

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		<p>Safety Apparel:</p> <ul style="list-style-type: none"> ♦ 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		<p>Receiving:</p> <p>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.</p>
WARNING		<p>Alignment:</p> <p>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.</p>

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)

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.

REASSEMBLY

Refer to *Table 9 and 9a* for torque values while reassembling pump.

**Table 9
Bolt Torque, Ft-Lbs (Nm)**

Location	Frame	3196, CV 3196, LF 3196, 3796		NM 3196		3198	
		Lube	Dry	Lube	Dry	Lube	Dry
Casing Bolts (370) or Casing Nuts (425)	6" STX	Refer to Table 9a		27 (36)	40 (53)	N/A	N/A
	8" STX			20 (27)	30 (40)	35 (47)	53 (71)
	MTX, LTX			27 (36)	40 (53)	35 (47)	53 (71)
	XLT-X, X17			N/A	N/A	N/A	N/A
Frame-to-Adapter	All	20 (27)	30 (40)	20 (27)	30 (40)	20 (27)	30 (40)
Bearing Clamp Ring Bolts (236A) Duplex Bearing Only	STX, MTX	10* (1.1)	17* (1.9)	10* (1.1)	17* (1.9)	10* (1.1)	17* (1.9)
	LTX	55* (6.2)	83* (9.4)	55* (6.2)	83* (9.4)	55* (6.2)	83* (9.4)
Bearing End Cover Bolts (371C)	XLT-X, X17	9 (12)	12 (16)	N/A	N/A	N/A	N/A
Dynamic Seal Capscrews (265)	STX, MTX, LTX	55* (6.2)	83* (9.4)	N/A	N/A	N/A	N/A
	XLT-X, X17	9 (12)	12 (16)	N/A	N/A	N/A	N/A

**Table 9a
Maximum Torque Values in ft.-lb. (Nm)
for Casing Bolts (370)**

		Models 3196, CV 3196 LF 3196, 3796 with 150 lb. Casing flanges				Model HT 3196 and all Models with 300 lb. Casing flanges	
		Material Specification					
		Ductile Iron Casing with A 307 Grade B casing bolts		Alloy Casing with (304SS) F593 Grade 1 or (316SS F593) Grade 2 casing bolts		Ductile Iron and Alloy Casings with A193 grade B7 casing bolts	
Frame	Casing Bolt Diameter (in.)	Lube	Dry	Lube	Dry	Lube	Dry
8" STX	1/2"	20 (27)	30 (41)	35 (47)	54 (73)	58 (79)	87 (118)
6" STX MTX LTX XLT-X	5/8"	39 (53)	59 (80)	71 (96)	107 (145)	115 (156)	173 (235)
X17	7/8"	113 (153)	170 (231)	141 (191)	212 (287)	330 (447)	495 (671)

* Values are in inch-lbs (Nm)

Refer to *Table 10* for shaft end play while reassembling pump.

	STX in. (mm)	MTX in. (mm)	LTX in. (mm)	XLT-X in. (mm)
Double Row	.0011 (.028) .0019 (.047)	.0013 (.033) .0021 (.054)	not applicable	.0014 (.036) .0023 (.058)
Duplex	.0007 (.018) .0010 (.026)	.0009 (.022) .0012 (.030)	.0010 (.026) .0015 (.038)	.0010 (.026) .0015 (.038)

Frame	Inboard	Outboard	
		Double Row	Duplex
STX	6207	5306	7306
MTX	6309	5309	7309
LTX	6311	not applicable	7310
XLT-X, X17	6313	5313	7313

	Sleeve Fit in. (mm)	Coupling Fit in. (mm)
With Sleeve	.001 (.026)	.001 (.026)
Less Sleeve	.002 (.051)	.001 (.026)

NOTE: Bearing type is based on SKF/MRC designation.

Assembly of Rotating Element and Bearing Frame STX, MTX

NOTE: Make sure that threads are clean and apply thread sealant to pipe threads and fittings.

1. Install oil fill plug (113A), oil drain plug (408A), sight window (319), sight oiler plug (408J), four oil mist connection plugs (408H) or grease fittings (193) and relief plugs (113), and oil cooler inlet and outlet plugs or oil cooler (408L, 408M) in bearing frame (228) (Fig. 111).
2. Attach bearing frame foot (241) with bolts (370F). Hand tighten.

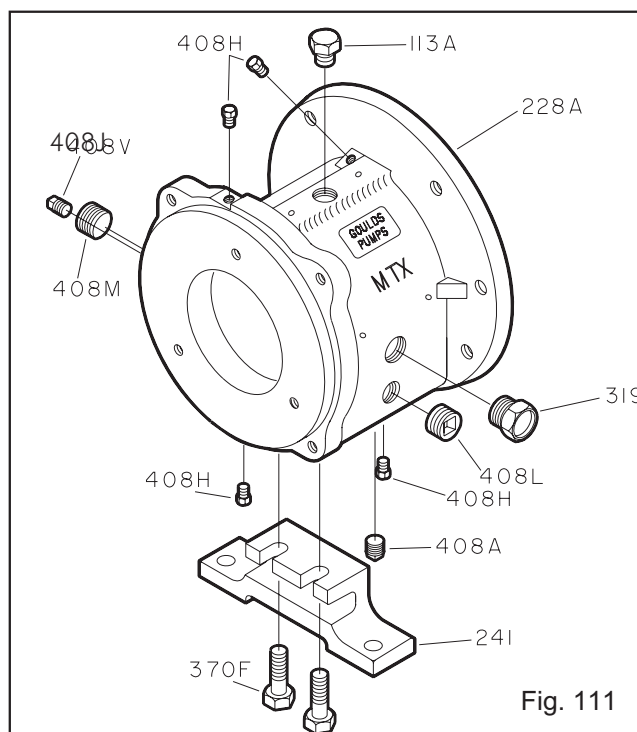


Fig. 111

3. Install outboard bearing (112A) on shaft (122) (Fig. 112).

NOTE: Refer to Appendix VII-1 for detailed outboard bearing installation instructions.

NOTE: Regreaseable bearing has a single shield. The outboard bearing is installed with shield toward impeller.

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



WARNING

Wear insulated gloves when using a bearing heater. Bearings will get hot and can cause physical injury.

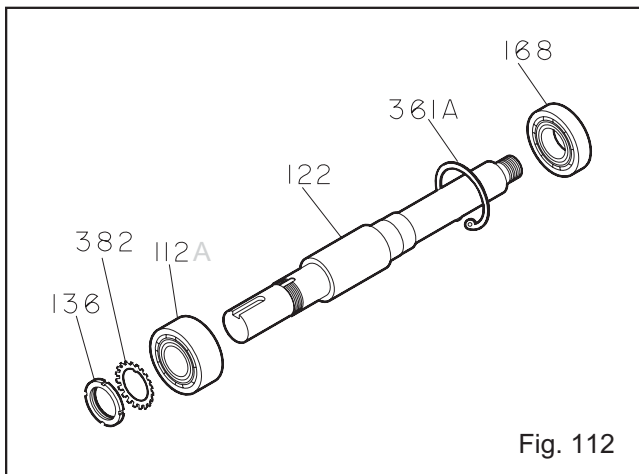


Fig. 112

4. Place lockwasher (382) on shaft (122). Place tang of lockwasher in keyway of shaft.
5. Thread locknut (136) onto shaft (122). Tighten locknut until snug. Bend any tang of lockwasher into a slot of locknut.

NOTE: Tighten locknut if necessary to align the closest tab of lockwasher with slot on locknut.

6. Place bearing retaining ring (361A) over shaft (122), flat side facing bearing.
7. Install inboard bearing (168A) on shaft (122).

NOTE: Regreaseable bearing has a single shield. The inboard bearing is installed with shield away from impeller.

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



WARNING

Wear insulated gloves when using a bearing heater. Bearings will get hot and can cause physical injury.

NOTE: Coat internal surfaces of bearings with lubricant to be used in service.

8. Install new O-ring (496) (Fig. 113).

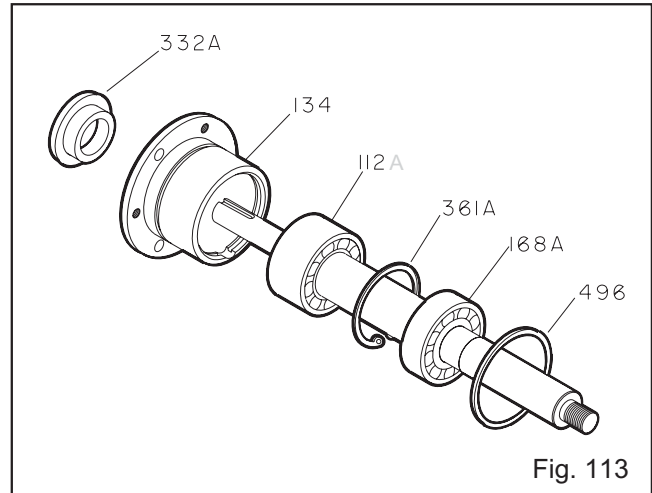


Fig. 113

9. Coat outside of outboard bearing (112A) and bearing housing (134) bore with oil.
10. Install bearing housing (134) onto shaft/bearing assembly.

NOTE: Do not force assembly together.

11. Insert retaining ring (361A) into groove in housing (134) bore. Check shaft for free turning.

NOTE: The space between the ends of retaining ring should be located in the oil return groove so as not to obstruct oil flow.

12. Install outboard labyrinth oil seal (332A) into bearing housing (134). It is an O-ring fit. Position the labyrinth seal drain slots at the bottom (6 o'clock) position.

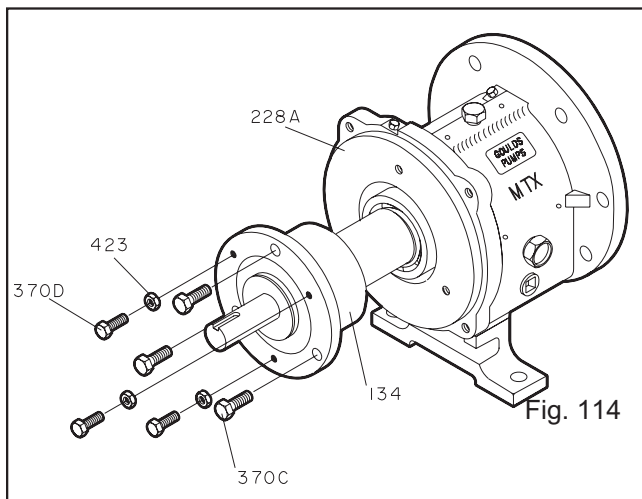
NOTE: Refer to Appendix IV or VIII for detailed labyrinth seal installation instructions.

NOTE: Make sure the keyway edges are free of burrs.

NOTE: Cover the keyway lengthwise with a piece of electrical tape prior to installing the labyrinth seal. This will protect the O-rings.

13. Coat outside of bearing housing (134) with oil (Fig. 114).
14. Coat all internal surfaces of bearing frame (228A) with oil.

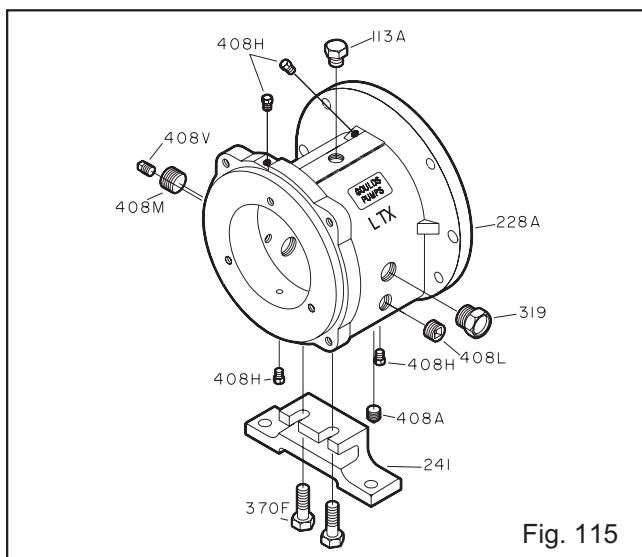
15. Install shaft assembly into frame (228A), making sure to leave approximately 0.125 in. (3.175 mm) clearance between the face of the bearing housing and bearing frame. Check shaft for free turning.
16. Install clamping bolts (370C) into bearing housing (134). Hand tighten.
17. Install jacking bolts (370D) with locking nuts (423) into housing (134). Hand tighten.



LTX

NOTE: Make sure that threads are clean and apply thread sealant to pipe threads and fittings.

1. Install the oil fill plug (113A), oil drain plug (408A), sight window (319), sight oiler plug (408J), four oil mist connection plugs (408H) or grease fittings (193) and grease relief plugs (113), and oil cooler inlet and outlet plugs or oil cooler (408L, 408M) in bearing frame (228) (Fig. 115).



2. Attach bearing frame foot (241) with bolts (370F). Hand tighten.
3. Install oil flinger (248A) on shaft (122) if removed (Fig. 116).

NOTE: The oil flinger is a press fit onto shaft. Use a driver of proper size to prevent damage to oil flinger.

4. Place bearing clamp ring (253B) over shaft (122). Note orientation.
5. Install outboard bearings (112A) on shaft (122).

NOTE: Refer to Appendix VII-2 for detailed outboard bearing installation instructions.



CAUTION

The LTX uses duplex bearings mounted back to back. Make sure orientation of the bearings is correct.

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



WARNING

Wear insulated gloves when using a bearing heater. Bearings will get hot and can cause physical injury.

6. Place lockwasher (382) on shaft (122). Place tang of lockwasher in keyway of shaft.
7. Thread locknut (136) onto shaft (122). Tighten locknut until snug. Bend any tang of lockwasher (382) into a slot of locknut.

NOTE: Tighten locknut if necessary to align the closest tab of lockwasher with slot on locknut.

8. Install inboard bearing (168A) on shaft (122).

NOTE: Regreaseable bearing has a single shield. The inboard bearing is installed with shield away from impeller.

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



WARNING

Wear insulated gloves when using a bearing heater. Bearings will get hot and can cause physical injury.

NOTE: Coat internal surfaces of bearings with lubricant to be used in service.

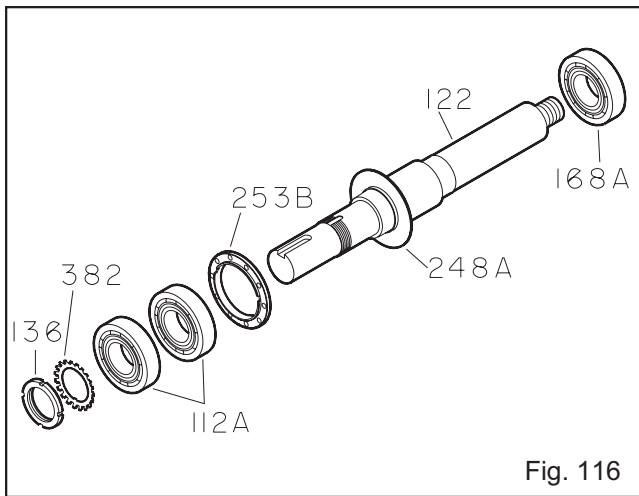


Fig. 116

9. Coat outside of outboard bearing (112A) and bearing housing (134A) bore with oil.
10. Install bearing housing (134) onto shaft/bearing assembly (Fig. 117).

NOTE: Do not force assembly together.

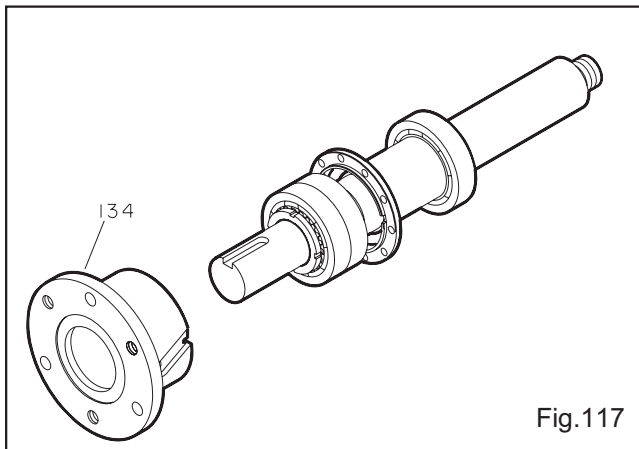


Fig.117

11. Install clamp ring bolts (236A). Check shaft for free turning. Refer to Table 9 for bolt torque values (Fig. 118).



CAUTION

Tighten clamp ring bolts (236A) in a criss cross pattern.

12. Install new O-ring (496).
13. Install outboard labyrinth oil seal (332A) into bearing housing (134). It is an O-ring fit. Position the labyrinth seal drain slots at the bottom (6 o'clock) position.

NOTE: See Appendix IV or VIII for further instructions on Labyrinth Seal installation.

NOTE: Make sure the keyway edges are free of burrs.

NOTE: Cover the keyway lengthwise with a piece of electrical tape prior to installing the labyrinth seal. This will protect the O-rings.

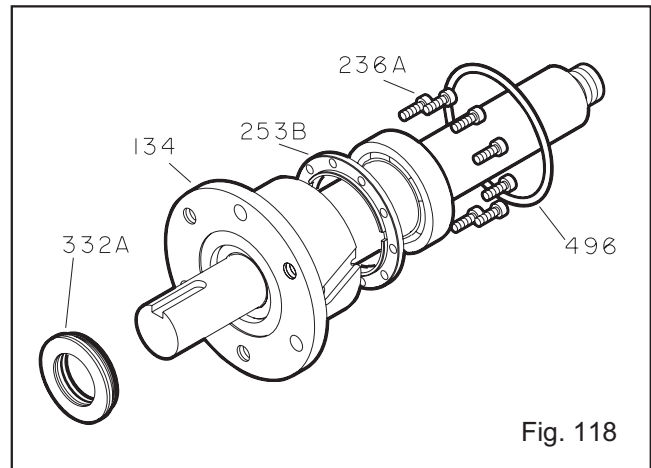


Fig. 118

14. Coat outside of bearing housing (134A) with oil.
15. Coat all internal surfaces of bearing frame (228) with oil.
16. Install shaft assembly into frame (228A), making sure to leave approximately 0.125 in. (3.175 mm) clearance between the face of the bearing housing and bearing frame. Check shaft for free turning (Fig. 119).
17. Install clamping bolts (370C) into bearing housing (134A). Hand tighten.
18. Install jacking bolts (370D) with locking nuts (423) into housing (134A). Hand tighten.

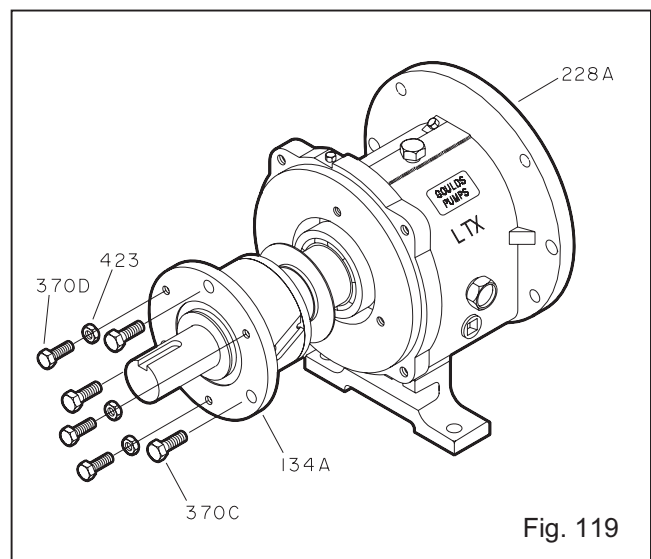


Fig. 119

XLT-X, X17

NOTE: Make sure that threads are clean and apply thread sealant to pipe threads and fittings.

1. Install oil fill plug (113A), oil drain plug (408A), sight glass (319), sight oiler plug (408J), four oil mist connection plugs (408H), or grease fittings (193) and grease relief plugs (113), and oil cooler inlet and outlet plugs or oil cooler (408L, 408M) in bearing frame (228A) (Fig. 120).

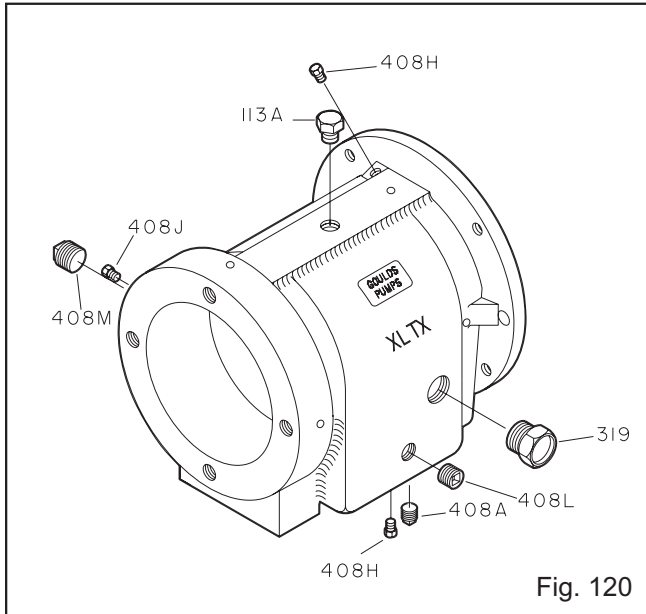


Fig. 120

2. Install outboard bearing (112A) on shaft (122) (Fig. 121).

NOTE: Regreaseable bearing has a single shield. The outboard bearing is installed with shield toward impeller.

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



WARNING

Wear insulated gloves when using a bearing heater. Bearings will get hot and can cause physical injury.



WARNING

Shaft (122) may be heavy. Use care when handling.

3. Place lockwasher (382) on shaft (122). Place tang of lockwasher in keyway of shaft.
4. Thread locknut (136) onto shaft (122). Tighten locknut until snug. Bend any tang of lockwasher (382) into a slot of locknut.

NOTE: Tighten locknut if necessary to align the closest tab of lockwasher with slot on locknut.

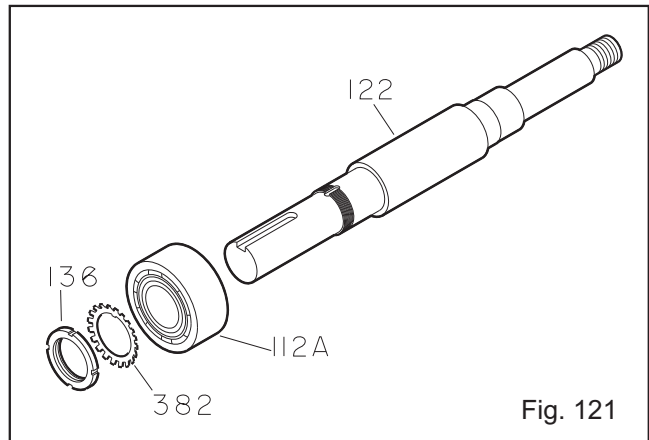


Fig. 121

5. Coat outside of outboard bearing (112A) and bore of bearing housing (134) with oil.
6. Install bearing housing (134) onto shaft/bearing assembly (Fig. 122).

NOTE: Do not force assembly together.

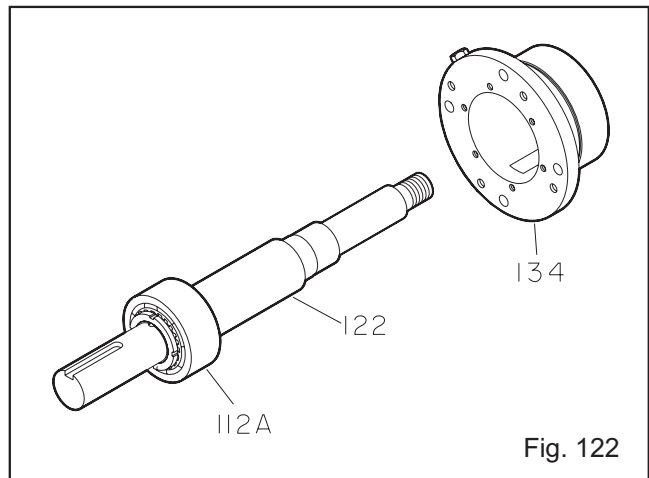


Fig. 122

7. Install gasket (360C), end cover (109A), bolts (371C). Refer to Table 9 for bolt torque values. Check shaft for free turning (Fig. 123).

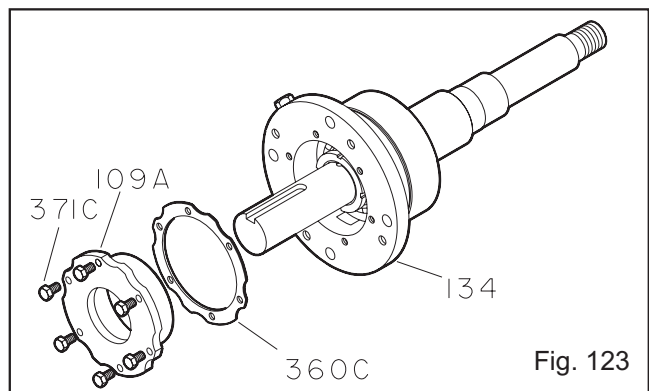


Fig. 123

8. Install inboard bearing (168A) on shaft (122) (Fig. 124).

NOTE: Refer to Appendix VII-1 for detailed outboard bearing installation instructions.

NOTE: Regreaseable bearing has a single shield. The inboard bearing is installed with shield away from impeller.

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



WARNING

Wear insulated gloves when using a bearing heater. Bearings will get hot and can cause physical injury.

NOTE: Coat internal surfaces of bearings with lubricant to be used in service.

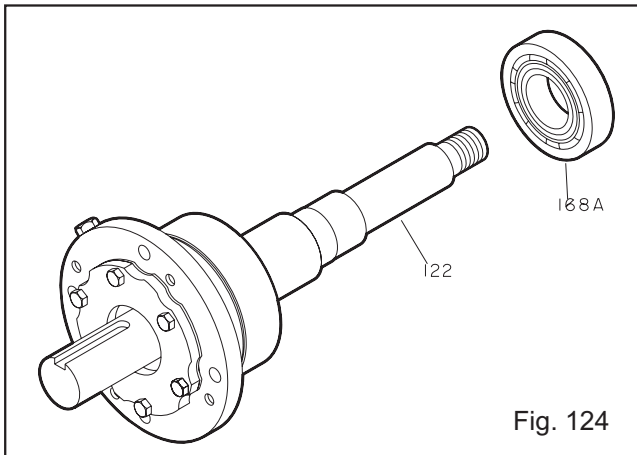


Fig. 124

9. Install new O-ring (496) (Fig. 125).
10. Install outboard labyrinth oil seal (332A) into end cover (109A). It is an O-ring fit. Position the labyrinth seal drain slots at the bottom 6 o'clock position (Fig. 125).

NOTE: See Appendix IV or VIII for further instructions on Labyrinth Seal installation.

NOTE: Make sure the keyway edges are free of burrs.

NOTE: Cover the keyway lengthwise with a piece of electrical tape prior to installing the labyrinth seal. This will protect the O-rings.

11. Coat outside of bearing housing (134) with oil.
12. Coat all internal surfaces of bearing frame (228A) with oil.

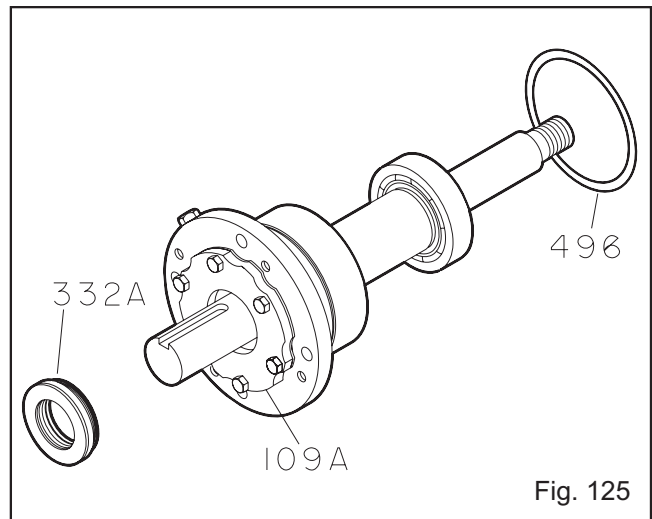


Fig. 125

13. Install shaft assembly into frame (228A), making sure to leave approximately 0.125 in. (3.175 mm) clearance between the face of the bearing housing and bearing frame. Check shaft for free turning (Fig. 126).
14. Install clamping bolts (370C) into bearing housing (134). Hand tighten.
15. Install jacking bolts (370D) with locking nuts (423) into housing (134). Hand tighten.
16. Attach bearing frame foot (241) with bolts (370F). Hand tighten.

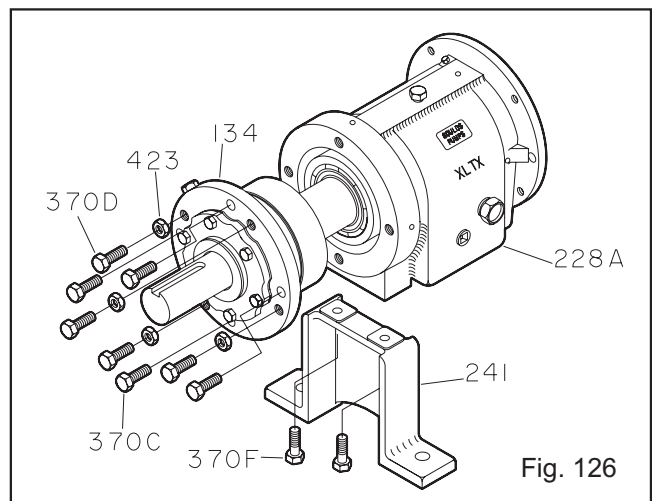


Fig. 126

STX, MTX with Duplex Bearings

1. Install the oil fill plug (113A), oil drain plug (408A), sight window (319), sight oiler plug (408J), four oil mist connection plugs (408H), or grease fittings (193) and grease relief plugs (113), and oil cooler inlet and outlet plugs or oil cooler (408L, 408M) in bearing frame (228) (Fig. 127).
2. Attach bearing frame foot (241) with bolts (370F). Hand tighten (Fig. 127).

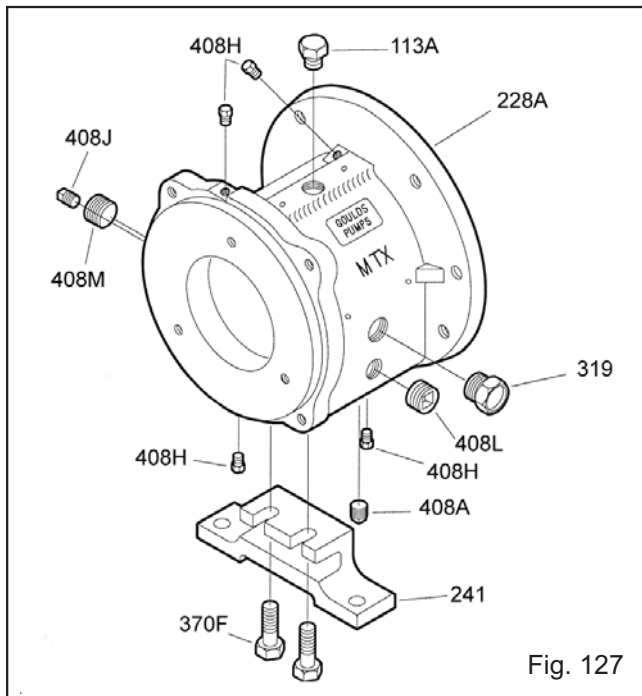


Fig. 127

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



WARNING

Wear insulated gloves when using a bearing heater. Bearings will get hot and can cause physical injury.

3. Install outboard bearings (112A) on shaft (122).

NOTE: Refer to Appendix VII-2 for detailed outboard bearing installation instructions.



CAUTION

Duplex bearings are mounted back to back. Make sure orientation of bearings is correct.

4. Place lockwasher (382) on shaft (122). Place tang of lockwasher in keyway of shaft (Fig. 128).

5. Thread locknut (136) onto shaft (122). Tighten locknut until snug. Bend any tang of lockwasher (382) into a slot of locknut.

NOTE: Tighten locknut if necessary to align the closest tab of lockwasher with slot on locknut.

6. Place bearing clamp ring (253B) over shaft (122). Note orientation.
7. Install inboard bearing (168A) on shaft (122).

NOTE: Regreaseable bearing has a single shield. The inboard bearing is installed with shield away from impeller.

NOTE: Coat internal surfaces of bearings with lubricant to be used in service.

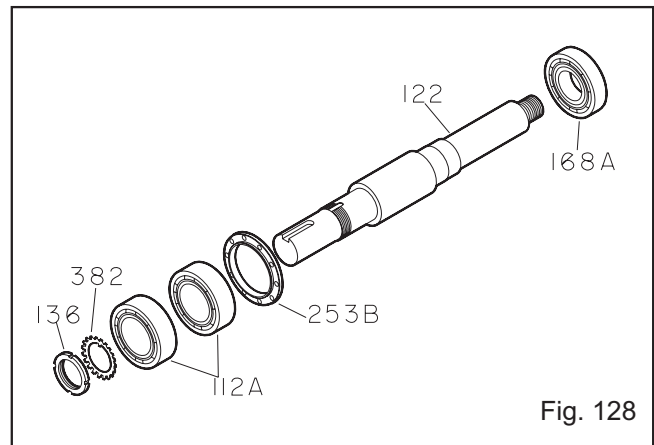


Fig. 128

8. Coat outside of outboard bearing (112A) and bore of bearing housing (134) with oil.
9. Lower shaft/bearing assembly into bearing housing (134) (Fig. 129).

NOTE: Do not force assembly together.

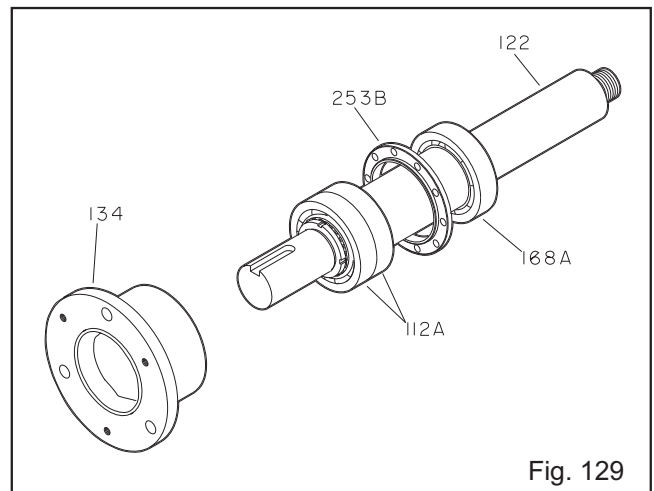


Fig. 129

10. Install clamp ring (253B) with bolts (236A). Tighten bolts in a crisscross pattern. Check shaft for free turning. Refer to *Table 9* for bolt torque values (Fig. 130).
11. Install new O-ring (496).
12. Install outboard labyrinth oil seal (332A) into bearing housing (134). It is an O-ring fit. Position the labyrinth seal drain slots at the bottom 6 o'clock position (Fig. 130).

NOTE: See Appendix IV or VIII for further instructions on Labyrinth Seal installation.

NOTE: Make sure the keyway edges are free of burrs.

NOTE: Cover the keyway lengthwise with a piece of electrical tape prior to installing the labyrinth seal. This will protect the O-rings.

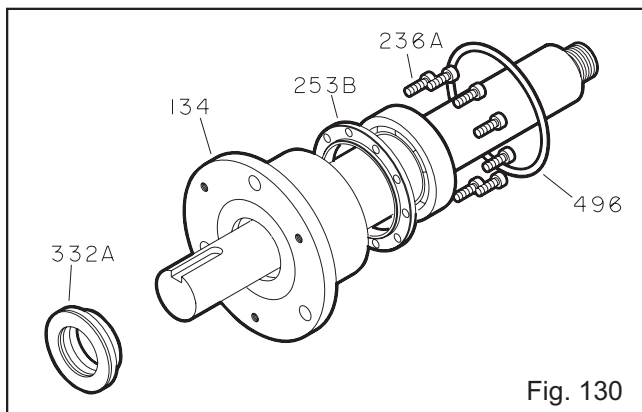


Fig. 130

13. Coat outside of bearing housing (134) with oil.
14. Coat all internal surfaces of bearing frame (228A) with oil.
15. Install shaft assembly into frame (228A), making sure to leave approximately 0.125 in. (3.175 mm) clearance between the face of the bearing housing and bearing frame. Check shaft for free turning (Fig. 131).

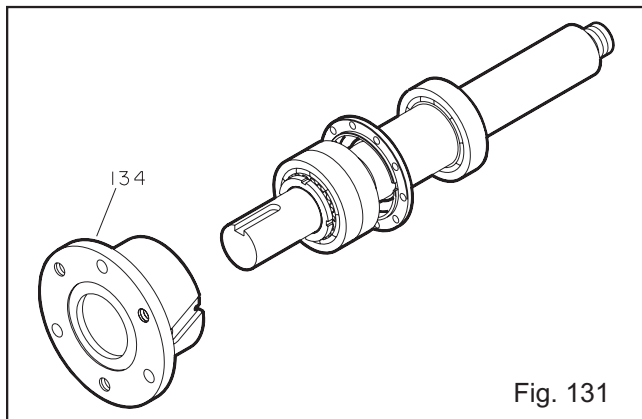


Fig. 131

16. Install clamping bolts (370C) into bearing housing (134A). Hand tighten.
17. Install jacking bolts (370D) with locking nuts (423) into housing (134A). Hand tighten.

XLT-X, X17 with Duplex Bearings

NOTE: Make sure that threads are clean and apply thread sealant to pipe threads and fittings.

1. Install the oil fill plug (113A), oil drain plug (408A), sight window (319), sight oiler plug (408J), four oil mist connection plugs (408H), or grease fittings (193) and grease relief plugs (113), and oil cooler inlet and outlet plugs or oil cooler (408L, 408M) in bearing frame (228) (Fig. 132).

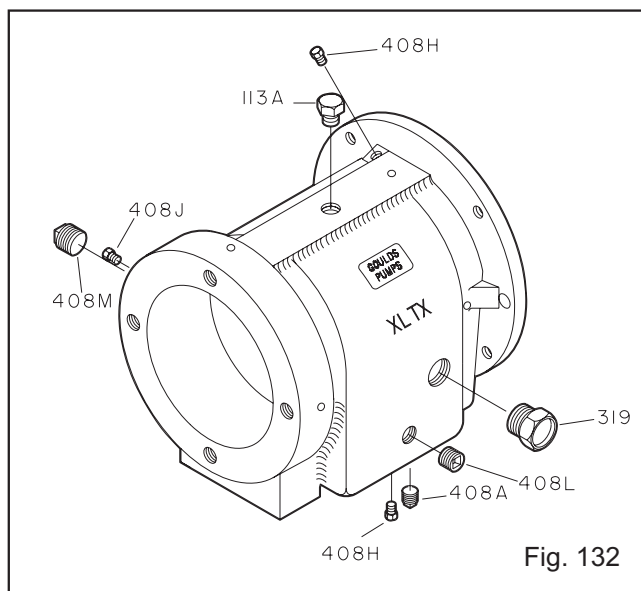


Fig. 132

2. Install outboard bearings (112A) on shaft (122) (Fig. 133).

NOTE: Refer to Appendix VII-2 for detailed outboard bearing installation instructions.

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



WARNING

Wear insulated gloves when using a bearing heater. Bearings will get hot and can cause physical injury.

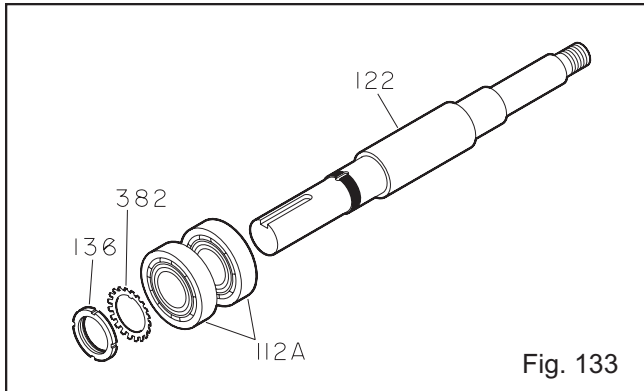


CAUTION

Duplex bearings are mounted back to back. Make sure bearing orientation is correct.

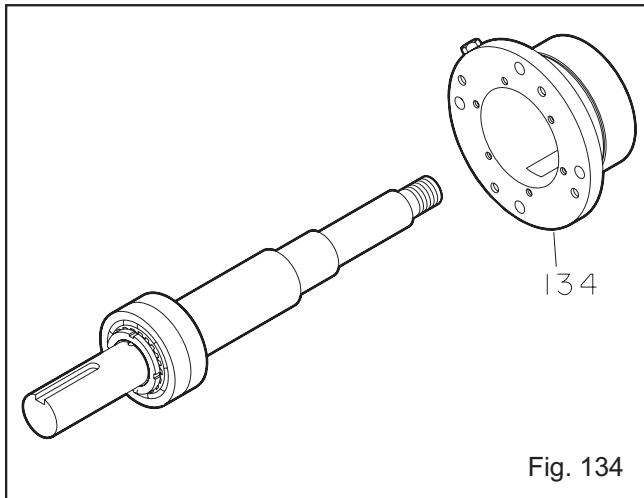
- Place lockwasher (382) on shaft (122). Place tang of lockwasher in keyway of shaft.
- Thread locknut (136) onto shaft (122). Tighten locknut until snug. Bend any tang of lockwasher (382) into a slot of locknut.

NOTE: Tighten locknut if necessary to align the closest tab of lockwasher with slot on locknut.

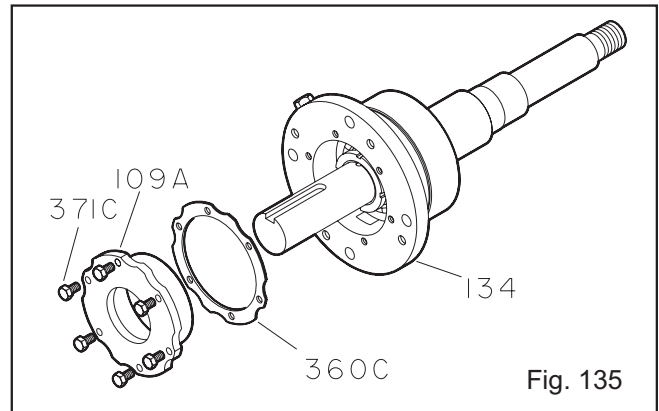


- Coat outside of outboard bearing (112A) and bore of bearing housing (134) with oil.
- Install bearing housing (134) onto shaft/bearing assembly (Fig. 134).

NOTE: Do not force assembly together.



- Install gasket (360C), end cover (109A), and bolts (371C). Refer to *Table 9* for bolt torque values. Check shaft for free turning (Fig. 135).



- Install inboard bearing (168A) on shaft (122) (Fig. 136).

NOTE: Regreaseable bearing has a single shield. The inboard bearing is installed with shield away from impeller.

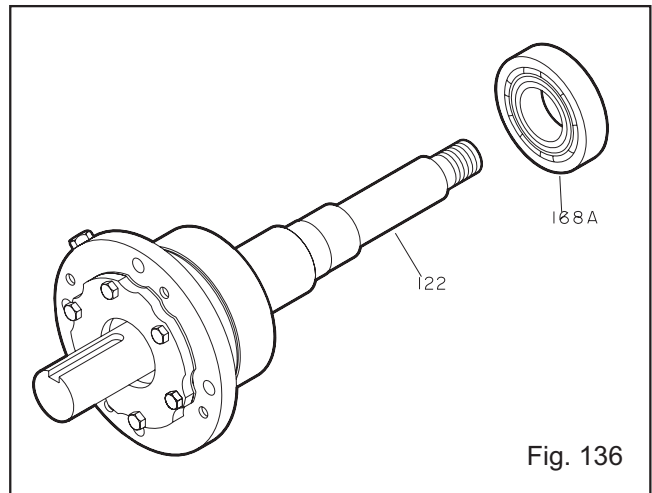
NOTE: There are several methods used to install bearings. The recommended method is to use an induction heater that heats as well as demagnetizes the bearings.



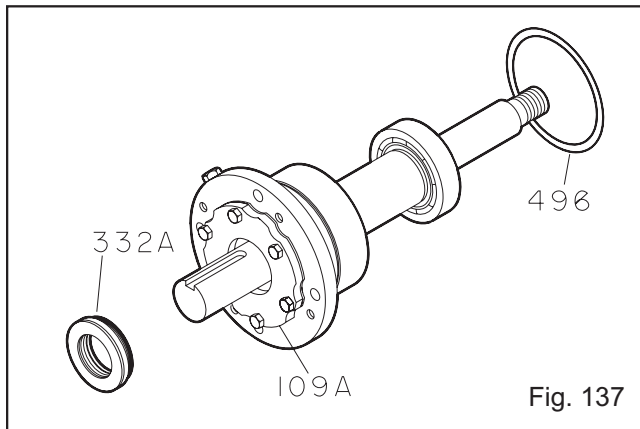
WARNING

Wear insulated gloves when using a bearing heater. Bearings will get hot and can cause physical injury.

NOTE: Coat internal surfaces of bearings with lubricant to be used in service.



- Install new O-ring (496) (Fig. 137).

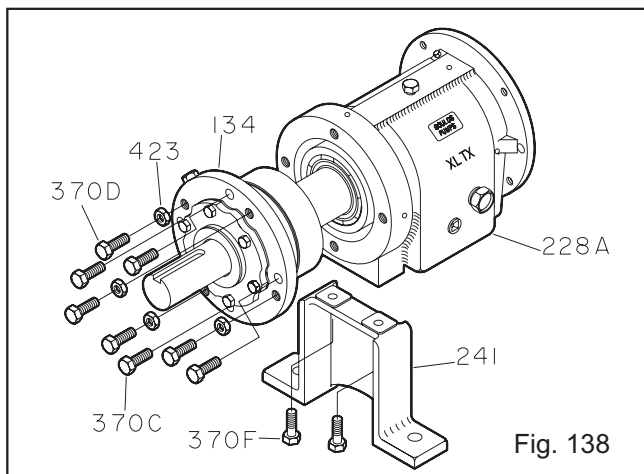


- Install outboard labyrinth oil seal (332A) into end cover (109A). It is an O-ring fit. Position the labyrinth seal drain slots at the bottom 6 o'clock position.

NOTE: Make sure the keyway edges are free of burrs.

NOTE: Cover the keyway lengthwise with a piece of electrical tape prior to installing the labyrinth seal. This will protect the O-rings.

- Coat outside of bearing housing (134) with oil.
- Coat all internal surfaces of bearing frame (228A) with oil.
- Install shaft assembly into frame (228A), making sure to leave approximately 0.125 in. (3.175 mm) clearance between the face of the bearing housing and bearing frame. Check shaft for free turning (Fig. 138).

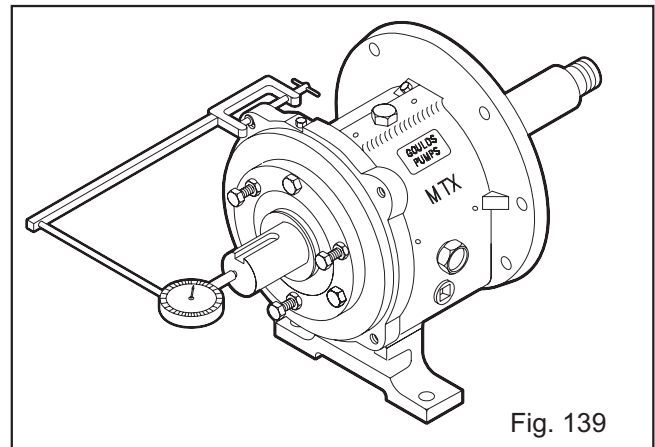


- Install clamping bolts (370C) into bearing housing (134). Hand tighten.
- Install jacking bolts (370D) with locking nuts (423) into housing (134). Hand tighten.

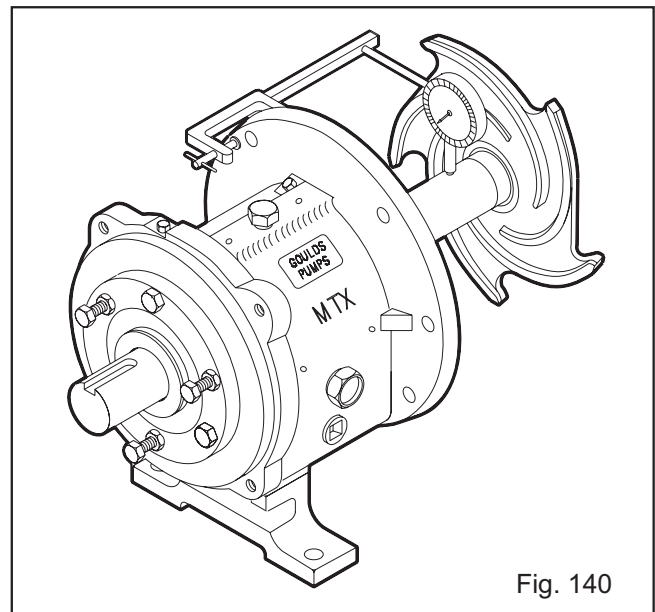
- Attach bearing frame foot (241) with bolts (370F). Hand tighten.

ALL MODELS

- Support frame assembly in horizontal position.
- Check shaft end play. Move shaft forward then backward by hand, noting indicator movement. If total indicator reading is greater than *Table 10* values, disassemble and determine cause (Fig. 139).



- Check shaft/sleeve runout. Put on shaft sleeve (126) if used, and thread on impeller, hand tight. Rotate shaft 360 degrees. If total indicator reading is greater than .002 in., disassemble and determine cause. Remove impeller and shaft sleeve (Fig. 140).



4. Check frame face run out. Rotate shaft so indicator rides along the fit for 360 degrees. If total indicator reading is greater than 0.001 in. (.025 mm) disassemble and determine cause (Fig. 141).

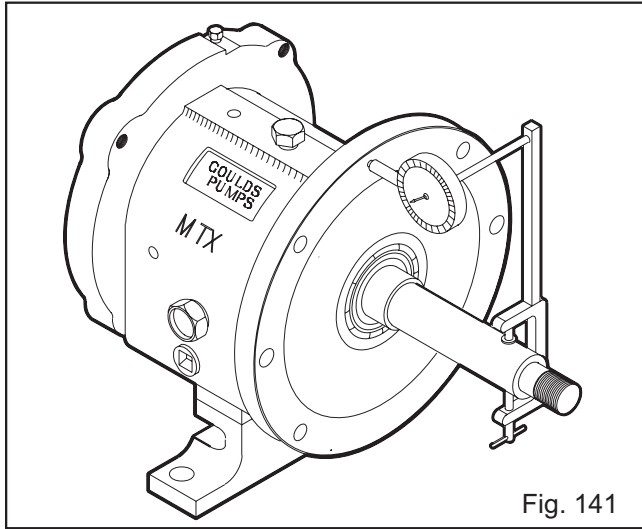


Fig. 141

5. Place manila gasket (360D) on frame (228) (Fig. 142).

NOTE: The gasket is designed to fit one way only. The dowel pins (469B) may be started in their holes to hold the gasket in place.

6. Install frame adapter (108), onto frame assembly. Align bolt holes and dowel locations with those on frame (Fig. 142).

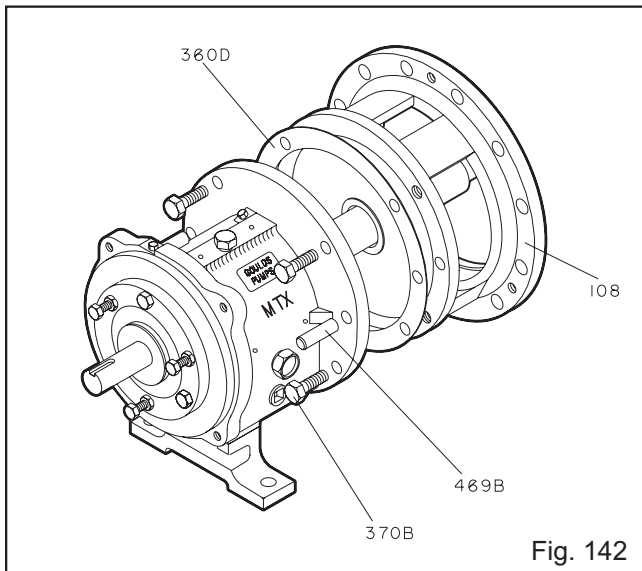


Fig. 142

7. Install dowel pins (469B) and bolts (370B). Tighten bolts to Table 9 torque specifications in a crisscross pattern.

8. Check adapter fits. Rotate shaft through 360 degrees. If total indicator reading is greater than .005 in. (.13 mm), determine the cause and correct before proceeding (Fig. 143).

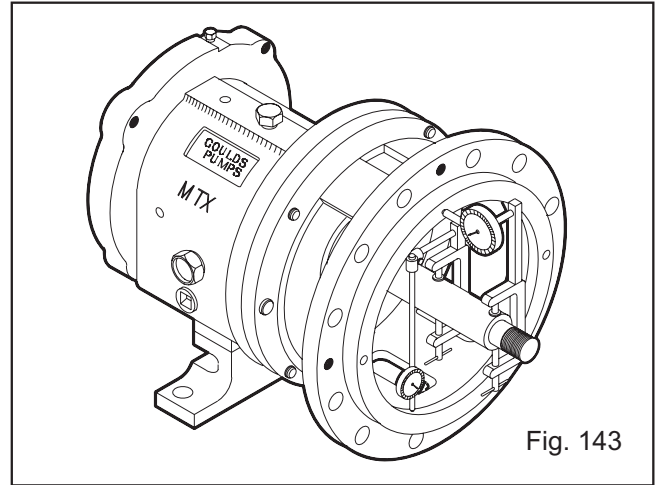
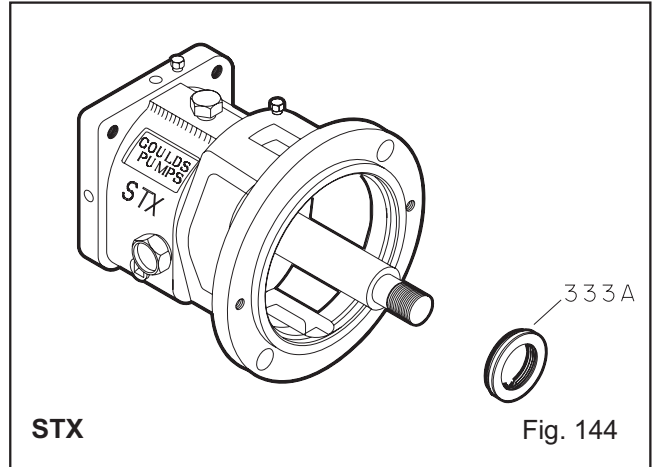


Fig. 143

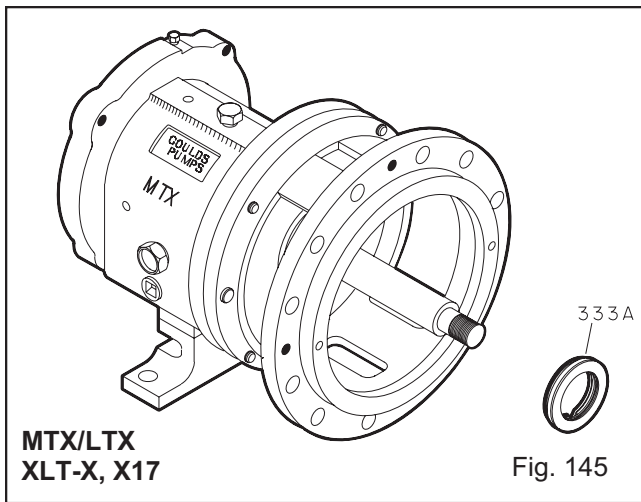
9. Install inboard labyrinth oil seal (333A) into adapter (108) / bearing frame (228). It is an O-ring fit. Position the labyrinth seal drain slots at the bottom (6 o'clock) position. (Fig. 144).

NOTE: For detailed labyrinth seal installation instructions, see Appendix IV or VIII, Labyrinth Seal Installation Instructions.



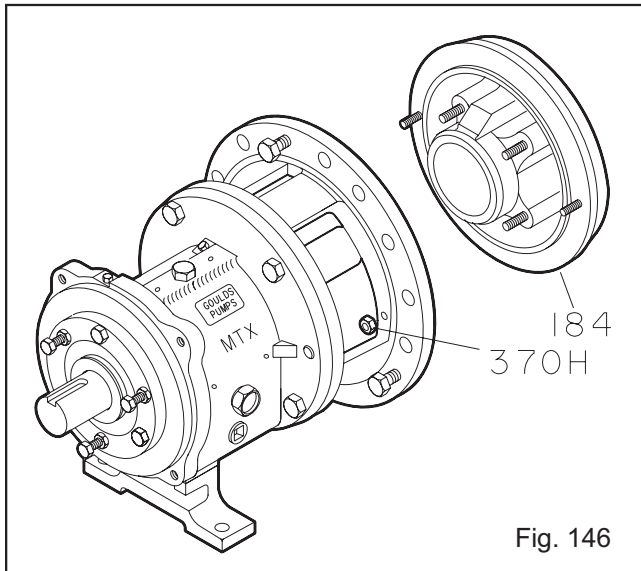
STX

Fig. 144

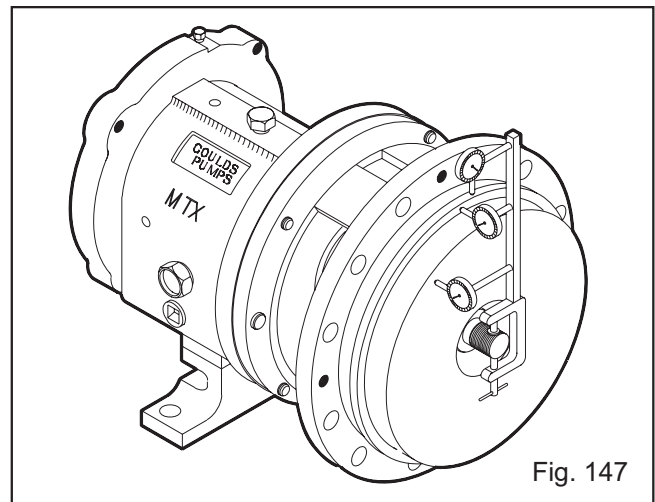


Pumps With Mechanical Seals:

1. Install seal chamber cover or backplate (184) with nuts (370H) (Fig. 146).



2. Check seal chamber cover run-out. Rotate indicator through 360 degrees. If total indicator reading is greater than 0.005 in. (.13 mm), determine cause and correct before proceeding (Fig. 147).



3. Install shaft sleeve (126) if used (Fig. 148).

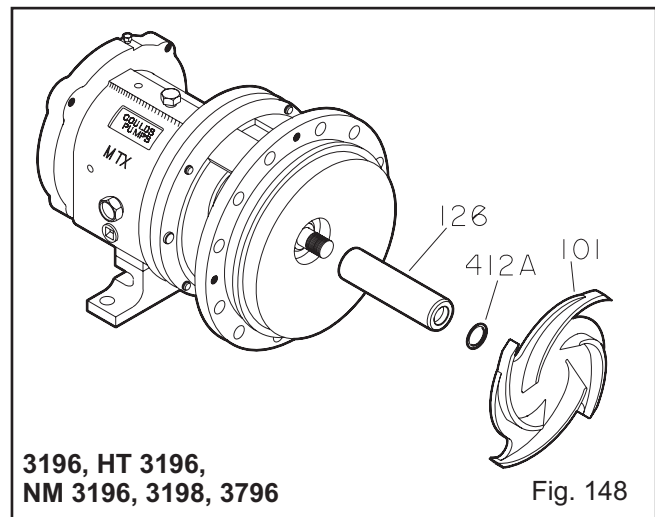
NOTE: If using 3198 with a Teflon® sleeve, the sleeve should already be installed and finish machined.

NOTE: Make sure sleeve is fully seated.

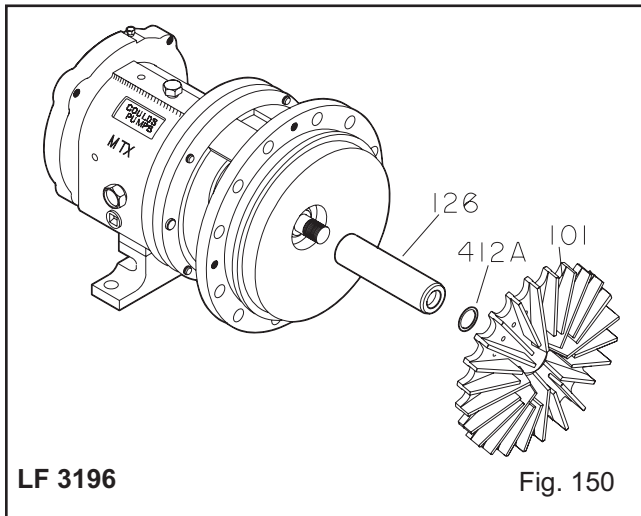
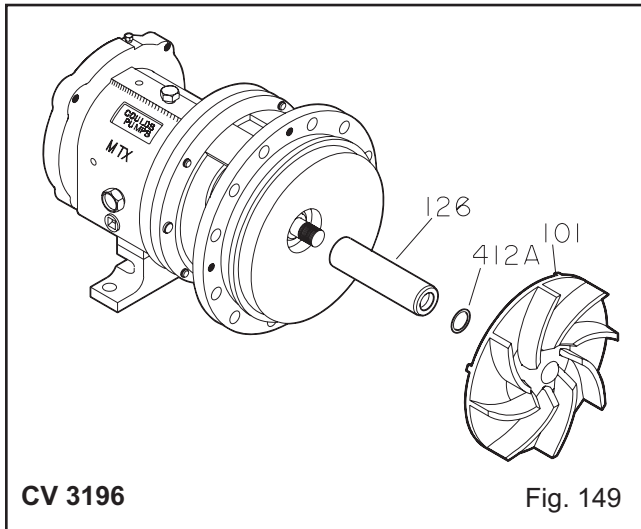


WARNING

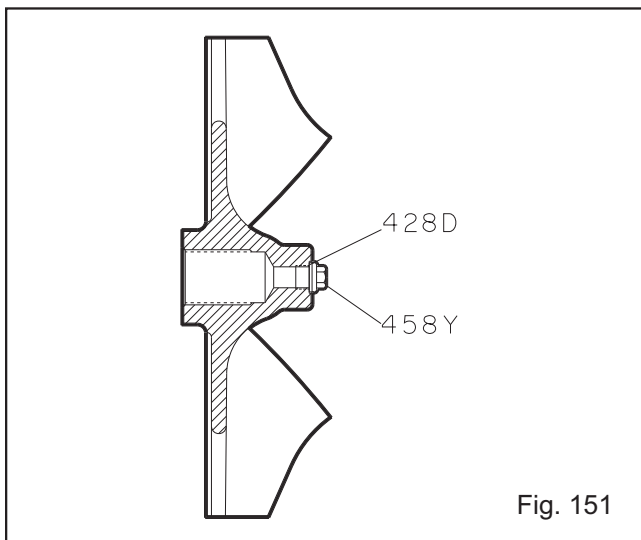
Wear a heavy set of work gloves when handling impeller (101) as sharp edges may cause physical injury.



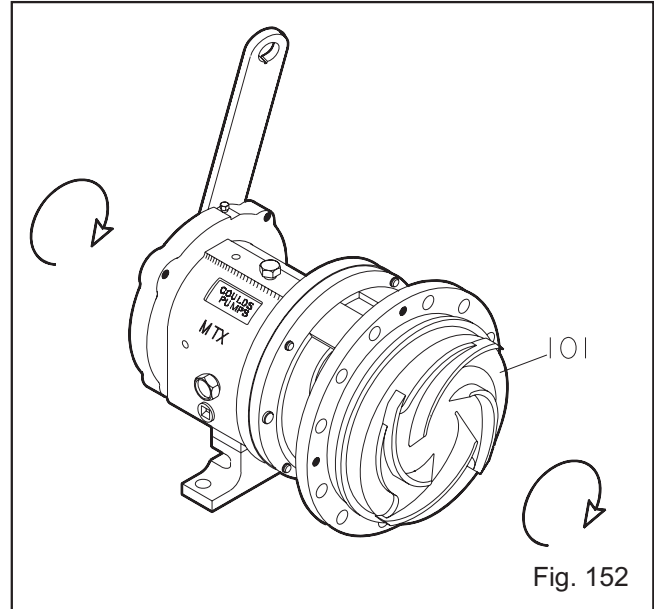
4. STX, MTX, LTX - Install impeller (101) with O-ring (412A).



XLT-X & X17 - Install the impeller (101) without the O-ring (412A) and Teflon® washer (428D) on plug (458Y).

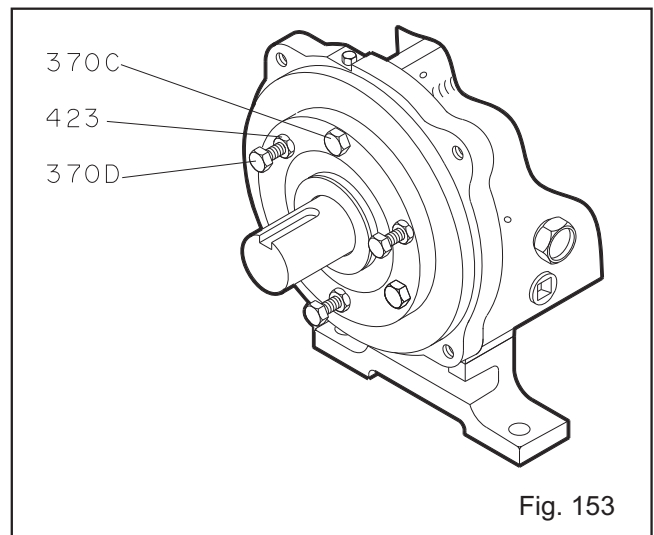


- Put shaft wrench and coupling key on shaft. When impeller (101) makes firm contact with sleeve (126), raise shaft wrench (counterclockwise, viewed from impeller end of shaft) off bench and slam it down (clockwise, viewed from impeller end of shaft). A few sharp raps will tighten impeller (101) properly (Fig. 152).



- Loosen clamp bolts (370C), and jacking bolts (370D). Measure gap between impeller (101) and seal chamber/stuffing box cover (184) with a feeler gauge. When 0.030 in. clearance is reached, tighten clamp bolts (370C), jacking bolts (370D), and locking nuts (423) (Fig. 153)

NOTE: This approximates the impeller position when set at 0.015 in. (.38 mm) from casing. Final impeller adjustment must be made after installation into casing.



6

7. Check impeller (101) runout. Check vane tip to vane tip. If total indicator reading is greater than 0.005 in. (.13 mm), determine cause and correct before proceeding (Fig. 154).

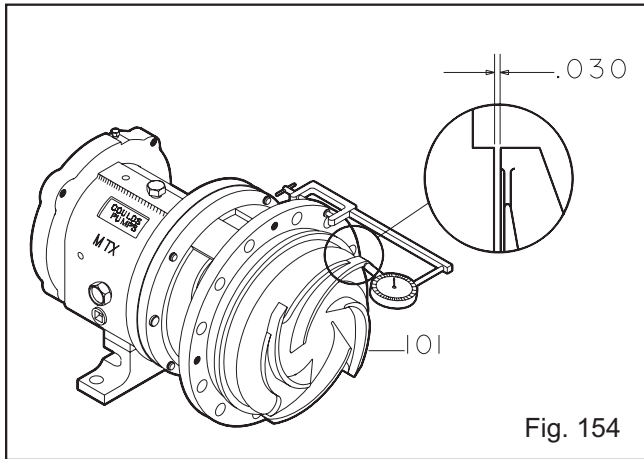


Fig. 154

NOTE: The face of the CV 3196 impeller is not machined. Checking the face runout on the CV 3196 impeller is not required.

8. Blue the shaft sleeve (126) or shaft (122) if no sleeve is used. Scribe a mark at gland gasket face of seal chamber/stuffing box cover (184). This will be the datum for installation of mechanical seal (Fig. 155).

NOTE: The mechanical seal reference dimension for the NM 3196 and the 3198 is based on the gland seat face of the backplate.

NOTE: If installing a cartridge mechanical seal, the shaft or sleeve does not need to be marked. The seal is self setting.

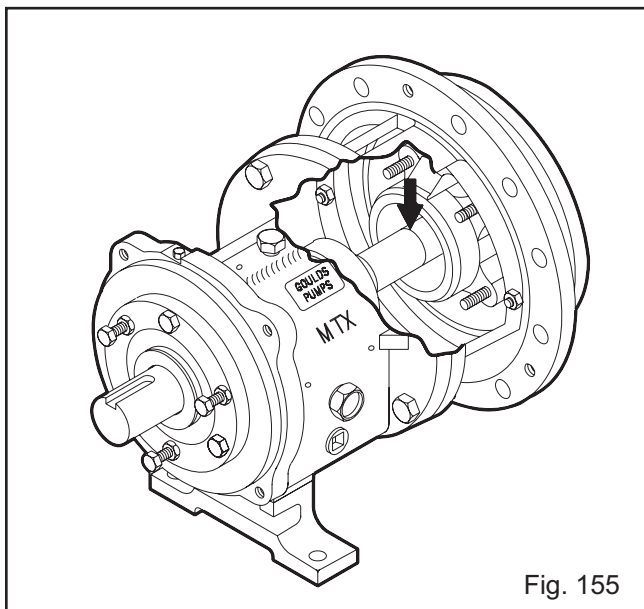


Fig. 155

9. Remove the impeller (101), and shaft sleeve (126) if used.

NOTE: Do not remove a Teflon® sleeve from a knurled 3198 shaft.

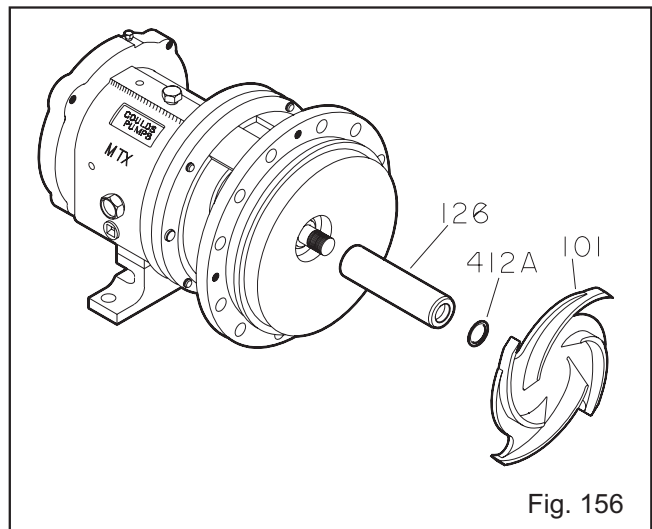


Fig. 156

10. Remove the seal chamber cover or the backplate (184).

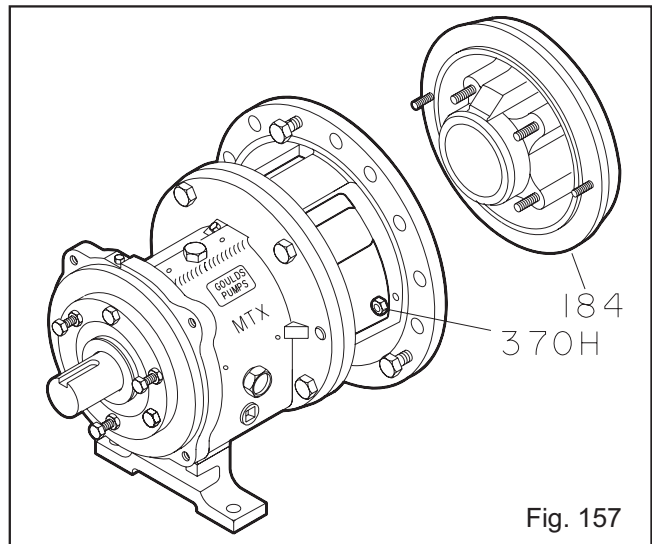


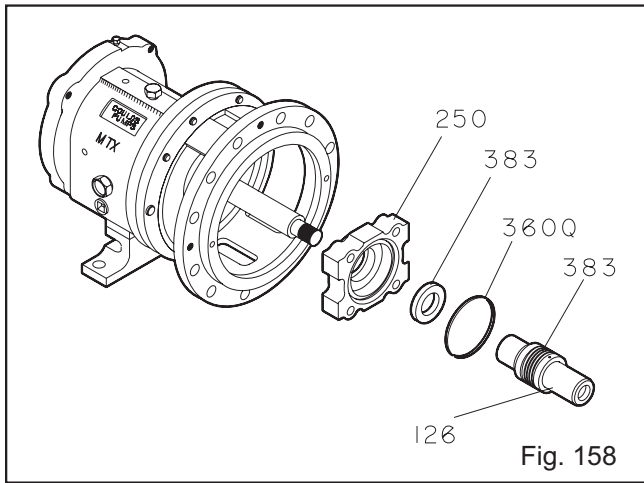
Fig. 157

For inside mounted seals:

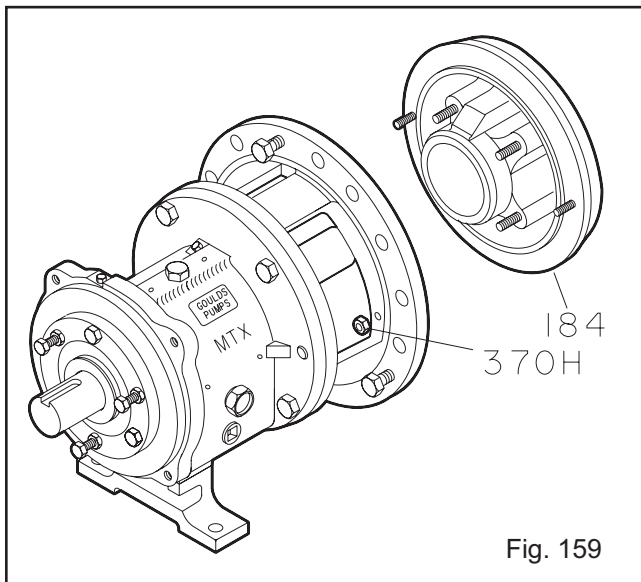
11. Install stationary seat into gland (107) per seal manufacturer's instructions.
12. Slide gland (107) with stationary seat over shaft, up to adapter face (Fig. 158).

13. Install mechanical seal on shaft (122) or shaft sleeve (126) per seal manufacturer's instructions. Install shaft sleeve (126) if used (with seal).

NOTE: Anti-galling compound can be applied to the sleeve bore to aid in disassembly.



14. Install seal chamber cover (184) with nuts (370H) (Fig. 159).

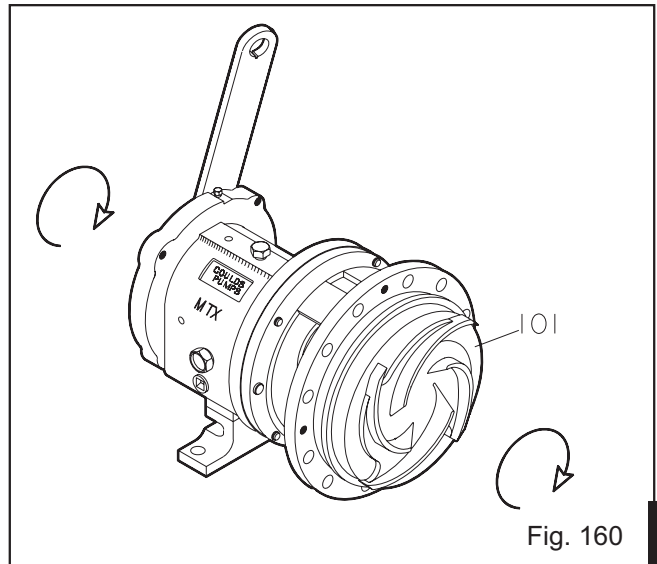


WARNING

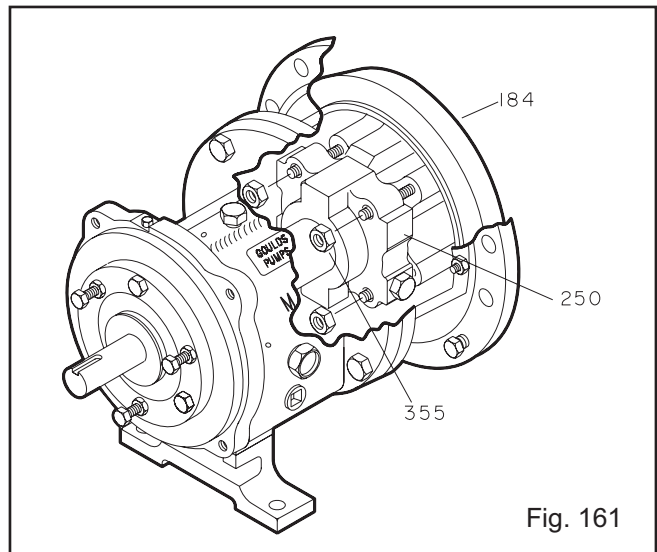
Wear a heavy set of work gloves when handling impeller (101) as sharp edges may cause physical injury.

15. Install impeller (101) with new O-ring (412A). Put shaft wrench and coupling key on shaft. When impeller (101) makes firm contact with sleeve (126), raise shaft wrench (counterclockwise when viewed from impeller end of shaft) off bench and slam it down (clockwise when viewed from impeller end of shaft). A few sharp raps will tighten impeller (101) properly (Fig. 160).

NOTE: Be sure to use a properly balanced impeller.

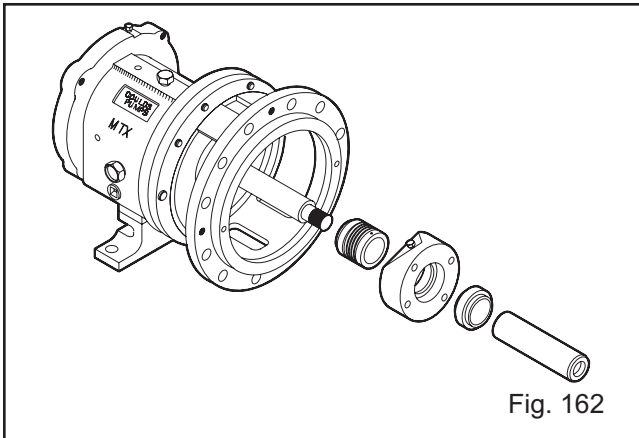


16. Install gland (107) with nuts (355) (Fig. 161).

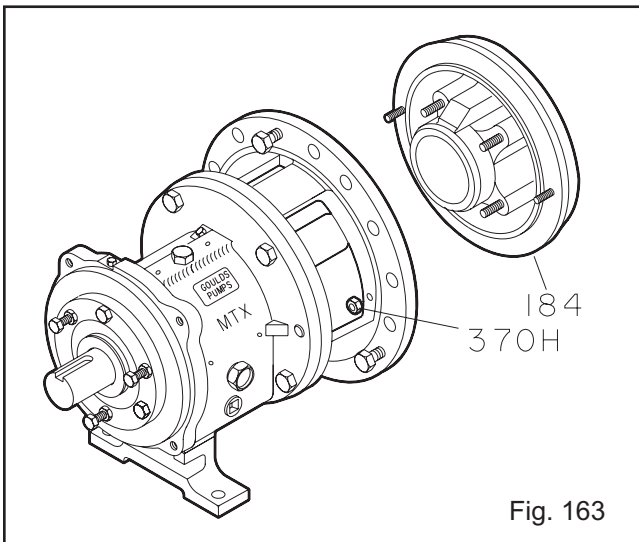


For outside mounted seals:

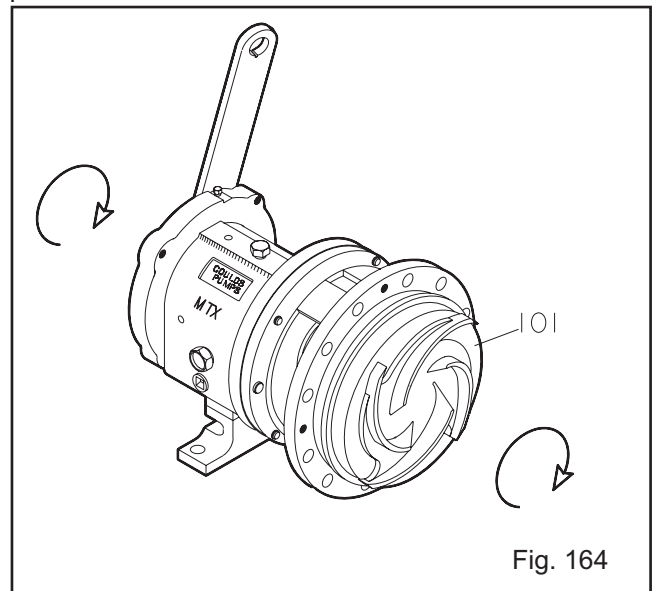
11. Install the mechanical seal on the shaft (122) or sleeve, if used (126) per the seal manufacturer's instructions. Install the sleeve with the seal, if used.
12. Slide gland and then stationary seat, with gaskets, on the shaft or sleeve (Fig. 162).



13. Install the seal chamber or backplate (184) with hex nuts (370H). Be sure that the gland studs line up with the holes in the gland (Fig. 163).



14. Install the impeller (101) with a new o-ring (412A). Put the shaft wrench and coupling key on the shaft. When the impeller makes firm contact with the sleeve, raise the shaft wrench (counter-clockwise when viewed from the impeller end of the shaft) off the bench and slam it down (clockwise when viewed from the impeller end of the shaft). A few sharp raps will tighten the impeller properly (Fig. 164).

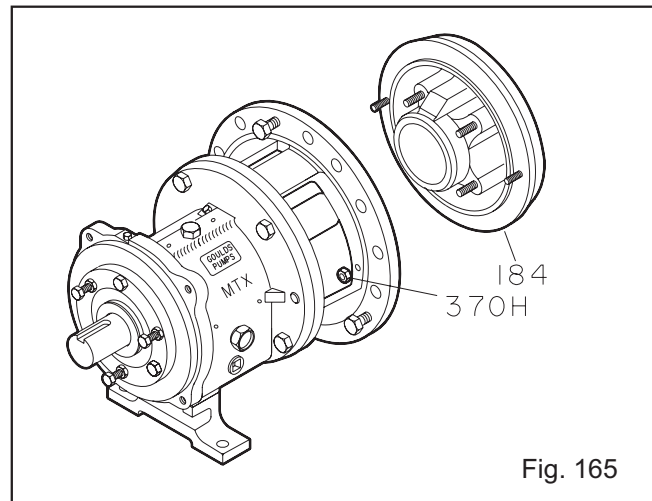


NOTE: Be sure to use a properly balanced impeller.

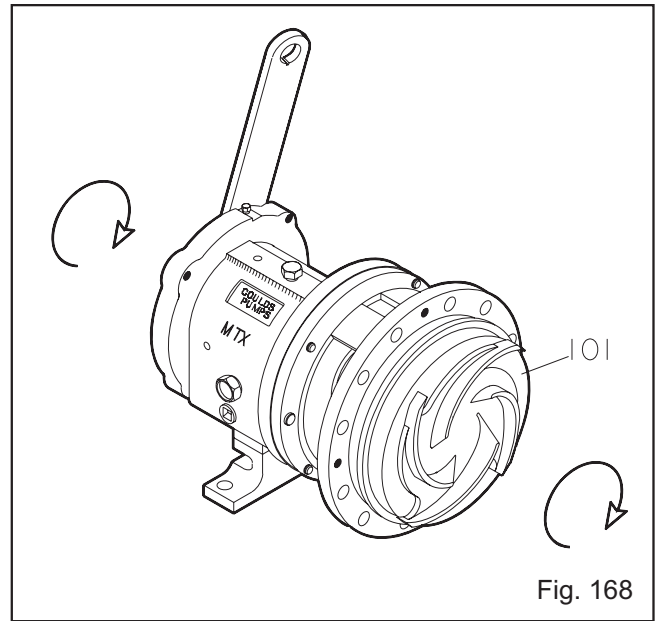
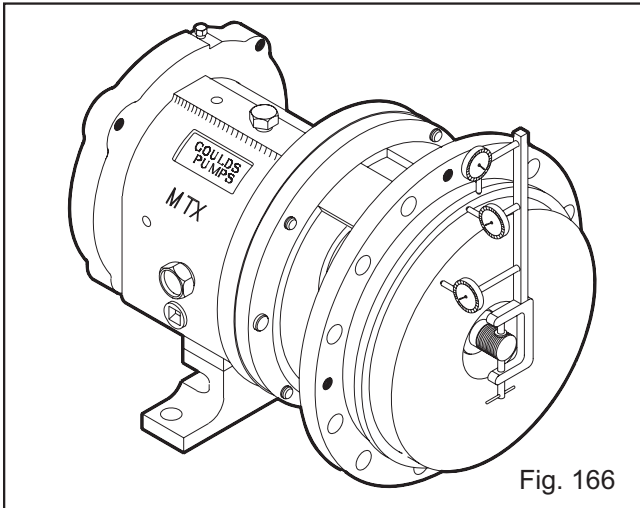
15. Install the gland (107) with hex nuts (355).

Pumps With Packing:

1. Install stuffing box cover (184) with nuts (370H) (Fig 165).



2. Check stuffing box cover run-out. Rotate indicator through 360 degrees. Total indicator reading greater than 0.005 in. (.13 mm) indicates a problem (Fig. 166).



3. Install shaft sleeve (126) (Fig. 167).

NOTE: Anti-galling compound can be applied to the sleeve bore to aid in disassembly.

NOTE: Make sure sleeve is fully seated.



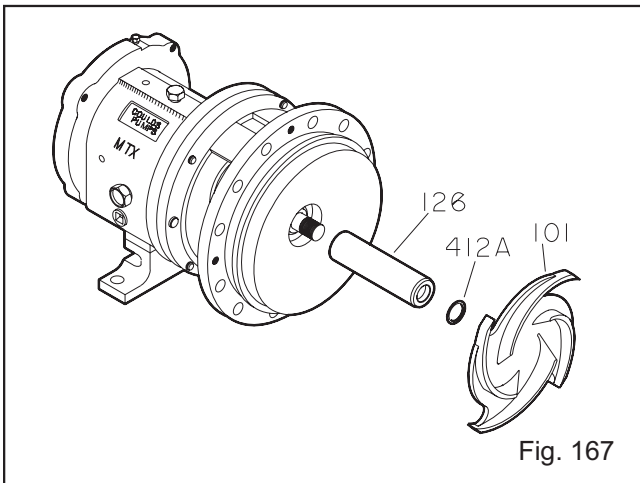
WARNING

Wear a heavy set of work gloves when handling impeller (101) as sharp edges may cause injury.

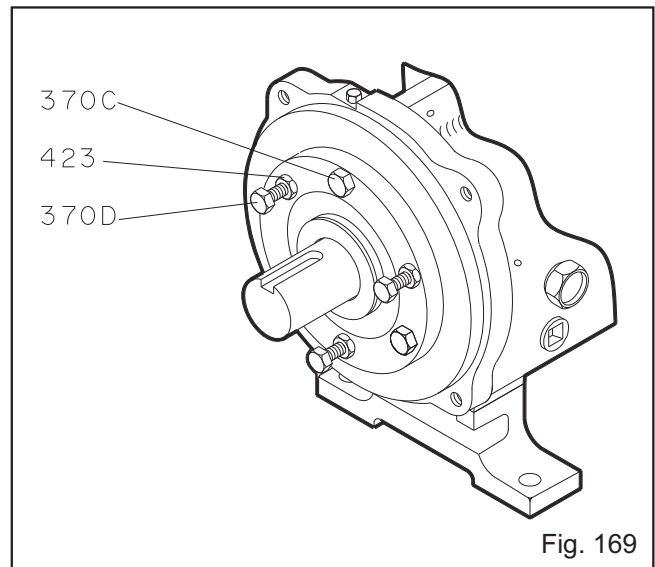
5. Loosen clamp bolts (370C), and jacking bolts (370D) (Fig. 169). Measure gap between impeller (101) and seal chamber/stuffing box cover (184) with a feeler gauge. When 0.030 in. (.76 mm) clearance is reached, tighten clamp bolts (370C), jacking bolts (370D), and locking nuts (423) (Fig. 169).

NOTE: This approximates the impeller position when set at 0.015 in. (.38 mm) from casing.

6



4. Install impeller (101) with O-ring (412A). Put shaft wrench and coupling key on shaft. When impeller (101) makes firm contact with sleeve (126), raise shaft wrench (counterclockwise when viewed from impeller end of shaft) off bench and slam it down (clockwise when viewed from impeller end of shaft). A few sharp raps will tighten impeller properly (Fig. 168).



6. Check impeller runout. Check vane tip to vane tip. Total indicator reading greater than 0.005 in. (.13 mm) indicates a problem (Fig. 170).

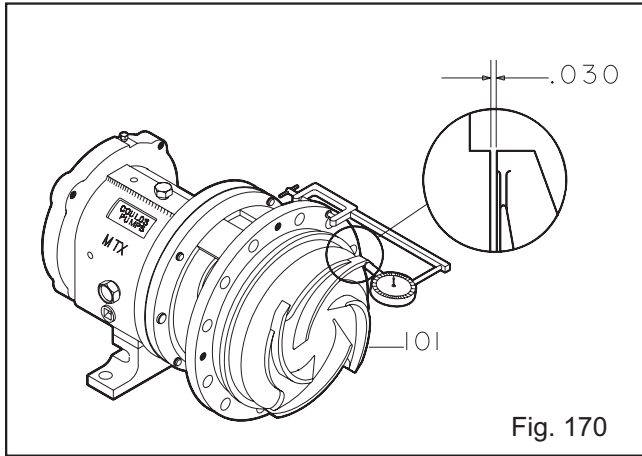


Fig. 170

NOTE: The face of the CV 3196 impeller is not machined. Checking the face runout on the CV 3196 impeller is not required.

7. Install packing and gland according to Section 4, Operation.

Pumps With Dynamic Seals:
(3196, CV 3196, LF 3196 only)

1. Place backplate (444) flat side down on the bench (Fig. 171).

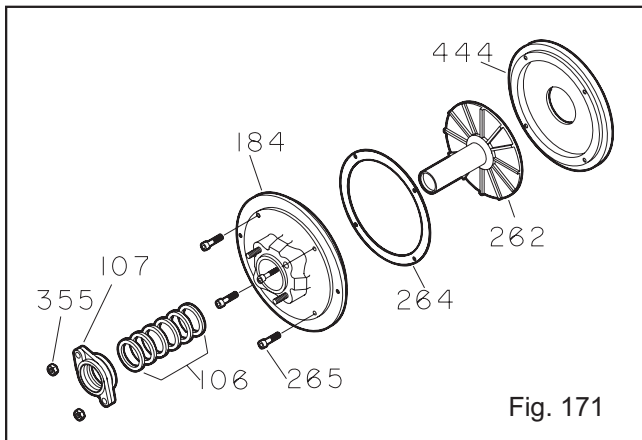


Fig. 171

2. Place repeller (262) in backplate (444), sleeve side up.
3. Place Teflon gasket (264) on backplate (444), lining up holes.
4. Place stuffing box cover (184) on backplate (444), lining up holes.

5. Install four (4) socket head cap screws (265), tighten securely.
6. Install new sealing element into gland.
7. Install gasket (360Q) and gland (107) on stuffing box cover (184). Install nuts (355).
8. Install dynamic seal assembly. Install nuts (370H) (Fig. 172).

NOTE: Anti-galling compound can be applied to the sleeve bore to aid in disassembly.

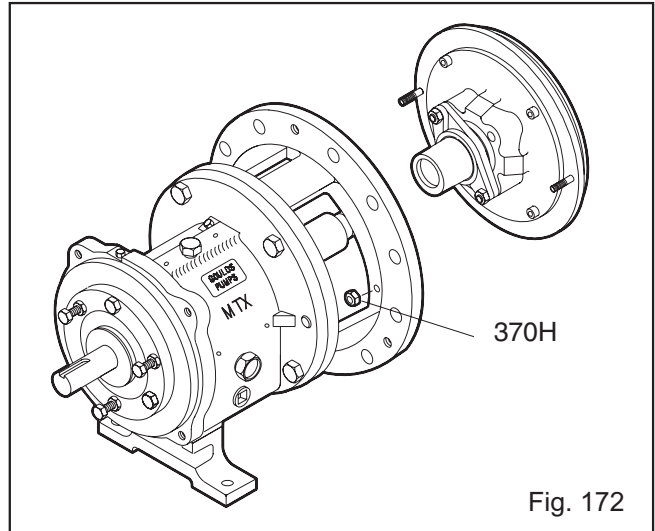


Fig. 172

9. Check stuffing box cover run-out. Rotate indicator through all 360 degrees. Total indicator reading greater than 0.005 in. indicates a problem (Fig. 173).

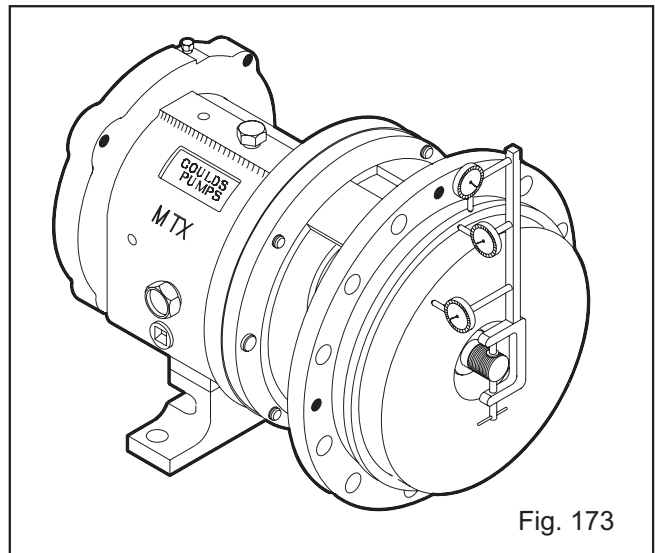


Fig. 173

ALL MODELS STX, MTX, LTX, XLT-X, X17

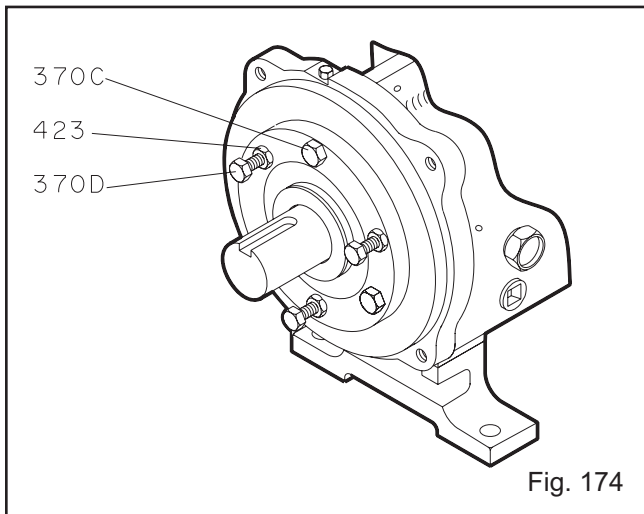
Reinstall Back Pull-Out Assembly



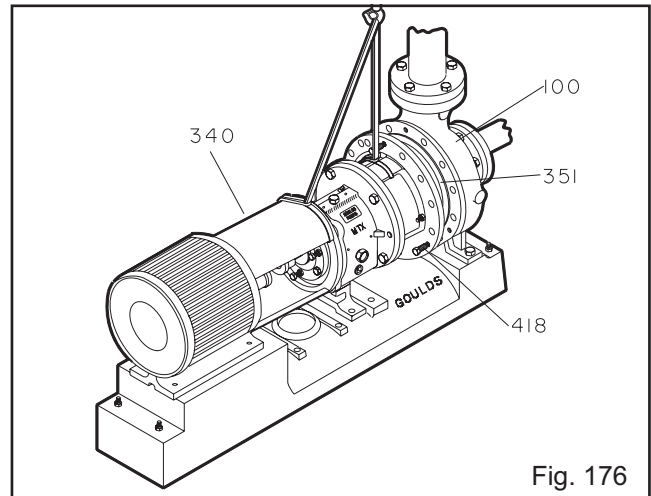
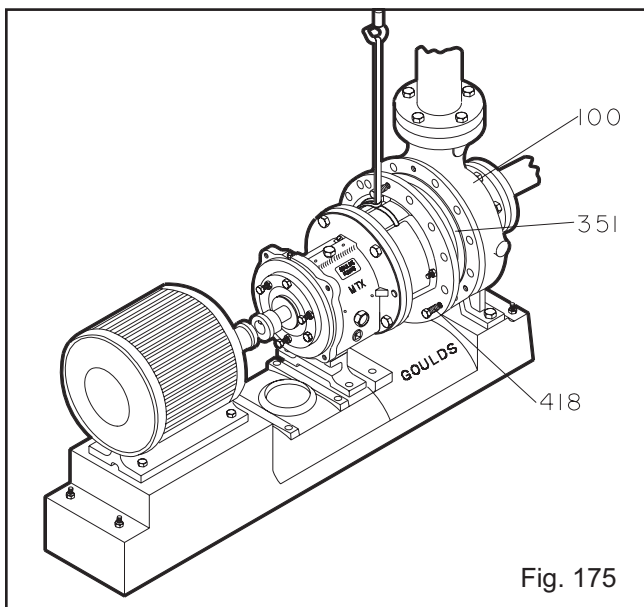
WARNING

Back pull-out assembly weighs more than 50 lbs. Do not handle unassisted as physical injury may occur.

1. Clean casing fit and install casing gasket (351) in place on seal chamber/stuffing box cover.
2. Loosen clamping bolts (370C) and jacking bolts (370D) on bearing housing (Fig. 174).



3. Install back pull-out assembly in casing (Fig. 175, 176).

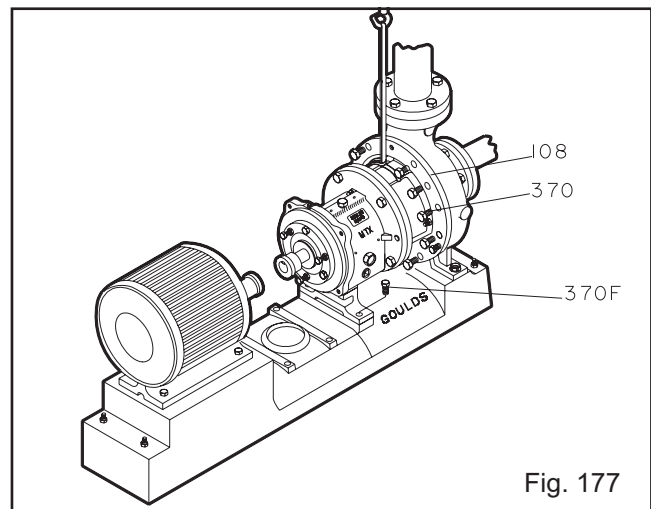


4. Install casing bolts (370), finger tight. Casing bolts (370) may be coated with anti-galling compound to aid disassembly. Tighten the casing bolts per *Table 9* torque values. Install casing jack screws (418), snug tight (Fig. 177).



CAUTION

Do not overtighten casing jack screws (418).



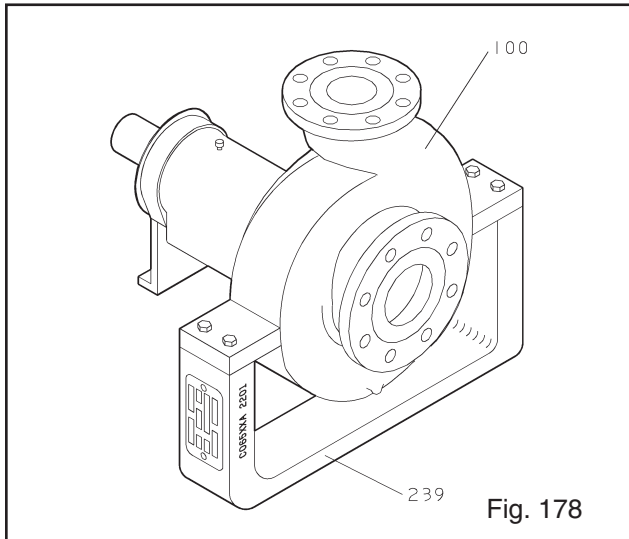
5. Replace shims under frame foot and tighten frame foot to baseplate. To insure that the proper shim is used, a dial indicator should be mounted to measure distance between top of frame and baseplate. This distance should not change as frame foot bolting is tightened.

6. Check total travel of impeller in casing. With new parts, acceptable range is 0.030 in. (.76 mm) to 0.065 in. (1.65 mm). If outside this range, improper parts or installation or too much pipe strain is present. Determine cause and correct.
7. Adjust impeller clearance according to procedure outlined in the Preventive Maintenance Section.

8. Replace auxiliary piping at this time.
9. Fill pump with proper lubricant. Refer to *Section 5, Preventive Maintenance* for requirements.

NOTE: For reassembly of the C-Face adapter, see Appendix V.

Model HT 3196 Only



1. Assemble casing support (239) to casing (100) as shown in Fig. 178. The stamped part number on the casing support (239) is located on the left hand side when facing the casing suction.

POST ASSEMBLY CHECKS



All checks and procedures listed under Safety, Installation, Operation and Preventive Maintenance sections must be followed.

After completion of these operations, check if it is possible to rotate shaft easily by hand. If all is proper, continue with pump start-up.

ASSEMBLY TROUBLESHOOTING

Symptom	Cause	Remedy
Excessive shaft end play.	Bearing internal clearance too great.	Replace bearings with correct type.
	Snap ring loose in bearing housing groove.	Reseat.
Excessive shaft/sleeve runout.	Sleeve worn.	Replace
	Shaft bent.	Replace.
Excessive bearing frame flange runout.	Shaft bent.	Replace
	Bearing frame flange distorted.	Replace.
Excessive frame adapter runout.	Corrosion.	Replace.
	Adapter to frame gasket not seated properly.	Reseat.
Excessive seal chamber/stuffing box cover runout.	Seal chamber/stuffing box cover not properly seated in frame adapter.	
	Corrosion or wear.	Replace.
Excessive impeller vane tip runout.	Bent vane(s).	Replace impeller.

PARTS LIST WITH MATERIALS

Item	Qty per Pump	Part Name	3196, CV 3196, HT 3196, 3796				
			All D.I.	D.I. w/ 316SS Impeller	All 316SS	Al CD4MCu	All Alloy 20
100	1	Casing	1012				
101	1	Impeller	1013				
105	1	Lantern Ring				Teflon®	
106	1 Set	Stuffing Box Packing				Non-Asbestos Braid	
107	1	Gland—Packed Box		1203			1204
108	1	Frame Adapter				1013	
109C	1 X	Outboard Bearing End Cover				1001	
112A	1	Outboard Bearing				Double row angular contact (duplex pair for LTX)	
113	2	Plug—Grease Relief				2210	
113B	1	Plug—Oil Fill				2210	
122	1	Shaft—Less Sleeve	▲			2229	2230
122	1	Shaft—With Sleeve				2238	
126	1	Shaft Sleeve				2229	2230
134	1	Bearing Housing				1001	
136	1	Bearing Locknut				Steel	
168A	1	Radial Bearing				Single Row Ball	
184	1	Seal Chamber/Stuffing Box Cover	1012	1012	1203	1216	1204
193	2	Grease Fitting				Steel	
228	1	Bearing Frame				STX All Others - 1001	
236A	10	Cap Screw—Bearing Clamp Ring				2210	
241	1	Frame Foot				1001	
248	1	Oil Thrower				2210	
250	1	Gland—Mechanical SEal				Material Varies	
253B	1	Bearing Clamp Ring				2210	
319	1	Sight Glass				Glass/Steel	
332A	1	Outboard Labyrinth Seal w/O-rings				Brass ASTM B505-96	
333A	1	Inboard Labyrinth Seal w/O-rings				Brass ASTM B505-96	
351	1	Casing Gasket				Aramid Fiber w/EPDM	
353	4	Gland Stud				2228	
355	4	Gland Stud Nut				2228	
358	1	Plug—Casing Drain		2210		2229	2230
358Y	1 X	Plug, Impeller			2229		2230
360C	1 X	Gasket—Thrust End Cover				Vellumoid	
360D	1	Gasket—Frame-to-Adapter				Vellumoid	
360Q	1	Gasket—Gland-to-Stuffing Box Cover				Material Varies	
361A	1	Retaining Ring				Steel	
370	★	Bolt—Adapter to Case		2210			2228
370B	4	Bolt—Frame-to-Adapter				2210	
370C	✱	Clamp Bolt —Bearing Housing				2210	
370D	✱	Jack Bolt—Bearing Housing				2210	
370F	2	Bolt—Frame Foot to Frame				2210	
370H	2	Stud—Stuffing Box Cover-to-Adapter				2228	
371C	6 X	Cap Screw-End Cover to Bearing Housing				2210	
382	1	Bearing Lockwasher				Steel	
383	1	Mechanical Seal				Material Varies	
400	1	Coupling Key				2210	
408A	1	Plug—Oil Drane				2210	
408H	4	Plug—Oil Mist Connection				2210	
408J	1	Plug—Oiler				2210	
408L	1	Plug—Oil Cooler Inlet				2210	
408M	1	Plug—Oil Cooler Outlet				2210	
408N	1	Plug—Sight Glass				2210	
418	3	Jack Bolt—Adapter-to-Case				2228	
423	3	Jam Nut—Bearing Housing Jack Bolt				2210	
423B	2	Hex Nut—Stuffing Box Cover to Adapter				2228	
428	1	Gasket, Plug				Teflon®	
458Y	1 X	Plug, Impeller			2229		2230
469B	2	Dowel Pin—Frame-to-Adapter				Steel	
494	1	Tube Element, Finned Cooled				304SS / Copper	
496	1	O-Ring Bearing Housing				Buna N	
412A	1	O-Ring—Impeller				Teflon®	
497F	1	O-Ring—Outboard Labyrinth Rotor				Viton	
497G	1	O-Ring—Outboard Labyrinth Stator				Viton	
497H	1	O-Ring—Inboard Labyrinth Rotor				Viton	
497J	1	O-Ring—Inboard Laybrinth Stator				Viton	
497L	1	O-Ring Internal (inboard)				Viton	
497N	1	O-Ring Internal (outboard)				Viton	
503	1 #	Adapter Ring				1013	
529	1	Lockwasher—Frame Foot-to-Bearing Frame				Steel	
555	1	Tube, Finned Cooling Assembly				304AA / Copper	
555A	1	Tube, Ftg Male (Frame Cooling)				Brass	
555B	2	Connector, Thermocouple (Frame Cooling)				Brass	
555C	2	Elbow, Female (Frame Cooling)				Brass	
555D	1	Conn TC Sealed PWR				Cast Iron	

MATERIAL CROSS REFERENCE CHART

Material	ITT Goulds Pumps Material Code	ASTM	DIN	ISO	JIS
Cast Iron	1001	A48 CLASS 20			
Ductile Iron	1012	A395 Gr60-40-18			
Ductile Iron	1013	A536 Gr60-42-10			
CD4MCu	1041	A744 CD4MCU			
Monel	1119	A494 GrM-35-1			
316SS	1203	A744 CF-8M	1.4408		G5121 (SC514)
Alloy 20	1204	A744CN-7M	1.4500		
317SS	1209	A744CG-8M	1.4448		
Hastelloy C	1215	A494 CW-6M			
CD4MCu	1216	A744CD4MCU	9.4460		
Hastelloy B	1217	A494 N-7M			
Titanium	1220	B367 GrC-3			
Nickel	1601	A494 GrCZ100			
Monel	2150	B164 UNS N04400			
Nickel	2155	B160 UNS N02200			
Titanium	2156	B348 Gr2			
Carbon Steel	2201	A576 Gr. 1018 and 1020			
Carbon Steel	2210	A108Gr1211			
304SS	2228	A276 Type 304			
316SS	2229	A276 Type 316			
Alloy 20	2230	B473 (N08020)			
317SS	2232	A276			
4150 Steel	2237	A322Gr4150			
4140 Steel	2238	A434Gr4140			
4140 Steel	2239	A193 Gr. B7			
Alloy B-2	2247	B335 (N10665)			
Alloy C-276	2248	B574 (N10276)			
GMP-2000	6929	N/A			
PFA Lined Steel	6944	N/A			
PFA Lined 316SS	6947	N/A			
PFA Lined Ductile Iron	9639	N/A			

Fasteners/Plugs

Material	ITT Goulds Pumps Material Code	ASTM
Carbon Steel	2210	A307Gr.B.
Stainless Steel	2228	F593Gr1
316 Stainless Steel	2229	F593Gr2

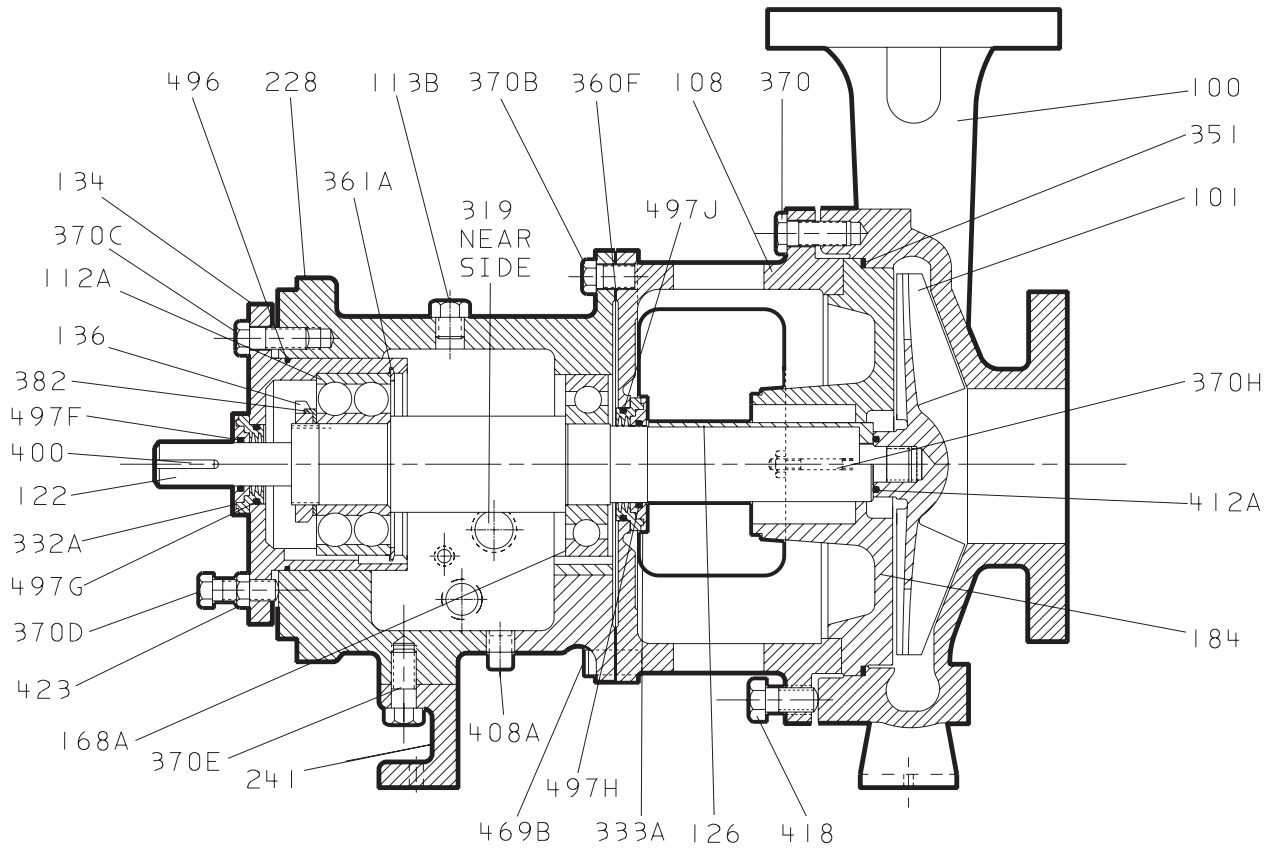
Model HT 3196 Parts List with Materials of Construction

(For all other Items refer to the 3196 Parts List with Materials of Construction)

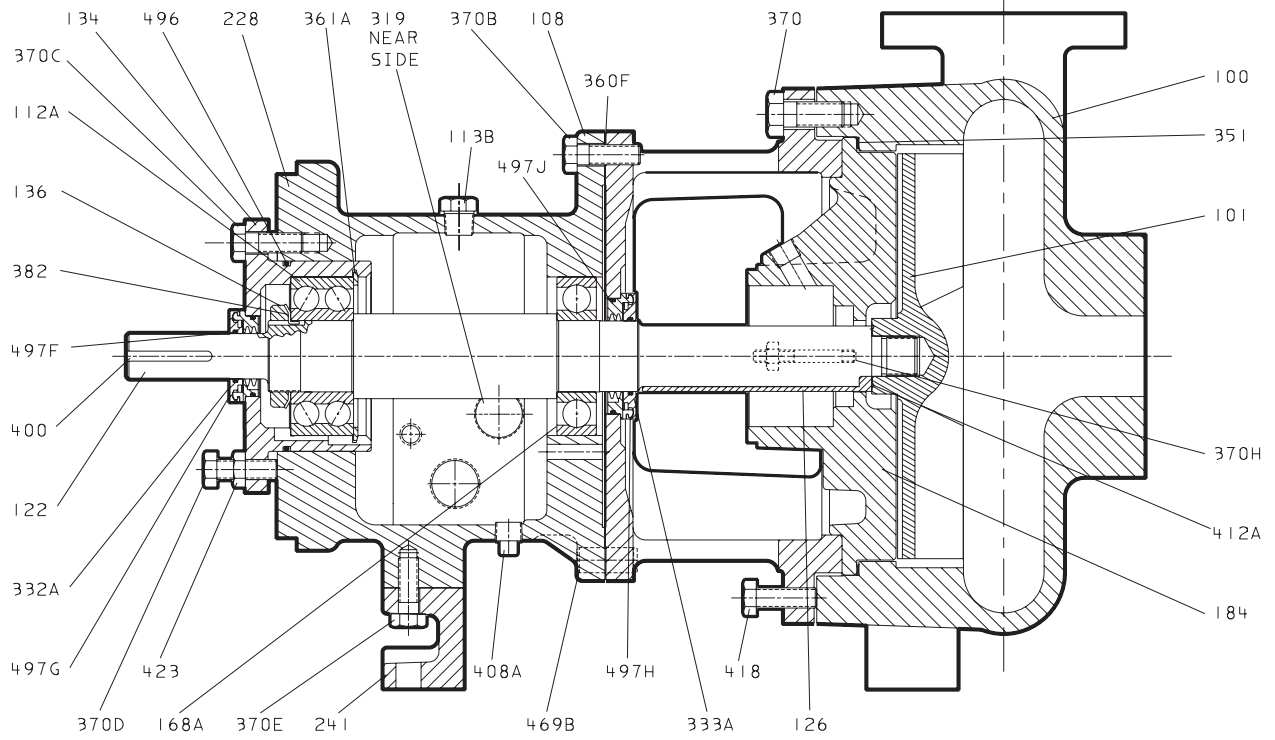
316SS			Alloy 20		
Item	Part Description	Mat'l Code	Item	Part Description	Mat'l Code
100	Casing	1203	100	Casing	1204
122	Shaft - With Sleeve	2229	122	Shaft - With Sleeve	2229
122	Shaft - Less Sleeve (Optional)	2229	122	Shaft - Less Sleeve (Optional)	2230
239	Support, Casing	2201	239	Support, Casing	2201
351	Gasket, Casing	5175	351	Gasket, Casing	5175
370	Screw, H. Cap Adapter to Casing	2239	370	Screw, H. Cap Adapter to Casing	2239
370Y	Screw, H. Cap Casing to Support	2210	370Y	Screw, H. Cap Casing to Support	2210
412A	O-Ring, Graphoil Impeller		412A	O-Ring, Graphoil Impeller	
437	Lockwasher, Casing to Support	2210	437	Lockwasher, Casing to Support	2210
494	Finned Cooler Tube		494	Finned Cooler Tube	

Hastelloy C			CD4MCu		
Item	Part Description	Mat'l Code	Item	Part Description	Mat'l Code
100	Casing	1215	100	Casing	1216
122	Shaft - With Sleeve	2229	122	Shaft - With Sleeve	2229
122	Shaft - Less Sleeve (Optional)	2248	122	Shaft - Less Sleeve (Optional)	2230
239	Support, Casing	2201	239	Support, Casing	2201
351	Gasket, Casing	5175	351	Gasket, Casing	5175
370	Screw, H. Cap Adapter to Casing	2239	370	Screw, H. Cap Adapter to Casing	2239
370Y	Screw, H. Cap Casing to Support	2210	370Y	Screw, H. Cap Casing to Support	2210
412A	O-Ring, Graphoil Impeller		412A	O-Ring, Graphoil Impeller	
437	Lockwasher, Casing to Support	2210	437	Lockwasher, Casing to Support	2210
494	Finned Cooler Tube		494	Finned Cooler Tube	

Model 3196 Cross Sectional

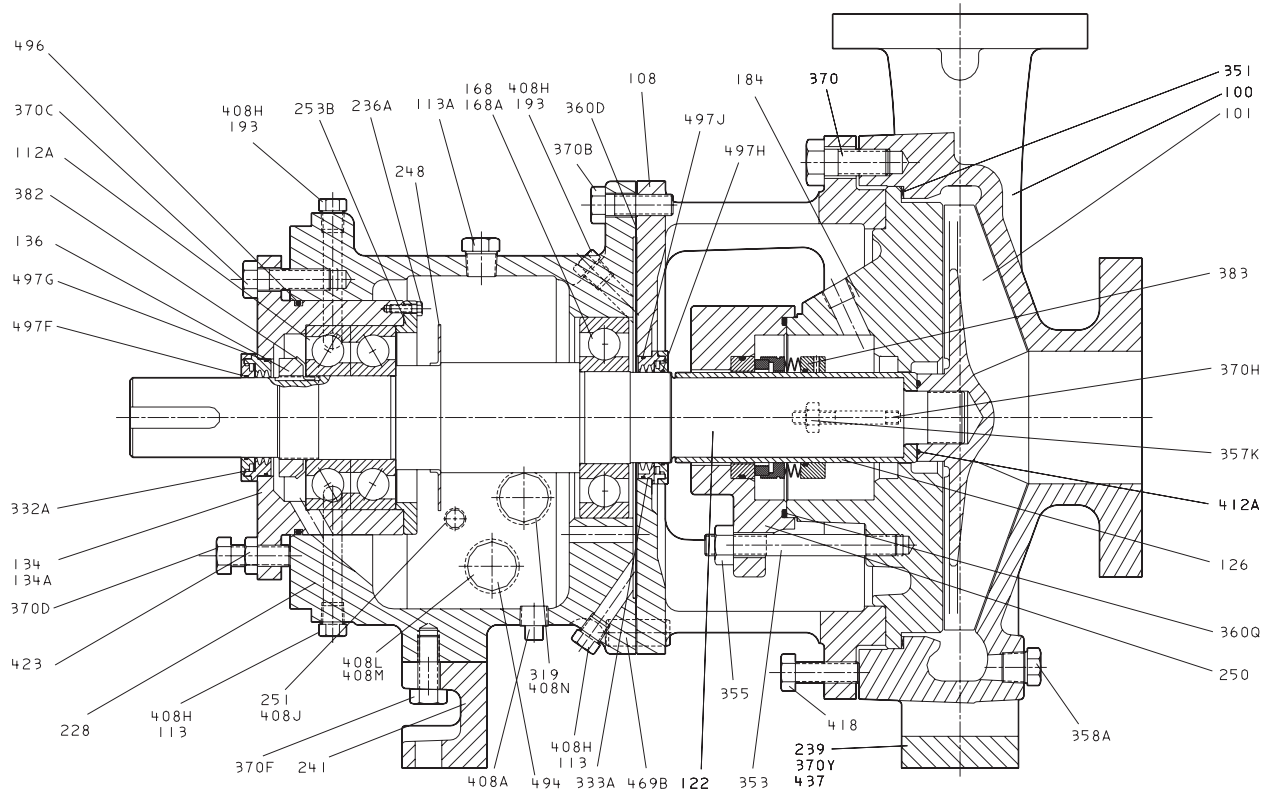


Model CV 3196 Cross Sectional



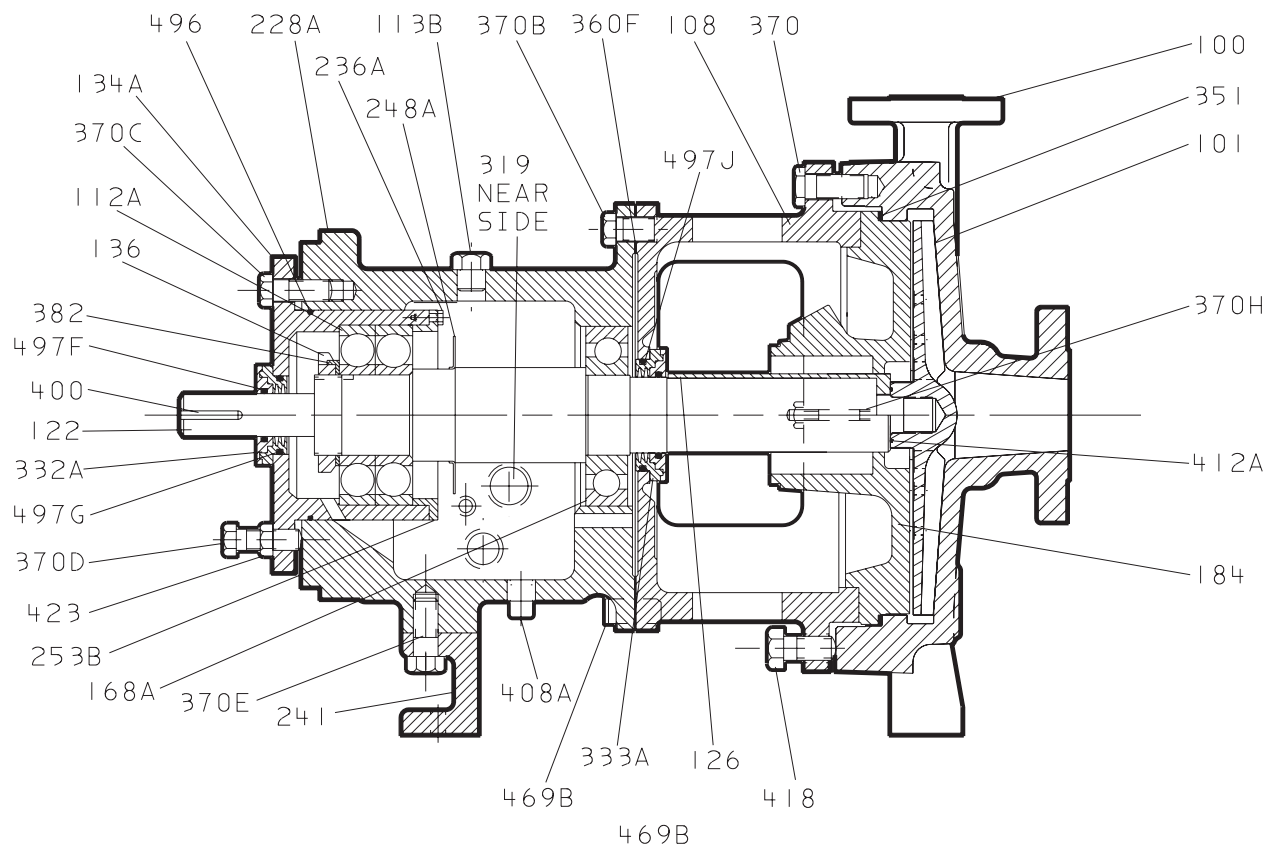
6

Model HT 3196 Cross Sectional (LTX)



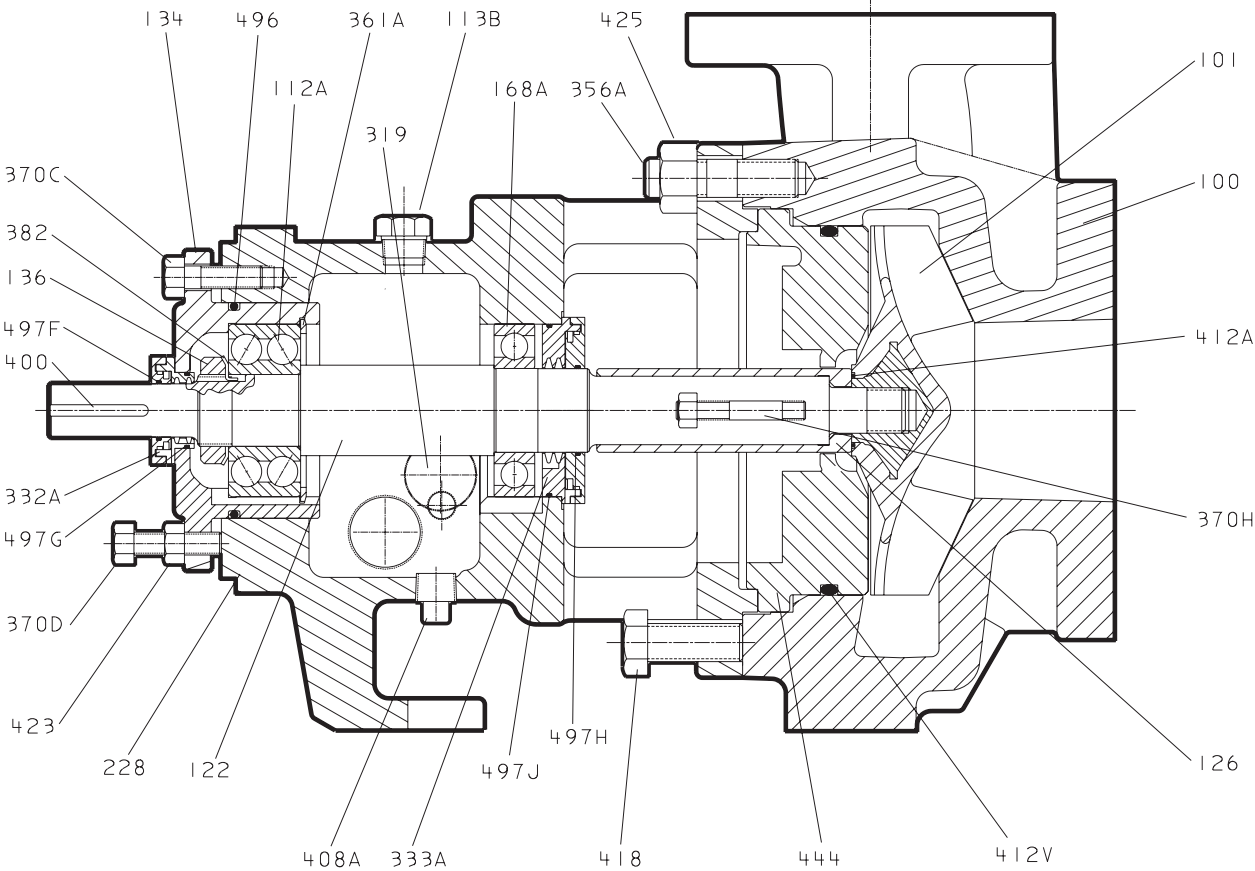
**Finned tube oil cooler is not shown but is standard with HT 3196.
See power frame exploded view drawing.**

Model LF 3196 Cross Sectional

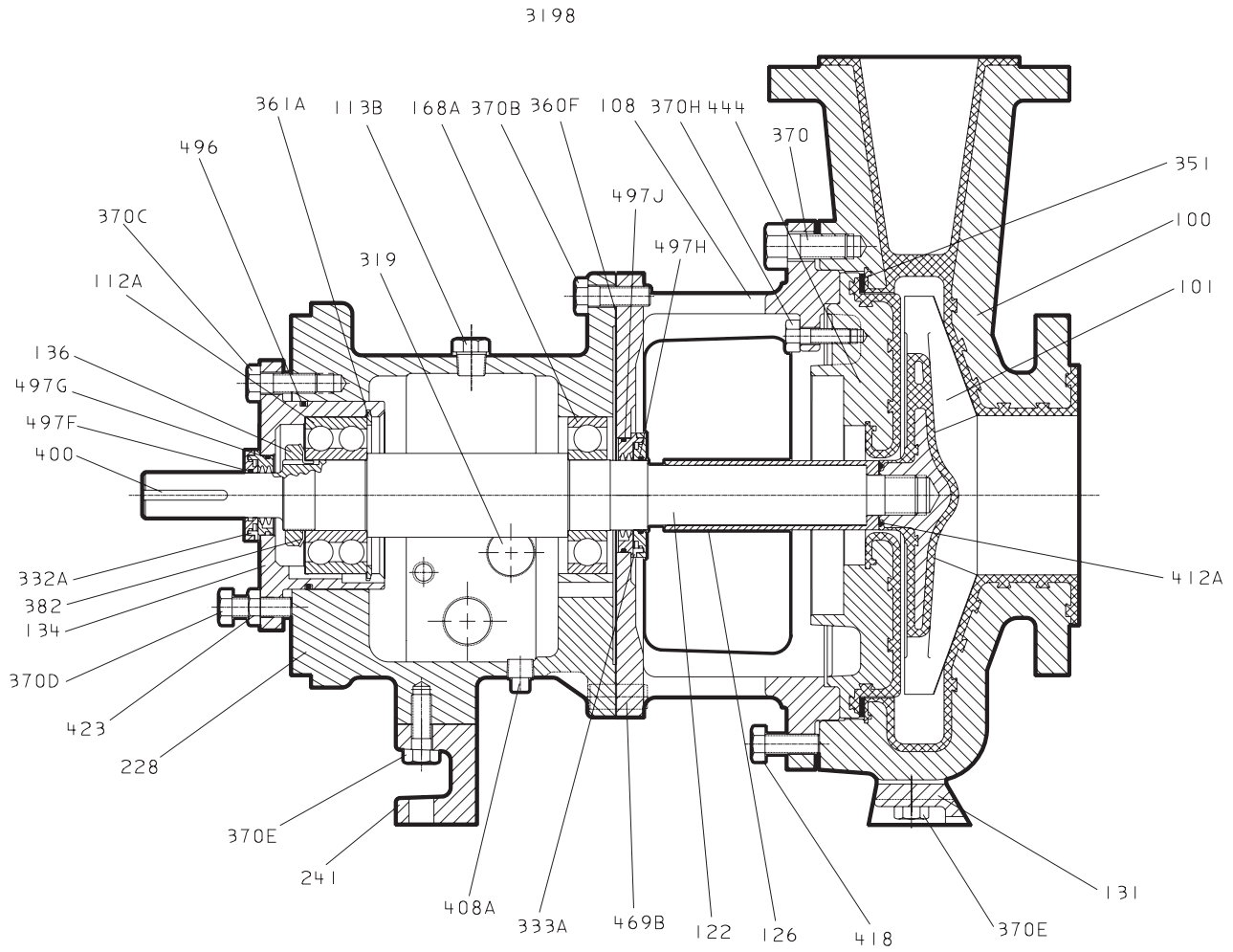


6

Model NM 3196 Cross Sectional



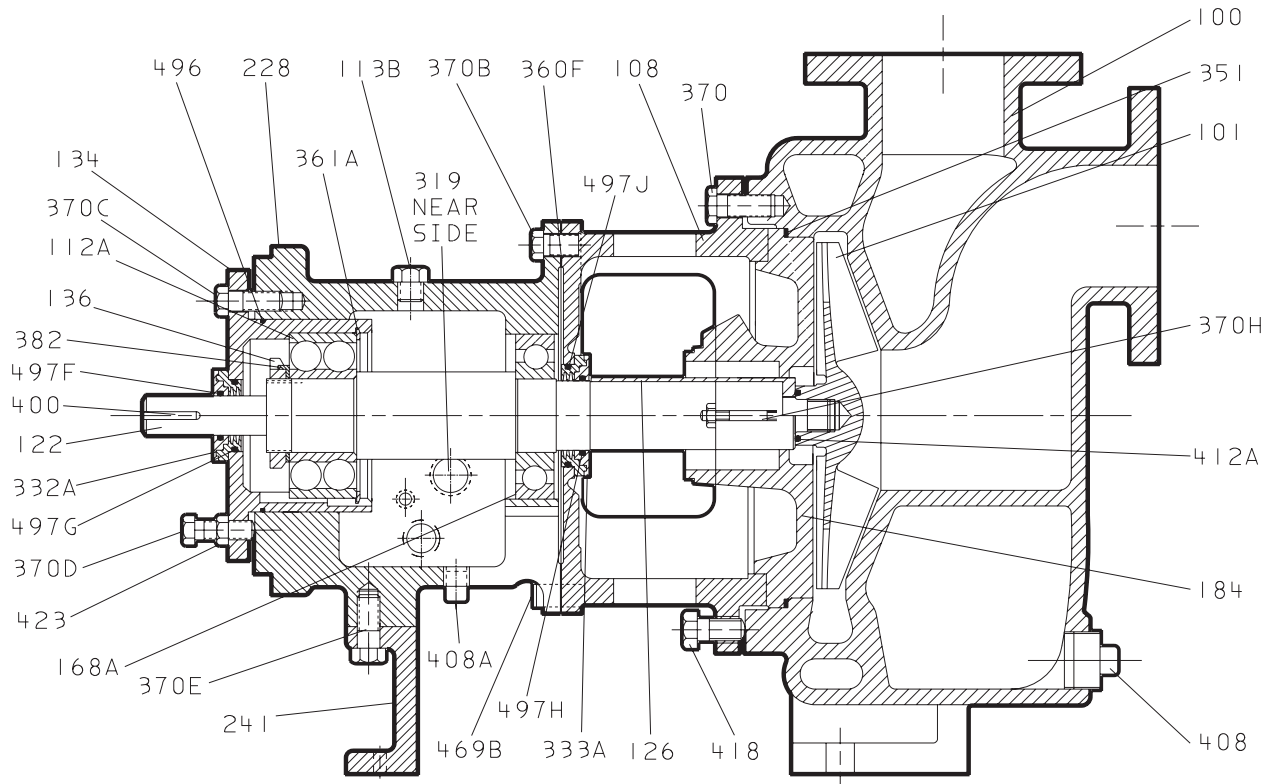
Model 3198 Cross Sectional



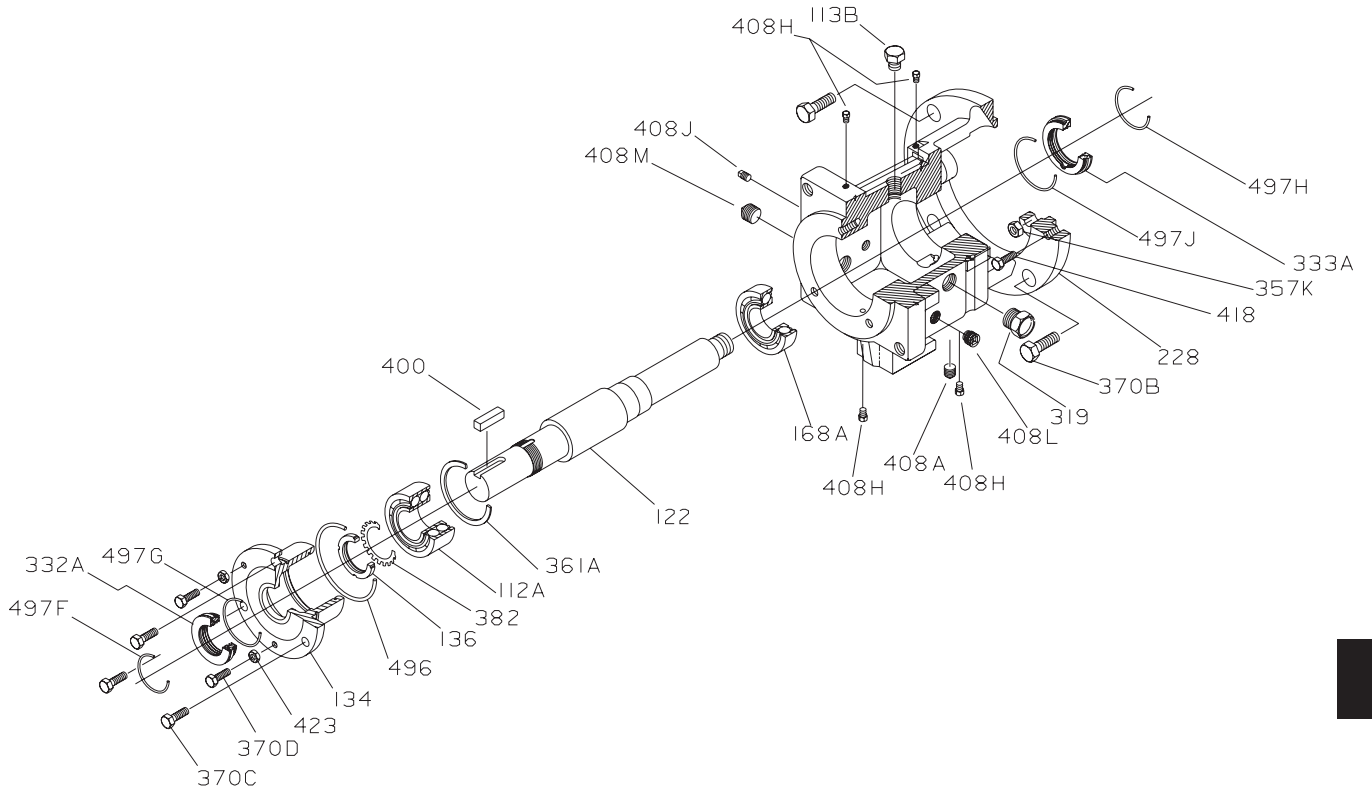
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Model 3796 Cross Sectional

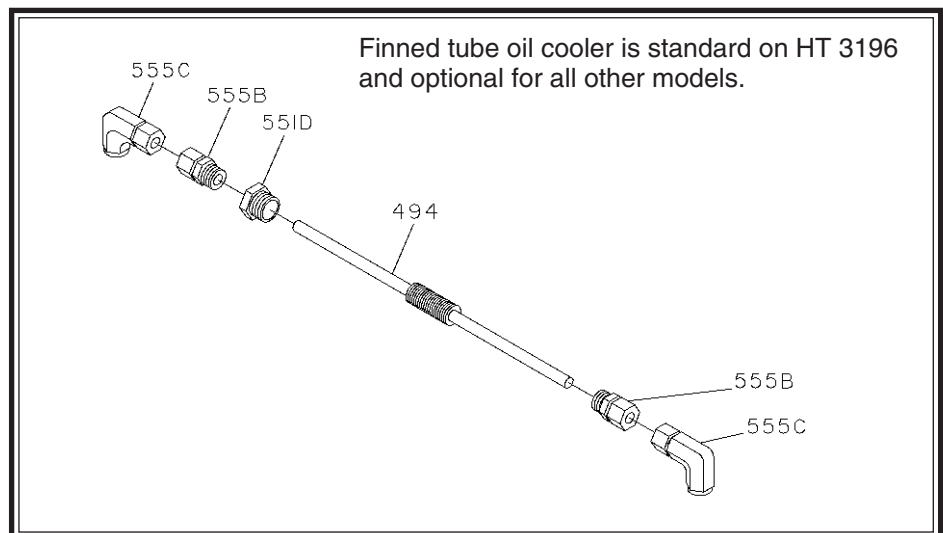
3796 MTX



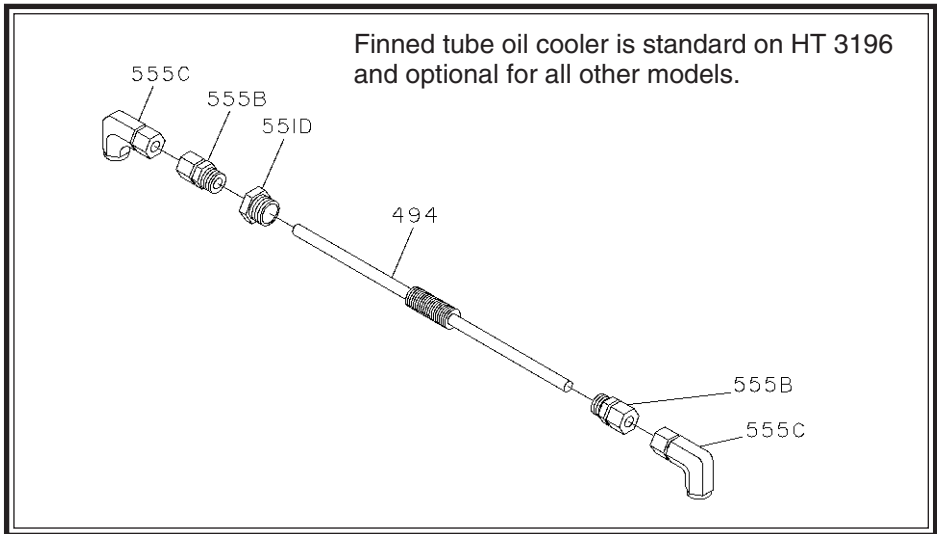
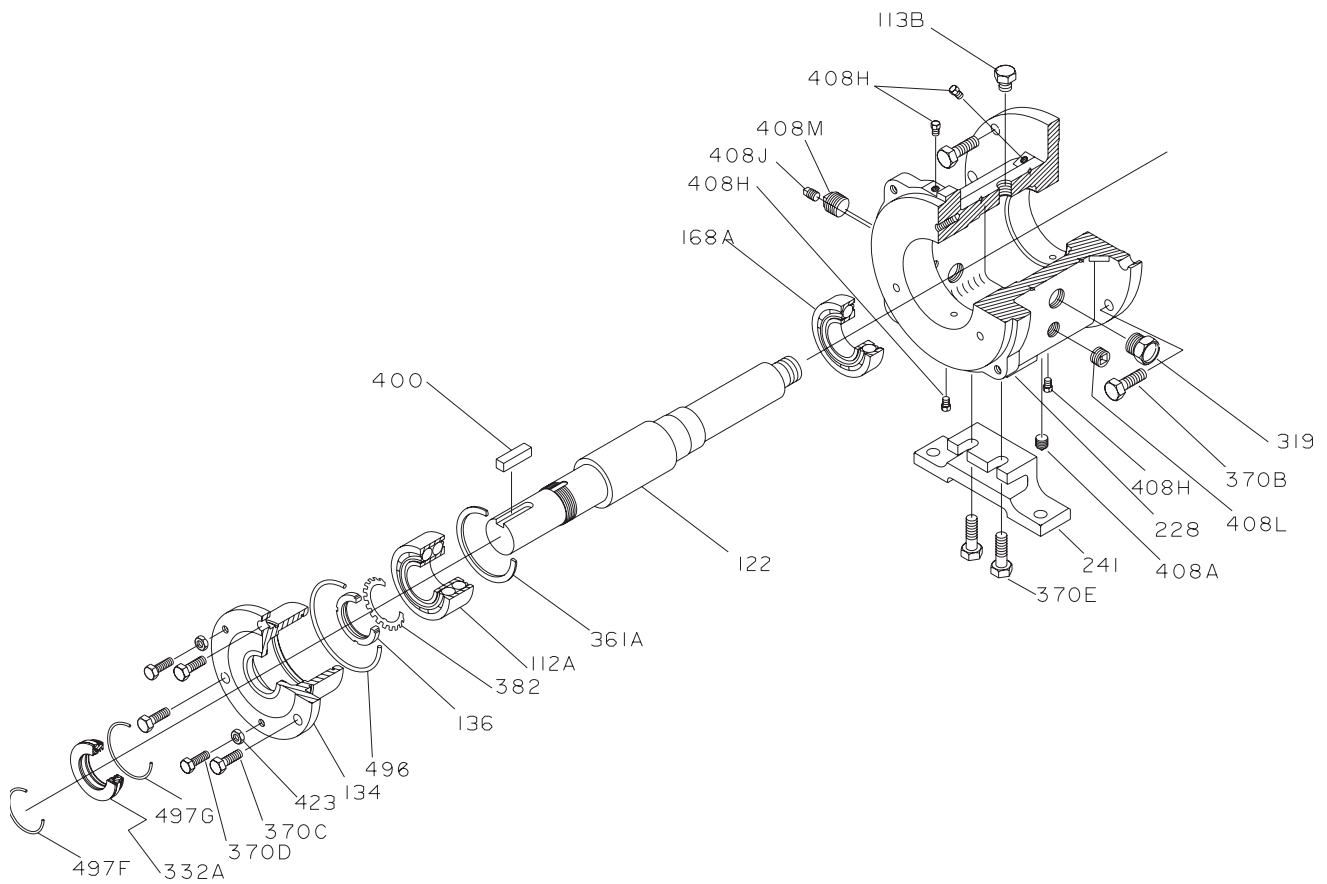
STX Power End



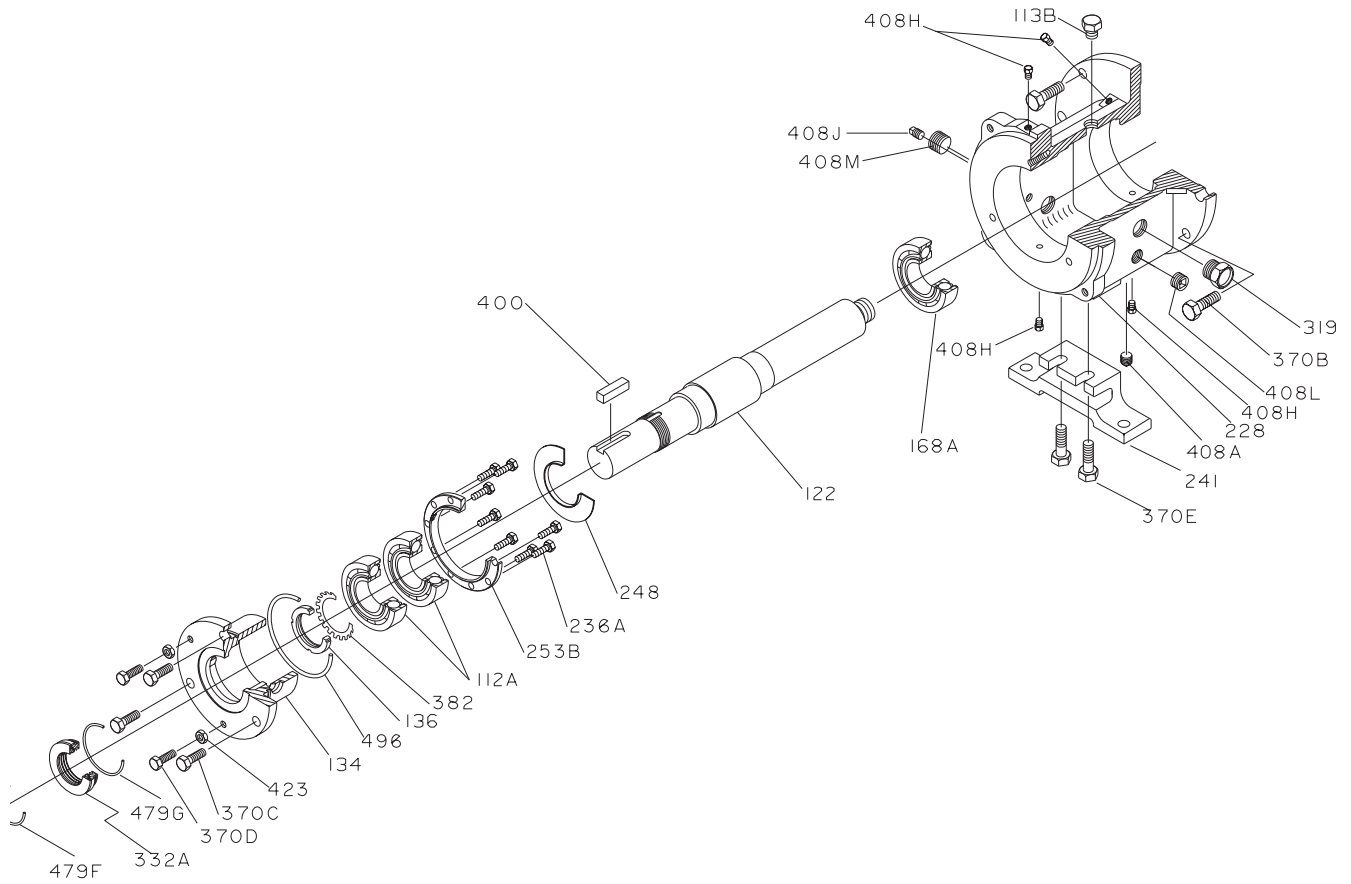
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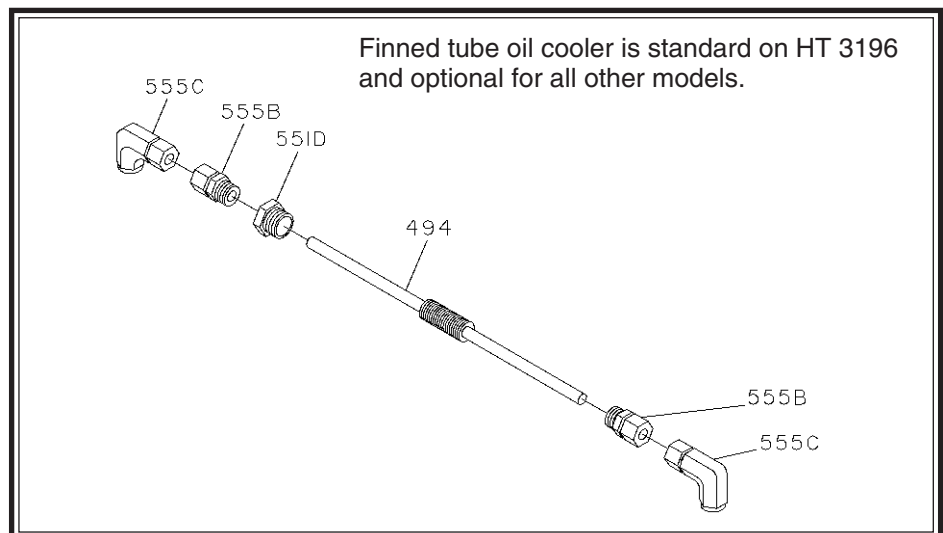
MTX Power End



LTX Power End



6



XLT-X Power End

