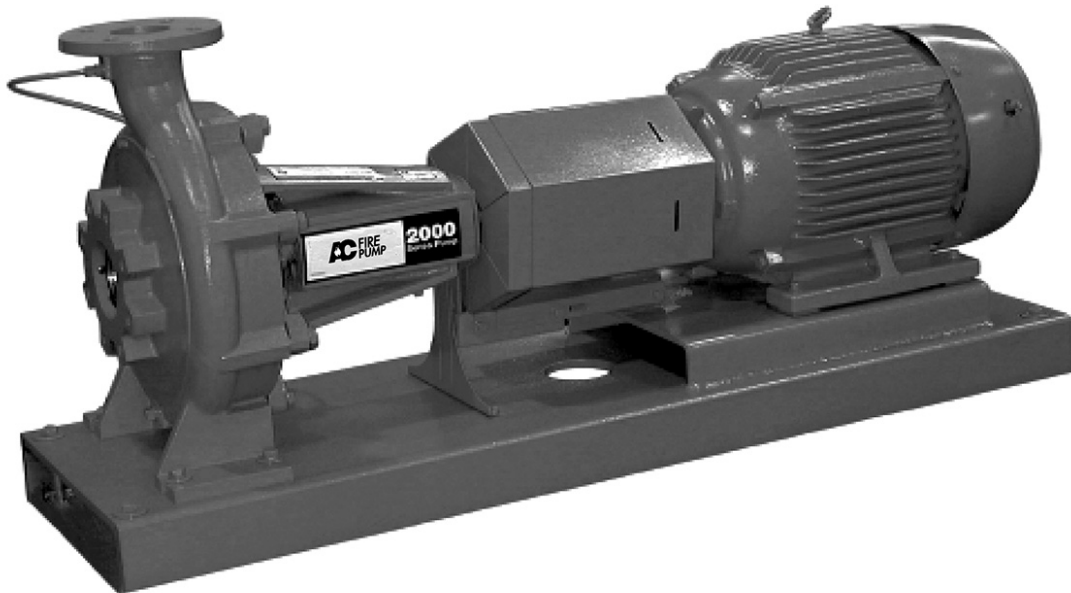


INSTRUCTION MANUAL

AC8652
REVISION D



INSTALLER: PLEASE LEAVE THIS MANUAL FOR THE OWNER'S USE.

2000 Series Frame Mounted Pumps

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NOTE

The information contained in this book is intended to assist operating personnel by providing information on the characteristics of the purchased equipment.

It does not relieve the user of their responsibility of using accepted engineering practices in the installation, operation, and maintenance of this equipment.

Any further questions, contact A-C Fire Pump, (847) 966-3700.

DESCRIPTION

The Series 2000 Frame Mounted Centrifugal Pump is an end suction centerline discharge pump. The Series 2000 Pump's rear pull out construction makes servicing simpler and faster. The hydraulically balanced impellers extend bearing life and assure smoother, quieter operation.

PUMP APPLICATION

The Series 2000 Pump's available constructions and sizes make it ideal for applications in general industry, water supply, water transfer, condenser, and chilled and hot water circulation.

SAFETY INSTRUCTIONS



SAFETY INSTRUCTIONS

This safety alert symbol will be used in this manual and on the pump safety instruction decals to draw attention to safety related instructions. When used the safety alert symbol means ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED! FAILURE TO FOLLOW THE INSTRUCTIONS MAY RESULT IN A SAFETY HAZARD.

Your Series 2000 pump should have the following safety instruction decals located approximately as shown. If the decals are missing or are illegible contact your local AC Fire Pump Systems representative for a replacement. (Fig. 1)

ELECTRICAL SAFETY:



WARNING: Electrical Shock Hazard

Electrical connections to be made by a qualified electrician in accordance with all applicable codes, ordinances, and good practices. Failure to follow these instructions could result in serious personal injury or death, and property damage.



WARNING: Electrical Overload Hazard

Three phase motors must have properly sized heaters to provide overload and under voltage protection. Single-phase motors have built-in overload protectors. Failure to follow these instructions could result in serious personal injury or death, and property damage.

THERMAL SAFETY:



WARNING: Extreme Temperature Hazard

If pump, motor, or piping is operating at extremely high or low temperature, guarding or insulation is required. Failure to follow these instructions could result in serious personal injury or death, and property damage.

MECHANICAL SAFETY:



WARNING: Unexpected Startup Hazard

Disconnect and lockout power before servicing. Failure to follow these instructions could result in serious personal injury or death, and property damage.



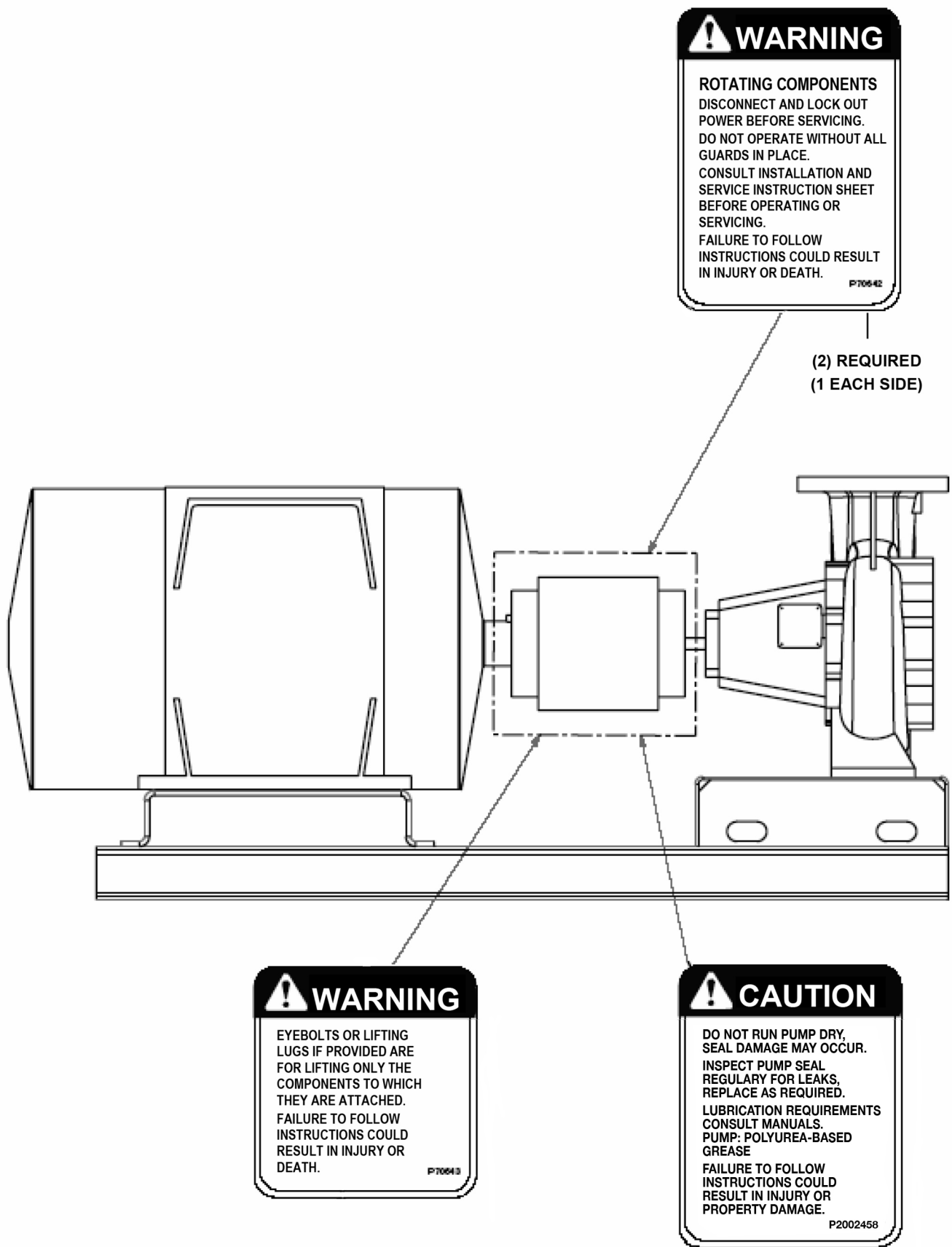
WARNING: Excessive System Pressure Hazard

The maximum working pressure of the pump is listed on the nameplate, do not exceed this pressure. Failure to follow these instructions could result in serious personal injury or death, and property damage.



WARNING: Excessive Pressure Hazard Volumetric Expansion

The heating of water and other fluids causes volumetric expansion. The associated forces may cause failure of system components and release of high temperature fluids. Installing properly sized and located compression tanks and pressure relief valves will prevent this. Failure to follow these instructions could result in serious personal injury or death, and property damage.



! WARNING

ROTATING COMPONENTS
 DISCONNECT AND LOCK OUT
 POWER BEFORE SERVICING.
 DO NOT OPERATE WITHOUT ALL
 GUARDS IN PLACE.
 CONSULT INSTALLATION AND
 SERVICE INSTRUCTION SHEET
 BEFORE OPERATING OR
 SERVICING.
 FAILURE TO FOLLOW
 INSTRUCTIONS COULD RESULT
 IN INJURY OR DEATH.

P70642

(2) REQUIRED
 (1 EACH SIDE)

! WARNING

EYEBOLTS OR LIFTING
 LUGS IF PROVIDED ARE
 FOR LIFTING ONLY THE
 COMPONENTS TO WHICH
 THEY ARE ATTACHED.
 FAILURE TO FOLLOW
 INSTRUCTIONS COULD
 RESULT IN INJURY OR
 DEATH.

P70643

! CAUTION

DO NOT RUN PUMP DRY,
 SEAL DAMAGE MAY OCCUR.
 INSPECT PUMP SEAL
 REGULARLY FOR LEAKS,
 REPLACE AS REQUIRED.
 LUBRICATION REQUIREMENTS
 CONSULT MANUALS.
 PUMP: POLYUREA-BASED
 GREASE
 FAILURE TO FOLLOW
 INSTRUCTIONS COULD
 RESULT IN INJURY OR
 PROPERTY DAMAGE.

P2002458

FIG. 1

PUMP LOCATION

Locate the pump so there is sufficient room for inspection, maintenance, and service. If the use of a hoist or tackle is needed, allow ample head room.



WARNING

Eyebolts or lifting lugs if provided are for lifting only the components to which they are attached. Failure to follow instructions could result in injury or death.

If lifting of the entire pump is required, do so with slings placed as shown. (Fig. 2 & 3)

The best pump location for sound and vibration absorption is on a concrete floor with subsoil underneath. If the pump location is overhead, special precautions should be undertaken to reduce possible sound transmission, consult a sound specialist.

If the pump is not on a closed system, it should be placed as near as possible to the source of the liquid supply, and located to permit installation with the fewest number of bends or elbows in the suction pipe.

The installation must be evaluated to determine that the Net Positive Suction Head Available (NPSHA) meets or exceeds the Net Positive Suction Head Required (NPSHR), as stated by the pump performance curve.

IMPORTANT: Do not install and operate Series 2000 Pumps in closed systems unless the system is constructed with properly sized safety devices and control devices. Such devices include the use of properly sized and located pressure relief valves, compression tanks, pressure controls, temperature controls, and flow controls as appropriate. If the system does not include these devices, consult the responsible engineer or architect before making pumps operational.

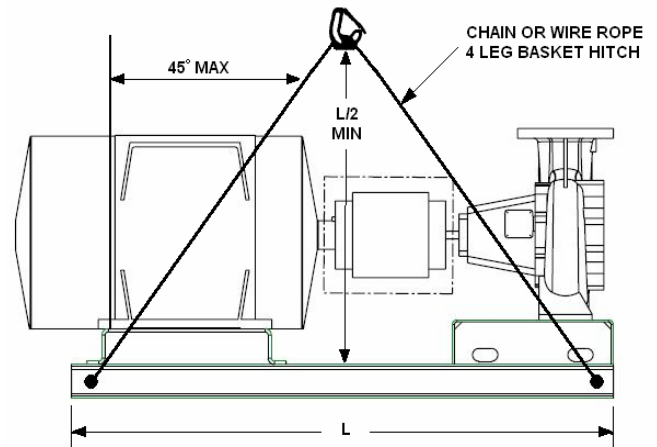
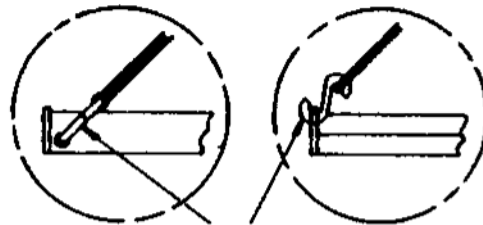


FIG. 2 – Bases with Lifting Holes



“S” Hooks

FIG. 2A

FIG. 2B

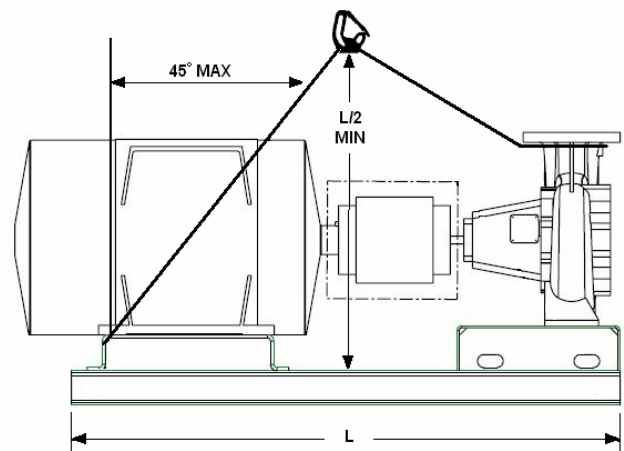


FIG. 3 – Bases without Lifting Holes

INSTALLATION

This pump is built to provide years of service if installed properly and attached to a suitable foundation. A base of concrete weighing 2-1/2 times the weight of the pump is recommended. (Check the shipping ticket for pump weight.)

If possible, tie the concrete pad in with the finished floor. Use foundation bolts and larger pipe-sleeves to give room for final bolt location. (Fig. 4)

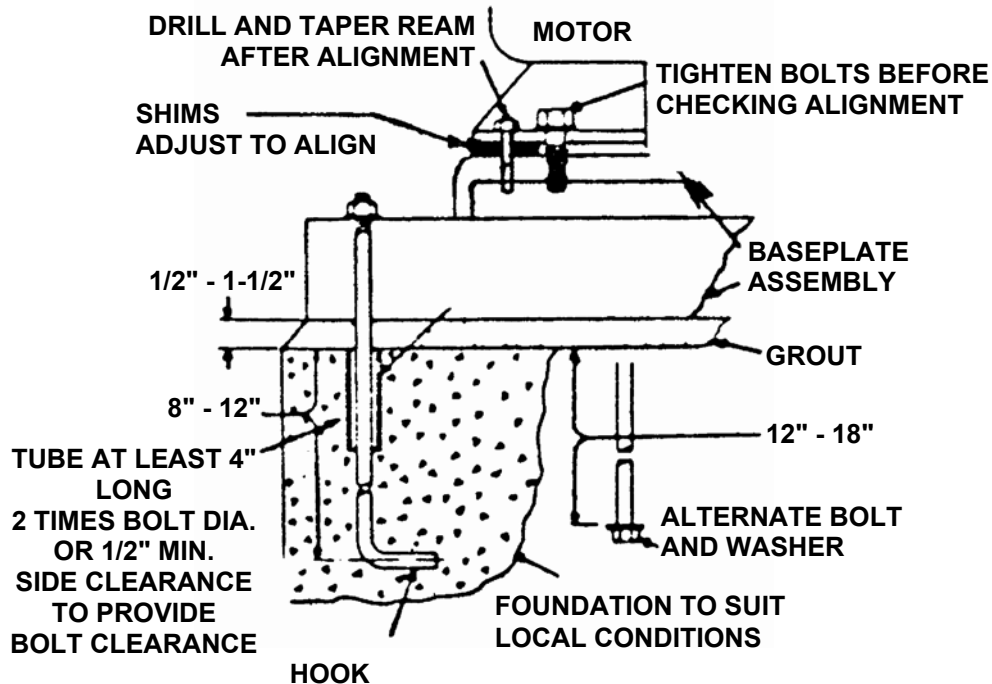


FIG. 4

LEVELING

Place the pump on its concrete foundation supporting it with steel wedges or shims totaling 1" in thickness. These wedges or shims should be put on both sides of each anchor-bolt to provide a means of leveling the base.

IT IS VERY IMPORTANT THAT THE PUMP-BASE BE SET LEVEL TO AVOID ANY MECHANICAL DIFFICULTIES WITH THE MOTOR OR PUMP. THIS PUMP WAS PROPERLY ALIGNED (IF FURNISHED WITH A MOTOR) AT THE FACTORY. HOWEVER, SINCE ALL PUMP BASES ARE FLEXIBLE THEY MAY SPRING AND TWIST DURING SHIPMENT. DON'T PIPE THE PUMP UNTIL IT IS REALIGNED. AFTER PIPING IS COMPLETED AND AFTER THE PUMP IS GROUTED-IN AND BOLTED-DOWN, ALIGN IT AGAIN. IT MAY BE NECESSARY TO RE-ADJUST THE ALIGNMENT FROM TIME TO TIME WHILE THE UNIT AND FOUNDATION ARE NEW.

GROUTING

After the pump has been leveled, securely bolted to the floor, and properly aligned, a good grade of non-shrinking grout should be poured inside the pump base. To hold wedges or shims in place, allow the grout to flow around them.

SEE ANSI/OSHA COUPLER GUARD REMOVAL/INSTALLATION

(SEE BELOW)

ALIGNMENT PROCEDURE

NOTE: A flexible coupling will only compensate for small amounts of misalignment. Permissible misalignment will vary with the make of coupling. Consult coupling manufacturer's data when in doubt.

Allowances are to be made for thermal expansion during cold alignment, so that the coupling will be aligned at operating temperature. In all cases, a coupling must be in alignment for continuous operation. Even though the coupling may be lubricated, misalignment causes excessive wear, vibration, and bearing loads that result in premature bearing failure and ultimate seizing of the pump. Misalignment can be angular, parallel, or a combination of these, and in the horizontal and vertical planes. Final alignment should be made by moving and shimming the motor on the base plate, until the coupling hubs are within the recommended tolerances measured in total run-out. All measurements should be taken with the pump and motor foot bolts tightened. The shaft of sleeve bearing motors should be in the center of its mechanical float.

NOTE: Proper alignment is essential for correct pump operation. This should be performed after base plate has been properly set and grout has dried thoroughly according to instructions. Final alignment should be made by shimming driver only. Alignment should be made at operating temperatures.



WARNING: Unexpected Start-up Hazard

Disconnect and lock out power before servicing. Failure to follow these instructions could result in serious personal injury or death and property damage.

ANSI/OSHA COUPLER GUARD REMOVAL/INSTALLATION



WARNING: Unexpected Start-up Hazard

Disconnect and lock out power before servicing. Failure to follow these instructions could result in serious personal injury or death and property damage.

NOTE: Do not spread the inner and outer guards more than necessary for guard removal or installation. Over spreading the guards may alter their fit and appearance.

Removal

- Remove the two capscrews that hold the outer (motor side) coupler guard to the support bracket(s).
- Spread the outer guard and pull it off the inner guard.
- Remove the capscrew that holds the inner guard to the support bracket.
- Spread the inner guard and pull it over the coupler.

Installation

- Check coupler alignment before proceeding. Correct if necessary.
- Spread the inner guard and place it over the coupler.
- With the inner guard straddling the support bracket, install a capscrew through the hole (or slot) in the support bracket and guard located closest to the pump. Do not tighten the capscrew.
- Spread the outer guard and place it over the inner guard.
- Install the outer guard capscrews by following the step stated below which pertains to your particular pump:
 - For pumps with a motor saddle support bracket:* Ensure the outer guard is straddling the support arm, and install but do not tighten the two remaining capscrews.
 - For pumps without a motor saddle support bracket:* Insert the spacer washer between the holes located closest to the motor in the outer guard, and install, but do not tighten, the two remaining capscrews.

- f. Position the outer guard so it is centered around the shaft, and so there is less than 1/4" of the motor shaft exposed. On guards that utilize a slotted support bracket, the inner guard will have to be

positioned so there is only 1/4" of the pump shaft exposed.

- g. Holding the guard in this position, tighten the three capscrews.

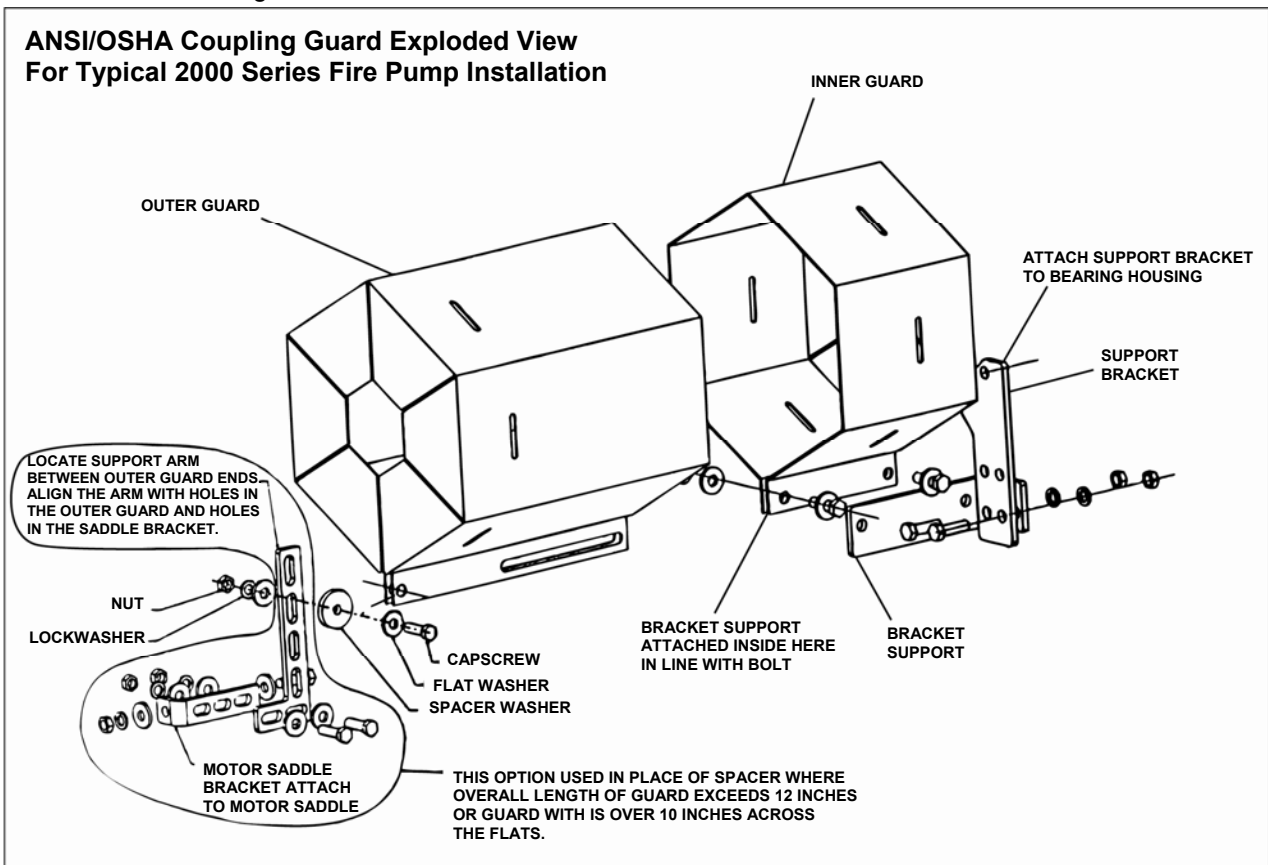


FIG. 5

Method 1 – Straight Edge Alignment for Standard Sleeve Type Coupler with Black Rubber Insert

(See Fig. 5A)

Proceed with this method only if satisfied that face and outside diameters of the coupling halves are square and concentric with the coupling borers. If this condition does not exist or elastomeric couplings do not make this method convenient, use Method 2.

1. Check angular misalignment using a micrometer or caliper. Measure from the outside of one flange to the outside of the opposite flange at four points 90° apart. DO NOT ROTATE COUPLER. Misalignment up to 1/64" per inch of coupler radius is permissible.
2. At four points 90° apart (DO NOT ROTATE COUPLER), measure the parallel coupler misalignment by laying a

straight edge across one coupler half and measuring the gap between the straight edge and opposite coupler half. Up to a 1/64" gap is permissible.

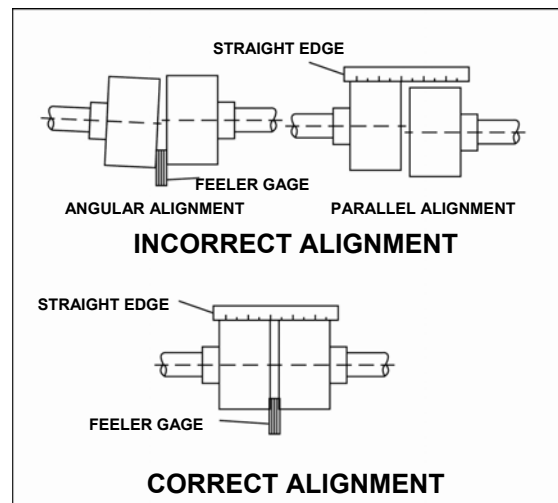


FIG. 5A – CHECKING ALIGNMENT (METHOD 1)

Method 2- For Orange Hytrel Insert, 3500 Operation, or All Other Coupler Types Except as Noted Below

(See Fig. 5B)

- a. Make sure each hub is secured to its respective shaft and that all connecting and/or spacing elements are removed at this time.
- b. The gap between the coupling hubs is set by the manufacturer before the units are shipped. However, this dimension should be checked. (Refer to the coupling manufacturer's specifications supplied with the unit.)
- c. Scribe index lines on coupling halves as shown in Fig. 5B.
- d. Mount dial indicator on one hub as shown for parallel alignment. Set dial to zero.
- e. Turn both coupling halves so that index lines remain matched. Observe dial reading to see whether driver needs adjustment (See paragraph i below).
- f. Mount dial indicator on one hub as shown for angular alignment. Set dial to zero.
- g. Turn both coupling halves so that index lines remain matched. Observe dial reading to see whether driver needs adjustment (See paragraph i below).
- h. Assemble coupling. Tighten all bolts and set screw(s). It may be necessary to repeat steps c through f for a final check.
- i. For single element couplings, a satisfactory parallel misalignment is 0.004"T.I.R., while a satisfactory angular misalignment is 0.004"T.I.R. per inch of radius R (See Fig. 5B).

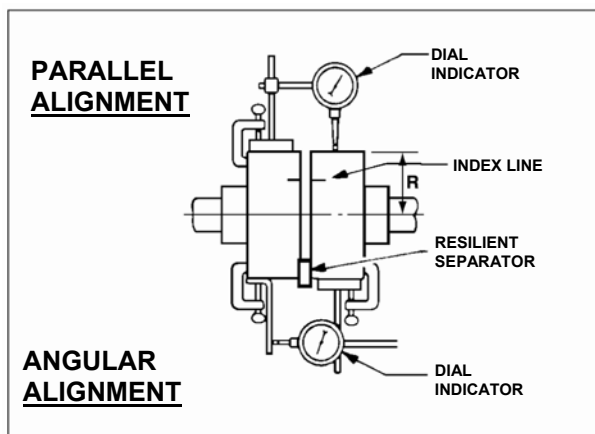


FIG. 5B – CHECKING ALIGNMENT (METHOD 2)

Grid Couplings

NOTE: The following procedure is intended for mounting and alignment of Rexnord Industries, LLC. and Clarke Fire Protection Products, Inc., Tapered Grid Couplings.

Adequate lubrication is essential for satisfactory operation. Grease supplied by the coupling manufacturer is highly recommended. Other greases to be used should be approved by the coupling manufacturer.

Alignment is shown using spacer bar and straight edge. Rexnord Industries, LLC. and Clarke Fire Protection Products, Inc. state this practice has been proven for many industrial applications. Superior alignment can be achieved through the use of dial indicators as shown above.

1. Clean all metal parts using non-flammable solvent. Install keys and mount shaft hubs with flange faces flush with shaft ends or as otherwise specified, BE (Shaft Gap) = 3.5" for 3x2x6.5F 2000 Series Firepump and 5.00" for 4x3x9F 2000 Series Firepump. Tighten setscrews.

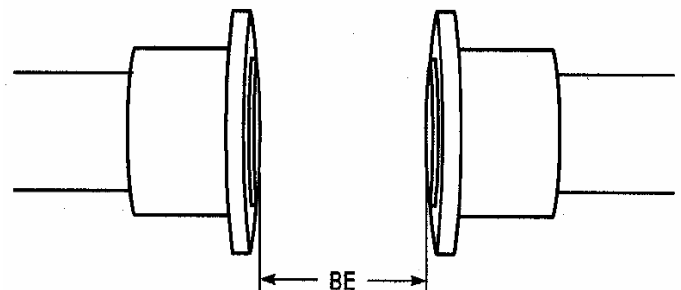


FIG. 5C – SHAFT GAP

2. Bring the pump and motor halves of the coupler into approximate height alignment, by placing equal amounts of shims under all the motor feet. Tighten the motor bolts.
3. Lightly coat seals with coupling vendor supplied grease and roll the seal over the spacer hub teeth into place. Position each half spacer hub on register of shaft hub and fasten parts together. Torque fasteners to specifications in Fig. 5J.

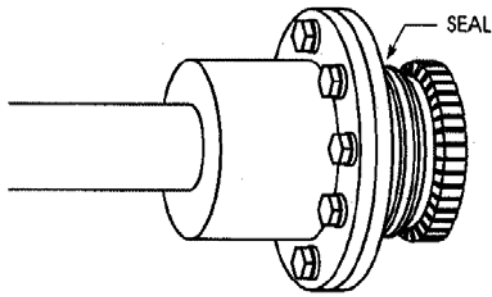


FIG. 5D – SHAFT HUB, SEAL, & SPACER HUB ASSEMBLY

4. Use a spacer bar equal in thickness to the gap specified in Fig. 5J. Insert bar, as shown below, to same depth at 90° intervals and measure clearance between bar and hub face with feeler gauges. The difference in minimum and maximum measurements must not exceed the ANGULAR installation limits shown in Fig. 5J.

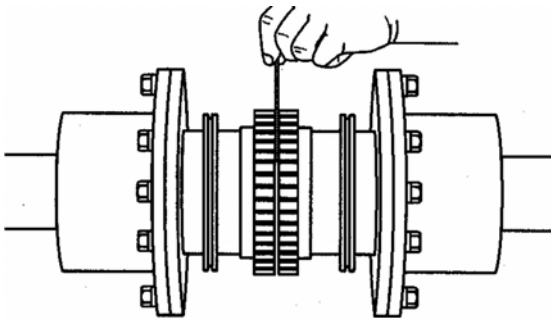


FIG. 5E – USING SPACER BAR

5. Align so that a straight edge rests within the limits shown in Fig. 5J on both hubs as shown below and also at 90° intervals. Check with feelers. The clearance must not exceed the PARALLEL OFFSET installation limits specified in Fig. 5J.

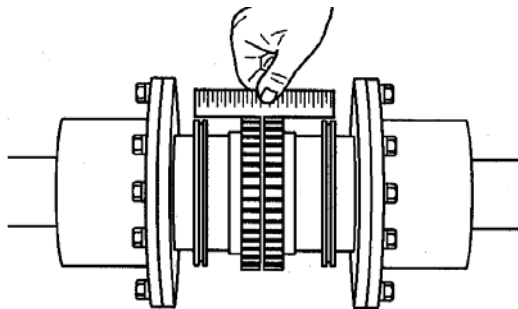


FIG. 5F – USING STRAIGHT EDGE

6. If adjustment is needed, loosen the motor bolts and add (or remove) equal amounts of shims under each motor foot, to align the height. To correct side misalignment, strike the side of the motor foot with a mallet. Tighten the motor bolts and check again. If a correction is made, re-check alignment in all directions. Repeat this process until the desired result is obtained.

7. Pack gap and grooves with coupling vendor supplied grease before inserting grid. When grids are furnished in two or more segments, install them so that all cut ends extend in the same direction as shown below. This will ensure correct grid contact with non-rotating pin in cover halves. Spread the grid slightly to pass over the coupling teeth and seat with a soft mallet.

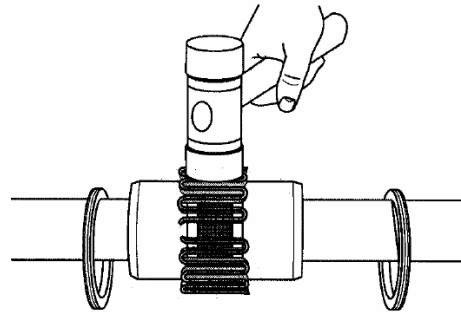


FIG. 5G – SEATING THE GRID

8. Pack the spaces between and around the grid with as much as coupling vendor supplied grease as possible and wipe off the excess until flush with the top of the grid. Position seals on hubs to line-up with grooves in cover. Position gaskets on flange of lower cover half and assemble covers so that the match marks are on the same side.

9. Ensure lube plugs are installed in cover.



CAUTION: Coupling Failure

Do not operate coupling without proper lubrication. Coupling failure may occur.

Failure to follow these instructions could result in property damage and/or moderate personal injury.

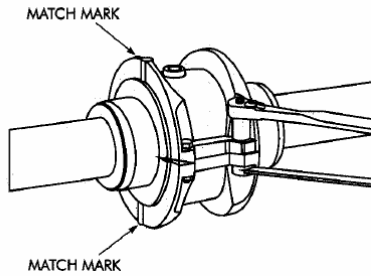
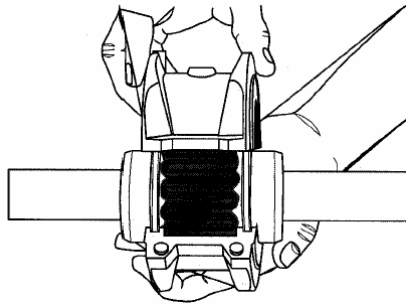
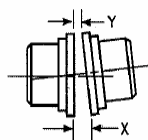
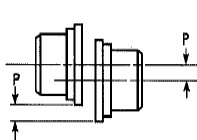


FIG. 5H – COVER INSTALLATION

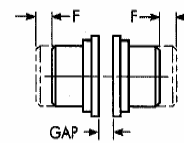
ANGULAR MISALIGNMENT



PARALLEL OFFSET MISALIGNMENT



END FLOAT



| Size | Installation Limits | | | | Fastener Tightening Torque Values | | | |
|-------|---------------------|---------------|-----------------|------------------------------------|---|------------------------------|-----------------------|----------|
| | Parallel Offset (P) | Angular (x-y) | Hub Gap +/- 10% | End Float Physical Limit (Min) 2xF | Cover Fastener Tightening Torque Values | Flange Type 31 & 35 | Maximum Allowable RPM | Lube Wt. |
| | Max Inch | Max Inch | Inch | Inch | In. Series Fasteners (lb*in) | In. Series Fasteners (lb*in) | | lb |
| 1040T | 0.006 | 0.003 | 0.125 | 0.211 | 100 | 120 | 3600 | 0.12 |
| 1050T | 0.008 | 0.004 | 0.125 | 0.212 | 200 | 250 | 3600 | 0.15 |
| 1060T | 0.008 | 0.005 | 0.125 | 0.258 | 200 | 440 | 3600 | 0.19 |
| 1070T | 0.008 | 0.005 | 0.125 | 0.259 | 200 | 440 | 1800 | 0.25 |
| 1080T | 0.008 | 0.006 | 0.125 | 0.288 | 200 | 825 | 1800 | 0.38 |

FIG. 5J – MISALIGNMENT & FASTENER TORQUE VALUES

Final Alignment

Final alignment cannot be accomplished until the pump has been operated initially for a sufficient length of time to attain operating temperature. When normal operating temperature has been attained, secure the pump to re-check alignment and compensate for temperature accordingly. See Alignment Section.



WARNING: Rotating Components Hazard

Do not operate pump without all guards in place. Failure to follow these instructions could result in serious personal injury or death and property damage.



WARNING: Coupling Failure

Do not operate pump with coupling out of alignment. Ensure final coupling alignment is within the values stated above or according to the coupling manufacturer's instructions. Coupling, pump, or driver failure may occur.

Failure to follow these instructions could result in serious personal injury or death and property damage.

Due to the different types of couplers available for your Series 2000 pump, refer to coupler manufacturer's instructions for alignment values and additional instructions.

ROTATION

Pump rotation is clockwise when viewed from back of the motor. An arrow is also located on the pump to show the direction of rotation.

PIPING

Always install a section of straight pipe between the suction side of the pump and first elbow. This reduces turbulence of the suction by straightening out the flow of liquid before it enters the pump. The length should be equal to ten times the diameter of the pipe.

Be sure to eliminate any pipe-strain on the pump. Support the suction and discharge pipes independently by use of pipe hangers near the pump. Line up the vertical and horizontal piping so that the bolt-holes in the pump flanges match the bolt-holes in the pipe flanges. **DO NOT ATTEMPT TO SPRING THE SUCTION OR DISCHARGE LINES INTO POSITION.** Coupling and bearing wear will result if suction or discharge lines are forced into position. The code for Pressure Piping (A.S.A.B. 31.1) lists many types of supports available for various applications.

As a rule, ordinary wire or band hangers are not adequate to maintain alignment. It is very important to provide a strong, rigid support for the suction and discharge lines.

Where considerable temperature changes are anticipated, fittings for absorbing

expansion should be installed in the system in such a way as to avoid strain on the pump.

On an open-system with a suction-lift, use a foot-valve of equal or greater area than the pump suction piping. Prevent clogging by using a strainer at the suction inlet next to the foot-valve. The strainer should have an area three times that of the suction pipe with a mesh hole diameter of no less than 1/4".

When using an isolation base, flexible piping should be used on both the suction and discharge sides of the pump.

A check valve installed in the discharge line will serve to protect the pump from water hammer. Also install an isolation valve for servicing and for throttling.

NOTES:

1. The pipeline should have isolation valves around the pump and have a drain valve in the suction pipe.
2. When installing connections to a threaded pump housing the use of PTFE tape sealer or a high quality thread sealant is recommended.

PRIMING AND STARTING



CAUTION: Seal Damage Hazard

Do not run pump dry, seal damage may occur. Failure to follow these instructions could result in property damage and/or moderate personal injury.

NOTICE:

Make sure the grease container, the greasing device, and the fittings are clean. Failure to do so can result in impurities entering the bearing housing when you regrease the bearings.

Before starting the pump, the pump body must be full of liquid. Manual priming may be required if the system does not automatically fill the pump body with liquid.

The pump should be started with the discharge valve closed and the suction valve fully open. After the pump is up to operating speed the discharge valve should be opened slowly.

IMPORTANT: The pump should never be operated with suction valve closed or throttled. This could result in cavitations.

Bearing Maintenance

Bearing Lubrication Schedule

| Type of bearing | First lubrication, assembled pumps and replacement bearing frames | First lubrication, replacement bearings | Lubrication interval, pump, polyurea-based grease, operating hours |
|----------------------------|---|---|---|
| Grease-lubricated bearings | Not applicable, lubricated before shipment | Hand pack bearings before pressing on the shaft. After bearing frame assembly, follow relube instructions to lube bearings. | <ul style="list-style-type: none"> • 3600 hours, 2 pole • 7200 hours, 4 pole • 50% for severe conditions: dirty, wet and/or above 100°F (38°C) ambient • 50% for bearing frame temperature above 180°F (82°C) • 75% for lithium-based grease |

Regrease the grease-lubricated bearings

It is important to lubricate pumps and motors that require regreasing with the proper grease. See the motor service instructions and nameplate for motor regreasing information. Pumps are to be regreased using the grease types listed below or approved equal. Always keep pump and motor properly lubricated.

1. With fully enclosed coupling guards, regrease pump while pump is running.
 - a. With old style open ended guards, stop pump, re-grease, and hand turn shaft before re-starting.
2. Wipe dirt from the grease fittings before greasing.
3. Fill both of the grease cavities through the fittings with the recommended grease. Stop when grease leaks out at shaft.
4. If needed, stop pump and wipe off excess grease.
5. Restart pump.

The bearing temperature usually rises after you regrease due to excess supply of grease. Temperatures return to normal in about two to four operating hours as the pump runs and purges the excess grease from the bearings. Maximum normal bearing housing temperature for polyurea-based grease is 225°F (107°C) and for lithium-based grease 180°F (82°C).

Lubricating grease requirements

NOTICE:

- Never mix grease of different consistencies (NLGI 1 or 3 with NLGI 2) or with different thickeners. For example, never mix lithium-based grease with a polyurea-based grease. This can result in decreased performance.
- Remove the bearings and old grease if you need to change the grease type or consistency. Failure to do so can result in equipment damage or decreased performance.

Specifications – Grease Types

| Polyurea-based greases | Lithium-based greases, NLGI 2 |
|--|--|
| Pumps built on or after Dec 1, 2014 use Polyurea-based greases. See date code label and lubrication label on pump or bearing frame indicating polyurea-base grease | Pumps built before Dec 1, 2014 were built with Lithium-based greases, NLGI 2, and do not have lubrication label on pump or bearing frame indicating pump grease type |
| ExxonMobil Polyrex™ EM | Shell Gadus® S2 V100 2 (was Alvania® RL 2) |
| Chevron SRI NLGI 2 | Chevron Multifak® EP 2 |
| Shell Gadus® S5 T100 2 | ExxonMobil Unirex™ N2 |

GENERAL INSTRUCTIONS

1. Keep this pump and motor properly lubricated.
2. When there is a danger of freezing, drain the pump.
3. Inspect pump regularly for leaky seals or gaskets and loose or damaged components. Replace or repair as required.

SERVICE INSTRUCTIONS



WARNING

Disconnect and lock out power before servicing. Failure to follow these instructions could result in injury or death.

1. Close valves on suction and discharge sides of pump. (If no valves have been installed, it will be necessary to drain the system.)



CAUTION

Check surfaces for extreme temperatures, allow pump temperature to reach acceptable level before proceeding. Open drain valve, do not proceed until liquid stops coming out of drain valve, if liquid does not stop flowing from drain valve, isolation valves are not sealing and should be repaired before proceeding. After liquid stops flowing from drain valve, leave drain valve open and continue. Remove the drain plug located on the bottom of the pump casing. Do not reinstall plug or close drain valve until reassembly is completed. Failure to follow these instructions could result in injury or death.

2. Remove coupler guard and loosen set screws in both coupler halves and slide each half back as far as possible on its shaft. Remove coupler sleeve. Where a full diameter impeller is used, it may be

necessary to remove the pump side coupler half and to slide the motor back on its base in order to gain sufficient clearance to remove the pump assembly from the casing.

3. Remove support foot capscrews. Loosen casing capscrews (1-904-0), do not remove them. Loosen only capscrews holding stuff box cover to casing. Start to remove the pump assembly from the casing (2-001-0).



CAUTION

Make certain the internal pressure is relieved before continuing. Failure to follow these instructions could result in injury or property damage.

Remove seal flushing tube, if used.

Remove the casing capscrews and remove the pump assembly from the casing.

4. Pull the entire rotating assembly from the casing leaving the casing connected to the piping unless it is to be repaired, replaced, or if applicable, to have new wear rings installed.

5. Remove the O-ring (2-914-0) from the stuffing box cover and inspect for damage. Replace if necessary.

IMPELLER REMOVAL

1. Lock the coupling end of the shaft in a padded vise.
2. Remove the impeller nut (4-023-0). To do this, turn the impeller nut in the same direction in which the impeller rotates (counterclockwise viewing from the suction inlet).
3. Pull the impeller (4-002-0) from the shaft and remove the impeller key (4-911-0).

DISMANTLING THE STUFFING BOX

A. Pumps with Mechanical Seals

1. Remove spacer sleeve (1-154-0).
2. Remove the two nuts holding the gland (6-014-0) to the stuffing box (2-036-0).
3. Pull the stuffing box cover off the shaft assembly.

NOTE: On the larger 2000 Series pumps, it will be necessary to remove the capscrews holding the stuffing box cover to the frame. The mechanical seal (6-400-0) should now be exposed on the shaft sleeve. (In some cases, the shaft sleeve may come off the shaft with the stuffing box cover. If this happens, gently press or pull the shaft sleeve and mechanical seal from the stuffing box toward frame side of the stuffing box cover.) This will expose the mechanical seal as above.

4. Remove the seal from the shaft sleeve, examine for damage, and if necessary replace.
5. Remove the gland (6-014-0), shaft sleeve (1-009-0), and the deflector (1-136-0) from the pump shaft. A puller may be used to remove the shaft sleeve if it does not slide off the pump shaft easily.

B. Pumps with Packed Stuffing Box

1. Loosen packing gland (6-014-0) by loosening the two gland retaining nuts.
2. Pull the stuffing box cover, gland, and packing from the shaft.
3. Remove the two gland retaining nuts and remove the gland (6-014-0). Remove the

packing rings (6-924-0) and, where applicable, the seal cage (6-013-0) from the stuffing box. A standard packing hook is recommended for removing the pack and seal cage.

4. Remove the packing base ring.

FRAME DISASSEMBLY

1. Remove bearing caps (5-018-3 and 5-018-4).
2. Remove snap ring (5-068-4) from the outboard bearing housing.
3. Press the shaft (5-007-0), outboard bearing (5-026-4), and inboard bearing (5-026-3) toward the motor side of the frame until the outboard bearing clears the frame's outboard bearing housing.
4. Using a suitable pair of snap ring pliers, remove snap ring (5-068-3) from the outboard bearing housing. (Flat snap ring located on the inside of the outboard bearing housing.)
5. Finish removing the shaft and outboard bearing.
6. Remove the snap ring (5-086-0) from the outboard end (motor end) of the pump shaft.
7. Using a suitable bearing press, remove the inboard bearing (5-026-3) and the outboard bearing (5-026-4) from the pump shaft (5-007-0).

CASING WEARING RING REMOVAL (OPTIONAL)

The optional wearing rings are removed from the casing and stuffing box cover by the following method:

1. Drill two axial holes into each wearing ring approximately 180° apart being careful not to drill into casing or stuffing box cover.
2. Split the wearing rings using a chisel.
3. Remove the parts from the wearing ring fit.

This completes the disassembly of the 2000 Series frame mounted pump. 1

ASSEMBLY PROCEDURES

FRAME ASSEMBLY

1. Press the outboard bearing (5-026-4) onto the motor side of the pump shaft (5-007-0).

NOTE: When pressing bearings onto the shaft, press only against the inner race.

2. Install snap ring (5-086-0) on the pump shaft with the tapered edge away from the bearing (outboard side of outboard bearing).
3. Place snap ring (5-068-3, flat snap ring) over the pump shaft (5-007-0) positioning the snap ring between the two bearing shoulders.

NOTE: There are two snap rings that go into the outboard bearing housing: snap rings (5-068-3 and 5-068-4). Snap ring (5-068-3) is flat and goes into the inside snap ring groove, and snap ring (5-068-4) is tapered and goes into the outside snap ring groove.

4. Press inboard bearing (5-026-3) onto the inboard side (pump side) of the pump shaft.
5. Press the inboard end (pump end) of the shaft-bearing assembly into the outboard end (motor end) of the pump frame. Press the unit toward the pump side of the frame until the inboard bearing clears the outboard bearing housing.

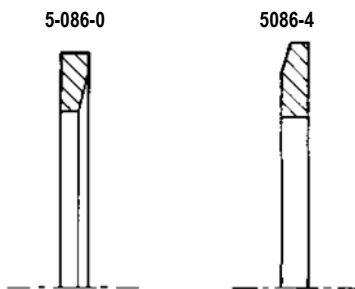


FIG. 6 – Tapered Snap Rings

6. Using a suitable pair of snap ring pliers, place snap ring (5-068-3, located on the pump shaft between the bearings) into the inside snap ring groove of the outboard bearing housing.
7. Continue pressing the shaft and bearing assembly into the frame until the outboard

bearing (5-026-4) seats firmly against snap ring (5-068-3) inside the outboard bearing housing.

8. Place snap ring (5-068-4) in the outside snap ring groove of the outboard bearing housing (tapered edge away from bearing).
9. Install bearing caps (5-018-3 and 5-018-4) onto both ends of the pump frame.

STUFFING BOX ASSEMBLY

NOTE: There are two pipe taps on the stuffing box; one closest to the gland, and one furthest away from the gland.

If the pump is equipped with mechanical seals, the stuffing box cover should be positioned with the pipe tap closest to the gland on top.

If the pump is equipped with packing, the stuffing box cover should be positioned so the pipe tap furthest away from the gland is on top.

For ease of assembly, install pipe fittings in the stuffing box pipe taps before assembling stuffing box on the frame.

A. Pumps with Mechanical Seals

1. Install the two gland retaining studs (6-908-0) into the stuffing box cover.
2. Install the rotating and stationary elements of the mechanical seal (6-400-0) on the shaft sleeve (1-009-0) being certain that the two wearing surfaces face each other. Position the seal on the sleeve according to the "G" dimension found in Fig. 7.
3. Place seal spring retainer into stuffing box.
4. Place seal spring into stuffing box.
5. Place sleeve and seal assembly into stuffing box with rotating half of seal installed closest to the impeller.
6. Install the seal gland (6-014-0) (flat side toward stuffing box) on the stuffing box using the gland studs (6-908-0) and gland nuts (6-903-0). Tighten gland nuts evenly until the gland is approximately 1/8" from the stuffing box.

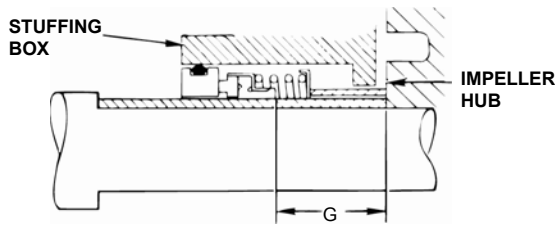


FIG. 7

| "G" Setting Dimensions | |
|---------------------------------|-------------------|
| Shaft Sleeve OD (inches) | G (inches) |
| 1.25 | 1.22 |
| 1.62 | 1.31 |
| 2.0 | 1.38 |

7. Slide the deflector ring (1-136-0) onto the motor shaft.
8. Slide the stuffing box cover, seal, and sleeve assembly onto the frame shaft being certain the stuffing box is closest to the frame. To prevent any leakage, use silicone sealant between the shaft and shaft sleeve.
9. If applicable, bolt the frame to the stuffing box using capscrews (1-904-0).

IMPELLER INSTALLATION

1. If the pump is equipped with mechanical seals, slide the spacer sleeve (1-154-0) over the shaft sleeve and into the stuffing box.
2. Install the impeller key into the keyway on the impeller side of the pump shaft.
3. Slide the pump impeller (4-002-0) onto the pump shaft.
4. Screw the impeller nut (4-023-0) onto the pump shaft until finger tight. Clamp the coupling end of the pump shaft in a padded vise, and tighten (clockwise as viewed from the suction inlet) the impeller nut to 25-30 ft. lbs.
5. For pumps with mechanical seals, tighten gland evenly against the stuffing box.

FINAL ASSEMBLY

1. Place the O-ring casing seal (2-914-0) around the O-ring seat on the stuffing box cover.
2. Carefully slide the frame assembly into the casing being sure not to pinch the O-ring. Insert the capscrews (1-904-0) through the frame and into the casing (the large 2000 Series pumps use capscrews and clamping lugs (2-937-0) to hold the frame to the casing). Tighten opposite capscrews evenly around the frame until the stuffing box has been drawn evenly into the casing. Then alternately torque each capscrew to 25 lbs.
3. Secure frame foot to pump base.
4. If necessary, connect the suction and discharge piping to the pump.
5. Connect the flush line to the stuffing box.

B. Pumps with Packed Stuffing Boxes

1. Slide deflector (1-136-0) onto the pump shaft.
2. Slide the packing gland (6-014-0) onto the pump shaft (flat side toward frame).
3. Slide the shaft sleeve (1-009-0) onto the pump shaft. To prevent leakage, use silicone sealant between the shaft and shaft sleeve.
4. Place the packing base ring (6-152-0) into the stuffing box. Slide the stuffing box cover over the pump shaft, and, if applicable, bolt the stuffing box to the frame using capscrews (1-904-0).
5. Install the packing (6-924-0) and, if applicable, the seal cage (6-013-0) into the stuffing box being sure to stagger the joints.
6. Tighten the packing gland nuts to seat the packing. Loosen the nuts to permit the packing to expand then retighten finger tight.

6. Align the pump to the motor as instructed.
7. Connect the pump to the motor. Reinstall the coupling guard and drain plugs. Close drain valve.
8. Connect the power to the motor. **CHECK THE MOTOR ROTATION.**
9. Open isolation valves, inspect pump for leaks. If not leaking, return pump to service.

NOTE FOR PACKED PUMPS: Final adjustment of the gland nuts must be done with the pump running. Allow 30 minutes between adjustments. Tightening the nuts too quickly can cause damage to the packing and sleeve. A good adjustment should allow approximately one (1) drip per second.

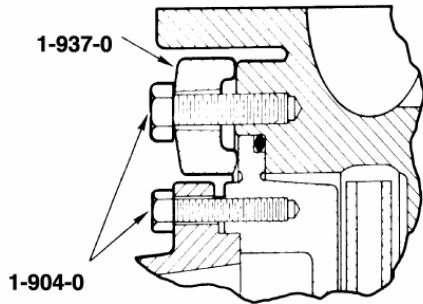
This completes the assembly of the 2000 Series pump.

NOTE: All pumps are shipped with coupling guards. Coupling guards must be in place before operating pump.

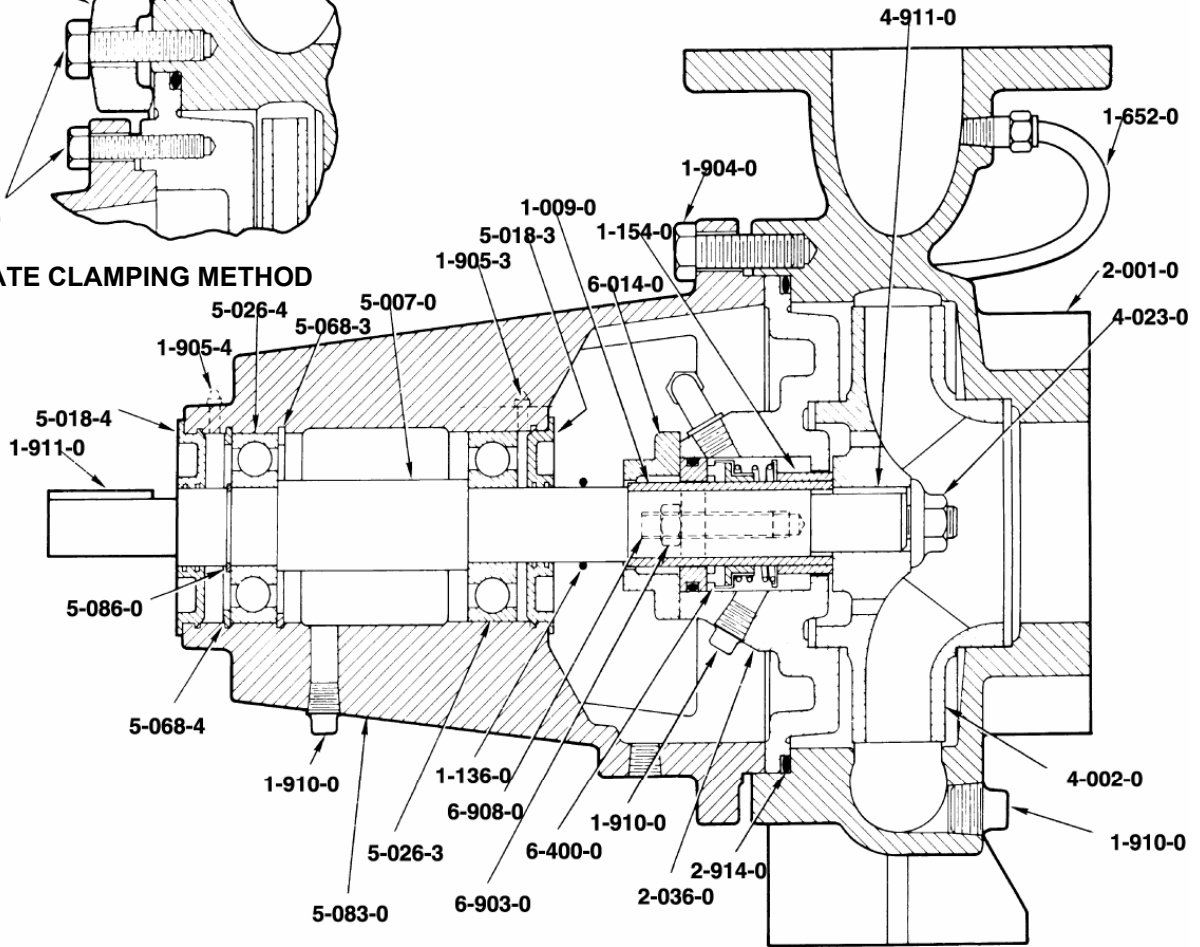


WARNING

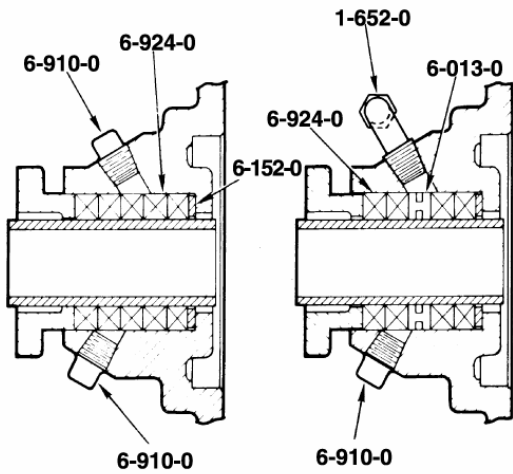
Do not operate without all guards in place. Failure to follow these instructions could result in injury or death.



ALTERNATE CLAMPING METHOD

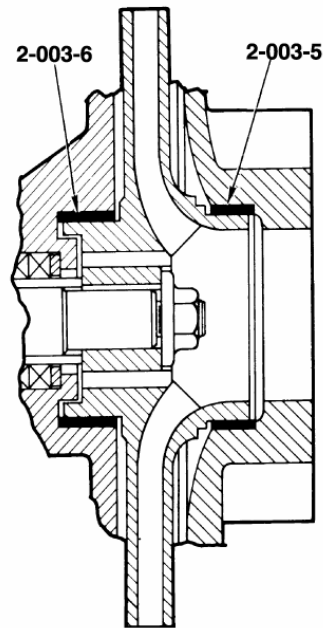


INTERNAL OR EXTERNAL FLUSH



**PUMP WITH PACKING
(PLUGGED)**

**PUMP WITH PACKING
OPTIONAL SEAL CAGE
(INTERNAL OR EXTERNAL)**



PUMP WITH OPTIONAL CASING WEAR RINGS

REPAIR PARTS LIST

| Cat. No. | Part Name | Quantity |
|----------|---------------------------|----------|
| 1-009-0 | Shaft Sleeve | 1 |
| 1-136-0 | Deflector | 1 |
| 1-154-0 | Spacer Sleeve | 1 |
| 1-248-1 | Frame Foot Assembly | 1 |
| 1-652-0 | By-Pass Piping Kit | 1 |
| 1-904-0 | Capscrews – Miscellaneous | 8 |
| | With Lugs | 16 |
| 1-905-3 | Grease Fitting, Inboard | 1 |
| 1-905-4 | Grease Fitting Outboard | 1 |
| 1-910-0 | Pipe Plugs | 2 |
| | Without By-Pass | 3 |
| 1-911-0 | Key, Coupling | 1 |
| 2-001-0 | Casing | 1 |
| 2-036-0 | Stuffing Box Cover | 1 |
| 2-914-0 | O-Ring, Casing Seal | 1 |
| 2-937-0 | Clamping Lug | 8 |
| 4-002-0 | Impeller | 1 |
| 4-023-0 | Impeller Nut | 1 |
| 4-911-0 | Key, Impeller | 1 |
| 5-007-0 | Shaft | 1 |
| 5-018-3 | Bearing Cap, Inboard | 1 |

| Cat. No. | Part Name | Quantity |
|----------|-------------------------------------|----------|
| 5-018-4 | Bearing Cap, Outboard | 1 |
| 5-026-3 | Bearing, Inboard | 1 |
| 5-026-4 | Bearing, Outboard | 1 |
| 5-068-3 | Snap Ring, Inboard Bearing Housing | 1 |
| 5-068-4 | Snap Ring, Outboard Bearing Housing | 1 |
| 5-083-0 | Frame | 1 |
| 5-086-0 | Snap Ring, Shaft | 1 |
| 6-014-0 | Gland | 1 |
| 6-152-0 | Ring Packing Base | 1 |
| 6-400-0 | Mechanical Seal | 1 |
| 6-903-0 | Gland Nut | 2 |
| 6-908-0 | Gland Stud | 2 |
| 6-910-0 | Pipe Plug | 1 |
| | Without By-Pass | 2 |
| 6-924-0 | Packing | 5 |
| | With Seal Cage | 4 |

| OPTIONAL COMPONENTS | | |
|---------------------|-------------------------------|---|
| 1-652-0 | By-Pass Piping Kit, Seal Cage | 1 |
| 2-003-5 | Wear Ring, Suction | 1 |
| 2-003-6 | Wear Ring, Stuffing Box | 1 |
| 6-013-0 | Seal Cage | 1 |

ORDERING PARTS

The pumps covered by this manual have been designed and built with certain replaceable wearing parts. The recommended inventory of spare parts depends upon the installation and the importance of continued operation.

For critical service requiring a minimum of “down time” a complete or “quick change” rotating element is recommended.

For normal service, with repairs to be made in the field, the following parts are recommended for stock.

- 1 set of bearings
- 1 set of wearing rings
- 2 sets of gaskets and O-rings
- 2 mechanical seals (complete)

Parts should be ordered as far in advance of their use as possible since circumstances

beyond the control of the company may reduce existing stock. Not all parts are stocked and must be manufactured for each order.

To facilitate rapid handling of your order for spare parts, be sure to include the following information:

1. Serial number of the pump.
2. Quantity of each part.
3. Catalog number of the part.
4. Name of the part.
5. Material desired. (Parts will be furnished in original materials unless specified as a material change. All material substitutions should be discussed with the factory.)

DEALER SERVICING

If trouble occurs that cannot be rectified, contact your local AC Fire Pump Systems representative. He will need the following information in order to give you assistance.

1. Complete nameplate data of pump and motor.

2. Suction and discharge pipe pressure gauge readings.
3. Ampere draw of the motor.
4. A sketch of the pump hook-up and piping.



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