GOULDS PUMPS

Installation, Operation, and Maintenance Manual

JCU

ITT

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1 Introduction and Safety

1.1 Safety

WARNING:

- The operator must be aware of the pumpage and take appropriate safety precautions to prevent physical injury.
- Risk of serious injury or death. If any pressure-containing device is over-pressurized, it can explode, rupture, or discharge its contents. It is critical to take all necessary measures to avoid over-pressurization.
- Risk of death, serious personal injury, and property damage. Installing, operating, or maintaining the unit using any method not prescribed in this manual is prohibited. Prohibited methods include any modification to the equipment or use of parts not provided by ITT. If there is any uncertainty regarding the appropriate use of the equipment, please contact an ITT representative before proceeding.
- Risk of serious personal injury. Applying heat to impellers, propellers, or their retaining devices can cause trapped liquid to rapidly expand and result in a violent explosion. This manual clearly identifies accepted methods for disassembling units. These methods must be adhered to. Never apply heat to aid in their removal unless explicitly stated in this manual.
- Risk of serious personal injury or property damage. Dry running may cause rotating parts within the pump to seize to non-moving parts. Do not run dry.
- Running a pump without safety devices exposes operators to risk of serious personal injury or death. Never operate a unit unless appropriate safety devices (guards, etc.) are properly installed. See specific information about safety devices in other sections of this manual.
- Risk of death, serious personal injury, and property damage. Heat and pressure buildup can cause explosion, rupture, and discharge of pumpage. Never operate the pump with suction and/or discharge valves closed.
- Risk of severe physical injury or death from explosion of trapped liquid. Never use heat to remove parts unless explicitly stated in this manual.
- Always lockout power to the driver before performing pump maintenance.
- Never operate any pumping system with a blocked suction and discharge. Operation, even for a brief period under these conditions, can cause confined pumped fluid to overheat. If pump becomes plugged, shut down and unplug prior to restarting pump.
- Precautions must be taken to prevent physical injury. The pump may handle hazardous and/or toxic fluids. Proper personal protective equipment should be worn. Pumpage must be handled and disposed of in conformance with applicable environmental regulations.
- If the pump or motor is damaged or leaking, electric shock, fire, explosion, liberation of toxic fumes, physical harm, or environmental damage may result. Do not operate the unit until the problem has been corrected or repaired.

CAUTION:

Risk of injury and/or property damage. Operating a pump in an inappropriate application can cause over pressurization, overheating, and/or unstable operation. Do not change the service application without the approval of an authorized ITT representative.

1.1.1 Safety terminology and symbols

About safety messages

It is extremely important that you read, understand, and follow the safety messages and regulations carefully before handling the product. They are published to help prevent these hazards:

- Personal accidents and health problems
- Damage to the product
- Product malfunction

Hazard levels

Hazard level	Indication
DANGER:	A hazardous situation which, if not avoided, will result in death or serious injury
WARNING:	A hazardous situation which, if not avoided, could result in death or serious injury
CAUTION:	A hazardous situation which, if not avoided, could result in minor or moderate injury
NOTICE:	• A potential situation which, if not avoided, could result in undesirable conditions • A practice not related to personal injury

Hazard categories

Hazard categories can either fall under hazard levels or let specific symbols replace the ordinary hazard level symbols.

Electrical hazards are indicated by the following specific symbol:

ELECTRICAL HAZARD:

These are examples of other categories that can occur. They fall under the ordinary hazard levels and may use complementing symbols:

- Crush hazard
- Cutting hazard
- Arc flash hazard

1.1.2 Environmental safety

The work area

Always keep the station clean to avoid and/or discover emissions.

Waste and emissions regulations

Observe these safety regulations regarding waste and emissions:

- Appropriately dispose of all waste.
- Handle and dispose of the processed liquid in compliance with applicable environmental regulations.
- Clean up all spills in accordance with safety and environmental procedures.
- Report all environmental emissions to the appropriate authorities.

WARNING:
If the product has been contaminated in any way, such as from toxic chemicals or nuclear radiation, do NOT send the product to ITT until it has been properly decontaminated and advise ITT of these conditions before returning.

Electrical installation

For electrical installation recycling requirements, consult your local electric utility.

1.1.2.1 Recycling guidelines

Always follow local laws and regulations regarding recycling.

1.1.3 User safety

General safety rules

These safety rules apply:

- Always keep the work area clean.
- Pay attention to the risks presented by gas and vapors in the work area.
- Avoid all electrical dangers. Pay attention to the risks of electric shock or arc flash hazards.
- Always bear in mind the risk of drowning, electrical accidents, and burn injuries.

Safety equipment

Use safety equipment according to the company regulations. Use this safety equipment within the work area:

- Hardhat
- Safety goggles, preferably with side shields
- Protective shoes
- Protective gloves
- Gas mask
- Hearing protection
- First-aid kit
- Safety devices

Electrical connections

Electrical connections must be made by certified electricians in compliance with all international, national, state, and local regulations. For more information about requirements, see sections dealing specifically with electrical connections.

Noise

WARNING:
Sound pressure levels may exceed 80 dbA in operating process plants. Clear visual warnings or other indicators should be available to those entering an area with unsafe noise levels. Personnel should wear appropriate hearing protection when working on or around any equipment, including pumps. Consider limiting personnel's exposure time to noise or, where possible, enclosing equipment to reduce noise. Local law may provide specific guidance regarding exposure of personnel to noise and when noise exposure reduction is required.

Temperature

WARNING:
Equipment and piping surfaces may exceed 130ºF (54ºC) in operating process plants. Clear visual warnings or other indicators should alert personnel to surfaces that may reach a potentially unsafe temperature. Do not touch hot surfaces. Allow pumps operating at a high temperature to cool sufficiently before performing maintenance. If touching a hot surface cannot be avoided, personnel should wear appropriate gloves, clothing, and other protective gear as necessary. Local law may provide specific guidance regarding exposure of personnel to unsafe temperatures.

1.1.3.1 Precautions before work

Observe these safety precautions before you work with the product or are in connection with the product:

- Provide a suitable barrier around the work area, for example, a guard rail.
- Make sure that all safety guards are in place and secure.
- Recognize the site emergency exits, eye wash stations, emergency showers and toilets.
- Allow all system and pump components to cool before you handle them.
- Make sure that you have a clear path of retreat.
- Make sure that the product cannot roll or fall over and injure people or damage property.
- Make sure that the lifting equipment is in good condition.
- Use a lifting harness, a safety line, and a breathing device as required.
- Make sure that the product is thoroughly clean.
- Make sure that there are no poisonous gases within the work area.
- Make sure that you have quick access to a first-aid kit.
- Disconnect and lock out power before servicing.
- Check the explosion risk before you weld or use electric hand tools.

1.1.3.2 Precautions during work

Observe these safety precautions when you work with the product or are in connection with the product:

CAUTION:
Failure to observe the instructions contained in this manual could result in personal injury and/or property damage, and may void the warranty. Read this manual carefully before installing and using the product.

- Never work alone.
- Always wear protective clothing and hand protection.

- Stay clear of suspended loads.
- Always lift the product by its lifting device.
- Beware of the risk of a sudden start if the product is used with an automatic level control.
- Beware of the starting jerk, which can be powerful.
- Rinse the components in water after you disassemble the pump.

1.1.3.3 Hazardous liquids

The product is designed for use in liquids that can be hazardous to your health. Observe these rules when you work with the product:

- Make sure that all personnel who work with biologically hazardous liquids are vaccinated against diseases to which they may be exposed.
- Observe strict personal cleanliness.
- A small amount of liquid will be present in certain areas like the seal chamber.

1.1.3.4 Wash the skin and eyes

1. Follow these procedures for chemicals or hazardous fluids that have come into contact with your eyes or your skin:

Condition	Action
Chemicals or hazardous fluids in eyes	1. Hold your eyelids apart forcibly with your fingers. 2. Rinse the eyes with eyewash or running water for at least 15 minutes. 3. Seek medical attention.
Chemicals or hazardous fluids on skin	1. Remove contaminated clothing. 2. Wash the skin with soap and water for at least 1 minute. 3. Seek medical attention, if necessary.

1.1.4 Safety regulations for Ex-approved products in potentially explosive atmospheres

Guidelines for compliance

WARNING:
Risk of serious personal injury. Applying heat to impellers, propellers, or their retaining devices can cause trapped liquid to rapidly expand and result in a violent explosion. This manual clearly identifies accepted methods for disassembling units. These methods must be adhered to. Never apply heat to aid in their removal unless explicitly stated in this manual.

If there are any questions regarding these requirements, the intended use, or if the equipment requires modification, contact an ITT representative before you proceed.

Personnel requirements

ITT disclaims all responsibility for work done by untrained and unauthorized personnel.

These are the personnel requirements for Ex-approved products in potentially explosive atmospheres:

- All work on the product must be carried out by certified electricians and ITT-authorized mechanics. Special rules apply to installations in explosive atmospheres.
- All users must know about the risks of electric current and the chemical and physical characteristics of the gas and/or vapor present in hazardous areas.
- Any maintenance for Ex-approved products must conform to international and national standards.

Product and product handling requirements

These are the product and product handling requirements for Ex-approved products in potentially explosive atmospheres:

- Only use the product in accordance with the approved motor data stated on the nameplates.
- The Ex-approved product must never run dry during normal operation. Dry running during service and inspection is only permitted outside the classified area.
- Before you start working with the product, make sure that the product and the control panel are isolated from the power supply and the control circuit, so they cannot be energized.
- Do not open the product while it is energized or in an explosive gas atmosphere.
- Make sure that thermal contacts are connected to a protection circuit according to the approval classification of the product.
- Intrinsically safe circuits are normally required for the automatic level-control system by the level regulator if mounted in zone 0.
- The yield stress of fasteners must be in accordance with the approval drawing and the product specification.
- Do not modify the equipment without approval from an authorized ITT representative.
- Only use parts that have been provided by an authorized ITT representative.

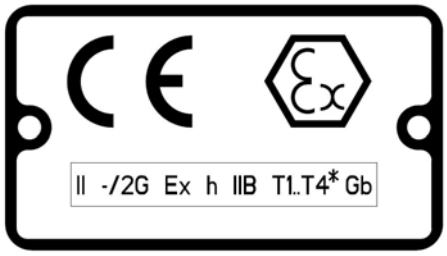


Figure 1: ATEX identification

Equipment for monitoring

For additional safety, use condition-monitoring devices. Condition-monitoring devices include but are not limited to these devices:

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

1.1.5 Product approval standards

Regular standards

WARNING:
Use of equipment unsuitable for the environment can pose risks of ignition and/or explosion. Ensure the pump driver and all other auxiliary components meet the required area classification at the site. If they are not compatible, do not operate the equipment and contact an ITT representative before proceeding.

All standard products are approved according to CSA standards in Canada and UL standards in USA. The drive unit degree of protection follows IP68 See the nameplate for maximum submersion, according to standard IEC 60529.

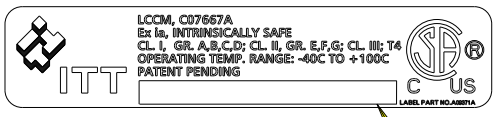
All electrical ratings and performance of the motors comply with IEC 600341.

Explosion-proofing standards

CSA certification

Intrinsically safe for:

- Class I, Div. 1, Groups A, B, C, D
- Class II, Div. 1, Groups E, F, G
- Class III
- Certified to Canadian and US requirements



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1.1.6 Product warranty

Coverage

ITT undertakes to remedy faults in products from ITT under these conditions:

- The faults are due to defects in design, materials, or workmanship.
- The faults are reported to an ITT representative within the warranty period.

- The product is used only under the conditions described in this manual.
- The monitoring equipment incorporated in the product is correctly connected and in use.
- All service and repair work is done by ITT-authorized personnel.
- Genuine ITT parts are used.
- Only Ex-approved spare parts and accessories authorized by ITT are used in Ex-approved products.

Limitations

The warranty does not cover faults caused by these situations:

- Deficient maintenance
- Improper installation
- Modifications or changes to the product and installation made without consulting ITT
- Incorrectly executed repair work
- Normal wear and tear

ITT assumes no liability for these situations:

- Bodily injuries
- Material damages
- Economic losses

Warranty claim

ITT products are high-quality products with expected reliable operation and long life. However, should the need arise for a warranty claim, then contact your ITT representative.

2 Transportation and Storage

2.1 Receive the unit

1. Inspect the package for damaged or missing items upon delivery.
2. Note any damaged or missing items on the receipt and freight bill.
3. File a claim with the shipping company if anything is out of order.
4. Pump should be placed in upright position only.

2.2 Unpack the unit

1. Remove packing materials from the unit.
   Dispose of all packing materials in accordance with local regulations.
2. Inspect the unit to determine if any parts have been damaged or are missing.
3. Contact your ITT representative if anything is out of order.
4. Pump should be placed in upright position only.

2.3 Pump handling

WARNING:
Dropping, rolling or tipping units, or applying other shock loads, can cause property damage and/or personal injury. Ensure that the unit is properly supported and secure during lifting and handling.

CAUTION:
Risk of injury or equipment damage from use of inadequate lifting devices. Ensure lifting devices (such as chains, straps, forklifts, cranes, etc.) are rated to sufficient capacity.

2.3.1 Lifting methods

WARNING:

- Risk of serious personal injury or equipment damage. Proper lifting practices are critical to safe transport of heavy equipment. Ensure that practices used are in compliance with all applicable regulations and standards.
- Safe lifting points are specifically identified in this manual. It is critical to lift the equipment only at these points. Integral lifting eyes or eye bolts on pump and motor components are intended for use in lifting the individual components only.
- Lifting and handling heavy equipment poses a crush hazard. Use caution during lifting and handling and wear appropriate Personal Protective Equipment (PPE, such as steel-toed shoes, gloves, etc.) at all times. Seek assistance if necessary.

Use the supplied lifting lugs and suitable slings in order to lift the entire pump to a vertical position and lower the unit into the sump. Then use the lifting lugs on the motor and a suitable sling, or optional slide rail system to hoist the motor into position. Use a tag line attached to the casing end in order to prevent the pump from swinging.

Examples

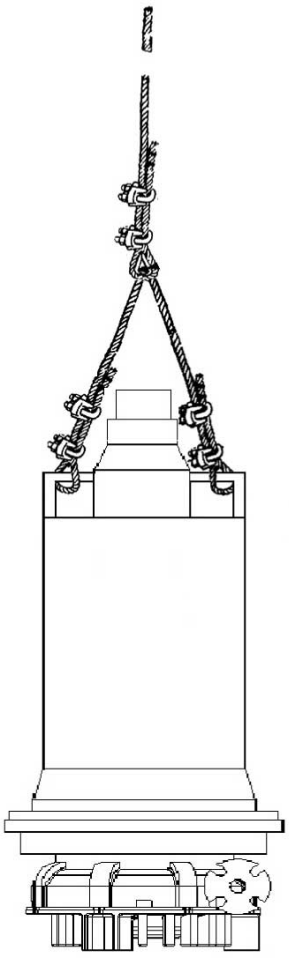

Figure 2: Example of proper lifting method using lifting lugs

2.4 Pump storage requirements

Requirements

Submersible units require proper preparation for storage and regular maintenance during storage. The unit is considered in storage when it has been delivered to the job site and is awaiting installation.

For specific requirements for storing motors, gearboxes, engines, panels, sealing plans and other auxiliaries, contact the equipment manufacturer.

Storage preparation

Condition	Proper preparation
Indoor storage area (preferred)	• Pave the area. • Clean the area. • Drain the area and keep it free from flooding.
Outdoor storage area (when indoor storage is not available)	• Observe all indoor storage requirements.

Condition	Proper preparation
	• Use weather-proof coverings such as flame-resistant sheeting or tarpaulins. • Place coverings in a manner that maximizes drainage and air circulation. • Tie coverings down in order to protect the pump from wind damage.
Placement of pumps and component parts	• Place the unit on skids, pallets, or shoring higher than 15 cm | 6 in. from the ground for good air circulation. • Sort the parts in order to permit easy access for inspection and/or maintenance without excessive handling. • Pump should be stored in upright position only.
Stacking of units or component parts	• Make sure that racks, containers, or crates bear the full weight of units or parts in order to prevent distortion. • Keep identification markings readily visible. • Immediately replace any cover you remove for internal access. • Store pump/motor in upright position.
Rotation of the pump and bowl assembly shaft	• Rotate the shaft and bowl assembly shaft counterclockwise once a month, at a minimum. • Make sure that the shaft rotates freely.
Controlled storage facilities	• Maintain an even temperature of 6°C | 10°F or higher above the dew point. • Keep the relative humidity to less than 50%. • Make sure that there is little or no dust.
Uncontrolled storage facilities that have uneven temperatures, higher humidity, and/or dusty conditions)	• Inspect the unit periodically to make sure that all preservatives are intact. • Seal all pipe threads and flanged pipe covers with tape.

When pump is not in regular operation

If a pump has been installed, but is not in regular operation for an extended period of time, such as during a seasonal shutdown, then operate it for at least 15 minutes every two weeks.

2.5 Preservation and Storage

ITT Goulds Pump Division's normal domestic shipping and storage preparation is suitable for protecting the pump during shipment in covered trucks. Although this is a submersible pump, storage in a clean, dry area will help preserve the paint and prevent corrosion. Hand rotation of the shaft every thirty days is recommended to keep the seals free and the bearings lubricated. For additional storage requirements, reference ABB/Baldor/Reliance Submersible motor Instruction Manual.

3 Installation

3.1 Inspect the Pump

3.2 Install the sump

1. The sump floor should be level and firm where the pump will be placed.
2. Make sure the sump and sump inlet line are free from large pieces of debris which could eventually obstruct the pump inlet.

3.3 Install the motor

The motor is furnished with thermal protection and a moisture probe.

1. Wire the motor according to the motor manufacturer's wiring diagram in the motor IOM.
2. Recheck the protective circuits after the wiring is completed to avoid a possible motor failure because of an oversight.
3. The motor must be completely submerged for continuous operation. It can be operated for a maximum of 15 minutes without being submerged, The sump controls should be set to allow a maximum possible run of 15 minutes after the motor is no longer completely submerged if the sump is large enough to not have completed the pump-down in that time. Motor is rated for a maximum 10 starts per hour.

NOTICE:
The motor is rated for full horsepower with liquid temperatures of 104°F (40°C) or lower, unless noted otherwise on nameplate or ITT documentation.

3.4 Install the pump

1. Make sure the lifting device is securely fastened to the motor lugs or hooks so the unit will not be dropped when it is lowered into the sump.
2. Check the 1/8" vent hole in the adapter plate, between the motor and the casing, to make certain it is not plugged and then carefully lower the unit into position in the sump.
3. Check the pump for being approximately level.
4. Support the discharge pipe to prevent excessive loads from being transmitted to the pump flange and casing.

3.5 Slide rail system (optional)

3.5.1 Install the base component assembly

1. Apply gasket adhesive to item #360W and place on side shown in Section Y-Y to base upright.

NOTICE:
Quantity two 1/2" holes may need to be punched or cut in gasket to allow clearance for items #372K.

2. Position item #787G, sump flange adapter, as shown in section Y-Y and secure to base upright using items #372K.
3. Apply gasket adhesive to item #360W and place in section Y-Y and secure to base upright.
4. Insert short-threaded end of stubs, items #787U, through base uprights and into the top two holes of the sump flange adapter, item #787G.
5. Position top two holes of the discharge elbow, item #315, over the two studs, items #787U, and thread nuts, items #787V, onto studs finger tight. Insert items #370S, hex head cap screws, through remaining elbow and base upright holes, and thread into sump flange adapter finger tight.
6. Level discharge flange then tighten nuts and hex head cap screws, items #370S and #787V.
7. Secure item #787H, adjusting bracket, to sump flange adapter using items 370T, hex head cap screws.
8. Thread quantity one nut, item #357, onto the entire length of item #787J, adjusting bolts, and insert into the hole centered in item #787H, adjusting bracket.

NOTICE:
The adusting bolt's head should face towards the sump flange adapter.

3.5.2 Install the guide bracket / pivot bracket assembly

Apply Loctite 242 on all hardware unless otherwise specified.

1. Apply gasket adhesive to item #360W and place on side shown in Section "Y"-"Y" to base upright. Note, quantity two 1/2" holes may need to be punched or cut in gasket to allow clearance for items
2. Position item #787G, sump flange adapter, as shown in section "Y"-"Y" and secure to base upright using items #372K.
3. Apply gasket adhesive to item #360W and place on opposite side shown in Section "Y"-"Y" to base upright..
4. Insertshort-threaded end of studs, items #787U, through base upright and into the top two holes of the sump flange adapter, item#787G.
5. Position top two holes of the discharge elbow, item #315, over the two studs, items #787U, and thread nuts, items #787V, onto studs finger tight. Insert items #370S, hex head cap screws, through remaining elbow and base upright holes, and thread into sump flange adapter finger tight.
6. Level discharge flange then tighten nuts and hex head cap screws, items #370S and #787V.
7. Secure item #787H, adjusting bracket, to sump flange adapter using items 370T, hex head cap screws.
8. Thread quantity one nut, item #357, onto the entire length of item #787J, adjusting bolt, and insert into the hole centered in item #787H, adjusting bracket. Note, the adjusting bolt's head should face towards the sump flange adapter.

3.5.3 Install the lifting bracket assembly

Apply Loctite 271 to all lifting bracket hardware.

1. Position left and right lifting brackets as shown on the top and elevation views of the drawing. Insert item #370R, hex head cap screw, through the right lifting bracket, the motor's lifting lug, and out left lifting bracket. Thread item #357C onto item #370R finger tight.
2. Place washers, items #788B, over items # 788A, hex head cap screws, and insert them into the holes located in the motor adapter, item #240, finger tight. Note, drill and tap holes in motor adapter at the location shown on page 4 of the slide rail installation instructions. Pump does not need to be disassembled for drill and tap operation.
3. Insert item #371G, hex head cap screw, through both lifting brackets and thread heavy hex nut, item #357A, finger tight. Do not apply Loctite 271to items #371G and #357A at this time. Text of third step.
4. Tighten items #788A and #357C.

5. Remove items #371G and #357A and position lift cable loop between lifting brackets. Apply Loctite 271 and reinsert item #371G, hex head cap screw, through cable and lifting brackets and thread heavy hex nut, item #357A, and item #415A, jam nut, onto item #371G. Check cable clamps..

3.5.4 Install the slide rail

Refer to drawing B1-445153SLR and B2-445153SLR

1. With anchor bolts in position, lower the base, item #787A, onto a flat, clean foundation and tighten anchor bolt nuts.
2. Insert the slide rails, items #787C over the cylinders on the base and insert intermediate bracket, item #787P, cylinders into the tops of the slide rails. Allow .25" gap between the top of the slide rails and the intermediate bracket for thermal expansion. Secure the intermediate bracket to the sump wall. Repeat as necessary with the remainder of the rails and brackets.
3. Install the discharge pipe.
4. Lift the pump using the lift cable and lower it to have the guide bracket fit between the rail pipes. The pump should be reasonably level to keep the guide bracket from exerting too much force on the rail pipes when the pump is lowered or raised
5. Carefully lower the pump into position. Turn the adjusting bolts, items #787J, to provide the proper o-ring compression. The pump may need to be raised and lowered back into position a few times until the proper adjustment is found. The pump should properly lock into place with no visible gap between the o-ring and sump flange adapter. Tighten items #357, hex nuts, against items #787H, adjusting brackets, to prevent movement of adjusting bolts.

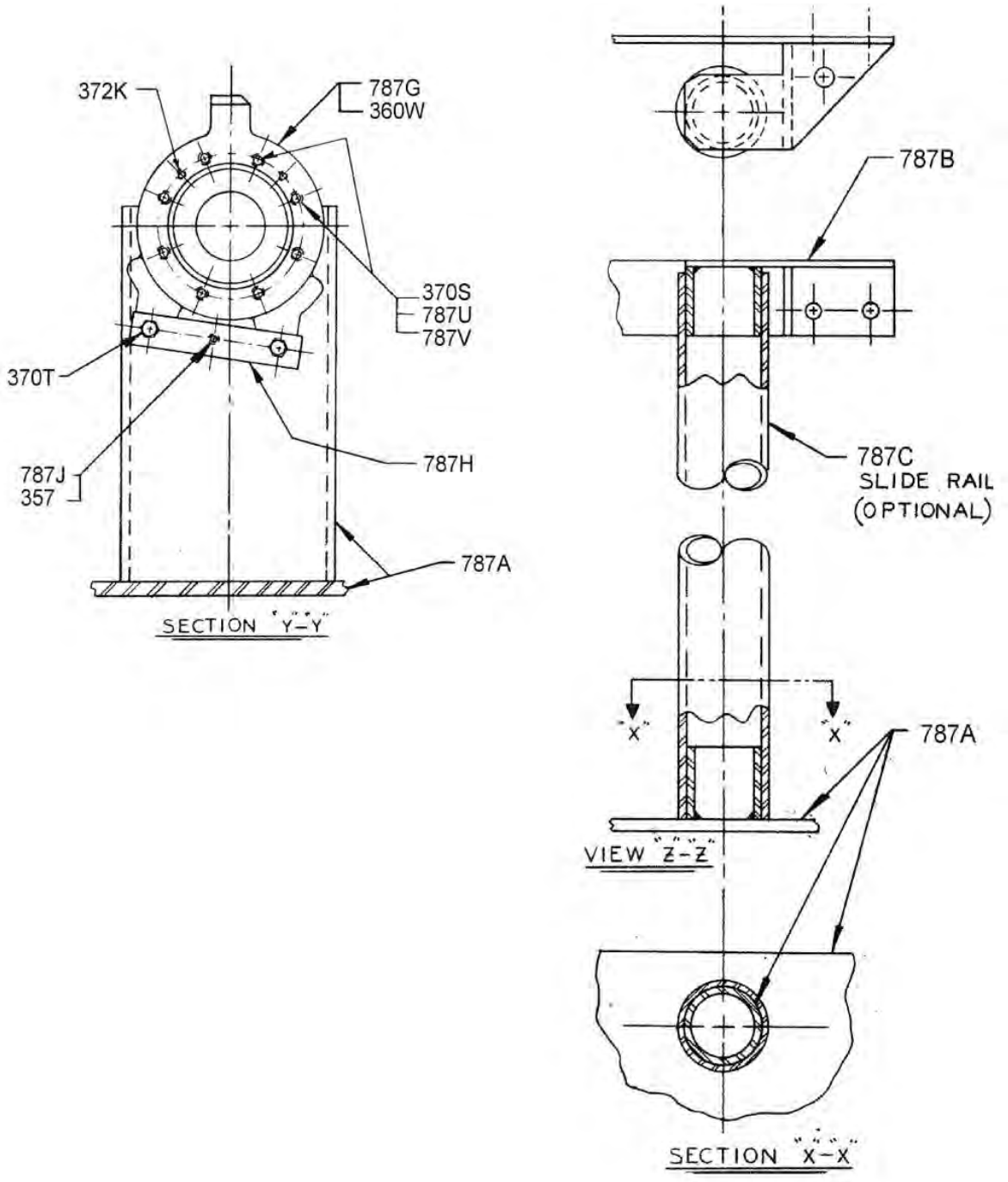

Figure 3: Slide rail system (optional)

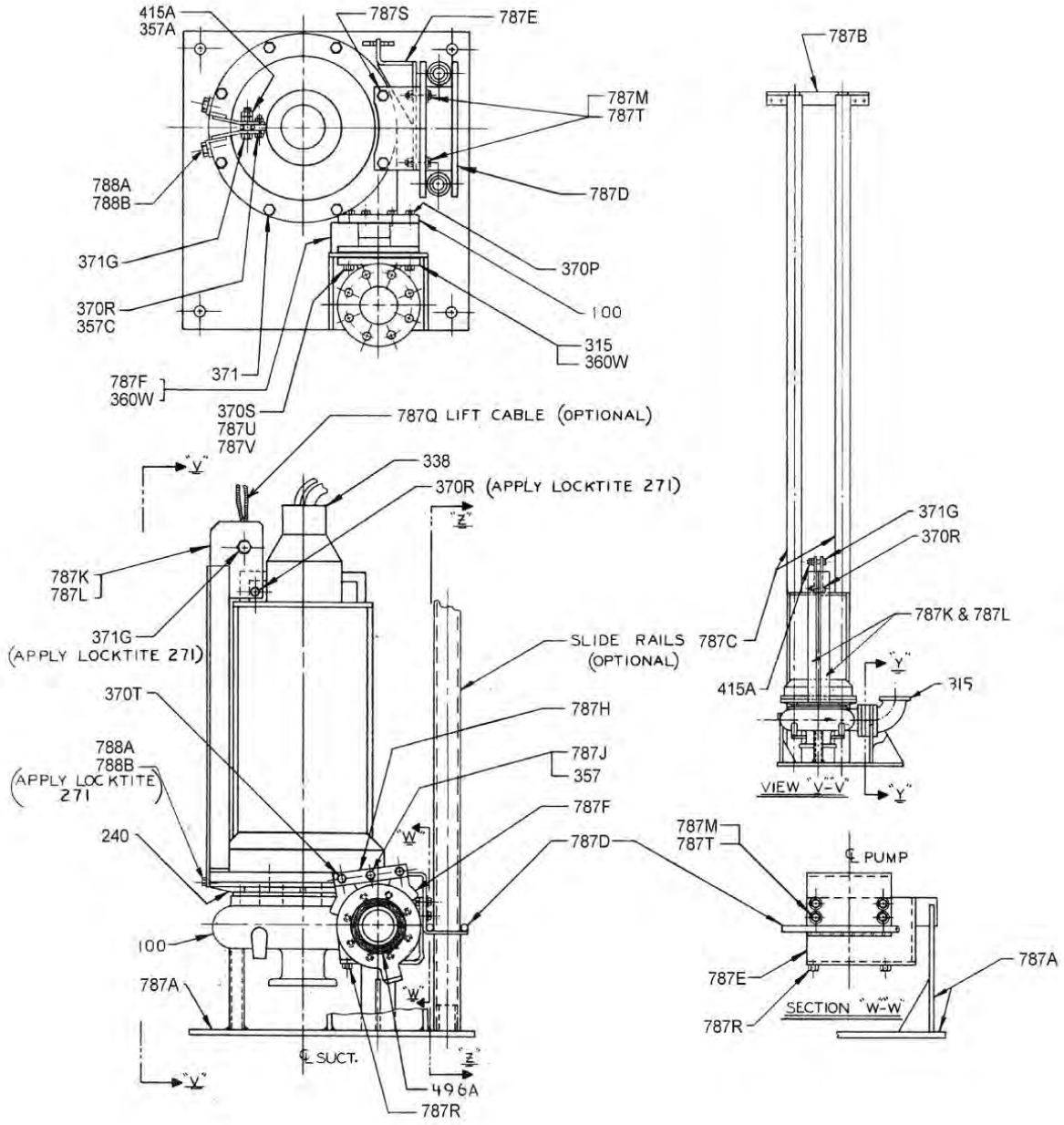

Figure 4: Slide rail system (optional)

4 Commissioning, Startup, Operation, and Shutdown

4.1 Start the pump

The most important concern is the prevention of motor overloading.

1. Refer to the motor nameplate for full load ampere rating of the motor.
2. Install an ammeter on the motor leads and check the motor draw immediately after the unit is started.

NOTICE:
A lower than expected current draw with a 3-phase motor may be an indication of incorrect rotation. If the amps are lower than expected, check rotation.

a) Observe the discharge for flow rate. If it is lower than expected change two of the three motor leads to reverse the direction of rotation.

NOTICE:
Single-phase motors are internally wired for correct rotation.

b) Check the motor overload at some other condition from that encountered at start-up

The ammeter on the motor leads should be checked for overload at all sump level heights with the liquid that will be normally pumped. The horsepower will tend to increase as the level in the sump rises, due to increased flow.

5 Maintenance

5.1 Maintenance

5.1.1 Maintenance - O-ring, pump flange to slide rail base flange

Whenever the pump is removed from the sump using the slide rail system, the pump flange to slide rail base flange O-ring should be inspected for wear. If it does not appear to be in good condition, a replacement O-ring should be installed after the groove has been cleaned and dried so the adhesive will bond to the metal and rubber.

NOTICE:
Cleaning the guide bracket around the hinge pin 9868 will help ensure proper operation when the pump is lowered back into place.

5.2 Disassembly

5.2.1 Disassembly precautions

WARNING:

- Failure to disconnect and lock out driver power may result in serious physical injury or death. Always disconnect and lock out power to the driver before performing any installation or maintenance tasks.
    - Electrical connections must be made by certified electricians in compliance with all international, national, state, and local rules.
    - Refer to driver/coupling/gear manufacturer's installation and operation manuals (IOM) for specific instructions and recommendations.
- Risk of serious personal injury. Applying heat to impellers, propellers, or their retaining devices can cause trapped liquid to rapidly expand and result in a violent explosion. This manual clearly identifies accepted methods for disassembling units. These methods must be adhered to. Never apply heat to aid in their removal unless explicitly stated in this manual.
- Handling heavy equipment poses a crush hazard. Use caution during handling and wear appropriate Personal Protective Equipment (PPE, such as steel-toed shoes, gloves, etc.) at all times.
- Precautions must be taken to prevent physical injury. The pump may handle hazardous and/or toxic fluids. Proper personal protective equipment should be worn. Pumpage must be handled and disposed of in conformance with applicable environmental regulations.
- Risk of serious physical injury or death from rapid depressurization. Ensure pump is isolated from system and pressure is relieved before disassembling pump, removing plugs, opening vent or drain valves, or disconnecting piping.
- Risk of serious personal injury from exposure to hazardous or toxic liquids. A small amount of liquid will be present in certain areas like the seal chamber upon disassembly.

CAUTION:

- Avoid injury. Worn pump components can have sharp edges. Wear appropriate gloves while handling these parts.

5.2.2 Disassemble the pump

1. Disconnect all electrical service. Mark leads for reassembly.
2. Remove cap screws 370E that fasten suction cover to casing. Remove cover and suction cover liner.
3. Remove impeller cap screw 370C. Pull impeller out of casing. If impeller cannot be easily removed, proceed to next step.
   If the impeller could not be easily removed, carefully pry the mount away from the motor. Use two locations on opposite sides simultaneously to prevent possible damage to motor.
4. Remove cap screw 370K which fastens motor-to-motor mount 340. Carefully pull mount with casing attached away from motor.
5. Remove cap screws 370J (or flat head screws 372J) and separate motor mount from casing.

NOTICE:

The motor shall be disassembled only by an authorized repair center. Failure to comply will result in voiding warranty.

For motor instructions see ABB/Baldor/Reliance Electrical Manual B-3629.

5.3 Pre-assembly

5.3.1 Pre-assembly inspections

Guidelines

Before you assemble the pump parts, make sure you follow these guidelines:

- Inspect the pump parts according to the information in these pre-assembly topics before you reassemble your pump. Replace any part that does not meet the required criteria.
- Make sure that the parts are clean. Clean the pump parts in solvent in order to remove oil, grease, and dirt.

NOTICE:

Protect machined surfaces while cleaning the parts. Failure to do so may result in equipment damage.

5.3.2 Replacement guidelines

Casing check and replacement

WARNING:
Risk of death or serious injury. Leaking fluid can cause fire and/or burns. Inspect and ensure gasket sealing surfaces are not damaged and repair or replace as necessary.

Inspect the casing for cracks and excessive wear or pitting. Thoroughly clean gasket surfaces and alignment fits in order to remove rust and debris.

Repair or replace the casing if you notice any of these conditions:

Casing areas to inspect

The arrows point to the areas to inspect for wear on the casing:

Impeller replacement

Inspect impeller vane edges for excessive cracks, pitting or corrosion damage. Replace impeller if excessively worn or defective.

Gaskets, O-rings, and seats replacement

WARNING:
Risk of death or serious injury. Leaking fluid can cause fire and/or burns. Replace all gaskets and O-rings at each overhaul or disassembly.

WARNING:
Risk of serious personal injury or property damage. Fasteners such as bolts and nuts are critical to the safe and reliable operation of the product. Ensure appropriate use of fasteners during installation or reassembly of the unit.

- Use fasteners of the proper size and material only.
- Replace all corroded fasteners.
- Ensure that all fasteners are properly tightened and that there are no missing fasteners.

Motor support

Inspect the motor support for any cracks or excessive corrosion damage. Replace if necessary.

Motor shaft check

Check the shaft for straightness or excessive wear, including thread wear or galling. If damage is evident, contact Baldor authorized motor repair center for motor repairs.

5.4 Reassembly

5.4.1 Reassemble the pump

1. Check the vent hole in the adapter 340 to be sure it is clear.
2. Clean and remove any burrs from all mating metal surfaces, including shaft and impeller bore.
3. Install new O-ring (496).
4. Fasten casing and motor mount together.
5. Install mount on motor flange, align and fasten.
6. Push impeller on the shaft until seated. Push suction cover liner into casing and measure clearance between impeller and liner. Feeler gauges can be used with larger pumps by reaching in the suction opening.
   An alternate method, recommended for smaller pumps, is to bend a short length (1") of soft solder over each vane and tap the liner into position. Measure the thickness of the compressed solder strip.

7. Use impeller shims (330) for total thickness of the measured thickness, minus the amount shown in the impeller shim thickness table below.
8. Remove liner and impeller and install shim in impeller bore.
9. Install key and reinstall impeller on motor shaft. Secure with washer (199) and cap screw (370C). Tighten impeller hardware according to information in *Impeller hardware torque values* table.
10. Push suction cover liner into casing bore. Check that the lip contacts the casing rather than the face against the impeller.
11. Install the O-ring (412F) around the liner lip and install suction cover with cap screws (370E) and washers (528K). Check for free rotation by turning impeller clockwise by hand with wrench on impeller screw.
12. When connecting electrical service, make sure polarity is correct to give counterclockwise rotation when looking into the suction opening.

Table 1: Typical Parts List

Item	Qty / Pump	Part Name
100	1	Casing
100B *	1	Liner, Suction Cover
101 *	1	Impeller
182	1	Suction Cover
199	1	Washer. Impeller
330 *	1 set	Shim, Impeller
340	1	Motor Mount
370C	1	Hex Cap Screw, Impeller
370E	varies	Hex Cap Screw
370J	varies	Hex Cap Screw
370K	varies	Hex Cap Screw
412F *	1	O-ring
496 *	1	O-ring
528K	varies	Washer
9700	1	Motor

* Recommended spare parts, including outer mechanical seal for motor.

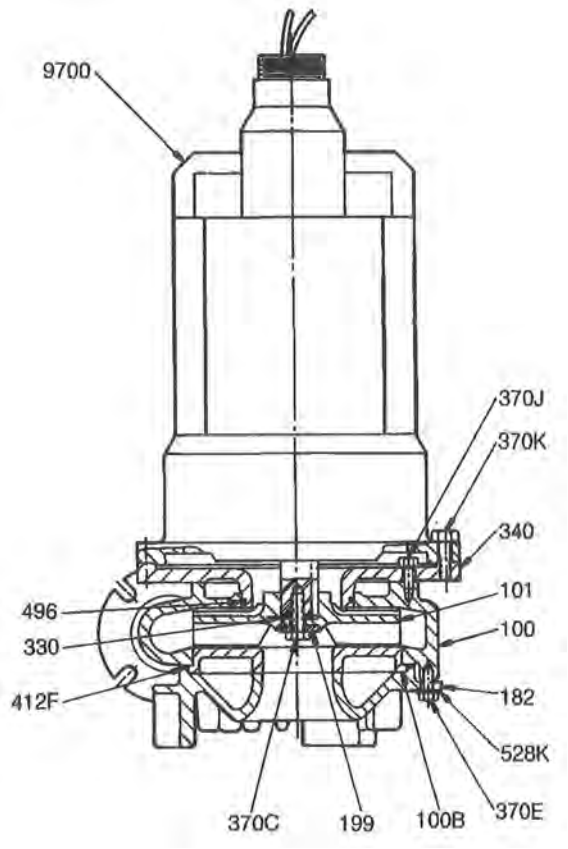

Table 2: Impeller Shim Thickness

Impeller Diameter (inches)	Measure Clearance Minus Shim Thickness (inches)
up to 11	.010 to .015
11 to 14	.015 to .020
over 14	.020 to .025

NOTICE:

- For 360TY with 320TY mounting flange motors only, delete impeller washer (199) and impeller screw (370C) and replace with impeller nut (304) of 316SS for all pump constructions.
- Flat head screws (372J) furnished instead of hex cap screw (370J) on 3" JCU with 210TYZB motor.
- Threaded hardware coated with Loctite 242, or equal. When impeller nut is used, Loctite 272 with primer should be used.

Table 3: Impeller hardware torque values

Motor Frame	Impeller Mounting Hardware	Required Torque, Lubricated (ft/lbs)
180TY	1/2"-13 UNC bolt w/washer	27
210TYZ	5/8"-11 UNC bolt w/washer	54
250TY	5/8"-11 UNC bolt w/washer	54
320TY	3/4"-10 UNC bolt w/washer	66

Motor Frame	Impeller Mounting Hardware	Required Torque, Lubricated (ft/lbs)
360TY	1-1/2"-12 UNF nut	623

NOTICE:

1. Loctite 242 shall be applied to impeller bolt prior to each assembly. When impeller nut is used, Loctite 272 with primer should be applied. Refer to Loctite for thread-lock application instructions.
2. Impeller mounting hardware is designed for one time use only. New hardware shall be installed during each assembly.
3. Torques in this table are based on a 416 stainless steel motor shaft material and bolt/nut materials of SAE F593 Groups 1 & 2. For other material combinations, refer to factory for torque value.

6 Troubleshooting

6.1 Troubleshooting

Symptom	Cause	Remedy
Insufficient or no discharge	Speed too low (usually due to low voltage)	Verify proper voltage
	System head too high	Verify discharge pressure
	Insufficient NPSH or submergence	Verify liquid level is above minimum required
	Wear of pump parts	Review pump parts for wear
	Wrong direction of rotation	Verify rotation, or swap two of the three electrical leads
	Pump not completely primed (plugged vent hole)	Check vent hole
	Suction opening or discharge pipe clogged	Clean suction area, and check discharge piping for clogs
	Viscosity of slurry too high	Check for solids settling that increases viscosity
Excessive current draw	Pump operating at a high horsepower area of the pump curve (capacity is greater than the design capacity)	Increase discharge pressure by partially closing discharge valve
	Impeller rubbing or mechanical defect in the motor	Check impeller clearance as previously described in these instructions
	Specific gravity or viscosity too high	Check for solids settling that increases viscosity
	Low voltage	Verify proper voltage

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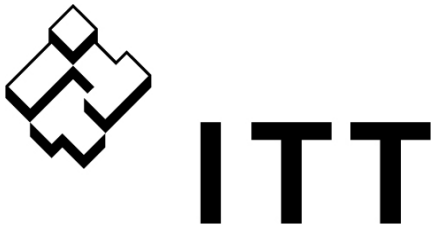

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