

GOULDS PUMPS

Installation, Operation and Maintenance Instructions



3298 Family



ITT

FOREWORD

This manual provides instructions for the Installation, Operation, and Maintenance of the Goulds Model 3298 family of Magnetic Drive Process Pumps. This manual must be read and understood before installation and start-up.

The design, materials, and workmanship incorporated in the construction of Goulds pumps makes them capable of giving trouble-free service. The life and satisfactory service of any mechanical unit, however, is enhanced and extended by correct application, proper installation, periodic inspection, condition monitoring and careful maintenance. This instruction manual was prepared to assist operators in understanding the construction and the correct methods of installing, operating, and maintaining these pumps.

ITT - Goulds shall not be liable for physical injury, damage or delays caused by a failure to observe the instructions for Installation, Operation, and Maintenance contained in this manual.

Warranty is valid only when genuine ITT - Goulds Pumps parts are used.

Use of the equipment on a service other than stated in the order could nullify the warranty, unless written approval is obtained in advance from ITT - Goulds Pumps.

Supervision by an authorized ITT - Goulds representative is recommended to assure proper installation.

Additional manuals can be obtained by contacting your local ITT - Goulds representative, by calling 1-800-446-8537, or visiting our website at www.gouldspumps.com.

THIS MANUAL EXPLAINS

- **Proper Installation**
- **Start-Up Procedures**
- **Operation Procedures**
- **Routine Maintenance**
- **Pump Overhaul**
- **Troubleshooting**
- **Ordering Spare or Repair Parts**

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IMPORTANT SAFETY NOTICE

To: Our Valued Customers

User safety is a major focus in the design of our products. Following the precautions outlined in this manual will minimize your risk of injury.

ITT Goulds pumps will provide safe, trouble-free service when properly installed, maintained, and operated.

Safe installation, operation, and maintenance of ITT Goulds Pumps equipment are an essential end user responsibility. This *Pump Safety Manual* identifies specific safety risks that must be considered at all times during product life. Understanding and adhering to these safety warnings is mandatory to ensure personnel, property, and/or the environment will not be harmed. Adherence to these warnings alone, however, is not sufficient — it is anticipated that the end user will also comply with industry and corporate safety standards. Identifying and eliminating unsafe installation, operating and maintenance practices is the responsibility of all individuals involved in the installation, operation, and maintenance of industrial equipment.

Please take the time to review and understand the safe installation, operation, and maintenance guidelines outlined in this Pump Safety Manual and the Instruction, Operation, and Maintenance (IOM) manual. Current manuals are available at www.gouldspumps.com/literature_ioms.html or by contacting your nearest Goulds Pumps sales representative.

These manuals must be read and understood before installation and start-up.

For additional information, contact your nearest Goulds Pumps sales representative or visit our Web site at www.gouldspumps.com.

SAFETY WARNINGS

Specific to pumping equipment, significant risks bear reinforcement above and beyond normal safety precautions.

WARNING

A pump is a pressure vessel with rotating parts that can be hazardous. Any pressure vessel can explode, rupture, or discharge its contents if sufficiently over pressurized causing death, personal injury, property damage, and/or damage to the environment. All necessary measures must be taken to ensure over pressurization does not occur.

WARNING

Operation of any pumping system with a blocked suction and discharge must be avoided in all cases. Operation, even for a brief period under these conditions, can cause superheating of enclosed pumpage and result in a violent explosion. All necessary measures must be taken by the end user to ensure this condition is avoided.

WARNING

The pump may handle hazardous and/or toxic fluids. Care must be taken to identify the contents of the pump and eliminate the possibility of exposure, particularly if hazardous and/or toxic. Potential hazards include, but are not limited to, high temperature, flammable, acidic, caustic, explosive, and other risks.

WARNING

Pumping equipment Instruction, Operation, and Maintenance manuals clearly identify accepted methods for disassembling pumping units. These methods must be adhered to. Specifically, applying heat to impellers and/or impeller retaining devices to aid in their removal is strictly forbidden. Trapped liquid can rapidly expand and result in a violent explosion and injury.

ITT Goulds Pumps will not accept responsibility for physical injury, damage, or delays caused by a failure to observe the instructions for installation, operation, and maintenance contained in this Pump Safety Manual or the current IOM available at www.gouldspumps.com/literature.

SAFETY

DEFINITIONS

Throughout this manual the words **WARNING**, **CAUTION**, **ELECTRICAL**, and **ATEX** are used to indicate where special operator attention is required.

Observe all Cautions and Warnings highlighted in this Pump Safety Manual and the IOM provided with your equipment.



WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

Example: Pump shall never be operated without coupling guard installed correctly.



CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

Example: Throttling flow from the suction side may cause cavitation and pump damage.



ELECTRICAL HAZARD

Indicates the possibility of electrical risks if directions are not followed.

Example: Lock out driver power to prevent electric shock, accidental start-up, and physical injury.



When installed in potentially explosive atmospheres, the instructions that follow the Ex symbol must be followed. Personal injury and/or equipment damage may occur if these instructions are not followed. If there is any question regarding these requirements or if the equipment is to be modified, please contact an ITT Goulds Pumps representative before proceeding.

Example:  Improper impeller adjustment could cause contact between the rotating and stationary parts, resulting in a spark and heat generation.

GENERAL PRECAUTIONS

WARNING

A pump is a pressure vessel with rotating parts that can be hazardous. Hazardous fluids may be contained by the pump including high temperature, flammable, acidic, caustic, explosive, and other risks. Operators and maintenance personnel must realize this and follow safety measures. Personal injuries will result if procedures outlined in this manual are not followed. ITT Goulds Pumps will not accept responsibility for physical injury, damage or delays caused by a failure to observe the instructions in this manual and the IOM provided with your equipment.

General Precautions		
WARNING		NEVER APPLY HEAT TO REMOVE IMPELLER. It may explode due to trapped liquid.
WARNING		NEVER use heat to disassemble pump due to risk of explosion from tapped liquid.
WARNING		NEVER operate pump without coupling guard correctly installed.
WARNING		NEVER run pump below recommended minimum flow when dry, or without prime.
WARNING		ALWAYS lock out power to the driver before performing pump maintenance.
WARNING		NEVER operate pump without safety devices installed.
WARNING		NEVER operate pump with discharge valve closed.
WARNING		NEVER operate pump with suction valve closed.
WARNING		DO NOT change service application without approval of an authorized ITT Goulds Pumps representative.
WARNING		Safety Apparel: ♦ Insulated work gloves when handling hot bearings or using bearing heater ♦ Heavy work gloves when handling parts with sharp edges, especially impellers ♦ Safety glasses (with side shields) for eye protection ♦ Steel-toed shoes for foot protection when handling parts, heavy tools, etc. ♦ Other personal protective equipment to protect against hazardous/toxic fluids
WARNING		Receiving: Assembled pumping units and their components are heavy. Failure to properly lift and support equipment can result in serious physical injury and/or equipment damage. Lift equipment only at specifically identified lifting points or as instructed in the current IOM. Current manuals are available at www.gouldspumps.com/literature_ioms.html or from your local ITT Goulds Pumps sales representative. Note: Lifting devices (eyebolts, slings, spreaders, etc.) must be rated, selected, and used for the entire load being lifted.
WARNING		Alignment: Shaft alignment procedures must be followed to prevent catastrophic failure of drive components or unintended contact of rotating parts. Follow coupling manufacturer's coupling installation and operation procedures.

General Precautions		
WARNING		Before beginning any alignment procedure, make sure driver power is locked out. Failure to lock out driver power will result in serious physical injury.
CAUTION		Piping: Never draw piping into place by forcing at the flanged connections of the pump. This may impose dangerous strains on the unit and cause misalignment between pump and driver. Pipe strain will adversely effect the operation of the pump resulting in physical injury and damage to the equipment.
WARNING		Flanged Connections: Use only fasteners of the proper size and material.
WARNING		Replace all corroded fasteners.
WARNING		Ensure all fasteners are properly tightened and there are no missing fasteners.
WARNING		Startup and Operation: When installing in a potentially explosive environment, please ensure that the motor is properly certified.
WARNING		Operating pump in reverse rotation may result in contact of metal parts, heat generation, and breach of containment.
WARNING		Lock out driver power to prevent accidental start-up and physical injury.
WARNING		The impeller clearance setting procedure must be followed. Improperly setting the clearance or not following any of the proper procedures can result in sparks, unexpected heat generation and equipment damage.
WARNING		If using a cartridge mechanical seal, the centering clips must be installed and set screws loosened prior to setting impeller clearance. Failure to do so could result in sparks, heat generation, and mechanical seal damage.
WARNING		The coupling used in an ATEX classified environment must be properly certified and must be constructed from a non-sparking material.
WARNING		Never operate a pump without coupling guard properly installed. Personal injury will occur if pump is run without coupling guard.
WARNING		Make sure to properly lubricate the bearings. Failure to do so may result in excess heat generation, sparks, and / or premature failure.
CAUTION		The mechanical seal used in an ATEX classified environment must be properly certified. Prior to start up, ensure all points of potential leakage of process fluid to the work environment are closed.
CAUTION		Never operate the pump without liquid supplied to mechanical seal. Running a mechanical seal dry, even for a few seconds, can cause seal damage and must be avoided. Physical injury can occur if mechanical seal fails.
WARNING		Never attempt to replace packing until the driver is properly locked out and the coupling spacer is removed.
WARNING		Dynamic seals are not allowed in an ATEX classified environment.
WARNING		DO NOT operate pump below minimum rated flows or with suction and/or discharge valve closed. These conditions may create an explosive hazard due to vaporization of pumpage and can quickly lead to pump failure and physical injury.

General Precautions		
WARNING		Ensure pump is isolated from system and pressure is relieved before disassembling pump, removing plugs, opening vent or drain valves, or disconnecting piping.
WARNING		Shutdown, Disassembly, and Reassembly: Pump components can be heavy. Proper methods of lifting must be employed to avoid physical injury and/or equipment damage. Steel toed shoes must be worn at all times.
WARNING		The pump may handle hazardous and/or toxic fluids. Observe proper decontamination procedures. Proper personal protective equipment should be worn. Precautions must be taken to prevent physical injury. Pumpage must be handled and disposed of in conformance with applicable environmental regulations.
WARNING		Operator must be aware of pumpage and safety precautions to prevent physical injury.
WARNING		Lock out driver power to prevent accidental startup and physical injury.
CAUTION		Allow all system and pump components to cool before handling them to prevent physical injury.
CAUTION		If pump is a Model NM3171, NM3196, 3198, 3298, V3298, SP3298, 4150, 4550, or 3107, there may be a risk of static electric discharge from plastic parts that are not properly grounded. If pumped fluid is non-conductive, pump should be drained and flushed with a conductive fluid under conditions that will not allow for a spark to be released to the atmosphere.
WARNING		Never apply heat to remove an impeller. The use of heat may cause an explosion due to trapped fluid, resulting in severe physical injury and property damage.
CAUTION		Wear heavy work gloves when handling impellers as sharp edges may cause physical injury.
CAUTION		Wear insulated gloves when using a bearing heater. Bearings will get hot and can cause physical injury.

ATEX CONSIDERATIONS and INTENDED USE

Special care must be taken in potentially explosive environments to ensure that the equipment is properly maintained. This includes but is not limited to:

1. Monitoring the pump frame and liquid end temperature.
2. Maintaining proper bearing lubrication.
3. Ensuring that the pump is operated in the intended hydraulic range.

The ATEX conformance is only applicable when the pump unit is operated within its intended use. Operating, installing or maintaining the pump unit in any way that is not covered in the Instruction, Operation, and Maintenance manual (IOM) can cause serious personal injury or damage to the equipment. This includes any modification to the equipment or use of parts not provided by ITT Goulds Pumps. If there is any question regarding the intended use of the equipment, please contact an ITT Goulds representative before proceeding. Current IOMs are available at www.gouldspumps.com/literature_ioms.html or from your local ITT Goulds Pumps Sales representative.

All pumping unit (pump, seal, coupling, motor and pump accessories) certified for use in an ATEX classified environment, are identified by an ATEX tag secured to the pump or the baseplate on which it is mounted. A typical tag would look like this:



The CE and the Ex designate the ATEX compliance. The code directly below these symbols reads as follows:

- II = Group 2
- 2 = Category 2
- G/D = Gas and Dust present
- T4 = Temperature class, can be T1 to T6 (see Table 1)

Table 1		
Code	Max permissible surface temperature °F (°C)	Max permissible liquid temperature °F (°C)
T1	842 (450)	700 (372)
T2	572 (300)	530 (277)
T3	392 (200)	350 (177)
T4	275 (135)	235 (113)
T5	212 (100)	Option not available
T6	185 (85)	Option not available

The code classification marked on the equipment must be in accordance with the specified area where the equipment will be installed. If it is not, do not operate the equipment and contact your ITT Goulds Pumps sales representative before proceeding.

PARTS



The use of genuine Goulds parts will provide the safest and most reliable operation of your pump. ITT Goulds Pumps ISO certification and quality control procedures ensure the parts are manufactured to the highest quality and safety levels.

Please contact your local Goulds representative for details on genuine Goulds parts.

GENERAL INFORMATION

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PUMP DESCRIPTION

The Model 3298 is a sealless close coupled or frame mounted centrifugal pump with an enclosed impeller that is driven by a synchronous magnetic coupling and meets dimensional standards of ANSI B73.1. (The 1x1½-5 is not ANSI dimensional.)

The SP 3298 is a self-priming sealless close coupled or frame mounted centrifugal pump with an enclosed impeller that is driven by a synchronous magnetic coupling. The pump and frame / adapter feet locations meet ANSI B73.1 dimensional standards.

The V 3298 is a vertical in-line sealless close coupled centrifugal pump with an enclosed impeller that is driven by a synchronous magnetic coupling and meets the dimensional standards of ANSI B73.2.

Casing - The casings are one piece cast ductile iron lined with 1/8" TEFZEL^{®1} and have ANSI class 150 flanges with a TEFZEL[®] raised face. The 3298 and SP 3298 are end suction, top centerline discharge and are self-venting. The V 3298 is side suction, side discharge and is also self-venting.

Impeller Magnet Assembly - The 3298 family utilizes a one or two piece impeller magnet assembly. The magnet ring is balanced to ISO 1940 G6.3 levels and is sealed within the solid enclosed TEFZEL[®] impeller magnet assembly.

Stationary Shaft - The impeller magnet assembly rotates about a solid stationary silicon carbide shaft. The shaft is supported at one end by the containment shell and the other end by the TEFZEL[®] bearing spider.

Bearing Spider - The bearing spider constructed from solid TEFZEL[®] houses one of the key silicon carbide thrust bearings in the pump and supports the stationary shaft at one end.

Rear Impeller Wear Ring - is standard on M and L group size pumps and is not required on S group sizes. The wear ring is pressed into the rear of the impeller assembly. The wear ring reduces axial thrust in the M and L group size pumps.

Magnetic Coupling - is a coaxial synchronous type using rare earth magnets. This concept results in a compact design and allows the impeller to turn at the same speed as the motor, (i.e. there is no slip between the drive and driven magnets.)

Magnets - Neodymium Iron (NdFe).

Containment Shell - isolates the pumped liquid from the atmosphere. The containment shell construction is backed with vinylester FRP.

Radial Bearings and Thrust Bearings - Goulds standard bearing material is carbon with optional Pure Sintered Alpha Grade Silicon Carbide or DryGuard™ Pure Sintered Alpha Grade Silicon Carbide.

Standard Close Coupled Mounting - The drive magnet assembly is keyed, set screwed and mounted directly to the motor shaft. This arrangement eliminates the need to perform pump/motor alignment.

Optional Power End³ - The standard configuration is cast iron with flood oil lubricated ball bearings. Pure oil mist systems are available as an option. For protection and reliability of the bearings and the lubricant, a labyrinth seal is provided. On the inboard side a lip seal is used to prevent leakage of oil into the magnetic drive assembly.

¹ TEFLO[®] and TEFZEL[®]: Registered trademarks for fluoropolymer resins, films and fibers made by DuPont.

² The 1x1½-5 is tangential discharge.

³ Frame mounted power end not available on the V 3298.

NAMEPLATE INFORMATION

Every pump has two Goulds nameplates that provide information about the pump. The tags are located on the casing and bearing frame.

When ordering spare parts, you will need to identify pump model, size, serial number, and the item number of required parts. Information can be taken from the pump casing tag. Item numbers can be found in this manual.

Description	Fig. No.	Example
Pump Casing Tag - provides information about the pump's hydraulic characteristics. Note the format of the pump size: Discharge x Suction - Nominal maximum Impeller Diameter in inches (Example: 2x3-8) (Figs. 1 & 2).	Fig. 1 English	
	Fig. 2 Metric	
Bearing Frame Tag - provides information on the lubrication system used (Fig. 3).	Fig. 3	
ATEX Tag - If applicable, your pump unit may have the following ATEX tag affixed to the pump and/or baseplate. See the <i>Safety</i> section for a description of the symbols and codes (Fig. 4).	Fig. 4	

RECEIVING THE PUMP

Inspect the pump as soon as it is received. Make notes of damaged or missing items on the receipt and freight bill. File any claims with the transportation company immediately.

STORAGE REQUIREMENTS

Short Term - (Less than 3 months) Goulds normal packaging procedure is designed to protect the pump during shipping. Upon receipt store in a covered and dry location.

Long Term - (More than 6 months) Preservative treatment of bearings and machined surfaces will be required. Rotate shaft several times every 3 months. Refer to driver and coupling manuals for their long term storage procedures. Store in a dry covered location.

HANDLING



WARNING

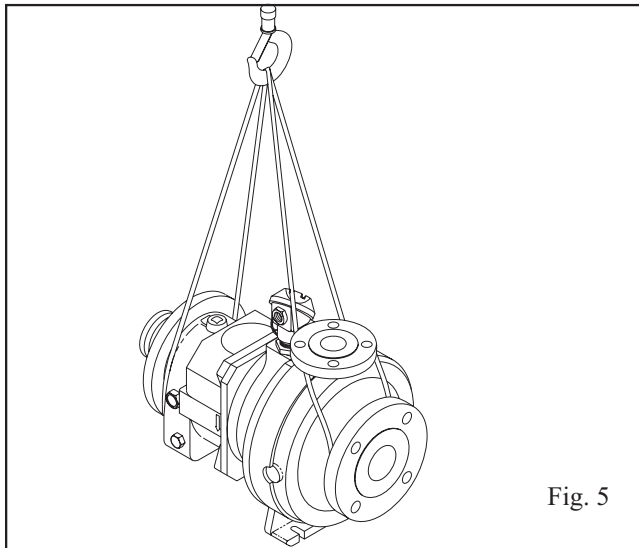
Failure to properly lift and support equipment could result in serious injury or damage to pumps.

Use care when moving pumps. Lifting equipment must be able to adequately support the entire assembly. Hoist bare pumps, using a sling under the suction flange and bearing housing. (Fig. 5)

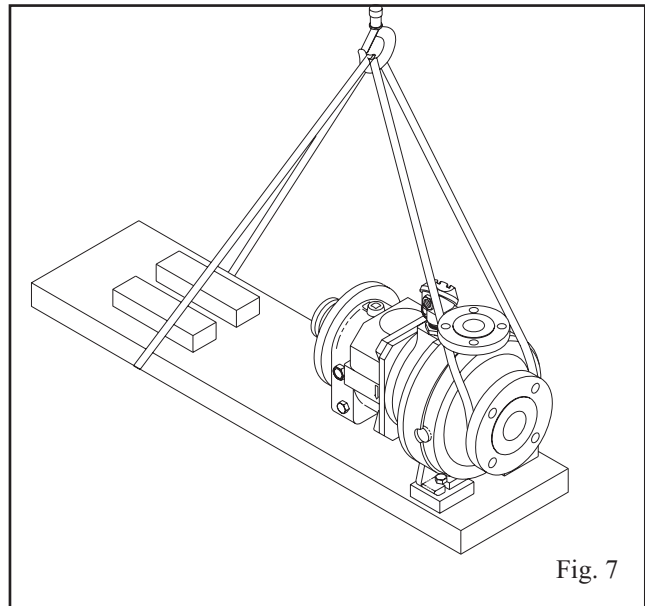
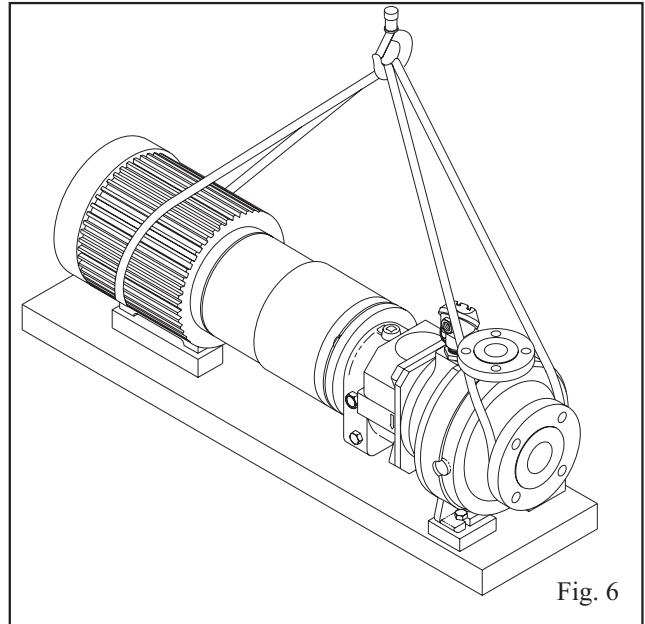


WARNING

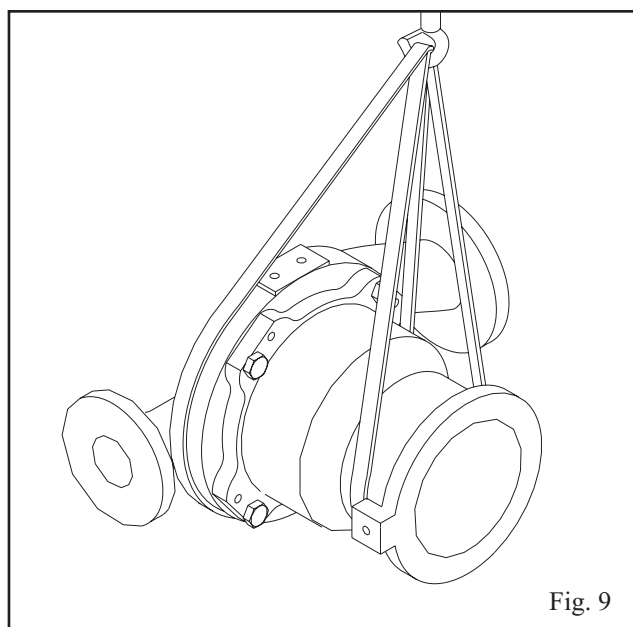
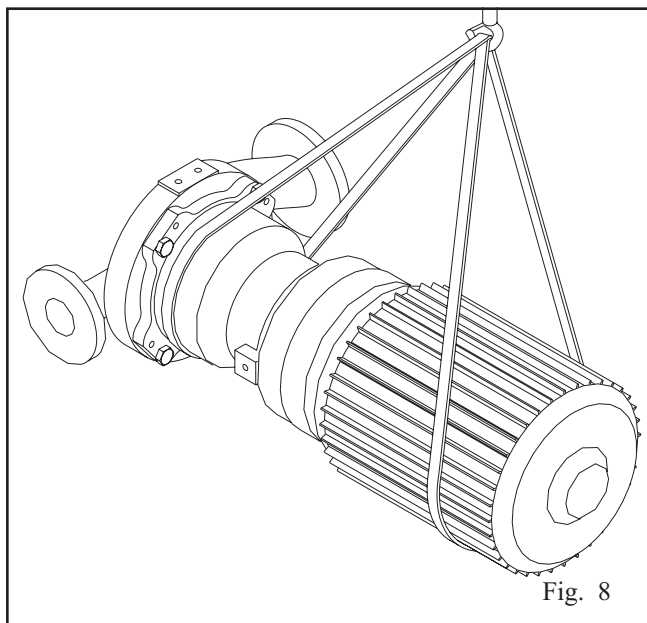
These pumps use ceramic silicon carbide components. Do not drop pump or subject to shock loads, this may damage internal ceramic components.



Baseplate mounted units are moved with slings under the pump and driver. (Figs. 5 & 7)



Complete vertical pumps are lifted with straps under the pump and motor (Fig. 8). Bare vertical pumps (without a motor) are lifted with straps under the pump and motor adapter (Fig. 9).



INSTALLATION

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Equipment that is to be installed in a potentially explosive environment must be done so in accordance with the following installation instructions.

BASEPLATE INSPECTION

1. Remove all equipment.
2. Completely clean the underside of baseplate. It is sometimes necessary to coat the underside of the baseplate with an epoxy. This may have been purchased as an option.
3. Remove the rust preventative solution from the machined pads with an appropriate solution.

SITE / FOUNDATION

A pump should be located near the supply of liquid and have adequate space for operation, maintenance, and inspection.

Baseplate mounted pumps are normally grouted to a concrete foundation, which has been poured on a solid footing. The foundation must be able to

absorb any vibration and to form a permanent, rigid support for the pumping unit.

The location and size of the foundation bolts are shown on the outline assembly drawing, provided with the pump data package.



All equipment being installed must be properly grounded to prevent unexpected static electric discharge. This includes ensuring that the PFA lined pumps are pumping fluids that are conductive. If not, a static electric discharge may occur when the pump is drained and disassembled for maintenance purposes.

Foundation bolts commonly used are sleeve type (Fig. 10) and J type (Fig. 11). Both designs permit movement for final bolt adjustment.

1. Inspect foundation for dust, dirt, oil, chips, water, etc. and remove any contaminants. Do not use oil-based cleaners as grout will not bond to it.
2. Prepare the foundation in accordance with the grout manufacturer's recommendations.

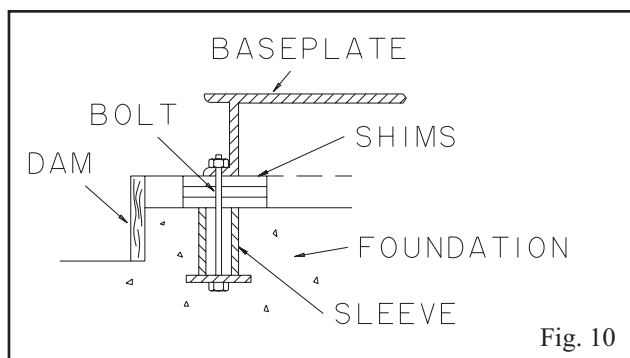


Fig. 10

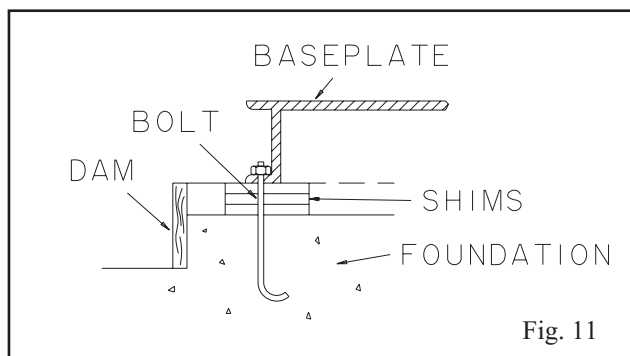


Fig. 11

LEVEL BASEPLATE

CAST IRON / FABRICATED STEEL

1. Place two sets of wedges or shims on the foundation, one set on each side of every foundation bolt (Fig. 12, 13). The wedges should extend .75 in. (20 mm) to 1.5 in. (40 mm) above the foundation, to allow for adequate grouting. This will provide even support for the baseplate once it is grouted.
2. Remove water and/or debris from anchor bolt holes/sleeves. If the sleeve type bolts are being used, fill the sleeves with rags to prevent grout from entering.

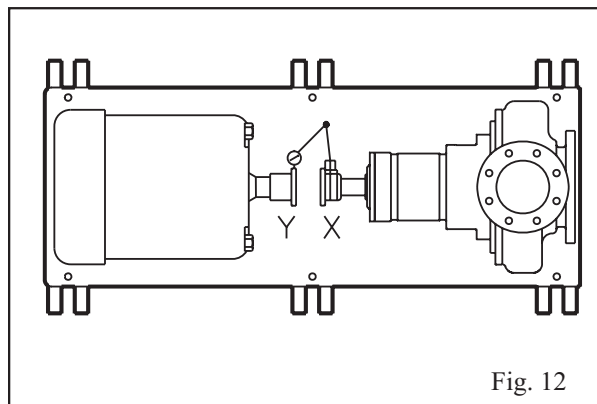


Fig. 12

3. Carefully lower baseplate onto foundation bolts.
4. Level baseplate to within .125 in. (3mm) over the length of the base and .062 in. (1.5 mm) over the width of the base by adjusting shims or wedges.
5. Hand tighten bolts.

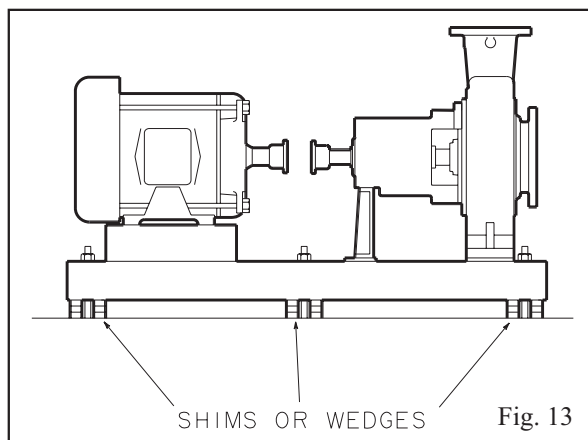
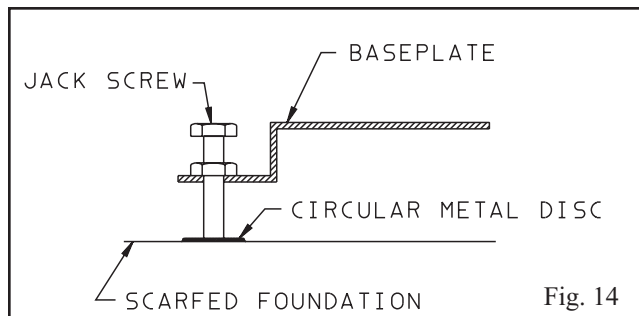


Fig. 13

FEATURE FABRICATED STEEL/ API STYLE

(BASEPLATES PROVIDED WITH VERTICAL LEVELING ADJUSTORS)

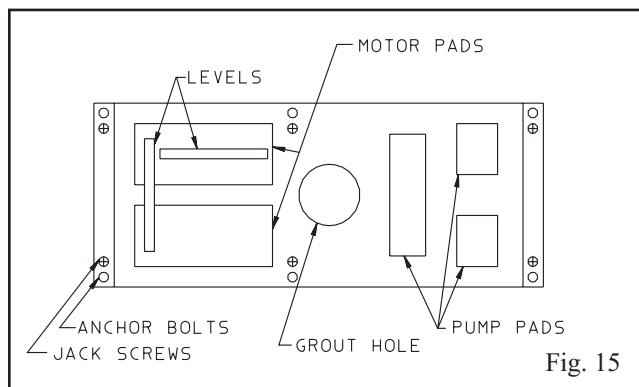
1. Coat the jack screws with an anti-seizing compound to allow for easy removal after the grout has been cured.
2. Cut round circular plates from bar stock to set the jack screws on. The edges of the plates should be chamfered to reduce stress concentrations.
3. Set the baseplate on the foundation and use the four corner jack screws to raise the baseplate off the foundation 0.75" to 1.5" (Fig. 14). The two center jack screws should not be touching the foundation.



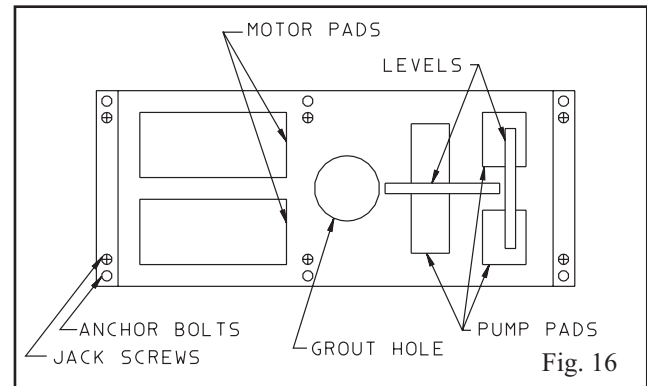
4. Place two machinist levels on the motor pads, one lengthwise on a single motor pad, and another across the ends of both motor pads (Fig 15).

NOTE: When using a machinist level, it is important that the surface being leveled is free of all contaminants, such as dust, to ensure an accurate reading.

5. Level the motor pads as close to zero as possible, in both directions, by adjusting the four jack screws.
6. Next, turn down the center jack screws so that they are resting on their metal discs on the foundation.



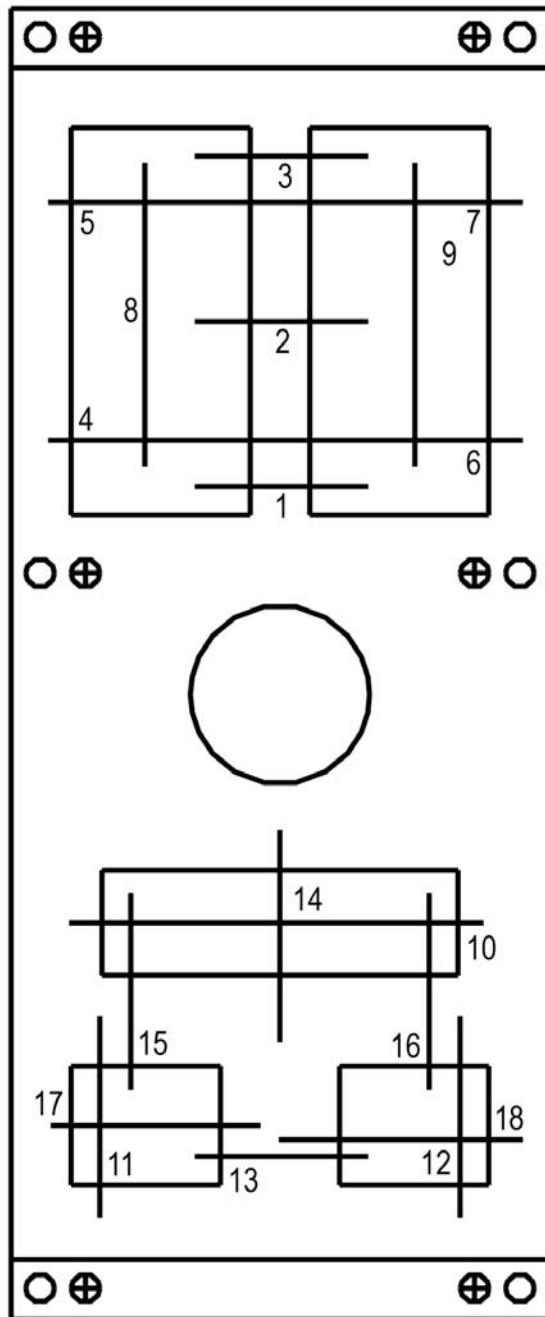
7. Place the two levels on the pump pads, one lengthwise on a single pump pad, and another across the middle of both pump pads. (Fig. 16)



8. Level the pump pads as close to zero as possible, in both directions, by adjusting the jack screws.
9. Install the anchor bolts until they are hand tight.
10. Return the levels to the motor pads and check the level measurements.
11. Adjust the jack screws and anchor bolts, if necessary, until all level measurements are within the design requirements of 0.002 in./ft.
12. When taking readings, center the level over the pad being measured.

NOTE: The Baseplate Leveling Worksheet provided may be used when taking readings.

BASEPLATE LEVELING WORKSHEET



LEVEL MEASUREMENTS

- 1) _____
- 2) _____
- 3) _____
- 4) _____
- 5) _____
- 6) _____
- 7) _____
- 8) _____
- 9) _____
- 10) _____
- 11) _____
- 12) _____
- 13) _____
- 14) _____
- 15) _____
- 16) _____
- 17) _____
- 18) _____

ALIGNMENT AND ALIGNMENT PROCEDURE



WARNING

Before beginning any alignment procedure, make sure driver power is locked out. Failure to lock out driver power can result in serious personal injury.



Alignment procedures must be followed to prevent unintended contact of rotating parts. Follow coupling manufacturer's coupling installation and operation procedures.

To remove guard, refer to coupling guard assembly/disassembly instructions.

The points at which alignment is checked and adjusted are:

- **Initial Alignment** is done prior to operation when the pump and the driver are at ambient temperature.
- **Final Alignment** is done after operation when the pump and driver are at operating temperature.

Alignment is achieved by adding or removing shims from under the feet of the driver and shifting equipment horizontally as needed.

NOTE: *Proper alignment is the responsibility of the installer of the unit.*

Accurate alignment of the equipment must be attained. Trouble-free operation can be accomplished by following these procedures:

ALIGNMENT CHECKS

Initial Alignment (Cold Alignment)

- Before Grouting Baseplate - To ensure alignment can be obtained.
- After Grouting Baseplate - To ensure no changes to alignment have occurred during grouting process.
- After Connecting Piping - To ensure that pipe strains haven't altered alignment. If changes have occurred, alter piping to remove pipe strains on pump flanges.

Final Alignment (Hot Alignment)

- After First Run - To obtain correct alignment when both pump and driver are at operating temperature. Thereafter, alignment should be checked periodically in accordance with plant operating and maintenance procedures.

NOTE: *Alignment check must be made if process temperature changes, piping changes, and/or pump service is performed.*

ALIGNMENT CRITERIA

Good alignment is achieved when the dial indicator readings as specified in the alignment procedure are .002 in. (.05 mm) Total Indicated Reading (T.I.R.) or less when the pump and driver are at operating temperature (Final Alignment).

During the installation phase, however, it is necessary to set the parallel alignment in the vertical direction to a different criteria due to differences in expansion rates of the pump and driver. *Table 2* below shows recommended cold settings for electric motor driven pumps based on different pumpage temperatures. Driver manufacturers should be consulted for recommended cold settings for other types of drivers (steam turbines, engines, etc.).

Table 2
Cold Settings of Parallel
Vertical Alignment

Pumpage Temperature	Set Driver Shaft
50°F (10°C)	.002in. (.05mm) LOW
150°F (65°C)	.001in. (.03mm) HIGH
250°F (120°C)	.005in. (.12mm) HIGH

SET UP

1. Mount two dial indicators on one of the coupling halves (X) so they contact the other coupling half (Y) (Fig. 17).
2. Check setting of indicators by rotating coupling half X to ensure indicators stay in contact with coupling half Y but do not bottom out. Adjust indicators accordingly.

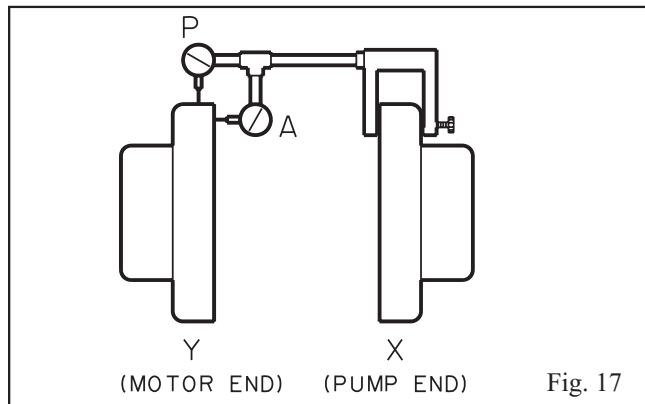


Fig. 17

MEASUREMENT

1. To ensure accuracy of indicator readings, always rotate both coupling halves together so indicators contact the same point on coupling half Y. This will eliminate any measurement problems due to runout on coupling half Y.
2. Take indicator measurements with driver feet hold down bolts tightened. Loosen hold down bolts prior to making alignment corrections.
3. Take care not to damage indicators when moving driver during alignment corrections.

ANGULAR ALIGNMENT

A unit is in angular alignment when indicator A (Angular indicator) does not vary by more than .002 in. (.05 mm) as measured at four locations 90° apart.

Vertical Correction (Top to Bottom)

1. Zero indicator A at top dead center (12 o'clock) of coupling half Y.
2. Rotate indicators to bottom dead center (6 o'clock). Observe needle and record reading.
3. **Negative Reading** - The coupling halves are further apart at the bottom than at the top. Correct by either raising the driver feet at the shaft end (add shims) or lowering the driver feet at the other end (remove shims) (Fig. 18).

Positive Reading - The coupling halves are closer at the bottom than at the top. Correct by either lowering the driver feet at the shaft end (remove shims) or raising the driver feet at the other end (add shims).

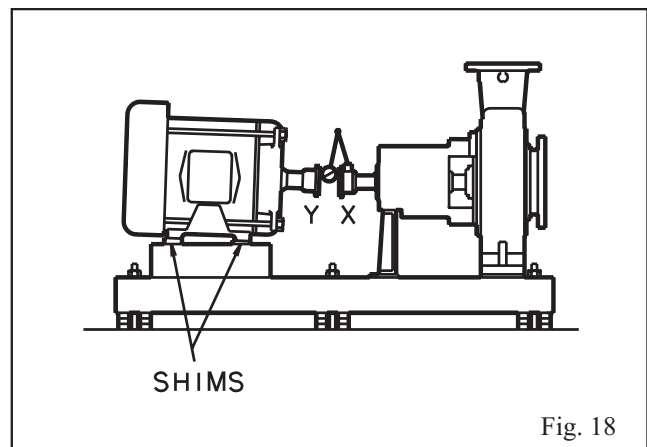


Fig. 18

4. Repeat steps 1 through 3 until indicator A reads .002 in. (.05 mm) or less.

Horizontal Correction (Side to Side)

1. Zero indicator A on left side of coupling half Y, 90° from top dead center (9 o'clock).
2. Rotate indicators through top dead center to the right side, 180° from the start (3 o'clock). Observe needle and record reading.
3. **Negative Reading** - The coupling halves are further apart on the right side than the left. Correct by either sliding the shaft end of the driver to the left or the other end to the right.

Positive Reading - The coupling halves are closer together on the right side than the left. Correct by either sliding the shaft end of the driver to the right or the other end to the left (Fig. 19).

4. Repeat steps 1 through 3 until indicator A reads .002 in. (.05 mm) or less.

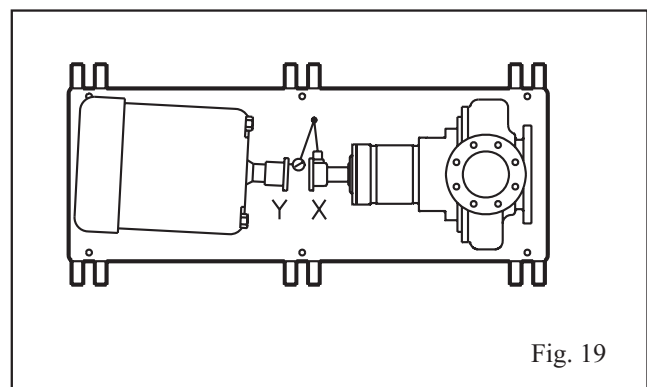


Fig. 19

5. Re-check both horizontal and vertical readings to ensure adjustment of one did not disturb the other. Correct as necessary.

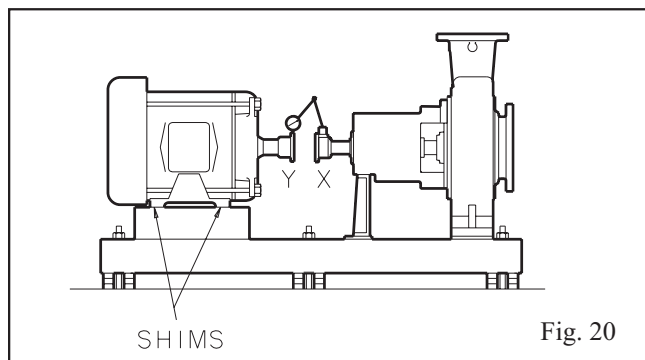
PARALLEL ALIGNMENT

A unit is in parallel alignment when indicator P (parallel indicator) does not vary by more than .002 in. (.05 mm) as measured at four points 90° apart at operating temperature. Note the preliminary cold setting criteria, *Table 2*.

Vertical Correction (Top to Bottom)

1. Zero indicator P at top dead center of coupling (12 o'clock) half Y (Fig. 19).
2. Rotate indicator to bottom dead center (6 o'clock). Observe needle and record reading.
3. **Negative Reading** - Coupling half X is lower than coupling half Y. Correct by removing shims of thickness equal to half of the indicator reading under each driver foot.

Positive Reading - Coupling half X is higher than coupling half Y. Correct by adding shims of thickness equal to half of the indicator reading from each driver foot (Fig. 20).



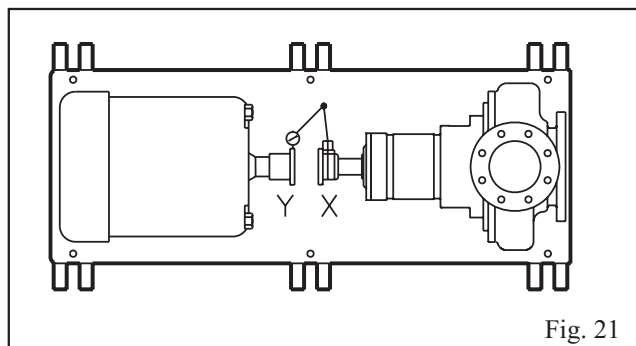
NOTE: Equal amounts of shims must be added to or removed from each driver foot. Otherwise the vertical angular alignment will be affected.

4. Repeat steps 1 through 3 until indicator P reads within .002 in. (.05 mm) or less when hot, or per Table 1 when cold.

Horizontal Correction (Side to Side)

1. Zero indicator P on the left side of coupling half Y, 90° from top dead center (9 o'clock).
2. Rotate indicators through top dead center to the right side, 180° from the start. Observe needle and record reading (3 o'clock).
3. **Negative Reading** - Coupling half Y is to the left of coupling half X. Correct by sliding driver evenly in the appropriate direction (Fig. 21).

Positive Reading - Coupling half Y is to the right of coupling half X. Correct by sliding driver evenly in the appropriate direction.



NOTE: Failure to slide motor evenly will affect horizontal angular correction.

4. Repeat steps 1 through 3 until indicator P reads .002 in. (.05 mm) or less.
5. Re-check both horizontal and vertical readings to ensure adjustment of one did not disturb the other. Correct as necessary.

COMPLETE ALIGNMENT

A unit is in complete alignment when both indicators A (angular) and P (parallel) do not vary by more than .002 in. (.05 mm) as measured at four points 90° apart.

Vertical Correction (Top to Bottom)

1. Zero indicators A and P at top dead center (12 o'clock) of coupling half Y.
2. Rotate indicator to bottom dead center (6 o'clock). Observe the needles and record the readings.
3. Make corrections as outlined previously.

Horizontal Correction (Side to Side)

1. Zero indicators A and P on the left side of coupling half Y, 90° from top dead center (9 o'clock).
2. Rotate indicators through top dead center to the right side, 180° from the start (3 o'clock). Observe the needle, measure and record the reading.
3. Make corrections as outlined previously.
4. Recheck both vertical and horizontal readings to ensure adjustment of one did not disturb the other. Correct as necessary.

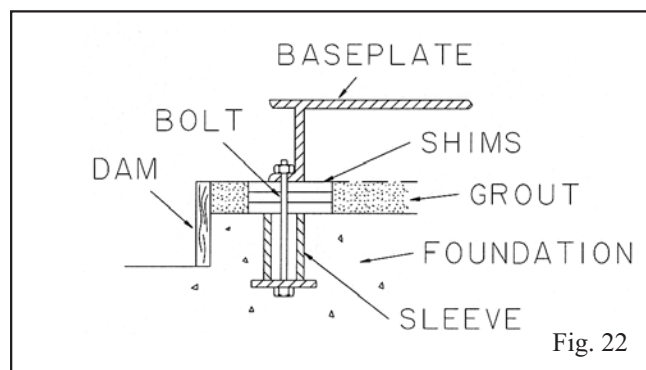
ALIGNMENT TROUBLESHOOTING

Table 3		
Alignment Troubleshooting		
PROBLEM	PROBABLE CAUSE	REMEDY
Cannot obtain horizontal (Side-to-Side) alignment, angular or parallel.	Driver feet bolt bound.	Loosen pump hold down bolts and slide pump and driver until horizontal alignment is achieved.
Cannot obtain vertical (Top to Bottom) alignment, angular or parallel.	Baseplate not leveled properly, probably bowed.	Determine if center of baseplate should be raised or lowered and correct by evenly adding or removing shims at the center of the baseplate.

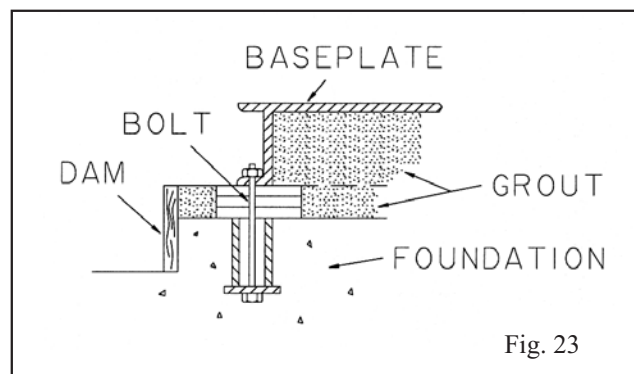
NOTE: With experience, the installer will understand the interaction between angular and parallel and will make corrections appropriately.

GROUT BASEPLATE

1. Clean areas of baseplate that will contact grout. Do not use an oil-based cleaner because grout will not bond to it.
2. Build a dam around foundation (Fig. 22). Thoroughly wet foundation.
3. Pour grout through grout hole in baseplate up to level of dam. Remove air bubbles from grout as it is poured by puddling, using a vibrator, or pumping the grout into place. Non-shrink grout is recommended (Fig. 22).



4. Allow grout to set.
5. Fill remainder of baseplate with grout. Remove air as before (Fig. 23).



6. Allow grout to set at least 48 hours.
7. Tighten foundation bolts.

ALIGNMENT CHECK

Re-check alignment before continuing, using methods previously described.

PIPING

Guidelines for piping are given in the Centrifugal Pump section of the “Hydraulic Institute Standards” and should be reviewed prior to pump installation.



WARNING

Never draw piping into place by forcing at the flanged connections of the pump. This will impose dangerous strains on the unit and cause misalignment between pump and driver. Pipe strain can adversely effect the operation of the pump. That could result in serious personal injury and damage to equipment.



Flange loads from the piping system, including those from thermal expansion of the piping, must not exceed the limits of the pump. Casing deformation can result in contact with rotating parts and result in excess heat generation, sparks and premature failure.

1. All piping must be supported independently and must line up naturally with the pump flanges.
2. Piping runs shall be designed to minimize friction losses.
3. DO NOT make final connection of piping to pump until grout has hardened and pump and driver hold-down bolts have been tightened.
4. It is suggested that expansion loops or joints, if used, be properly installed in suction and/or discharge lines when handling liquids at elevated temperatures, so linear expansion of piping will not draw pump out of alignment (Fig. 24 & 25).

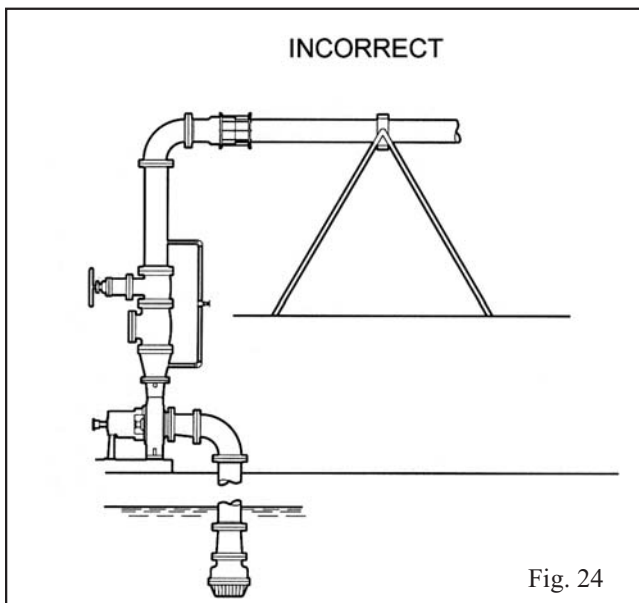


Fig. 24

CORRECT

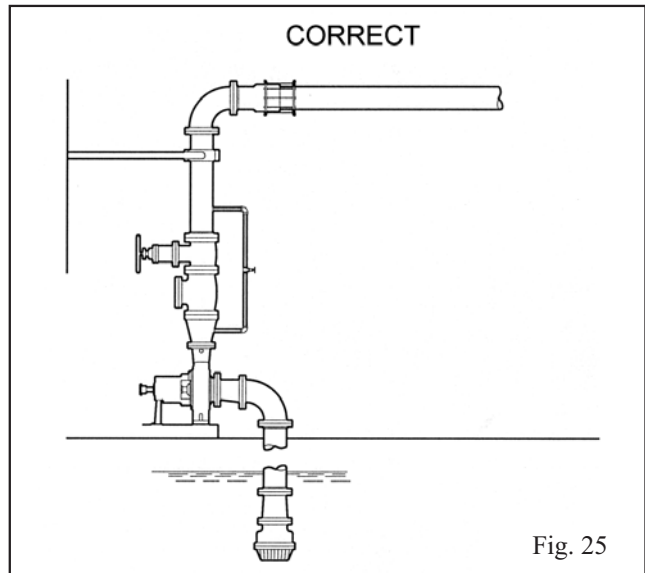


Fig. 25

5. The piping should be arranged to allow pump flushing prior to removal of the unit on services handling corrosive liquids.
6. System should be thoroughly cleaned prior to installation.

SUCTION PIPING

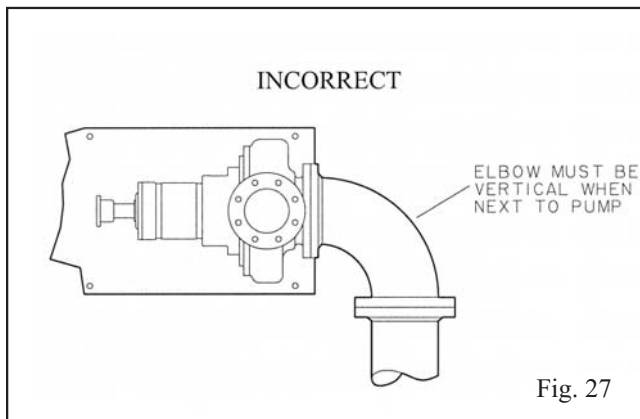
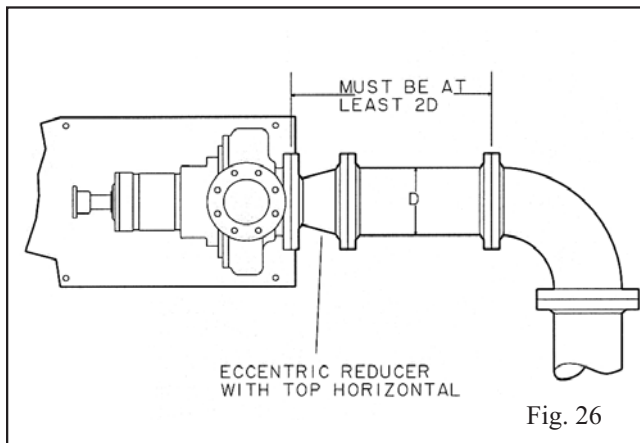


WARNING

$NPSH_A$ must always exceed $NPSH_R$ as shown on Goulds performance curves received with order. Reference Hydraulic Institute for $NPSH$ and pipe friction values needed to evaluate suction piping.

Properly installed suction piping is a necessity for trouble free pump operation. Suction piping should be flushed **BEFORE** connection to the pump.

1. Use of elbows close to the pump suction flange should be avoided. There should be a minimum of 2 pipe diameters of straight pipe between the elbow and suction inlet. Where used, elbows should be long radius (Fig. 26)



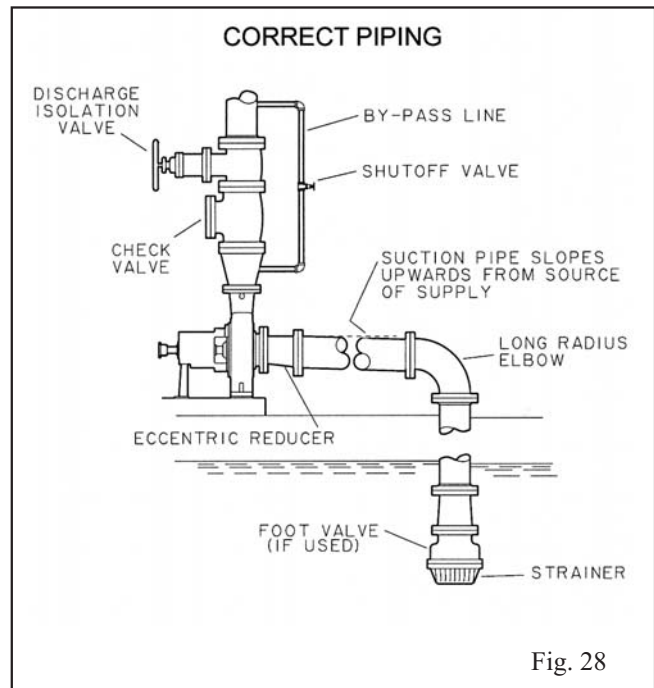
2. Use suction pipe one or two sizes larger than the pump suction, with a reducer at the suction flange. **Suction piping should never be of smaller diameter than the pump suction.**
3. Reducers should be eccentric at the pump suction flange with sloping side down and horizontal side at the top (Figs. 26, 27, 28).



CAUTION

Pump must never be throttled on suction side.

4. Suction strainers, when used, must have a net "free area" of at least three times the suction pipe area.
5. Separate suction lines are recommended when more than one pump is operating from the same source of supply.

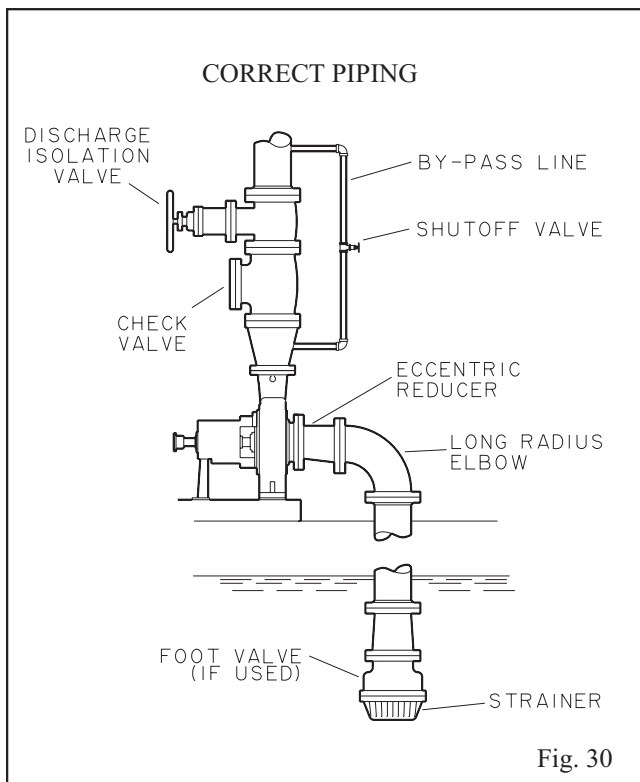
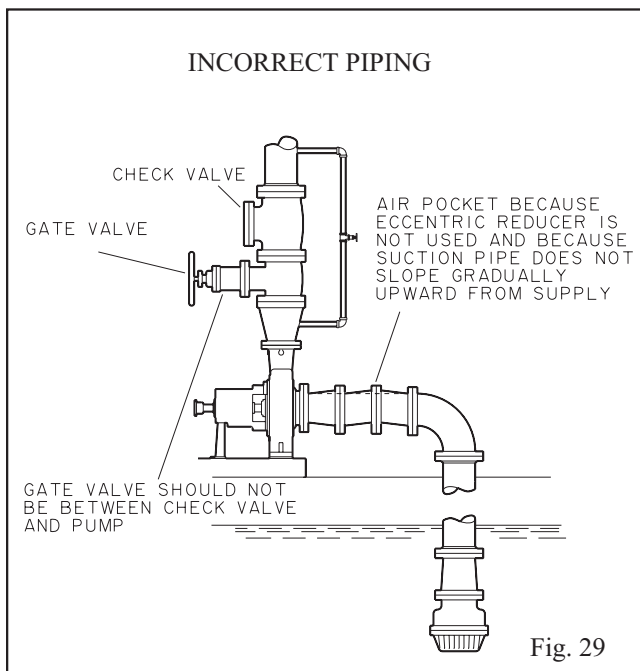


Suction Lift Conditions

1. Suction pipe must be free from air pockets
2. Suction piping must slope upwards to pump.
3. All joints must be air tight.
4. A means of priming the pump must be provided, such as a foot valve, except for the self priming pump.

Suction Head/Flooded Suction Conditions

1. An isolation valve should be installed in the suction line at least two pipe diameters from the suction to permit closing of the line for pump inspection and maintenance.
2. Keep suction pipe free from air pockets.
3. Piping should be level or slope gradually downward from the source of supply
4. No portion of the piping should extend below pump suction flange.
5. The size of entrance from supply should be one or two sizes larger than the suction pipe.
6. The suction pipe must be adequately submerged below the liquid surface to prevent vortices and air entrainment at the supply.



DISCHARGE PIPING

1. Isolation and check valves should be installed in discharge line. Locate the check valve between isolation valve and pump, this will permit inspection of the check valve. The isolation valve is required for priming, regulation of flow, and for inspection and maintenance of pump. The check valve prevents pump or seal damage due to reverse flow through the pump when the driver is turned off.
2. Increasesers, if used, should be placed between pump and check valves.
3. Cushioning devices should be used to protect the pump from surges and water hammer, if quick-closing valves are installed in system.

FINAL PIPING CHECK

After Connecting Piping to the Pump



Rotate shaft by hand to ensure it rotates smoothly and there is no rubbing which could lead to excess heat generation and or sparks.

1. Rotate shaft several times by hand to be sure that there is no binding and all parts are free.
2. Check alignment, per the alignment procedure outlined previously to determine absence of pipe strain. If pipe strain exists, correct piping.



A build up of gases within the pump, sealing system and or process piping system may result in an explosive environment within the pump or process piping system. Ensure process piping system, pump and sealing system are properly vented prior to operation.

OPERATION

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PREPARATION FOR START-UP



When installing in a potentially explosive environment, please ensure that the motor is properly certified.

CHECKING ROTATION - FRAME MOUNTED



CAUTION

Serious damage may result if pump is run in the wrong rotation.

1. Lock out power to driver.



WARNING

Lock out driver power to prevent accidental start-up that could result in serious personal injury.

2. Make sure coupling spacer is removed and coupling hubs are fastened tightly to the shafts and are not loose.

NOTE: Pump is shipped with coupling spacer removed.

3. Unlock driver power.

4. Make sure everyone is clear. Jog driver just long enough to determine direction of rotation. Rotation must correspond to arrow on bearing frame.
5. Lock out power to driver.

COUPLE PUMP AND DRIVER



WARNING

Lock out driver power to prevent accidental start-up that could result in serious personal injury.

Lubricate coupling per manufacturer's instructions and install coupling spacer.

INSTALL COUPLING GUARD

Install coupling guard as defined in the appendix.



WARNING

Never operate a pump without a coupling guard properly installed. Operating pump without a properly installed coupling guard can result in serious personal injury.

CHECKING ROTATION - CLOSE COUPLED



CAUTION

Serious damage may result if pump is run in the wrong rotation.

1. Unlock driver power.
2. Make sure everyone is clear. Jog driver just long enough to determine direction of rotation. Rotation of motor fan must correspond to arrow on close coupled frame.

LUBRICATING BEARINGS



Bearings must be lubricated properly in order to prevent excess heat generation, sparks, and premature failure.

Flood Oil Lubrication - Pumps are shipped without oil. Fill bearing frame with oil through filler connection until oil level reaches center of sight-glass (Fig. 31). A high quality turbine type oil with rust and oxidation inhibitors should be used as specified in *Table 6*.

Close Coupled Pumps - Pump does not have ball bearings. Consult motor instruction book for required lubrication.



WARNING

Operation of the unit without proper lubrication will cause bearing failure and pump seizure.

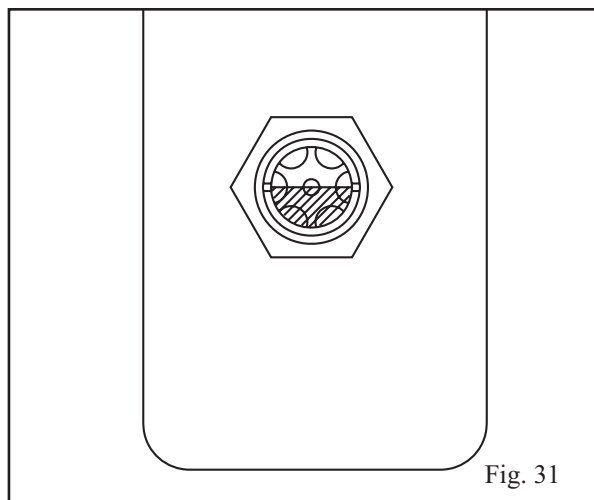


Fig. 31

CONNECT CONDITION MONITORING DEVICES

If unit is equipped with power monitoring systems, this must be connected.

PRIMING PUMP

Never start pump until properly primed (pump casing and suction piping are full of liquid). Components such as internal sleeve bearings depend on liquid for lubrication and will quickly fail if run dry.

Your particular system conditions will dictate method used to prime pump.

STARTING PUMP

1. Make sure suction valve and any recirculation or cooling lines are open.
2. Fully close or partially open discharge valve as dictated by system conditions.
3. Start driver.



CAUTION

Immediately observe pressure gauges. If discharge pressure is not quickly attained, stop driver, reprime and attempt to restart.

4. Slowly open discharge valve until the desired flow is obtained.



CAUTION

Continuous operation against closed discharge valve will cause pump to overheat. Overheating the magnetic drive assembly will weaken or ruin the magnets.



WARNING

Continuous operation against closed discharge valve may vaporize liquid creating an explosive hazard due to confined vapor under high pressure and temperature.

OPERATION

GENERAL CONSIDERATIONS

Always vary capacity with valve in discharge line. *NEVER* throttle flow from suction side.

Driver may overload or magnets de-couple if pumpage specific gravity (density) is greater than originally assumed, or rated flow rate is exceeded.

Always operate the pump at or near the rated conditions to prevent damage resulting from cavitation or recirculation.



CAUTION

Do not operate above rated temperature range of magnets as this will weaken or ruin the magnets.



Service temperature in an ATEX classified environment is limited by Table 1 in the Safety section.

**Table 4
Temperature Ratings**

Group	Size	Rated Temperature
XS	1x1.5-5	250° F (121° C)
S	All	250° F (121° C)
M	All	250° F (121° C)
L	All	250° F (121° C)

OPERATING AT REDUCED CAPACITY



WARNING

Do NOT operate pump below minimum rated flows or with discharge valve closed. These conditions may vaporize liquid creating an explosive hazard due to confined vapor under high pressure and temperature.

SUCTION VALVE CLOSED / DRY RUN OPERATION



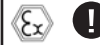
WARNING

Do not operate pump with suction valve closed. Operating pump after suction valve closed will cause wear of thrust and radial bearings and pump failure. Operating pump with suction valve closed may vaporize liquid creating an explosive hazard due to confined vapor under high pressure and temperature.



CAUTION

Always vary capacity with regulating valve in the discharge line. NEVER throttle flow from the suction side.



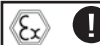
CAUTION

Driver may overload if the pumpage specific gravity (density) is greater than originally assumed, or the rated flow rate is exceeded.



CAUTION

Always operate the pump at or near the rated conditions to prevent damage resulting from cavitation or recirculation.



CAUTION

Damage occurs from:

1. Increased vibration levels - Affects bearings.
2. Increased radial loads - Stresses on shaft and bearings.
3. Heat build up - Vaporization causing rotating parts to score or seize.
4. Cavitation - Damage to internal surfaces of pump.

Goulds recommends the use of a power monitor to prevent pump damage from systems which have the potential for dry run operation. Refer to Appendix for information on power monitors.

DRAINING TANKS / DRY RUN OPERATION



WARNING

After pump has drained tank, it should be shut down immediately. Operating pump after the tank has been drained of liquid will cause wear of thrust and radial bearings and pump failure. Operating pump after tank has been drained of liquid may vaporize liquid creating an explosive hazard due to confined vapor under high pressure and temperature.

Goulds recommends the use of a power monitor to prevent pump damage from systems which have the potential for dry run operation.

DISCHARGE VALVE CLOSED



WARNING

Do not operate pump with discharge valve closed. Operating pump with a closed discharge valve may vaporize liquid creating an explosive hazard due to confined vapor under high pressure and temperature.

Goulds recommends the use of a power monitor and/or a minimum flow by-pass line to prevent pump damage from systems which have the potential for closed discharge operation.

OPERATING UNDER FREEZING CONDITIONS

Exposure to freezing conditions, while pump is idle, could cause liquid to freeze and damage the pump. Liquid inside pump should be drained. Liquid inside cooling coils, if supplied, should also be drained.

3298 Minimum Continuous Recommended Flow

Table 5 - Minimum Flow ¹							
Group	Pump Size	60 Hertz			50 Hertz		
		GPM			m3/hr		
		3600	1800	1200	3000	1500	1000
3298							
XS	1 x 1 - 5	1	0.5	—	0.2	0.1	—
	1½ x 2 - 6	5	3	—	1	0.5	—
S	1 x 1 - 6	5	3	2	2	1	0.5
	1 x 1 - 8	15	8	4	3	2	1
	1½ x 3 - 7	20	10	6	5	2	1
	2 x 3 - 6	30	15	8	6	3	1
M	1½ x 3 - 8	30	15	8	6	3	1
	2 x 3 - 8	50	9	5	9	2	1
	3 x 4 - 7	80	13	9	18	9	6
	1 x 2 - 10	30	5	3	5	3	2
L	1½ x 3 - 10	60	30	20	11	5	4
	2 x 3 - 10	100	50	33	19	10	6
	3 x 4 - 10G	175	90	60	33	16	11
	3 x 4 - 10H	—	90	30	—	17	3
	4 x 6 - 10	—	⁽⁵⁾ 475	⁽⁵⁾ 325	—	⁽⁵⁾ 95	⁽⁵⁾ 55
SP 3298							
S	1 x 1½ - 6	5	3	2	2	1	0.5
	2 x 3 - 6	30	15	8	6	3	1
V 3298							
S	1½ x 2 - 6	5	3	2	2	1	0.5
	1½ 2 - 8	60	30	20	11	7	4
	2 x 3 - 6	60	30	20	11	7	4
M	1½ x 2 - 10	30	5	3	5	0.7	0.5

NOTES:

1. All flows are continuous operation 24 hours/day - 7 days/week.
2. Based on water with a specific gravity of 1.0 and specific heat of 1.0
3. Pumps can be operated reliably at lower minimum flows under intermittent operating conditions. Contact Goulds Pumps. Intermittent Operation = operating under these conditions less than 15% of the time.
4. Contact factory for pump efficiency at minimum flows.
5. Can be operated at substantially lower flows with adequate NPSH margin. Contact Goulds for details.

SHUTDOWN

1. Slowly close discharge valve.
2. Shut down and lock out driver to prevent accidental rotation.



WARNING

When handling hazardous and/or toxic fluids, skin, eye and respiratory protection are required. If pump is being drained, precautions must be taken to prevent injury or environmental contamination. Pumpage must be handled and disposed of in conformance with applicable environmental regulations.

FINAL ALIGNMENT



Alignment procedures must be followed to prevent unintended contact of rotating parts. Follow coupling manufacturer's coupling installation and operation procedures.

1. Run the unit under actual operating conditions for a sufficient length of time to bring the pump and driver up to operating temperature.
2. Check and reset alignment per alignment procedure outlined earlier.
3. Reinstall coupling guard per instruction in appendix.

PREVENTIVE MAINTENANCE

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MAINTENANCE SCHEDULE	33
MAINTENANCE OF BEARINGS — Frame Mounted	34
TROUBLESHOOTING	35

GENERAL COMMENTS

A routine maintenance program can extend the life of your pump. Well maintained equipment will last longer and require fewer repairs. It is recommended that maintenance records be kept to help pinpoint potential causes of problems.



The preventive maintenance section must be adhered to in order to keep the applicable ATEX classification of the equipment. Failure to follow these procedures will void the ATEX classification for the equipment.

5

MAINTENANCE SCHEDULE

ROUTINE MAINTENANCE

- Bearing lubrication (frame mounted pumps)
- Vibration analysis
- Discharge pressure

ROUTINE INSPECTIONS

- Check level and condition of oil through sight glass on bearing frame. (frame mounted Pumps)
- Check for unusual noise, vibration, and bearing temperatures.
- Inspect pump and piping for leaks.

3 MONTH MAINTENANCE

- Check foundation hold down bolts of motor and pump for tightness.
- Change oil per (frame mounted pumps) per guidelines on following page.
- Check alignment per section 3.

YEARLY INSPECTIONS

- Check pump capacity, pressure, and power. If the pump performance does not satisfy your process requirements, the pump should be disassembled and inspected. Worn parts should be replaced.

INSPECTION INTERVALS

Inspection intervals should be shortened appropriately if the pumpage is abrasive and/or corrosive,



or if the environment is classified as potentially explosive.

MAINTENANCE OF BEARINGS—FRAME MOUNTED

STANDARD CLOSE COUPLED PUMP

Many 3298s, SP 3298s, and V 3298s are close coupled mounted as standard. Close coupled pumps do not have bearings which require lubrication.



Throughout this section on bearing lubrication, different pumpage temperatures are listed. If the equipment is ATEX certified and the listed temperature exceeds the applicable value shown in Table 1 under Safety, then that temperature is not valid. When this situation occurs, please consult with your ITT/Goulds representative.

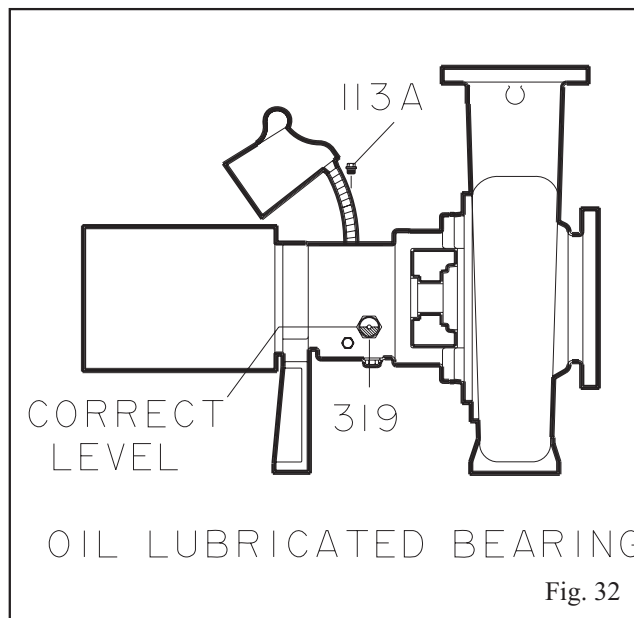
OIL LUBRICATED BEARINGS



WARNING

Pumps are shipped without oil. Oil lubricated bearings must be lubricated at the job site.

Remove fill plug (113A) and add oil until level is at the center of the sight glass (319). Replace fill plug (Fig. 32) (See Table 6).



OIL LUBRICATED BEARINGS

Frame mounted 3298s and SP 3298s do have bearings which require lubrication. Oil level is measured through the sight glass. Oil level must not fall below center of site glass. An increase in level may be noted after start up due to oil circulation within the bearing frame. Change oil after 200 hours for new bearings, thereafter, every 4000 operating hours or 6 months, whichever period is shorter.

Table 6
Bearing Frame Lubrication Requirement

ISO Grade	VG 68	
Approximate SSU 100°F (38°C)	300	
DIN 51517	C68	
Kinematic Viscosity at 40°C (105°F) (mm ² /sec)	68	
Acceptable	Exxon	NUTO H68
	Chevron	GTS Oil 68
	Mobil	DTE 26
	Gulf	Harmony
	Shell	Tellus Oil 68
	Phillips	Mangus Oil 315
	Phillips	MM SAE 20-20W
	Phillips	HDS SAE 20-20W

NOTE: This is a list of oils that meet the lubrication requirements of this pump. It is not intended to be an endorsement of products listed nor exclude other oils that meet these requirements.

TROUBLESHOOTING

Table 7
Troubleshooting Pump

Problem / Malfunction	Probable Cause	Remedy	
No liquid delivered	Pump not primed.	3298-V 3298	Reprime pump, check that pump and suction line are full of liquid.
		SP 3298	Add initial charge to casing.
			Suction lift greater than maximum allowable - raise sump level.
	Suction line clogged.	Check suction line pressure. If low, locate and remove obstructions.	
	Impeller clogged with foreign material.	Disassemble and remove blockage.	
	Magnet de-coupling.	Shut down. Check temperature and viscosity of pumpage.	
Pump not producing rated flow or head	Air leak in suction line.	Check for leakage and correct.	
	Impeller partly clogged.	Back flush pump to clean impeller.	
	Worn impeller rings.	Replace defective part as required.	
	Insufficient suction head.	Ensure that suction line shutoff valve is fully open and line is unobstructed. Check suction pressure.	
	Worn or broken impeller.	Inspect and replace if necessary.	
	Wrong Rotation.	Correct Wiring.	
Pump starts then stops pumping	Improperly primed pump.	Reprime pump.	
	Air leak in suction line.	Check for leakage and correct.	
	Magnet de-coupling.	Shut down. Check temperature and viscosity of pumpage.	
	Air or vapor pockets in suction line.	Rearrange piping as necessary, to eliminate air pockets.	
Bearings run hot	Improper lubrication.	Check lubricant for suitability and level.	
	Lube cooling.	Check cooling system.	
	Improper alignment.	Check pump alignment.	
Pump is noisy or vibrates	Improper pump / driver alignment.	Align shafts.	
	Partly clogged impeller causing imbalance.	Disassemble and remove blockage.	
	Broken or bent impeller or shaft.	Replace as required.	
	Base not rigid enough.	Tighten hold down bolts of pump and motor or adjust stilts. Check grout.	
	Suction or discharge piping not anchored or properly supported.	Anchor per Hydraulic Institute Standards recommendations (Edition 14, centrifugal pump section).	
	Pump is cavitating.	Increase NPSH available.	

TROUBLESHOOTING, con't

Table 7
Troubleshooting Pump

Problem / Malfunction	Probable Cause	Remedy
Motor requires excessive power	Head lower than rating. Pumps too much liquid.	Intall throttle valve.
	Liquid heavier than expected.	Check specific gravity and viscosity.
	Head higher than rating, capacity at rating.	Check impeller diameter.
	Rotating parts binding or severely worn.	Check internal wearing parts for proper clearances.
	Wrong Rotation.	Correct wiring.
Condition monitoring device shuts down pump	Damaged sleeve & thrust bearings.	Replace as required.
	Plugged recirculation circuit.	Disassemble and remove blockage. Determine and correct cause of blockage.
	Recirculation liquid vaporization.	Check actual liquid temperature versus design temperature. Check actual NPSH available versus design. Check minimum flow requirement for pump size. Correct all as necessary.
	Damaged containment shell.	Replace as required.
	Magnets decoupled.	Check temperature and viscosity of pumpage.
	Pump run dry.	Check control device for proper operation. Check suction line for blockage. Reprime pump.
	Excessive motor power.	System head lower than rating. Pumps too much liquid. Check rotating parts for binding and wear. Liquid heavier than expected.

Table 7A

Failure Symptoms Due to Dry Run Operation

Poor lubrication or dry run operation of 3298 liquid lubricated bearing surfaces results in a significant increase of heat generation. The lack of cooling flow through the pump also causes significant temperature increase of the bearings. This temperature increase causes damage to the surrounding parts as described and shown in Fig. 33: (Numbers in Fig. 33 correspond to numbers described below).

1. The plastic surrounding the outboard thrust bearing may be melted.
2. The plastic surrounding the carbon or silicon carbide impeller radial bearings may be melted.
3. The plastic surrounding the inboard thrust bearings may be melted.
4. If the impeller seizes on the shaft due to excessive heat, the shaft may spin in the shaft spider, wearing the inside diameter of the shaft spider.

REMEDY

- A. Install dry run protection device like a power monitor (refer to appendix for more information on power monitors)
- B. Modify process system or controls to eliminate dry run operation.
- C. Change bearing material to DryGuard™ coated silicon carbide if silicon carbide bearings were initially installed in the pump.

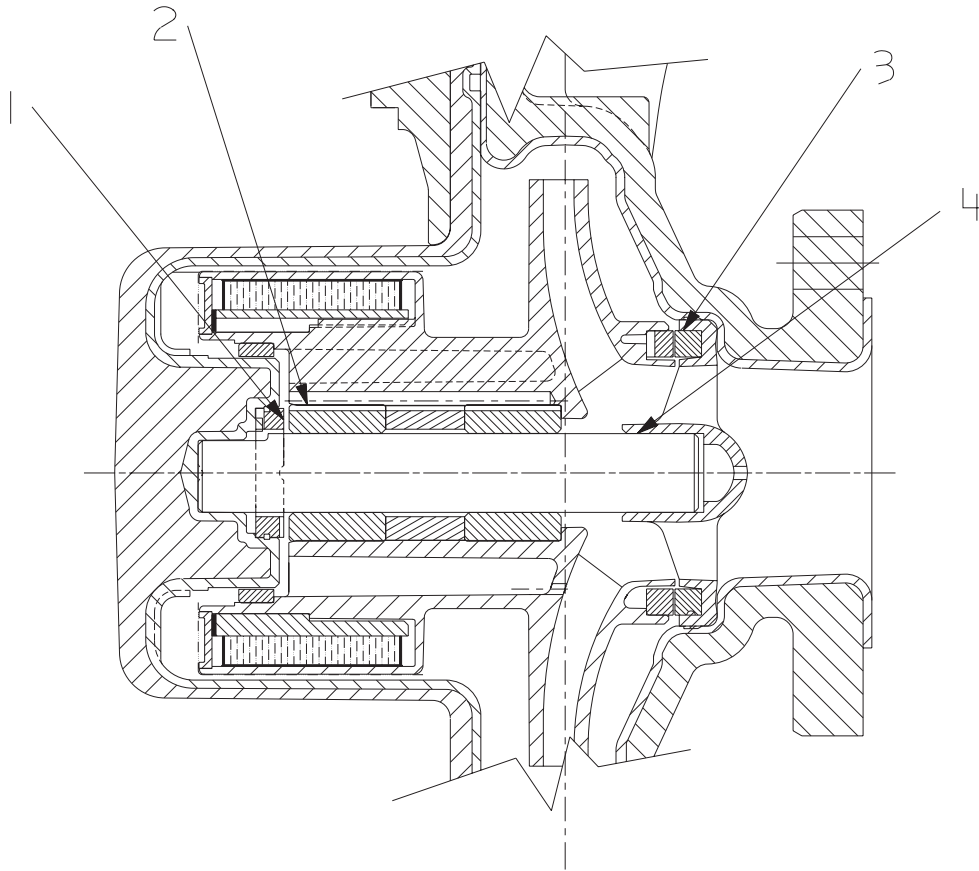


Fig. 33

DISASSEMBLY & REASSEMBLY

REQUIRED TOOLS	39
PREPARATION FOR DISASSEMBLY	47
DISASSEMBLY	
3298 XS Group	48
3298 S Group	50
3298 M Group	53
3298 L Group	56
SP 3298	59
V 3298	62
INSPECTIONS	64
REASSEMBLY	
3298 XS Group	66
3298 S Group	69
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3298 L Group	78
SP 3298	84
V 3298	89
SECTIONALS, PARTS LIST, MATERIALS OF CONSTRUCTION	92-112

REQUIRED TOOLS



WARNING

This pump contains extremely strong magnets. The use of non-magnetic tools and work surface are required.

Non-Magnetic Tools

- 9/16", 3/4" Socket wrench
- Non-metallic hammer

Tools

NOTE: Keep magnetic tools away from magnets.

- Long T-handle Allen wrench - 3/16"
- 1/2", 9/16", 3/4" sockets
- Socket wrench with minimum 4" extension
- Screw drivers
- Lip seal driver
- Hammer

- 5/16" x 2" Hex Cap Screws (Qty = 3)
- 5/8" x 4" Hex Cap Screws (Qty = 3)

Tool Kits

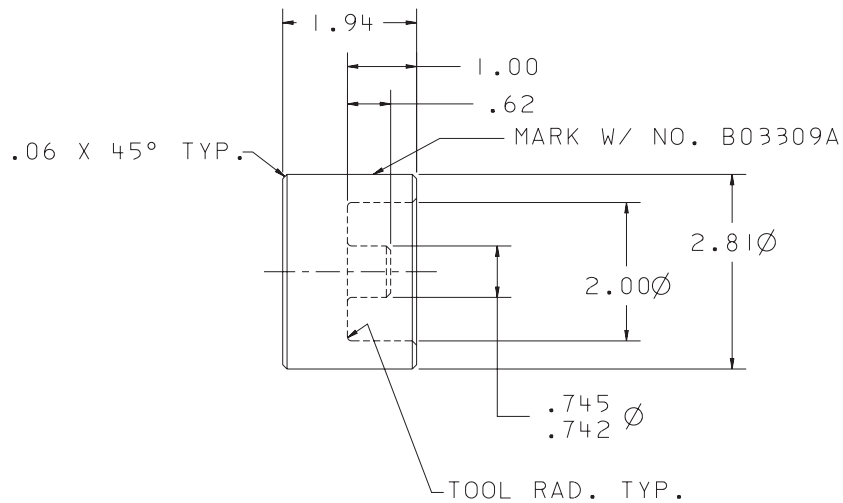
Tool kits have been created to insure easy assembly and disassembly of 3298's. Goulds recommends the use of these kits by our customers

Table 8	
3298 Tool Kit	
XS	R298TK04
X	R298TK01
M	R298TK02
L	R298TK03

OPTIONAL TOOLS

Optional Tool Kit - #R298TK04 for XS Group

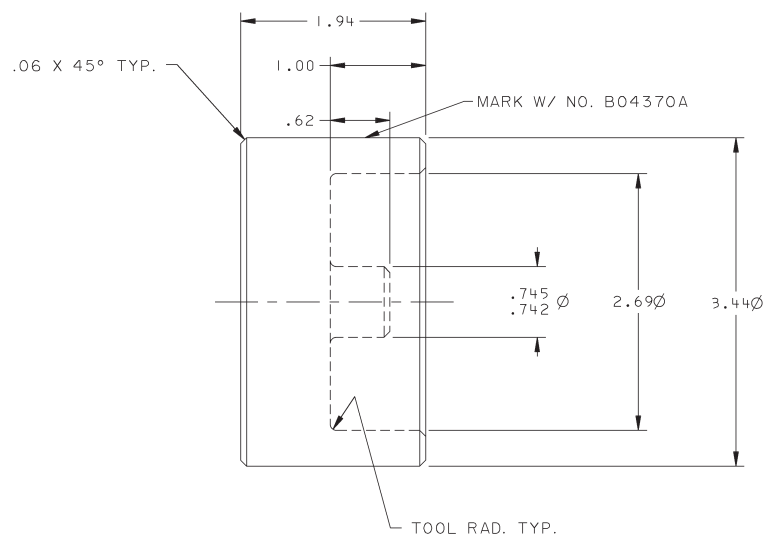
1 x 1½-5 Bearing Spider Installation Driver - Tool Number B03309A Qty. 1



MATERIAL 3 X 2 1/4 LG. - NYLON

Fig. 34

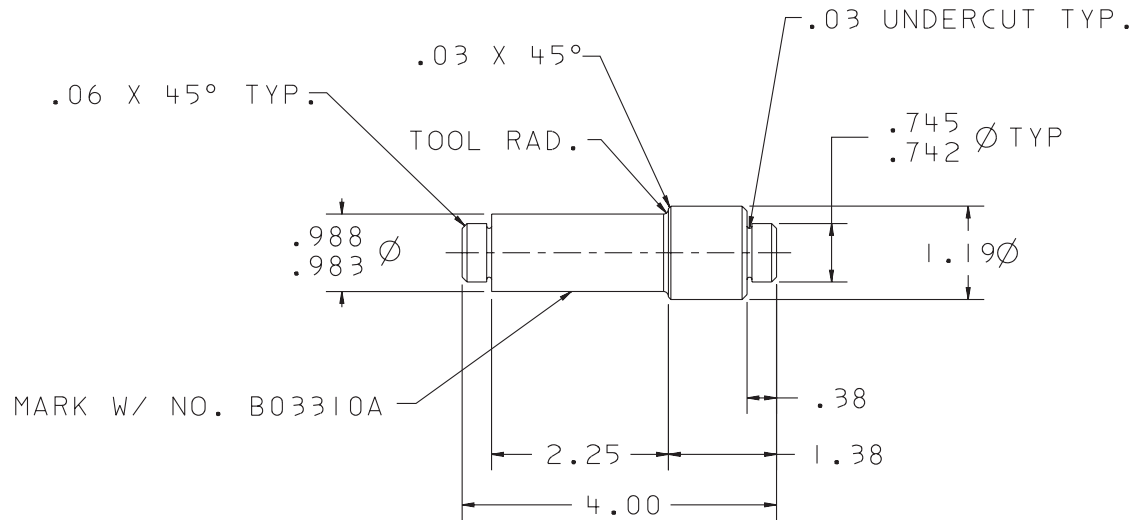
1½ x2-6 Bearing Spider Installation Driver - Tool Number B04370A Qty. 1



MATERIAL 3 1/2 X 2 1/4 LG. - NYLON

Fig. 35

Radial Bearing Installation Tool - Tool Number B03310A Qty. 1



MATERIAL 1 1/4 DIA. X 4.12 LG. - NYLON

Fig. 36

Bearing Press Support Tool - Tool Number A06872A

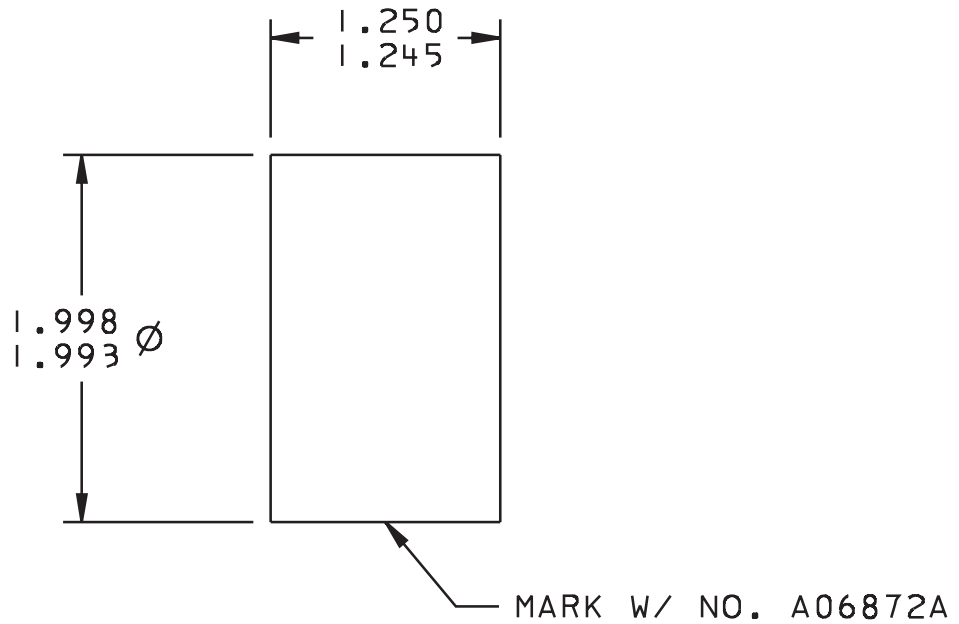


Fig. 37

Shaft Wrench - Tool Number A01676A

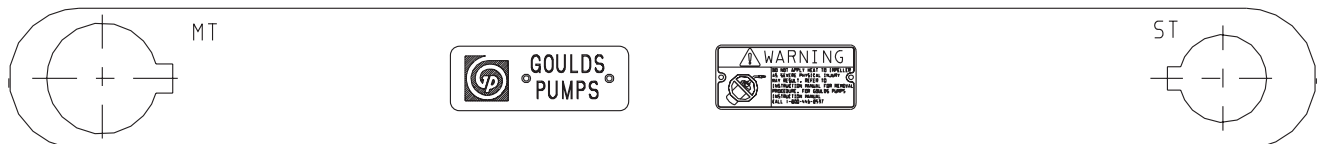
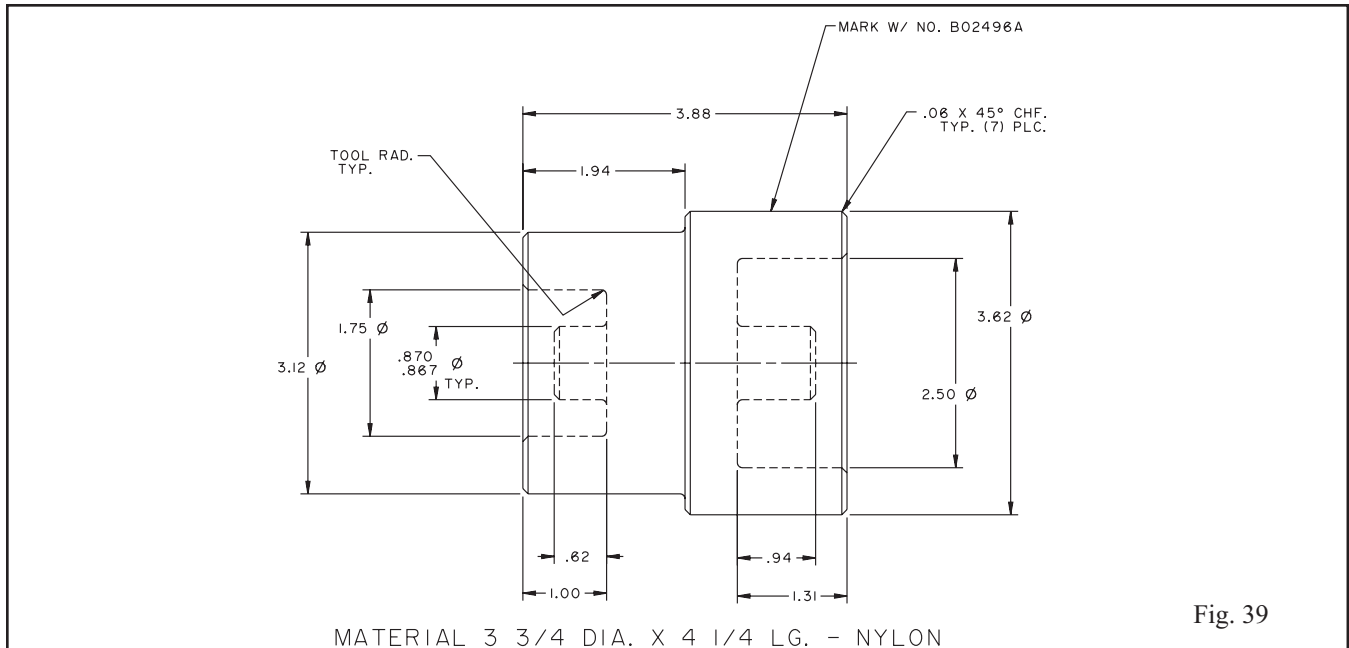


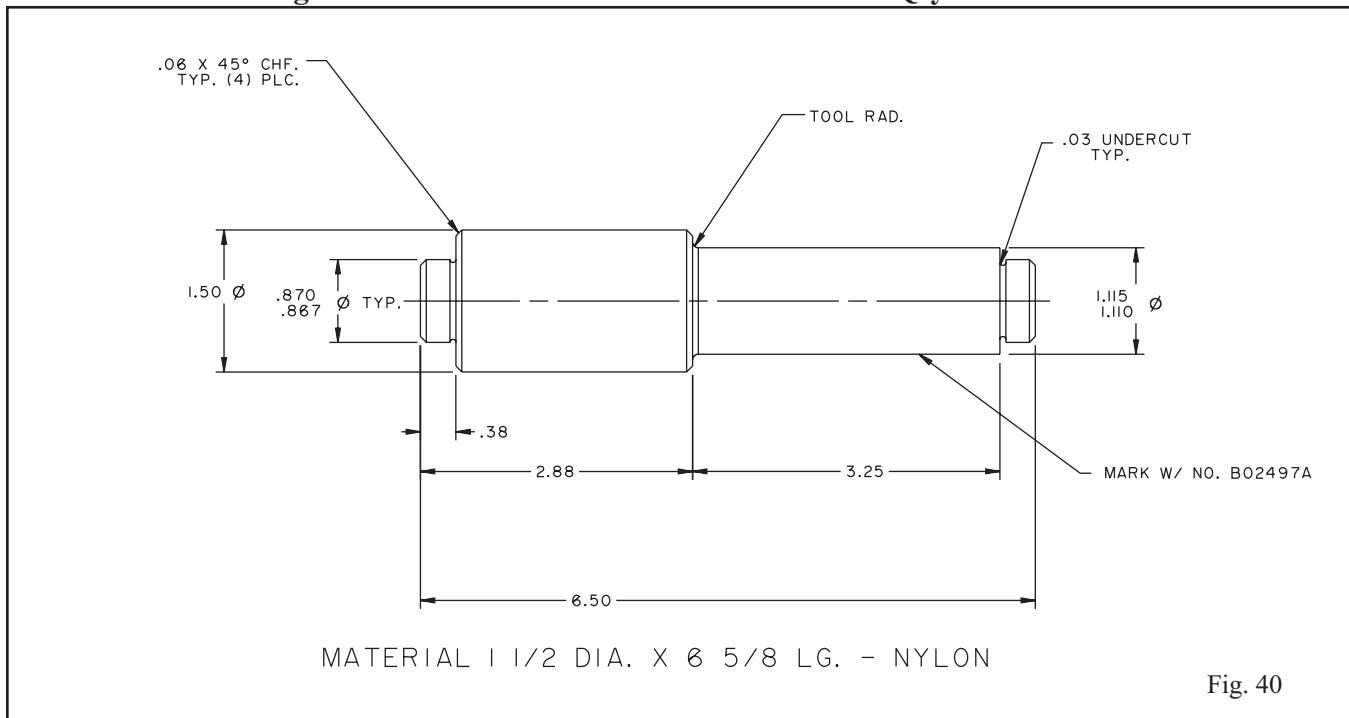
Fig. 38

OPTIONAL TOOL KIT - #R298TK01
for 3298 S Group Sizes 1 x 1½-6, 1 x 1½-8, 2 x 3-6
for SP 3298 S Group Sizes 1 x 1½-6, 2 x 3-6
for V 3298 S Group Sizes 1½ x 2-6, 1½ x 2 - 8, 2 x 3-6

Bearing Spider Installation Driver - Tool Number B02496A Qty. 1

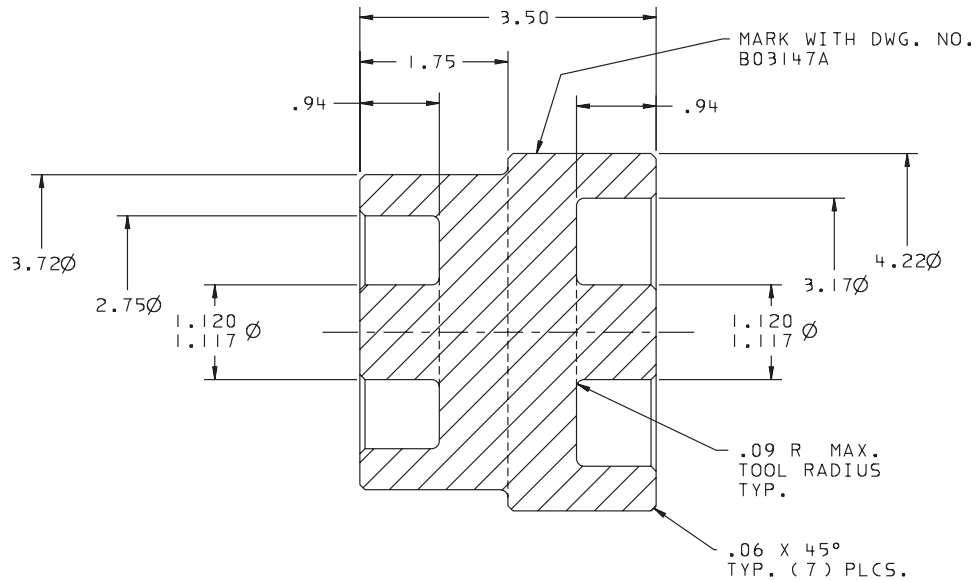


Radial Bearing Installation Tool - Tool Number B02497A Qty. 1



OPTIONAL TOOL KIT - #R298TK02 **for 3298 M Group Pump Sizes 2 x 3-8, 3 x 4-7, 1 x 2-10** **for V 3298 M Group Sizes 1½ x 2-10**

Bearing Spider Installation Driver - Tool Number B03147A, Qty 1



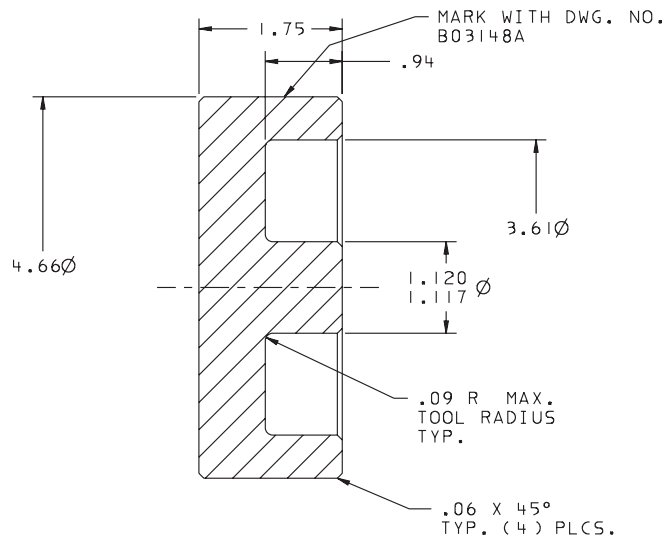
USED WITH BEARING SPIDERS:
C04488A (2X3-8)
C04489A (1X2-10)

MATERIAL 4.50Ø X 3.75 LNG. - NYLON

Fig. 41

6

Bearing Spider Installation Driver - Tool Number B03148A Qty. 1



USED WITH BEARING SPIDERS:
C04487A (3X4-7)

MATERIAL 4.88Ø X 2.00 LNG. - NYLON

Fig. 42

Radial Bearing Installation Tool - Tool Number B03149A Qty. 1

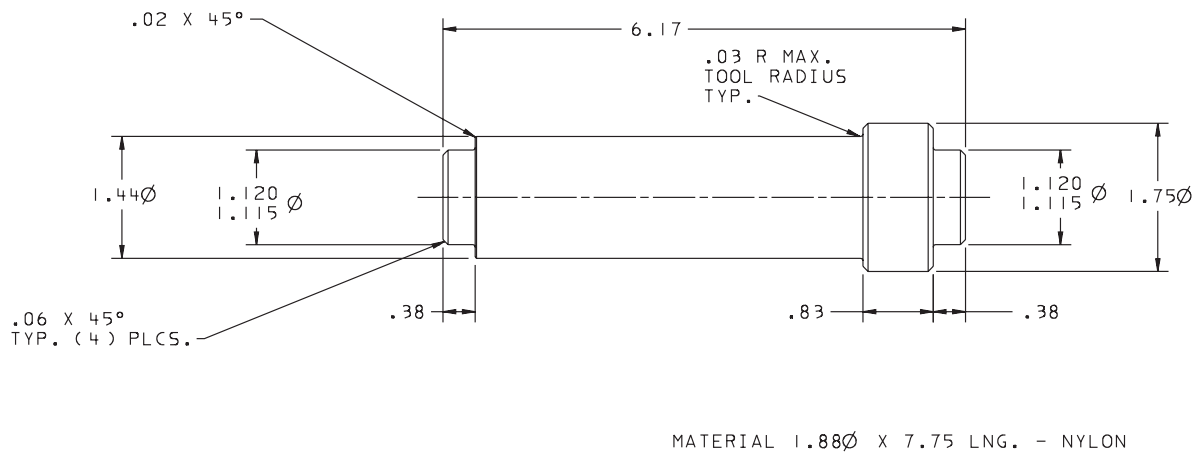


Fig. 43

Magnet Assembly/ Disassembly Guide Rods - Tool Number B03189A Qty. 2

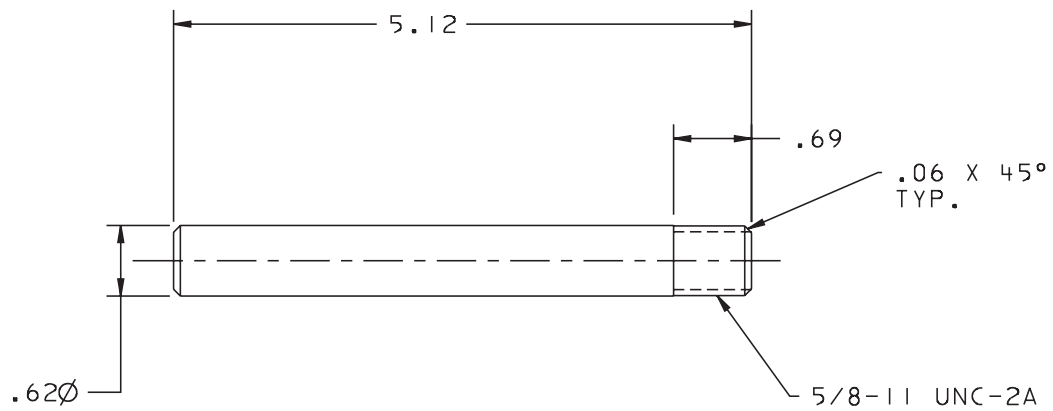
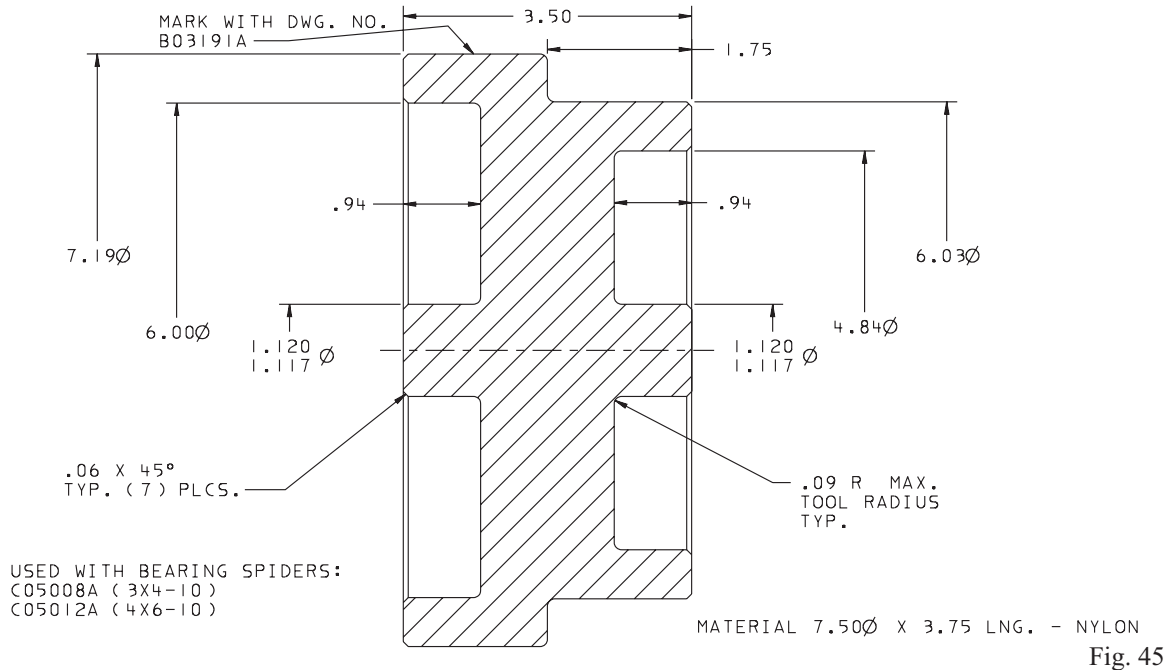


Fig. 44

OPTIONAL TOOL KIT - #R298TK03 **for L Group Pump Sizes 3 x 4-10, 4 x 6-10**

Bearing Spider Installation Driver - Tool Number B03191A Qty. 1



6

Radial Bearing Installation Tool - Tool Number B03175A Qty. 1

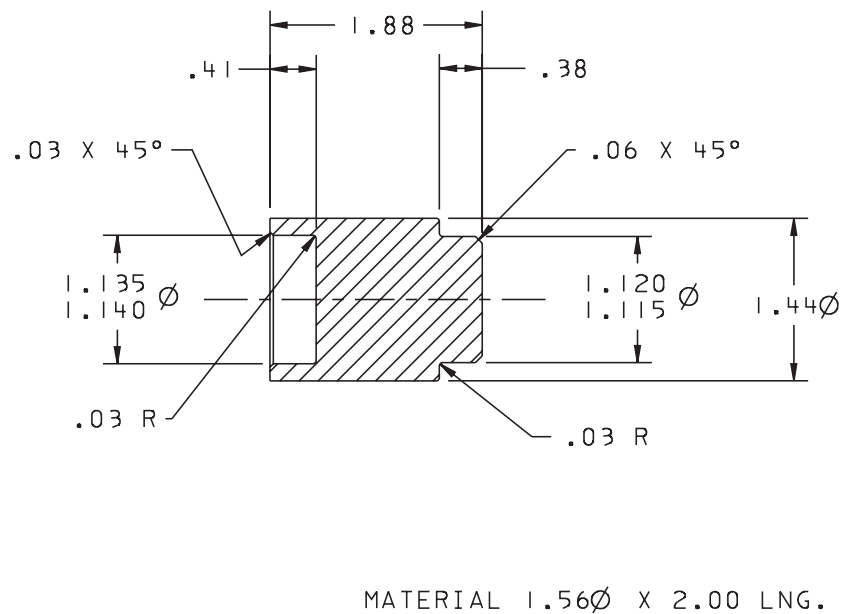


Fig. 46

Radial Bearing Installation Tool - Tool Number B03149A Qty. 1

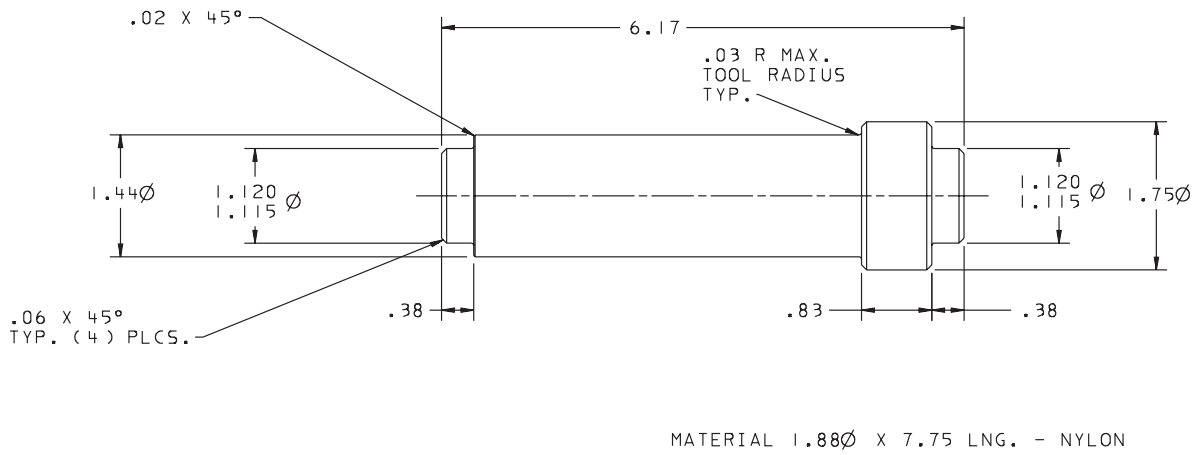


Fig. 47

Magnetic Assembly/Disassembly Guide Rods - Tool Number B03189A Qty. 2

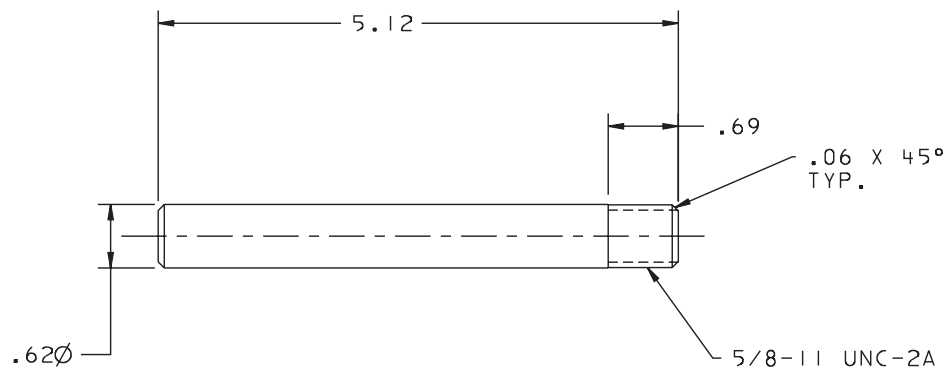


Fig. 48

PREPARATION FOR DISASSEMBLY



A build up of gases within the pump, sealing system and or process piping system may result in an explosive environment within the pump or process piping system. Ensure process piping system, pump, and sealing system are properly vented prior to operation.



WARNING

The 3298 family of pumps often handles hazardous and/or toxic fluids. Skin, eye and respiratory protection required. Precautions must be taken to prevent injury or environmental contamination. Drain and decontaminate pump in accordance with all federal, state, local, and company regulations.



Leakage of process liquid may result in creating an explosive atmosphere. Follow all pump and seal assembly procedures.

1. Lock out power to driver.
2. Shut off all valves controlling flow to and from pump.
3. The pump should be drained and flushed before it is removed from the piping. After isolating the pump from the system, flush the pump using a compatible liquid.



WARNING

Failure to properly lift and support equipment could result in serious injury or damage to pumps.



WARNING

Ensure pump is isolated from system and pressure is relieved before any plugs are removed or piping disconnected.

4. Disconnect all piping and auxiliary equipment.
5. Remove coupling guard (For frame mounted version).
6. Remove coupling (For frame mounted version).
7. Remove casing foot and frame / C-face motor support foot bolts.
8. Remove pump from baseplate.
9. Drain Oil from frame mounted pump.

DECONTAMINATION PROCEDURE

10. Connect clean flush liquid supply to discharge nozzle.
11. Devise a means of collecting flush liquid as it drains out the drain connection.
12. Flush to remove residue.

DISASSEMBLY

3298 XS GROUP DISASSEMBLY



WARNING

Each component must be individually decontaminated using procedures in accordance with all federal, state, local, and company environmental regulations.



WARNING

The magnets contained in this unit are extremely powerful. Keep magnetic drive components and magnetic tools apart from each other by a minimum of three (3) feet [one (1) meter]. Serious injury to fingers and hands will result.

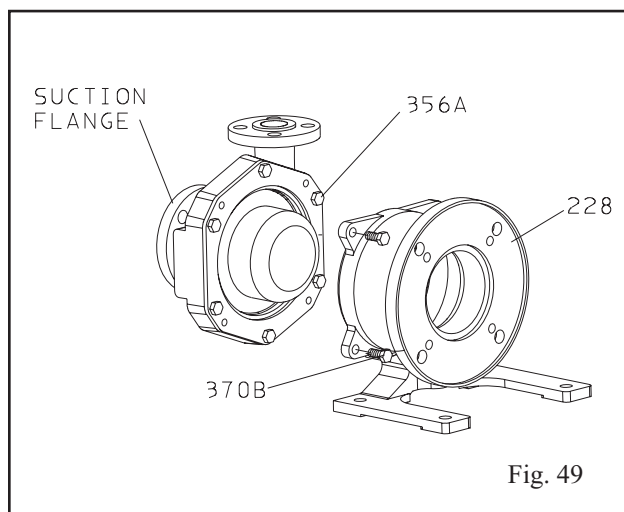
NOTE: When working on pump, use a bench with a non-magnetic work surface such as wood or brass surface.



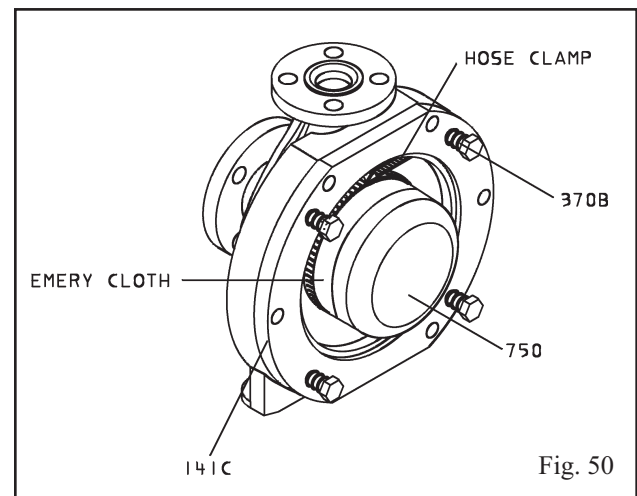
CAUTION

The shop area must be clean and free of any substances that would contaminate the magnets, ex-ferrous metals.

1. Secure the C-face motor support (228) to workbench.
2. Remove 4 bolts (370B) from the C-face motor support (228) (Fig. 49).

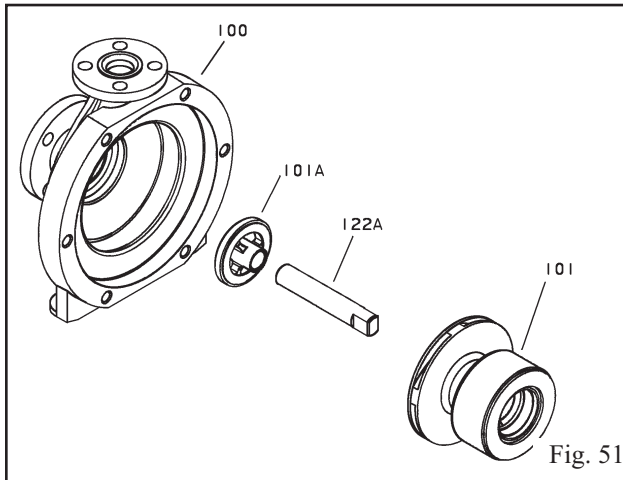


3. Grasp suction flange of casing and pull casing liquid end free from magnet assembly (Fig. 49).
4. Remove casing bolts (356A) (Fig. 49).
5. Wrap a piece of emery cloth around the containment shell (750) and secure with a large hose clamp (Fig. 50).
6. Screw C-face motor support bolts (370B) into the tapped holes of the clamp ring (141C) and tighten evenly to remove containment shell. Remove O-ring (412M) from containment shell (750) and discard.



7. Remove hose clamp and emery cloth.

8. Remove impeller assembly (101) (Fig. 51).
9. Remove shaft (122A) if replacement is necessary (Fig. 51).
10. Inspect bearing spider (101A). Press out through suction of casing (100) if replacement is necessary (Fig. 51).

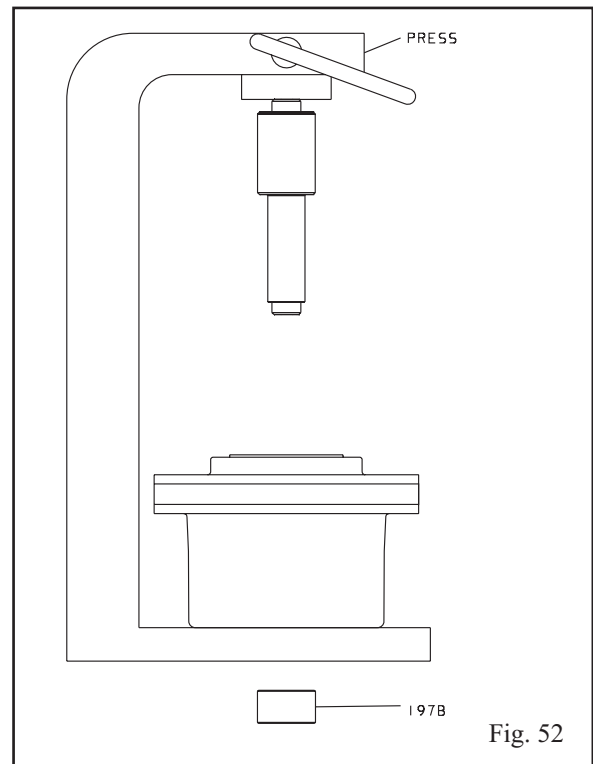


WARNING

The magnets contained in this unit are extremely powerful. Keep magnetic drive components and magnetic tools apart from each other by a minimum of three (3) feet {one (1) meter}. Serious injury to fingers and hands will result.

11. Press out radial bearing (197B) from impeller assembly (101) utilizing the bearing tool if replacement is necessary (Fig. 52).

12. When replacement of the close coupled drive magnet assembly (740B) is required, remove and discard the nylok set screws (222L). Use a puller and the 2 - 3/8" tapped holes provided to remove the magnet assembly from the motor shaft.



3298 S GROUP DISASSEMBLY



WARNING

Each component must be individually decontaminated using procedures in accordance with all federal, state, local, and company environmental regulations.



WARNING

The magnets contained in this unit are extremely powerful. Keep magnetic drive components and magnetic tools apart from each other by a minimum of three (3) feet [one (1) meter]. Serious injury to fingers and hands will result.

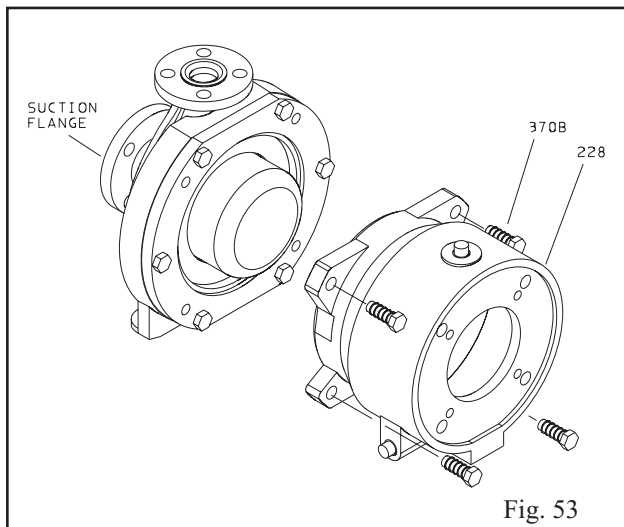
NOTE: When working on pump, use a bench with a non-magnetic work surface such as wood or brass surface.



CAUTION

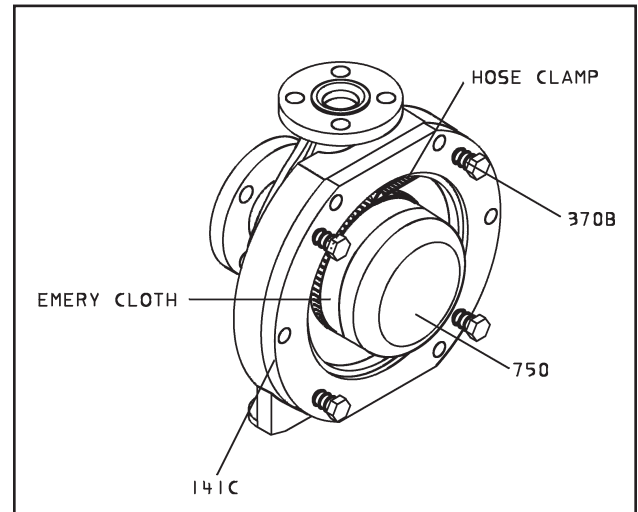
The shop area must be clean and free of any substances that would contaminate the magnets, ex. ferrous metals.

1. Secure the C-face motor support / bearing frame (228) to workbench.
2. Remove four bolts (370B) from the C-face motor support / bearing frame (228) (Fig. 53).

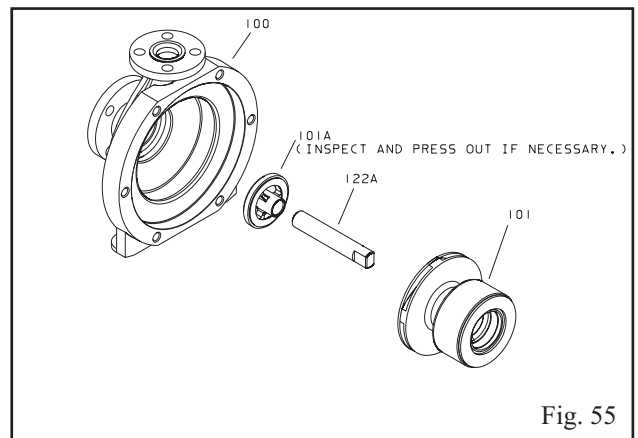


3. Grasp suction flange of casing and pull casing liquid end free from magnet assembly (Fig. 53).
4. Remove casing bolts (356A) (Fig. 53).

5. Wrap a piece of emery cloth around the containment shell (750) and secure with a large hose clamp (Fig. 54).
6. Screw C-face motor support / bearing frame bolts (370B) into the tapped holes of the clamp ring (141C) and tighten evenly to remove containment shell (750) and discard.



7. Remove hose clamp and emery cloth.
8. Remove impeller assembly (101) (Fig. 55).
9. Remove shaft (122A) if replacement is necessary (Fig. 55).
10. Inspect bearing spider (101A) and press out through suction of casing (100) if replacement is necessary (Fig. 55).

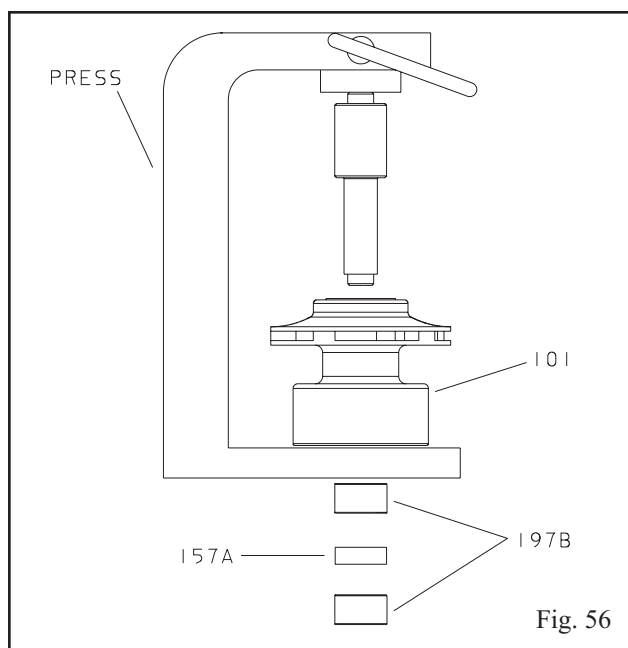




WARNING

The magnets contained in this unit are extremely powerful. Keep magnetic drive components and magnetic tools apart from each other by a minimum of three (3) feet [one (1) meter]. Serious injury to fingers and hands will result.

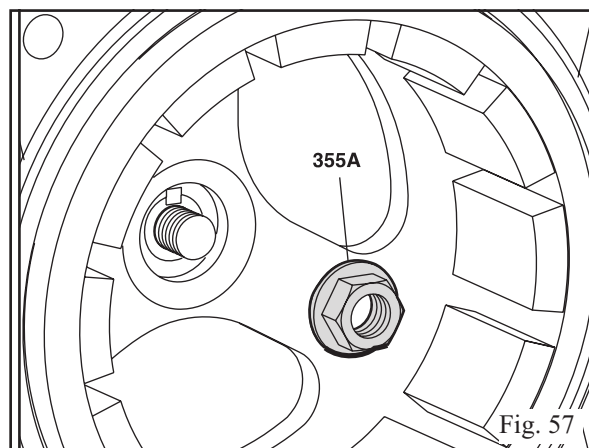
11. Press out radial bearings (197B) from impeller assembly (101) utilizing the bearing tool if replacement is necessary (Fig. 56).



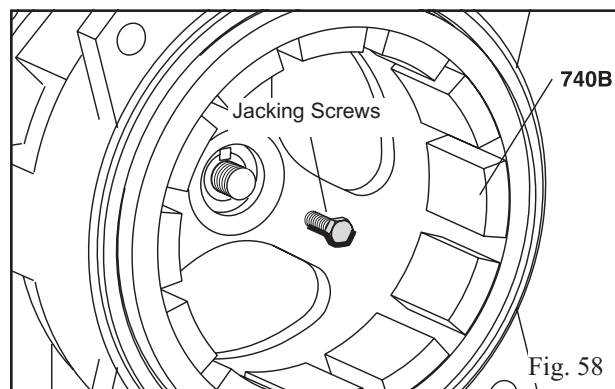
12. Remove reverse thrust bearing (197C) from containment shell (750) if replacement is necessary.
13. When replacement of the close coupled drive magnet assembly (740B) is required, remove and discard the nylok set screws (222L). Use a puller and the 2 - 3/8" tapped holes provided to remove the magnet assembly from the motor shaft.

This completes disassembly of the 3298 close coupled version. If disassembly of the 3298 frame mounted version is required proceed to Step 14.

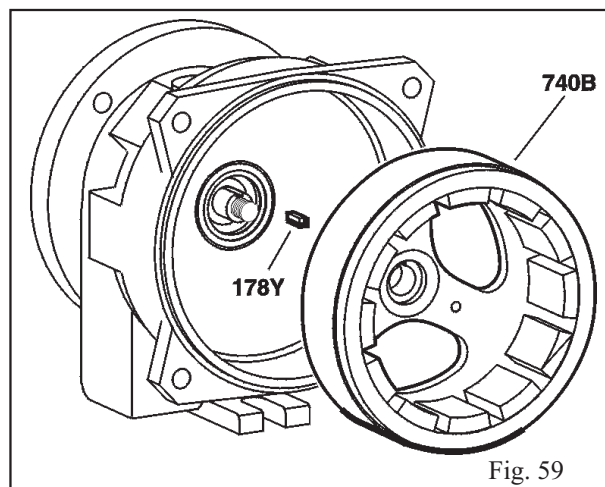
14. Place shaft wrench on drive shaft (122B) and remove the hex nut (355A) (Fig. 57).



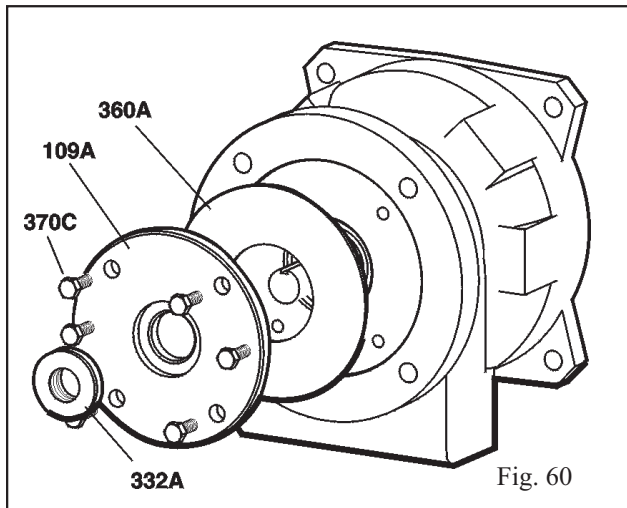
15. Place three 5/16" x 2" cap screws in jacking screw holes in magnet assembly (740B) (Fig. 58).



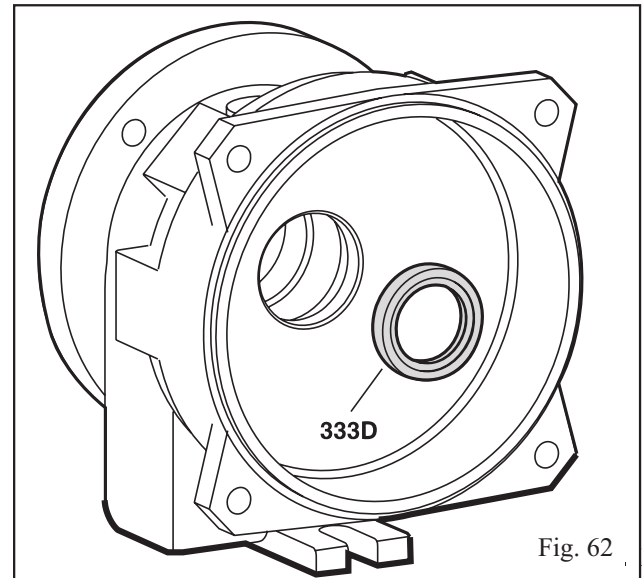
16. Tighten jacking screws evenly and in sequence until the magnet assembly (740B) can be removed.
17. Remove magnet assembly (740B) and set aside away from attracting metals (Fig. 59).



18. Remove bearing end cover bolts (370C) (Fig. 60).
19. Install two end cover bolts (370C) in jacking screw holes, tighten evenly to remove bearing end cover (109A).
20. Slide bearing end cover (109A) back. Labyrinth oil seal (332A) will slide back with the end cover.
21. Remove labyrinth seal (332A) (Fig. 60).
22. Remove bearing end cover (109A). Remove gasket (360A) and discard (Fig. 60).

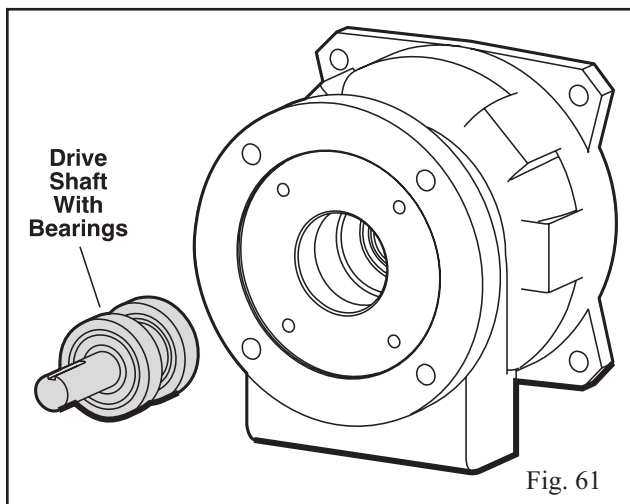


25. Remove lip seal (333D) as shown (Fig. 62).



This completes disassembly of the 3298 S frame mounted version.

23. Remove drive shaft (122B) with ball bearings (112) from bearing frame (228) (Fig. 61).



24. Press bearings (112) off shaft and inspect.

3298 M GROUP DISASSEMBLY



WARNING

Each component must be individually decontaminated using procedures in accordance with all federal, state, local, and company environmental regulations.



WARNING

The magnets contained in this unit are extremely powerful. Keep magnetic drive components and magnetic tools apart from each other by a minimum of three (3) feet [one (1) meter]. Serious injury to fingers and hands will result.

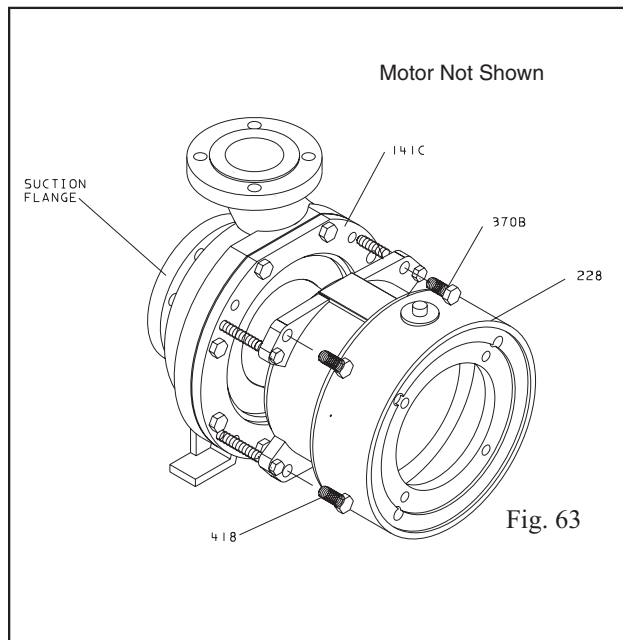
NOTE: When working on pump, use a bench with a non-magnetic work surface such as wood or brass surface.



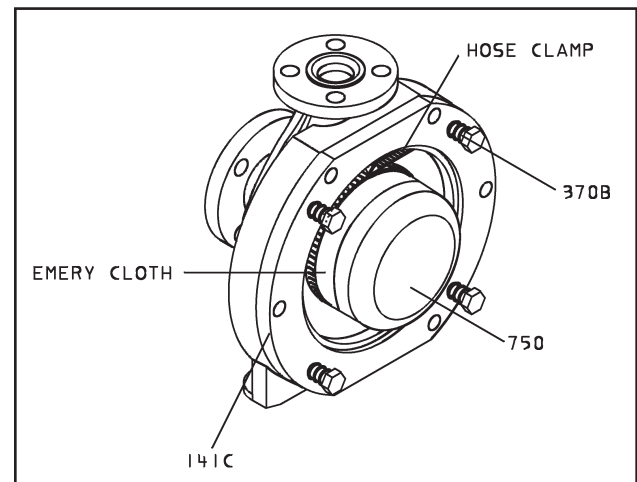
CAUTION

The shop area must be clean and free of any substances that would contaminate the magnets, ex. ferrous metals.

1. Secure the C-face motor support / bearing frame (228) to workbench.
2. Remove four bolts (370B) from the C-face motor support/bearing frame (228) (Fig. 63)

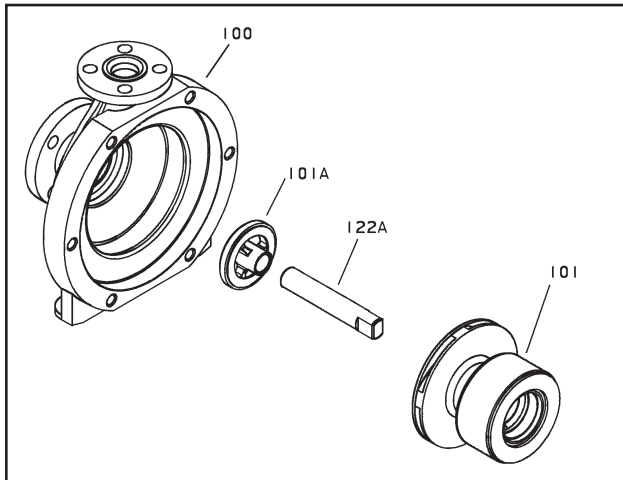


3. Tighten jacking screws (418) until gap between clamp ring (141C) and C-face motor support bearing frame is 3.5 inches. Then grasp suction flange of casing and pull casing liquid end free from magnet assembly (Fig. 63).
4. Remove casing bolts (356A).
5. Wrap a piece of emery cloth around the containment shell (750) and secure with a large hose clamp (Fig. 64).
6. Screw C-face motor support / bearing frame bolts (370B) into the tapped holes of the clamp ring (141C) and tighten evenly to remove containment shell. Remove O-ring (412M) from containment shell (750) and discard.



7. Remove hose clamp and emery cloth.

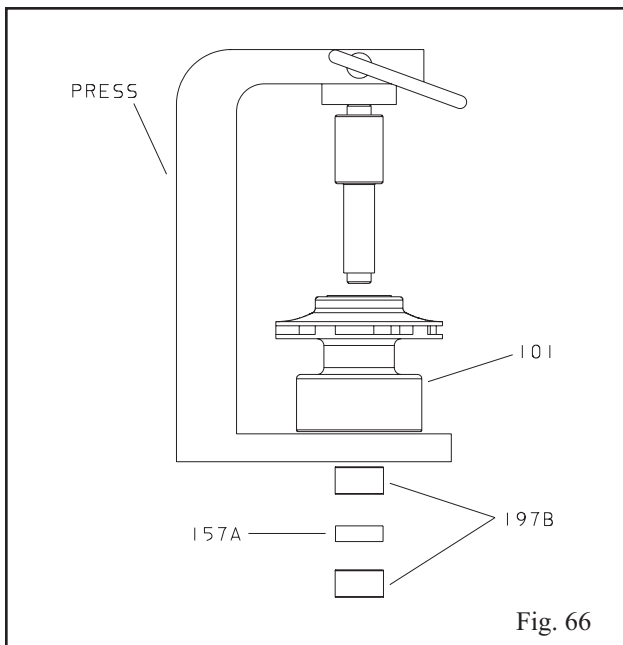
8. Remove impeller assembly (101) (Fig. 65).
9. Remove shaft (122A) if replacement is necessary (Fig. 65).
10. Inspect bearing spider (101A) and press out through suction of casing (100) if replacement is necessary (Fig. 65).



WARNING

The magnets contained in this unit are extremely powerful. Keep magnetic drive components and magnetic tools apart from each other by a minimum of three (3) feet [one (1) meter]. Serious injury to fingers and hands will result.

11. Press out radial bearings (197B) from impeller assembly (101) utilizing the bearing tool if replacement is necessary (Fig. 66).



12. Inspect rear impeller wear ring (203) and remove if replacement is necessary.
13. Remove reverse thrust bearing (197C) from containment shell (750) if replacement is necessary.
14. When replacement of the close coupled drive magnet assembly (740B) is required, remove and discard the nylok set screws (222L). Use a puller and the 2 - 3/8" tapped holes provided to remove the magnet assembly from the motor shaft.

This completes disassembly of the 3298 close coupled version. If disassembly of the 3298 frame mounted version is required proceed to Step 15.

15. Place shaft wrench on drive shaft (122B) and remove the hex nut (355A) (Fig. 67).

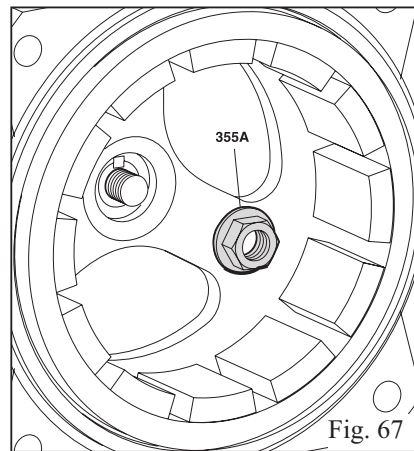


Fig. 67

16. Place three 5/8" x 4" cap screws in jacking screw holes in magnet assembly (740B) (Fig. 68). **Note: M group sizes have rub rings. Reference sectionals in the Dissassembly & Reassembly Section.**

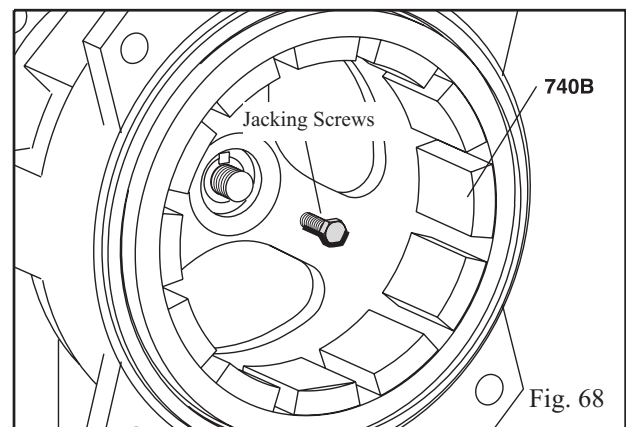
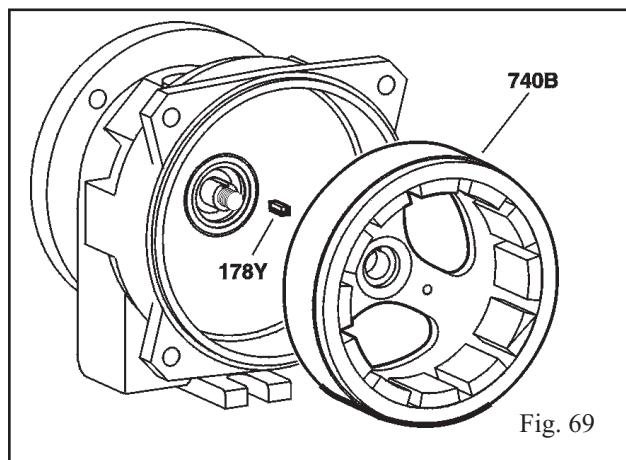
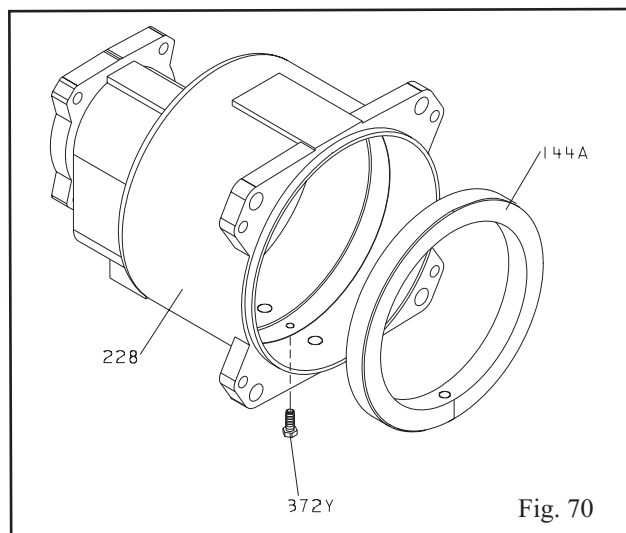


Fig. 68

17. Tighten jacking screws evenly and in sequence until the magnet assembly (740B) can be removed.
18. Remove magnet assembly (740B) and set aside away from attracting metals (Fig. 69).

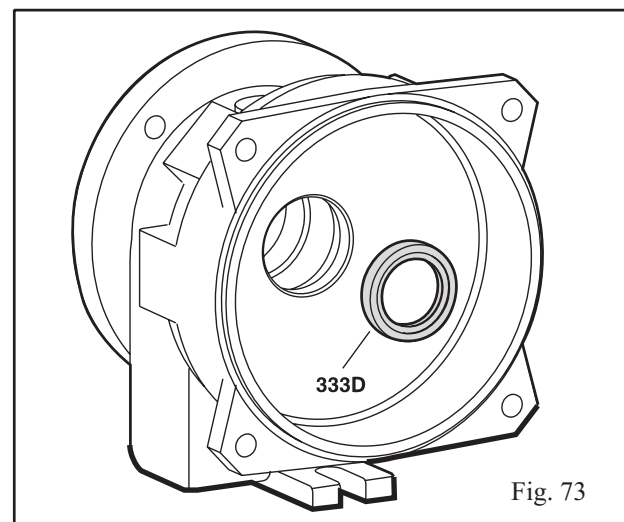
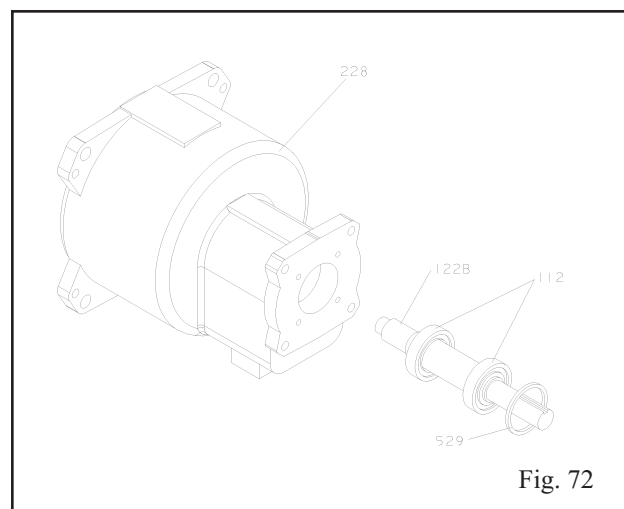
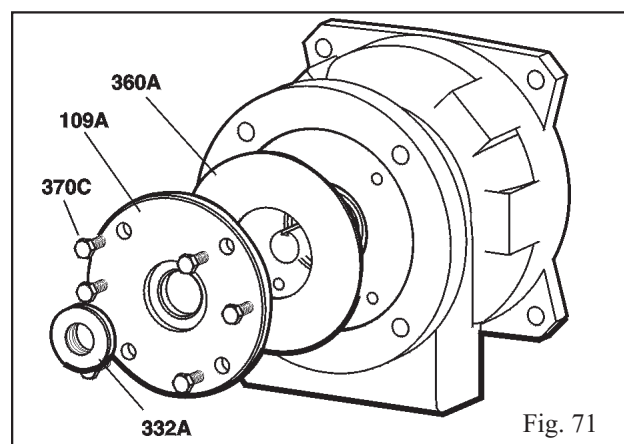


19. Remove $\frac{5}{16}$ " rub ring cap screw (372Y) from bottom of bearing frame (228). (Fig. 70)
20. Remove rub ring (144A) from bearing frame (228) (Fig. 70).



21. Remove bearing end cover bolts (370C) (Fig. 71).
22. Install two end cover bolts (370C) in jacking screw holes, tighten evenly to remove bearing end cover (109A).
23. Slide bearing end cover (109A) back. Labyrinth oil seal (332A) will slide back with the end cover.
24. Remove labyrinth seal (332A) (Fig. 71).
25. Remove bearing end cover (109A). Remove gasket (360A) and discard (Fig. 71).
26. Remove drive shaft (122B) with ball bearings (112) and wave washer (529) (Fig. 72).

27. Press bearings (112) off shaft and inspect.
28. Remove lip seal (333D) as shown (Fig. 73).



This completes disassembly of the 3298 M frame mounted version.

3298 L GROUP DISASSEMBLY



WARNING

Each component must be individually decontaminated using procedures in accordance with all federal, state, local and company environmental regulations.



WARNING

The magnets contained in this unit are extremely powerful. Keep magnetic drive components and magnetic tools apart from each other by a minimum of three (3) feet [one (1) meter]. Serious injury to fingers and hands will result.

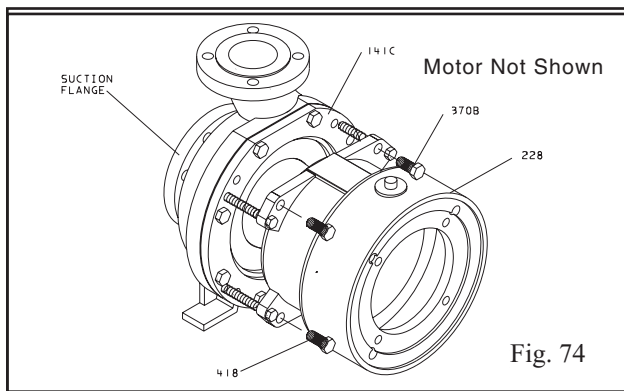
NOTE: When working on pump, use a bench with a non-magnetic work surface such as wood or brass surface.



CAUTION

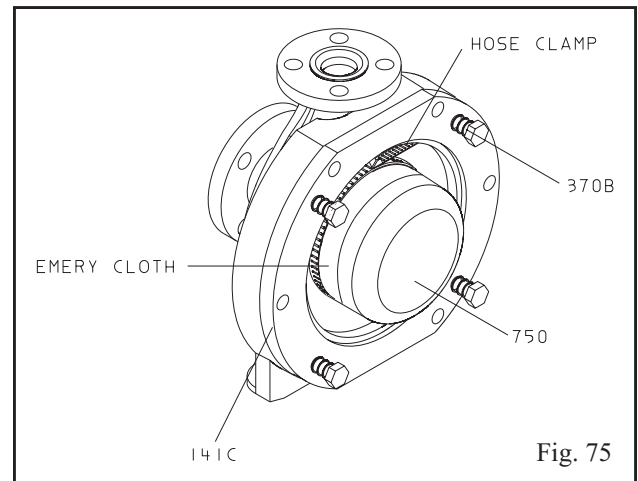
The shop area must be clean and free of any substances that would contaminate the magnets, ex. ferrous metals.

1. Secure the C-face motor support / bearing frame (228) to workbench.
2. Remove four bolts (370B) from the C-face motor support/bearing frame (228) (Fig. 74).

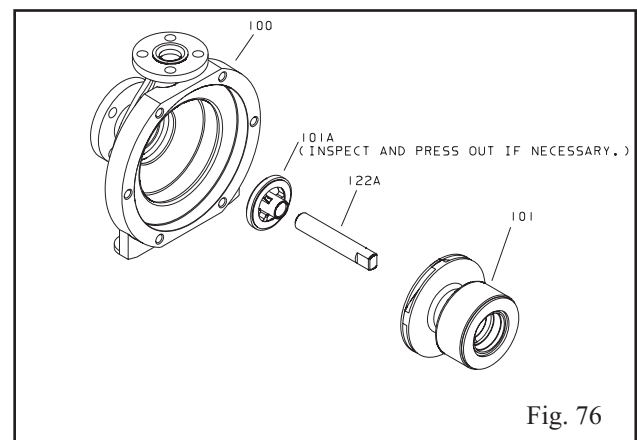


3. Tighten jacking screws (418) until gap between clamp ring (141C) and C-face motor support bearing frame is 3.5 inches. Then grasp suction flange of casing and pull casing liquid end free from magnet assembly (Fig. 74).
4. Remove casing bolts (356A).
5. Wrap a piece of emery cloth around the containment shell (750) and secure with a large hose clamp (Fig. 75).

6. Screw C-face motor support / bearing frame bolts (370B) into the tapped holes of the clamp ring (141C) and tighten evenly to remove containment shell. Remove O-ring (412M) from containment shell (750) and discard.



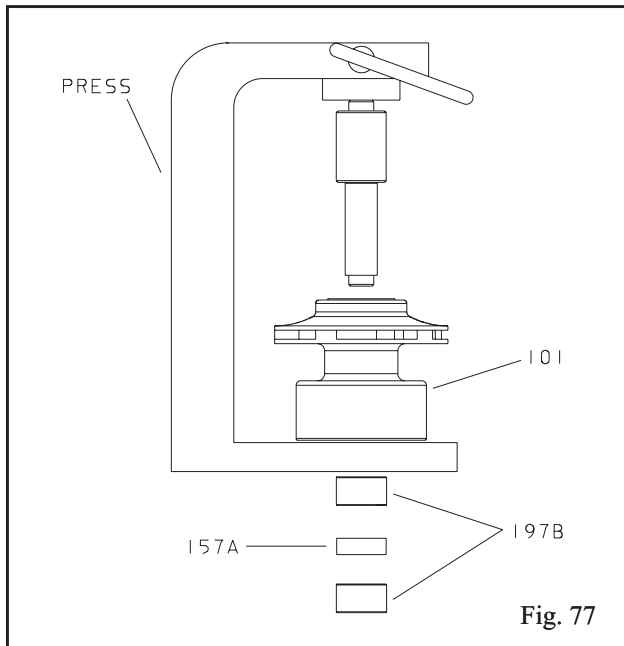
7. Remove hose clamp and emery cloth.
8. Remove impeller assembly (101) (Fig. 76).
9. Remove shaft (122A) if replacement is necessary (Fig. 76).
10. Inspect bearing spider (101A) and press out through suction of casing (100) if replacement is necessary (Fig. 76).



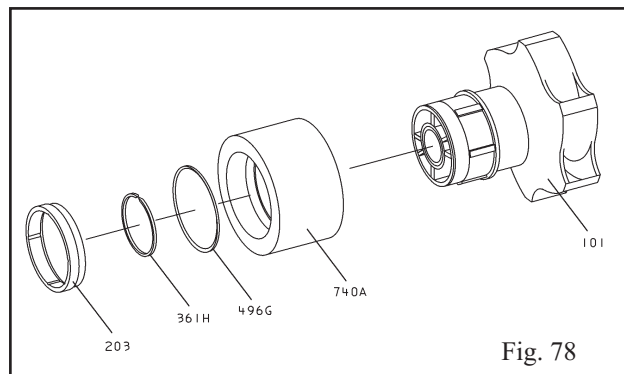
WARNING

The magnets contained in this unit are extremely powerful. Keep magnetic drive components and magnetic tools apart from each other by a minimum of three (3) feet [one (1) meter]. Serious injury to fingers and hands will result.

11. Press out radial bearings (197B) from impeller assembly (101) utilizing the bearing tool if replacement is necessary (Fig. 77).

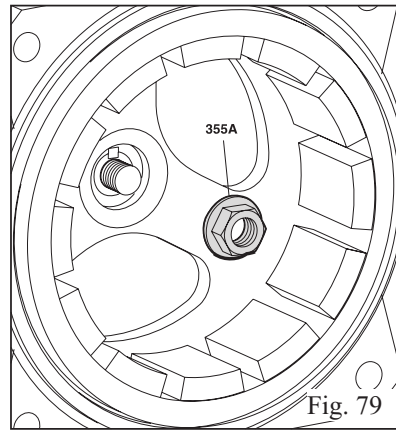


12. Inspect rear impeller wear ring (203) and remove if replacement is necessary.
13. Remove retaining ring (361H). Slide or press driven magnet assembly (740A) off impeller assembly (101) (Fig. 78).

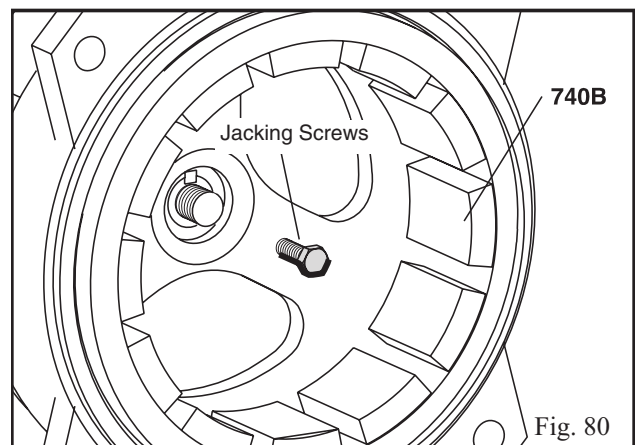


14. Remove reverse thrust bearing (197C) from containment shell (750) if replacement is necessary.
15. When replacement of the close coupled drive magnet assembly (740B) is required, remove and discard the nylok set screws (222L). Use a puller and the 2 - 3/8" tapped holes provided to remove the magnet assembly from the motor shaft.

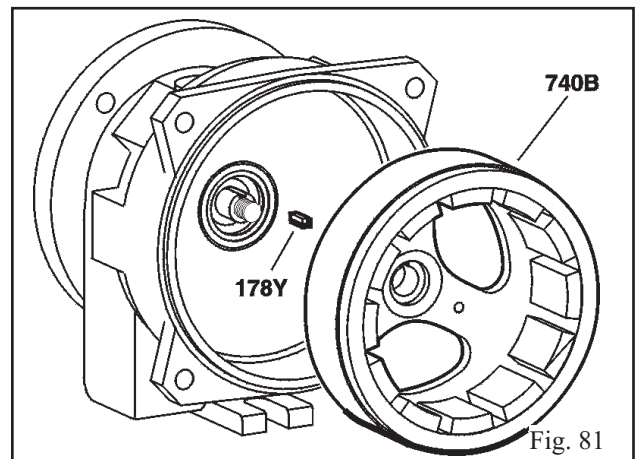
This completes disassembly of the 3298 close coupled version. If disassembly of the 3298 frame mounted version is required, proceed to Step 16.



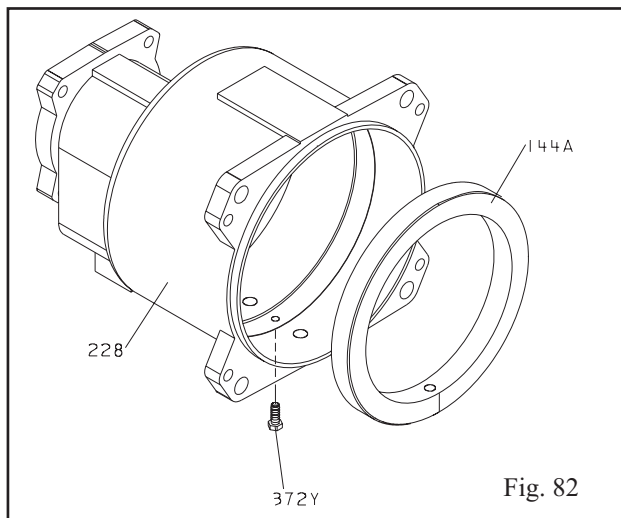
16. Place shaft wrench on drive shaft (122B) and remove the hex nut (355A) (Fig. 79).



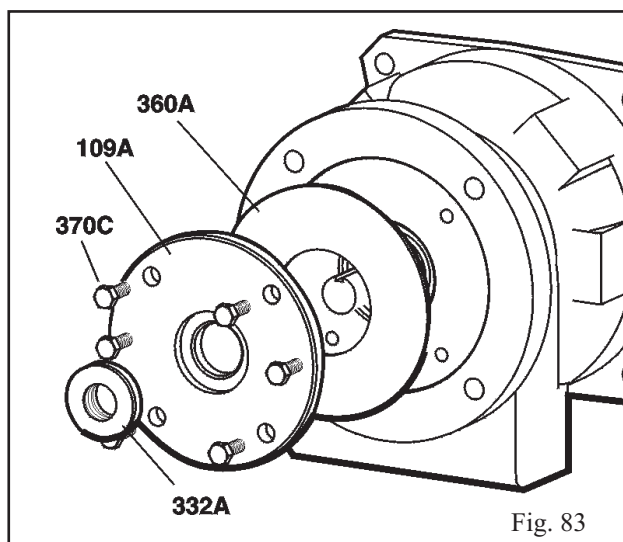
17. Place three $\frac{5}{8}$ " x 4" cap screws in jacking screw holes in magnet assembly (740B) (Fig. 80). **Note: L group sizes have rub rings. Reference sectionals in Disassembly/Reassembly section.**
18. Tighten jacking screws evenly and in sequence until the magnet assembly (740B) can be removed.
19. Remove magnet assembly (740B) and set aside away from attracting metals (Fig. 81).



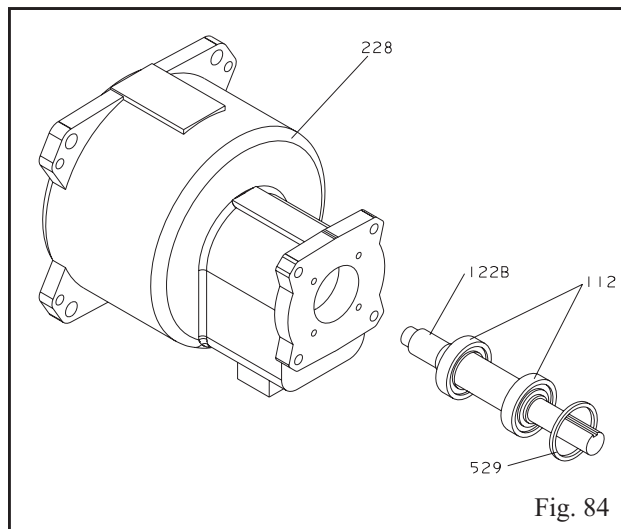
20. Remove $\frac{5}{16}$ " rub ring cap screw (372Y) from bottom of bearing frame (228) (Fig. 82).



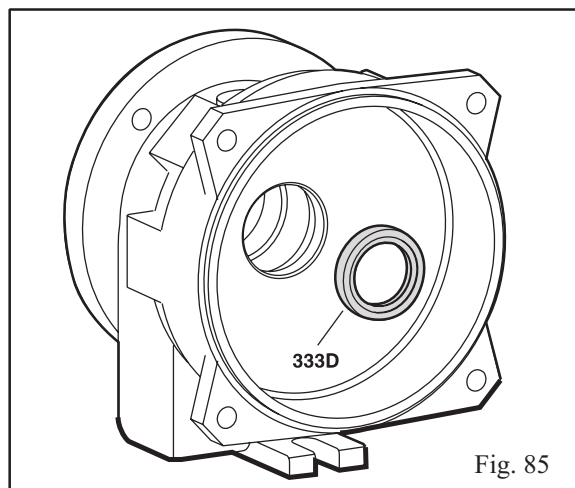
21. Remove rub ring (144A) from bearing frame (228) (Fig. 82).
22. Remove bearing end cover bolts (370C) (Fig. 83).
23. Install two end cover bolts (370C) in jacking screw holes, tighten evenly to remove bearing end cover (109A).
24. Slide bearing end cover (109A) back. Labyrinth oil seal (332A) will slide back with the end cover.
25. Remove labyrinth seal (332A) (Fig. 83).
26. Remove bearing end cover (109A). Remove gasket (360A) and discard (Fig. 83).



27. Remove drive shaft (122B) with ball bearings (112) and wave washer (529) (Fig. 84).



28. Press bearings (112) off shaft and inspect.
29. Remove lip seal (333D) as shown (Fig. 85).



This completes disassembly of the 3298 L frame mounted version.

SP 3298 DISASSEMBLY



WARNING

Each component must be individually decontaminated using procedures in accordance with all federal, state, local, and company environmental regulations.



WARNING

The magnets contained in this unit are extremely powerful. Keep magnetic drive components and magnetic tools apart from each other by a minimum of three (3) feet [one (1) meter]. Serious injury to fingers and hands will result.

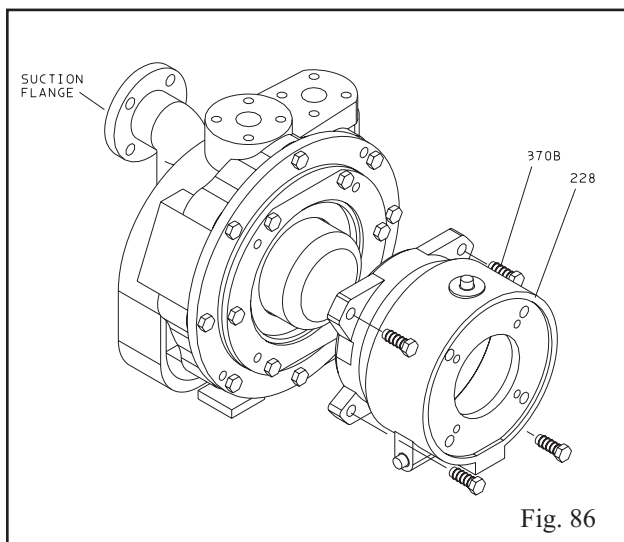
NOTE: When working on pump, use a bench with a non-magnetic work surface such as wood or brass surface.



CAUTION

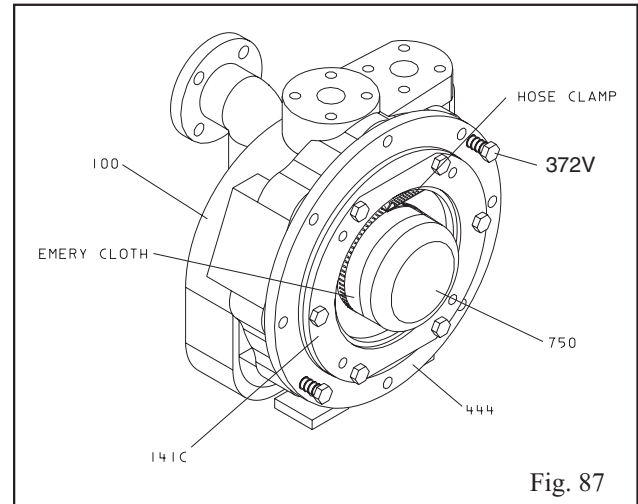
The shop area must be clean and free of any substances that would contaminate the magnets, ex. ferrous metals.

1. Secure the C-face motor support / bearing frame (228) to workbench.
2. Remove four bolts (370B) from the C-face motor support / bearing frame (228) (Fig. 86).
3. Grasp suction flange of casing and pull casing liquid end free from magnet assembly (Fig. 86).

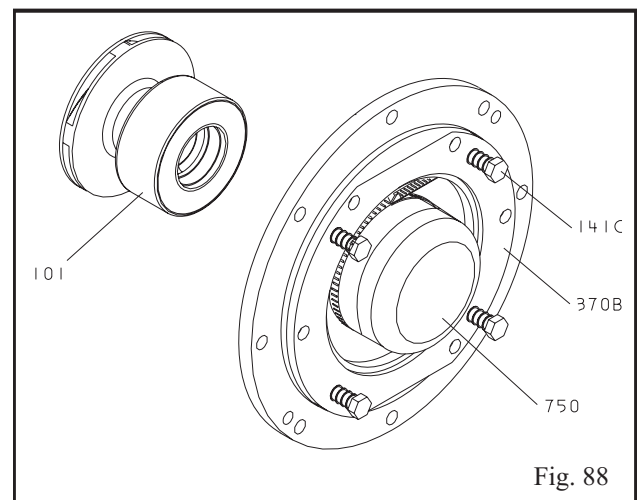


4. Wrap a piece of emery cloth around the containment shell (750) and secure with a large hose clamp (Fig. 87).

5. Remove the backplate bolts (372V) (Fig. 87).
6. Thread casing bolts (372V) into tapped holes in backplate (444) and tighten evenly to remove the backplate / clamp ring assembly from the casing (100). Remove the O-ring (412V) from the backplate and discard (Fig. 87).



7. Remove impeller assembly (101) (Fig. 88).
8. Remove clamp ring bolts (356A).
9. Screw C-face motor support / bearing frame bolts (370B) into the tapped holes of the clamp ring (141C) and tighten evenly to remove containment shell. Remove O-ring (412M) from containment shell (750) and discard (Fig. 88).



10. Remove hose clamp and emery cloth.
11. Remove shaft (122A) from the containment shell if replacement is necessary (Fig. 89).

12. Remove volute insert (100U) from casing (100) (Fig. 89).



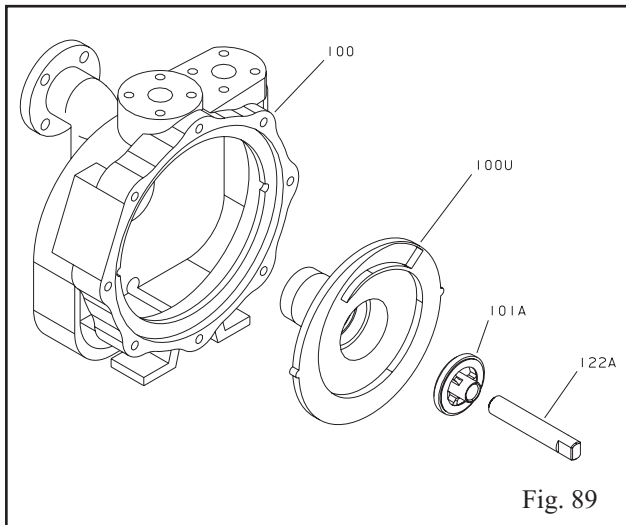
WARNING

The magnets contained in this unit are extremely powerful. Keep magnetic drive components and magnetic tools apart from each other by a minimum of three (3) feet [one (1) meter]. Serious injury to fingers and hands will result.

13. Inspect bearing spider (101A) and press out through volute insert if replacement is necessary (Fig. 89).

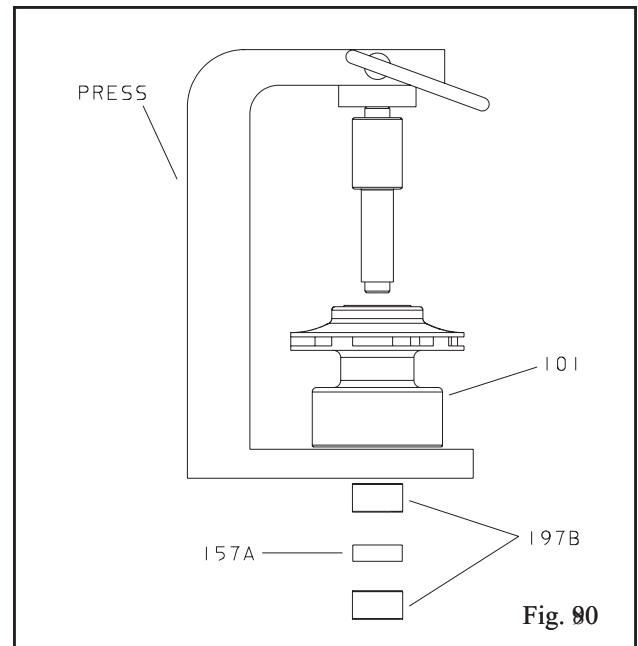


WARNING



The magnets contained in this unit are extremely powerful. Keep magnetic drive components and magnetic tools apart from each other by a minimum of three (3) feet [one (1) meter]. Serious injury to fingers and hands will result.

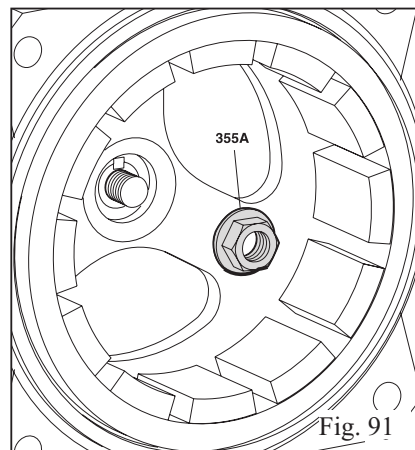
14. Press out radial bearings (197B) from impeller assembly (101) utilizing the bearing tool if replacement is necessary (Fig. 90).



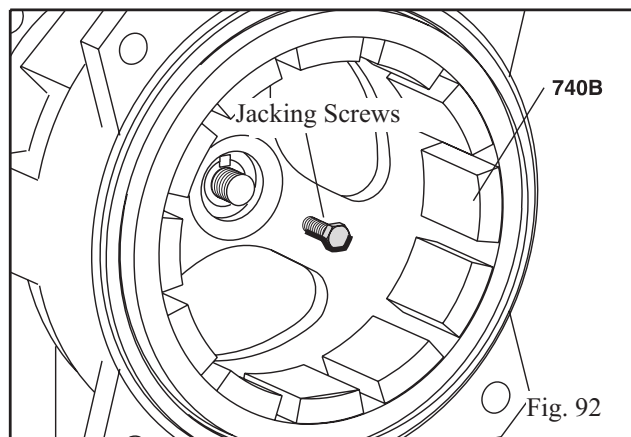
15. Remove reverse thrust bearing (197C) from containment shell (750) if replacement is necessary.
16. When replacement of the close coupled drive magnet assembly (740B) is required, remove and discard the nylok set screws (222L). Use a puller and the 2 - 3/8" tapped holes provided to remove the magnet assembly from the motor shaft.

This completes disassembly of the 3298 close coupled version. If disassembly of the 3298 frame mounted version is required, proceed to Step 17.

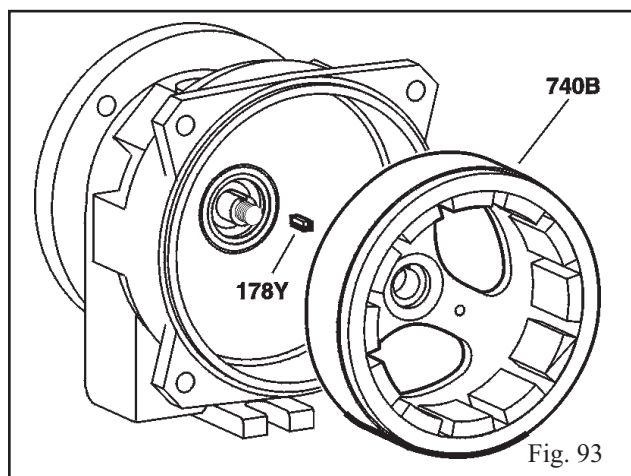
17. Place shaft wrench on drive shaft (122B) and remove the hex nut (355A) (Fig. 91).



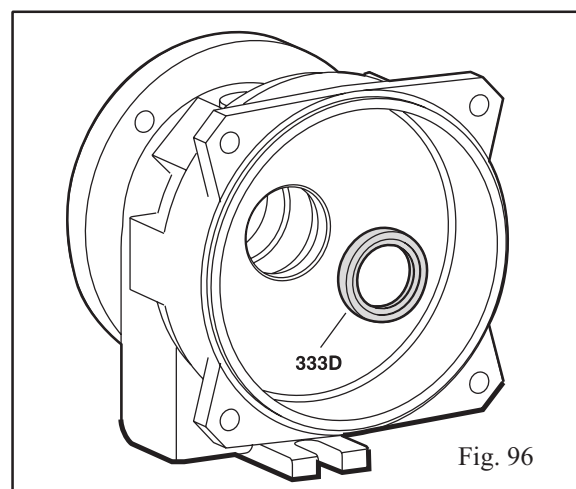
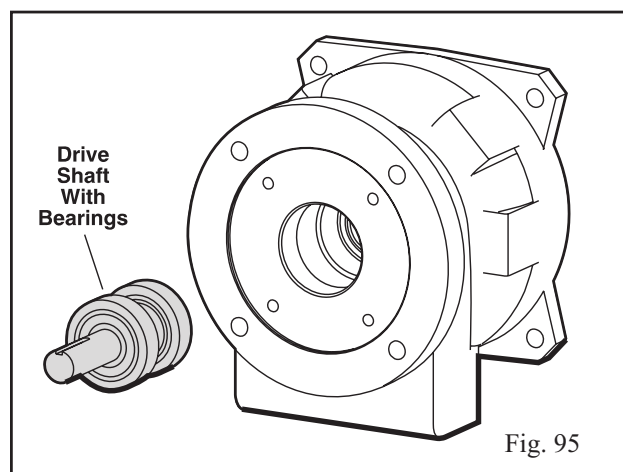
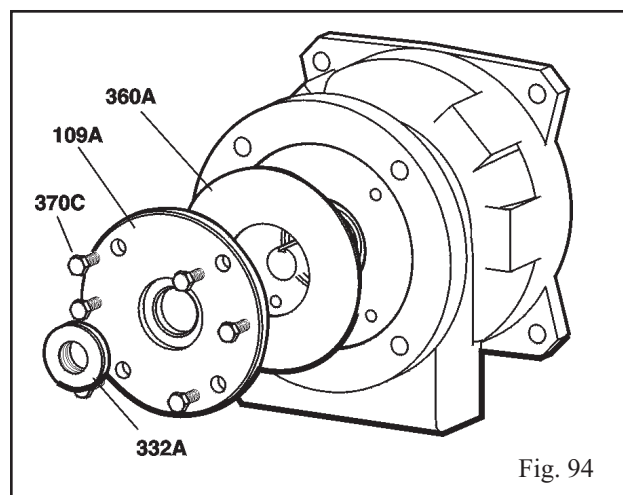
18. Place three $\frac{5}{16}$ " x 2" cap screws in jacking screw holes in magnet assembly (740B) (Fig. 92).
19. Tighten jacking screws evenly and in sequence until the magnet assembly (740B) can be removed.



20. Remove magnet assembly (740B) and set aside away from attracting metals (Fig. 93).



21. Remove bearing end cover bolts (370C) (Fig. 94).
22. Install two end cover bolts (370C) in jacking screw holes, tighten evenly to remove bearing end cover (109A).
23. Slide bearing end cover (109A) back. Labyrinth oil seal (332A) will slide back with the end cover.
24. Remove labyrinth seal (332A) (Fig. 94).
25. Remove bearing end cover (109A). Remove gasket (360A) and discard (Fig. 94).
26. Remove drive shaft (122B) with ball bearings (112) from bearing frame (228) (Fig. 95).
27. Press bearings (112) off shaft and inspect.
28. Remove lip seal (333D) as shown (Fig. 95).



This completes disassembly of the SP 3298 S frame mounted version.

V 3298 DISASSEMBLY



WARNING

Each component must be individually decontaminated using procedures in accordance with all federal, state, local, and company environmental regulations.



WARNING

The magnets contained in this unit are extremely powerful. Keep magnetic drive components and magnetic tools apart from each other by a minimum of three (3) feet [one (1) meter]. Serious injury to fingers and hands will result.

NOTE: When working on pump, use a bench with a non-magnetic work surface such as wood or brass surface.



CAUTION

The shop area must be clean and free of any substances that would contaminate the magnets, ex. ferrous metals.

1. Secure the casing (100) to workbench.
2. Remove 4 bolts (370B) from the C-face motor support / bearing frame (228) (Fig. 97).

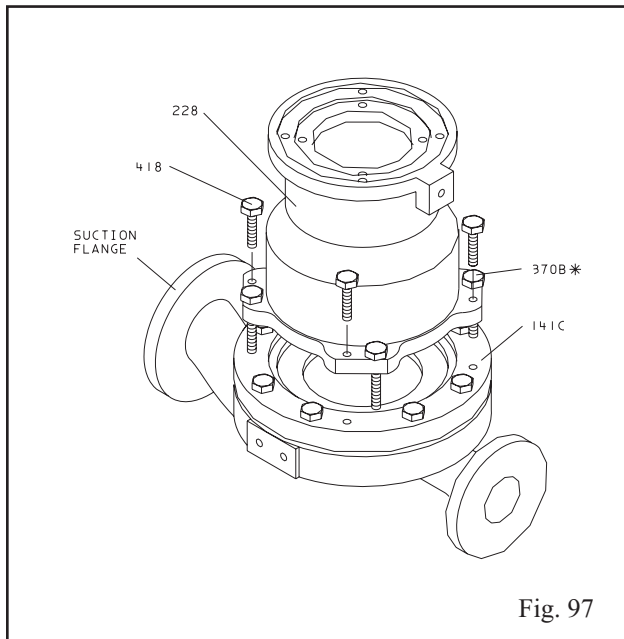


Fig. 97

3. Grasp motor adapter and pull free from casing (Fig. 97).

4. Remove casing bolts (356A) (Fig. 97)
5. Wrap a piece of emery cloth around the containment shell (750) and secure with a large hose clamp (Fig. 98).
6. Screw C-face motor support / bearing frame bolts (370B) into the tapped holes of the clamp ring (141C) and tighten evenly to remove containment shell. Remove O-ring (412M) from containment shell (750) and discard.

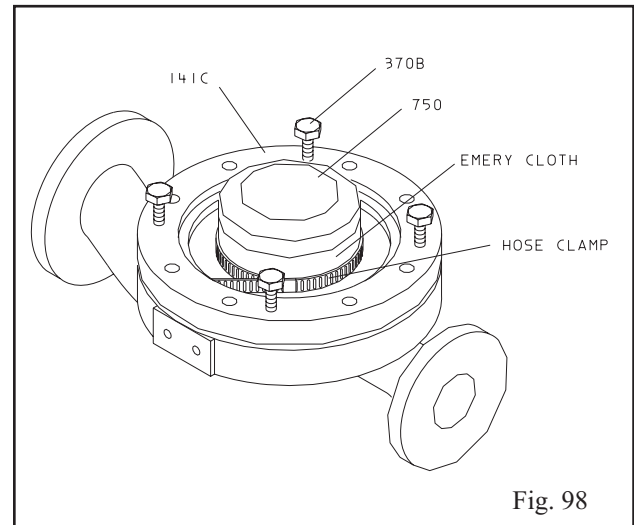
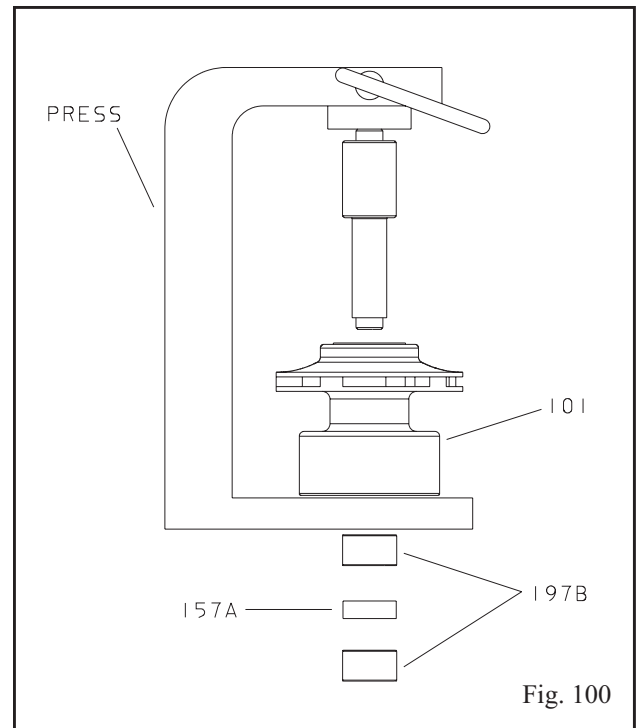
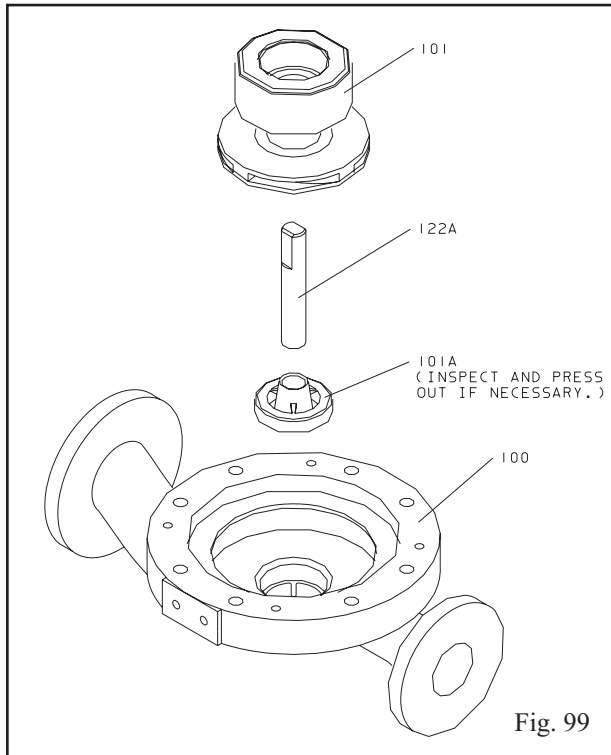


Fig. 98

7. Remove hose clamp and emery cloth.

8. Remove impeller assembly (101) (Fig. 99).
9. Remove shaft (122A) if replacement is necessary (Fig. 99).
10. Inspect bearing spider (101A) and pull out from casing (100) using spider removal tool if replacement is necessary (Fig. 99).



This completes disassembly of the V 3298 close coupled version.



WARNING

The magnets contained in this unit are extremely powerful. Keep magnetic drive components and magnetic tools apart from each other by a minimum of three (3) feet [one (1) meter]. Serious injury to fingers and hands will result.

11. Press out radial bearings (197B) from impeller assembly (101) utilizing the bearing tool if replacement is necessary (Fig. 100).
12. Remove reverse thrust bearing (197C) from containment shell (750) if replacement is necessary.
13. When replacement of the close coupled drive magnet assembly (740B) is required, remove and discard the nylok set screws (222L). Use a puller and the 2 - 3/8" tapped holes provided to remove the magnet assembly from the motor shaft.

INSPECTIONS

Model 3298 parts must be inspected to the following criteria before reassembly to ensure pump will run properly. Any part not meeting required criteria should be replaced.

CASING (100)

1. Casing (100) should be inspected for excessive wear, abrasive damage, cut or a loose liner.

VOLUTE INSERT (SP 3298 Only)

1. Volute insert (100U) should be inspected for excessive wear, abrasive damage or cut surfaces.

SPIDER (101A)

1. Spider Bearing should be inspected for cracks, chips, or scoring.

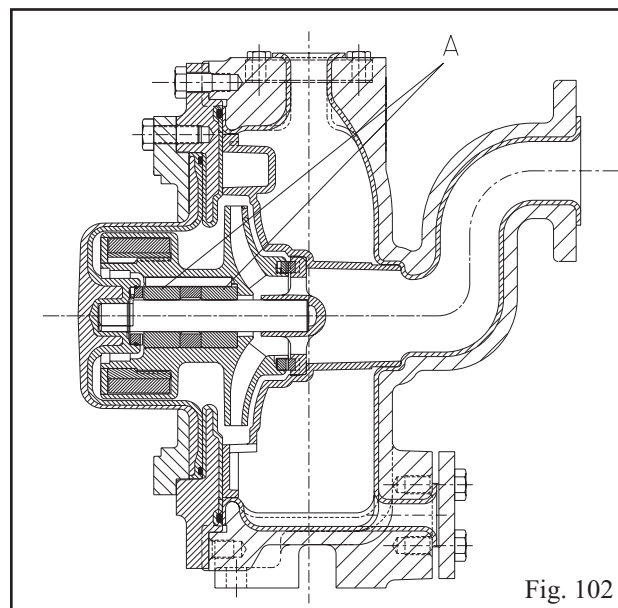
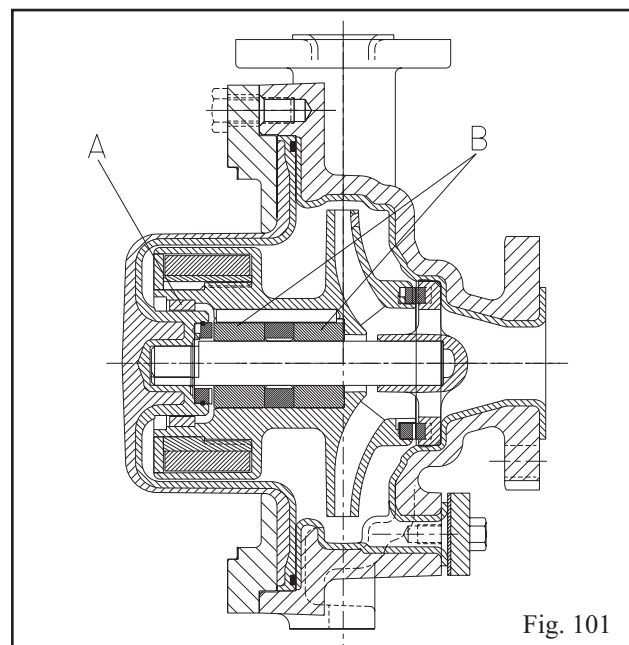
IMPELLER (101)

1. Inspect leading and trailing edges of vanes for erosion damage.
2. Inspect impeller for cracks and grooves in excess of .030 in. (.75 mm).
3. Check for blocked passages.

BACKPLATE (SP 3298 Only)

1. Backplate (444) should be inspected for excessive wear, abrasive damage, cut or a loose liner.

INSPECTION LOCATIONS:



*

For M

and L Group Sizes Only -
2 x 3-8, 3 x 4-7, 1 x 2-10, 4 x 6-10

BACK WEAR RING (203)

1. Inspect back wear ring per following table:

Table 9			
Diametrical Back Wear Ring Clearances			
	Size	New Clearance in. (mm)	Replace at in. (mm)
Wear Ring to Containment Shell Location A Ref. Fig. 101 / 102	1 x 1½-5 1½ x 2-6 1 x 1½-6 1 x 1½-7 1 x 1½-8 2 x 3-6 1½ x 3-8 1 x 1½-8	No Wear Ring	No Wear Ring
	3 x 4-7 2 x 3-8 1 x 2-10	0.060/0.066 (1.52/1.68)	0.090 (2.3)
	1½ x 3-10 2 x 3-10 3 x 4-10H 3 x 4-10G 4 x 6-10	0.060/0.070 (1.52/1.78)	0.094 (2.4)

NOTE: S group sizes 1 x 1½-6, 1 x 1½-8, 2 x 3-6 do

not have wear ring (203).

RADIAL BEARING (197B)

1. Inspect bearings for cracks or chips.
2. Inspect dimensions per *Table 10*:

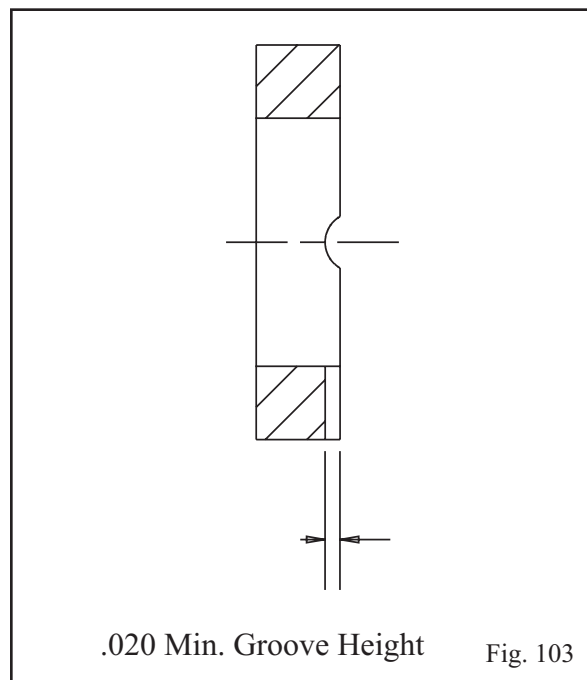
Table 10		
Diametric Bearing Clearances		
	New Clearance in. (mm)	Replace at in. (mm)
Shaft to Bearing	.003 - .006	.012
Location B Ref. Fig. 85 & 85A	(.076 - .152)	(.305)

REVERSE THRUST BEARING (197C)

Inspect bearing for cracks, chips, or scoring. If minimum groove height is less than the minimum height recommended, then replace (Fig. 103).

IMPELLER THRUST BEARING (197D)

Inspect bearing for cracks, chips, and scoring. If minimum groove height is less than the minimum height recommended, then replace (Fig. 103).



STATIONARY SHAFT (122A)

Shaft should be free from cracks and scoring.

CONTAINMENT SHELL (750)

1. Must be free from scratches or cracks.
2. Grooves in excess of .010 in. (.25 mm) for the outside diameter and .030 in (.75mm) for the inside diameter require containment shell replacement.
3. Shaft (122A) should fit snug into containment shell.

MAGNET ASSEMBLY (740B)



WARNING

The magnets contained in this unit are extremely powerful. Keep magnetic drive components and magnetic tools apart from each other by a minimum of three (3) feet [one (1) meter]. Serious injury to fingers and hands will result.

NOTE: *The magnets are extremely brittle. It is normal to have chips (up to 10% of the magnet surface) per MMPA standard no. 0100-90.*

1. Magnets must be free of major cracks (extending over 50% of surface) and also free of imperfections that create loose particles.
2. If magnet assembly (740B) was exposed to product, it should be replaced.
3. Inspect assembly for cracks and replace if any are found.
4. Inspect magnets for proper bonding to carrier.

BEARING FRAME (228) - Frame Mounted Version Only

1. Visually inspect frame and frame foot for cracks.
2. Inspect for corrosion or pitting of frame and/or rub ring if parts have been exposed to pumpage.
3. Inspect frame bearing bores. The maximum acceptable bore is 2.4419 in. (62.024 mm) for S group size pumps and 2.8353 in. (72.017 mm) for M and L group size pumps.
4. Inspect ball bearings for contamination and damage.
5. Make sure gasket surfaces are clean.
6. Visually inspect bearing end cover (109A) for cracks and pits. Gasket surface must be clean.
7. Replace lip seal (332A).
8. Visually inspect shaft (122B) for cracks and scoring.

3298 REASSEMBLY

3298 XS GROUP REASSEMBLY

Refer to *Table 11* for torque values while reassembling pump.

Table 11
***Bolt Torque Table**
Ft-Lbs (Nm)

Location	Dry Threads
Hex Nut - 355A	30 (40)
Clamp Ring Screws - 356A	30 (40)
Support / Frame Screws - 370B	30 (40)
Cover to Frame - 370C	30 (40)
Drain Screws - 426A XS, S	14 (19)
Drain Screws - 426A M, L	18(25)
* Torque values based on Dry Threads	



WARNING

The magnets contained in this unit are extremely powerful. Keep magnetic drive components and magnetic tools apart from each other by a minimum of three (3) feet [one (1) meters]. Serious injury to fingers and hands will result.

1. Lubricate the outside of the radial bearing. Press the radial bearing (197B) into impeller utilizing the bearing installation tool. Support impeller with bearing press support tool, as shown. Line up keyway in bearing with key in impeller (Fig. 104).

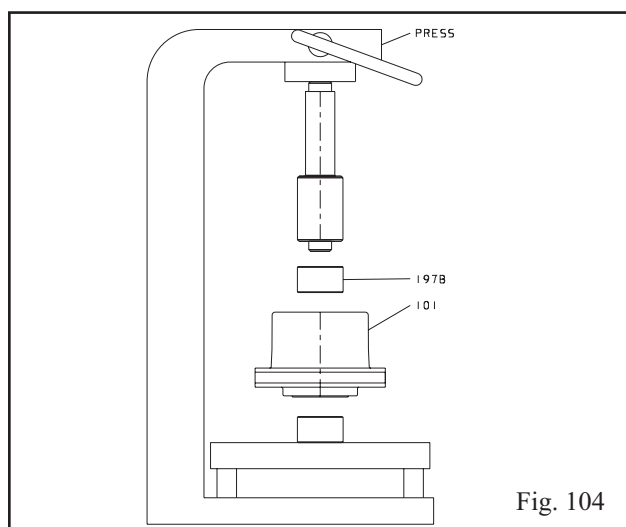


Fig. 104



CAUTION

Use caution when using a hydraulic press as you cannot feel when the bearing hits the bottom of the bore.

NOTE: *On occasion, the action of pressing the radial bearings into the impeller may cause some ETFE to peel. If this occurs, press out the bearings, remove any ETFE filings, and then press the bearings back into the impeller.*

2. Turn impeller over and install impeller thrust bearing (197D). Line up the two slots in the impeller thrust bearing to the two tabs in the impeller (Fig. 105).

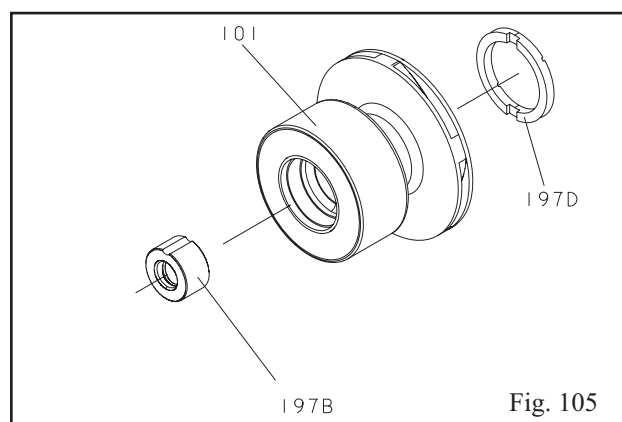


Fig. 105

3. Press shaft (122A) into containment shell (750) (Fig. 106).
4. Coat O-ring (412M) with O-ring lubricant. The lubricant is used to help the O-ring remain in place. Insert O-ring in containment shell (750). (Fig. 106).

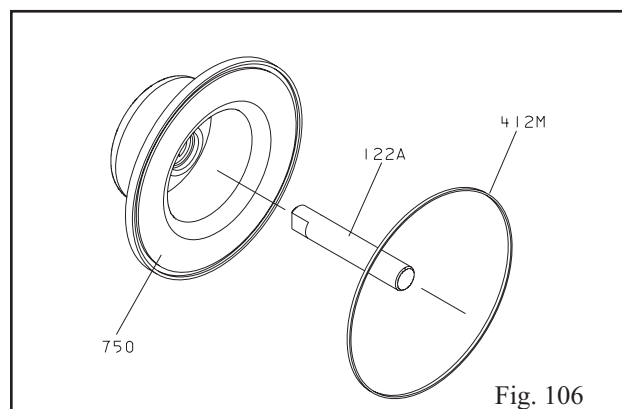


Fig. 106

5. Slide impeller assembly (101) onto shaft (Fig. 107).

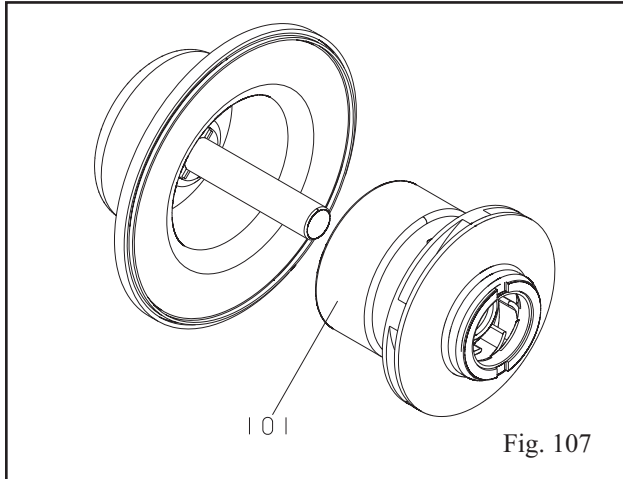


Fig. 107

6. Press spider (101A) into casing (100) with spider tool (Fig. 108).

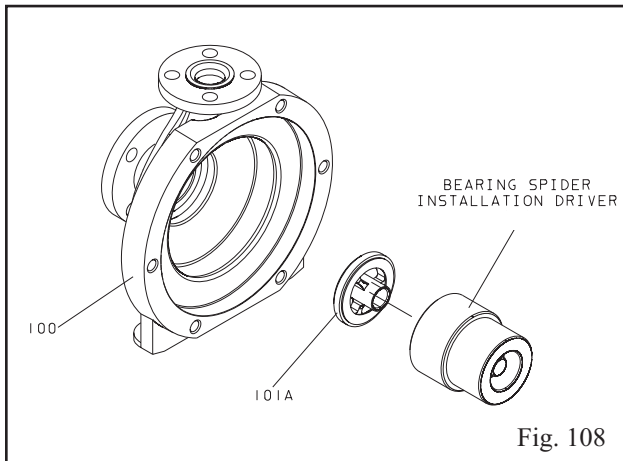


Fig. 108

7. Check rotary assembly total travel. See Fig. 109 for the appropriate measurements needed. For the XS pump, total travel is A - B and should be 0.026 - 0.083 in. (0.66-2.11 mm).
8. Install containment shell / impeller assembly into casing (100). Use care that the O-ring (412M) remains in place.



WARNING

The magnets contained in this unit are extremely powerful. Serious injury to fingers and hands will result if care is not taken.

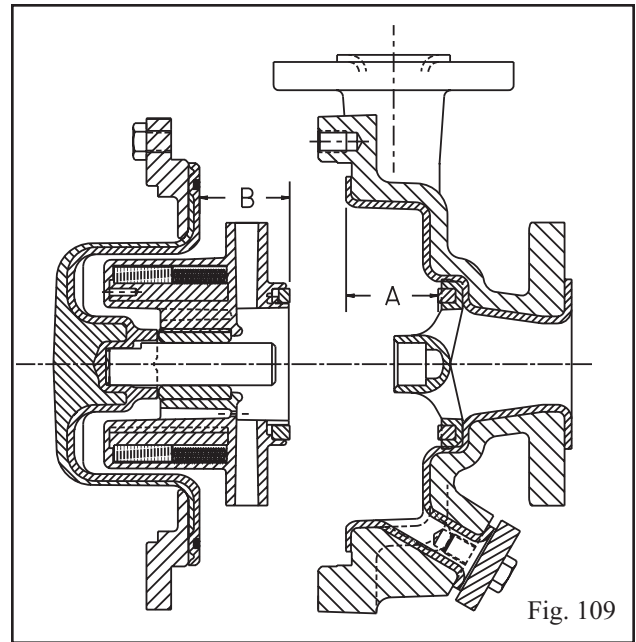


Fig. 109

9. Install clamp ring (141C) to casing (100) with 6 hex cap screws (356A) (Fig. 109).

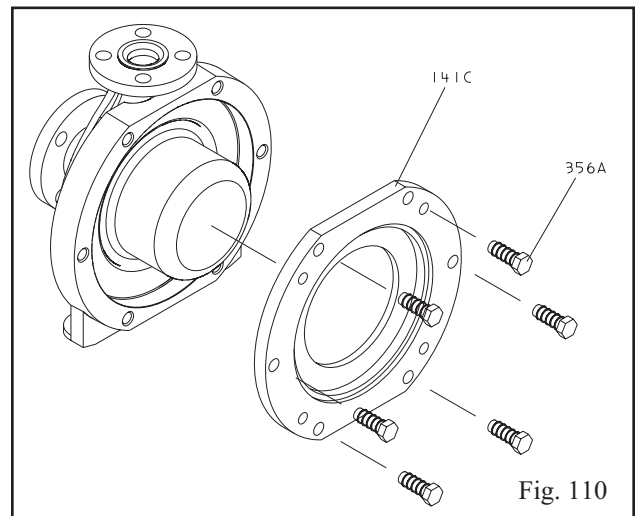
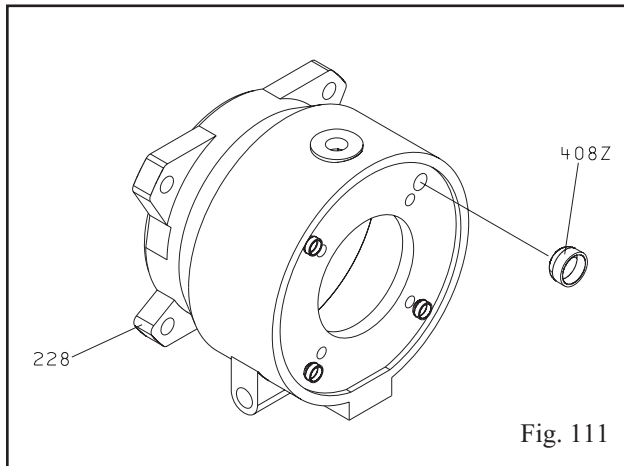


Fig. 110

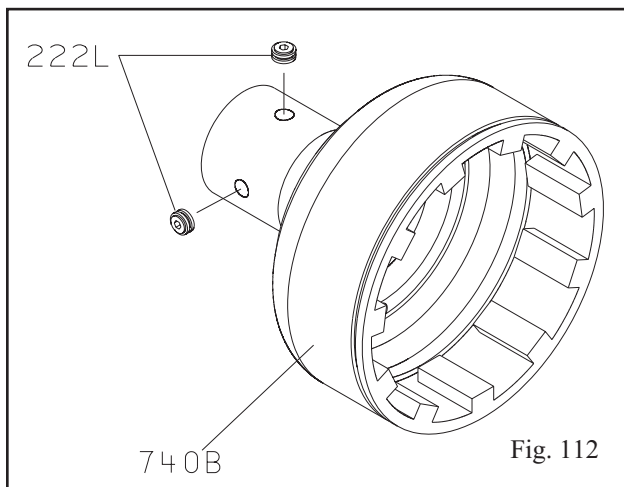
10. Set partially built assembly aside well away from attracting metals.

11. For use with 143TC/145TC motor frames. Install four expansion plugs (408Z) into C-face motor support (228) by tapping on the plug with a 5/8" rod (Fig. 111).



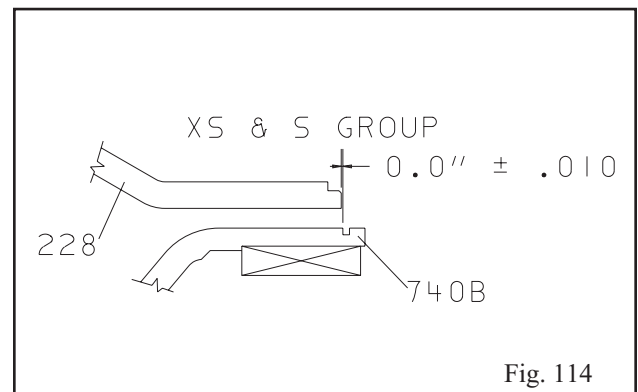
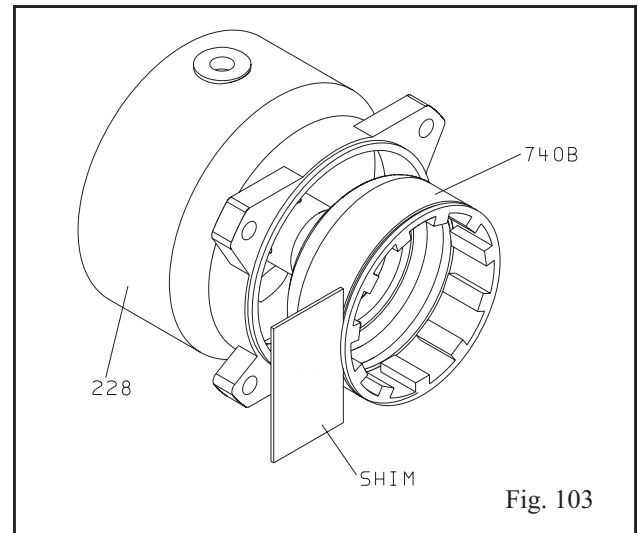
For motor frames 182TC - 256TC expansion plugs are not used.

12. Set C-face motor support (228) on motor. Install 4 screws (371).
13. Slide key (178Y) into motor shaft keyway.
14. Install 2 set screws (222L) into magnet assembly (740B) (Fig. 112).



15. Install magnet assembly inside the C-face motor support by sliding an 1/8" shim into the groove/notch located in the side of the magnet assembly. Slowly drop in the magnet assembly until the shim is resting on the face of the C-face motor support (Fig. 113). Reference Fig. 114 for installation dimensions.
16. Rotate the magnet assembly (740B) to line up the key (178Y) with the access hole on the C-face motor support (228). Tighten the first set screw (222L) through the access hole.

17. Remove the shim. Rotate the magnet assembly 90° to access the other set screw. Tighten.



Final Assembly for close coupled and frame mounted versions

18. Bolt down C-face support / frame (228) to work bench if not already done so.



WARNING

The magnets contained in this unit are extremely powerful. Serious injury to fingers and hands will result if care is not taken.

19. Slide casing assembly into C-face support / bearing frame assembly by holding casing firmly by the suction flange and suction side of the discharge flange. Keep hands away from clamp ring to avoid pinched fingers. Slowly insert to avoid damage.
20. Secure with 4 hex cap screws (370B). Tighten.

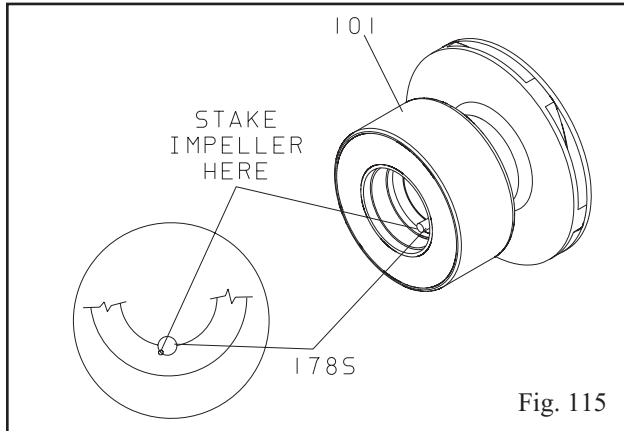


Rotate shaft by hand to ensure it rotates smoothly and there is no rubbing which could lead to excess heat generation and or sparks.

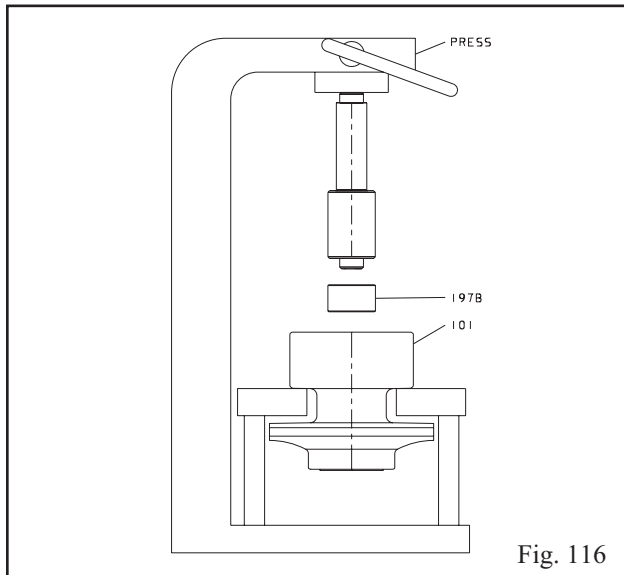
This completes XS group assembly.

3298 S GROUP REASSEMBLY

1. Slide key (178S) into impeller (101). To hold key in place, stake impeller at end of key (Fig. 115). Use a center punch.



2. Lubricate the outside of both radial bearings. Press the first radial bearing (197B) into impeller utilizing the bearing installation tool. Support impeller as shown. Line up keyway in bearing with key in impeller (Fig. 116).

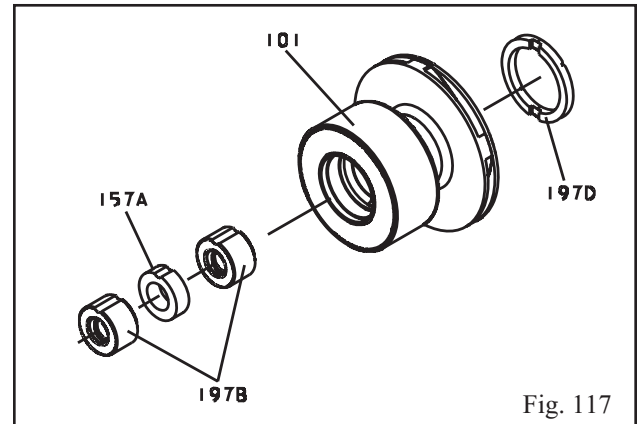


CAUTION

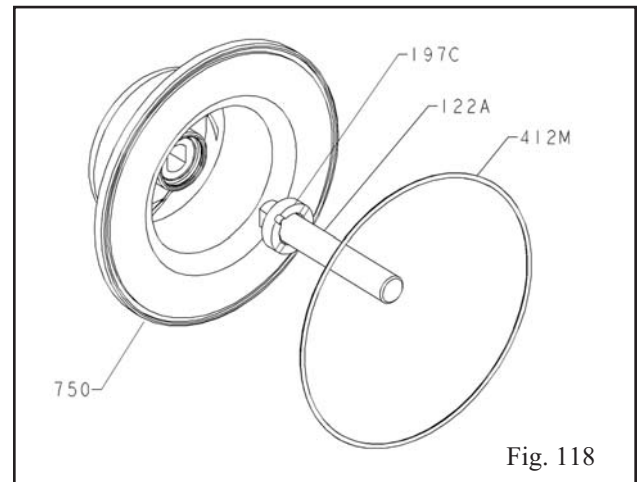
Use caution when using a hydraulic press as you cannot feel when the bearing hits the bottom of the bore.

NOTE: On occasion, the action of pressing the radial bearings into the impeller may cause some ETFE to peel. If this occurs, press out the bearings, remove any ETFE filings, and then press the bearings back into the impeller.

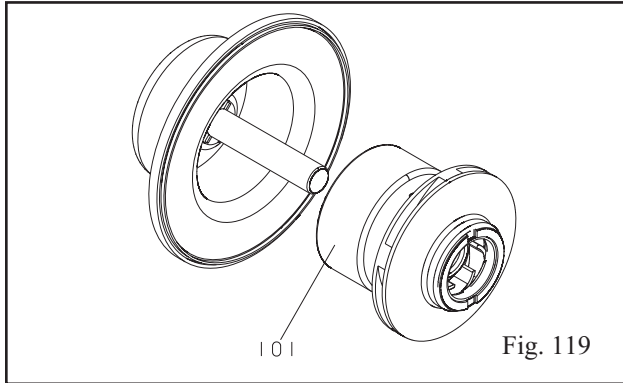
3. Slide bearing spacer (157A) into impeller (Fig. 117).
4. Press second radial bearing (197B) into impeller (Fig. 117).
5. Turn impeller over and install impeller thrust bearing (197D). Line up the two slots in the impeller thrust bearing to the two tabs in the impeller (Fig. 117).



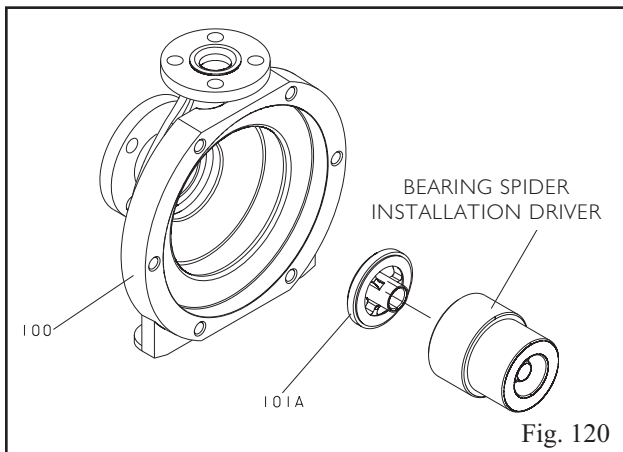
6. Slide reverse thrust bearing (197C) on shaft (122A).
7. Press shaft (122A) into containment shell (750) (Fig. 118).
8. Coat O-ring (412M) with O-ring lubricant. The lubricant is used to help the O-ring remain in place. Insert O-ring in containment shell (750) (Fig. 118).



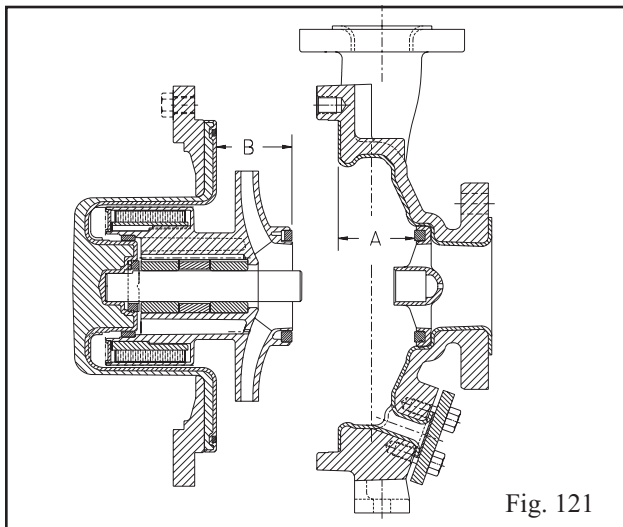
9. Slide impeller assembly (101) onto shaft (Fig. 119).



10. Press spider (101A) into casing (100) with spider tool (Fig. 120).



11. Check rotary assembly total travel. See Fig. 121 below for the appropriate measurements needed. For the S pump, total travel is A - B and should be 0.013 - 0.100 in. (0.33 - 2.5 mm).



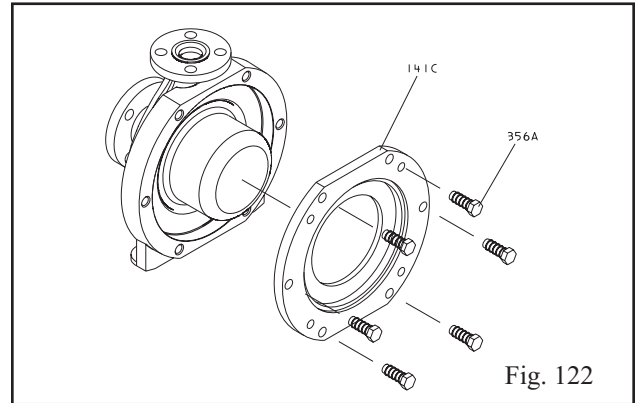
12. Install containment shell / impeller assembly into casing (100). Use care that the O-ring (412M) remains in place.



WARNING

The magnets contained in this unit are extremely powerful. Serious injury to fingers and hands will result if care is not taken.

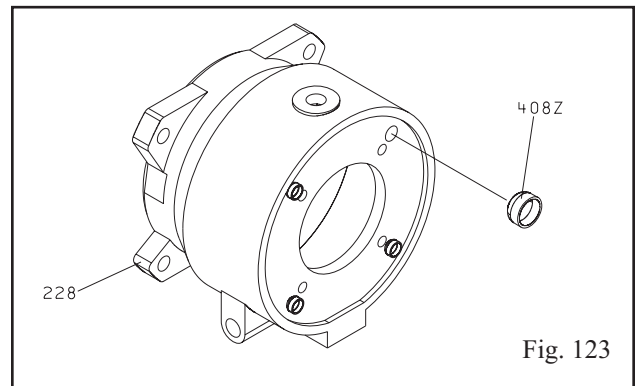
13. Install clamp ring (141C) to casing (100) with six hex cap screws (356A) (Fig. 122).



14. Set partially built assembly aside well away from attracting metals. **Continue assembly with the close coupled or frame mounted version of assembly as described below.**

Close Coupled Assembly

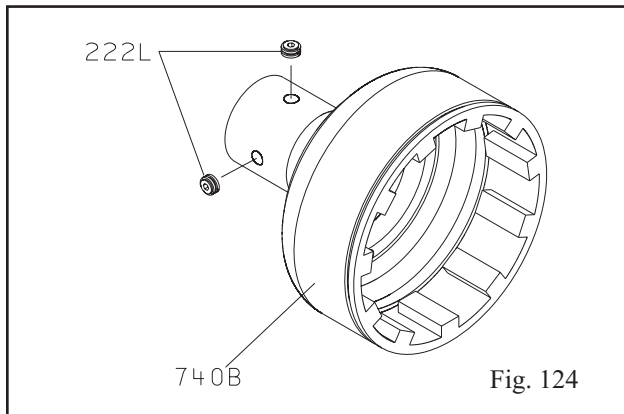
15. For use with 143TC/145TC motor frames. Install 4 expansion plugs (408Z) into C-face motor support (228) by tapping on the plug with a 5/8" rod (Fig. 123).



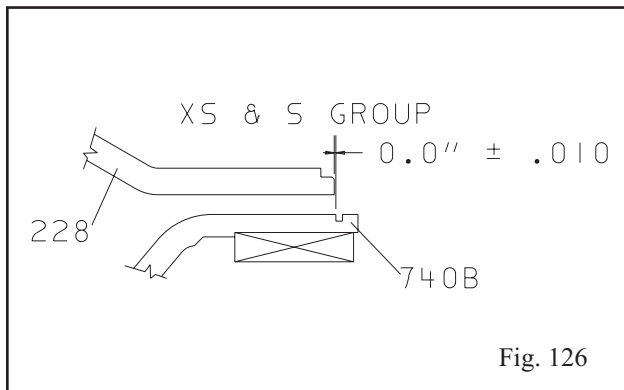
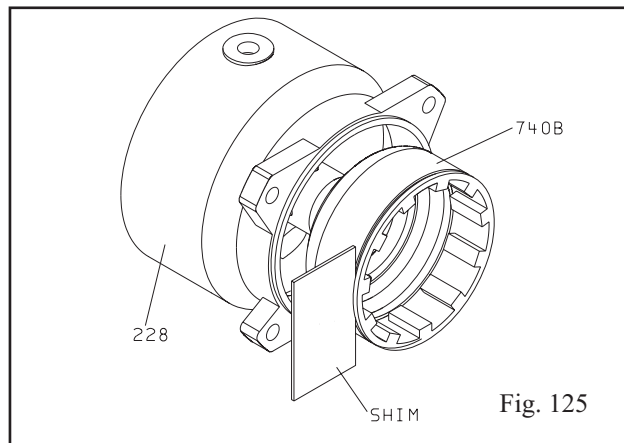
For motor frames 182TC - 256TC expansion plugs are not used.

16. Set C-face motor support (228) on motor. Install 4 screws (371).
17. Slide key (178Y) into motor shaft keyway.

18. Install two set screws (222L) into magnet assembly (740B) (Fig. 124).



19. Install magnet assembly inside the C-face motor support by sliding a 1/8" shim into the groove/ notch located in the side of the magnet assembly. Slowly drop in the magnet assembly until the shim is resting on the face of the C-face motor support (Fig. 125). Reference Fig. 126 for installation dimensions.



20. Rotate the magnet assembly (740B) to line up the key (178Y) with the access hole on the C-face motor support (228). Tighten the first set screw (222L) through the access hole.
21. Remove the shim. Rotate the magnet assembly 90° to access the other set screw. Tighten.

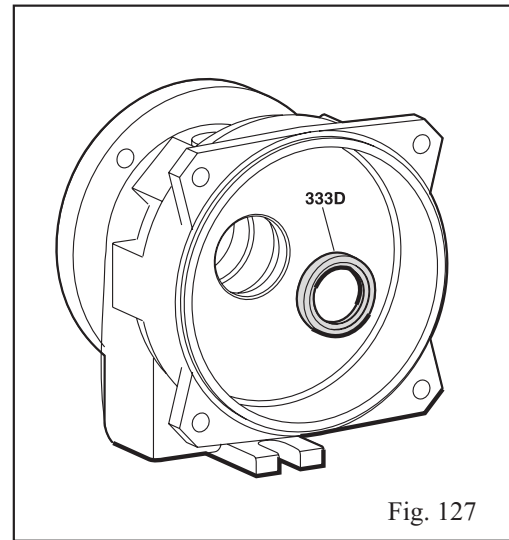
This completes the assembly of a closed coupled drive end. Proceed to Step 24.

Frame Mounted Assembly

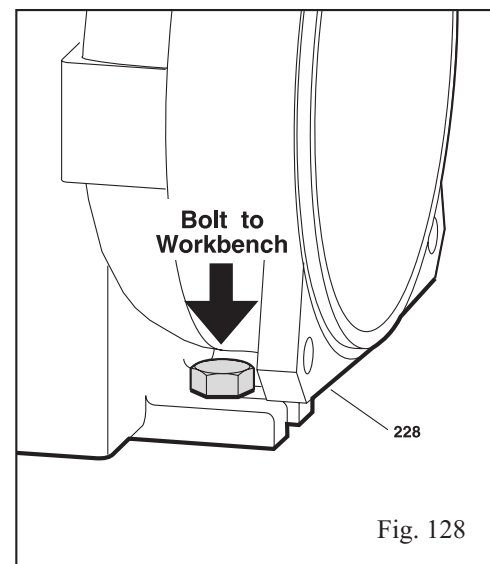
15. Install ball bearings (112) on shaft (122B) at both ends.

NOTE: There are several methods used to install bearings. The preferred method is to use an induction heater that heats as well as demagnetizes the bearings.

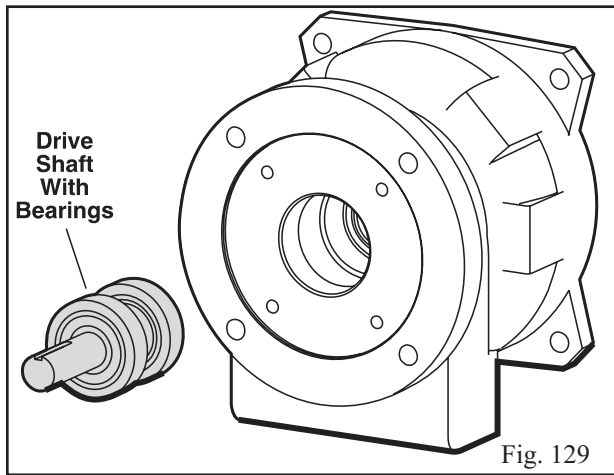
16. Install the lipseal (333D) in bearing frame (228) (Fig. 127).



17. Bolt or clamp bearing frame (228) to work bench (Fig. 128).

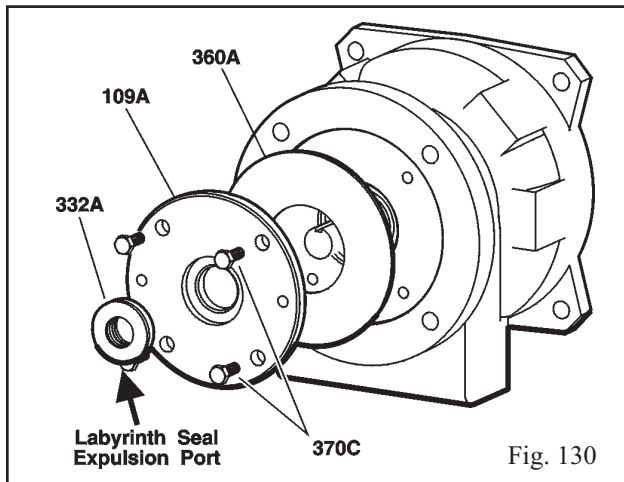


18. Install shaft (122B) with ball bearings (112) into bearing frame (228). The threaded end of the shaft goes toward the magnets (Fig. 129).



NOTE: It may be necessary to lightly press shaft with bearings into the bearing frame (228). It is important to press the bearings in by putting a sleeve on the inner race of the outboard ball bearing.

19. Install bearing end cover gasket (360A) and bearing end cover (109A) with hex cap screws (370C) (Fig. 130).



NOTE: Bolt pattern for the bearing end cover (109A) is not symmetric so the bearing end cover gasket (360A) and bearing end cover (109A) can only go on one way. This ensures that the oil return slot will always be down.

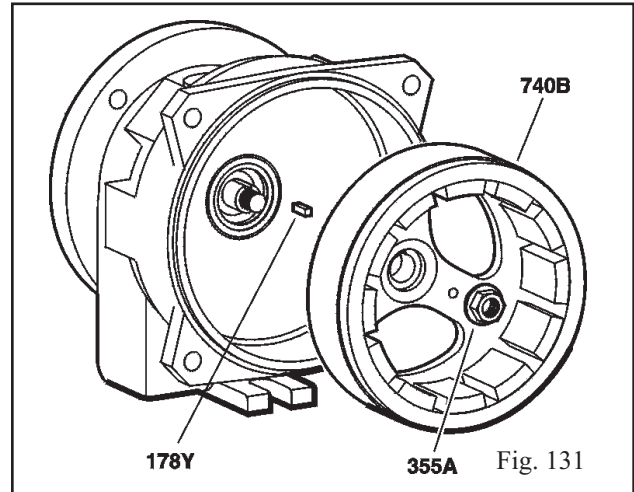
20. Press labyrinth seal (332A) into end cover (109A). Ensure O-rings are in grooves of labyrinth seal. Orient expulsion ports to the 6 o'clock position and press into bearing end cover (109A) until it is shouldered against end cover. No adjustment is necessary.

NOTE: Ensure shaft O-ring, grooves, shaft keyways and keyway in frame are free of burrs.

21. Install key (178Y) on shaft (122B) (Fig. 131).

WARNING
Use non-magnetic socket and wrench to avoid personal injury or damage to parts.

22. Install magnet assembly (740B) onto shaft (122B) (Fig. 131).



CAUTION
Do NOT hammer magnet assembly (740B) on to shaft. This will damage ball bearings (112).

23. Place shaft wrench on drive shaft (122B). Install hex nut (355A). Torque nut per Torque Table 11 in this section.

Final Assembly for Close Coupled and Frame Mounted Versions

24. Install gasket (360W) into the clamp ring (141C).
25. Bolt down C-face support / frame (228) to workbench if not already done so.

WARNING
The magnets contained in this unit are extremely powerful. Serious injury to fingers and hands will result if care is not taken.

26. Slide casing assembly into C-face support / bearing frame assembly by holding casing firmly by the suction flange and suction side of the discharge flange. Keep hands away from clamp ring to avoid pinched fingers. Slowly insert to avoid damage.
27. Secure with four hex cap screws (370B). Tighten.

Rotate shaft by hand to ensure it rotates smoothly and there is no rubbing which could lead to excess heat generation and or sparks.

This completes S group assembly.

3298 M GROUP REASSEMBLY

1. Slide key (178S) into impeller (101). To hold key in place, stake impeller at end of key (Fig. 132). Use a center punch.

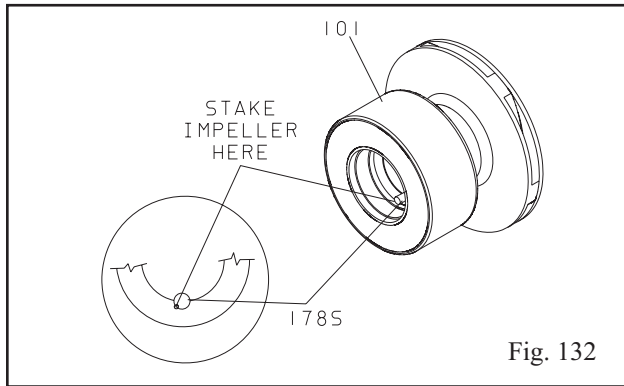


Fig. 132

2. Lubricate the outside of both radial bearings. Press the first radial bearing (197B) into impeller utilizing the bearing installation tool. Support impeller as shown. Line up keyway in bearing with key in impeller (Fig. 133).

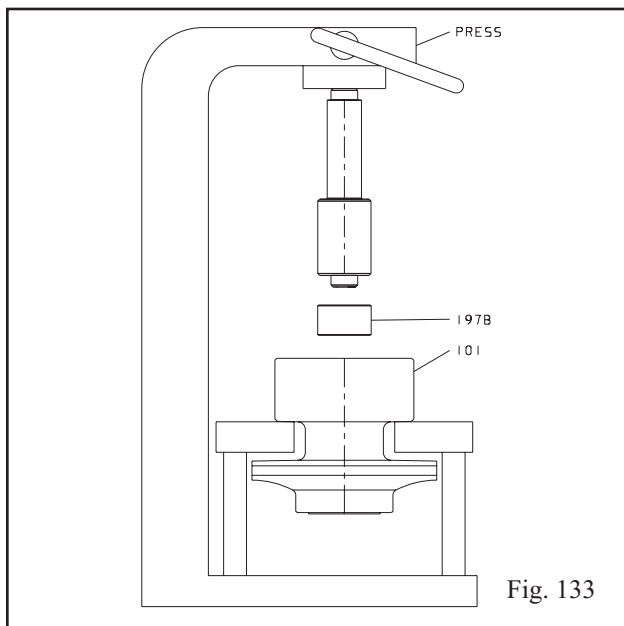


Fig. 133



CAUTION

Use caution when using a hydraulic press as you cannot feel when the bearing hits the bottom of the bore.

NOTE: On occasion, the action of pressing the radial bearings into the impeller may cause some ETFE to peel. If this occurs, press out the bearings, remove any ETFE filings, and then press the bearings back into the impeller.

3. Slide bearing spacer (157A) into impeller (Fig. 134).
4. Press second radial bearing (197B) into impeller (Fig. 134).
5. Press back impeller wear ring (203) into impeller assembly (Fig. 134).
6. Turn impeller over and install impeller thrust bearing (197D). Line up the two slots in the impeller thrust bearing to the two tabs in the impeller (Fig. 134).

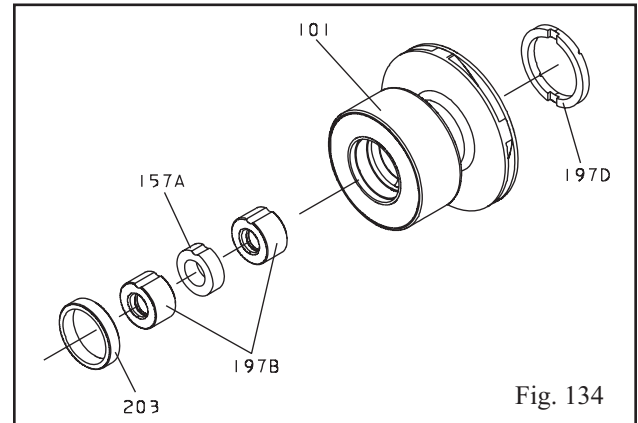


Fig. 134

7. Slide reverse thrust bearing (197C) on shaft (122A).
8. Press shaft (122A) into containment shell (750) (Fig. 135).
9. Coat O-ring (412M) with O-ring lubricant. The lubricant is used to help the O-ring remain in place. Insert O-ring in containment shell (750) (Fig. 135).

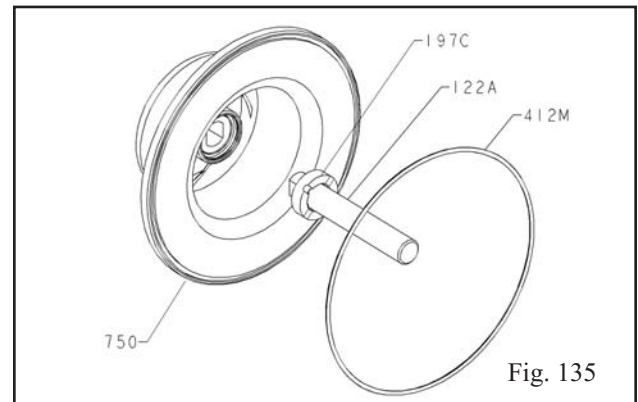
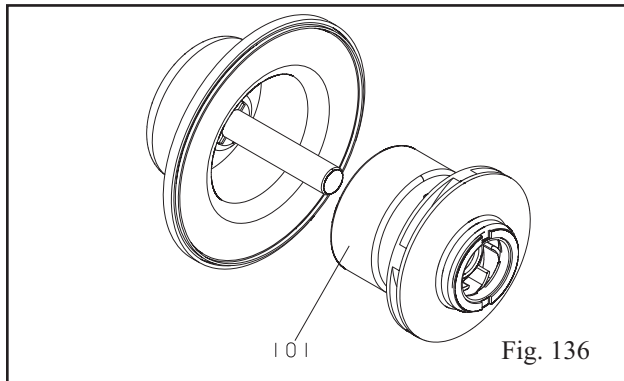
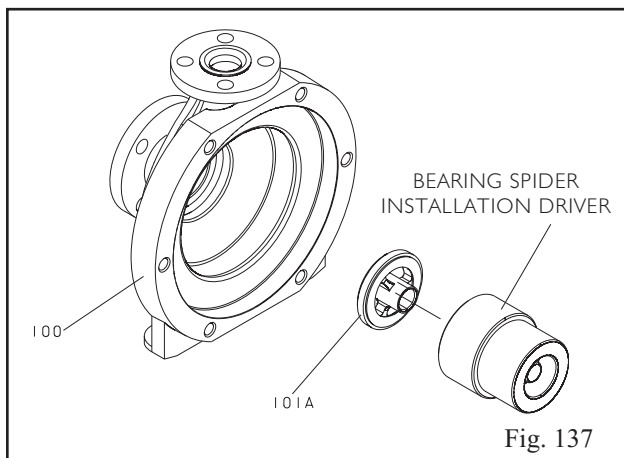


Fig. 135

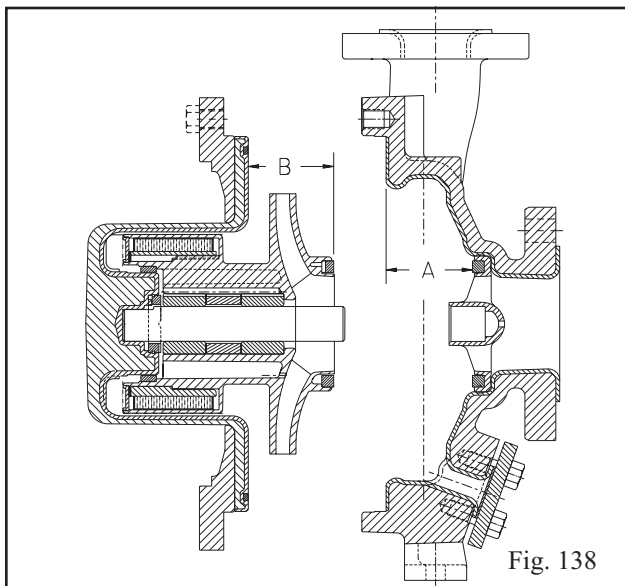
10. Slide impeller assembly (101) onto shaft (Fig. 136).



11. Press spider (101A) into casing (100) with spider tool (Fig. 137).



12. Check rotary assembly total travel. See Fig. 138 below for the appropriate measurements needed. For the M pump, total travel should be 0.020 - 0.105 in. (0.51 - 2.67 mm).



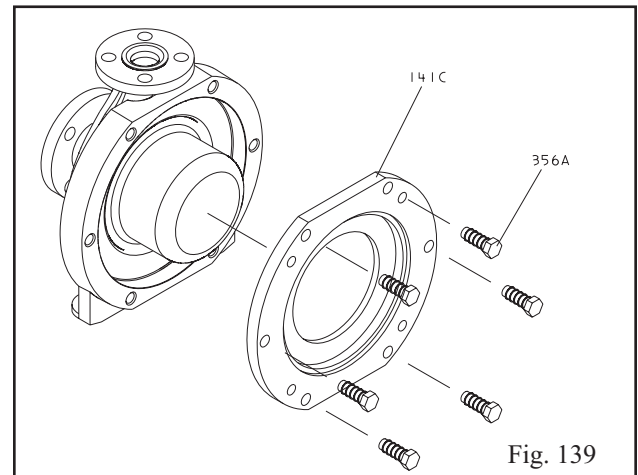
13. Install containment shell / impeller assembly into casing (100). Use care that the O-ring (412M) remains in place.



WARNING

The magnets contained in this unit are extremely powerful. Serious injury to fingers and hands will result if care is not taken.

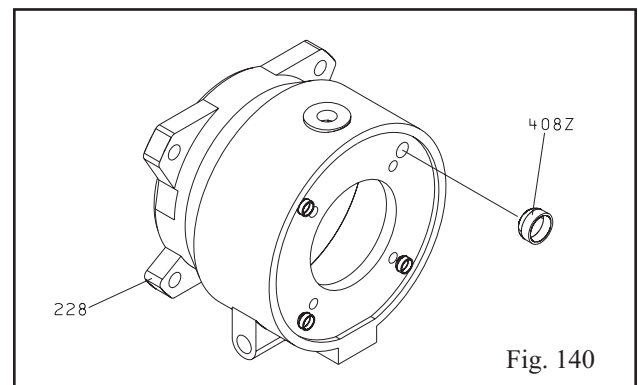
14. Install clamp ring (141C) to casing (100) with eight hex cap screws (356A) (Fig. 139).



15. Set partially built assembly aside well away from attracting metals. Continue assembly with the close coupled or frame mounted version of assembly as described below.

Close Coupled Assembly

16. For motor frames 284TSC - 286TSC install four expansion plugs (408Z) into C-face motor support (228) by tapping on the plug with a 1" rod (Fig. 140).



For motor frames 182TC - 256TC and motor frame 324TSC expansion plugs are not used.

17. Set C-face motor support (228) on motor. Install four screws (371).
18. Slide key (178Y) into motor shaft keyway.

19. Install two set screws (222L) into magnet assembly (740B) (Fig. 141).

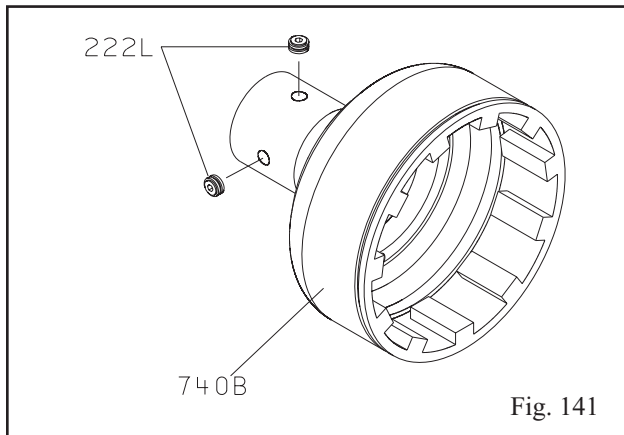


Fig. 141

20. Install magnet assembly inside the C-face motor support by sliding a 1/8" shim into the groove/notch located in the side of the magnet assembly. Slowly drop in the magnet assembly until the shim is resting on the face of the C-face motor support (Fig. 142). Reference Fig. 143 for installation dimensions.

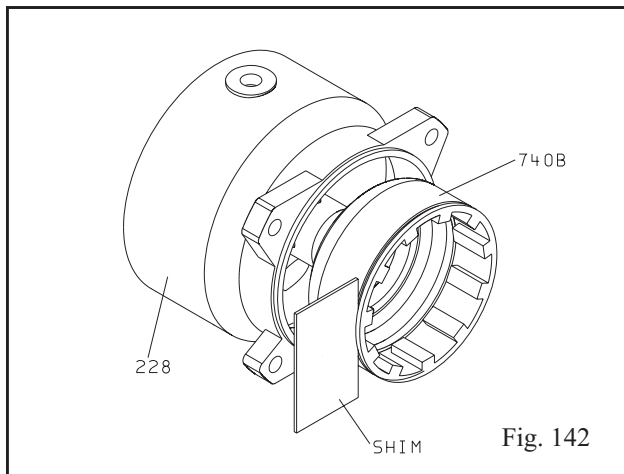


Fig. 142

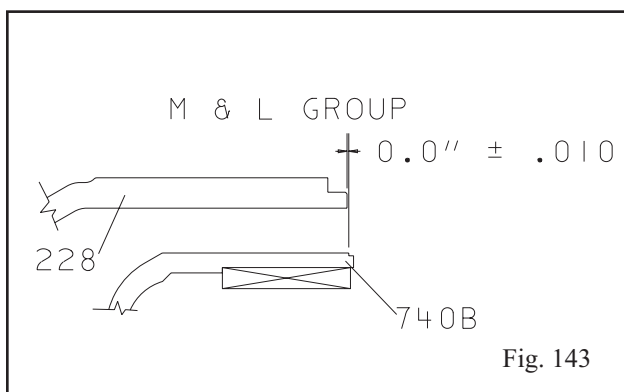


Fig. 143

21. Rotate the magnet assembly (740B) to line up the key (178Y) with the access hole on the C-face motor support (228). Tighten the first set screw (222L) through the access hole.

22. Remove the shim. Rotate the magnet assembly 90° to access the other set screw. Tighten.

This completes the assembly of a closed coupled drive end. Proceed to Step 27.

Frame Mounted Assembly

16. Install ball bearings (112) on shaft (122B) at both ends.

NOTE: There are several methods used to install bearings. The preferred method is to use an induction heater that heats as well as demagnetizes the bearings.

17. Install the lipseal (333D) in bearing frame (228) (Fig. 144).

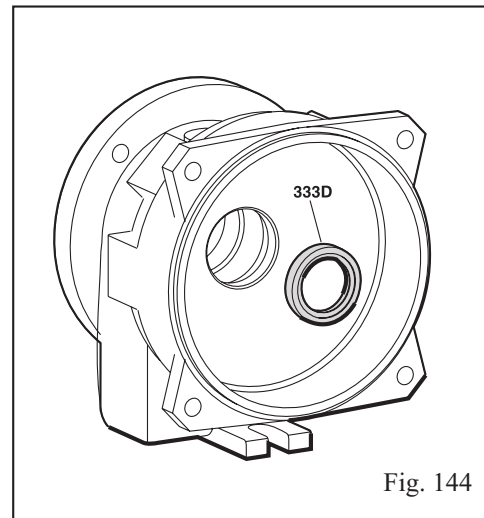


Fig. 144

18. Bolt or clamp bearing frame (228) to work bench (Fig. 145).

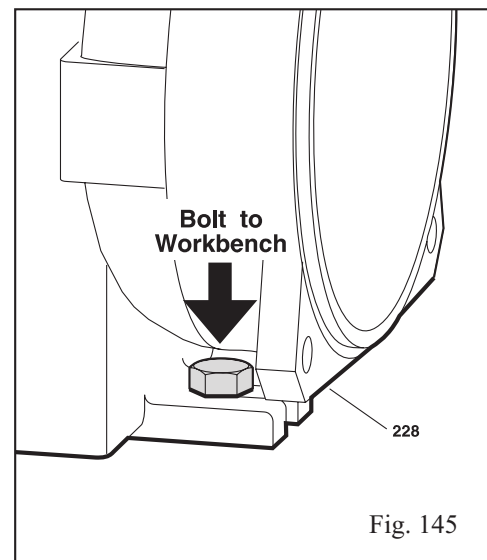
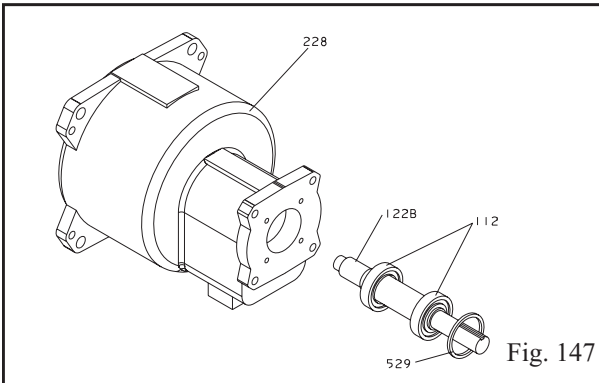
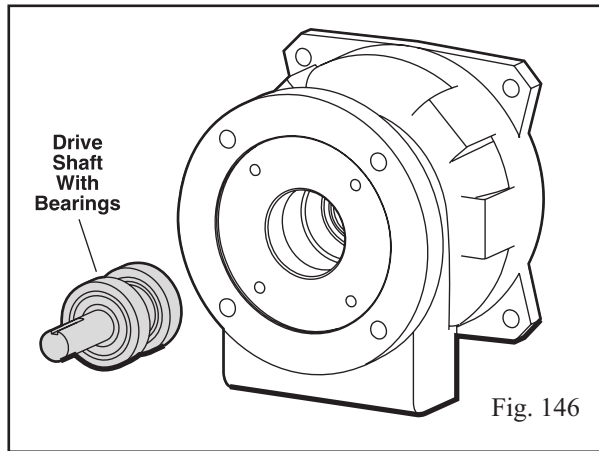


Fig. 145

19. Install shaft (122B) with ball bearings (112) into bearing frame (228). The threaded end of the shaft goes toward the magnets (Fig. 146). Install wave washer (529) (Fig. 147).

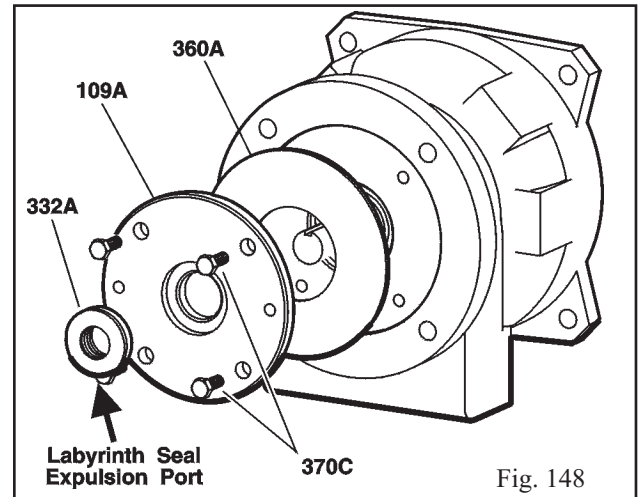


NOTE: It may be necessary to lightly press shaft with bearings into the bearing frame (228). It is important to press the bearings in by putting a sleeve on the inner race of the outboard ball bearing.

20. Install bearing end cover gasket (360A) and bearing end cover (109A) with hex cap screws (370C) (Fig. 148).

NOTE: Bolt pattern for the bearing end cover (109A) is not symmetric so the bearing end cover gasket (360A) and bearing end cover (109A) can only go on one way. This ensures that the oil return slot will always be down.

21. Press labyrinth seal (332A) into end cover (109A). Ensure O-rings are in grooves of labyrinth seal. Orient expulsion ports to the 6 o'clock position and press into bearing end cover (109A) until it is shouldered against end cover. No adjustment is necessary.



NOTE: Ensure shaft O-ring, grooves, shaft keyways and keyway in frame are free of burrs.

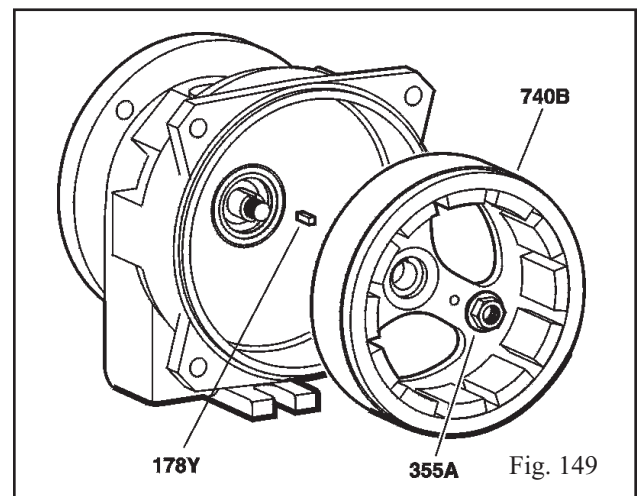
22. Install key (178Y) on shaft (122B) (Fig. 149).



WARNING

Use non-magnetic socket and wrench to avoid personal injury or damage to parts.

23. Install magnet assembly (740B) onto shaft (122B) (Fig. 149).

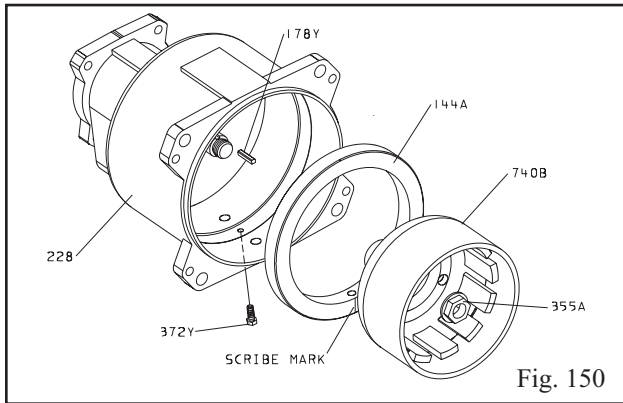


CAUTION

Do NOT hammer magnet assembly (740B) on to shaft. This will damage ball bearings (112).

24. Place shaft wrench on drive shaft (122B). Install hex nut (355A). Tighten nut per Torque Table 11 in this section.

25. Install rub ring (144A) into bearing frame (228). Line up through hole in rub ring with tapped hole in frame (228) by using scribe mark on the rub ring to reference tapped hole in frame. Lightly tap rub ring (144A) with rubber mallet until it shoulders into bearing frame (228) (Fig. 150).



26. Install $\frac{5}{16}$ " hex cap screw (372Y) into bottom of frame (228). This screw will prevent rotation of rub ring (144A) from rotating during pump operation (Fig. 150).

Final Assembly for Close Coupled and Frame Mounted Versions

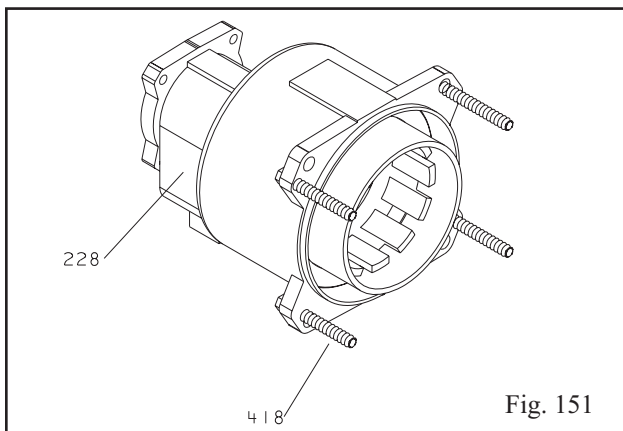
27. Install gasket (360W) into the clamp ring (141C) (Fig. 152).
28. Bolt down C-face support / frame (228) to workbench if not already done so.



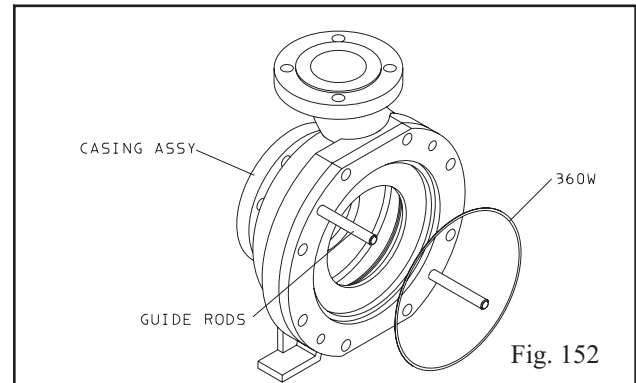
WARNING

The magnets contained in this unit are extremely powerful. Serious injury to fingers and hands will result if care is not taken.

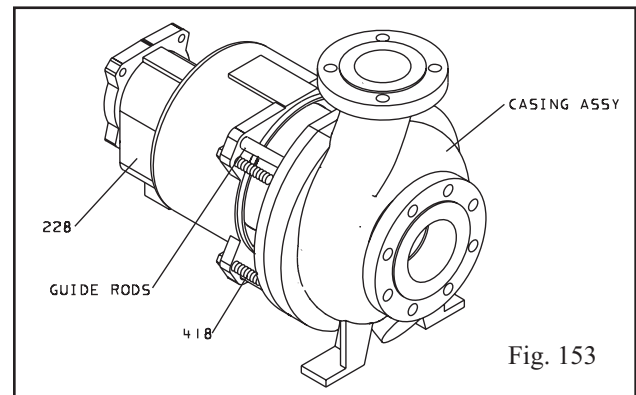
29. Tighten jacking screws (418) until they are fully extended through the C-face support / frame flange (228). Extension from frame should be approximately 3.5 inches (Fig. 151).



30. Install guide rods (Qty = 2, B03189A) into clamp ring (141C). These rods will help guide the casing assembly into C-face support / frame (228) which contains drive magnets (740B) (Fig. 152).



31. Slide casing assembly towards C-face support / bearing frame assembly by holding casing firmly by the suction flange and suction side of the discharge flange.
32. Position casing assembly so that the two guide rods are engaged into two (2) of the C-face support / frame cap screw holes and the jacking screws (418) are in contact with the casing assembly clamp ring (141C) (Fig. 153).



33. Untighten jacking screws (418) and slowly draw casing assembly into C-face support / bearing frame assembly. Keep hands away from clamp ring to avoid pinched fingers.
34. When casing assembly clamp ring fully contacts C-face support / bearing frame assembly, secure with four hex cap screws (370B). Tighten.



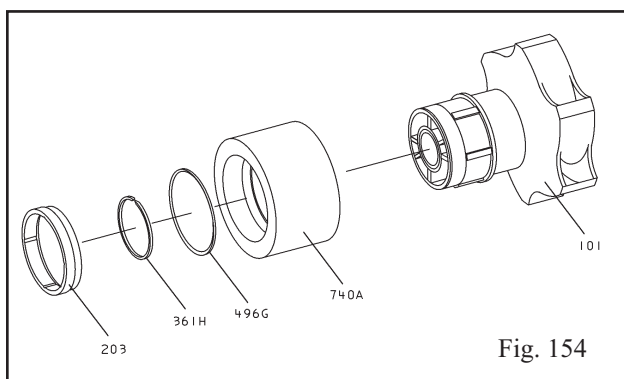
Rotate shaft by hand to ensure it rotates smoothly and there is no rubbing which could lead to excess heat generation and or sparks.

This completes M group assembly.

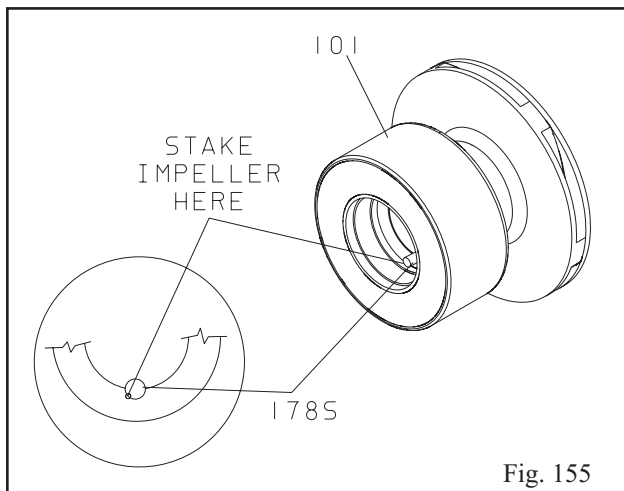
3298 L GROUP REASSEMBLY

1. Install o-ring (496G) into driven magnet assembly (740A).
2. Lubricate o-ring (496G) with Parker o-ring lube or equivalent. Press driven magnet assembly (740A) onto impeller assembly (101). Install retaining ring (361H) into groove in impeller assembly (101) (Fig. 154).

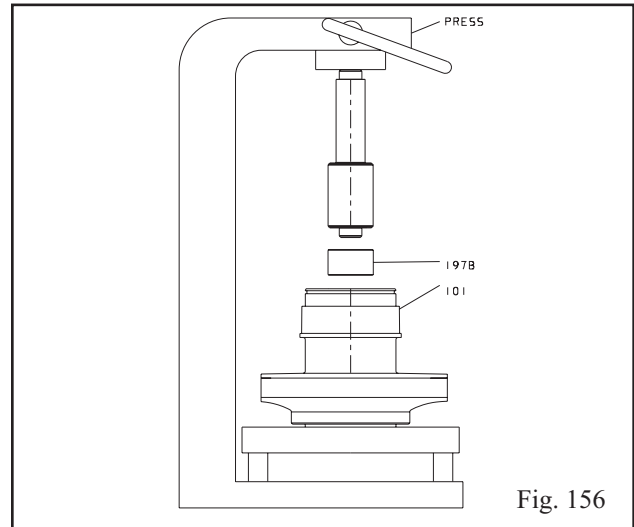
Part	Material	Item	Qty
Retaining Ring	Carbon Fiber Reinforced Tefzel®	361H	1



3. Slide key (178S) into impeller (101). To hold key in place, stake impeller at end of key (Fig. 155). Use a center punch.



4. Lubricate the outside of both radial bearings. Press the first radial bearing (197B) into impeller utilizing the bearing installation tool. Support impeller as shown. Line up keyway in bearing with key in impeller (Fig. 156).

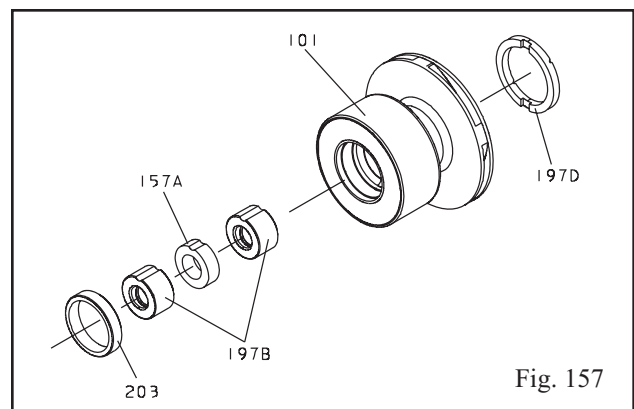


CAUTION

Use caution when using a hydraulic press as you cannot feel when the bearing hits the bottom of the bore.

NOTE: On occasion, the action of pressing the radial bearings into the impeller may cause some ETFE to peel. If this occurs, press out the bearings, remove any ETFE filings, and then press the bearings back into the impeller.

5. Slide bearing spacer (157A) into impeller (Fig. 157).
6. Press second radial bearing (197B) into impeller (Fig. 157).
7. Press back impeller wear ring (203) into impeller assembly (Fig. 157).



8. Slide reverse thrust bearing (197D) on shaft (122A). Press shaft (122A) into containment shell (750).
9. Coat O-ring (412M) with O-ring lubricant. The lubricant is used to help the O-ring remain in place. Insert O-ring in containment shell (750). (Fig. 158).

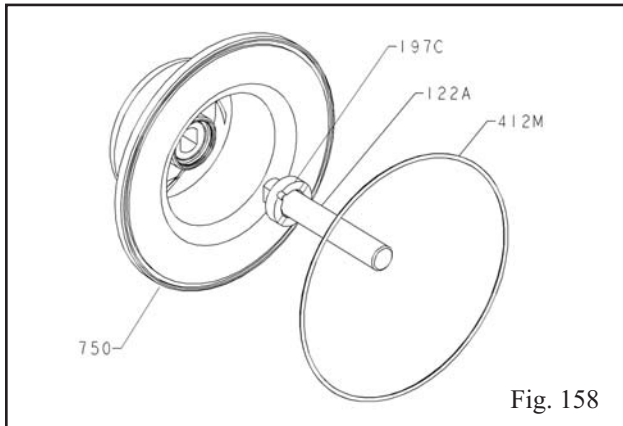


Fig. 158

10. Slide impeller assembly (101) onto shaft (Fig. 159).

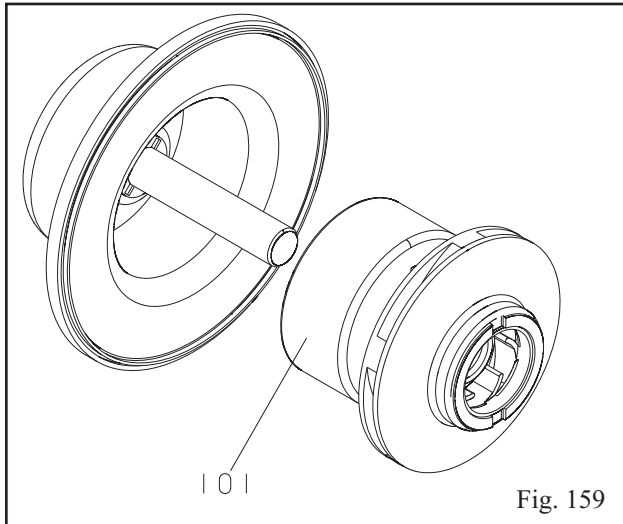


Fig. 159

11. Press spider (101A) into casing (100) with spider tool (Fig. 160).

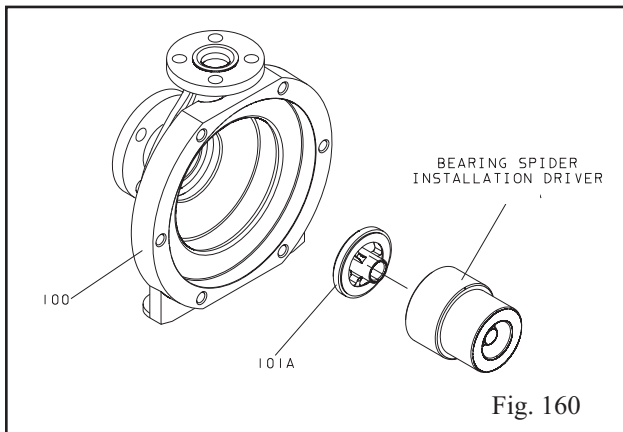


Fig. 160

12. Check rotary assembly total travel. See Fig. 161 for the appropriate measurements needed. For the L pump, total travel is A - B and should be 0.020 - 0.105 in. (0.51 - 2.67 mm)

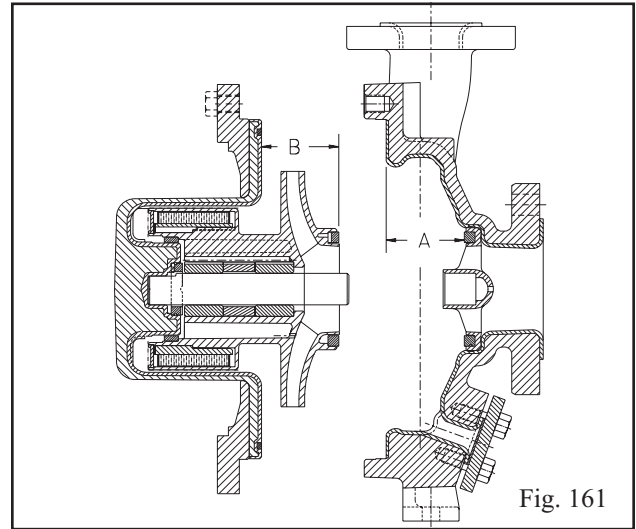


Fig. 161

13. Install containment shell / impeller assembly into casing (100). Use care that the O-ring (412M) remains in place.



WARNING

The magnets contained in this unit are extremely powerful. Serious injury to fingers and hands will result if care is not taken.

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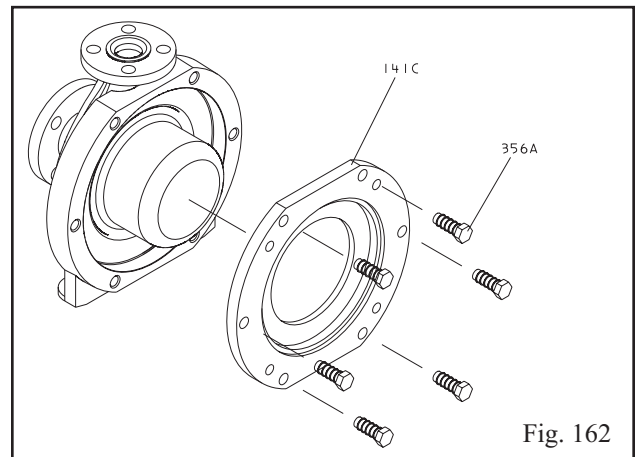
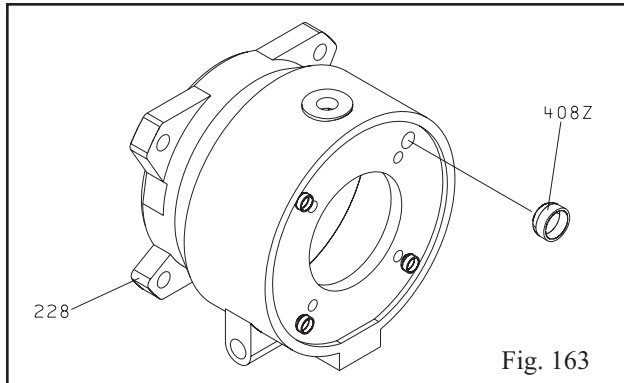


Fig. 162

14. Install clamp ring (141C) to casing (100) with 8 hex cap screws (356A) (Fig. 162).
15. Set partially built assembly aside well away from attracting metals. **Continue assembly with the close coupled or frame mounted version of assembly as described below.**

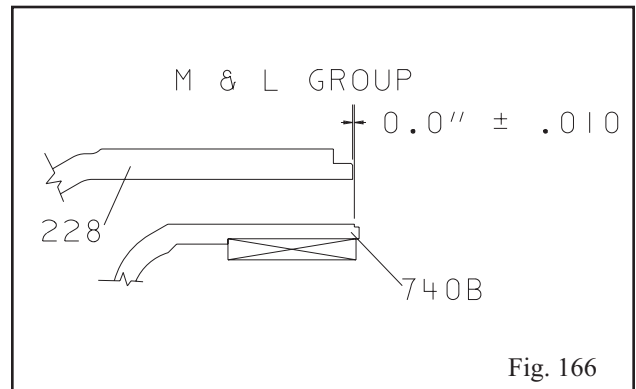
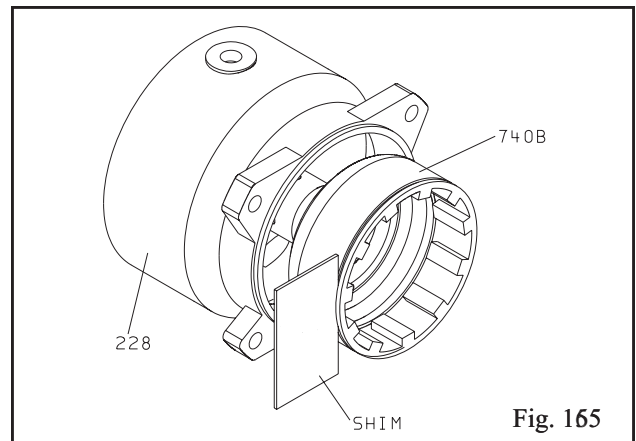
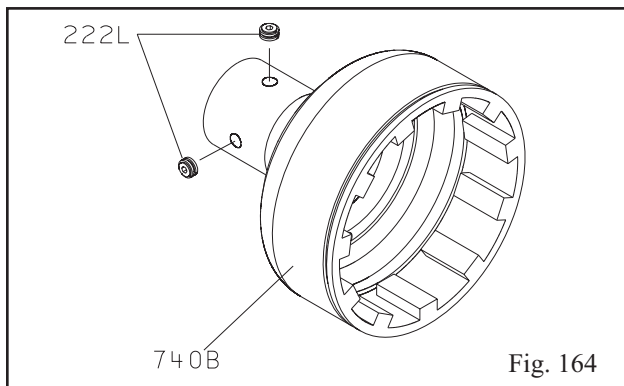
Close Coupled Assembly

16. For motor frames 284TSC - 286TSC install 4 expansion plugs (408Z) into C-face motor support (228) by tapping on the plug with a 1" rod (Fig. 163).



For motor frames 182TC - 256TC and motor frame 324TSC expansion plugs are not used.

17. Set C-face motor support (228) on motor. Install 4 screws (371).
18. Slide key (178Y) into motor shaft keyway.
19. Install 2 set screws (222L) into magnet assembly (740B) (Fig. 164).
20. Install magnet assembly inside the C-face motor support by sliding an 1/8" shim into the groove/notch located in the side of the magnet assembly. Slowly drop in the magnet assembly until the shim is resting on the face of the C-face motor support (Fig. 165). Reference Fig. 166 for installation dimensions.



21. Rotate the magnet assembly (740B) to line up the key (178Y) with the access hole on the C face motor support (228). Tighten the first set screw (222L) through the access hole.
22. Remove the shim. Rotate the magnet assembly 90° to access the other set screw. Tighten.

This completes the assembly of a closed coupled drive end. Proceed to Step 27.

Frame Mounted Assembly

16. Install ball bearings (112) on shaft (122B) at both ends.

NOTE: There are several methods used to install bearings. The preferred method is to use an induction heater that heats as well as demagnetizes the bearings.

17. Install the lipseal (333D) in bearing frame (228) (Fig. 167).

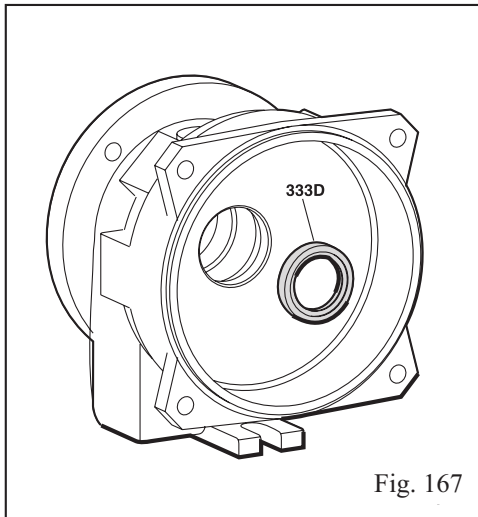


Fig. 167

18. Bolt or clamp bearing frame (228) to work bench (Fig. 168).

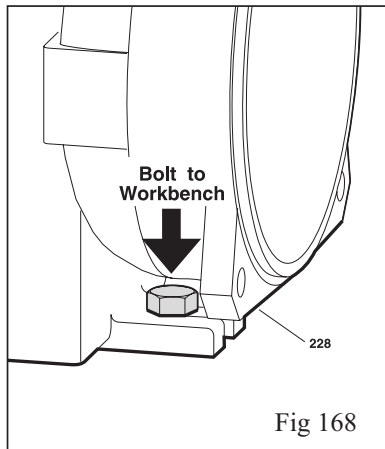


Fig. 168

19. Install shaft (122B) with ball bearings (112) into bearing frame (228). The threaded end of the shaft goes toward the magnets (Fig. 169). Install wave washer (529) (Fig. 170).

NOTE: It may be necessary to lightly press shaft with bearings into the bearing frame (228). It is important to press the bearings in by putting a sleeve on the inner race of the outboard ball bearing.

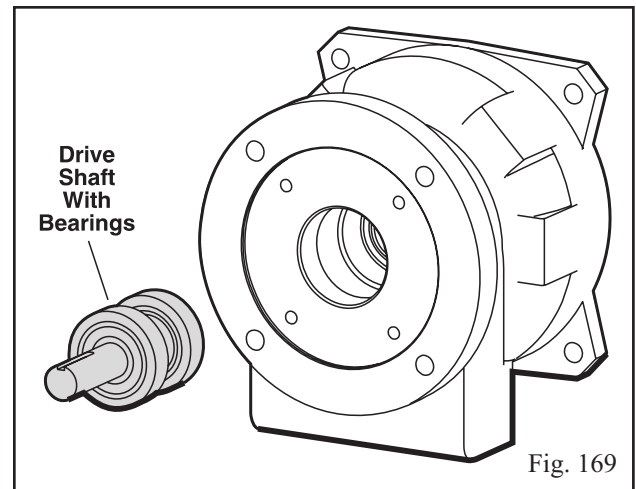


Fig. 169

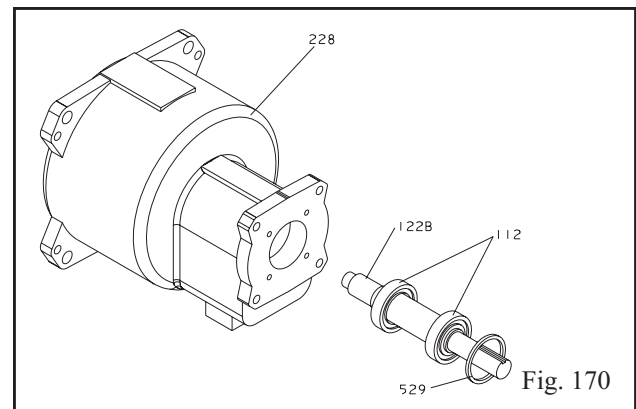


Fig. 170

20. Install bearing end cover gasket (360A) and bearing end cover (109A) with hex cap screws (370C) (Fig. 171).

NOTE: Bolt pattern for the bearing end cover (109A) is not symmetric so the bearing end cover gasket (360A) and bearing end cover (109A) can only go on one way. This ensures that the oil return slot will always be down.

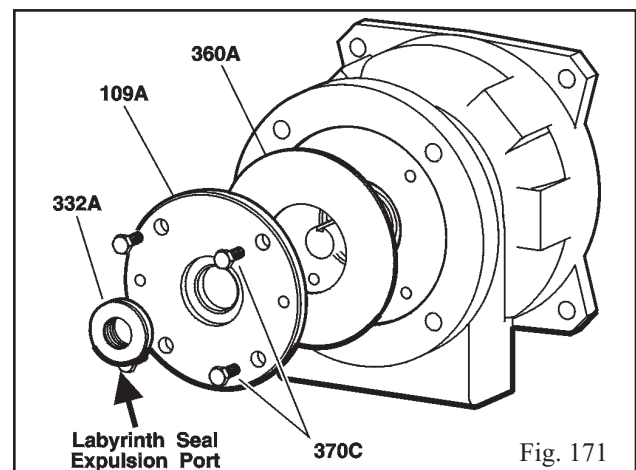


Fig. 171

21. Press labyrinth seal (332A) into end cover (109A). Ensure O-rings are in grooves of labyrinth seal. Orient expulsion ports to the 6 o'clock position and press into bearing end cover (109A) until it is shouldered against end cover. No adjustment is necessary.

NOTE: Ensure shaft O-ring, grooves, shaft keyways, and keyway in frame are free of burrs.

22. Install key (178Y) on shaft (122B) (Fig. 172).



WARNING

Use non-magnetic socket and wrench to avoid personal injury or damage to parts.

23. Install magnet assembly (740B) onto shaft (122B) (Fig. 172).

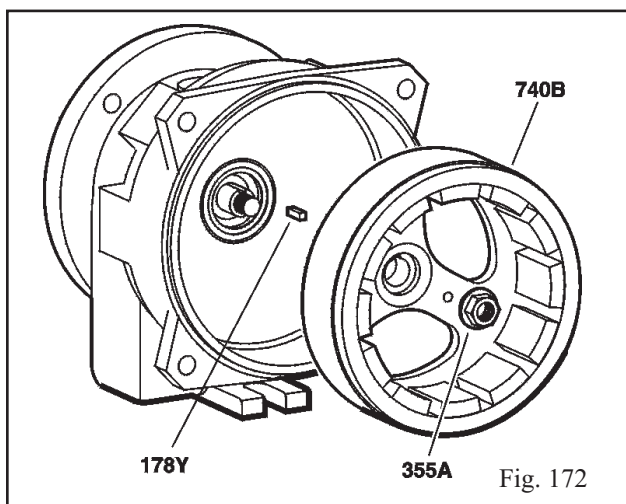


Fig. 172



CAUTION

Do NOT hammer magnet assembly (740B) on to shaft. This will damage ball bearings (112).

24. Place shaft wrench on drive shaft (122B). Install hex nut (355A). Torque nut per Torque Table 11 in this section.
25. Install rub ring (144A) into bearing frame (228). Line up through hole in rub ring with tapped hole in frame (228) by using scribe mark on the rub ring to reference tapped hole in frame. Lightly tap rub ring (144A) with rubber mallet until it shoulders into bearing frame (228) (Fig. 173).

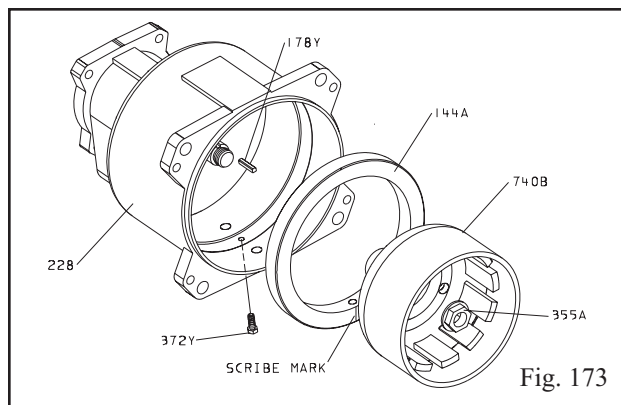


Fig. 173

26. Install $\frac{5}{16}$ " hex cap screw (372Y) into bottom of frame (228). This screw will prevent rotation of rub ring (144A) from rotating during pump operation (Fig. 173).

Final Assembly for Close Coupled and Frame Mounted Versions

27. Install gasket (360W) into the clamp ring (141C) (Fig. 175).
28. Bolt down C-face support / frame (228) to work bench if not already done so.



WARNING

The magnets contained in this unit are extremely powerful. Serious injury to fingers and hands will result if care is not taken.

29. Tighten jacking screws (418) until they are fully extended through the C-face support / frame flange (228). Extension from frame should be approximately 3.5 inches (Fig. 174).

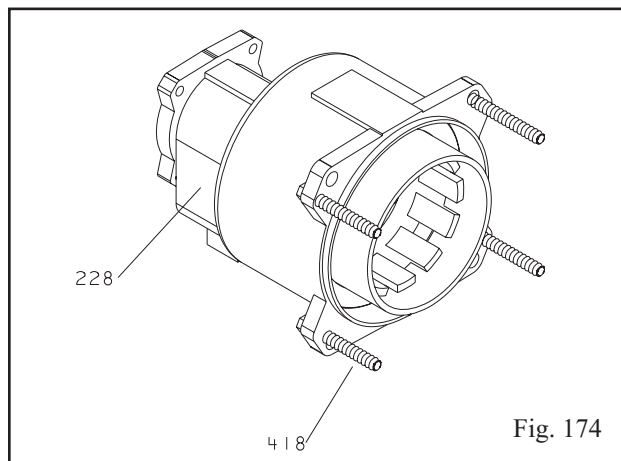
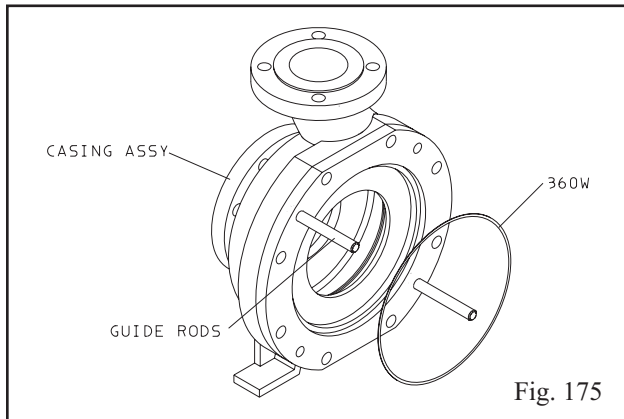
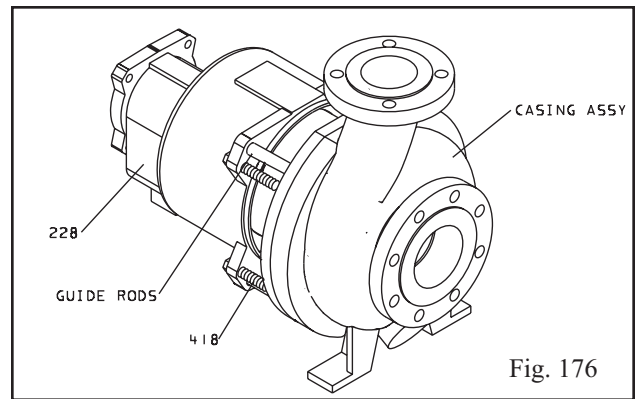


Fig. 174

30. Install guide rods (Qty = 2, B03189A) into clamp ring (141C). These rods will help guide the casing assembly into C-face support/frame (228) which contains drive magnets (740B) (Fig. 175).



31. Slide casing assembly towards C-face support/bearing frame assembly by holding casing firmly by the suction flange and suction side of the discharge flange.
32. Position casing assembly so that the two guide rods are engaged into two (2) of the C-face support/frame cap screw holes and the jacking screws (418) are in contact with the casing assembly clamp ring (141C) (Fig. 176).



33. Untighten jacking screws (418) and slowly draw casing assembly into C-face support/bearing frame assembly. Keep hands away from clamp ring to avoid pinched fingers.
34. When casing assembly clamp ring fully contacts C-face support/bearing frame assembly, secure with four hex cap screws (370B). Tighten.



Rotate shaft by hand to ensure it rotates smoothly and there is no rubbing which could lead to excess heat generation and or sparks.

This completes L group assembly.

SP 3298 REASSEMBLY

S GROUP REASSEMBLY

1. Slide key (178S) into impeller (101). To hold key in place, stake impeller at end of key (Fig. 177). Use a center punch.

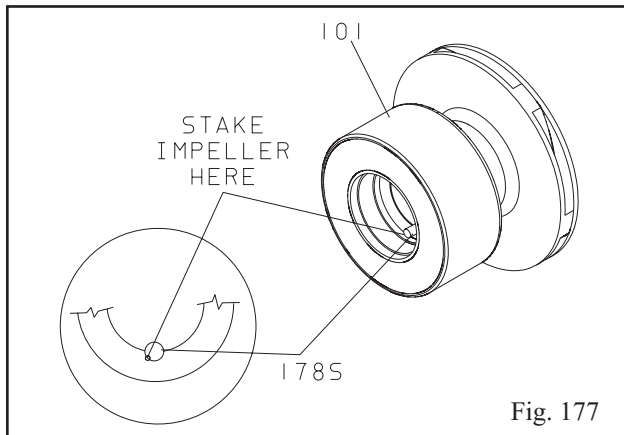


Fig. 177

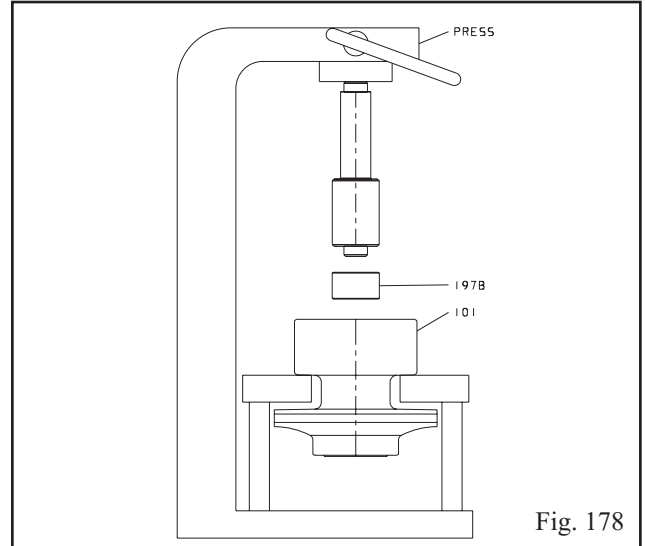


Fig. 178

2. Lubricate the outside of both radial bearings. Press the first radial bearing (197B) into impeller using the bearing installation tool. Support the impeller as shown. Line up keyway in bearing with key in the impeller (Fig. 178).



CAUTION

Use caution when using a hydraulic press as you cannot feel when the bearing hits the bottom of the bore.

NOTE: *On occasion, the action of pressing the radial bearings into the impeller may cause some ETFE to peel. If this occurs, press out the bearings, remove any ETFE filings, and then press the bearings back into the impeller.*

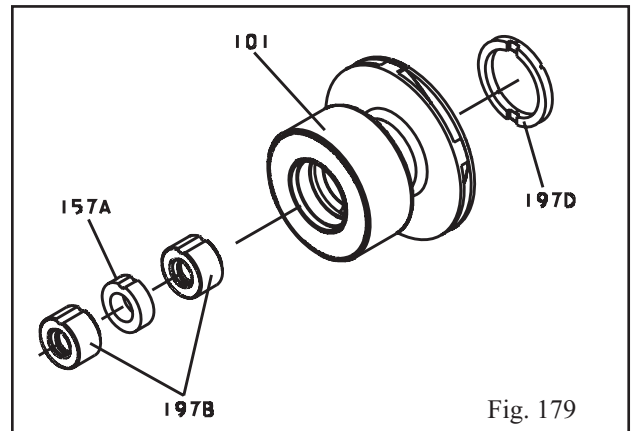


Fig. 179

3. Slide bearing spacer (157A) into impeller (Fig. 179).
4. Press second radial bearing (197B) into impeller (Fig. 179).
5. Turn impeller over and install impeller thrust bearing (197D) lining up tab (Fig. 179).
6. Slide reverse thrust bearing (197C) on shaft (122A).
7. Press shaft (122A) into containment shell (750).

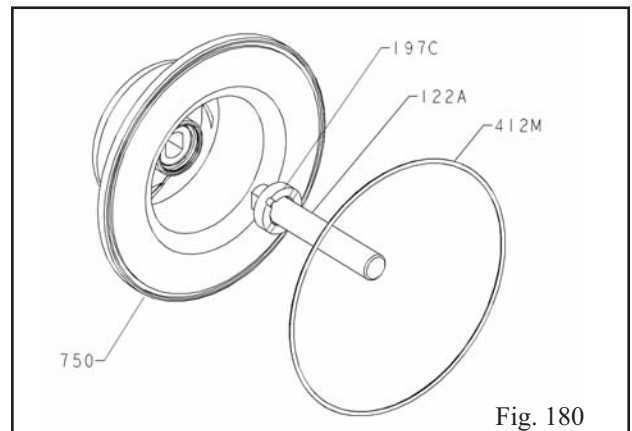


Fig. 180

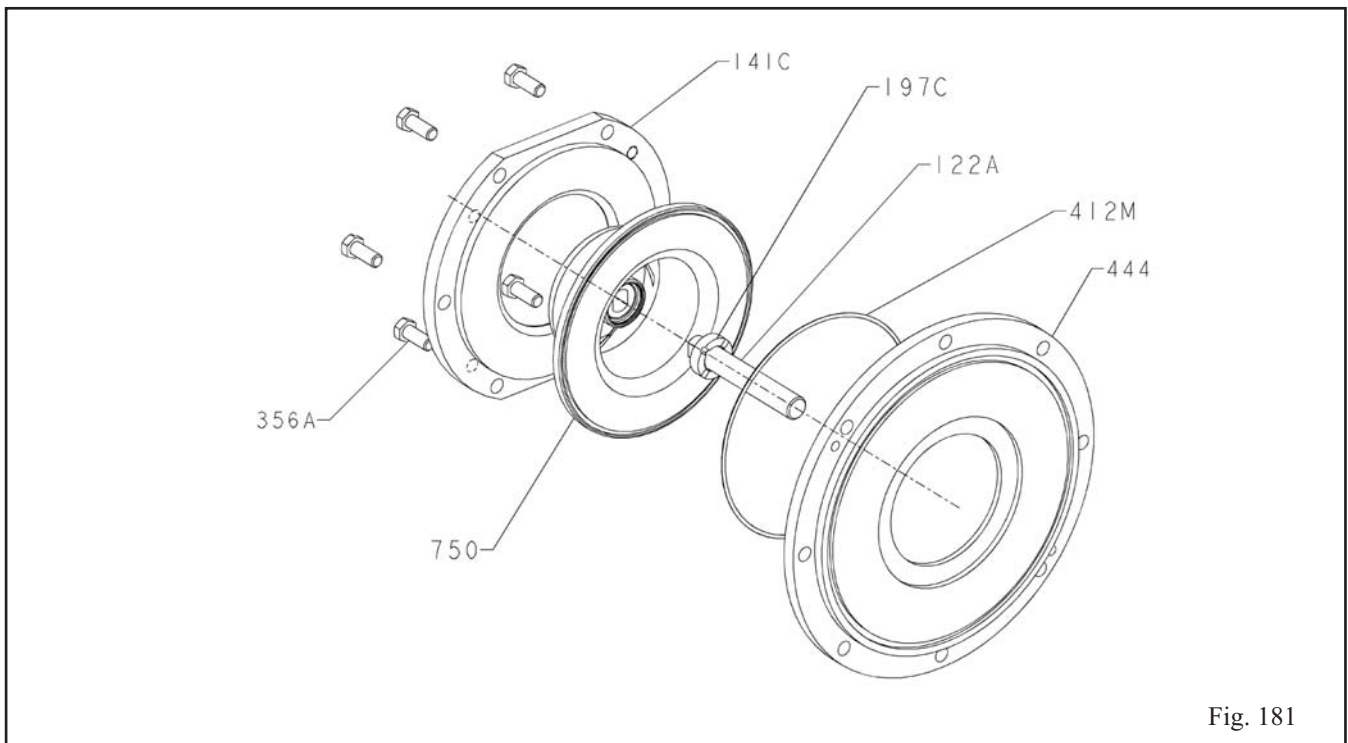


Fig. 181

8. Coat O-ring (412M) with O-ring lubricant. The lubricant is used to help the O-ring remain in place. Insert O-ring in containment shell (Fig. 180).
9. Place backplate (444) face down on work surface.
10. Place containment shell with reverse thrust bearing in backplate. Place clamp ring (141C) over containment shell and secure with clamp ring bolts (356A) (Fig. 181).
11. Coat O-ring (412V) with O-ring lubricant. The lubricant is used to help the O-ring remain in place. Insert O-ring in backplate.



WARNING

The magnets contained in this unit are extremely powerful. Serious injury to fingers and hands will result if care is not taken.

12. Slide impeller assembly (101) onto shaft (Fig. 182).

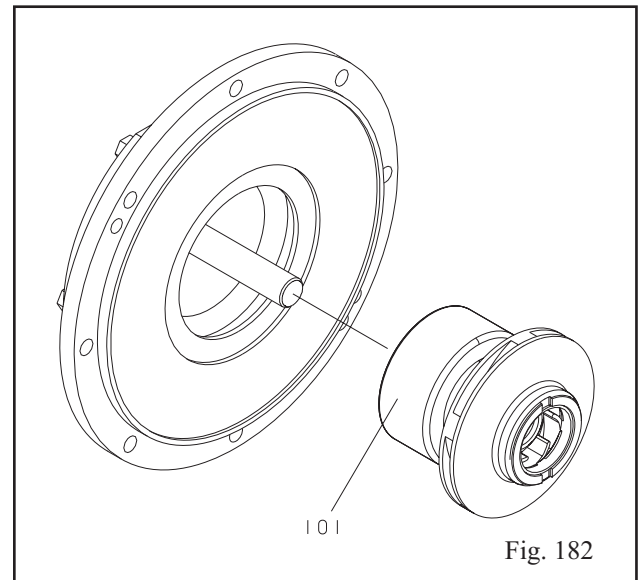


Fig. 182

14. Press spider (101A) into volute insert (100U) with spider tool (Fig. 183).
15. Press volute insert with spider into the casing (100) (Fig. 183).



CAUTION

Ensure volute insert is oriented such that the cut-water (tongue) is up. If installed incorrectly, pump will not prime and could cause pump failure.

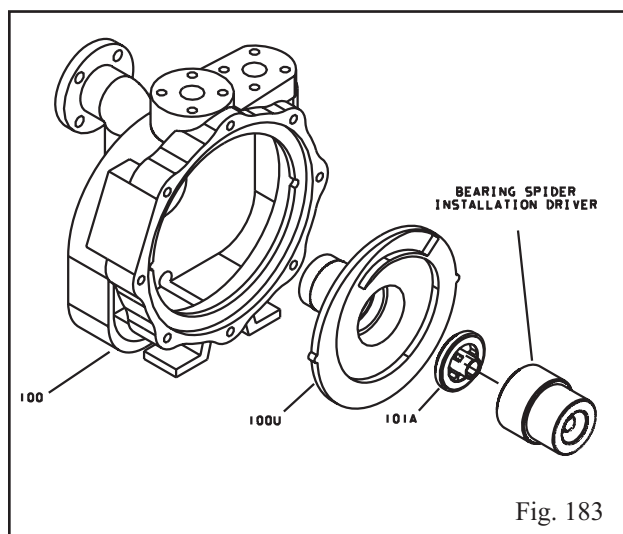


Fig. 183

16. Check rotary assembly total travel. See Fig. 184 below for the appropriate measurements needed. Total travel is A - B and should be .013 - .100 in. (0.33-2.5 mm).

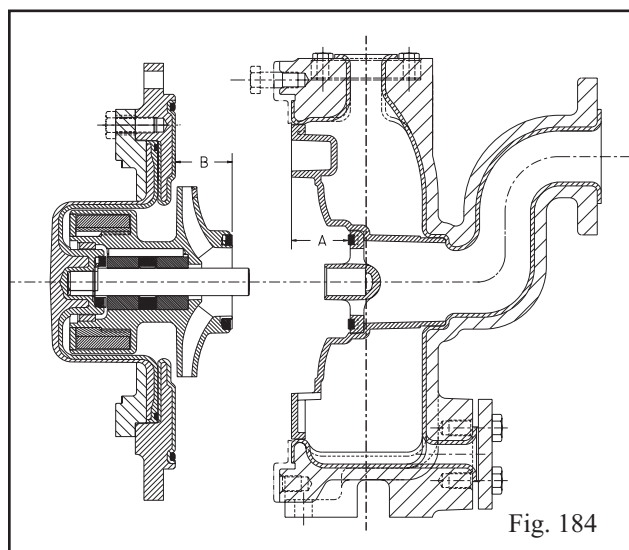


Fig. 184

17. Install containment shell / clamp ring / impeller / backplate assembly into the casing assembly and secure with casing bolts (372V) (Fig. 185).

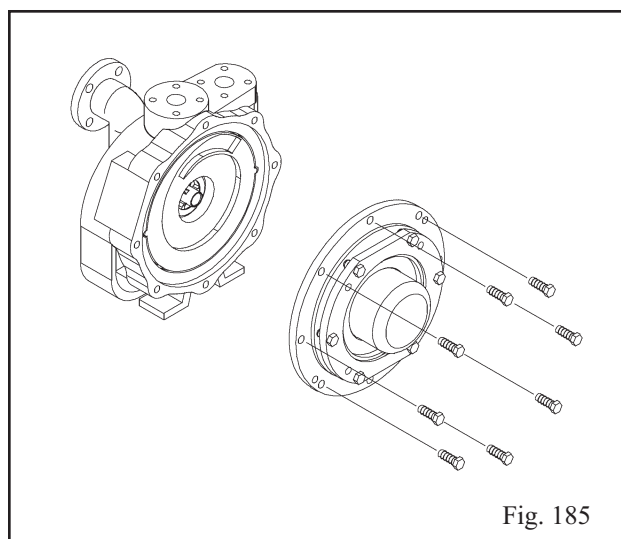


Fig. 185



WARNING

The magnets contained in this unit are extremely powerful. Serious injury to fingers and hands will result if care is not taken.

18. Set partially built assembly aside well away from attracting metals. **Continue assembly with the close coupled or frame mounted version of assembly as described below.**

Close Coupled Assembly

19. For use with 143TC/145TC motor frames. Install four expansion plugs (408Z) into C-face motor support (228) by tapping on the plug with a 5/8" rod (Fig. 186).

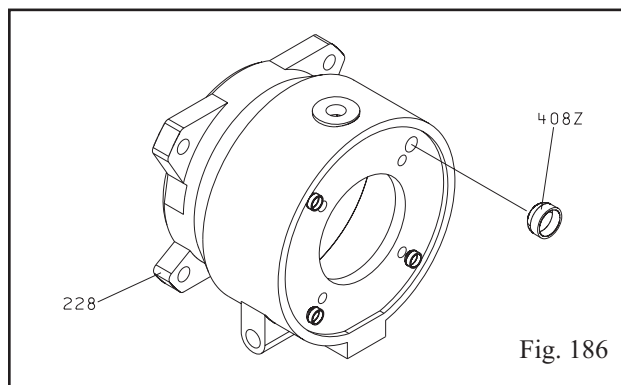
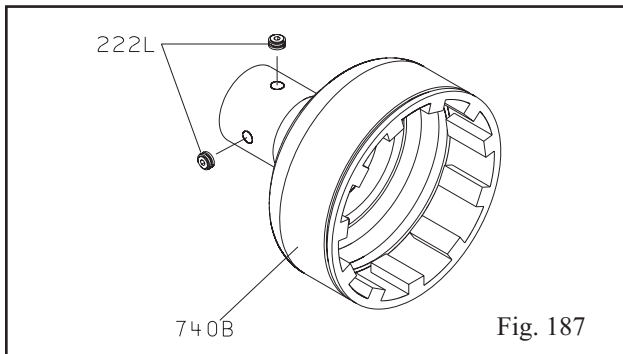


Fig. 186

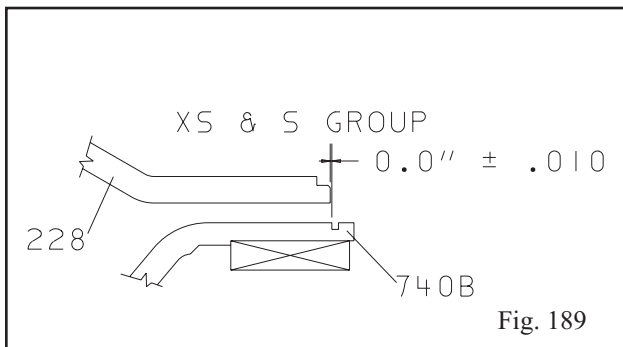
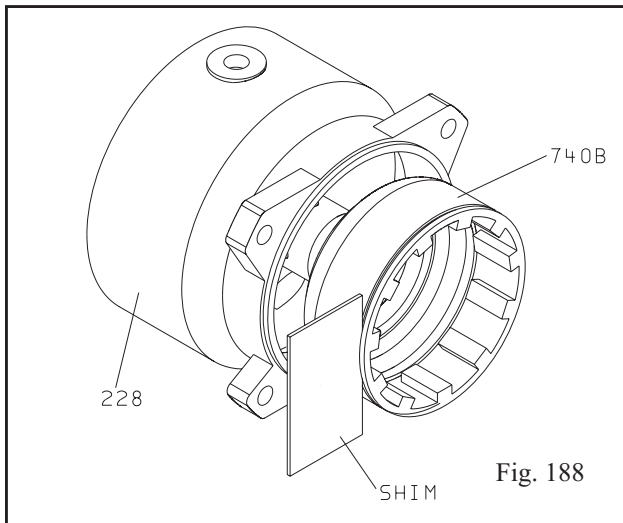
For motor frames 182TC - 256TC expansion plugs are not used.

20. Set C-face motor support (228) on motor. Install four screws (371).
21. Slide key (178Y) into motor shaft keyway.

22. Install two set screws (222L) into magnet assembly (740B) (Fig. 187).



23. Install magnet assembly inside the C-face motor support by sliding a 1/8" shim into the groove/notch located in the side of the magnet assembly. Slowly drop in the magnet assembly until the shim is resting on the face of the C-face motor support (Fig. 188). Reference Fig. 189 for installation dimensions.



24. Rotate the magnet assembly (740B) to line up the key (178Y) with the access hole on the C-face motor support (228). Tighten the first set screw (222L) through the access hole.
25. Remove the shim. Rotate the magnet assembly 90° to access the other set screw. Tighten.

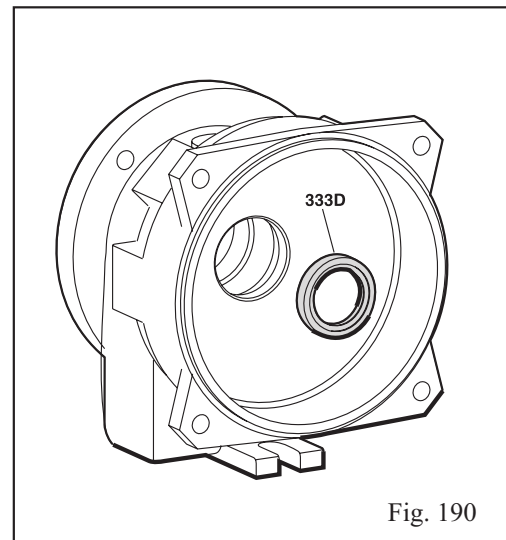
This completes the assembly of a closed coupled drive end. Proceed to Step 28.

Frame Mounted Assembly

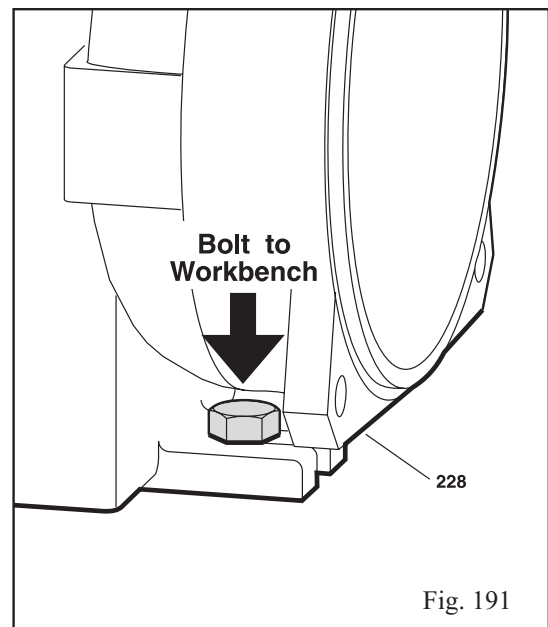
19. Install ball bearings (112) on shaft (122B) at both ends.

NOTE: There are several methods used to install bearings. The preferred method is to use an induction heater that heats as well as demagnetizes the bearings.

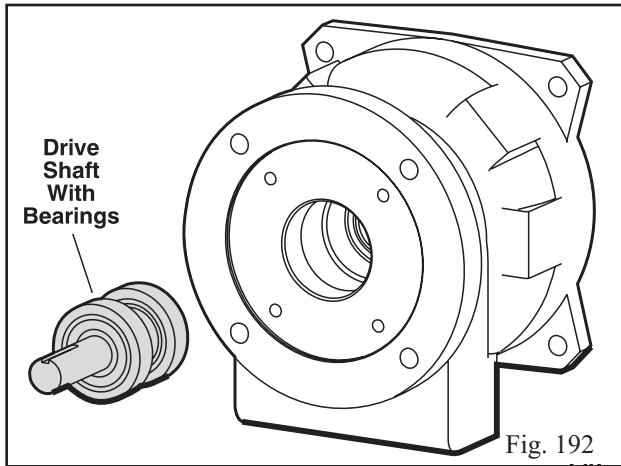
20. Install the lipseal (333D) in bearing frame (228) (Fig. 190).



21. Bolt or clamp bearing frame (228) to work bench (Fig. 191).

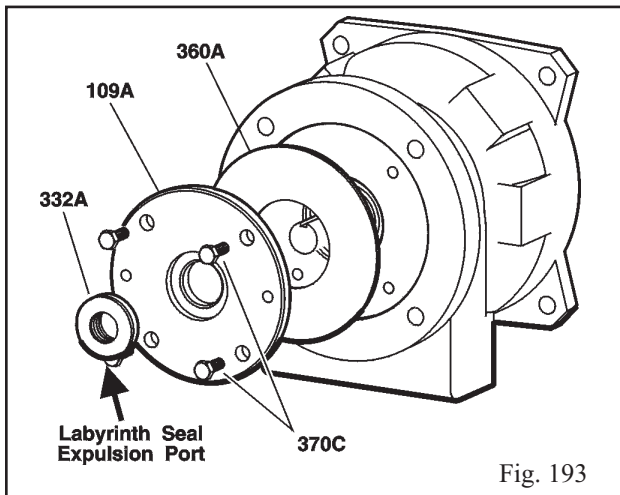


22. Install shaft (122B) with ball bearings (112) into bearing frame (228). The threaded end of the shaft goes toward the magnets (Fig. 192).



NOTE: It may be necessary to lightly press shaft with bearings into the bearing frame (228). It is important to press the bearings in by putting a sleeve on the inner race of the outboard ball bearing.

23. Install bearing end cover gasket (360A) and bearing end cover (109A) with hex cap screws (370C) (Fig. 193).



NOTE: Bolt pattern for the bearing end cover (109A) is not symmetric so the bearing end cover gasket (360A) and bearing end cover (109A) can only go on one way. This ensures that the oil return slot will always be down.

24. Press Labyrinth seal (332A) into end cover (109A). Ensure O-rings are in grooves of labyrinth seal. Orient expulsion ports to the 6 o'clock position and press into bearing end cover (109A) until it is shouldered against end cover. No adjustment is necessary.

NOTE: Ensure shaft O-ring, grooves, shaft keyways and keyway in frame are free of burrs.

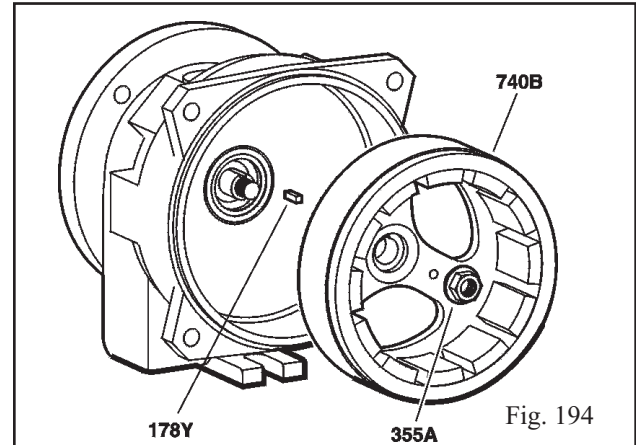
25. Install key (178Y) on shaft (122B) (Fig. 194).



WARNING

Use non-magnetic socket and wrench to avoid personal injury or damage to parts.

26. Install magnet assembly (740B) onto shaft (122B) (Fig. 194).



CAUTION

Do NOT hammer magnet assembly (740B) on to shaft. This will damage ball bearings (112).

27. Place shaft wrench on drive shaft (122B). Install hex nut (355A). Torque nut per Torque Table 11 in this section.

Final Assembly for Close Coupled and Frame Mounted Versions

28. Install gasket (360W) into the clamp ring (141C).
29. Bolt down C-face support/frame (228) to workbench if not already done so.



WARNING

The magnets contained in this unit are extremely powerful. Serious injury to fingers and hands will result if care is not taken.

30. Slide casing assembly into C-face support/bearing frame assembly by holding casing firmly by the suction flange and suction side of the discharge flange. Keep hands away from clamp ring to avoid pinched fingers. Slowly insert to avoid damage.
31. Secure with four hex cap screws (370B). Tighten.

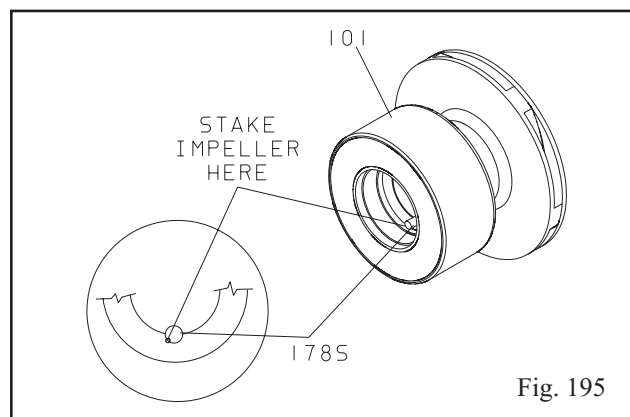


Rotate shaft by hand to ensure it rotates smoothly and there is no rubbing which could lead to excess heat generation and or sparks.

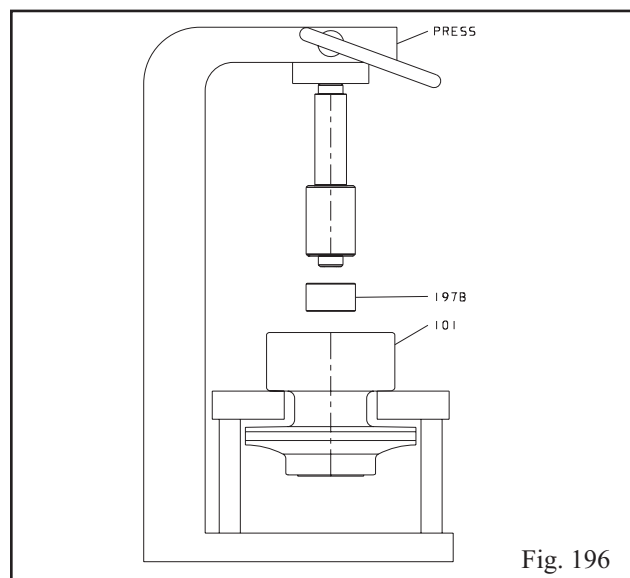
This completes S group assembly.

V 3298 GROUP REASSEMBLY

1. Slide key (178S) into impeller (101). To hold key in place, stake impeller at end of key (Fig. 195). Use a center punch.



2. Lubricate the outside of both radial bearings. Press the first radial bearing (197B) into impeller utilizing the bearing installation tool. Support impeller as shown. Line up keyway in bearing with key in impeller (Fig. 196).

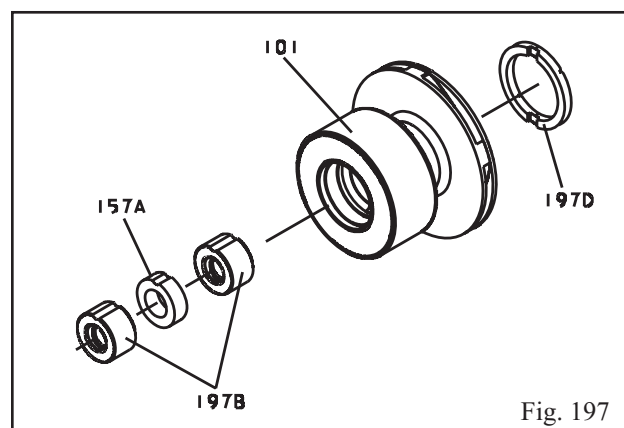


CAUTION

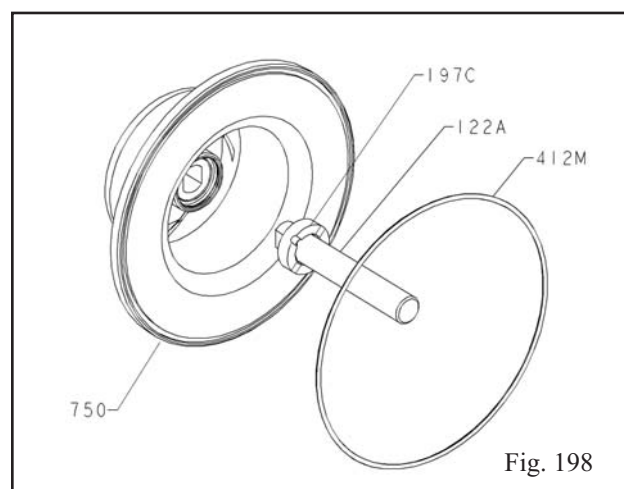
Use caution when using a hydraulic press as you cannot feel when the bearing hits the bottom of the bore.

NOTE: *On occasion, the action of pressing the radial bearings into the impeller may cause some ETFE to peel. If this occurs, press out the bearings, remove any ETFE filings, and then press the bearings back into the impeller.*

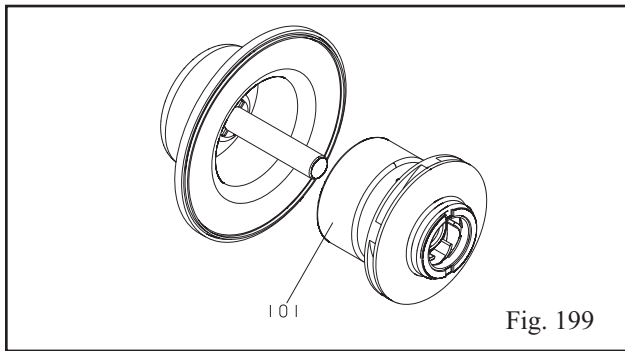
3. Slide bearing spacer (157A) into impeller (Fig. 197).
4. Press second radial bearing (197B) into impeller (Fig. 197).
5. Turn impeller over and install impeller thrust bearing (197D) lining up tab (Fig. 197).



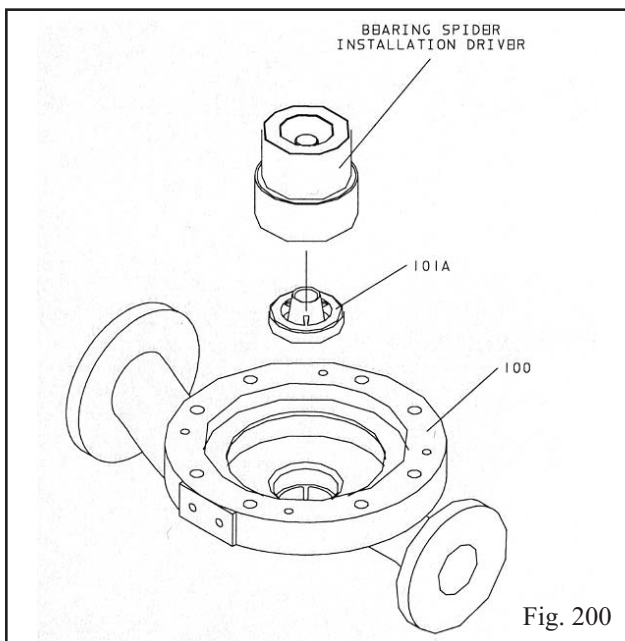
6. Slide reverse thrust bearing (197C) on shaft (122A). Press shaft (122A) into containment shell (Fig. 198).
7. Coat O-ring (412M) with O-ring lubricant. The lubricant is used to help the O-ring remain in place. Insert O-ring in containment shell (750) (Fig. 198).



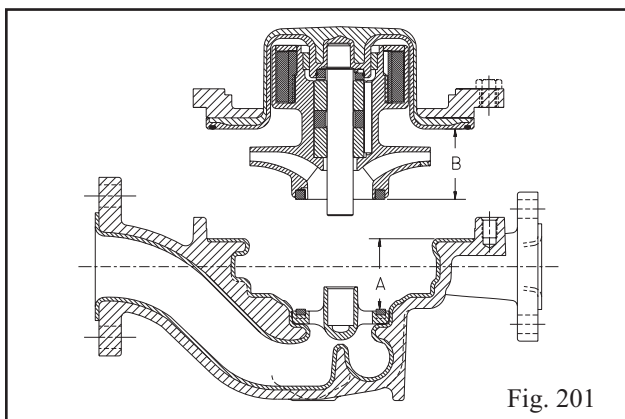
8. Slide impeller assembly (101) onto shaft (Fig. 199).



9. Press spider (101A) into casing (100) with spider tool (Fig. 200).



10. Check rotary assembly total travel. See Fig. 201 for the appropriate measurements needed. Total travel is A - B and should be within the following limits: S pumps 0.013 - 0.100 in. (0.33 - 2.5mm), and M pumps 0.020 - 0.105 in. (0.51 - 2.67mm).



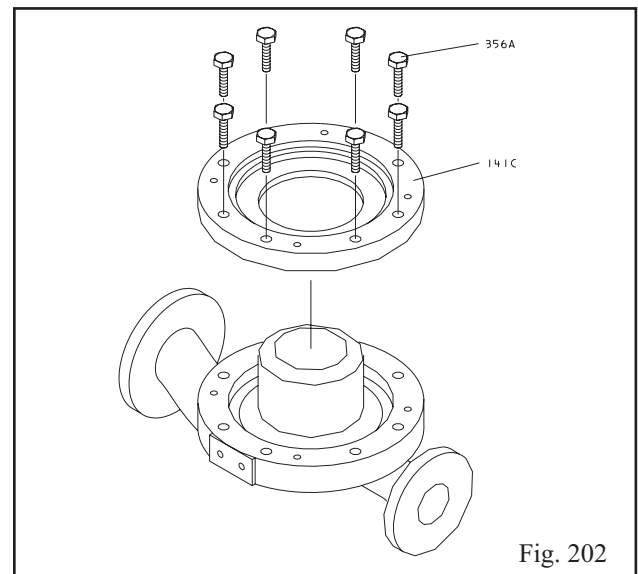
11. Install containment shell / impeller assembly into casing (100). Use care that the O-ring (412M) remains in place.



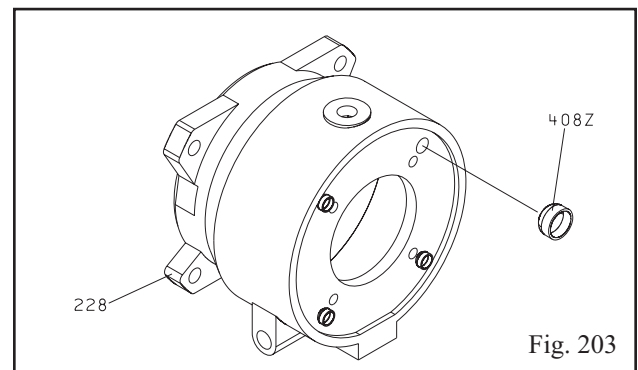
WARNING

The magnets contained in this unit are extremely powerful. Serious injury to fingers and hands will result if care is not taken.

12. Install clamp ring (141C) to casing (100) with six hex cap screws (356A) (Fig. 202).



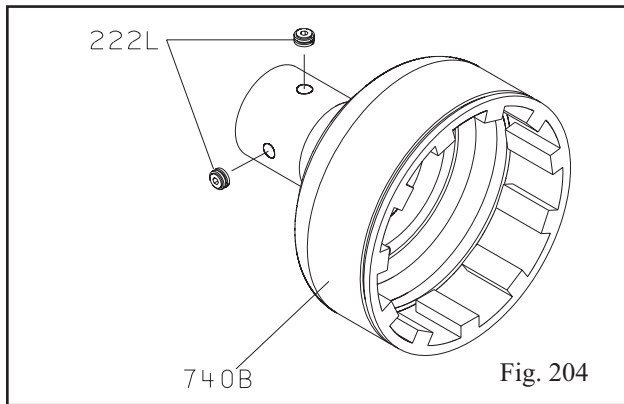
13. Set partially built assembly aside well away from attracting metals.
14. For use with 143TC/145TC motor frames. Install four expansion plugs (408Z) into C-face motor support (228) by tapping on the plug with a 5/8" rod (Fig. 203).



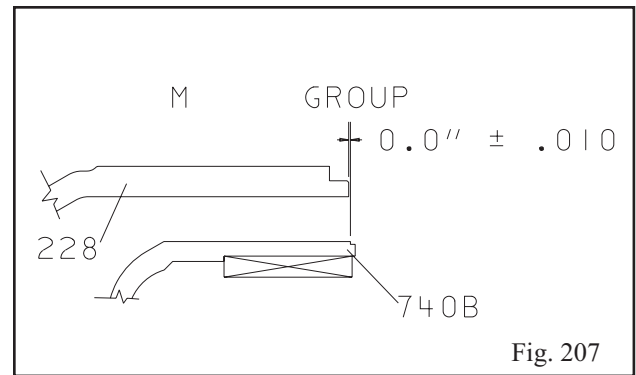
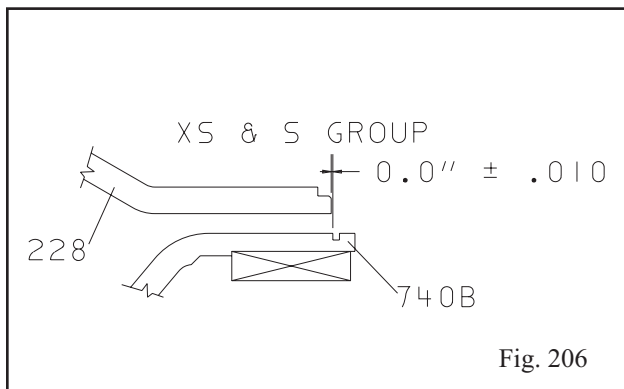
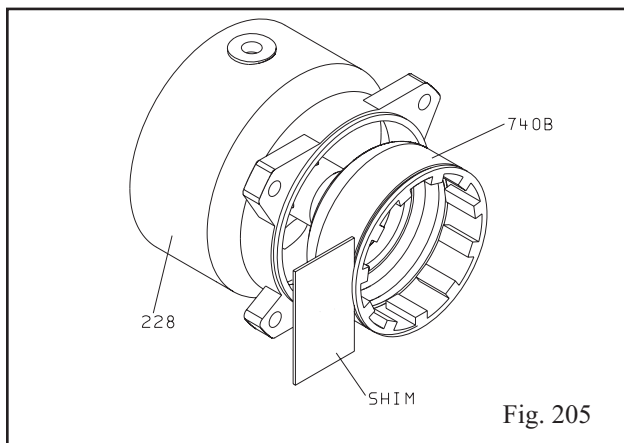
For motor frames 182TC - 256TC expansion plugs are not used.

15. Set C-face motor support (228) on motor. Install four screws (371).
16. Slide key (178Y) into motor shaft keyway.

17. Install two set screws (222L) into magnet assembly (740B) (Fig. 204).



18. Install magnet assembly inside the C-face motor support by sliding a 1/8" shim into the groove/notch located in the side of the magnet assembly. Slowly drop in the magnet assembly until the shim is resting on the face of the C-face motor support (Fig. 205). Reference Figs. 206 and 207 for installation dimensions.



19. Rotate the magnet assembly (740B) to line up the key (178Y) with the access hole on the C-face motor support (228). Tighten the first set screw (222L) through the access hole.
20. Remove the shim. Rotate the magnet assembly 90° to access the other sets. Tighten.
21. Install gasket (360W) into the clamp ring (141C).
22. Bolt down C-face support / frame (228) to work bench if not already done so.



WARNING

The magnets contained in this unit are extremely powerful. Serious injury to fingers and hands will result if care is not taken.

23. Slide casing assembly into C-face support / bearing frame assembly by holding casing firmly by the suction flange and suction side of the discharge flange. Keep hands away from clamp ring to avoid pinched fingers. Slowly insert to avoid damage.
24. Secure with four hex cap screws (370B). Tighten.

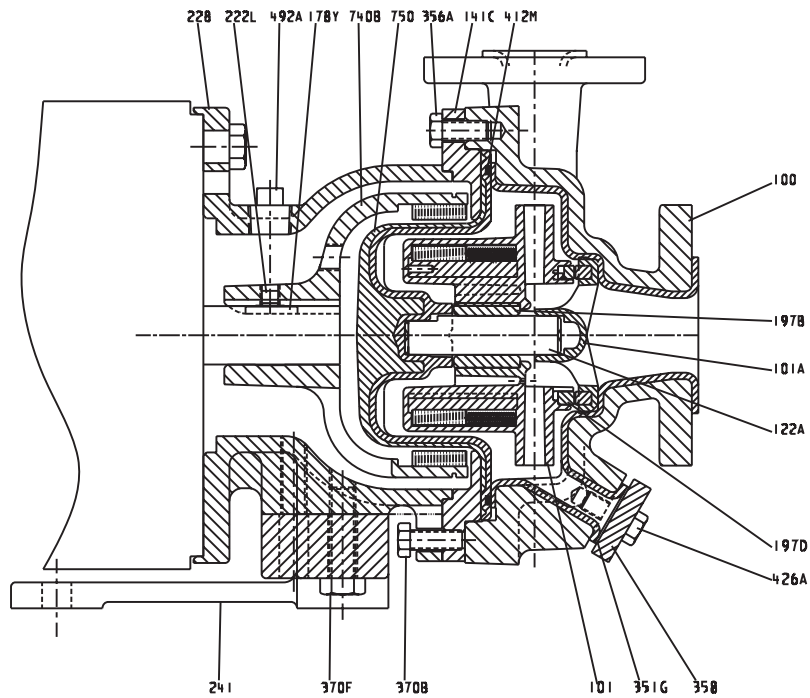


Rotate shaft by hand to ensure it rotates smoothly and there is no rubbing which could lead to excess heat generation and or sparks.

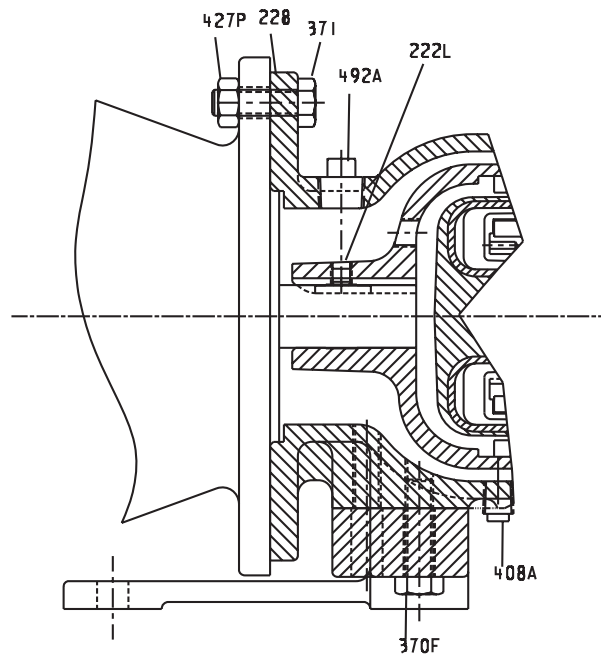
This completes the V 3298 assembly.

Sectional 3298 XS Group Close Coupled Sizes 1 x 1½-5 and 1½ x 2-6

**NEMA
Motors**



**IEC
Motors**



3298 XS 1 x 1½-5 and 1½ x 2-6 — Close Coupled

3298 XS Group Close Coupled

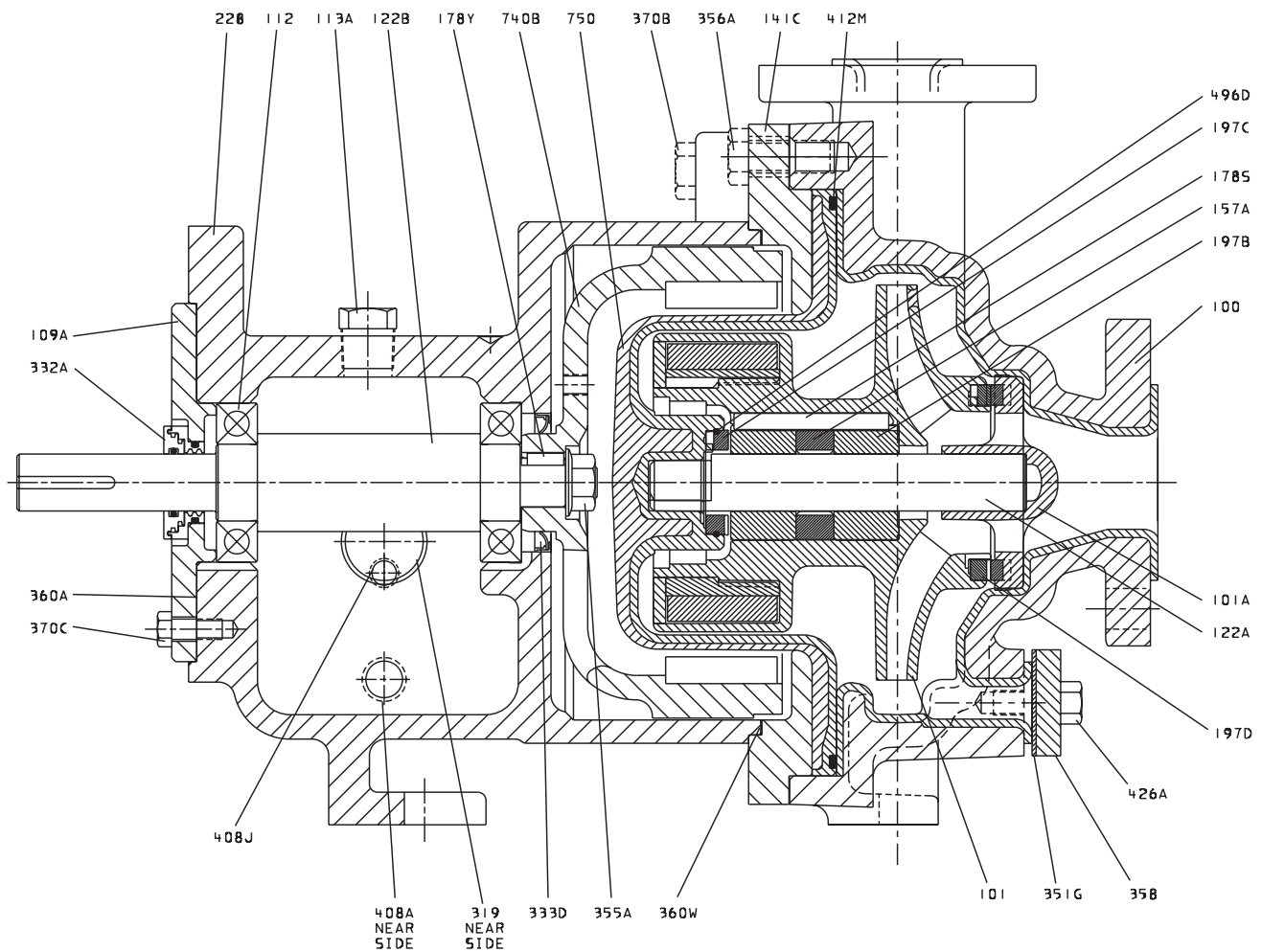
Sizes 1 x 1½-5 and 1½ x 2-6

Close Coupled		
Item #	Part Name	Material
100	Casing	Ductile Iron / Tefzel®
101	Impeller, Assembly	Carbon Filled Tefzel®
101A ¹	Bearing Spider	Standard - Carbon Filled Tefzel® / Silicon Carbide Optional - DryGuard Silicon Carbide
122A	Stationary Shaft	Standard - Silicon Carbide Optional - DryGuard Silicon Carbide
141C	Clamp Ring	Ductile Iron
178Y	Key, Motor to Magnet Assembly	Steel
197B ¹	Bearing, Radial	Standard - Carbon Graphite Optional - Silicon Carbide Optional - DryGuard Silicon Carbide
197D ¹	Bearing, Impeller Thrust	Standard - Carbon/Glass filled Teflon® Optional - Silicon Carbide Optional - DryGuard Silicon Carbide
222L	Set Screw	Steel
228	C Face Motor Support	Cast Iron
241 ²	Frame Foot	Ductile Iron
351G	Gasket, Casing Drain	Gylon
356A	Hex Cap Screw - Clamp Ring to Casing	304SS
358	Cover, Drain	Steel
370B	Hex Cap Screw - Support to Clamp Ring	304SS
370F	Hex Cap Screw - Frame Foot to Support	304SS
412M ¹	O-Ring - Containment Shell	Standard - Viton® Optional - EDPM Optional - Teflon® Encapsulated Viton® Optional - Chemraz® 505 Optional - Kalrez® 4079
426A	Hex Cap Screw - Drain Cover	304SS
492A	Plug - Access Hole	Steel
740B	Drive Carrier	Cast Iron / Neodymium Iron
750	Containment Shell	Carbon Filled Tefzel® / Fiber Reinforced Vinylester

¹ Recommended Spare Parts

² Not supplied on 1 ½ x 2 - 6 with 213/215TC motor frame

Sectional 3298 S Group Frame Mounted Sizes 1 x 1½-6, 1 x 1½-8, 1½ x 3-7, 2 x 3-6



3298 S Group Frame Mounted Version

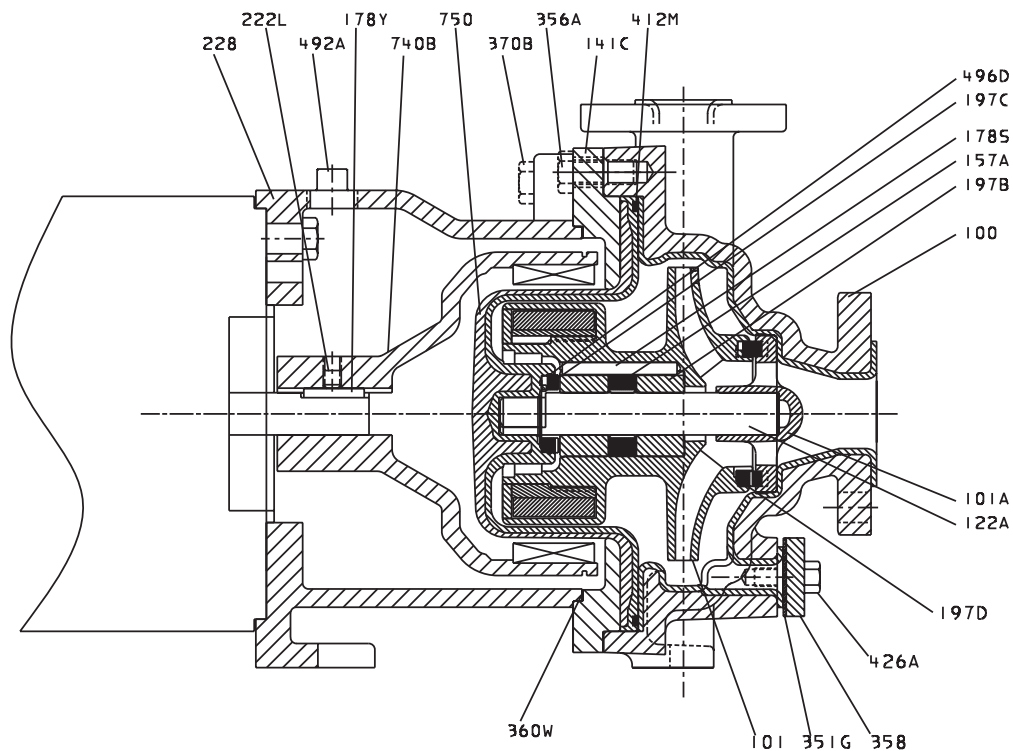
3298 S Group Frame Mounted

Sizes 1 x 1½-6, 1 x 1½-8, 1½ x 3-7, 2 x 3-6

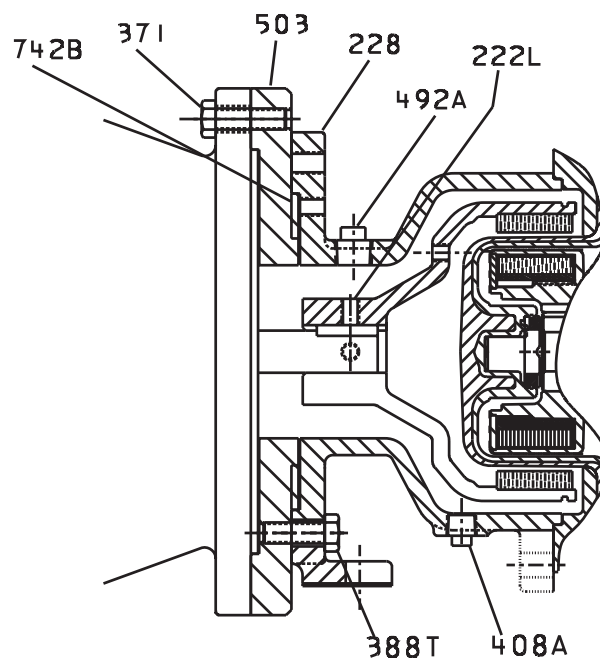
Frame Mounted		
Item #	Part Number	Material
100	Casing	Ductile Iron / Tefzel®
101	Impeller, Assembly	Carbon filled Tefzel®
101A *	Bearing Spider	Standard - Carbon filled Tefzel® / Silicon Carbide Optional - Carbon filled Tefzel® / DryGuard Silicon Carbide
109A	End Cover	Ductile Iron
112 *	Ball Bearings	Steel
122A	Stationary Shaft	Standard - Silicon Carbide Optional - DryGuard Silicon Carbide
122B	Drive Shaft	Steel
141C	Clamp Ring	Ductile Iron
157A	Bearing Spacer - Radial Bearings	Teflon®
178S *	Key, Impeller to Radial Bearings	Teflon®
178Y	Key, Drive Carrier	Steel
197B *	Bearing - Radial	Standard - Silicon Carbide Optional - DryGuard Silicon Carbide
197C *	Bearing, Reverse Thrust	Carbon Filled Teflon®
197D *	Bearing, Impeller - Thrust	Standard - Carbon Filled Teflon® Optional - Silicon Carbide Optional - DryGuard Silicon Carbide
228	Frame - Bearing	Cast Iron
332A *	Laby Seal Outboard	Brass
333D *	Oil Lip Seal - Inboard	BUNA Rubber
351G *	Gasket, Case Drain	Gylon
355A *	Hex Nut	Steel
356A	Hex Cap Screw - Clamp Ring to Case	304SS
358	Flange - Case Drain	Steel
360A *	Gasket - End Cover to Frame	Varnished Kraft
360W	Gasket - Frame to Clamp Ring	Aramid Fibers w/EPDM
370B	Hex Cap Screw - Frame to Clamp Ring	304SS
370C	Hex Cap Screw - End Cover	304SS
412M *	O-Ring - Containment Shell	Standard - Viton® Optional - EPDM Optional - Teflon® Encapsulated Viton® Optional - Chemraz® 505 Optional - Kalrez® 4079
426A	Hex Cap Screw - Case Drain	304SS
740B	Drive Magnet Assembly	Cast Iron / Neohymium Iron
750	Containment Shell	Tefzel® / Fiber Reinforced Vinylester
* Recommended Spart Parts		

Sectional 3298 S Group Close Coupled Sizes 1 x 1½-6, 1 x 1½-8, 1½ x 3-7, 2 x 3-6

**NEMA
Motors**



**IEC
Motors**



3298 S Group Close Coupled Version

3298 S Group Close Coupled

Sizes 1 x 1½-6, 1 x 1½-8, 1½ x 3-7, 2 x 3-6

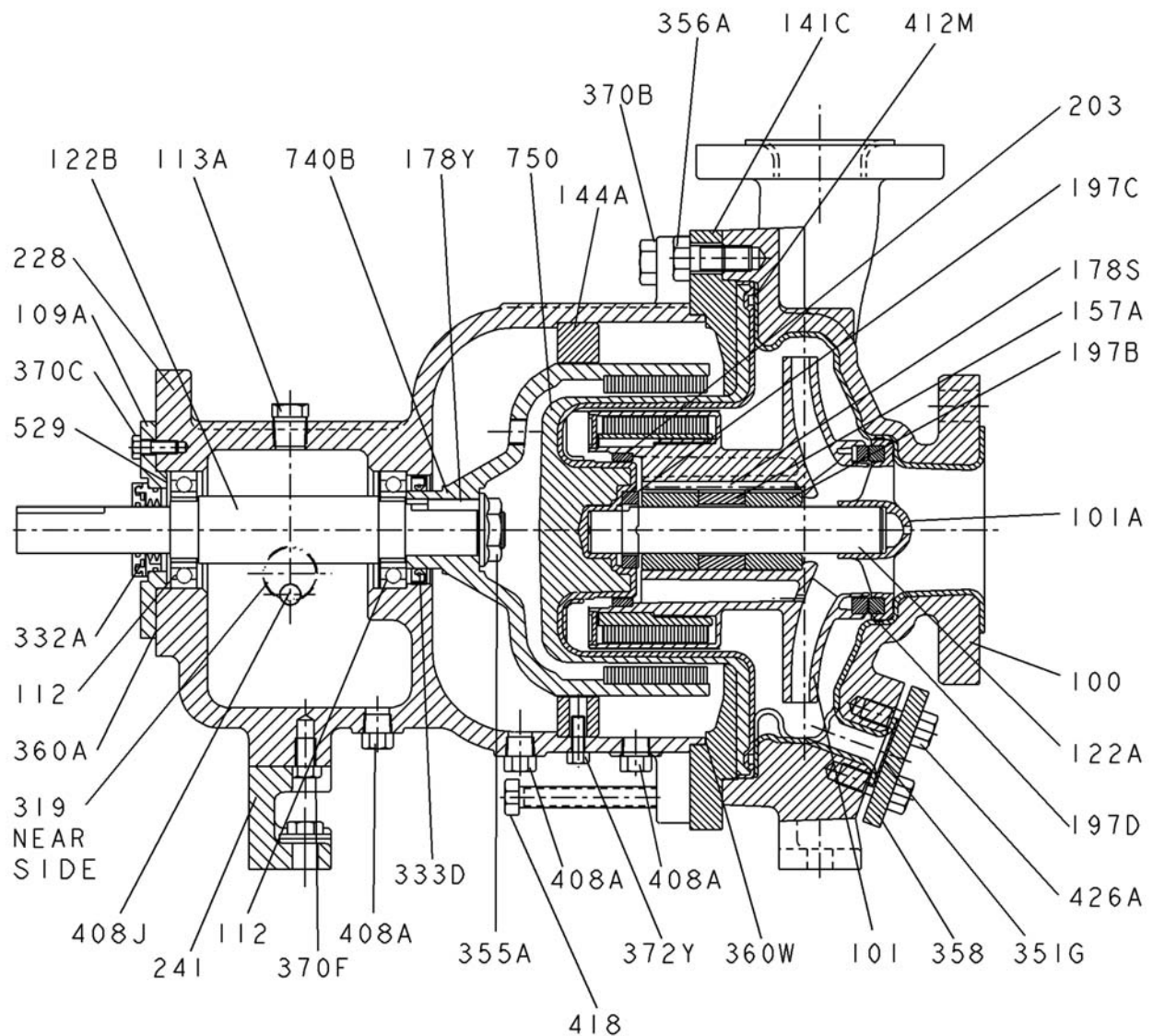
3298 S Group Close Coupled		
Item Number	Part Name	Material
100	Casing	Ductile Iron / Tefzel®
101	Impeller, Assembly	Carbon Filled Tefzel®
101A *	Bearing Spider	Standard - Carbon filled Tefzel® / Silicon Carbide Optional - Carbon filled Tefzel / DryGuard Silicon Carbide
122A	Stationary Shaft	Standard - Silicon Carbide Optional - DryGuard Silicon Carbide
141C	Clamp Ring	Ductile Iron
157A	Bearing Spacer - Radial Bearings	Teflon®
178S *	Key, Impeller to Radial Bearings	Teflon®
178Y	Key, Motor to Carrier	Steel
197B *	Bearing - Radial	Standard - Carbon Graphite Optional - Silicon Carbide Optional - DryGuard Silicon Carbide
197C *	Bearing, Reverse Thrust	Carbon Filled Teflon®
197D *	Bearing, Impeller - Thrust	Carbon Filled Teflon® Optional - Silicon Carbide Optional - DryGuard Silicon Carbide
222L	Set Screw	Steel
228	Motor Support - Close Coupled	Cast Iron
351G *	Gasket, Case Drain	Gylon
356A	Hex Cap Screw - Clamp Ring to Case	304SS
358	Flange - Case Drain	Steel
360W *	Gasket - Motor Support to Clamp Ring	Aramid Fibers w/EPDM
370B	Hex Cap Screw - Motor Support to Clamp Ring	304SS
412M *	O-Ring - Containment Shell	Standard - Viton® Optional - EPDM Optional - Teflon® Encapsulated Viton® Optional - Chemraz® 505 Optional - Kalrez® 4079
426A	Hex Cap Screw - Case Drain	304SS
492A	Access Hole Plug	Steel
740B	Drive Magnet Assembly	Cast Iron / Neohymium Iron
750	Containment Shell	Tefzel® / Fiber Reinforced Vinylester
* Recommended Spare Parts		

Item Number	Part Name	Material
228	Frame, Close Coupled (IEC)	Ductile Iron
333L	Screw, Set	304SS
371	H.C. Screw - Motor to Frame	Carbon Steel
388T	H.C. Screw - Adapt to Frame ¹	Carbon Steel
408A	Plug - Drain	Carbon Steel
492A	Plug - Access Hole	Carbon Steel
503	Ring, Adapter ¹	Cast Iron
742B	Ring, Centering ²	Carbon Steel

¹ Used with Motor Frames 132 & 160 only.

² Used with Motor Frames 80 & 90 only.

Sectional 3298 M Group Frame Mounted Sizes 3 x 4-7, 1½ x 3-8, 2 x 3-8, 1 x 2-10



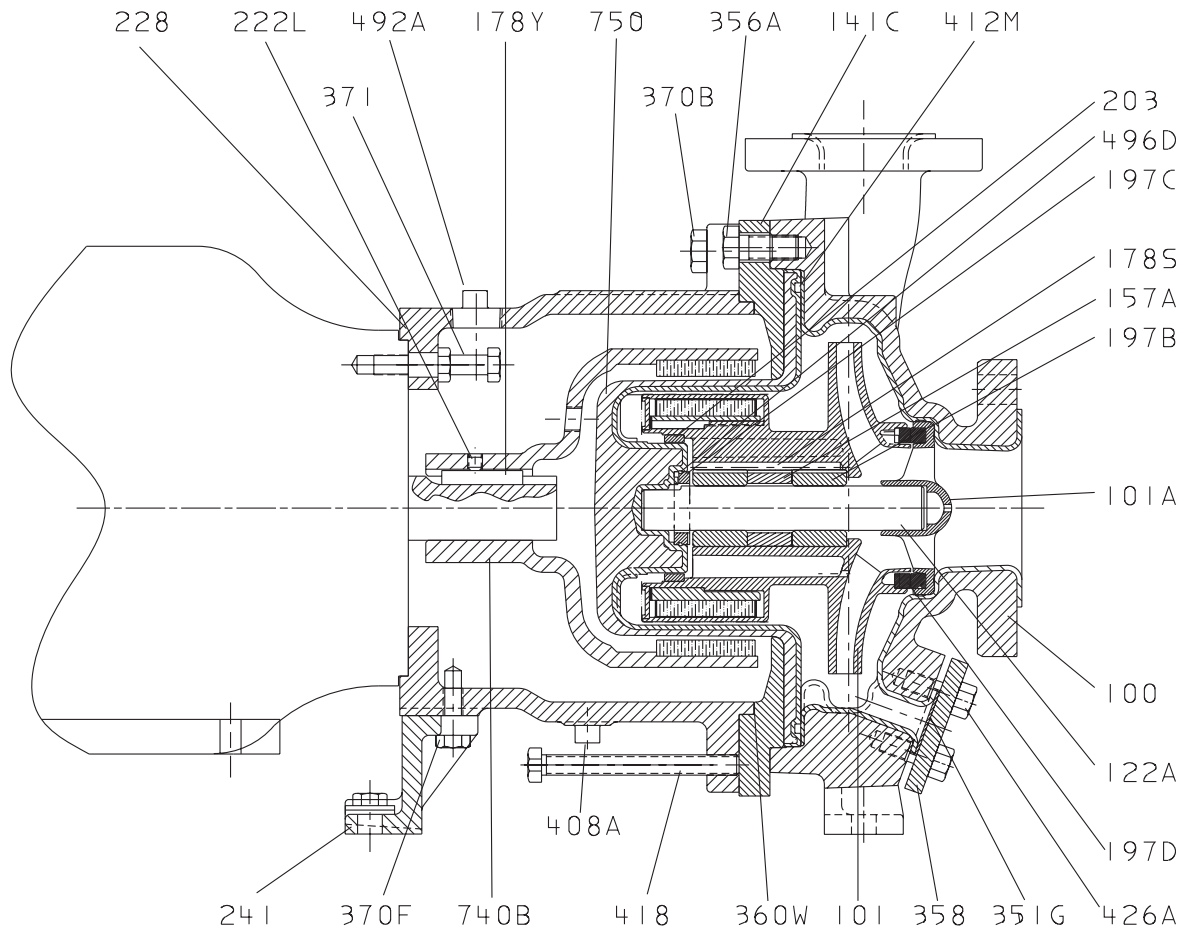
3298 M Group Frame Mounted Version

3298 M Group Frame Mounted

Sizes 3 x 4-7, 1½ x 3-8, 2 x 3-8, 1 x 2-10

Frame Mounted		
Item Number	Part Name	Material
100	Casing	Ductile Iron / Tefzel®
101	Impeller, Assembly	Carbon filled Tefzel®
101A*	Bearing Spider	Standard - Carbon filled Tefzel® / Silicon Carbide Optional - Carbon filled Tefzel® / DryGuard Silicon Carbide
109A	End Cover	Ductile Iron
112*	Ball Bearings	Steel
113A	Plug - Oil Fill	Steel
122A	Stationary Shaft	Standard - Silicon Carbide Optional - DryGuard Silicon Carbide
122B	Drive Shaft	Steel
141C	Clamp Ring	Ductile Iron
144A	Rub Ring	Cast Iron
157A	Bearing Spacer - Radial	Teflon®
178S*	Key, Impeller to Bearings	Teflon®
178Y	Key, Drive Carrier	Steel
197B*	Bearing - radial	Standard - Carbon Graphite Optional - Silicon Carbide Optional - DryGuard Silicon Carbide
197C*	Bearing, Reverse Thrust	Carbon Filled Teflon®
197D*	Bearing, Impeller - Thrust	Standard - Carbon Filled Teflon® Optional - Silicon Carbide Optional - DryGuard Silicon Carbide
203*	Ring - Back Wearing	Carbon Filled Teflon®
228	Frame - Bearing	Cast Iron
241	Frame Foot	Cast Iron
319	Sight Window	Steel / Glass
332A	Labyrinth Seal	Carbon Filled Teflon®
333D*	Lip Seal	Buna Rubber
351G*	Gasket, Case Drain	Gylon
355A	Flanged Hex Nut	Steel
356A	Hex Cap Screw - Clamp Ring to Case	304SS
358	Flange, Case Drain	Steel
360A*	Gasket - Cover to Frame	Varnished Kraft
360W*	Gasket - Frame to Clamp Ring	Aramid Fibers w/EPDM
370B	Hex Cap Screw - Frame to Clamp Ring	304SS
370C	Hex Cap Screw - Cover to Frame	304SS
370F	Hex Cap Screw - Frame Foot	304SS
372Y	Hex Cap Screw - Frame to Rub Ring	304SS
408A	Plug- Drain	Steel
408J	Plug - Oiler	Steel
412M*	O-ring - Containment Shell	Standard - Viton® Optional - EPDM Optional Teflon® Optional - Chemraz® 505 Optional - Kalrez® 4079
418	H. T. Bolt - Jacking	304SS
426A	Hex Cap Screw - Case Drain	304SS
529*	Washer, Wave Spring	Steel
740B	Drive Carrier	Cast Iron / Neodymium
750	Containment Shell	Tefzel® / Fiber Reinforced Vinylester
* Recommended Spare Parts		

Sectional 3298 M Group Close Coupled Sizes 3 x 4-7, 1½ x 3-8, 2 x 3-8, 1 x 2-10



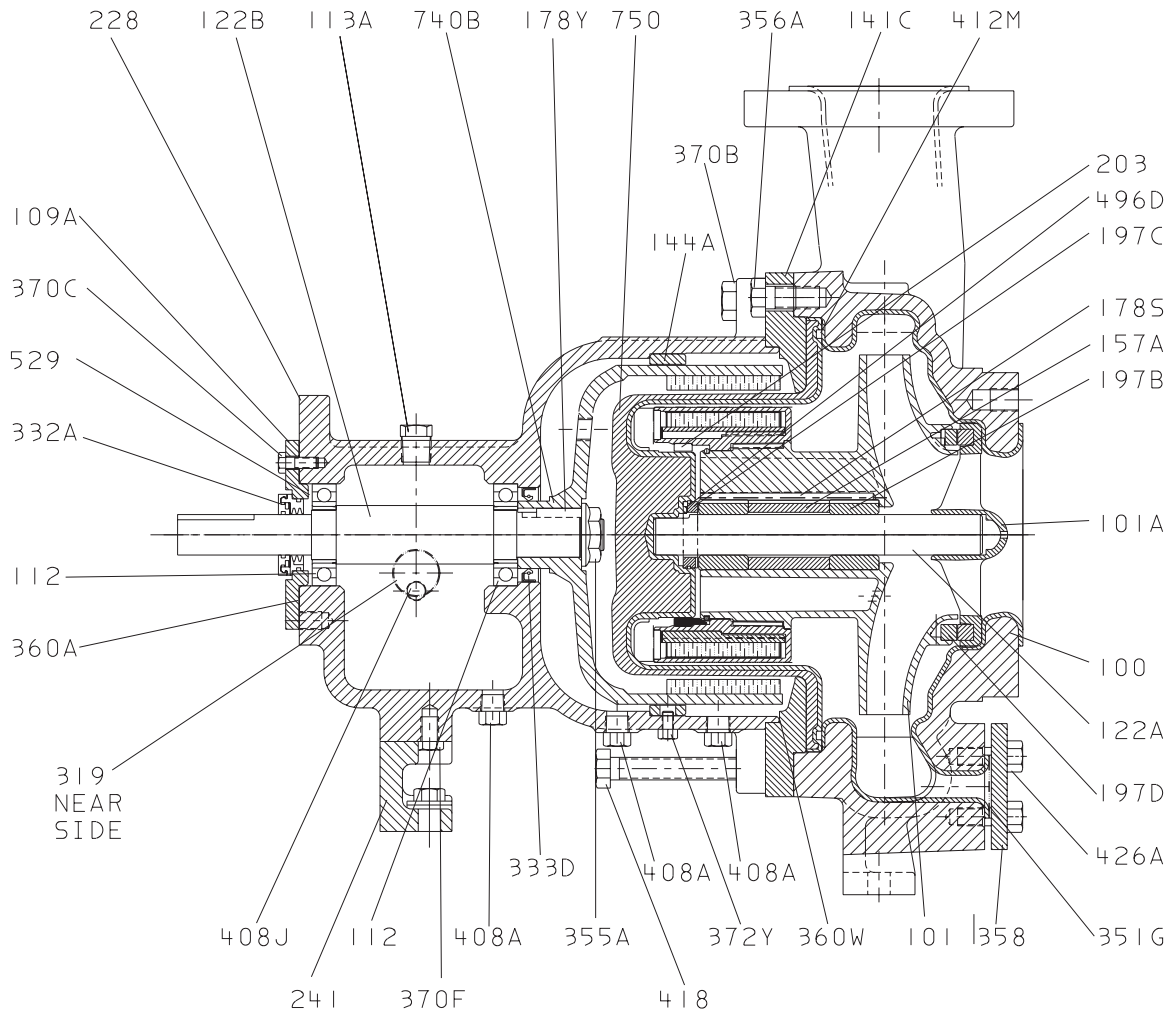
3298 M Group Close Coupled Version

3298 M Group Close Coupled

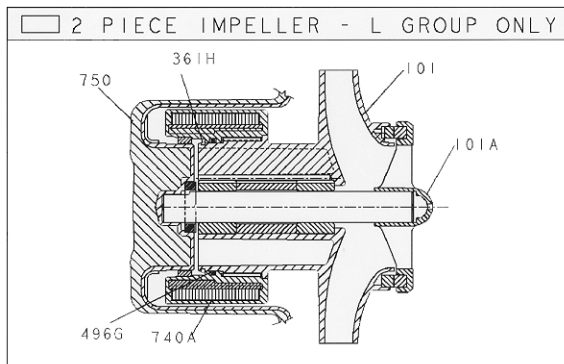
Sizes 3 x 4-7, 1½ x 3-8, 2 x 3-8, 1 x 2-10

Close Coupled		
Item Number	Part Name	Material
100	Casing	Ductile Iron / Tefzel®
101	Impeller, Assembly	Carbon filled Tefzel®
101A*	Bearing Spider	Standard - Carbon filled Tefzel® / Silicon Carbide Optional - Carbon filled Tefzel® / DryGuard Silicon Carbide
122A	Stationary Shaft	Standard - Silicon Carbide Optional - DryGuard Silicon Carbide
141C	Clamp Ring	Ductile Iron
157A	Bearing Spacer - Radial	Teflon®
178S*	Key, Impeller to Bearings	Teflon®
178Y	Key, Motor to Drive Carrier	Steel
197B*	Bearing - Radial	Standard - Carbon Optional - Silicon Carbide Optional - DryGuard Silicon Carbide
197C*	Bearing, Reverse Thrust	Carbon Filled Teflon®
197D*	Bearing, Impeller Thrust	Standard - Carbon Filled Teflon® Optional - Silicon Carbide Optional - DryGuard Silicon Carbide
203*	Ring, Back Wearing	Carbon Filled Teflon®
222L	Set Screw	Steel
228	Frame, Close Coupled	Cast Iron
241	Frame Foot	Cast Iron
351G*	Gasket, Case Drain	Gylon
356A	Hex Cap Screw - Clamp Ring to Case	304SS
358	Flange - Case Drain	Steel
360W*	Gasket - Frame Support to Clamp Ring	Aramid Fibers w/EPDM
370B	Hex Cap Screw - Frame to Clamp Ring	304SS
370F	Hex Cap Screw - Frame Foot	304SS
371	Hex Cap Screw - Frame to Motor	304SS
408A	Plug - Drain	Steel
412M*	O-ring - Containment Shell	Standard - Viton® Optional - EPDM Optional Teflon® Encapsulated Viton® Optional - Chemraz® 505 Optional - Kalrez® 4079
418	Hex Tap Bolt - Jacking	304SS
426A	Hex Cap Screw - Case Drain	304SS
492A	Plug - Access Hole	Steel
740B	Drive Carrier	Cast Iron / Neodymium Iron
750	Containment Shell	Tefzel® / Fiber Reinforced Vinylester
* Recommended Spare Parts		

Sizes 1½ x 3-10, 2 x 3-10, 3 x 4-10G, 3 x 4-10H, 4 x 6-10



3298 L Group Frame Mounted Version

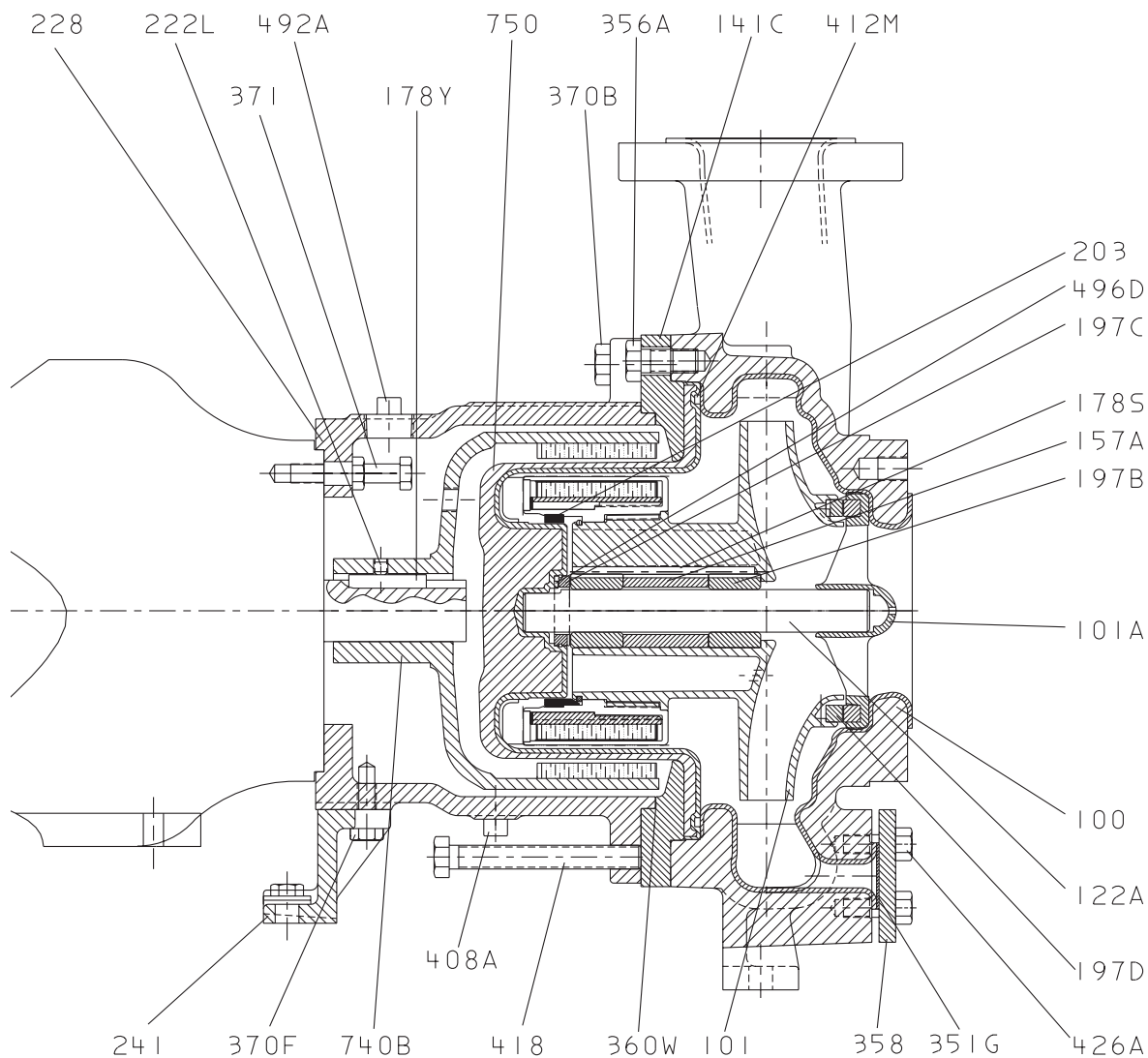


3298 L Group Frame Mounted

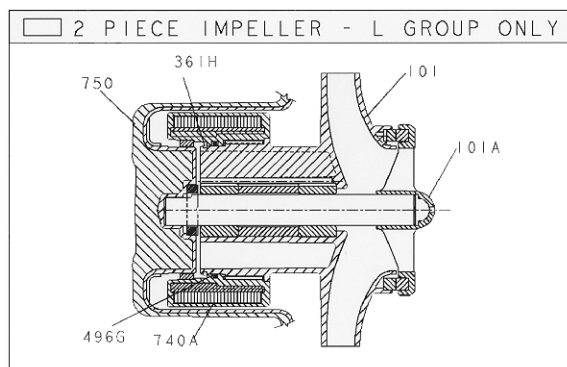
Sizes 1½ x 3-10, 2 x 3-10, 3 x 4-10G, 3 x 4-10H, 4 x 6-10

Frame Mounted		
Item Number	Part Name	Material
100	Casing	Ductile Iron / Tefzel®
101	Impeller, Assembly	Carbon Fiber Reinforced Tefzel®
101A*	Bearing Spider	Standard - Carbon filled Tefzel® / Silicon Carbide Optional - Carbon filled Tefzel® / DryGuard Silicon Carbide
109A	End Cover	Ductile Iron
112*	Ball Bearings	Steel
113A	Plug - Oil Fill	Steel
122A	Stationary Shaft	Standard - Silicon Carbide Optional - DryGuard Silicon Carbide
122B	Drive Shaft	Steel
141C	Clamp Ring	Ductile Iron
144A	Rub Ring	Cast Iron
157A	Bearing Spacer - Radial	Teflon®
178S*	Key, Impeller to Bearings	Teflon®
178Y	Key, Drive Carrier	Steel
197B*	Bearing - radial	Standard - Carbon Graphite Optional - Silicon Carbide Optional - DryGuard Silicon Carbide
197C*	Bearing, Reverse Thrust	Carbon Filled Teflon®
197D*	Bearing, Impeller - Thrust	Standard - Carbon Filled Teflon® Optional - Silicon Carbide Optional - Carbon filled Tefzel® / DryGuard Silicon Carbide
203*	Ring - Back Wearing	Carbon Filled Teflon®
228	Frame - Bearing	Cast Iron
241	Frame Foot	Cast Iron
319	Sight Window	Steel / Glass
332A	Labyrinth Seal	Carbon Filled Teflon®
333D*	Lip Seal	Buna Rubber
351G*	Gasket, Case Drain	Gylon
355A	Flanged Hex Nut	Steel
356A	Hex Cap Screw - Clamp Ring to Case	304SS
358	Flange, Case Drain	Steel
360A*	Gasket - Cover to Frame	Varnished Kraft
360W*	Gasket - Frame to Clamp Ring	Aramid Fibers w/EPDM
361H	Retaining Ring	Teflon® Encapsulated Silicone
370B	Hex Cap Screw - Frame to Clamp Ring	304SS
370C	Hex Cap Screw - Cover to Frame	304SS
370F	Hex Cap Screw - Frame Foot	304SS
372Y	Hex Cap Screw - Frame to Rub Ring	304SS
408A	Plug- Drain	Steel
408J	Plug - Oiler	Steel
412M*	O-Ring - Containment Shell	Standard - Viton® Optional - EPDM Optional Teflon® Optional - Chemraz® 505 Optional - Kalrez® 4079
418	H. T. Bolt - Jacking	304SS
426A	Hex Cap Screw - Case Drain	304SS
496G*	O-ring Driven Magnet Assembly	Standard Viton® Optional - EPDM Optional - Teflon® Optional - Chemraz® 505 Optional - Kalrez® 4079
529*	Washer, Wave Spring	Steel
740A	Driven Magnet Assembly	Tefzel® / Neodymium Iron
740B	Drive Carrier	Cast Iron / Neodymium
750	Containment Shell	Carbon filled Tefzel® / Fiber Reinforced Vinylester

3298 L Group Close Coupled **Sizes 1½ x 3-10, 2 x 3-10, 3 x 4-10G, 3 x 4-10H, 4 x 6-10**



3298 L Group Close Coupled Version

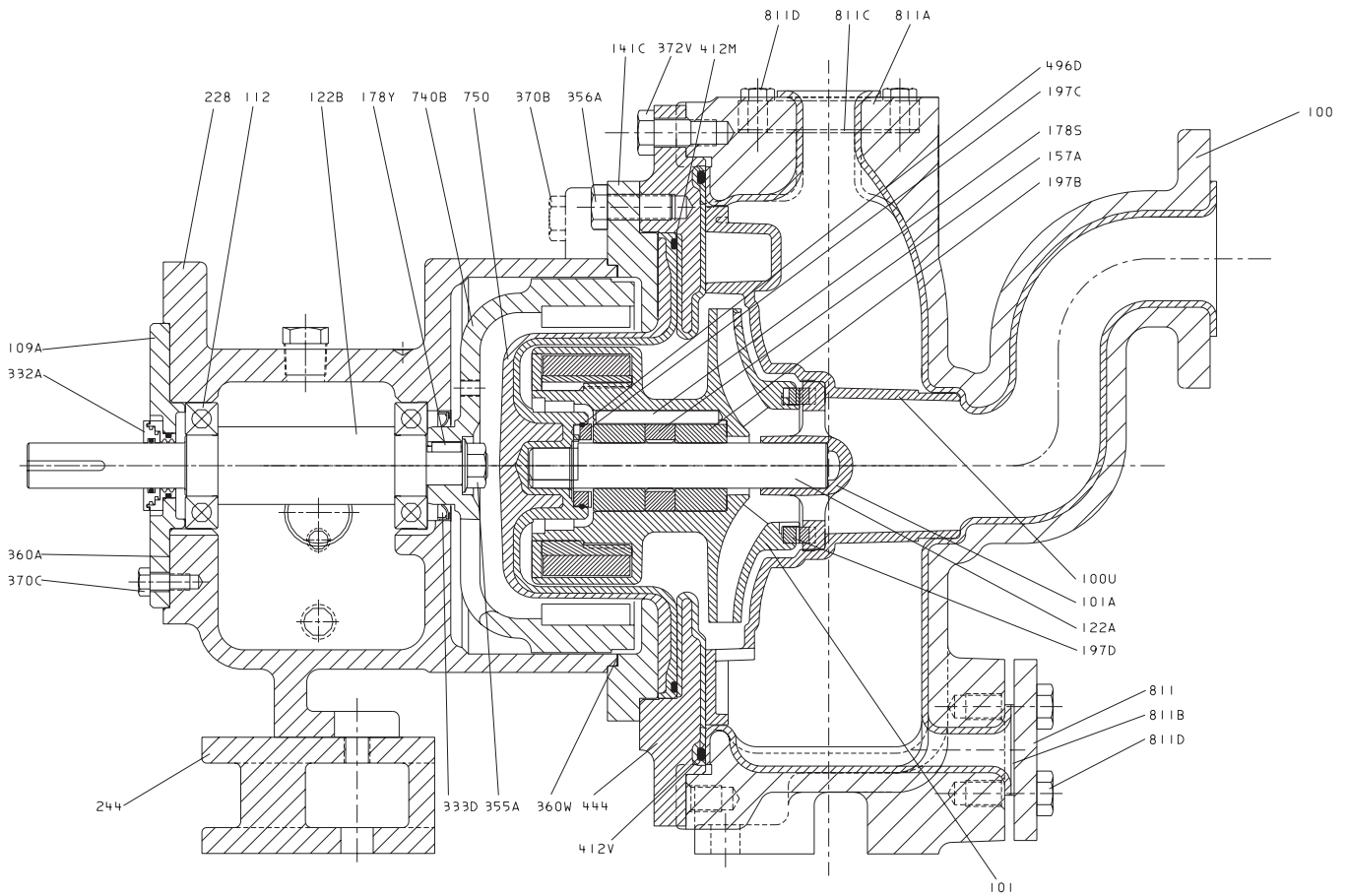


3298 L Group Close Coupled

Sizes 1½ x 3-10, 2 x 3-10, 3 x 4-10G, 3 x 4-10H, 4 x 6-10

Close Coupled		
Item Number	Part Name	Material
100	Casing	Ductile Iron / Tefzel®
101	Impeller, Assembly	Carbon Fiber Tefzel®
101A*	Bearing Spider	Standard - Carbon filled Tefzel® / Silicon Carbide Optional - Carbon filled Tefzel® / DryGuard Silicon Carbide
122A	Stationary Shaft	Standard - Silicon Carbide Optional - DryGuard Silicon Carbide
141C	Clamp Ring	Ductile Iron
157A	Bearing Spacer - Radial	Teflon®
178S*	Key, Impeller to Bearings	Teflon®
178Y	Key, Motor to Drive Carrier	Steel
197B*	Bearing - Radial	Standard - Carbon Optional - Silicon Carbide Optional - DryGuard Silicon Carbide
197C*	Bearing, Reverse Thrust	Carbon Filled Teflon®
197D*	Bearing, Impeller Thrust	Standard - Carbon Filled Teflon® Optional - Silicon Carbide Optional - DryGuard Silicon Carbide
203*	Ring, Back Wearing	Carbon Filled Teflon®
222L	Set Screw	Steel
228	Frame, Close Coupled	Cast Iron
241	Frame Foot	Cast Iron
351G*	Gasket, Case Drain	Gylon
356A	Hex Cap Screw - Clamp Ring to Case	304SS
358	Flange - Case Drain	Steel
360W*	Gasket - Frame Support to Clamp Ring	Aramid Fibers w/EPDM
361H	Retaining Ring	Teflon® Encapsulated Silicone
370B	Hex Cap Screw - Frame to Clamp Ring	304SS
370F	Hex Cap Screw - Frame Foot	304SS
371	Hex Cap Screw - Frame to Motor	304SS
408A	Plug - Drain	Steel
412M*	O-Ring - Containment Shell	Standard - Viton® Optional - EPDM Optional Teflon® Encapsulated Viton® Optional - Chemraz® 505 Optional - Kalrez® 4079
418	Hex Tap Bolt - Jacking	304SS
426A	Hex Cap Screw - Case Drain	304SS
492A	Plug - Access Hole	Steel
740A	Driven Magnet Assembly	Tefzel® Neodymium Iron
740B	Drive Carrier	Cast Iron / Neodymium Iron
750	Containment Shell	Carbon filled Tefzel® / Fiber Reinforced Vinylester
496G*	O-Ring - Driven Magnet Assembly	Standard Viton® Optional - EPDM Optional Teflon® Encapsulated Viton® Optional - Chemraz® 505 Optional - Kalrez® 4079
* Recommended Spare Parts		

SP 3298 S Group Frame Mounted **Sizes 1 x 1½-6, 2 x 3-6**



SP 3298 S Group Frame Mounted Version

SP 3298 S Group Frame Mounted

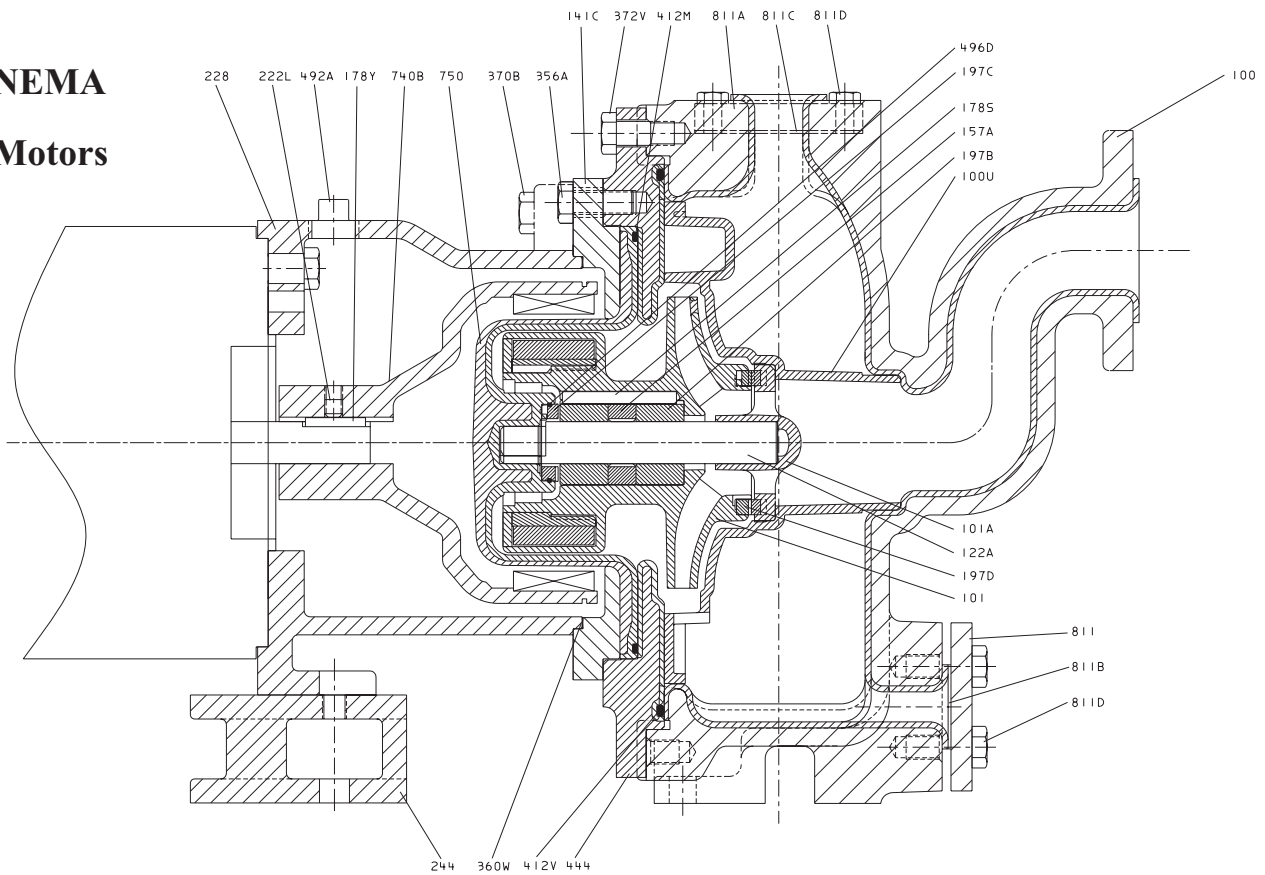
Sizes 1 x 1½-6, 2 x 3-6

Frame Mounted		
Item Number	Part Name	Material
100	Casing	Ductile Iron / TEFZEL [®]
100U	Volute Insert	Carbon Filled TEFZEL [®]
101	Impeller, Assembly	TEFZEL [®]
101A*	Bearing Spider	TEFZEL [®] / Silicon Carbide
109A	End Cover	Ductile Iron
112*	Ball Bearings	Steel
113A	Plug - Oil Fill	Steel
122A	Stationary Shaft	Silicon Carbide
122B	Drive Shaft	Steel
141C	Clamp Ring	Ductile Iron
157A	Bearing Spacer - Radial	TEFLON [®]
178S*	Key, Impeller to Radial Bearings	TEFZEL [®]
178Y	Key, Drive Carrier	Steel
197B*	Bearing - radial	Standard - Carbon Optional - Silicon Carbide Optional - DryGuard Silicon Carbide
197C*	Bearing, Reverse Thrust	Carbon Filled Teflon [®]
197D*	Bearing, Impeller - Thrust	Standard - Carbon Filled Teflon [®] Optional - Silicon Carbide Optional - DryGuard Silicon Carbide
203	Ring - Back Wearing	Carbon Filled TEFLON [®]
228	Frame - Bearing	Cast Iron
319	Sight Window	Steel / Glass
332A*	Labyrinth Seal	Carbon Filled TEFLON [®]
333D*	Lip Seal	Buna Rubber
355A*	Flanged Hex Nut	Steel
356A	Hex Cap Screw - Clamp Ring to Backplate	304SS
360A*	Gasket - Cover to Frame	Varnished Kraft
360W	Gasket - Frame to Clamp Ring	Aramid Fibers w/EPDM
370B	Hex Cap Screw - Frame to Clamp Ring	304SS
370C	Hex Cap Screw - Cover to Frame	304SS
372V	Hex Cap Screw - Backplate to Casing	304SS
408A	Plug- Drain	Steel
408J	Plug - Oiler	Steel
412M*	O-ring - Containment Shell	Standard - Viton [®] Optional - EPDM Optional Teflon [®] Encapsulated Viton [®] Optional - Chemraz [®] 505 Optional - Kalrez [®] 4079
412V*	O-ring Backplate	Standard - Viton [®] Optional - EPDM Optional Teflon [®] Encapsulated Viton [®] Optional - Chemraz [®] 505 Optional - Kalrez [®] 4079
444	Backplate	Ductile Iron/TEFZEL [®]
740B	Drive Magnet Assembly	Cast Iron / Neodymium
750	Containment Shell	TEFZEL [®] / Fiber Reinforced Vinyl Ester
811	Cover - Case Drain	Carbon Steel
811A	Cover - Case Fill	Carbon Steel
811B	Gasket - Case Drain	Non-Asbestos Packing
811C	Gasket - Case Fill	Non-Asbestos Packing
811D	Hex Cap Screw - Drain Cover	304SS
* Recommended Spare Parts		

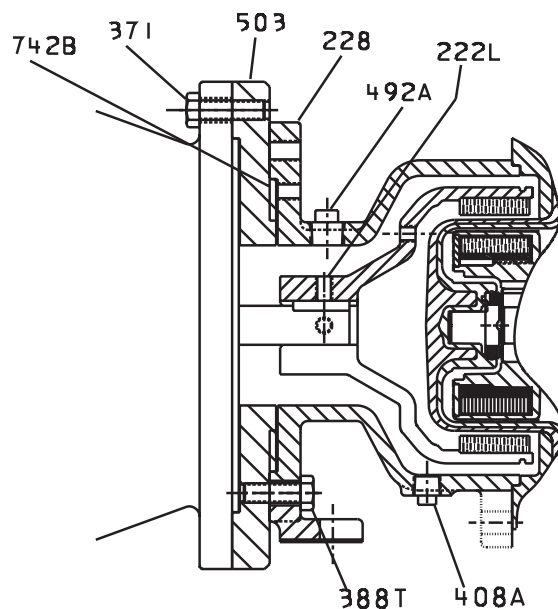
SP 3298 S Group Close Coupled

Sizes 1 x 1½-6, 2 x 3-6

**NEMA
Motors**



**IEC
Motors**



SP 3298 S Group Close Coupled Version

SP 3298 S Group Close Coupled

Sizes 1 x 1½-6, 2 x 3-6

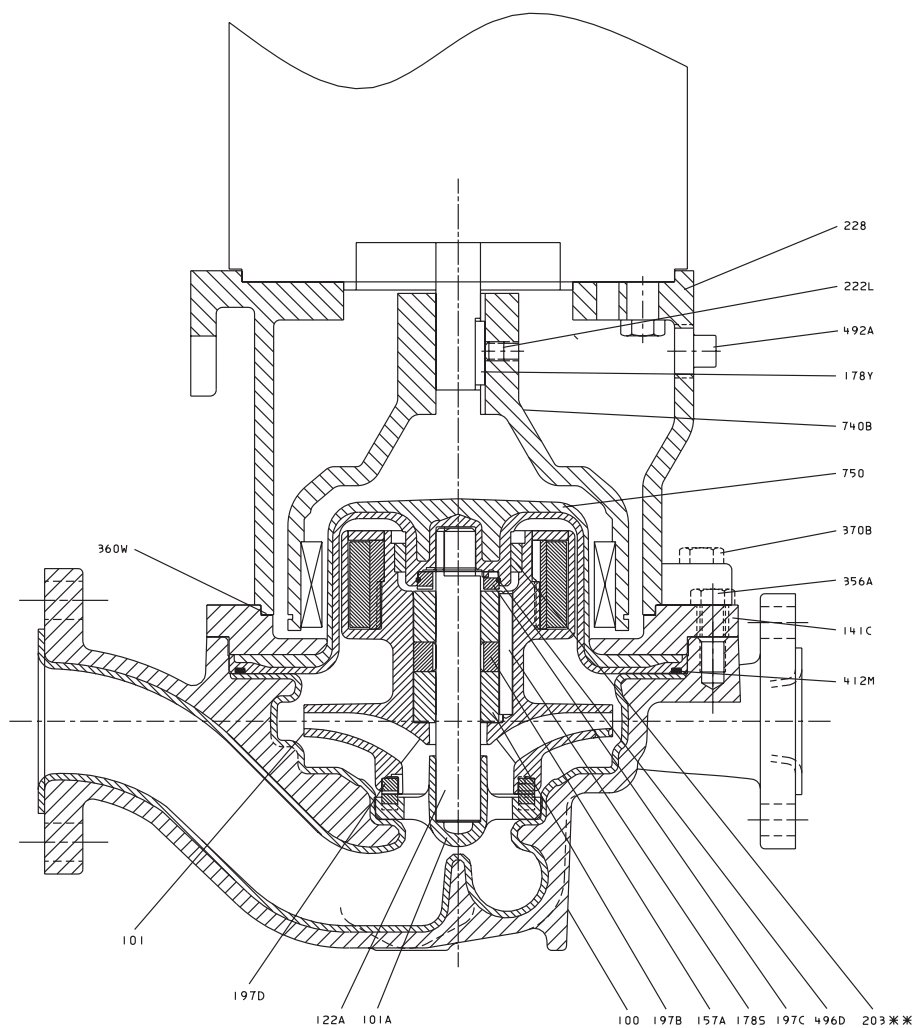
Close Coupled		
Item Number	Part Name	Material
100	Casing	Ductile Iron / TEFZEL®
100U	Volute Insert	Carbon Filled TEFZEL®
101	Impeller, Assembly	TEFZEL®
101A*	Bearing Spider	TEFZEL® - Silicon Carbide
122A	Stationary Shaft	Silicon Carbide
141C	Clamp Ring	Ductile Iron
157A	Bearing Spacer - Radial	TEFLON®
178S*	Key, Impeller to Radial Bearings	TEFZEL®
178Y	Key, Motor to Drive Carrier	Steel
197B*	Bearing - radial	Standard - Carbon Optional - Silicon Carbide Optional - DryGuard Silicon Carbide
197C*	Bearing, Reverse Thrust	Carbon Filled Teflon®
197D*	Bearing, Impeller - Thrust	Standard - Carbon Filled Teflon® Optional - Silicon Carbide Optional - DryGuard Silicon Carbide
222L	Set Screw	303SS
228	Frame - Close Coupled (NEMA)	Cast Iron
356A	Hex Cap Screw - Clamp Ring to Backplate	304SS
360W*	Gasket - Supp. to Clamp Ring	Aramid Fibers w/EPDM
370B	Hex Cap Screw - Frame to Clamp Ring	304SS
372V	Hex Cap Screw - Backplate to Casing	304SS
412M*	O-ring - Containment Shell	Standard - Viton® Optional - EPDM Optional Teflon® Encapsulated Viton® Optional - Chemraz® 505 Optional - Kalrez® 4079
412V*	O-ring Backplate	Standard - Viton® Optional - EPDM Optional Teflon® Encapsulated Viton® Optional - Chemraz® 505 Optional - Kalrez® 4079
444	Backplate	Ductile Iron/TEFZEL®
492A	Plug - Access Hole	Steel
740B	Drive Magnet Assembly	Cast Iron / Neodymium Iron
750	Containment Shell	TEFZEL® / Fiber Reinforced Vinyl Ester
811	Cover - Case Drain	Carbon Steel
811A	Cover - Case Fill	Carbon Steel
811B	Gasket - Case Drain	Non-Asbestos Packing
811C	Gasket - Case Fill	Non-Asbestos Packing
811D	Hex Cap Screw - Drain Cover	304SS
228	Frame, Close Coupled (IEC)	Ductile Iron
222L	Screw, Set	304SS
371	H.C. Screw - Motor to Frame	Carbon Steel
388T	H.C. Screw - Adapt to Frame ¹	Carbon Steel
408A	Plug - Drain	Carbon Steel
492A	Plug - Access Hole	Carbon Steel
503	Ring, Adapter ¹	Cast Iron
742B	Ring, Centering ²	Carbon Steel

* Recommended Spare Parts

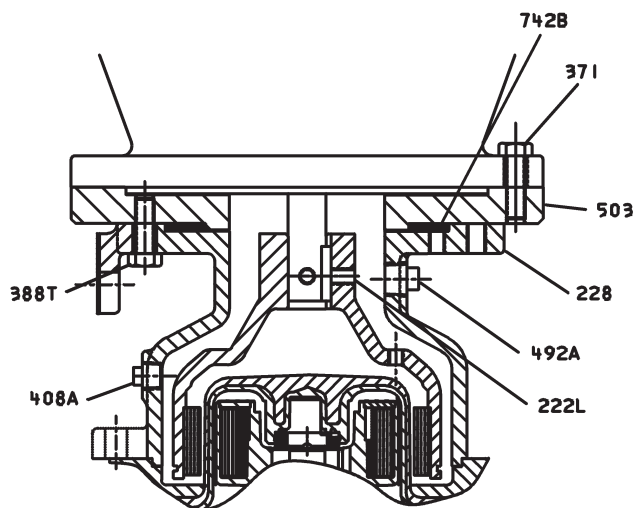
Sectional V 3298

Sizes $1\frac{1}{2}$ x 2-6, 2 x 3-6, $1\frac{1}{2}$ x 2-8 M: $1\frac{1}{2}$ x 2-10

NEMA Motors



IEC Motors



V 3298 Group Close Coupled

Sizes S: 1½ x 2-6, 2 x 3-6, 1½ x 2-8 M: 1½ x 2-10

Close Coupled		
Item Number	Part Name	Material
100	Casing	Ductile Iron / TEFZEL [®]
101	Impeller, Assembly	TEFZEL [®]
101A	Bearing Spider	TEFZEL [®] - Silicon Carbide
122A	Stationary Shaft	Silicon Carbide
141C	Clamp Ring	Ductile Iron
157A	Bearing Spacer - Radial	TEFLON [®]
178S	Key, Impeller to Radial Bearings	TEFZEL [®]
178Y	Key, Motor to Magnet Assembly	Steel
197B	Bearing - Radial	Standard - Carbon Optional - Silicon Carbide Optional - DryGuard Silicon Carbide
197C	Bearing, Reverse Thrust	Carbon Filled Teflon [®]
197D	Bearing, Impeller - Thrust	Standard - Carbon Filled Teflon [®] Optional - Silicon Carbide Optional - DryGuard Silicon Carbide
203	Ring - Back Wear Ring	Carbon Filled Teflon
222L	Set Screw	303SS
228	Frame - Close Coupled (NEMA)	Cast Iron
351G	Gasket, Casing Drain	Non-Asbestos Packing
356A	Hex Cap Screw - Clamp Ring to Case	304SS
358	Cover, Drain	Steel
360W	Gasket - Supp. To Clamp Ring	Aramid Fibers w/ EDPM
370B	Hex Cap Screw - Backplate to Casing	304SS
412M	O-ring - Containment Shell	Standard - Viton [®] Optional - EPDM Optional Teflon [®] Encapsulated Viton [®] Optional - Chemraz [®] 505 Optional - Kalrez [®] 4079
426A	Hex Cap Screw - Drain Cover	304SS
492A	Plug - Access Hole	Steel
740B	Magnet Assembly	Cast Iron / Neodymium Iron
750	Containment Shell	TEFZEL [®] / Fiber Reinforced Vinyl Ester

6

Item Number	Part Name	Material
228	Frame, Close Coupled (IEC)	Ductile Iron
222L	Screw, Set	304SS
371	H.C. Screw - Motor to Frame	Carbon Steel
388T	H.C. Screw - Adapt to Frame ¹	Carbon Steel
408A	Plug - Drain	Carbon Steel
492A	Plug - Access Hole	Carbon Steel
503	Ring, Adapter ¹	Cast Iron
742B	Ring, Centering ²	Carbon Steel

¹ Used with Motor Frames 132 & 160 only.
² Used with Motor Frames 80 & 90 only.
 * Recommended Spare Parts

SPARE AND REPAIR PARTS

RECOMMENDED SPARES	113
HOW TO ORDER PARTS	115
INTERCHANGEABILITY	117-122
RETURN OF MATERIALS	123

When ordering parts, always refer to part name, Goulds Serial No., and indicate Item No. from the sectional drawing.

RECOMMENDED SPARES

Liquid End			
Part	Material	Item	Qty
Containment Shell O-ring	Standard-Viton Optional - EDPM Optional - TEFLON® Encapsulated Viton	412M	1
Gasket - Clamp Ring	Aramid Fiber / EDPM Binder	360W	1
Bearing Spider	TEFZEL® / Silicon Carbide	101A	1
Impeller Bearing	TEFZEL®	178S	1
Radial Bearing	Standard - Carbon Optional - Silicon Carbide Optional - DryGuard Silicon Carbide	197B	2
Reverse Thrust Bearing	Silicon Carbide	1973	1
Impeller Thrust Bearing	Standard - Carbon Filled Teflon® Optional - Silicon Carbide Optional - DryGuard Silicon Carbide	197D	1
Rear Impeller Wear Ring (M and L Group Sizes Only)	Standard - Carbon Filled TEFLON®	203	1
Power End - Frame Mounted Only			
End Cover Gasket	Varnished Kraft	360A	1
Labyrinth Seal	Carbon Filled TEFLON®	332A	1
Ball Bearing	Steel	112	2
Lip Seal	Buna Rubber	333D	1
Hex Flange Nut	Steel	355A	1
L Group Impeller O-Ring	Standard-Viton Optional - EDPM Optional - TEFLON® Encapsulated Viton	496G	1

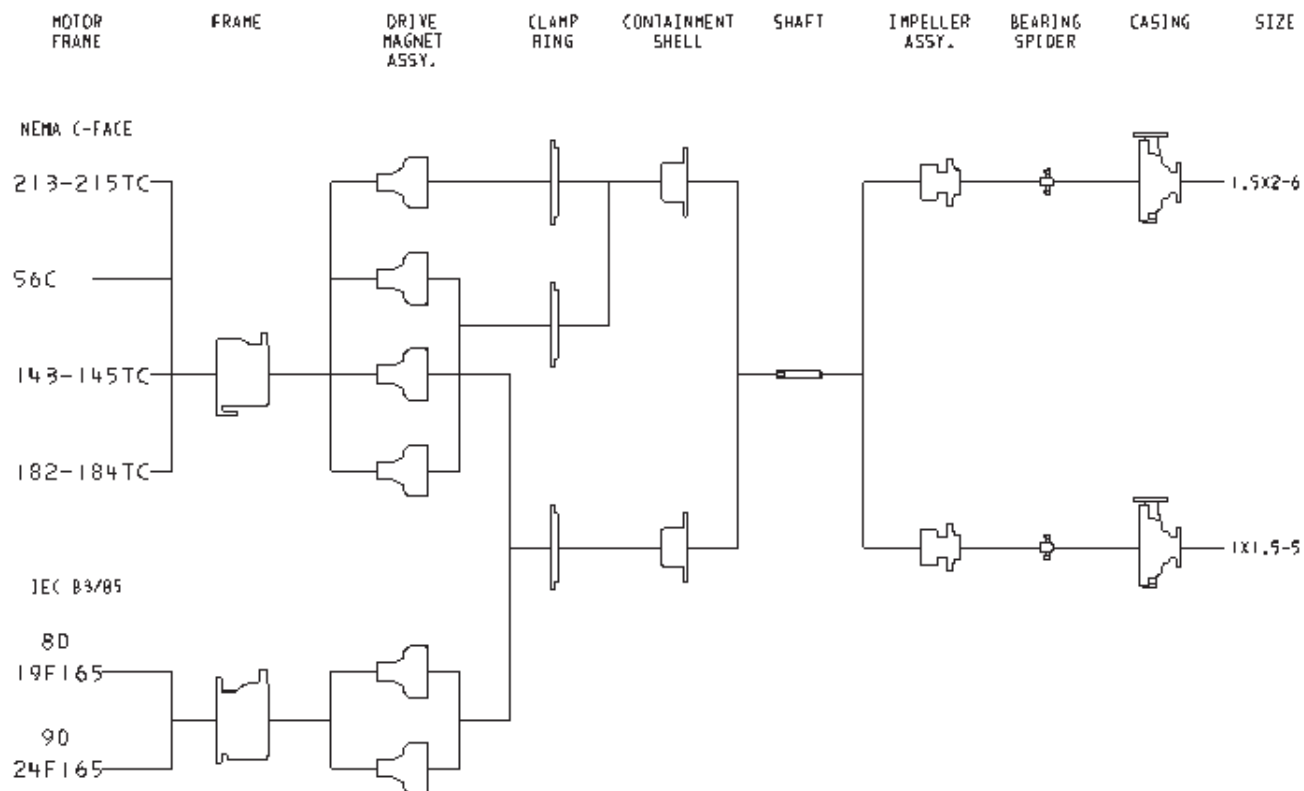
Table 12						
3298 Repair Kits						
Size	Bearing Kits ¹			Repair Kit ²		Power End Kit ³
	Carbon	Silicon Carbide	Dry-Guard™	Carbon / Silicon Carbide	Dry-Guard™	
XS Group						N/A
1X1.5-5	R298BKCXS26	R298BKXS15	R298BKSFXS15	R298K155V	R298RKSF15	
1.5X2-6	R298BKCXS6	R298BKXS6	R298BKSFXS6	R298RK526V	R298RKS526	N/A
S Group						R298PKS
1X1.5-6	R298BKCS15	R298BKSS15	R298BKSF15	R298RK156V	R298RKSF15	
1X1.5-8	R298BKCS15	R298BKSS15	R298BKSF15	R298RK158V	R298RKSF15	
1.5X3-7	R298BKCS3	R298BKSS3	R298BKSF3	R298RK36V	R298RKSF3	
2X3-6	R298BKCS3	R298BKSS3	R298BKSF3	R298RK36V	R298RKSF3	
M Group						R298PKML
1.5X3-8	R298BKCM153	R298BKSM153	R298BKSF153	R298RK538V	R298RKSF538	
1X2-10	R298BKCM2	R298BKSM2	R298BKSF3	R298RK210V	R298RKSF3	
2X3-8	R298BKCM3	R298BKSM3	R3+9BKSF3	R298RK38V	R298RKSF3	
3X4-7	R298BKCM4	R298BKSM4	R298BKSF4	R298RK47V	R298RKSF4	
L Group						R298PKML
1.5X3-10	R298BKCL310	R298BKSL310	R298BKSF310	R298RK5310V	R298RKSF5310	
2X3-10	R298BKCL310	R298BKSL310	R298BKSF310	R298RK2310V	R298RKSF2310	
3X4-10H	R298BKCL4	R298BKSL4	R298BKSF4	R298RK410V	R298RKSF4	
3X4-10G	R298BKCL410	R298BKSL410	R298BKSF410	R298RK3410V	R298RKSF410	
4X6-10	R298BKCL6	R298BKSL6	R298BKSF6	R298RK610V	R298RKSF6	

¹ The Bearing Kits include the spider, the thrust bearing, the bearing spacer, bearing key, radial bearings, rear impeller wear ring (if required), and the containment shell o-ring.

² The Pump Repair Kits include the impeller, shaft, reverse thrust bearing and the containment shell (L groups also include magnet retaining ring.)

³ The Power End Repair Kits include the ball bearings, drive carrier key, lip seal, hex flange nut (drive carrier shaft nut), bearing end cover gasket, frame gasket, and the labyrinth o-rings.

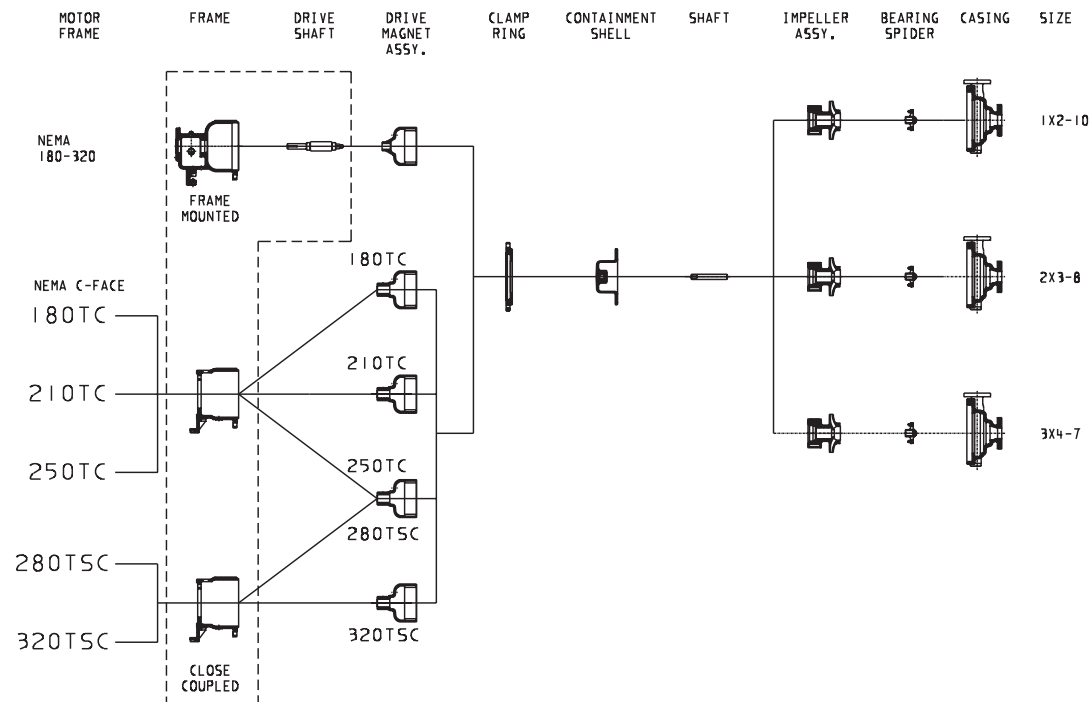
INTERCHANGEABILITY 3298 XS GROUP



7



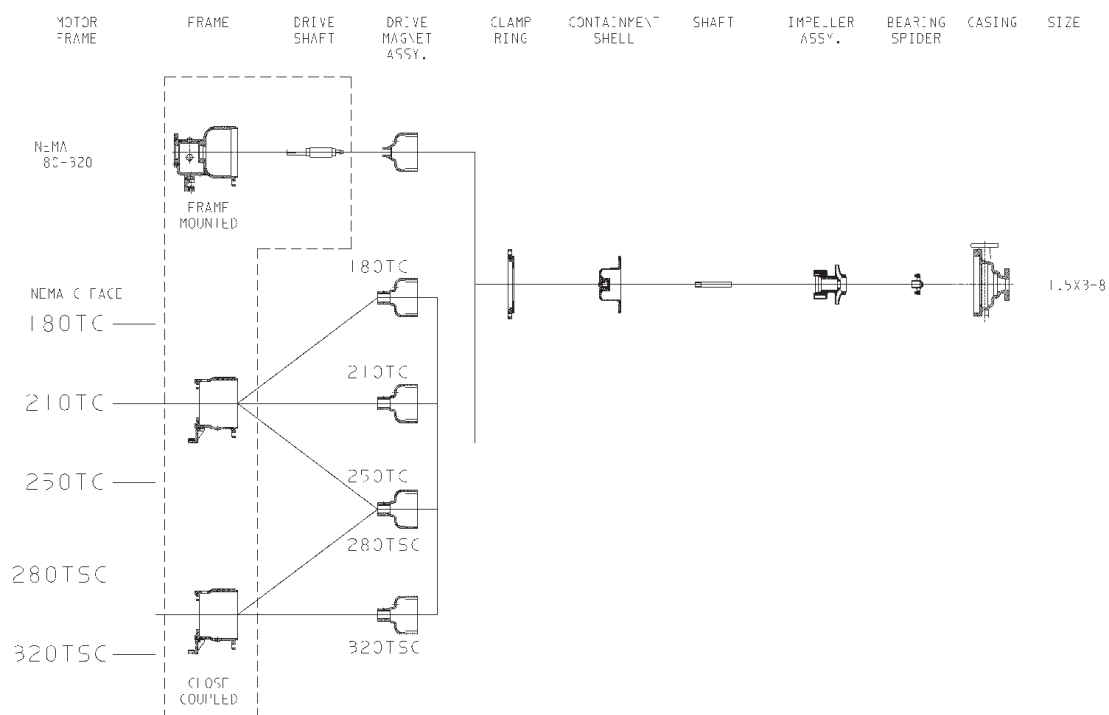
INTERCHANGEABILITY 3298 M GROUP



PARTS INSIDE DASHED BOX ARE COMMON TO 3298 M&L GROUP

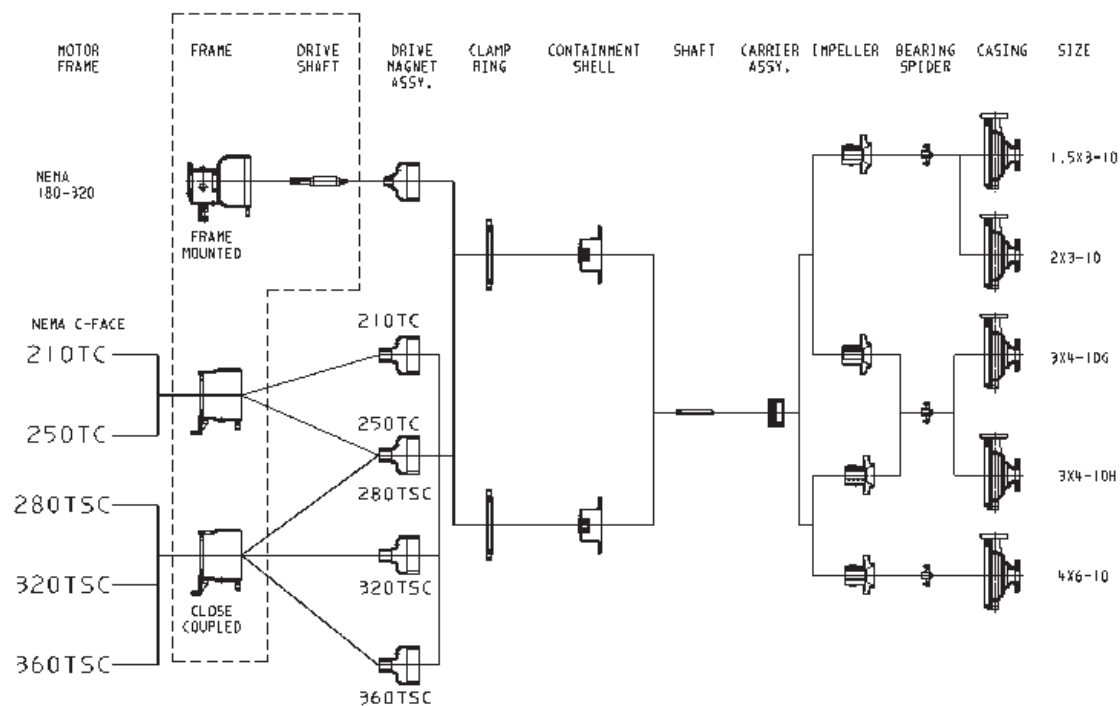
DWG. NO. A06035A

INTERCHANGEABILITY 3298 M GROUP (SIZE 1½ x 3-8 ONLY)



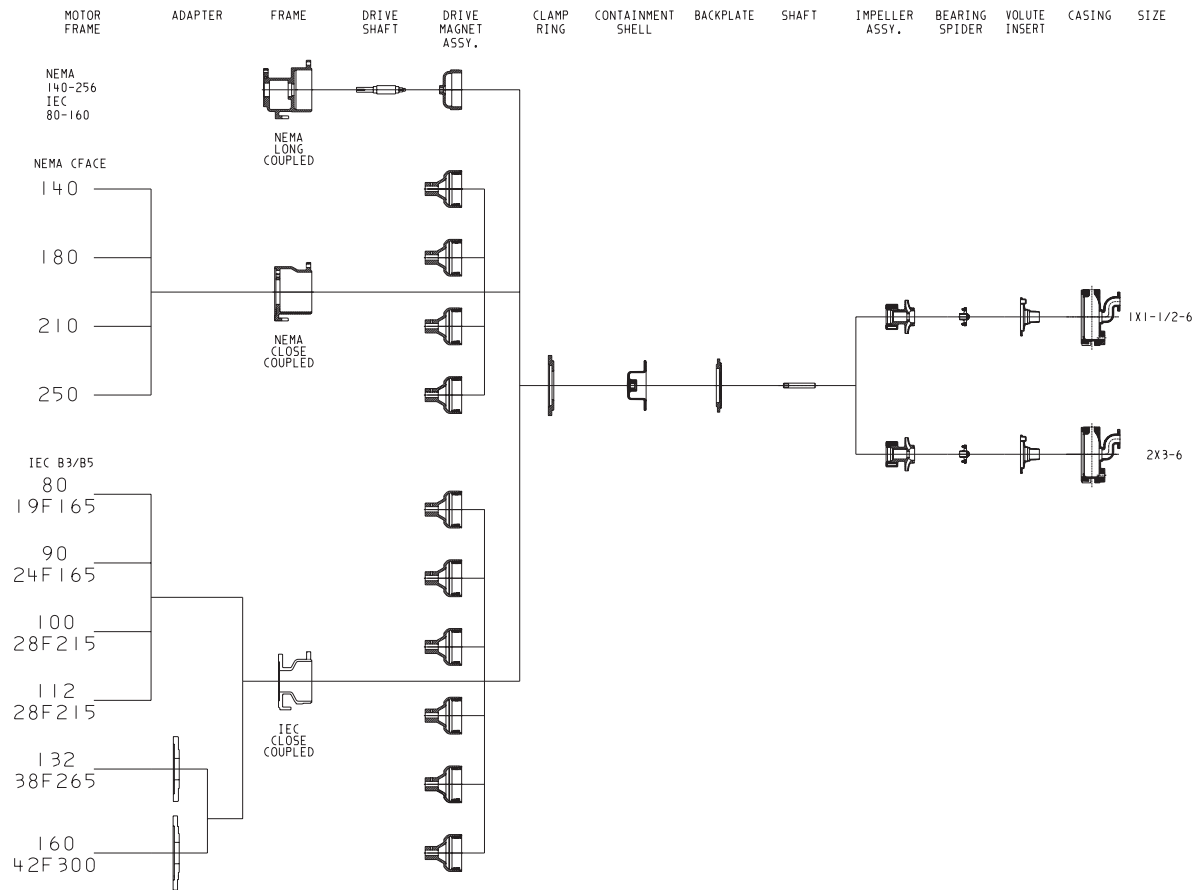
PARTS INSIDE DASHED BOX ARE COMMON TO 3298 M&L GROUP

INTERCHANGEABILITY 3298 L GROUP

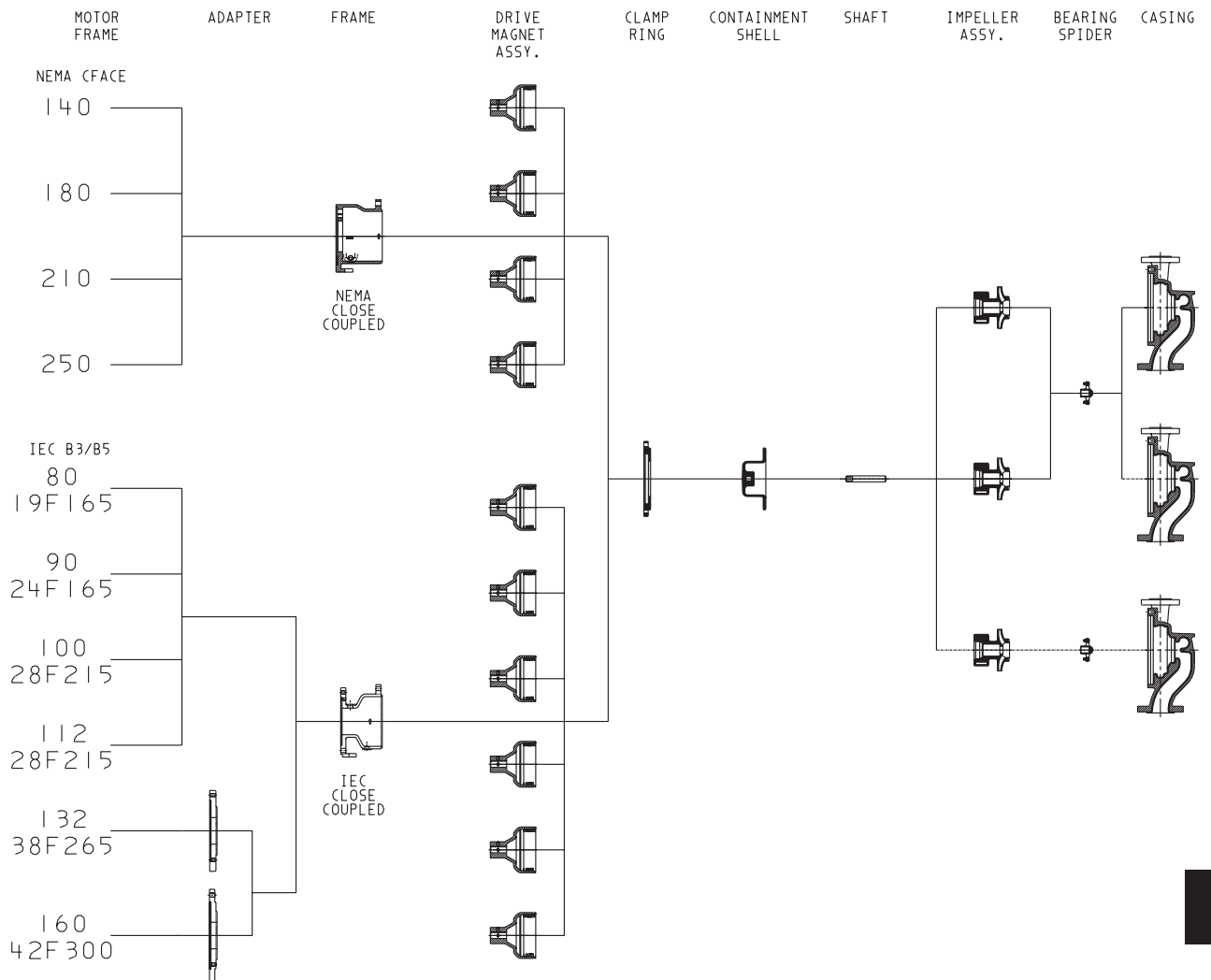


PARTS INSIDE DASHED BOX ARE COMMON TO 3298 M&L GROUP

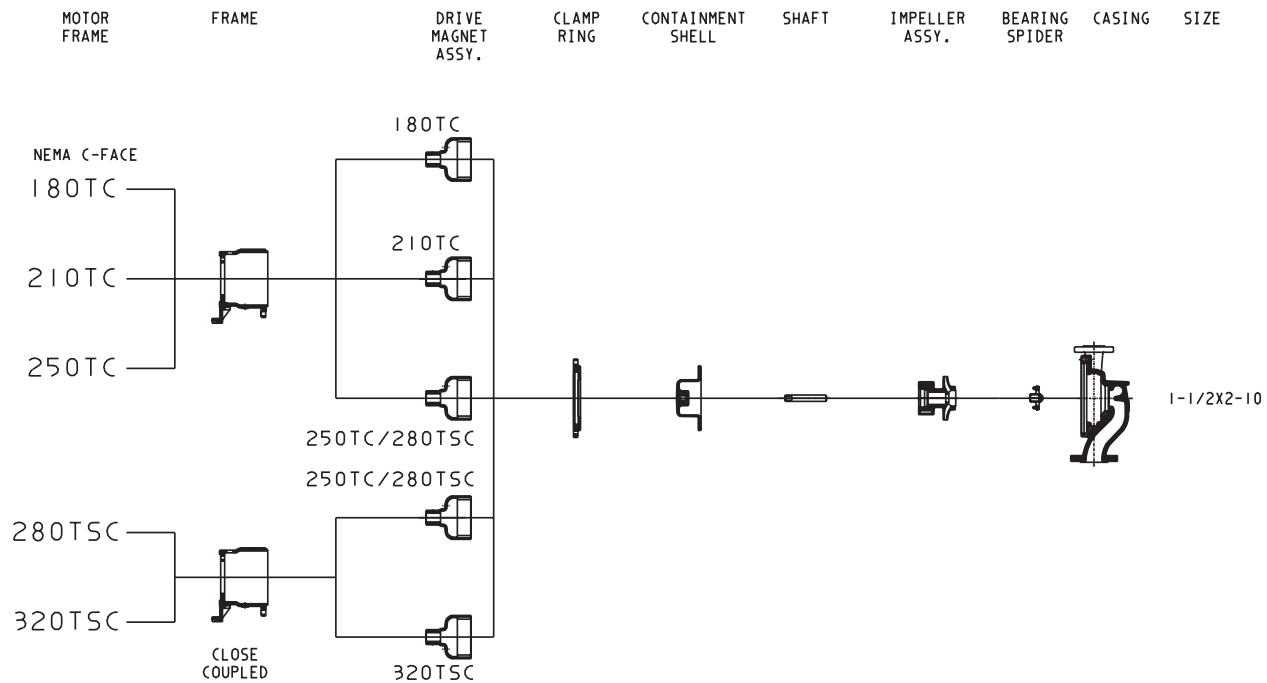
INTERCHANGEABILITY SP 3298 S GROUP



INTERCHANGEABILITY V 3298 S GROUP



INTERCHANGEABILITY V 3298 M GROUP



RETURN OF MATERIALS

If it is necessary to return the pump to a Goulds factory or repair facility for service, certain procedures must be followed.

Do not return any parts without authorization from the warranty engineer, a warranty claim number, and the preprinted shipping label supplied by Goulds. In rare instances because of the pumpage, ITT Goulds Pumps Warranty Services may, at their option, decide not to have the parts returned.

The parts being returned must be decontaminated prior to shipment. The decontamination must be verified in writing. The correct Material Safety Data Sheet (MSDS) must accompany the parts along with decontamination "sign off." This information is stated within the ITT

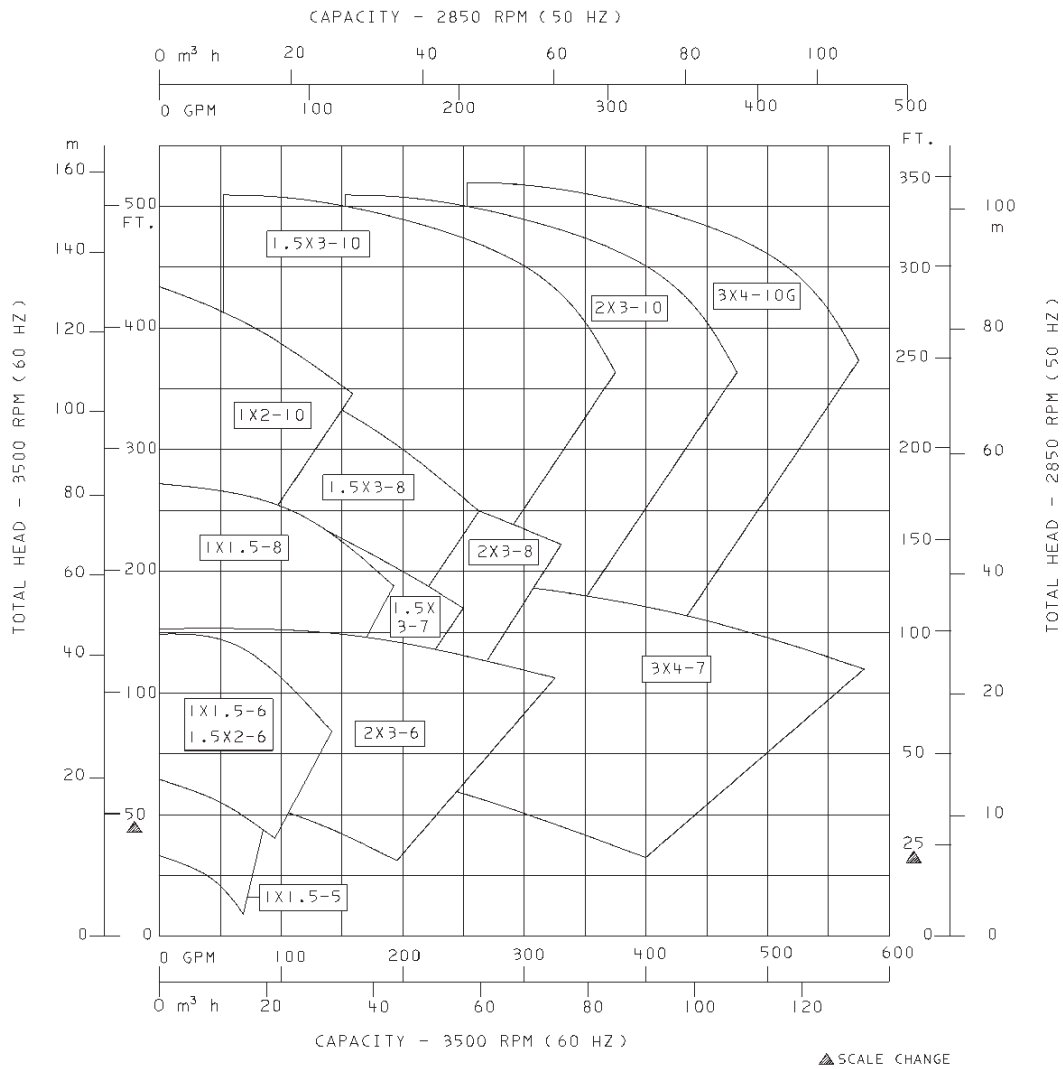
Goulds Pumps "decontamination procedure." The Warranty Service engineer will send a copy of this procedure to the customer. Please remember that inspection of the parts cannot be started until we receive the proper documentation. This is a safety and legal issue and consequently strict adherence to procedure is mandatory — there will be no exceptions.

Before shipping, check with your carrier for special procedures that may be required when shipping highly magnetic materials.

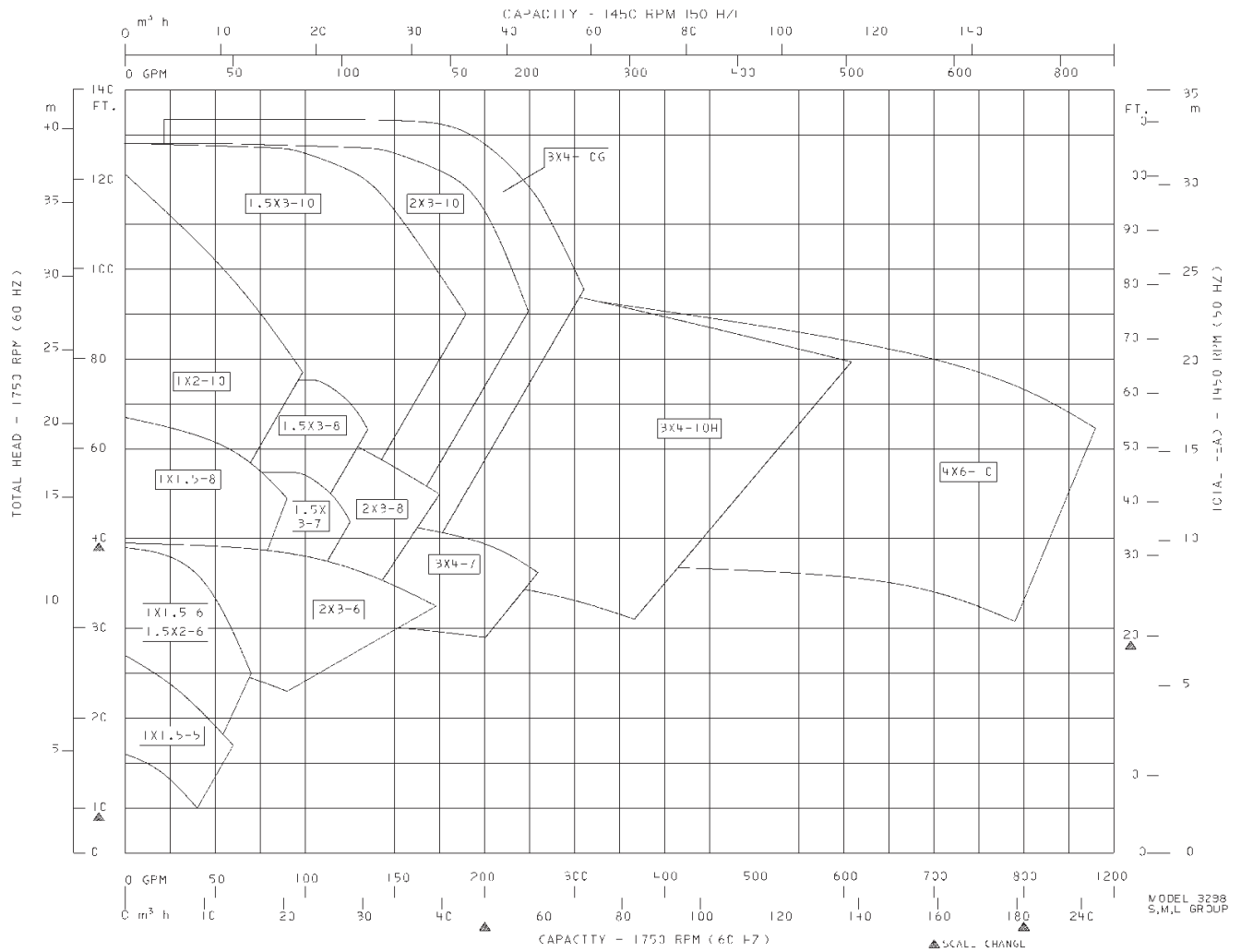
All pumps must be decontaminated prior to return. Refer to *Preparation for Disassembly and Decontamination Procedure*.

APPENDIX I

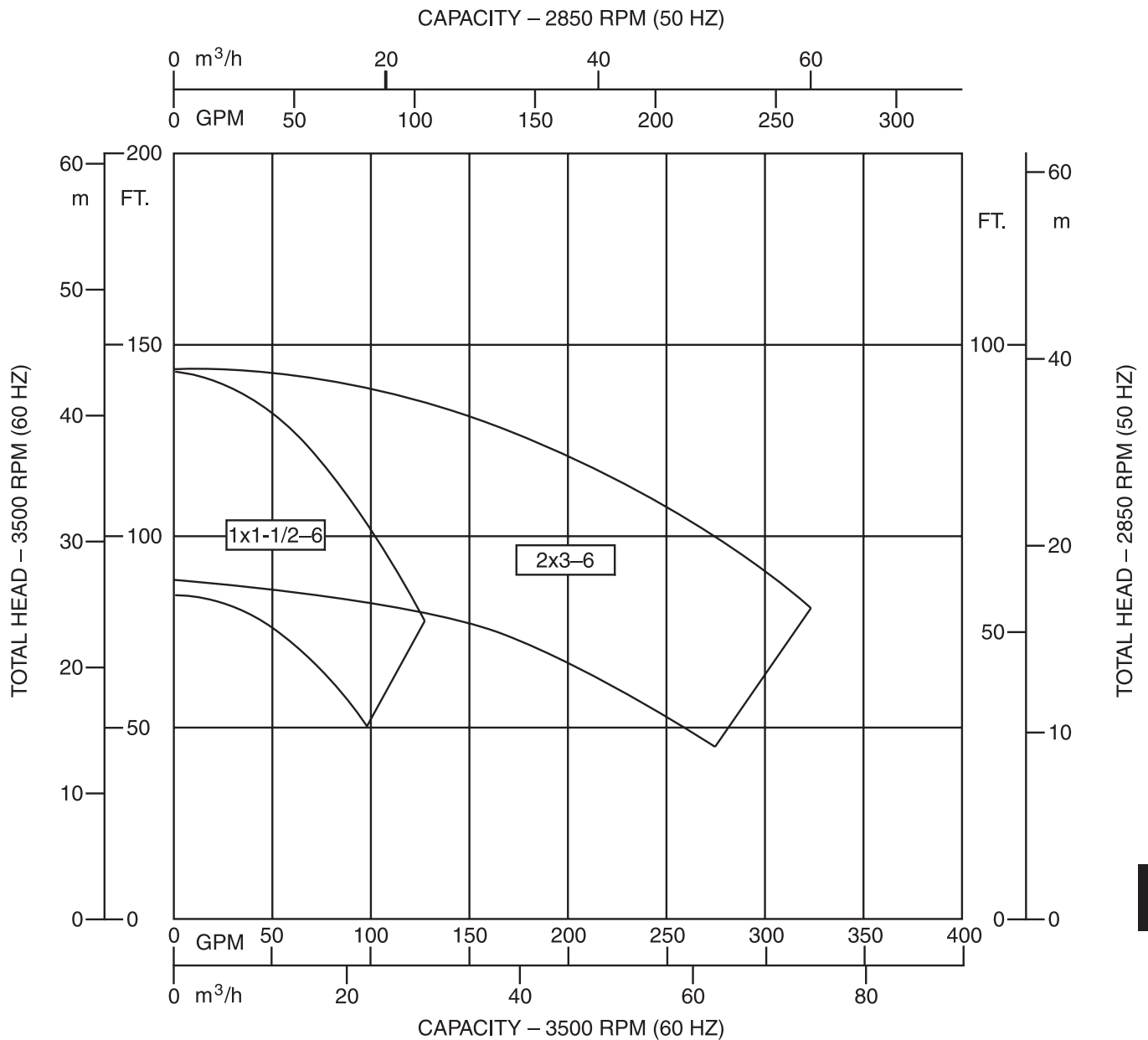
3298 HYDRAULIC COVERAGE CHARTS



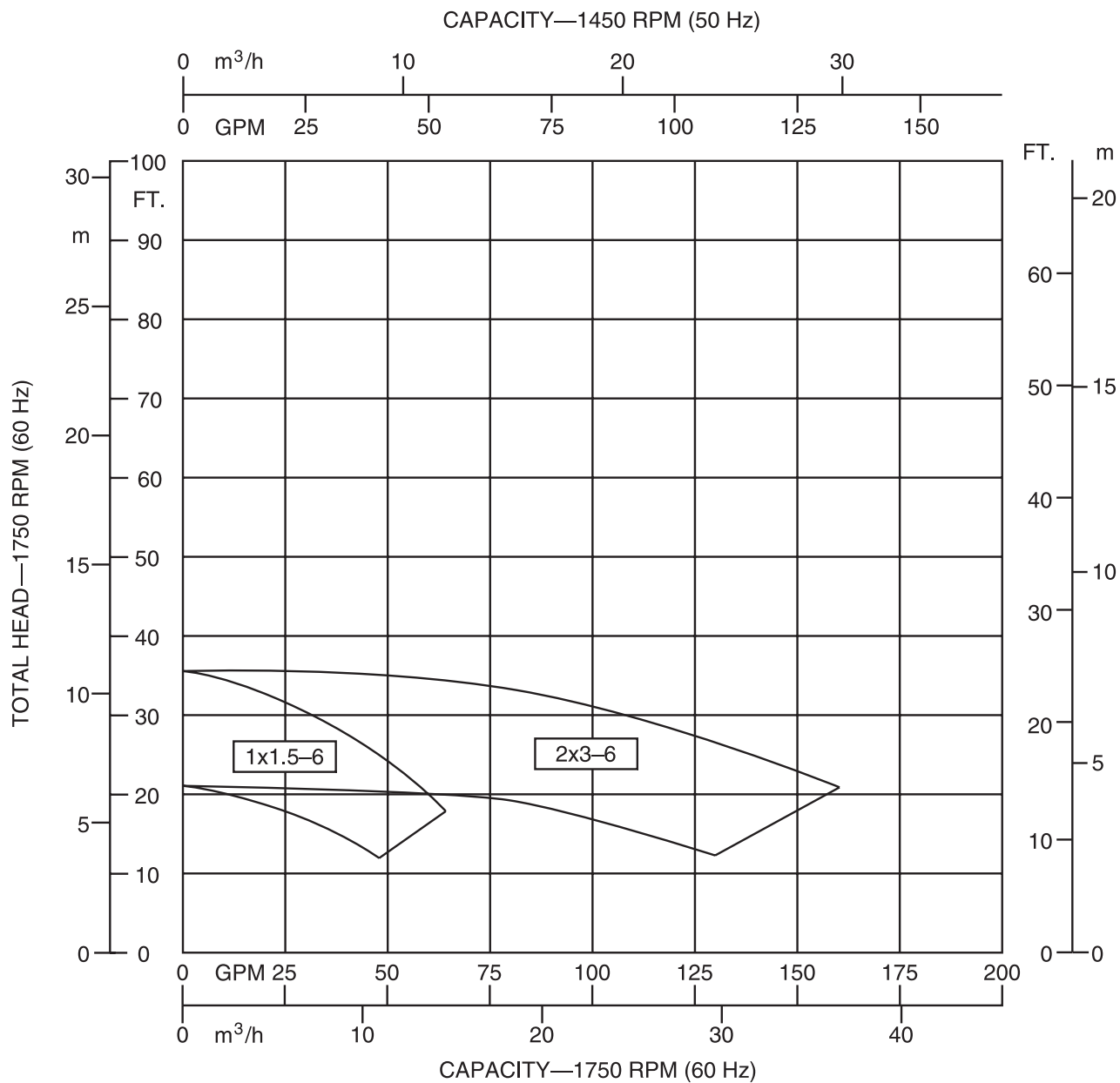
3298 HYDRAULIC COVERAGE CHARTS



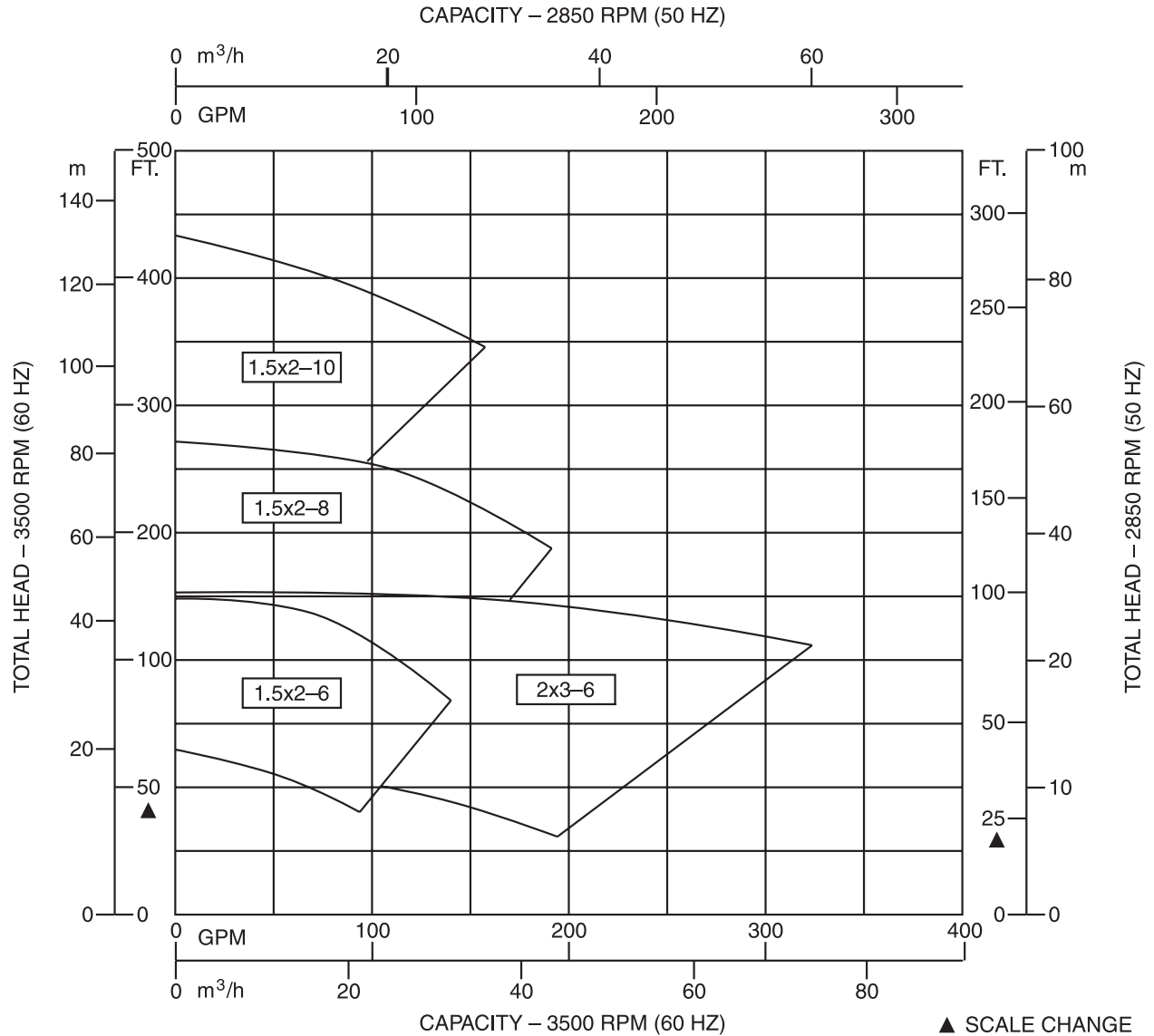
SP 3298 HYDRAULIC COVERAGE CHARTS



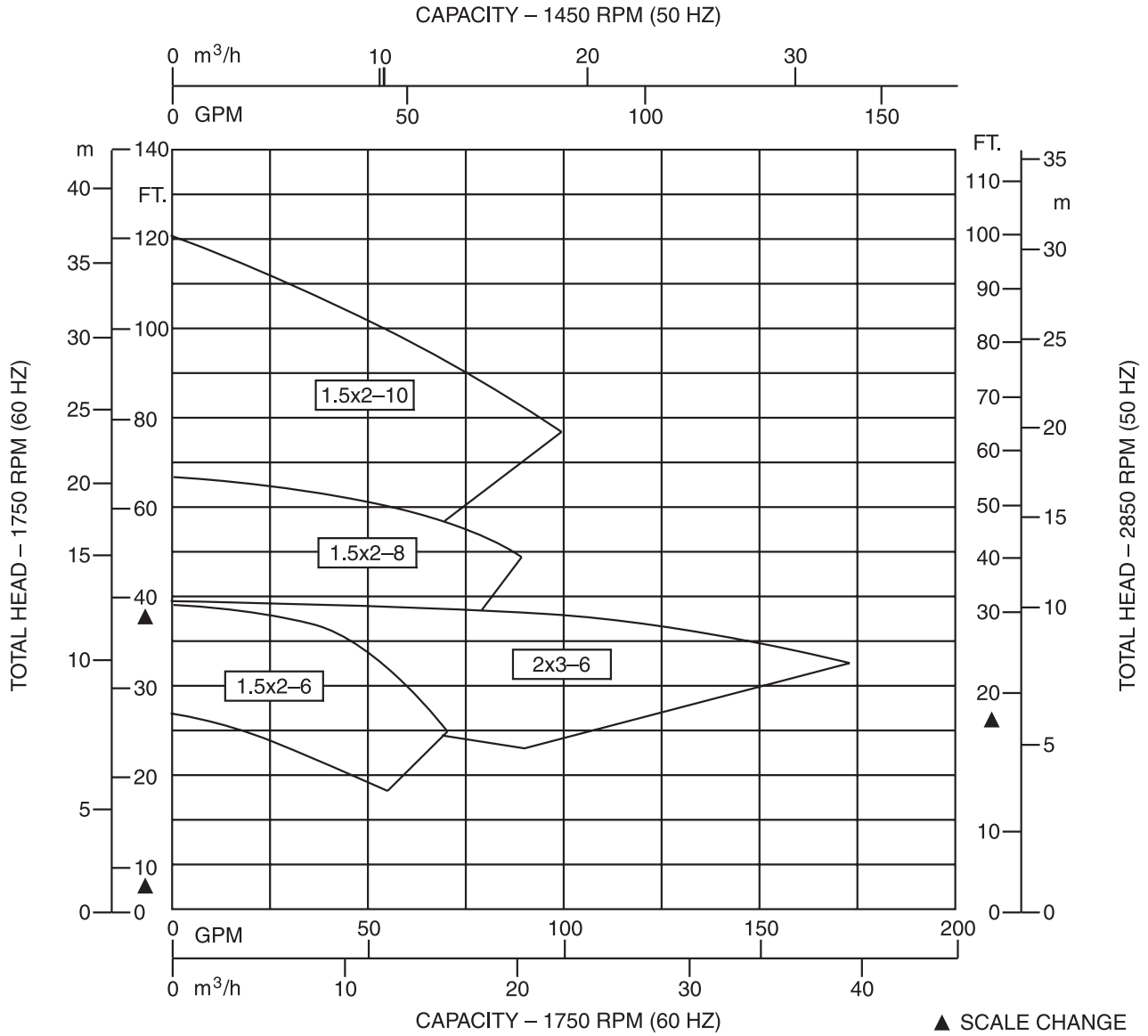
SP 3298 HYDRAULIC COVERAGE CHARTS



V 3298 HYDRAULIC COVERAGE CHARTS



V 3298 HYDRAULIC COVERAGE CHARTS



APPENDIX II

COUPLING GUARD INSTALLATION - Frame Mounted Only



The coupling guard used in an ATEX classified environment must be constructed from a non-sparking material.



WARNING

Before assembly or disassembly of the coupling guard is performed, the motor must be de-energized, the motor controller/starter put in a locked-out position, and a caution tag placed at the starter indicating the disconnect. Replace coupling guard before resuming normal operation of the pump. Goulds Pumps assumes no liability for avoiding this practice.

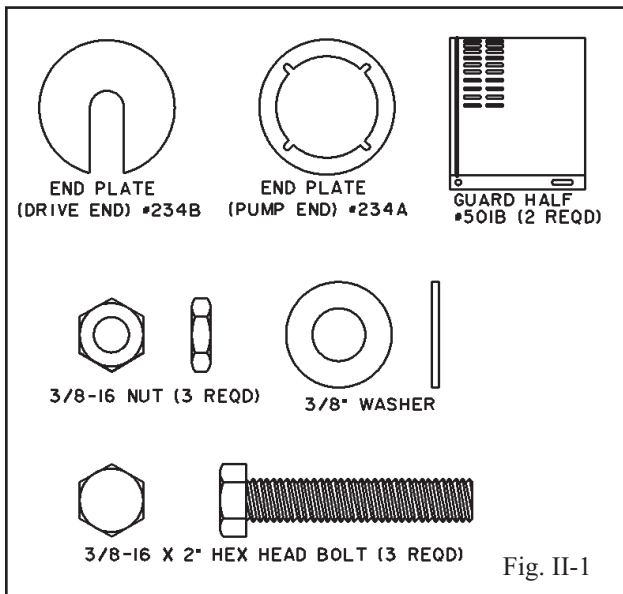


Fig. II-1

Simplicity of design allows complete assembly of the coupling guard, including the end plate (pump end), in about fifteen minutes. If the end plate is already in place, assembly can be accomplished in about five minutes.

Assembly:

NOTE: If end plate (pump end) is already installed, make any necessary coupling adjustments and then proceed to Step 2.

1. **STX, MTX, LTX** - Align end plate (pump end) to the bearing frame. (No impeller adjustment required.)

XLT-X Align the end plate (pump end) to the pump bearing housing so that the large slots on the end plate clear the bearing housing tap bolts and the small slots are aligned to the impeller adjusting bolts. Attach the end plate to the bearing housing using the jam nuts on the impeller adjusting bolts as shown in Fig. II-3.

After the end plate is attached to the bearing housing, the impeller clearance must be checked and reset as explained in the *Preventive Maintenance* section.

NOTE: Coupling adjustments should be completed before proceeding with coupling guard assembly.

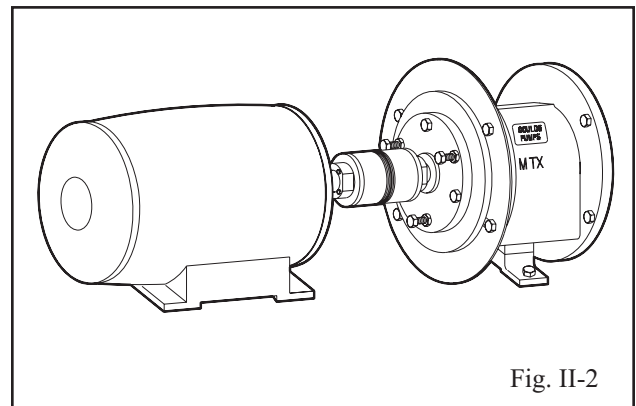


Fig. II-2

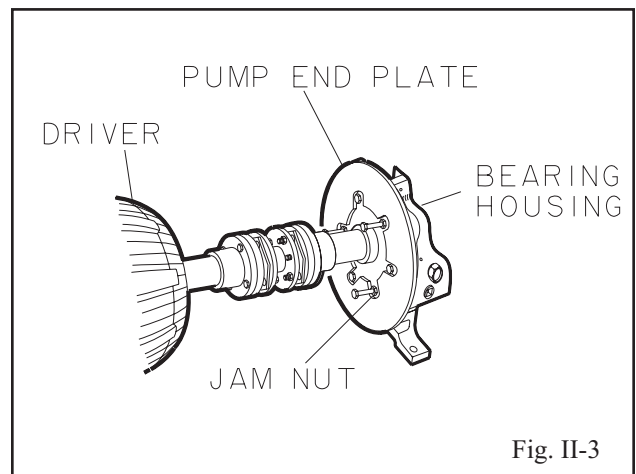
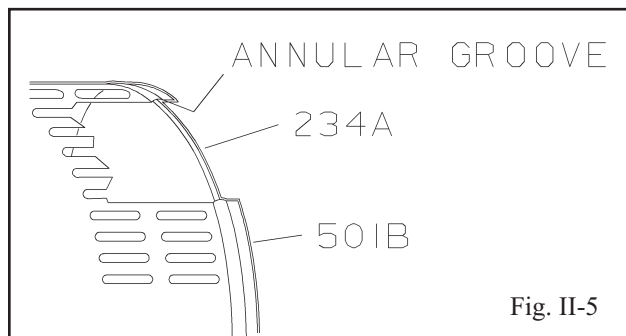
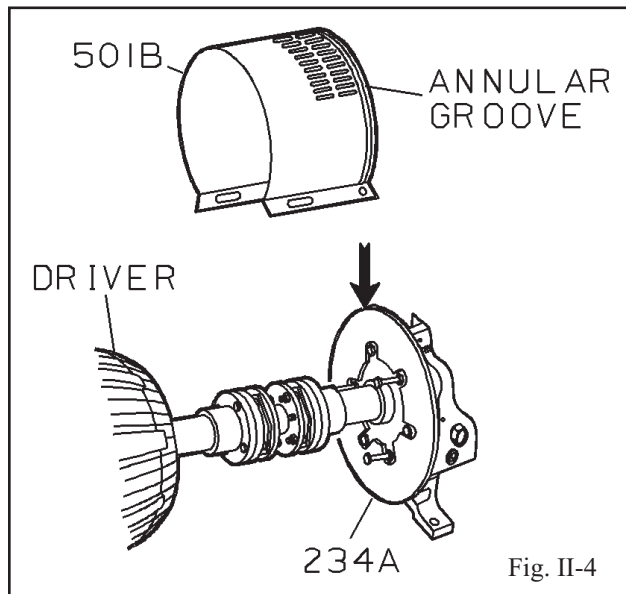
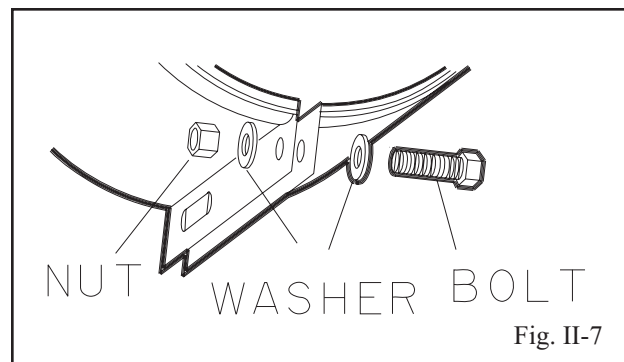
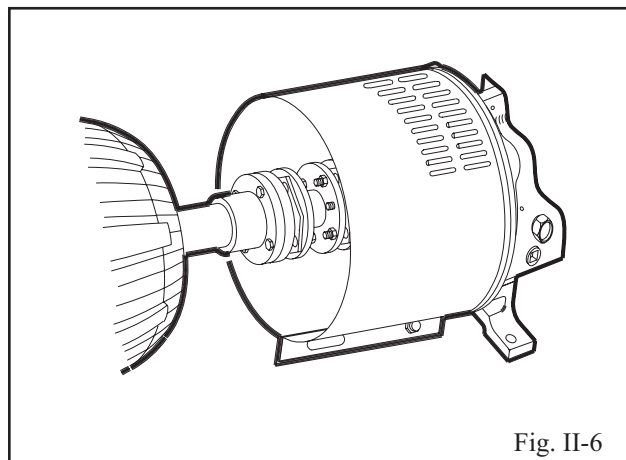


Fig. II-3

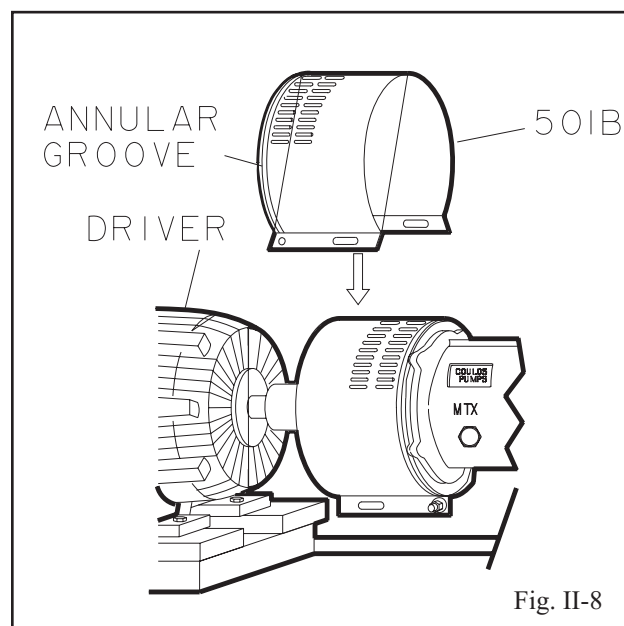
2. Spread bottom of coupling guard half (pump end) slightly and place over pump end plate as shown in Fig. II-4. The annular groove in the guard half is located around the end plate (Fig. II-5).



3. After the coupling guard half (pump end) is located around the end plate, secure it with a bolt, nut and two washers through the round hole at the front end of the guard half as shown in Fig. II-6. Tighten securely (Fig. II-7).



4. Spread bottom of coupling guard half (driver end) slightly and place over coupling guard half (pump end) so that annular groove in coupling guard half (driver end) faces the motor as shown in Fig. II-8.



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

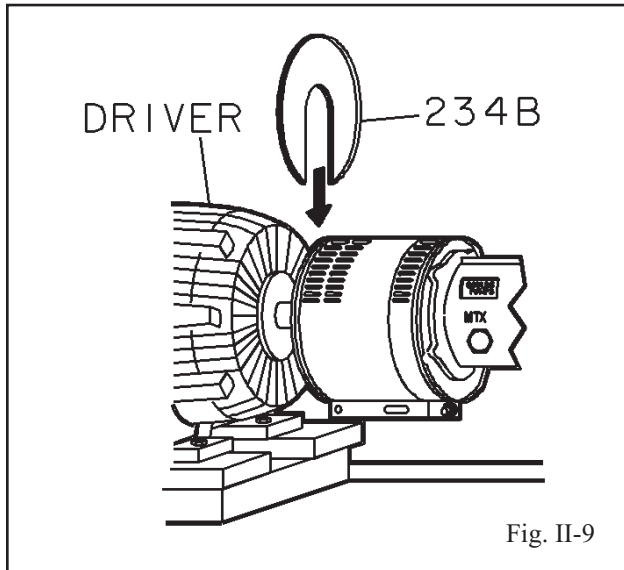


Fig. II-9

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



WARNING

Before assembly or disassembly of the coupling guard is performed, the motor must be de-energized, the motor controller/starter put in a locked-out position, and a caution tag placed at the starter indicating the disconnect. Replace coupling guard before resuming normal operation of the pump. Goulds Pumps assumes no liability for avoiding this practice.

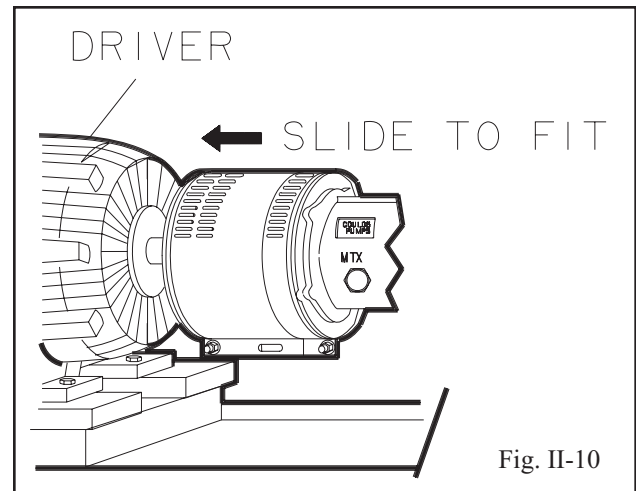


Fig. II-10

Disassembly

The coupling guard must be removed for certain maintenance and adjustments to the pump, such as adjustment of the coupling, impeller clearance adjustment, etc. The coupling guard should be replaced after maintenance is completed.

DO NOT resume normal pump operation with the coupling guard removed.

NOTE: Refer to illustrations for assembly in reverse order.

1. Remove nut, bolt, and washers from center slotted hole in the coupling guard. Slide motor end coupling guard half towards pump (Fig. II-10).
2. Remove nut, bolt, and washers from coupling guard half (driver end), and remove end plate (Fig. II-9).
3. Spread bottom of coupling guard half slightly and lift off (Fig. II-8).
4. Remove remaining nut, bolt, and washers from coupling guard half (pump end). Spread bottom of coupling guard half slightly and lift off (Fig. II-4).

This completes disassembly of the coupling guard.

NOTE: It is not necessary to remove the end plate (pump end) from the pump bearing housing. The bearing housing tap bolts are accessible without removing the end plate in case maintenance of internal pump parts is necessary. Before removing the pump bearing housing, refer to Section 6 - Disassembly & Reassembly.

APPENDIX III

IMPELLER AND SP 3298 TRIM PROCEDURE

IMPELLER TRIM PROCEDURE

DO NOT chuck the impeller assembly.

DO NOT take cuts larger than .050".

DO NOT over tighten arbor screw (this could crack the carbon bearings).

DO:

1. Use Arbor tool A06785A01 (XS Group size 1 x 1½-5).
Use Arbor tool A06785A02 (S Group sizes 1 x 1½-6, 1 x 1½-8, 2 x 3-6).
Use Arbor tool A06785A03 (M and L Group sizes 2 x 3-8, 3 x 4-7, 1 x 2-10, 3 x 4-10, 4 x 6-10).
2. Make sure Arbor is running true - within .002 TIR.
3. Tighten screw only enough to turn impeller without slipping.

NOTES:

1. Allowable front shroud t.i.r. is .060".
2. When trimming an XS impeller, trim both the front and back shrouds and the vanes to a minimum diameter of 3 ¾".
Trimming between 3 ¾" and 3", trim only the front shroud and the vanes.
3. Nylon impeller arbor sleeves may be used in place of bearings.
XS Group B04674A01
S Group B04676A02
M Group B04676A03
L Group B04676A04

Group XS

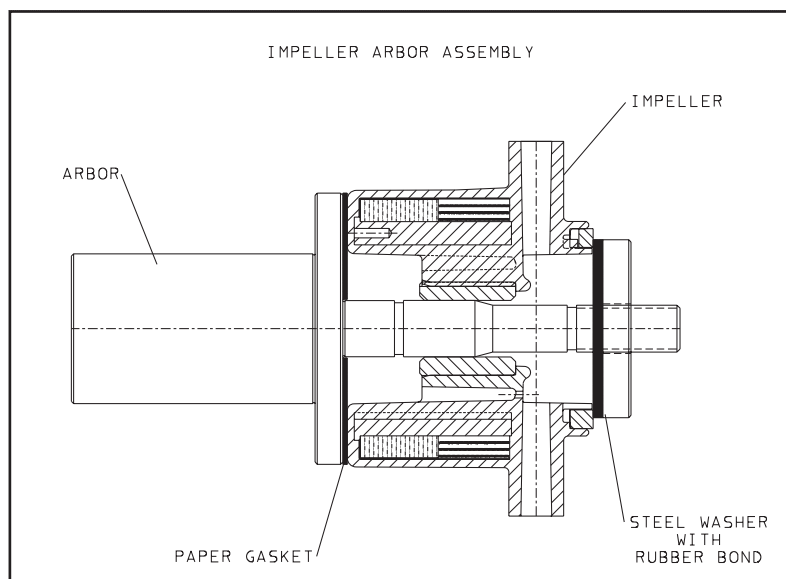
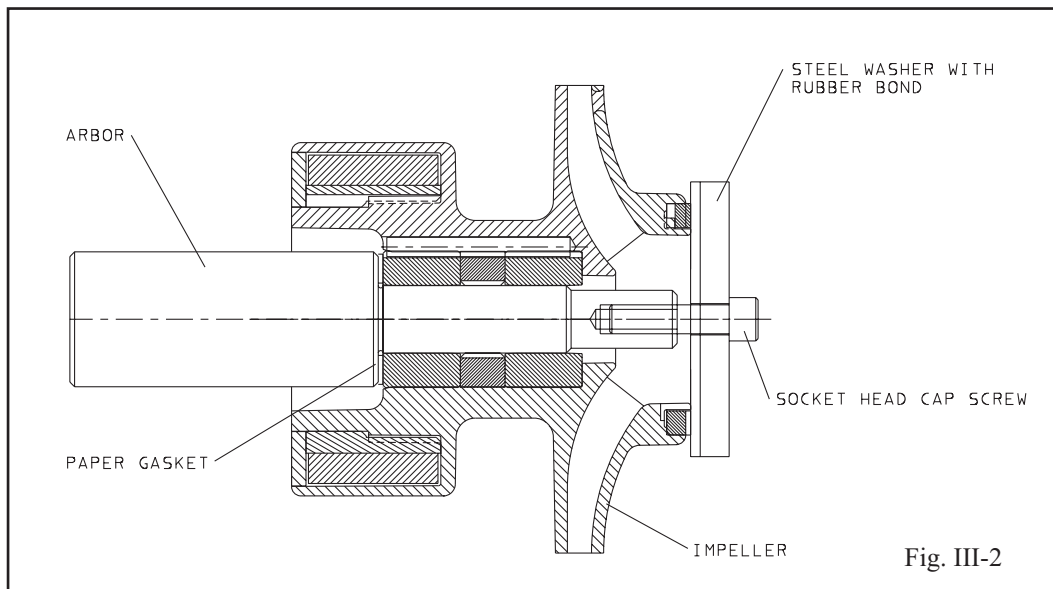


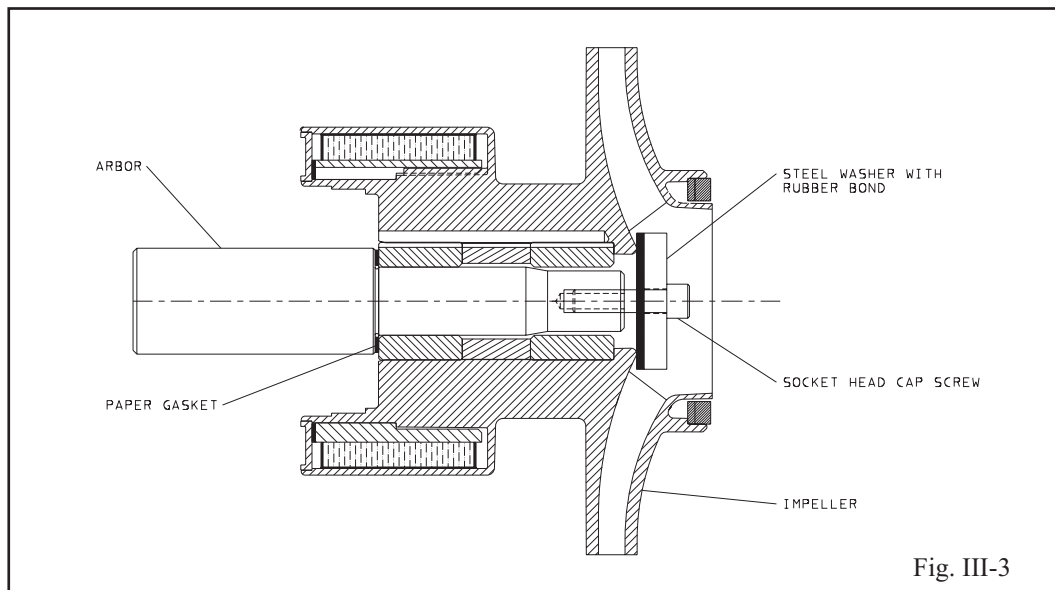
Fig. III-1

IMPELLER TRIM PROCEDURE

Group S & M



Group L



RECOMMENDED CUTTING TOOL

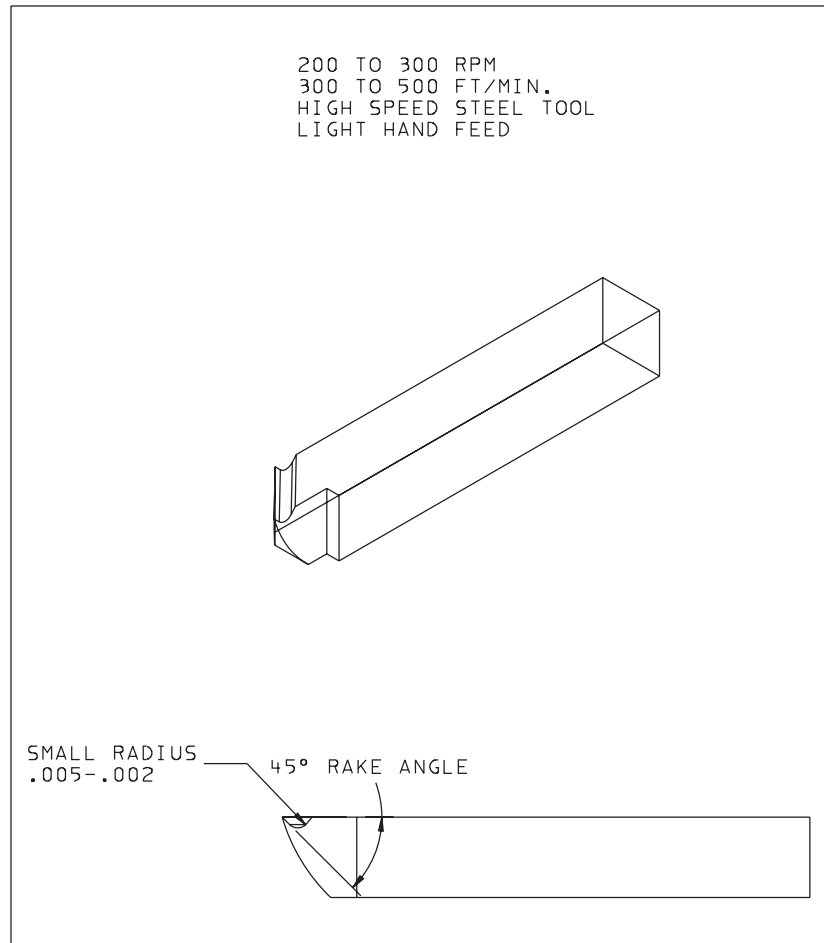


Fig. III-4

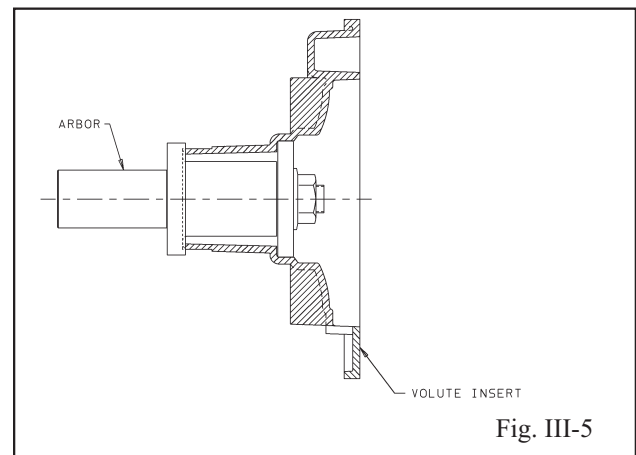
SP3298 VOLUTE INSERT TRIM PROCEDURE

8

DO NOT take cuts larger than .050"

DO:

1. Use Arbor Tool C06820A (SP3298 1X1.5-6)
- 2.. Use Arbor Tool C06821A (SP3298 2X3-6)
3. Make sure arbor is running true within .002" tir.



SP3298 VOLUTE INSERT CUTWATER TRIM PROCEDURE

Machine cutwater diameter to full depth "R" as shown in Table III-1.

- Use arbor C06820A for SP3298 1x1.5-6
- Use arbor C06821A for SP3298 2x3-6

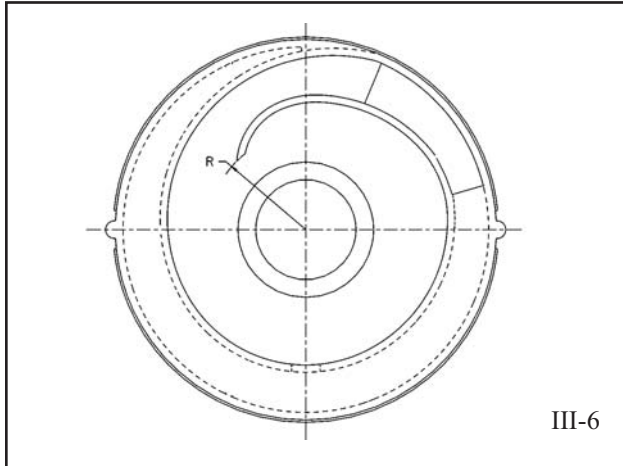
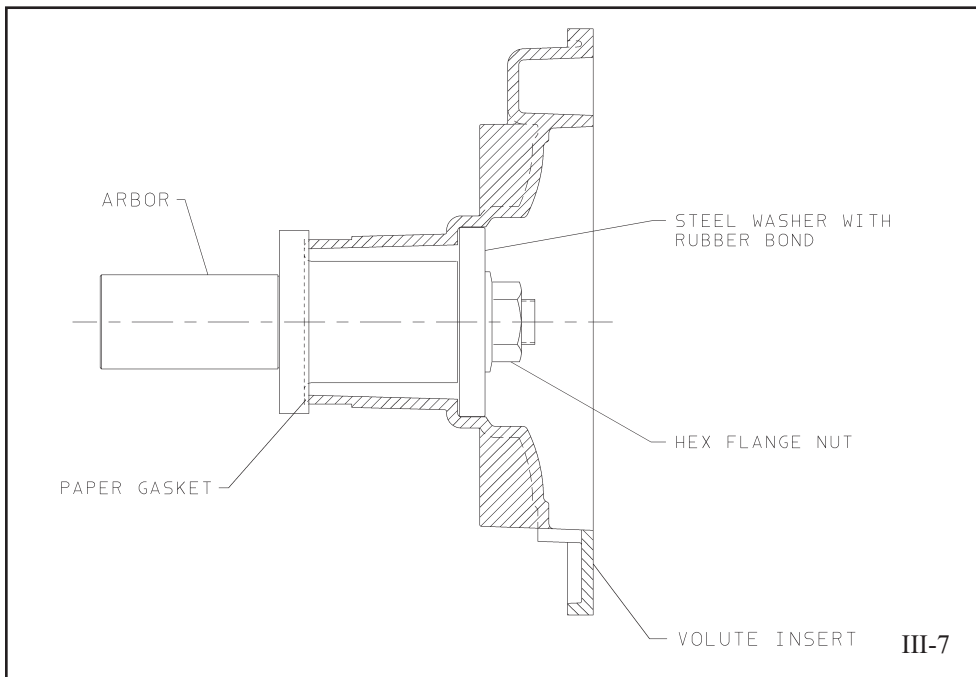


Table III-1

Impeller Diameter	"R" ± 0.010 "
5.00	2.563
5.12	2.625
5.25	2.688
5.38	2.750
5.50	2.813
5.62	2.875
5.75	2.938
5.88	3.000
6.00	3.063
6.06	3.094



APPENDIX IV

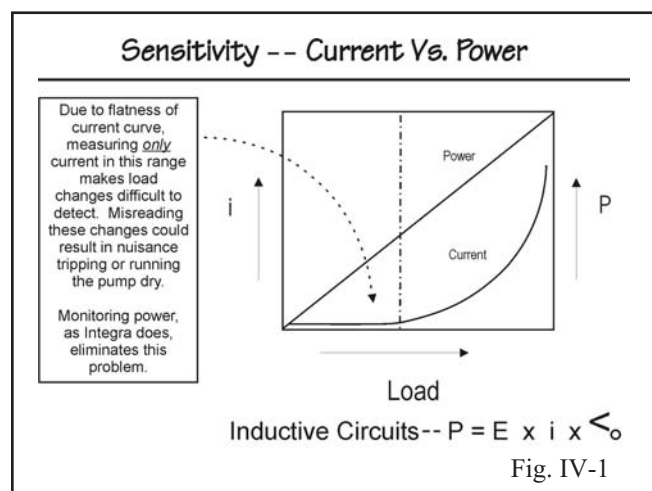
POWER MONITORS

CONDENSED POWER MONITOR USER GUIDE

ITT Goulds Pumps offers various power monitoring devices which have been designed to protect pumps from dry-running, running against a closed discharge valve, and running outside of the recommended operating region for specific pump sizes, speeds, and impeller diameters. Power monitors were designed to detect power relative to load which is a linear function as opposed to measuring amperage relative to load which is a parabolic function. The linear characteristic of measuring power vs. load enhances sensitivity at low power conditions where increments in power are critical. See Fig. IV-1 for comparison of power measurements vs. amperage measurements. Quite simply, a properly adjusted and installed power monitor is an insurance policy for securing extended pump life.

The following summarized concepts will assist in effectively selecting and properly calibrating power monitors used to protect pumps.

1. Read your power monitor installation instructions and wiring diagram before attempting to calibrate the unit.
2. Understand your pump's recommended operating envelope as provided by ITT Goulds Pumps.



3. Understand your systems requirements and limitations.

4. Understand the full range of your operating duty, including power requirements at the rated minimum and maximum flow conditions.
5. If only small fluctuations occur between the rated point and trip points (less than 15% of the total motor horsepower available), then the Integra Motor Minder should not be used. In this case, use either the Emotron or Load Controls unit as they can detect to approximately 1% changes in horsepower.
6. Understand the relationship and limitations of item numbers 2, 3, and 4 as an integrated functional system.
7. Identify potential failures that would most likely be characteristic of your specific process and the pump type selected.
8. Understand the power scope and torque scope of the selected electric motor.
9. A complete analysis of the above concepts will define a safe operating range for your specific system.
10. When feasible, further define your operating range to run as close to BEP (best efficiency point) as practical.
11. Select single trip unit or dual trip unit as practical for your specific system.
12. Set low power trip point at the power draw required when operating at the manufacturer's recommended minimum flow or higher, yet less than the normal operating point.
13. Set the high trip point at the power draw required when operating at the manufacturer's recommended maximum flow or lower, or at flow rate that will prevent cavitation.
14. When using dual trip power monitors, select high and low trip points designed to protect your specific system within the recommended pump operating region defined by ITT Goulds Pumps. This method will create boundaries for a safe pump operating envelope.

POWER MONITORS, (cont'd)

15. Set nuisance trip feature for each power trip. The nuisance trip device should be set at an appropriate interval that will allow the system to experience momentary fluctuations in power draw. However, the nuisance trip device should also be set at an appropriate time frame that will prevent the pump from experiencing excessive heat or dangerous operating conditions.
16. Set the delay timer for start-up conditions that will appropriately allow the system to come to normal operating power within a time frame that will maximize protection of your pump.
17. For variable speed operation, consult ITT Goulds Pumps or the power monitor manufacturer for appropriate auxiliary devices designed for operating at multiple speeds or fluctuating frequencies.
18. Select electrical enclosure that is suitable for the operating environment or install the unit in an appropriate electrical panel.
19. Do not activate the power monitor's manual override until a thorough examination of the source of the problem is defined and corrected.
20. Investigate and select power monitor features that are most suitable for your particular application and plant safety.

Power monitors can be strategically calibrated to protect your pump from any of the following conditions by appropriately determining the power draw at any of these individual conditions:

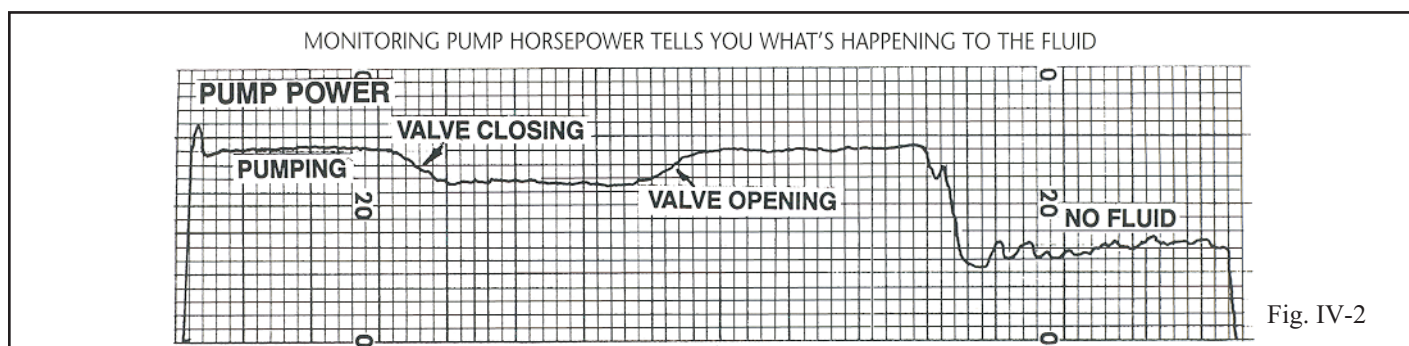
- Dry Running
- Closed Discharge Valve
- No Prime
- Inadequate Suction Conditions

- Plugged Suction
- Cavitation
- Air Lock
- Decoupled Magnets
- Solidified, Plugged, or Frozen Discharge Line
- Fluctuating Viscosities, Precipitation, or Coagulation
- Broken or Damaged Shaft
- Broken or Damaged Coupling
- Jammed Impeller
- Bad Bearings
- Rapid Cycling

The power draw at each of these conditions can be simulated in a plant test or estimated through calculations or interpolations from the pump performance curve. By defining these dangerous power fluctuations, appropriate calibration of the power monitoring unit will prevent avoidable pump failures. See *Fig. IV-2* for a typical power evaluation recorded from a common centrifugal pump electric motor.

Contact ITT Goulds Pumps Application Engineering staff or regional distributor for assistance and power analysis for your specific system.

For further details and evaluation of power monitoring units, a comprehensive power monitor user guide is available from ITT Goulds Pumps distribution network.



APPENDIX V

Reliability Tips for Operating Lined Magnetically-Driven Sealless Pumps

QUICK REFERENCE SUMMARY

These summarized reliability guidelines outline recommendations for creating an optimal environment for operating lined mag-drive pumps. For further details on the subject of operating a lined-mag drive pump with superior reliability, please request the Lined Mag-Drive Reliability Guide from your ITT Goulds Pumps' representative.

- Do not operate mag-drive pumps under no flow conditions.
- Do not operate mag-drive pumps against a closed discharge valve.
- Do not operate mag-drive pumps with solids that exceed the manufacturer's maximum limits in particle size or concentration.
- Before operating mag-drive pumps, confirm chemical compatibility of process liquid with all wetted pump components in an effort to reduce corrosion, permeation, or erosion.
- Do not operate mag-drive pumps with process liquids that may exceed the maximum temperature limits or fall below the minimum temperature limits defined by the pump manufacturer.
- Do not operate mag-drive pumps outside of the manufacturer's recommended operating range. Otherwise, recirculate adequate flow through bypass lines when operating near or below the manufacturer's recommended mechanical and thermal operating flow to prevent excessive temperature rise or recirculation cavitation.
- Consider the inner and outer magnet assemblies' material temperature limits and recoverable flux density losses due to increased temperatures.
- Do not operate mag-drive pump without considering the process liquid's vapor pressure characteristics over the temperature range of the application. Adequate NPSHa as well as vapor pressure is mandatory to prevent cavitation or vaporization in localized low pressure regions within the pump.
- Use power monitoring devices when potentially operating near or outside of the manufacturer's recommended operating envelope.
- Consider temperature controlling devices such as heat jackets or steam tracing for pumps that are subject to process fluids that transform characteristics such as viscosity, specific gravity, crystallization, coagulation, solidification, or vaporization with variable process temperatures.
- Use temperature monitoring devices such as thermocouples, RTDs, temperature controllers, or thermometers when process fluid is susceptible to critical variations in temperature.
- Use leak detectors such as fiber optic sensing devices or pressure monitoring devices when fluid is prohibited from entering the atmosphere.
- Ensure selected motor torque at maximum power and start-up conditions for corrected hydraulic and magnetic loss power at worst case fluid specific gravity and viscosity is less than the magnet break-away torque at maximum temperature.
- Keep process liquid in liquid form. Prevent the liquid from flashing.
- Do not exceed the manufacturer's maximum viscosity limits as internal fluid circulation velocities will be inadequate to properly cool and lubricate sleeve bearings.

APPENDIX VI

Polyshield® ANSI Combo Installation, Operation, and Maintenance Instructions

SAFETY CONSIDERATIONS

Several important general precautions are listed below:

1. Do not remove the Polyshield® ANSI Combo from its shipping pallet until you are ready to hoist it onto its location.
2. Do not subject the Polyshield® ANSI or Custom Combo to rough handling or unnecessary mechanical shock.
3. Do not attempt to lift the Polyshield® ANSI Combo by any means other than that which is prescribed in these procedures.
4. Do not use hammer blows or other impact loading to adjust the positioning of the Polyshield® ANSI Combo. Do not pry against the Polyshield® mounting block when moving the motor during shaft alignment.
5. Do not attempt to transport, handle, or install a Polyshield® ANSI Combo when ambient temperature is below -50° F (-45° C).
6. Do not operate a pump installed on a Polyshield® ANSI Combo at process fluid temperatures in excess of 300° F (150° C) with polymer mounting pads and 500° F with alloy mounting pads unless prior approval from ITT Industries - Goulds Pumps is obtained in writing.



Service temperature in an ATEX classified environment is limited by Table 1 in the Safety Section.

NOTE: Always coordinate installation activity with operations personnel, and follow all plant safety requirements and applicable safety and health laws, directives and regulations.

OVERVIEW



CAUTION

Observance of proper handling procedures during installation is extremely important to prevent damage to the Polyshield® ANSI Combo. While polymer concrete possesses inherent high strength, subjecting it to impact or bending loads through rough handling or improper lifting or mounting may result in irreparable damage to the Polyshield® ANSI Combo as well as damage to the mounted equipment or injury to personnel.

APPLICATION

The polymer concrete material used in the manufacture of the Polyshield® ANSI Combo has been formulated for application in a wide range of corrosive fluid handling services. The material is not, however, universally corrosion resistant. A comprehensive corrosion guide is available. (Refer to Accessories Section of the Electronic Pricebook.) It is strongly recommended that this bulletin be reviewed prior to specifying or installing a Polyshield® Product.

The Polyshield® ANSI Combo is also suitable for application in a wide range of fluid process temperatures, specifically, -50° F to 300° F (-45° C to 150° C). Depending on the configuration of the pump that is to be mounted on the Polyshield®, fluid process temperature in excess of 300° F (150° C) may be permissible. Contact your ITT Industries - Goulds Pumps representative for assistance in determining acceptability of a specific application.

STORAGE

This section addresses the storage procedures for the Polyshield® ANSI Combo only. When storing Polyshield® ANSI Combos and pump assemblies, it is important that the proper storage procedures for the pump be observed as well. Refer to the Installation, Operation and Maintenance Instructions (IOM) for the particular Goulds pump that is mounted on your Polyshield® product.

Polyshield® normal packaging is designed to protect the Polyshield® ANSI Combo during shipment and handling from the time it is manufactured at the factory to installation at the end user's job site. If the Polyshield® Combo is to be stored for a period of time prior to installation, it is recommended that the following procedures be followed:

- a. Leave the Polyshield® ANSI Combo strapped to its wooden shipping pallet.
- b. Place the pallet on a solid, dry, level surface in a location where the ANSI Combo cannot be struck by passing fork trucks, falling objects, etc. Make sure the pallet does not rock.
- c. Do not stack heavy objects on top of the Polyshield® ANSI Combo.
- d. If the Polyshield® ANSI Combo is to be stored in an

outdoor location, cover the Polyshield® completely with a tarpaulin or dark plastic sheeting to prevent UV degradation of the surface.

NOTE: UV degradation (bleaching) of the polymer concrete is the normal result of exposure to sunlight. This phenomenon is purely a visible change in the color of the material, which in no way compromises the performance or corrosion resistance characteristics of the Polyshield®.



WARNING

Do not attempt to stand a Polyshield® on its end to make more efficient use of storage space. Neither the Polyshield® Combo nor the strapping that holds the Polyshield® Combo to its wooden pallet have been designed for vertical storage. Severe personal injury or death, as well as irreparable damage to the Polyshield® Combo may result if the Combo tips over.

Lifting Polyshield® Combo Units and Polyshield® Combo / Pump Assemblies



CAUTION

Polyshield® units should be transported via fork truck to the area of their intended installation on the wooden pallets on which they were shipped. Never transport a Polyshield® unit over a long distance or over rough terrain while suspended from slings.

Only trained personnel should do lifting. Pumps and motors often have integral lifting eyes or eye bolts. These are intended for use in lifting the individual pieces of equipment. Do not use these features to lift a Polyshield® Combo / pump assembly.

Lifting

The following procedures are recommended for lifting Polyshield® ANSI Combo units:

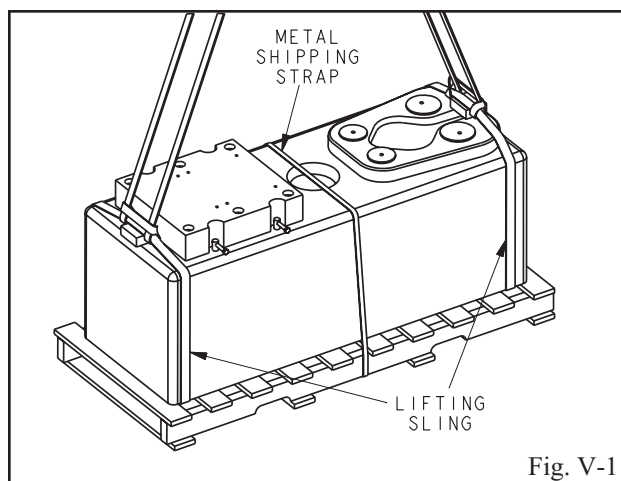
Polyshield® with no mounted equipment:



WARNING

Do not install eyebolts in the Polyshield® thread inserts for the purpose of lifting the base. This practice imposes lateral loads on the inserts — which they were not designed to withstand.

Remove the metal shipping straps that hold the Polyshield® unit to the wooden pallet. Slip slings under each end of the Polyshield® unit as a harness (Fig. VI-1).



Lift the Polyshield® unit a few inches off the pallet and verify that it hangs reasonably level and that the slings are not prone to slipping out of position.



WARNING

Keep hands and feet out from under the Polyshield® unit during these steps. If slings slip and the unit tips over, severe personal injury or death may result, as well as irreparable damage to the Polyshield® Combo.

If the sling appears to be unstable, set the Polyshield® unit back on the pallet and reposition the slings.

After satisfactory slinging has been achieved, the Polyshield® unit may be hoisted onto its foundation. Take care not to bump the unit against fixed objects or induce any unnecessary shock loads. Lower the unit slowly over the foundation using care to center the unit over the rebar cage. Place shim packs or wedges under the Polyshield® unit at a minimum of eight total or (four [4] locations on each side) to allow for the removal of the slings. Twelve (12) total shim locations or (six [6] shim locations each side are required for Polyshield® units exceeding six feet in length.

POLYSHIELD® WITH INSTALLED EQUIPMENT:

Pump and motor installed:

Remove the metal shipping straps that hold the Polyshield® unit to the wooden pallet. Slip slings under each end of the Polyshield® unit. This procedure is recommended up to the MTX or LTX pump units. All motors up to a 364T NEMA frame may be installed while mounted. Motor frame sizes 365T or larger should be removed during locating and installation of the Polyshield® ANSI Combo units. Check to see that the pump suction nozzle does not interfere with the lifting sling. If the pump creates interference, it should be removed. Lift the Polyshield® ANSI Combo a few inches off the pallet and verify that it hangs reasonably level and that the slings are not prone to slipping out of position.

After satisfactory slinging has been achieved, the Polyshield® ANSI Combo may be hoisted onto its foundation. Take care not to bump the unit against fixed objects or induce any unnecessary shock loads. Lower the unit slowly over the foundation using care to center the unit over the rebar cage. Place shim packs or wedges under the Polyshield® unit at a minimum of eight total (or four [4] locations on each side) to allow for the removal of the slings. Twelve (12) total shim locations (or six [6] shim locations each side) are required for Polyshield® units exceeding six feet in length.

INSTALLATION

General Description of the Polyshield® ANSI Combo

The Polyshield® ANSI Combo is a solid, polymer concrete foundation and baseplate shell that is manufactured in versions that conform to accommodate ASME/ANSI B73.1 pumps.

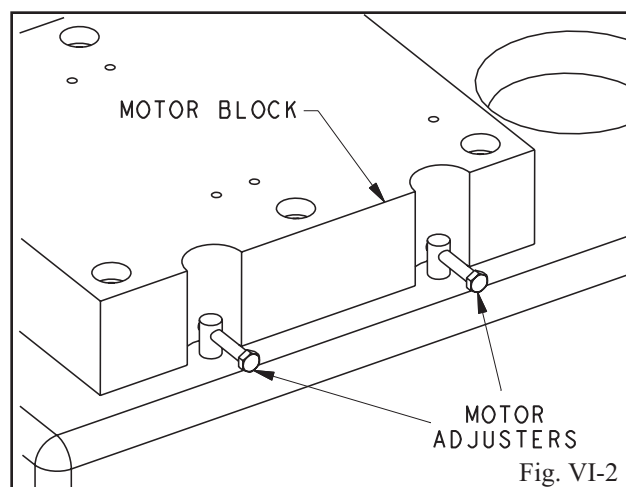
Polyshield® ANSI Combo units are manufactured in five primary sizes with integral catch basins and removable motor mounting blocks.

Metallic thread inserts are provided in the mounting surface for the particular combination of pump and motor that the Combo is intended. The metallic thread inserts on the pump end are available in 316SS (18.8 CrNi stainless steel), Alloy 20 (A744, CN-7M) and Hastelloy C 276 (A494, CW-6M). Multiple motor insert patterns are also available to accommodate more than one NEMA frame size. The standard thread insert material for the motor end is 316SS (18.8 CrNi stainless steel).

Optional alloy pads are available instead of metallic inserts for requirements that call for 0.002"/ft. and or process temperatures between 301° F and 500° F.

Polyadjust Motor Block Adjuster System

The Polyshield® ANSI Combo utilizes as standard the unique Polyshield® Polyadjust motor mounting system (Fig. VI-2). This system is comprised of a one-piece polymer concrete motor mounting block having surface flatness and parallelism equivalent to machine steel blocks. The Polyadjust motor mounting block system incorporates the Polyloc Transverse Jack Bolt system. The Polyloc system provides transverse motor adjustment. The side-mounted adjusters allow for shaft alignment to critical tolerances with minimal disturbance of indicators. The adjusters make contact with a solid motor mounting block not the foot of the motor.



Polyshield® ANSI and Custom Combos Installation Procedures (NEW CONSTRUCTION)

1. Remove laitance and form grease and oil from area where the Polyshield® ANSI Combo will be located using mechanical means, abrasive blasting, or water blasting. Remove any loose debris including fins, aggregate, or any protruding objects around the perimeter of the area where the Polyshield ANSI Combo will rest.
2. Measure the outside dimensions of the Polyshield® ANSI Combo and subtract 8" from both the width and length to determine the rebar maximum dimension, thus providing clearance from the side of the walls of the ANSI Combo.
3. Drill holes in the existing slab a minimum of four inches deep for doweling in the vertical rebar rods allowing a minimum of one inch clearance from the top of the interior of the Polyshield® ANSI Combo. Space the rebar rods of 12" centers. Remove dust and debris from dowel holes and fill with epoxy adhesive for anchoring the rebar.
4. Allow the epoxy adhesive to cure, and then install horizontal rebar rods, tying in place with wire.
5. Place the Polyshield® ANSI Combo over the rebar cage, making adjustments for proper elevation, orientation relative to piping centerlines. A qualified millwright should field verify proper position of the pump mounting pads relative to the centerline of the suction piping. Appropriate shims may be placed along the bottom edge of the Polyshield® ANSI Combo to aid in leveling. Place shim packs or wedges under the Polyshield® unit at a minimum of eight total (or four [4] locations on each side) to allow for the removal of the slings and metal lifting straps from each end. A minimum of twelve (12) total shim locations (or six [6] shim locations each side) are recommended for Polyshield® units exceeding seven feet in length.

6. Check and verify the dimensions again before the grouting procedure begins.
7. A low slump standard concrete mix is suitable for filling the Polyshield® ANSI Combo in new construction.
8. Seal around the outside bottom perimeter of the Polyshield® ANSI Combo with a fast setting hydraulic cement. Two brand name hydraulic cements are: ***Water Plug Hydraulic Cement*** and ***Dam-It Non Shrink Hydraulic Cement***.
9. Pour the concrete mixture through the grout fill port on the top of the Polyshield® ANSI Combo using a concrete vibrator to ensure proper flow of the concrete. Do not over vibrate as excessive vibrating leads to larger aggregate settling which will result in a weak mix.
10. Pour the concrete to the bottom edge of the grout fill port.
11. Remove any loose debris from around edges of the grout fill port.
12. Seal grout fill port with grout port plug and Polyshield® Seal Kit provided.
13. Install pump, motor, and attach lines.

TOOLS FOR INSTALLATION

- Hammer drill with proper size bit
- Worm gear saw with diamond blade (if required)
- Rebar cutters (new installation)
- Concrete mixer
- Concrete vibrator
- Lifting device (for placing Polyshield® Foundation)
- Hand tools
- Chipping hammer
- Pressure washer or abrasive blast rig as required
- Epoxy adhesive (for setting rebar into concrete slab – new installation)
- Rebar tie wire
- Fast set cement

POLYSHIELD® ANSI COMBO SEALING KIT EPOXY NOVOLAC (EN) INSTRUCTIONS

Each Kit contains:

- Polyshield® EN Resin
- Polyshield® EN Hardener
- Stir Sticks
- Latex Gloves
- Instruction Sheet
- MSDS Material Safety Data Sheet

APPLICATION INSTRUCTIONS:

The Polyshield® EN Sealing Kit is intended for use in (1) bonding the plug into the grout hole at the top of the combo and (2) sealing and providing chemical resistance barrier around the perimeter of the pump pad.

1. All surfaces to be bonded should be thoroughly cleaned and should be free of dust, oils and contaminants. Sand surfaces to be bonded prior to use.
2. Pour Polyshield® EN Hardener into the Polyshield® Resin can. Mix well with stir stick for about two minutes.
3. Apply to properly prepared surface by stir stick or putty knife.
4. Use MEK, Xylene solvents for cleaning tools and equipment and for lightly brushing surface to provide a smooth finish.

SAFETY PRECAUTIONS



WARNING

Resin and hardener components may be irritating to the eyes and skin on contact. Vapors may cause irritation of eyes and respiratory tract. Area must be ventilated. Wear protective clothing including gloves. For detailed safety information, refer to the Material Safety Data Sheets of these products.

POLYSHIELD® ANSI COMBO SEALING KIT VINYL ESTER (VE) INSTRUCTIONS

Each Kit contains:

- Polyshield® VE Resin
- Polyshield® VE Hardeners #1
- Stir Sticks
- Latex Gloves
- Instruction Sheet
- MSDS Material Safety Data Sheet

APPLICATION INSTRUCTIONS

The Polyshield® VE Sealing Kit is intended for use in (1) bonding the plug into the grout hole at the top of the combo and (2) sealing and providing chemical resistance barrier around the perimeter of pump pad.

1. All surfaces to be bonded should be thoroughly cleaned and should be free of dust, oils and contaminants. Sand surfaces to be bonded prior to use.
2. Pour Polyshield® VE Hardener #1 into the Polyshield® VE Resin can. Mix well with stir stick for about two minutes.
3. Apply to properly prepared surface by stir stick or putty knife.
4. Use MEK, Xylene solvents for cleaning tools and equipment and for lightly brushing surface to provide a smooth finish.

SAFETY PRECAUTIONS



WARNING

Resin and hardener components may be irritating to the eyes and skin on contact. Vapors may cause irritation of eyes and respiratory tract. Area must be ventilated. Wear protective clothing including gloves. For details on safety information, refer to the Material Safety Data Sheets of these products.

SHELF LIFE AND STORAGE

Store resin and hardener in their unopened containers in a dry cool place away from open flames, heat or sources of ignition. Shelf life is limited to 60 days if stored in a cool, dry location.

Polyshield® Seal Kits provide sealant for every ANSI Combo. Polyshield® Seal Kits are shipped with each ANSI Combo.

Table VI-1		
Fastener Size and Recommended Torque Values		
Fastener Standard	Fastener Nominal Size	Recommended Torque ¹ lb.-ft.
SAE	$\frac{5}{16}$	6
	$\frac{3}{8}$	10
	$\frac{7}{16}$	18
	$\frac{1}{2}$	27
	$\frac{5}{8}$	53
	$\frac{3}{4}$	94
	$\frac{7}{8}$	152
	1	228

¹ Torque values shown for SAE fasteners are based on dry threads at 75% of proof load for ASTM307 Grades A and B (SAE Grade 1) fasteners.

For lubricated, plated, or PTFE coated threads, use 75% of torque values shown.

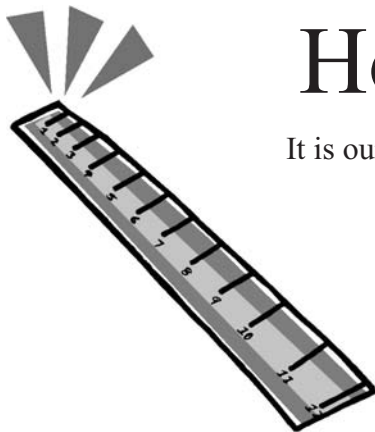
Polyshield® is a registered trademark, U.S. Patent Nos. 5165651, et. al, apply.

HOW TO ORDER

**When ordering parts call
1-800-446-8537
or your local Goulds Representative**

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