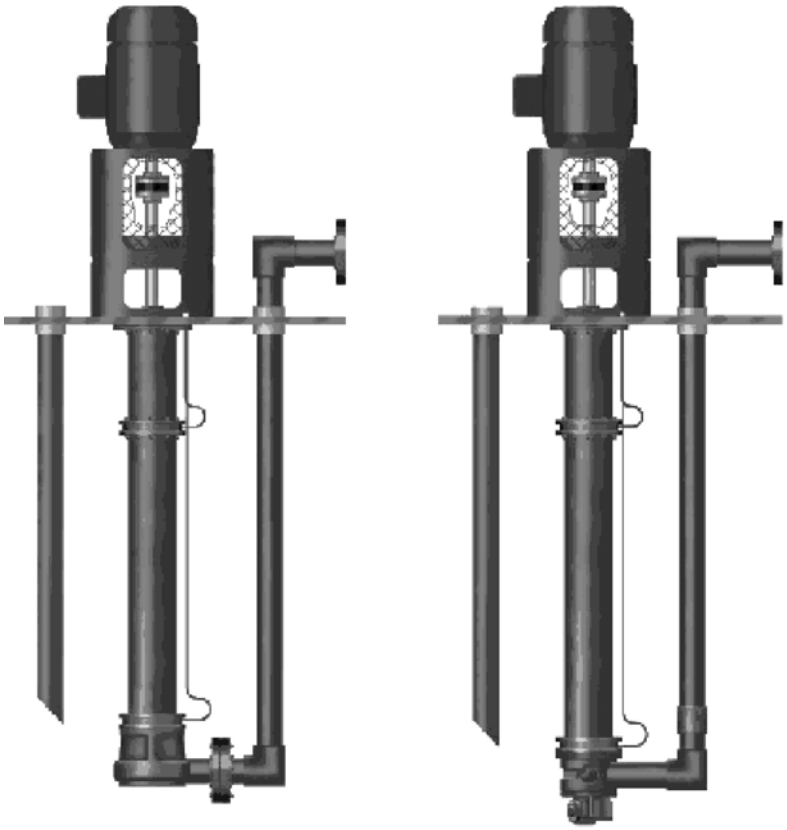
EAGLE

Installation, Operation and Maintenance Instructions



EAGLE MODEL S300 & S310 SUMP PUMPS

Revised: 10/2003

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INTRODUCTION

This instruction manual is intended to assist those involved with the installation, operation, and maintenance of Eagle Model S300 Series Pumps. It is recommended that this manual be thoroughly reviewed prior to installing or performing any work on the pump or motor.

⚠ WARNING

Read this manual and follow the safety directions before installing or operating this unit.

⚠ WARNING

Eagle Pump & Compressor Ltd. will not be liable for any damages or delay caused by failure to comply with the provisions of this instruction manual. This pump is not to be operated at speeds, working pressures, discharge pressures or temperatures higher than, nor used with liquids other than originally intended for, without written permission from Eagle Pump & Compressor Ltd.

SECTION 1 - SAFETY REGULATIONS

1.0 Safety Regulations

In addition to the general technical regulations of the local authorities, the following guidelines must be strictly observed:

Failure to observe these notices could result in severe personal injury, death, property damage and/or pump damage.

- The pump should only be operated within the rated conditions of the pump. Do not operate the pump at other than intended speeds, working pressures, discharge pressures, temperatures and oil levels without written permission from Eagle Pump & Compressor Ltd.

1.1 Importance of Instructions

The design, material and workmanship incorporated in the construction of Eagle pumps makes them capable of giving long, trouble-free service. The life and satisfactory service of any mechanical unit, however; is enhanced and extended by periodic inspection and careful maintenance. This instruction manual was prepared to assist operators in understanding the construction and correct methods of installing, operating and maintaining these pumps.

Study thoroughly Sections 1, 2 & 3 and carefully follow the instructions for installation and operation. Sections 4, 5, 6 & 7 are answers to trouble and maintenance questions. Keep this instruction manual handy for reference.

1.2 Receiving Inspection – Shortages

Care should be taken when unloading pumps. If the shipment is not delivered in good order and in accordance with the Bill-of-Lading, note the damage or shortage on both the receipt and freight bill.

MAKE ANY CLAIMS TO THE TRANSPORATION COMPANY PROMPTLY.

Instruction sheets on various components as well as the Instruction Book and "Shipped Loose" for the pump are included in the shipment. DO NOT DISCARD!

1.3 Preservation and Storage

Eagle's normal domestic storage preparation is suitable for protecting the pump during shipment in covered trucks. It also provides protection during covered storage at the jobsite, and for the short period between installation and start-up. If the pump is to be idle and exposed to the elements for an extended period, either before or after installation, special precautions are required. One approach is to provide special preservatives and wrapping before shipment. However, after installation, the protective wrappings will have been removed. Therefore, application of preservatives after installation is considered a good practice.

The driver, coupling, and seal manufacturers should be contacted for their recommendations on preservations and protection procedures.

1.4 Handling Techniques

Care should be used in moving pumps. Pumps should not be hoisted by the motor eyebolts, or discharge pipe. Eyebolts, if installed, are intended for removing the electric motor. Discharge piping cannot support the full or partial weight of the pump and may break. An assembled pump should be hoisted using a sling through the lifting lugs provided.

SECTION 2 - INSTALLATION

Pump unit should be placed as close as practical to the source of supply. Floor space and headroom allotted to the unit must be sufficient for inspection and maintenance. Be sure to allow for crane or hoist service.

2.0 Preparation for Installation

Vertical units are shipped completely assembled, except level controls, coupling inserts and suction screen (S300-A only). Check all bolts and nuts on entire unit to make sure they are securely tightened. Install level controls and suction screen per manufacturer's recommendations.

2.1 Installation of Unit in Pit

- Installation must be done with care to avoid damage and to ensure proper operation.
- Check clearance between the unit and pit. There must be at least ½" clearance between the sides of the pumping unit and any portion of the pit.
- There should be 4 to 6" from the bottom of the pump to the bottom of the pit.
- Lower assembled pump carefully into pit. Guide unit carefully so that it does not strike the sides of the pit.
- When the coverplate is supported on the pit, level the coverplate. Shim under coverplate when necessary to level the unit. Pump must hang straight down to avoid placing a bending stress on the unit. Bolt coverplate to the supports on the pit.

2.2 Stuffing Boxes

An upper stuffing box is available as an option when it is desirable to seal vapors, fumes, etc., in the sump or tank.

A) Packing – Upper Stuffing Box

Packing rings are supplied and special care must be used during installation. To pack the stuffing box, install the packing and lantern ring in the proper sequences, 3 rings, lantern ring, 2 rings, and gland. Firmly seat each ring. Stagger joint in each 90°. Make sure center of

lantern ring lines up flush, tap in the stuffing box.

Since the upper stuffing box seals vapors only, there is no leakage at the gland. Standard lubrication is by a grease fitting. Approximately 5 shots per 100 hours is adequate.
Sealing liquid may be supplied through a line from the discharge pipe if the pump fluid is clean. If it is abrasive, an outside source of clean liquid should be used. After the packing has been completely run in, at least 40 to 60 drops per minute should be allowed to trickle from the stuffing box at all times with a clean liquid flush.

B) Mechanical Seals

When the mechanical seals are furnished, they are installed and adjusted at the factory. To properly prepare the seal for operation, lubrication or flush lines must be connected. Standard lubrication is an oil reservoir – gravity fed directly to the seal face. Seal flush is also provided and is shipped completely assembled. Separate seal manufacturer's installation drawings are attached to the pump and should be filed for future use in maintaining the seal and in adjusting the seal when the pump is disassembled.

C) Rotary Vapour Seal

If your pump is equipped with a Rotary Vapour Seal, the constant level oil must be installed and the resevoir must be filled with oil. Refer to Section 5.5 "Rotary Vapour Seal – Step #7"

2.3 Installation of Motor – Fig. 1.0

If the motor is shipped from Eagle's shop, both the coupling halves will be assembled on shafts in their correct positions. If the motor is shipped separately or furnished by the customer, the motor coupling half must be fitted on the motor shaft prior to installing the motor.

Place motor on motor support (240) and tighten bolts snugly.

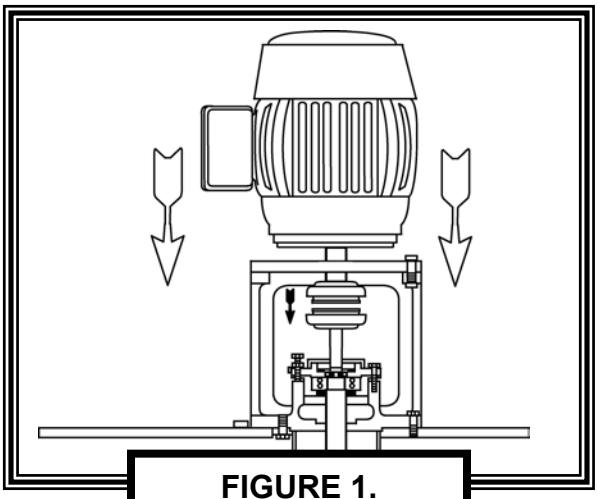


FIGURE 1.

2.4 Impeller Adjustment

Impeller clearance is adjusted at the factory, but should always be re-adjusted prior to pump operation. Clearance between impeller and the casing should be checked using the procedure in Section 5.1, *Adjusting Impeller Clearance*.

2.5 Rotation Check

Before the coupling is connected, the motor should be wired and the direction of rotation checked. A rotation arrow is located on the motor support. Serious damage can result if the pump is run in the wrong direction. Standard rotation for the S300/S310 Series Pump is CW as viewed from the driver. Once the motor rotation is checked, connect the coupling, following the manufacturer's instructions. If a coupling guard is furnished with the unit, ensure that it is securely fastened in place.

2.6 Connection of Flexible Coupling

Connect coupling; follow the instructions in the provided box for the particular make of coupling used. This data is supplied separately, giving complete instructions for the connection, lubrication, alignment and maintenance.

Pump should never be operated without the coupling guard correctly installed.

2.7 Piping

Guidelines for piping are given in the "Hydraulic Institute Standards" and should be reviewed prior to pump installation. All piping should be supported independently of, and line up naturally with, the pump flanges.

NEVER DRAW PIPING INTO PLACE BY USE OF FORCE AT THE FLANGED CONNECTIONS OF THE PUMP.

Discharge piping should be short and as direct as possible to minimize friction losses. Foundation, pump and driver hold-down bolts should be tightened prior to connecting discharge piping to the pump.

2.8 Level Controls

Consult the manufacturer's recommendation regarding the installation, maintenance and operation of float switches and/or level controls.

B) Metallic Bearings

Both cast iron and bronze steady bearings are available and must be grease lubricated. Lack of lubrication can lead to galling and eventual seizing. It becomes extremely difficult to keep enough grease in the housing when handling hot liquids, caustic solutions or solvents.

Unless an adequate maintenance program exists, it is recommended that a self-lubricating bearing such as a carbon be used in place of the metallic bearing.

C) **Lubrication**

The type of grease to be used is Shell Alvania E.P.I. Lowtherm or equal.

⚠ WARNING

Improper installation and/or operation could cause the pump to run dry, resulting in serious damage to your pump.

SECTION 3 - OPERATION

3.0 Bearings

Thrust Bearing

Ball bearings are standard on all S300 Series Pumps and are lubricated at the factory. Do not grease at too frequent intervals. Approximately 10 shots every 100 hours is adequate. The type of grease to be used is Shell Alvania E.P.I. or equal.

Steady Bearings

A) Carbon Bearings

These bearings are chemically inert in most liquids and can be used in liquids up to the temperature limits of the pump.

The carbon bearing is sealed within the housing by two lip seals and filled with grease by a pressure lubricator located above the support plate. The pressure cup must be kept full of grease.

3.1 Motor Bearing and Coupling

Check to be sure the motor bearings and coupling are properly lubricated. Refer to the manufacturers recommendations.

3.2 Priming

Before starting up the pump, check the impeller centerline submergence. The pump must be full of liquid with specified submergence head above the centerline of the impeller.
DO NOT run the pump dry, as this might damage the pump parts or steady bearings.

3.3 Flush Flows

Before the pump is started, the flushing flow should be started (when furnished).

3.4 Check for Free Turning

Before the pump is started, rotate the pump by hand to make sure it turns freely, and does not rub or bind. Packing and/or mechanical seal, if supplied, could interfere with free turning.

3.5 Operating at Reduced Flows

A centrifugal pump should never be operated continuously near shut-off or zero capacity, or with the discharge valve closed. To do so may shorten the life of the pump and greatly increase down time and maintenance.

Operation with the discharge valve closed will cause a temperature increase in the liquid within the casing. If this condition exists over a long period, the temperature of the liquid may increase until the boiling point is reached. If this occurs, the rotating parts are exposed to vapor and may score or seize to stationary parts.

Hydraulic radial thrust is unbalanced when the pump is operating near shut-off and this subjects the shaft to abnormal deflection and accelerated lower steady bearing wear. The pump will be noisy, will vibrate excessively and may result in shaft breakage.

A simple method of relieving the pump of undue strain is to extend a by-pass line from the pump discharge line back to the sump or tank. A throttle valve or an orifice plate should be placed by the bypass line and sufficient flow returned to allow the pump to operate at a capacity reasonably near its rating. The by-passed liquid should always be returned to the source of supply and discharged below the liquid level to avoid air entrapment.

3.6 Operating at Reduced Heads

When the discharge head or pressure is dropped considerably below the rated point for any length of time, the motor should be watched for overloading. If this condition is likely to persist, arrangements should be made either to manually or automatically throttle the discharge valve to build up head to a safe point.

3.7 Operating with Surge Conditions

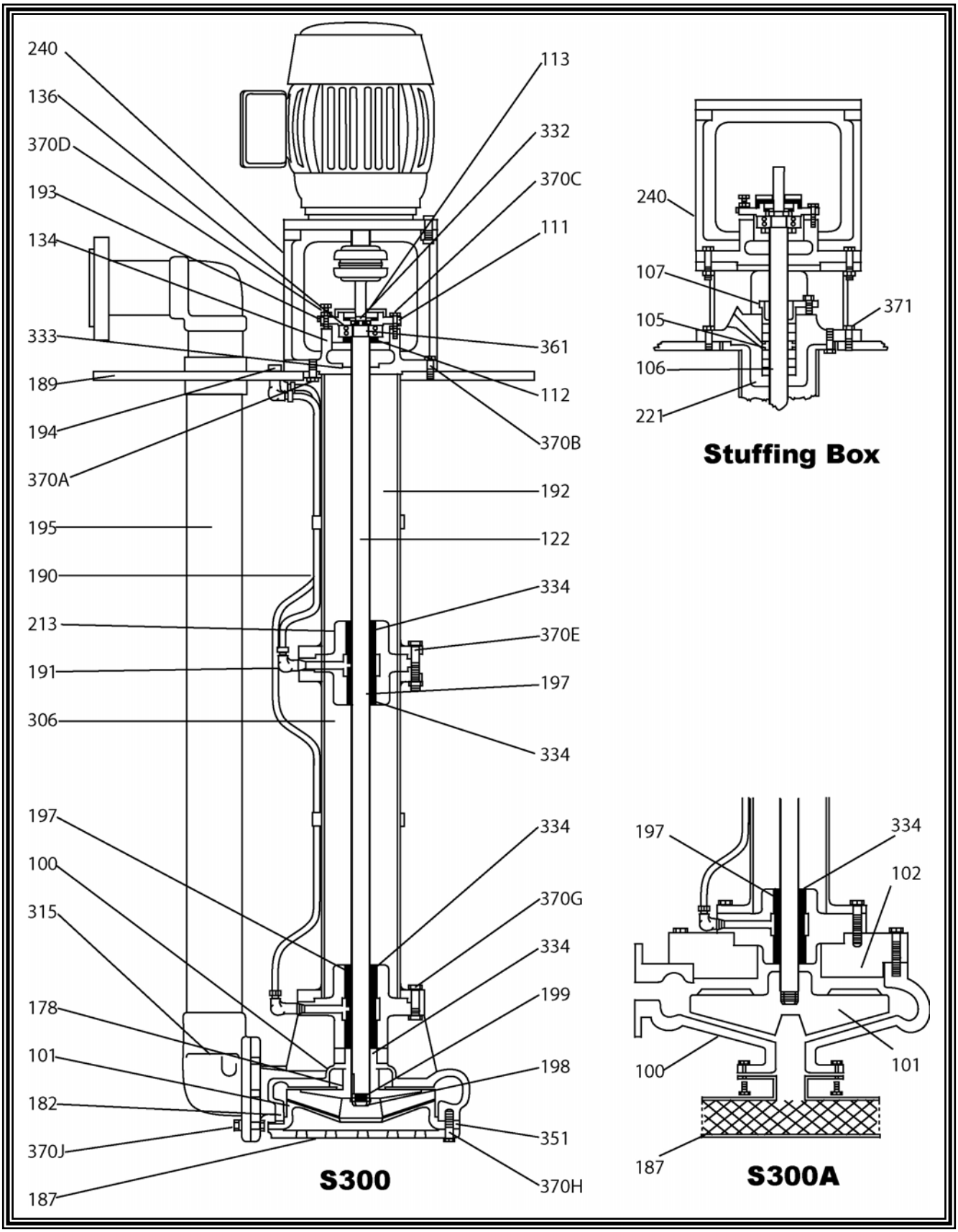
If the pump is installed with a quick closing valve in the discharge line that closed when the pump is running, dangerous pressure surges may be built up that can cause damage to the pump or line. In services of this kind, some cushioning arrangement must be provided to protect the pumping equipment.

3.8 Freezing Conditions

When exposed to freezing conditions and the pump is standing idle, special precautions should be taken to prevent freezing and pump damage. Flush lines should also be properly protected form freezing.

SECTION 4 – PRODUCT DESCRIPTION

Figure 4.A. **SECTIONAL VIEW**



PARTS LIST AND MATERIALS OF CONSTRUCTION

Item No.	No. Req'd Per Pump	Part Name	Standard Material of Construction		
			All Iron	316SS Fitted	All 316SS
100	1	Casing ●	C.I.		316
101	1	Impeller ●	C.I.	316	316
102	1	Adapter Plate – Column to Casing	C.I.	C.I.	316
105	1	Upper Stuffing Box Lantern Ring*	316 – Teflon		
106	1 Set	Upper Stuffing Box Packing*	Teflon		
107	1	Upper Stuffing Box Gland*	C.I. or as Specified		
111	1	Bearing Housing Cover	C.I.		
112	1	Ball Bearing	Steel		
113	1	Dust Cover	C.I.		
122	1	Pump Shaft	Steel		416
134	1	Bearing Housing	C.I.		
136	1	Retainer Nut – Ball Bearing	Steel		
178	1	Impeller Key ●	316		
182	1	Suction Cover ●	C.I.		316
187	1	Strainer ●	C.I.		316
189	1	Mounting Plate	Steel or as Specified		
190	▲	Lubrication or Flush Line*	Steel		316
191	▲	Flush Line Elbow*	Steel		316
192	1	Head Column	Steel		304
193	1	Grease Fitting – To Bearing Housing	Steel		
194	▲	Grease Fitting – To Intermediate Bearings	Steel		316
195	1	Discharge Pipe	Steel		316
197	▲	Steady Bearing	Carbon ■		
198	1	Impeller Screw ●	Alloy Plated Steel		316
199	1	Impeller Washer ●	416		
213	▲	Intermediate Bearing Housing	C.I>		316
221	1	Stuffing Box*	C.I. or as Specified		
240	1	Motor Support	C.I.		
306	▲	Column Extension	Steel		316
315	1	Discharge Elbow	Steel		316
332	1	Grease Seal – Bearing Cover	Nitrile		
333	1	Grease Seal – Motor Stand	Nitrile		
334	▲	Grease Seal – Intermediate Bearing	Nitrile/Viton/Aflas		
351	1	Gasket – Suction Cover to Casing ●	Non Asbestos		
361	1	Retainer Washer – Ball Bearing	Steel		
370-A	6	Capscrew Column to Motor Stand	Steel		316
370-B	4	Capscrew Motor Stand to Support Plate	Steel		
370-C	3	Capscrew – Bearing Housing Cover to Bearing Housing	Steel		
370-D	3	Capscrew – Adjustable	Steel		
370-E	▲	Capscrew with Nut-Column to Intermediate Bearing	Steel		316
370-G	6	Capscrew with Nut-Column Pipe to Casing ●	Steel		316
371-H	6	Capscrew – Strainer to Casing ●	Steel		316
370-J	4	Capscrew with Nut – Discharge Elbow to Casing ●	Steel		316
371	1	Gasket – Stuffing Box to Mounting Plate*	Neoprene		

● **Please refer to Figure 4-B for S310 pumps.**

▲ Quantity dependent on pit depth.

■ Also available in Teflon, bronze and iron. Use 316 or alloy shaft with rubber or viton bearings.

* Optional equipment.

SECTIONAL VIEW OF MODEL S310 PUMP PARTS

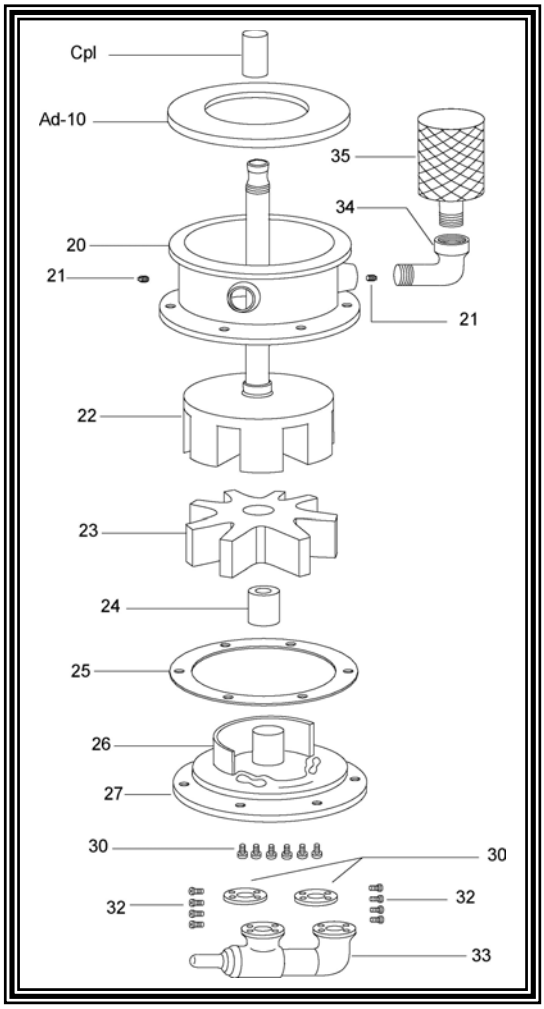


Figure 4.B.

PARTS LIST AND MATERIALS OF CONSTRUCTION				
Item No.	**No. Req'd per Pump**	**Part Name**	**Material Available**	
CPL	1	Coupler	Steel	S.S.
AD-10	1	Adapter Plate	Steel	S.S.
20	1	Casing	Iron	Steel
21	2	Pipe Plug	Steel	
22	1	Rotor and Shaft	Iron/Steel	Steel/Steel
23	1	Idler	Iron	Steel
24	1	Idler Bushing	Carbon Graphite	
25	2	Head Gasket	Standard	
26	1	Idler Pin	Hard Steel	
27	1	Head	Iron	Steel
30	6	Cap Screw for Head	Steel	
31	2	Relief Valve Gasket	Standard	
32	8	Cap Screw for Valve	Steel	
33	1	Internal Relief Valve	Iron	Steel
34	1	Suction Elbow	Steel	
35	1	Suction Filter	Iron	

SECTION 5 – CARE & MAINTENANCE

5.0 Lubrication

1) Thrust Bearing. See Section 3 – Bearings
2) Steady Bearing. See Section 3 – Bearings.
3) Motor Bearing and Coupling. Follow manufacturer's recommendation

5.1 Adjusting Impeller Clearance

If a gradual loss in head and/or capacity occurs, performance can be restored by adjusting the impeller. It is also recommended that the impeller clearance be set at installation prior to start up.

To adjust the impeller clearance:

a) Disconnect Coupling

b) Loosen adjustment bolts and jam nuts (D) in Figure 2.

c) Tighten shell bolts (C) in Figure 2., while rotating the shaft until the impeller lightly contacts the suction cover.

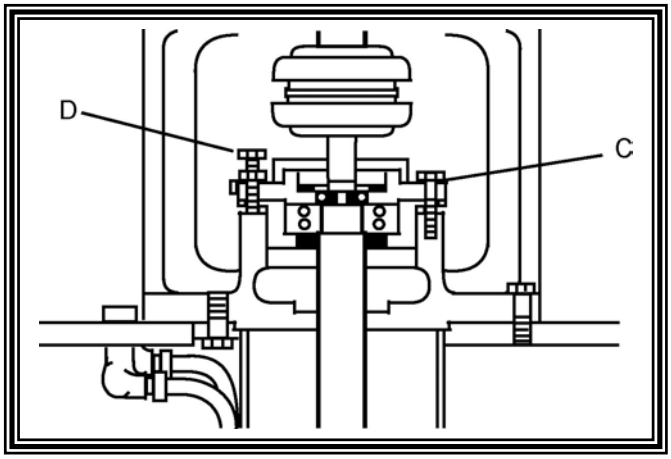


FIGURE 2.

d) Loosen bolts (C) until the following clearances are reached between the underside of the bolt head and the bearing shell.

- S300 pumps – 0.015" plus 0.004" per intermediate bearing and packing.
- S310 pumps – 0.005" plus 0.004" per intermediate bearing and packing.

e) Make sure jam nuts on bolts (D) are loose. Tighten bolts (D) evenly until bearing shell is tight against bolts (C). Make sure all bolts are tight. Tighten jam nuts.

f) Connect coupling.

With the above method, the rotating element and impeller have been moved the desired distance away from the suction cover, thus giving the required clearance between these two parts. Rotate shaft several times to check for free turning.

5.2 Disassembly Procedures

TO PREPARE FOR DISASSEMBLY PROCEED AS FOLLOWS:

a) Never use heat to disassemble the pump; this could cause an explosion by any trapped liquid.

b) Lock out power supply to motor.

c) Shut off valves controlling the flow from the pump.

d) Disconnect coupling.

e) Disconnect motor and remove the motor from the support.

f) Disconnect the discharge pipe at the discharge flange.

g) Dismantle the flow controls (when furnished).

h) Remove the bolts holding mounting plate to support and lift the pump from the sump and lay horizontally on the proper supports.

i) Remove the stuffing box gland if any corrosive and/or toxic fluids are pumped. **USE EXTREME CAUTION!**

The numbers located on Figure 3, refer to the procedure steps. e.g.: Number 1. Refers to Step 1.

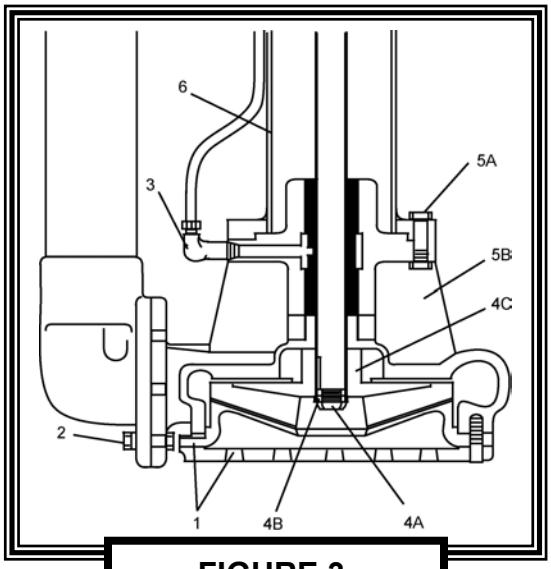


FIGURE 3.

1) Remove strainer and suction cover.

2) Disconnect discharge pipe from casing.

3) Disconnect any steady bearing flush tubing.

4) Remove the impeller screw (4A) and washer (4B) and pull the impeller (4C) and key off of the shaft.

5) Remove the column to casing bolts (5A) and pull the casing (5B) from the column.

6) Remove the column to steady bearing housing bolts and slide the column pipe off of the shaft. On longer units, there is one or more column pipes and steady baring housings.

   Starting at the casing end of the pump, remove the column pipes and steady bearing housings one at a time. While removing columns, support the shaft to prevent bending and possible damage to the bearings.

HINT:

Match mark each column pipe-bearing housing joint to enable correct position of these parts during reassembly.

7) Remove pump half coupling hub and key.

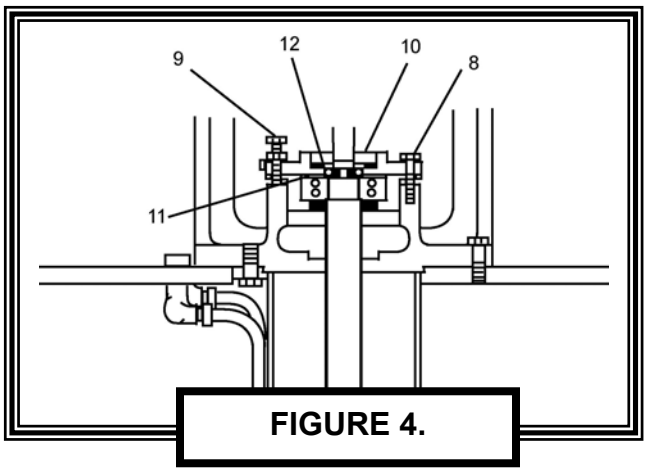


FIGURE 4.

8) Remove bearing shell bolts and slide the bearing shell assembly from the bearing housing. (See Figure 4.)

9) Remove adjustment bolts and jam nuts.

10) Remove end cover/slip seal from the bearing shell. A screwdriver can be used to pry the seal from the housing.

11) Slide the bearing shell off the bearing and shaft.

12) Remove the bearing locknut and washer. Pull the bearing off the shaft with a puller.

13) The motor support, bearing housing and upper stuffing box (if provided) need not be removed unless they are to be replaced. If the pump has an upper stuffing box the packing and the lantern ring should be replaced.

14) Steady bearings and casing bushing should not be removed unless they are to be replaced.

5.3 Inspections and Overhaul

Impeller

Replace if impeller shows excessive erosion, corrosion and extreme wear or vane breakage. Check the impeller balance.

Shaft

Check shaft to see that it is straight. Baring areas (ball and steady bearings) must be smooth and in good condition. Replace if necessary.

Ball Bearing

Replace if worn, loose or rough and noisy when rotated. New bearings should not be unwrapped until ready for use. Replacement bearings must be the proper size and type as specified. Refer to Section 4, *Materials of Construction*.

Steady Bearings

Check bearing bore for excessive wear and roughness. Replace worn or damaged bearings.

To replace steady bearings:

a) Press bearings from housing using a suitable tool. Clean housing thoroughly.

b) Apply a light coating of oil to the bore of the bearing housing and the O.D. of bearings.

c) Carefully press the new bearing into the housing. It is not necessary to align the bearing lube holes with the housing lube hole.

For sealed bearing housings: Repeat steps (a) through to (c) above.

d) Press a new lip seal into the bearing housing. Care should be taken to keep the seal "Square" as it is pressed.

e) Press the new bearing down to the lip seal.

f) Press the second lip seal down to the bearing.

All steady bearings within the same group have the same outside dimension. Any bearing material, metallic, graphite, fluted, etc., can be inter-changed within that housing without any modification (includes sealed bearings).

Grease Seals

Replace if torn or otherwise damaged. The seals are held by a press fit. Lips on seals should face outward (away from the bearings).

5.4 Reassembly Procedure

This section covers reassembly of the pump after complete disassembly. Make sure all directions in Section 5.3, *Inspection and Overhaul*, have been followed.

1) Press the ball bearing onto the shaft as far as possible by hand. Heating the bearing will facilitate assembly. Start the bearing square on the shaft and use a driving sleeve on the inner race to firmly seat the bearing.

2) Place bearing lock washer and locknut on the shaft and tighten firmly. Bent tang on the lock washer into the groove in the locknut. A spanner wrench should be used to tighten the locknut.

3) Install the lip seal (#333) into the motor stand and then install the bearing housing (#134) into the recess on the motor stand.

4) Slide the bearing end cover over the shaft and seat in the shell, replace adjustment bolts. Tighten jam nuts finger tight.

5) With the top plate in the vertical position, bolt the head column pipe into position and install the shaft/ball bearing assembly. Do not damage the bearing grease seal. Replace the bearing shell to housing bolts. Supports should be provided to support both the column pipe and the shaft.

6) Slide a steady bearing housing (when furnished) against the column pipe flange. If flush tubing is used, make sure drilled flush opening in bring housing flange matches the location of holes in the support plate.

7) Install additional column pipes and bearing housings, if any.

8) Install and bolt the casing to the column. Make sure discharge nozzle aligns with the discharge pipe hole in the support plate.

9) Add a film of oil to the shaft and place the impeller and key, (or screw impeller) on the shaft for S300 pumps. For S310 pumps, screw the rotor shaft into the shaft coupling.

10) Place the suction cover and strainer (S300), or head (S310), with the gasket against the casing and the bolt in place. If the unit is furnished with a ball type float control, the lower float rod guide arm is fastened to the casing with an extra long bolt.

11) For S300 pumps, check the axial travel of the impeller within the casing by using the procedure in Section 5.1, *Care & Maintenance* ~ Adjusting Impeller Clearance.

12) Connect discharge elbow and the piping to the casing.

13) Replace the pump half coupling hub.

14) Connect all auxiliary piping.

15) Lubricate the pump bearings as described in Section 3.0, Bearings.

16) If the unit has packed upper stuffing box, repack the box with new packing and lantern ring. Refer to Section 2, *Stuffing Boxes*.

17) Follow the directions in Sections 1, 2 & 3 for installation and operation instructions.

Pay particular attention to the instructions concerning the rotation and impeller adjustment.

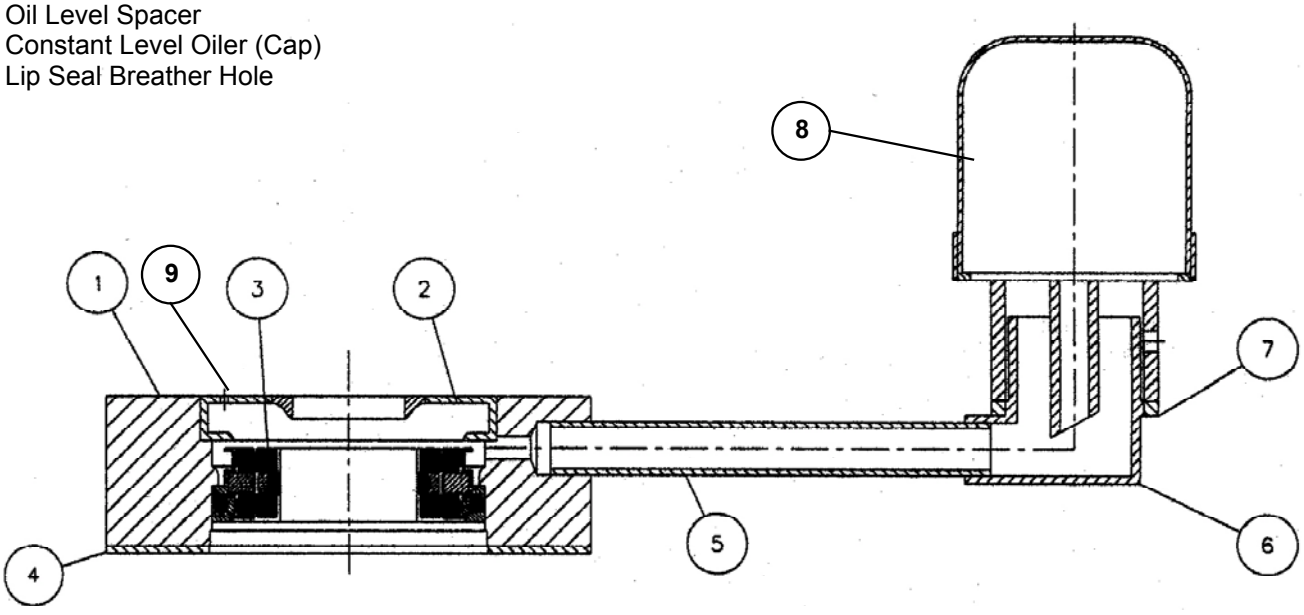
SECTION 5.5 - ROTARY VAPOUR SEAL

Your Eagle S300 or S310 Sump Pump may be equipped with an Eagle Rotary Vapour Seal.

The following installation guide is applicable to all types of Eagle S300 & S310 Sump Pumps. It is our experience that following this guideline will prolong your equipment life.

PARTS BREAKDOWN & DIAGRAM

1 S300 Rotary Vapour Seal Gland
2 Lip Seal
3 Magtecta Double Seal
4 Gland Gasket
5 1/4" x 6" Long NPT Nipple
6 A100 Constant Level Oiler (Base)
7 Oil Level Spacer
8 Constant Level Oiler (Cap)
9 Lip Seal Breather Hole



COMMISSIONING & START-UP INSTRUCTIONS

- **Do not disassemble any portion of the mechanical seal unit, as this will void any warranty.**

The Eagle Rotary Vapour Seal has been assembled and installed at the Eagle manufacturing facility however; the Constant Oil Leveller (6, 7, 8) is NOT installed and shipped loose with the pump unit.

The Oiler must be installed before pump operation can commence. The Oiler provides a liquid barrier and cooling for the mechanical seal. Refer to section 7 in the installation instructions below.

INSTALLATION INSTRUCTIONS

The following instructions are intended to help in the installation/ replacement of existing Rotary seals.

NOTES:

- **Eagle Rotary Vapour seals are a one-piece cartridge design.**
- **Do not disassemble any portion of the unit, as this will void any warranty.**
- **Do not use grease for the shaft or O-ring housing (stuffing box bore). The O-rings provide seal face anti-rotation and/ or drive.**

1. Ensure there are no sharp edges over which the seal O-ring must pass. Break all sharp edges. Pay special attention to keyways, shaft steps and housing bore edges.
2. Clean and degrease the shaft and stuffing box bore.
3. For replacements, ensure any old gasket material on stuffing box face.
4. Install a new gland gasket (4) onto the stuffing box face.
5. Slide the seal assembly onto shaft, ensuring the following
    a. The lip seal facing away from the stuffing box.
    b. ¼" seal gland port is facing towards window opening in stuffing box casting.
    c. Assembly should locate easily onto stuffing box.
6. Insert and tighten Gland bolts.
7. Install the seal fluid barrier components (5, 6, 7)
    a. Install ¼" x 6" nipple (5) into seal gland port and secure tightly.
    b. Install Oiler base to end of ¼" nipple. Oiler opening should face upwards.
    c. Install Oiler Spacer by sliding the spacer over the Oiler opening and allowing it to rest on the base. The spacer is provided to ensure the proper oil level for the Vapour Seal.
    d. Add oil to the Oiler Base (6) until a small amount of oil appears in the Lip Seal Breather Hole (9).
    e. While holding the Oiler Cap (8) in one hand, fill the cap approx. 3/4 full of oil, then quickly insert the cap and place into position on the Oiler Base (6).

Recommended oil: SAE 10 Lubricant (Approximately 180 SSU viscosity @ 100 Deg F)

SECTION 6 – TROUBLESHOOTING

SYMPTOM	POSSIBLE CAUSE
No Liquid Delivered	Priming – casing and suction pipe not completely filled with liquid or no liquid in the pit.
	Speed too low
	Discharge head too high.
	Impeller, suction pipe or strainer completely plugged.
	Wrong direction of rotation
	Air pocket in the suction line (if tailpipe is supplied)
	Not enough suction head for hot or volatile liquids **CHECK CAREFULLY AS THIS IS A FREQUENT CAUSE OF TROUBLE ON SUCH SERVICE**
Not Enough Liquid Delivered	Priming – no liquid in the pit
	Speed too low.
	Discharge head higher than anticipated
	Impeller, suction pipe or strainer partially plugged
	Wrong direction of rotation
	Not enough suction head for hot or volatile liquids **CHECK CAREFULLY AS THIS IS A FREQUENT CAUSE OF TROUBLE ON SUCH SERVICE**
	Mechanical Defects: Impeller clearance too great. Impeller damage.
Not Enough Pressure	Speed too low
	Air or gases in liquid
	Impeller diameter may be too small
	Mechanical Defects: Impeller clearance too great. Impeller damage.
	Wrong direction of rotation
	Pressure gauge on wrong place on discharge nozzle or discharge pipe
	Impeller not properly adjusted
Pump Works for a While Then Quits	Float Control needs adjustment
	Not enough suction head for hot or volatile liquids **CHECK CAREFULLY AS THIS IS A FREQUENT CASUE OF TROUBLE ON SUCH SERVICE.**
	Air or gases in liquid
	Impeller suction pipe or strainer plugged.
Pump Takes Too Much Power	Speed too high
	Head lower than rating, pumping too much liquid
	Liquid heavier than anticipated
	Mechanical defects: Shaft bent Rotating element binds. Pump and driving unit misaligned.
	Wrong direction of rotation.
Pump is Noisy	Hydraulic noise
	Mechanical Defects: Shaft bent Rotating parts bind, are loose or broken Bearing sworn out Pump and driving unit misaligned Impeller burring on suction cover or casing
	When connected to electric motors, check whether motor wiring is correct and receives full voltage.

SECTION 7 – SPARE PARTS

7.0 Spare Parts

To ensure against possible long and costly "downtime" periods, especially on critical services, it is advisable to have spare parts on hand.

The following is a list of recommended group parts

#	PART DESCRIPTION	Qty Required	#	PART DESCRIPTION	Qty Required
1	Ball Bearing – Coupling End (112)	One (1)	**6**	Impeller (101) for S300 Pumps	One (1)
2	Grease Seal – Bearing Cover (332)	One (1)	**7**	Rotor Shaft (22) for S310 Pumps	One (1)
3	Grease Seal – Motor Stand (333)	One (1)	**8**	Pump Shaft (122)	One (1)
4	Steady Bearing (197)	Qty depends on pump length	**9**	Motor Drive Coupling Insert	One (1)
5	Grease Seal – Internal Bearing (334)	Qty depends on pump length	**10**	Mechanical seal (*If pump is supplied with seal)	One (1)

7.1 Instructions for Ordering Spare Parts

To assure proper efficient pump orientation, your orders should include:

- Model number, size of the pump and serial number. This data can be obtained from the nameplate.
- Indicate the names, part numbers and materials of the parts required.
- Give the quantity of the parts required.
- Give the complete billing and shipping instructions.

Eagle Pump & Compressor Ltd.
7025 - 5th Street, SE
Calgary, AB T2H 2G2

Phone: 403-253-0100
Fax: 403-253-8884

Eagle Pump & Compressor warrants all the products of its own manufacture against defective materials and workmanship only, as follows:

Pumps

Pumps are warranted for (12) months from date of start-up or (18) months from date of shipment from the factory, whichever occurs first.

Other Components

With respect to products not manufactured by **Eagle**, **Eagle** will, if practical, pass along the warranty of the original manufacturer.

Parts

Ninety (90) days from date of sale.

Notice of alleged defect must be given to seller in writing with all identifying details including serial number, model number, type of equipment and date of purchase, within thirty (30) days of the discovery of same during the warranty period.

Eagle's obligation under this warranty is limited to repairing, or at its option, replacing of any product or part thereof, which proves to be defective, provided such defect, occurred in normal service and not as a result of misuse, abuse, neglect or accident. F.O.B. nearest authorized warranty center.

If requested by **Eagle**, such product or part thereof must be promptly returned to **Eagle**, freight prepaid for inspection.

This warranty shall not apply and **Eagle** shall not be responsible for:

a) Improper application of the product;
b) Consequential, collateral or special losses or damages;
c) In no event shall the total liability exceed the initial cost of the repair;
d) Equipment conditions caused by wear due to abnormal conditions of use;
e) Deviation from operating instructions, specification or other special terms of sale;
f) Travel time, charges related to travel such as mileage, sustenance, etc., and/or overtime;
g) Labour charges other than specified and approved by **Eagle**, loss or damage resulting from improper operation, maintenance or repairs made by person(s) other than Eagle's personnel.

In no event shall **Eagle** be liable for any claims, whether arising from breach of contract or warranty claims of negligence or negligent manufacture, in excess of the original repair price.

THIS WARRANTY IS THE SOLE SERVICE AND REPAIR WARRANTY OF EAGLE, AND ANY OTHER WARRANTIES, EXPRESSED, IMPLIED IN LAW OR IMPLIED IN FACT, INCLUDING ANY WARRANTIES OF MERCHANTIABILITY AND FITNESS FOR PARTICULAR USE, ARE HEREBY SPECIFICALLY EXCLUDED.

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 the company.

EAGLE
PUMP & COMPRESSOR LTD.

7025 - 5th Street SE, Calgary, AB T2H 2G2 Canada

Rotary Screw Compressors
Air/Gas Dryers
Vertical Sump Pumps
Multistage Horizontal Pumps
ANSI Centrifugal Pumps

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1-888-831-2777

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