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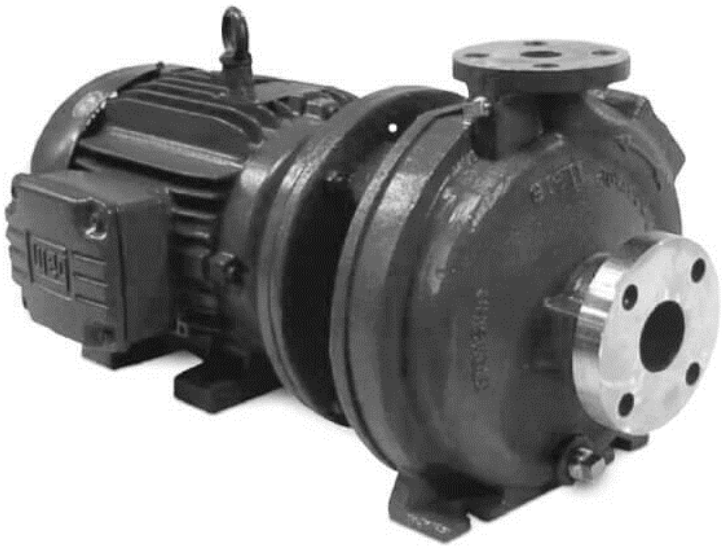
INSTALLATION, OPERATION
& MAINTENANCE MANUAL

811CC SERIES

Close-Coupled Centrifugal Pumps



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GRISWOLD

GRS-10010-E-01

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INTRODUCTION

Forward

This manual is intended to assist those who are involved with the installation, operation and maintenance of the Griswold Model 811CC Series Process Pump. These instructions should be reviewed in their entirety and should be thoroughly understood prior to installation, operation or maintenance on the pumping unit. If there are any questions, contact either Griswold Pump Company or your local authorized Griswold representative prior to proceeding.

Safety

Failure to read and comply with installation, operation and maintenance instructions will void the responsibility of the manufacturer and may result in bodily injury or equipment damage.

This manual should be kept as a part of the permanent records for the pump and should be readily accessible as a reference to anyone working on the pumping unit.

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. Griswold Pump Company 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**, and **NOTE** are used to indicate procedures or situations, which require special operator attention.

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

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

NOTE:

Indicates special instructions which are important but not related to hazards.

General Safety

- Do not allow pump, piping or other components containing water to freeze. Freezing may damage the components, leading to possible injury or flooding
- Periodically inspect pump and associated components
- Wear safety glasses when working on pumps
- Keep work area clean, uncluttered and with adequate lighting
- Ensure pump and components cannot roll or fall over, possibly causing bodily injury or property damage
- Allow all system and pump components to cool before handling
- Disconnect and lock out power before servicing the pump
- Check explosion risk before spark inducing work, such as welding, using electric power tools, grinders, etc.

General Safety Precautions

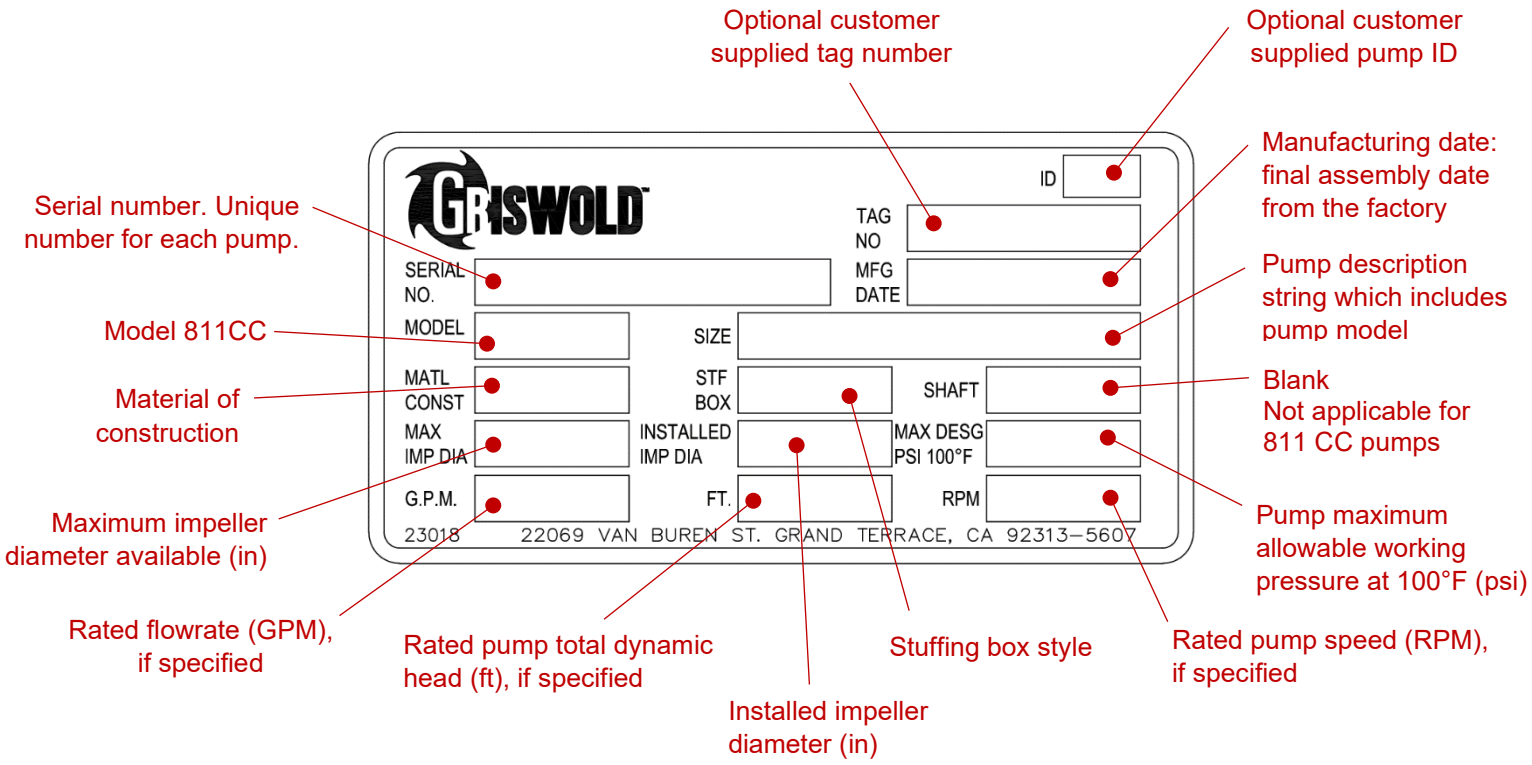
Griswold pumps have been designed and manufactured for safe and reliable operation when properly applied, operated and maintained in accordance with this instructional manual. Your safety is a primary concern for Griswold Pump, so we offer the following recommendations:

Never apply heat to remove an impeller. Trapped liquid, when heated, may cause an explosion.	**Never** operate the pump beyond the service conditions for which it was sold.
Always wear personal protective gear – safety glasses, steel-toed shoes, gloves, etc., when working on the pump.	**Always** follow established decontamination procedures before working on the pump.
Never use heat during the disassembly of the pump. Trapped liquid, when heated, may cause an explosion.	**Always** start the pump only with proper prime.
Always lock out the driver before performing maintenance on the pump.	**Never** run the pump dry.
Never operate the pump with a fully closed discharge valve. If the pump is operated with no flow, its temperature will increase, and damage may result.	**Never** operate the pump without the suction valve fully open.

PRODUCT DESCRIPTION

The Griswold 811CC Series pump is a centrifugal single-stage close-coupled pump which utilizes the cases, impellers and stuffing boxes common to the Griswold 811 product line. The pump has a back-pull-out design, meaning that it is possible to remove the pump back-end without disturbing the case and piping, which can facilitate easier maintenance of the pump. The casing has a top centerline discharge design and features a fully confined gasket. Case flange-to-flange dimensions meet ASME B73.1. The product is designed to bolt onto standard JP motor frames.

Every 811CC Series pump will be provided with an attached nameplate that provides information about the pump.



TRANSPORTATION AND STORAGE

Receiving and Handling the Pump

- Upon receipt, a thorough inspection should be made of the pump and related equipment. If materials are not received in good condition or there are shortages, make a notation of the damage and/or shortage on both the receipt and the freight bill. Submit any claims to the transportation company promptly! A documentation package is included with the pump shipment. Do not discard these materials. Put them in a safe place for easy reference.

- Crush hazard. Care should be taken when unloading and handling the pump, especially with regards to rigging and lifting. Failure to properly lift and support the equipment can result in physical injury and/or equipment damage.
- Lifting devices (such as eyebolts, slings, etc.) must be properly rated for the entire load being lifted.
- Care should be taken so that the load is stable and that excessive stresses are not transferred to a single lifting point (such as lifting the pump assembly by the motor eyebolt alone).

Storage

If pumps are to be stored prior to installation, they should be kept in a clean, dry environment. Depending upon the duration of the storage, it may be necessary to apply preservatives and to perform routine maintenance such as regularly rotating shafts to prevent flat spots from forming on the bearings in both the pump and driver. If pumps are to be stored for more than 4-6 months prior to installation and/or start-up, follow recommendations listed below. Storage for more than 4-6 months will require pumps to be prepared for long-term storage. Preservative treatment should be added to the power frame to aid against condensation and rust (if applicable). Treatment shall be similar to Royal Purple VP Preservative Oil #10. All machine surfaces that are not painted or not of corrosion resistant material shall be coated with a light coat of machine oil or grease. The shaft should be turned several rotations every 3 months or less and left 90 degrees from the original position. Store in a dry protected location ensuring that flange covers are left in place and all openings are plugged. Similarly, if the pump is to be installed and then started at a later date, it may be advisable to protect the pump during the idle time, especially if it's to be exposed to the elements.

INSTALLATION

Trouble-free operation of a pump begins with proper installation with particular attention being paid to the pump location, pump mounting and piping attachments.

Location

The pump location should be clean, dry, well ventilated, properly drained and allow room for maintenance and inspection.

Locate the pump as near to the liquid source as practical. Make the pipe runs as short and straight as possible, especially if suction lift is required.

Baseplates and Anchors

The preferred mounting for a baseplate is on a concrete pad with grouting. No matter how robust its design, there is always some flexibility in the baseplate itself. If there is insufficient support under the baseplate, it can distort causing pipe strain difficulties and normal vibrations can be amplified to unacceptable levels through resonances in the pump support and/or piping. A properly grouted baseplate will resist distortion and will provide sufficient mass to dampen any vibration.

Anchor (foundation) bolts are used to hold the baseplate to its support structure. In the preferred case of mounting the pump unit on a concrete pad, the anchor bolts are set into the pad as indicated in the following illustration. When pouring the pad, it's helpful to have a wooden template attached to the foundation form to position the anchor bolts at their locations as indicated on the pump unit assembly drawing.

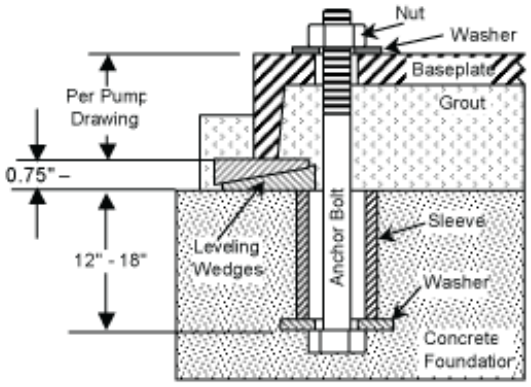


Figure 1
Typical Anchor Bolt (Sleeve Type)

- Anchor bolts are usually sized 1/8" smaller than the anchor bolt hole size in the base. Calculate bolt length as indicated in Figure 1 at the left.
- The ID of the sleeve should be two bolt sizes larger than the anchor bolt.
- Allow approx. ¾" - 1½" space between the bottom edge of the baseplate and the foundation for grouting.
- A “Sleeve” type anchor bolt is shown here. Alternatively, a “hook” or “J” type anchor bolt may be used.
- Pack the space between the anchor bolt and sleeve to prevent concrete and/or grout from entering this area.

Installing and Grouting Base

NOTE:
Before the baseplate is installed, it is advisable to thoroughly clean the underside to enable the grouting to adhere to it. Do not use oil-based cleaners since grout will not bond to it.

Once the concrete pad has cured, the baseplate can be carefully lowered over the anchor bolts. Place shims or tapered wedges under the baseplate at each of the anchor bolt positions to provide about 0.75" – 1.50" clearance between the base and the foundation. Adjust shims/wedges to level the baseplate. Lightly tighten the anchor bolts; the anchor bolts should not be fully tightened until the grout has set.

Grouting furnishes support for the pump unit baseplate providing rigidity, helping to dampen any vibration and serves to distribute the weight of the pump unit over the foundation. To be effective, grouting must completely fill all voids under the baseplate. For proper adhesion or bonding, all areas of the baseplate that will be in contact with the grout should be thoroughly cleaned. See note above. The grout must be non-shrinking. Follow the directions of the grout manufacturer for mixing. Proceed with grouting as follows:

NOTE:
If the size of the equipment or the layout of the installation require it, grouting can be done in two steps as long as the first step is allowed to cure completely before the second step is applied

1. Build a sturdy form on the foundation around the baseplate to contain the grout.
2. Soak the top of the concrete foundation pad thoroughly. Remove surface water before pouring.
3. Pour the grout through the hole(s) in the top and/or through the open ends of the channel steel baseplate, eliminating air bubbles by tapping, using a vibrator or pumping the grout into place. If necessary, drill vent holes into the top of the base to evacuate air.
4. Allow grout to set completely, usually a minimum of 48 hours.
5. Tighten foundation anchor bolts.
6. After the grout has dried thoroughly, apply an oil base paint to shield the grout from air and moisture.

Suction and Discharge Piping

A complete instruction for piping design is beyond the scope of this manual. A comprehensive guideline is available in industry standards from Hydraulic Institute (www.pumps.org). Note the following highlights:

In general, all piping must be supported independently of, and line up naturally with, the pump flanges. Even a small amount of pipe strain, or flange loading, can cause vibration and premature wear. In cases of pumping at elevated temperatures, pipe expansion must be accommodated with expansion loops or expansion joints. These must be properly anchored to prevent pipe strain from being

imposed on the pump from both thermal expansion and hydraulic reactive loads.

With the initial installation of the pump system, all piping must be thoroughly cleaned and/or flushed prior to pump start-up. Weld slag, rags, dirt and other debris in the piping can and will cause damage to the pump.

Piping design should incorporate the ability to flush prior to the removal of pump components in services where corrosive or otherwise harmful liquids are handled.

It is important to monitor the performance of a pump therefore it is recommended that gauges be installed in the suction and discharge lines. Select the appropriate gauge range to provide accurate readings. On pumps with suction lift, use a compound or vacuum gauge on the suction side.

Suction Piping – General

Properly designed and installed suction piping is critical to the successful operation of a pump. When pump operational problems are encountered, the causes are most often on the suction side. To achieve proper pump performance, consider the following:

1. Avoid using elbows close to the pump suction flange as this can create an uneven flow into the pump suction and impeller. If an elbow is necessary, it should be of the long radius type and there should be a minimum of six pipe diameters of straight pipe between the elbow and the pump suction nozzle.
2. NPSH available must be greater than the NPSH required by the pump. The ANSI/HI 9.6.1 guideline provides guidance in determining recommended NPSH margins. The following factors should be considered to minimize the pressure drop to the pump and preserve the available NPSH (NPSHa). Insufficient NPSHa will cause pump cavitation and can cause equipment damage.
    a. The suction pipe should be at least one size larger than the pump suction size. This will require an eccentric reducer to transition from the suction pipe to the pump suction flange. The flat side of the eccentric reducer is at the top. This is to prevent air pockets in the suction line.
    b. If a strainer is used on the pump suction side, it must have a free area at least three (3) times the area of the suction pipe. It must be checked and cleaned regularly as a clogged strainer will reduce the NPSHa.
    c. Never throttle the suction side of the pump as this directly reduces the NPSHa.
3. When the suction supply source feeds more than one pump, separate suction lines are recommended.

Suction Piping – Suction Lift Installations

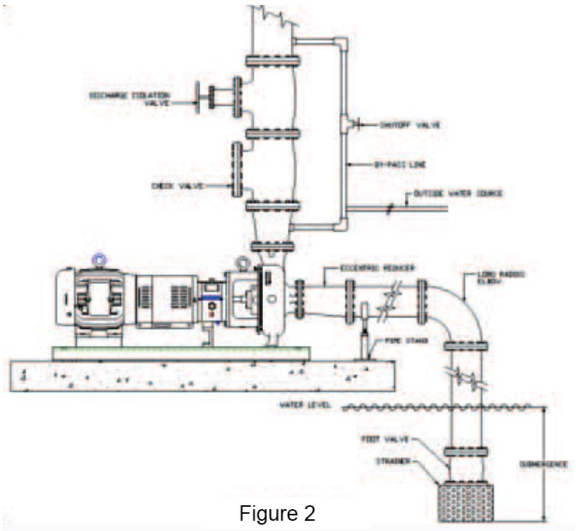


Figure 2

1. Suction lines when operating under lift conditions must be absolutely free from air leaks.
2. Suction piping should gradually slope upward toward the pump.
3. NPSH available must be greater than the NPSH required by the pump. The ANSI/HI 9.6.1 guideline provides guidance in determining recommended NPSH margins.
4. A means of priming the pump, such as a foot valve, must be provided.
5. Pipe must be supported properly to prevent flange loading.
6. Provide adequate submergence over the suction pipe inlet to prevent formation of vortices.

Suction Piping – with Positive Head (Flooded Suction)

1. The suction line must include an isolation valve to close off the source of supply when performing inspection or maintenance on the pump. Install this valve at least two pipe diameters before the pump suction nozzle.
2. Piping should be level or gradually slope downward from the suction source to avoid air pockets.
3. Attention should be paid to the design of the exit from the supply source to prevent the formation of vortices or eddies that can draw air into the pump. This relates to the velocity of the outflow and the submergence of the supply exit below the liquid level.

Discharge Piping

1. Discharge piping will normally be larger than the pump discharge size, so a concentric increaser is usually used for adaptation. Locate increaser below check valve.
2. A check valve and isolation valve should be located in the discharge line. The check valve should be located between the isolation valve and the pump. This will prevent back flow through the pump (reverse rotation) and will also serve to reduce any back pressure.
3. If an expansion joint is used, it should be located between the check valve and the pump. Proper anchoring is necessary.

Flushing

Flushing is usually associated with the shaft sealing and is application specific.

Mechanical seals are usually flushed to prevent localized heating at the seal faces. Flush may be with a bypass line from the pump discharge to the gland flush connection or from the gland flush connection to the pump suction. If the process fluid contains solids or other contaminants the seal may be flushed from an external clear liquid source, usually into the seal gland flush connection.

If packing is used and flushing is required, such as when the process fluid contains minor amounts of solids, which would wear the packing and sleeve, a clean water flush is frequently introduced into the lantern ring connection on the stuffing box cover. This injects water into the lantern ring area between the rings of packing to prevent the intrusion of solids. It's helpful to have a pressure gauge, needle control valve and flow indication device in this flush line to monitor flushing liquid.

If the pump is in a suction lift application, the stuffing box pressure may be less than atmospheric pressure in which case pressurized water should be supplied to the lantern ring connection to prevent the seal faces from becoming unlubricated. If the process fluid is clean, this may be a bypass line from the discharge of the pump. If the process fluid contains solids, external water injection may be necessary as noted above.

Prior to pump start-up, all cooling and flushing lines (as applicable) must be installed and functional.

PUMP OPERATION

Pump/Motor Rotation

CAUTION

Severe damage can be done to the pump if it is driven in reverse rotation. Do not install coupling spacer until correct motor rotation has been established.

If motor rotation has not been established, then:

WARNING

Driver power must be locked out to prevent accidental start-up and to prevent physical injury.

1. With power off and locked out, remove spacer between coupling hubs.
2. Restore power and momentarily energize (jog) motor to determine rotation. Motor shaft must rotate in direction of arrow on the pump. Correct rotation if necessary.

NOTE:
With a three-phase induction motor, swapping any two leads can change the rotation direction.

3. Shut off power and lock out.

Impeller Clearance

Impeller clearance is set during factory pump assembly, but it should be checked prior to initial pump start-up, especially if the service is at an elevated temperature where greater clearances are required. Clearances and adjustment procedures are shown in the Table 1, Page 18. Once clearance has been set and bolts tightened, rotate shaft by hand to verify that the impeller does not contact the case. Expect some drag from the mechanical seal.

Lubrication

Refer to the documentation of the motor to ensure that the motor has been properly lubricated and been thoroughly checked before starting pump operation.

Shaft Seal (Mechanical Seal or Packing)

For pumps with mechanical seals, the seal has been installed at the factory. No further adjustments are necessary. If cartridge seals are used, ensure that the positioning clips have either been removed or re-positioned for operation.

If the pump is furnished with packing, check to see that the gland nuts are finger-tight only. Packing must be run in gradually after initial start-up. For proper operation, packing must leak at least approximately 40-60 drops per minute in order to lubricate and cool the packing and shaft sleeve. Once the pump has been placed in operation, the gland nuts should be tightened ¼ turn at a time until the required leakage rate is attained. This may take several hours.

⚠ WARNING

A pump must never be allowed to run dry or without liquid in the seal chamber. Operating a pump without liquid in the casing or seal chamber, even briefly, can result in damage to the mechanical seal, damage to the pump or personal injury.

Priming

⚠ CAUTION

A centrifugal pump must be primed before operation. If run dry, damage can occur to close-clearance parts and the mechanical seal will be destroyed. If not primed, the pump will not deliver liquid.

Systems with Positive Suction Head (Flooded Suction)

Before pump operation, slowly open the suction isolation valve. Open air vents in suction and discharge piping until liquid flows out. Close all vents.

Systems on Suction Lift with Foot Valve

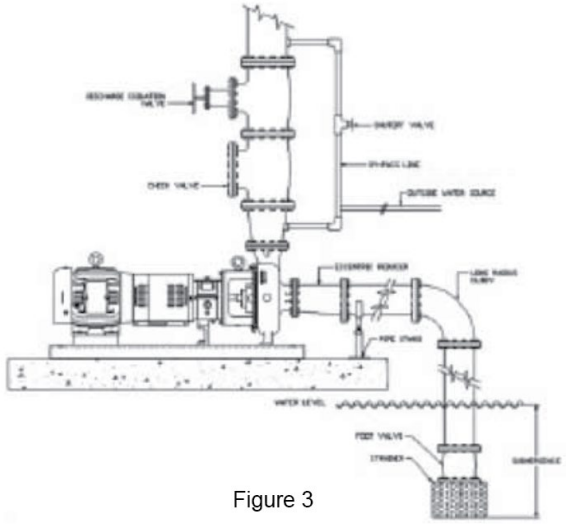


Figure 3

See Figure 3. Note vent location above pump discharge nozzle.

For initial start-up when the discharge system is empty, it may be necessary to provide prime with an external, or outside, water source. Once the discharge system is full, re-priming may be done with a bypass as shown.

With vent open, furnish water into the pump and suction piping with either a bypass line from the

discharge system or from an outside source. Once liquid escapes from the vent, the pump and suction pipe should be full of liquid (primed).

Starting the Pump

DO NOT operate the pump below minimum rated flows or with suction and/or discharge valve closed. These conditions may create an explosive hazard due to vaporization of the service fluid and can quickly lead to pump failure and physical injury.

1. Re-check motor to ensure that connections are correct. Check that thermal overload relays are properly sized and set for operation.
2. Be sure that the suction isolation valve is completely open. Never use the suction valve to control flow.
3. If the service fluid has a temperature greater than 200°F, the pump should be gradually warmed until its temperature is within 100°F of intended operating temperature. Heating rate should not exceed 2.5°F per minute.
4. Ensure that all flushing and cooling lines, as applicable, are attached and operational.
5. Discharge valve should be “cracked” open.
6. Start pump.
7. Immediately take note of the pressure gauges in order to validate that the pump is fully primed and is coming up to speed properly.
8. As soon as the driver comes up to full speed, gradually open the discharge valve allowing the system to fill and stabilize at the pump’s operating capacity and head
9. Listen for any untoward noise and check for any significant vibration or indications of binding. If any of these are observed, the pump should be stopped immediately and a thorough check of the installation should be made to determine the cause. Correct any fault(s) prior to re-starting the pump.
10. Check the shaft seal. If the pump has a mechanical seal, there should be no visible leakage. If pump has packing, there should be a steady leakage stream. See section on page 16 for instructions for properly setting the packing.

Operating Precautions

- Do not allow the pump to be subjected to pressures that are higher than the maximum allowable working pressure (MAWP)
- Do not allow the pump the be subjected to temperatures greater than the maximum allowable working temperature (MAWT)
- If altering the pump flowrate by increasing system resistance (e.g. by adjusting a valve), always throttle the flow on the discharge side of the pump. Throttling on the suction side of the pump will decrease the NPSHa for the pump and can cause pump damage
- Do not overload the driver, which can damage the driver and create unexpected heat generation. This can occur if the specific gravity of the service fluid increases from what the motor was sized for. Another example that can cause excessive power draw is a change in the system which allows the pump flowrate to exceed the rated conditions
- Do not operate the pump with a flowrate less than the indicated minimum flowrate
- Do not subject the pump to freezing conditions. Freezing may damage the components, leading to possible injury or flooding

TROUBLESHOOTING

If problems are encountered during start-up or pump operation, refer to the following table for likely causes:

Problem	Possible Cause	Remedy
No liquid delivered	Pump not primed	Re-prime pump, check that suction line is full of liquid
	Suction line obstructed	Remove obstruction
	Impeller clogged	Remove obstruction
	Wrong direction of rotation Note: Possible severe damage!	Check rotation, change if necessary
	Foot valve or suction pipe has inadequate submergence	Check suction source for vortexing, correct as necessary
	Suction lift too high	Review/revise level on suction
Pump does not produce rated flow or head	Air leak through gasket	Replace gasket, tighten connections
	Air leak through stuffing box	Inspect packing/mechanical seal, add pressurized flush if necessary
	Impeller partially clogged	Remove obstruction
	Inadequate suction head	Review/revise design
	Worn or damaged impeller	Inspect/replace as necessary
Pump starts then stops pumping	Pump improperly primed	Re-prime pump
	Air or vapor in suction line	Review/revise suction piping to eliminate air pockets
	Air leak in suction line	Check gaskets, repair leak
Bearings run hot	Improper lubrication	Check lubricant for applicability and level/quantity
	Bearing cooling not working	Check cooling water line(s)
Pump is noisy or vibrates	Partial impeller clog/imbalance	Remove obstruction
	Broken or bent impeller or shaft	Replace as necessary
	Foundation not rigid	Tighten hold-down bolts of base, pump and motor, re-check alignment
	Worn bearings	Replace as necessary
	Suction and/or discharge piping not anchored correctly	Review design, modify as necessary
	Pump cavitation	Review suction system, correct problem(s)
Excessive stuffing box leakage	Packing gland improperly adjusted	Tighten gland nuts
	Stuffing box not packed properly	Check, re-pack as necessary
	Shaft sleeve scored, ridged	Replace as necessary
	Worn mechanical seal	Replace as necessary
Excessive power required	Actual head lower than design	Throttle discharge valve slightly, trim impeller. Review design
	Liquid heavier than expected	Review design
	Stuffing box packing too tight	Re-pack pump
	Rotating parts binding	Check pump internals

REPAIR AND MAINTENANCE

Disassembly and Reassembly Warnings

Prior to working on this or any pump, note the following safety precautions and warnings:

WARNING

- Lock out power supply.
- Close suction and discharge valves.
- Pump components can be heavy. Proper lifting methods must be used to avoid physical injury and equipment damage.
- Wear steel-toe shoes, safety glasses, gloves and any other required protective clothing.
- If the pump contains toxic or hazardous fluids, proper personal protective equipment must be worn.
- Toxic or hazardous materials must be handled and disposed of properly in accordance with all applicable environmental regulations.
- Never apply heat to remove parts. Trapped liquid may cause an explosion and cause physical injury.
- Allow system components to cool before handling.

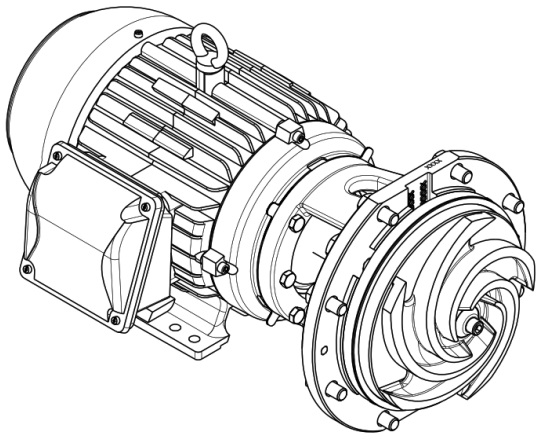
The Griswold Model 811CC Series pump utilizes a back pull-out design. The pumping assembly (back pull-out assembly) can be removed from service without disturbing the casing.

Disassembly Required Tools

- Open End Wrenches
- Allen Wrenches
- Micrometer
- Torque Wrench
- Feeler Gages
- Hoist
- Rubber Mallet
- Screwdriver(s)
- Cleaning Agents

Removing Pump from Service

1. Lock out power supply.
2. Close suction and discharge valves.
3. Drain liquid from casing and flush as necessary or required. If liquid is toxic or hazardous, wear appropriate protective equipment and handle liquid properly!
4. Disconnect any flushing or cooling lines.
5. Remove motor foot hold-down bolts.
6. Remove complete back pull-out assembly by removing frame adapter-to-casing bolts (26). The adapter has provisions for 3/8-16 UNC jacking screws to aid in this process, if needed. Support back pull-out assembly with appropriate lifting device(s).
7. Inspect casing internals for wear.
8. Using suitable lifting device(s), transport back pull-out assembly to maintenance area.



Impeller Removal

1. Secure pump/back pull-out assembly to work bench.
2. Remove impeller screw and washer (14 and 13)
3. Remove impeller (11). Do not apply heat as this poses an explosion risk due to any trapped service fluid in the impeller bore. Discard both O-ring seals on each side of the impeller (12 and 15).

Removal of Stuffing Box Cover – Mechanical Seal Pumps

Seals may be component type or cartridge type. With a cartridge seal, the gland, sleeve, and seal rotary and stationary components are an assembled unit.

Component Seal Removal

1. Remove seal gland stud nuts (10). Separate seal gland (19) and slide gland toward motor (33).
2. Remove stuffing box stud nuts (8).
3. To remove stuffing box (5), slide component forward and off of pump shaft.
4. Remove seal components together with shaft sleeve (23). Note that seal set screws may have to be loosened. Remove seal components from shaft sleeve. Slide seal gland with stationary seat and O-ring gasket off of pump shaft. Be careful not to damage the stationary seat of the seal as it is located in the gland bore.

Cartridge Seal Removal

Refer to seal manufacturer's drawing:

1. Replace seal rotary positioning clips.
2. Loosen seal sleeve axial adjustment set screws.
3. Remove seal gland stud nuts (10).
4. Slide cartridge seal assembly back toward motor (33).
5. Remove stuffing box stud nuts (Item 8).
6. To remove stuffing box (Item 5), slide component forward and off of pump shaft.
7. Remove cartridge seal assembly.

Removal of Stuffing Box Cover – Packed Stuffing Box Pumps

1. Remove packing gland stud nuts (10).
2. Remove stuffing box cover stud nuts (8).
3. Remove stuffing box cover (5) by sliding component forward and off of pump shaft.
4. Remove packing rings (17) and lantern ring (16).

Removal of Frame Adapter

Every 811CC pump has an adapter between the motor and the pump. The adapter will have 4 shim packs between the bracket and the motor of identical thickness. The pump will also be shipped with additional shims so that clearance adjustments can be made.

1. Loosen the motor-to-adapter bolts (29).
2. Remove the 4 shim packs (32) that are between the adapter and the motor. Inspect the shims, discarding any that are damaged, and place shims with the extra shims that were shipped with the pump for future pump reassembly.
3. Remove the motor-to-adapter bolts (29) and remove the adapter (27).

Parts Inspection

All parts must be inspected before reassembly to ensure that the rebuilt pump will perform properly. Each part should be examined for signs of fatigue, excessive wear and cracks. Replace any worn parts if they do not meet the following tolerance standards.

- Sleeve (23) - Visually inspect. Check for grooves or pitting. Replace sleeve if worn.
- Casing (1) - Visually inspect for signs of wear, corrosion, or pitting. The casing should be replaced if wear exceeds 1/8" deep. Check gasket surface for signs of corrosion or irregularities.
- Impeller (11) - Visually inspect impeller vanes for wear, erosion or corrosion damage. If vanes are worn more than 1/8" deep, or if they are bent, the impeller should be replaced.
- Frame Adapter (27) - Visually inspect for cracks, warpage or corrosion damage. Replace if any of these signs appear.
- Seal Chamber/Stuffing Box Cover (5) - Visually inspect for cracks, pitting, erosion or corrosion. Check face of cover for wear, scoring or grooves. Replace if worn more than 1/8" deep.

Check Stuffing Box Cover Runout

1. Install stuffing box cover (5) with studs and nuts (7 and 8).
2. Mount dial indicator on the end of the shaft. Rotate shaft 360°. Maximum dial indicator runout should not exceed 0.005" for outside diameter of pilot fit, face of casing gasket surface and stuffing box cover face.

If greater values are measured, disassemble and determine cause before proceeding with assembly.

Check Impeller Runout

1. Install shaft sleeve and impeller. Tighten impeller onto shaft.
2. Attach dial indicator to flange of frame adapter. Position indicator on tip of impeller vane. Rotate shaft 360 degrees. Check impeller run out from vane tip to vane tip. Total indicator runout should be less than 0.005 inch. If greater values are measured, disassemble and determine cause before proceeding with assembly.

Preliminary Impeller Clearance Adjustment

1. Loosely install the frame adapter (27) onto the motor (33).
2. Before tightening the adapter-to-motor bolts (29), install a shim pack of 0.075″ thickness between the motor and the bracket at each of the 4 bolt locations.
3. Snug the adapter-to-motor bolts (29). These bolts will be loosened again for the final impeller clearance adjustment.
4. Check that the impeller rotates freely. If necessary, adjust shim pack thickness.

I. For Pumps with Component Mechanical Seals

1. Apply a bluing solution to the shaft sleeve and scribe a mark on the sleeve at the face of the seal chamber/stuffing box cover. This locates the seal setting reference point for the installation of the mechanical seal rotary unit. See mechanical seal manufacturer's dimension print for the seal to be used.
2. Remove the impeller (11) and shaft sleeve (23). Remove stuffing box cover (5).
3. Install the mechanical seal stationary seat into the mechanical seal gland (19). Follow the seal manufacturer's instructions. Slide the seal gland with the stationary seat over the shaft and locate back towards the bearing frame.
4. Install the seal rotary unit on the shaft sleeve following the seal manufacturer's instructions. Re-install the sleeve (23), with seal rotary, on the pump shaft.
5. Install stuffing box cover (5) with studs and nuts (7 and 8).
6. Install impeller with O-rings (15 and 12) and fasten it onto the shaft with the impeller screw and washer (14 and 13).
7. Install mechanical seal gland (19) over studs with nuts (10). Tighten nuts evenly. Check shaft for free rotation. If any binding or rubbing occurs, determine cause and correct before proceeding.

II. For Pumps with Cartridge-type Mechanical Seals

Cartridge seals are supplied as an assembled unit, therefore the gland, sleeve, seal rotary and seal stationary are pre-assembled and seal compression is pre-set at the factory. Seal faces are held in position for assembly into the pump with positioning screws or clips.

After the preliminary impeller adjustment is made:

1. Remove impeller (11) and stuffing box cover (5).
2. Install cartridge seal assembly over the pump shaft (or pump shaft sleeve, if used) being careful to not damage the O-ring located in the ID of the seal's shaft sleeve. Locate the seal assembly back towards the motor (33).
3. Install stuffing box cover (5) with studs and nuts (7 and 8).
4. Install impeller with O-rings (15 and 12) and fasten it onto the shaft with the impeller screw and washer (14 and 13).
5. Install the cartridge seal assembly over the studs with nuts (9 and 10). Tighten nuts evenly.
6. It is recommended to wait until after the final impeller adjustment before setting the cartridge seal sleeve set screws and removing the axial positioning seal clips.

III. For Pumps with Packed Stuffing Box

For proper operation, packing must leak to provide lubrication and cooling. Packing should be gradually run in until a leakage rate of at least 40-60 drops per minute is achieved. Do not attempt to eliminate leakage by over-tightening the gland nuts. If any solids are present in the service fluid, it will be necessary to provide a clean liquid flush to the lantern ring connection

in the stuffing box cover (flushes between the rings of packing).

After the preliminary impeller adjustment is made:

1. Remove impeller (11) leaving the shaft sleeve (23) in place.
2. Re-install impeller with O-rings (15 and 12) and fasten it onto the shaft with the impeller screw and washer (14 and 13).
3. Install packing rings (17) into the stuffing box (5). Stagger the packing ring joints at 90° intervals. Three rings should be located at the bottom of the stuffing box (5), followed by the lantern ring (16), then followed with three additional rings (Item 17). Be sure the lantern ring is located under the lantern ring flush connection. Otherwise, flushing liquid, if used, cannot enter between the packing rings.
4. Install the packing gland halves (18) and tighten the gland nuts (10) finger-tight only.

NOTE: When the pump is initially run, there will be a relatively high leakage rate from the stuffing box and this is to be expected. As the packing runs in, the gland nuts may be tightened gradually until the required leakage rate (40-60 drops per minute) is reached. It is suggested that the gland nuts be tightened 1/4 turn at a time every 2-3 hours during the run-in period.

Installation of Back Pull-out Assembly

NOTE: Use proper lifting methods and equipment to avoid physical injury and/or damage.

1. Inspect casing. Clean casing register bores and gasket seal face and install gasket (4) into case (1).
2. Install back pull out assembly into casing.
3. Apply anti-seize compound to casing bolts (26). Install casing bolts hand tight.
4. Incrementally torque casing bolts to values shown in APPENDIX I in an alternating star pattern.

NOTE: While tightening the bolts, keep checking that the impeller can rotate freely. Stop and investigate if the impeller seizes. Shims may need to be added/removed from between the adapter and the motor if the impeller is contacting either the case or the stuffing box. Also check that all of the components between the motor and the case are squarely assembled one to another.

5. Set impeller clearance as described in the following section.
6. Check shaft rotation by hand. If binding or rubbing is present, determine the cause and correct before proceeding.
7. Re-connect cooling and/or flushing lines.
8. Check motor rotation by bumping the motor.

Proceed with pump start-up as noted in the “Operation” Section.

Setting the Impeller Clearance

Setting the impeller clearance of an 811CC Series pump is done by adjusting the thickness of shims between the adapter and the motor, which relocates the axial position of the impeller between the case and stuffing box. Therefore, the impeller clearance can be set at the workbench or after the case has been installed into the piping.

1. Before starting the impeller clearance setting procedure, it is expected that the pump has been assembled with the preliminary impeller clearance setting (see page 16), that the impeller spins freely within the pump without rubbing and, if applicable, that the cartridge mechanical seal axial position has not yet been set. If the case flanges are bolted to the system piping, the motor hold-down bolts must be loosened and/or removed to facilitate the small axial movements necessary to conduct the procedure.
2. Loosen the adapter-to-motor bolts (29). sufficiently to remove all 4 shim packs (32). The adapter has provisions for 3/8-16 UNC jacking bolts to aid in this process, if needed.
3. Slowly and evenly tighten the adapter-to-motor bolts (30) until the case lightly touches the impeller.

   NOTE: When it has been determined that the case is touching the impeller (which can be checked by rotating the shaft and listening/feeling for rubbing), check that the

gap between adapter and the case is even with a feeler gauge. If the measurement varies more than 0.008", repeat the previous step until the measurement is even. This will ensure that an accurate impeller clearance is being set.

4. Take multiple gap measurements between the adapter and the motor with a feeler gauge. Average the gap readings to determine the average gap. Take note of this value.
5. Determine and take note of the target impeller clearance (see Table 1).

Service Fluid Temperature	811CC Recommended Assembly Impeller Clearance
-20°F to 200°F	0.005″
Up to 250°F	0.006″

Table 1: Recommended Assembly Impeller Clearance vs. Service Temperature

6. Take the average gap reading from step 4 and add the target impeller clearance from step 5. This will be the shim pack thickness.

$$Shim\ Pack\ Thickness = Average\ Gap + Impeller\ Clearance$$

7. Assemble 4 shim packs to meet the calculated shim pack thickness. Verify the shim pack thicknesses with a suitable instrument (e.g. a pair of calipers). Insert the 4 shim packs between the frame adapter (27) and the motor (33) at the bolt locations.
8. Tighten the adapter-to-motor bolts (29) to the torque specified in APPENDIX I.
9. Verify that the impeller (11) can freely rotate without contact with the case or stuffing box.
10. Keep any remaining shims for future impeller clearance adjustments.

Routine and Preventative Maintenance

A routine maintenance program can and will extend the life of your pump. Well-maintained equipment will last longer and require fewer, less expensive repairs. You should keep detailed maintenance records as this is helpful in diagnosing problems and the potential causes of problems.

Routine monitoring practices should include, as a minimum:

- Shaft seal condition – mechanical seals should show no visible leakage. Packing, if used, should leak at a rate of about 40-60 drops per minute.
- Overall pump vibration – imminent bearing failure can be preceded by a change in bearing vibration. Other vibration problems can arise due to the presence of cavitation or resonances between the pump, the foundation and the piping.
- Pressure gauges on the suction and discharge sides of the pump. The difference between the gauge readings can be used to calculate the total developed head by the pump. A gradual decrease in the developed head of the pump can indicate an opening of the impeller clearance and the need for impeller clearance adjustment to maintain design pump performance.

Quarterly Maintenance

Every three months, the following inspections should be done:

- Check foundation and hold-down bolts for tightness.

Annual Maintenance

The pump's performance should be measured in detail at least once per year. It's helpful to establish performance benchmarks during the early stages of pump operation while parts are new and installation adjustments are correct. This data should include:

- Pump developed head as measured by suction and discharge gauges.
- Pump flow rate. This may be difficult to define in most installations, but if possible to ascertain, it is a very useful variable.
- Motor power consumption (amp draw)
- Vibration signature

When an annual assessment of pump performance is made, any changes in the above data may be helpful in determining maintenance that may be required.

Maintenance and monitoring intervals should be shortened if the pump is applied in an especially

severe service such as with highly corrosive liquids or applications with measurable amounts of solids.

SPARE PARTS

Recommended Spares – All Pumps

- Impeller (11)
- Shaft Sleeve and O-ring (23 and 24)
- Case Gasket (4)
- Impeller O-Rings (15)
- Impeller Screw and O-ring (12 and 14)
- Shim Packs, Qty 4 (32)

Recommended Spares – By Pump Application

- For pumps utilizing a packed stuffing box:
  - Lantern Ring Half, Qty 2 (16)
  - Packing Set, 5 Rings (17)
  - Packing Gland (18)
- For pumps utilizing a mechanical seal:
  - Spare mechanical seal, per application

Whenever a pump is disassembled, parts that have been permanently compressed such as gaskets and O-rings should be replaced during reassembly.

Ordering Parts

Parts are available through your local authorized Griswold distributor. Please provide a serial number for accurate identification.

APPENDIX
Torque Values

Use the bolt torque values shown in the following table to aid in the reassembly of the pump.

	Case Size	Bolt Diameter	Maximum Assembly Torque, ft-lbs (N-m)	
			Dry	Lubed
Casing Bolt	6"	5/8"	59 (80)	39 (53)
	8"	1/2"	30 (41)	20 (27)
Frame adapter	8"	1/2"	59 (80)	39 (53)
Impeller Screw	All	3/8"	12 (16)	8 (11)
Adapter-to-Motor Bolts	All	3/8"	29 (39)	19 (26)

Table 2: Maximum Bolt Assembly Torque Values

Pressure-Temperature Ratings

Chart 1 specifies the maximum allowable working pressure for 811CC pumps given the pump material of construction, the case flange rating and the pumping temperature.

The maximum allowable working temperature for 811CC pumps is 250°F.

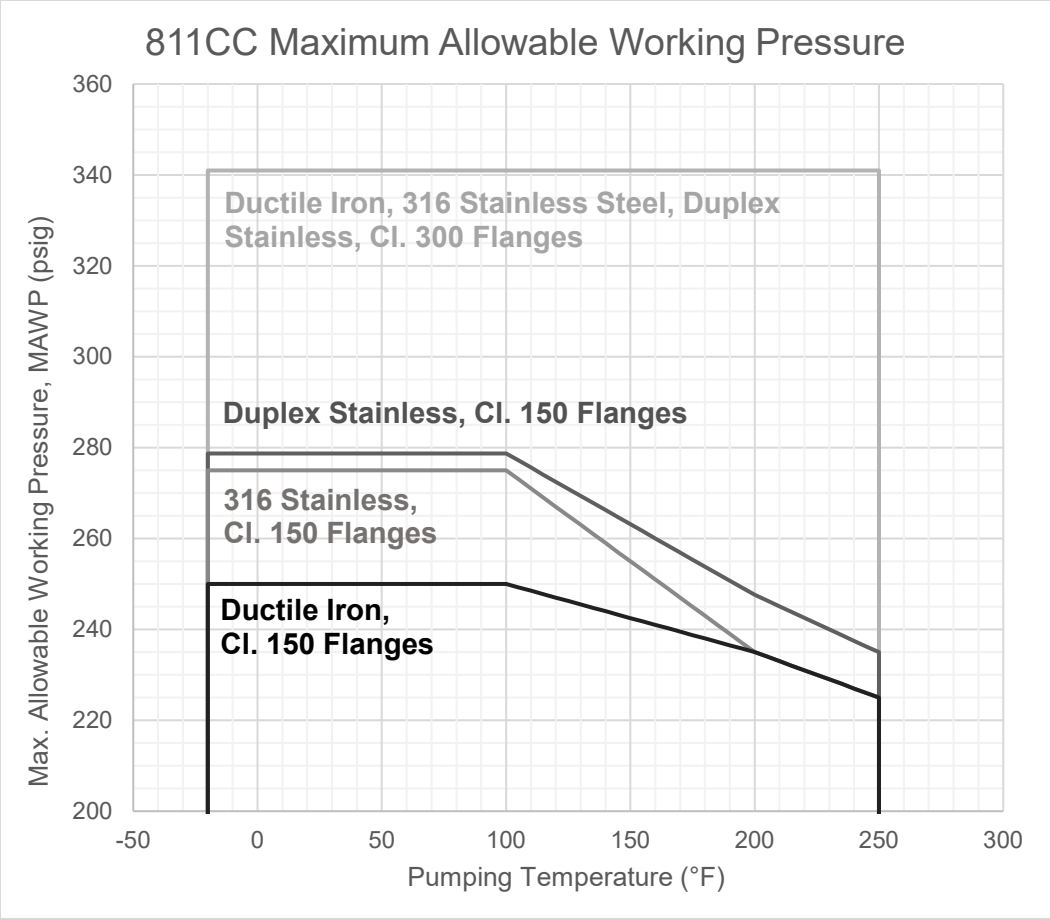
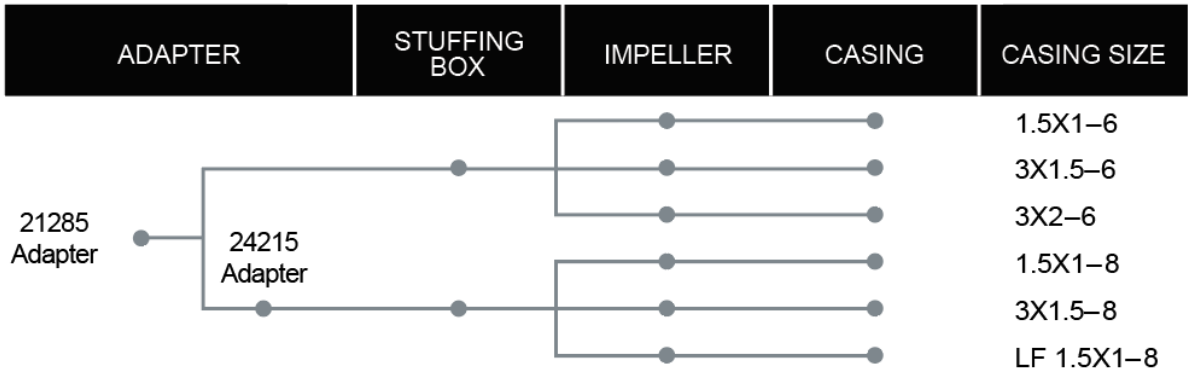


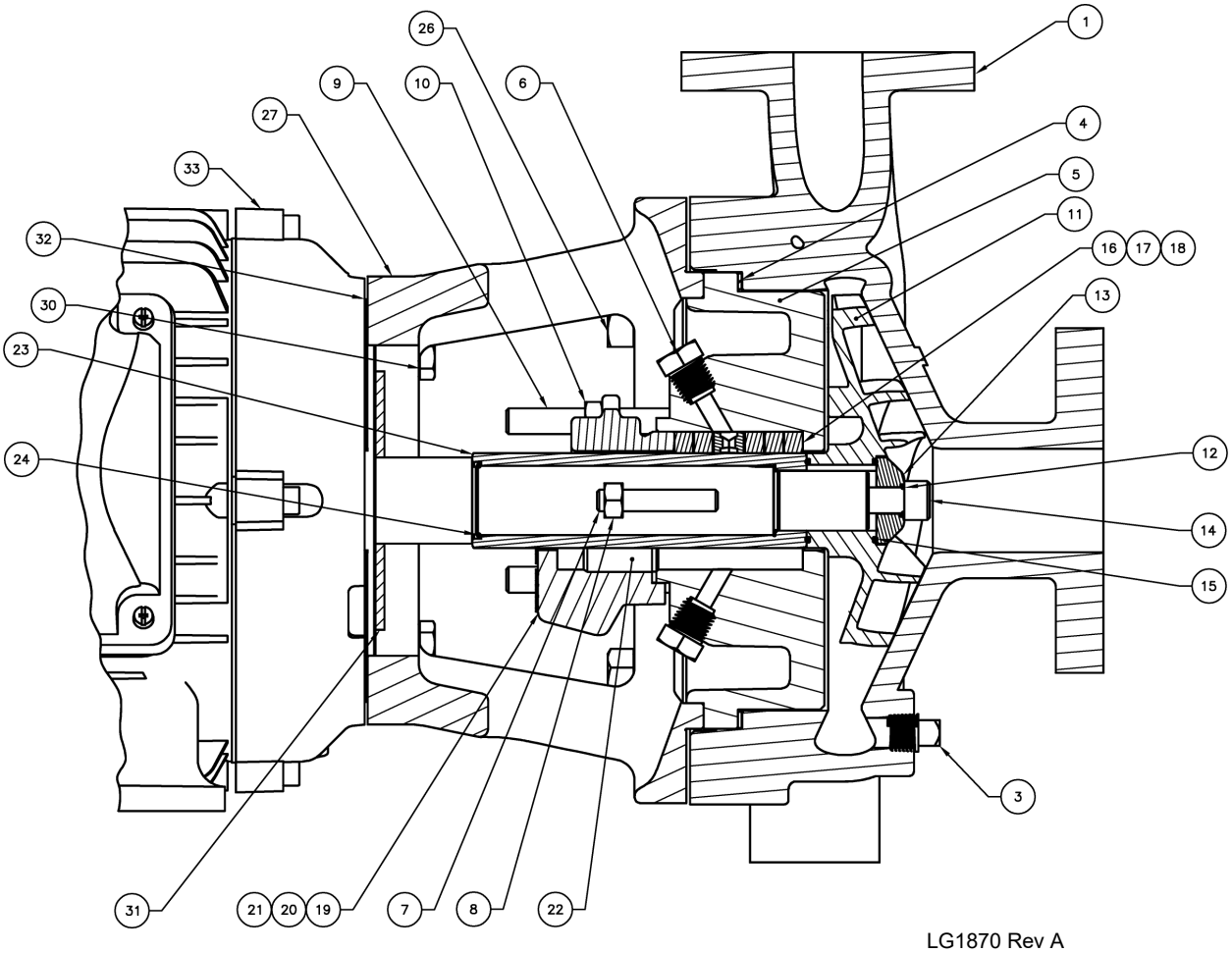
Chart 1: 811CC Maximum Allowable Working Pressure vs. Temperature

Parts Interchangeability Chart

Casings and impellers are unique for each pump size. The casings and stuffing boxes are interchangeable with Griswold 811 pumps and the 811CC impellers are a reworked (bored) version of impellers from the Griswold 811 product line.



811CC Series 6" Cross Sectional



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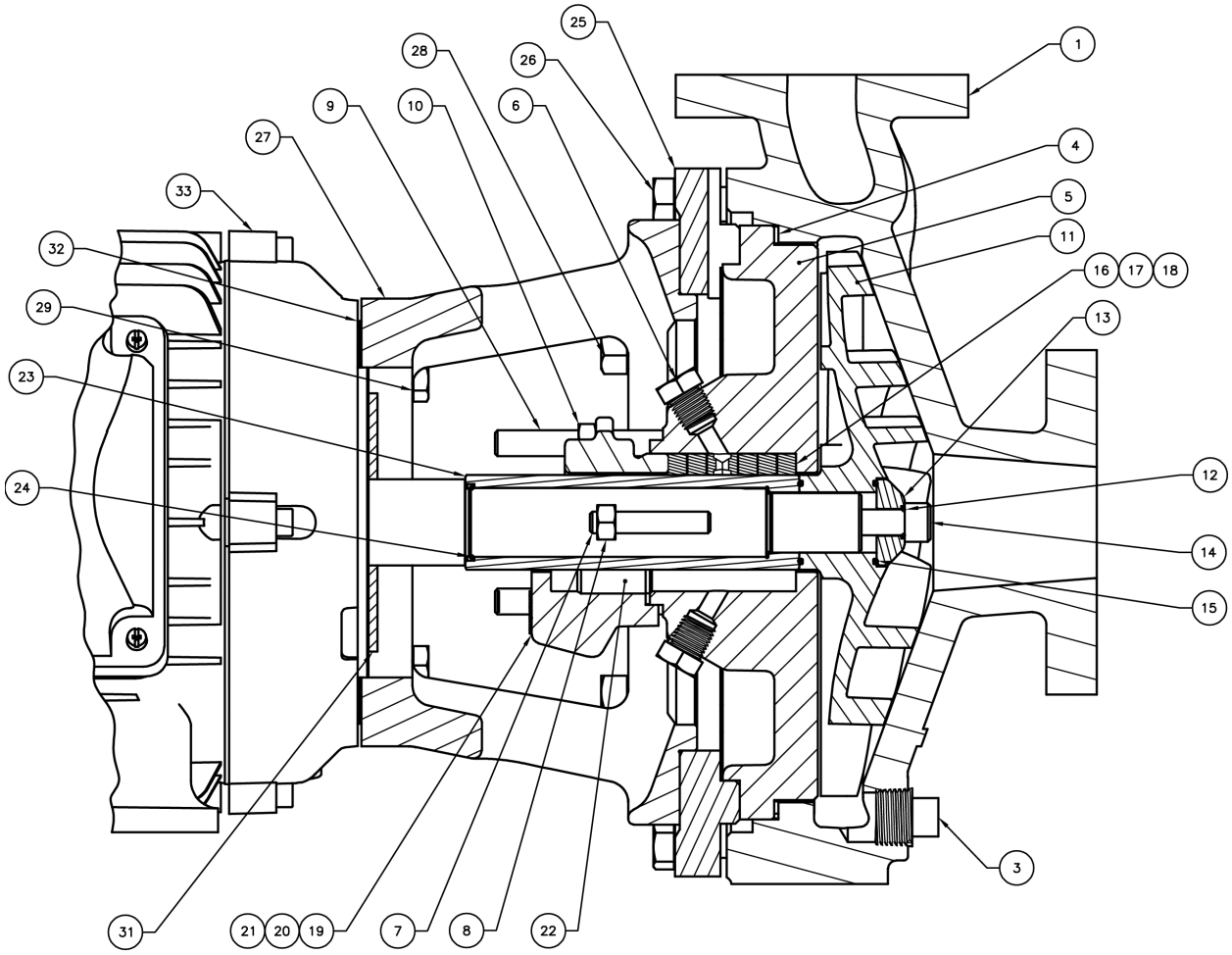
811CC Series 8" Cross Sectional



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Parts and Material Composition

Item	Description	Qty.	Material	
1	Case	1	Ductile Iron	CD4MCu
2	Discharge and Suction Tap Plug (Not Shown)	1	Stainless Steel	
3	Casing Drain Plug	1	Stainless Steel	
4	Case Gasket	1	EPDM/Aramid Fiber	
5	Stuffing Box	1	Ductile Iron	CD4MCu
6	Stuffing Box Plug	2	Stainless Steel	
7	Stuffing Box / Adapter Stud	2	Stainless Steel	
8	Stuffing Box / Adapter Stud Nut	2	Stainless Steel	
9	Gland Stud	4	Stainless Steel	
10	Gland Nut	4	Stainless Steel	
11	Impeller	1	CD4MCu	
12	Impeller Screw O-Ring	1	Viton	
13	Impeller Washer	1	Stainless Steel	
14	Impeller Screw	1	Stainless Steel	
15	Impeller O-Ring	2	PTFE	
16	Lantern Ring	2	PTFE	
17	Packing	5	Kevlar	
18	Packing Gland	2	Stainless Steel	
19	Gland	1	Stainless Steel	
20	Gland Gasket	1	EPDM/Aramid Fiber	
21	Packing Gland Plug	1	Stainless Steel	
22	Seal (Not Shown)	1	Consult Factory	
23	Sleeve	1	Stainless Steel	
24	Sleeve O-Ring	1	Viton	
25	8" Small Frame Adapter	1	Ductile Iron	
26	Case Screw	4, 8	Stainless Steel	
27	Frame Adapter	1	Ductile Iron	
28	Adapter / Adapter Screw	4	Steel	
29	Motor / Adapter Screw	4	Stainless Steel	
30	Bracket / Motor Jacking Screw (Not Shown)	2	Stainless Steel	
31	Slinger	1	Neoprene	
32	Shim	-	Stainless Steel	
33	Motor	1	Consult Factory	

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