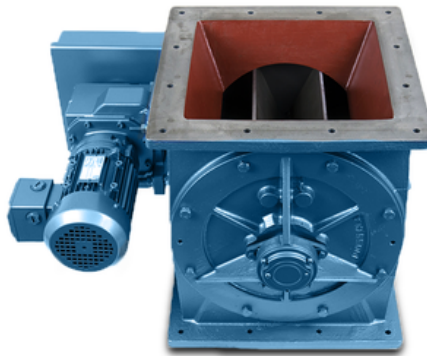




## **INSTALLATION, OPERATION & MAINTENANCE MANUAL**

**FOR**

**HEAVY DUTY  
ROTARY VALVES**



**SUNCO POWDER SYSTEMS, INC.**  
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## **SAFETY PRECAUTIONS & WARNINGS** **(Required To Be Read By All Personnel)**

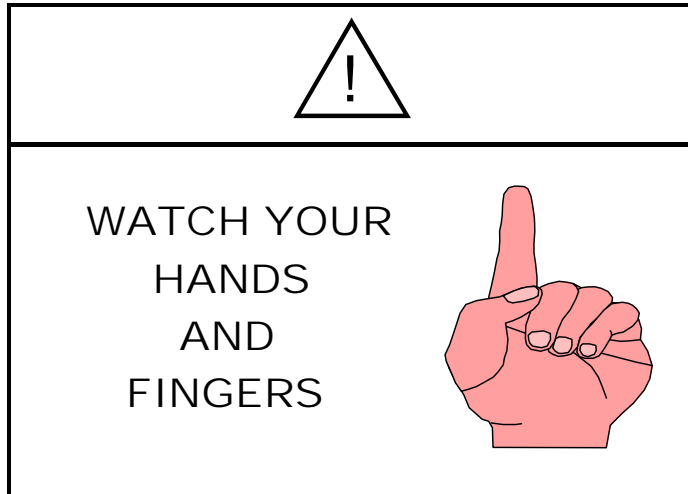
As with all machinery, it is very important every issue pertaining to safety is fully observed. Rotary Valve safety begins with a plan that considers every possible danger and potential hazard.

Operating and maintenance personnel should be thoroughly trained in safe operating procedures, recognition of possible hazards and maintenance of a safe area around the rotary valve.

The following Safety Guidelines should be followed. These are guidelines only and compliance with safety standards – local, state and federal, including OSHA – is the responsibility of the user of the Rotary Valve.

1. Maintain a safety program for all operating personnel.
2. Only qualified and/or approved personnel should undertake the installation, start-up and maintenance of the Rotary Valve.
3. All operating personnel should be advised of the location of all emergency controls and safety devices. Clear access should be made to these controls and devices.
4. **ALWAYS** disconnect and isolate the power source prior to conducting any maintenance on the valve. The supply to the gearmotor must be “locked out” to prevent accidental motor start up.
5. **NEVER** operate the Rotary Valve with the chain guard removed.
6. **NEVER** install the Rotary Valve with the inlet and/or outlet exposed. If the inlet and/or outlet need to be open, guards are required and are available from SUNCO.
7. **NEVER** touch the valve internals with hands, fingers or any type of unblocking rods.
8. **NEVER** stick your hand, fingers or any body part into the valve inlet and/or outlet opening.
9. Rotary Valves are harmless if procedures are followed. Following all procedures fully will prevent damage to: 1) the valve, 2) your clothing, 3) your tools, and 4) Most importantly – To Your Personnel.

**Warning Label/Serial Tag Nameplate Examples**



**Label 1**

This is an example of the Warning Label attached to the Rotary Valve guard



**Tag 1**

This is an example of the Serial Tag Nameplate that is attached to the motor mounting plate or guard.

## **General Description of Valve Components**

The SUNCO Rotary Valve is of all metric construction with fasteners of metric thread. The body is constructed of heavy-duty cast iron, stainless steel or aluminum material. The end covers are of similar metal and are spigot-located into the valve body for ensure concentricity.

### **Rotors**

All rotors are fully fabricated, precision-machined and are available in a variety of materials of construction. There are two main rotor types offered:

- a) Open-End Rotor: This is the most common design offered. The rotor utilizes 6 or 8 vanes and the rotor tips can be fixed, adjustable and replaceable or beveled. The rotor pockets can be “shallow pocket” design, scalloped and or Teflon coated.
- b) Closed-End Rotor: This design allows the material to be held within the rotor pocket, thus minimizing contact with the end covers. A closed-end rotor is most commonly used on application where material abrasion is a concern. These type rotors can also utilize fixed, adjustable and replaceable or beveled tip designs.

### **Bearings**

Sealed for life ball type, rigged outboard in raised boss of end covers and positioned by circlip.

### **Shaft Seals**

Aluminum of cast iron gland follower with pressurizing PTFE packing.

### **Drive**

The valve is chain-driven from a gearmotor, which is side mounted to the valve body. The chain drive consists of a taperlock sprocket and heavy-duty roller chain, supplied in a completely enclosed OSHA guard. Also available are variable speed motors, direct drive, inverter duty, explosion proof and air-operated designs.

All SUNCO Rotary Valves are tested prior to shipment and are ready for installation when received by the end user. It is critical that is the valve will be held in storage, that it is stored in a clean, dry atmosphere with the inlet and outlet fully sealed to prevent ingestion of dust, dirt, moisture, etc. The machined shaft and flanges must also be given a light coat of mineral oil monthly to prevent the formation of rust.

## **Installation**

The wiring of the electric motor to power the valve should be in accordance with the instructions supplied in or on the conduit box. It is very important that you do not perform any work on the valve while the power is connected.

It is important that the valve mating flanges are perfectly flat and level, as any distortions or stresses imposed on the valve could, because of the close tolerances within the body (.10 to .15 mm), jam the rotor.

The valve must NOT be installed at an incline as this may inhibit performance and will void the valve warranty. After bolting up the valve, be sure that the rotor freely rotates. Valve direction must be clockwise.

Gaskets are not typically supplied with the valve. However these are available upon request at an additional charge.

Before start-up, check the chain tension and adjust as necessary.

Also, before running the valve, all approach equipment (i.e. hopper, ducting, screw feeder, etc.) should be thoroughly cleaned and checked to be free of foreign matter, since serious damage to the valve internals could result. Weld spatter, weld rod ends, bolts, wood, etc., are regular problems and are not covered by the valve warranty.

## **Lubrication**

Most gearboxes are shipped dry; therefore every unit MUST be checked and filled with the appropriate grade of oil as stated below. Before starting up, remove the oil filler plug and fill with the proper oil until the correct level is shown in the oil level window. Allow the oil to settle and then replace the oil filler plug. Be sure to keep the breather holes clear at all times. If these become blocked, pressure may build up due to surging oil, which can result in leakage through the seals.

Approximately one month after start-up, drain the oil from the gearbox, flush and refill with new oil. Thereafter, the oil should be changed after every 1500 hours of operation or more often in severe operating conditions.

### **Recommended Oil Grades:**

<i>Castrol Companies</i>	<i>Shell Group</i>	<i>Texaco Companies</i>	<i>Mobile Companies</i>	<i>BP Group</i>
Alpha SP 220	Omala Oil 220	Meropa 220	Mobilgear 630	BP Energol GR XP 220

## **Start-Up Procedures**

With the valve inlets and outlets fully protected to ensure safety, power should now be supplied to the drive motor and the motor should be jogged to ensure clockwise rotation when looking at the drive gearmotor output shaft.

With chain tension having previously been checked and adjusted, the guard cover must now be re-installed. Remember never run the valve with the chain cover removed.

Tighten gland followers where rotor shaft protrudes from the end covers. If valve has been provided with air purge to the glands, clean and dry air 1-2 PSI above the valve internal pressure should now be applied.

With the chain cover on and the inlet and outlet shielded, the valve should run for approximately 30 minutes before conveying any material. This will reverify that foreign objects are not present in the system.

The valve is now ready for production

## **General Maintenance**

**Always isolate the power before beginning any work on the valve.**

It is recommended that the complete Rotary Valve be dismantled for cleaning, inspection and overhaul as necessary at regular intervals.

The interval between such routine overhauls will vary between the product being handled and total operating time. To a large degree, the rate of wear for a particular application would be best gauged by practical experience.

Adjustment to the rotor shaft glands should be made with the unit in a stationary position and with the power "off", taking care to ensure that the gland is pulled up evenly and to no greater extent than the amount necessary to prevent leakage.

The importance of gland maintenance cannot be overstressed since a leak-proof gland allows no flow through of dust particles and consequently eliminates wear due to erosion.

If normal running adjustment is insufficient to prevent leakage or gives rise to continual over-heating, then the lipseals should be completely replaced.

Any maintenance apart from the planned overhaul should be covered by frequent inspection and attention to the rotor shaft glands, reduction gear lubrication and lubrication of the motor drive chain and chain sprockets (if chain driven).

### **Motor, Drive, Sprockets and Chain**

With the power “off”, remove the chain cover and inspect the rotor and rotor shaft sprockets. Examine the sprocket teeth for signs of wear and replace if necessary.

When replacing the sprockets and drive chain, be sure that the sprockets are correctly aligned and that the chain tension is correct.

With one straight length of chain reasonably taut, it should be possible to manually flex the trailing length a total of 12-15 mm (1/2” – 5/8”).

Adjustment to vary the distance between the sprocket centers and therefore the chain tension, is provided for in the motor mounting arrangement where the nuts can be adjusted on studs and in-effect jacking in/out gearmotor.

### **Adjustment of Open-End Rotor (See “Drawing A”)**

On Rotary Valves fitted with open-end rotors, a system of rotor centralization by means of disc springs is used to simplify the adjustment.

At the drive end of the rotor shaft, disc springs are fitted between the bearing and a circlip on the rotor shaft. This has the effect of pulling the rotor towards the drive end of the valve.

The non-drive end of the rotor shaft is fitted with an adjusting bolt and washer against the bearing. By turning the bolt clockwise, the rotor shaft is drawn towards the non-drive end against the spring load, therefore allowing fine adjustment to be made to centralize the rotor within the body assembly.

### **Quick-Release Rotor (See “Drawing B”)**

To remove the rotor:

- a) With the power “off” and working on the non-drive end valve and cover, undo the thumbnuts which hold the cover to the body. The rotor will draw out of the body as the end cover is withdrawn.

To refit the rotor:

- b) Slide the rotor into the valve body with the slot of the rotor shaft inline with the peg of the drive shaft. Ease the shaft through the drive side gland and rotate the rotor slightly until you feel the slot engage the peg. Refit the end cover retaining nuts and check the drive end cover gland. Tighten as necessary. Also check the non-drive end cover gland.



## **Rotor Removal (Other Than Quick Release)**

To remove the rotor from the body of the valve, follow these procedures:

1. Disconnect all electrical power to the valve.
2. Remove the chain guard cover by removing the cover nut. Then disconnect the chain drive and remove both sprockets. A gentle tap with a rubber hammer on the sprocket should free it.
3. Remove the back plate of the guard by unscrewing the (5) setscrews holding the plate to the base plate and drive end cover.
4. Working on the non-drive end of the valve cover, undo the setscrews holding the cover to the body. Insert two of these setscrews into the jacking hole and tighten to remove the cover. The rotor may also come out at this time.
5. If the rotor is not already removed, carry out the same procedures described in Item 4 on the drive end of the valve cover or with “pullers”, push the rotor through the bearings and release.
6. The rotor can then be checked, repaired or replaced.

## **Rotor Tip Replacement and Adjustment**

### **1. Open-End Rotor (Standard Clearances)**

- a) Remove the rotor using the appropriate method (see “Rotor Removal” section above)
- b) Remove the old blades, marking the face of the fixed vane from which they were removed to ensure the new blades are fitted in the correct position.
- c) Fit the new blades so they are at the bottom of their radial adjustment limit. Ensure each blade is centered to the rotor vane fixings only.
- d) Refit the rotor back into the valve body, replace the end cover and ensure the bearing retainer is on the non-drive end side.
- e) The blades should now be set and the rotor centralized using the appropriate method (see “Rotor Removal” section above).
- f) Using feeler gauges, adjust one blade through the inlet to give a radial clearance of 0.1 – 0.125mm (0.004” – 0.005”). This clearance should be taken at both ends of the blade. The rotor should then be turned by hand and the blade clearance checked in the inlet area. Repeat this process until all the blades are set correctly.
- g) Rotate the rotor by hand using some form of crank handle to ensure it is rotating freely.

### **2. Open-End Rotor (Non-Standard Clearances)**

The term “non-standard” covers all rotors that have been machined for elevated material temperatures, special clearances for sugar, detergent, etc., and any special requested clearances. In any of these cases, Sunco should be consulted for correct clearances.

## **Rotor Tip Replacement and Adjustment (con't)**

### **3. Closed-End Rotor (Standard Clearances)**

- a) Remove the rotor using the appropriate method (see "Rotor Removal" section above)
- b) Remove the old blades, marking the face of the fixed vane from which they were removed to ensure the new blades are fitted in the correct position.
- c) Fit the new blades so they are at the bottom of their limit and tighten.
- d) Using a straight edge resting across both end discs, bring the leading edge of the tip level with the bottom of this straight edge. Repeat this with all the tips.
- e) Refit the rotor back into the valve body and replace the end cover.
- f) Turn the rotor by hand using some form of crank handle to ensure it rotates freely.

### **4. Closed-End Rotor (Non-Standard Clearances)**

The term "non-standard" covers all rotors that have been machined for elevated material temperatures, special clearances for sugar, detergent, etc., and any special requested clearances. In any of these cases, Sunco should be consulted for correct clearances.

## **Air Purged Glands (See "Drawing C")**

To prevent dust-laden air from penetrating the packing gland and thereby breaking down both the packing and rotor shaft, air purging can be a distinct advantage. This is especially true on abrasive products and on pneumatic conveying applications.

To satisfy these requirements, a phosphor or nylon lantern ring is used and replaces one lipseal. The end cover is drilled and tapped to accommodate a 1/8 BSP connection to which an air supply of 1-2 PSI above the pneumatic conveying line pressure is applied. This allows air to bleed inwardly into the valve thereby eliminating contamination.

## **Special Remarks**

### **1. Rotor/Body/End Cover Contact**

It is very important that the rotor, body and end covers do not rub or come in contact with each other. Should this occur, it will cause a screeching and eventually lead to the valve seizing up.

### **2. Air Loss Across Rotary Valves**

By design, it is impossible to provide a rotary airlock that does not pass some air. This is because there needs to be a running clearance of approximately 0.1mm feeler gauge clearance on the diameter, and where applicable, on the length of the rotor. Also once the rotor pockets have been emptied of material, the returning empty rotor pockets will contain some air at the outlet pressure which will be returned up to the inlet.

The amount of air loss across the valve will be directly related to the amount of pressure differential the valve is exposed to.

If a soft plastic sack will be connected to the valve outlet, air will be drawn out, causing the bag to be drawn into the valve. To prevent occurrences like this, it is necessary to support the sack internally and to also provide air inlet vent holes around the collar to maintain the sack at atmospheric pressure.

## **SPARE PARTS LIST**

<b><u>Item</u></b>	<b><u>Description</u></b>	<b><u>Part No.</u></b>
1	Body	*-005-1
2	Rotor	*-006-2
3	End Cover	*-007-3
4	Gland Follower	*-008-4
5	Bearing Locating Washer	*-009-5
6	Ball Bearing	*-010-6
7	Box of Gland Packing	*-011-7
8	End Cover Bolt	*-012-8
9	Gland Tensioning Bolt	*-013-9
10	Mounting Bolt	*-014-10
11	Rotor Locating Washer	*-015-11
12	Disc Spring, Non-Drive End	*-016-12a
13	Disc Spring, Drive-End	*-016-12b
14	Motor Plate	*-017-13
15	Gearbox	*-018-14
16	Motor Sprocket	*-019-15
17	Valve Sprocket	*-020-16
18	Motor Bushing	*-021-17
19	Valve Bushing	*-022-18
20	Chain	*-023-21
21	Key	*-024-22
22	Guard	*-025-23
23	Backplate	*-026-24
24	Motor	*-027-25
25	Washer	*-028-26
26	Circlip	*-029-27
27	Key	*-030-001
28-30	Washer	*-031-002
31	Zero Speed Switch	ZSS-033-31

### **Notes:**

1. The (\*) at the beginning of the part number should be replaced with the size of the valve. For example, the part number for a body for an 8" rotary valve would be P/N 8-005-1, for a 10" rotary valve, it would be 10-005-1, etc.
2. When requesting spare parts pricing, customer will need to provide a unit serial number, Sunco sales order number or past purchase order to ensure the correct materials of construction.
3. Contact Sunco for pricing and delivery.

## **Troubleshooting Guide**

### **Motor Problems**

1. If a motor fails to run, check to see if the power supply is available and sufficient at the motor against that specified on the nameplate. Also check the wiring connectors, overloads, etc., and reset or replace if necessary
2. The motor may also be burnt out and in need of rewinding or rewiring.
3. Motor failure can be caused by no oil in the gearbox. If so, the gear or gearbox may need to be replaced.
4. Motor may be using greater amperage than nameplate. Disconnect chain drive and run gearmotor to assess whether additional loading is from the gearbox. If from the valve, check the clearance or product. If the gearbox is suspect, contact Sunco.
5. Motor or drive noise can result from insufficient oil in gearbox and/or lubrication on the chain. Check chain alignment and chain clearance within the guard. If the noise is from the gearbox, contact Sunco.

### **Rotary Valve Problems**

1. If noise is coming from the valve, check clearances and centralize or clean valve internals.
2. Valve direction must be clockwise. Rotary Valve should NOT be installed at an incline as this may inhibit performance and will void the warranty.
3. Valve screeching can also be due to the type of product being handled. While although environmentally troublesome, is not detrimental to the valve.
4. Leaking glands can be caused by a lack of maintenance resulting in dusting. To repair, take out existing packing, thoroughly clean housing and re-pack with new packing as per manual.

### **Operational Problems**

1. If throughput is not being maintained, check the valve speed and valve clearances and adjust and replace as required. If the problems persist, check the rotor pockets to see if they are being emptied and the rotor is clean.

## VALVE DATA SHEET

Customer: \_\_\_\_\_ Date: \_\_\_\_\_

Contact: \_\_\_\_\_ Rep.: \_\_\_\_\_

Address: \_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

### Application Details:

Product To Be Handled: \_\_\_\_\_

Bulk Density: \_\_\_\_\_ Temperature: \_\_\_\_\_ (Max) \_\_\_\_\_ (Min)

Particle Size: \_\_\_\_\_ Moisture Content: \_\_\_\_\_

Material Is: Abrasive: \_\_\_ Adhesive: \_\_\_ Corrosive: \_\_\_ Free Flowing: \_\_\_

Sticky: \_\_\_ Explosive: \_\_\_ Other: \_\_\_\_\_

Feed Rate Required: \_\_\_\_\_ LB/HR \_\_\_\_\_ FT<sup>3</sup>/HR

### System Details:

Pressure or Vacuum Above Valve: \_\_\_\_\_ (Operating) \_\_\_\_\_ (Maximum)

Pressure or Vacuum Below Valve: \_\_\_\_\_ (Operating) \_\_\_\_\_ (Maximum)

Equipment Above Valve: \_\_\_\_\_

Equipment Below Valve: \_\_\_\_\_

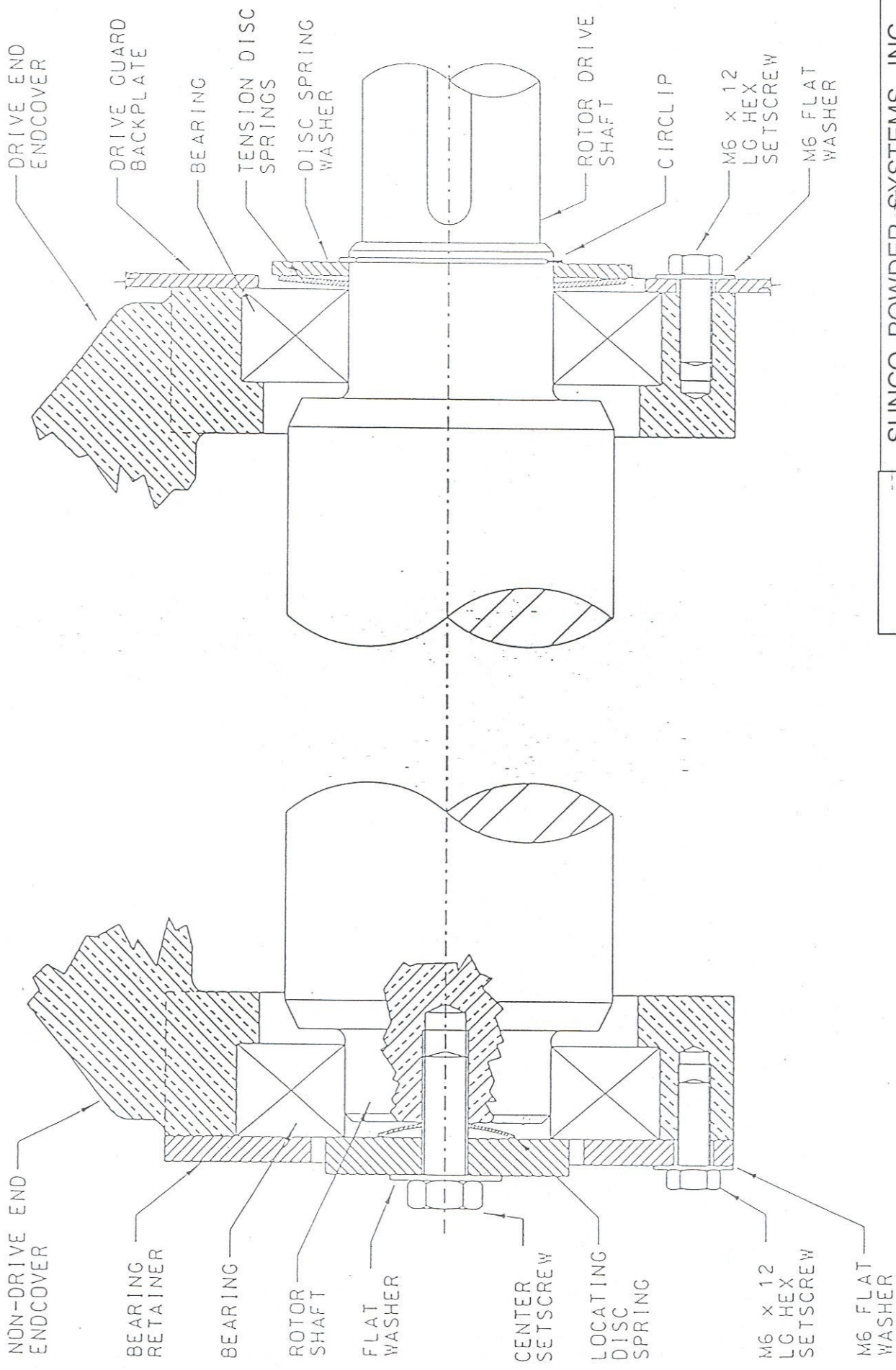
### Construction:

Materials of Construction: Housing: \_\_\_\_\_ Rotor \_\_\_\_\_ Tips \_\_\_\_\_

Electrical Requirements: \_\_\_\_\_ Voltage \_\_\_\_\_ Ph \_\_\_\_\_ Hz

Motor Requirements: TEFC \_\_\_\_\_ Exp. Proof \_\_\_\_\_ Class/Div. \_\_\_\_\_

Other Required Options: \_\_\_\_\_



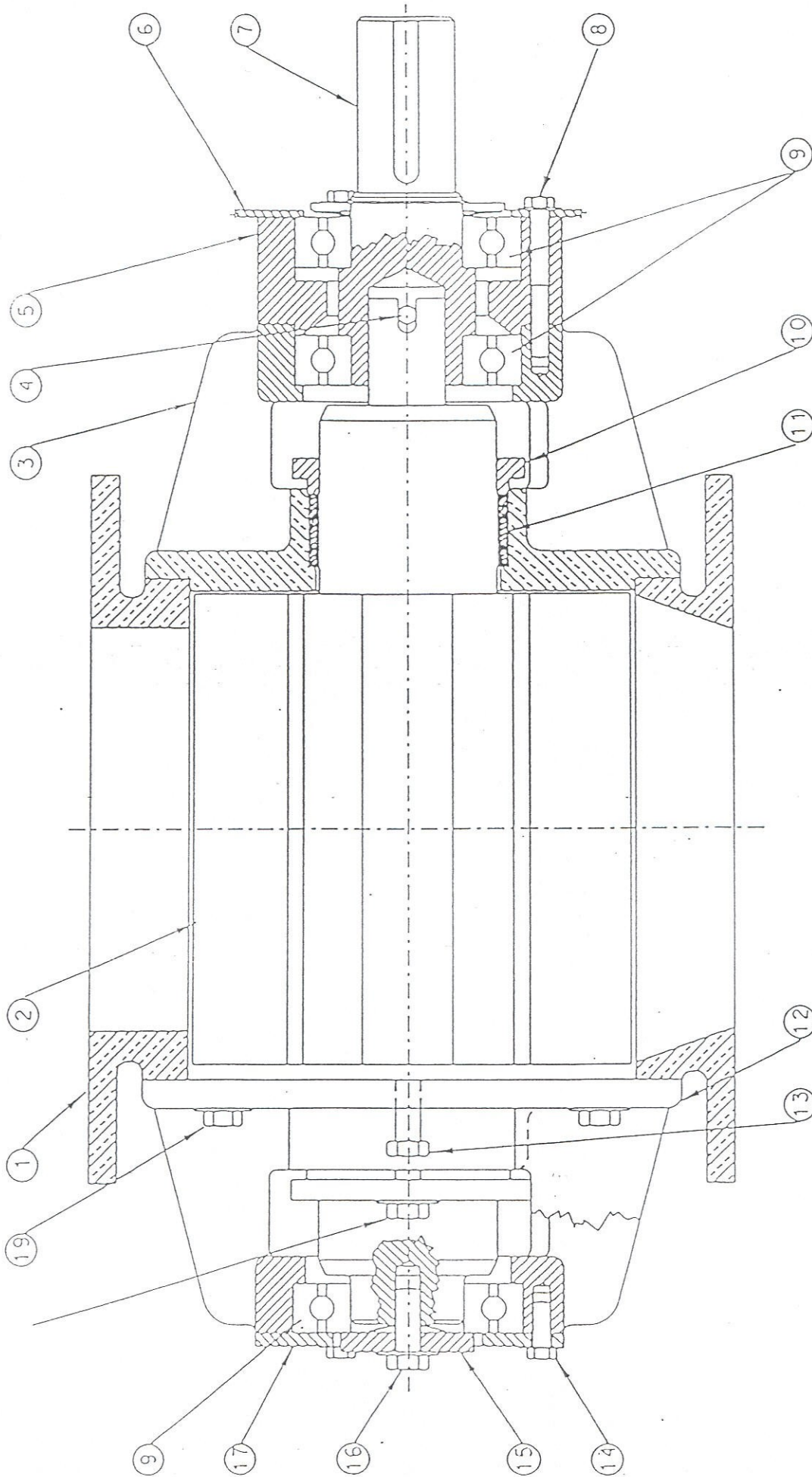
**A**

**SUNCO POWDER SYSTEMS, INC.**  
 CHARLOTTE, NORTH CAROLINA  
 (704) 545-3922

NAME: TYPICAL ROTOR CENTRALIZING SYSTEMS WITH DISC SPRING

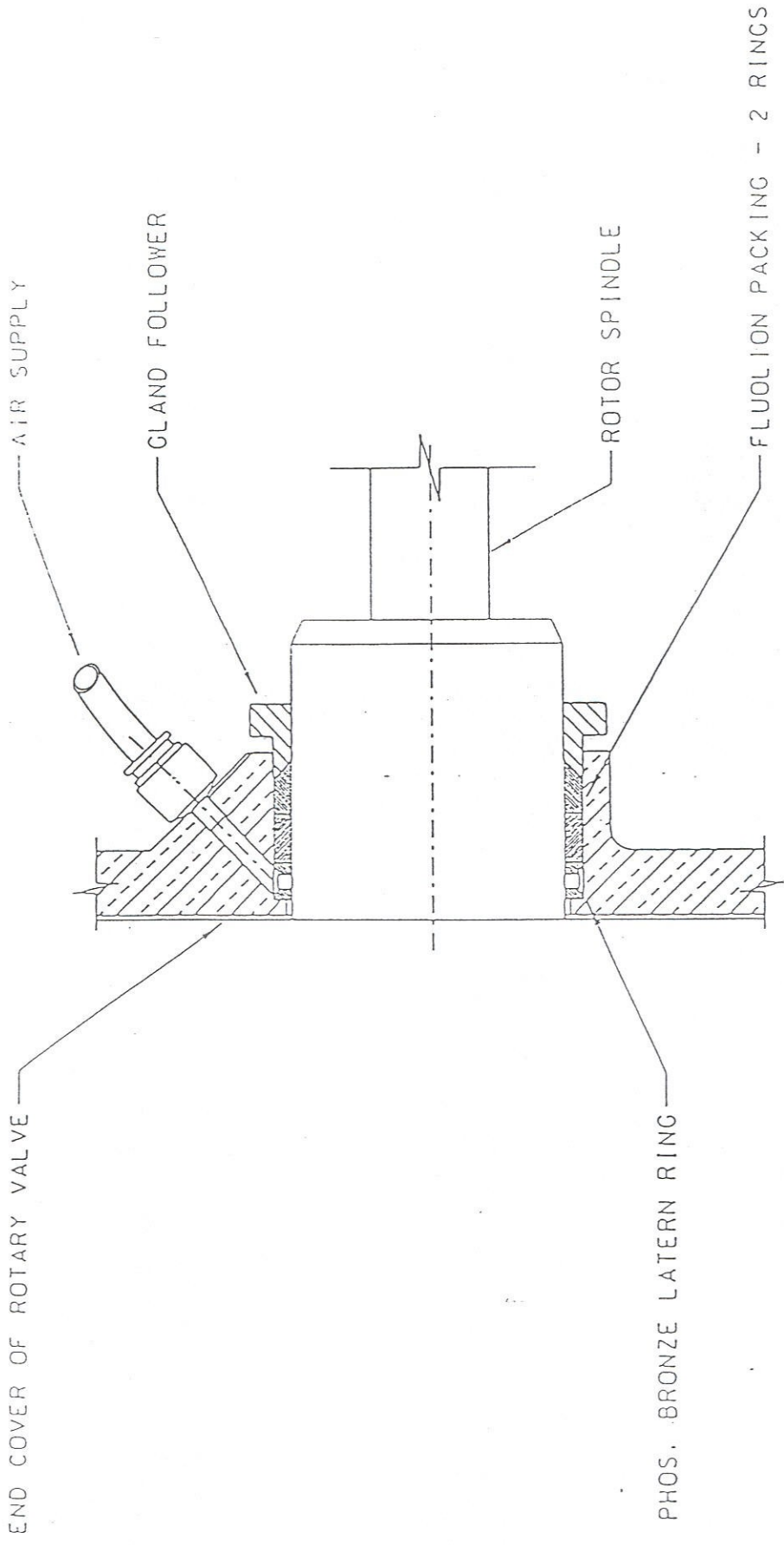
DRAWING NO. 97-B-0100 DATE 01/16/1997





- 1. BODY
- 2. ROTOR
- 3. QUICK RELEASE ENDCOVER
- 4. DRIVE PEG
- 5. STUB SHAFT SUPPORT HOUSING
- 6. DRIVE GUARD BACKPLATE
- 7. STUB SHAFT
- 8. STUB SHAFT HOUSING
- 9. BALL BEARINGS
- 10. GLAND FOLLOWERS
- 11. GLAND PACKING
- 12. STANDARD ENDCOVER
- 13. JACKING SCREW
- 14. BEARING RETAINER BOLTS
- 15. LOCATING WASHER
- 16. LOCATING BOLT
- 17. BEARING RETAINER
- 18. GLAND TENSIONING BOLTS
- 19. ENDCOVER BOLTS

B	<b>SUNCO POWDER SYSTEMS, INC.</b> CHARLOTTE, NORTH CAROLINA (704) 545-3922
DRAWING NO. 97-B-0101	DATE 01/16/1997
NAME SECTIONAL VIEW OF QUICK RELEASE VALVE	



C

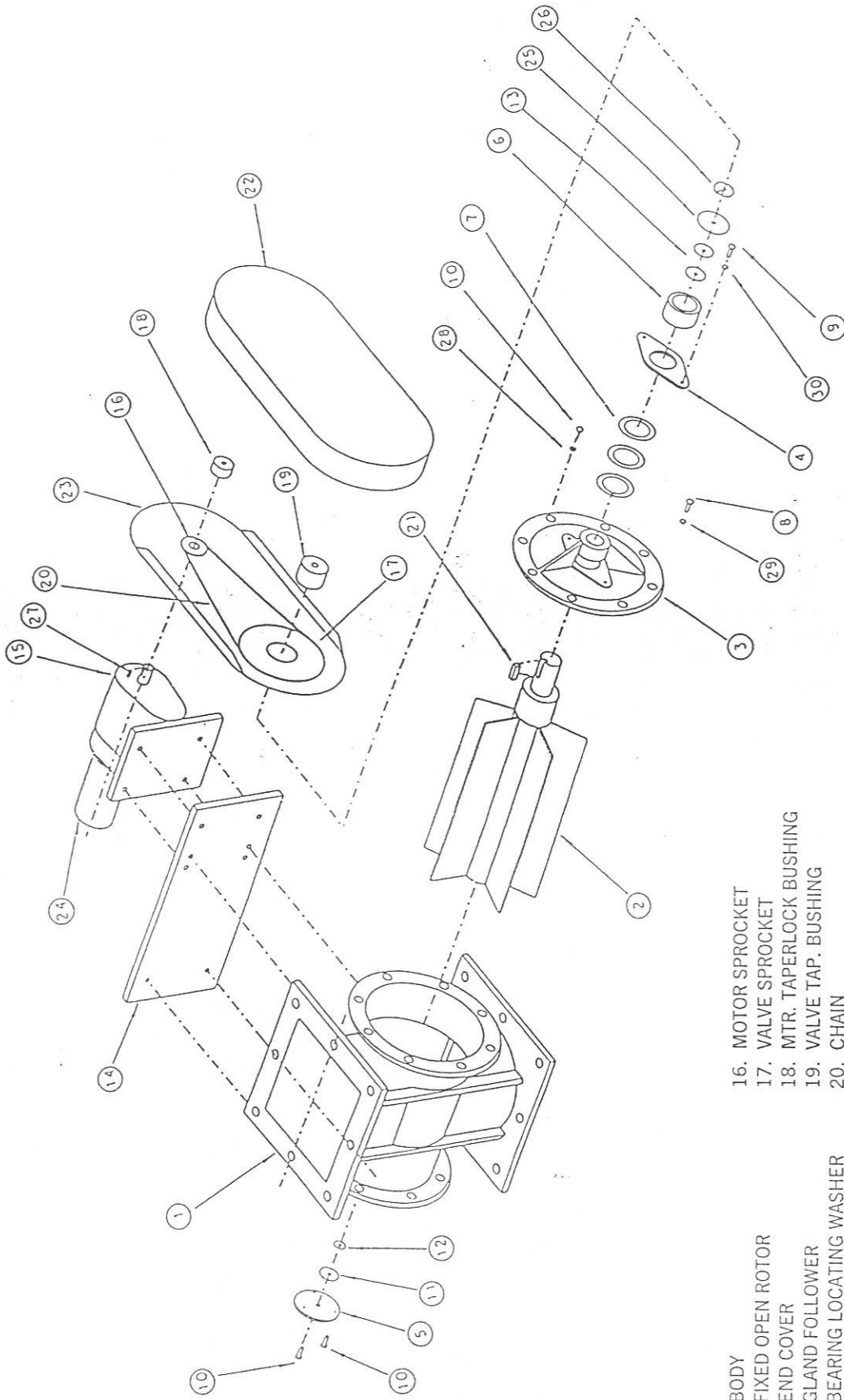
**SUNCO POWDER SYSTEMS, INC.**  
 CHARLOTTE, NORTH CAROLINA  
 (704) 545-3922

NAME  
 ARRANGEMENT OF  
 AIR PURGE GLAND

DRAWING NO. 97-B-0102      DATE 01/16/1997







- |                            |                            |
|----------------------------|----------------------------|
| 1. BODY                    | 16. MOTOR SPROCKET         |
| 2. FIXED OPEN ROTOR        | 17. VALVE SPROCKET         |
| 3. END COVER               | 18. MTR. TAPERLOCK BUSHING |
| 4. GLAND FOLLOWER          | 19. VALVE TAP. BUSHING     |
| 5. BEARING LOCATING WASHER | 20. CHAIN                  |
| 6. BALL BEARING            | 21. KEY                    |
| 7. GLAND PACKING           | 22. GUARD                  |
| 8. END COVER BOLT          | 23. BACKPLATE              |
| 9. GLAND TENSIONING BOLT   | 24. MOTOR                  |
| 10. MOUNTING BOLT          | 25. WASHER                 |
| 11. ROTOR LOCATING WASHER  | 26. CIRCLIP                |
| 12. DISC SPRING            | 27. KEY                    |
| 13. DISC SPRINGS           | 28. WASHER                 |
| 14. MOTOR PLATE            | 29. WASHER                 |
| 15. GEARBOX                | 30. WASHER                 |

**E**

**SUNCO POWDER SYSTEMS, INC.**  
 CHARLOTTE, NORTH CAROLINA  
 (704) 545-3922

EXPLODED VIEW  
 HEAVY DUTY ROTARY VALVE, SQUARE INLET

NAME \_\_\_\_\_ DATE 01/16/1997

DRAWING NO. 97-B-0104