

SUMMIT PUMP

Model 2175 S, M & L

Paper Stock and Process Pump

Installation, Operation, and Maintenance Manual



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1. INTRODUCTION

This installation, operation, and maintenance manual is designed to help you achieve the best performance and longest life from your Summit Pump.

This pump is an open impeller, centrifugal model with end suction / top discharge. The pump is designed for handling paper stock.

If there are any questions regarding the pump or its application, which are not covered in this manual or in other literature accompanying this unit, please contact your Summit Pump distributor.

For information or technical assistance on the power source, contact the power source manufacturer's local dealer or representative.

The following message types are used in this manual to alert maintenance personnel to procedures that require special attention for the protection and safety of both equipment and personnel:

| WARNING! |
|--|
| Failure to comply with the warnings in this manual could result in personal injury or death. |

| CAUTION! |
|---|
| Failure to comply with the cautions in this manual could result in destruction of or damage to equipment. |

| |
|---|
| NOTE: <i>Identifies a condition or procedure which is essential to proper equipment operation.</i> |
|---|

2. RECEIPT AND STORAGE

RECEIVING THE PUMP

Immediately upon arrival, carefully inspect the pump for evidence of damage during transit. Immediately report any damage to your Summit Pump Distributor.

STORING THE PUMP

Store the pump in a clean dry place. **Do not remove piping connection covers.** Rotate the pump shaft by hand **at least once per week** to maintain a protective film of oil or grease on the bearings.

3. INSTALLATION

LOCATION

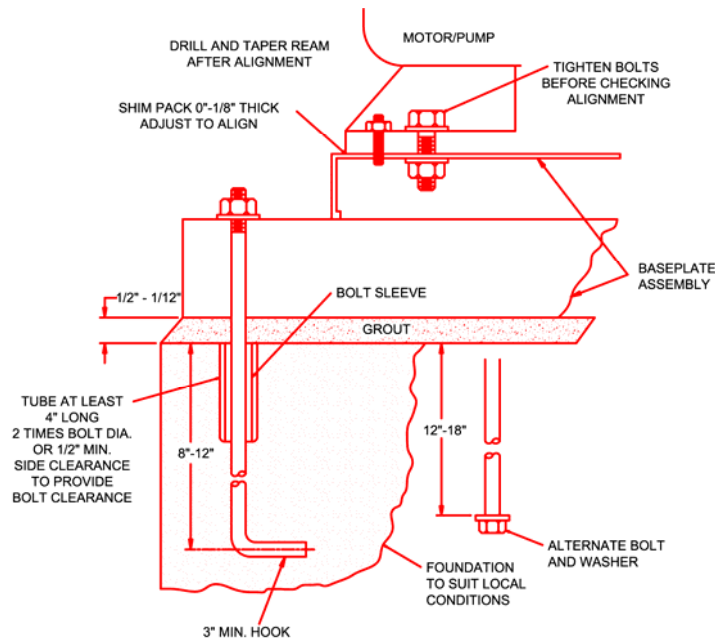
When choosing a location for the pump, select an area that provides ample space around the pump and driver for inspection and maintenance. Locate the pump as close as possible to the source of supply. The location must provide NPSH (Net Positive Suction Head) equal to or greater than that required by the pump at any capacity over its expected operating range.

Ensure that there is ample room around the pump and driver to permit access for maintenance. The overhead should provide space required for removal of the pump pull out bearing frame and / or the motor.

FOUNDATION

Use a foundation that is substantial enough to support all points of the pump base-plate. Install the base plate bolt down bolts in pipe sleeves with an ID that is two times the bolt diameter. The foundation bolts must be long enough to allow 1/2" to 1 1/2" of grout under the base plate. (See *Figure 1.*) Level and grout the base-plate per standard construction practices (see ANSI/HI 1.2.4-1997). Take special attention to ensure that grout completely fills the underside of the base with no air pockets or voids under the plate.

Figure 1 – Foundation



After the grout has cured and you have tightened the foundation bolts, you must check the alignment of the pump and driver.

NOTE: Do not connect piping to the pump until the grout has hardened.

PIPING CONNECTION – SUCTION / DISCHARGE

Connect piping run in as direct and short a manner as possible. Independently support and anchor all piping. Support must not depend on the pump flanges.

Suction Piping

Never use suction piping that is smaller than the pump piping connection. Design a short section of pipe next to the pump section flange that can be dropped out to facilitate cleaning. This eliminates the need to dismount the pump to remove solids or clogs that may reduce pump flow.

Use eccentric reducers on the suction line with the flat side located on top to avoid air pockets. Position the suction valves as close to the source/tank/chest as possible.

| CAUTION! |
|---|
| Do not throttle the pump using the suction side valve. This valve is for pump isolation during maintenance. |

Discharge Piping

For a short piping run, use the same diameter of piping for the discharge piping as the diameter of the pump discharge opening. For a long piping run, the discharge piping size should be one to two sizes larger than the pump discharge opening. Install a check valve between the gate valve and pump suction. The check valve will prevent back flow during pump shut down. The gate valve will provide pump isolation for maintenance. When using a pipe increaser, locate it directly on the pump discharge flange, before the check valve.

| CAUTION! |
|--|
| Never use force to align piping to the pump flanges. |

| WARNING! |
|---------------------------------|
| Pump Driver must be locked out. |

ALIGNMENT

It is very important to check the alignment of the pump and motor drive shaft after the grout is set and hardened.

CAUTION!

Careful alignment is an extremely important consideration to ensure long pump life.

■ TO ALIGN THE PUMP

1. Use a flexible spacer coupling, which is recommended for centrifugal pump applications, to allow for pull out feature of the pump bearing frame.
2. Check and adjust the parallel and angular alignment to within .005 inches prior to connecting the coupling halves. Follow the coupling manufacturer's instructions to ensure tolerances unique to specific applications are in line with manufacturer's standards and to meet any specific alignment requirements unique to the coupling application.
3. Jog the motor to check rotation prior to connecting coupling halves. Its arrow should match up with the arrow on the pump.
4. Connect coupling halves. Install a coupling guard after the pump is aligned and rotation check is complete.

WARNING!

Do Not operate the pump without the proper guard. See ANSI/ASME B15.1 - 1996.

5. Operate the pump for one to two hours to attain operating temperatures. Final alignment cannot be accomplished until the pump has operated for a sufficient time to attain these temperatures.

CAUTION!

Lock out power to motor to avoid personal injury.

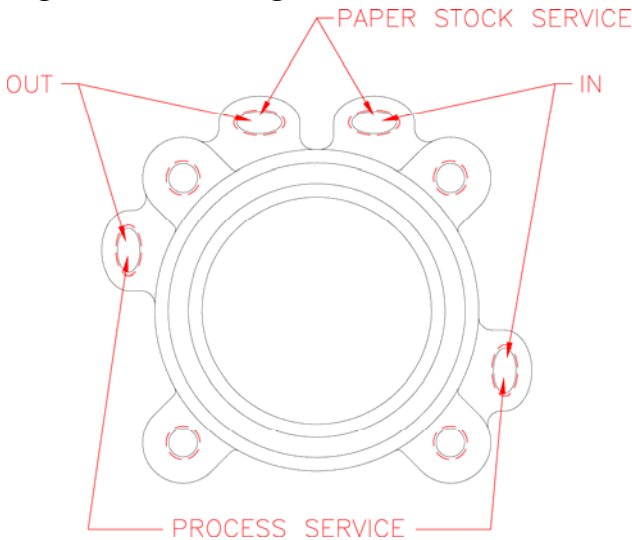
6. After final alignment, dowel-pin the pump to the base. Use threaded taper pins with hex nuts. This type of pins can be easily removed for pump or motor repairs. Use taper drive and reamers for installation of this pin type.

Pumps in hot service will need an alignment check at operating temperatures.

STUFFING BOX

| |
|---|
| CAUTION! |
| Lock out power to motor to avoid personal injury. |

Figure 2 – Stuffing Box



There are four pipe taps on the standard stuffing box cover. (See *Figure 2*.) Two are alternately used as in and out connections for process / chemical services and the other two are used for in and out connections for paper stock service.

Packed Box

Braided packing is supplied as standard equipment on all pumps. Install gland bolt nuts finger-tight only. Adjust the gland bolt nuts during start-up to achieve 40-65 drops of leakage per minute. Specific packing type is dependent on pH, temperature, etc. of the liquid being pumped.

Table 1

| | Pump Model | | | |
|-----------------|------------|-----|-----|-----|
| | STO | MTO | LTO | XLO |
| Packing Size | 7/16 | 5/8 | | |
| Number of Rings | 5 | | | |

Clean and cool pumpage may be used to lubricate the packing. If the pumpage is not suitable, you must supply an external source of lubrication.

CAUTION!

Do not allow packing to run dry. It must be lubricated.

See ANSI/ASME B73.1 M-1984 for proper seal flush plans.

Cartridge Mechanical Seal

WARNING!

Determine the effects that a failure of the mechanical seal might have on the environment and personnel and correct conditions to prevent personal injury.

WARNING!

Only work on seal when the pump is locked out and the seal is depressurized.

Refer to the Burgmann installation, operating, and maintenance instructions. Failure to do so can result in environmental damage, personal injury, and seal malfunction and / or seal failure. Pay particular attention to paragraphs 4.2, 4.3 and 4.4.

Start Up

Read, understand and follow the Burgmann Operation section 4.0, paragraphs 4.1 and 4.2

Storage, Assembly and Disassembly

Refer to the Burgmann Seal Storage assembly and disassembly sections 3.0, 3.1, 3.2, and 3.3, paying particular attention to the seal drawing included in the instructions.

Type 1 Mechanical Seal

■ TO INSTALL TYPE 1 MECHANICAL SEAL

1. MTO, LTO, XLO Slide the stuffing box cover over the shaft/sleeve. Bolt the cover (184) to the frame adapter(108).
STO Slide the 6" or 8" stuffing box cover (184) with adapter ring (108) over shaft and bolt to bearing.
2. Mark / scribe the shaft at the face of the stuffing box.
3. Unbolt and remove the stuffing box cover.
4. Locate the installation reference dimension on the seal installation drawing. Normally this is the dimension from the face of the stuffing box to the rear of the seal.

5. Mark the shaft with a felt marker or marking tool at the dimension (i.e. 1/32”).
6. Lubricate the shaft with silicon grease or soapy water. Slide the seal onto the shaft. Line up the face of the seal with your mark and secure with set screw.
7. Reassemble the pump.

4. OPERATION

LUBRICATION

| |
|--|
| CAUTION! |
| PUMPS ARE SHIPPED WITH NO OIL IN THE BEARING FRAME! Oil must be installed before operating the pump. |

Ball bearings are very sensitive to both over and under lubrication, both being detrimental to bearing performance. Either case is detrimental to bearing performance. Use a thermometer to determine overheating. Excessive overheating will reduce bearing life.

The relationship between temperature and pumpage temperature is an indication of performance. *Table 2* indicates the relationship between these temperatures.

Table 2

| | Degrees Fahrenheit | | |
|---|--------------------|------|------|
| Pumping liquid temperature | 60° | 200° | 300° |
| Approximate normal line bearing temperature | 115° | 140° | 160° |

The information shown in *Table 2* is based on a room temperature of 70°F. Maximum bearing temperature is 175°F. The temperatures shown above have a tolerance of plus 15°F. It is necessary to flush water on the shaft for liquid temperatures above 250°F. This can be done either through a flushing gland or the stuffing box seal cage.

Oil Lubrication

Use only high quality turbine oil with rust and oxidation inhibitors. Service temperatures determine oil viscosity. See *Table 3*.

Use a 300 SSU viscosity at 100° F for applications where pumping temperatures are below 200° F. At pumping temperatures above 350° F, use 470 SSU at 100° F with optional cooler.

Table 3

| Bearing Temperature | ISO Grade | Viscosity at 100 Degrees F |
|---------------------|-----------|----------------------------|
| Up to 150° F | 46 | 215 SSU |
| 150° F to 200° F | 68 | 300 SSU |
| Above 200° F | 100 | 470 SSU |

Grease Lubrication

Regrease grease lubricated bearings with NLG1 No. 2 consistency grease for pumpage

temperatures -60° F to 350° F. Grease is not recommended for temperatures above 350° F. Regrease bearings every three months.

Table 4

| Acceptable Lubricating Oils | | | | | |
|-----------------------------|-----------------------------|-------|-----|--------|-------|
| ISO VG | | 32 | 46 | 68 | 100 |
| Keystone: | KLC Antiwear | 32 | 46 | 68 | 100 |
| Lubriplate | | AC0 | AC1 | AC2 | AC3 |
| Mobil: | DTE | Light | - | Medium | Heavy |
| Mobil: | Synthetic | 624 | 525 | 626 | 627 |
| Phillips: | Magnus | 32 | 46 | 68 | 100 |
| | Synthetic, syndustrial mist | | | | 100 |
| Shell: | Tellus Fluids HD | 32 | 46 | 68 | 100 |

Table 5

| Acceptable Greases | |
|--------------------|-------------|
| Citgo | Mystic EP2 |
| Keystone | 81EP2 |
| Mobil | Mobilux EP2 |
| Mobil Synthetic | SCH 100 |

■ TO REGREASE LUBRICATED BEARINGS

1. Wipe dirt and foreign matter from the fittings.
2. Remove grease relief plugs from the bottom of the frame.
3. Fill grease through fittings until it comes out through the relief holes.
4. Reinstall grease relief plugs.

ROTATION

■ TO ROTATE THE PUMP

1. Lock out power to the pump driver.
2. Remove the coupling guard and coupling.
3. Momentarily restore power and energize the motor to determine rotation.
4. Confirm that motor rotation coincides with proper pump rotation. The proper pump rotation is counterclockwise when facing the pump's suction.

WARNING!

Operating the pump in the opposite rotation may dislodge the impeller causing severe damage to the impeller suction side plate, and/or casing.

5. Reinstall the coupling and coupling guard.

IMPELLER CLEARANCE

Impeller clearance is the measurement between the impeller vanes and the surface of the casing. This clearance is set at .015 inches during assembly, but may need to be adjusted before initial startup. (See APPENDIX A for detailed procedures on setting the impeller clearance.)

PRIMING

Prior to starting a centrifugal pump, it is imperative that you prime the pump by flooding the suction piping and casing with fluid. Priming will occur when you open the suction isolation valve and the packing sealing liquid valve.

CAUTION!

Do not operate the pump without liquid in the casing.

CAUTION!

Quenching liquid to stuffing box valve must be open before starting pump.

START UP

■ TO START UP THE PUMP

1. Rotate the pump by hand, making sure that the rotating element is spinning freely.
2. Be sure the suction valve is open.
3. Partially close the discharge valve.

CAUTION!

Do not operate the pump with the discharge valve closed for an extended period of time.

4. Unlock power to the pump driver.

5. Slowly open the discharge valve as soon as the motor reaches operating speed.
6. Check stuffing box leakage and adjust, if necessary, to achieve leakage of 40-65 drops per minute.
7. Adjust the discharge valve as needed while checking piping for leaks.
8. Check mechanical operation of the pump and motor.

WARNING!

Do not operate the pump without the proper guard. See ANSI/ASME B15.1-1996.

SHUT DOWN

■ TO SHUT DOWN THE PUMP

1. Gradually close the discharge valve and turn off the power to the motor.
2. Close valve to stuffing box liquid, quench/cooling/flushing.
3. Lock out power to the pump driver.

APPENDIX A - IMPELLER CLEARANCE SETTING

If a gradual loss in head and/or capacity occurs, you can restore performance by adjusting the impeller clearance, which is the measurement between the impeller vanes and the surface of the casing. *Table 6* displays the suggested impeller clearance settings based on the temperature of the liquid.

Table 6 – Impeller Clearance

| Temperature | Impeller Clearance |
|----------------|--------------------|
| 200° F (93°C) | .015" (.38 mm) |
| 250° F (121°C) | .017" (.43 mm) |
| 300° F (144°C) | .019" (.48 mm) |
| 350° F (177°C) | .021" (.53 mm) |
| 400° F (204°C) | .023" (.58 mm) |

FEELER GAUGE TECHNIQUE

CAUTION!

Lock out power to motor to avoid personal injury.

- TO USE THE FEELER GAUGE TECHNIQUE FOR IMPELLER CLEARANCE SETTING
- 1. Lock out power to the pump driver.
- 2. Remove the coupling guard.
- 3. Loosen jacking bolts (370D) and jam nuts (423).
- 4. Tighten bearing housing bolts (370C) evenly, while slowly rotating the shaft until the impeller starts to rub on the casing.
- 5. Using a feeler gauge, set the gap between the 3 housing bolts (370C) and the bearing housing (134). (Refer to *Table 6* for settings.)
- 6. Tighten jack bolts (370D) evenly until bearing housing backs out and contacts the bearing housing bolts (370C).
- 7. Tighten jam nuts (423) evenly, rotating the shaft to make sure the assembly turns freely.
- 8. Reinstall the coupling guard.
- 9. Unlock power to the pump driver.

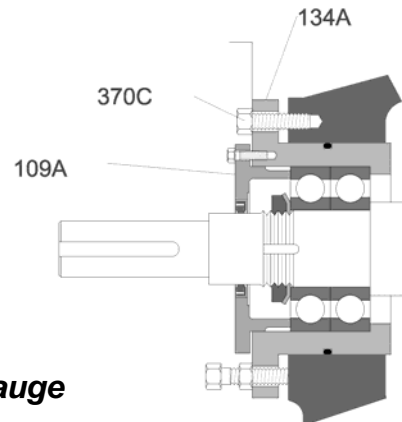
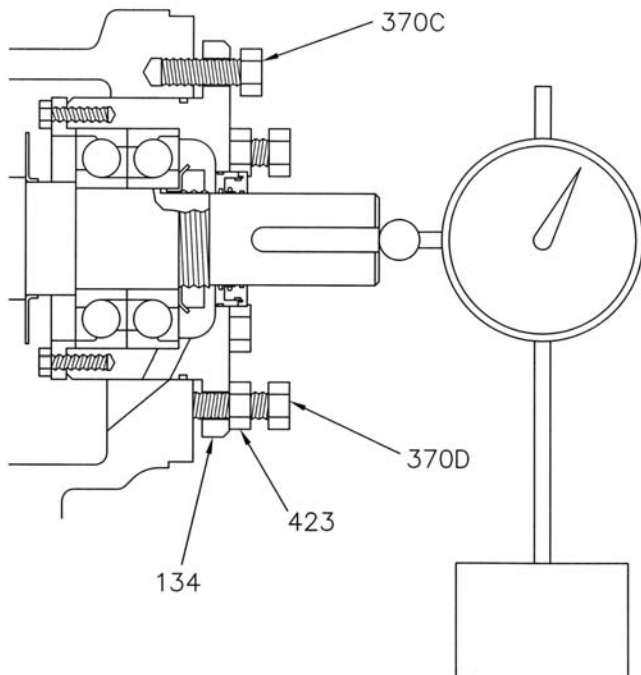


Figure 2 – Feeler Gauge

DIAL INDICATOR TECHNIQUE

- TO USE THE DIAL INDICATOR TECHNIQUE FOR IMPELLER CLEARANCE SETTING
1. Lock out power to the pump driver.
 2. Remove the coupling guard.
 3. Place a dial indicator with a magnetic base on the pump base plate. Place the indicator against the end of the pump shaft.
 4. Loosen jack bolts (370D) and jam nuts (423).
 5. Tighten bearing housing bolts (370C) evenly while slowly rotating the shaft until the impeller starts to rub on the casing.
 6. Set the dial indicator to zero.
 7. Loosen housing bolts (370C) one turn.
 8. Tighten the jack bolts (370D) evenly until they contact the frame. Continue to tighten until the dial indicator reads the proper clearance as shown in *Table 6*.
 9. Tighten bearing housing bolts (370C) evenly; then tighten jack bolts (370D) evenly, and tighten jam nuts (423). Be sure the dial indicator **does not move** from the proper setting.
 10. Rotate the shaft to be sure it turns freely.
 11. Reinstall the coupling guard.
 12. Unlock power to the pump driver.

Figure 3



APPENDIX B - CENTRIFUGAL PUMP TROUBLESHOOTING

The following table provides possible solutions for symptoms that may be experienced with your centrifugal pump.

| WARNING! |
|--|
| <p>Before attempting to service the pump:</p> <ol style="list-style-type: none"> 1. Follow the shut down procedures. 2. Lock out the power source. 3. Allow the pump to cool. 4. Close the suction and discharge valves. 5. Drain the pump. |

Table 7

| CENTRIFUGAL PUMP TROUBLESHOOTING | | |
|---|--|--|
| Symptom | Cause | Solution |
| Pump not delivering liquid or Pump not delivering enough liquid | • Pump not primed. | • Re-prime pump. |
| | • Suction lift too high. | • Install shorter suction pipe. |
| | • Speed too low. | • Change motor wiring. |
| | • Wrong direction of rotation or impeller installed backwards. | • Install impeller correctly. |
| | • Impeller clogged. | • Back-flush pump. |
| | • Suction line plugged. | • Remove debris. |
| Low flow and low head | • Air leak in stuffing box. | • Replace or adjust packing. |
| | • Worn suction side plate. | • Replace defective part. |
| | • Impeller worn or damaged. | • Inspect and replace impeller, if needed. |
| | • Air leak in suction line. | • Replace gasket. |
| | • Impeller clogged. | • Back-flush pump. |
| | • Wrong direction of rotation. | • Change motor wiring. |

Table 7 (continued)

| CENTRIFUGAL PUMP TROUBLESHOOTING | | |
|---|--|--|
| Symptom | Cause | Solution |
| Pump loses prime | • Pump not primed correctly. | • Re-prime pump. |
| | • Air leak in suction line. | • Replace gasket or pipe plug. |
| | • Lantern ring in wrong location. | • Repack moving lantern ring to correctly align with flush hole. |
| Bearings are running hot | • Misalignment. | • Realign drive coupling. |
| | • Low or insufficient lubricant. | • Check oil level and or grease. |
| Motor requires excessive amperage | • Stuffing box gland is too tight. | • Readjust or replace packing. |
| | • Total dynamic head is too low. | • Install throttle or reduce impeller diameter. |
| | • Rotary part rubbing stationary part. | • Adjust part or replace parts. |
| | • Liquid is heavier than specified. | • Check specific gravity of liquid. |
| Stuffing box is leaking excessively | • Stuffing box is incorrectly packed. | • Repack stuffing box. |
| | • Shaft sleeve is scored or worn. | • Replace shaft sleeve as required. |
| | • Wrong type of packing. | • Install correct packing. |
| | • Shaft is bent. | • Replace shaft. |
| | • Worn mechanical seal parts. | • Rebuild seal; replace parts. |

APPENDIX C - MAINTENANCE AND REPAIR

DISASSEMBLY PROCEDURES

(See APPENDIX D for cross-section and parts list.)

■ PREPARE TO DISASSEMBLE YOUR PUMP

1. Lock out power supply at the motor starter.
2. Close off discharge, suction, sealing fluid, and cooling fluid.
3. Drain casing and flush, if needed.
4. Disconnect auxiliary pipes.
5. Remove coupling spacer. Do not remove hub.
6. Remove the drain plug to drain oil.

■ TO DISASSEMBLE YOUR PUMP

1. Place lifting sling through I-hook (132) to ensure safe handling.
2. Remove foot frame bolts (529).
3. Remove bolts (370) holding the frame adapter (108) to casing (100).
4. Adjust tension on lifting sling to support back pull-out assembly.
5. Pull the frame adapter back from casing.

Take the frame assembly to bench and secure for further work.

6. Remove the casing gasket.
7. Use a $\frac{3}{4}$ " Allen wrench to remove the impeller screw (198).
8. Remove the impeller key (178) from the shaft (122) while holding the shaft with a strap wrench or suitable tool that will not mark the shaft.

NOTE: *Threads are right-handed.*

CAUTION!

Do not use heat to disassemble pump due to risk of exploding trapped liquid.

9. For a packed pump:
 - a. Remove the packing gland nuts (353A).
 - b. Slide gland toward frame (228). Gland will separate into two pieces.

For a mechanical seal:

- a. Remove seal gland nuts (353A).
 - b. Slide gland (250) toward frame (228).
 - c. Slide off seal gland (250) with stationary seal and o-ring gasket.
10. Remove the adapter to box cover nuts (423B). Remove adapter to box cover bolts (370H). Slide off stuffing box cover (184).
 11. a. For a packed pump: Remove packing (106) and lantern ring (105) from stuffing box cover (184).
b. For a mechanical seal: Remove mechanical seal rotating element (383) from pump shaft sleeve by loosening set screws and sliding off assembly.
 12. Scribe the location of the coupling hub on the shaft (122) and remove the coupling hub.
 13. Remove the suction side plate nuts (357A).
 14. Tighten the jack-bolts (371R) evenly to push the side plate out of the casing. Inspect for excessive wear, erosion, or mechanical damage and replace when 0.015" clearance cannot be maintained between impeller and plate.
 15. Remove the frame adapter (108) by removing two dowel pins (469B) and four adapter bolts (370B) and then separate the adapter (108) from the bearing frame (228).
 16. Slide the deflector (123) from the shaft.
 17. Remove the bolts (370J) holding the inboard bearing end cover (119A) to the frame (228).
 18. If the inboard frame labyrinth seal (333A) requires replacement, tap the seal from the inboard bearing end cover (119A).
 19. Remove the outboard bearing housing bolts (370C). If needed, use impeller adjustment bolts (370D) to aid in the removal of the shaft and bearing assembly from the bearing frame.
 20. Slide the entire shaft assembly (including the shaft, radial and thrust bearings, and bearing housing) from the back end of the bearing frame.
 21. Remove inboard bearing (168A) and outboard bearing (112A) using an arbor press or bearing puller. On L models only, do not remove oil ring (248A) unless it is damaged.

NOTE: *Do not use a hammer, which may cause damage to the shaft.*

22. Remove the bolts (371C) holding the bearing end cover to the bearing housing (134A) and then remove the bearing end cover (109A).
23. If the outboard frame labyrinth seal (332A) requires replacement, tap the seal from the outboard bearing end cover (109A).
24. Remove the bearing housing (134A) from the shaft.

25. Straighten the bearing lockwasher (136) and then remove the bearing locknut (136) and washer.

NOTE: *Do not use a hammer, which may cause damage to the shaft.*

26. Remove outboard bearing (112A) from shaft (122) using a press or bearing puller.
27. Inspect all parts for cracks, erosion, pitting, rusting, damaged threads, corrosion, and groove worn shaft/sleeve.

ASSEMBLY PROCEDURES

(See APPENDIX D for cross-section and parts list.)

CAUTION!

Thoroughly inspect casing adapter and impeller for cracks, corrosion, and erosion areas.

■ TO REASSEMBLE YOUR PUMP

1. Temperature mounting is the recommended technique for installing bearings of the size used onto the pump shaft. This can be done using one of two methods:
 - a. Heating the bearing using induction heater, ovens, hot plates, or heating cones.
 - b. Cooling the shaft.

The bearing temperature should be 150°F above the shaft temperature. (DO NOT exceed 250°F.)

Use a temple stick or surface pyrometer to determine correct temperature for installation. When installation temperature is correct, slide the outboard bearings/duplex back to back onto the shaft up to the shoulder.
2. Press the tang of the bearing lock washer (382) into the shaft keyway until it is firmly against the bearing.
3. Install inboard bearing (168A) using same technique as in Step 1 above.
4. Lightly oil the shaft threads and place the bearing locknut (136) snugly against the lock washer (382). Use a spanner wrench to tighten firmly. Use a drift pin to secure the tang of the lock washer in the slot in the locknut. If necessary, tighten the locknut so the tang falls into the slot, but DO NOT loosen the locknut to get the tang into the slot.
5. With the O ring (496) in place, slide the bearing housing (134A) over the impeller end of the shaft and over the outboard bearing.
6. Use an arbor press to install the labyrinth seal (332A) (See *Appendix E. Maintenance Instructions*) into the bearing cover (109A) with the expulsion port at the 6 O'clock position. Press it in only as far as the beginning of the stator location ramp and avoid

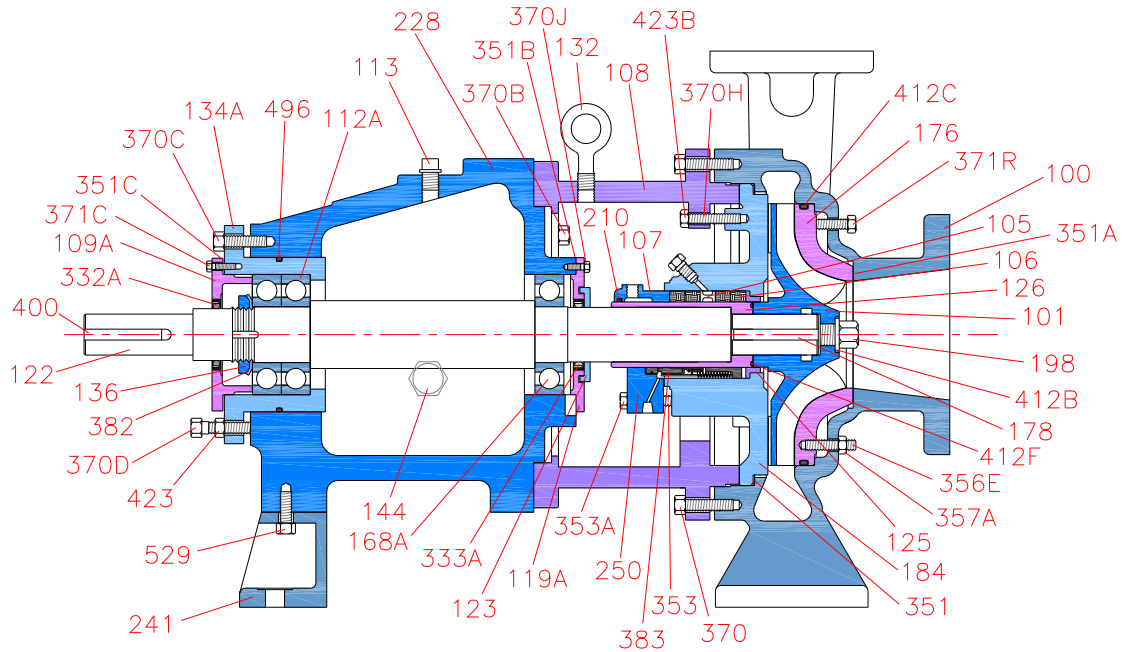
angular misalignment. There is nominal 0.002” interference fit. Discard any residual material from the stator gasket.

7. Lightly lube the shaft and rotor drive ring and slide the bearing cover, seal and gasket (360A) onto the shaft as a single unit. Align the work “TOP” on the cover with “TOP” on the bearing housing. Bolt (371C) the cover in place.
8. Place a small amount of O ring lubricant on the inside of the bearing frame (228) at the bearing housing (134A) and inboard seats, on the O ring (496), and on the inboard oil seal. Slide the shaft assembly as far as possible into the bearing frame. The word, “TOP” on the flange of the bearing housing lines up with the top of the bearing frame when the bearing housing is properly installed. With the bearing housing O ring in place in the groove on the housing, insert the bearing housing bolts into the bearing housing and screw them about ½” into the frame to hold the shaft.
9. Install the inboard labyrinth seal (333A) (See *Appendix E. Maintenance Instructions*) onto the inboard bearing cover (119A) with the expulsion port at the 6 O’clock position. Press it in as described in Step 6 above.
10. Lightly lube the shaft and rotor drive ring and slide the inboard bearing cover into place. Bolt (370J) to bearing frame (228).
11. Slide the deflector (123) onto the shaft with the flat side facing in until it rests against the bearing frame (228).
12. Determine bearing end play by performing the following:
 - a. Clamp the dial indicator to the pump with the button resting against the end of the shaft.
 - b. Push the shaft back and forth as far as possible.Total end play must be a minimum of 0.001” and a maximum of 0.008”. If under 0.001”, add coupling end bearing end cover gaskets made from 0.006” thick manila paper. If over 0.008”, remove gaskets.
13. Install and position the coupling hub at the scribe mark on the shaft.
14. Bolt the bearing frame (228) to the frame adapter (108).
15. Install shaft sleeve (126) and stuffing box cover (184):
 - a. For packed pumps, slide the shaft sleeve on the shaft with the O ring in place. Use a sleeve to tap the stuffing box bushing (125) into place. Lift the stuffing box cover into place at the impeller end of the shaft. Guide the stuffing box cover over the shaft and sleeve to prevent any contact to these surfaces. Bolt (370) the stuffing box cover to the frame adapter (108).
 - b. For mechanical seal pumps, read the manufacturer’s assembly instructions. Certain seals have a stationary seat in the stuffing box cover (184) and the rotating portion slides onto the sleeve prior to installing the stuffing box cover. Refer to STUFFING BOX section.
16. Install stuffing box cover (184). Install gasket (351) onto cover. Use lubricant to aid in holding in place during assembly.

17. Install impeller key (178). Lubricate shaft with oil or copper base antiseize lubricant.
18. Install impeller (101) impeller screw (198), making sure to use a new “O” ring (412B). Use a spanner or strap wrench to hold shut and when tightening the impeller screw.
19. Pump power unit is ready to reinstall or spares storage.
20. Install new suction sideplate “O” ring (412C) in sideplate (176). Install new sideplate to casing gasket (351A). Lubricate gasket to hold it in place.
21. Slide suction sideplate into place aligning the four (4) studs (356E) with the holes in the casing. “O” ring lubricant or antiseize lubricant may be used to assist installation. Tighten sideplate nuts (357A).
22. Slide reassembled power unit into casing. Tighten adapter to casing bolts (370) evenly to be sure stuffing box cover pulls into casing evenly. Check with feeler gauge points at 90° apart to assure even spacing around adapter.
23. Install pedestal to bearing frame bolts (529). Install shims as needed and tighten bolts.
24. Adjust the impeller clearance according to the instructions in Appendix A.
25. If the pump is a packed box, refer to 3. *Installation, Stuffing Box* on page 6.
26. If the pump has a mechanical seal, refer to 3. *Installation, Stuffing Box* on page 7.

APPENDIX D – PUMP CROSS SECTION AND PARTS LIST

MODEL 2175 CROSS SECTION



MODEL 2175 PARTS LIST

| Item# | Qaun | Description | Item# | Qaun | Description |
|-------|------|-----------------------|-------|--------|-------------------------------------|
| 100 | 1 | Casing | 241 | 1 | Foot, frame |
| 101 | 1 | Impeller | 250 | 1 | Gland, mech. seal |
| 105 | 1 | Ring, lantern | 332A | 1 | Labyrinth seal, outboard frame |
| 106 | 5 | Packing | 333A | 1 | Labyrinth seal, inboard frame |
| 107 | 1 | Gland, packing | 351 | 1 | Gasket, cover to case |
| 107 | 1 | Gland, quench type | 351A | 1 | Gasket, sideplate to case |
| 108 | 1 | Adapter, frame | 353 | * | Stud, gland |
| 109A | 1 | Cover, outboard | 353A | * | Nut, gland stud |
| 112A | 1 | Bearing, outboard | 356E | 4 | Stud, sideplate to case |
| 113 | 1 | Plug, oil fill | 357A | 4 | Nut, sideplate to case |
| 119A | 1 | Cover, inboard | 370 | varies | Bolt, case |
| 122 | 1 | Shaft | 370B | 4 | Bolt, frame to adapter |
| 123 | 1 | Deflector | 370C | 6 | Bolt, bearing housing |
| 125 | 1 | Bushing, stuffing box | 370D | 4 | Bolt, impeller adjustment |
| 126 | 1 | Sleeve, shaft | 370H | 2 | Bolt, adapter to stuffing box cover |
| 132 | 1 | Hook, eye | 370J | 6 | Bolt, bearing cover inboard |
| 134A | 1 | Housing, bearing | 371C | 1 | Bolt, cover to housing |
| 136 | 1 | Locknut, bearing | 371R | 3 | Bolt, jack out |
| 144 | 1 | Gauge, oil sight | 382 | 1 | Lockwasher, bearing |
| 168A | 1 | Bearing, inboard | 383 | 1 | Mechanical seal |
| 176 | 1 | Sideplate, suction | 400 | 1 | Key, coupling |
| 178 | 1 | Key, impeller | 412C | 1 | O-Ring, sideplate |
| 184 | 1 | Cover, stuffing box | 412D | 1 | O-Ring, impeller screw |
| 198 | 1 | Screw, impeller | 423 | 3 | Nut, impeller adjustment |
| 210 | 1 | Packing, gland | 496 | 1 | O-Ring, bearing housing |
| 228 | 1 | Frame | 529 | 2 | Bolt, frame to foot |

* Packing gland has two each studs and nuts

APPENDIX E – MAINTENANCE INSTRUCTIONS FOR INPRO/SEAL® “VBX” BEARING ISOLATORS

DETAILS OF OPERATIONS

The Inpro Bearing Isolator is a Labyrinth type seal, which performs two functions:

1. Maintains the clean oil in the bearing housing.
2. Keeps contaminants from entering the bearing housing.

The unit is comprised of three major components: the **rotor**, the **stator**, and the “**VBX**”[®] **ring**.

The **rotor** fits over the shaft and is held in place by an elastometric drive ring. The drive ring causes the rotor to turn with the shaft and also provides a positive static seal on the shaft. There is no metal to metal contact between the shaft and rotor, thus no wear and friction concerns.

The **stator** is held in the housing by a nominal .002” interference fit. An o-ring gasket on the outside diameter of the stator secures a positive seal between the stator and the housing bore. The designed Labyrinth grooves and lube return trough on the stator inside diameter retains the lubricant inside the bearing housing.

The rotor and stator act together to keep contamination out of the bearing housing.

The “**VBX**”[®] ring, stator, and rotor are a unit and must not be pulled apart. If the unit is pulled apart or comes apart, it must be replaced with a new unit. The “**VBX**”[®] is intended to be an inseparable design.

Repairs or replacement of seals are only necessary if excessive oil leakage is visible. If or when the bearing housing is disassembled, it is recommended that the rotor o-rings be replaced.

DISASSEMBLY PROCEDURES

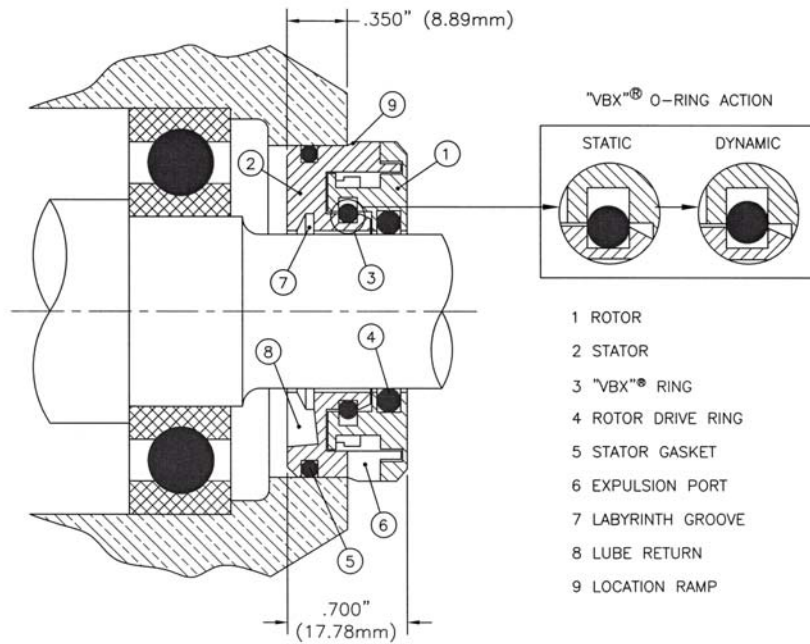
1. Remove shaft assembly (122) per instructions for pump disassembly beginning on page 17.
2. Follow steps 17 and 18 in the disassembly instructions beginning on page 17 for inboard bearing isolator removal.
3. Follow steps 19 through 23 in the disassembly instructions beginning on page 17 for outboard bearing isolator removal.
4. Inspect the bearing isolators. If the unit pulls apart, a new isolator is needed for reassembly.
5. Replace the rotor drive O-rings (4) and stator gasket O-rings (5) each time the units are removed from the pump assembly.

INSTALLATION PROCEDURES

1. Inboard Labyrinth Seal (333A). Place end cover (119A) on arbor press table. Place the isolator seal (333A) stator side in the bore. **THE EXPULSION PORT MUST BE IN THE 6 O’CLOCK POSITION.** While using a block large enough to cover the

entire flange of the isolator, use an arbor press to press the stator into the bore. Press into place until the location ramp begins. (See *Figure 4*.)

Figure 4

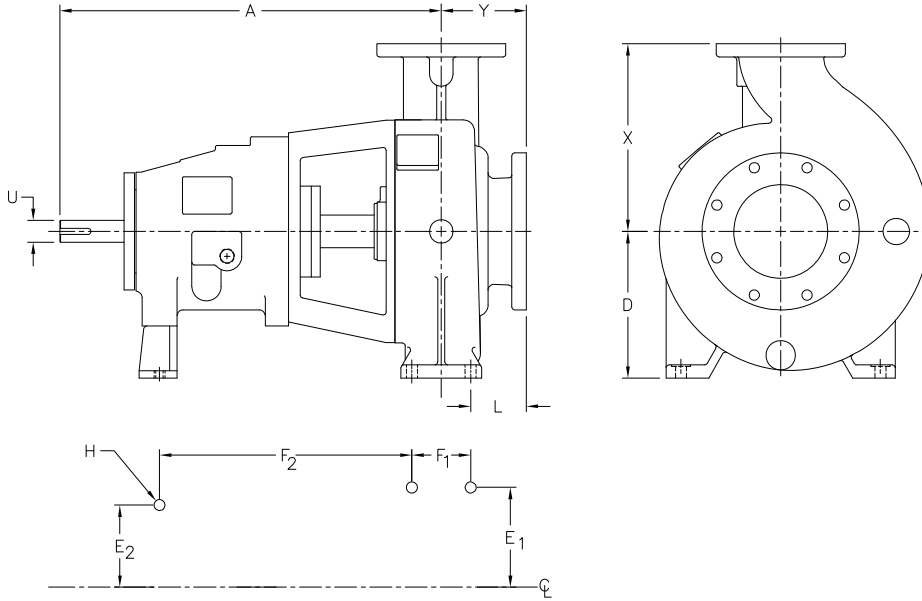


2. Outboard Isolator (332A). Position the bearing cover (109A) on arbor press table. Place the isolator in the bore and press into place using the same technique as in *Step 1* above.
3. Set covers aside for installation as detailed in Pump Assembly procedures.

MAKE SURE EXPULSION PORT AND LUBE RETURN ARE IN THE 6 O'CLOCK POSITION IN FINAL ASSEMBLY.

APPENDIX F – DIMENSIONAL DATA

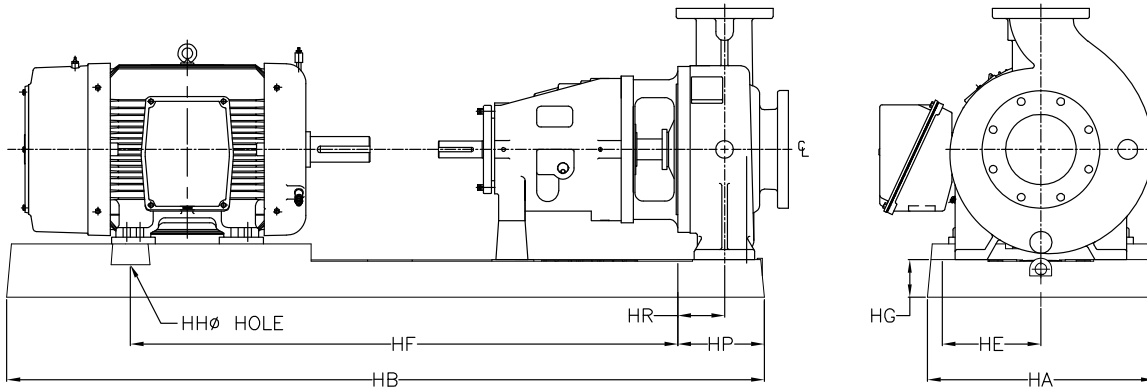
MODEL 2175 DIMENSIONAL DATA



| PUMP DIMENSIONS | | | | | | | | | | | | | | | | |
|-----------------|-----------|------|-----|--------|--------|--------|----------|-------|--------------|----|--------|--------|-------|---------|-----|--------|
| Pump Frame | Pump Size | SIZE | | X | D | Y | A | L | FOOT PATTERN | | | | SHAFT | | | |
| | | DIS | SUC | | | | | | E1 | E2 | F1 | F2 | ØH | U | KEY | |
| S | 3X6-12 | 3 | 6 | 13 | 12 1/2 | 7 1/4 | 32 1/2 | 4 3/4 | 8 1/2 | 7 | 5 | 21 1/2 | 7/8 | 1 14/16 | 1/2 | |
| | 4X6-12 | 4 | 6 | 14 1/2 | | | | | | | | | | | | |
| | 6X8-12 | 6 | 8 | 16 | | | | | | | | | | | | |
| | 8X8-12 | 8 | 8 | 19 | 14 1/2 | 8 1/8 | 33 | 5 5/8 | 10 1/4 | | | | | | | 22 |
| | 3X6-14 | 3 | 6 | 13 | 12 1/2 | 7 1/4 | 32 1/2 | 4 3/4 | 8 1/2 | | | | | | | 21 1/2 |
| | 4X6-14 | 4 | 6 | 14 1/2 | | | | | | | | | | | | |
| | 4X6-18 | 4 | 6 | 16 | | | | | | | | | | | | |
| 6X8-14 | 6 | 8 | 16 | | | | | | | | | | | | | |
| M | 6X8-18 | 6 | 8 | 18 | 14 1/2 | 7 1/4 | 32 1/2 | 5 5/8 | 10 1/4 | 7 | 22 | 7/8 | 2.375 | 5/8 | | |
| | 6X8-22 | 6 | 8 | 21 | 17 | | | | | | | | | | | |
| | 8X10-14 | 8 | 10 | 19 | 14 | 8 1/8 | 33 | | | | | | | | | |
| | 8X10-18 | 8 | 10 | 21 | 17 1/2 | | | | | | | | | | | |
| | 8X10-18H | 8 | 10 | 21 | 17 | | | | | | | | | | | |
| | 8X10-22 | 8 | 10 | 23 | 20 | | | | | | | | | | | |
| L | 10X12-18 | 10 | 12 | 23 | 20 | 8 7/8 | 33 5/8 | 5 3/8 | 12 | 7 | 21 5/8 | 7/8 | 3.375 | 7/8 | | |
| | 10X12-22 | 10 | 12 | 25 | | | | | | | | | | | | |
| | 12X14-18 | 12 | 14 | 25 | | | | | | | | | | | | |
| | 12X14-22 | 12 | 14 | 27 | | | | | | | | | | | | |
| | 14X14-18 | 14 | 14 | 27 | | | | | | | | | | | | |
| | 14X14-18H | 14 | 14 | 27 | | | | | | | | | | | | |
| | 14X14-22 | 14 | 14 | 30 | | | | | | | | | | | | |
| | 14X14-22H | 14 | 14 | 30 | | | | | | | | | | | | |
| L | 16X18-22 | 16 | 18 | 32 | 28 | 12 3/4 | 34 11/16 | 7 3/4 | 10 | 10 | 21 1/4 | 7/8 | 7/8 | | | |
| | 18X18-22 | 18 | 18 | 34 | | 9 7/8 | 33 5/8 | 6 3/8 | 12 | | | | | | | |

Not for manufacture or installation - see factory.

BASEPLATE RELATED DIMENSIONS

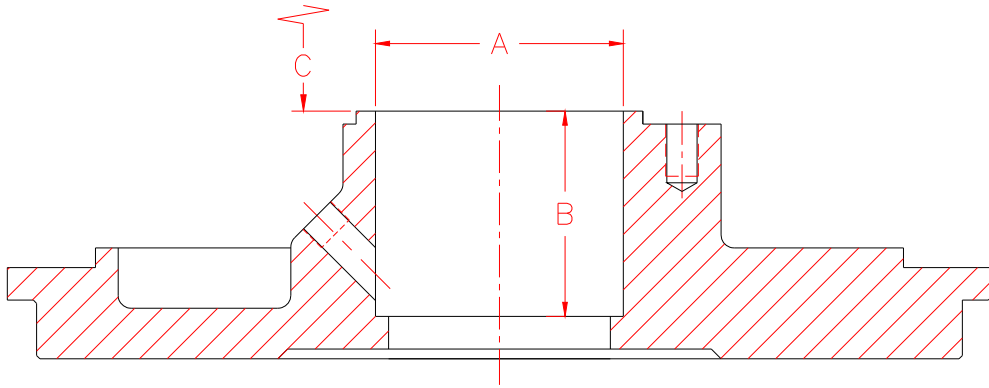


BASEPLATE DIMENSIONS

| PUMP FRAME | BASEPLATE NUMBER | MAX MOTOR FRAME | HA | HB | HE | HF | HP | HG | HH | HR |
|------------|------------------|-----------------|--------|--------|--------|--------|-------|-------|-----|-------|
| S | 1 | 286TS | 26 | 68 | 11 1/4 | 47 | 13 | 4 3/8 | 1 | 8 3/4 |
| | 2 | 36STS | 26 | 74 | 11 1/4 | 47 | 13 | 4 3/8 | 1 | 8 3/4 |
| | 3 | 447TS | 26 | 86 | 11 1/4 | 62 | 10 | 4 3/8 | 1 | 5 1/4 |
| | 4 | 447TS | 26 | 94 | 11 1/4 | 62 | 10 | 4 3/8 | 1 | 5 1/4 |
| M | 1 | 286T | 26 | 68 | 11 1/4 | 47 | 13 | 4 3/8 | 1 | 8 3/4 |
| | 2 | 36STS | 26 | 74 | 11 1/4 | 47 | 13 | 4 3/8 | 1 | 8 3/4 |
| | 3 | 447TS | 26 | 86 | 11 1/4 | 63 | 10 | 4 3/8 | 1 | 5 3/4 |
| L | 1 | 405TS | 33 1/4 | 88 1/4 | 15 1/4 | 85 1/4 | 1 3/8 | 4 7/8 | 3/4 | 6 3/8 |
| | 2 | 447TS | 33 1/4 | 96 1/4 | 15 1/4 | 93 1/2 | 1 3/8 | 4 7/8 | 3/4 | 6 3/8 |

Not for manufacture or installation - see factory.

STUFFING BOX RELATED DIMENSIONS



| STUFFING BOX RELATED DIMENSIONS | | | | |
|--|----------|----------|----------|---------------------|
| PUMP FRAME | A | B | C | PACKING SIZE |
| S | 4.00 | 3.68 | 3.12 | 1/2" X 1/2" |
| M | 4.75 | | 3.25 | |
| L | 5.75 | | | |

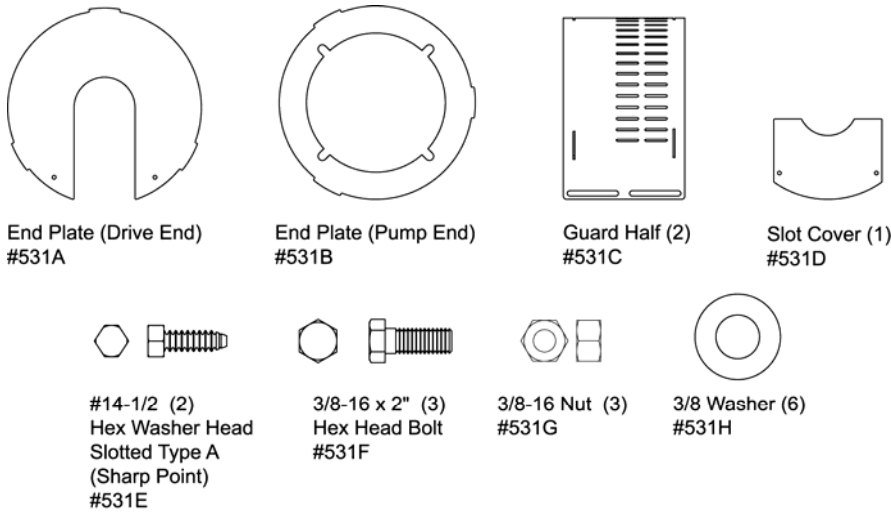
APPENDIX G – ANSI B15.1 COUPLING GUARDS

**INSTALLATION INSTRUCTIONS FOR SUMMIT PUMP
ANSI B15.1 COUPLING GUARDS**

WARNING!

Before assembling or disassembling the coupling guard, de-energize the motor, lock out the motor controller/starter, and place a caution tag at the starter indicating that it is disconnected. Before resuming normal pump operation, replace the coupling guard. Summit Pump assumes no liability when these procedures are avoided.

Figure G-1



The design’s simplicity allows complete coupling guard assembly, including the end plate (pump end), in about fifteen minutes.

ASSEMBLY PROCEDURES

■ TO ASSEMBLE YOUR COUPLING GUARD

NOTE: *If the end plate (pump end) was previously installed, make any necessary adjustments to the coupling and skip to Step 2.*

1. On the STO, MTO, and LTO, align the end plate (pump end) to the bearing frame. (Impeller adjustment is not required.)

On the XLO-X, align the end plate (pump end) to the pump bearing housing with the small slots on the end plate aligned to the impeller adjusting bolts and the large slots clearing the bearing housing tap bolts. Then attach the end plate to the bearing

housing using the jam nuts on the impeller adjusting bolts as shown in *Figure G-3*.

After attaching the end plate to the bearing housing, check and reset the impeller clearance as detailed in *APPENDIX A - IMPELLER CLEARANCE SETTING*.

NOTE: Complete the coupling adjustments before proceeding with the coupling guard assembly.

Figure G-2
STO, MTO, LTO

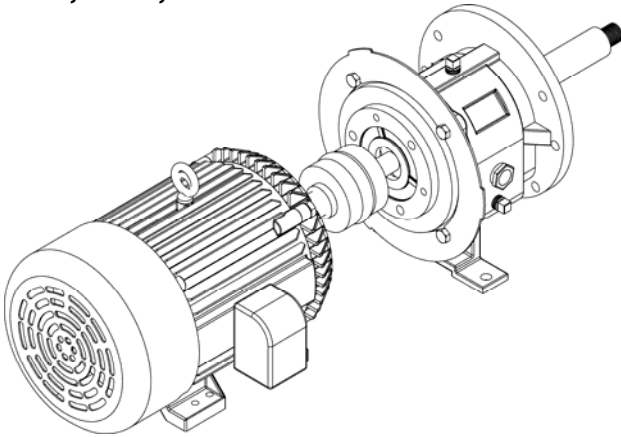
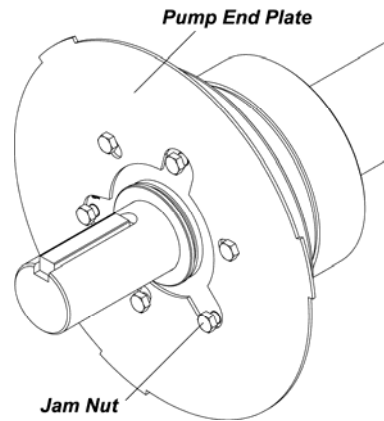


Figure G-3
XLO-X



2. Slightly spread the bottom of the coupling guard half (pump end) and place it over the pump end plate as shown in *Figure G-4*. The annular groove in the guard half is located around the end plate. (See *Figure G-5*.)

Figure G-4

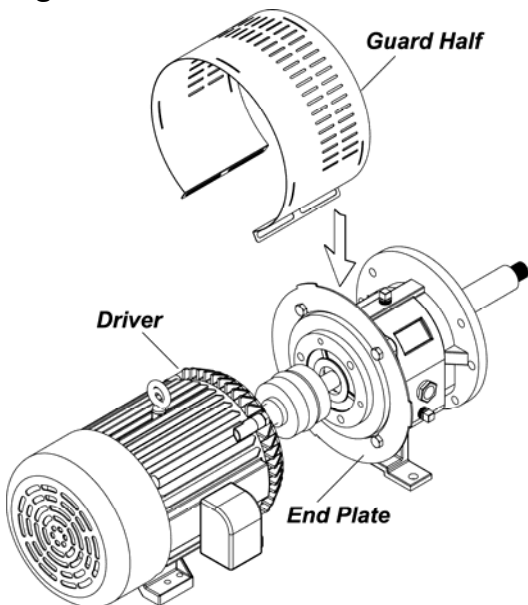
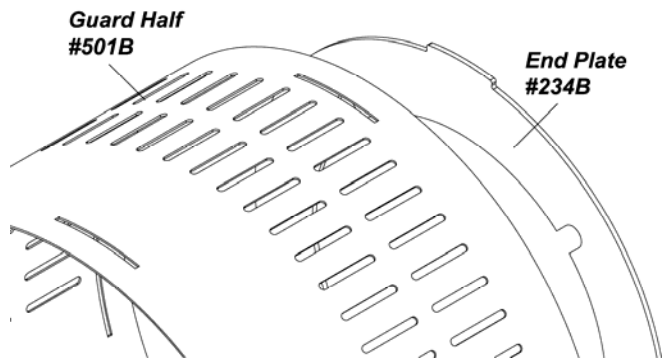


Figure G-5



3. After placing the coupling guard half (pump end) around the pump end plate, secure it with a bolt, nut and two (2) washers through the round hole in the front end of the guard half as shown in *Figure G-6*. Tighten securely. (See *Figure G-7*.)

Figure G-6

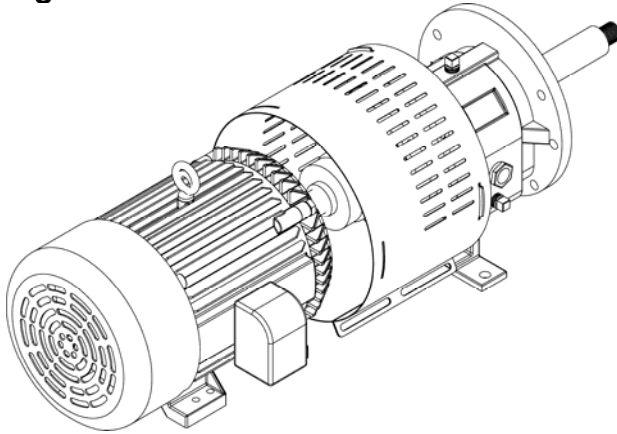
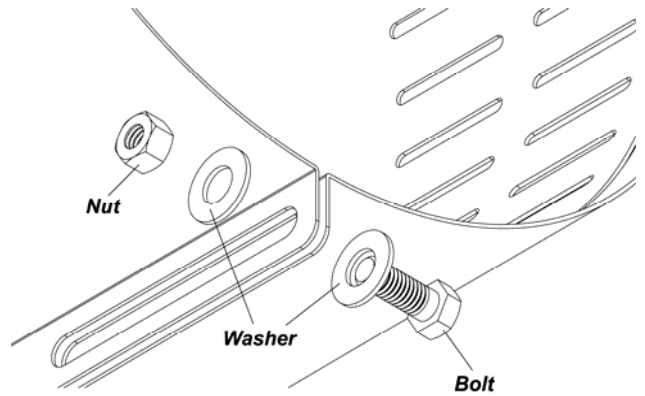


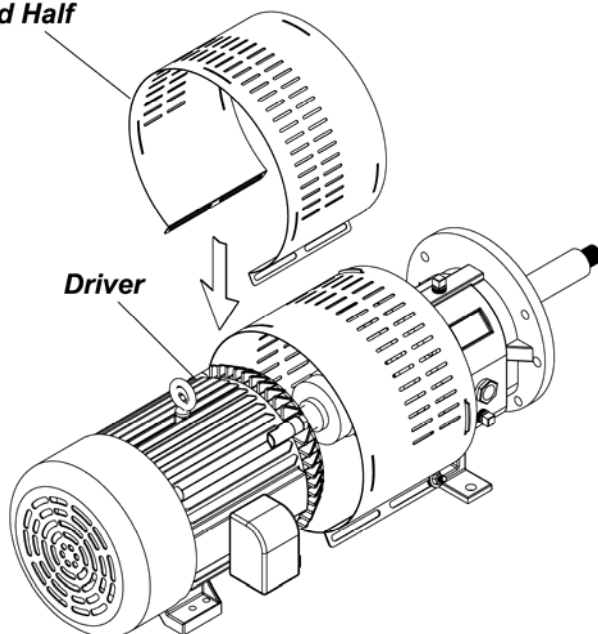
Figure G-7



4. Slightly spread the bottom of the coupling guard half (driver end) and place it over the coupling guard half (pump end) so that the annular groove in the coupling guard half (driver end) faces the motor as shown in *Figure G-8*.

Figure G-8

Guard Half



5. Place the end plate (driver end) over the motor shaft as shown in *Figure G-9*. Position the end plate in the annular groove at the rear of the coupling guard half (driver end) and secure it with a bolt, nut, and two (2) washers through the round hole at the rear of the guard half. Finger-tighten only.

Figure G-9

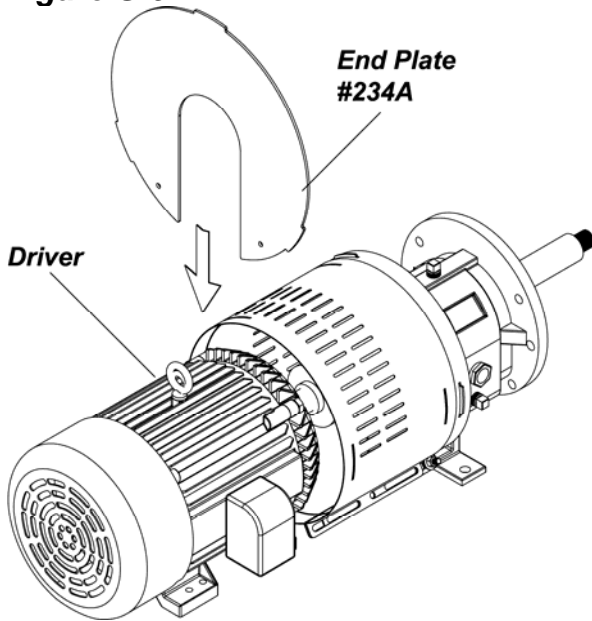
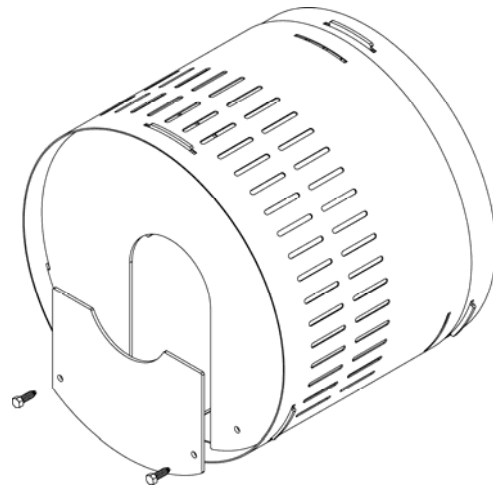


Figure G-9.5

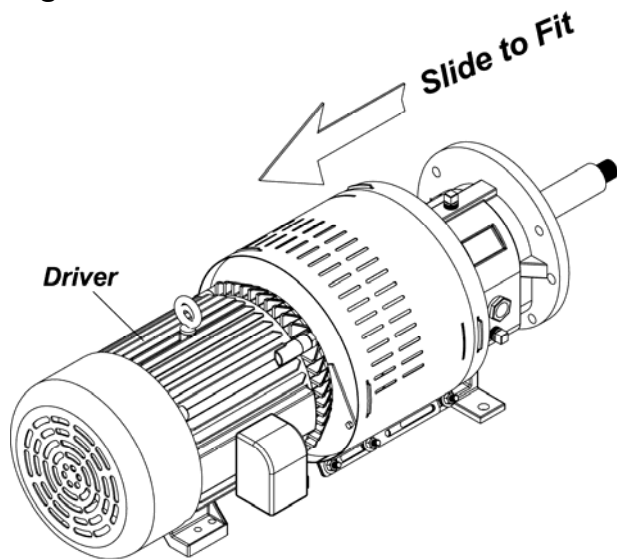


6. Adjust the length of the coupling guard to completely cover the shafts and coupling as shown in *Figure G-10*, by sliding the coupling guard half (driver end) toward the motor. After adjusting the length, secure the guard with a bolt, nut and two (2) washers through the slotted holes at the center of the guard and tighten. Check tightness on all of the nuts on the guard assembly.

WARNING!

Before assembling or disassembling the coupling guard, de-energize the motor, lock out the motor controller/starter, and place a caution tag at the starter indicating that it is disconnected. Before resuming normal pump operation, replace the coupling guard. Summit Pump assumes no liability when these procedures are avoided.

Figure G-10



DISASSEMBLY PROCEDURES

■ TO DISASSEMBLE YOUR COUPLING GUARD

It is necessary to remove the coupling guard for certain pump maintenance and adjustments, such as coupling adjustment, impeller clearance adjustment, and so forth. Replace the coupling guard after completing maintenance.

DO NOT resume normal pump operation while the coupling guard is removed.

NOTE: *Refer to the illustrations for assembly beginning with Figure G-10 and working in reverse order.*

1. Remove the nut, bolt and washers from the center-slotted hole on the coupling guard. Slide the motor end of the coupling guard half toward the pump. (See *Figure G-10*.)
2. Remove the nut, bolt and washers from the driver end of the coupling guard half and remove the end plate. (See *Figure G-9*.)
3. Slightly spread the bottom of the coupling guard half and lift it off. (See *Figure G-8*.)
4. Remove the remaining nut, bolt and washers from the pump end of the coupling guard half. Slightly spread the coupling guard half and lift it off. (See *Figure G-4*.)

This concludes the coupling guard disassembly procedures.

NOTE: *It is unnecessary to remove the end plate (pump end) from the bearing housing. If internal pump part maintenance is necessary, the bearing housing tap bolts are accessible without removing the end plate. Refer to APPENDIX C - MAINTENANCE AND REPAIR before removing the pump bearing housing.*

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