

**ROTARY WATERBLAST TOOL**

# **CST-AIR-P12**

**Cable Swivel Tool**

## **Operation and Maintenance Manual**



**WATERJET ENGINEERING**  
466 S. Skyline Drive • Durango, Colorado 81303 • (970) 259-2869 • Fax (970) 259-2868

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### **1.0 INTRODUCTION**

This manual was prepared to provide the operator with the basic information needed to operate and service this equipment. The operating recommendations in the manual will insure that you receive satisfactory performance. All operating personnel responsible for the care of this equipment should be familiar with the information in this manual.

If you have any questions or problems with this equipment, please contact the distributor you obtained the product from, or the manufacturer:

**StoneAge, Inc.**  
466 S. Skylane Drive.  
Durango, CO 81303  
(970) 259-2869  
fax (970) 259-2868

### **2.0 SAFETY WARNING**

Operations with this tool can be potentially dangerous if caution is not exercised prior to and during tool use. Please read and follow all of these instructions.

- 2.1** Only competent and trained persons should operate this equipment.
- 2.2** Do not exceed the maximum operating pressure specified for any component in a system.
- 2.3** This equipment should always be used with an operator controlled dump mechanism to release the high pressure water.
- 2.4** The immediate work area should be marked off to keep out untrained persons.
- 2.5** All personnel in the area should wear eye protection, and other protective clothing in accordance with specific conditions.
- 2.6** The tool should be securely supported. Strong thrust is created by waterjets and these forces can become unbalanced if a nozzle should become plugged.
- 2.7** Inspect the equipment for visible signs of deterioration, damage, or improper assembly. Do not operate until repaired. Make sure all threaded connections are tight and leak free.
- 2.8** Check to see that all control functions work properly before going to high pressure.
- 2.9** If it is necessary to have a person work near the cleaning jets, then it is this person who should have control of the pressure dump mechanism.

### **3.0 DESCRIPTION**

The **Cable Swivel Tool** is an air powered swivel designed for large vessel and boiler cleaning. The powerful rotating jets cover a large area for efficient cleaning. An air motor and gearbox rotate the head of the tool.

**The CST has a hole through the center, through which a cable is passed.** Up to 3/8"Ø cable may be used. The cable is strung across the vessel, and the CST is pulled along the cable by jet reaction force or by another cable attached to the pulling eye or high pressure hoses. The tool can be used at operating pressures up to 10000 psi and flow rates up to 150 gpm. It has two 1" NPT female inlets in the body. One of these ports may be plugged. The tool has a flow rating of Cv=5.3. At 150 gpm, the pressure drop through the tool will be 800 psi.

The standard nozzle head has six 3/4 NPT female ports; two opposite at 90°, two opposite at 80°, and one at 70° matched with one at 110°. Two or more may be plugged; always **use balanced combinations of ports**.

**The CST should be greased at the three zerks every 40 hours to protect the bearings.** The bearings are factory sealed, and should be replaced when they lock up.

**Always check the pulling eye for free rotation before use,** otherwise the pulling cable will get wrapped around the support cable.

**The air motor lubricator should be refilled every 12 hours.**

**When ready to begin using the tool, start the rotation before going up in pressure.**

We recommend hanging the high pressure hoses from slings at intervals along the cable.

#### **4.0 PARTS LIST**

### ***CST-AIR-P12 CABLE SWIVEL TOOL***

#### **Swivel Assembly**

<b><u>PART NO.</u></b>	<b><u>DESCRIPTION</u></b>	<b><u>QTY</u></b>
CST 001	Shaft	1
CST 006	Threaded Collar	1
CST 007	Sleeve, Bearing	2
CST 211	Carbide Seat	2
CST 012	H.P. Seal	2
CST 024	Set Screw	6
CST 027	Bent Pipe Inlet	2
CST 030	O-ring	4
CST 031	Back Up Ring	4
CST 033	Shaft Seal	4
CST 040-P12	Head	1
CST 045	Cap Screw	4
CST 104	Body	1
CST 205	Face Ring	2
CST 109	Bearing	2
CST 118	Torque Bolt	1
CST 123	Spacer, Head end	1
CST 125	Spacer, Tail end	1
CST 129	O-ring	2
CST 176	Locking Collar	1
FS 004-0°	Zerk	2

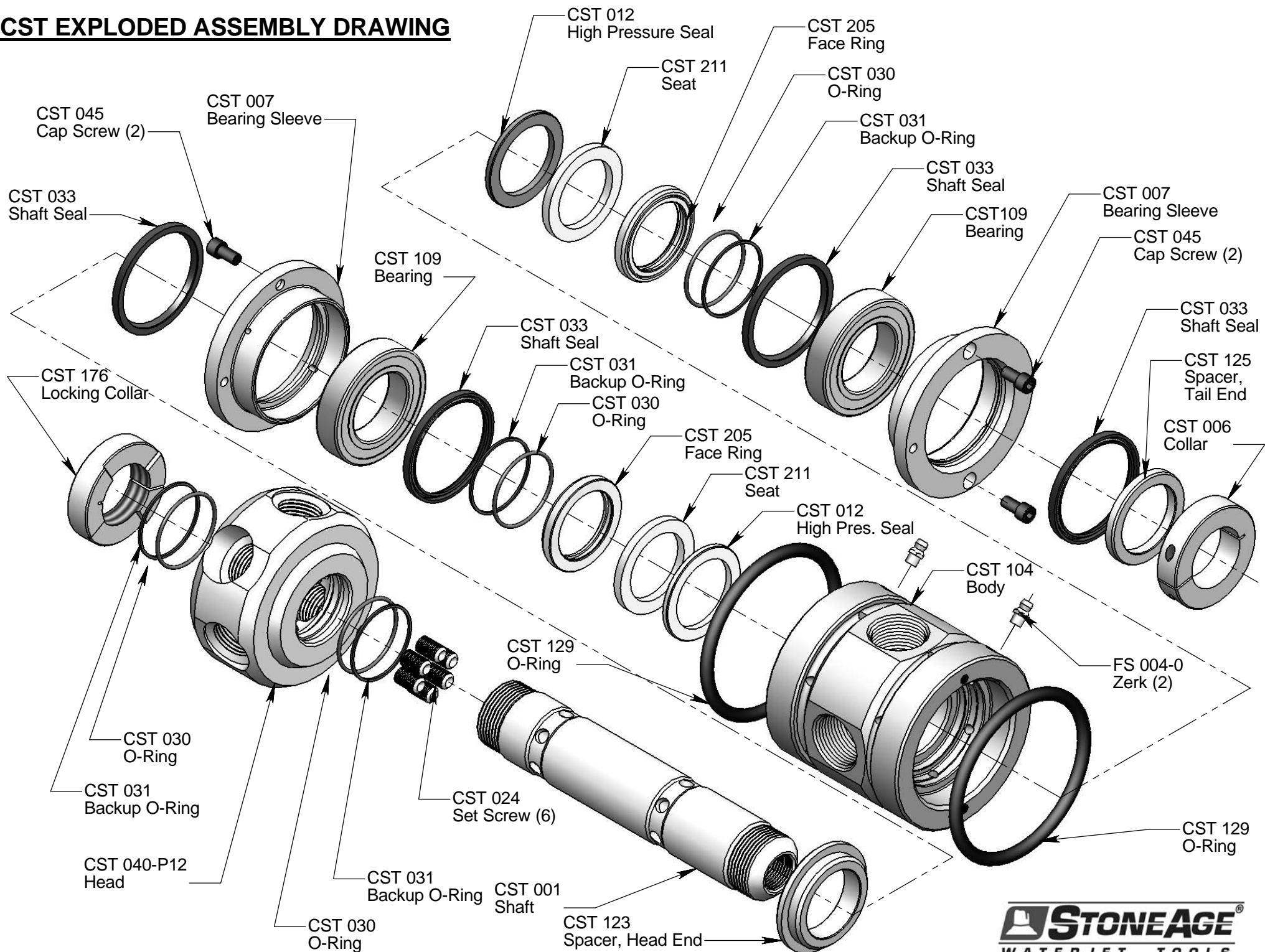
#### **Air Drive Assembly-CST 100**

CST 022-002	Stub Shaft	1
CST 120-002	Torque Arm	1
CST 130	Hose	1
CST 151-EG	Gearbox, Electra-Gear	1
BR 155	Muffler	1
CB 114	Inlet Fitting	1
GP 057	Oiler	1
LM 016-4	Air Motor	1

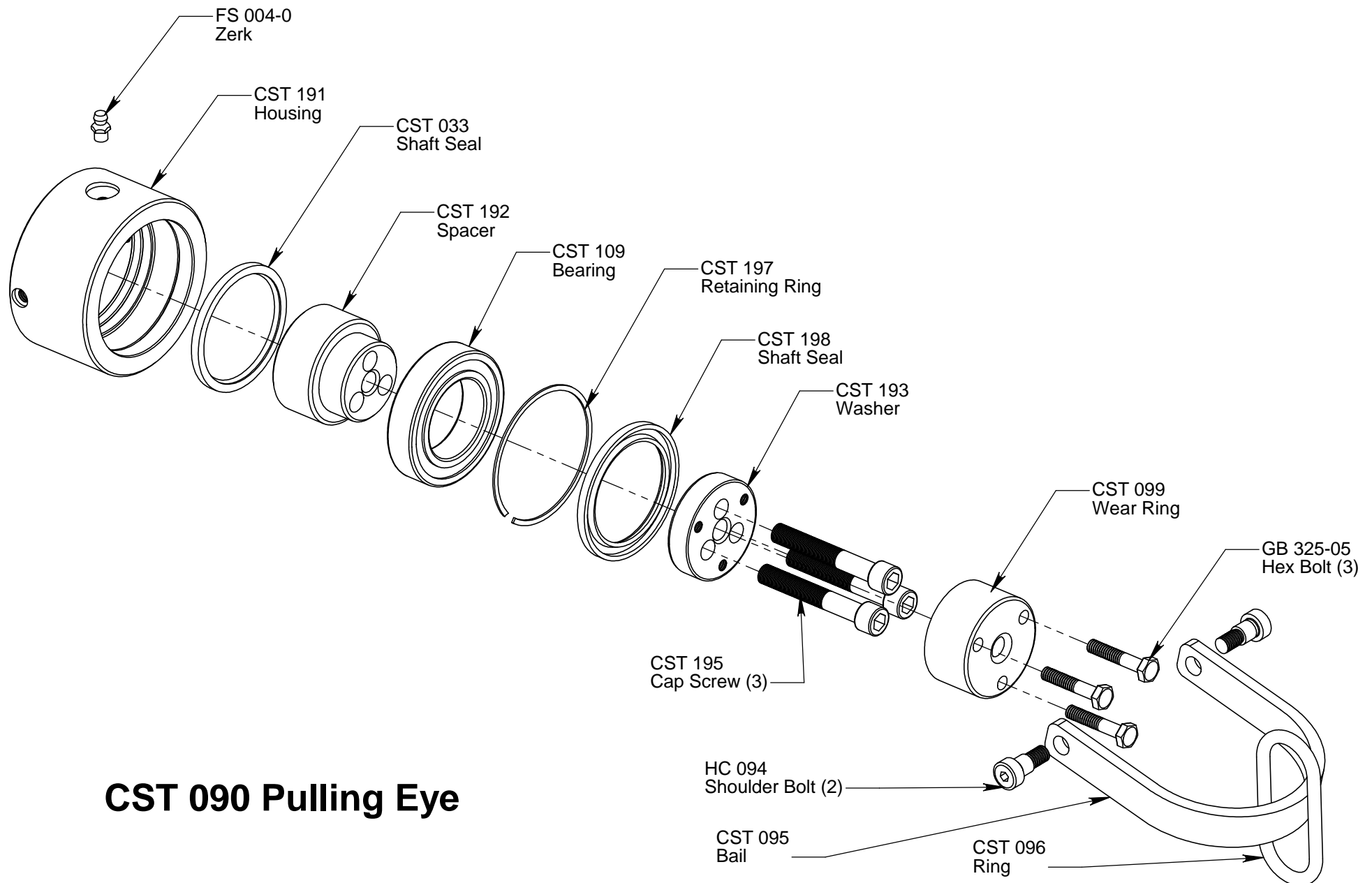
#### **Pulling Eye Assembly-CST 090**

CST 033	Shaft Seal	1
CST 095	Bail	1
CST 096	Ring	1
CST 099	Wear Ring	1
CST 109	Bearing	1
CST 191	Housing	1
CST 192	Spacer	1
CST 193	Washer	1
CST 195	Pulling Eye Bolt	3
CST 197	Retaining Ring	1
CST 198	Shaft Seal	1
FS 004-0°	Zerk	1
GB 325-05	Hex Bolt	3
HC 094	Shoulder Bolt	2

## CST EXPLODED ASSEMBLY DRAWING

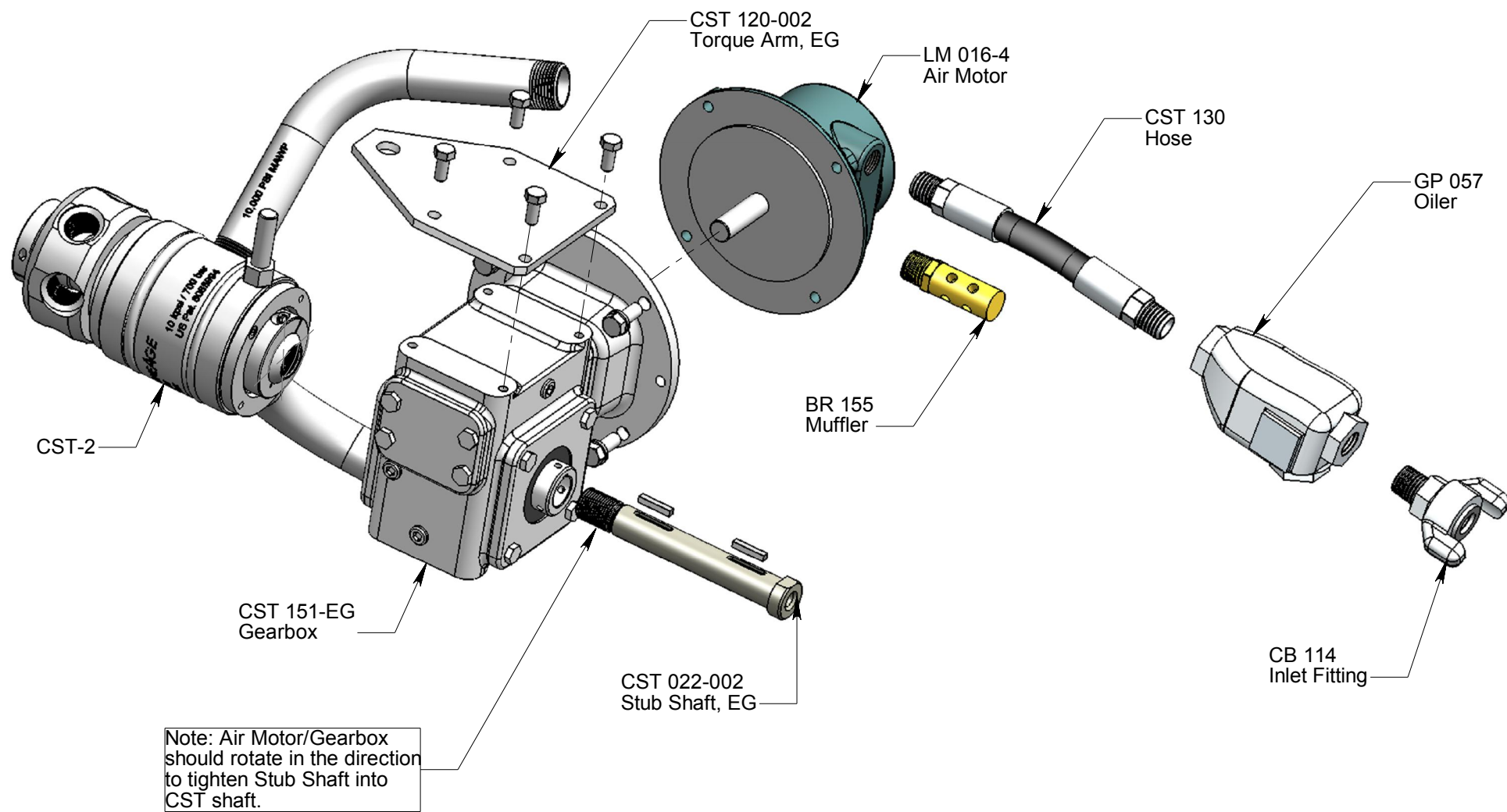


## 5.2 PULLING EYE EXPLODED ASSEMBLY



**CST 090 Pulling Eye**

### 5.3 Air Drive Assembly CST 100 Assembly

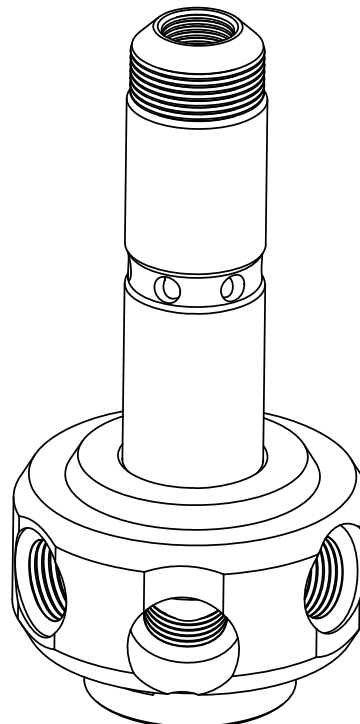
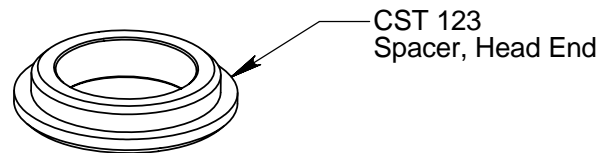
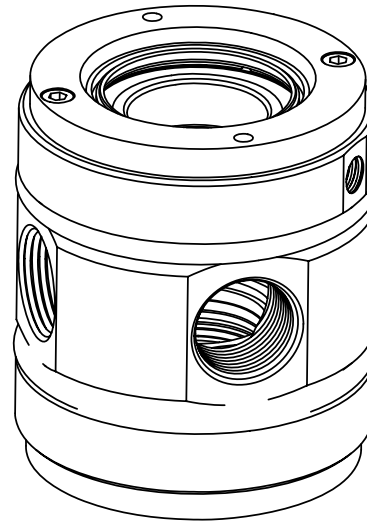
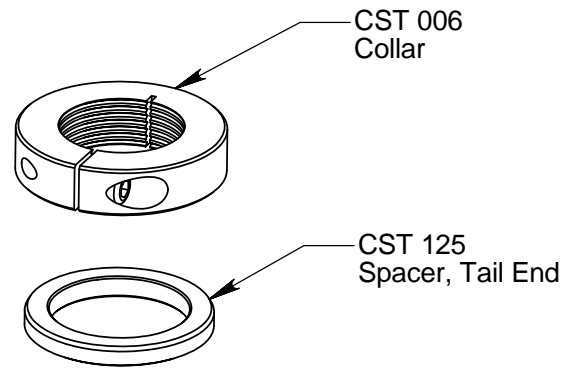


## 6.0 DISASSEMBLY INSTRUCTIONS

1) Loosen clamp screw on Collar (CST 006) that is on the end opposite the head; unscrew Collar from Shaft end.

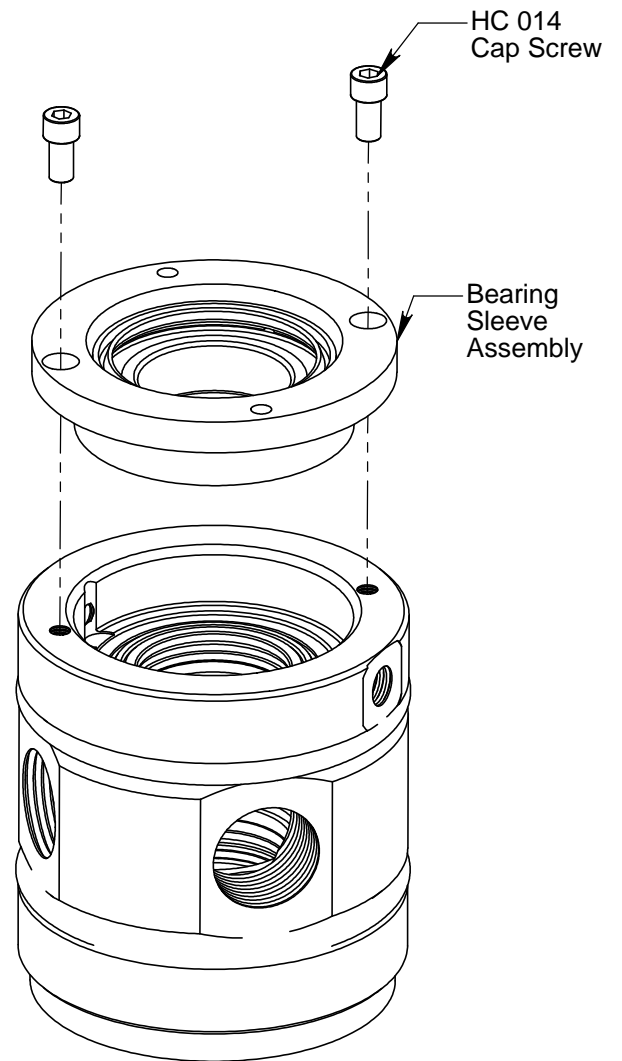
2) Clamp the head in a vise and pull the Body off the Shaft or push the shaft thru the body.

To remove the head from the shaft, remove the Collar (CST 176) near the head; push the shaft out of the head. Inspect the O-Rings and Backup rings in the head for cuts or extrusions. Replace if damaged.

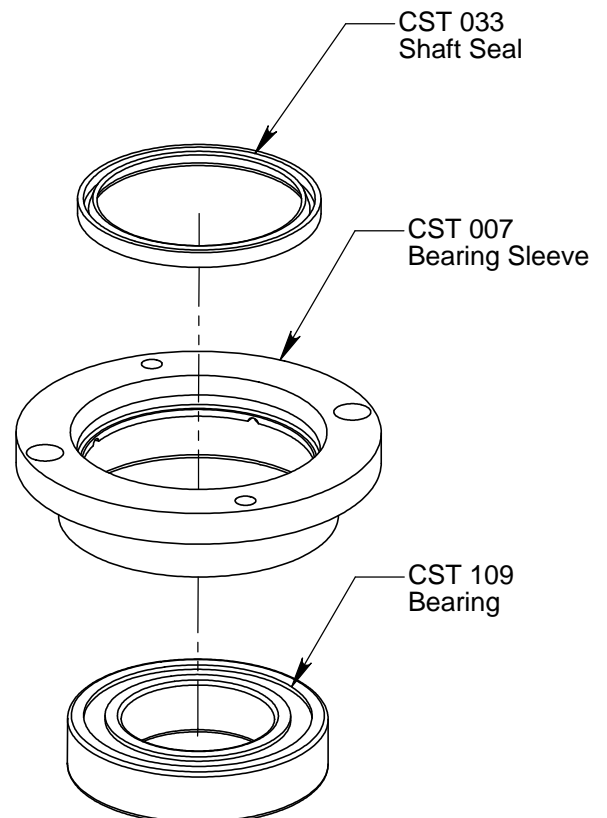




3) Remove Cap Screws (CST 045); pry the bearing sleeve assembly out of the body, using two screwdrivers inserted in the slots. Keep assembly as straight as possible in bore as it comes out.



4) Inspect Shaft Seal (CST 033) for cuts or damage: remove it only if it needs to be replaced.



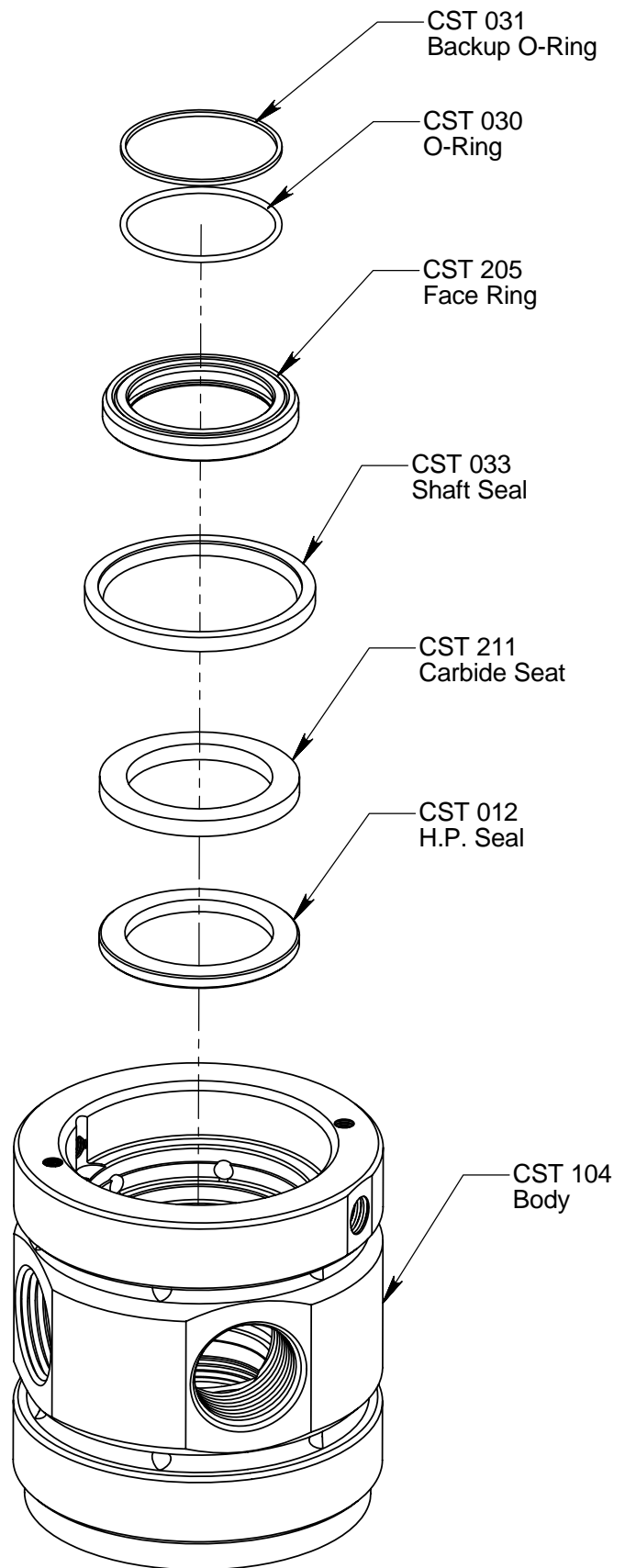
5) Inspect bearing (CST 109); it should rotate smoothly. If it needs to be replaced, press it out of the bearing sleeve (CST 007).

6) Pulling the Face ring (CST 205) out of the body; inspect the O-Ring and Backup Ring (CST 030, 031) for cuts or extrusions and replace if damaged.

7) Carefully remove the Carbide Seat (CST 211) and High Pressure Seal (CST 012) to avoid damage to the Shaft Seal (CST 033). Inspect the shaft seal for cuts or damage to the rubber lip. Remove and replace the Shaft Seal (CST 033) only if it is damaged. It is difficult to remove, and is pried out with a screwdriver.

Inspect the Carbide Seat for chips, cracks or erosion. Replace if damaged.

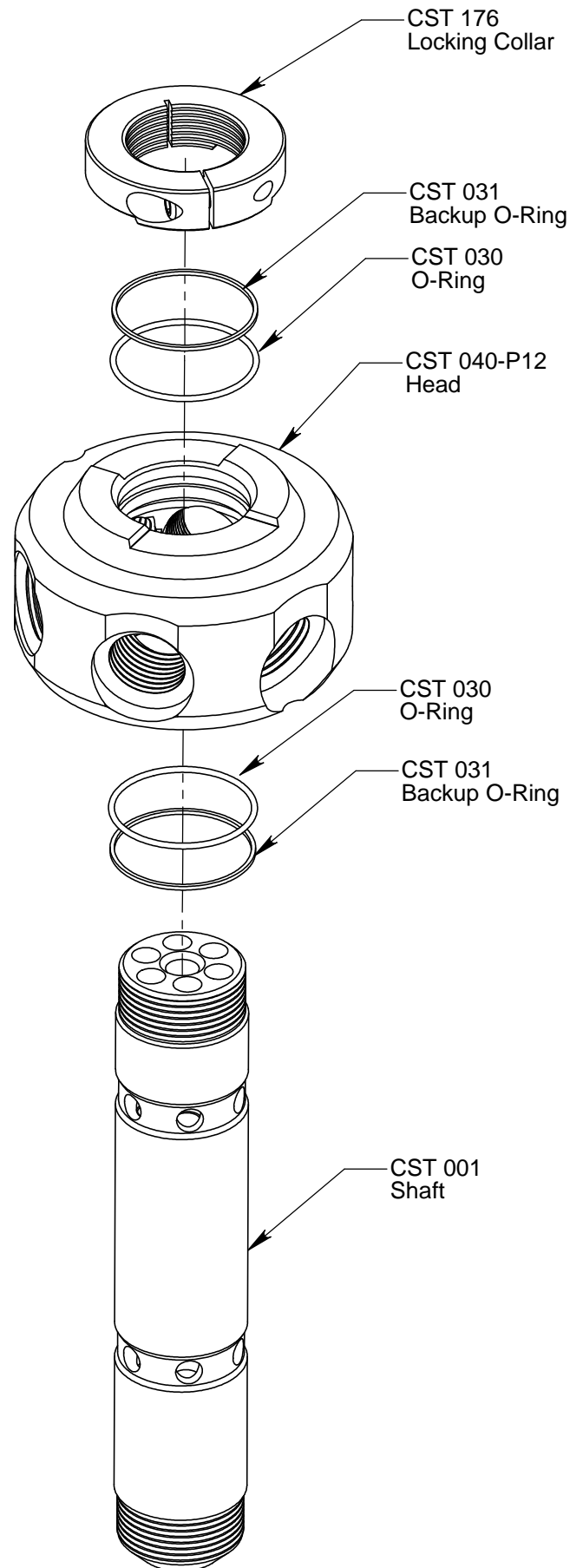
8) Turn Body over and repeat Steps 3 to 7 for the other end.



## 6.1 ASSEMBLY INSTRUCTIONS

1) Install O-Rings and Backup Rings (CST 030, 031) in grooves in Head (CST 040). Note orientation of the O-Rings and Backup Rings; it is important that they are installed in this orientation.

2) Apply grease to O-Rings and Backup Rings in Head. Slide Head (CST 040, with O-Rings and Backup Rings installed) carefully onto the shaft (CST 001) until threads on shaft end are exposed. Thread Collar (CST 176) onto the shaft until flush with end of shaft. Tighten clamp screw on Collar to lock in place.

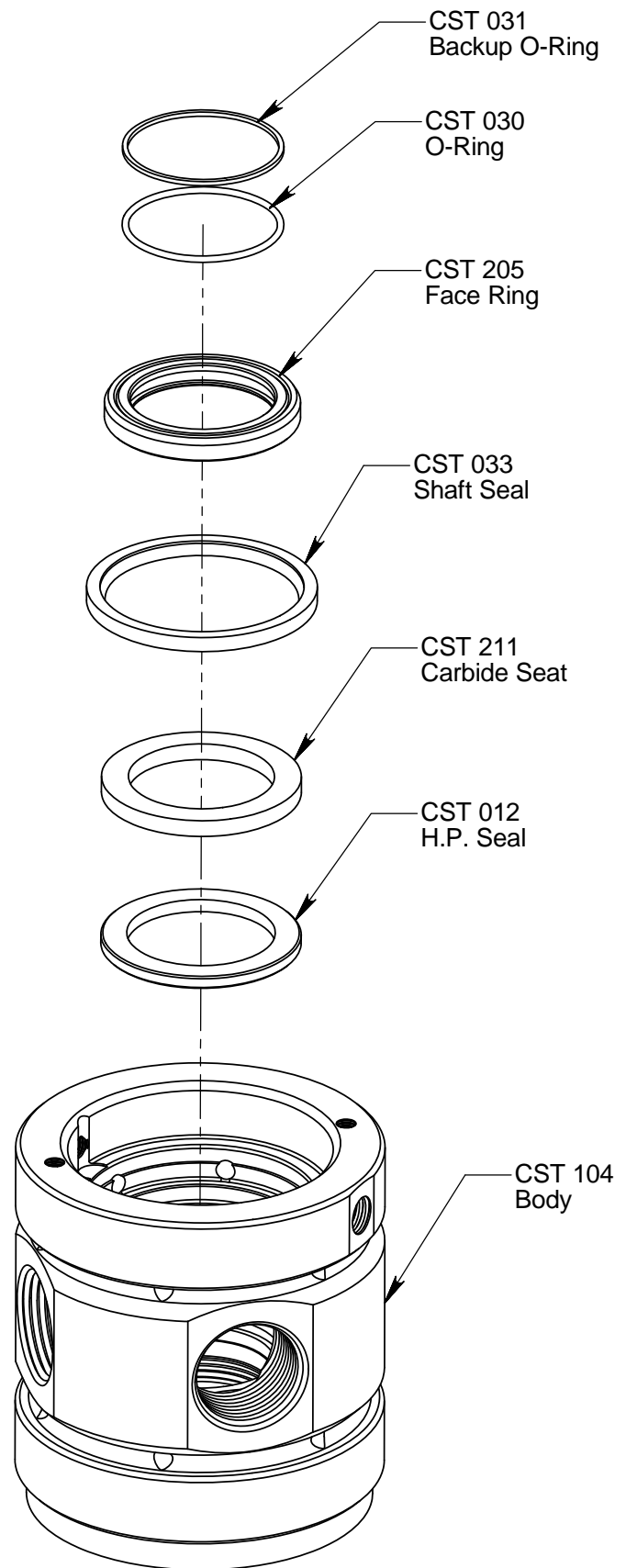


3) Apply grease to the faces of the High Pressure Seal (CST 012). Install High Pressure Seal and Carbide Seat (CST 211) into Body (CST 104). The Seal should fit tight into bore. If the Shaft Seal (CST 033) is still in place, the H.P Seal and seat must be pushed thru the shaft seal.

4) Install new SHaft Seal (CST 033) into Body if old one was removed. The lip of the shaft seal should face down, toward the Carbide Seat.

5) Note that Face Ring (CST 205) has a face with a larger chamfer on the edge. The opposite face goes down against the Carbide Seat. Install O-ring (CST 030) and Backup ring (CST 031) into Face Ring (CST 205). Note order of O-Ring and Backup ring; it is important that they are installed as shown. Apply grease to O-Ring and Backup Ring.

Push Face Ring thru shaft seal against top of Carbide Seat. The top of the Face Ring should be close to flush with bearing bore step in Body.

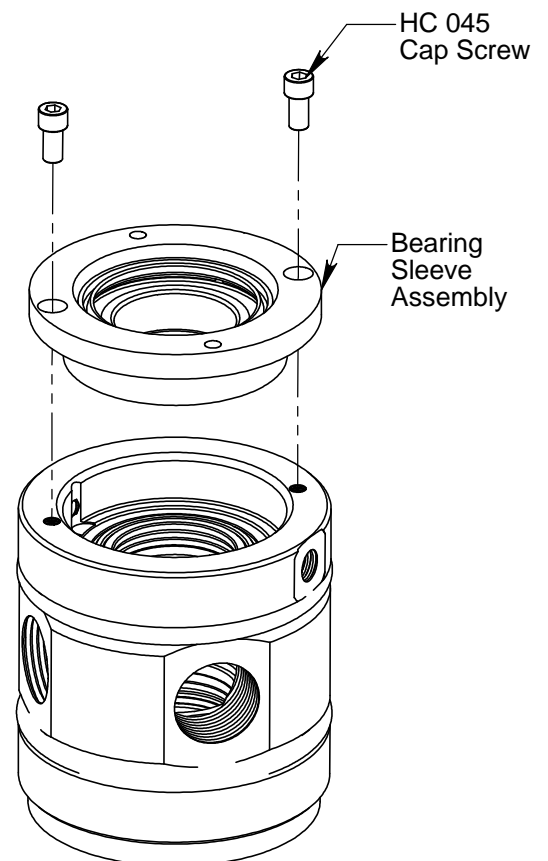
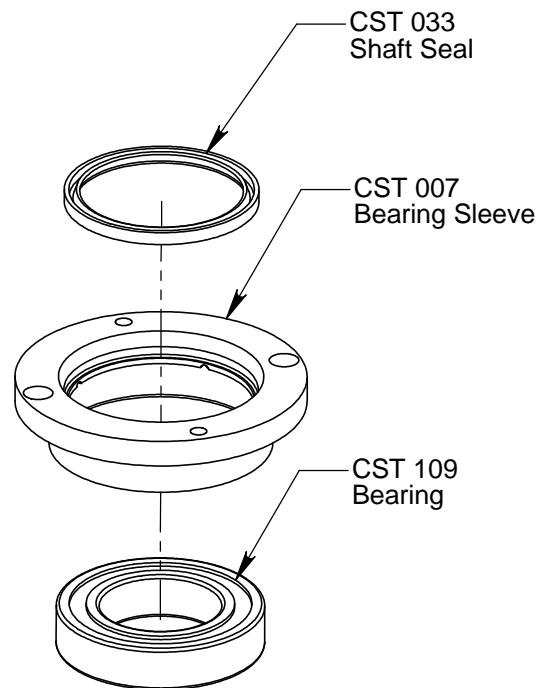


6) Install Shaft Seal (CST 033) into Bearing Sleeve (CST 007). The lip of the shaft seal should face away from the bearing bore.

7) Install Bearing (CST 109) into Bearing Sleeve (CST 007).

8) Install Bearing Sleeve Assembly (From Step 7) into Body, aligning holes in Sleeve with tapped holes in Body. Install two Cap Screws (CST 045)

9) Turn Body over and repeat Steps 3-8 for the other end.



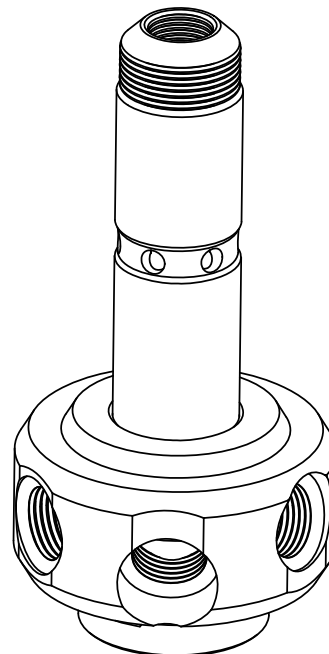
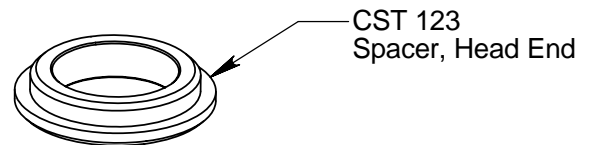
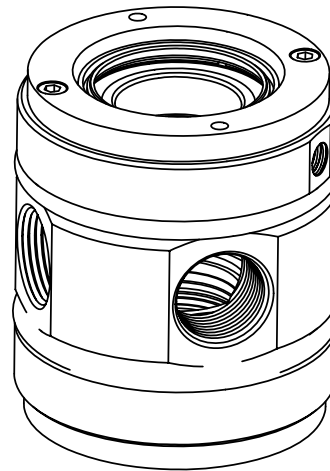
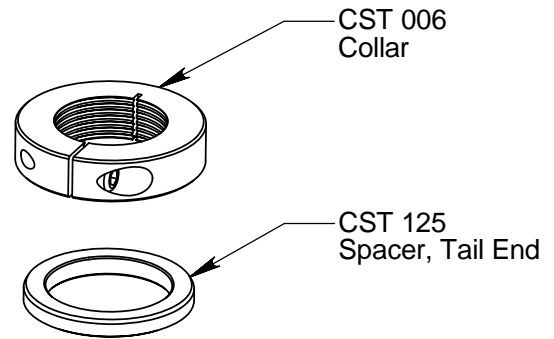
10) Slide Head End Spacer (CST 123) onto Shaft, down against Head. The Large Diameter end of the spacer should go against head.

11) Carefully push Body Assembly down onto Shaft until inner race of bottom bearing is against the Spacer.

12) Slide the tail End Spacer (CST 125) onto Shaft end and down against the bearing.

13) Thread Collar (CST 006) onto end of shaft. Tighten this collar snugly against the spacer to remove end play of the shaft. Do not load bearings by overtightening Collar. The face of the collar should be about flush with the end clamp screw on Collar to lock in place. Check that the Head and Shaft can be rotated by hand.

14) Grease the swivel at the Two Zerks in the body.



### **6.3 TROUBLESHOOTING GUIDE**

<b>SYMPTOM</b>	<b>PROBLEM</b>	<b>SOLUTION</b>
Leaks out weeps in body	<ol style="list-style-type: none"><li>1. Worn H.P. Seal</li><li>2. Eroded seat</li><li>3. Damaged face ring</li></ol>	<ol style="list-style-type: none"><li>1. Replace seal (CST 012)</li><li>2. Replace seat (CST 211)</li><li>3. Replace face ring (CST 205)</li></ol>
Seals wear out too quickly	<ol style="list-style-type: none"><li>1. Rotation too fast</li><li>2. Damaged seat</li><li>3. Seal bore ID worn</li></ol>	<ol style="list-style-type: none"><li>1. Slow down rotation speed</li><li>2. Check for chipped edges</li><li>3. Replace body</li></ol>
Water found in bearings	<ol style="list-style-type: none"><li>1. Operated with H.P. seal leaking badly</li><li>2. O-rings and backup rings are damaged.</li><li>3. Shaft seals damaged.</li></ol>	<ol style="list-style-type: none"><li>1. Replace seal (CST 012)</li><li>2. Replace O-rings and backup rings. (CST 030, CST 031)</li><li>3. Replace shaft seals (CST 033)</li></ol>
Shaft will not rotate	<ol style="list-style-type: none"><li>1. High seal torque</li><li>2. Air motor damage</li><li>3. Bad bearings</li><li>4. Improper Assembly</li></ol>	<ol style="list-style-type: none"><li>1. Test rotation with no water pressure</li><li>2. Remove air motor from gearbox and test for operation.</li><li>3. Replace bearings</li><li>4. Inspect and repair</li></ol>

## **7.0 LIMITED WARRANTY**

StoneAge, Inc. warrants to the extent herein provided the products of its own manufacture against defects in material and workmanship under normal use and service for which the products were designed for a period of six (6) months after shipment from the factory. If such products should fail through defect in workmanship or material and specific written notice of failure is made within six (6) months after date of shipment from the factory, StoneAge, Inc. will either repair or replace any such items, F.O.B. its factory without charge. StoneAge, Inc. shall not be liable for expense incurred in repairs or alterations made outside the factory without the proper and prior authorization. StoneAge, Inc. shall have the option of requiring the return of the defective products to its factory, with transportation charges prepaid, to establish the claim. StoneAge, Inc. shall in no event be held liable for damages or delay resulting from or arising out of defective products nor for consequential damages or otherwise except for repair or replacement of items of defective material or workmanship asforesaid.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR USE AND NEITHER ASSUMES, NOR AUTHORIZES ANY PERSON TO ASSUME FOR STONEAGE, INC. ANY OTHER LIABILITY IN CONNECTION WITH THE SALE OF ITS PRODUCTS. THIS WARRANTY SHALL NOT APPLY TO PRODUCTS OR ANY PARTS THEREOF WHICH HAVE BEEN SUBJECT TO ACCIDENT, NEGLIGENCE, ALTERATION, ABUSE, OR MISUSE. STONEAGE, INC. MAKES NO WARRANTY WHATSOEVER IN RESPECT TO ACCESSORIES, PARTS OR PRODUCTS NOT MANUFACTURED BY STONEAGE, INC.

**WARNING: Any modification of this equipment, or use of non-StoneAge specified replacement parts, will void the manufacturer warranty and could potentially cause harm to the operator or damage to the equipment.**



# AM SERIES LUBRICATED AIR MOTORS

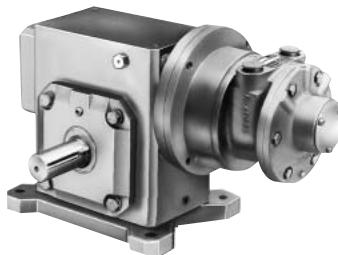
## OPERATION & MAINTENANCE MANUAL



Model 2AM Shown



Model 4AM Shown



Model 6AM Shown



Model 16AM Shown

Thank you for purchasing this Gast product. It is manufactured to the highest standards using quality materials. Please follow all recommended maintenance, operational and safety instructions and you will receive years of trouble free service.

**IMPORTANT: PLEASE READ THIS MANUAL AND SAVE FOR FUTURE REFERENCE.**

### General information

• Clearances:	Model	Total End Clearance (in/mm)	Top Clearance (in/mm)
	1AM/1 UP	0.00020/0.0508	0.0015/0.0381
	2AM	0.00025/0.0635	0.0015/0.0381
	2AM *	0.00025/0.0635	0.0025/0.0635
	4AM	0.00035/0.0889	0.0015/0.0381
	4AM *	0.00035/0.0889	0.0025/0.0635
	6AM	0.00035/0.0889	0.0015/0.0381
	8AM	0.00048/0.1219	0.0015/0.0381
	16AM	0.00060/0.1524	0.0015/0.0381
* Models with the last three digits greater than 500 (ie 2AM XXX-501)			

- **Vane Life:** Depends upon speed, operating pressure and motor maintenance.
- **Operating Pressure:** 100 psi or below (7 bar)

### Product Use Criteria:

- Operate at temperature up to 250°F (121°C).
- Protect unit from dirt and moisture.
- Use ONLY compressed air to drive motor.
- Air lines connected to motor should be the same size or the next size larger than the intake port for efficient output and speed control.
- Protect all surrounding items from exhaust air.
- Bearings are grease packed.
- Use Gast #AD220 or a detergent SAE#10 automotive engine oil for lubricating.



ISO 9001 & 14001 CERTIFIED

[www.gastmfg.com](http://www.gastmfg.com)

## Lubrication

Use Gast #AD220 or a detergent SAE #10 automotive engine oil for lubricating. Lubricating is necessary to prevent rust on all moving parts. Excessive moisture in the air line may cause rust or ice to form in the muffler when air expands as it passes through the motor. Install a moisture separator in the air line and an after cooler between compressor and air receiver to help prevent moisture problems.

## Manual Lubrication

Shut the air motor down and oil after every 8 hours of operation. Add 10-20 drops of oil to the air motor intake port.

## Automatic Lubrication

Adjust inline oiler to feed 1 drop of oil per minute for high speed or continuous duty usage. Do Not overfeed oil or exhaust air may become contaminated.

Check intake and exhaust filters after first 500 hours of operation. Clean filters and determine how frequently filters should be checked during future operation. This one procedure will help assure the product's performance and service life.

## Flushing

Flushing this product to remove excessive dirt, foreign particles, moisture or oil that occurs in the operating environment will help to maintain proper vane performance. Flush the motor if it is operating slowly or inefficiently.

**Use only Gast #AH255B Flushing Solvent. DO NOT use kerosene or ANY other combustible solvents to flush this product.**

1. Disconnect air line and muffler.
2. Add flushing solvent directly into motor. If using liquid solvent, pour several tablespoons directly into the intake port. If using Gast #AH255B, spray solvent for 5-10 seconds into intake port.
3. Rotate the shaft by hand in both directions for a few minutes.
4. **You must wear eye protection for this step.** Cover exhaust with a cloth and reconnect the air line. Slowly apply pressure until there is no trace of solvent in the exhaust air.
5. Listen for changes in the sound of the motor. If motor sounds smooth, you are finished. If motor does not sound like it is running smoothly, installing a service kit will be required. (See "Service Kit Installation").

**Check that all external accessories such as relief valves or gauges are attached and are not damaged before operating product.**

## Shutdown

**It is your responsibility to follow proper shutdown procedures to prevent product damage.**

1. Turn off air intake supply.
2. Disconnect plumbing.
3. Remove air motor from connected machinery.
4. **Wear eye protection.** Keep away from air stream.  
Use clean, dry air to remove condensation.
5. Lubricate motor with a small amount of oil in chamber. Rotate shaft by hand several times.

6. Plug or cap each port.
7. Coat output shaft with oil or grease.
8. Store motor in a dry environment.

## SERVICE KIT INSTALLATION

**Gast will NOT guarantee field-rebuilt product performance. For performance guarantee, the product must be returned to a Gast authorized service facility.**

Service kit contents vary. Most contain vanes, end cap gasket, body gasket, bearings and a muffler element or felt.

## Major and Minor Rebuilds

**Tool kits which include a more in-depth rebuild manual are available through your Gast distributor.**

These kits include the tools required to remove and reassemble end plates, bearings and shaft seals, and to set the proper end clearance. The rebuild manual also includes step by step instructions, including illustrations, to help achieve a successful rebuild. Gast Manufacturing, Inc. highly recommends using the air motor rebuild manual and tool kit when attempting a minor or major rebuild to your Gast air motor.

## Minor Rebuild:

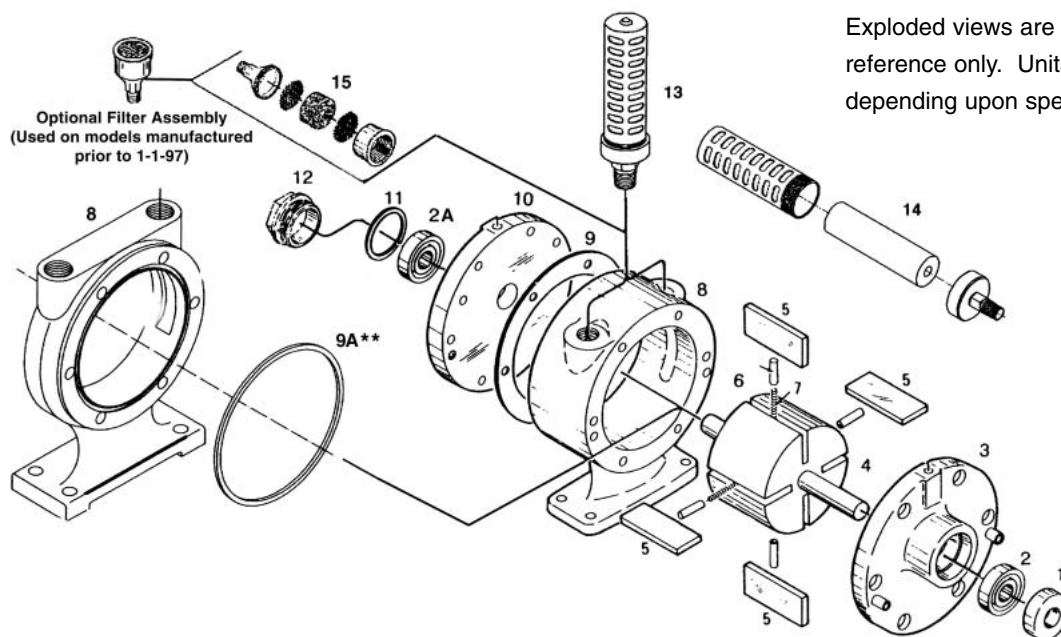
1. Remove the end cap.
2. Remove dead end plate bolts.
3. Remove dead end plate. (Use factory issued tool, do not use screwdriver to remove the end plate.
4. Remove the dowel pins from the body and push back into end plate until flush or just below the machined surface of the end plate.
5. Remove vanes.
6. Clean parts. Check for scoring on the end plate and rotor assembly. If scoring exists, send unit to a Gast authorized service facility.
7. **Lubricated models only:** Lightly oil and reinstall vanes.
8. Place the proper end plate gasket on the end plate. If the original is damaged, replace with a new one supplied in the Service Kit.
9. Place the dead end plate on the body.
10. Press the bearing onto the shaft using a factory supplied bearing pusher.
11. Tap dowel pins into body and install end plate bolts. Tighten bolts to 75-100 in-lbs.
12. Set end clearance as required by model:  
**1AM-4AM and NL22-NL52 models** - use the bearing taper from kit to lightly tap on inner race of the dead end bearing to free up and center the rotor in the body.  
**6AM-8AM models** - lightly strike the drive end shaft with a soft hammer to push the rotor away from the drive end plate. The rotor must NOT rub on either end plate.
13. Reattach end cap.
14. **If the air motor is lubricated,** apply a few drops of Gast #AD220 lubricant into ports. Rotate shaft by hand for a few rotations.

## Major Rebuild:

1. Remove the end cap.
2. Remove dead end plate bolts.

3. Remove dead end plate. (Use factory issued tool, do not use screwdriver to remove the end plate.)
4. Remove the dowel pins from the body and push back into end plate until flush or just below the machined surface of the dead end plate.
5. Remove rotor using an arbor press.
6. Remove vanes and ejection mechanism if reversible. (Ejection mechanisms may consist of vane springs, pins, caps or cam rings.)
7. Remove shaft seal and bearings from drive end plate and bearing from dead end plate. (Use factory issued tool.)
8. Do Not remove drive end plate bolts or drive end plate.
9. Clean parts. Check for scoring on the end plates and rotor assembly. If scoring exists, send unit to a Gast authorized service facility.
10. **For reversible models only:**  
**1AM and 1UP models** - place a new cam ring between the rotor and the drive end plate.  
**2AM and 4AM models** - place springs and caps in rotor.  
**6AM, 8AM and 16AM models** - install push pins.
11. Place the drive shaft of the rotor assembly through the drive end plate. Press the drive bearing onto the drive shaft using a factory supplied bearing pusher.
12. Using the bearing taper from the Tool Kit, lightly tap on inner race of the drive end bearing to snug up rotor to drive end plate.
13. Install new vanes as required by model:  
**All single rotation units** - the angle cuts on the vane face to center of the rotor.  
**Reversible units 2AM and 4AM** - the notch on vane faces to center of the rotor.  
**6AM, 8AM and 16AM models** - install the vane spring lip into the notch at one end of the vane and place in rotor vane slot with spring facing pushpin.
14. Place the proper end plate gasket on the body of dead end. If the original is damaged, replace with a new one supplied in the service kit.  
If your air motor uses O-rings, place the new O-rings in the body groove. Some models do not use end plate gaskets or O-rings.
15. Place the dead end plate on the body.
16. Install the dead end bearing and press into place with bearing pusher tool from tool kit.
17. Install the dowel pins.
18. Fully tighten the remaining bolts to 75-100 in-lbs.
19. Set end clearance as required by model:  
**1AM-4AM and NL22-NL52 models** - use the bearing taper from the Tool Kit and lightly tap on the inner race of the dead end bearing to free up and center the rotor in the body.  
**6AM-8AM models** - lightly strike the drive end shaft with a soft hammer to push the rotor away from the drive end plate. The rotor must NOT rub on either end plate.
20. Apply a small amount of grease to bearing seal and install the drive end bearing seal by pressing flush with bearing pushing tool from Tool Kit.
21. Reattach end cap.
22. **If the air motor is lubricated**, apply a few drops of Gast #AD220 lubricant into ports and rotate shaft by hand for a few rotations.

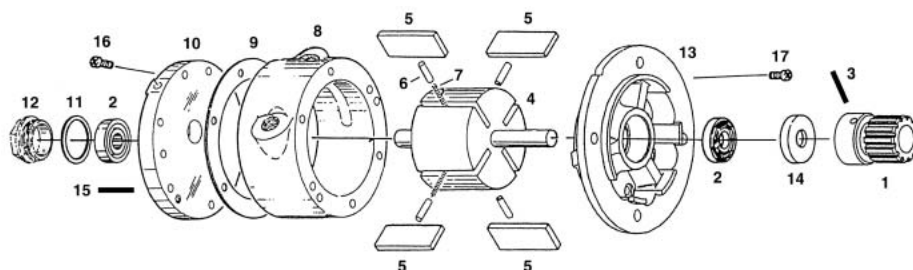
## EXPLODED PRODUCT VIEWS, PARTS & ORDERING INFORMATION



Exploded views are shown for reference only. Units may vary depending upon specific model.

### 4AM SERIES

REF#	DESCRIPTION	QTY	4AM-FRV-13C	4AM-NRV-22B	4AM-FRV-24	4AM-NRV-50C	4AM-NRV-54A	4AM-NRV-70C	4AM-ARV-119 METRIC	4AM-ARV-120 METRIC
1 Δ	SHAFT SEAL	1	AC466B	AC466B	NAS2	B2328	AA466B	B2328	B2328	B2328
2 Δ	DRIVE END BEARING	1	AA299J	AA299J	AA299J	AB519	AA299J	AB519	AB519	AB519
2A Δ	DEAD END BEARING	1	AA299J	AA299J	AA299J	AA299J	AA299J	AA299J	AA299J	AA299J
3	DRIVE END PLATE	1	AC727	AC665	AC727	AG707	AC665	AG707	AK425A	AK425A
4	ROTOR ASSEMBLY	1	AB617	AB617	AM426	AM455A	AM411	AM319A	AM455C	AM455B
5 Δ	VANE	4	AB876	AB876	AB876	AB876	AB876	AB876	AB876	AB876
6 Δ	PUSH PINS	4	AM467	AM467	AM467	AM467	AM467	AM467	AM467	AM467
7 Δ	VANE SPRING	2	AM466	AM466	AM466	AM466	AM466	AM466	AM466	AM466
8	BODY	1	AM425	AM410	AM425	AM410	AM410	AM410	AM410M	AM410M
9 Δ **	SHIMS	2	B330	B330	B330	B330	B330	B330	B330	B330
10	DEAD END PLATE	1	AC728	AC728	AC727	AC728	AC728	AC728	AB622M	AB622M
11 Δ	END CAP GASKET	1	AA46	AA46		AA46	AA46	AA46	AA46	AA46
12	DEAD END CAP	1	AM307D	AM307D		AM307D	AM307D	AM307D	AM307D	AM307D
13	MUFFLER ASSEMBLY	1	AL445	AL445	AL445	AL445	AL445	AL445	AL445	AL445
14 Δ	MUFFLER CARTRIDGE	1	AL458	AL458	AL458	AL458	AL458	AL458	AL458	AL458
15 Δ	MUFFLER FELT	1	AC983	AC983	AC983	AC983	AC983	AC983	AC983	AC983
***	SERVICE KIT	1	K205	K205	K205G	K206A	K279	K280A	K206C	K206B



### 4AM SERIES

REF#	DESCRIPTION	QTY	4AM-RV-75
1	GEAR STD.	1	AA294
2 Δ	BEARING	2	AA299J
3	PIN	1	AA297
4	ROTOR	1	AA293
5 Δ	VANE	4	AB876
6 Δ	SPRING PIN	4	AM467
7 Δ	SPRINGS	2	AM466
8	BODY	1	AM410
9 Δ	SHIMS	2	B330
10	DEAD END PLATE	1	AC728
11 Δ	END CAP GASKET	1	AA46
12	END CAP	1	AM307D
13	DRIVE END PLATE	1	AA424
14	SEAL	1	AA466B
15	DOWEL PINS	4	AB162
16	1/4-28 x .50 PFHMS	6	BB631
17	1/4-28 x .625 SHCS	6	BB634
***	SERVICE KIT	1	K205

\*\*\* Item not shown.

\*\* #AL484 (9A) O-ring replaces shims on some models.

Δ Denotes parts included in the Service Kit.

Parts listed are for stock models. For specific OEM models, please consult the factory. When corresponding or ordering parts, please give complete model and serial numbers.

## WARRANTY

Gast finished products, when properly installed and operated under normal conditions of use, are warranted by Gast to be free from defects in material and workmanship for a period of twelve (12) months from the date of purchase from Gast or an authorized Gast Representative or Distributor. In order to obtain performance under this warranty, the buyer must promptly (in no event later than thirty (30) days after discovery of the defect) give written notice of the defect to Gast Manufacturing Incorporated, PO Box 97, Benton Harbor Michigan USA 49023-0097 or an authorized Service Center (unless specifically agreed upon in writing signed by both parties or specified in writing as part of a Gast OEM Quotation). Buyer is responsible for freight charges both to and from Gast in all cases.

This warranty does not apply to electric motors, electrical controls, and gasoline engines not supplied by Gast. Gast's warranties also do not extend to any goods or parts which have been subjected to misuse, lack of maintenance, neglect, damage by accident or transit damage.

THIS EXPRESS WARRANTY EXCLUDES ALL OTHER WARRANTIES OR REPRESENTATIONS EXPRESSED OR IMPLIED BY ANY LITERATURE, DATA, OR PERSON. GAST'S MAXIMUM LIABILITY UNDER THIS EXCLUSIVE REMEDY SHALL NEVER EXCEED THE COST OF THE SUBJECT PRODUCT AND GAST RESERVES THE RIGHT, AT ITS SOLE DISCRETION, TO REFUND THE PURCHASE PRICE IN LIEU OF REPAIR OR REPLACEMENT.

GAST WILL NOT BE RESPONSIBLE OR LIABLE FOR INDIRECT OR CONSEQUENTIAL DAMAGES OF ANY KIND, however arising, including but not limited to those for use of any products, loss of time, inconvenience, lost profit, labor charges, or other incidental or consequential damages with respect to persons, business, or property, whether as a result of breach of warranty, negligence or otherwise. Notwithstanding any other provision of this warranty, BUYER'S REMEDY AGAINST GAST FOR GOODS SUPPLIED OR FOR NON-DELIVERED GOODS OR FAILURE TO FURNISH GOODS, WHETHER OR NOT BASED ON NEGLIGENCE, STRICT LIABILITY OR BREACH OF EXPRESS OR IMPLIED WARRANTY IS LIMITED SOLELY, AT GAST'S OPTION, TO REPLACEMENT OF OR CURE OF SUCH NONCONFORMING OR NON-DELIVERED GOODS OR RETURN OF THE PURCHASE PRICE FOR SUCH GOODS AND IN NO EVENT SHALL EXCEED THE PRICE OR CHARGE FOR SUCH GOODS. GAST EXPRESSLY DISCLAIMS ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE OR PURPOSE WITH RESPECT TO THE GOODS SOLD. THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTIONS SET FORTH IN THIS WARRANTY, notwithstanding any knowledge of Gast regarding the use or uses intended to be made of goods, proposed changes or additions to goods, or any assistance or suggestions that may have been made by Gast personnel.

Unauthorized extensions of warranties by the customer shall remain the customer's responsibility.

CUSTOMER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF GAST PRODUCTS FOR CUSTOMER'S USE OR RESALE, OR FOR INCORPORATING THEM INTO OBJECTS OR APPLICATIONS WHICH CUSTOMER DESIGNS, ASSEMBLES, CONSTRUCTS OR MANUFACTURES.

This warranty can be modified only by authorized Gast personnel by signing a specific, written description of any modifications.

## MAINTENANCE RECORD

[illegible]

**TROUBLESHOOTING CHART**

Problem					
Low Torque	Low Speed	Won't Run	Runs Hot	Runs Well Then Slows Down	Reason & Remedy For Problem.
●	●	●			Dirt or foreign material present. Inspect and clean.
●	●	●			Internal rust. Inspect and clean.
●	●	●	●	●	Vanes misaligned. Realign vanes.
●	●				Low air pressure. Increase pressure.
	●				Air line too small. Install larger line(s).
	●			●	Restricted exhaust. Inspect and repair.
●	●	●		●	Motor is jammed. Disassemble and repair.
	●			●	Air source inadequate. Inspect and repair.
	●			●	Air source too far from motor. Reconfigure setup.

**AUTHORIZED SERVICE FACILITIES**

Gast Manufacturing Inc.  
2550 Meadowbrook Road  
Benton Harbor, MI 49022  
TEL: 616-926-6171  
FAX: 616-927-0808  
www.gastmfg.com

Gast Manufacturing Inc.  
505 Washington Ave  
Carlstadt, NJ 07072  
TEL: 201-933-8484  
FAX: 201-933-5545

Brenner Fiedler & Assoc.  
13824 Bentley Place  
Cerritos, CA 90701  
TEL: 800-843-5558  
TEL: 310-404-2721  
FAX: 310-404-7975

Gast Manufacturing Co., Ltd  
Beech House, Knaves Beech  
Business Centre, Loudwater  
High Wycombe, Bucks HP 10 9SD  
England  
TEL: 44 628 532600  
FAX: 44 628 532470

Wainbee Limited  
215 Brunswick Blvd.  
Pointe Claire, Quebec  
Canada H9R 4R7  
TEL: 514-697-8810  
FAX: 514-697-3070

Wainbee Limited  
5789 Coopers Avenue  
Mississauga, Ontario  
Canada L4Z 3S6  
TEL: 905-568-1700  
FAX: 905-568-0083

Japan Machinery Co., Ltd.  
Central PO Box 1451  
Tokyo, 100-91 Japan  
TEL: 81-3-3573-5421  
FAX: 81-3-3571-7865  
or: 81-3-3571-7896

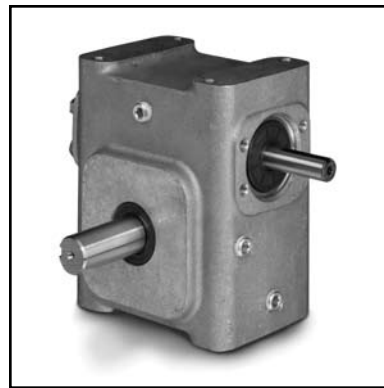
General Correspondence  
should be sent to:  
Gast Mfg. Inc./A Unit of IDEX Corporation  
P O Box 97  
Benton Harbor, MI 49023-0097

# **GROVE GEAR**

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## ***ELECTRA-GEAR***

### **Worm Gear Reducers Installation, Lubrication and Maintenance Instructions**



### **Table of Contents**

<b>Warning/Caution Information</b> .....	2
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<b>Installation</b> .....	3
<b>Lubrication</b>	
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<b>Maintenance</b> .....	5-6
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## Selection Information

Read ALL instructions prior to operating reducer. Injury to personnel or reducer failure may be caused by improper installation, maintenance or operation.

Written authorization from GROVE GEAR / ELECTRA-GEAR is required to operate or use reducers in man lift or people moving devices.

Check to make certain application does not exceed the allowable load capacities published in the current catalog.

Buyer shall be solely responsible for determining the adequacy of the product for any and all uses to which Buyer shall apply the product. The application by Buyer shall not be subject to any implied warranty of fitness for a particular purpose.

## Safety Alert

### WARNING

- For safety, Buyer or User should provide protective guards over all shaft extensions and any moving apparatus mounted thereon. The User is responsible for checking all applicable safety codes in his area and providing suitable guards. Failure to do so may result in bodily injury and/or damage to equipment.
- Hot oil and reducers can cause severe burns. Use extreme care when removing lubrication plugs and vents.
- Make certain that the power supply is disconnected before attempting to service or remove any components. Lock out the power supply and tag it to prevent unexpected application of power.
- Reducers are not to be considered fail safe or self-locking devices. If these features are required, a properly sized, independent holding device should be utilized. **Reducers should not be used as a brake.**
- Any brakes that are used in conjunction with a reducer must be sized or positioned in such a way so as to not subject the reducer to loads beyond the catalog rating.
- Lifting supports including eyebolts are to be used for vertically lifting the gearbox only, with no other associated attachments or motors.
- Use of an oil with an EP additive on units with backstops may prevent proper operation of the backstop. Injury to personnel, damage to the reducer or other equipment may result.
- Overhung loads subject shaft bearings and shafts to stress which may cause premature bearing failure and/or shaft breakage from bending fatigue, if not sized properly.

### CAUTION

- Test run unit to verify operation. If the unit tested is a prototype, that unit must be of current production.
- If the speed reducer cannot be located in a clear and dry area with access to adequate cooling air supply, then precautions must be taken to avoid the ingestion of contaminants such as water and the reduction in cooling ability due to exterior contaminants.
- Mounting bolts should be routinely checked to ensure that the unit is firmly anchored for proper operation.

## Important Information

In the event of the resale of any of the goods, in whatever form, Resellers/Buyers will include the following language in a conspicuous place and in a conspicuous manner in a written agreement covering such sale:

*The manufacturer makes no warranties or representations, express or implied, by operation of law or otherwise, as to the merchantability or fitness for a particular purpose of the goods sold hereunder. Buyer acknowledges that it alone has determined that the goods purchased hereunder will suitably meet the requirements of their intended use. In no event will the manufacturer be liable for consequential, incidental or other damages. Even if the repair or replacement remedy shall be deemed to have failed of its essential purpose under Section 2-719 of the Uniform Commercial Code, the manufacturer shall have no liability to Buyer for consequential damages.*

Resellers/Buyers agree to also include this entire document including the warnings above in a conspicuous place and in a conspicuous manner in writing to instruct users on the safe usage of the product.

This instructions manual should be read together with all other printed information such as catalogs, supplied by Grove Gear / Electra-Gear.



## General Operation

1. Run the motor which drives the reducer and check the direction of reducer output rotation. Consult motor nameplate for instructions to reverse the direction of rotation.
2. Attaching the load: On direct coupled installations, check shaft and coupling alignment between speed reducer and loading mechanism. On chain/sprocket and belt/pulley installation, locate the sprocket or pulley as close to the oil seal as possible to minimize overhung load. Check to verify that the overhung load does not exceed specifications published in the catalog.
3. High momentum loads: If coasting to a stop is undesirable, a braking mechanism should be provided to the speed reducer output shaft or the driven mechanism.



The system of connected rotating parts must be free from critical speed, torsional or other type vibration, no matter how induced. The responsibility for this system analysis lies with the purchaser of the speed reducer.

## Installation

1. Mount the unit to a rigid flat surface using grade 5 or higher fasteners. The mounting fasteners should be the largest standard size that will fit in the base mounting hole. Shim as required under flange or base feet which do not lie flat against the mounting surface.
2. For shipment, pipe plugs are installed in the unit and a vent plug is packed separately. After mounting the unit in position, remove the appropriate pipe plug and install the vent plug in the location shown on page 5. On double reduction units both the primary and the secondary must be vented. Failure to vent the unit can cause premature seal wear or loss of seal and oil. These conditions are not covered by warranty. Check for correct oil level. Contact the Factory for level and vent recommendations on non-standard mounting positions. Grove Gear WASHGUARD® / Electra-Gear Platinum units include ventless sealing technology (enviroseal) pre-installed at the factory. It is not necessary to vent these units, and they can be used as supplied from the factory. Do not loosen the nut holding the stem of the enviroseal, and do not block the hole in the stem. Do not blow pressurized air into the hole, and avoid spraying washdown chemicals directly into the hole.
3. Connect motor to speed reducer.

**Depending upon gear geometry and operating conditions worm gear reducers may or may not backdrive. Use of a brake or external holding device is required if any evidence of backdriving is not desired.**

Special consideration should be given to high inertia loads connected to the output shaft. Consult the factory for further details.



**DO NOT CHANGE MOUNTING POSITIONS WITHOUT CONTACTING FACTORY.**  
Altering the mounting position may require special lubrication provisions which must be factory installed.



Do not operate the reducer without making sure it contains the correct amount of oil. Do not overfill or underfill with oil, or injury to personnel, reducer or other equipment may result.



A unit cannot be used as an integral part of a machine superstructure which would impose additional loads on the unit other than those imposed by the torque being transmitted either through a shaft-mounted arrangement, and any shaft mounted power transmitting device. (*e.g., sprockets, pulleys, couplings*)



For safe operation and to maintain the unit warranty, when changing a factory installed fastener for any reason, it becomes the responsibility of the person making the change to properly account for fastener grade, thread engagement, load, tightening torque and the means of torque retention.

## Lubrication - Standard Units

All standard reducers ordered from Factory are filled with Mobil Glygoyle 460 polyglycol (**PAG**) lubricant or equivalent suitable for continuous operation within a -10° F to 120° F ambient temperature range. Double and triple reduction units have separate oil sumps and must be filled/checked independently. Prior to startup, verify that the oil is at the level shown on page 6. Lubricant type is stamped on all nameplates.

**Change Intervals:** Standard compounded lubricants (non-synthetic) should be changed every six months or 2500 operating hours, whichever comes first. Factory installed synthetic lubricants should be changed only when performing maintenance that requires gearbox disassembly.



Oil should be changed more often if reducer is used in a severe environment (i.e. dusty, humid).



In the Food and Drug Industry (including animal food), consult the lubrication supplier for recommendation of lubricants which are acceptable to the Food and Drug Administration and/or other authoritative bodies having jurisdiction. Factory supplied **PAG** oil is acceptable for incidental food contact (NSF H1) for use in and around food processing areas.



**Do not mix different oils in the reducer.** Grove Gear / Electra-Gear reducers are shipped standard with **PAG** lubricant – this lubricant is not compatible with conventional mineral or PAO synthetic oils.

## Special Lubrication Requirements - Size 818 and Larger

Units shipped from Factory are assembled to properly lubricate all internal components based on a specific assumed mounting orientation. Factory assumed mounting orientations are given below. If a size 818 or larger unit will be mounted in a different orientation than listed below, or run with sustained input speeds less than 900 RPM, it should be specified with the order. The unit can then be modified to assure proper lubrication.

Factory Assumed Mounting Orientation	Applicable Unit Styles*	
Worm Over	B, T, F, H, FH, C, D, DT, DF, DH, DFH, DX, DXT, DXH, DXFH, TT	Single Reduction Double Reduction Worm-Worm Double Reduction Helical-Worm Triple Reduction Worm-Worm-Worm
Worm Under	U DU	Single Reduction Double Reduction Worm-Worm
Vertical Output	VL/VH, FE DVL/DVH, DFE DXVL/DXVH, DXFE	Single Reduction Double Reduction Worm-Worm Double Reduction Helical-Worm
Vertical Input	J DJ DXJ	Single Reduction Double Reduction Worm-Worm Double Reduction Helical-Worm
* Includes "M" and "MQ" versions of all styles listed		

The precision-made gears and bearings in Grove Gear / Electra-Gear Speed Reducers require high-grade lubricants of the proper viscosity to maintain trouble-free performance. All standard reducers ordered from the factory are filled with ISO viscosity grade 460 polyglycol (**PAG**) lubricant. If oil needs to be added or changed, ONLY compatible polyglycol lubricants should be used. Contact the factory for more information.

## Oil Capacities (ounces) - Standard Units

Mounting Position	UNIT SIZE													
	813	815	818	821	824	826	830	832	842	852	860	870*	880*	8100*
1-Worm Over	4	12	12	20	24	40	56	72	112	188	312	560	768	1152
2-Worm Under	8	16	20	28	40	60	84	108	152	304	328	524	820	1280
3-Vertical Output	4	16	16	28	32	48	68	88	128	248	320	332	460	640
4-Vertical Input	4	16	16	24	32	48	72	92	128	248	325	584	800	1200
5-Extended Bearing	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8	12	17	27	640	1008	1632
5-Worm Over on Secondary Unit of Double Reduction	—	—	—	N/A	N/A	N/A	N/A	192	308	320	485	805	1144	1716

\* Shipped Dry

16 oz. = 1 pint  
2 pints = 1 quart  
4 quarts = 1 gallon  
1 gallon = 128 oz. = 231 cu. in.

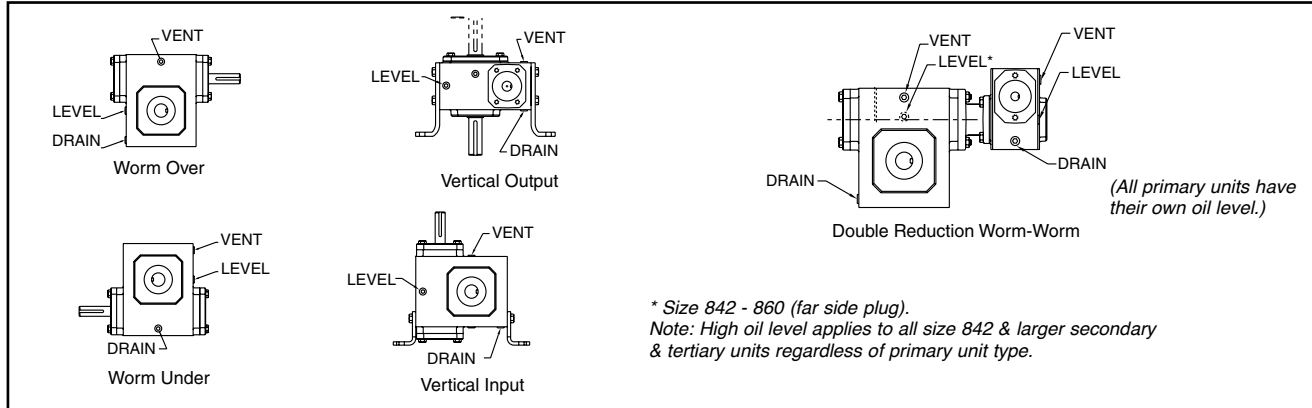


Always check for proper oil level after filling. Capacities vary somewhat with model and mounting position. Oil should rise to bottom edge of level hole. Do not overfill.



Do not operate the reducer without making sure it contains the correct amount of oil. Do not overfill or underfill with oil, or injury to personnel, reducer or other equipment may result.

## Standard Gear Reducer Mounting Positions & Vent Plug, Level and Drain Locations



### Maintenance - Standard Units

Your Grove Gear / Electra-Gear reducer has been tested and adjusted at Factory. Dismantling or replacement of components must be done by Grove Gear / Electra-Gear to maintain the warranty.

1. Frequently check the oil level of the reducer. If oil level is low, (refer to reducer vent and level position chart) add proper lubrication through the filler plug until it comes out the oil level plug.
2. Inspect vent plug often to insure it is clean and operating.
3. Always check for proper oil level after filling. Do not overfill or underfill with oil, or injury to personnel, reducer, or other equipment may result.
4. Do not mix different oils in the reducer.

**CAUTION** Mounting bolts should be routinely checked to ensure that the unit is firmly anchored for proper operation.

**Seals:** The Grove Gear / Electra-Gear line of speed reducers utilizes premium quality seals which are the state-of-the-art in sealing technology. Seals are, however, a wear item and eventually need to be replaced. Replacement can be easily accomplished by following the steps below:

1. Remove the worn seal without damaging the shaft surface or the seal bore. This can be done by drilling a .062 diameter hole in the seal casing (being careful not to drill into the bearing behind the seal). Install a #10 sheet metal screw into the hole and pry out the seal.
2. Clean the seal bore of sealant.
3. Before installing the new seal, use electrical tape to cover any keyways on the shaft to prevent seal lip damage.
4. Grease the seal lips with bearing grease and apply a sealant to the seal bore.
5. Slide the seal into the shaft being careful not to fold the inner lip over on any shaft steps.
6. Press the seal into its bore with a sleeve that presses on the seal casing, being careful to keep the seal square in its bore.

### Lubrication - Grove Gear WASHGUARD® / Electra-Gear Platinum

All Grove Gear WASHGUARD® / Electra-Gear Platinum reducers are shipped from Factory filled with Mobil Glygoyle 460 polyglycol (**PAG**) lubricant or equivalent suitable for continuous operation within a -10° F to 120° F ambient environment. If ambient temperature will be outside the above range, or if operation will be intermittent at temperatures below 20° F, consult Factory for lubrication recommendations. The unit is factory filled with the correct amount of oil for most mounting positions. If the unit will operate at input speeds below 900 RPM, or if a size 830 or larger unit is to operate with one of its shafts in a vertical position, consult Factory for special lubrication considerations.

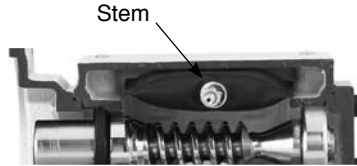
**CAUTION** In the Food and Drug Industry (including animal food), consult the lubrication supplier for recommendation of lubricants which are acceptable to the Food and Drug Administration and/or other authoritative bodies having jurisdiction. Factory supplied **PAG** oil is acceptable for incidental food contact (NSF H1) for use in and around food processing areas.

**CAUTION** **Do not mix different oils in the reducer.** Grove Gear WASHGUARD® / Electra-Gear Platinum reducers are shipped standard with **PAG** lubricant – this lubricant is not compatible with conventional mineral or PAO synthetic oils.

## Maintenance – Grove Gear WASHGUARD® / Electra-Gear Platinum

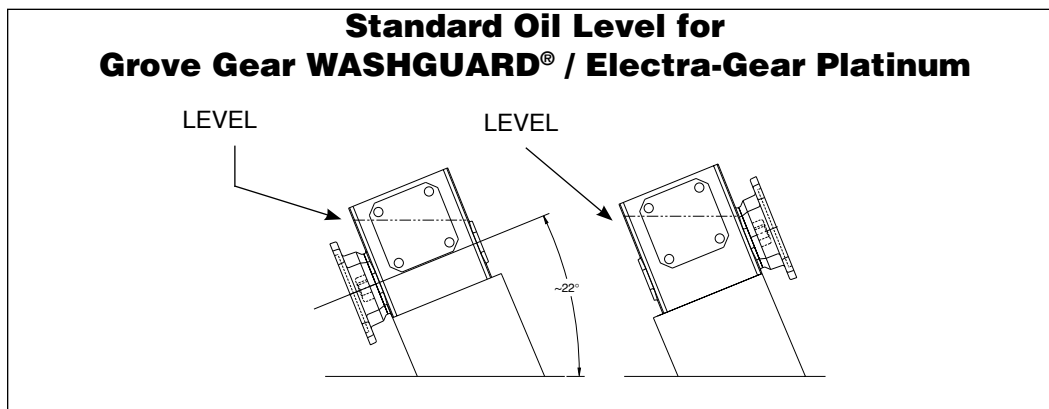
Your Grove Gear WASHGUARD® / Electra-Gear Platinum reducer has been tested and adjusted at Factory. Dismantling or replacement of components must be done by Grove Gear / Electra-Gear to maintain the warranty.

Inspect the stem of the internal Enviro-Seal often to ensure it is clean and operating properly. Do not remove nut holding the stem of the Enviro-Seal to the housing.



**CAUTION** Mounting bolts should be routinely checked to ensure that the unit is firmly anchored for proper operation.

**Seals:** The Grove Gear WASHGUARD® / Electra-Gear Platinum line of gear reducers utilize premium quality seals which are state-of-the-art in sealing technology. Seals are, however, a wear item and eventually need to be replaced. Replacement can easily be accomplished by following the procedure given under Maintenance - Standard Units from page 6. If seal leakage has resulted in the loss of a significant amount of oil, it may be necessary to add more lubricant. For all Grove Gear WASHGUARD® / Electra-Gear Platinum worm drives, fill the gearbox to the level indicated in the diagram below.



### Grove Gear WASHGUARD® / Electra-Gear Platinum Oil Fill (ounces)

	813	815	818	820	824	826	830	832	842	852
Solid Output Shaft	8	20	24	36	40	72	108	120	208	368
Hollow Output Shaft	8	20	23	30	36	64	96	104	196	316

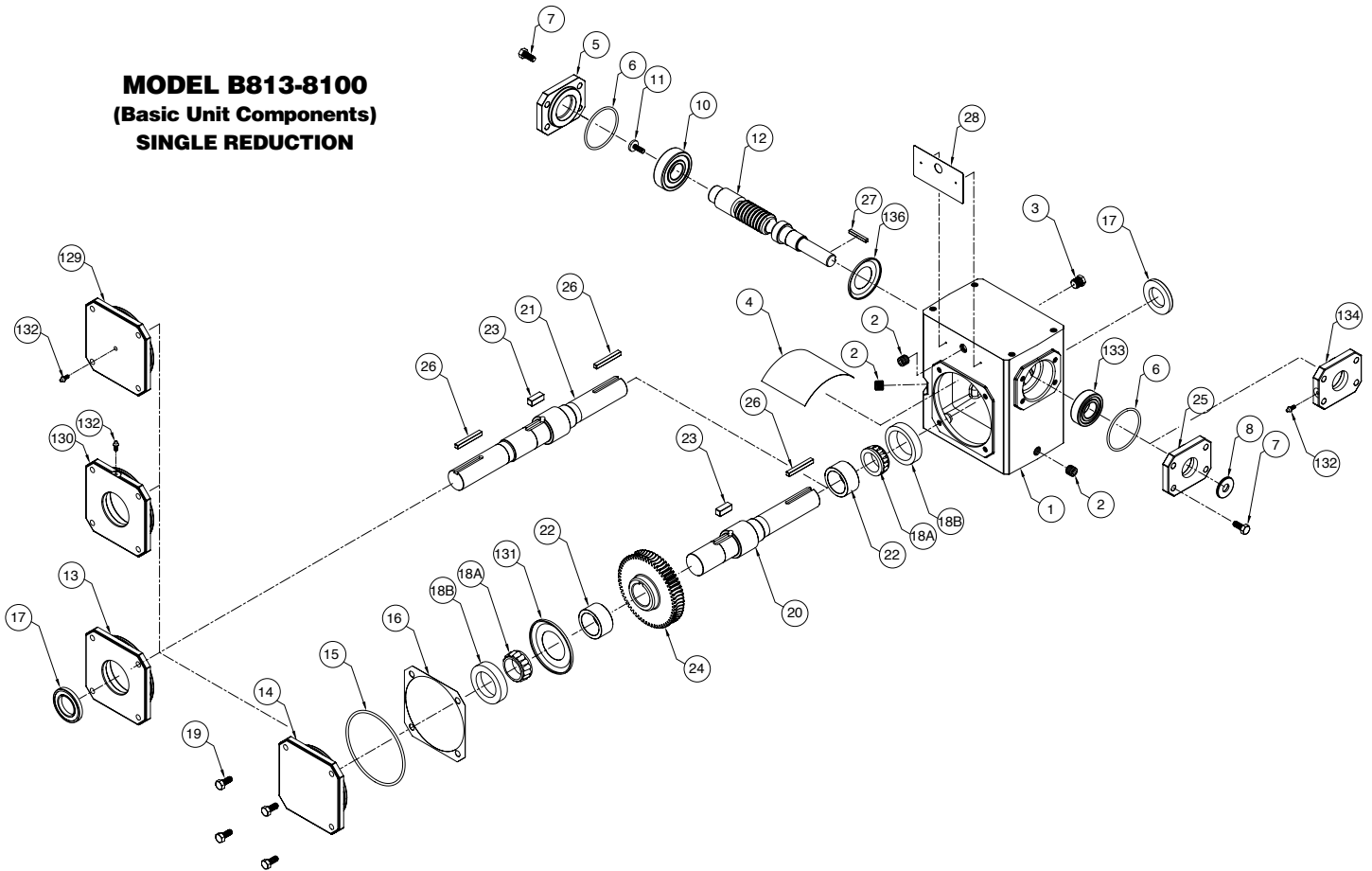
### Class of Service

Load conditions must be within cataloged ratings published in the current Grove Gear / Electra-Gear Catalog (available upon request). Published ratings assume lubrication with ISO 460 viscosity grade polyglycol (**PAG**) oil. Contact Factory for ratings when an alternate lubricant is used.

**Warranty From Grove Gear / Electra-Gear** - See 8050 catalog for warranty terms and conditions.

# PARTS LIST

## MODEL B813-8100 (Basic Unit Components) SINGLE REDUCTION



### BASIC SINGLE REDUCTION UNIT (B-STYLE)

#### ITEM # DESCRIPTION

- 1 HOUSING
- 2 PIPE PLUG
- 3 VENT PLUG
- 4 SPLASH GUARD
- 5 INPUT CAP
- 6 O-RING
- 7 HEX HEAD CAP SCREW
- 8 INPUT OIL SEAL
- 9 INPUT BEARING (cup and cone for 842 and larger units)
- 10 INPUT BEARING (cup and cone for 842 and larger units)
- \*11 RETAINING SCREW
- 12 INPUT WORM SHAFT
- 13 OUTPUT COVER - OPEN
- 14 OUTPUT COVER - CLOSED
- 15 O-RING
- 16 OUTPUT COVER SHIM (as required)
- 17 OUTPUT OIL SEAL
- 18 OUTPUT BEARING (18A. CONE, 18B. CUP)
- 19 HEX HEAD CAP SCREW

- ♣ 20 OUTPUT SHAFT - SINGLE
- ♣ 21 OUTPUT SHAFT - DOUBLE
- 22 GEAR SPACER
- 23 GEAR KEY (only used on size 826 and larger units)
- ♣ 24 OUTPUT GEAR
- \*25 INPUT COVER
- 26 KEY - OUTPUT EXTENSION
- 27 KEY - INPUT EXTENSION
- 28 NAMEPLATE

### QUILL MOTOR FLANGE UNIT (BMQ-STYLE)

- 40 QUILL MOTOR FLANGE
- 41 INPUT OIL SEAL
- 42 HEX HEAD CAP SCREW (flange to housing)
- 43 RETAINING RING - SHAFT
- \*44 RETAINING RING - HOUSING
- 45 QUILL INPUT SHAFT
- 46 KEY - INPUT
- 47 HEX HEAD CAP SCREW (motor to flange)

### HOLLOW OUTPUT SHAFT UNIT (H-STYLE)

- 51 OUTPUT COVER
- 52 OUTPUT OIL SEAL

- 53 OUTPUT BEARING (53A. CONE, 53B. CUP)
- 54 GEAR SPACER
- ♣ 55 OUTPUT SHAFT
- 56 SETSCREW
- 57 GEAR KEY (only used on size 826 and larger units)
- ♣ 58 OUTPUT GEAR
- 59 OUTPUT KEY

### LONG MOTOR FLANGE AND COUPLING KIT (BM-STYLE)

- 110 "C" FACE MOTOR FLANGE
- 111 HEX HEAD CAP SCREW (flange to housing)
- 112 COUPLING KEY - REDUCER SHAFT
- 113 SETSCREW - REDUCER SHAFT
- 114 COUPLING GEAR - REDUCER SHAFT
- 115 COUPLING SLEEVE
- 116 SETSCREW - MOTOR SHAFT
- 117 COUPLING GEAR - MOTOR SHAFT
- 118 COUPLING KEY - MOTOR SHAFT
- 119 HEX HEAD CAP SCREW

- (motor to flange)
- 120 PLASTIC PLUG

### VERTICAL SHAFT REQUIRED PARTS

(supplied only when mounting position involves a vertical shaft)

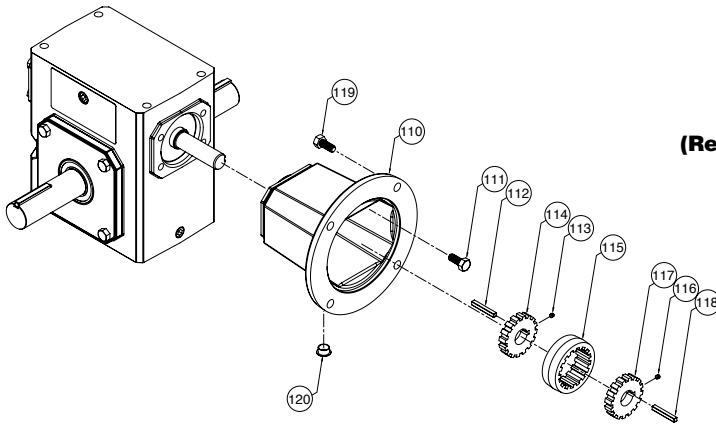
- \*129 OUTPUT COVER - CLOSED
- \*130 OUTPUT COVER - OPEN
- \*131 OUTPUT BEARING GREASE RETAINER
- 132 GREASE FITTING
- 133 SEALED BALL BEARING (only used on size 818 thru 826 units)
- ♦ 134 INPUT COVER
- ♦ 136 INPUT BEARING GREASE RETAINER

\* ONLY USED ON SIZE 842 AND LARGER UNITS

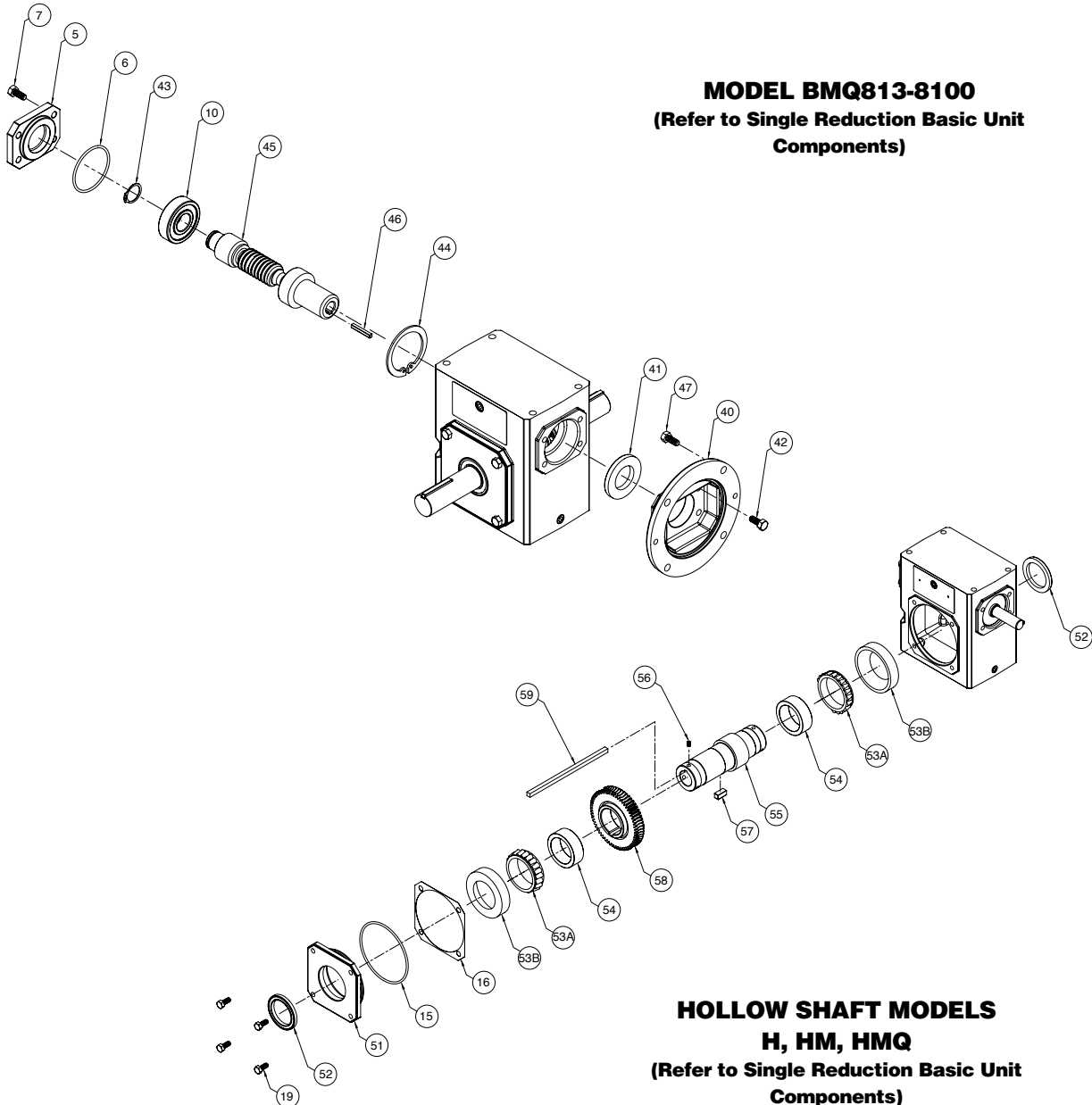
♦ ONLY USED ON SIZE 830 AND LARGER UNITS

♣ SUPPLIED ONLY AS OUTPUT ASSEMBLY ON 813 THROUGH 824 UNITS

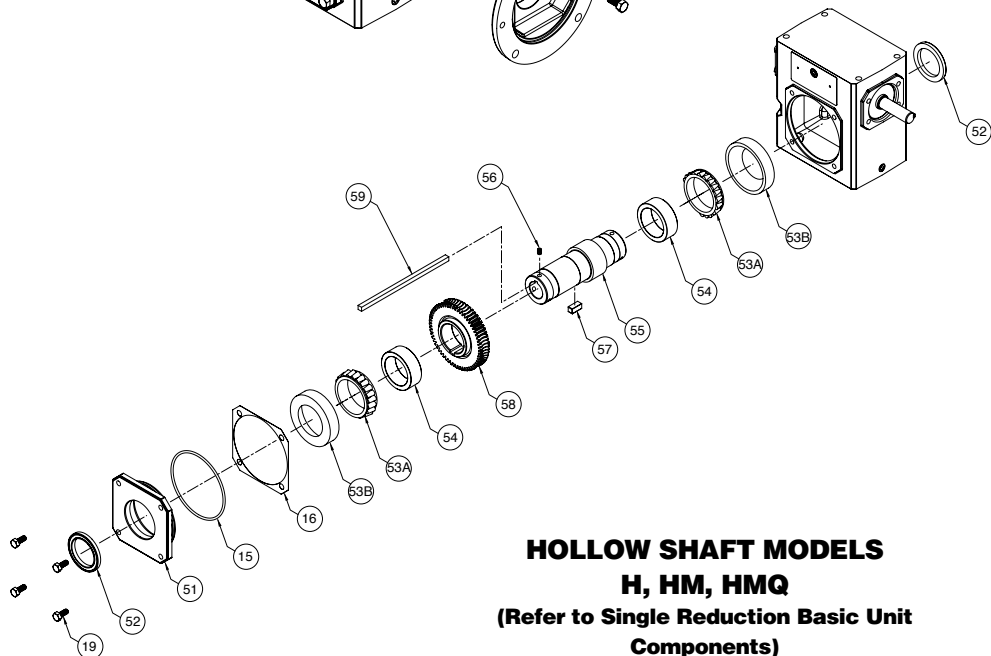
# PARTS LIST



**MODEL BM813-8100**  
(Refer to Single Reduction Basic Unit Components)

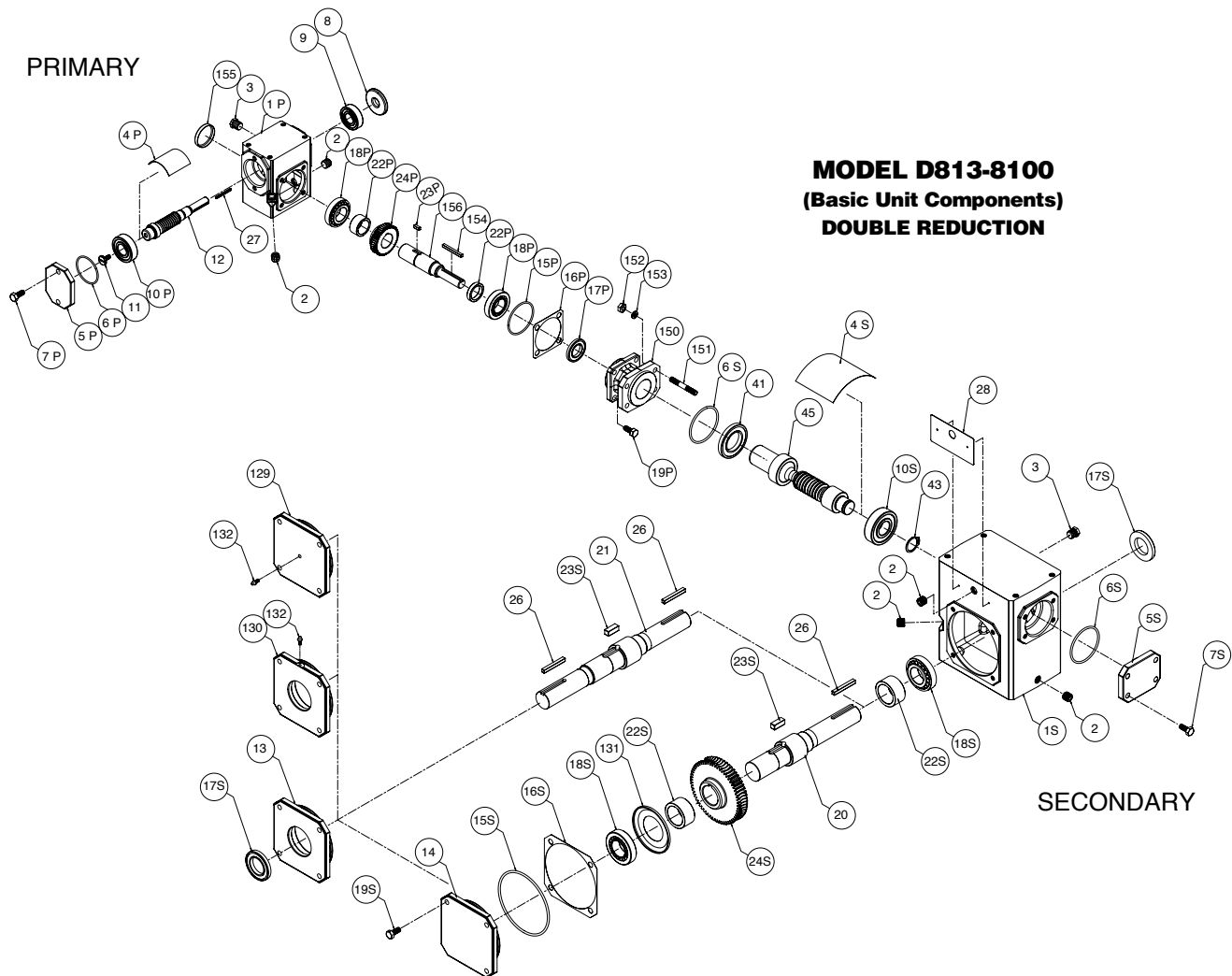


**MODEL BMQ813-8100**  
(Refer to Single Reduction Basic Unit Components)



**HOLLOW SHAFT MODELS**  
**H, HM, HMQ**  
(Refer to Single Reduction Basic Unit Components)

## PARTS LIST



**MODEL D813-8100**  
**(Basic Unit Components)**  
**DOUBLE REDUCTION**

### DOUBLE REDUCTION UNIT (D-STYLE)

#### ITEM # DESCRIPTION

1	HOUSING
2	PIPE PLUG
3	VENT PLUG
4	SPLASH GUARD
5	INPUT CAP
6	O-RING
7	HEX HEAD CAP SCREW
8	INPUT OIL SEAL
9	INPUT BEARING (cup and cone for 842 and larger units)
10	INPUT BEARING (cup and cone for 842 and larger units)
11	RETAINING SCREW
12	INPUT WORM SHAFT
13	OUTPUT COVER - OPEN
14	OUTPUT COVER - CLOSED
15	O-RING
16	OUTPUT COVER SHIM (as required)
17	OUTPUT OIL SEAL
18	OUTPUT BEARING (18A. CONE, 18B. CUP)
19	HEX HEAD CAP SCREW
▲20	OUTPUT SHAFT - SINGLE
▲21	OUTPUT SHAFT - DOUBLE

22	GEAR SPACER
23	GEAR KEY (only used on size 826 and larger units)
▲24	OUTPUT GEAR
26	KEY - OUTPUT EXTENSION
27	KEY - INPUT EXTENSION
28	NAMEPLATE
41	INPUT OIL SEAL
43	RETAINING RING - SHAFT
45	QUILL INPUT SHAFT
150	DOUBLE REDUCTION ADAPTER
151	STUD
152	HEX NUT
153	LOCK WASHER
154	PRIMARY SOLID OUTPUT KEY
155	EXPANSION PLUG
156	PRIMARY SOLID OUTPUT SHAFT

#### QUILL MOTOR FLANGE UNIT (DMQ-STYLE)

40	QUILL MOTOR FLANGE
41	INPUT OIL SEAL
42	HEX HEAD CAP SCREW (flange to housing)
43	RETAINING RING - SHAFT
*44	RETAINING RING - HOUSING
45	QUILL INPUT SHAFT

46	KEY - INPUT
47	HEX HEAD CAP SCREW (motor to flange)

#### HOLLOW OUTPUT SHAFT UNIT (H-STYLE)

51	OUTPUT COVER
52	OUTPUT OIL SEAL
53	OUTPUT BEARING (53A. CONE, 53B. CUP)
54	GEAR SPACER
▲55	OUTPUT SHAFT
56	SETSCREW
57	GEAR KEY (only used on size 826 and larger units)
▲58	OUTPUT GEAR
59	OUTPUT KEY

#### LONG MOTOR FLANGE AND COUPLING KIT (BM-STYLE)

110	"C" FACE MOTOR FLANGE
42	HEX HEAD CAP SCREW (flange to housing)
112	COUPLING KEY - REDUCER SHAFT
113	SETSCREW - REDUCER SHAFT
114	COUPLING GEAR - REDUCER SHAFT
115	COUPLING SLEEVE
116	SETSCREW - MOTOR SHAFT

117	COUPLING GEAR - MOTOR SHAFT
118	COUPLING KEY - MOTOR SHAFT
47	HEX HEAD CAP SCREW (motor to flange)
120	PLASTIC PLUG

#### VERTICAL SHAFT REQUIRED PARTS

(supplied only when mounting position involves a vertical shaft)

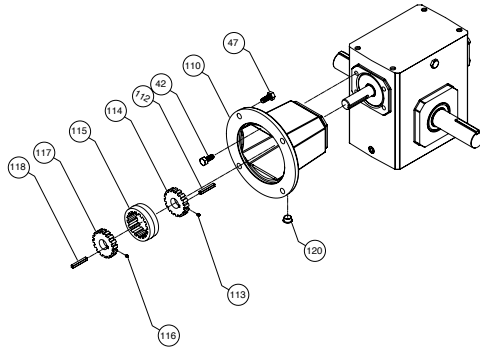
*129	OUTPUT COVER - CLOSED
*130	OUTPUT COVER - OPEN
*131	OUTPUT BEARING GREASE RETAINER
132	GREASE FITTING
133	SEALED BALL BEARING (only used on size 818 thru 826 units)
◆134	INPUT COVER
◆136	INPUT BEARING GREASE RETAINER

\* ONLY USED ON SIZE 842 AND LARGER UNITS  
◆ ONLY USED ON SIZE 830 AND LARGER UNITS  
▲ SUPPLIED ONLY AS OUTPUT ASSEMBLY ON 813 THROUGH 824 UNITS

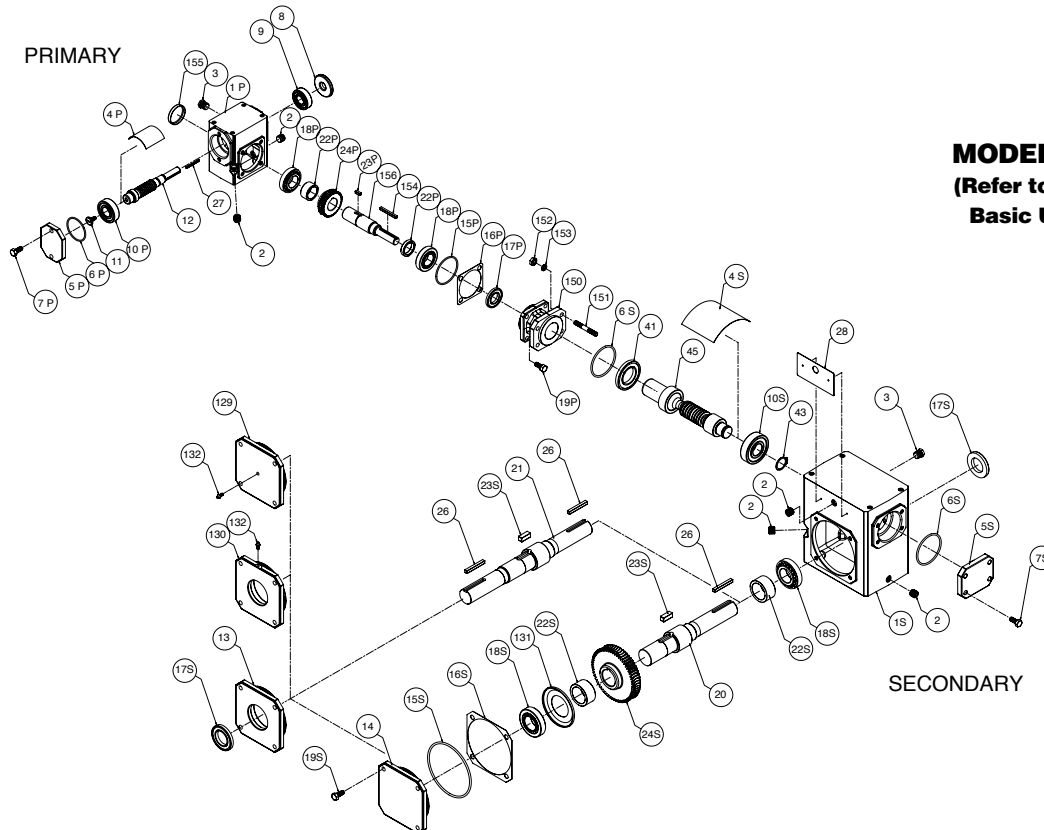
P - PRIMARY  
S - SECONDARY



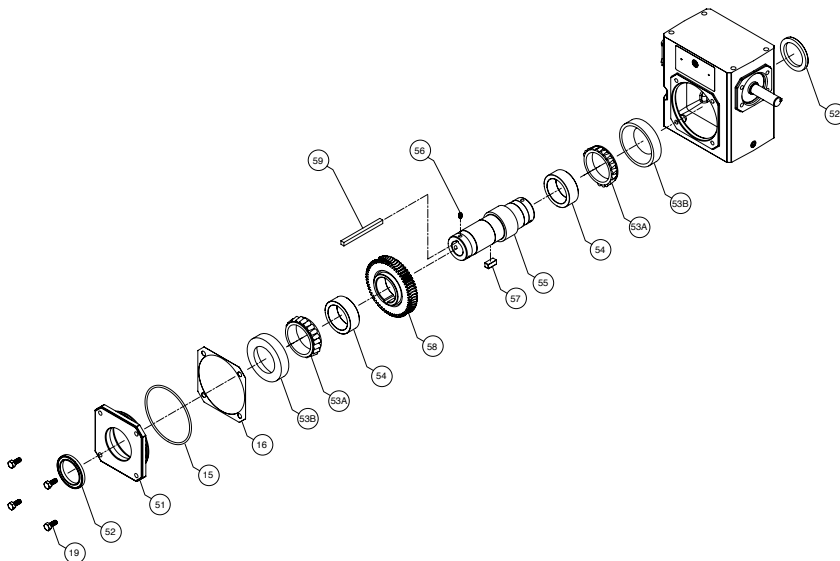
## PARTS LIST



**MODEL DM813-8100**  
(Refer to Double Reduction  
Basic Unit Components)



**MODEL DMQ813-8100**  
(Refer to Double Reduction  
Basic Unit Components)

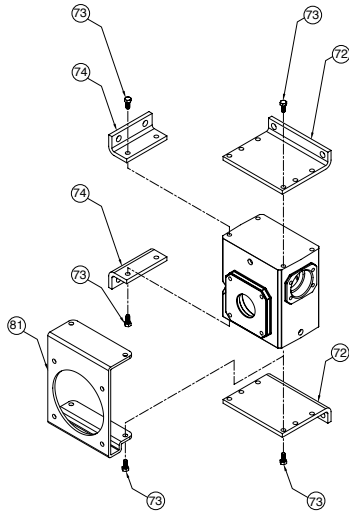


**HOLLOW SHAFT MODELS**  
**DH, DHM, DHMQ**  
(Refer to Double Reduction  
Basic Unit Components)



## PARTS LIST

### STEEL MOUNTING ACCESSORIES

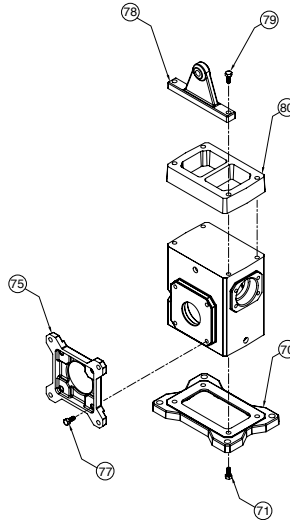


#### MOUNTING BRACKET OPTIONS

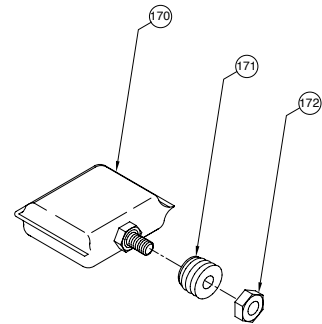
- 70 HORIZONTAL MOUNTING BASE
- 71 CAP SCREW
- 72 HIGH AND LOW V-BRACKETS
- 73 HEX HEAD CAP SCREW
- 74 "J" MOUNT BRACKET
- 75 "F" OUTPUT FLANGE (CAST)

- 77 HEX HEAD CAP SCREW
- 78 TORQUE BRACKET
- 79 HEX HEAD CAP SCREW
- 80 RISER BLOCK
- 81 "FB" OUTPUT FLANGE (bent steel - only available thru size 826, excluding 815 units)

### CAST MOUNTING ACCESSORIES



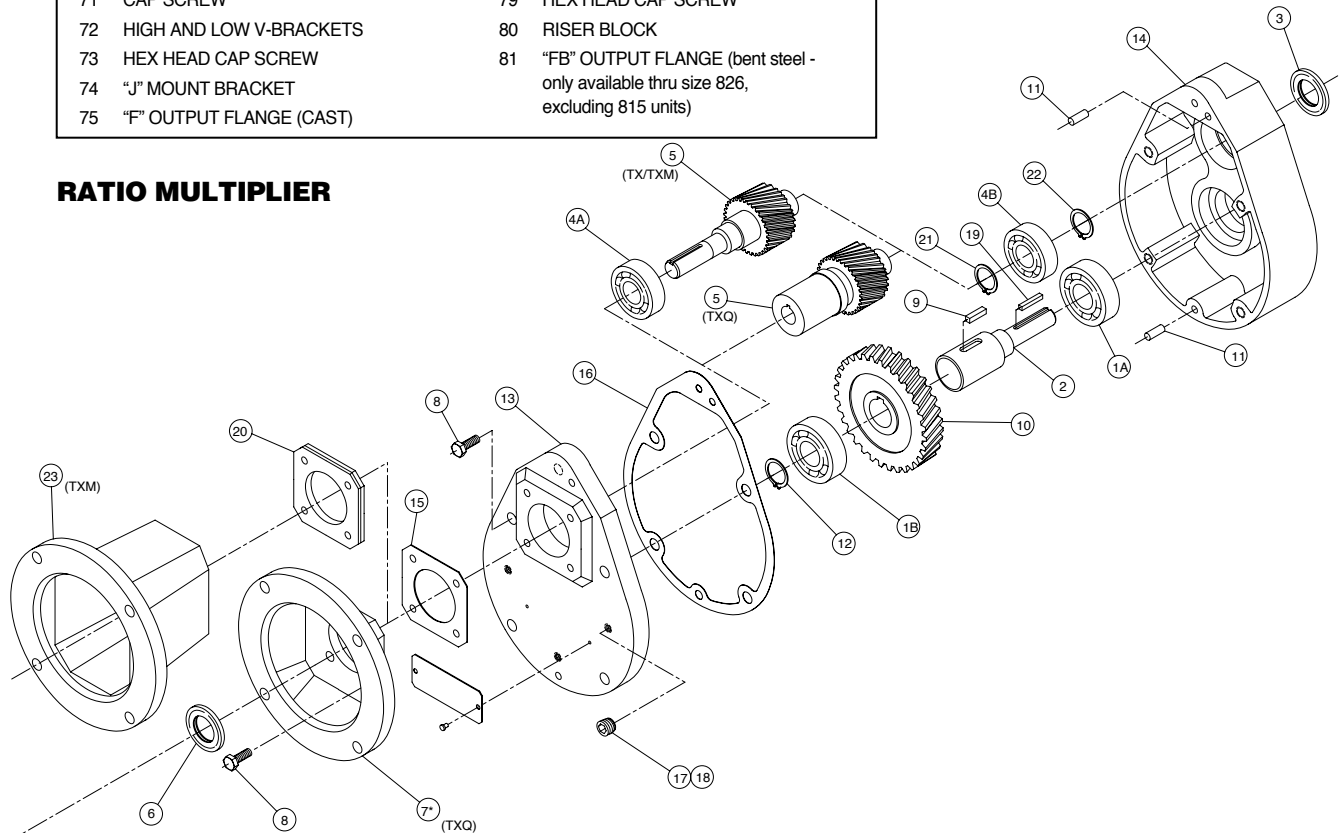
### ENVIROSEAL



#### ENVIROSEAL

- 170 INTERNAL PRESSURE COMPENSATION CHAMBER
- 171 INTERNAL PRESSURE COMPENSATION CHAMBER STEM PLUG
- 172 INTERNAL PRESSURE COMPENSATION CHAMBER STEM NUT

### RATIO MULTIPLIER



#### RATIO MULTIPLIER (INPUT TO DOUBLE REDUCTION HELICAL WORM STYLES)

##### ITEM # DESCRIPTION

- 1A BEARING, OUTPUT - EXTENSION END
- 1B BEARING, OUTPUT - INBOARD END
- 2 SHAFT, OUTPUT (state output frame size)

- 3 OIL SEAL, OUTPUT
- 4A BEARING, INPUT - EXTENSION END (n/a for TXQ)
- 4B BEARING, INPUT - INBOARD END
- 5 SHAFT, INPUT
- 6 OIL SEAL, INPUT
- \*7 FLANGE, MOTOR (TXQ only)
- 8 HEX HEAD CAP SCREW
- 9 KEY, GEAR

- 10 GEAR, OUTPUT
- 11 PIN, DOWEL
- 12 SPACER, LOW SPEED
- 13 COVER, HOUSING
- 14 HOUSING
- 15 GASKET, INPUT COVER
- 16 GASKET, HOUSING
- 17 PLUG, PIPE
- 18 PLUG, VENT

- 19 KEY, OUTPUT SHAFT
- 20 COVER, INPUT, SEAL RETAINER
- 21 RING, RETAINING, INTERNAL, INPUT SHAFT
- 22 RING, RETAINING, EXTERNAL, INPUT SHAFT
- 23 FLANGE, MOTOR (TXM only)

\*MOTOR FLANGE REPLACES INPUT COVER ON "TXQ" MODEL

**GROVE GEAR**  
**ELECTRA-GEAR**



1524 15th Avenue • Union Grove, WI 53182  
Phone: 262-878-1221 • Fax: 262-878-1968 • [www.grovegear.com](http://www.grovegear.com)