

GOULDS PUMPS

Installation, Operation and Maintenance Instructions



Model 3171



ITT

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.

FOREWORD

This manual provides instructions for the Installation, Operation, and Maintenance of the Goulds Model 3171 Vertical Sump Pump. This manual covers the standard product plus common options that are available. For special options, supplemental instructions are supplied. **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 long, 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 Industries - 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.



When pumping unit is installed in a potentially explosive atmosphere, the instructions after the 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 a Goulds representative before proceeding.

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

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

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

Additional manuals can be obtained by contacting your local ITT Industries - Goulds representative or by calling 1-800-446-8537.

THIS MANUAL EXPLAINS

- Proper Installation
- Start-up Procedures
- Operation Procedures
- Routine Maintenance
- Pump Overhaul
- Trouble Shooting
- Ordering Spare or Repair Parts

TABLE OF CONTENTS

PAGE	SECTION	
7	SAFETY	1
11	GENERAL INFORMATION	2
15	INSTALLATION	3
19	OPERATION	4
23	PREVENTIVE MAINTENANCE	5
29	DISASSEMBLY & REASSEMBLY	6
41	APPENDIX I: FLOAT CONTROLS	7
45	APPENDIX II: UPPER STUFFING BOX & VAPOR-PROOF CONSTRUCTION	
47	APPENDIX III: STEAM JACKETED (MOLTEN SULFUR) CONSTRUCTION	
48	APPENDIX IV: ENCLOSED LINE SHAFT	
51	APPENDIX V: GREASE CUP - SEALED BEARINGS	


SAFETY

DEFINITIONS	7
GENERAL PRECAUTIONS	8
EXPLOSION PREVENTION	8
SPECIAL ATEX CONSIDERATIONS	8
ATEX IDENTIFICATION	9
INTENDED USE	9
CONDITION MONITORING	9


DEFINITIONS


These pumps have been designed for safe and reliable operation when properly used and maintained in accordance with instructions contained in this manual. A pump is a pressure containing device with rotating parts that can be hazardous. Operators and maintenance personnel must realize this and follow safety measures. ITT Industries Goulds Pumps shall not be liable for physical injury, damage or delays caused by a failure to observe the instructions in this manual.

Throughout this manual the words **WARNING**, **CAUTION**, **ELECTRICAL**, **ATEX**, and **NOTE** are used to indicate procedures or situations which require special operator attention:

 **WARNING**
Operating procedure, practice, etc. which, if not correctly followed, could result in personal injury or loss of life.

 **CAUTION**
Operating procedure, practice, etc. which, if not followed, could result in damage or destruction of equipment.

 *If equipment is to be installed in a potentially explosive atmosphere and these procedures are not followed, personal injury or equipment damage from an explosion may result.*

 *Particular care must be taken when the electrical power source to the equipment is energized.*


NOTE: *Operating procedure, condition, etc. which is essential to observe.*

 **WARNING**
Particular care must be taken when the electrical power source to the equipment is energized.

EXAMPLES

 **WARNING**
Pump shall never be operated without coupling guard installed correctly.

 **CAUTION**
Throttling flow from the suction side may cause cavitation and pump damage.

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

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

NOTE: *Proper alignment is essential for long pump life.*

GENERAL PRECAUTIONS



WARNING

Personal injuries will result if procedures outlined in this manual are not followed.

		NEVER use heat to disassemble pump due to risk of explosion from trapped liquid.
		NEVER operate pump without coupling guard correctly installed.
		NEVER operate pump beyond the rated conditions to which the pump was sold.
		NEVER start pump without proper prime.
		NEVER run pump below recommended minimum flow or when dry.

		ALWAYS lock out power to the driver before performing pump maintenance.
		NEVER operate pump without safety devices installed.
		NEVER operate pump with discharge valve closed.
		NEVER operate pump with suction valve closed.
		DO NOT change conditions of service without approval of an authorized Goulds representative.

EXPLOSION PREVENTION



In order to reduce the possibility of accidental explosions in atmospheres containing explosive gasses and/or dust, the instructions under the ATEX symbol must be closely followed. ATEX certification is a directive enforced in Europe for non-electrical and electrical equipment installed in Europe. ATEX requirements are not restricted to Europe, and are useful guidelines for equipment installed in any potentially explosive environment.

SPECIAL ATEX CONSIDERATIONS

All installation and operation instructions in this manual must be strictly adhered to. In addition, care must be taken 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.

ATEX IDENTIFICATION

For a pumping unit (pump, seal, coupling, motor and pump accessories) to be certified for use in an ATEX classified environment, the proper ATEX identification must be present.

The ATEX tag will be secured to the pump or the baseplate on which it is mounted. A typical tag will 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 should be in accordance with the specified area where the equipment will be installed. If it is not, please contact your ITT/Goulds representative before proceeding.

INTENDED USE

The ATEX conformance is only applicable when the pump unit is operated within its intended use. All instructions within this manual must be followed at all times. Operating, installing or maintaining the pump unit in any way that is not covered in this manual 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. If there is any question regarding the intended use of the equipment please contact an ITT/Goulds representative before proceeding.

CONDITION MONITORING



For additional safety precautions, and where noted in this manual, condition monitoring devices should be used. This includes, but is not limited to:

- ◆ Pressure gauges
- ◆ Flow meters
- ◆ Level indicators
- ◆ Motor load readings
- ◆ Temperature detectors
- ◆ Bearing monitors
- ◆ Leak detectors
- ◆ PumpSmart control system

For assistance in selecting the proper instrumentation and its use, please contact your ITT/Goulds representative.

GENERAL INFORMATION

PUMP DESCRIPTION 11
NAMEPLATE INFORMATION 13
RECEIVING THE PUMP 14

PUMP DESCRIPTION

The Model 3171 is a Vertical Submerged Bearing Sump and Process Pump.

The Model is based on three bearing frames with 17 hydraulic sizes. The S/ST group has identical bearings with a slightly different shaft on the impeller end for the S and ST. The M/MT group is identical in all aspects for the power end. The MT is used to denote the fact that the liquid end is common with an S group unit, but has been modified slightly to accept a larger shaft. Groups are as follows:

S/ST	9 pump sizes
M/MT	8 pump sizes

NOTE: 2 are common with S group sizes.

L	2 pump sizes
---	--------------

NOTE: Each pump has a choice of two different discharge pipes giving four combinations.

Casing: The casing is tangential discharge and self-venting. The casing, with its integral bearing retainer, is precision bored to insure permanent alignment between the column casing, suction cover, and bearing at all times. The suction cover bolts are all tapped into raised bosses to insure generous metal thickness at all points in the casing.

Impeller: The impeller is fully open and keyed to the shaft and held by a self-locking cap screw to insure positive locking and prevent damage from reverse rotation. Impellers are spin-balanced (single plane) to ISO G6.3 to insure smooth operation. The impeller is provided with back vanes to reduce the axial thrust and prevent the entrance of solids.

Strainer: The strainer is a flat plate strainer to maximize draw down in a given sump depth. Openings are sized to prevent the entrance of large solids commonly ending up in open sumps.

Discharge Elbow: The elbow is designed for maximum hydraulic performance. Special design allows for fitting the pumps into the minimum possible opening. Threaded connection to the discharge pipe allows the pipe to be changed without removing the pump from the sump.

Column Pipe: Column pipe has flanged connections, accurately machined to insure true parallelism and accurately maintain steady bearings concentric with the shaft.

Shaft: Standard design uses a one-piece shaft to insure accurate alignment. The shaft is precision ground, polished, and straightened to keep vibration and deflection to a minimum. Standard bearing spans keep the shaft well below first critical speed for all sizes.

Bearings: The thrust bearing is a grease-lubed double row angular contact ball bearing. It is shouldered and locked to the shaft and the housing enabling it to carry all of the thrust loads and some of the radial load. All fits are precision machined to industry standards. The steady bearings are press fit sleeve bearings. Fits are designed for optimum life under all operating conditions.

Seals: The standard 3171 has three seals.

- * An upper labyrinth seal is used to exclude dirt and water from the thrust bearing.
- * A lower grease seal is used below the thrust bearing to contain the grease and exclude any possible contamination.
- * A carbon Teflon® casing collar is installed immediately behind the impeller in the casing to minimize recirculation back to the sump, thereby maximizing hydraulic efficiency.

Motor Support: Motor supports are cast construction and precision machined to maintain proper alignment between the motor and pump shaft with minimal shimming. Motor supports are designed for vertical C-face motors as standard. P-Base supports are available upon request as well as IEC adapters.

Direction of Rotation: Rotation is clockwise looking down on the pump shaft.

NAMEPLATE INFORMATION

Every pump has a Goulds nameplates that provides information about the pump. The tag is located on themotor support

When ordering spare parts you will need to identify the pump model, size, serial number, and the item number of the required parts. Part numbers can also be found on the Repair Parts Data Sheet supplied with the original pump data package.

GOULDS PUMPS, INC.
SLURRY PUMP DIVISION
ASHLAND, PA. 17921

MODEL SERIAL NO.

GPM FT. HD.
RPM IMP. DIA.
S.G. MAX. ALLOW. PRESS. PSI

CAUTION: SEE INSTRUCTION MANUAL BEFORE OPERATION.
MADE IN U.S.A

RECEIVING THE PUMP

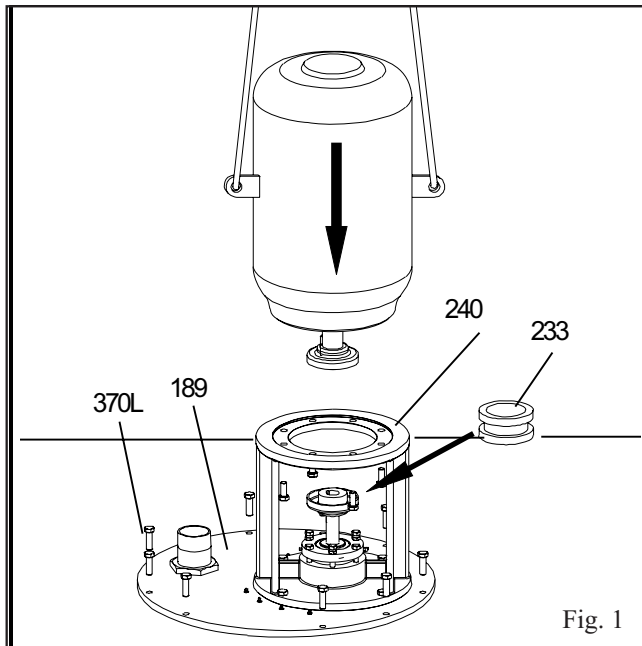
Inspect the pump as soon as it is received. Carefully check that everything is in good order. Make notes of damaged or missing items on the receipt and freight bill. File any claims with the transportation company as soon as possible.

STORAGE REQUIREMENTS

Short Term: (Less than 6 months) Goulds normal packaging procedure is designed to protect the pump during shipping. Upon receipt, store the pump(s) in a covered and dry location.

Long Term: (More than 6 months) Preservative treatment of the bearings and machined surfaces is required. Rotate shaft several times every three months making sure that the shaft does not stop in the same place as it may develop a sag. Refer to driver and coupling manufacturers for their recommended long term storage procedures. Store in a covered dry location.

NOTE: Long term storage treatment can be purchased with initial pump order.



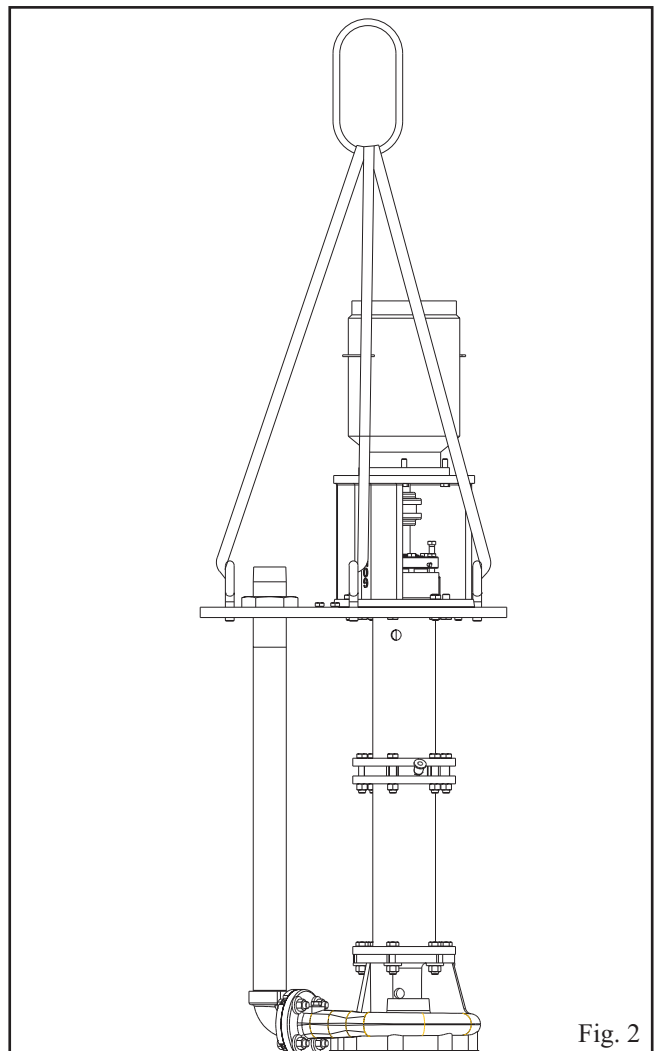
HANDLING



WARNING


Pump and components are heavy. Failure to properly lift and support equipment could result in serious physical injury or damage to pumps. Steel toed shoes must be worn at all times.

Use care when moving pumps. Lifting equipment must be able to adequately support the entire assembly. Position the pump where it can be handled without dragging the casing on the ground or moving the lifting equipment while the pump is off the ground. Use the lifting lugs supplied with the unit and suitable slings to lift the entire pump to a vertical position. A tag line should be attached to the casing end to prevent the pump from swinging and possibly causing damage or injury. Lower the unit into the sump. The motor should then be hoisted into position using the lifting lugs on the motor and a suitable sling (Figs. 1, 2).




INSTALLATION

INSPECTION	15
SITE/FOUNDATION	16
WHEN PIT COVER IS BEING USED	16
NO PIT COVER	16
MOTOR INSTALLATION AND COUPLING ALIGNMENT	17
PIPING	18

 *Equipment that will operate in a potentially explosive environment must be installed in accordance with the following instructions.*

 *All equipment being installed must be properly grounded to prevent unexpected static electric discharge. If not, a static electric discharge may occur when the pump is drained and disassembled for maintenance purposes.*

 *Service temperature in an ATEX classified environment is limited to the area classification specified on the ATEX tag affixed to the pump (reference Table 1 in the Safety section for ATEX classifications).*

INSPECTION

1. Remove all equipment from shipping containers.
2. Completely clean the underside of the support plate and both sides of the optional pit cover (if supplied).
3. Remove any grease from machined surfaces if applicable.



CAUTION

Remove plastic shipping plugs from the vent holes in the head column and casing. Refer to Fig. 3 for locations.

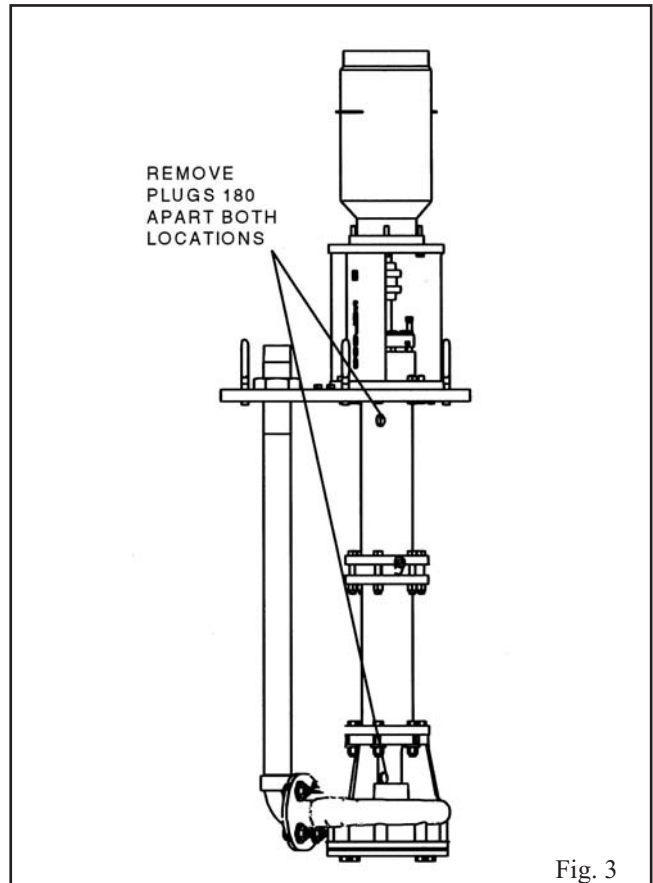
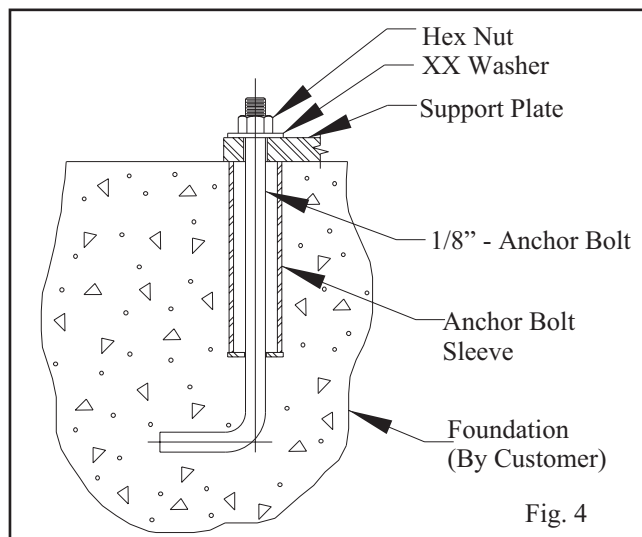


Fig. 3

SITE/FOUNDATION

The pump should be located where there is adequate space for installation, operation, maintenance, and inspection. Make sure there is adequate overhead clearance for installing and removing the pump. There should be at least 1/2" clearance between the sides of the pump and any portion of the pit.

Vertical sump pumps are normally bolted to a concrete sump or steel tank. The supporting structure must provide a permanent rigid support for the pumping unit(s) to eliminate any possible vibration. Support plates and/or pit covers are not normally grouted in place. The location and size of the mounting bolt holes are shown on the pump outline drawing provided with the pump data package. If anchor bolts are to be poured into the concrete, we recommend a sleeve type as shown in Fig. 4 to allow for adjustment.



WHEN PIT COVER IS USED

If access to the bottom of the pit cover is not possible during the installation process, the pump (less motor), support plate and pit cover must be assembled and installed as a unit.

1. The pit cover must be installed perfectly level to insure that the pump remains plumb when installed.
2. Carefully lower pit cover on to foundation bolts.
3. Using as long a level as practical, level the pit cover in all directions with shims or wedges.
4. Hand tighten the anchor bolts, check the level and re-shim if necessary.
5. Tighten all anchor bolts in a star pattern to avoid distorting the support plate.

6. If access to the bottom side is possible, carefully lower the pump and support plate onto the pit cover.
7. Install all bolts finger tight.
8. Check level on support plate and shim if necessary.
9. Tighten all bolts in a star pattern to avoid distorting the support plate.

VAPOR-PROOF OPTION

The vapor-proof option includes machined, gasketed fits between the support plate/pit cover and the pit cover/foundation. These gaskets must be installed to insure emissions performance. The pit cover should be bolted to a metal sole plate with a machined surface to insure an air tight seal.

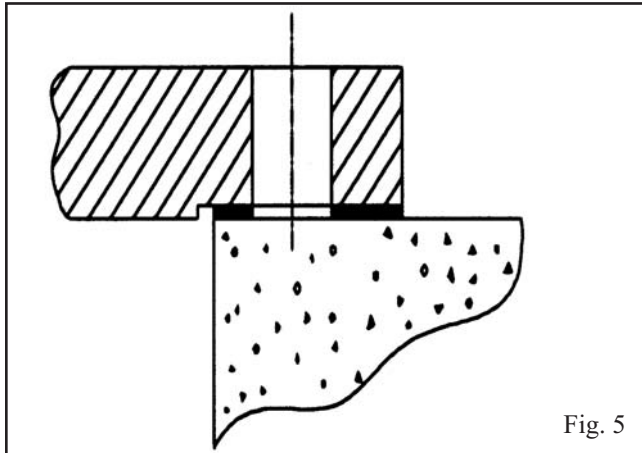
NO PIT COVER

STANDARD SUPPORT PLATES

1. Carefully lower the pump and support plate onto the foundation bolts.
2. Level the support plate in all directions using shims and wedges.
3. Hand tighten the anchor bolts, check the level and re-shim if necessary.
4. Tighten all anchor bolts in a star pattern to avoid distorting the support plate.
5. Assure the support plate is level.

Vapor-Proof Option

The support plate/foundation fit is a gasketed fit. The support plate should be bolted to a metal sole plate with a machined surface to insure an air tight seal. Refer to Fig. 5 for standard layout.



Tank Flange Support Plates

1. Mating flange on the tank must be level. Very minor adjustments can be made with gasket material between the two flanges.
2. Install all bolts finger tight.
3. Tighten all bolts in a star pattern to avoid any distortion of the support plate.

Vapor Proof Option

A gasket is supplied for installation between the two flanges to insure an air tight fit.

MOTOR INSTALLATION AND COUPLING ALIGNMENT

The Model 3171 is designed to be used with NEMA Vertical C-face motors. P-Base motor adapters, and IEC motor adapters are available as options.

INSTALLATION

1. Install both coupling halves prior to mounting the motor. Refer to the coupling manufacturers instructions.
2. Using the lifting lugs on the motor, carefully lower the motor onto the pump and align the bolt holes.
3. Install the bolts finger tight.
4. Before the coupling is connected, the motor should be wired and the direction of rotation checked. A rotation arrow is located on the motor support. Correct rotation for the 3171 is clockwise looking down from the driver at the impeller.

ALIGNMENT OF FLEXIBLE COUPLING



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.



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



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



The coupling used in an ATEX classified environment must be properly certified.

Alignment of the pump and motor is of extreme importance for trouble-free mechanical operation. Straight edge alignment by an experienced installer proves adequate for most installations. For disc couplings and applications where it is felt that alignment to tighter tolerances is desirable, use dial indicators. Standard dial indicator procedures would apply.

STRAIGHT EDGE ALIGNMENT

1. Check for coupling alignment by laying a straight edge across both coupling rims at four points 90° apart.
2. Move motor until straight edge rests evenly at each position. Repeat procedure until correct alignment is achieved.
3. Install flexible sleeve between the hubs per the manufacturers directions included with the pump data package.
4. Tighten all motor bolts.

PIPING

GENERAL

Guidelines for piping are given in the “Hydraulic Institute Standards” available from: Hydraulic Institute, 9 Sylan Way, Parsippany, NJ, 07054-3802 and must be reviewed prior to pump installation.

1. All piping must be supported independently of, and line up naturally with, the pump’s discharge pipe.
2. Piping runs should be as short as possible to minimize friction losses.
3. DO NOT connect piping to pump until the anchor bolts have been tightened.
4. Carefully clean all pipe parts, valves and fittings prior to assembly.
5. Isolation and check valves should be installed in the discharge line. Locate the check valve between the isolation valve and the pump in order to permit inspection of the check valve. The isolation valve is required for inspection of the pump and flow regulation. The check valve prevents pump damage due to reverse flow through the pump when the driver is turned off.
6. Increases, if used, should be installed between the pump and check valve to minimize friction losses through the check valve.
7. Cushioning devices should be used to protect the pump from surges and water hammer if quick closing valves are installed in the system.

SUCTION PIPING - FOR OPTIONAL DRY PIT, OUTSIDE TANK MOUNT, AND TAILPIPE APPLICATIONS ONLY



WARNING

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

1. The general requirement for the 3171 is to install an elbow at the pump. Long radius elbows are recommended. If an elbow can be eliminated or moved further from the suction, it would be recommended to do this.



WARNING

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 affect the operation of the pump resulting in physical injury and damage to the equipment.



CAUTION

Pump must never be throttled on the suction side.

2. Suction piping should never be a smaller diameter than the pump suction.
3. The pump should never be throttled on the suction side.
4. Separate suction lines are recommended when more than one pump is operating from the same source of supply.
5. Suction pipe must be free of air pockets.
6. Suction piping must slope upwards to the pump.
7. All joints must be air tight.
8. A means of priming the pump must be provided. For outside tank mount and dry pit, this is usually accomplished by allowing the fluid level inside the tank/pit to rise above the casing level. In tailpipe applications, the casing must be submerged prior to starting the pump.
9. For outside tank mount and dry pit applications, an isolation valve should be installed in the suction line at least two pipe diameters from the suction to permit closing the line for pump inspection and maintenance. Isolation valve must be kept fully open during operation.
10. The entrance to the suction pipe must be kept adequately submerged below the free liquid surface to prevent vortices and air entrainment.

OUTSIDE TANK MOUNT ONLY

The outside tank mount option has a column assembly that allows the fluid coming through the lower bushings to flow up through the column and back through the connection at the top of the column back to the tank. The pipe at the top of the pump column must be connected back to the source tank to prevent fluid from entering the thrust bearing.

OPERATION

PREPARATION FOR START-UP 19
OPERATION 21

PREPARATION FOR START-UP

The following options may be supplied with your pump. Refer to the original data package to see which options apply.


EXTERNAL BEARING FLUSH

There are five 1/4" NPT pipe plugs on the standard support plate for connection of up to five flush lines. Pumps with more than five bearings will have one for each bearing. Pumps with less than five bearings will still have five plugs, but only the required number will be connected to a bearing. Remove the plugs from the holes that are connected to flush lines. An external source of clean water capable of delivering 1-2 GPM to EACH bearing should be connected to the taps.

NOTE: *The flush must be turned on prior to starting the pump and left on until the pump turns off.*

GREASE LUBRICATED BEARINGS

Grease lubricated bearings will have zerk fittings installed for each bearing. Bearings are pre-lubricated at the factory. Unscrew the fittings and confirm there is adequate grease in the line. Replace the fitting and add grease if necessary.

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

SEALED BEARINGS

Sealed bearings have a lip seal installed above and below the bearing to exclude grit from the bearing (Fig. 6). Sealed bearings use a spring loaded grease cup to lubricate the bearings (See Appendix V). The bearings are prelubricated at the factory, but the grease cups ship in a separate box to prevent shipping damage. The grease cups should be filled with grease and screwed into the taps that are connected to the bearings. They should be refilled with fresh grease as needed. Frequent inspection after startup is recommended to check usage and establish the best relubrication interval.

4

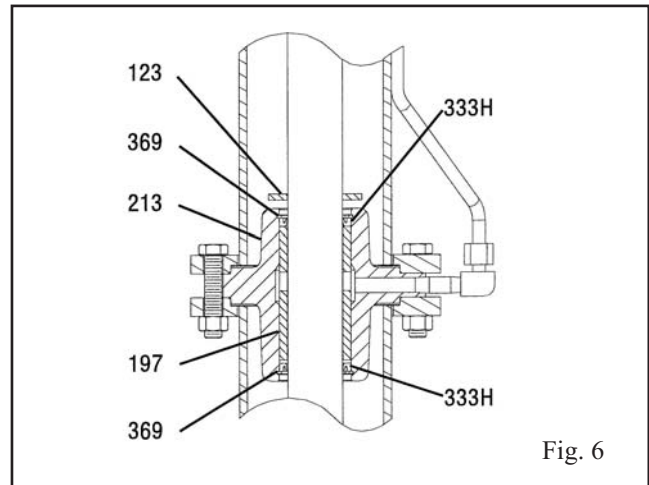




Fig. 6


PACKED UPPER STUFFING BOX

 **Packed stuffing boxes are not allowed in an ATEX classified environment.**

An upper stuffing box is installed for high temperatures and vapor proof construction. The standard configuration is packed. Since no fluid is in the column to lubricate the packing, the packing is grease lubed. The packing is installed at the factory prior to shipment. A screw type grease cup is provided for the packed box. Fill the cup with grease and give the cap several turns to force grease into the packing. Fresh grease should be installed on a regular basis to insure constant lubrication for the packing. Frequent inspection after startup is recommended to check usage and establish the best relubrication interval.

MECHANICAL SEAL UPPER STUFFING BOX

 **The mechanical seal used in an ATEX classified environment must be properly certified.**

 **The mechanical seal must always be properly flushed. Failure to do so will result in excess heat generation and seal failure.**

A mechanical seal is frequently supplied on upper stuffing box applications. The seal is installed and set at the factory. Cartridge seals may still have the setting clips installed and should be removed. Refer to the seal manufacturers guidelines for any special requirements for the particular seal provided. Some require oil lubrication from a bottle oiler, some are dry running, some may require external flush plans. Do not allow the seal to run dry unless it is specifically designed for this.

STEAM JACKET PUMPS

The steam jacketed connections are located on the support plate. Connect the steam in line to an appropriate source of steam. The steam out/condensate return connections should be made as dictated by the installation requirements. A suitable trap should be used.


FLOAT CONTROLS

A variety of different float controls can be supplied by Goulds. Refer to the float control installation instructions provided with the controls for proper installation procedure. Procedures for some of the more common controls are provided in *Appendix I*.

CHECKING ROTATION

Rotation should have been checked prior to coupling alignment and installation. Refer to Section 3 if this has not been done.


CHECK IMPELLER CLEARANCE

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

The pump efficiency is maintained when the proper impeller clearance is set. The clearance is set at 0.015" off of the suction cover at the factory, but could change due to piping attachment. Refer to procedure on setting impeller clearance (see Section 5 - Preventive Maintenance).

PRIMING

Never start the pump until it has been properly primed. The pump casing should be fully submerged prior to starting the pump.

 **Pumps that are not self-priming must be fully primed at all times during operation.**



CAUTION

Do not run the pump dry, as this may damage the pump and/or steady bearings.

For Dry Pit/Outside tank mount units:

1. Suction supply line must have adequate fluid head to prime the pump.
2. Slowly open the suction valve.

STARTING THE PUMP

1. Before the pump is started, the external bearing flush (if specified) must be started.
2. Make sure the pump shaft is freely rotating.
3. Partially open the discharge valve.
4. Start driver.





CAUTION


Observe pump for high vibration levels, bearing temperature, and excessive noise. If normal levels are exceeded, shut down, and resolve.


Start Up Precautions


 **All equipment and personal safety related devices and controls must be installed and operating properly.**


 **To prevent premature pump failure at initial start up due to dirt or debris in the pipe system, ensure the system has been adequately cleaned and flushed.**

 *Variable speed drivers should be brought to rated speed as quickly as possible.*


 *Variable speed drivers should not be adjusted or checked for speed governor or overspeed trip settings while coupled to the pump at initial start up. If settings have not been verified, uncouple the unit and refer to the driver manufacturer's instructions for assistance.*


 *Pumpage temperatures in excess of 200°F will require warmup of pump prior to operation. Circulate a small amount of pumpage through the pump until the casing temperature is within 100°F of the pumpage temperature and evenly heated.*

 **CAUTION**
When starting pump, immediately observe pressure gauges. If discharge pressure is not quickly attained, stop driver, reprime, and attempt to restart.

 **CAUTION**
Damage occurs from:

- Increased vibration levels. Affects bearings, stuffing box or seal chamber, and mechanical seal.
- Increased radial loads. Stresses on shaft and bearings.
- Heat build-up. Vaporization causing rotating parts to score or seize.
- Cavitation. Damage to the internal surfaces of the pump.

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


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

OPERATION

GENERAL CONSIDERATIONS

Always vary capacity with a regulating valve in the discharge line.

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

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

 **CAUTION**
Always vary capacity with a regulating valve in the discharge line. Never throttle flow from the suction side.

OPERATING AT REDUCED CAPACITY

 **CAUTION**
Operating a vertical sump pump near shut-off or with a discharge valve closed will damage the pump.

Damage occurs from:


- *Unbalanced radial loads* — subjects the shaft to abnormal deflection causing accelerated lower steady bearing wear.
- *Increased vibration levels* — affects bearings, seals, and noise.

- *Cavitation* — causes damage to the internal surfaces of the pump.
- *Heat Build-Up (Dry Pit, Outside Tank Mount)* — vaporization of the fluid can cause rotating parts to score and seize.

When operating at reduced capacities cannot be avoided, a simple method of relieving the pump of undue strain is to extend a bypass line from the pump discharge back to the sump or tank. A throttle valve or orifice plate should be placed in the bypass line and sufficient flow returned to allow the pump to operate near its rated point. The bypassed liquid should always be returned to the source of supply and discharged below the liquid level to avoid air entrainment.

FINAL ALIGNMENT / CLEARANCE CHECK

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 alignment and impeller clearance while the unit is still hot per the appropriate procedures.
3. Re-install coupling guard.

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



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

Observe pump for vibration levels, bearing temperature and excessive noise. If normal levels are exceeded, shut down and resolve.



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.

PREVENTIVE MAINTENANCE

GENERAL COMMENTS.	23
MAINTENANCE SCHEDULE.	23
MAINTENANCE OF BALL BEARINGS / GREASE LUBRICATED STEADY BEARINGS	24
IMPELLER CLEARANCE SETTING	25
TROUBLESHOOTING.	26

GENERAL COMMENTS

A routine maintenance program can extend the life of your pump. Well maintained equipment will last longer and require fewer repairs. Accurate records should be kept as they will identify trends and help pinpoint potential causes of problems.

MAINTENANCE SCHEDULE


5

ROUTINE MAINTENANCE

- Bearing lubrication
- Discharge Pressure
- Temperature Monitoring
- Vibration Analysis
- Seal Monitoring (when applicable)


ROUTINE INSPECTIONS

- Check for unusual noise, vibration and thrust bearing temperature.
- Check float controls for proper setting and operation.
- Inspect pump and piping for leaks.
- Check grease for thrust bearing. Refer to *Table 1* for lubrication intervals.
- Grease steady bearings if applicable, adjust grease cups if supplied.

 *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.*

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.*

3 MONTH INSPECTIONS

- Check anchor bolts for tightness.
- If pump has been left idle, check carbon steel shafts (if applicable) for rust and seizing by rotating the shaft several turns. Replace if required.
- Ball Bearing Grease should be changed at least every 3 months (2000 hours) or more often (*See Table 1*) if there are any adverse conditions which may contaminate the grease. Grease should be injected while turning the shaft until fresh grease comes out.
- Check shaft alignment and realign if necessary.

ANNUAL INSPECTIONS

- Check the pump capacity, pressure and power. If pump performance does not satisfy your process requirements and the process requirements or piping system have not changed, the pump should be disassembled, inspected, and worn parts should be replaced. If there is no sign of wear, a system inspection should be done.

Table 1				
Lubricating Intervals in Operating Hours				
Group	Below 1800 RPM	1800 RPM	3000 RPM	3600 RPM
S/ST	2000	2000	1200	750
M/MT	2000	1800	800	450
L	2000	1200	N/A	N/A

MAINTENANCE OF BALL BEARINGS / GREASE LUBRICATED STEADY BEARINGS

The Model 3171 comes with a grease lubricated duplex thrust bearing. The original grease from the factory is a lithium based duplex thrust bearing. The bearing is pre-lubricated at the factory. Regrease the bearing per the schedule in *Table 1*.

RE-GREASE PROCEDURE

NOTE: When regreasing, there is a danger of impurities entering the bearing housing. The grease, greasing device, and fittings must be clean.

1. Wipe dirt from grease fittings.
2. Check relief port 180° from fitting to make sure it is open.
3. Fill the grease cavity through the fitting until fresh grease comes out the relief hole.
4. Ensure the relief port closes.

NOTE: The bearing temperature usually rises after regreasing due to an excess supply of grease. Temperatures will return to normal after the pump has run and purged the excess from the bearings, usually two to four hours.

For most operating conditions, a lithium based grease of NLGI consistency No. 2 is recommended. This grease is acceptable for bearing temperatures of 5° F to 230° F (-15° C to 115° C). Bearing temperatures are generally about 20° F (18° C) higher than the bearing housing outer surface.



CAUTION

Never mix greases of different consistency (NLGI 1 or 3 with NLGI 2) or different thickener. For example, never mix a lithium based grease with a polyurea based grease.

The original grease from the factory is a lithium based NLGI 2. *Table 2* lists some various manufacturers compatible greases.

Table 2	
Mobil	Mobilith AW2
Amoco	Amolith EP2
Ashland	Multilube EP2
Exxon	Unirex N2
Shell	Alvania EP LF2
Unocal	Unoba EP2
Chevron	Dura-Lith EP NLGI2

Temperature extremes (either high or low) may require a different grease.

NOTE: If it is necessary to change the grease type or consistency, the bearing must be removed and all the old grease eliminated from the housing and bearing.



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



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. Should this situation occur, please consult with your ITT/Goulds representative.

IMPELLER CLEARANCE SETTING



WARNING

Lock out driver power to prevent electric shock, accidental startup and physical injury.

DIAL INDICATOR METHOD

1. Remove coupling guard.
2. Remove coupling if required.
3. Set indicator so the indicator button contacts either the shaft end or the face of the pump coupling hub (Fig. 8).
4. Loosen jam nuts (415) on jack bolts (370D). Back off jack bolts several turns.
5. Turn all locking bolts (370C) in several turns until impeller contacts the suction cover (182). Turn shaft to insure contact has been made.
6. Set dial indicator at zero.
7. Tighten the jam bolts (370D) and loosen the locking bolts (370C) to move the impeller away from the suction cover until the dial indicator shows that a 0.015" clearance has been obtained.
8. Tighten the jam nuts (415) and the locking bolts evenly.
9. Check the shaft for free rotation.
10. Replace coupling.
11. Replace coupling guard.

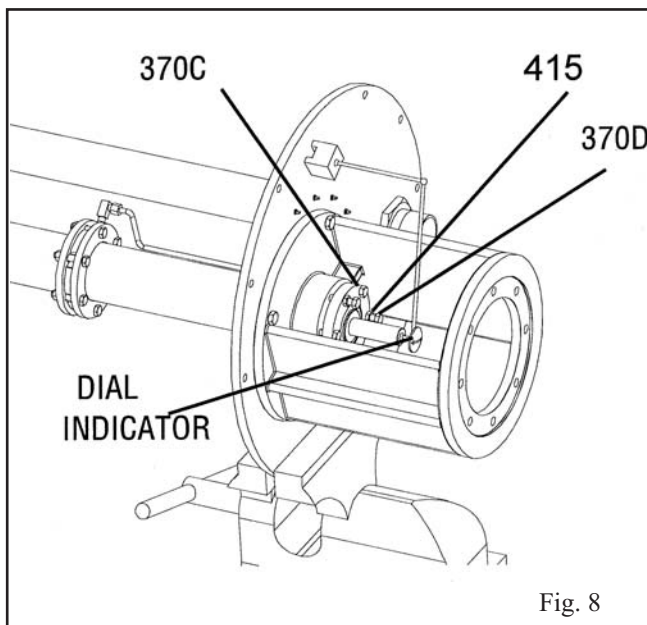


Fig. 8

FEELER GAUGE METHOD

1. Remove coupling guard.
2. Remove coupling if required.
3. Loosen jam nuts (415) on jack bolts (370D). Back off jack bolts several turns.
4. Turn all locking bolts (370C) in several turns until impeller contacts the suction cover (182). Turn shaft to insure contact has been made.
5. Loosen locking bolts (370C) until a 0.015" feeler gauge can be inserted between the underside of the bolt head and the bearing shell (134) See Fig. 9.
6. Tighten jack bolts (370D) evenly until the bearing shell (134) is tight against the locking bolts. Make sure all bolts are tight. Tighten jam nuts (415).
7. Check the shaft for free rotation.
8. Replace coupling.
9. Replace coupling guard.

Both of the above methods set the impeller 0.015" away from the suction cover, giving the required clearance for ambient temperatures. For high temperatures, it is recommended that this procedure be repeated after bringing the pump up to temperature prior to start-up.

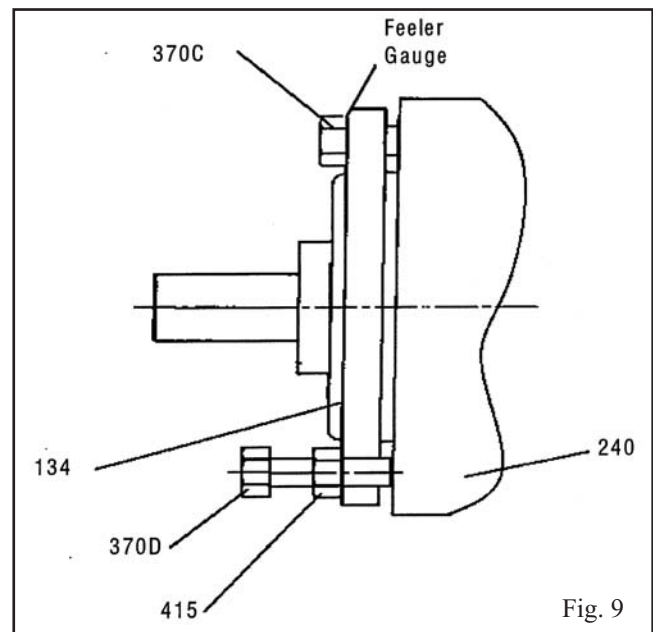


Fig. 9

TROUBLESHOOTING

Problem	Probable Cause	Remedy
No Liquid delivered.	Pump not primed.	No liquid in pit. Fill pit above casing. On dry pit units, casing and suction pipe must be completely filled.
	Discharge head too high.	Check total head, particularly friction loss.
	Speed too low.	Check motor speed.
	Wrong direction of rotation.	Check rotation.
	Impeller, discharge pipe, strainer completely plugged.	Remove obstructions or backflush.
	Suction pipe problems (where applicable).	Check suction lift, it may be too high. Line may be plugged.
	Inadequate NPSH available.	Check NPSH available and required.
Pump not producing rated flow or head.	Impeller, discharge pipe, or strainer partially plugged.	Remove obstructions or backflush.
	Wrong direction of rotation.	Check rotation.
	Discharge head higher than anticipated.	Check total head, particularly friction loss.
	Worn or broken impeller.	Inspect and replace if necessary.
	Suction pipe problems (where applicable).	Check suction lift, it may be too high. Line may be plugged.
	Speed too low.	Check motor speed.
	Air or gasses in liquid.	Increase submergence, rearrange piping to prevent entrained air.
	Inadequate NPSH available.	Check NPSH available and required.
Pump starts then stops running.	Float controls misadjusted.	Check float controls.
	Air or gasses in liquid.	Increase submergence, rearrange piping to prevent entrained air.
	Strainer plugged.	Check sump for large items that the pump may be picking up. Bearings run hot.
	Air leak in suction line (where applicable).	Repair leak.
Bearings run hot.	Improper alignment.	Realign pump and driver.
	Improper lubrication.	Check lubricant for suitability and level.

TROUBLESHOOTING

Problem	Probable Cause	Remedy
Pump is noisy or vibrates.	Foundation not rigid.	Tighten hold down bolts, stiffen foundation.
	Improper pump / driver alignment.	Align shafts.
	Partially clogged impeller causing unbalance.	Backflush pump to clean impeller.
	Binding, loose, broken rotating parts.	Inspect and replace as required.
	Bent shaft.	Straighten or replace.
	Worn bearings.	Inspect and replace as required.
Pump is noisy or vibrates, cont'd	Discharge piping or suction piping not anchored or properly supported.	Anchor and support per Hydraulic Institute standards.
	Pump is cavitating.	Correct system problem.
Motor requires excessive power.	Head lower than rating. Pump is pumping too much liquid.	Install throttle valve or trim impeller.
	Liquid heavier than expected.	Check specific gravity and viscosity.
	Rotating parts binding.	Check internal wear parts for proper clearances.
	Speed too high.	Check motor.

DISASSEMBLY & REASSEMBLY

REQUIRED TOOLS	29
DISASSEMBLY	29
INSPECTIONS	32
REASSEMBLY	34

REQUIRED TOOLS

- Wrenches
- Screwdriver
- Lifting Sling
- Rubber Mallet
- Induction Bearing Heater
- Bearing Puller
- Brass Drift Punch
- Snap-Ring Pliers
- Torque Wrench with Sockets
- Allen Wrenches
- Dial Indicator
- Micrometer
- Cleaning Agents
- Feeler Gauges
- Hydraulic Press

DISASSEMBLY



WARNING

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

When handling hazardous and/or toxic fluids, proper personal protective equipment should be worn. If pump is being drained, precautions must be taken to prevent physical injury. Pumpage must be handled and disposed of in conformance with applicable environmental regulations.



WARNING

The 3171 may handle hazardous and/or toxic fluids. Skin and eye protection are required. Precautions must be taken to prevent physical injury. Pumpage must be handled and disposed of in conformance with applicable environmental regulations.



WARNING

Lock out power supply to driver motor to prevent accidental startup and physical injury.

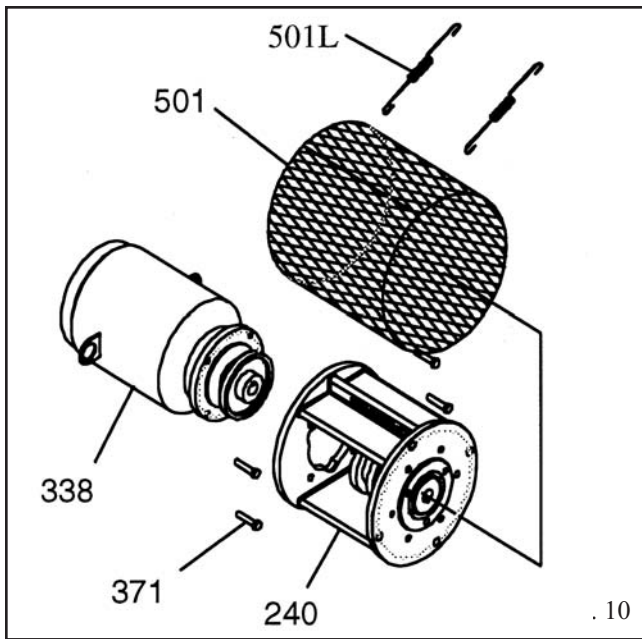
1. Shut off all valves controlling flow to and from pump.



WARNING

Operator must be aware of pumpage and safety precautions to prevent physical injury.

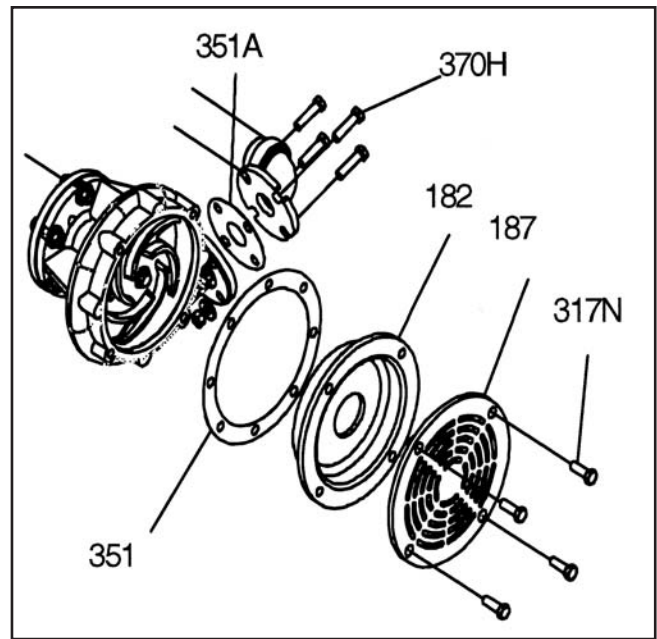
2. Drain liquid from piping, flush pump if necessary.
3. Disconnect all auxiliary piping.
4. Remove coupling guard.
5. Disconnect coupling.
6. Remove motor bolts (371) (Fig. 10).
7. Place sling on motor lifting lugs and remove motor.
8. Remove support plate anchor bolts.
9. Attach eyebolts to the support plate.



10. Using slings of suitable capacity, lift pump from the sump. Refer to *Installation* section for proper handling procedure.

! WARNING
Always use equipment adequate to lift the pump. Follow the equipment manufacturers safe operating guidelines.

11. Lay the pump horizontally on proper supports where there is sufficient clearance to disassemble the pump.
12. Remove the strainer (187) by removing bolts (317N) (Fig. 11).
13. Remove suction cover (182).



14. Remove suction cover gasket (351) and discard. Replace the gasket during reassembly.
15. Remove discharge elbow-casing bolts (370H).
16. Disconnect any steady bearing flush tubing (190).

REMOVAL OF IMPELLER

! WARNING
When removing impeller, wear heavy work gloves to prevent cutting hands on the sharp edges of impeller vanes.

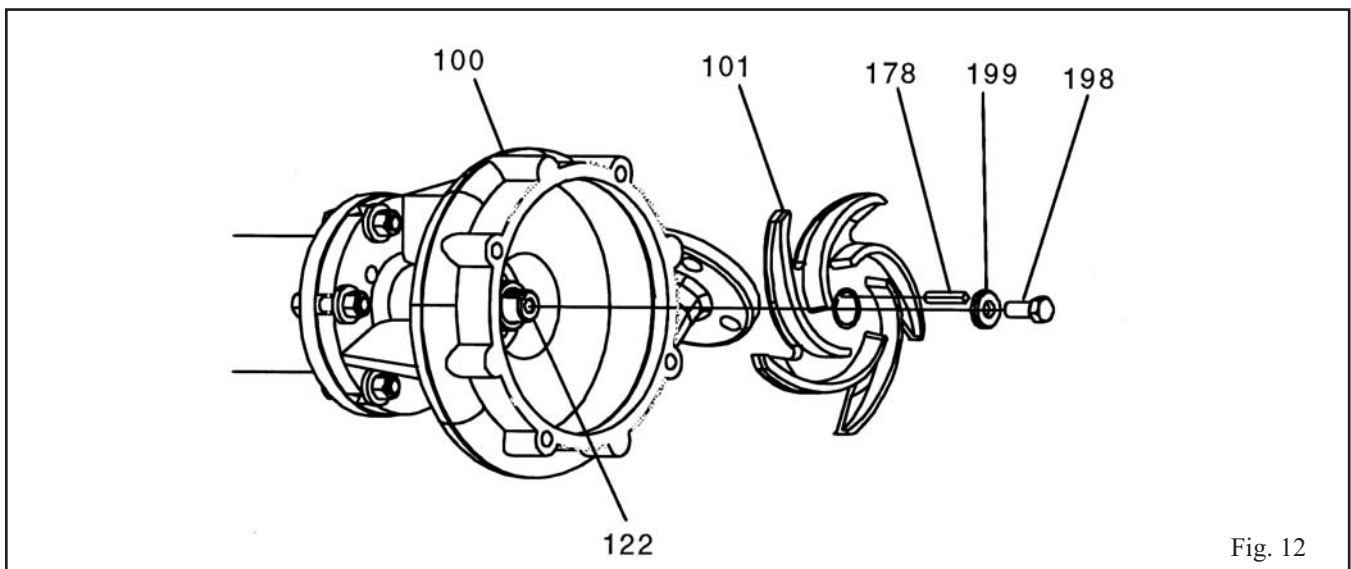


Fig. 12

17. Remove impeller screw (198) and impeller washer (199).
18. Remove impeller (101) from shaft (122) (Fig. 12). Save key (178) for reassembly unless it is damaged. Removal can best be accomplished in one of two ways.

18a. Loosen locking bolts (370C) and jam nuts (415). Tighten jacking bolts (370D) until impeller is pushed off the shaft (see Fig. 9 page 23), or

18b. Use a suitable puller that clamps the outside edge of the impeller and pushes against the shaft.

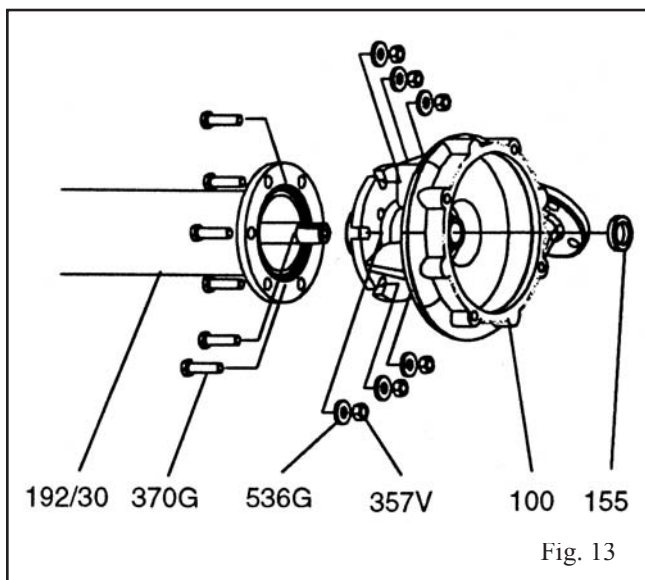
19. Remove column to casing bolts (370G) and remove casing (100) from column (Fig. 4). Remove casing/discharge elbow gasket (351A) and discard.

L GROUP ONLY

19a. Remove casing (100) to adapter (108) bolts. Remove casing. Do not remove casing collar (155) at this time. (Not shown)

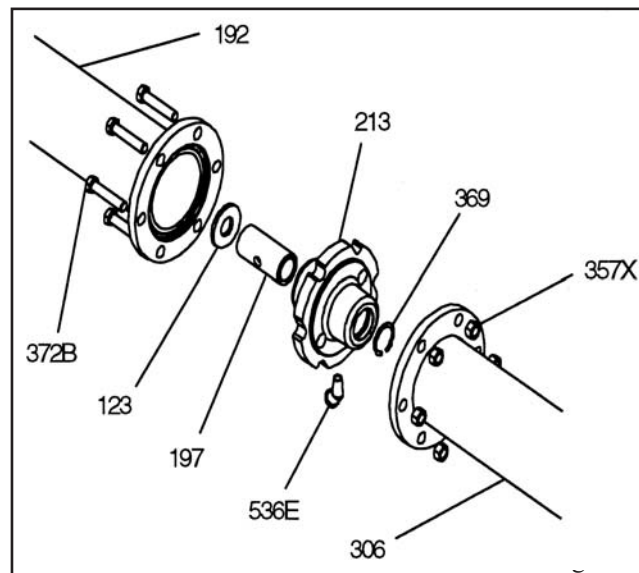
19b. Remove adapter (108) to column bolts. Remove adapter. Do not remove steady bearing (197) at this time.

NOTE: It is recommended that all column connections and motor support be marked prior to disassembly to insure correct positioning of these parts during reassembly.



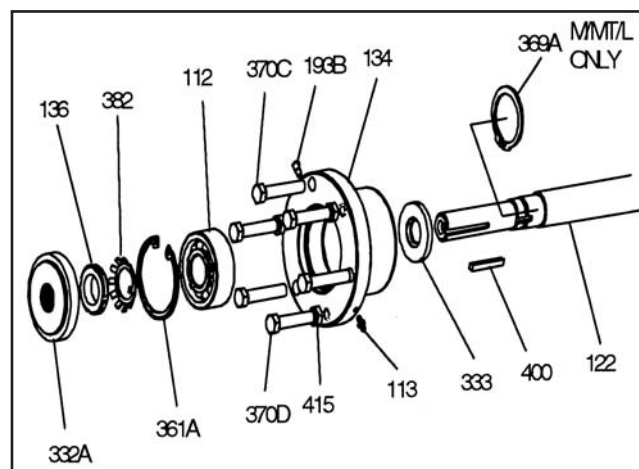
COLUMN DISASSEMBLY

If your pump has no intermediate steady bearings (only one column section), you will not have any column extension (306) or steady bearing housing (213). Go to Step 21.



20. Remove column to steady bearing housing bolts (372B). Starting at the casing end of the pump, remove column extensions (306), steady bearing housings (213), and deflectors (123) one at a time. While removing column sections, support the shaft to prevent bending. There is usually no need to remove the head column (192). Do not remove steady bearings at this time. Refer to inspection procedures prior to removal.

21. Remove pump half coupling hub (233) and key.



22. Remove locking bolts (370C) and slide bearing shell (134) assembly with shaft out through the motor support (240).



CAUTION

Two people should handle any shaft over 9' long as improper handling can bend a shaft.

- Remove labyrinth seal (332A). A screwdriver is required to pry the seal from the bearing shell (134).



CAUTION

It is recommended that the labyrinth seal be replaced every time the pump is inspected.

- Remove bearing retaining ring (361A). Slide bearing shell (134) off the bearing and shaft.

- Remove locknut (136) and lockwasher (382).
- Using a suitable bearing puller, remove bearing (112).

NOTE: *Save bearing for inspection.*

- Set the shaft on a table where it is adequately supported.



CAUTION

Two people should handle any shaft over 9' long as improper handling can bend a shaft.

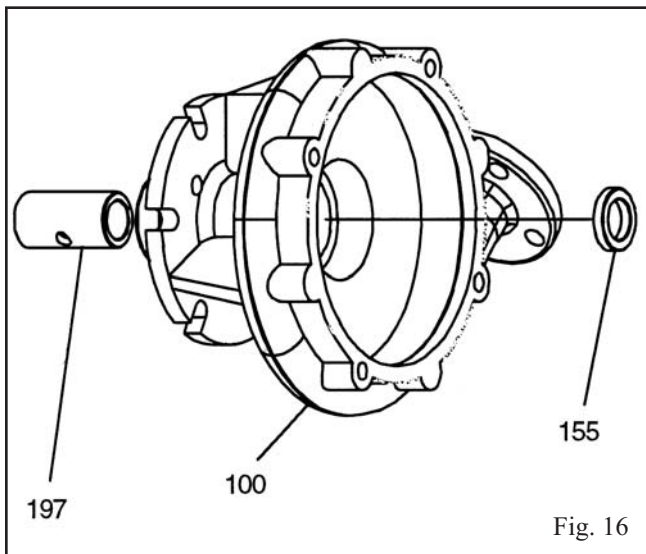
- There is usually no need to tear the pump down any further unless parts are known to be bad.

INSPECTIONS

Parts for the Model 3171 must be inspected to the following criteria before they are reassembled to insure the pump will run properly. Any part not meeting the required criteria should be replaced.

CASING AND SUCTION COVER

- The casing (100) and suction cover (182) should be inspected for excessive wearing or pitting. They should be replaced if they exceed.
 - Localized wear or grooving greater than 1/8 in. (3.2mm) deep.
 - Pitting greater than 1/8 in. (3.2mm) deep.
- Inspect casing gasket seat surfaces for irregularities.
- Check I.D. of casing collar (155) and steady bearing (197) per the dimensions in *Table 3*. If I.D. is greater than allowable, remove snap ring (369) and use a suitable hydraulic press to remove these items for replacement. If sealed bearings have been provided, lip seals (333H) must be removed also.
- Inspect casing-to-column connection area for any cracks or excessive corrosion damage. Replace if any of these conditions exist.



**Table 3
Steady Bearing Tolerances**

Bearing Material	Bearing I.D. (pressed in place)			Housing Bore			Running Clearance (1/2 diametrical clearance)		
	S/ST	M/MT	L	S/ST	M/MT	L	S/ST	M/MT	L
Carbon	1.132-1.134	1.633-1.635	2.258-2.260	1.621-1.623	2.121-2.123	2.994-2.996	0.0055-0.0035	0.006-0.004	0.0065-0.004
Bronze	1.129-1.131	1.629-1.631	2.256-2.258	1.621-1.623	2.121-2.123	2.994-2.996	0.004-0.002	0.004-0.002	0.0055-0.003
Fluted Elastomer	1.126-1.130	1.627-1.632	2.253-2.257	1.621-1.623	2.121-2.123	2.994-2.996	0.0035-0.0005	0.0045-0.001	0.005-0.004
Rulon	1.132-1.134	1.633-1.635	2.258-2.260				0.0055-0.0035	0.006-0.004	0.0065-0.004
Casing Collar	S/ST	M/MT	L	S/ST	M/MT	L	S/ST	M/MT	L
	1.183-1.190	1.678-1.685	2.299-2.306	1.811-1.813	2.243-2.245	3.243-3.245	0.0335-0.029	0.031-0.0265	0.029-0.0245

NOTE: Bearing I.D. prior to pressing into housing will be slightly larger to allow for I.D. shrinkage after it is pressed in place.

IMPELLER

1. Inspect impeller (101) vanes for damage. Replace if grooved deeper than 1/16" (1.6mm) or if worn evenly more than 1/32" (0.8mm).
2. Inspect back pumpout vanes for damage. Replace if worn more than 1/32" (0.8mm).
3. Inspect leading and trailing edges of the vanes for pitting, erosion or corrosion damage.

COLUMN SECTIONS

1. Inspect column section(s) (306, 192) for any cracks or excessive corrosion damage. Replace if any of these conditions exist.

STEADY BEARING HOUSINGS

1. Check I.D. of steady bearing (197) per the dimensions in *Table 3*. If I.D. is greater than allowable, remove snap ring (if used) (369) and use a suitable hydraulic press to remove this item for replacement. If sealed bearings have been provided, lip seals (333H) must be removed also.
2. Check bore of steady bearing housing (213) per *Table 3*. If bore is excessive, replace.

SHAFT

1. Check the thrust bearing fit. If it is outside the tolerance in *Table 4*, replace the shaft (122).

**Table 4
Thrust Bearing Fits**

Group	Shaft O.D.	Shell I.D.
S/ST	0.9848 / 0.9844	2.4416 / 2.4409
M/MT	1.5755 / 1.5749	3.5442 / 3.5433
L	2.1660 / 2.1655	4.7253 / 4.7240

2. Check the steady bearing areas. If more than 0.002" of wear exists, replace the shaft.
3. Check the shaft straightness. If any of the values exceed the values in *Table 5*, replace the shaft.

**Table 5
Shaft Runout Tolerances**

Group	Coupling End	Shaft Body	Impeller End
All	0.002"	0.0005"/ft.	0.005"

1. Inspect bearing shell (134) bore according to the dimensions in *Table 2*, and replace if dimensions exceed values found in *Table 2*.
2. Remove lower grease seal (133). It is always recommended that the seal be replaced at every overhaul.
3. Visually inspect for cracks and pits. Pay particular attention to the snap ring groove.

BALL BEARING

1. Ball bearing (112) should be inspected for contamination and damage, the condition of the bearing will provide useful information on operating conditions in the bearing shell. Lubricant condition should be noted. Bearing damage should be investigated to determine cause. If cause is not normal wear, it should be corrected before the pump is returned to service.

DO NOT RE-USE BEARINGS.

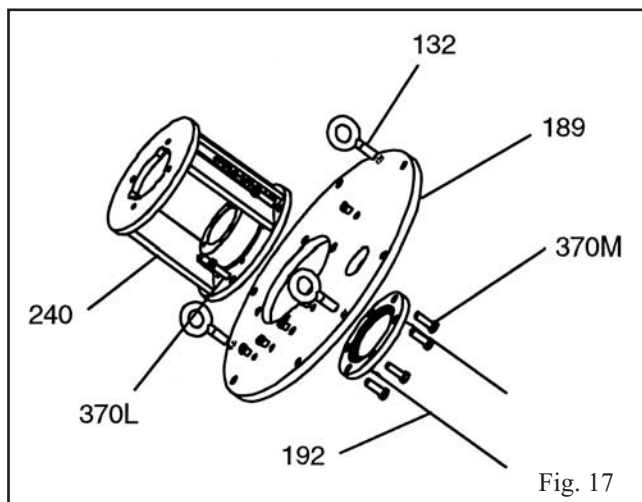
MOTOR SUPPORT

1. Inspect motor support (240) for any cracks or excessive corrosion damage. Replace if any of these conditions exist.

REASSEMBLY

ASSEMBLY OF MOTOR SUPPORT, HEAD COLUMN AND SUPPORT PLATE

1. Attach motor support (240) to support plate (189) with bolts (370J).
2. Attach head column (192) to motor support with bolts (370M). Vent holes should be closer to the motor support.



OPTIONAL WITH STUFFING BOX DESIGN

1. Attach stuffing box (221) to support plate (189) with bolts (370L).
2. Attach motor support (240) to stuffing box with bolts (370J).
3. Attach head column (192) to stuffing box with bolts (370M). Vent holes should be closer to the motor support.

ASSEMBLY OF ROTATING ELEMENT



CAUTION

Shafts can be damaged by improper handling. Extreme care should be taken at all times. It is recommended that shafts over 9' long be handled by two people at all times to prevent possible bending.

1. Install retaining ring (369A) on shaft (122).

NOTE: S/ST groups do not use the 369A retaining ring.

2. Install thrust bearing (112) on shaft.

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



WARNING

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

3. Install lockwasher (382) on shaft (122). Place tang of lockwasher in keyway of shaft.
4. Thread locknut (136) onto shaft. Tighten locknut until snug. Bend any tang of the lockwasher into one of the slots on the locknut. Tighten the locknut if necessary to align a lockwasher tab with a locknut slot.
5. Press grease seal (333) into bearing shell (112).
6. Slide bearing shell onto pump end of shaft and over the bearing.
7. Insert retaining ring (361A) in bearing shell groove keeping flat side against bearing.
8. Slide labyrinth seal (332A) over coupling end of shaft. Press into bearing shell until it is flush.

9. With the support plate in a vertical position, slide the shaft horizontally through the motor support. Support the shaft and column with suitable stands.
10. Install hold down bolts (370C) and jacking bolts (370D) with jam nuts (415).

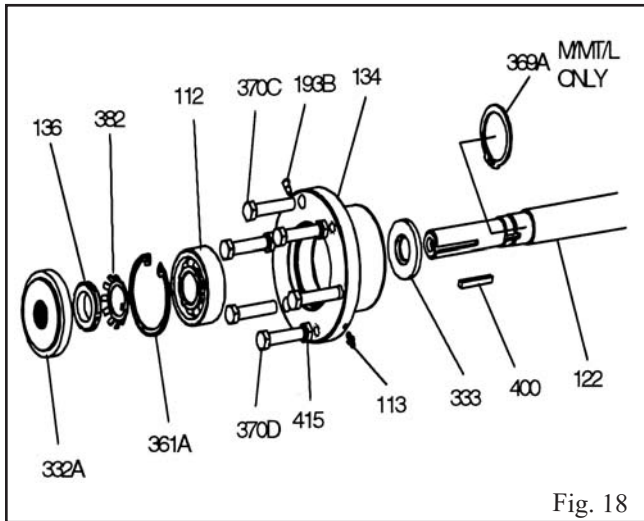


Fig. 18

ASSEMBLY OF COLUMN (WHEN REQUIRED)

When intermediate steady bearings are required, there will be additional column extensions (306) and steady bearing housings (213) required.

1. Prepare the steady bearing housing assembly(s) if required. Remove snap ring (369) if used. Using a hydraulic press, press out old steady bearing (197). Press in new steady bearing. Snap ring (369) is no longer required due to the fits. If your pump has these, it is not necessary to put them back in. The snap ring is still used on sealed bearings. Refer to Fig. 7 if you have this option.

NOTE: *The steady bearing does not have to be centered exactly nor do the holes in the bearing have to line up with the holes in the housing. There is a recessed area on the inside of the housing (213) that allows lubricants to find the opening in the bearing.*

2. Slide casing assembly onto shaft. Seat casing flange against column flange. Make sure discharge nozzle is aligned with the discharge pipe hole in the support plate. Install bolts (371G).
3. Add a film of oil to the shaft and place the impeller key (178) and impeller (101) on the shaft.

4. Make sure all of the bearing shell bolts (370C, 370D) are completely backed off. Install the impeller washer (199) and impeller screw (198). Tightening the impeller screw will seat the impeller on the shaft. The impeller screw has a nylon insert to lock it in place. Do not exceed the following torque values when tightening the impeller screw:

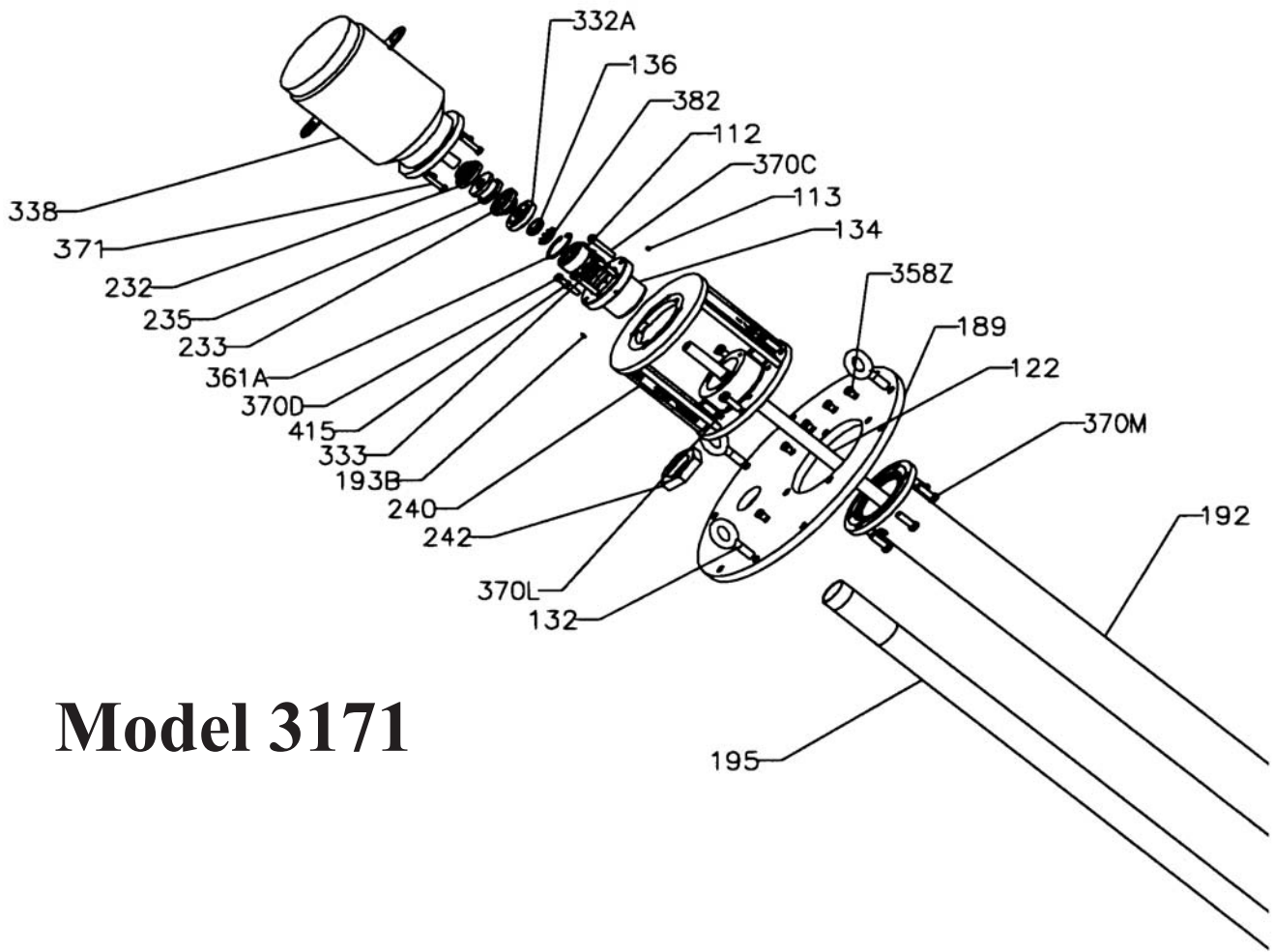
S/ST Group 500 in. lb.

M/MT, L Groups 900 in. Lb.

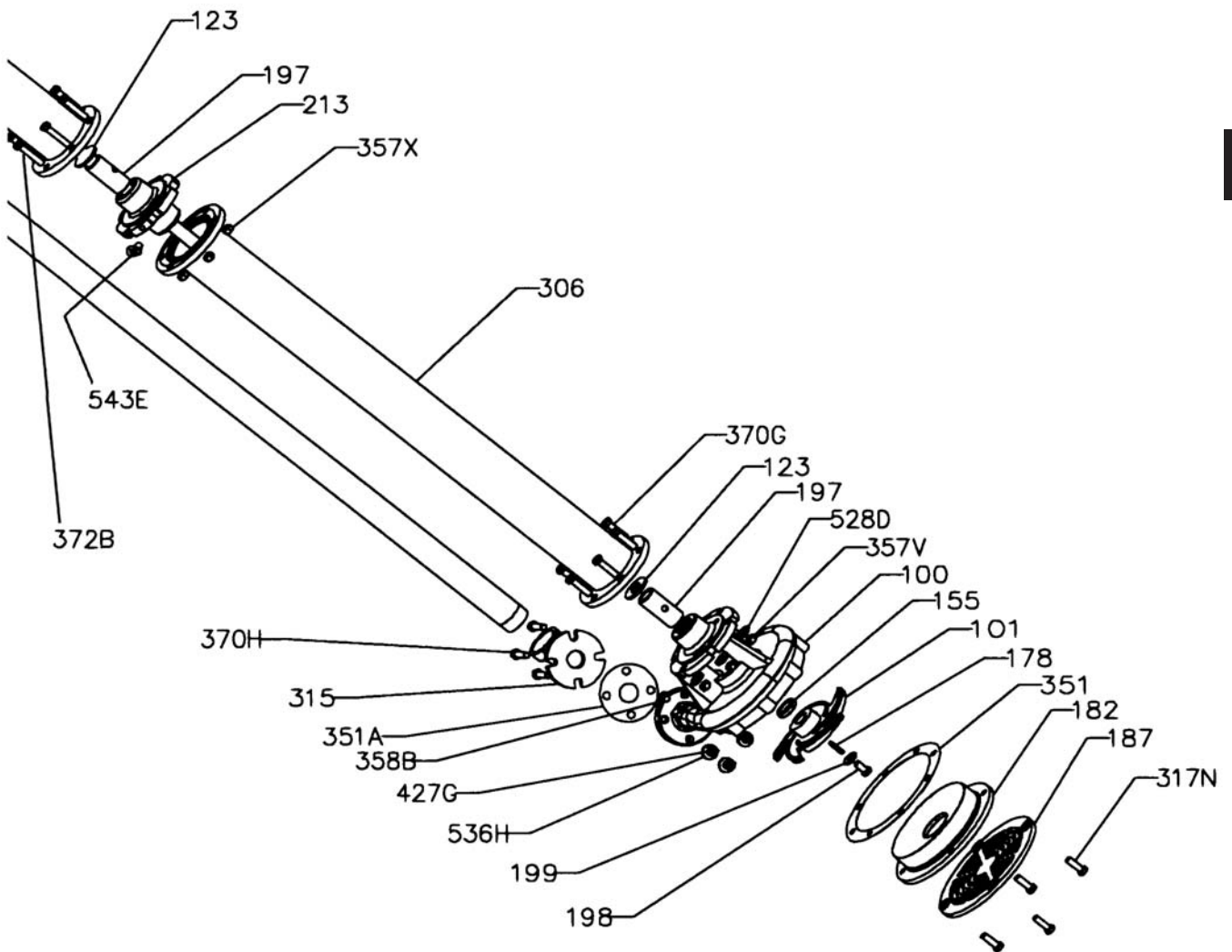
5. Install suction cover gasket (351).
6. Install suction cover (182).
7. Install strainer (187) with bolts 317N.

NOTE: *Alloy strainers have extra heavy spacer washers (533) between the strainer and the suction cover. If the unit is supplied with a lower float control guide arm (366), an extra long bolt is used on this hole.*

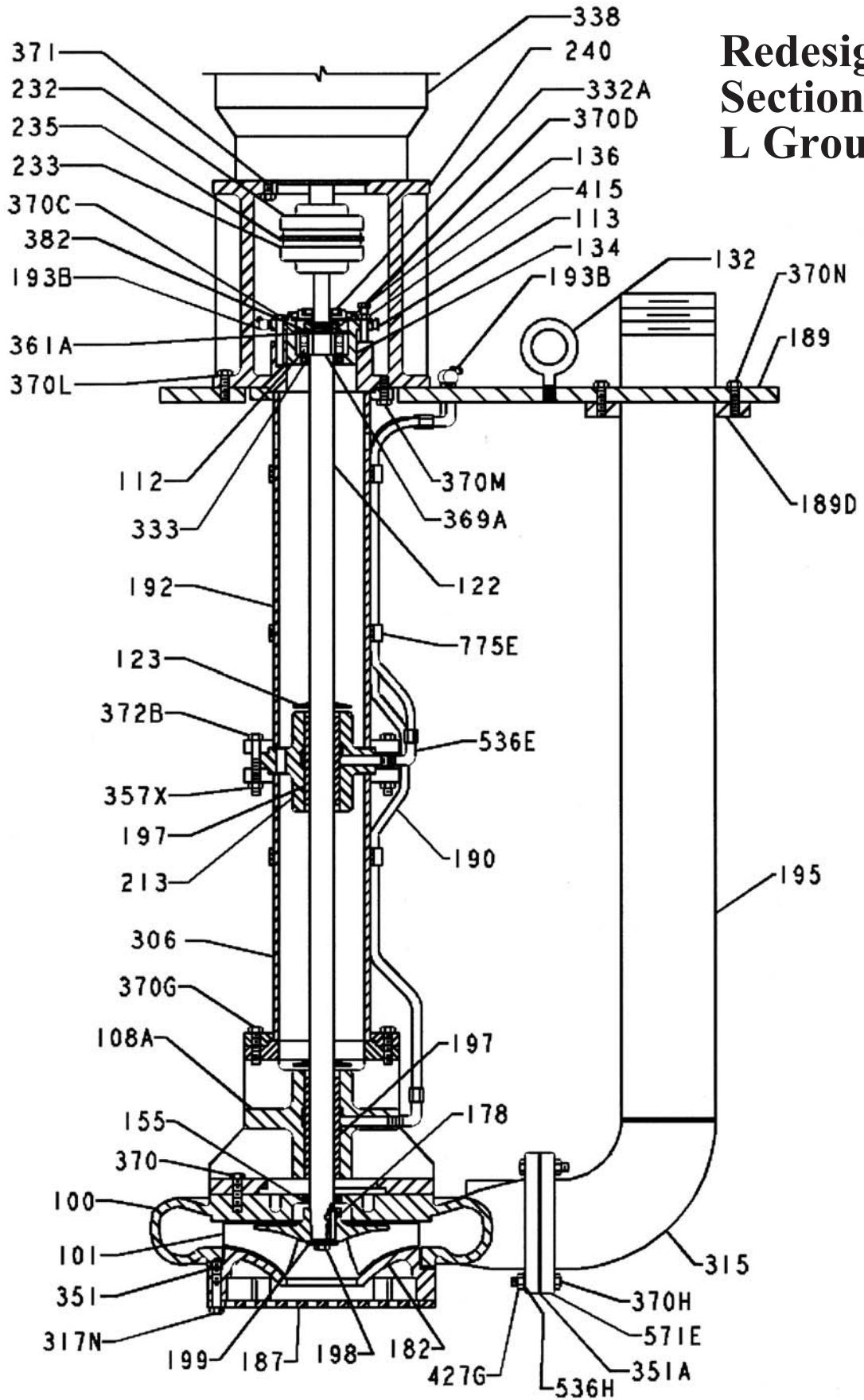
8. Check the axial travel of the impeller using the impeller adjustment procedure. If the travel is less than 0.030", extra gaskets (351) should be added to obtain the minimum travel.
9. Install discharge elbow gasket (351A) and discharge elbow (315) using bolts (370H). Accurate alignment of the elbow is critical to insure there is unobstructed flow through the connection.
10. Install discharge pipe (195), pipe nuts (242) and flange (195S if used). Make sure the pipe nuts are tight and that no strain has been placed on the pump. Rotate shaft by hand to assure there is no binding.
11. Connect all auxiliary piping.
12. Replace the pump half coupling hub (233).
13. Lubricate the pump bearings.
14. Follow directions in Sections 2 and 3 for Installation and Operation.



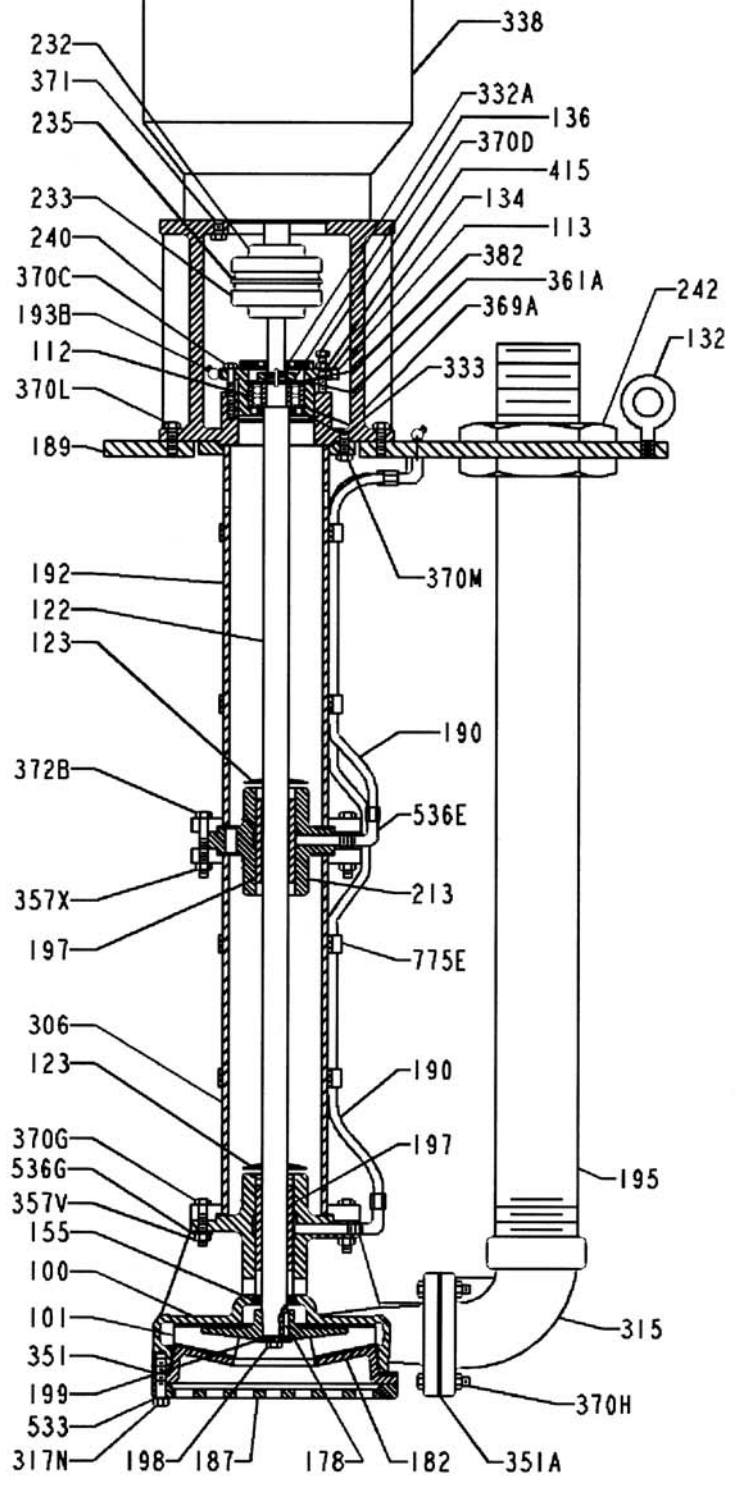
Model 3171



Redesign Sectional L Group



Redesign Sectional S/ST, M/MT Group



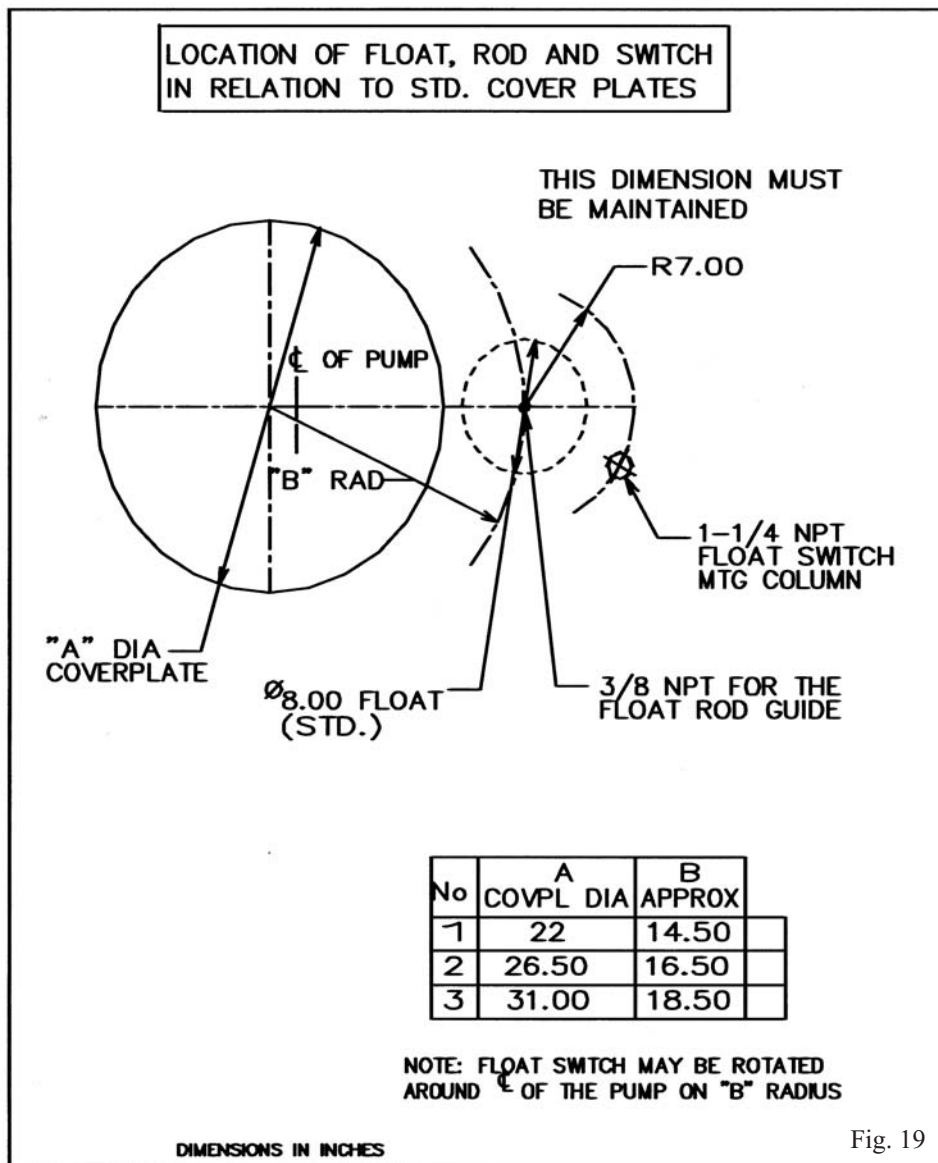
APPENDIX I

FLOAT CONTROLS

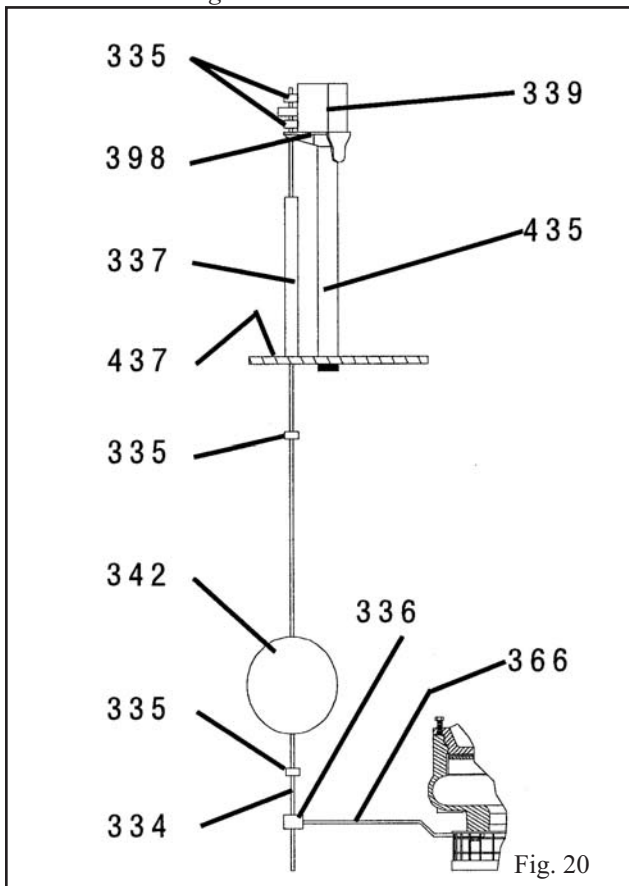
SQUARE D 9036 SIMPLEX AND 9038 DUPLEX

A single float and rod assembly is used with the 9036 float switch on a simplex unit or the 9038 duplex alternator. Refer to manufacturers wiring diagram for correct wiring of the switch. See *Fig. 1* for the basic mechanical layout.

1. If a pit cover is supplied by Goulds with the pumps, the holes for the float switch support pipe (435) and the upper rod guide (337) will be located and installed by the factory. If the pit cover is to be supplied by others, it will be necessary to locate, drill, and tap the holes prior to installing the switch. See *Fig. 19* for the hole size and locating procedure.



2. Attach the lower guide arm (366) and the float rod guide (336) to the correct suction cover bolt (based on layout) prior to installing the pump in the sump.
3. Thread the float switch support pipe (435) and the upper rod guide (337) into the pit cover.
4. Attach float switch bracket (398) to the float switch support pipe.
5. Install the float rod (334), collars (335), and float (342) as shown in *Fig. 20*.



The on and off levels are controlled by adjusting the collars (335). As the liquid level rises, the float rises to contact the upper collar and the upward movement of the float rod causes the mechanical switch inside the control to close, completing the circuit to the starter. Operation continues until the liquid level drops low enough for the float to contact the lower collar. This pulls the rod down opening the switch and turning off the pump.

The Square D 9038 duplex alternator is installed the same as above. The difference is in the operating sequence. The first pump will start as the water level rises allowing the float to contact the upper collar. When the water level drops down and shuts off the first pump, a lever arm inside the control mechanically switches to the second pump and it will come on for the next cycle.

Should the first pump fail to keep up with demand, or not come on at all, a continued rise in the level will turn both pumps on. Both pumps will run until the low water level is reached. Should both pumps be unable to keep up with the demand, an optional high water alarm switch can be supplied in the alternator to close a switch if the water level rises past the second pumps on level. This switch can be wired into a customer supplied alarm horn or light.

APEX HIGH LEVEL ALARM

The APEX high level alarm is an independent device used to sense fluid level and close a switch activating a separate alarm. The switch is mounted on a pipe above the support plate (*Fig. 21*). The pipe must extend into the sump 4-6" below the required actuation point. As the liquid level rises in the pipe, trapped air causes bellows inside the switch to inflate and trips a micro switch. The switch can then activate a light, horn, relay, solenoid valve, or other electric device.

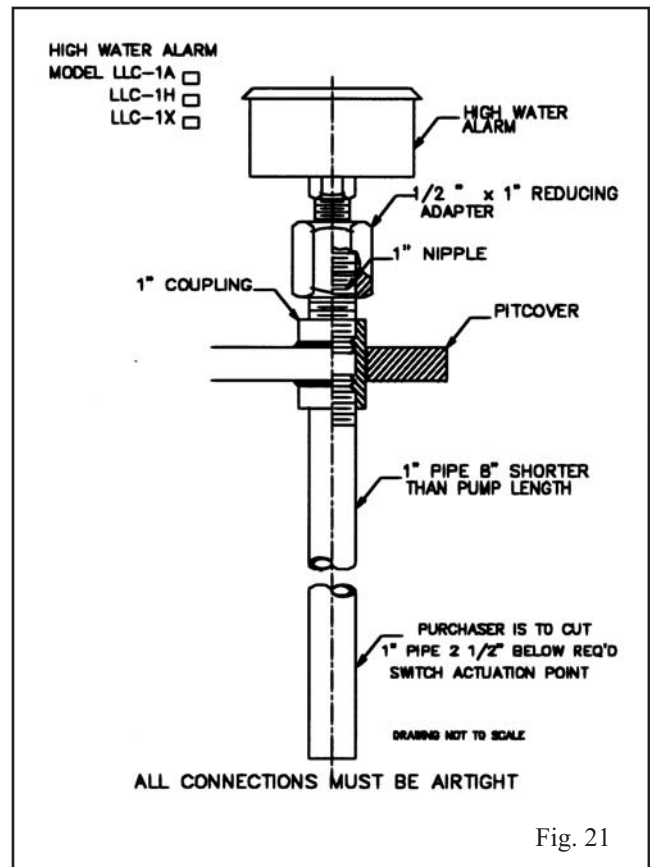


Fig. 21

MAGNETROL DISPLACER TYPE LIQUID LEVEL SWITCH

These switches offer a wide choice of control and alarm configurations. They are ideally suited for vapor proof installations as there are no external moving parts to seal. The switch is closed by a magnetic seal inside a sealed tube. Switch operation is controlled by the buoyancy of weighted displacers suspended on a spring. As liquid level rises, the resulting change in buoyancy forces moves the spring upwards. The spring movement causes a magnetic sleeve to attract a pivoted magnet, closing the actuating switch. Refer to manufacturer-supplied installation guide for proper switch setting and installation.

FLOAT BALL SWITCHES

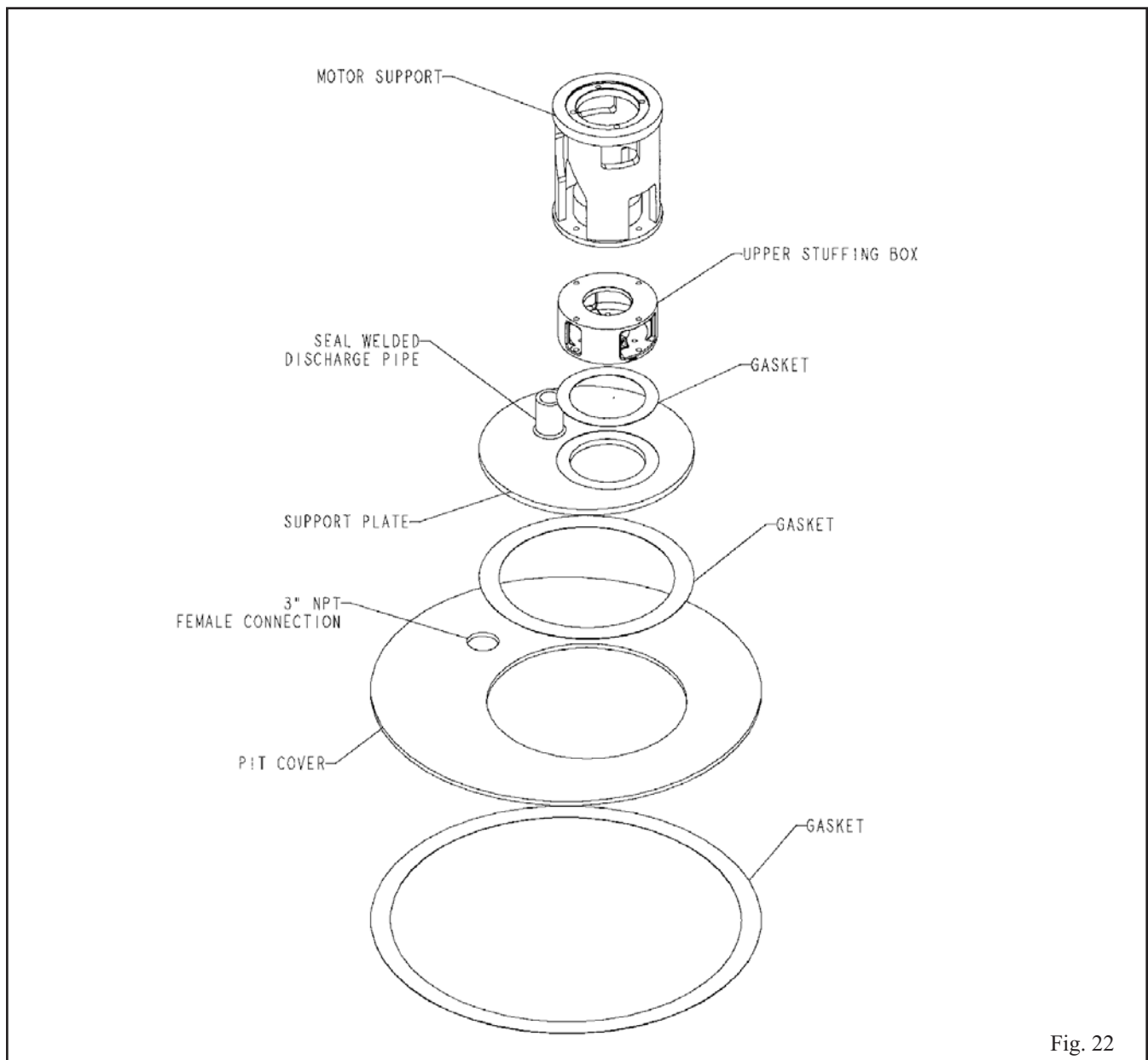
Float balls are individual switches that are used in multiple configurations to control the pump circuit. They are suspended in the sump to the desired control level. When the fluid level rises to the float ball, the switch begins to float. The float is either anchored to a pipe or weighted, allowing the switch to tilt when the fluid continues to rise. The tilting of the float closes a switch that can be used to turn the pump on, activate a high level alarm, or control any other electrical device.

APPENDIX II

UPPER STUFFING BOX AND VAPOR PROOF CONSTRUCTION

The Model 3171 is normally a sealless design. When temperatures exceed 180° F., it is necessary to move the thrust bearing away from the heat source in the sump. This is accomplished by adding the upper stuffing box. Air is then allowed to circulate around the bearing keeping it

cool. The upper stuffing box is also used to minimize vapor emissions when handling controlled substances. Proper installation and maintenance of a vapor proof pump along with the correct sealing device can give you vapor retardent installations.



PACKED STUFFING BOX

The stuffing box is packed at the factory. The packing is lubricated by a grease cup supplied with the pump.

1. Fill the grease cup with any lithium based #2 grease.
2. Install the grease cup on the tapped opening on the stuffing box.
3. Turn the cap on the grease cup several turns to inject grease into the packing.
4. Make sure gland nuts are finger tight.

OPERATION AND MAINTENANCE

1. Keep the grease cup full of grease at all times.
2. Periodically make several turns on cap on the grease cup injecting fresh grease into the stuffing box. Lubrication interval will vary depending upon the temperature and gland tightness. Experience will dictate the best interval for your service. Start by checking the pump daily, and extend the interval as required until you are comfortable that the proper maintenance interval has been achieved.
3. Do not over tighten the gland as this will lead to shaft damage. The pump is sealing only vapors so finger tight is adequate.

PACKING REPLACEMENT

1. Should it become necessary to replace the packing, the sequence is three rings of packing, lantern ring and then two rings of packing followed by the gland.

MECHANICAL SEALS

When mechanical seals are furnished, a manufacturers reference drawing is supplied with the pump data package. This drawing must be kept for future use when performing maintenance and adjusting the seal. If oil lubed seals are supplied, the seal faces must be lubricated by oil at all times.

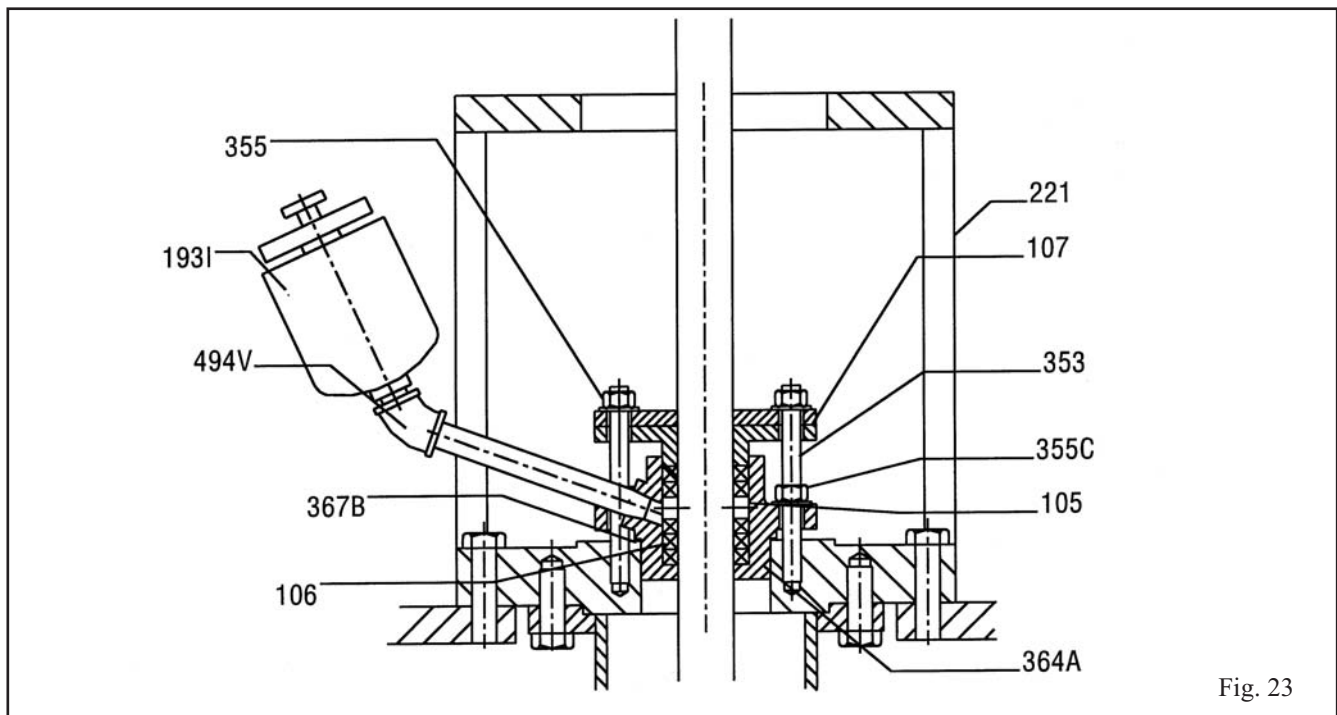


Fig. 23

APPENDIX III

STEAM JACKETED (MOLTEN SULFUR) CONSTRUCTION

INSTALLATION

1. Prior to installing the pump in the sump, familiarize yourself with the location of the steam lines. There are three connections above the support plate. Two steam connections, and one condensate return connection. The condensate return connection is connected to the bottom of the discharge pipe jacket. The steam connections are connected to the tops of the column and discharge jackets. The steam lines can be connected in one of two ways:
 - 1a. Both lines can be used as steam in. This would be the preferred method.
 - 1b. One line can be used as steam in, with the second line being used as a feed through to additional pumps. This method should be used only if absolutely necessary as it will be difficult to control the steam at subsequent pumps.
2. Prior to installing the pump, check the fittings for leaks. The jackets are hydrotested by the factory at 100 psi prior to shipment, however,

tube fittings may become loose in transit. Use plant air or high pressure water. If using air to check for leaks, use a soap solution at each joint and look for air bubbles.



WARNING

Use proper safety precautions when dealing with high pressure air / water.

3. Minimum recommended steam pressure is 35 psi. Less than ideal conditions will require higher pressure steam to keep the correct temperature.
4. Follow the procedures for the standard construction unit.

OPERATION

1. After the pump is brought to temperature for the first time, shut the unit down temporarily and re-adjust the impeller clearance. See Section Four. Cold clearance is set at the factory prior to shipment.

Refer to the IOM for all operating procedures.

APPENDIX IV

ENCLOSED LINE SHAFT

The enclosed line shaft design lends itself extremely well for applications where abrasives are present in the pumpage, or when a bearing lubricant other than the pumpage is required.

The main feature of this modified design is a positive lubrication system for all bearings requiring a minimum of lubrication fluid due to the bushing located at the bottom of the column adapter housing directly above the impeller.



WARNING

The fluid must run continuously to insure flow out of the column at all times. If the flush stops, the fluid in the sump can back up into the column contaminating the bearings.

The lubricant is injected at the lubrication line connection on the top of the support plant and, via a short tube, enters the column directly below the

support plate. The fluid is also injected into the lantern ring in the stuffing box for packing lubrication. The lubricant is forced down the column, passing through each bearing until it reaches the floating bushing. The floating design allows the bushing to follow shaft runout, thus eliminating excessive wear on the shaft or bushing.

Leakages (flows) across the bushing for certain pressure differentials are shown below. Higher pressures will result in higher leakages.

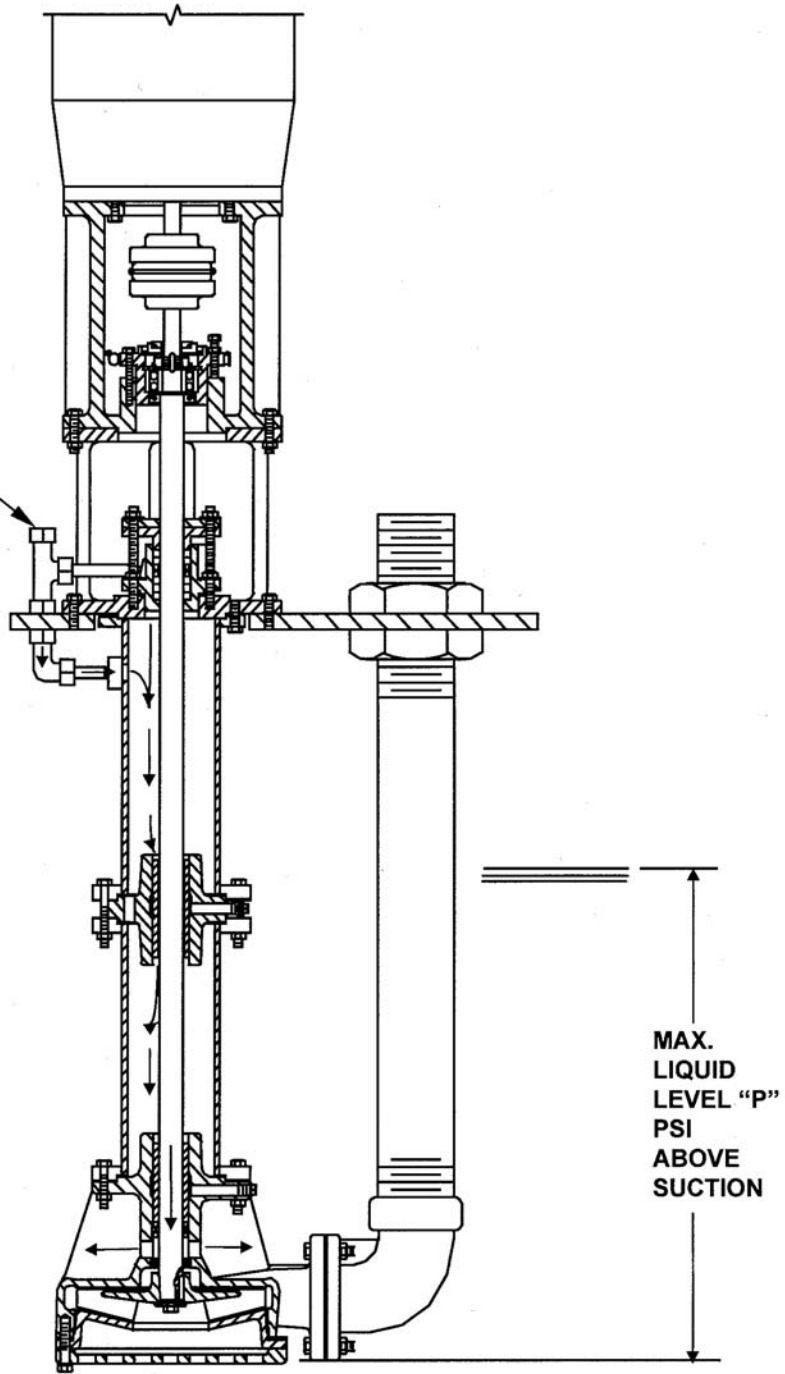
Pressure Differential (PSI)	Approximate Leakage (GPM)
3	0.30
5	0.44
7.5	0.60

Standard materials of construction of the floating bushing are 18-8 stainless steel housing and spring with a glass filled Teflon bushing. Flush tubing is steel as standard.

FLUSH INLET
CONNECTION 1/4
PRESSURE =
3 PSI + "P" PSI

POSITIVE FLOW
MUST BE
MAINTAINED AT
ALL TIMES

PSI	APPROX. LEAKAGE
3	0.03 GPM
5	0.44 GPM
7.5	0.60 GPM



MAX.
LIQUID
LEVEL "P"
PSI
ABOVE
SUCTION

APPENDIX V

GREASE CUP OPERATING INSTRUCTIONS

The spring operated auto grease cups, for the sealed bearing option, are designed to maintain a constant lubrication to the intermediate pump bearings fixed to the vertical pump housing. The center stem will protrude out of the housing when the cup is full and will gradually move down into the housing as the grease is used. Once the wing nut has been threaded against the stem zerk fitting and the bottom of the wing nut is resting on the cap of the grease cup, the grease reservoir is empty and has to be refilled.

FILLING THE HOUSING

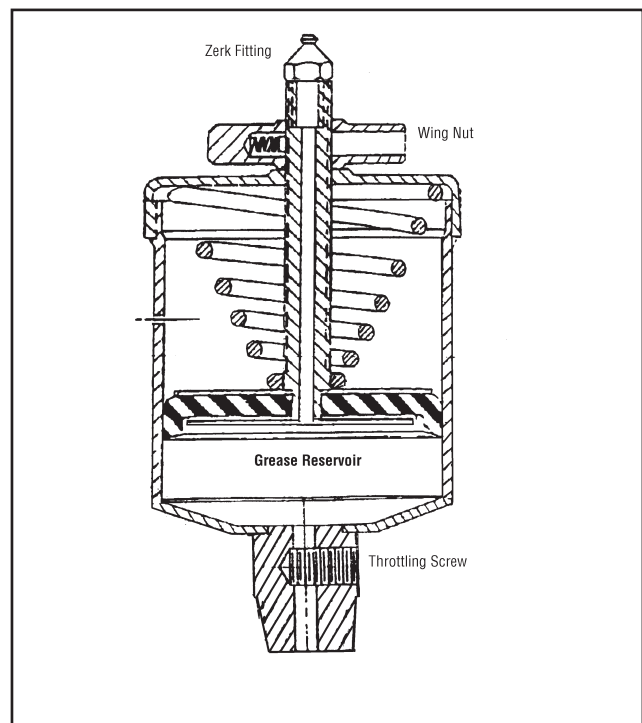
1. The grease cup can be filled in place.
2. Turn the wing nut clockwise until the center stem is raised all the way and the wing nut will not turn any further.
3. Fit a pressurized grease gun to the top zerk fitting and pump the grease cup full until a small amount of grease starts to come out of the side vent of the housing indicating the cup is full.
4. Unthread the wing nut to energize the grease cup allowing the internal spring pressure to push grease into the bearing lube line.
5. If the stem recedes into the housing immediately and the bearing has been previously purged, remove the top of the grease cup by unthreading the top lid and inspect the plunger for defects. If all the grease is found on the reverse, (or back side) of the plunger, it is defective and has to be replaced.

ADJUSTING THE FLOW

1. There are two ways to adjust the flow of grease in the automatic grease cup.
 - a.) Unthreading the wingnut completely against the zerk fitting of the center stem will allow the full grease cup to be used as required. Any throttling of the amount of grease used should then be done by unlocking the hex nut of the throttling screw and turning the slotted screw clockwise approx. 1/2 turn at a time and relocking the hex nut and monitoring the stem movement. When the grease in the grease cup is completely consumed in 1-2 weeks of operation, the flow is correct and this will maintain the proper grease to the bearings.
 - b.) Leave the throttling screw locked open and back off the wingnut several turns for every 2-3 days of operation. This will provide a more precise amount of grease to the bearings independent of changing operating temperatures and surrounding conditions., but will require a more controlled maintenance schedule to make sure this is done on a regular basis and is NOT the preferred method.

GREASE TYPE

1. For normal operating temperatures 50 to 150 deg. F, a #2 Lithium based grease is acceptable. Synthetics can be used if consulted with factory.
2. Extreme cold conditions may require the use of a # 1 grease to allow adequate flow into the bearings.



Standard Parts List With Materials of Construction

Item	Qty. Per Pump	Part Name	All Iron	Bronze Fitted	Carbon Steel	CD4 Fitted	316SS	Alloy 20	Hast. B	Hast. C
100	1	Casing	1000	1000	1212	1216	1203	1204	1217	1215
101	1	Impeller	1018	1101	1212	1216	1203	1204	1217	1215
112	1	Thrust Bearing	Double Row Angular Contact							
122	1	Shaft	2205				2216	2221	2263	2264
123	*	Deflector	EPDM							
134	1	Bearing Shell	1000							
136	1	Bearing Locknut	Steel							
155	1	Casing Bushing	Carbon Filled PTFE (Teflon®)							
178	1	Impeller Key	2229					2230	2247	2248
182	1	Suction Cover	1000	1212	1216	1203	1204	1217	1215	
187	1	Strainer	1000	3211			1204	1217	1215	
189	1	Support Plate	3201							
190	*	Flush Tubing	As Specified							
192	1	Head Column	6501		6545		6506	6519	6548	
193B	1	Grease Fitting	Carbon or as specified							
195	1	Discharge Pipe	6501				6506	6519	6548	
197	*	Steady Bearings	Carbon or As Specified							
198	1	Impeller Screw	2229					2230	2247	6548
199	1	Impeller Washer	2229					2230		
213	*	Steady Bearing Housing	1000		1203		1204	1217	1215	
240	1	Motor Support	1000							
242	2	Pipe Nut	1000			1203	1204	1217	1215	
306	*	Column Extension	6501		6545		6506			
315	1	Discharge Elbow	1000	1212	1216	1203	1204	1217	1215	
332A	1	Labyrinth Seal	Carbon Teflon®							
333	1	Lip Seal	Nitrile Lip Seal							
333H	2/Brg.	Lip Seal	Nitrile				Viton®			
351	1	Gasket - Suction Cover to Casing	Nitrile Acrylic							
351A	1	Gasket - Discharge Elbow to Casing	Nitrile Acrylic							
361A	1	Retaining Ring - Thrust Bearing	Steel							
369	*	Retaining Ring - Steady Bearing	PH15-7MO Stainless					C-20	Hastelloy	
369A	1	Retaining Ring - Shaft	M/MT, L Groups Only. Steel							
370C	3	Clamp Bolt - Bearing Shell	2210							
370D	3	Jack Bolt - Bearing Shell	2210							
370G	6	Bolt - Column to Casing	2210		2229		2230	2247	2248	
370H	4	Bolt - Elbow to Casing	2210		2229		2230	2247	2248	
370L	4	Bolt - Motor Adapter to Support Plate	2210							
370M	6	Bolt - Head Column to Motor Support	2210		2229		2230	2247	2248	
371	4	Bolt - Motor to Motor Support	2210							

* Quantity dependent upon pump length and speed. Nuts and Washers are omitted for clarity.

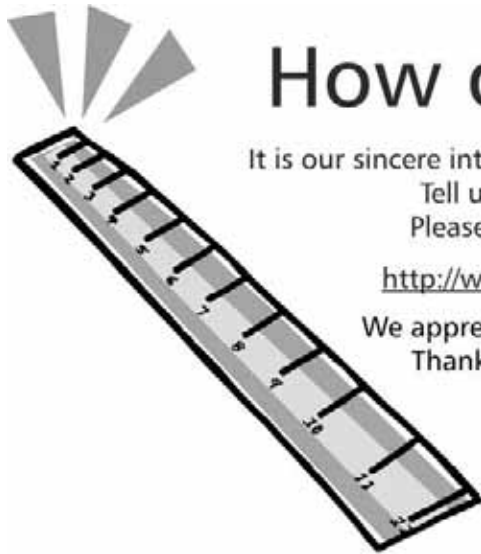
Material Code Cross Reference	
Goulds Code	ASTM Number
1000	A48 CL25B Cast Iron
1018	A536-84 60-42-10 Ductile Iron
1101	B584 Silicon Brass
1203	A743 CF8M 316 Stainless
1204	A743 CN7M Alloy 20
1212	A216 WCB Carbon Steel
1215	A494-90 CW6M C1,1 Hastelloy C
1216	A890 1A CD4MCuN
1217	A494 N-7M Hastelloy B
2205	C1045 Carbon Steel Ground and Polished
2210	A108 Gr1211 Carbon Steel
2216	A276 316 Stainless Ground and Polished
2229	A276-91A Stainless
2230	B743 20CB3 Carpenter 20
2247	B335 Type B-2 Hastelloy B
2248	B574 C-276 Hastelloy C
2263	B335 B-2 Hastelloy B Ground and Polished
2264	B574 C-276 Hastelloy C Ground and Polished
3201	A283 Grade D Carbon Steel Plate
3211	A240 316 Steel Plate
6501	A53 Type F Carbon Steel Schedule 40 Pipe
6506	B464 C20CB3 Carpenter 20 Schedule 40 Pipe
6511	Red Brass Pipe SPS
6519	B622 Hastelloy B Schedule 40 Pipe
6545	A312 316L Stainless Steel Schedule 40 Pipe
6548	Hastelloy C C-276 Schedule 40 Pipe

HOW TO ORDER

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

EMERGENCY SERVICE

Emergency parts service is available
24 hours/day, 365 days/year . . .
Call **1-800-446-8537**



How did we measure up?

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