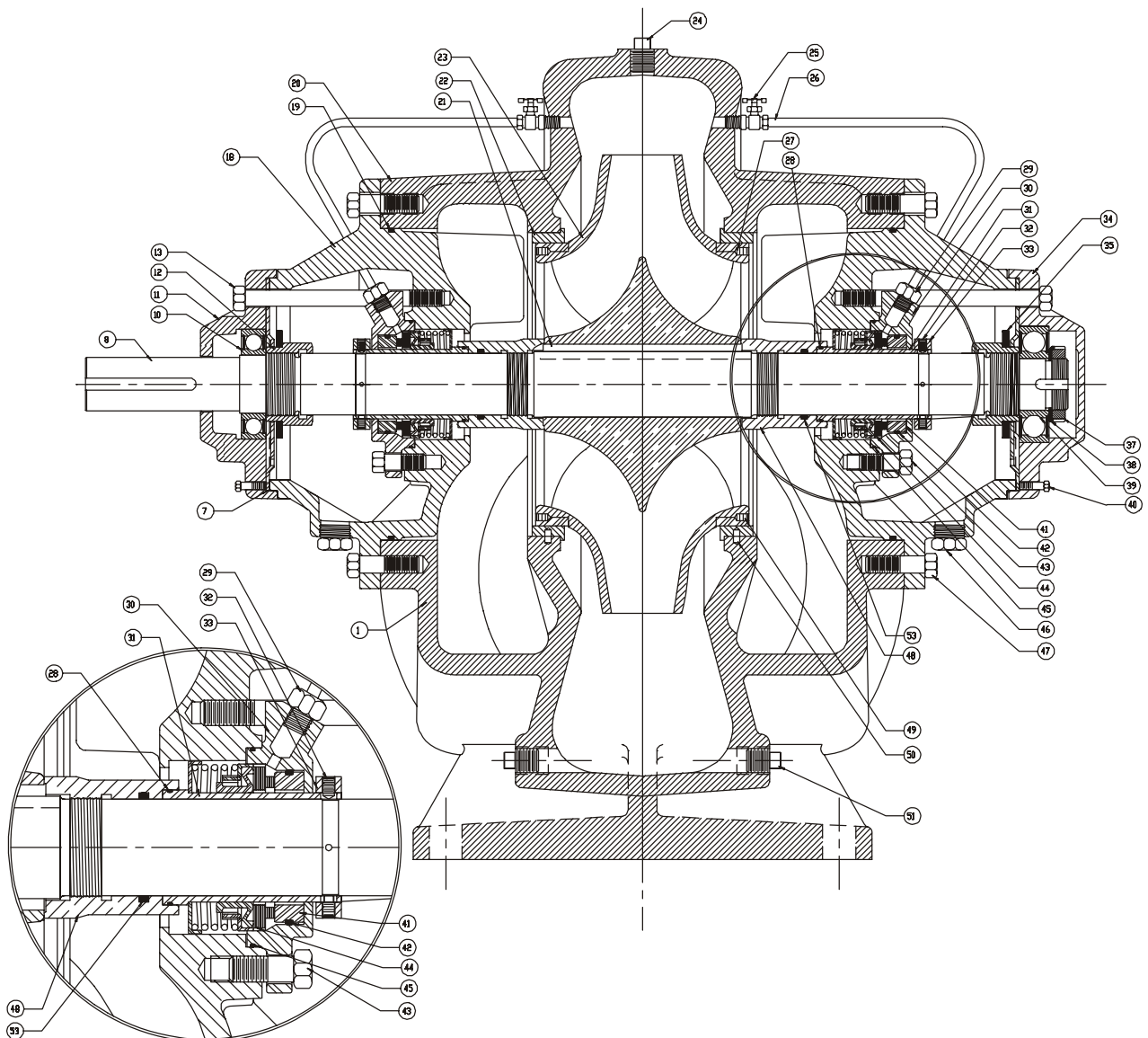


SERVICE WORK INSTRUCTIONS

**COMMERCIAL PUMPS**

**SERIES 4600 HORIZONTAL SPLIT CASE**



## MAINTENANCE - HORIZONTAL SPLIT CASE

Series 4600 Horizontal Split Case pumps are built to operate without periodic maintenance, with the exception of lubrication of motor bearings, if required. A systematic inspection made at regular intervals, giving special attention to the following, will ensure years of trouble-free operation.

### GENERAL CARE

- Keep unit clean.
- Provide the motor with correctly sized overload protection.
- Keep moisture, dust or other loose particles away from the ventilating openings of the motor. Avoid operating the unit in overheated surroundings (Above 100°F/ 38°C).

#### WARNING

Whenever any disassembly work is to be done on pump, disconnect power source to driver to eliminate any possibility of the unit starting while being serviced.

### BEARINGS

- Series 4600 pumps are supplied as standard, with maintenance free, sealed for life, grease lubricated bearings. Site regreasing is not required.
- If re-greasable bearings were ordered: Grease lubricated bearings require very little attention. More trouble can be caused by overcharging than undercharging with grease.
- Approximately every month, inject a small quantity of grease (Esso Andok No. 280 or equal).
- Remove plug under bearing cover to allow excess grease to flush.
- Inject new grease into grease fitting on top of bearing cover.
- Start and run pump for a short time to eject any excess grease.
- Clean excess grease and replace plug.

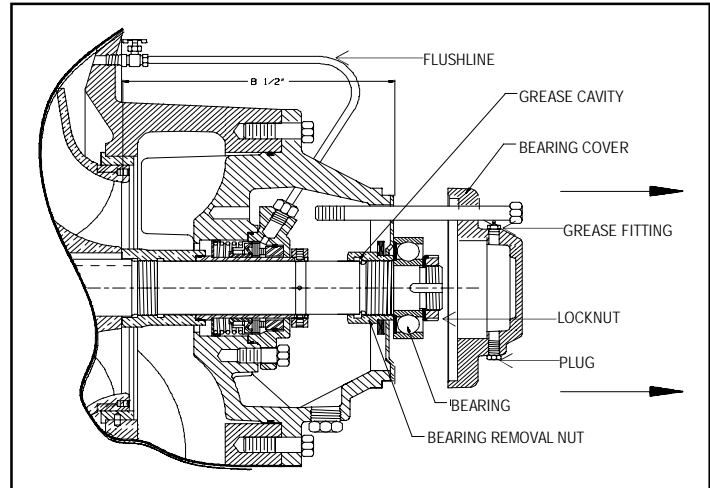
### MECHANICAL SEAL PUMPS

#### BEARING REMOVAL

- Remove bolts (13) from bearing cover (11) and remove bearing cover(s).
- Jacking screws (40) are provided if necessary.
- Remove bearing locknut (37) if working on outboard bearing.
- Remove bearing (10) by holding shaft (8) in place and turning nut (12) behind bearing; bearing will slide off shaft.
- Remove bearing retainer (27) and water slinger (35).

*Tip: Holding removal nut in place and turning shaft may speed up the bearing removal process*

### PUMP ASSEMBLY



**REMOVE BEARING COVER (AND LOCKNUT IF NEEDED) AND USE BEARING REMOVAL NUT TO PUSH BEARING OFF SHOULDER (RE-GREASABLE BEARING OPTION ILLUSTRATED)**

### MECHANICAL SEAL REMOVAL

Each mechanical seal:

- Disconnect flush line (26) connection from seal gland plate (30).
- Work now through the space left by the removed bearing and cover.
- Remove seal gland cap screws (43) (4 per mechanical seal).
- Remove the two stainless steel collar set screws (32) identified by the letter "X" (At 180° from each other) . **LEAVE SET SCREWS MARKED "O" IN PLACE.**
- Pull cartridge mechanical seal free along the shaft and out (Cartridge includes the seal gland plate (30), shaft sleeve (31), "O" Ring (28), collar (33), and mechanical seal [44]).

### CARTRIDGE MECHANICAL SEAL

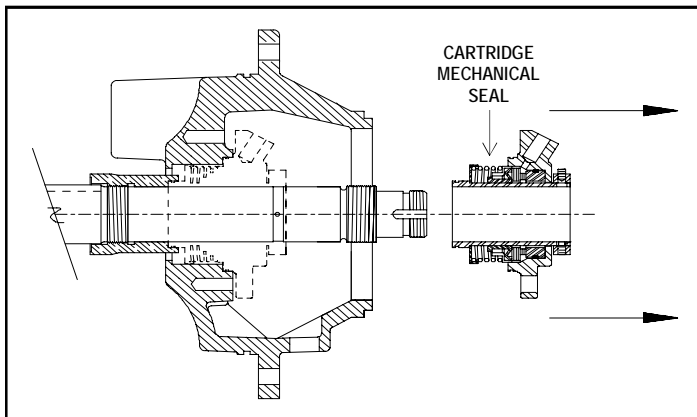
- Remove the two collar locking set screw identified by the letter "O" (At 180° from each other).
- Allow the seal gland plate, with seal seat, to come away from the sleeve. Remove the seal rotating assembly from the sleeve.
- Inspect shaft sleeve under the rotating assembly. Replace the sleeve if it is worn or corroded
- Install new mechanical seal on the sleeve, with new seat in the seal gland plate.
- Replace collar with the two locking set screws in position "O" to fix mechanical seal on position.

## MECHANICAL SEAL CARTRIDGE REPLACEMENT

- Inspect shaft sleeve "O" Ring (28). Replace if necessary. Lubricate "O" Ring with small amount of silicon or glycerine ointment.
- Slide mechanical seal cartridge onto the shaft, and press firmly to seat shaft sleeve "O" Ring under impeller nut (49).
- Replace the two stainless steel set screws in position "X" to fix the cartridge on the shaft.
- Press each gland plate (30) firmly against the stuffing box (18) and replace the capscrews (43). Tighten diagonally and evenly.
- Install flush line connection to seal gland plate.
- Replace bearing removal nut, slinger, bearing and bearing cover.
- Press each gland plate (30) firmly against the stuffing box (18) and replace the capscrews (43). Tighten diagonally and evenly.
- Pull each shaft sleeve and collar away from the gland plate. Resistance will be felt from the seal spring. Insert 0.030" (0.762mm) spacers on either side of the sleeve between the collar and the seal plate. (Motor shims are ideal for this purpose)
- Replace the two stainless steel set screws in position "X" to fix the cartridge on the shaft.
- Remove the spacers from between the collars and gland plates.
- Install flush line connection to seal gland plate.
- Replace bearing removal nut, slinger, bearing and bearing cover.

### CAUTION

New bearings must be heated to 300°F (150° C) with a properly designed bearing heater prior to installation. Replace the bearing quickly and accurately when at correct temperature. REMEMBER TO REPLACE THE REMOVAL NUT BEFORE INSTALLING NEW BEARING.



## REMOVE MECHANICAL SEAL CARTRIDGE FROM PUMP SHAFT

## PUMP DISASSEMBLY - SERIES 4600 HORIZONTAL SPLIT CASE PUMP

### TO REMOVE ROTATING ASSEMBLY

- Remove coupling guard and disconnect coupling halves.
- Disconnect flush line (26) from upper half casing (20).
- Remove bolting (13) from bearing covers (11) and remove bearing covers.
- Remove bearing locknut (37) from outboard bearing (Opposite end of shaft from the motor).
- Remove bearing (39) by holding shaft (8) in place and turning nut (12) behind bearing; bearing will slide out.
- **Tip:** Hold removal nut (12) in place with wrench and turn the shaft (8) at coupling key, for quicker bearing removal.
- Remove bearing retainer (7) and water slinger.
- Remove seal gland cap screws (4 per mechanical seal) (43).
- Remove the two stainless steel collar set screws (32) identified by the letter "X" (At 180° from each other) from each collar (33) LEAVE SET SCREWS MARKED "O" IN PLACE.
- Pull each cartridge mechanical seal free along the shaft and out (Cartridge includes the seal gland plate, shaft sleeve, sleeve "O" Ring, collar, and mechanical seal). See Page 3.
- Remove the two collar locking set screw identified by the letter "O" (At 180° from each other).
- Allow the seal gland plate, with seal seat, to come away from the sleeve. Remove the seal rotating assembly from the sleeve
- Remove stuffing box bolts (47) and separate stuffing box from casing assembly.
- Remove top casing bolting.
- Screw jack screws down to separate upper (20) and lower (1) case.
- Turn jack screws back after separation to prevent interference at reassembly.
- Lift upper casing (20) straight up until clear of impeller.
- Remove, and store (2) tapered dowel pins.
- LOCATE PUMP SUCTION FLANGE AND NOTE SHAFT COUPLING LOCATION AND IMPELLER VANE DIRECTION RELATIVE TO PUMP SUCTION FLANGE.
- Place slings around shaft (8) near the bearing housings and lift shaft assembly.
- Place shaft assembly in a clean, dry work area for necessary disassembly.

### DISASSEMBLY OF ROTATING ELEMENT

- Remove pump shaft coupling flange.
- Unscrew impeller unit (48) on right side of the impeller when facing suction flange. (Impeller blades are curving or 'pointing' away from you).
- Remove impeller (23) by sliding from shaft.
- Remove impeller key (21).
- Unscrew other impeller unit.

## REMOVAL OF IMPELLER WIRE RING (49) (If installed)

- It is not necessary to remove impeller from shaft to replace impeller wire rings (49).
- Remove rotating element.(See above)

### NOTE

**NOTE DIRECTION OF VANES, RELATIVE TO COUPLING END OF SHAFT. IMPELLER MUST BE INSTALLED IN SAME DIRECTION AS REMOVED.**

- Remove locking set screws (29) from rings (49).
- Rings may now be pulled from impeller, cut off with a chisel, or turned off if a suitable lathe is available using original shaft centers - **DO NOT CUT INTO BODY OF IMPELLER** -
- When new rings are installed, drill and tap new holes for locking set screws - do not attempt to use old half holes in impeller hub.

*Tip: When viewed from above the machined vanes appear to "point" to the discharge connection*

## INSPECTION

- Visually inspect parts for damage affecting serviceability.
- Check "O" rings and gaskets for cracks, nicks or tears.
- Check packing rings installed for excessive compression, fraying or shredding and embedded particles.
- Replace if defective in any way.
- Mount shaft between lathe centers to check eccentricity throughout the entire length, runout should not exceed .002 in. (0.05 mm).
- Bearing surface should be smooth and shoulders square and free of nicks.
- Measure OD of impeller hub or impeller wear rings (22) and ID of casing wear ring.
- Compute diametrical clearance (ID minus OD) and compare with original (0.0075 ins. to 0.0085 ins./ 0.19 mm to 0.22 mm) radial clearance .
- Surfaces must be smooth and concentric.
- Examine impeller passages for cracks, dents or embedded material.
- Inspect shaft sleeve under the mechanical seal rotating assembly. Replace if worn or corroded.

## PUMP ASSEMBLY -SERIES 4600 HORIZONTAL SPLIT CASE

Assembly is the reverse of the disassembly procedure

- All parts, inside and out, should be clean since dirt and grit will cause excessive wear, plus needless shutdown.
- Reinstall first impeller nut in correct position - 8 1/2" from

bearing shoulder to sleeve face (see drawing "PUMP ASSEMBLY").

- Reinstall impeller with vanes in the correct direction. ("Pointing" to discharge).
- Pump rotation is defined by viewing from the driver end.
- Impeller vanes slope must be opposite the pump rotation (Convex or "Belly" of blades must face rotation direction).
- Do not lock impeller nut with impeller key until impeller has been positioned in center of volute; this may be accomplished by moving the nut.
- Make certain that casing rings are in proper position; the half raised ring should be on the outside and completely in the lower half casing and ensure ring is fully seated.
- Install casing gasket and do not cut overlap before casing cover is in place and bolted.
- Install upper half and insert dowel pins into place (Install overboard stuffing box first).
- Lubricate stuffing box 'O' ring with Super-O-Lube from Parker Seal Company and fit into groove on stuffing box.
- Install stuffing box, tighten capscrews diagonally and evenly.
- Cut gasket on each side of the stuffing box and bore after all cap screws are tightened.
- Install new mechanical seal on each stainless steel sleeve, with new seat in each seal gland plate.
- Install seal gland plate on each sleeve then replace each sleeve collar with the two locking set screws in position "O" to fix mechanical seal on position.
- Replace mechanical seal cartridge onto the shaft.
- Bolt the seal gland plates into place.
- Pull each shaft sleeve and collar away from the gland plate. Resistance will be felt from the seal spring. Insert 0.030" (0.762mm) spacers on either side of the sleeve between the collar and the seal plate. (Motor shims are ideal for this purpose)
- Replace the two stainless steel set screws in position "X" to fix the cartridge on the shaft.
- Remove the spacers from between the collars and gland plates.
- Install flush line connections to seal gland plates.
- Fill bearing removal nut inner cavity with grease and replace bearing removal nut.
- Replace water slinger and bearing retainer. The notch on the bearing retainer faces inside of pump.
- Heat bearing to 300°F (150°C) on a properly designed bearing heater. Using an insulated glove, slide the bearing firmly onto shaft to the shoulder. Let the bearing cool.
- Replace lockwasher and locknut, if outboard end.
- Slide the bearing cover into place and tighten the socket headed capscrews diagonally and tightly.

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