



GARDNER DENVER™

Experience Proven Results™

PARTS LIST OPERATING AND SERVICE MANUAL

LEGEND “R” SERIES BLOWERS

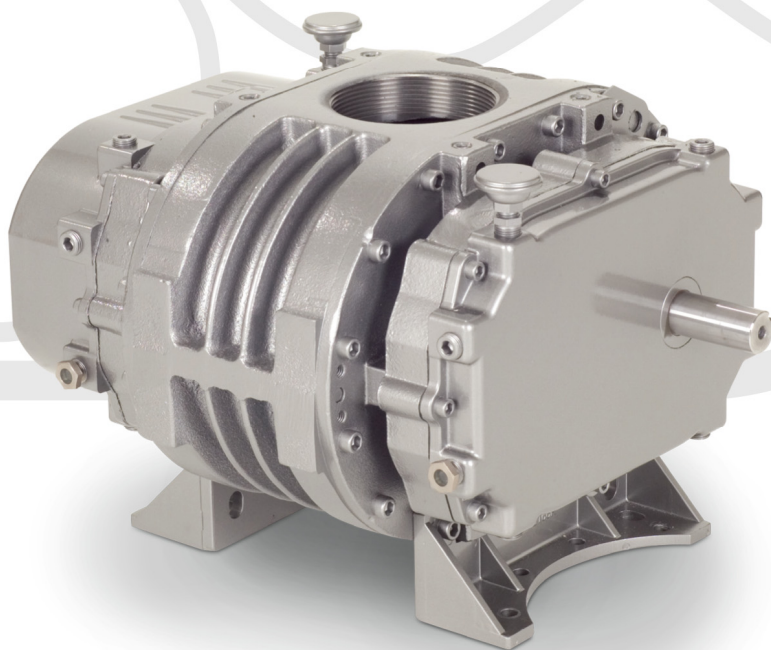
**3” – 5” GEAR
DIAMETER**

Models

**GAB__ R__
GAC__ R__
GAE__ R__**



**SB-7-632
Version 03
May 8, 2009**



**MAINTAIN BLOWER RELIABILITY AND PERFORMANCE
WITH GENUINE GARDNER DENVER
PARTS AND SUPPORT SERVICES**

Factory genuine parts, manufactured to design tolerances, are developed for optimum dependability - - - specifically for your blower. Design and material innovations are born from years of experience with hundreds of different blower applications. When you specify factory genuine parts you are assured of receiving parts that incorporate the most current design advancements manufactured in our state-of-the-art blower factory under exacting quality standards.

Your AUTHORIZED DISTRIBUTOR offers all the backup you require. A worldwide network of authorized distributors provides the finest product support in the blower industry.

1. Trained technical representatives to assist you in selecting the correct replacement parts.
2. Complete inventory of new machines and new, genuine factory parts.
3. A full line of factory tested AEON[®] PD blower lubricants, specifically formulated for optimum performance in all blowers.
4. Authorized distributor service technicians are factory-trained and skilled in blower maintenance and repair. They are ready to respond and assist you by providing fast, expert maintenance and repair service.

INSTRUCTIONS FOR DETERMINING BLOWER CONFIGURATION

1. Face the blower drive shaft.
2. In a **VERTICAL** configuration, air flow is horizontal.
3. In a **HORIZONTAL** configuration, air flow is vertical.
4. In a vertical configuration, a **BOTTOM HAND** exists when the drive shaft is below the horizontal center line of the blower. A **TOP HAND** exists when the drive shaft is above the horizontal center line of the blower.
5. In a horizontal configuration, a **RIGHT HAND** exists when the drive shaft is to the right of the vertical center line of the blower. A **LEFT HAND** exists when the drive shaft is to the left of the vertical center line of the blower.

INSTRUCTIONS FOR ORDERING REPAIR PARTS

For pricing, and ordering information contact your nearest AUTHORIZED FACTORY DISTRIBUTOR. When ordering parts, specify Blower **MODEL** and **SERIAL NUMBER** (see nameplate on unit).

Rely upon the knowledge and experience of your AUTHORIZED DISTRIBUTOR and let them assist you in making the proper parts selection for your blower.

For the location of your local authorized Gardner Denver blower distributor refer to the yellow pages of your phone directory, check the Web at www.gardnerdenver.com or contact:

Gardner Denver Compressor Division
1800 Gardner Expressway
Quincy, IL 62305
Phone: (217) 222-5400
Fax: (217) 221-8780

GARDNER DENVER LUBRICANT ORDER INFORMATION

Re-order Part Numbers for Factory Recommended Lubricants.

Gear and Drive End

AEON PD Synthetic Lubricant, AEON PD-XP—Extreme Duty Synthetic Lubricant or
AEON PD-FG—Food Grade Synthetic Lubricant

AEON PD Synthetic Lubricant

<u>Description</u>	<u>Part Number</u>
1 Quart	28G23
Case/12Quarts	28G24
1 Gallon Container	28G40
Case/6 Gallons	28G41
5 Gallon Pail	28G25
55 Gallon Drum	28G28

AEON PD-XD – Extreme Duty Synthetic Lubricant

<u>Description</u>	<u>Part Number</u>
1 Quart	28G46
Case/12Quarts	28G47
1 Gallon Container	28G42
Case/6 Gallons	28G43
5 Gallon Pail	28G44
55 Gallon Drum	28G45

AEON PD-FG – Food Grade Synthetic Lubricant

<u>Description</u>	<u>Part Number</u>
1 Quart	28H97
Case/12Quarts	28H98
1 Gallon Container	28H333
Case/6 Gallons	28H334
5 Gallon Pail	28H99
55 Gallon Drum	28H100

Drive End

AEON PD Grease

<u>Description</u>	<u>Part Number</u>
Case/10 Tubes (14oz/Tube)	28H283

**Call your local Gardner Denver Distributor to place your order for Gardner Denver lubricants.
Your Authorized Gardner Denver Distributor is:**

FOREWORD

Sutorbilt® blowers are the result of advanced engineering and skilled manufacturing. To be assured of receiving maximum service from this machine, the owner must exercise care in its operation and maintenance. This manual is written to give the operator and maintenance department essential information for day-to-day operation, maintenance and adjustment. Careful adherence to these instructions will result in economical operation and minimum downtime.



Danger is used to indicate the presence of a hazard which will cause severe personal injury, death, or substantial property damage if the warning is ignored.



Warning is used to indicate the presence of a hazard which can cause severe personal injury, death, or substantial property damage if the warning is ignored.



Caution is used to indicate the presence of a hazard which will or can cause minor personal injury or property damage if the warning is ignored.

NOTICE

Notice is used to notify people of installation, operation or maintenance information which is important but not hazard-related.

SAFETY PRECAUTIONS

Safety is everybody's business and is based on your use of good common sense. All situations or circumstances cannot always be predicted and covered by established rules. Therefore, use your past experience, watch out for safety hazards and be cautious. Some general safety precautions are given below:

DANGER

Failure to observe these notices could result in injury to or death of personnel.

- **Keep fingers and clothing away** from revolving fan, drive coupling, etc.
- **Do not use the air discharge** from this unit for breathing – not suitable for human consumption.
- **Do not loosen or remove** the oil filler plug, drain plugs, covers or break any connections, etc., in the blower air or oil system until the unit is shut down and the air pressure has been relieved.
- **Electrical shock** can and may be fatal.
- **Blower unit must be grounded** in accordance with the National Electrical Code. A ground jumper equal to the size of the equipment ground conductor must be used to connect the blower motor base to the unit base.
- **Open main disconnect switch**, tag and lockout before working on the control.
- **Disconnect the blower** from its power source, tag and lockout before working on the unit – this machine may be automatically controlled and may start at any time.

WARNING

Failure to observe these notices could result in damage to equipment.

- **Stop the unit** if any repairs or adjustments on or around the blower are required.
- **Disconnect the blower** from its power source, tag and lockout before working on the unit – this machine maybe automatically controlled and may start at any time.
- **Do not exceed** the rated maximum speed shown on the nameplate.
- **Do not operate unit** if safety devices are not operating properly. Check periodically. **Never bypass safety devices.**

TABLE OF CONTENTS

Maintain Blower Reliability And Performance	2
Foreword.....	4
Safety Precautions.....	5
Sutorbilt Legend Series Blowers Matrix/Menu	8
Introduction	9
Section 1, Equipment Check	10
Section 2, Installation.....	12
Section 3, Lubrication	17
Section 4, Operation.....	22
Section 5, Special Tools Required	25
Section 6, Disassembly Instructions.....	27
Section 7, Assembly Instructions.....	31
Section 8, Parts List.....	39 thru 62

INDEX

Aeon PD Extreme Duty Lubricant	20	Mechanical Seals Only.....	31, 32
Aeon PD Food Grade Lubricant	20	Mounting Configurations	12
Aeon PD Synthetic Lubricant	20	Operation, Section 4	22
Air Filters And Filter Silencers	16	Parts List, Section 8	39
Assembly Instructions, Section 7	31	Piping	14
Blower Startup Checklist	23	Recommended Lubricant	20
Disassembly Instructions, Section 6.....	27	Removing Protective Materials.....	10
Drive End Lubrication	17, 18	Repositioning The Mounting Feet	12
Drive Installation.....	13	Safety Precautions	5
Equipment Check, Section 1	10	Safety Precautions	24
Foundations	12	Section 7	
Gear End Lubrication	18	Assembly Instructions	31
Installation, Section 2	12	Setting Impeller End Clearance With Mechanical Seals	35
Installing The Timing Gears	36	Setting Impeller End Clearances.....	34
Introduction	9	Special Tools Required Section 5	25
Limitations	22	Storage	10
Location.....	12	Trouble Shooting.....	24
Lubrication, Section 3.....	17	Warranty	63

LIST OF ILLUSTRATIONS

FIGURE 2-1 – BLOWER MOUNTING CONFIGURATION.....	13
FIGURE 2-2 – BELT DRIVE OVERHUNG LOAD CALCULATIONS	15
FIGURE 3-1 - LUBRICATION	17
FIGURE 3-2 – APPROXIMATE OIL CAPACITIES.....	18
FIGURE 3-3 – AEON PD SYNTHETIC LUBRICANT	20
FIGURE 3-4 – SYNTHETIC LUBRICANT CHART.....	20
FIGURE 3-5 – LUBRICATION RECOMMENDATION.....	21
FIGURE 4-1 – MAXIMUM / MINIMUM OPERATING LIMITATIONS.....	22
FIGURE 5-1 – PULLER PLATE	25
FIGURE 5-2 – SEAL DRIVE	25
FIGURE 5-3 – MECHANICAL SEAL INSTALLATION TOOL.....	26
FIGURE 5-4 – BEARING PRESS TOOL – MECHANICAL SEAL UNITS	26
FIGURE 6-1 – DISASSEMBLY ILLUSTRATIONS	27
FIGURE 6-2 – DISASSEMBLY ILLUSTRATIONS	27
FIGURE 6-3 – DISASSEMBLY ILLUSTRATIONS	28
FIGURE 6-4 – DISASSEMBLY ILLUSTRATIONS	28
FIGURE 6-5 – DISASSEMBLY ILLUSTRATIONS	28
FIGURE 6-6 – DISASSEMBLY ILLUSTRATIONS	29
FIGURE 7-1 – ASSEMBLY ILLUSTRATIONS	31
FIGURE 7-2 – ASSEMBLY ILLUSTRATIONS	32
FIGURE 7-3 – ASSEMBLY ILLUSTRATIONS	32
FIGURE 7-4 – ASSEMBLY ILLUSTRATIONS	33
FIGURE 7-5 – ASSEMBLY ILLUSTRATIONS	34
FIGURE 7-6 – ASSEMBLY ILLUSTRATIONS	34
FIGURE 7-7 – ASSEMBLY ILLUSTRATIONS	34
FIGURE 7-8 – ASSEMBLY ILLUSTRATIONS	37
FIGURE 7-9 – TORQUE FT LBS	38

SUTORBILT LEGEND SERIES BLOWERS MATRIX/MENU

NOTICE TO CUSTOMER – To find the construction options for Your blower unit, FILL IN THE BALANCE OF LETTERS OR NUMBERS FROM YOUR UNIT NAMEPLATE

G A R

COLUMN NUMBER: 1 2 3 4 5 6 7

FOLLOW THE LINE DOWN AND OVER FROM EACH SPACE THUS FILLED IN TO FIND THE APPROPRIATE CONSTRUCTION OPTION WITH WHICH YOUR MACHINE IS EQUIPPED.

COLUMN 1 – BASIC DESIGNATOR

COLUMN 2 – PRODUCT FAMILY

COLUMN 3 – GEAR DIAMETER

B	3"	E	5"			
C	4"					

COLUMN 4 – CASE LENGTH

- L - Low Pressure
- M - Medium Pressure
- H - High Pressure

COLUMN 5 – CONFIGURATION

- A Vertical-Top Hand -Central Timed
- B Vertical-Bottom Hand – Central Timed
- C Horizontal – Left Hand – Central Timed
- D Horizontal – Right Hand – Central Timed

COLUMN 6 – DESIGN VERSION

COLUMN 7 – ADDITIONAL DESCRIPTION

	<u>SEALS</u>	<u>CLEARANCES</u>	<u>LUBRICATION</u>
A.	Lip	Standard	Grease-Splash
B.	Mechanical	Standard	Grease-Splash
C.	Lip	High Temperature	Grease-Splash
D.	Lip	Standard	Dual-Splash
E.	Mechanical	Standard	Dual-Splash
F.	Lip	High Temperature	Dual-Splash
G.	Mechanical	High Temperature	Dual-Splash

INTRODUCTION

YOUR KEY TO TROUBLE FREE SERVICE

Thank you for investing in Gardner Denver quality. The Gardner Denver reputation for rugged dependability has been earned by over 50 years of service in demanding, industrial operations where downtime cannot be tolerated and efficient blower performance is expected.

Your Gardner Denver Sutorbilt blower is a precision engineered blower that has been carefully manufactured and thoroughly tested at the state-of-the art Gardner Denver Blower Factory in Sedalia, Missouri.

As with other precision machinery, there are several relatively simple installation, operation and maintenance procedures that you must observe to assure optimum blower performance. There is no guesswork in the manufacture of your highly advanced Sutorbilt blower and there must be none in preparing the blower to get the job done in the field.

The purpose of this manual is to help you properly install, operate and maintain your Sutorbilt blower. It is essential that you review all sections of this manual in preparation for installing your blower. Follow the instructions for installing your blower. Follow the instructions carefully and you will be rewarded with trouble-free Gardner Denver Sutorbilt service year in and year out.

SECTION 1 EQUIPMENT CHECK

Before uncrating, check the packing slip carefully to be sure all the parts have been received. All accessories are listed as separate items on the packing slip, and small important accessories such as relief valves can be overlooked or lost. After every item on the packing slip has been checked off, uncrate carefully.

NOTICE

Register a claim with the carrier for lost or damaged equipment.

WARNING

Customers are cautioned to provide adequate protection, warning and safety equipment necessary to protect personnel against hazards involved in installation and operation of this equipment in the system or facility.

STORAGE

Your Gardner Denver Blower was packaged at the factory with adequate protection to permit normal storage for up to six (6) months.

If the unit is to be stored under adverse conditions or for extended periods of time, the following additional measures should be taken to prevent damage.

1. Store the blower in a clean, dry, heated (if possible) area.
2. Make certain inlet and discharge air ports are tightly covered to prevent foreign material from entering the air box.
3. All exposed, non-painted surfaces should be protected against rust and corrosion.
4. Provide adequate protection to avoid accidental mechanical damage.
5. In high humidity or corrosive environments, additional measures may be required to prevent rusting of the blower internal surfaces.
6. To prevent rusting of gears, bearings, etc., the oil reservoirs may be filled with normal operating oil.

CAUTION

Before running the blower, drain the oil and replace to the proper operating level with clean, fresh lubricant.

7. Rotate the blower shaft (10 to 25 turns) weekly during storage. Inspect the blower shaft (near the shaft seal area) monthly and spray with rust inhibitor if needed.
8. For long term storage (over six (6) months), contact Gardner Denver Compressor Division Customer Service for recommendations.

REMOVING PROTECTIVE MATERIALS

The shaft extension is protected with rust inhibitor which can be removed with any standard solvent.

CAUTION

Follow the safety directions of the solvent manufacturer.

Blower inlet and outlet are temporarily capped to keep out dirt and other contaminants during shipment. These covers must be removed before start-up.

The internal surfaces of all Sutorbilt units are mist sprayed with a rust preventative to protect the machine during shipment. Remove this film upon initial startup, using any commercial safety solvent. Position the blower so that the inlet and discharge connections are in the vertical position (vertical airflow). On vertically mounted units, it will be necessary to lay the unit on its side supporting the ends of the unit so as not to restrict the port on the bottom side. Place a shallow pan on the under side of the unit. With the blower disconnected from power, spray the solvent in the top port, rotating the impellers by spinning the shaft manually. Continue this procedure until the unit is visibly clean.



Rotating components will cause severe injury in case of personal contact. Keep hands and loose clothing away from blower inlet and discharge ports.

SECTION 2 INSTALLATION

LOCATION

Install the blower in a well lit, clean dry place with plenty of room for inspection and maintenance.

FOUNDATIONS

For permanent installation we recommend concrete foundations be provided, and the equipment should be grouted to the concrete. It is necessary that a suitable base be used, such as a steel combination base under blower and motor, or a separate sole plate under each. Before grouting, equipment must be leveled, free of all strains, and anchored so no movement will occur during setting of grout. After grout has completely hardened, a recheck is necessary to compensate for shrinkage, etc. If required, add shims under blower feet after final tightening of foundation anchor bolts to remove strain from the blower housing.

Where jack screws or wedges are used during grouting, they must be backed off and wedges removed before final tightening of anchor bolts. Refer to grouting instructions.

Where a concrete foundation is not feasible, care must be taken to insure that equipment is firmly anchored to adequate structural members, restricting movement and vibration.

MOUNTING CONFIGURATIONS

The blower flex-mount design enables horizontal and vertical mounting configurations with top or bottom hand, right or left hand shaft positioning. The units are center timed allowing rotation in either direction (refer to Figure 2-1).

REPOSITIONING THE MOUNTING FEET.

1. Position the mounting feet to the desired location and snug the capscrew.
2. Place the blower on its feet on a flat surface.
3. Loosen mounting feet capscrews and level unit up. The bench or blower base flatness should be within .002 of an inch.

NOTICE

If the unit is not flat within .002 of an inch, it will be necessary to shim the blower feet at installation.

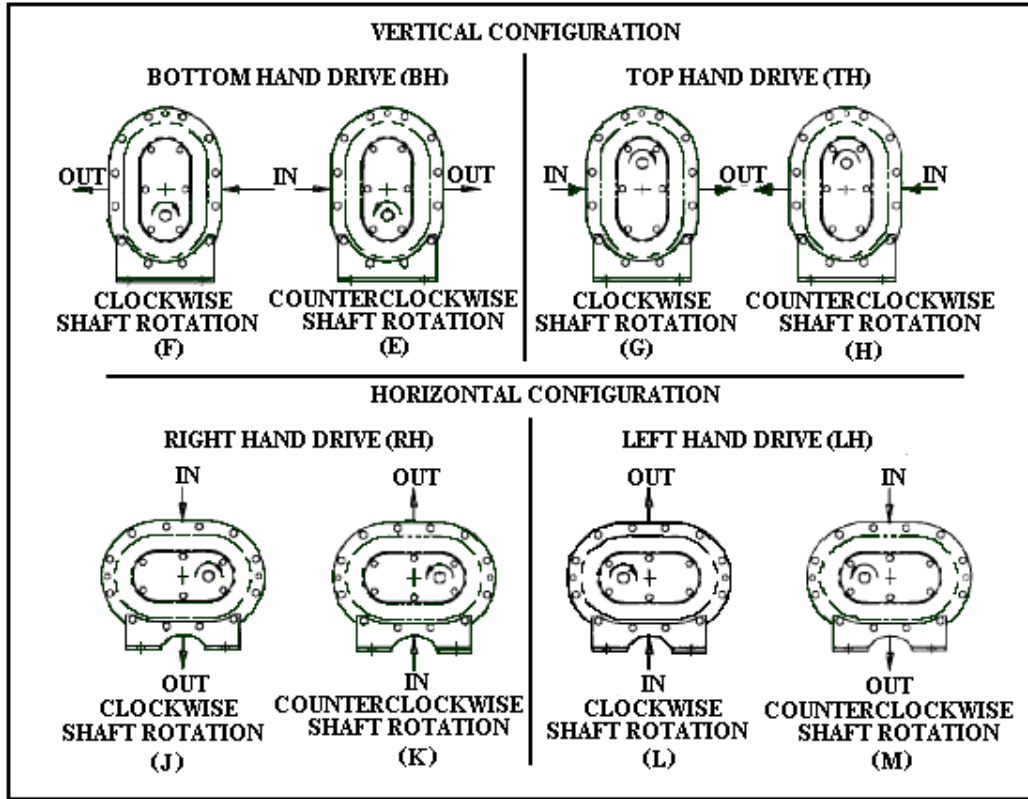


FIGURE 2-1 – BLOWER MOUNTING CONFIGURATIONS

4. Secure the mounting feet capscrews to the torque value in Figure 7-9, page 38.

NOTICE

When changing mounting configuration, it may be necessary to reposition breather/oil fill (B), oil level gauge (H) and drain plug (A). Refer to Figure 3-1, page 17, for correct location.

DRIVE INSTALLATION

When selecting a V-belt drive, check to be sure the shaft overhung load limitation is not exceeded. Refer to FIGURE 2-2, page 15, for overhung load calculations and limitations.

Belt drives must be carefully aligned. Motor and blower pulleys must be parallel to each other and in the same plane within 1/32 inch. Belt tension should be carefully adjusted to the belt manufacturer's recommendation using a belt tension gauge. Check tension frequently during the first day of operation.

⚠ WARNING

Over tightening belts leads to heavy bearing loads and premature failure.

On the direct connected units, alignment and lubrication of couplings to specifications of the coupling manufacturer is very important. When mounted drives are supplied from the factory proper alignment has been established before shipment. However, during shipping, handling and installation, it is likely that the alignment has been disturbed and final adjustment must be made before startup.

**WARNING**

Exceeding overhung load limitations leads to unwarrantable premature bearing failure and shaft breakage.

The location of the sheave on the blower shaft greatly affects the stress in the shaft. The optimum blower sheave positioning is as close as possible to the blower drive cover, not to exceed dimension "C" in Drive Shaft Illustration, FIGURE 2-2, page 15

The calculated shaft moment must not exceed the maximum allowable moment listed in Maximum Allowable Moment Chart, FIGURE 2-2 page 15. If the calculated shaft moment exceed the maximum allowable moment:

- Increase Sheave Diameters to Reduce Belt Pull
- Use Jackshaft Drive
- Use Direct Coupled or Gearbox Drive

To calculate shaft moment for a given V-Belt Drive Arrangement:

1. Use the formula for Calculation of Belt Pull, FIGURE 2-2, page 15, to calculate belt pull. Refer to Arc of Contact Factor Chart, Figure 2-2, page 15.
2. Insert the calculated belt pull into the formula for Calculation of Shaft Moment, FIGURE 2-2, page 15 to arrive at the calculated shaft moment.

PIPING

Inlet and discharge connections on all blowers are large enough to handle maximum volume with minimum friction loss. Reducing the pipe diameter on either inlet or discharge will only create additional line loss and increase the overall pressure differential. Excessive weight of piping and fittings will cause internal misalignment and premature wear. Never allow the blower to carry the weight of the pipe. If possible, a spool or sleeve-type expansion joint should be installed between the unit and the piping. Where a flexible connection is not practical, the weight of the rigid connection must be separately supported.

All system piping must be cleaned internally before connecting to the blower.

**WARNING**

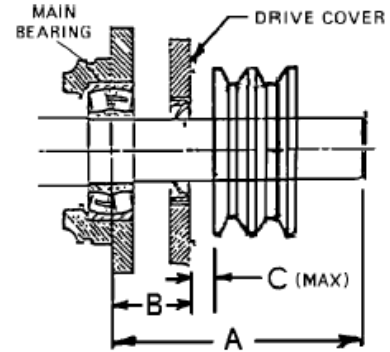
Sutorbilt blowers are shipped dry from the factory. Do not attempt to operate the blower before following proper lubrication instructions. Permanent damage to the gears, bearings and seals will occur.

Gear Diameter (Inches)	GREASE SPLASH Dimensions (Inches)			Maximum Allowable Moment (LB-IN)
	A	B	C (Max)	
3	2.88	.85	.38	385
4	3.49	1.10	.38	490
5	3.90	1.40	.38	1245

MAXIMUM ALLOWABLE MOMENT

Gear Diameter (Inches)	DUAL SPLASH LUBE Dimensions (Inches)			Maximum Allowable Moment (LB-IN)
	A	B	C (Max)	
3	3.07	1.18	.25	385
4	3.62	1.27	.25	650
5	3.85	1.39	.25	1370

MAXIMUM ALLOWABLE MOMENT



Z	Ac	Z	Ac	Z	Ac	Z	Ac	Z	Ac	Z	Ac
0.000	1.000	0.250	0.966	0.500	0.926	0.750	0.879	1.000	0.823	1.250	0.751
0.025	0.997	0.275	0.962	0.525	0.922	0.775	0.874	1.025	0.816	1.275	0.742
0.050	0.994	0.300	0.958	0.550	0.917	0.800	0.869	1.050	0.810	1.300	0.734
0.075	0.990	0.325	0.954	0.575	0.913	0.825	0.864	1.075	0.803	1.325	0.725
0.100	0.987	0.350	0.951	0.600	0.908	0.850	0.858	1.100	0.796	1.350	0.716
0.125	0.983	0.375	0.947	0.625	0.904	0.875	0.852	1.125	0.789	1.375	0.706
0.150	0.980	0.400	0.943	0.650	0.899	0.900	0.847	1.150	0.782	1.400	0.697
0.175	0.977	0.425	0.939	0.675	0.894	0.925	0.841	1.175	0.774	1.425	0.687
0.200	0.973	0.450	0.935	0.700	0.889	0.950	0.835	1.200	0.767		
0.225	0.969	0.475	0.930	0.725	0.884	0.975	0.829	1.225	0.759		

ARC OF CONTACT FACTORS

Belt Pull = $\frac{2.5 - A_c}{A_c} \times \frac{125954 \times H_p \times S.F.}{D \times RPM}$

Key:

- A_c = Arc of Contact Factor (Refer to Arc of Contact Factor Chart above)
- H_p = Blower Horsepower for Operating Conditions
- S.F. = Actual Drive Service Factor
- D = Blower Sheave Pitch Diameter in Inches
- RPM = Blower Sheave Speed
- Z = $\frac{\text{Large Sheave Pitch Diameter (in)} - \text{Small Sheave Pitch Diameter (in)}}{\text{Sheave Center Distance (in)}}$

CALCULATION OF BELT PULL

$$\text{Shaft Moment (LB-IN)} = \text{Belt Pull} \times \left[B + C + \left(\frac{\text{Sheave Width}}{2} \right) \right]$$

CALCULATION OF SHAFT MOMENT

FIGURE 2-2 – BELT DRIVE OVERHUNG LOAD CALCULATIONS

AIR FILTERS AND FILTER SILENCERS



Servicing the air filters is one of the most important maintenance operations to be performed to insure long blower life.

Servicing frequency of filter elements is not time predictable. A differential pressure indicator, with a continuous gauge reading, should be installed across the inlet filter. It will tell how much of the service life of the filter element has been used. It will also eliminate both premature filter servicing and premature blower failure due to a plugged filter when the filter pressure drop is used to establish maintenance points. In all cases refer to the filter manufacturer's service instructions. Due to the many types of filters, it is not practical to give specific instructions covering all models.

NOTICE

No matter what type of filter is used, always make sure all seats, gaskets, clamps and hose connections on the filter and inlet line are absolutely air tight. Each time the filter is serviced, inspect interior of the blower for dirt.

SECTION 3 LUBRICATION

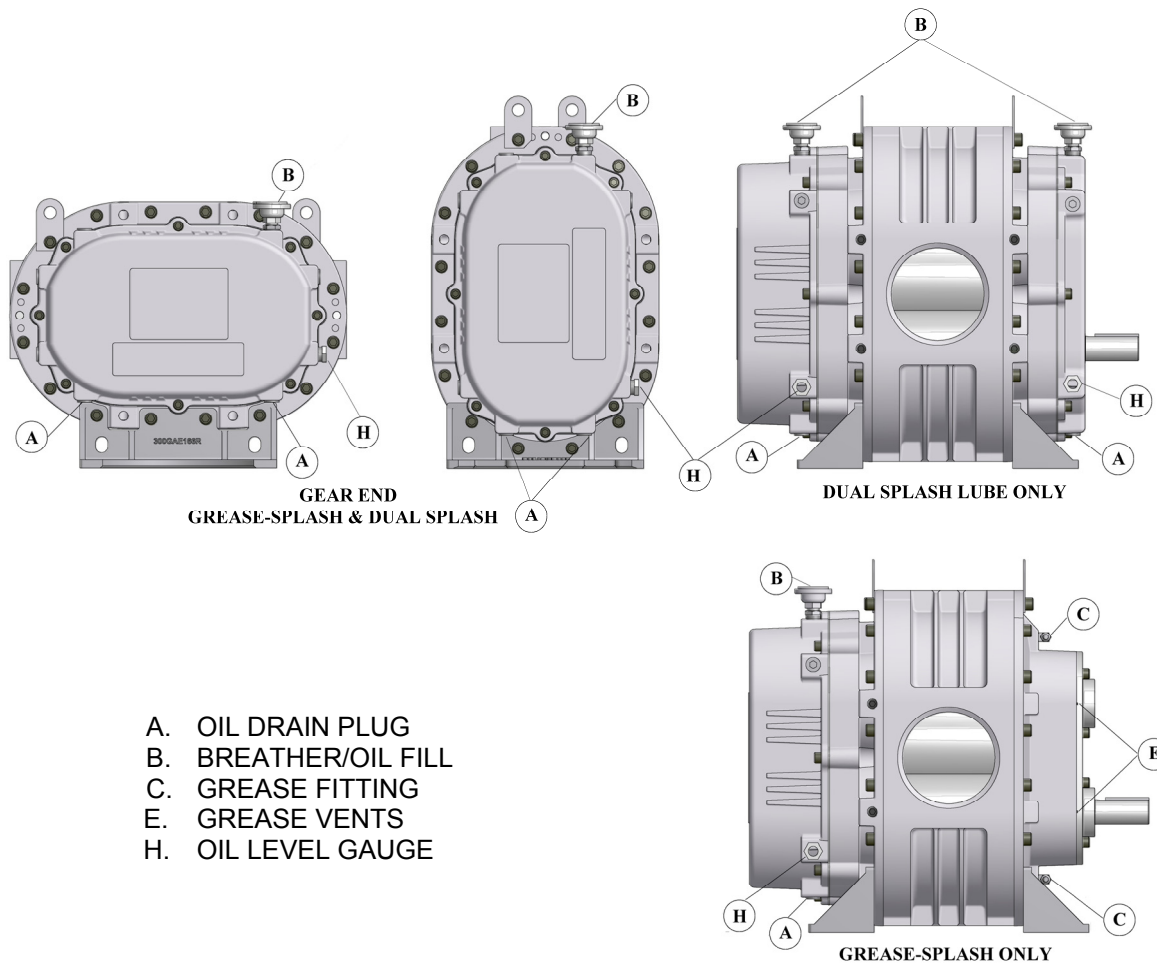


FIGURE 3-1 - LUBRICATION

DRIVE END LUBRICATION (For Grease – Splash Lube Blowers)

Drive end bearings are grease lubricated at the factory with Lithium Complex based grease. **For relubrication, use Gardner Denver AEON PD Grease, Part Number 28H283.** AEON PD Grease is a high temperature, high performance grease that is formulated with antiwear additives to provide superior service under the severe operating conditions of positive displacement blowers. It contains rust inhibitors which provide excellent protection against rust and corrosion.

If you choose not to use AEON PD Grease, select compatible base grease. The grease should be NLGI Grade 2 EP, contain rust inhibitors, and be suitable for blower discharge temperatures up to 350° F (177° C). Completely clean or purge the factory-filled grease from the blower. **Do not mix different types of grease as they may not be compatible. Substitutions may cause early bearing failure.**

Re-grease bearings every 500 hours of operation. Lubricate each bearing through the grease fittings located at C in FIGURE 3-1 (2 places). When re-greasing, the old grease will be forced out of the vents (E in FIGURE 3-1). To prevent damage to seals, these vents must be open at all times.



Do not over-grease bearings as this could cause premature bearing failure.

DRIVE END LUBRICATION (For Dual Splash Lube Blowers)

At the drive end, the bearings are lubricated by the slinger, which must be on the lowest rotor when in a vertical configuration.

Approximate oil sump capacities are listed in Figure 3-2.

NOTICE
Machines are shipped without oil in the sump. Do not operate before adding lubricant.

Lubrication Instructions

Filling procedure

Refer to Figure 3-1, page 17. Remove the breather (B) from the drive cover. Add oil to the drive sump until oil reaches the center of the oil level gauge (H). Secure breather (B) in the drive cover.

Add fresh oil as required to maintain proper level. The oil level should be at the middle of the sight glass when the machine is not operating. Refer to Figure 3-2, for approximate oil capacities.

Legend “R” Series, Grease-Splash Lube Blower Oil Capacities

Approximate Sump capacity in pints or ounces							
		Vertical Configuration			Horizontal Configuration		
Series	Gear Diameter (in)	Gear End	Drive End	Total	Gear End	Drive End	Total
3	3.5	0.6 PT (9 oz.)	grease	0.6 PT (9 oz.)	1.1 PT (18 oz.)	grease	1.1 PT (18 oz.)
4	4	0.9 PT (14 oz.)	grease	0.9 PT (14 oz.)	1.5 PT (24 oz.)	grease	1.5 PT (24 oz.)
5	5	1.1 PT (18 oz.)	grease	1.1 PT (18 oz.)	2.5 PT (40 oz.)	grease	2.5 PT (40 oz.)

Note: Quantities are for purchase estimates only.

Legend “R” Series, Dual Splash Lube Blower Oil Capacities

Approximate Sump capacity in pints or ounces							
		Vertical Configuration			Horizontal Configuration		
Series	Gear Diameter (in)	Gear End	Drive End	Total	Gear End	Drive End	Total
3	3.5	0.6 PT (9 oz.)	0.3 PT (5 oz.)	0.9 PT (14 oz.)	1.1 PT (18 oz.)	0.6 PT (9 oz.)	1.7 PT (27 oz.)
4	4	0.9 PT (14 oz.)	0.4 PT (6 oz.)	1.3 PT (20 oz.)	1.5 PT (24 oz.)	0.7 PT (11 oz.)	2.2 PT (35 oz.)
5	5	1.1 PT (18 oz.)	0.6 PT (9 oz.)	1.7 PT (27 oz.)	2.5 PT (40 oz.)	1.2 PT (19.1 oz)	3.7 PT (59.1 oz.)

Note: Quantities are for purchase estimates only.

FIGURE 3-2 – APPROXIMATE OIL CAPACITIES

GEAR END LUBRICATION (For Grease – Splash Lube and Dual Splash Lube Blowers)

At the gear end, the timing gear teeth are lubricated by being partially submerged in oil. The gear teeth serve as oil slingers for gear end bearings.

Approximate oil sump capacities are listed in Figure 3-2.



Do not overfill as this will tend to cause excessive heating of the gears and may damage the unit.

NOTICE

Machines are shipped without oil in the sump. Do not operate before adding lubricant.

LUBRICATION INSTRUCTIONS

Filling procedure Refer to FIGURE 3-1, page 17. Remove the breather (B) from the gear cover. Add oil to the gear case until oil reaches the center of the oil level gauge (H). Secure breather (B) in the gear cover.

Add fresh oil as required to maintain proper level. The oil level should be at the middle of the sight glass when the machine is not operating. Refer to Figure 3-2, page 18, for approximate oil capacities.

RECOMMENDED LUBRICANT

AEON PD Synthetic Blower Lubricant is recommended. Refer to FIGURE 3-3, for AEON PD, AEON PD-FG (Food Grade) and AEON PD-XD (Extreme Duty) part numbers. Order AEON PD from your Gardner Denver Distributor or call Gardner Denver directly.

Convenient Package Sizes	AEON PD Part No.	AEON PD-FG Part No.	AEON PD-XD Part No.
1 quart	28G23	28H97	28G46
Case 12 quarts	28G24	28H98	28G47
1 gallon	28G40	28H333	28G42
Case 6 gallons	28G41	28H334	28G43
5 gallon pail	28G25	28H99	28G44
55 gallon drum	28G28	28H100	28G45

FIGURE 3-3 – AEON PD SYNTHETIC LUBRICANT

AEON PD is formulated especially for positive displacement blower service to provide maximum blower protection at any temperature. One fill of AEON PD will last a minimum of 4 times longer than a premium mineral oil. Refer to FIGURE 3-4.

		Ambient Temperatures			
		Less than 10° F	10°F to 32°F	32°F to 90°F	Greater than 90°F
Blower Discharge Temperature	Less than 32°F	AEON PD AEON PD-FG	AEON PD AEON PD-FG		
	32° F to 100° F	AEON PD AEON PD-FG	AEON PD AEON PD-FG	AEON PD AEON PD-FG	
	100° F to 225°F	AEON PD AEON PD-FG	AEON PD AEON PD-FG	AEON PD AEON PD-FG	AEON PD AEON PD-FG
	225° F to 300° F	AEON PD AEON PD-FG	AEON PD AEON PD-FG	AEON PD AEON PD-FG	AEON PD XD
	Greater than 300°F			AEON PD XD	AEON PD XD

FIGURE 3-4 – SYNTHETIC LUBRICANT CHART

AEON PD Synthetic Lubricant should be drained after 6000 hours of operation. Re-fill with fresh AEON PD oil. If mineral oil is used, perform the above oil change maintenance every 1500 hours. Recommended service intervals are for normal blower operating conditions. Severe operating conditions may warrant more frequent oil changes. Laboratory analysis of lubricant should be used to help determine the optimum oil change interval.

For best performance and equipment protection, use AEON PD Synthetic Lubricant, which has been specifically formulated for positive displacement blowers. If you choose not to use AEON PD Synthetic Blower Lubricant, select an oil with rust and oxidation inhibitors, anti-foam additives, and the viscosities listed in FIGURE 3-5. Do not use an oil that contains EP additives.

NOTICE
Flush the oil whenever a change is made from one type of oil to another.

Drain the current lubricant as thoroughly as possible. Refill with the new lubricant. Fill to normal level of the blower, which is at the middle of the sight glass when the machine is not operating. Run the blower for one hour. Shut off the blower and drain the lubricant completely. Refill the blower again with the new lubricant.

Blower Discharge Temperature	Ambient Temperature			
	Less than 10° F*	10° F to 32° F**	32° F to 90° F	Greater than 90° F
Less than 32° F (0° C)	ISO 100	ISO 100		
32° F to 100° F (0° C to 38° C)	ISO 100	ISO 100	ISO 150	
100° F to 225° F (38° C to 105° C)	ISO 100	ISO 100	ISO 150	ISO 220
225° F to 300° F (105° C to 149° C)	ISO 150	ISO 150	ISO 220	ISO 220
Greater than 300° F (149° C)			***	***

* For ambient temperatures less than 10° F, but not less than -20° F, the use of oil sump heaters, heated enclosures or synthetic lubricant is required.

** For ambient temperatures 10° F to 32° F, the use of oil sump heaters, heated enclosures or synthetic lubricant is recommended.

*** The lubricant viscosity must be 70 SUS minimum at the lubricant operating temperature.

The pour point of the lubricant should be at least 5° to 10° F below the minimum expected ambient temperature.

For continuous operation, where the lubricant temperature exceeds 200° F, synthetic lubricant is recommended.

FIGURE 3-5 – LUBRICATION RECOMMENDATION

SECTION 4 OPERATION

Future operating problems can be avoided if proper precautions are observed when the equipment is first put into service.

Before starting under power, the blower should be turned over by hand to make certain there is no binding or internal contact.

Each size blower has limits on pressure differential, running speed and discharge temperature which must not be exceeded. These limits are shown in "Maximum Operating Limitations", FIGURE 4-1, below.



Operating beyond the specified operating limitations will result in damage to the unit.

It is important that the pressures and temperatures are measured directly at the ports of the blower to avoid error that may be caused by intervening pipe runs, fittings, etc.

Relief valves must be used to protect against excessive pressure or vacuum conditions. These valves should be tested at initial startup to be sure they are adjusted to relieve at or below the maximum pressure differential rating of the blower.

NOTICE

Relief valves should be placed as close as possible to the blower inlet or discharge.

In some instances, pressure may be relieved at a lower point than the blower maximum in order to protect the motor or the equipment served by the blower.

Discharge temperature switches are recommended to protect against excessive inlet restriction or inlet temperatures. Check valves in the discharge line on pressure blowers and in the inlet line on vacuum blowers are recommended to protect the blower from motoring backwards when shut down under load.

LIMITATIONS

For information regarding limitations, refer to FIGURE 4-1, below.

MAXIMUM / MINIMUM OPERATING LIMITATIONS							
SIZE	MAX. RPM	MIN. RPM VERT.	MIN RPM HORIZ.	MAX. PRESSURE PSI	MAX VAC IN HG	MAX. TEMPERATURE RISE ° F	MAX. DISCHARGE TEMPERATURE ° F
3LR	3600	1528	1091	7	14	160	260
3MR	3600	1528	1091	12	15	180	280
3HR	3600	1528	1091	15	16	220	320
4LR	3600	1337	955	7	14	160	260
4MR	3600	1337	955	10	16	185	285
4HR	3600	1337	955	15	16	210	310
5LR	2850	1070	764	7	14	160	260
5MR	2850	1070	764	13	16	180	280
5HR	2850	1070	764	15	16	200	300

DO NOT EXCEED THESE LIMITS

NOTICE
Blower speed, line losses, elevation, and increased inlet temperatures will affect the maximum operating limitations. The minimum RPM for the blowers is based on lubrication only. The blowers may only be operated down to the minimum RPM, when the temperature rise and discharge temperature are below the maximum limitations as shown.

FIGURE 4-1 – MAXIMUM / MINIMUM OPERATING LIMITATIONS

BLOWER STARTUP CHECKLIST

This startup procedure should be followed during the initial installation and after any shutdown periods or after the blower has been worked on or moved to new location. It is suggested that the steps be followed in sequence and checked off (✓) in the boxes provided.

1. Check the unit and all piping for foreign material and clean if required.
2. Check the flatness of the feet and the alignment of the drive. Feet that are bolted down in a bind can cause housing distortion and internal rubbing. Misaligned V-drives can cause the rotors to rub against the headplates and cause a reduction in the volumetric efficiency of the unit. Misaligned couplings can ruin bearings.
3. If the blower is V-belt driven, check the belt tension and alignment. Over-tensioned belts create heavy bearing/shaft loads which lead to premature failure.
4. Be sure adequate drive guards are in place to protect the operator from severe personal injury and incidental contact.
5. Check the unit for proper lubrication. Proper oil level cannot be over-emphasized. Too little oil will ruin bearings and gears. Too much oil will cause overheating and can ruin gears and cause other damage. Insure that grease lubricated bearings are properly lubricated.
6. With motor electrical power locked out and disconnected, turn the drive shaft by hand to be certain the impellers do not bind.
7. "Jog" the unit with the motor a few times to check that rotation is in the proper direction, and to be certain it turns freely and smoothly.
8. The internal surfaces of all Sutorbilt units are mist sprayed with a rust preventive to protect the machine during the shipping and installation period. This film should be removed upon initial startup.
9. Start the unit and operate 15 minutes at no load. During this time, check for hot spots and other indications of interference.
10. Apply the load and observe the operation of the unit for one hour. Check frequently during the first day of operation.
11. If malfunctions occur, do not continue to operate. Problems such as knocking rotors can cause serious damage if the unit is operated without correction.

SAFETY PRECAUTIONS

1. Do not operate blower with open inlet or outlet port.
2. Do not exceed specified vacuum or pressure limitations.
3. Do not operate above or below recommended blower speed range.
4. Blower is not to be used where non-sparking equipment is specified.
5. Do not operate without belt guard or coupling shield.


Do not exceed sheave or coupling manufacturer’s rim speed limit.

6. The blower and blower discharge piping may be extremely hot and cause skin burns on contact.

TROUBLE SHOOTING

No matter how well the equipment is designed and manufactured, there may be times when servicing will be required due to normal wear, the need for adjustment, or various external causes. Whenever equipment needs attention, the operator or repairman should be able to locate the cause and correct the trouble quickly. The Trouble Shooting Chart below is provided to assist the mechanic in those respects.

PROBLEM	POSSIBLE CAUSES	SOLUTION
Knocking	<ol style="list-style-type: none"> 1. Unit out of time. 2. Distortion due to improper mounting or pipe strains. 3. Excessive pressure differential. 4. Worn gears. 5. Worn bearings. 	<ol style="list-style-type: none"> 1. Re-time impellers 2. Check mounting alignment and relieve pipe strains. 3. Reduce to manufacturer's recommended pressure. Examine relief valve, re-set if necessary. 4. Replace timing gears. 5. Replace bearings..
Excessive blower temperature.	<ol style="list-style-type: none"> 1. Too much oil in gear case. 2. Too low operating speed. 3. Dirty air Filter. 4. Clogged filter or muffler. 5. Excessive pressure differential. 6. Worn impeller clearances. 7. Internal contact. 	<ol style="list-style-type: none"> 1. Reduce oil level. 2. Increase blower speed. 3. Clean or replace air filter 4. Remove cause of obstruction. 5. Reduce pressure differential across the blower. 6. Replace impeller. 7. Correct clearances.
Impeller end or tip drag.	<ol style="list-style-type: none"> 1. Insufficient assembled clearances. 2. Case or frame distortion. 3. Excessive operating pressure. 4. Excessive operating temperature. 	<ol style="list-style-type: none"> 1. Correct clearances. 2. Check mounting and pipe strain. 3. Remove cause. 4. Remove cause
Lack of volume.	<ol style="list-style-type: none"> 1. Slipping belts. 2. Worn clearances. 3. Dirty air filter 	<ol style="list-style-type: none"> 1. Tighten belts. 2. Re-establish proper clearances. 3. Clean or replace air filter.
Excessive bearing or gear wear.	<ol style="list-style-type: none"> 1. Improper lubrication. 	<ol style="list-style-type: none"> 1. Correct lubrication level. Replace dirty oil.
Loss of oil.	<ol style="list-style-type: none"> 1. Headplate, gear case or drive cover vents plugged. 2. Worn Seal. 	<ol style="list-style-type: none"> 1. Clean vents. 2. Replace seals.

**SECTION 5
MAINTENANCE**

ORDER SPECIAL TOOLS BY PART NUMBER. SEE PAGE 2 FOR ORDERING INSTRUCTIONS.

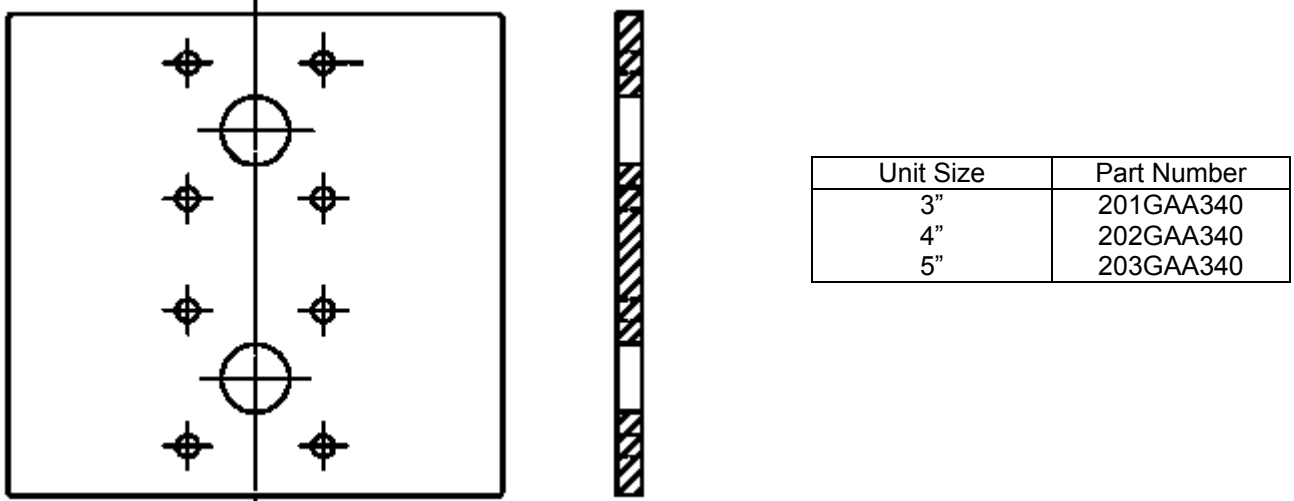
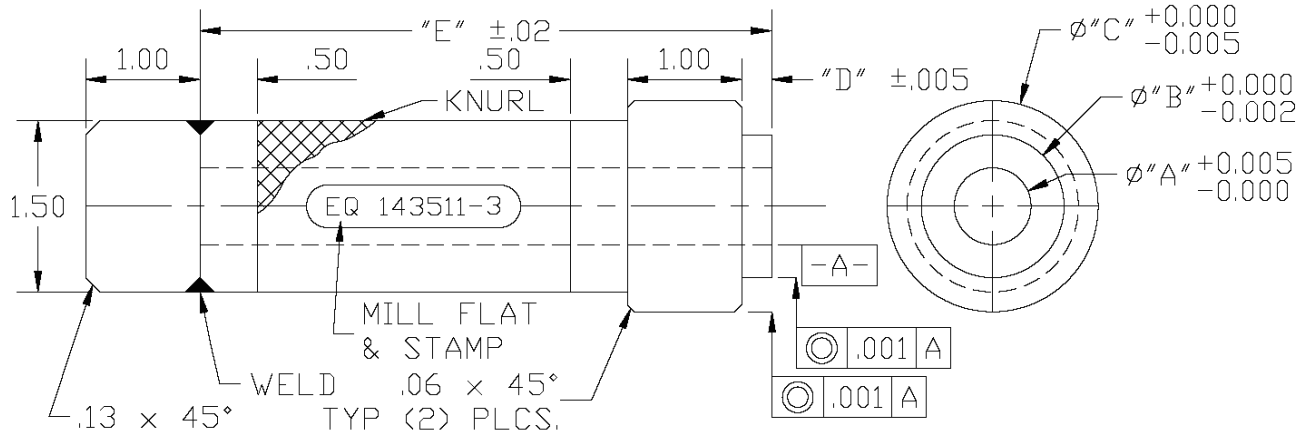
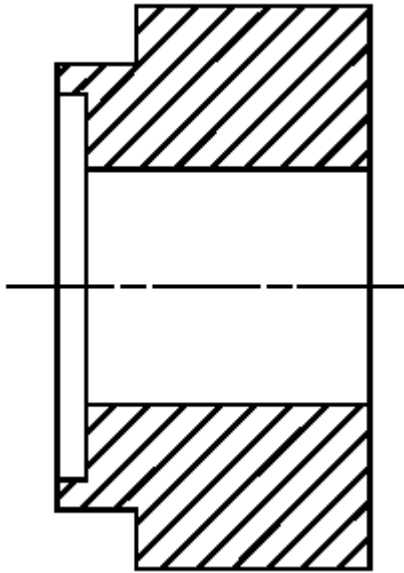


FIGURE 5-1 – PULLER PLATE



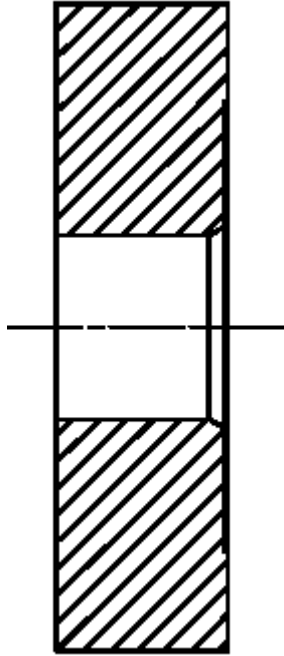
PART NO.	SIZE	"A"	"B"	"C"	"D"	"E"
EQ 143511-3	3"	.790	1.435	2.044	.335	5.50
EQ 143511-4	4"	1.000	1.624	2.436	.395	6.25
EQ 143511-5	5"	1.184	2.247	2.829	.695	7.00

FIGURE 5-2 – SEAL DRIVE



Unit Size	Part Number
3"	205GAA074
4"	206GAA074
5"	207GAA074

FIGURE 5-3 – MECHANICAL SEAL INSTALLATION TOOL



Unit Size	Part Number
3"	201GAA074
4"	202GAA074
5"	203GAA074

FIGURE 5-4 – BEARING PRESS TOOL – MECHANICAL SEAL UNITS

SECTION 6 DISASSEMBLY INSTRUCTIONS

NOTICE

Numbers in parentheses () refer to key numbers in assembly drawings on pages 39 and 43.

1. Drain oil from gear case by removing drain plug (2).
2. Remove the socket head bolts (5) from the gear cover (3).
3. Remove the gear cover from the gear headplate.

NOTICE

The cover and gear headplate gasket tends to bond tightly to both surfaces. After socket head bolt removal, it is sometimes necessary to take a ball peen hammer and a blunt chisel and drive off the cover.

IMPORTANT:

MARK ALL PARTS WITH A CENTER PUNCH SO THEY CAN BE REASSEMBLED IN THE SAME POSITION (IMPELLERS, HEADPLATES, AND GEARS).

4. If the timing gears appear undamaged, the gear backlash must be checked to see if the gears can be salvaged.
 - A. Mount a magnetic base dial indicator on the gear headplate (see FIGURE 6-1).
 - B. Lock one impeller stationary by wedging a feeler gauge between the impeller and the headplate.
 - C. The tip of the indicator should be placed at the center of the contact surface on a tooth of the gear on the free shaft.
 - D. Rock the impeller back and forth by hand and read the total rotational movement to the nearest .0005 inches. Do this at four gear mesh positions 90 degrees apart.
 - E. Permissible gear backlash is shown below.

GEAR DIA.	GEAR BACKLASH
3"	.0015 - .0025
4"	.0015 - .0025
5"	.002 - .003

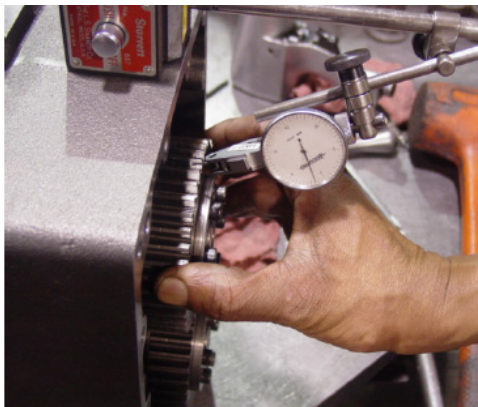


FIGURE 6-1



FIGURE 6-2



FIGURE 6-3

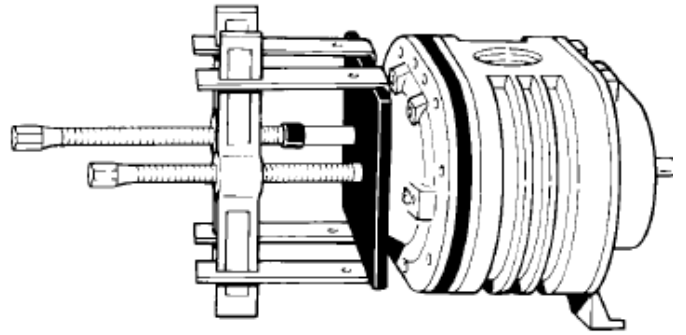


FIGURE 6-4

NOTICE

If backlash is above the specified limit, the gears are not necessarily unusable. Excessive play could be caused by worn bearings.

5. If timing gears appear to be reusable, match mark timing gear toothmesh by making small punch marks on the ends of meshing gear teeth with a pin punch and hammer (see FIGURE 6-2, page 27). The impeller tip to valley (throat) and the case to headplates should also be matchmarked to facilitate blower reassembly.
6. Remove all cap screws from both gear locking assemblies (see FIGURE 6-3). Thread 3 of these cap screws into the threaded holes in the outer ring of each locking assembly. Tighten the screws evenly to remove the locking assembly from each gear. Remove the gears (9) from both rotor shafts.

NOTICE

Blowers with mechanical seals have two wavy washers (28) located between the bearings and the cover on the drive end.

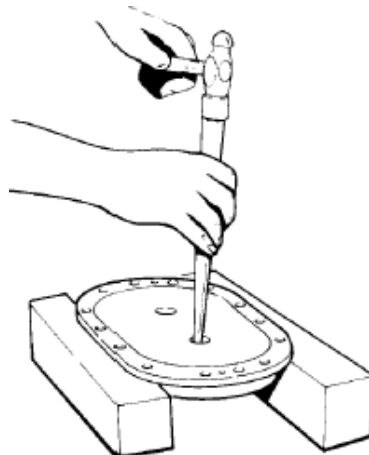


FIGURE 6-5

7. Remove the socket head cap screws (30) from the drive end bearing cover (29) and remove the cover. Support the external surface of the drive end cover near the oil seal with blocks of wood. Drive the oil seal from the cover using a hammer and punch. Discard the seal as it will not be reused. Replace oil seals each time the drive end cover is removed.

For Dual Splash Version

Remove the socket cap screws (84) from each slinger and remove slingers.

For Dual Splash Version with Mechanical Seal

Remove the socket cap screws (84) from each slinger and remove slingers. Remove flat head cap screws (86) from wavy spring retainer plates and remove retainer plate and wavy spring.

8. Remove mounting foot (17) from the drive headplate (24) by removing the capscrews (16).
9. Remove the capscrews (21) which secure the drive headplate (24) to the impeller case (22).
10. Using the puller plate shown on page 25, bolt to the drive headplate using the tapped holes on used to secure the drive cover.
11. Install a gear puller to each shaft and attach puller arms to the plate. Turn each puller only half a revolution at a time keeping the advance of the shafts as uniform as possible (see Figure 6-4). After the headplate has been removed, detach the puller plate.
12. Remove the two drive end bearings (35 and 80 for dual splash lube) or (14 and 35 for grease) from the drive headplate (24) using a ball peen hammer and punch (see Figure 6-5, page 28).

CAUTION

Exercise care not to damage the headplate bearing bores when removing bearings.

13. The oil seals can now be driven out of the drive headplate with hammer and punch (see Figure 6-5, page 28). Discard the seals as they will not be reused. Replace oil seals each time the headplate is removed.

For Mechanical Seal Version

Remove mechanical seal from the drive headplate.

NOTICE

Seals and bearings should be replaced during overhaul as a matter of service policy.

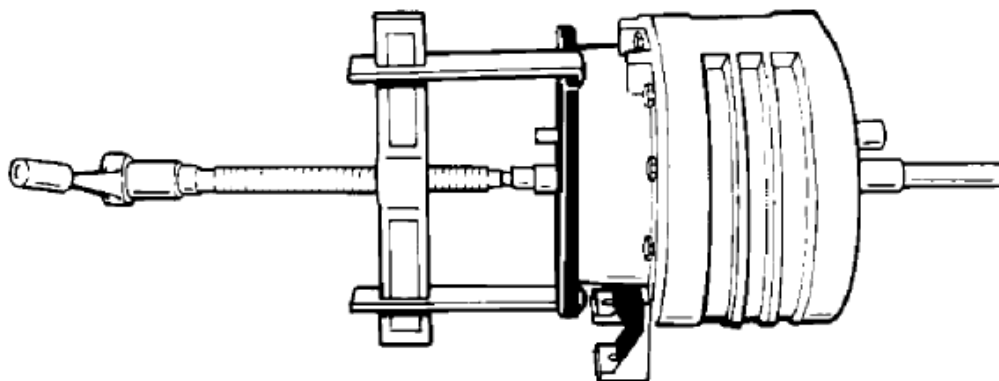


FIGURE 6-6

14. Remove the four bearing retaining screws (10), and washers (12) from the gear headplate.

For Mechanical Seal Version

Remove bearing retainer plate by removing 8 screws.

15. Attach puller plate to the gear headplate using the tapped holes on the bearing housing.

16. Install a gear puller to one of the shafts and attach puller arms to the plate (see Figure 6-6).

17. Remove mounting foot (17) from the gear headplate by removing 4 capscrews (16).

18. Push the impeller shaft through the gear headplate and remove the impeller assembly(23) (see Figure 6-6).
Remove the other impeller assembly following the same procedure.

19. Remove the cap screws (21) securing the gear headplate to the impeller case. Located near each dowel pin on the headplate is a threaded hole. Insert a 5/16-18 UNC capscrew into each of the threaded holes.
Tighten the screws evenly until the headplate separates from the impeller case.

20. Remove the two gear and bearings (14) from the gear headplate (18) as done in step 12.

21. Remove the oil seals (15) from gear headplate (19) as done in step 13.

SECTION 7 ASSEMBLY INSTRUCTIONS

NOTICE

Numbers in parentheses () refer to key numbers in assembly drawings on pages 39 and 43.

1. Make sure all metallic parts are clean and free of any nicks or burrs.
2. Lubricate the outside diameter of the lip seal (15) with a light oil or grease. Install seals in both the drive headplate (24) and gear headplate (18). Use the seal driver (Figure 5-2). The seal lip should always face towards the bearing or lubricant. New seals should be installed each time the headplate is removed.

NOTICE

Make sure seals are fully seated. Use extreme care when installing.

MECHANICAL SEALS ONLY

- A. Lightly coat the headplate bores with assembly lubricant.
- B. Refer to Figure 7-1. Install mechanical seal (A) into the headplate bore (C) using a press and the correct driver shown on page 26. Drive the seal securely on to its seat.

CAUTION

Use extreme care when installing seals in the headplate bores. Do not attempt to install the mechanical seals without the use of a press. Blows from a hammer or mallet can damage the fragile seal surface. Too much force can crush the seal casing. Make certain the seal is properly seated and undamaged before proceeding.

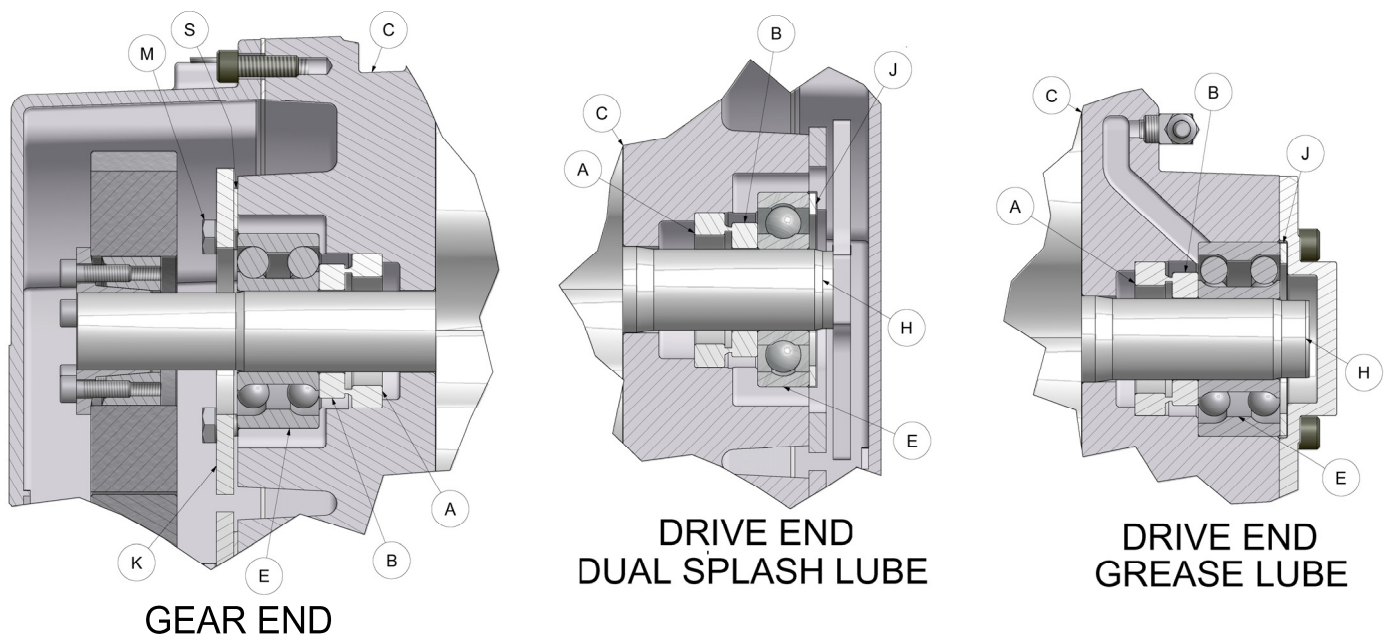


FIGURE 7-1



FIGURE 7-2

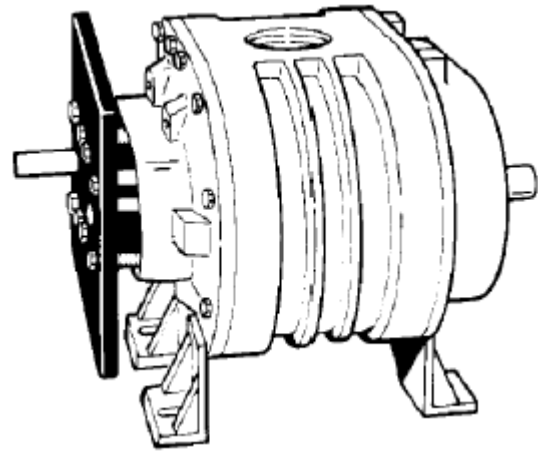


FIGURE 7-3

3. Assemble gear headplate (18) and mounting foot (17) to the impeller case with cap screws (21) and where the mounting foot is secured to the headplate use capscrews (16). The two positioning dowel pins (19) will ensure proper alignment of the headplate and impeller case. Also secure lifting lugs using capscrews (21) (see exploded assembly drawing on page 39. Refer to Figure 7-9, page 38, for torque specifications.

⚠ CAUTION

Seals are delicate; use extreme care when installing impeller shafts in the headplate bores. A piece of light shim stock wrapped around the shaft keyway will prevent cutting the seal lip.

4. Apply a light oil or grease on the shaft seal areas and the bearing areas. Insert impellers into the gear headplate using the same headplate bores as used in the original assembly.
5. Position blower so that impellers are vertical, with the drive end on top. It will be necessary to use blocks in order for the unit to set level. Measure the total end clearance using a depth micrometer (see Figure 7-2).

NOTICE

If more than .007" shim is required, put .007" on the drive end and the remaining on the gear end.

If total clearance is not within the limits specified in Figure 7-4, page 33, it may be necessary to shim the case to obtain the proper total end clearance. The shim should be placed between the drive headplate and impeller case.

6. Assemble drive headplate (24) to impeller case as in step 3 with the gear headplate. If shims were required, place shims between drive headplate and impeller case.

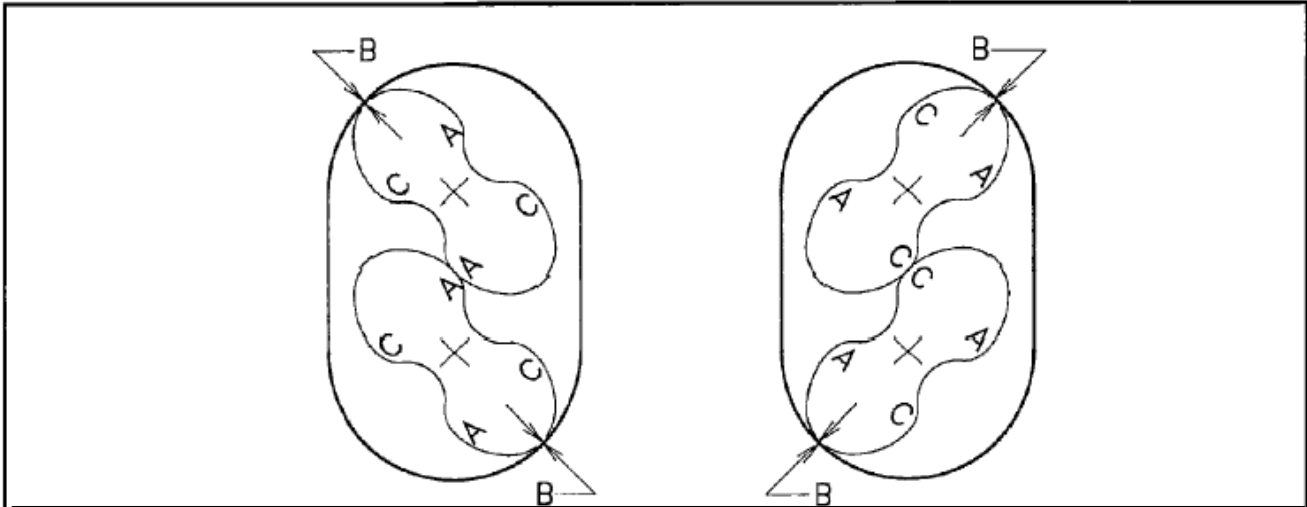
MECHANICAL SEALS ONLY

- A. Refer to Figure 7-1, page 31. Lightly coat the impeller shaft (H) and the inside diameter of the mating ring (B) with assembly lubricant.
- B. Install the mating ring (B) on the shaft only far enough to get the bearing (E) started on the shaft.

⚠ CAUTION

Do not drive the mating ring down to the mechanical seal, as this can damage the seal.

- C. Lightly lubricate the bearing inner race (E) with a light oil or grease.
- D. Using a press, install the bearing on the shaft with the bearing driver shown on page 24.



INTERNAL CLEARANCES FOR STANDARD UNITS ONLY

	3H	3M	3L	4H	4M	4L	5H	5M	5L
TOTAL END CLEARANCE	0.007-0.011			0.007-0.011			0.007-0.011		
IMPELLER TO GEAR HEADPLATE	0.003-0.005			0.003-0.005			0.003-0.005		
IMPELLER TIMING (A-A) (C-C)	$\frac{0.005}{0.007}$.006-.008		$\frac{0.006}{0.008}$.007-.010		$\frac{.007}{.010}$.008-.010	
TIP TO CASE CLEARANCE (B-B)	0.002 min.			0.002 min.			0.002 min.		

FIGURE 7-4

The bearing driver will position the mating ring (B) to the correct depth with respect to the mechanical seal (A).

7. Apply a light oil to the drive headplate bearing bore, bearing inside diameter, and shaft seat. Install the drive end bearings (14 and 35 for grease) or (80 and 35 for dual splash lube) as far as possible without force.
8. Attach the puller plate shown on page 25, to the drive headplate using the tapped holes used on the drive headplate (see FIGURE 7-3, page 32). Tighten the bolts so that the advance of the bearings stay as uniform as possible. Bearings should be pressed until flush with the drive headplate.
9. Lubricate the gear end bearing fits with a light oil as described previously. Install gear end bearings (14) as far as possible without force. Use the plate, used to install the drive end bearings, to press the bearings on the shafts as described in Step 8. Press bearings into the gear headplate until completely seated in the bearing bore.

NOTICE

Bearings will not be flush with gear headplate bores when completely seated.

10. Impellers should now be checked for free axial movement by hitting the ends of the impeller shafts with the palm of your hand.
11. Push the impellers against the gear headplate and recheck the total end clearance between the drive headplate and the impellers (see FIGURE 7-4).
 - A. If total end clearance is insufficient, loosen impeller case to headplate bolts on either headplate, and move the headplate away from the case far enough to insert a paper shim in the amount equal to the insufficient clearance. Retighten case bolts and again check the total end clearance. Refer to FIGURE 7-4 for correct clearance.
 - B. Excessive end clearances normally will require new impeller assemblies, but in some circumstances the impeller case can be removed and reduced in width by machining off the amount of excess clearance.
 - C. Apply Loctite 246 on the 4 bearing retaining screws. Install 4 bearing screws and washers into the gear end headplate. Tighten screws evenly to the torque value given in FIGURE 7-9.

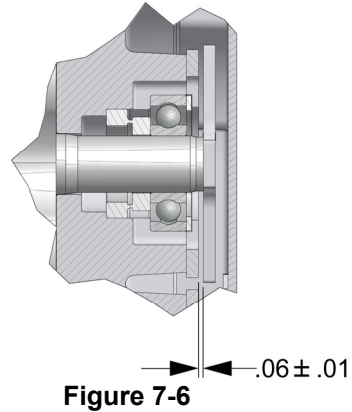
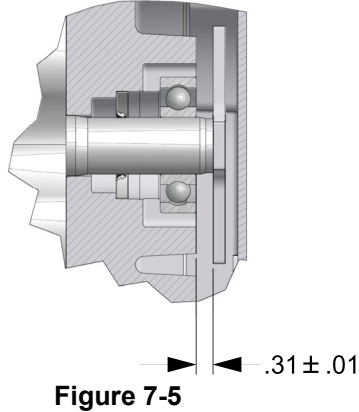
For Mechanical Seal Version

Install 8 bearing retaining screws and washers into the gear bearing retainer plates. Tighten screws evenly.

12.

A. Dual Splash Version

Install slingers on both shafts. Hold $.31" \pm .01"$ gap between face of the bearing and back of the slingers. Rotate slingers approximately 90 degree apart, apply Loctite 246 on the socket cup screw and tight. Recommended torque is 3-3.5 FT-LBS. (See FIGURE 7-5).



B. For Dual Splash Version with Mechanical Seal

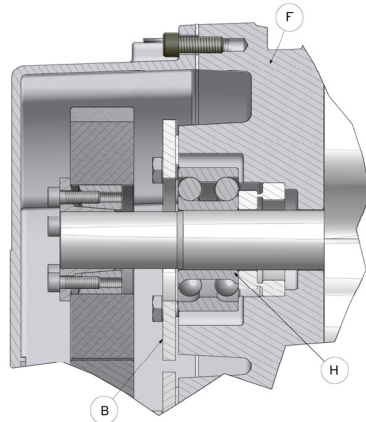
Install slingers on both shafts. Hold $.06" \pm .01"$ gap between wavy spring retainer plates and back of the slingers. Rotate slingers approximately 90 degree apart, apply Loctite 246 on the socket cup screw and tight. Recommended torque is 3-3.5 FT-LBS. (See FIGURE 7-6).

13. SETTING IMPELLER END CLEARANCES

Refer to FIGURE 7-7, page 34. The outer races of the gear end bearings are clamped against the headplate (F) by the bearing retaining screws or by bearing retainer plate (mechanical seal version) (B).

This is referred to as the "fixed end". The interference fit between the shaft and the bearing inner race (H) keeps the shaft from moving axially. Adjustment is by movement of the shaft through the gear end bearing inner race (H).

A. Check the total end clearance by adding the clearance between the impellers and the drive headplate to the clearance between the impellers and the gear headplate.



NOTICE
Check the clearance over the entire width of the impeller and consider the tightest spot.

- B. Divide the end clearance by 3 and distribute approximately 1/3 on the gear end and the remaining 2/3 on the drive end.
- C. To move the impeller assembly toward the drive end, lightly tap the shaft at the gear end with a soft face mallet.
- D. To move the impeller assembly toward the gear end, lightly tap the shaft at the drive end with a soft face mallet.
- E. To set the fixed end, insert the feeler gauge in the amount specified in FIGURE 7-4, page 33, between the headplate and the impeller at the gear end.
- F. Tap lightly until the feeler gauge is snug. Adjust both impellers using the same procedure. Rotate the impellers checking for clearance through a complete revolution.

SETTING IMPELLER END CLEARANCE WITH MECHANICAL SEALS

Refer to FIGURE 7-1, page 31. The gear end bearings are held in position by the force created by the wavy spring (J) on the drive end and the bearing retainer (K) on the gear end. This is referred to as the fixed end. The interference fit between the shaft (H) and the bearing inner race (E) keeps the shaft from moving axially.

End clearance adjustment is by movement of the bearing retainer (K). Tightening the bearing retainer screws (M) moves the bearing to load the wavy spring (J), and the impeller is forced toward the drive end. Relaxing the screws allows the wavy spring to return the impeller toward the gear end.

- A. Assemble drive cover to drive headplate. Refer to Step 15 with the exception of the use of wavy springs (J) installed between the drive end bearings and the wavy spring retainer plates.
- B. Back out retainer screws (M) until both impellers are tight against the gear headplate.
- C. With feeler gauge, measure the clearance between each impeller and the drive headplate. This value is the total end clearance.
- D. Measure the clearance between the gear headplate and bearing retainer (K) at point (S).
- E. Subtract 1/3 of the total end clearance from the clearance measured at point (S). This value is the amount of shim (13) that should be placed between the retainer and the headplate at point (S).
- F. Tighten the bearing retainer screws (M) to the torque value given in FIGURE 7-9, page 38. With the retainer screws secure, approximately 1/3 of the total end clearance should be on the gear end and the remaining 2/3 on the drive end.

1. INSTALLING THE TIMING GEARS

If reusing the timing gears, the gears should be returned to their original positions.

- A. Obtain 2 gear locking assemblies. Clean the inside and outside diameters of both locking assemblies. Clean the inside diameter of 2 gears. Clean the outside diameter of the both rotor shafts. Lightly oil the surfaces that have been cleaned. Note: DO NOT USE MOLYBDENUM DISULFIDE, MOLYKOTOE, OR ANY OTHER SIMILAR LUBRICANTS.
- B. Slide a locking assembly into a gear. Install the gear and locking ring assembly onto the idler rotor shaft. Push the locking assembly firmly until flush with the end of the idler rotor shaft and hand tighten the 7 cap screws. Align and adjust the connections.
- C. Use a torque wrench to tighten the screws to 75 in. lbs. in a diametrically opposite sequence. Ensure that none of the screws will turn when 75 in. lbs. is applied to them a second time.
- D. Tighten the screws further to 150 in. lbs. in a diametrically opposite sequence. Ensure that none of the screws will turn when 150 in. lbs. is applied to them a second time.
- E. Slide the second locking assembly into a gear. Install the gear and locking ring assembly onto the drive rotor shaft. Note the circular mark on each gear indicates the position of the largest runout. These marks must be 180 degrees apart when the gears are installed.
- F. Push the locking assembly firmly until flush with the end of drive rotor shaft and hand tighten all cap screws but leave them loose enough that the gear can be rotated on the shaft.
- G. The first step in setting the interlobe clearance is to measure the total clearance between two meshing lobes. This is accomplished by determining the maximum feeler gauge thickness that will fit between the rotor lobes near the pitch diameter. The clearance should be measured along the entire length of the meshing lobes. This measurement should be taken for each of the 2 interlobe meshes. The location of the smallest total interlobe clearance should be marked on the rotor lobes. Refer to diagram in FIGURE 7-4, page 33. Use feeler gauges to check clearances between impeller lobes at positions A—A and C—C. Add the clearances, and divide the total clearance evenly between A—A and C—C.
- H. Rotate the rotors until the two lobes that have the smallest total interlobe clearance (as determined in step G) are visible through the discharge port. Lock the idler rotor from turning by wedging a shop rag between the tip of a lobe and the air cylinder. Insert feeler gauges with a thickness equal to the half clearance (determined in step G) between the drive rotor and the idler rotor lobe. Pull the drive rotor tight against the feeler gauges (drive rotor, feeler gauges, and idler rotor must be tight against each other). While holding the drive rotor tight against the feeler gages rotate (in the direction that the rotor turns) the gear on the drive rotor until a tooth on it contacts a tooth on the gear on the idler rotor. Hand tighten the 7 capscrews in the drive gear locking assembly. Align and adjust the connection.
- I. Use a torque wrench to tighten the screws to 75 in. lbs in a diametrically opposite sequence. Ensure that none of the screws will turn when 75 in. lbs is applied to them a second time.
- J. Tighten the screws further to 150 in. lbs in a diametrically opposite sequence. Ensure that none of the screws will turn when 150 in. lbs is applied to them a second time.
- K. Check gear backlash four places at 90 degree intervals as described in the disassembly procedure (Item 4).

CAUTION

These impeller-to-impeller and impeller-to-case clearances are extremely critical. Even though the blower may turn freely by hand when cold, under operating conditions, the parts expand, and the rotors are subject to slight deflection.

If the clearances are not sufficient, the impellers may contact each other or the housing with destructive results. If the clearances are too great, the blower may not develop the pressure or airflow that is required to perform its function.

14. Impeller tip to case clearance should be checked at this time by inserting the correct thickness feeler gauge between the tip and the case and rotating the impeller (see FIGURE 7-4, page 34). Repeat the procedure on both impellers.

NOTICE

When checking the tip to case clearance, move the feeler gauge over the entire length of the impeller to ensure that the tips do not bind along their length.



FIGURE 7-8

NOTICE

Replacement gears have minimum backlash marks on the outside diameter of the gear face. These marks should be located 180 degrees from each other (see FIGURE 7-8).

NOTICE

The gear used for adjustment should be flush with its mate on completion of the timing.

NOTICE

If any of the four gear backlash readings are not within the specified limits, the gears must be replaced.

15. Replace drive shaft oil seal (31) in the drive end cover (29). The seal lip should always face towards the bearing or lubricant.

Grease Units

Pack bearing cavities with recommended grease and secure drive cover with socket head cup screws (30) to drive headplate.

Dual Splash Units

Install drive end gasket. Gently slide the drive end cover over the drive shaft and tap cover down over dowel pins until flush. Install and tighten drive cover bolts.

Refer to FIGURE 7-9, for torque specifications.

⚠ CAUTION

Exercise care not to damage the seal lip as it passes over the shaft keyway.

16. Assemble the gear cover (3) and gasket (7) to the gear headplate (18) using socket head screw (5). Tighten the capscrews alternately and evenly. Refer to FIGURE 7-9 for torque specifications.
17. Place the blower on its feet on a flat surface. Loosen cap screws (16) and level the unit up. The bench or blower base flatness should be within .002 of an inch. Re-tighten cap screws (16) to the specification in FIGURE 7-9.

NOTICE

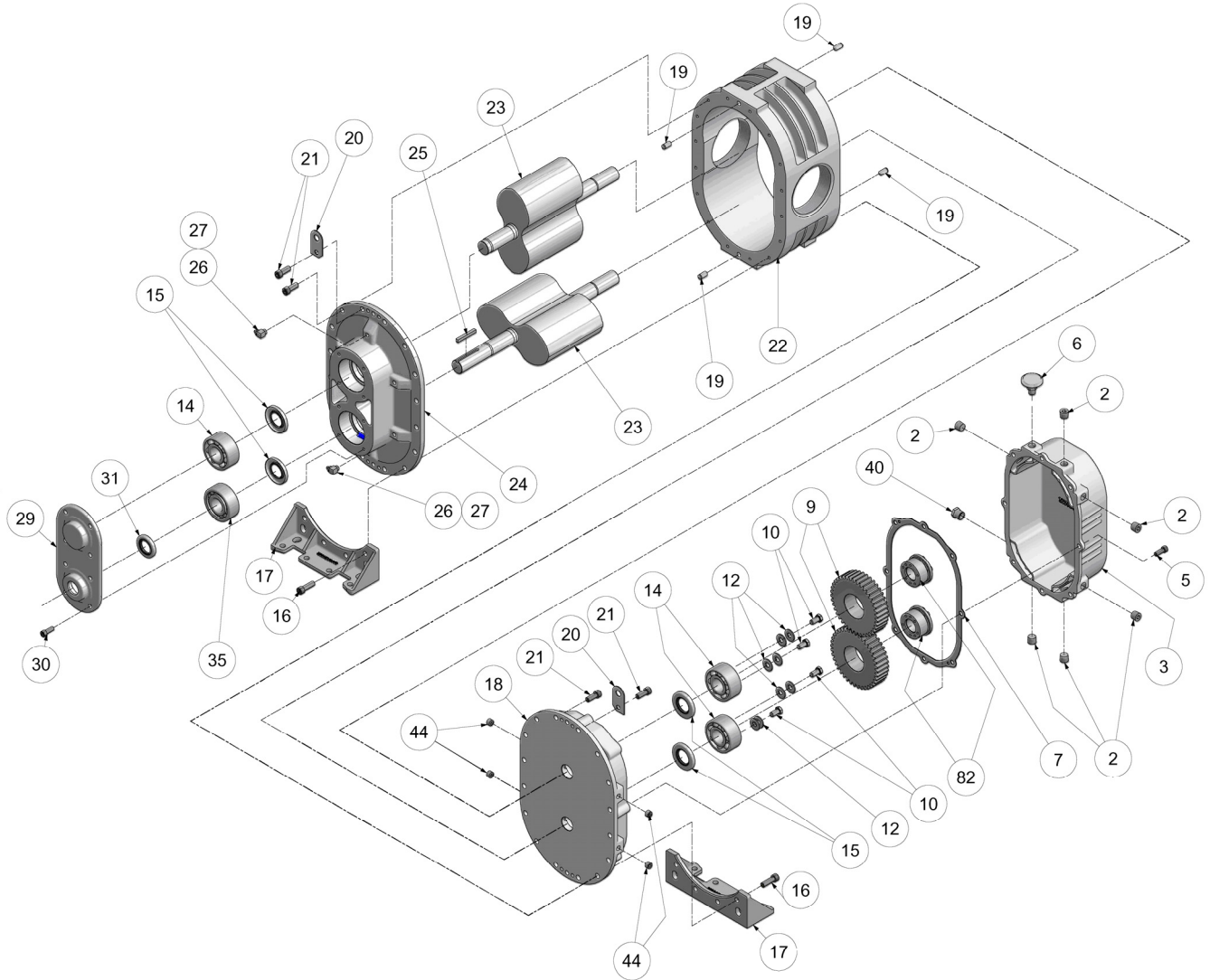
If the unit is not flat within .002 of an inch, it will be necessary to shim the blower feet at installation.

FASTENERS	GEAR DIAMETER		
	3	4	5
CAPSCREW (21)	23 – 30	42 – 45	42 – 45
CAPSCREW (16)	23 – 30	42 – 45	42 – 45
SOCKET HD CAPSCREW (5)	6 – 8	23 – 25	23 – 25
SOCKET HD CAPSCREW (30)	6 – 8	23 – 25	23 – 25
CAPSCREW (10)	6 – 8	38 – 42	38 – 42

NOTE: () DENOTES ITEMS IN EXPLODED VIEW DRAWINGS ON PAGES 39 AND 43.

FIGURE 7-9 – TORQUE (FT-LBS)

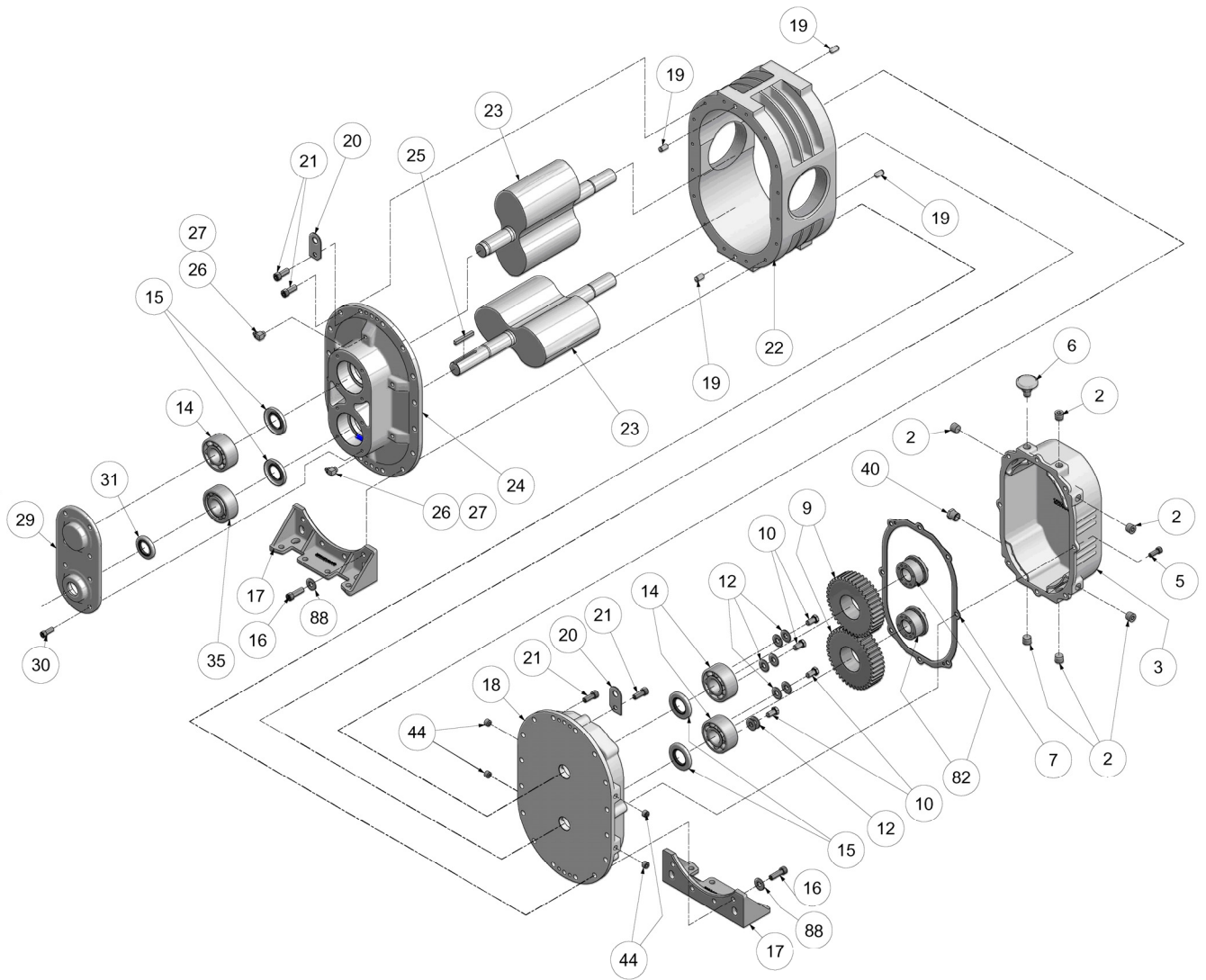
SECTION 8 PARTS LIST



Order by Part Number and Description. Reference Numbers are for your convenience only.

Ref.	Model GAB	Lip Seal	No.	Grease Splash Lube		
				Size – 3H	Size – 3M	Size -- 3L
No.	Description	Req'd	GABH_R Δ $\Delta = (A \text{ or } C)$	GABM_R Δ $\Delta = (A \text{ or } C)$	GABL_R Δ $\Delta = (A \text{ or } C)$	
2	Plug	6	64AC2	64AC2	64AC2	
3	Gear Case.....	1	303GAB602	303GAB602	303GAB602	
5	Screw	8	75P7	75P7	75P7	
6	Breather	1	5L358	5L358	5L358	
* 7	Gasket.....	1	300GAB715	300GAB715	300GAB715	
9	Gear Kit.....	1	300GAB6008	300GAB6008	300GAB6008	
* 10	Screws	4	75A33P	75A33P	75A33P	
12	Washer.....	4	95A2	95A2	95A2	
* 14	Ball Bearing.....	3	12BA143	12BA143	12BA143	
* 15	Oil Seal.....	4	900891030601	900891030601	900891030601	
16	Screw	4	75P56	75P56	75P56	
17	Foot – Vert. & Horiz.	2	303GAB166	303GAB166	303GAB166	
18	Bearing Housing Gear End.....	1	302GAB006	302GAB006	302GAB006	
19	Dowel Pin	4	62M48	62M48	62M48	
20	Lifting Lug.....	2	200GAA451	200GAA451	200GAA451	
21	Screw	20	75P55	75P55	75P55	
22	Impeller Case.....	1	900873034301	900873033801	900873034201	
23	Rotor Group					
	3" Standard Clearances.....	1	307GAB4028	309GAB4028	308GAB4028	
	3" High Temperature Clearances.....	1	To be assigned	To be assigned	To be assigned	
24	Bearing Housing Drive End	1	900873033501	900873033501	900873033501	
25	Key-Square	1	900639910304	900639910304	900639910304	
26	Pipe Fitting	2	40E9	40E9	40E9	
27	Cap.....	2	40P58	40P58	40P58	
29	Drive Cover	1	9010873033701	9010873033701	9010873033701	
30	Screw	6	75P22	75P22	75P22	
* 31	Oil Seal.....	1	60DD725	60DD725	60DD725	
* 35	Bearing – Roller	1	12BA153	12BA153	12BA153	
40	Oil Level Gauge	1	40P82	40P82	40P82	
44	Screw	4	76F1	76F1	76F1	
** 45	Paint, Bulk, GDP188, Aluminum.....	0.125	28H284	28H284	28H284	
** 54	Shim Case .0025/.0035"	1	200GAB732	200GAB732	200GAB732	
** 55	Shim Case .010"	1	201GAB732	201GAB732	201GAB732	
** 56	Shim Case .0015/.002"	1	202GAB732	202GAB732	202GAB732	
82	Locking Assembly	2	22G45	22G45	22G45	
** 105	Overhaul Kit 3" R VERS Lip Seal, Grease Splash Lube	1	302GAB6010	302GAB6010	302GAB6010	
** 900	Group-Indent & Instruction Legend Series 3" R VERS	1	303GAB4011	303GAB4011	303GAB4011	

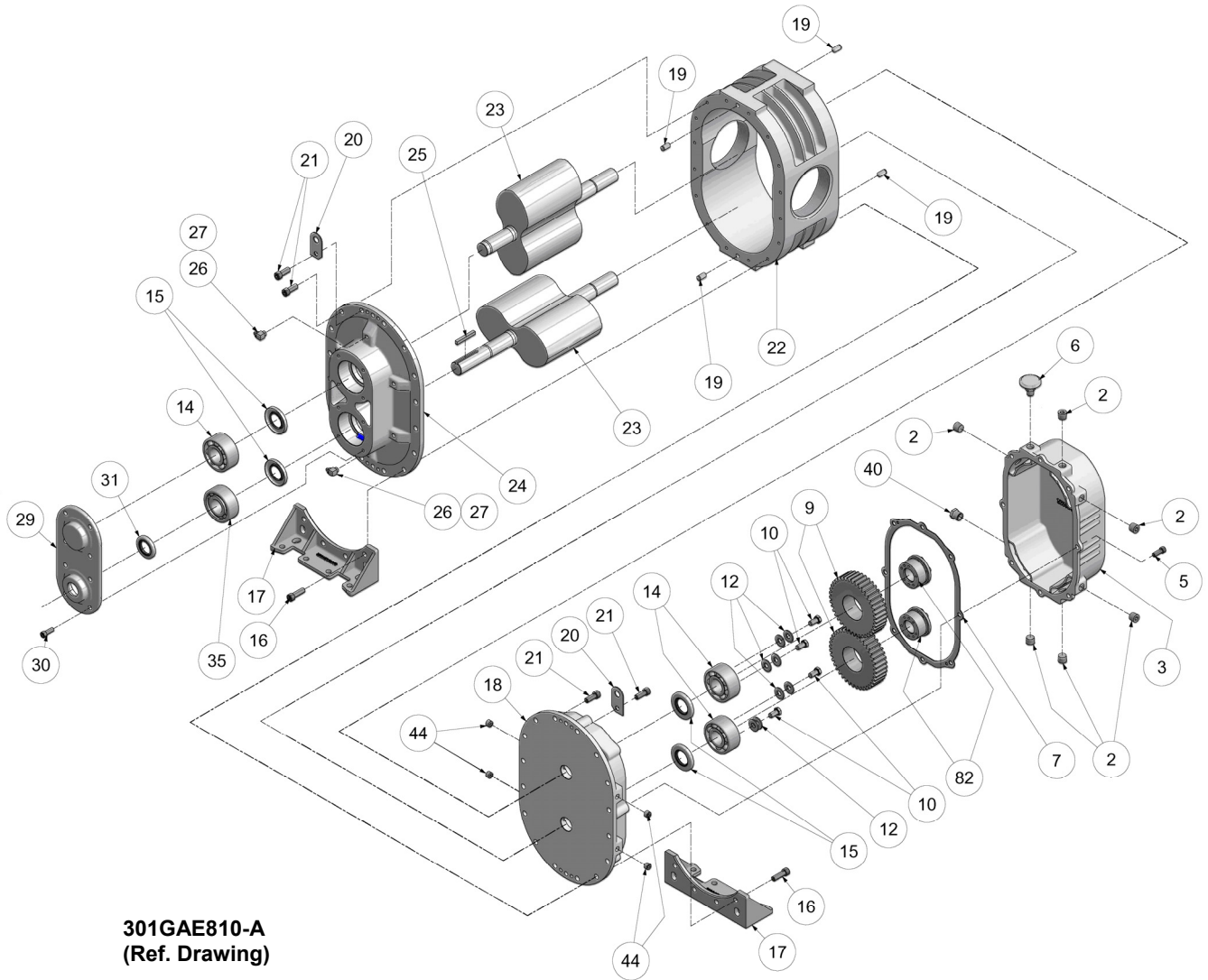
* INCLUDED IN OVERHAUL KIT.
 ** NOT SHOWN ON ILLUSTRATION.



Order by Part Number and Description. Reference Numbers are for your convenience only.

Ref.	Model GAC	Lip Seal	No.	Grease Splash Lube		
				Size – 4H	Size – 4M	Size -- 4L
No.	Description		Req'd	GACH_R Δ $\Delta = (A \text{ or } C)$	GACM_R Δ $\Delta = (A \text{ or } C)$	GACL_R Δ $\Delta = (A \text{ or } C)$
2	Plug.....		6	64AC3	64AC3	64AC3
3	Gear Case.....		1	304GAC602	304GAC602	304GAC602
5	Screw.....		8	75P40	75P40	75P40
6	Breather.....		1	5L359	5L359	5L359
* 7	Gasket.....		1	300GAC715	300GAC715	300GAC715
9	Gear Kit.....		1	300GAC6008	300GAC6008	300GAC6008
* 10	Screws.....		4	655ED03P	655ED03P	655ED03P
12	Washer.....		8	95A3	95A3	95A3
* 14	Ball Bearing.....		3	12BA144	12BA144	12BA144
* 15	Oil Seal.....		4	60DD630	60DD630	60DD630
16	Screw.....		8	75P56	75P56	75P56
17	Foot – Vert. & Horiz.		2	300GAC166	300GAC166	300GAC166
18	Bearing Housing Gear End.....		1	302GAC006	302GAC006	302GAC006
19	Dowel Pin.....		4	62M48	62M48	62M48
20	Lifting Lug.....		2	200GAA451	200GAA451	200GAA451
21	Screw.....		16	75P55	75P55	75P55
22	Impeller Case.....		1	900883042201	900883041801	900883042001
23	Rotor Group					
	4" Standard Clearances.....		1	307GAC4028	306GAC4028	305GAC4028
	4" High Temperature Clearances.....		1	To be assigned	To be assigned	To be assigned
24	Bearing Housing Drive End.....		1	300GAC006	300GAC006	300GAC006
25	Key-Square.....		1	900639910304	900639910304	900639910304
26	Pipe Fitting.....		2	40E9	40E9	40E9
27	Cap.....		2	40P58	40P58	40P58
29	Drive Cover.....		1	900883040301	900883040301	900883040301
30	Screw.....		8	75P189	75P189	75P189
* 31	Oil Seal.....		1	60DD716	60DD716	60DD716
* 35	Bearing – Roller.....		1	12BA154	12BA154	12BA154
40	Oil Level Gauge.....		1	40P34	40P34	40P34
44	Screw.....		4	76F1	76F1	76F1
** 45	Paint, Bulk, GDP188, Aluminum.....		0.125	28H284	28H284	28H284
** 54	Shim Case .0025/.0035".....		1	200GAC732	200GAC732	200GAC732
** 55	Shim Case .010".....		1	201GAC732	201GAC732	201GAC732
** 56	Shim Case .0015/.002".....		1	202GAC732	202GAC732	202GAC732
82	Locking Assembly.....		2	22G44	22G44	22G44
88	Washer.....		4	95A3	95A3	95A3
** 105	Overhaul Kit 4" R VERS Lip Seal, Grease Splash Lube.....		1	300GAC6010	300GAC6010	300GAC6010
** 900	Group-Indent & Instruction Legend Series 4" R VERS.....		1	201GAC4011	201GAC4011	201GAC4011

* INCLUDED IN OVERHAUL KIT.
 ** NOT SHOWN ON ILLUSTRATION.

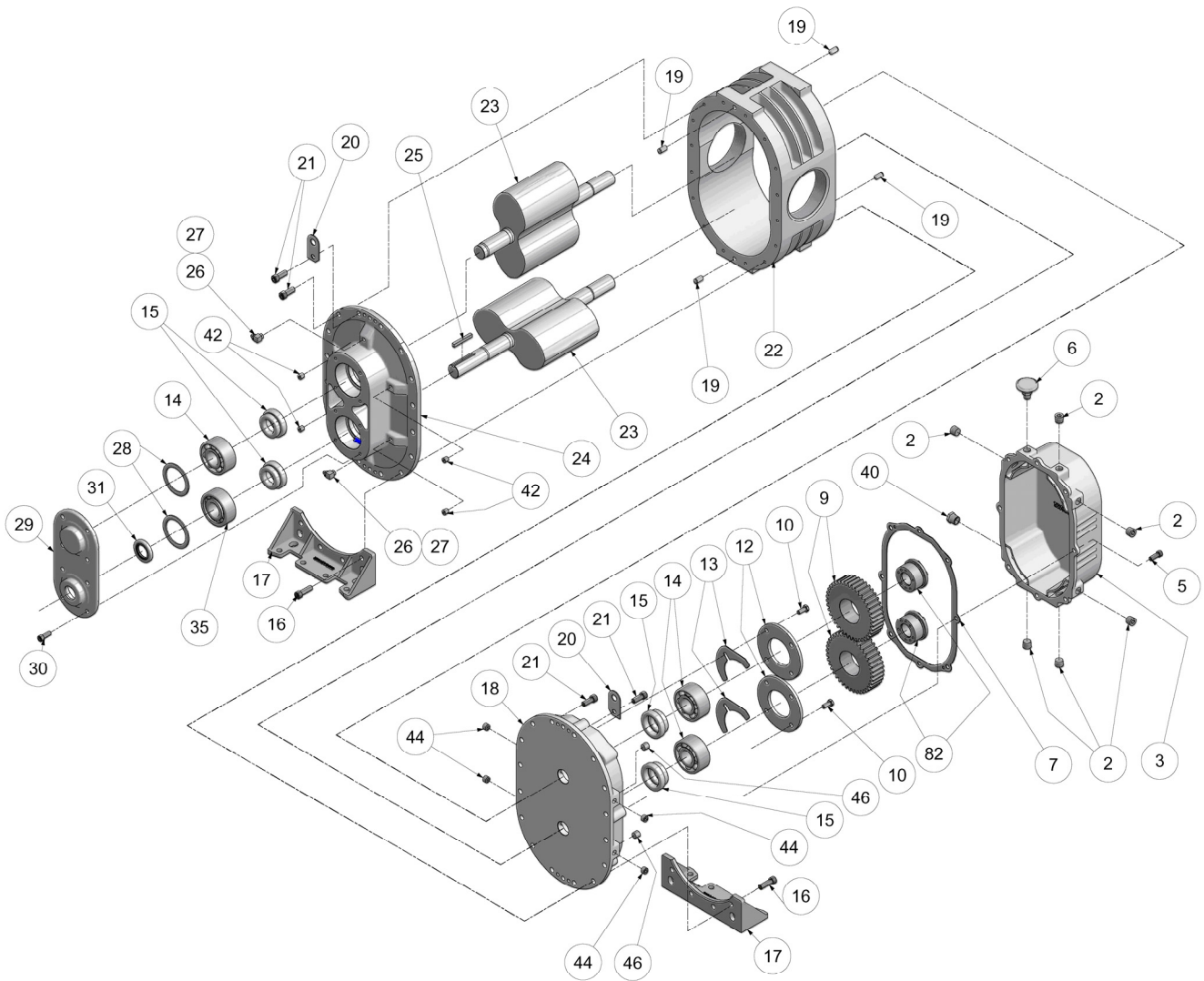


301GAE810-A
 (Ref. Drawing)

Order by Part Number and Description. Reference Numbers are for your convenience only.

Ref.	Model GAE	Lip Seal	No.	Grease Splash Lube		
				Size – 5H	Size – 5M	Size -- 5L
No.	Description		Req'd	GAEH_R Δ $\Delta = (A \text{ or } C)$	GAEM_R Δ $\Delta = (A \text{ or } C)$	GAEL_R Δ $\Delta = (A \text{ or } C)$
2	Plug.....		6	64AC3	64AC3	64AC3
3	Gear Case.....		1	304GAE602	304GAE602	304GAE602
5	Screw.....		8	75P40	75P40	75P40
6	Breather.....		1	5L359	5L359	5L359
* 7	Gasket.....		1	300GAE715	300GAE715	300GAE715
9	Gear Kit.....		1	300GAE6008	300GAE6008	300GAE6008
* 10	Screws.....		4	655ED03P	655ED03P	655ED03P
12	Washer.....		8	95A3	95A3	95A3
* 14	Ball Bearing.....		3	8500397	8500397	8500397
* 15	Oil Seal.....		4	60DD714	60DD714	60DD714
16	Screw.....		8	75P56	75P56	75P56
17	Foot – Vert. & Horiz.		2	300GAE166	300GAE166	300GAE166
18	Bearing Housing Gear End.....		1	301GAE006	301GAE006	301GAE006
19	Dowel Pin.....		4	62M48	62M48	62M48
20	Lifting Lug.....		2	200GAA451	200GAA451	200GAA451
21	Screw.....		24	75P55	75P55	75P55
22	Impeller Case.....		1	900883051701	900883051801	900883051901
23	Rotor Group					
	5" Standard Clearances.....		1	327GAE4028	326GAE4028	325GAE4028
	5" High Temperature Clearances.....		1	To be assigned	To be assigned	To be assigned
24	Bearing Housing Drive End.....		1	206GAE006	206GAE006	206GAE006
25	Key-Square.....		1	900639910305	900639910305	900639910305
26	Pipe Fitting.....		2	40E9	40E9	40E9
27	Cap.....		2	40P58	40P58	40P58
29	Drive Cover.....		1	900883050401	900883050401	900883050401
30	Screw.....		8	75P189	75P189	75P189
* 31	Oil Seal.....		1	60DD726	60DD726	60DD726
* 35	Bearing – Roller.....		1	12BA155	12BA155	12BA155
40	Oil Level Gauge.....		1	40P34	40P34	40P34
44	Screw.....		4	76F92	76F92	76F92
** 45	Paint, Bulk, GDP188, Aluminum.....		0.125	28H284	28H284	28H284
** 54	Shim Case .0025/.0035".....		1	200GAE732	200GAE732	200GAE732
** 55	Shim Case .010".....		1	201GAE732	201GAE732	201GAE732
** 56	Shim Case .0015/.002".....		1	202GAE732	202GAE732	202GAE732
82	Locking Assembly.....		2	22G43	22G43	22G43
** 105	Overhaul Kit 5" R VERS Lip Seal, Grease Splash Lube.....		1	300GAE6010	300GAE6010	300GAE6010
** 900	Group-Indent & Instruction Legend Series 5" R VERS.....		1	205GAE4011	205GAE4011	205GAE4011

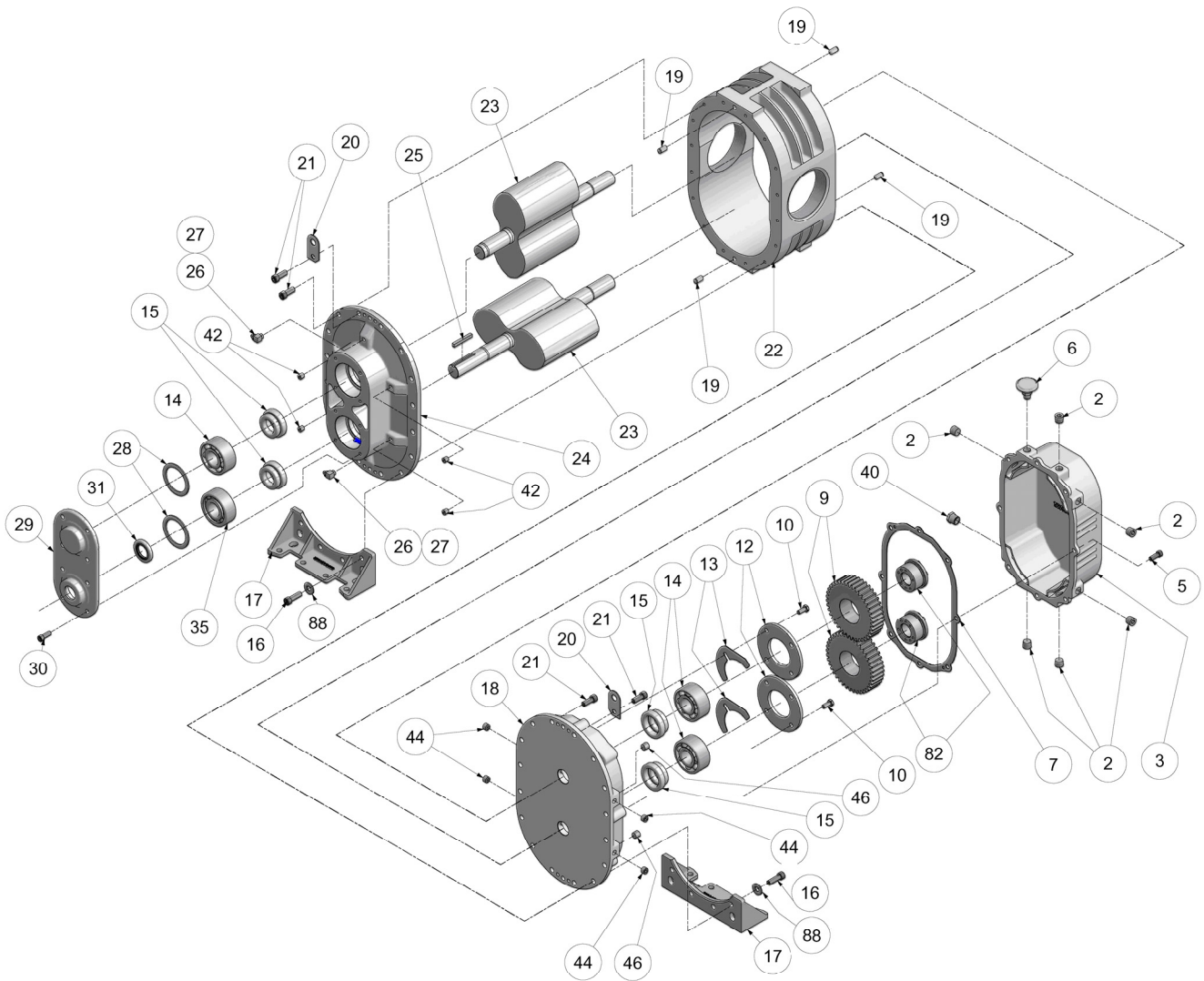
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Order by Part Number and Description. Reference Numbers are for your convenience only.

Ref. No.	Model GAB Description	Mechanical Seal No. Req'd	Grease Splash Lube		
			Size – 3H GABH_RB	Size – 3M GABM_RB	Size -- 3L GABL_RB
2	Plug	6	64AC2	64AC2	64AC2
3	Gear Case	1	303GAB602	303GAB602	303GAB602
5	Screw	8	75P7	75P7	75P7
6	Breather.....	1	5L358	5L358	5L358
* 7	Gasket	1	300GAB715	300GAB715	300GAB715
9	Gear Kit	1	300GAB6008	300GAB6008	300GAB6008
* 10	Screws.....	4	75A33P	75A33P	75A33P
12	Bearing Retainer	2	300GAB205	300GAB205	300GAB205
* 13	Shim Set.....	1	900881032200	900881032200	900881032200
* 14	Ball Bearing	3	12BA143	12BA143	12BA143
* 15	Mechanical Seal.....	4	900871020003	900871020003	900871020003
16	Screw	4	75P56	75P56	75P56
17	Foot – Vert. & Horiz.....	2	303GAB166	303GAB166	303GAB166
18	Bearing Housing Gear End	1	304GAB006	304GAB006	304GAB006
19	Dowel Pin	4	62M48	62M48	62M48
20	Lifting Lug.....	2	200GAA451	200GAA451	200GAA451
21	Screw	20	75P55	75P55	75P55
22	Impeller Case	1	900873034301	900873033801	900873034201
23	Rotor Group				
	3" Standard Clearances	1	307GAB4028	309GAB4028	308GAB4028
	3" High Temperature Clearances.....	1	To be assigned	To be assigned	To be assigned
24	Bearing Housing Drive End.....	1	900883030301	900883030301	900883030301
25	Key-Square	1	900639910304	900639910304	900639910304
26	Pipe Fitting	2	40E9	40E9	40E9
27	Cap	2	40P58	40P58	40P58
* 28	Wavy Spring	2	900669170203	900669170203	900669170203
29	Drive Cover	1	900873033701	900873033701	900873033701
30	Screw	6	75P22	75P22	75P22
* 31	Oil Seal.....	1	60DD725	60DD725	60DD725
* 35	Bearing – Roller.....	1	12BA153	12BA153	12BA153
40	Oil Level Gauge.....	1	40P82	40P82	40P82
42	Plug	4	64AC1	64AC1	64AC1
44	Screw	4	76F1	76F1	76F1
** 45	Paint, Bulk, GDP188, Aluminum	0.125	28H284	28H284	28H284
46	Plug	4	64AC1	64AC1	64AC1
** 54	Shim Case .0025/.0035"	1	200GAB732	200GAB732	200GAB732
** 55	Shim Case .010".....	1	201GAB732	201GAB732	201GAB732
** 56	Shim Case .0015/.002"	1	202GAB732	202GAB732	202GAB732
82	Locking Assembly	2	22G45	22G45	22G45
** 105	Overhaul Kit 3" R VERS Mechanical Seal, Grease Splash Lube	1	303GAB6010	303GAB6010	303GAB6010
** 900	Group-Indent & Instruction Legend Series 3" R VERS.....	1	303GAB4011	303GAB4011	303GAB4011

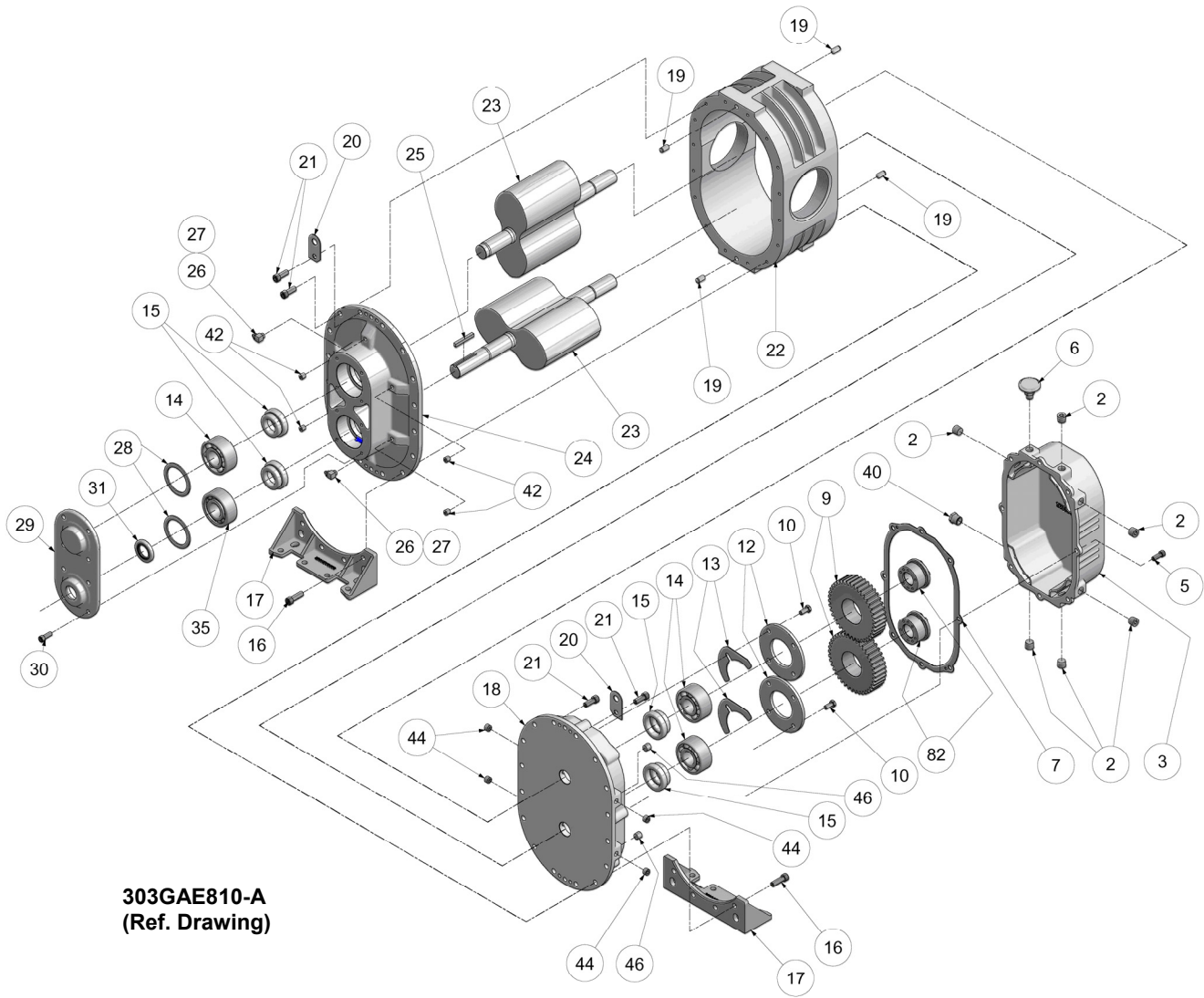
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Order by Part Number and Description. Reference Numbers are for your convenience only.

Ref. No.	Model GAC Description	Mechanical Seal No. Req'd	Grease Splash Lube		
			Size – 4H GACH_RB	Size – 4M GACM_RB	Size -- 4L GACL_RB
2	Plug	6	64AC3	64AC3	64AC3
3	Gear Case	1	304GAC602	304GAC602	304GAC602
5	Screw	8	75P40	75P40	75P40
6	Breather.....	1	5L359	5L359	5L359
* 7	Gasket.....	1	300GAC715	300GAC715	300GAC715
9	Gear Kit	1	300GAC6008	300GAC6008	300GAC6008
* 10	Screws.....	8	75A33P	75A33P	75A33P
12	Bearing Retainer	2	900883040201	900883040201	900883040201
* 13	Shim Set.....	1	900881042900	900881042900	900881042900
* 14	Ball Bearing.....	3	12BA144	12BA144	12BA144
* 15	Mechanical Seal.....	4	900871020004	900871020004	900871020004
16	Screw	8	75P56	75P56	75P56
17	Foot – Vert. & Horiz.....	2	300GAC166	300GAC166	300GAC166
18	Bearing Housing Gear End	1	304GAC006	304GAC006	304GAC006
19	Dowel Pin	4	62M48	62M48	62M48
20	Lifting Lug.....	2	200GAA451	200GAA451	200GAA451
21	Screw	16	75P55	75P55	75P55
22	Impeller Case	1	900883042201	900883041801	900883042001
23	Rotor Group				
	4" Standard Clearances	1	307GAC4028	306GAC4028	305GAC4028
	4" High Temperature Clearances.....	1	To be assigned	To be assigned	To be assigned
24	Bearing Housing Drive End.....	1	900883041201	900883041201	900883041201
25	Key-Square	1	900639910304	900639910304	900639910304
26	Pipe Fitting	2	40E9	40E9	40E9
27	Cap.....	2	40P58	40P58	40P58
* 28	Wavy Spring.....	2	900669170304	900669170304	900669170304
29	Drive Cover	1	900883040301	900883040301	900883040301
30	Screw	8	75P189	75P189	75P189
* 31	Oil Seal.....	1	60DD716	60DD716	60DD716
* 35	Bearing – Roller	1	12BA154	12BA154	12BA154
40	Oil Level Gauge	1	40P34	40P34	40P34
42	Plug	4	64AC1	64AC1	64AC1
44	Screw	4	76F1	76F1	76F1
** 45	Paint, Bulk, GDP188, Aluminum	0.125	28H284	28H284	28H284
46	Plug	4	64AC1	64AC1	64AC1
** 54	Shim Case .0025/.0035"	1	200GAC732	200GAC732	200GAC732
** 55	Shim Case .010"	1	201GAC732	201GAC732	201GAC732
** 56	Shim Case .0015/.002"	1	202GAC732	202GAC732	202GAC732
82	Locking Assembly	2	22G44	22G44	22G44
88	Washer.....	4	95A3	95A3	95A3
** 105	Overhaul Kit 4" R VERS Mechanical Seal, Grease Splash Lube.....	1	302GAC6010	302GAC6010	302GAC6010
** 900	Group-Indent & Instruction Legend Series 4" R VERS.....	1	201GAC4011	201GAC4011	201GAC4011

* INCLUDED IN OVERHAUL KIT.
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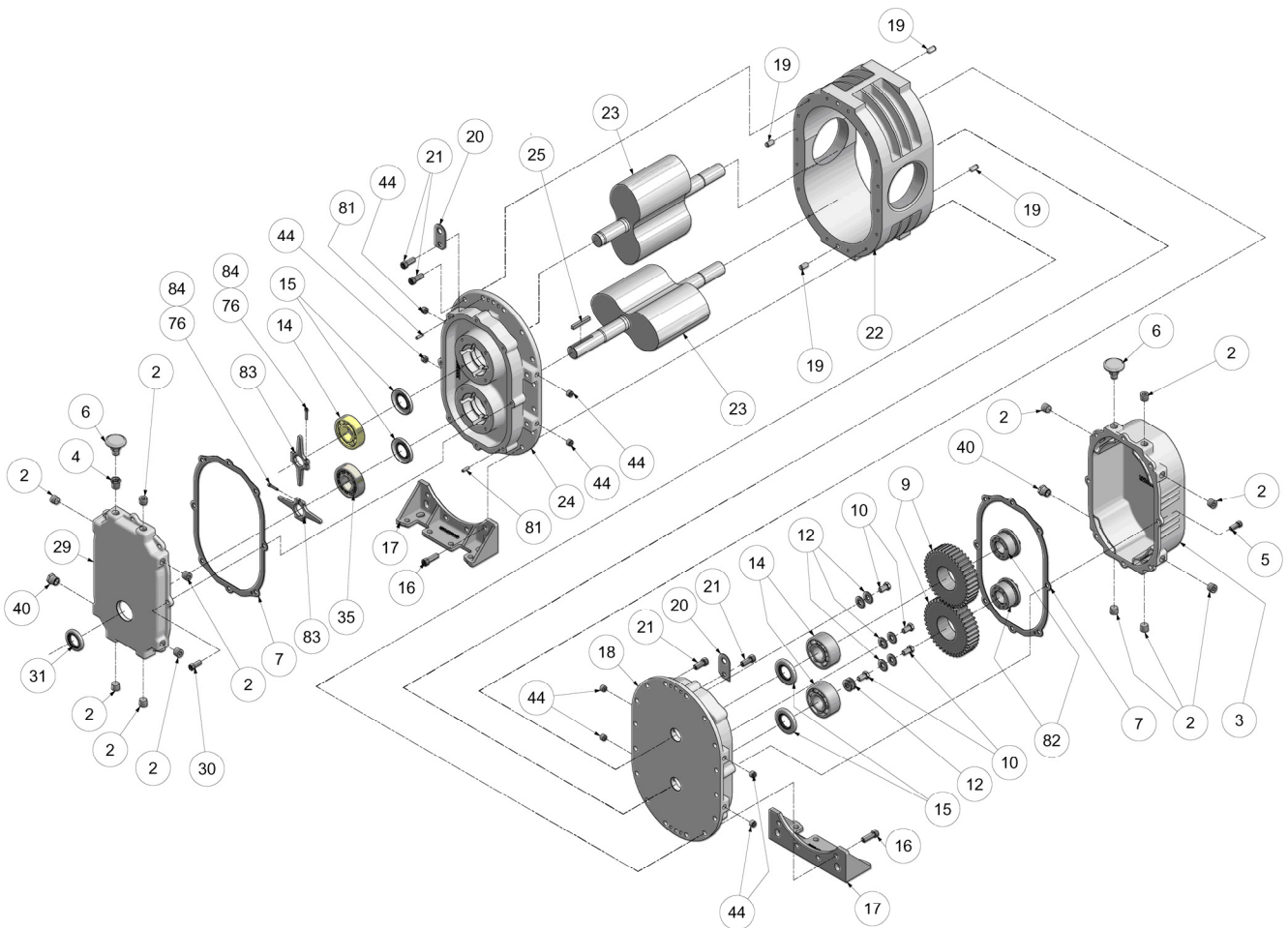


303GAE810-A
(Ref. Drawing)

Order by Part Number and Description. Reference Numbers are for your convenience only.

Ref. No.	Model GAE Description	Mechanical Seal No. Req'd	Grease Splash Lube		
			Size – 5H GAEH_RB	Size – 5M GAEM_RB	Size -- 5L GAEL_RB
2	Plug	6	64AC3	64AC3	64AC3
3	Gear Case	1	304GAE602	304GAE602	304GAE602
5	Screw.....	8	75P40	75P40	75P40
6	Breather.....	1	5L359	5L359	5L359
* 7	Gasket	1	300GAE715	300GAE715	300GAE715
9	Gear Kit	1	300GAE6008	300GAE6008	300GAE6008
* 10	Screws.....	8	75A33P	75A33P	75A33P
12	Bearing Retainer	2	900883050501	900883050501	900883050501
* 13	Shim Set.....	1	900881052900	900881052900	900881052900
* 14	Ball Bearing	3	8500397	8500397	8500397
* 15	Mechanical Seal.....	4	900871020005	900871020005	900871020005
16	Screw.....	8	75P56	75P56	75P56
17	Foot – Vert. & Horiz.....	2	300GAE166	300GAE166	300GAE166
18	Bearing Housing Gear End	1	303GAE006	303GAE006	303GAE006
19	Dowel Pin	4	62M48	62M48	62M48
20	Lifting Lug.....	2	200GAA451	200GAA451	200GAA451
21	Screw.....	24	75P55	75P55	75P55
22	Impeller Case	1	900883051701	900883051801	900883051901
23	Rotor Group				
	5" Standard Clearances	1	327GAE4028	326GAE4028	325GAE4028
	5" High Temperature Clearances.....	1	To be assigned	To be assigned	To be assigned
24	Bearing Housing Drive End.....	1	207GAE006	207GAE006	207GAE006
25	Key-Square	1	900639910305	900639910305	900639910305
26	Pipe Fitting	2	40E9	40E9	40E9
27	Cap.....	2	40P58	40P58	40P58
* 28	Wavy Spring	2	900669170405	900669170405	900669170405
29	Drive Cover	1	900883050401	900883050401	900883050401
30	Screw.....	8	75P189	75P189	75P189
* 31	Oil Seal.....	1	60DD726	60DD726	60DD726
* 35	Bearing – Roller.....	1	12BA155	12BA155	12BA155
40	Oil Level Gauge.....	1	40P34	40P34	40P34
42	Plug	4	64AC1	64AC1	64AC1
44	Screw.....	4	76F92	76F92	76F92
** 45	Paint, Bulk, GDP188, Aluminum	0.125	28H284	28H284	28H284
46	Plug	4	64AC2	64AC2	64AC2
** 54	Shim Case .0025/.0035"	1	200GAE732	200GAE732	200GAE732
** 55	Shim Case .010".....	1	201GAE732	201GAE732	201GAE732
** 56	Shim Case .0015/.002"	1	202GAE732	202GAE732	202GAE732
82	Locking Assembly	2	22G43	22G43	22G43
** 105	Overhaul Kit 5" R VERS Mechanical Seal, Grease Splash Lube	1	302GAE6010	302GAE6010	302GAE6010
** 900	Group-Indent & Instruction Legend Series 5" R VERS.....	1	205GAE4011	205GAE4011	205GAE4011

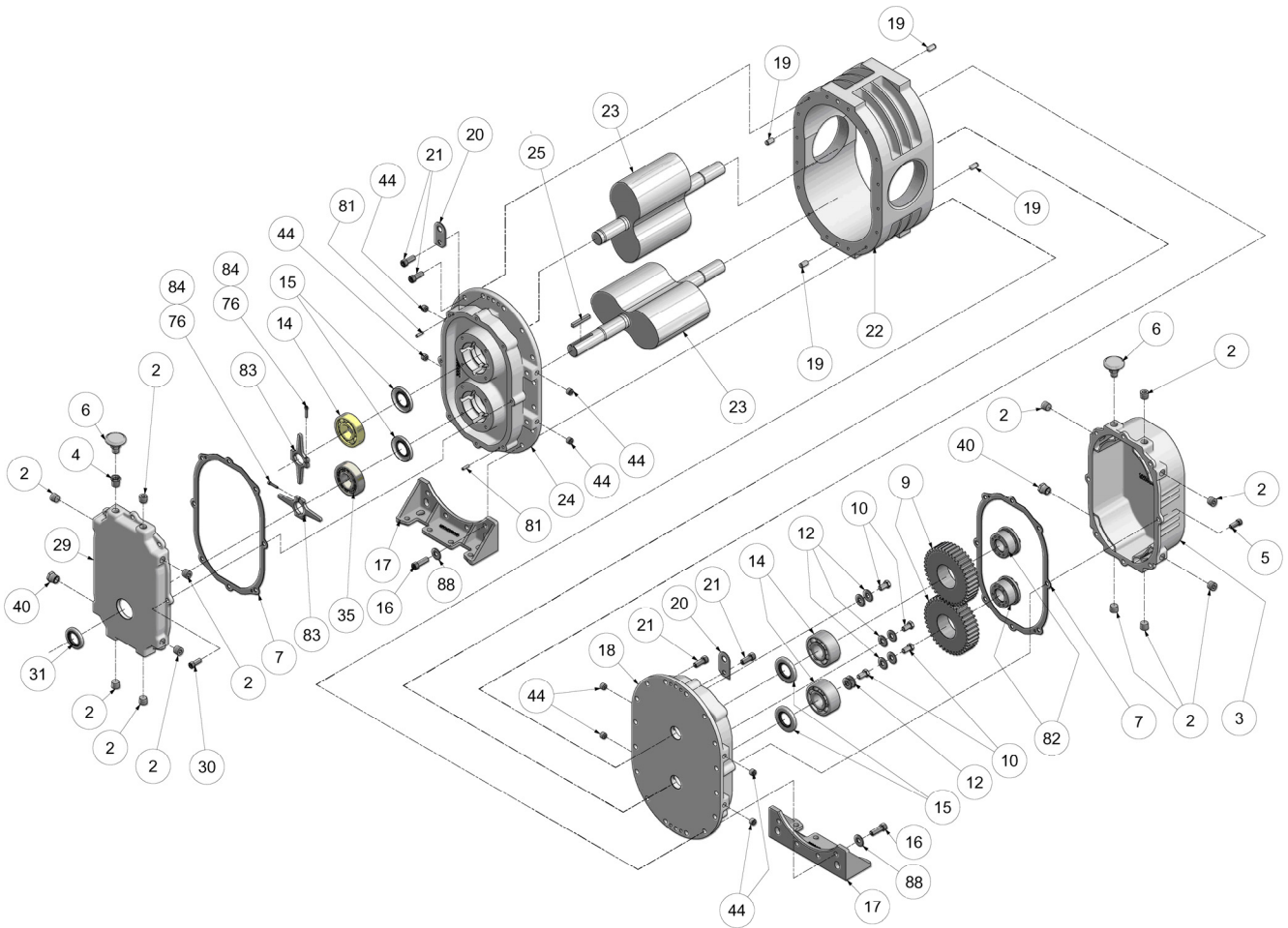
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Order by Part Number and Description. Reference Numbers are for your convenience only.

Ref.	Model GAB	Lip Seal	No.	Dual Splash Lube		
				Size – 3H	Size – 3M	Size -- 3L
No.	Description	Req'd	GABH_R Δ Δ= (D or F)	GABM_R Δ Δ= (D or F)	GABL_R Δ Δ= (D or F)	
2	Plug.....	12	64AC2	64AC2	64AC2	
3	Gear Case.....	1	303GAB602	303GAB602	303GAB602	
5	Screw.....	8	75P7	75P7	75P7	
6	Breather.....	2	5L358	5L358	5L358	
* 7	Gasket.....	2	300GAB715	300GAB715	300GAB715	
9	Gear Kit.....	1	300GAB6008	300GAB6008	300GAB6008	
* 10	Screws.....	4	75A33P	75A33P	75A33P	
12	Washer.....	8	95A2	95A2	95A2	
* 14	Ball Bearing.....	3	12BA143	12BA143	12BA143	
* 15	Oil Seal.....	4	900891030601	900891030601	900891030601	
16	Screw.....	4	75P56	75P56	75P56	
17	Foot – Vert. & Horiz.	2	303GAB166	303GAB166	303GAB166	
18	Bearing Housing Gear End	1	302GAB006	302GAB006	302GAB006	
19	Dowel Pin.....	4	62M48	62M48	62M48	
20	Lifting Lug.....	2	200GAA451	200GAA451	200GAA451	
21	Screw.....	20	75P55	75P55	75P55	
22	Impeller Case.....	1	900873034301	900873033801	900873034201	
23	Rotor Group					
	3" Standard Clearances.....	1	307GAB4028	309GAB4028	308GAB4028	
	3" High Temperature Clearances.....	1	To be assigned	To be assigned	To be assigned	
24	Bearing Housing Drive End.....	1	303GAB006	303GAB006	303GAB006	
25	Key-Square.....	1	900639910304	900639910304	900639910304	
29	Drive Cover.....	1	302GAB477	302GAB477	302GAB477	
30	Screw.....	8	75P7	75P7	75P7	
* 31	Oil Seal.....	1	60DD725	60DD725	60DD725	
* 35	Bearing – Spherical.....	1	12BA153	12BA153	12BA153	
40	Oil Level Gauge.....	2	40P82	40P82	40P82	
44	Screw.....	8	76F1	76F1	76F1	
** 45	Paint, Bulk, GDP188, Aluminum	0.125	28H284	28H284	28H284	
** 54	Shim Case .0025/.0035".....	1	200GAB732	200GAB732	200GAB732	
** 55	Shim Case .0010".....	1	201GAB732	201GAB732	201GAB732	
** 56	Shim Case .0015/.002".....	1	202GAB732	202GAB732	202GAB732	
76	Compound, Loctite.....	50	25BC877	25BC877	25BC877	
81	Dowel Pin.....	2	62M13	62M13	62M13	
82	Locking Assembly.....	2	22G45	22G45	22G45	
83	Slinger.....	2	300GAB173	300GAB173	300GAB173	
84	Screw.....	2	75LM13	75LM13	75LM13	
** 105	Overhaul Kit 3" R VERS Lip Seal, Dual Splash Lube.....	1	301GAB6010	301GAB6010	301GAB6010	
** 900	Group-Indent & Instruction Legend Series 3" R VERS	1	303GAB4011	303GAB4011	303GAB4011	

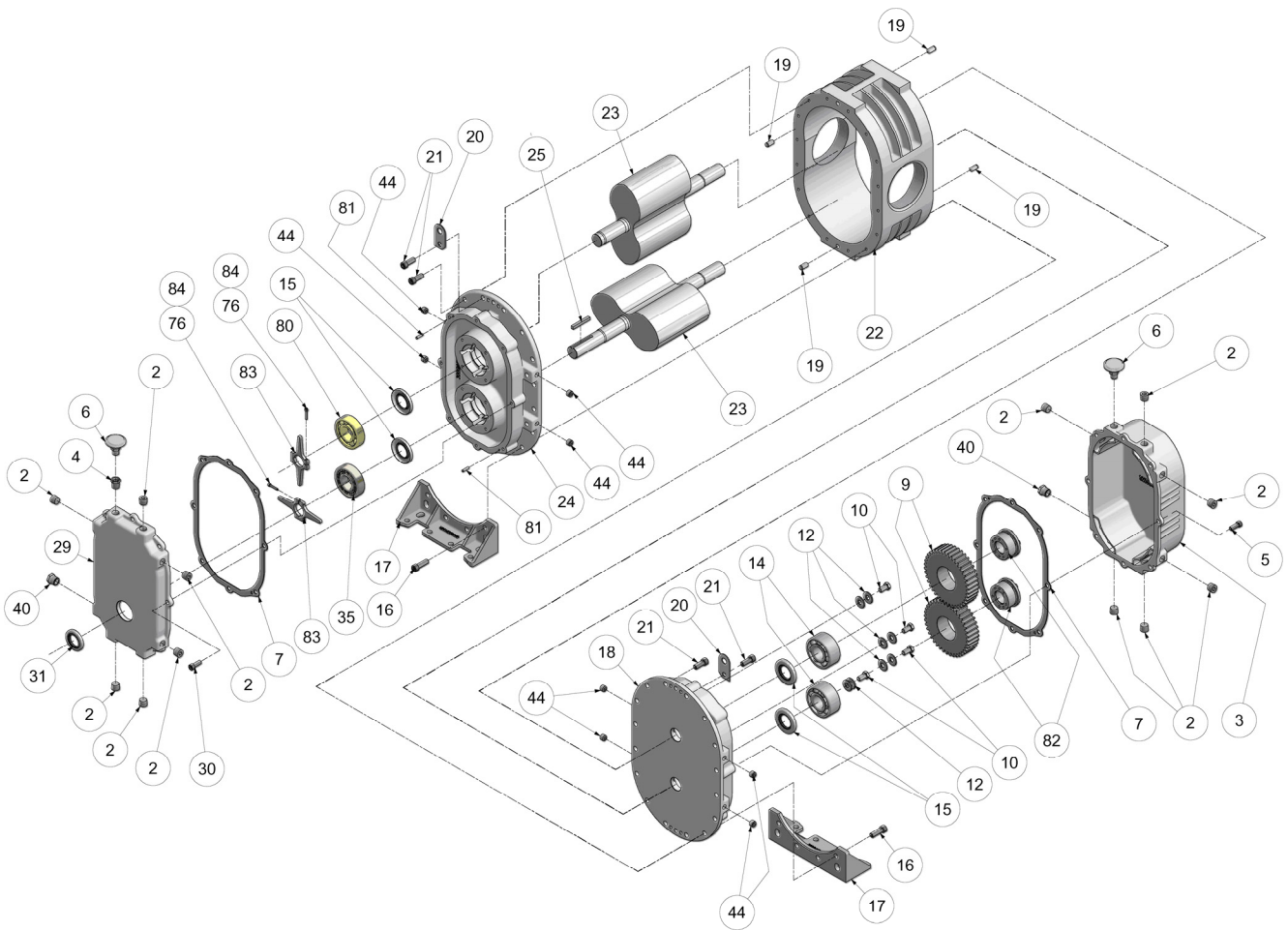
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Order by Part Number and Description. Reference Numbers are for your convenience only.

Ref.	Model GAC	Lip Seal	No.	Dual Splash Lube		
				Size – 4H	Size – 4M	Size -- 4L
No.	Description	Req'd	GACH_R Δ Δ= (D or F)	GACM_R Δ Δ= (D or F)	GACL_R Δ Δ= (D or F)	
2	Plug.....	12	64AC3	64AC3	64AC3	
3	Gear Case.....	1	304GAC602	304GAC602	304GAC602	
5	Screw.....	8	75P40	75P40	75P40	
6	Breather.....	2	5L359	5L359	5L359	
* 7	Gasket.....	2	300GAC715	300GAC715	300GAC715	
9	Gear Kit.....	1	300GAC6008	300GAC6008	300GAC6008	
* 10	Screws.....	4	655ED03P	655ED03P	655ED03P	
12	Washer.....	8	95A3	95A3	95A3	
* 14	Ball Bearing.....	3	12BA144	12BA144	12BA144	
* 15	Oil Seal.....	4	60DD630	60DD630	60DD630	
16	Screw.....	8	75P56	75P56	75P56	
17	Foot – Vert. & Horiz.	2	300GAC166	300GAC166	300GAC166	
18	Bearing Housing Gear End	1	302GAC006	302GAC006	302GAC006	
19	Dowel Pin.....	4	62M48	62M48	62M48	
20	Lifting Lug.....	2	200GAA451	200GAA451	200GAA451	
21	Screw.....	16	75P55	75P55	75P55	
22	Impeller Case.....	1	900883042201	900883041801	900883042001	
23	Rotor Group					
	4" Standard Clearances.....	1	307GAC4028	306GAC4028	305GAC4028	
	4" High Temperature Clearances.....	1	To be assigned	To be assigned	To be assigned	
24	Bearing Housing Drive End.....	1	303GAC006	303GAC006	303GAC006	
25	Key-Square.....	1	900639910304	900639910304	900639910304	
29	Drive Cover.....	1	302GAC477	302GAC477	302GAC477	
30	Screw.....	8	75P40	75P40	75P40	
* 31	Oil Seal.....	1	60DD716	60DD716	60DD716	
* 35	Bearing – Spherical.....	1	12BA255	12BA255	12BA255	
40	Oil Level Gauge.....	2	40P34	40P34	40P34	
44	Screw.....	8	76F1	76F1	76F1	
** 45	Paint, Bulk, GDP188, Aluminum	0.125	28H284	28H284	28H284	
** 54	Shim Case .0025/.0035".....	1	200GAC732	200GAC732	200GAC732	
** 56	Shim Case .0015/.002".....	1	202GAC732	202GAC732	202GAC732	
76	Compound, Loctite.....	50	25BC877	25BC877	25BC877	
81	Dowel Pin.....	2	62M13	62M13	62M13	
82	Locking Assembly.....	2	22G44	22G44	22G44	
83	Slinger.....	2	300GAC173	300GAC173	300GAC173	
84	Screw.....	2	75LM14	75LM14	75LM14	
88	Washer.....	4	95A3	95A3	95A3	
** 105	Overhaul Kit 4" R VERS Lip Seal, Dual Splash Lube.....	1	301GAC6010	301GAC6010	301GAC6010	
** 900	Group-Indent & Instruction Legend Series 4" R VERS	1	201GAC4011	201GAC4011	201GAC4011	

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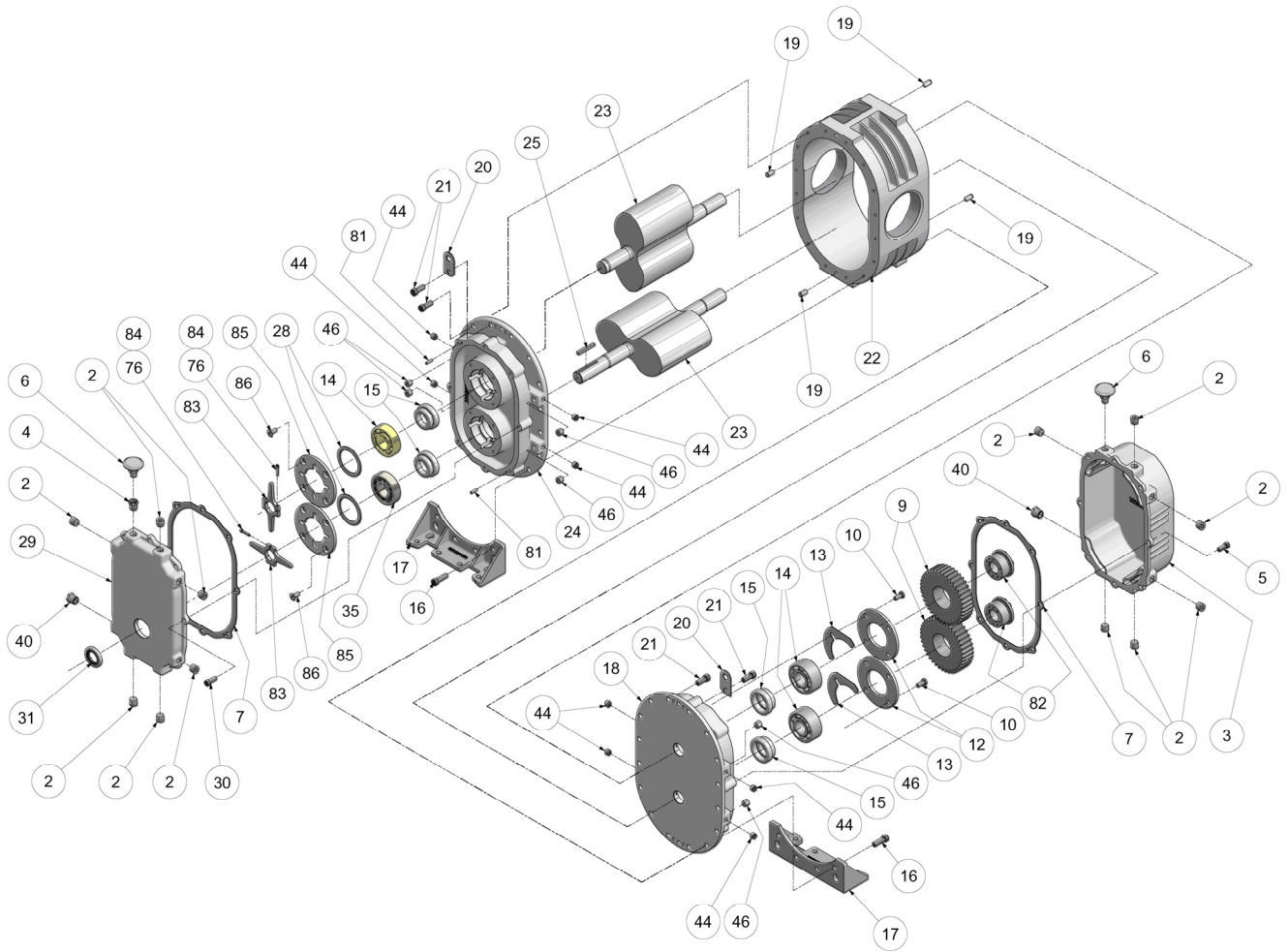


300GAE810-A
(Ref. Drawing)

Order by Part Number and Description. Reference Numbers are for your convenience only.

Ref.	Model GAE	Lip Seal	No.	Dual Splash Lube		
				Size – 5H	Size – 5M	Size -- 5L
No.	Description	Req'd	GAEH_R Δ Δ= (D or F)	GAEM_R Δ Δ= (D or F)	GAE_L_R Δ Δ= (D or F)	
2	Plug.....	12	64AC3	64AC3	64AC3	
3	Gear Case.....	1	304GAE602	304GAE602	304GAE602	
5	Screw.....	8	75P40	75P40	75P40	
6	Breather.....	2	5L359	5L359	5L359	
* 7	Gasket.....	2	300GAE715	300GAE715	300GAE715	
9	Gear Kit.....	1	300GAE6008	300GAE6008	300GAE6008	
* 10	Screws.....	4	655ED03P	655ED03P	655ED03P	
12	Washer.....	8	95A3	95A3	95A3	
* 14	Ball Bearing.....	2	8500397	8500397	8500397	
* 15	Oil Seal.....	4	60DD714	60DD714	60DD714	
16	Screw.....	8	75P56	75P56	75P56	
17	Foot – Vert. & Horiz.	2	300GAE166	300GAE166	300GAE166	
18	Bearing Housing Gear End	1	301GAE006	301GAE006	301GAE006	
19	Dowel Pin.....	4	62M48	62M48	62M48	
20	Lifting Lug.....	2	200GAA451	200GAA451	200GAA451	
21	Screw.....	24	75P55	75P55	75P55	
22	Impeller Case.....	1	900883051701	900883051801	900883051901	
23	Rotor Group					
	5" Standard Clearances.....	1	327GAE4028	326GAE4028	325GAE4028	
	5" High Temperature Clearances.....	1	To be assigned	To be assigned	To be assigned	
25	Key-Square.....	1	900639910305	900639910305	900639910305	
29	Drive Cover.....	1	300GAE477	300GAE477	300GAE477	
30	Screw.....	8	75P40	75P40	75P40	
* 31	Oil Seal.....	1	60DD726	60DD726	60DD726	
* 35	Bearing – Spherical.....	1	12BA253	12BA253	12BA253	
40	Oil Level Gauge.....	2	40P34	40P34	40P34	
44	Screw.....	8	76F92	76F92	76F92	
** 45	Paint, Bulk, GDP188, Aluminum.....	0.125	28H284	28H284	28H284	
** 54	Shim Case .0025/.0035".....	1	200GAE732	200GAE732	200GAE732	
** 55	Shim Case .010".....	1	201GAE732	201GAE732	201GAE732	
** 56	Shim Case .0015/.002".....	1	202GAE732	202GAE732	202GAE732	
76	Compound, Loctite.....	5	25BC877	25BC877	25BC877	
* 80	Bearing – Conrad.....	1	12BA254	12BA254	12BA254	
81	Dowel Pin.....	2	62M13	62M13	62M13	
82	Locking Assembly.....	2	22G43	22G43	22G43	
83	Slinger.....	2	300GAE173	300GAE173	300GAE173	
84	Screw.....	2	75LM14	75LM14	75LM14	
** 105	Overhaul Kit 5" R VERS Lip Seal, Dual Splash Lube.....	1	301GAE6010	301GAE6010	301GAE6010	
** 900	Group-Indent & Instruction Legend Series 5" R VERS.....	1	205GAE4011	205GAE4011	205GAE4011	

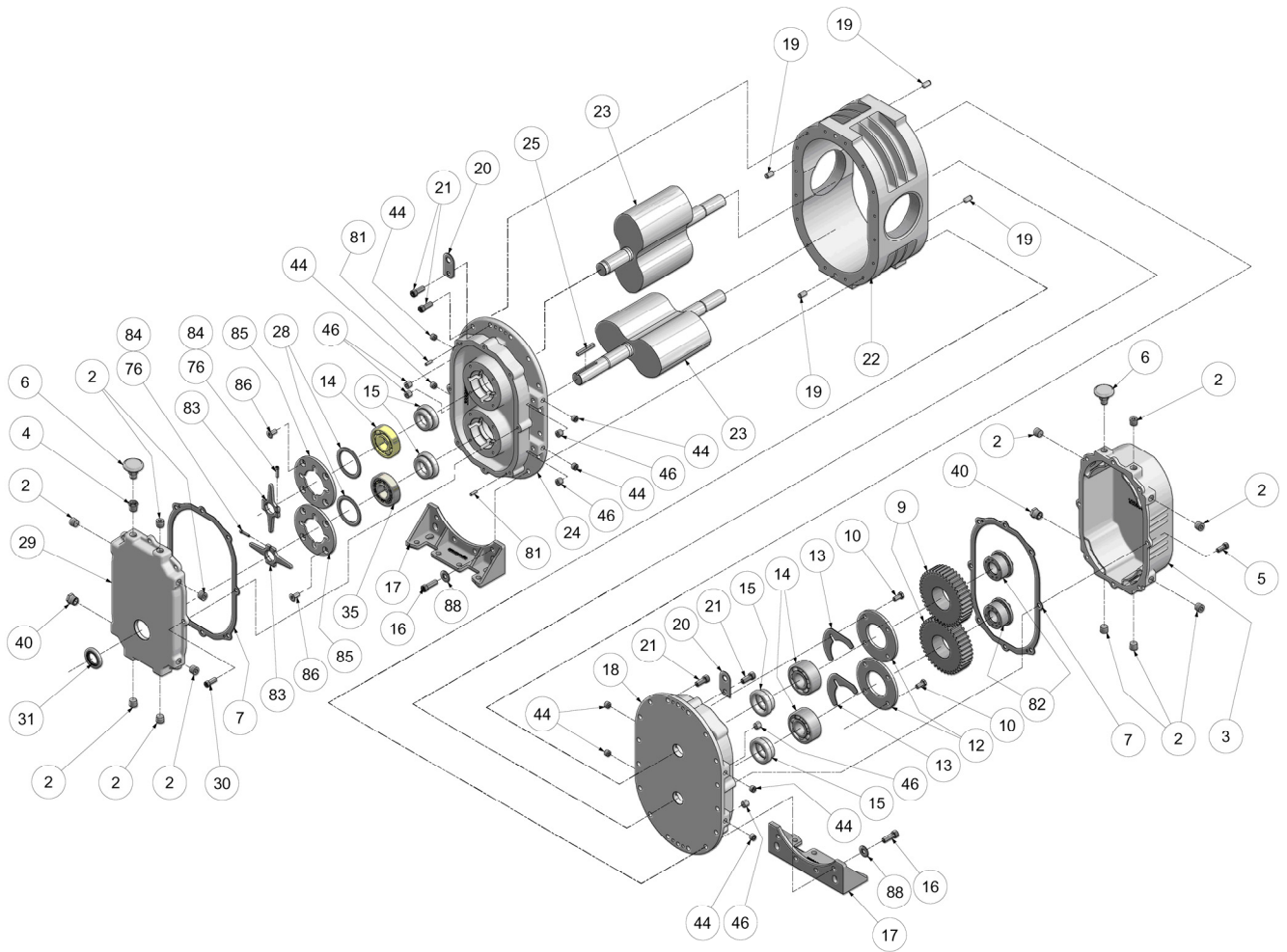
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Order by Part Number and Description. Reference Numbers are for your convenience only.

Ref. No.	Model GAB Description	Mechanical Seal No. Req'd	Dual Splash Lube		
			Size – 3H GABH_R Δ Δ= (E or G)	Size – 3M GAMB_R Δ Δ= (E or G)	Size -- 3L GABL_R Δ Δ= (E or G)
2	Plug.....	12	64AC2	64AC2	64AC2
3	Gear Case.....	1	303GAB602	303GAB602	303GAB602
5	Screw.....	8	75P7	75P7	75P7
6	Breather.....	2	5L358	5L358	5L358
* 7	Gasket.....	2	300GAB715	300GAB715	300GAB715
9	Gear Kit.....	1	300GAB6008	300GAB6008	300GAB6008
* 10	Screws.....	4	75A33P	75A33P	75A33P
12	Bearing Retainer.....	2	300GAB205	300GAB205	300GAB205
* 13	Shim Set.....	1	900881032200	900881032200	900881032200
* 14	Ball Bearing.....	3	12BA143	12BA143	12BA143
* 15	Mechanical Seal.....	4	900871020003	900871020003	900871020003
16	Screw.....	4	75P56	75P56	75P56
17	Foot – Vert. & Horiz.	2	303GAB166	303GAB166	303GAB166
18	Bearing Housing Gear End.....	1	304GAB006	304GAB006	304GAB006
19	Dowel Pin.....	4	62M48	62M48	62M48
20	Lifting Lug.....	2	200GAA451	200GAA451	200GAA451
21	Screw.....	20	75P55	75P55	75P55
22	Impeller Case.....	1	900873034301	900873033801	900873034201
23	Rotor Group				
	3" Standard Clearances.....	1	307GAB4028	309GAB4028	308GAB4028
	3" High Temperature Clearances.....	1	To be assigned	To be assigned	To be assigned
24	Bearing Housing Drive End.....	1	305GAB006	305GAB006	305GAB006
25	Key-Square.....	1	900639910304	900639910304	900639910304
* 28	Wavy Spring.....	2	900669170203	900669170203	900669170203
29	Drive Cover.....	1	302GAB477	302GAB477	302GAB477
30	Screw.....	6	75P7	75P7	75P7
* 31	Oil Seal.....	1	60DD725	60DD725	60DD725
* 35	Bearing – Spherical.....	1	12BA153	12BA153	12BA153
40	Oil Level Gauge.....	2	40P82	40P82	40P82
44	Screw.....	8	76F1	76F1	76F1
** 45	Paint, Bulk, GDP188, Aluminum.....	0.125	28H284	28H284	28H284
46	Plug.....	8	64AC1	64AC1	64AC1
** 54	Shim Case .0025/.0035".....	1	200GAB732	200GAB732	200GAB732
** 55	Shim Case .010".....	1	201GAB732	201GAB732	201GAB732
** 56	Shim Case .0015/.002".....	1	202GAB732	202GAB732	202GAB732
76	Compound, Loctite.....	50	25BC877	25BC877	25BC877
81	Dowel Pin.....	2	62M13	62M13	62M13
82	Locking Assembly.....	2	22G45	22G45	22G45
83	Slinger.....	2	300GAB173	300GAB173	300GAB173
84	Screw.....	2	75LM13	75LM13	75LM13
85	Bearing Retainer.....	2	300GAB205	300GAB205	300GAB205
86	Screw.....	8	75LM214	75LM214	75LM214
** 105	Overhaul Kit 3" R VERS Mechanical Seal Dual, Splash Lube ..	1	304GAB6010	304GAB6010	304GAB6010
** 900	Group-Indent & Instruction Legend Series 3" R VERS.....	1	303GAB4011	303GAB4011	303GAB4011

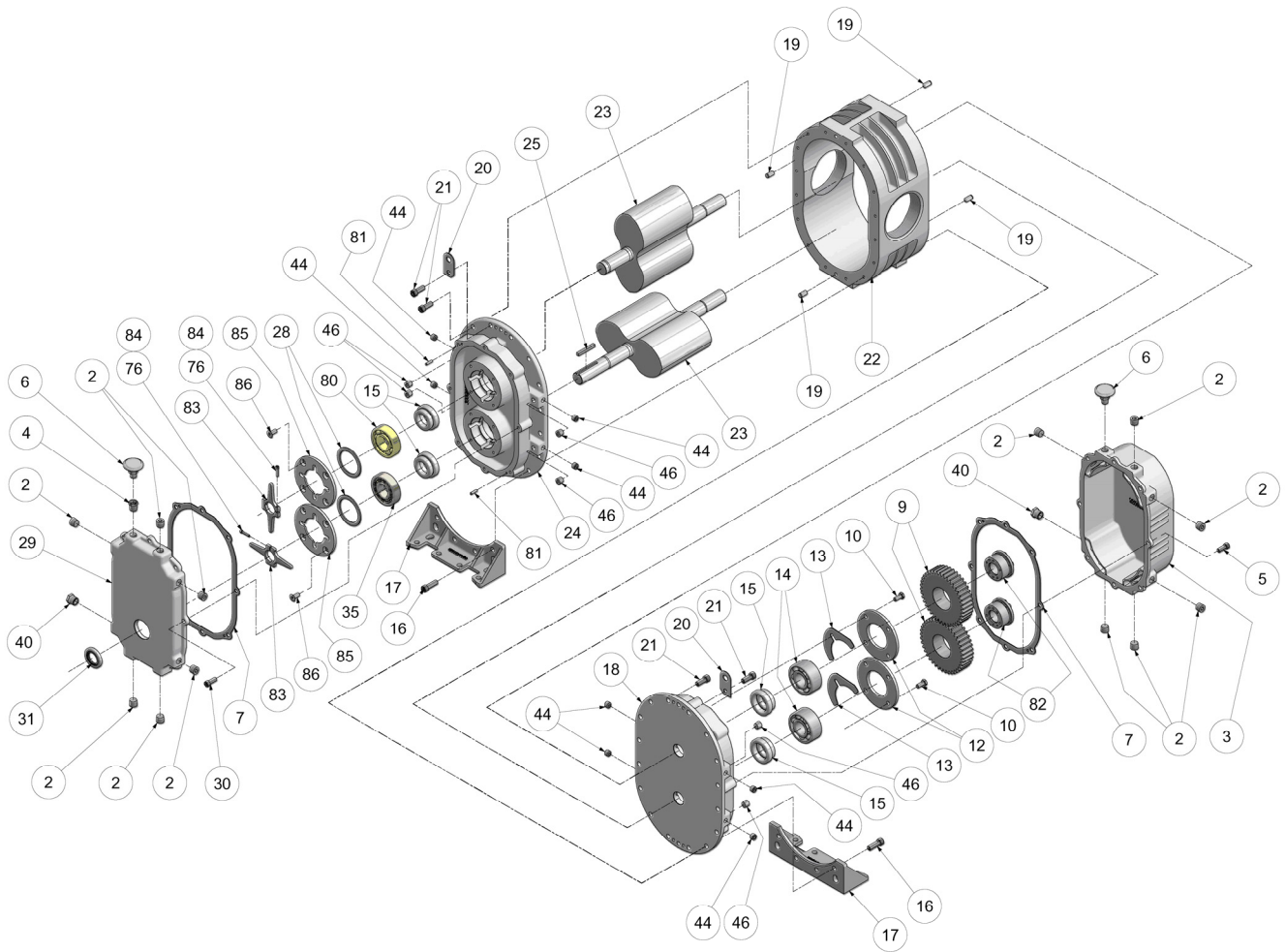
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Order by Part Number and Description. Reference Numbers are for your convenience only.

Ref. No.	Model GAC Description	Mechanical Seal No. Req'd	Dual Splash Lube		
			Size – 4H GACH_R Δ Δ= (E or G)	Size – 4M GACM_R Δ Δ= (E or G)	Size -- 4L GACL_R Δ Δ= (E or G)
2	Plug.....	12	64AC3	64AC3	64AC3
3	Gear Case.....	1	304GAC602	304GAC602	304GAC602
5	Screw.....	8	75P40	75P40	75P40
6	Breather.....	2	5L359	5L359	5L359
* 7	Gasket.....	2	300GAC715	300GAC715	300GAC715
9	Gear Kit.....	1	300GAC6008	300GAC6008	300GAC6008
* 10	Screws.....	8	75A33P	75A33P	75A33P
12	Bearing Retainer.....	2	900883040201	900883040201	900883040201
* 13	Shim Set.....	1	900881052900	900881052900	900881052900
* 14	Ball Bearing.....	3	12BA144	12BA144	12BA144
* 15	Mechanical Seal.....	4	900871020004	900871020004	900871020004
16	Screw.....	8	75P56	75P56	75P56
17	Foot – Vert. & Horiz.	2	300GAC166	300GAC166	300GAC166
18	Bearing Housing Gear End.....	1	304GAC006	304GAC006	304GAC006
19	Dowel Pin.....	4	62M48	62M48	62M48
20	Lifting Lug.....	2	200GAA451	200GAA451	200GAA451
21	Screw.....	16	75P55	75P55	75P55
22	Impeller Case.....	1	900883042201	900883041801	900883042001
23	Rotor Group				
	4" Standard Clearances.....	1	307GAC4028	306GAC4028	305GAC4028
	4" High Temperature Clearances.....	1	To be assigned	To be assigned	To be assigned
24	Bearing Housing Drive End.....	1	305GAC006	305GAC006	305GAC006
25	Key-Square.....	1	900639910304	900639910304	900639910304
* 28	Wavy Spring.....	2	900669170304	900669170304	900669170304
29	Drive Cover.....	1	302GAC477	302GAC477	302GAC477
30	Screw.....	8	75P40	75P40	75P40
* 31	Oil Seal.....	1	60DD716	60DD716	60DD716
* 35	Bearing – Spherical.....	1	12BA255	12BA255	12BA255
40	Oil Level Gauge.....	2	40P34	40P34	40P34
44	Screw.....	8	76F1	76F1	76F1
** 45	Paint, Bulk, GDP188, Aluminum.....	0.125	28H284	28H284	28H284
46	Plug.....	8	64AC1	64AC1	64AC1
** 54	Shim Case .0025/.0035".....	1	200GAC732	200GAC732	200GAC732
** 56	Shim Case .0015/.002".....	1	202GAC732	202GAC732	202GAC732
76	Compound, Loctite.....	50	25BC877	25BC877	25BC877
81	Dowel Pin.....	2	62M13	62M13	62M13
82	Locking Assembly.....	2	22G44	22G44	22G44
83	Slinger.....	2	300GAC173	300GAC173	300GAC173
84	Screw.....	2	75LM14	75LM14	75LM14
85	Bearing Retainer.....	2	300GAC205	300GAC205	300GAC205
86	Screw.....	8	75LM214	75LM214	75LM214
88	Washer.....	4	95A3	95A3	95A3
** 105	Overhaul Kit 4" R VERS Mechanical Seal, Dual Splash Lube ..	1	303GAC6010	303GAC6010	303GAC6010
** 900	Group-Indent & Instruction Legend Series 4" R VERS.....	1	201GAC4011	201GAC4011	201GAC4011

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302GAA810-A
(Ref. Drawing)

Order by Part Number and Description. Reference Numbers are for your convenience only.

Ref. No.	Model GAE Description	Mechanical Seal No. Req'd	Dual Splash Lube		
			Size – 5H GAEH_R Δ Δ= (E or G)	Size – 5M GAEM_R Δ Δ= (E or G)	Size -- 5L GAEL_R Δ Δ= (E or G)
2	Plug.....	12	64AC3	64AC3	64AC3
3	Gear Case.....	1	304GAE602	304GAE602	304GAE602
5	Screw.....	8	75P40	75P40	75P40
6	Breather.....	2	5L359	5L359	5L359
* 7	Gasket.....	2	300GAE715	300GAE715	300GAE715
9	Gear Kit.....	1	300GAE6008	300GAE6008	300GAE6008
* 10	Screws.....	8	75A33P	75A33P	75A33P
12	Bearing Retainer.....	2	900883050501	900883050501	900883050501
* 13	Shim Set.....	1	900881052900	900881052900	900881052900
* 14	Ball Bearing.....	2	8500397	8500397	8500397
* 15	Mechanical Seal.....	4	900871020005	900871020005	900871020005
16	Screw.....	8	75P56	75P56	75P56
17	Foot – Vert. & Horiz.	2	300GAE166	300GAE166	300GAE166
18	Bearing Housing Gear End.....	1	303GAE006	303GAE006	303GAE006
19	Dowel Pin.....	4	62M48	62M48	62M48
20	Lifting Lug.....	2	200GAA451	200GAA451	200GAA451
21	Screw.....	24	75P55	75P55	75P55
22	Impeller Case.....	1	900883051701	900883051801	900883051901
23	Rotor Group				
	5" Standard Clearances.....	1	327GAE4028	326GAE4028	325GAE4028
	5" High Temperature Clearances.....	1	To be assigned	To be assigned	To be assigned
24	Bearing Housing Drive End.....	1	304GAE006	304GAE006	304GAE006
25	Key-Square.....	1	900639910305	900639910305	900639910305
* 28	Wavy Spring.....	2	900669170405	900669170405	900669170405
29	Drive Cover.....	1	300GAE477	300GAE477	300GAE477
30	Screw.....	8	75P40	75P40	75P40
* 31	Oil Seal.....	1	60DD726	60DD726	60DD726
* 35	Bearing – Spherical.....	1	12BA253	12BA253	12BA253
40	Oil Level Gauge.....	2	40P34	40P34	40P34
44	Screw.....	8	76F92	76F92	76F92
** 45	Paint, Bulk, GDP188, Aluminum.....	0.125	28H284	28H284	28H284
46	Plug.....	8	64AC2	64AC2	64AC2
** 54	Shim Case .0025/.0035".....	1	200GAE732	200GAE732	200GAE732
** 55	Shim Case .010".....	1	201GAE732	201GAE732	201GAE732
** 56	Shim Case .0015/.002".....	1	202GAE732	202GAE732	202GAE732
76	Compound, Loctite.....	5	25BC877	25BC877	25BC877
* 80	Bearing – Conrad.....	1	12BA254	12BA254	12BA254
81	Dowel Pin.....	2	62M13	62M13	62M13
82	Locking Assembly.....	2	22G43	22G43	22G43
83	Slinger.....	2	300GAE173	300GAE173	300GAE173
84	Screw.....	2	75LM14	75LM14	75LM14
85	Bearing Retainer.....	2	300GAE205	300GAE205	300GAE205
86	Screw.....	8	75LM214	75LM214	75LM214
** 105	Overhaul Kit 5" R VERS Mechanical Seal, Dual Splash Lube .	1	303GAE6010	303GAE6010	303GAE6010
** 900	Group-Indent & Instruction Legend Series 5" R VERS.....	1	205GAE4011	205GAE4011	205GAE4011

* INCLUDED IN OVERHAUL KIT.
 ** NOT SHOWN ON ILLUSTRATION



**WARRANTY
SUTORBILT BLOWERS
Legend SERIES**

GENERAL PROVISIONS AND LIMITATIONS

Gardner Denver (the "Company") warrants to each original retail purchaser ("Purchaser") of its products from the Company or its authorized distributor that such products are, at the time of delivery to the Purchaser, made with good material and workmanship. No warranty is made with respect to:

1. Any product which has been repaired or altered in such a way, in the Company's judgment, as to affect the product adversely.
2. Any product which has, in the Company's judgment, been subject to negligence, accident, improper storage, or improper installation or application.
3. Any product which has not been operated or maintained in accordance with the recommendations of the Company.
4. Components or accessories manufactured, warranted and serviced by others.
5. Any reconditioned or prior owned product.

Claims for items described in (4) above should be submitted directly to the manufacturer.

WARRANTY PERIOD

The Company's obligation under this warranty is limited to repairing or, at its option, replacing, during normal business hours at an authorized service facility of the Company, any part which in its judgment proved not to be as warranted within the applicable Warranty Period as follows.

BARE BLOWERS

Basic grease lubricated bare blowers, consisting of all parts within, are warranted for 18 months from date of initial use or 24 months from date of shipment to the first purchaser, whichever occurs first. Basic dual splash lubricated bare blowers, consisting of all parts within, are warranted for 24 months from date of initial use or 30 months from date of shipment to the first purchaser, whichever occurs first. Any disassembly or partial disassembly of the blower, or failure to return the "unopened" blower per Company instructions, will be cause for denial of warranty.

OTHER COMPONENTS

All other components are warranted for 12 months from date of initial use or 18 months from date of shipment to first purchaser, whichever comes first. The Company reserves the right to withdraw the Warranty where evidence indicates application outside the stated performance area, or where there is evidence of abuse

LABOR TRANSPORTATION AND INSPECTION

The Company will provide labor, by Company representative or authorized service personnel, for repair or replacement of any product or part thereof which in the Company's judgment is proved not to be as warranted. Labor shall be limited to the amount specified in the Company's labor rate schedule.

Labor costs in excess of the Company rate schedules caused by, but not limited to, location or inaccessibility of equipment, or labor provided by unauthorized service personnel is not provided by this warranty.

All costs of transportation of product, labor or parts claimed not to be as warranted and, of repaired or replacement parts to or from such service facilities shall be borne by the Purchaser. The Company may require the return of any part claimed not to be as warranted to one of its facilities as designated by the Company, transportation prepaid by Purchaser, to establish a claim under this warranty. Replacement parts provided under the terms of the warranty are warranted for the remainder of the Warranty Period of the product upon which installed to the same extent as if such parts were original components.

DISCLAIMER

THE FOREGOING WARRANTY IS EXCLUSIVE AND IT IS EXPRESSLY AGREED THAT, EXCEPT AS TO TITLE, THE COMPANY MAKES NO OTHER WARRANTIES, EXPRESSED, IMPLIED OR STATUTORY, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY.

THE REMEDY PROVIDED UNDER THIS WARRANTY SHALL BE THE SOLE, EXCLUSIVE AND ONLY REMEDY AVAILABLE TO THE PURCHASER AND IN NO CASE SHALL THE COMPANY BE SUBJECT TO ANY OTHER OBLIGATIONS OR LIABILITIES. UNDER NO CIRCUMSTANCES SHALL THE COMPANY BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, EXPENSES, LOSSES OR DELAYS HOWSOEVER CAUSED.

No statement, representation, agreement, or understanding, oral or written, made by any agent, distributor, representative, or employee of the Company which is not contained in this Warranty will be binding upon the Company unless made in writing and executed by an officer of the Company.

This warranty shall not be effective as to any claim which is not presented within 30 days after the date upon which the product is claimed not to have been as warranted. Any action for breach of this warranty must be commenced within one year after the date upon which the cause of action occurred.

Any adjustment made pursuant to this warranty shall not be construed as an admission by the Company that any product was not as warranted.

Gardner **Denver**[®]

www.GardnerDenverProducts.com
pd.blowers@gardnerdenver.com
Gardner Denver, Inc.
1800 Gardner Expressway,
Quincy, IL 62305
Customer Service Department
Telephone: (800) 682-9868 FAX: (217) 221-8780



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