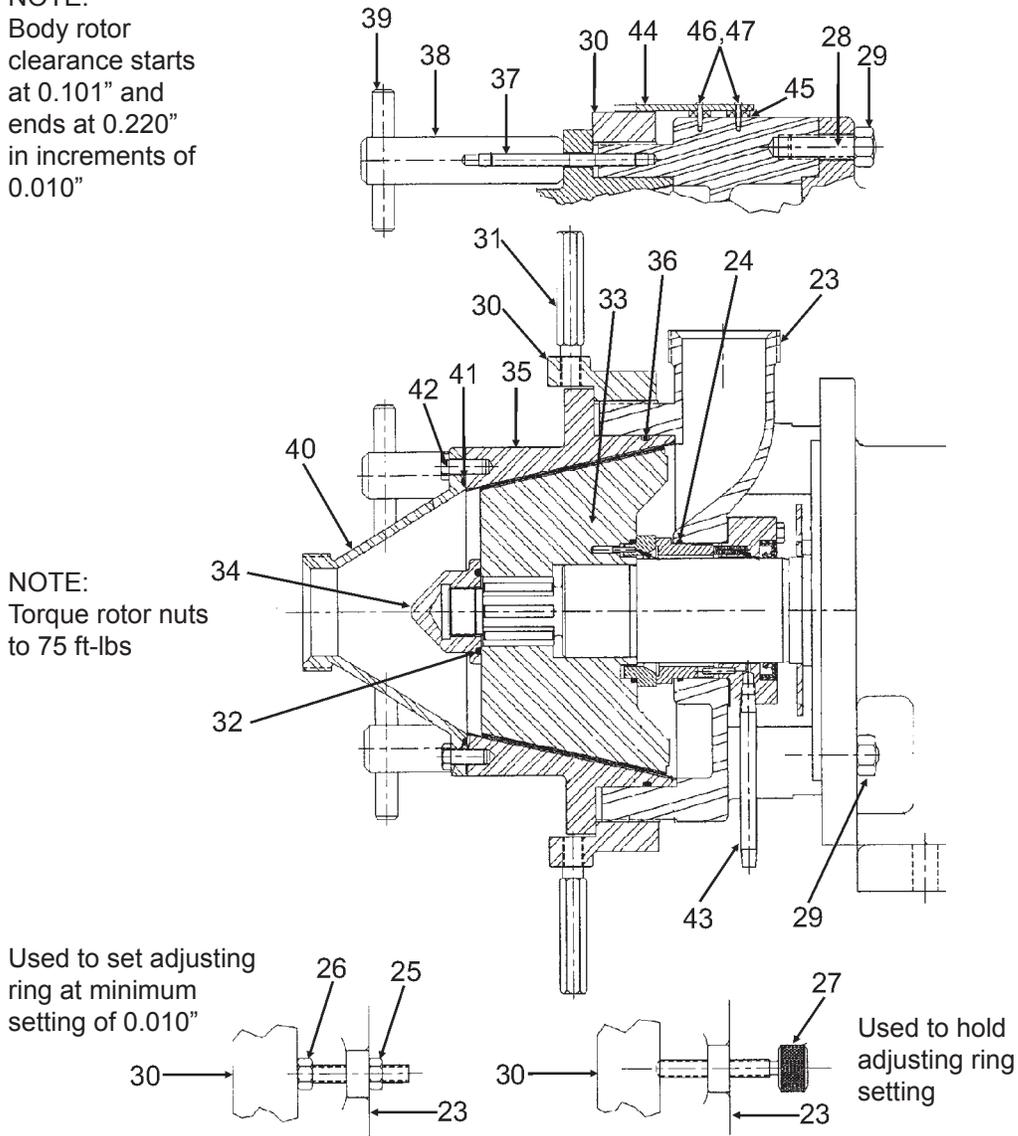


Figure 24

# PARTS LIST

## COLLOID MILL FLUID HEAD

| ITEM NO. | DESCRIPTION                       | QTY | PART NO.  | NOTES |
|----------|-----------------------------------|-----|-----------|-------|
| 23       | Body, 2" Bevel Seat               | 1   | OMS001000 |       |
|          | Body, 2" TCF                      | 1   | 35886     |       |
| 24       | Seal Seat & Body O-ring, FKM      | 2   | V70150    |       |
|          | Seal Seat & Body O-ring, Silicone | 2   | S75150    |       |
| 25       | Hex Nut                           | 1   | 36-55     |       |
| 26       | Capscrew                          | 1   | 30-86     |       |
| 27       | Knurled Lock Screw                | 1   | OMS129000 |       |
| 28       | Stud - Body                       | 4   | OMS011000 |       |
| 29       | Hex Nut                           | 4   | 36-70     |       |
| 30       | Adjusting Ring                    | 1   | OMS003000 |       |
| 31       | Adjusting Ring Handle             | 2   | OMS054000 |       |
| 32       | O-ring, Rotor Nut, FKM            | 1   | V70222    |       |
|          | O-ring, Rotor Nut, Silicone       | 1   | S75222    |       |
| 33       | Rotor                             | 1   | OMS010000 |       |
| 34       | Rotor Retaining Nut               | 1   | OMS052000 |       |
| 35       | Stator                            | 1   | OMS004000 |       |
| 36       | O-ring, Stator, FKM               | 1   | V70263    |       |
|          | O-ring, Stator, Silicone          | 1   | S75263    |       |
| 37       | Stud, Handle Shaft                | 4   | OMS011100 |       |
| 38       | Handle Shaft                      | 4   | OMS099000 |       |
| 39       | Handle Pin                        | 4   | OMS100000 |       |
| 40       | Cover, 2" Bevel Seat              | 1   | OMS002000 |       |
|          | Cover, 2" TCF                     | 1   | 35887     |       |
| 41       | O-ring, Cover, FKM                | 1   | V70253    |       |
|          | O-ring, Cover, Silicone           | 1   | S75253    |       |
| 42       | Capscrew                          | 4   | 30-151    |       |
| 43       | Pipe Nipple                       | 2   | OMS018000 |       |
| 44       | Indicator                         | 1   | OMS056100 |       |
| 45       | Spacer                            | 2   | OMS454000 |       |
| 46       | Machine Screw                     | 2   | 30-299    |       |
| 47       | Lockwasher, #10                   | 2   | 43-21     |       |

PL5081-CH13

# NOTES

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