

# End suction frame mounted pumps Series F



## Repair Instructions



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**4845749**  
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## Read this entire bulletin

Before attempting to repair this pump. For installation and operation refer to instruction bulletin 2880549. Properly installed, your Peerless pump will give you satisfactory, dependable service. We urge that you read carefully these step-by-step instructions to simplify any problems of installation, operation or repair.

Failure to read and comply with installation and operating instructions will void the responsibility of the manufacturer

### WARRANTY

New Equipment manufactured by Seller or Service supplied by Seller is warranted to be free from defects in material and workmanship under normal use and service for a period of one year from date of shipment. In the case of spare or replacement parts manufactured by Seller, the warranty period shall be for a period of twelve months from shipment. Seller's obligation under this warranty is limited to repairing or replacing, at its option, any part found to its satisfaction to be so defective, provided that such part is, upon request, returned to Seller's factory from which it was shipped, transportation prepaid. Parts replaced under warranty shall be warranted only from date of repair. This warranty does not cover parts damaged by decomposition from chemical action or wear caused by abrasive materials, nor does it cover damage resulting from misuse, accident, neglect or from improper operation, maintenance, installation, modification or adjustment. This warranty does not cover parts repaired outside Seller's factory without prior written approval. Seller makes no warranty as to starting equipment, electrical apparatus or other material not of its manufacture. If Purchaser or others repair, replace, or adjust Equipment or parts without Seller's prior written approval, Seller is relieved of any further obligation to Purchaser under this section with respect to such Equipment or parts, unless such repair, replacement, or adjustment was made after Seller failed to satisfy within a reasonable time Seller's obligations under this Paragraph. -

and may also result in bodily injury as well as property damage.

This bulletin is intended to be a permanent part of your pump installation and should be preserved in a convenient location for ready reference. If these instructions should become soiled obtain a new copy from Peerless Pump. Include pump model and/or serial number with your request.

**Seller's liability for breach of these warranties (or for breach of any other warranties found by a court of competent jurisdiction to have been given by Seller) shall be limited to:**

- (a) accepting return of such Equipment FCA Plant of Manufacture (CPT under Incoterms 2000), and
- (b) refunding any amount paid thereon by Purchaser (less depreciation at the rate of 15% per year if Purchaser has used Equipment for more than thirty [30] days), and canceling any balance still owing on the Equipment.
- (c) in the case of Service, at Seller's option, redoing the Service, or refunding the purchase order amount of the Service or portion thereof upon which such liability is based.

**These warranties are expressly in lieu of any other warranties, express or implied, and Seller specifically disclaims any implied warranty of merchantability or fitness for a particular purpose, and in lieu of any other obligation or liability on the part of the Seller whether a claim is based upon negligence, breach of warranty, or any other theory or cause of action. In no event shall Seller be liable for any consequential, incidental, indirect, special or punitive damages of any kind.**

For purposes of this Section, the Equipment warranted shall not include equipment, parts, and work not manufactured or performed by Seller. With respect to such equipment, parts, or work, Seller's only obligation shall be to assign to Purchaser the warranties provided to Seller by the manufacturer or supplier providing such equipment, parts or work. No Equipment furnished by Seller shall be deemed to be defective by reason of normal wear and tear, failure to resist erosive or corrosive action of any fluid or gas, Purchaser's failure to properly store, install, operate, or maintain the Equipment in accordance with good industry practices or specific recommendations of Seller, including, but not limited to Seller's installation and operation manuals, or Purchaser's failure to provide complete and accurate information to Seller concerning the operational application of the Equipment.

### WARNING

Do not operate this pump at any pressure, flow rate, or liquid temperature other than those for which the pump was originally purchased. Do not pump any other liquid than the one for which the pump was originally purchased without

the consent of Peerless Pump or its authorized representatives. Disregard of this warning can result in pump failure and serious personal injury or death.

# PUMP REMOVAL

## WARNING

Before starting disassembly of the pump, it is recommended that a set of spare parts be obtained. Peerless

Pump does not recommend reuse of gaskets, O-rings, packing rings, or ball bearings.  
2.

Shut down pump. Disconnect power to the pump driver before starting any repairs. Refer to Bulletin No. 2880549 for the procedure to follow.

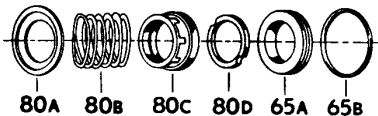
# PUMP DISASSEMBLY

Disassemble pump in the following manner:

**NOTE:** The pump may be either packed or with a mechanical seal. Procedures for the two types of sealing differ slightly.

1. Remove any seal piping (tubing) that may be present between pump discharge and stuffing box of adapter (71, Figure 1).
1. Take out all screws and remove casing (1) and casing gasket (73A). If necessary, lightly tap with plastic hammer at several places to loosen casing from adapter.
1. Insert a rod of suitable diameter into a passage of impeller (2) and hold while loosening impeller lock screw (26). Remove lock screw and impeller washer (24A).
1. Slide impeller from end of shaft (6) and remove impeller key (32). If impeller is hard to remove, use a small wood block against adapter and pry carefully at several points around impeller to loosen.
1. For the mechanical seal pump, very carefully remove seal parts (80A thru 80D). Be particularly careful not to scratch or damage lapped surface of sealing washer (80D). Store seal parts in suitable container; lapped surface of sealing washer must be up and covered.
2. For the packed pump, loosen both gland bolts (17B) and pull gland (17) out slightly to relax packing (13).
3. Remove screws and slide adapter (71) off from shaft. Use care not to scratch shaft sleeve (14).
8. Carefully push floating seat (65A) from adapter, avoiding scratching or other damage to lapped surface. Use narrow, flat screwdriver to lift and work O-ring (65B) from seat. Store seat with remaining mechanical seal parts with lapped surface up and covered.
9. Remove gland (17) packing (13) and lantern ring (29) (if furnished) from adapter (for packed pump).
10. Slide shaft sleeve (14) and deflector (40) from shaft. Remove a-ring (130) from shaft sleeve or gasket (38) from shaft.
11. Remove screws and slide outboard bearing cover (37) from shaft. Push outboard bearing cover seal (49) from cover.
12. Push shaft (6) with bearings (16, 18) from frame (19). Push in direction of motor coupling or belt pulley.
13. Carefully push inboard grease retainer (51) from frame (19).
14. If bearings (16, 18) are to be removed from shaft, temporarily install impeller key (32) and impeller (2) on shaft. With rod inserted into impeller passage, restrain shaft while loosening bearing lock nut (22). Remove lock nut, impeller and key from shaft. Support bearings on inner races and press shaft out. The bearing retaining ring (18A, Figure 3) on the shaft of the F3 frame in the outboard bearing journal need not be removed unless damaged, loose or worn.

# MECHANICAL SEAL



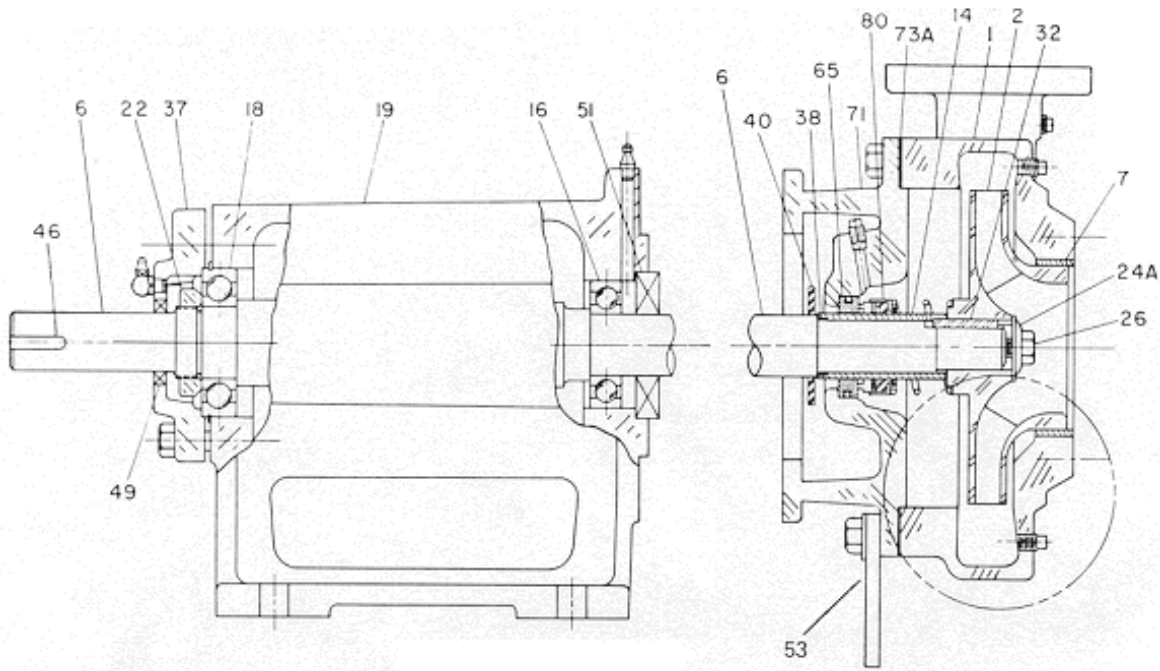
\*80A Spring Retainer 80B Spring  
80C Seal Bellows Assembly

80D Sealing Washer  
65A Floating Seat  
65B Seat Ring

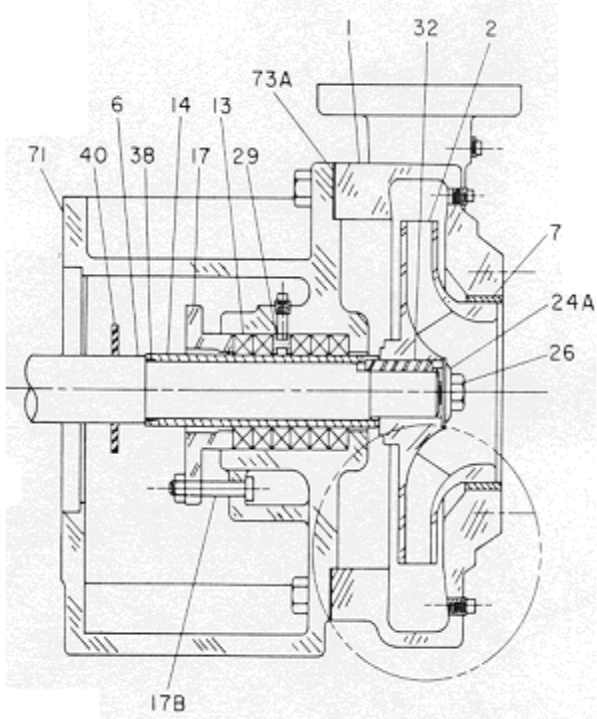
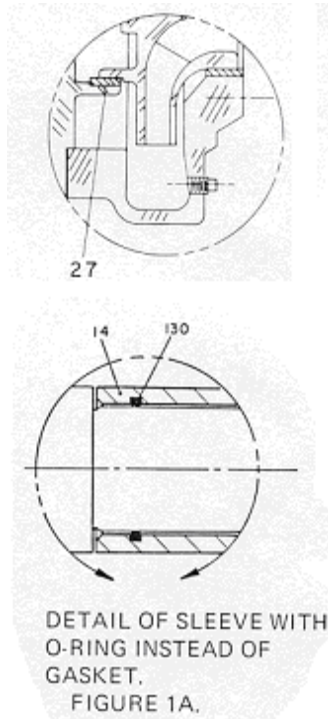
"Some pumps have a step turned on the impeller hub to accept the spring and therefore do not have or use a spring retainer."

**Thread Depth for Suction Flanges:**

2-1/2 to 4 Inch flange    5/8" UNC thread - 0.75" Deep  
 5 to 8 Inch Flange        3/4" UNC thread - 0.88" Deep



- 1 Casing
- 2 Impeller
- 6 Shaft
- 7 Casing Ring
- 13 Packing
- 14 Shaft Sleeve
- 16 Bearing, Inboard
- 17 Gland
- 178 Gland Bolt
- 18 Bearing, Outboard
- 19 Frame
- 22 Bearing Lock Nut
- 24A Impeller Washer
- 26 Impeller Lock Screw
- 27 Adapter Ring
- 29 Lantern Ring (optional)
- 32 Impeller Key
- 37 Bearing Cover, Outboard
- 38 Shaft Sleeve Gasket
- 40 Deflector
- 46 Coupling Key
- 49 Bearing Cover Seal, Outboard
- 51 Grease Retainer, Inboard
- 53 Case Support
- 65 Mechanical Seal, Stationary Element
- 71 Adapter
- 73A Casing Gasket
- 80 Mechanical Seal, Rotating Element
- 130 Shaft Sleeve a-Ring



**Figure 1, Type F1 and F2 END SUCTION PUMPS**

See Figure 3 for typical construction on F3 and F4 Frames

## FO FRAME DISASSEMBLY ONLY

Remove snap ring (16A) from groove in bearing bore on pump end of frame (19). Push shaft (6) with bearings from frame. Push in direction of pump end. If bearings (16, 18) are to be removed, support inner races and press shaft out. NOTE: Bearings are sealed type. There is no need for cleaning or lubrication. (See Figure 2.)

15. Remove casing ring (7) from casing only if damaged or worn to excess (refer to Repair).

6	Shaft
16	Bearing, Inboard
16A	Bearing, Retaining
18	Ring Bearing
19	Outboard Frame
40	Deflector, Inboard
40A	Deflector, Outboard
46	Coupling Key
131	Coupling Guard

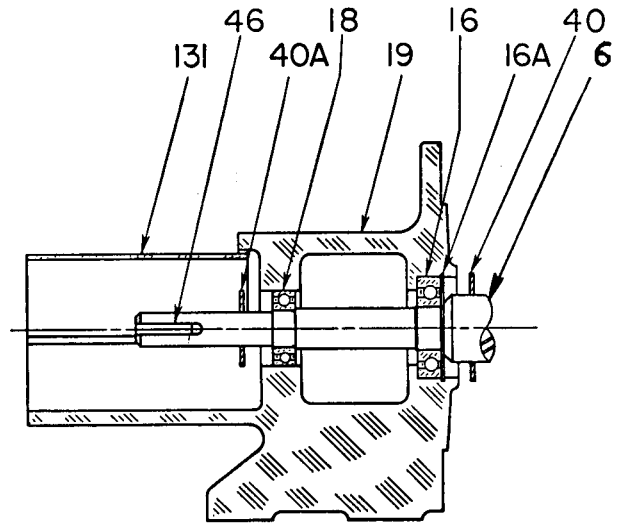


FIGURE 2. TYPE FO END SUCTION FRAME

## CLEANING

### WARNING

Petroleum-base cleaning solvents are flammable. Smoking or open flames in the vicinity of these solvents are extremely hazardous and must not be permitted. Disregard of this warning could result in grave personal injury.

1. Clean all metal parts with a solvent. Use a bristle brush (not metal or wire) to remove tightly adhering deposits. A fiber scraper may be used to remove the gasket and shellac from casing flanges. Blow dry with clean dry compressed air.

### CAUTION

Never use hydrocarbon liquids (oil or solvent) to clean mechanical seal parts. Use of oil or solvent will deteriorate material used for manufacture of the seal.

2. Clean seal parts using a mild soap solution. Rub only with finger to remove dirt. Rinse with clear water and dry with mild air stream. Use care not to damage or scratch lapped surfaces.
3. Clean ball bearings in the following manner:

- a. Place bearings in wire basket - so there is space for cleaner to reach all parts.
  - b. Immerse in Stoddard solvent. Agitate basket until grease is thoroughly loosened and can be flushed out.
  - c. Place bearing on a screened surface.
  - d. Using a spray gun with air filter and clean Stoddard solvent, flush each bearing until all grease and sludge is removed.
  - e. Blow solvent out of bearings with dry, filtered air.
  - f. Lubricate bearings immediately after cleaning with light spindle oil and place them in a covered container.
  - g. Do not spin bearings any time during cleaning.
4. Bearings not removed from the shaft may be cleaned in the following manner:
    - a. Flush with Stoddard solvent until all old grease is removed. Rotate bearing slowly (by hand) while flushing. DO NOT use kerosene or fuel oil for flushing.
    - b. Re-lubricate (refer to paragraph 3, step f, above).

## INSPECTION

Visually inspect and replace parts that are damaged and affecting the serviceability or sealing. Emphasize inspection of mating parts having relative motion - casing rings for example. Perform detailed inspections as follows:

1. Check O-rings, gaskets and seals for shrinkage, cracks, nicks or tears.
2. Check packing rings for excessive compression, fraying or shredding, embedded particles (dirt or metal). Replace if defective in any way.
3. Examine impeller passages for cracks, dents, gouges or embedded material.
4. Inspect shaft sleeves (14) for excessive wear. Replace sleeves that are worn. Replace gasket, if used.
5. Inspect lapped surfaces of sealing washer and floating seat for chipping, gouges, nicks, scratches or other damage. These surfaces must be free from any defect. If lapped surfaces are damaged, replace the entire seal.
6. Mount the shaft between lathe centers. Check the eccentricity throughout the entire length-with a dial indicator to be not more than 0.003 inch total indicator reading. Surfaces on which bearings mount must be smooth, have a finish not less than 32 micro-inches and the shoulders square and free from nicks.

## REPAIR

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When ordering repair parts, give the complete pump nameplate data (nameplate on the pump casing) plus the name and item number of the part shown on sectional view.

Remove burrs, nicks and scratches from non-critical areas with a fine stone or crocus cloth.

1. Impeller and Casing Wear. If the pump capacity falls off due to wear on the impeller and casing ring, repair is made by replacing the casing ring. The inside diameter of

the casing ring should be 0.008" to 0.012" larger than the impeller skirt diameter.

2. Normally, when the pump is completely disassembled, all gaskets, O-ring and seals (grease retainer) should be replaced at reassembly. If the O-rings for the floating seat of the mechanical seal or shaft sleeve are not damaged, they may be reused with the other satisfactory seal parts.

## REASSEMBLY

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Reassemble pump in the following manner:

1. If bearings (16, 18) were removed from shaft (6), support shaft and press bearing on, applying force only against the inner race. Be sure that inner races bottom on shaft shoulders. If bearing retaining ring (18A, Fig. 3) was replaced or removed from shaft of the F3 frame, reinstall in proper groove in outboard bearing journal before installing bearing. Press bearing until inner race bottoms on retaining ring.
2. Temporarily install impeller key (32) and impeller (2) on shaft. Use rod inserted in impeller passage to restrain shaft while tightening bearing locknut (22). Remove impeller and key.
3. Install new inboard grease retainer (51) in frame (19). Lip of retainer, which contacts shaft, must face away from inboard bearing (16) cavity.
4. Lightly pack each bearing with a recommended grease from the instruction "Lubrication" in this manual. Maintain absolute cleanliness at all times while packing and handling bearings. No further lubrication is necessary until normal maintenance interval is reached.
5. Coat shaft at inboard bearing (where grease retainer will contact) with light oil or grease. Carefully insert shaft through outboard end of frame, impeller end first. Carefully guide through inboard end and through grease retainer (51) so that lip remains facing away from bearing cavity. Push shaft so that retaining ring in outer race of outboard bearing (18) contacts frame.
6. Install new outboard bearing cover seal (49) in outboard bearing cover (37). Be sure that seal lip will face bearing when cover is installed.
7. Coat outboard end of shaft with light oil or grease up to bearing locknut. Carefully slide cover and seal on shaft, so that lip remains facing bearing; position so that grease fitting is at top and bottom against outer race of bearing. Install screws to hold cover, tightening uniformly (do not tighten so that cover is bowed).

### FO FRAME REASSEMBLY ONLY

If bearings (16, 18) were removed from shaft (6), support shaft and press bearings on, applying force only against the inner race. Be sure inner races bottom on shaft shoulders. Carefully insert shaft, coupling end first, through pump

end of frame (19). Push shaft so that shoulder of pump end bearing contacts shoulder in frame bore. Install snap ring (16A) in proper groove in frame bore.

8. Install deflector (40), shaft sleeve gasket (38) and shaft sleeve (14) on shaft. Be sure gasket is completely contained by sleeve and that sleeve bottoms on shaft shoulder (see Fig. 1). Install O-ring (130) in sleeve (14). Install deflector and shaft sleeve over shaft, making sure sleeve bottoms on shoulder. (See Fig. 1 A). Position deflector midway between end of sleeve and grease retainer. Align sleeve slot with key slot of shaft.
9. For the packed pump, slide the gland (17) and lantern ring (29) over the shaft sleeve to abut the deflector.

### CAUTION

Use care not to mar or scratch the lapped surfaces of floating seat and sealing washer when installing mechanical seal.

Damage to these surfaces will result in leakage and will require replacement of the entire seal.

10. For the mechanical seal pump, lubricate the O-ring (65B), groove in floating seat (65A) and seat cavity in adapter (71) with any of MOLYKOTE® DC No. 55 silicone grease, 3% detergent solution, glycerine or ethylene glycol.
11. Install floating seat in the adapter with lapped surface facing away from adapter shoulder. Apply lubricant (step 10 above) to entire surface of shaft sleeve and carefully install adapter. Use care not to cock or scrape floating seat on sleeve. Seat adapter against frame, tapping very lightly with plastic hammer, then install screws and tighten uniformly. Rotate shaft by hand to check that there is no binding or hang-up.
12. In the same manner as in step 11, lubricate the entire surface of shaft sleeve and the bores of sealing washer (80D) and spring bellows assembly (80C). Carefully install sealing washer, lapped surface toward floating seat, and spring bellows assembly on shaft sleeve and slide along to contact floating seat. Install spring (80B) and spring retainer (80A), if used.
13. For the packed pump, install the adapter (71) in the same manner as in step 11 except shaft sleeve need not be lubricated.

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Reassembly (concluded)



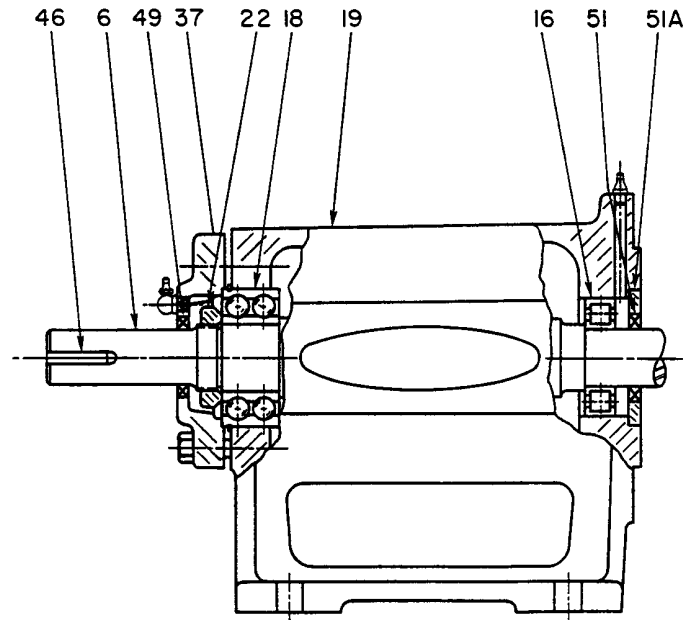
Be sure at all times that the gland is so that uniform pressure is exerted around the packing; a tipped gland is an invitation to trouble.

14. In order, install 3 rings of packing (13), the lantern ring (29) (if furnished) and 2 rings of packing in adapter cavity. When lantern ring is not furnished, install 6 rings of packing. Stagger the joint of each packing ring approximately 180° from adjacent rings. Be sure each ring is square with the shaft. Use a split bushing and the gland (17) to move rings to the bottom of the cavity. When all packing rings are in place, position the gland (17) and loosely seat on packing, using gland bolts (17B). Tighten as required to limit leakage after pump is running.
15. Install impeller key (32) in shaft keyway. Make sure that key enters slot in shaft sleeve. Align impeller (2) with key and install on shaft. Tap impeller hub lightly with plastic hammer to seat against shaft sleeve. For the mechanical seal pump, guide spring to seat on the shoulder as impeller is installed. Be sure spring is correctly seated against bellows assembly.
16. Install impeller washer (24A) and impeller lock screw (26). Restrain impeller with rod inserted in one passage and securely tighten screw. Rotate shaft by hand to check for free movement.

17. Lightly coat both sides of casing gasket (73A) with a non-hardening sealing compound, such as grease and graphite. Position on adapter making sure that holes are aligned. Install casing (1), tapping lightly with plastic hammer to seat on adapter. Install screws and tighten uniformly in a star pattern. The cap screws are SAE Grade 5 and are to be tightened to the following minimum torque values for dry threads.

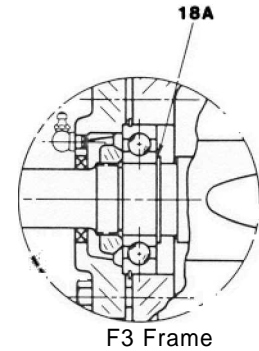
Size	Torque
3/8	30 ft · lbs
7/16	50 ft · lbs
1/2	75 ft · lbs
5/8	155 ft · lbs
3/4	265 ft · lbs

18. Install seal piping (tubing) (if used) between pump discharge and stuffing box of adapter.



- 6 Shaft
- 16 Bearing, Inboard
- 18 Bearing, Outboard
- 18A Bearing Retaining
- 19 Ring Frame
- 22 Bearing Lock Nut
- 37 Bearing Cover,
- 46 Outboard Coupling Key
- 49 Bearing Cover Seal,
- 51 Outboard Grease Retainer,
- 51A Inboard Grease Retainer Bushing

Series F Pump F4 Frame



F3 Frame

See Fig. 1 for typical construction of F1 and F2 frames.

FIGURE 3. TYPE F3 AND F4 END SUCTION FRAMES

NOTICE: Materials of construction, specifications, dimensions, design features, and application information, where shown in this bulletin, are subject to change and/or modification without notice by Peerless Pump at their option.