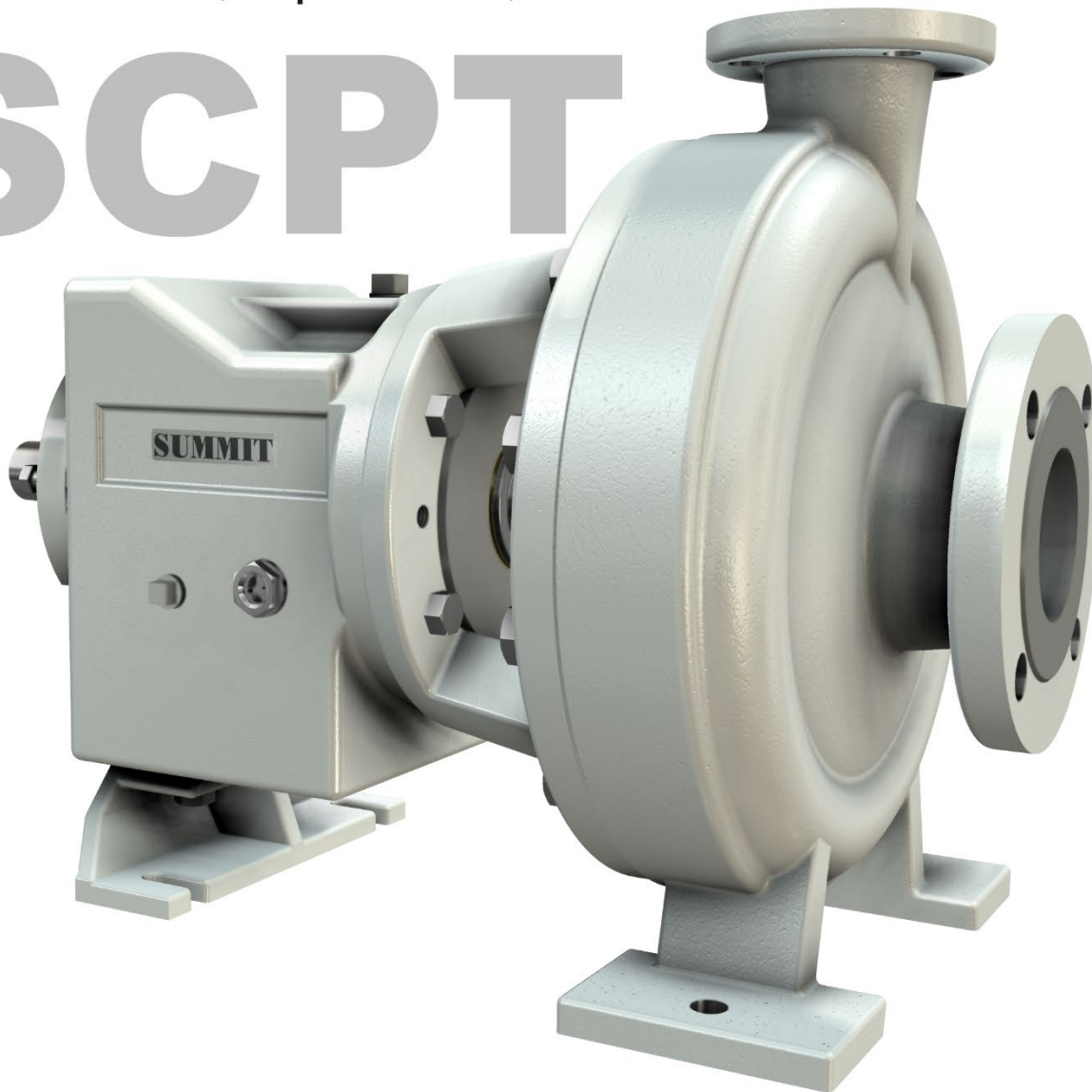


SUMMIT™

SCPT

Installation, Operation, and Maintenance Manual

SCPT



Standard Process Pump



SUMMIT™
PUMP, Inc

www.SUMMITPUMP.com

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I. WARRANTY

Pumping units assembled by Summit Pump, Inc., Green Bay, WI are guaranteed to be free from defects in material and workmanship for one year from the date of shipment from factory in Green Bay, WI. The obligation under this warranty, statutory or otherwise, is limited to replacement or repair at Green Bay, WI, of such part as shall appear to us upon inspection at such point, to have been defective in material or workmanship

This warranty does not obligate Summit Pump, Inc. to bear the cost of labor or transportation charges in connection with replacement or repair of defective parts; nor shall it apply to a pump upon which repairs or alterations have been made useless authorized by Summit Pump, Inc.

No warranty is made in respect to engines, motors, or trade accessories, such being subject to warranties of their respective manufacturers.

No express implied or statutory warranty, other than herein set forth, is made or authorized to be made by Summit Pump, Inc.

In no event shall Summit Pump, Inc. be liable for consequential damages or contingent liabilities arising out of the failure of any Summit Pump, Inc. pump or parts thereof to operate properly.

II. LIABILITY

Summit Pump, Inc. shall not be liable for personal or physical injury, damage or delays caused by failure to follow the instructions and procedures for installation, operation and maintenance contained in the current manual.

The equipment is not for the use in or with any nuclear facility or fire sprinkler system. Buyer accepts the responsibility for ensuring that the equipment is not in violation and Buyer shall indemnify and hold Seller harmless from any and all liability (including such liability resulting from seller's negligence) arising out of said improper use.

III. COPYRIGHT

This Installation, Operation, and Maintenance Manual contains proprietary information, which is protected by copyright. No part of this Installation, Operation, and Maintenance Manual may be photocopied or reproduced without prior written consent from Summit Pump, Inc.

The Information contained herein is for informational use only and is subject to change without notice. Summit Pump, Inc. assumes no responsibility or liability for any errors or inaccuracies that may appear in this manual.

1 INTRODUCTION

This manual provides instructions for the installation, operation, and maintenance of the Summit SCPT pump. The purpose of this manual is to support safe operation, reliable performance, and maximum service life of the equipment.

This manual applies to all standard SCPT pump configurations unless otherwise specified. Site-specific requirements, project specifications, and customer procedures may supplement the information contained herein.

1.1 SCPT PUMP

The SCPT is a horizontal, end-suction centrifugal pump conforming to ANSI B73.1. The SCPT provides reliable performance with industrial process applications including clean liquids, corrosive chemicals, and light slurries.

1.1.1 *Materials*

Standard SCPT wet-end components (casing, suction cover, impeller) are cast in CD6MN duplex stainless steel (ASTM A890 Grade 3A). CD6MN provides excellent corrosion and abrasion resistance over conventional austenitic stainless steels such as CF8M.

1.1.2 *Bearing Frame*

The SCPT bearing frame supports the drive and wet end components with precision machined alignments between parts. This promotes accurate running tolerances for mechanical seals and packing and reduces soft-foot during pump-to-driver alignment.

The bearing assembly is designed for heavy-duty applications and features a duplex or single row angular contact thrust bearing(s) and cylindrical roller radial bearing. Large bearing span reduces shaft deflection providing extended bearing life.

Impeller clearance is externally adjusted by moving the bearing housing axially within the bearing frame. This allows accurate clearance setting without pump disassembly or feeler gauges.

Bearing frames are easily converted to grease lubrication from standard oil lubrication.

1.1.3 *Liquid End*

The SCPT liquid end conforms to ANSI B73.1 standards for drop-in interchangeability with other ANSI process pumps. The back pull-out design allows the entire rotating assembly to be removed from service without disturbing suction or discharge piping.

The centerline discharge nozzle provides self-venting for air elimination and equalizes pipe stress distribution through integral feet. The casing features heavy wall construction with corrosion allowance for extended wear life.

The large diameter shaft provides low shaft deflection to improve bearing and mechanical seal life. Available in solid shaft or sleeved shaft construction.

The stuffing box is designed to accommodate packing, component mechanical seals, cartridge seals, or dynamic seals. Multiple stuffing box configurations are available depending on seal requirements.

1.1.4 Pump Principle

The SCPT pump impeller imparts liquid velocity to the casing. The casing converts the velocity energy to pressure energy and guides the liquid out the discharge. The pressure difference between the pump discharge and downline piping induces flow.

The lower pressure at the eye of the impeller versus the higher pressure at the suction pipe entrance allows the liquid to enter the suction pipe and pump.

Below is the general pumping principle:

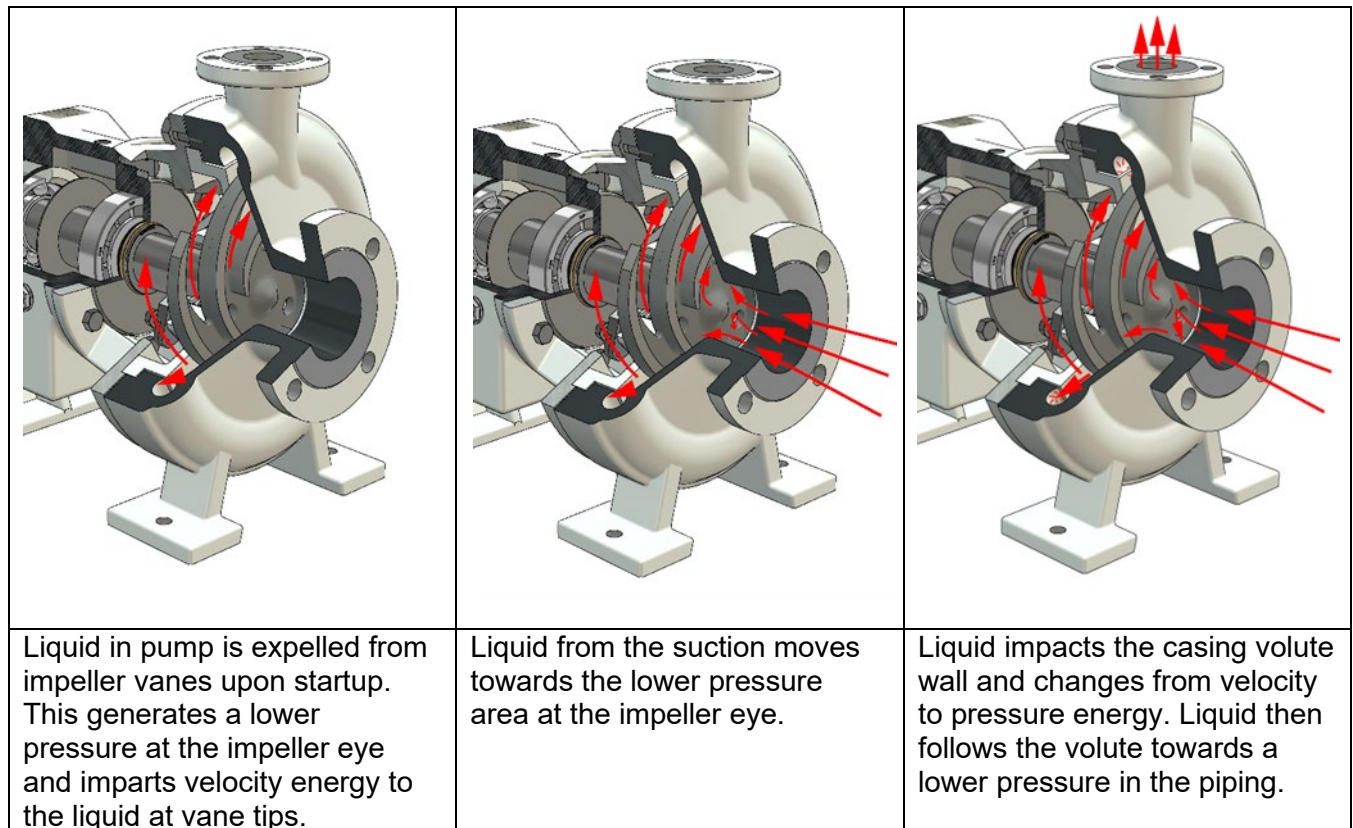


Figure 1-1: General SCPT pumping principle

1.2 GENERAL INFORMATION FOR USE

For reliable and efficient service, follow the recommended inspection and maintenance intervals. Regular observation of operating parameters such as vibration, temperature, and noise will assist in early detection of abnormal conditions.

Keep this manual readily accessible to all personnel involved with the installation, operation, or maintenance of the pump.

NOTICE

Use only genuine Summit Pump replacement parts to maintain design integrity and performance.

2 SAFETY

2.1 GENERAL SAFETY INSTRUCTIONS

This equipment is designed for safe and reliable operation when used as intended. The pump contains pressurized and rotating components that can cause injury if handled incorrectly. Follow all safety and operating instructions included in this manual.

Failure to observe safety precautions can result in personal injury, equipment damage, or environmental harm. Only trained and authorized personnel should install, operate, or service the pump.

All personnel must wear appropriate personal protective equipment and operate the pump only within the specified limits for pressure, temperature, and speed.

⚠ WARNING
Failure to follow these safety instructions can result in mechanical failure, personal injury, or the release of hazardous material.

2.2 DEFINITIONS

The following signal words are used throughout this manual to identify important safety information. Read and follow all safety messages to prevent injury or equipment damage.

⚠ DANGER
DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING
WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION
CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

NOTICE
Provides important information not directly related to personal safety, such as equipment protection or operational tips.

2.3 PUMP SAFETY WARNINGS

⚠ DANGER

Do not exceed the maximum allowable working pressure (MAWP) of the pump or system components. Verify all components are rated for system conditions.

⚠ DANGER

When pumping hazardous or toxic liquids, follow all safety procedures in the applicable Safety Data Sheet (SDS). Evaluate explosion, fire, and chemical exposure risks before operation.

⚠ WARNING

Do not operate the pump beyond rated temperature limits. Exceeding thermal limits may cause equipment failure, seal failure, or vapor explosion.

⚠ CAUTION

Follow all handling, assembly, and disassembly instructions in this manual. Failure to comply may result in equipment damage or personal injury.

NOTICE

This IOM is written for pump equipment only. Refer to respective IOM auxiliary equipment, such as but not limited to seals, couplings, motors, belts, sheaves and VFDs.

2.4 SAFETY CONCERNS

Summit Pump expects the end user to comply with industry and on-site safety protocols. In addition, the end user is expected to understand the product that is being supplied and all appropriate industrial standards for their application. Individuals involved in the installation, operation and maintenance (IOM) of the pumping equipment should be able to identify and eliminate unsafe environments.

User safety is high priority which Summit Pump addresses through user education and product design. Please contact your Summit Pump representative or visit <https://summitpump.com/home> for further information.

Summit Pump will not be liable for any damages because of non-conformance to instruction in this manual. The pump is not to be operated outside of the range of parameters given at time of sale for the individual order which include but is not limited to maximum pressures, temperature ranges, used with liquids outside specification, RPM ranges and NPSH margins. Doing so without written permission from Summit Pump may also void any warranties or replacement parts.

3 NOMENCLATURE

3.1 PUMP TAG INFORMATION

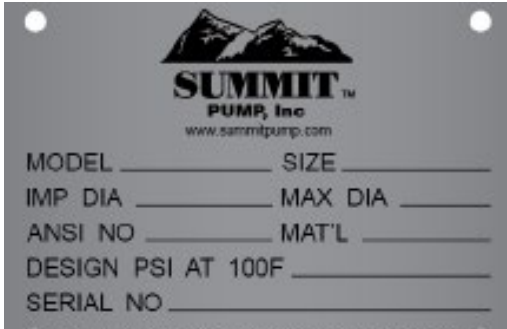


Figure 3-1: Pump tag - blank

All pumps and back pullouts with impellers will receive a pump tag with serial number. Serial numbers are not generated for products that are unable to identify a specific pump size.

Location of pump tags can be found on the bearing frame (330A).

3.1.1 Model

This field identifies the product line. For the SCPT line this will be labeled as “SCPT”.

3.1.2 Size

The size field will identify the wet end size of the product (e.g., 4x6-14). The first number is the nominal size of the discharge followed by a “X” . The second number is the nominal size of the suction followed by a dash. The third number is the nominal maximum diameter of the impeller. Note that nominal maximum impeller diameter shown here may not be the true maximum diameter of the impeller.

3.1.3 Imp Dia.

This field is the actual impeller diameter supplied from Summit Pump.

3.1.4 Max Dia.

This field is the true maximum diameter for the pump.

3.1.5 ANSI No

The SCPT has pump sizes that conform to ASME B73.1 standard. Pump sizes that comply with this standard will have the Dimension Designation as defined in ASME B73.1 printed in this field. If the field is left blank the pump is not defined by this standard.

3.1.6 MAT'L

The MAT'L field identifies the material of the casing and impeller the pump was sold into commerce with. The format will be as shown:

Example: CD6/CD6

The first material indicates the casing material and the second is the impeller material – “Casing / Impeller”

3.1.7 Design PSI at 100°F

The value shown here is the maximum allowable working pressure (MAWP) at 100°F. Refer to Summit Pump technical document SP-ENG-103 for further MAWP at other temperatures and materials.

3.1.8 Serial Number

The value here is the serial number of the sold assembly as shipped from Summit Pump’s assembly facility. Refer to Summit Pump document SP-ENG-087 for serial number nomenclature. Use this number when contacting Summit Pump or any representative of Summit Pump.

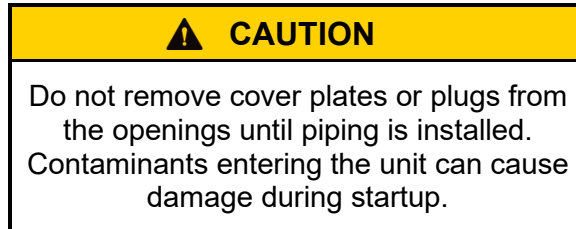
3.2 FRAME SIZES

SCPT power end frame sizes are labeled by number with “1” being the smallest of the 3 frame sizes. Frame size controls the relationship between certain parts such as bearings, shafts, sleeves, bearing frames, and housings. Frame size does not change hydraulic performance; it affects mechanical capacity.

4 RECEIPT AND STORAGE

4.1 RECEIVING THE PUMP

Upon arrival, carefully inspect the pump for evidence of damage during transit. Document all damage with photographs before moving the equipment. Immediately report any damage to your local Summit Pump, Inc. Distributor and make a claim with the shipping carrier.



Locate and read all tags attached to the pump and review this manual before handling or installation.

Check for loose hardware and tighten if needed. Prepare pump for storage duration or installation. Pumps are shipped prepared for immediate installation unless otherwise specified.

4.2 STORAGE

4.2.1 *Temporary*

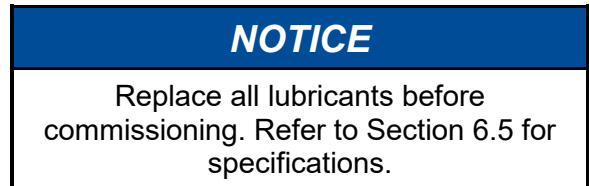
Temporary storage: less than three months.

- Store the pump in a clean, dry location protected from dirt and moisture.
- Do not remove protective covers or plates from the pump openings.
- Ensure bearings and drive components are protected from foreign material.
- Verify lubrication per Section 6.5 of this manual, before storage.
- Rotate the shaft by hand at least once every two weeks to prevent false brinelling and corrosion.

4.2.2 *Long Term*

Long Term Storage: more than three months.

- Keep the pump in a clean, dry, and well-ventilated area.
- Manually rotate the shaft at least once every two weeks to prevent the bearings from developing flat spots and corrosion.
- For cast-iron pumps with packing, remove the packing rings from the stuffing box and apply a rust-preventive compound inside the box.
- For oil-lubricated units, the bearing housing is shipped without oil. Before storage, either fill it with clean oil or coat the internal surfaces with a corrosion-preventive film.
- Apply a rust inhibitor to exposed metal surfaces such as the shaft end, flanges, and coupling. Protect internal components such as the casing and seal area with volatile corrosion inhibitors when needed.
- Follow the storage instructions supplied with any accessories, such as motors or instrumentation.

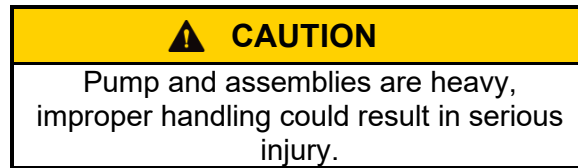


4.3 HANDLING

Pump unit boxes, pallets, and crates may be unloaded using a forklift or slings depending on size and package construction.

Always verify the center of gravity for the following components, as they require extra care regarding stability:

- Pump and baseplate assembly (without motor)
- Wet end
- Bearing unit
- Bare impeller



4.4 LIFTING

The lifting accessories must be rated to safely support the full weight of the pump assembly being handled. Always verify the capacity of slings, hooks, and hoists before lifting.

If suitable lifting equipment is unavailable, move heavy assemblies using skids or rollers at ground level. Do not attempt to lift components manually or with makeshift devices.

Crates and individual pump assemblies must never be dropped or subjected to impact during handling or transportation.



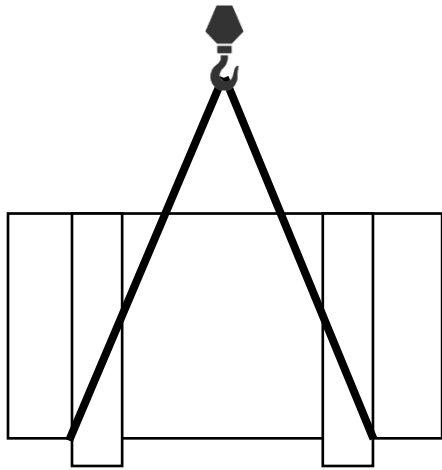


Figure 4-1: Hoisting the crate

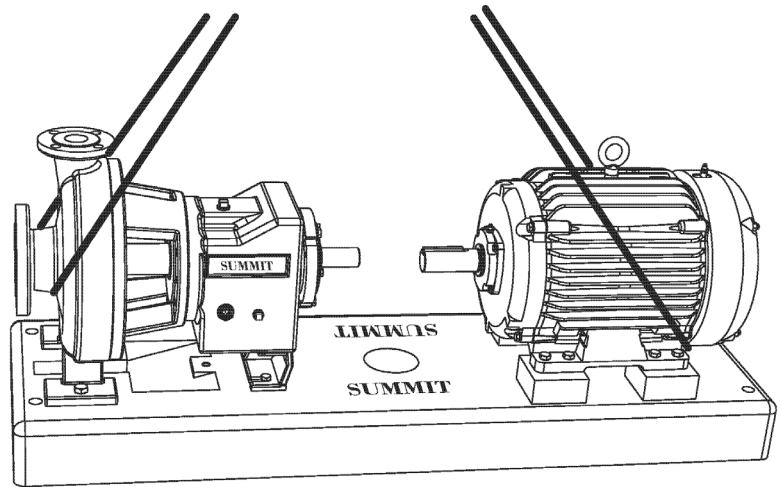


Figure 4-2: Safe lifting (Pump, Motor, Baseplate)

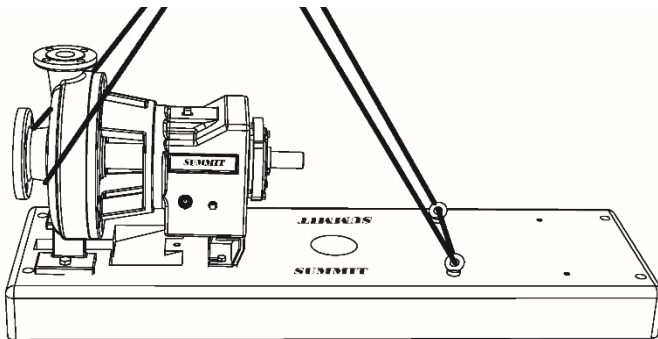


Figure 4-3: Safe lifting (Pump, Baseplate)

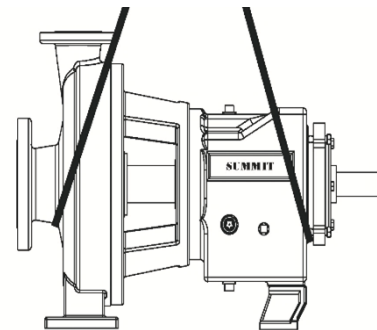


Figure 4-4: Safe lifting (pump)

NOTICE

Use nylon/vinyl lifting straps when lifting pumps or pump assemblies. Do not wrap chains directly around the casing, bearing housing, or seal chamber. Chains can cause surface damage and misalignment, leading to premature seal and bearing failure.

5 INSTALLATION

5.1 GENERAL

Summit pumps are assembled at the factory. Follow all instruction tags on the pump. Verify all fluid properties and application requirements have been considered and relayed to manufacturer and/or distributor. Verify all auxiliary piping (flush lines, cooling lines, seal piping) is connected per system drawings. Electrical grounding of the pump and base assembly shall be completed.

5.2 PERSONAL PROTECTIVE EQUIPMENT (PPE)



Safety Glasses



Safety Footwear



Gloves



Hard Hat

5.3 LOCATION

Select a location with adequate access for inspection and maintenance, and sufficient overhead clearance for lifting equipment. The pump should be located as close as possible to the fluid source. If the pump requires a water flush, locate it as close as possible to the water supply. Pump should be in a clean and dry area in most ideal environmental conditions.

5.4 PIPING

Suction and discharge lines should follow standards provided in ANSI/HI 9.6.6 Rotodynamic Pumps for Piping and ANSI/HI 9.8 Pump Intake Design. All system calculations must be completed and verified for accuracy prior to pump sizing and selection. Minimal considerations of the system shall be:

- Total
 - Suction static pressure and friction heads
 - Discharge static pressure and friction heads
- NPSH
- Submergence
- Liquid velocities
- Specific gravity
- Expected temperature of liquid

Equation 5-1: Liquid Velocity

$$Velocity \left(ft/s \right) = \frac{Flow \left(GPM \right) \times 0.4085}{\left(Pipe \ ID \ \left(in \right) \right)^2}$$

⚠ DANGER

Lock out all electrical and mechanical equipment prior to any work.

5.4.1 Piping Support

Support all piping independently near the pump. Do not use the pump casing as pipe support. Install pipe supports, hangers, or anchors to carry the weight of piping, valves, and fluid. Piping loads from weight, thermal expansion, or vibration must not transfer to the pump nozzles.

Verify piping alignment before making flange connections. Flanges should align naturally without forcing. Do not use flange bolts to pull misaligned piping into position. Forcing connections will damage the casing, introduce misalignment, and cause premature seal and bearing failure.

5.4.2 Suction Piping

Suction piping must be kept as short and direct as possible to minimize friction losses and maintain adequate NPSHa (Net Positive Suction Head available). NPSHa must always exceed NPSHr (Net Positive Suction Head required) with an acceptable margin. Typically piping material matches pump’s casing material to reduce electrolysis concerns. The suction line should gradually rise towards the pump to prevent air pockets. The suction line diameter must be equal to or larger than the pump suction nozzle, and all joints must be leak-free to avoid air infiltration. If branches are required in the suction line, they must be located at least 10 pipe diameters from the pump suction nozzle and designed to maintain smooth, uniform flow.

The SCPT is not self-priming. The pump casing and suction line must be filled with liquid prior to startup. Install one isolation valve in the suction line for maintenance. Do not throttle the suction valve during operation.

5.4.3 Discharge Piping

Install a check valve and isolation valve in the discharge line. Install the check valve between the pump discharge and the isolation valve to prevent backflow and reverse rotation. The isolation valve allows the pump to be removed from service for maintenance.

Before commissioning, thoroughly clean all piping. Foreign material left in the system will damage the pump during startup.



5.5 BASEPLATE

The baseplate must provide a rigid and stable support for the pump and driver. Each pump unit should be mounted on a fabricated steel, stainless steel, cast-iron, or polymer concrete baseplate. Mount the baseplate on a concrete foundation 4 to 8 inches longer and wider than the baseplate on all sides.

5.6 FOUNDATION

Use a foundation that is sufficient to support all points of the pump baseplate. Level and grout the baseplate per standard construction practices.

5.6.1 Concrete Subbase

The concrete sub foundation performs several functions. It must support the weight of the entire pump assembly, maintain the alignment of all system components, and absorb the loads, forces and vibrations that are developed under normal operating conditions. The concrete material used must be top quality and conform to local building codes as well as the contractor’s strength requirements. Reinforcing bars and mesh should be used as required.

The mounting surface of the concrete foundation must be flat and level beneath the footprint of the sub-base, or the pump could be installed out of square. This could create problems aligning the piping and pump, place extra loads on the couplings and bearings, and alter the operating levels of lubricants or hydraulic fluids in the system. It is recommended that the top surface of the slab be held flat and level to at least F50 according to American Concrete Institute (#117) and the Canadian Standards Association (#A23.1) which is approximately 1/8” per 10 foot.

The subbase height is usually determined by the process piping runs and elevation.

The weight of the sub foundation should be 3-5 times the weight of the pump, motor and baseplate. Dimensionally, it should be 4” to 8” longer and wider than the base plate. Anchor bolts are installed in pipe sleeves. The pipe diameter is 2.5 times larger than the anchor bolt diameter. This sleeve/bolt assembly is embedded in the base when poured.

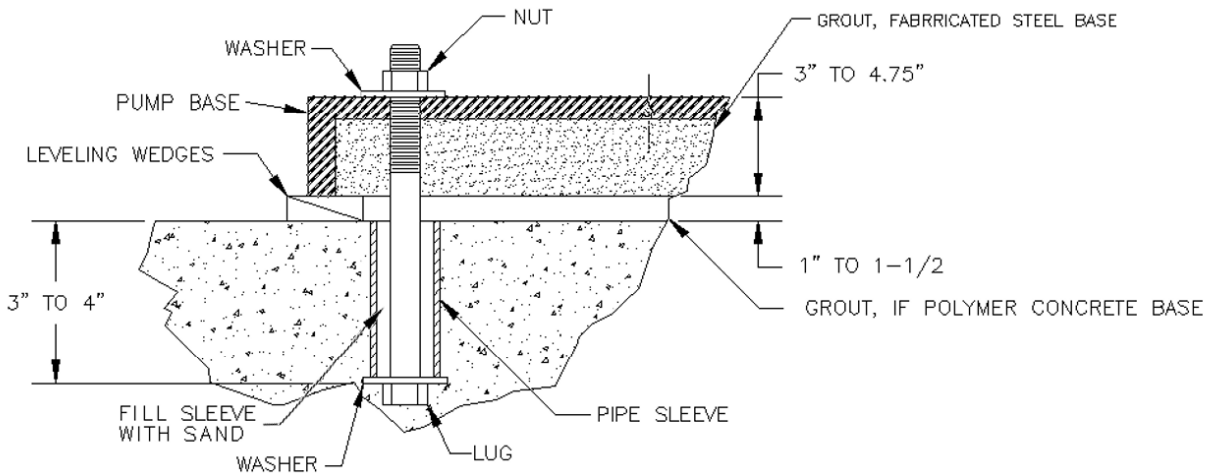


Figure 5-1: Anchor bolt configuration

The pipe sleeve should be filled with sand or plastic foam to the top of the sleeve. This will prevent the grout material from spilling into the sleeve and reducing the movement of the sleeve when pouring the grout.

Anchor bolt sizes: 1”-8UNC. Length is usually 7.5” to 10”, depending on base thickness and overall size.

5.7 BASEPLATE GROUTING

1. This grouting instruction assumes a concrete subbase has been put in place to accept the baseplate. The subbase should be clean of dirt, oil and any other debris.
2. Shims/wedges should be wood.

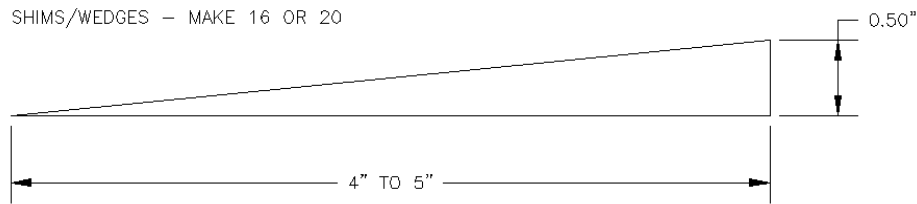


Figure 5-2: Wooden wedges

3. Shims/wedges should be placed on the subbase, as shown in Figure 5-2. Use 2 to 3 per stack to obtain desired gap between baseplate and sub-base. Normal gap is 1" to 1-1/2".
4. Carefully lower baseplate with pump and motor onto subbase over anchor bolts.
5. Level baseplate to 0.125" over length and 0.088" in over width.
6. When leveling is complete, uniformly hand tighten the anchor bolts.
7. Build a plywood form around baseplate supported on the subbase. It should be 3" high and 1" to 1.5" larger than the baseplate. Its size should be large enough to include the shims or wedges that are left in place.

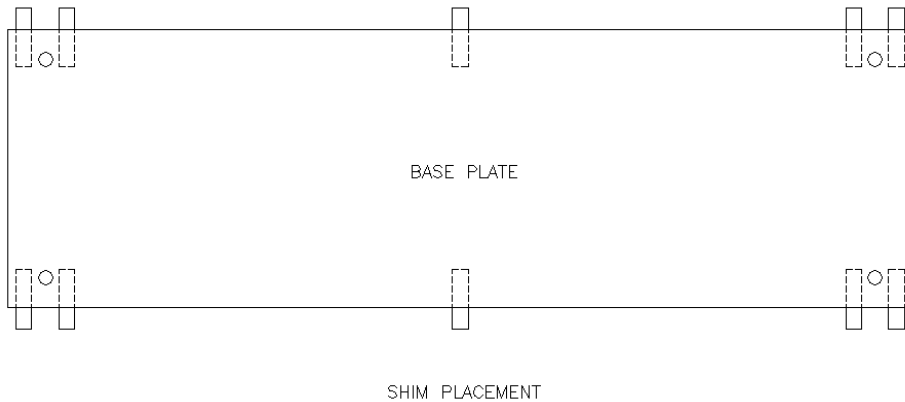


Figure 5-3: Wedge locations

8. Use a high quality non-shrinking epoxy grout, following manufacturer's mixing and installation instructions.
9. When grout has cured, per grout manufacturer's recommended cure time, tighten anchor bolts till secure.
10. When grouting is complete, check coupling alignment and re-align as necessary.

5.8 ALIGNMENT

⚠ WARNING
<p>Before beginning any installation or alignment procedures, make sure the drive motor cannot be started by any means.</p>

NOTICE
<p>Satisfactory performance of the coupling depends on correct installation and alignment.</p>

Proper alignment is critical to equipment life. Misalignment causes premature bearing, seal, and coupling failure.

Pump and driver assemblies are rough aligned at the factory. However, the alignment may change due to shipping, baseplate support, piping support, thermal expansion, or other factors.

5.8.1 Direct Coupled Pump

1. Check that driver rotation agrees with pump rotation. (the pump shaft rotation is clockwise when viewed from the driven end of the pump, as shown in Figure 6-4).
2. Check and adjust the parallel and angular alignments in vertical (6 and 12 o'clock) and horizontal (3 and 9 o'clock) directions.
3. Use flexible spacer couplings.
4. Verify coupling halves are locked together so that they do not move against each other.
5. Correct alignment by adding or removing shims from under the feet of the motor and shifting the motor horizontally, until the shafts are aligned within the given tolerances provided in Table 5-1.
6. Install a coupling guard when alignment is completed.

Table 5-1: Coupling tolerances ANSI/ASA S2.75-2017

	Coupling Alignment Tolerances (Per ANSI/ASA S2.75-2017)			
	1800 RPM		3600 RPM	
	Offset (max)	Angle (max)	Offset (max)	Angle (max)
Minimal	0.006 in	0.0012 in/in	0.0045 in	0.0009 in/in
Standard	0.003 in	0.0006 in/in	0.0025 in	0.0005 in/in
Precision	0.0016 in	0.0003 in/in	0.0013 in	0.0002 in/in

6 OPERATION

6.1 IMPELLER CLEARANCE ADJUSTMENT

Impeller clearance adjustment shall be done after the first rough alignment of the pump and motor but prior to the coupling being connected. If a mechanical seal is installed, it should not yet be attached to the sleeve. Setting the impeller clearance involves moving the shaft axially and can damage the seal if the seal is already set.

⚠ WARNING
Set mechanical seal after impeller clearance is adjusted.

NOTICE
Impeller clearance is NOT set at the factory and must be set onsite.

NOTICE
Pump should be minimally moved after the impeller clearance is set.

Proper impeller clearance is critical for pump performance. Improper settings can increase wear of the pump components, reduce expected performance or cause severe damage to the impeller and casing cover or thrust bearing. Impeller clearance may need adjustment due to wear causing lower head and flow.

6.1.1 Impeller Clearance Definition

Impeller clearance is defined by the distance between the suction side of the machined surface of the impeller vanes and the casing cover surface closest to the impeller. This dimension is shown as “IC” in Figure 6-1. The impeller clearance shown in Table 6-1 can be set when pump is at ambient temperature.

Table 6-1: Impeller Clearance

Frame Size	Impeller Clearance (IC) Up to 250° F	Impeller Clearance (IC) Up to 500° F
All Sizes	0.014” to 0.015”	0.025”

*Note Max Allowable Working Temperature is 500°F

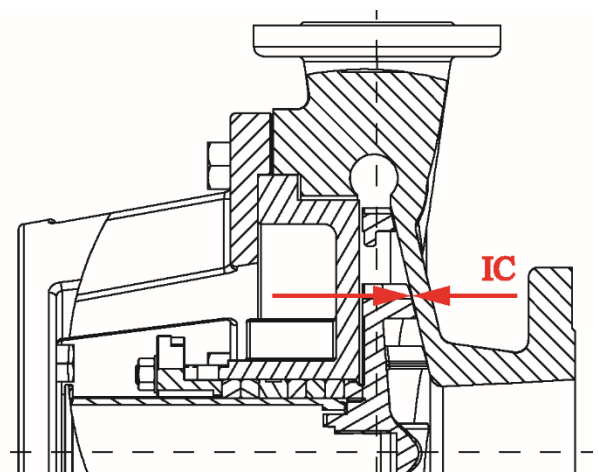


Figure 6-1: Impeller clearance

Clearances are designed to prevent contact between the impeller and the casing cover, even when the shaft and wetted components expand due to heat.

6.1.2 Setting Impeller Clearance

Impeller clearance is set externally after pump has been assembled utilizing the bearing carrier (382A) and the bearing carrier bolts (901E).

1. Loosen bolts (901E) from the bearing carrier (382A).
2. Turn the bearing carrier (382A) clockwise until you feel a slight noticeable drag. This means impeller (230A) is touching the casing cover (102A). This current position of the shaft will be noted as the datum, or zero, position.
3. For most accurate clearance setting, the use of a dial indicator is recommended. Set the dial against the shaft (210A) end as shown in Figure 6-2 and set the dial numeric value to zero.
4. Rotate the bearing carrier (382A) counterclockwise until the dial indicator reaches the value 0.005" less than of clearance shown in *Table 6-1*. Evenly tighten and torque bearing carrier screws (901E). Thread play increases clearance approximately 0.005". Adjust as needed to meet value in *Table 6-1*.
5. Turn the shaft (210A) by hand to confirm the pump rotates freely with no rubbing.

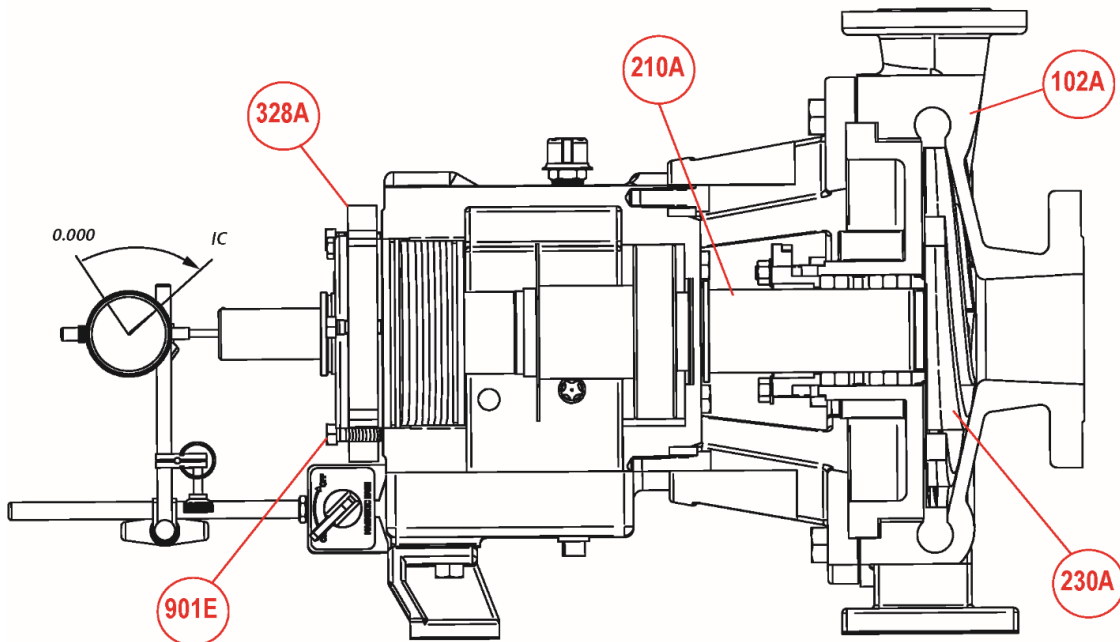
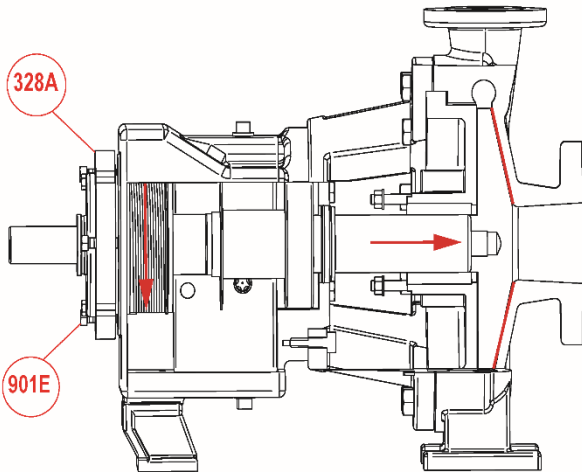


Figure 6-2: Dial indicator method

6.1.2.1 Alternative Method

While the dial indicator method is the preferred procedure for setting the impeller clearance due to its greater accuracy, the bearing carrier method offers an alternative approach when a dial indicator is not available. This method uses the bearing carrier itself as a reference point to set the impeller clearance, and while less precise, can provide acceptable results when performed carefully.

1. Loosen the hexagonal screws (901E) of the bearing carrier (382A).



2. Turn the bearing carrier (382A) clockwise until the impeller touches the case cover Figure 6-3.

3. Turn the bearing carrier counterclockwise halfway between two notches. This provides approximately 0.010 in. of clearance. When the bearing carrier screws (901E) are tightened, thread play increases the clearance to approximately 0.015 in.

4. For liquids above 250°F, set the clearance to approximately 0.020 in. before tightening the screws. After tightening, the final front clearance will be approximately 0.025 in.

Figure 6-3: Bearing carrier method

5. Tighten all bearing carrier screws (901E) evenly in stages. Do not allow the bearing carrier to rotate during tightening.
6. Turn the shaft by hand to confirm the pump rotates freely with no rubbing.

6.2 ROTATION

The pump can only operate in a clockwise rotation when viewed from the driven end of the pump Figure 6-4. If the pump is accidentally operated in a counterclockwise rotation, shut down the pump and Lockout/Tag out any power sources to the pump. The impeller may have unthreaded and seized to the casing. Check for damage with the casing, impeller, and shaft. Ensure the impeller is threaded on the shaft. If any damage is found or the impeller came loose a full inspection of the pump is recommended.

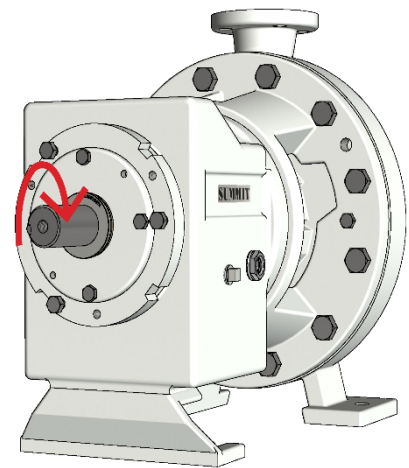


Figure 6-4: Rotation

NOTICE
<p>The pump will produce about half the expected head at an unknown flow if the pump is rotating counterclockwise.</p>

6.2.1 *Checking Rotation*



1. Lockout power to drive.
2. Disconnect coupling from the pump and motor.
3. Unlock power to motor.
4. Clear personnel from the immediate area and jog the motor just enough to determine the direction of rotation.
5. If the motor is rotating in the wrong direction, the electrical wiring will need to be adjusted by qualified personnel. Then repeat Steps 1-4.
6. Once rotation is in the desired direction, lock out motor power and reattach the coupling to the pump and motor.
7. Connect piping to pump and check shaft alignment.
8. Restore power to drive.

6.3 STUFFING BOX

The SCPT pump is supplied with a stuffing box designed to accommodate packing, a mechanical seal, or dynamic seal. Empty box is standard; packing, mechanical, or dynamic seals are optional depending on application requirements. The stuffing box is available with a standard bore (ASB), large bore (ALB), tapered bore (ATB) or dynamic seal (ADS).

For services involving solids, abrasives, or elevated temperatures, an external flush is recommended to prevent solids ingress and overheating in the stuffing box area.

6.3.1 *Seal Chamber Configurations*

The SCPT pump can be supplied with different seal chamber configurations depending on the sealing method:

- Standard bore box (ASB): accommodates packing or most single mechanical seals.
- Tapered or ribbed bore box (ATB): designed to reduce recirculation and improve cooling for mechanical seals.
- Large bore box (ALB): provides increased volume for cooling and circulation when using double mechanical seals or large cartridge seals.
- Dynamic seal (ADS): uses shaft rotation to create a hydrodynamic seal, eliminating the need for mechanical seal or packing. Suitable for non-hazardous liquids that can tolerate minor leakage at rest.

Select the seal chamber configuration based on seal type, liquid characteristics, and expected operating temperature.

6.3.2 Flushing

A clean external flush may be introduced into the stuffing box through the flush ports of the stuffing box or mechanical seal. The flush liquid pressure must be higher than the stuffing box pressure to ensure positive flow into the box.

As a guideline, flush pressure should be 10–15 psig higher than suction pressure and not less than 15 percent of the pump differential pressure. Seal support liquid should be regulated on the outlet side of the stuffing box to ensure proper circulation.

Flush piping must be well sealed. Air leaks can cause loss of prime, increased wear, or damage to internal components, especially in suction lift installations.

6.3.3 Packing

When supplied with packing, the stuffing box includes a lantern ring positioned to align with the flush ports. The lantern ring distributes flush liquid evenly around the shaft sleeve.

Packing rings must be installed individually and seated evenly. Stagger ring joints to minimize leakage paths. Packing gland adjustment should allow a controlled leakage during operation. Overtightening will result in excessive heat, accelerated wear, and potential shaft sleeve damage.

Alternate packing materials may be used as required by the application, provided they are compatible with the pumped liquid, temperature, and pressure. Packing is only compatible with Standard Bore box covers (ASB).

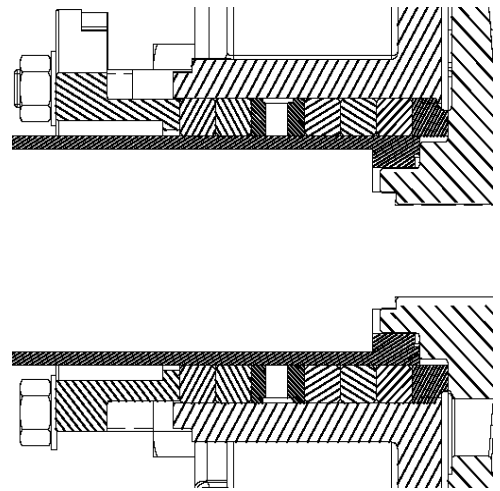


Figure 6-5: Stuffing Box

6.3.4 Mechanical Seal

Mechanical seals may be used in place of packing to minimize leakage and reduce maintenance requirements. The mechanical seal operates by maintaining contact between two lapped sealing faces, typically carbon and ceramic or other engineered materials. Handle seals carefully to avoid chipping or cracking the seal faces.

A mechanical seal may require external flush, quench, or cooling depending on the process liquid and seal design. Follow the seal manufacturer’s installation, piping plan, and operating recommendations. For abrasive or solids-bearing liquids, use a clean flush to prevent wear of the seal faces.

6.3.5 Dynamic Seal

Leakage of pumped liquid through the stuffing box during operation is controlled by the expeller (604A), which functions as the dynamic seal. In the event of a shutdown, leak prevention is managed by the static seal (435A).

6.4 PRIMING PUMP

Prior to startup the pump must be primed. This means the suction pipe and pump casing need to be filled completely with liquid. The SCPT pump is not a self-priming pump and only filling the casing will not be sufficient for proper operation. Verify the pump and suction line remain full of liquid before each startup.

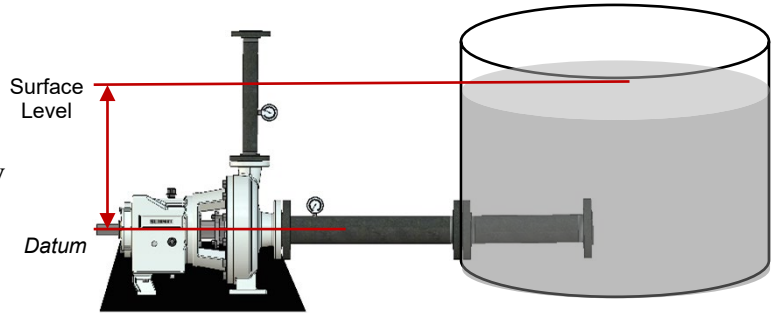


Figure 6-6: Flooded Suction

To prime the pump and system can be done in multiple ways. If the system is flooded and the static suction head is large enough to open the discharge check valve, then simply opening the suction isolation valve will allow prime.

In suction lift condition, manual priming will need to be done. This can be completed by filling the casing via the discharge pipe before the check valve but after the pump nozzle. There must be means of holding liquid in the suction line during priming.

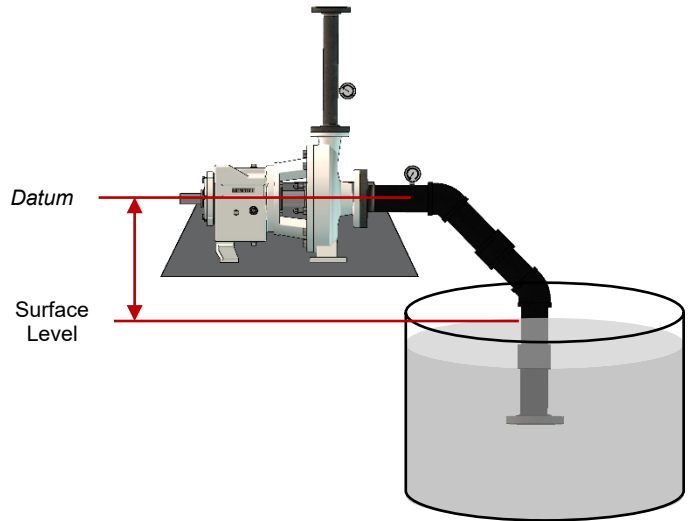


Figure 6-7: Suction Lift

6.5 LUBRICATION

⚠ CAUTION
Oil lubricated pumps are shipped WITHOUT oil. Add proper oil prior to startup.

NOTICE
Grease lubricated pump bearings are hand packed with Mobil Grease XHP222 at the factory.

NOTICE
Never add oil to grease lubricated pumps.

SCPT pumps come standard with oil lubrication, as an option grease lubrication is available. Oil lubricated pumps are not shipped with oil from the factory. Oil must be added prior to the first startup.

Verify that the pump and motor bearing lubrication (oil or grease) is in acceptable condition prior to start-up. Extended storage may have allowed condensation, dirt, or moisture and contaminated the lubricant.

6.5.1 Grease Lubrication

Greased lubricated pumps have bearings hand packed at the factory prior to shipment.

It is recommended to follow the lubrication schedule as indicated in Table 6-2. Initial lubrication should take place prior to initial startup.

NOTICE

Clean grease fittings prior to adding grease for maximum bearing life.

Table 6-2: Grease Lubrication

Bearing unit	Initial Lubrication		Re-Lubrication		Re-Lubrication Interval ¹ (Hours, Housing temp ≤130° F)			
	Impeller Side	Coupling Side	Impeller Side	Coupling Side	890 RPM	1180 RPM	1780 RPM	3540 RPM
	(oz)	(oz)	(oz)	(oz)				
1	0.7	1.5	0.22	0.40	14000	11000	9000	4000
2	3.0	3.0	0.60	0.90	12000	9500	7000	2000
3	5.0	7.5	1.3	2.1	10000	8000	4500	-

¹ Every 59° F rise in surface temperature reduces the interval to half.

Use a petroleum base or synthetic grease meeting NLGI grade 2 when the bearing housing temperature is below 175°F. Grease is only recommended when bearing temperatures are between -5°F and 230°F. Temperature range of the process fluid is -60°F to 350°F, grease is not recommended outside of this range. Bearing temperature is generally 20°F higher than bearing housing temperature.

Table 6-3: Acceptable greases

Acceptable Greases:	NLGI Grade 2
Citgo	Mystic EP2
Keystone	81EP2
Mobil	Mobil Grease XHP222
Mobil Synthetic	SCH 100
Exxon	Unirex N2
Sunoco	Multipurpose EP
SKF	LGMT 2

6.5.2 Oil Lubrication

⚠ CAUTION
Oil lubricated pumps are shipped WITHOUT oil. Add proper oil prior to startup

For the first oil filling, unscrew the breather vent (672A) and add oil until it reaches the center of the sight glass. Replace breather vent (672A). Use a high-quality, commercial-grade non-detergent oil. Acceptable viscosity grades are SAE 20-30 or ISO VG 46; acceptable Oils are listed in Table 6-4 below.

Table 6-4: Acceptable Oils

Acceptable Oils:	Grade
Exxon Terrestic	46
Shell Tellus	46
Mobil DTE Oil	Medium
Chevron GTS Oil	46
Klüber Crucolan	46

6.6 CONSTANT LEVEL OILER

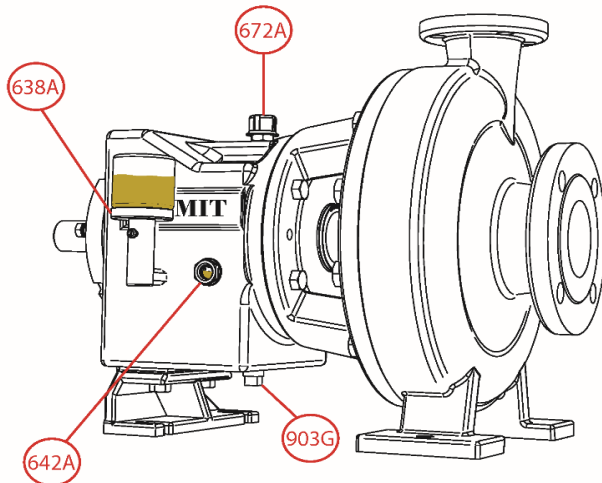


Figure 6-8: Oiler

Table 6-5: Oiler parts

Item #	Description
638A	Constant level oiler
642A	Sight Glass
672A	Breather, Vent
903G	Drain Plug

A constant level oiler is a mechanical device used to automatically

maintain a predetermined oil level within a bearing housing or gearbox. It consists of a transparent oil reservoir mounted to a regulating body that connects to the equipment housing through a side port. As the oil level in the housing drops, the oiler admits additional oil from the reservoir to restore the set level, preventing both under-lubrication and overfilling. The device operates by gravity and internal air balance and requires no external power

or adjustment once properly installed.

The SCPT comes equipped for right- or left-handed installation depending on your installation needs. To install the constant level oiler, follow these steps.

1. Remove the glass jar from the oiler assembly.
2. Remove the plug from either side of the bearing housing.
3. Apply a hydraulic thread sealant to the threads of the constant level oiler.
4. Thread the base of the constant level oiler into the bearing housing.

5. Use a level to ensure that the base is level in the horizontal plane.
6. Remove breather vent (672A) and add oil per values in Table 6-6 and reattach breather vent (672A).
7. Fill the glass jar with oil and reattach it to the base.

The constant level oiler unit operates purely by gravity and internal air balance, so no further adjustment is needed. The chart below shows the recommended amount of oil needed by volume for each size Bearing Frame.

Table 6-6: Oil volume

Bearing Unit	Oil Volume	
	(oz)	(liter)
1	12	.35
2	38	1.1
3	75	2.2

*Oil capacities can vary due to casting differences. Oil level should be set via the sight glass.

6.7 FIRST RUN CHECKS

1. Reference the operations manual for the pump’s driven equipment. Understand all starting parameters and procedures.
2. Ensure all plugs, seals, and piping are installed correctly and properly supported.
3. Perform leakage test on pump and piping systems before startup. Leakage particularly in the suction piping, can seriously reduce pump performance and prevent proper priming.
4. Verify proper alignment between the pump shaft and the driven equipment.
5. Verify pump rotates freely by hand with coupling disconnected.
6. Check all electrical connections and ensure the pump assembly is properly grounded.
7. Confirm all instruments and gauges are installed and functioning correctly.
8. Verify the pump and suction line are fully primed. Vent any trapped air.
9. Confirm the motor is wired for correct rotation. See Figure 10-2 for correct rotation.
10. Verify the stuffing box flush is operating and at the proper pressure (if applicable).
11. Confirm bearings are properly lubricated.
12. If pump has packing, verify gland adjustment allows controlled leakage. Target leakage rate is 30 to 80 drops per minute during operation.
13. Verify all required guarding is installed.
14. Ensure system controls allows pump to operate in allowed operation range.

6.8 START UP

⚠ DANGER
Install all guards which comply with ASME B15.1

⚠ WARNING
Read and understand the operation manuals supplied by all equipment manufacturers.

NOTICE
Shaft rotation is clockwise when viewed from the drive end.

Understand the expected flow and head of the pump by identifying the pump curve and system curve intersection. Know the expected suction and discharge pressures when pump is at operation speed.

1. If applicable, open the sealing water valves and set the pressure to appropriate levels.
2. Verify that the gland packing is leaking sufficiently. If no steady leakage is observed, loosen the stuffing box gland. Should the problem persist even after rotating shaft by hand, isolate pump from liquid and remove and repack the packing with less tension on the gland.
3. Prime the pump by filling at least the suction line and casing with liquid. Never allow the pump to operate dry, even briefly.
4. Ensure the suction valve is completely open and the discharge valve is shut or partially open.
5. Turn on the motor.
6. Slowly open the discharge valve until the desired flow rate is achieved.
7. Confirm that the gland packing continues to leak adequately. If leakage has stopped, loosen the stuffing box gland right away. If loosening doesn't resolve the issue and the packing overheats, shut down the pump and investigate the cause. After the packing has run without issues for 10 minutes, it can be gradually tightened. Turn the hex nuts roughly 1/6 of a turn every 5 to 10 minutes until the leakage reaches a minimum of 30 to 80 drops per minute. Throughout this process, ensure the stuffing box gland stays perpendicular to shaft axis.

Monitor the following during initial operation:

- Bearing temperature and vibration at measurement points. Typical locations are on the bearing housing at bearing locations.
- Packing leakage rate (maintain 30 to 80 drops per minute)
- Unusual noise or vibration
- Seal flush flow and pressure (if applicable)
- Pump suction and discharge pressures and system flow rate

If the pump does not achieve expected head or flow, or if abnormal noise, vibration, or temperature is observed, shut the pump down. Record all readings and conditions before attempting restart or troubleshooting.

6.9 POST-STARTUP CHECKS

After the pump has operated long enough to reach normal and steady-state operating temperature:

1. Re-check coupling alignment. Thermal expansion may affect alignment.
2. For high-temperature applications, torque casing cover bolts per specifications.
3. Verify packing leakage rate is 30 to 80 drops per minute. Adjust gland if necessary.
4. Verify seal flush and cooling systems are functioning properly.
5. Confirm bearing temperatures are within acceptable range.

6.10 SHUTDOWN

1. Close the discharge valve to prevent backflow if no other means of reverse flow prevention is present in the system.
2. Stop the driver.
3. Close the suction valve.
4. Shut off flush and cooling services.
5. If mechanical seal is installed, maintain seal flush until pump pressure is fully relieved.
6. If pumped liquid can freeze or solidify, drain the pump and suction piping completely.
7. During extended shutdowns, rotate shaft by hand 2 to 3 revolutions every few weeks to prevent false brinelling of bearings.

7 MAINTENANCE

7.1 TROUBLESHOOTING

7.1.1 Pump not Delivering Liquid

Probable Cause	Corrective Action
Wrong direction of rotation	Verify pump rotation is clockwise when viewed from driven equipment. Correct motor wiring if necessary.
Pump not adequately primed or vapor lock in suction or discharge pipe	Reprime pump and suction piping. Vent all air from system.
NPSHa insufficient	Verify suction piping arrangement. Check suction pressure and liquid vapor pressure. Clogged equipment such as strainers.
Air leakage in suction piping or shaft seal	Check suction piping for leaks. Inspect and adjust shaft seal.
Suction piping, suction valve, or impeller clogged	Inspect suction piping and pump for obstructions. Clean as necessary.
Rotational speed too low	Verify motor speed matches pump requirements.
System head exceeds pump capability	Check system resistance and reduce losses. Verify pump selection.
Air or gas entrainment in pumped liquid	Contact Summit Pump for further instructions.
Suction tank level low	Verify adequate NPSHa is available.
Discharge valves closed	Check all system components
Pump not connected to driver	Check power transmission

7.1.2 Insufficient Head

Probable Cause	Corrective Action
Air or gas entrainment in pumped liquid	Take sample of liquid, measure entrained air; check that minimum submergence is met; Aire leaks on suction side; other systems discharging near suction inlet.
Pumped liquid viscosity higher than expected	Reevaluate pump selection with known viscosity; determine solutions to reduce viscosity if possible.

Suction piping, suction valve, or impeller clogged	Inspect suction piping and pump for obstructions. Clean as necessary.
Rotational speed too low	Verify motor speed matches pump requirements.
Wrong direction of rotation	Verify rotation is clockwise when viewed from coupling end. Correct motor wiring if necessary.
System head exceeds pump capability	Check system resistance and reduce losses. Verify pump selection.
Impeller, suction cover liner, or casing worn or damaged	Inspect pump internals. Replace worn components.
Suction tank level low	Verify adequate NPSHa is available.
NPSHa insufficient	Verify suction piping arrangement. Check suction pressure and liquid vapor pressure. Clogged equipment such as strainers.
Discharge valves closed	Check all system components
System head too low	Verify by increasing system resistance. If confirmed, make necessary economic adjustment

7.1.3 Insufficient or Irregular Flow

Probable Cause	Corrective Action
Vapor lock in suction pipe	Reprime pump and suction piping. Vent all air from system.
Suction valve not fully open	Verify suction valve is fully open and suction line is unobstructed.
NPSHa insufficient	Verify suction piping arrangement. Check suction pressure and liquid vapor pressure.
Air leakage in suction piping or shaft seal	Check suction piping for leaks. Inspect and adjust shaft seal.
Air or gas entrainment in pumped liquid	Take sample of liquid, measure entrained air; check that minimum submergence is met; Aire leaks on suction side; other systems discharging near suction inlet.
Pumped liquid viscosity higher than expected	Reevaluate pump selection with known viscosity; determine solutions to reduce viscosity if possible.
Suction piping, suction valve, or impeller partially clogged	Inspect suction piping and pump for obstructions. Clean as necessary.
Rotational speed too low	Verify motor speed matches pump requirements.

System head exceeds pump capability	Check system resistance and reduce losses. Verify pump selection.
Impeller, suction cover liner, or casing worn or damaged	Inspect pump internals. Replace worn components.
System TDH changes from another pump system	Check all related processes
Faulty check valve or other equipment	Check all system equipment

7.1.4 High Power Consumption

Probable Cause	Corrective Action
Rotational speed too high	Verify motor speed matches pump requirements.
Wrong direction of rotation	Verify rotation is clockwise when viewed from coupling end. Correct motor wiring if necessary.
System head significantly different than design	Verify system piping arrangement and flow requirements.
Pumped liquid specific gravity higher than expected	Confirm actual liquid specific gravity.
Pumped liquid viscosity higher than expected	Reevaluate pump selection with known viscosity; determine solutions to reduce viscosity if possible.
Pump and motor misaligned	Re-align pump and motor assembly. Ensure no piping strain on pump.
Shaft bent or eccentric	Disassemble pump. Inspect and replace shaft if necessary. Replace bearings.
Internal components rubbing	Disassemble pump. Check impeller clearance and internal clearances.
Impeller, suction cover liner, or casing worn or damaged	Inspect pump internals. Replace worn components.
Bearing seized or dragging	Check bearing lubrication. Replace bearings if necessary.

7.1.5 Excessive Noise or Vibration

Probable Cause	Corrective Action
NPSHa insufficient (cavitation)	Verify suction piping arrangement. Check suction pressure and liquid vapor pressure. Calculate NPSHa,
Air or gas entrainment in pumped liquid	Take sample of liquid, measure entrained air; check that minimum submergence is met; Air leaks on suction side; other systems discharging near suction inlet.
Air leakage in suction piping or shaft seal	Check suction piping for leaks. Inspect and adjust shaft seal.
Suction piping, suction valve, or impeller clogged	Inspect suction piping and pump for obstructions. Clean as necessary.
Rotational speed too low or too high	Verify motor speed matches pump requirements.
System head exceeds pump capability	Check system resistance and reduce losses. Verify pump selection.
Pump operating below minimum recommended flow	Verify system flow requirements. Install minimum flow bypass if necessary.
Foundation not rigid	Strengthen foundation. Verify foundation meets requirements.
Piping strain on pump	Verify piping is independently supported. Check alignment after piping connection.
Pump and motor misaligned	Re-align pump and motor assembly. Ensure no piping strain on pump.
Shaft bent or eccentric	Disassemble pump. Inspect and replace shaft if necessary. Replace bearings.
Internal components rubbing	Disassemble pump. Check impeller clearance and internal clearances.
Impeller, suction cover liner, or casing worn or damaged	Inspect pump internals. Replace worn components.
Bearing seized or dragging	Check bearing lubrication. Replace bearings if necessary.
Bearing worn or loose	Disassemble pump. Replace bearings. Verify proper installation torque.
Lubrication inadequate or excessive	Verify proper lubricant type and quantity per maintenance schedule.

Impeller damaged or unbalanced	Disassemble pump. Inspect and replace impeller if necessary.
System natural frequency excited	Adjust pump speed, add weight or bracing to vibrating components.
Pump operating at end of curve; high flow	Excess turbulence noise in piping or pump could be lacking NPSHa.

7.1.6 Bearings Wear Rapidly

Probable Cause	Corrective Action
Pump and motor misaligned	Re-align pump and motor assembly. Ensure no piping strain on pump. Replace bearings.
Shaft bent or eccentric	Disassemble pump. Inspect and replace shaft. Replace bearings.
Internal components rubbing	Disassemble pump. Check impeller clearance and internal clearances.
Impeller damaged or unbalanced	Disassemble pump. Inspect and replace impeller if necessary.
Lubrication inadequate or excessive	Verify proper lubricant type and quantity per maintenance schedule.
Bearings improperly installed or contaminated	Replace bearings. Verify proper installation procedures and cleanliness.

7.1.7 Pump Overheats or Seizes

Probable Cause	Corrective Action
Pump not adequately primed	Reprime pump and suction piping. Vent all air from system.
NPSHa insufficient	Verify suction piping arrangement. Check suction pressure and liquid vapor pressure.
Pump operating below minimum recommended flow	Verify system flow requirements. Install minimum flow bypass if necessary.
Pump and motor misaligned	Re-align pump and motor assembly. Ensure no piping strain on pump.
Bearings worn	Disassemble pump. Replace bearings.
Shaft bent or eccentric	Disassemble pump. Inspect and replace shaft. Replace bearings.
Impeller damaged or unbalanced	Disassemble pump. Inspect and replace impeller if necessary.

Internal components rubbing	Disassemble pump. Check impeller clearance and internal clearances.
Discharge valve closed	Open discharge valve.
Discharge valve or piping clogged	Inspect discharge piping. Clean as necessary.
Liquid temperature higher than expected	Adjust lubrication and impeller clearance as needed.

7.2 MAINTENANCE SCHEDULE

Routine maintenance will increase the life of a pump and induce fewer repairs. The schedule below is a suggestion for routine maintenance. Actual routine maintenance schedules should be determined by the end user based on environmental, service, and operation conditions.

7.2.1 Daily Maintenance

1. Check the oil seals, casing gasket, seal area, and piping for damage or leakage.
2. Verify expected flow, head and power consumption are achieved.
3. Check noise levels, fluid and bearing temperatures.
4. Monitor vibrations and noise levels.

7.2.2 Six Month Maintenance

1. Daily maintenance and the following.
2. Lubricate bearings or change oil every three months, or more frequently based on service conditions.
3. Inspect and/or clean suction and discharge spools for debris or wear.
4. Check pump/piping supports and hold down bolts. Tighten if needed, report and resolve the issue.
5. If the pump has not been in service, check and lubricate packing. Rotate shaft by hand to prevent false brinelling of the bearings.

7.2.3 Annual Maintenance

1. All the above, and the following.
2. Check and compare pump performance with published performance curve and previous data recordings of the pump. These inspections can range from once a year to once every three to five years.

7.3 COLD WEATHER

If the pump is exposed to freezing ambient conditions, the casing, seal chamber, and all auxiliary piping must be fully drained when the pump is taken out of service. Liquid trapped inside the pump can freeze and cause cracking of the casing, seal components, or auxiliary piping.

Pumps that remain in service during cold conditions must maintain sufficient flow and temperature to prevent freezing within the casing and seal chamber. Heat tracing or insulation may be required depending on site conditions.

If the pump has been exposed to freezing temperatures while containing liquid, it must not be started until fully thawed and inspected for damage.

7.4 RECOMMENDED SPARE PARTS

To minimize downtime and reduce maintenance costs, Summit Pump recommends stocking the spare parts listed in Table 7-1. The recommended parts are based on typical wear rates under normal operating conditions over a two-year period.

When ordering spare parts, contact Summit Pump or your local distributor. Reference the pump serial number and part numbers from the exploded view drawings.

Table 7-1: Spare Parts

MODEL SCPT PROCESS PUMP			
ITEM	DESCRIPTION	ITEM	DESCRIPTION
210A	Shaft	423A	Labyrinth Seal, IB
230A	Impeller	423B	Labyrinth Seal, OB
320A	Bearing, Radial	458A	Lantern Ring
400A	Gasket	524A	Sleeve, Shaft
412A	Impeller, O-Ring	604A	Expeller
412B	Bearing Carrier, O-Ring	923A	Locknut
412C	Bearing Cover, O-Ring	931A	Lock washer
412D	Casing Cover, O-Ring		
412E	Thrust, O-Ring		

7.5 TOOLS AND FIXTURES

Maintenance of the SCPT pump requires standard industrial maintenance tools. Due to the ANSI dimensional design of the SCPT, commonly available tools used for ANSI process pumps are generally suitable.

Typical tools include lifting devices and rigging rated for component weight, open-end and socket wrenches, hex (Allen) wrenches, torque wrenches covering the fastener ranges used on the pump, dial indicators, bearing pullers, bearing heaters, cleaning equipment, and lubrication equipment.

Hook spanners or locknut torque wrenches are required for bearing locknuts. Shaft holding methods such as a bench vise with soft jaws or a dedicated shaft holding fixture are required when torquing locknuts or similar components to prevent shaft rotation and to avoid damage to machined surfaces.

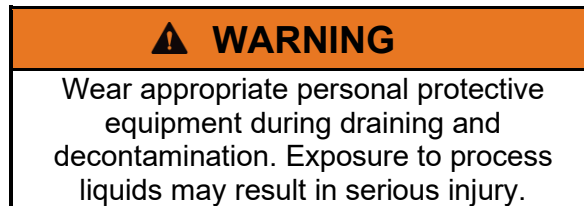
If a specific pump configuration requires specialized tools or torque ranges beyond standard practice, those requirements will be identified on the applicable assembly drawing or service documentation.

7.6 PUMP DECONTAMINATION

Before any maintenance, disassembly, or shipment, the pump must be fully drained and decontaminated. Residual process liquid may present hazards to personnel and may damage components during service.

Decontamination shall be performed in accordance with site procedures and the Safety Data Sheet (SDS) for the liquid that was pumped. All internal cavities including the casing, seal chamber, and auxiliary piping must be flushed until free of process fluid.

Pumps that have handled toxic, corrosive, or hazardous liquids must not be opened until they are verified safe by responsible site personnel.



8 EXPLODED VIEWS

Use the figures below and table with respect to identifying item numbers in the IOM manual. Item numbers will be referenced in parentheses following the name of the item. Example: Casing (102A).

8.1 PUMP WORKING COMPONENTS

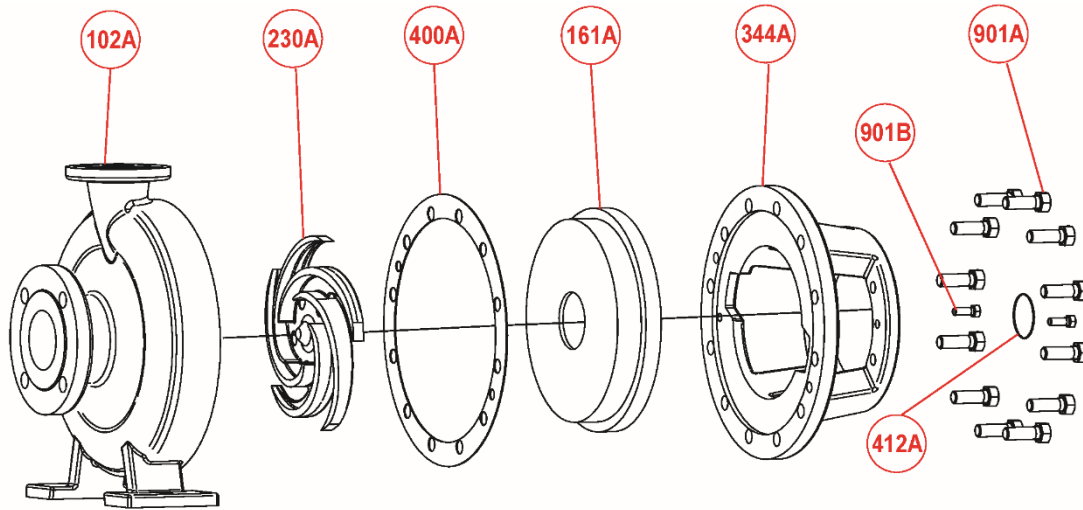


Figure 8-1: Pump End

8.2 SEALING COMPONENTS

8.2.1 Packing

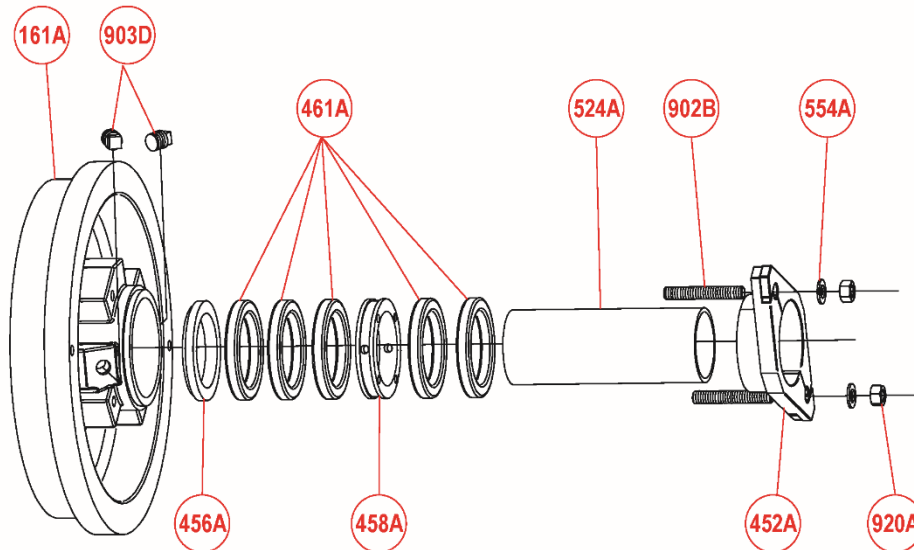


Figure 8-2: Sealing View

8.2.2 Dynamic Seal

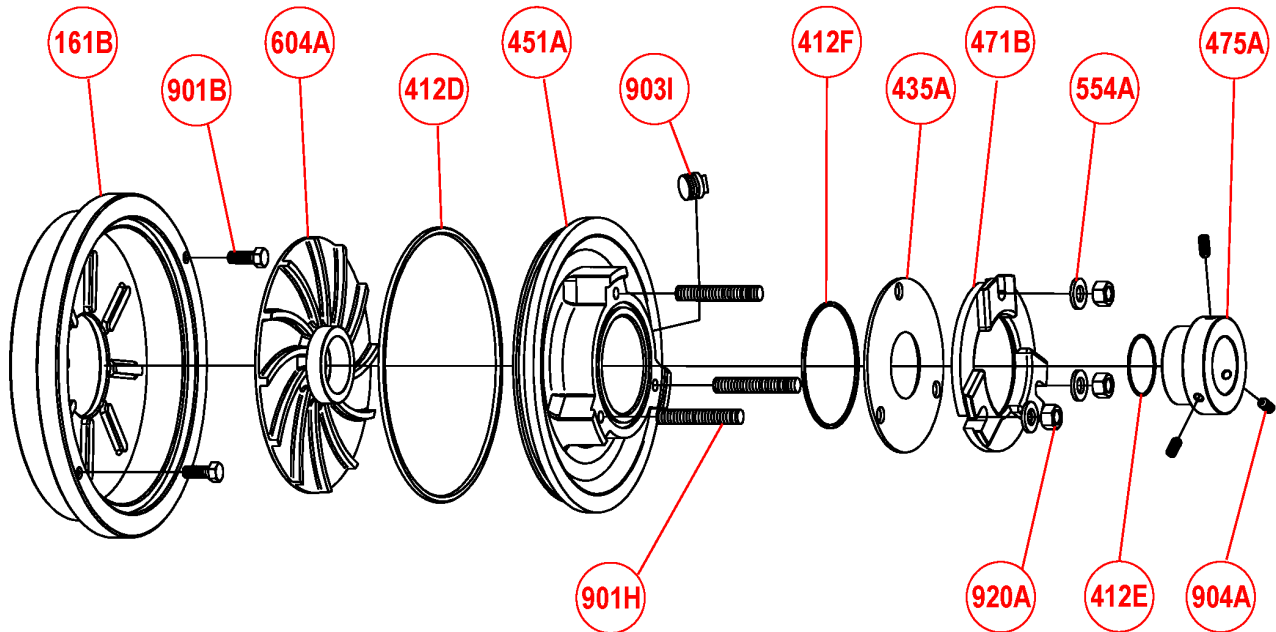


Figure 8-3: Dynamic Seal

Table 8-1: Sealing Components Parts List

Dynamic Seal Components			
ITEM	DESCRIPTION	ITEM	DESCRIPTION
161B	Casing Cover	554A	Flat Washer
412D	Casing Cover O-Ring	604A	Expeller
412E	Thrust Ring O-Ring	901B	Casing Cover Bolt
412F	Static Seal O-Ring	901H	Static Seal Bolts
435A	Static Seal	903I	Stuffing Box Plug
451A	Stuffing Box Housing	904A	Thrust Ring Set Screw
471B	Cover Plate for Seal	920A	Hex Nut
475A	Thrust Ring		

8.3 POWER END (OIL)

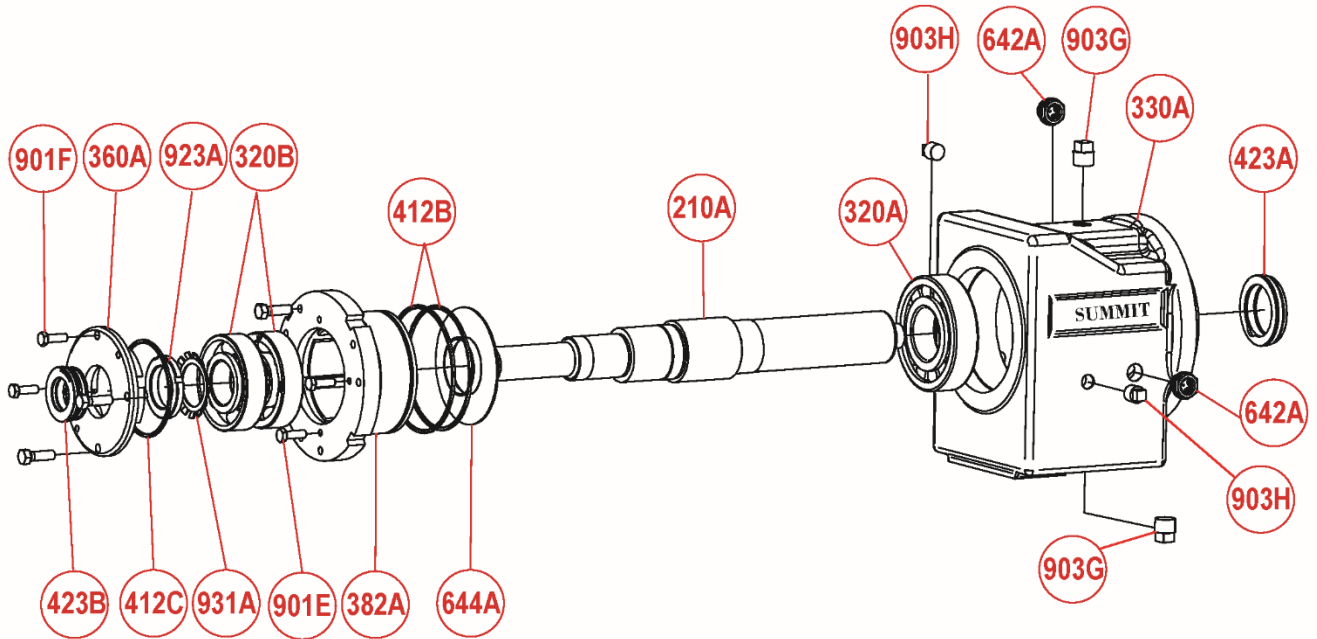


Figure 8-4: Power End Frame 2 & 3 Oil Lubricated

8.3.1 Frame 1

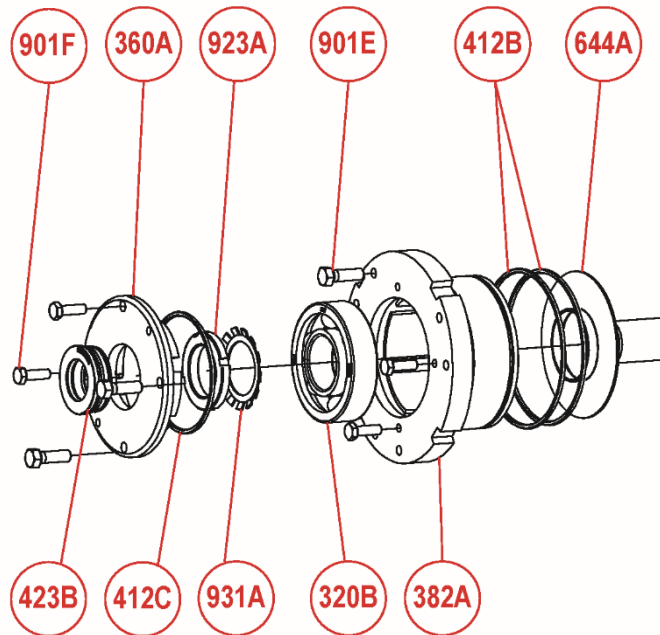


Figure 8-5: Power End Frame 1 oil lubricated

8.4 POWER END (GREASE)

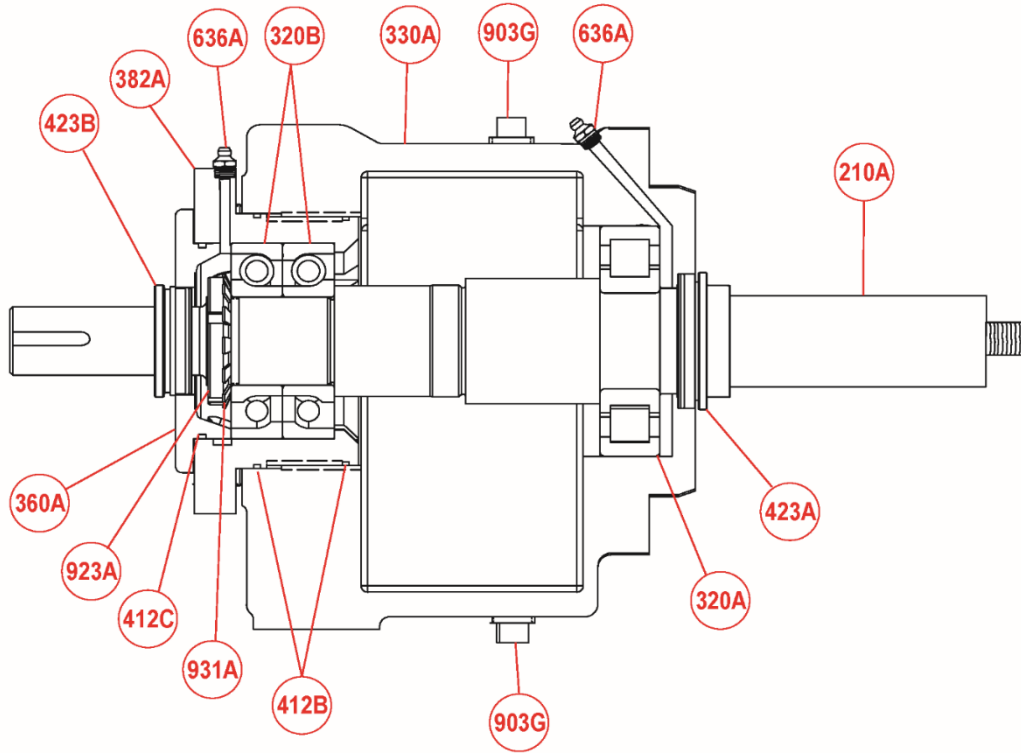


Figure 8-6: Power End, Grease

8.5 PARTS LIST

Table 8-2: SCPT Parts list

MODEL SCPT PROCESS PUMP					
ITEM	DESCRIPTION	ITEM	DESCRIPTION	ITEM	DESCRIPTION
102A	CASING	412A	IMPELLER O-RING	644A	OIL RING
161A	CASING COVER	412B	BEARING CARRIER O-RING	672A	VENT
183A	SUPPORT FOOT	412C	BEARING COVER O-RING	901A	CASING BOLT
210A	SHAFT	423A	LABY SEAL OB	901C	ADAPTER BOLT
230A	IMPELLER	423B	LABY SEAL IB	901D	FOOT BOLT
320A	RADIAL BEARING	452A	GLAND	901E	CARRIER BOLT
320B	THRUST BEARING	456A	NECK BUSHING	901F	COVER BOLT
330A	BEARING HOUSING	458A	LANTERN RING	902B	GLAND STUD
344A	ADAPTER	461A	PACKING RING	903G	PLUG
360A	BEARING COVER	524A	SLEEVE, PACKING	920A	HEX NUT
382A	BEARING CARRIER	554A	WASHER	923A	BEARING NUT
400A	CASING GASKET	642A	SIGHT GLASS	931A	LOCKWASHER

8.6 ASSEMBLED CROSS SECTION

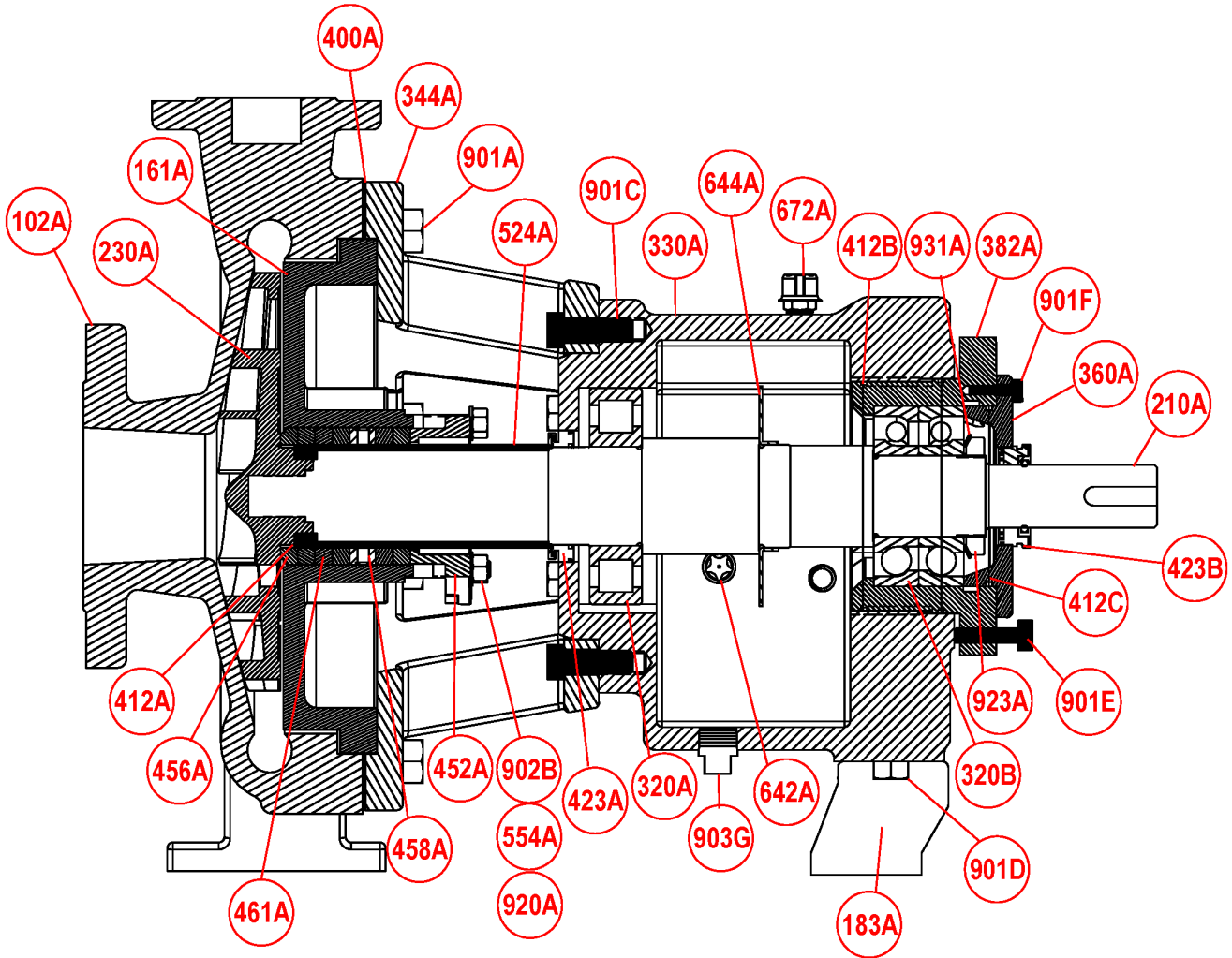


Figure 8-7: SCPT Cross Section

9 DISASSEMBLY

This section will cover all SCPT sizes. When pump components are referenced, the associated item number will be represented in parentheses following the component name, i.e. Casing (100). These item numbers are identified in Section 8.5 and can be located on the pump in Section 8.6.

Use the following steps as a general guideline, as it is impractical to cover every situation considering the conditions of the pump.

Notes:

- SCPT pumps may have a mechanical seal. This section will only consider packing, and dynamic seals. Refer to the seal manufacturer’s instructions for disassembly and assembly.

⚠ DANGER
Lockout power to avoid personal injury or death when working on the pump.

⚠ DANGER
Vent all pressure from pump, fittings, and connecting lines before disassembly.

⚠ DANGER
Never apply heat to the impeller for removal. The risk of explosion is elevated.

⚠ WARNING
Understand material being pumped. Obtain SDS information for product. Take all necessary precautions.

⚠ CAUTION
Secure pump before disassembly. The pump’s center of gravity changes when removing parts.

NOTICE
Recycle used grease, oil, and worn parts. Follow all local guidelines and regulations.

9.1 WET END

The pump should be secured to a flat clean surface prior to removal of any parts.

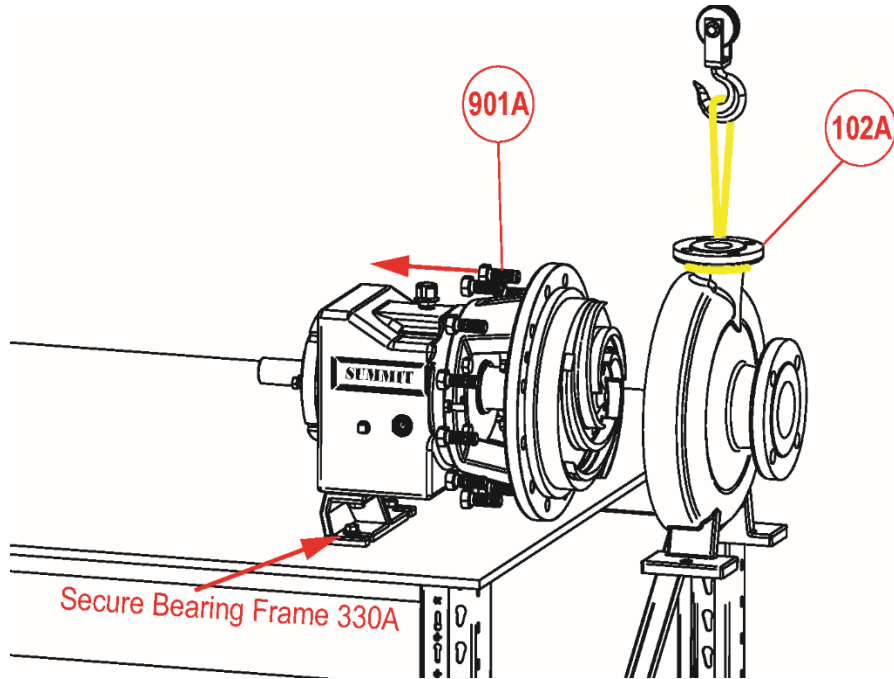


Figure 9-1: Remove casing

1. Support Casing (102A) with overhead crane or blocks under the casing (102A) to prepare for removal.
2. Unthread and remove casing bolts (901A) from casing (102A).
3. Remove casing (102A) and gasket (400A) from the casing cover (161A). Inspect for wear and replace if necessary.
4. Unthread the impeller (230A) from the shaft (210A). Threads are right hand, to unthread hold shaft (210A) from rotating on the coupling end and rotate impeller (230A) counterclockwise when viewing the pump from the impeller side.

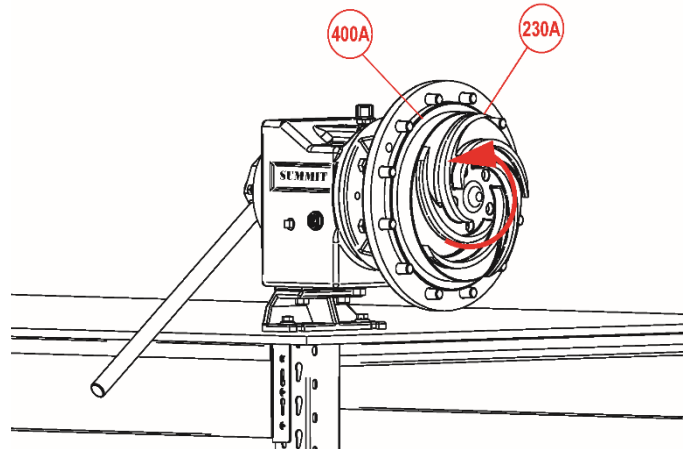


Figure 9-2: Impeller (230A) removal

5. Check for wear or damage on impeller (230A) and replace if necessary. Replace the impeller O-ring (412A).

9.2 SEALING COMPONENTS

Refer to the mechanical seal manufacturer's instructions for removal of the seal.

9.2.1 Packing

To remove packing, it is not necessary to remove the wet end components with the split gland (452A). If removing all components, it is practical to remove all packing components together as a unit and separate once removed from the power end. The instructions below will remove all packing components as a unit.

1. Unthread and remove the hexagonal screws (901B) from casing cover (161A).
2. Casing cover (161A) and all sealing components can now slide off the end of shaft (210A). Place in a clean area to continue disassembly.

3. Remove the gland nuts (920A) and washers (554A).
4. Remove the gland (452A) from gland studs (902B) and remove gland studs (902B) from casing cover (161A).
5. The neck bushing (456A), gland packings (461A), lantern ring (458A), and shaft sleeve (524A) can now be drawn out of casing cover (161A).

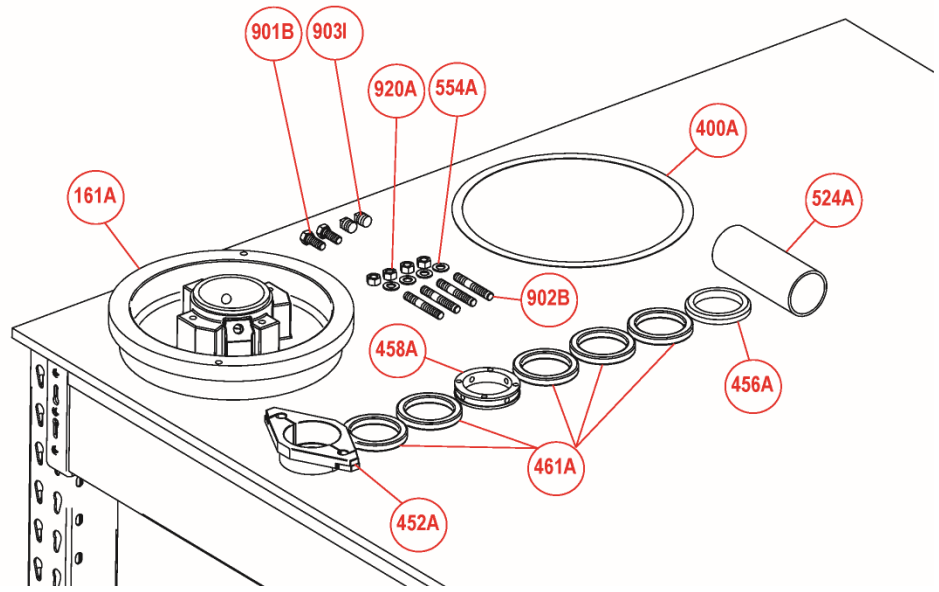


Figure 9-3: Sealing components Disassembled

6. The shaft wear sleeve (524A) may come off with the packing, if it did not, remove it from the shaft.

9.2.2 **Dynamic Seal**

NOTICE

Dynamic Seal components are not attached to each other (Frame 3, 15" excluded). Take care when handling.

1. Unthread hexagonal screws (901B).
2. Remove the casing cover (161B) from adapter (344A). Use hexagonal screws (901B) as jack bolts.
3. Remove the impeller (604A) and stuffing box housing (451A). (Frame 3, 15" pumps have an additional hexagonal screw (901G) that must be removed).

The cover plate (471B) and static seal (435A) can be removed by unthreading the studs (901H).

4. Unthread the set screws (904A) from the thrust ring (475A) and remove thrust ring (475A) from shaft (210A).

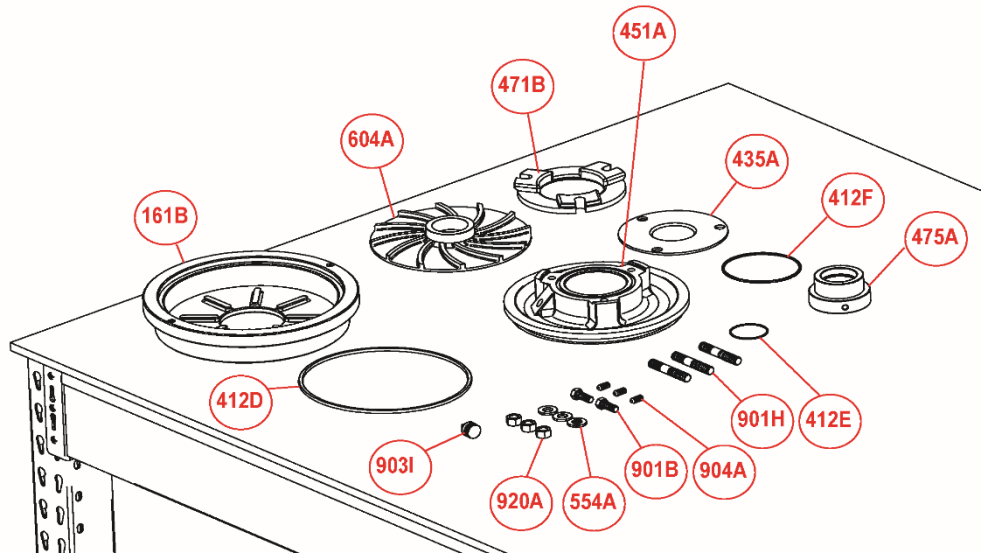


Figure 9-: Dynamic Seal Components

9.3 **POWER END**

NOTICE

Always replace bearings once they have been removed from the shaft.

NOTICE

Oil lubed power ends – Drain all oil using plug (903G).

1. Secure the bearing housing (330A) firmly to the work surface.
2. Loosen the hexagonal screws (901E) from the bearing carrier (382A).
3. Rotate the bearing carrier (382A) counterclockwise until the threads disengage and the shaft assembly can be removed from the bearing housing (330A).

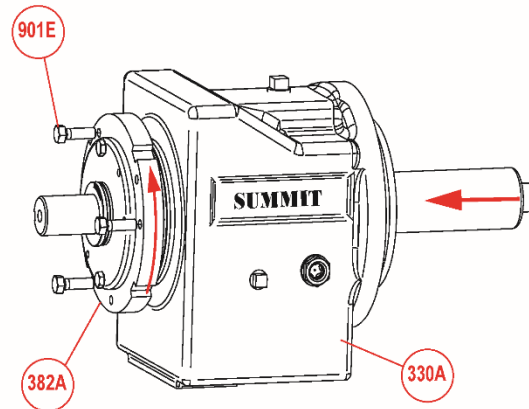


Figure 9-4: Remove Bearing Carrier

4. Secure the shaft assembly in a tabletop vice by clamping on the center of the shaft (210A).

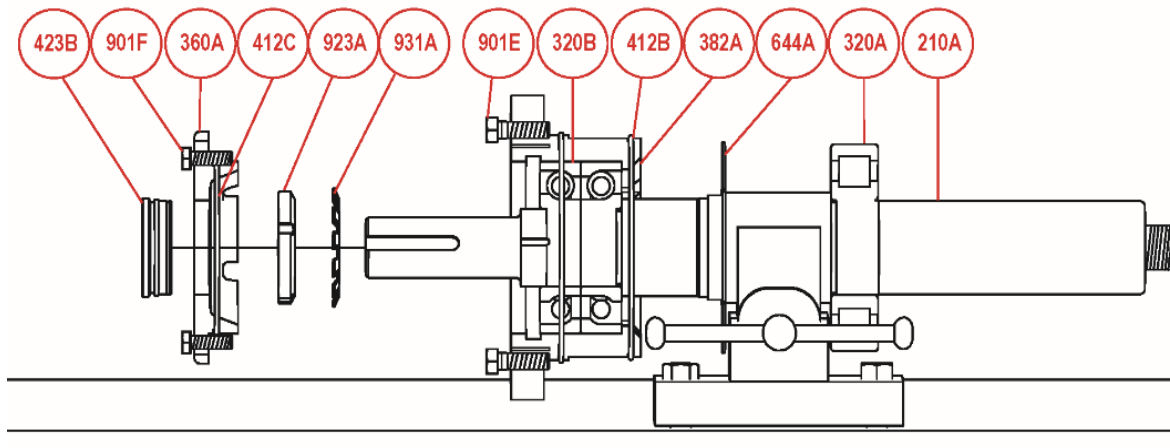


Figure 9-5: Power End Disassembly

5. Remove the hexagonal screws (901F) from the bearing cover (360A).
6. Use the hexagonal screws (901F) as jam bolts to push bearing cover (360A) from the bearing carrier (382A). Thread screws evenly to prevent misalignment.
7. Remove labyrinth ring (423B) from the bearing cover (360A), if replacing.
8. If replacing bearings, release the bent tab on the bearing lock washer (931A) and remove the bearing lock nut (923A). Threads are right-hand threads.
9. Using a hydraulic press, support bearing (320A) from the inner bearing race and press the shaft squarely to remove the bearing and spacer ring.

NOTICE

Use caution as not to damage impeller threads.

10. Remove the thrust bearing(s) (320B) and bearing carrier (382A) using a hydraulic press. Support bearing(s) (320B) from the inner bearing race and press the shaft squarely to remove the bearings and carrier.
11. Remove thrust bearing(s) (320B) from bearing carrier (382A).

NOTE: SCPT Frame 1 will have only one thrust bearing (320B). Frames 2 & 3 will have two thrust bearings. The removal process will remain the same for all frame sizes.

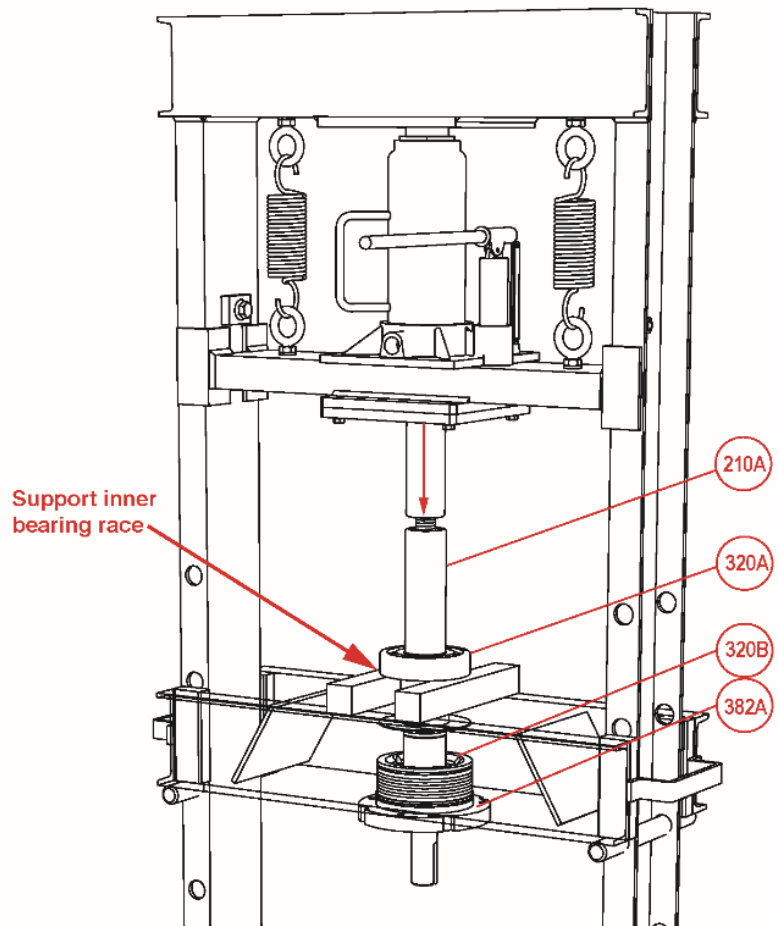


Figure 9-6: Bearing Removal

10 ASSEMBLY

Use the following steps as a general guideline, as it is impractical to cover every situation. The assembly considers a bare pump with no auxiliary equipment.

Notes:

- SCPT pumps may have a mechanical seal. This section will only consider packing and dynamical seal. Refer to seal manufacturer's instructions for disassembly and assembly procedures.
- Assembly assumes pumps are being assembled in a clean environment. Assembly will start as individual parts and finish with a fully assembled bare pump without other auxiliary equipment.
- SCPT frame 1 has one thrust bearing (320B). Assembly procedure will remain the same for all frame sizes.

Tools Required:

- SAE socket set and combination wrench set
- Torque wrench
- Bearing Heater (oil bath or induction heater)
- Impeller wrench for shaft coupling size
- Hydraulic press (recommended)
- Spanner wrench
- Bearing Locknut wrench
- Soft-headed mallet
- Packing tamper (sized for stuffing box with sleeve installed)

DANGER

Lock out/Tag out power to avoid personal injury or death when working on pump.

WARNING

Wear all required personal protective equipment.

NOTICE

Secure bearing frame before assembly. Pump's center of gravity changes when adding parts.

10.1 POWER END

1. Clean shaft (210A), bearing carrier (382A), bearing cover (360A) and ensure bearings (320A, 320B) are free from defect or debris. Having a clean environment and parts is necessary.
2. With the shaft (210A) in a vertical position, and the impeller end facing upward prepare to install bearing (320A) on the impeller end of shaft (210A) with the bearing's (320A) identification numbers facing outboard towards the impeller end and spacer towards coupling end. With bearings heated it should easily slide onto the shaft (210A), no press will be needed.

3. Heat the cylinder roller bearing (320B) and spacer to 212° F (235°F maximum) and slide the bearing squarely against the shoulder. Remember to place the spacer ring of the bearing against the shoulder Figure 10-1. Use of oil bath or induction heater is recommended.

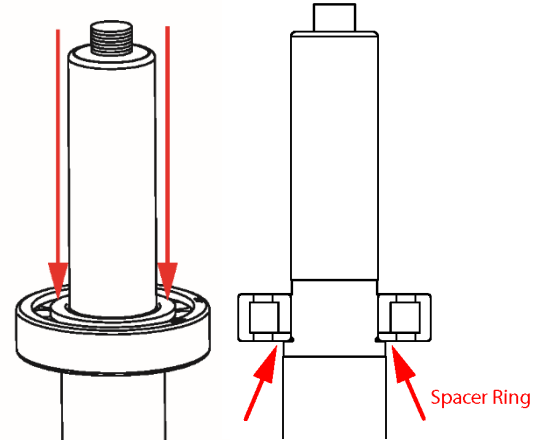


Figure 10-1: Radial bearing install

4. Check shoulder gap with a 0.001” or less, feeler gauge
5. Flip the shaft so the coupling end is facing upward.
6. Heat lubrication ring (644A) to 212° F. Use of oil bath or induction heater is recommended.
7. Install lubrication ring (644A) with the flat side against the shoulder.

Lightly lubricate O-rings (412B) with bearing oil, and place into the grooves on the bearing carrier (382A). Be careful not to damage O-Ring on threads.

8. Place the bearing carrier (382A) over the shaft Figure 10-3.
9. Heat thrust bearing(s) (320B) to 212°F (235°F maximum) and slide the bearing(s) squarely against the shoulder, ensuring back-to-back placement, Figure 10-2. Reference SP-ASY-002 for back-to-back bearing alignment.

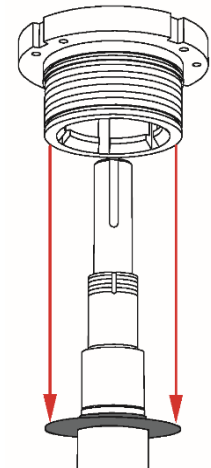


Figure 10-3: Bearing carrier

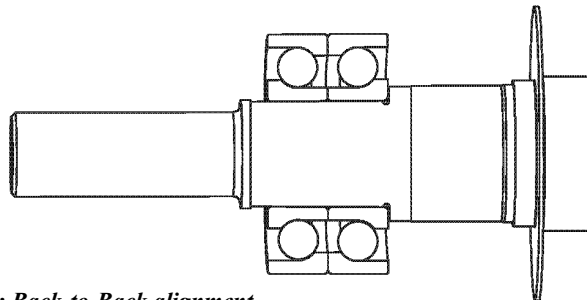


Figure 10-2: Back-to-Back alignment

10. Check for proper placement using feeler gauge 0.001” or less.
11. Place lock washer (931A) onto the shaft making sure the inner tang on the washer rests in the groove on the shaft (210A).

12. Hand thread lock nut (923A) on shaft (210A) and wait for bearing to cool to room temperature.
13. Check bearing(s) (320B) with a feeler gauge 0.001” or less, to ensure no movement occurred during cooling.
14. Use a torque wrench to secure lock nut (923A) in place, ensuring bearings are tight against the shoulder (use a feeler gauge to check proper placement).

Table 10-1: Bearing Locknut Torque

SCPT Locknut Torque Spec			
SCPT Frame Size	Outboard/Thrust	Part #	Torque - LBFT
Frame 1	3306A/C3	KM-06	20
Frame 2	7309-BECBM	KM-09	60
Frame 3	7315-BECBM	KM-15	190

NOTICE

NEVER loosen the locknut to align the tab. Doing so may compromise the integrity of the assembly.

15. Bend a tab of the lock washer (931A) into the slot on the locknut (923A) to secure it in place. If there are no tabs that lineup with the lock nut (923A), tighten locknut until a lock washer tab lines up with the locknut.
16. Apply a thin layer of bearing oil on the outside of the bearing(s) (320B) and inside bearing carrier (382A) and pull the bearing carrier (382A) up and over the thrust bearing(s) (320B).
17. Using a small amount of bearing oil, set O-ring (412C) into the groove on the bearing cover (360A).
18. Secure the bearing cover (360A) into place by tightening the four screws (901F) into the bearing carrier (382A). Torque to values in Table 12-1.

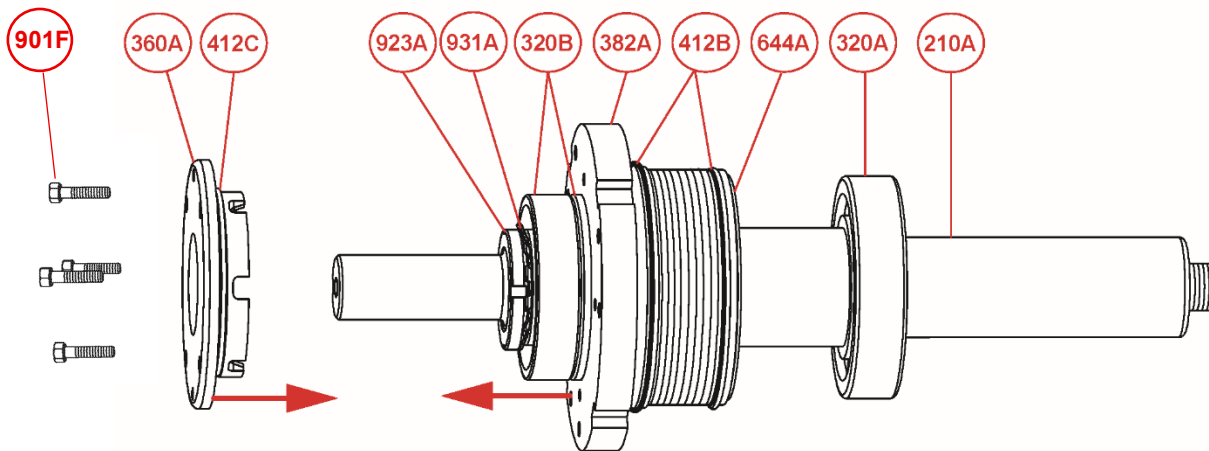


Figure 10-4: Install Bearing Cover

19. Secure bearing housing (330A) vertically with the coupling end facing upward.
20. Lower the shaft assembly into the bearing housing (330A)
21. Thread the bearing carrier (382A) clockwise (right-handed thread) into the bearing housing (330A) Figure 10-5.
22. Install the labyrinth rings (423A and 423B) into bearing housing (330A) and bearing cover (360A).
23. Secure the shaft axially to bearing housing (330A) by tightening screws (901E).

10.2 SEALING COMPONENTS

Installing mechanical seals, refer to the seal manufacturer’s installation and operation manual.

10.2.1 Packing

It is recommended to use pre-compressed gland packings. If you need to cut the packings, proceed as follows: Turn five rounds of the sealing band around a wooden dowel the same thickness as the shaft wearing sleeve (524A) and use a sharp knife to cut the packing rings straight and axially without over- or under dimensioning. Dimensions of the stuffing box housing and can be found in Table 14-2.

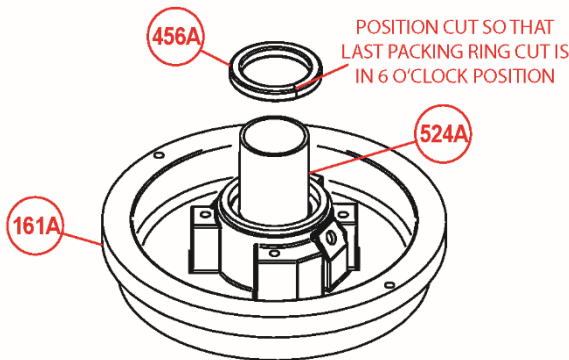


Figure 10-6: Sealing components

1. Attach the adapter (344A) to the bearing housing (330A) with the hexagonal screws (901C).

2. Place the casing cover (161A) on a clean work surface with the sealing cavity facing upwards.

3. Place the neck bushing (456A) to the bottom of the sealing cavity (radiused edge down towards the work surface).

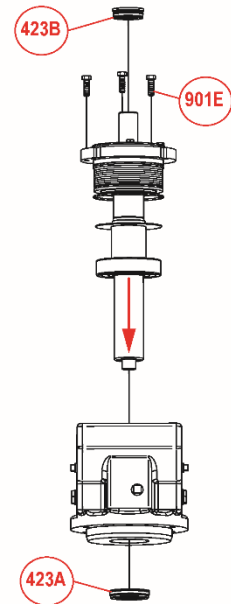


Figure 10-5: Shaft kit into housing

4. Place the shaft wearing sleeve (524A) in an upright position in the center of the sealing cavity.
5. When packing new packing rings, be precise and keep the components and working area clean. Lubricate the shaft sleeve (524A) and packing rings (461A) lightly with oil.
6. Insert the first two packing rings (461A), lantern ring (458A), followed by the remaining three packing rings and the two-piece stuffing gland (452A) one at a time. Ensure the packing rings are alternating 90° from each other, the first and last packing ring cut should be at the 6 o'clock position. Tighten the hexagonal nuts (920B) by hand.

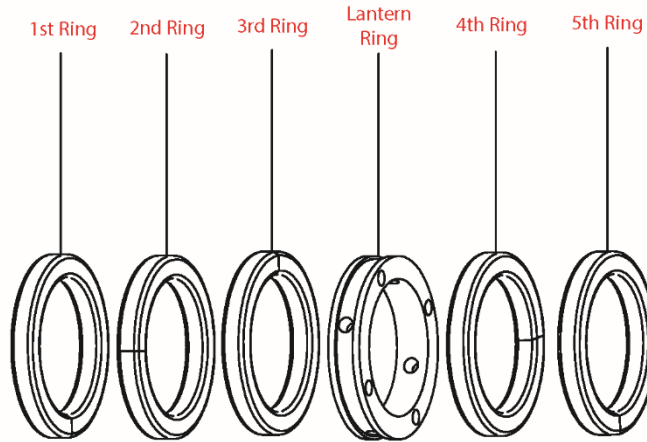


Figure 10-7: Packing ring sequence

7. Clean the surface of the shaft (210A) ensure all debris are gone and there are no burrs.
8. Slide the casing cover (161A) with gland packing components and sleeve (524A) onto the shaft. Check that the shaft wearing sleeve (524A) is seated on the shaft shoulder.

Note: For larger pumps, it is recommended to install packing, neck bushing, lantern ring, and gland after sleeve and casing cover are installed on the pump.

9. Attach casing cover (161A) to the adapter with hexagonal screws (901B).

10.2.2 Dynamic Seal

1. Attach adapter (344A) to bearing housing (330A) with hexagonal screws (901C).
2. Slide the thrust ring (475A) with its O-ring (412E) and set screws (904A) onto shaft (210A) and place against the shaft shoulder and out of the way Figure 10-8.

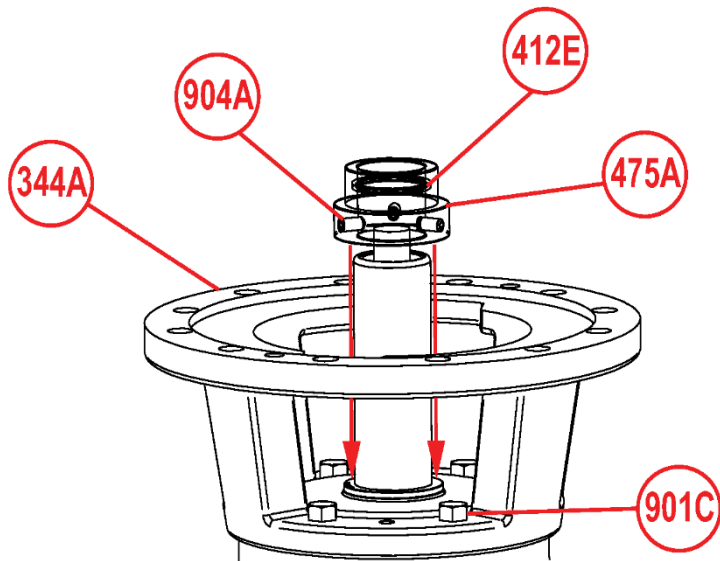


Figure 10-8: Thrust Ring

3. Place stuffing box housing (451A) on a clean, flat work surface.

4. Install O-ring (412F) the static seal (435A) and cover plate (471B) into their designated areas of the stuffing box (451A) and secure them in place using studs (901H) washer (554A) and nut (920A). Pay special attention to the orientation of the static seal (435A) the bevel side should be facing O-ring (412F) Figure 10-9.

5. Install O-ring (412D) into the O-ring groove in stuffing box (451A).

6. Place stuffing box cover (161B) on a clean flat surface with the vanes facing upward.
7. Place expeller (604A) inside of stuffing box cover (161B) with vanes facing stuffing box housing (451A).

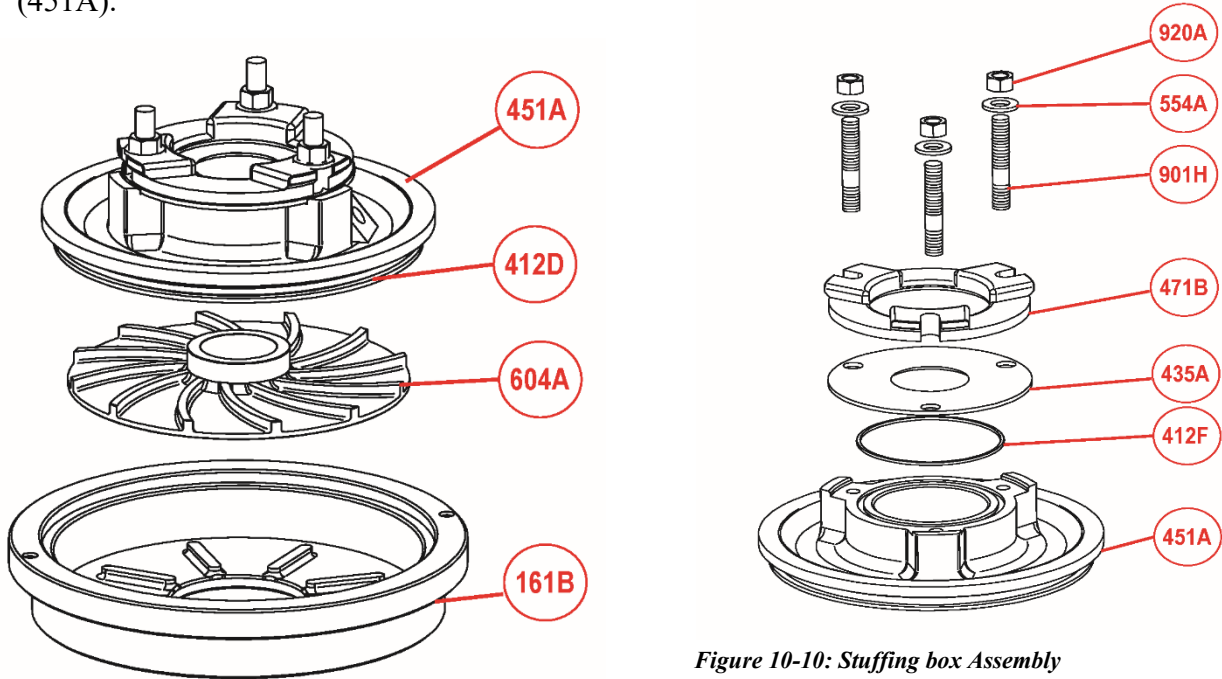


Figure 10-9: Dynamic Seal Assembly

Figure 10-10: Stuffing box Assembly

8. Push the stuffing box housing (451A) into stuffing box cover (161B) Figure 10-10. (Note: for 15" the expeller is built into stuffing box cover (161B) and stuffing box (451A) will bolt to the cover, all other assembly procedures will be the same).
9. Push the assembled parts on to the shaft and line up stuffing box cover (161B) holes to the adapter (344A) holes and secure with hexagonal screws (901B). (Note: the stuffing box plug should be positioned horizontally on the left side when viewed from the coupling end).
10. Continue to section 10.3 for instruction on how to complete the wet-end assembly.
11. When the Wet-End is fully assembled, place the thrust ring (475A) at the correct position on the shaft and secure with set screw (904A). The distance between the face of the cover plate and the shoulder of the thrust ring must be 0.197" Figure 10-11.

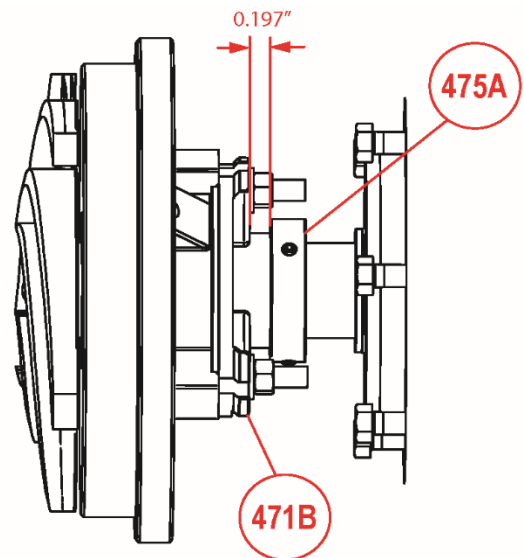


Figure 10-11: Thrust ring position

10.3 WET END COMPONENTS

1. Place the impeller O-ring (412A) in the groove in the impeller hub.

- Secure the shaft at the coupling end to prevent rotation, then install the impeller (230A) into its designated position. The gap between the impeller and the casing cover (161A) should be approximately 0.014 to 0.015 inches see section 6.1 for further details. Adjust bearing carrier as needed.

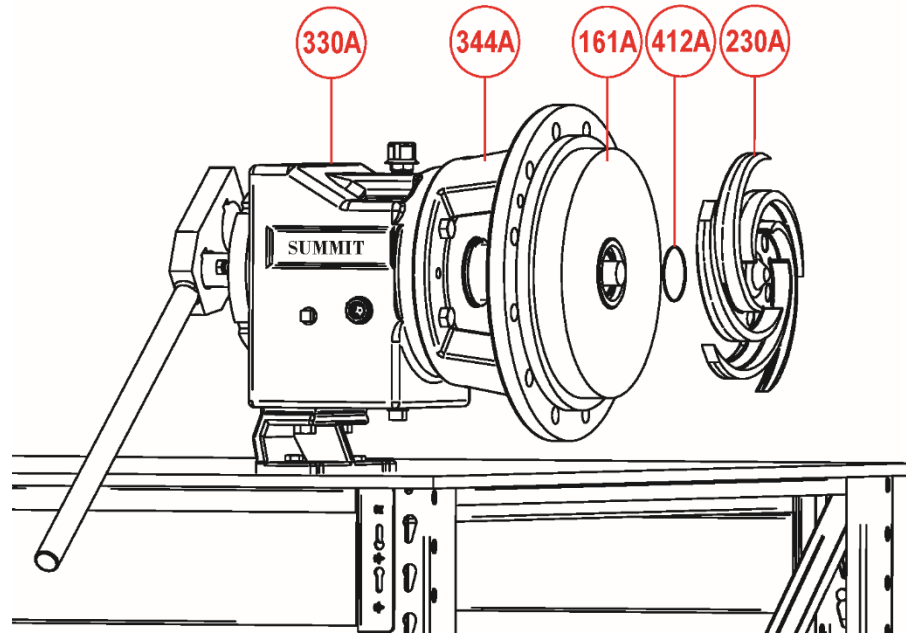


Figure 10-12: Install impeller

- Fit the gasket (400A) into the casing cover (102A).
- Suspend the casing (102A) with a hoist and attach it to the adapter (344A) using the hexagonal screws (901A). Tighten the bolts in a crisscross pattern using the torque values in Table 12-1.

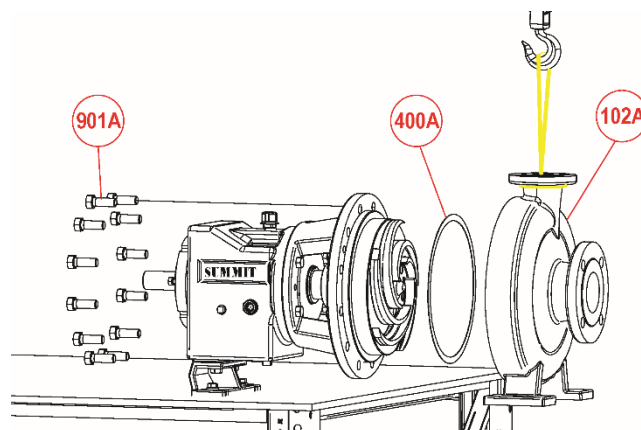


Figure 10-13: Attach casing

- Set impeller clearance as described in Section 6.1.

11 BARREL COUPLING GUARD

Summit Pump manufactured barrel type coupling guards come as an option to the SCPT pump. Assembly and disassembly instructions shall be followed as described in this manual. If a separate manual is supplied with the guard these instructions are superseded. For third party supplied guards please refer to the manufacturer’s instruction manual.

⚠ DANGER
 Lock out/Tag out power to avoid personal injury or death when working on pump.

⚠ WARNING
 Replace all guarding before re-energizing the driver equipment.

NOTICE
 Summit Pump, Inc. assumes no liability when these procedures are neglected.

11.1 GUARD COMPONENTS

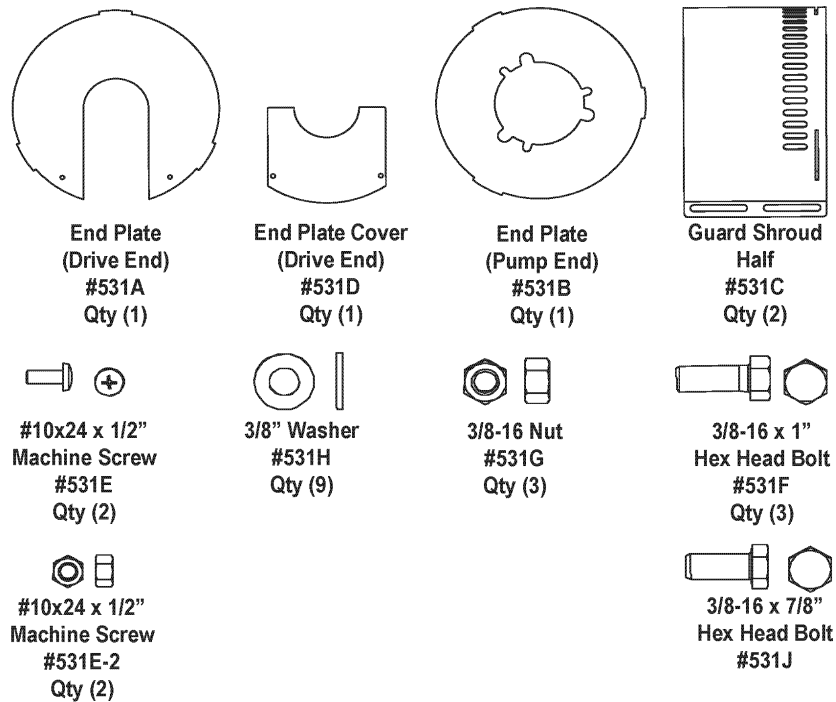


Figure 11-1: Barrel Coupling Guard Components

11.2 ASSEMBLY

Install Guard after motor has been aligned with pump.

1. Using Screws (531J) and washers (531H) through the narrow slots, secure the pump end plate (531B) to the bearing carrier (382A).

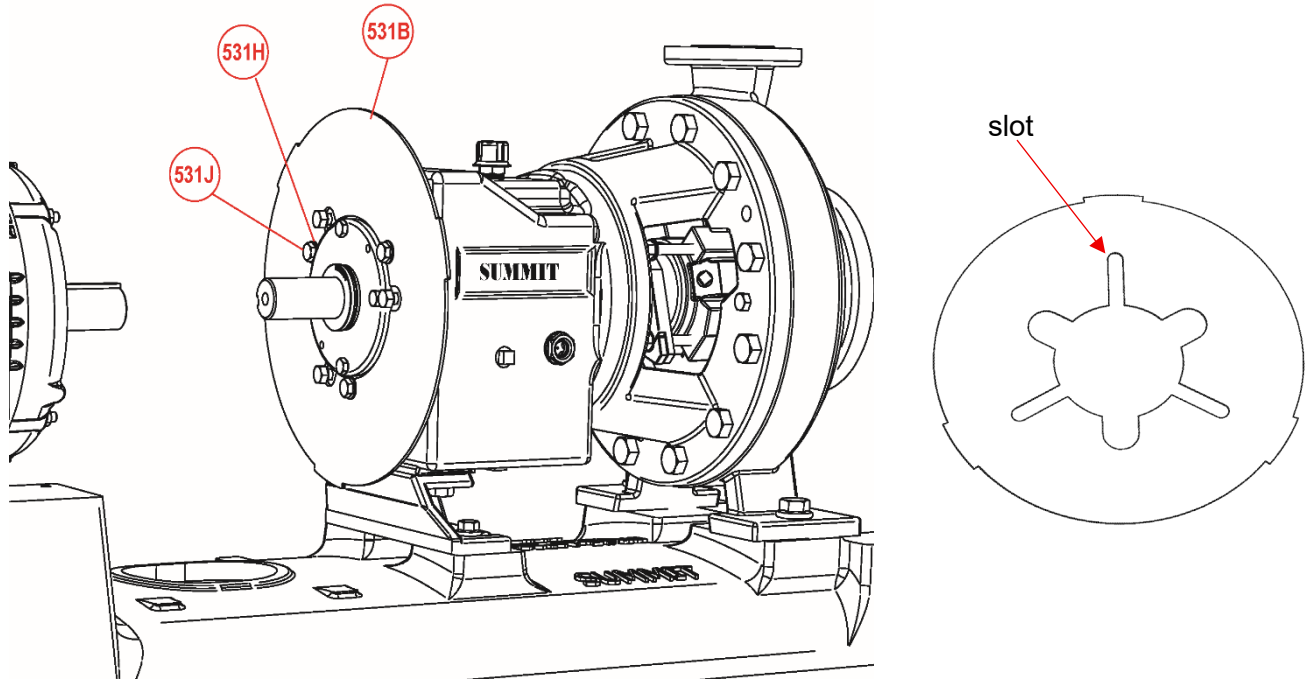


Figure 11-2: Pump end plate (531B) install

2. Set the impeller (230A) clearance as described in section 6.1.
3. Attach the end plate cover (531D) with machine screws (531E) and nuts (531E-2). It does not matter what side the end plate cover (531D) is attached on. Install the motor end plate (531A) over the motor shaft.
4. Install the coupling.

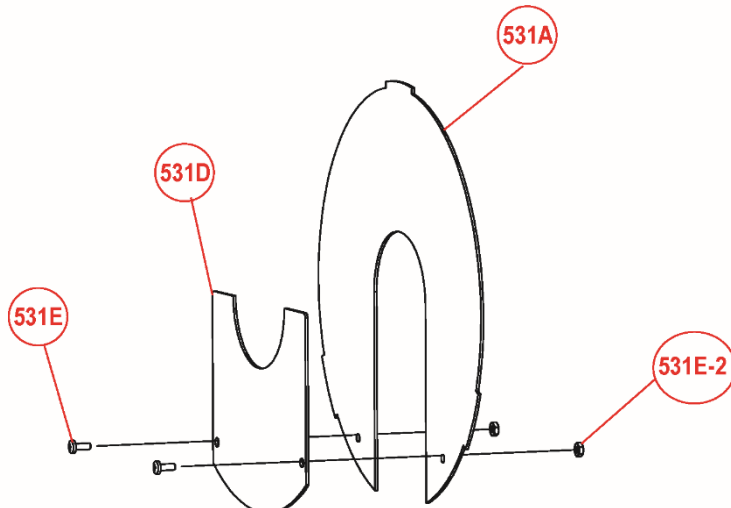


Figure 11-3: Motor end plate install

5. Slide one guard shroud (531C) inside the other guard shroud (531C). Holding both shrouds (531C) at the flanged opening, separate the flanges and install over the pump and motor shaft, if applicable.
6. Attach the guard shroud (531C) closest to the pump end plate (531B). Ensure the tabs of the pump end plate (531B) are engaged with the slots on the guard shroud (531C).
7. Engage the assembled motor end plate (531A/531D) with the guard shroud (531C). ensure tabs are engaged with the slots.

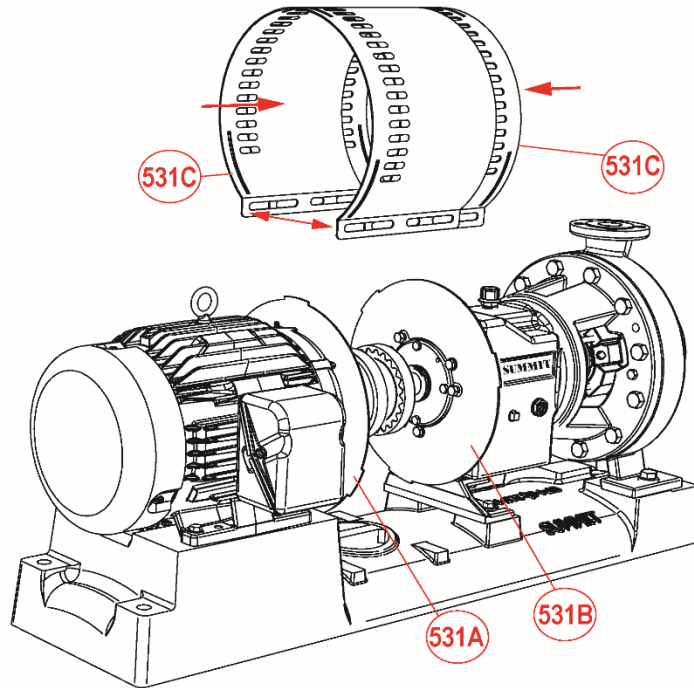


Figure 11-4: Shroud (531C) install

8. Install bolts (531F), nuts (531G) and washers (531H) in the slots of the flanged section of the guard shrouds (531C). Space the bolts (531F) relatively evenly, do not tighten yet.
9. Slide the guard shrouds (531C) apart from each other to desired distance from the motor.
10. Tighten nuts (531G) and bolts (531F).

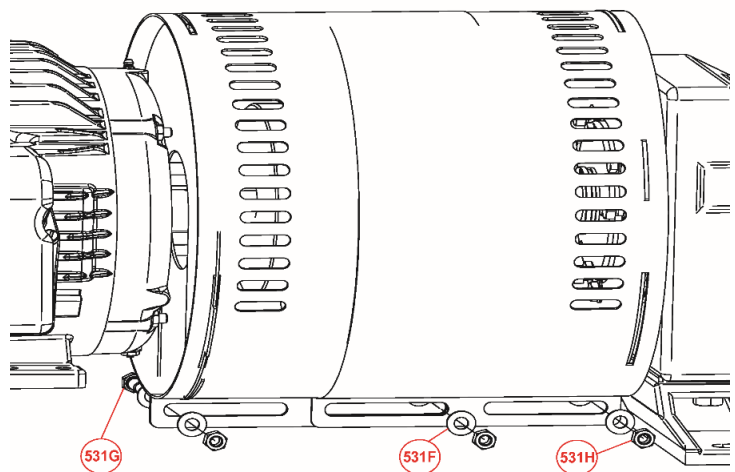


Figure 11-5: Guard fasteners

12 APPENDIX A: HARDWARE

Table 12-1: Hardware

Item ID	Description	Pump Size	Adapter Size	Fastener Thread Size	Length	Qty Per Pump	Steel Grade	Stainless Grade	Steel Torque (lbft)	Stainless Torque (lbft)	
554A	Washer, Packing Gland	Frame 1	All	3/8"	N/A	4	N/A	Stainless	N/A	N/A	
		Frame 2		1/2"							
		Frame 3									
636A	Grease Fitting	Frame 1	All	1/8"-27 NPT	N/A	2	Steel	N/A	2*TFFT	N/A	
		Frame 2									
		Frame 3									
901A	Bolt, Casing	Frame 1	6"	3/8"-16	1.25"	8	N/A	ASTM F593	N/A	21	
		Frame 1	8" & 8A"	1/2"-13						1.50"	12
		Frame 2		10"-11"	5/8"-11	1.75"					
		Frame 2	13"								
		Frame 3		15"						2.00"	127
		Frame 3									
901B	Bolt, Casing Cover	Frame 1	All	5/16"-18	1.00"	2	N/A	ASTM F593	N/A	12	
		Frame 2	8A"-10"	3/8"-16						1.25"	21
		Frame 2	11"-13"		1/2"-13						1.50"
		Frame 3	All								
901C	Bolt, Adapter	Frame 1	All	3/8"-16	1.00"	6	SAE J429	N/A	30	N/A	
		Frame 2		1/2"-13	1.50"				73		
		Frame 3		5/8"-11	2.00"				146		
901D	Bolt, Support Foot	Frame 1	All	3/8"-16	1.00"	2	SAE J429	N/A	30	N/A	
		Frame 2		1/2"-13	1.25"				73		
		Frame 3		5/8"-11	2.00"				146		
901E	Bolt, Bearing Carrier	Frame 1	All	3/8"-16	1.00"	3	SAE J429	N/A	30	N/A	
		Frame 2			1/2"-13				1.75"		73
		Frame 3									
901F	Bolt, Bearing Cover	Frame 1	All	5/16"-18	0.75"	4	SAE J429	N/A	17	N/A	
		Frame 2			1.00"				30		
		Frame 3		3/8"-16	1.00"						
901G	SB Housing-Cover	Frame 1	All	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		Frame 2									
		Frame 3									15"
901H	Static Seal Bolts	Frame 1	All	3/8"-16	1.25"	4	N/A	ASTM F593	N/A	21	
		Frame 2		1/2"-13						52	
		Frame 3									
902B	Stud, Gland	Frame 1	All	3/8"-16	2.50"	4	N/A	ASTM F593	N/A	21	
		Frame 2		1/2"-13						52	
		Frame 3									
903G	Plug, Drain	Frame 1	All	1/2" NPT	N/A	1	Steel	N/A	2*TFFT	N/A	
		Frame 2									
		Frame 3									
903H	Plug, Oiler	Frame 1	All	1/4" NPT	N/A	1	Steel	N/A	2*TFFT	N/A	
		Frame 2									
		Frame 3									
903I	Plug, Stuffing Box	Frame 1	All	1/4" NPT	N/A	2	N/A	Stainless	N/A	2*TFFT	
		Frame 2		1/2" NPT							
		Frame 3									
904A	Set Screw	Frame 1	All	5/16"-18	0.375"	3	N/A	Stainless	N/A	12	
		Frame 2		3/8"-16	0.500"					21	
		Frame 3									
920B	Nut, Gland	Frame 1	All	3/8"-16	N/A	N/A	N/A	ASTM F594	N/A	21	
		Frame 2		1/2"-13						52	
		Frame 3									
923A	Bearing Locknut	Frame 1	All	KM-06	N/A	1	Steel	N/A	20	N/A	
		Frame 2		KM-09					60		
		Frame 3		KM-15					190		

*TFFT=Turns From Finger Tight

13 APPENDIX B: ENGINEERING DATA

13.1 MATERIALS OF CONSTRUCTION

Standard pump materials are generalized below. Check with your local Summit Pump Distributor for the construction material of an existing pump via the serial number. When ordering a new pump and no materials are specified the standard materials will be used.

Table 13-1: Materials

Item Number	Part Description	Pump Material	
102A	Casing	CD6MN	
161A	Casing Cover	CD6MN	
210A	Shaft	329SS	
230A	Impeller	CD6MN	
320A	Radial Bearing	Steel	
320B	Thrust Bearing	Steel	
330A	Bearing Housing	Cast Iron	
344A	Adapter	Cast Iron	
360A	Bearing Cover	Cast Iron	
382A	Bearing Carrier	Cast Iron	
400A	Casing Gasket	PTFE	
412A	Impeller O-Ring	PTFE	
412B	Bearing Carrier O-Ring	Buna-N	
412C	Bearing Cover O-Ring	Buna-N	
412D	Thrust Ring O-Ring	FKM	EPDM
412E	Static Seal O-Ring	FKM	EPDM
451A	Stuffing Box Housing	CD6MN	
452A	Gland	304SS	
456A	Neck Bushing	329SS	
458A	Lantern Ring	PTFE	
461A	Packing	NON ASB	
475A	Thrust Ring	329SS	
524A	Sleeve	329SS	
604A	Expeller	CD6MN	
644A	Oil Ring	Steel	
901A	Casing Bolt	316SS	
901B	Casing Cover Bolt	316SS	
901C	Adapter Bolt	Steel	
901E	Bearing Carrier Bolt	Steel	
901F	Bearing Cover Bolt	Steel	

Table 13-2: Material Codes

Material	Specification
CD6MN	ASTM A890/A995 Grade 3A
329SS	AISI 329
Cast Iron	A 48, ASTM A395 of ASTM A216 WCB
304SS	AISI 304
316SS	AISI 316

13.2 ENGINEERING DATA

Table 13-3: Engineering Data

	1.5x1-6	3x1.5-6	3x2-6	4x3-6	1.5x1-8	3x1.5-8	3x1.5-8A	3x2-8A	4x3-8A	6x4-8A	2x1-10	2x1-10A	3x1.5-10	3x2-10	6x4-10	3x1.5-11	3x2-11	4x3-11	3x1.5-13	3x1.5-13C	3x2-13	4x3-13	6x4-13	8x6-13	8x6-15	10x8-15	10x8-15C		
Pump	Frame Size:	1						2						3															
	Power End Weight (lbs):	40						101						256															
	Maximum Particle Size (in):	0.28	0.41	0.46	0.38	0.31	0.41	0.41	0.44	0.62	0.60	0.39	0.50	0.50	0.72	0.89	0.36	0.59	0.87	0.31	0.40	0.56	0.66	1.00	1.19	1.75	1.20	2.00	
	BHP/100 RPM:	1.4						3.4						20.4															
	Maximum RPM:	6300 (Grease) / 8500 (Oil)						4500 (Grease) / 5600 (Oil)						2600 (Grease) / 3600 (Oil)															
	Specific Speed (ns):	1090	1277	1703	2509	743	854	982	1292	1447	672	724	620	827	1137	1757	775	1085	1240	620	775	775	1085	1550	2004	1751	2742	2687	
Suction Specific Speed (nss):	5330	7313	7973	8463	3766	5180	8162	5579	5838	6096	4391	5476	5528	6044	12914	8007	5889	6819	3771	6767	3978	5838	11210	9235	9788	8721	5476		
Impeller & Casing	Maximum Impeller Diameter (in):	6	6	6	6	8	8	8.5	8.5	8.5	8.5	10	10	10	10	10	11	11	11	13	13	13	13	13	13	13	15	15	15
	Minimum Impeller Diameter (in):	3.5	4	4	4.5	5	5	5.5	5.5	5.5	6.5	7	7	7	7	7	6.5	7	7	10	10	10	10	9	9.5	10	12	12	
	MAWP (psi) (Max Allowable Working Pressure):	290																											
	Maximum Temperature (°F):	500																											
Shaft & Bearings	Shaft Area Moment of Inertia (in ⁴):	231						1028						4437															
	Critical Speed (rpm):	25985	24160	20523	15339	14750	13698	27112	26762	26098	17276	20537	18834	18567	18834	16571	15616	14811	15976	12025	12117	8826	12395	11761	11033	11693	9055	8424	
	Overhang (in):	5.78						7.34						9.94															
	Solid Shaft L ³ /D ⁴ Ratio:	54						19						25															
	Ø at Impeller (in):	3/4"-16 UNF						1"-12 UNF						1-3/4"-12 UN															
	Ø under Sleeve (in):	1.125						1.875						2.25															
	Ø between Bearings (in):	1.78						2.52						3.90															
	Ø at Coupling (in):	0.875						1.375						2.375															
	Bearing Span (in):	4.00						6.52						9.50															
	Outboard (Thrust) Bearing:	3306A						7309						7315															
Inboard (Radial) Bearing:	NUP2073C						NUP311EC						NUP317EC																
Stuffing Box	Ø ASB Bore ID (in):	2						3						3.375															
	Ø Sleeve OD (in):	1.375						2.125						2.5															
	Bore Depth (in):	2.250						2.626						3.063															
	Number of Rings:	5																											
	Packing Size (in):	0.31						0.38						0.44															
	Lantern Ring Width (in):	0.5						0.59						0.6															
	Flush Water required (Gal/hr):	1						2						2.5															
Maximum Static Pressure (Dynamic Seal) (psi):	230																												

13.3 MAXIMUM STATIC PRESSURE

Table 13-4: Max. Suction (DS)

Max Suction Pressure with DS (FT)											
Frame Size	Size	900	1000	1200	1500	1800	3000	3600			
1	1.5x1-6	-	-	-	11.0	16.0	48.0	69.0			
	3x1.5-6						46.0	66.0			
	3x2-6				-	-	-	5.0	8.0	24.0	34.0
	4x3-6							9.0	13.0	38.0	54.0
	1.5x1-8							9.0	14.0	20.0	58.0
3x1.5-8	12.0	19.0	28.0	78.0	112.0						
2	3x1.5-8A	-	-	-	19.0	30.0	43.0	121.0	173.0		
	3x2-8A							124.0	178.0		
	4x3-8A				10.0	121.0	174.0				
	6x4-10				19.0	124.0	178.0				
	2x1-10				26.0	58.0	164.0	235.0			
	2x1-10A	17.0	24.0	39.0	56.0	157.0	224.0				
	3x1.5-10				57.0	160.0	229.0				
	3x2-10				58.0	162.0	233.0				
	6x4-10	20.0	29.0	47.0	38.0	56.0	155.0	236.0			
	3x1.5-11				68.0	191.0	273.0				
	3x2-11				66.0	189.0	270.0				
	4x3-11	15.0	18.0	26.0	45.0	64.0	180.0	257.0			
	3x1.5-13				44.0	62.0	173.0	248.0			
	3x1.5-13C				43.0	62.0	173.0	248.0			
	3x2-13	-	-	-	41.0	59.0	167.0	238.0			
4x3-13	41.0				59.0	165.0	271.0				
6x4-13	41.0				59.0	166.0	283.0				
3	8x6-13	22.0	27.0	39.0	61.0	88.0	-	-			
	8x6-15*	20.0	25.0	36.0	-	-					
	8x6-15**	19.0	24.0	35.0	53.0	77.0					
	10x8-15	21.0	26.0	37.0	58.0	-					
	10x8-15C			38.0		84.0					

*4-vane impeller
 **6-vane impeller

14 APPENDIX C: DIMENSIONAL DATA

14.1 PUMP

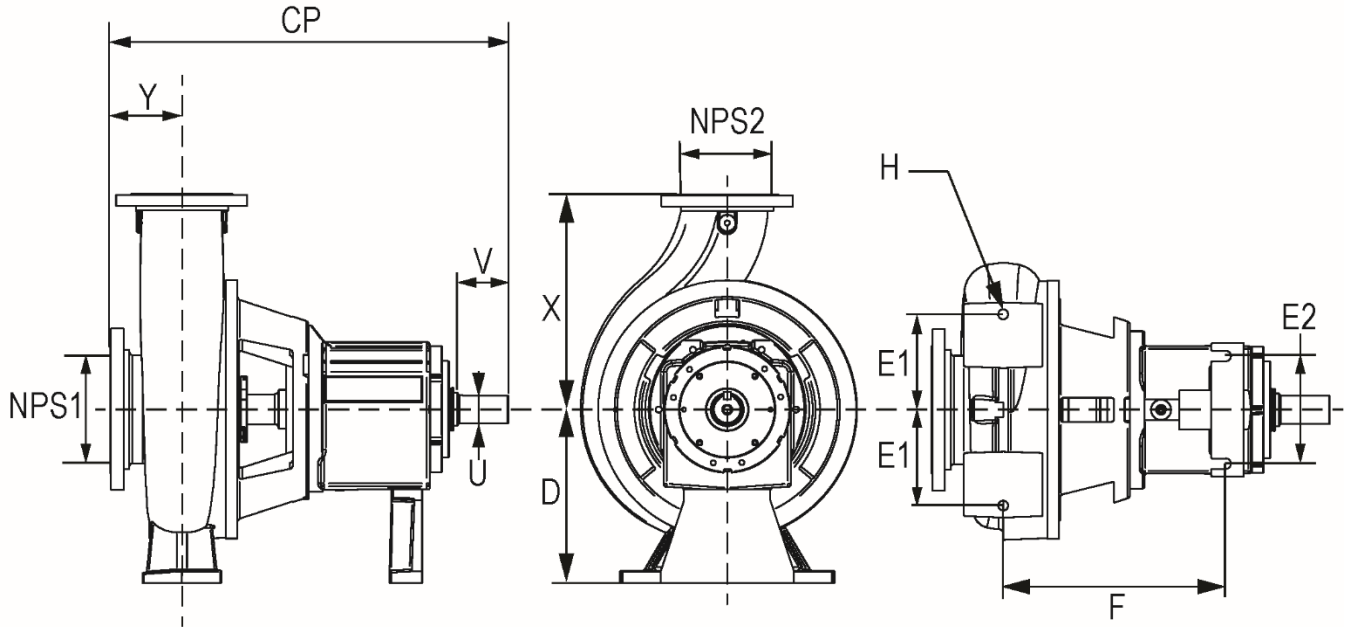


Figure 14-1: Pump Dimensions

Table 14-1: Dimensional Data

Frame Sizes	Pump Size	NPS1	NPS2	X	D	Y	CP	E1	E2	F	H	U	V
1	1.5x1-6	1.50	1	6.50	5.25	4	17.50	3	0	7.25	0.625	0.875	2
	3x1.5-6	3	1.50										
	3x2-6	3	2										
	4x3-6	4	3										
	1.5x1-8	1.50	1	6.50	5.25		17.50			7.25			
3x1.5-8	3	1.50	8.50	7	18								
2	3x1.5-8A	3	1.50	8.50	8.25	4	23.5	4.875	7.25	12.5	0.625	1.375	2.875
	3x2-8A	3	2	9.50									
	4x3-8A	4	3	11									
	6x4-8A	6	4	8.50									
	2x1-10	2	1	8.50									
	2x1-10A	2	1	9.50									
	3x1.5-10	3	1.50	13.50	10								
	3x2-10	3	2	10.50									
	6x4-10	6	4	11.50									
	3x1.5-11	3	1.50	12.50									
	3x2-11	3	2	10.50									
	4x3-11	4	3	11.50									
	3x1.5-13	3	1.50	12.50									
	3x1.5-13C	3	1.50	13.50									
	3x2-13	3	2	16									
8x6-13	8	6	18										
8x6-15	8	6	19										
10x8-15	10	8	6	33.875	8	9	18.75	0.875	2.375	4.375			
10x8-15C	10	8	19										

14.2 STUFFING BOX DIMENSIONS

14.2.1 Packing Ring Dimensions

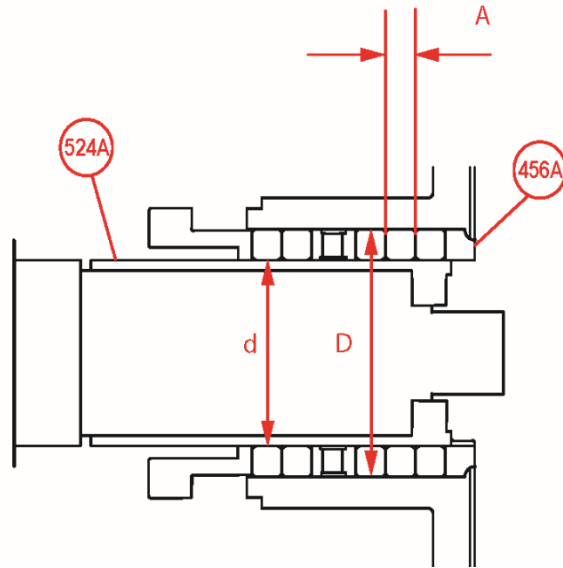


Figure 14-2: Stuffing box dimensions

Table 14-2: Stuffing box, and packing ring dimensions

Bearing Unit	Stuffing box $\text{Ø}d \times \text{Ø}D \times a$	Total length of packing ring
	(Inches)	(inches)
1	1.375 x 2 x 0.31	2.8
2	2.25 x 3 x 0.38	4.3
3	2.5 x 3.38 x 0.44	4.8

14.2.2 Standard Bore ASB

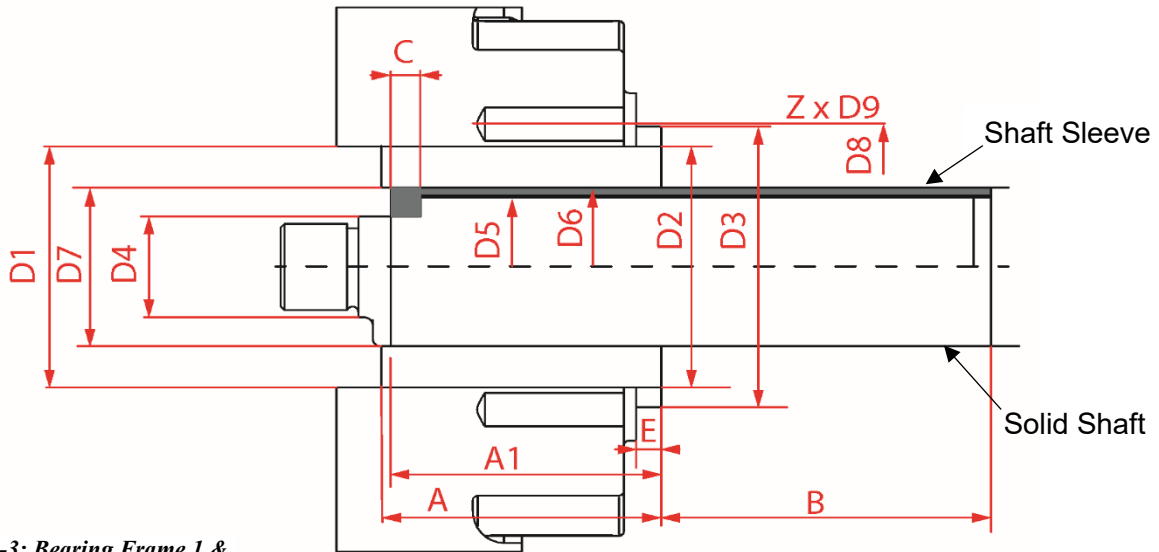


Figure 14-3: Bearing Frame 1 &

Table 14-3: Standard Bore ASB dimensions (in)

Bearing Unit	A	A1	B	C ±0.004	E	D1 +0.004 -0.0	D2 H8	D3 h8	D4
1	2.250	2.193	2.060	0.252	0.197	1.882	2.000	2.438	0.876
2	2.626	2.565	2.719	0.496	0.197	2.882	3.000	3.500	1.122
3	3.063	2.984	2.656	0.248	0.256	3.257	3.375	4.002	1.769

Bearing Unit	D4	D5	D6	D6 (B)	D7	D8	D9	D10	Z pcs
1	0.876	1.125	1.375	1.375	1.375	3.539	3/8-16 UNC	-	4
2	1.122	1.875	2.125	2.250	2.125	4.500	3/8-16 UNC	1.625	4
3	1.769	2.250	2.500	2.500	2.500	4.750	1/2-13 UNC	-	4

Note: (B) For gland packing only

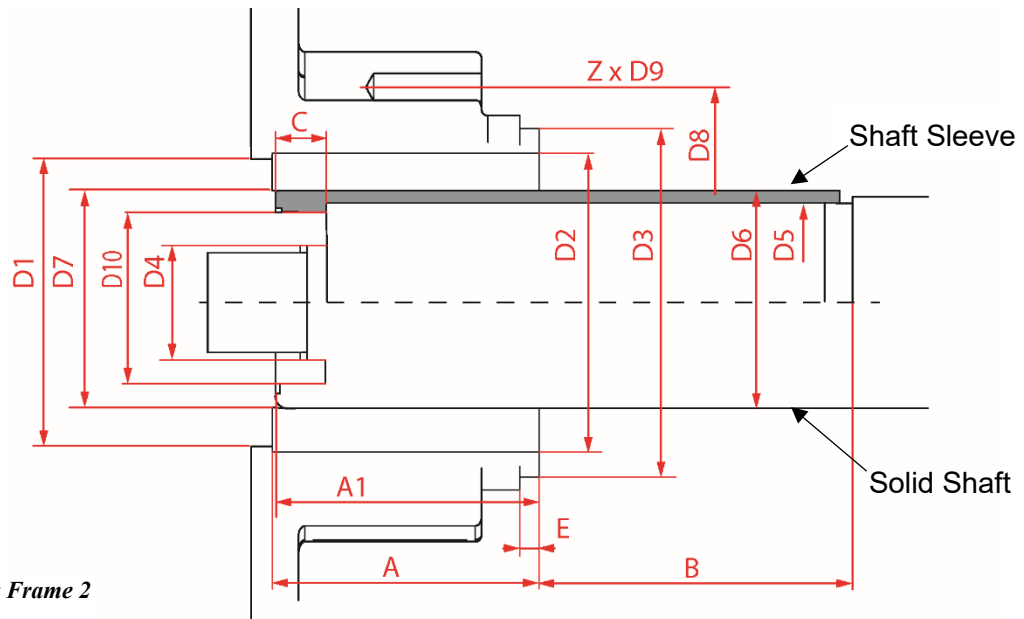


Figure 14-4: Bearing Frame 2

14.2.4 Tapered Bore ATB

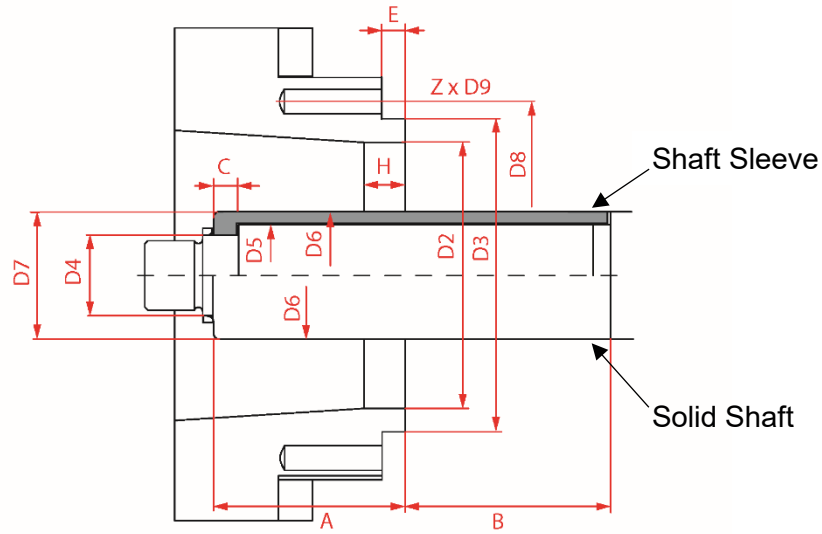


Figure 14-7: Bearing Frame 1 & 3

Table 14-5: Tapered Bore ATB Dimensions (in)

Bearing Unit	A	A1	B	C ±0.004	E	D1 +0.004 -0.0	D2 H8	D3 h8
1	2.125	2.068	2.185	0.252	0.197	2.008	2.875	3.375
2	2.250	2.189	3.094	0.496	0.197	2.992	4.125	4.562
3	3.000	2.921	2.719	0.248	0.256	3.425	4.625	5.125

Bearing Unit	D4	D5	D6	D7	D8	D9	D10	Z pcs
1	0.876	1.125	1.375	1.375	4.120	3/8-16 UNC	-	4
2	1.122	1.875	2.125	2.125	5.250	3/8-16 UNC	1.625	4
3	1.769	2.250	2.500	2.500	6.000	1/2-13 UNC	-	4

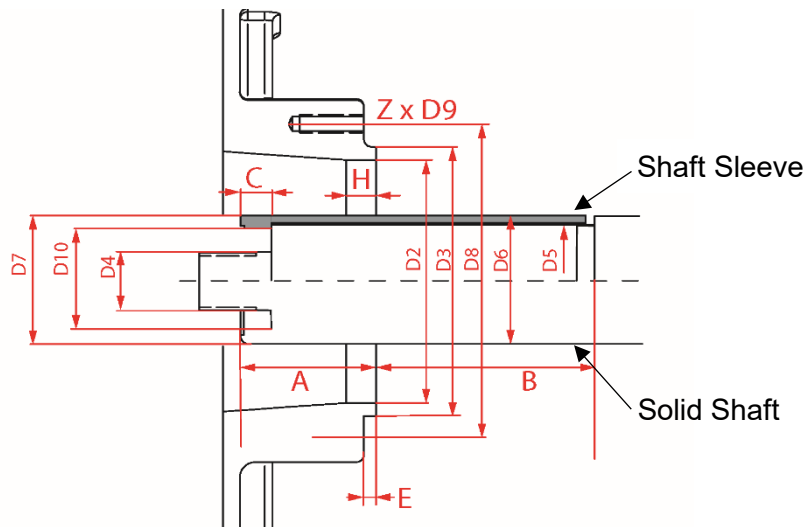


Figure 14-8: Bearing Frame 2

15 PUMP INFORMATION

Purchase Date: _____

Purchase Order: _____

Serial Number: _____

Equipment Number: _____



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PUMP, Inc