Installation,
Operation, and
Maintenance Manual

Series 90

Bell & Gossett
a xylem brand

Table of Contents

Introduction and Safety

Introduction

Purpose of this manual

The purpose of this manual is to provide necessary information for:

- Installation
- Operation
- Maintenance

CAUTION:

Read this manual carefully before installing and using the product. Improper use of the product can cause personal injury and damage to property, and may void the warranty.

NOTICE:

Save this manual for future reference, and keep it readily available at the location of the unit.

Requesting other information

Special versions can be supplied with supplementary instruction leaflets. See the sales contract for any modifications or special version characteristics. For instructions, situations, or events that are not considered in this manual or in the sales documents, please contact the nearest Xylem representative.

Always specify the exact product type and identification code when requesting technical information or spare parts.

Safety

WARNING:

- The operator must be aware of safety precautions to prevent physical injury.
- Any pressure-containing device can explode, rupture, or discharge its contents if it is over-pressurized. Take all necessary measures to avoid over-pressurization.
- Operating, installing, or maintaining the unit in any way that is not covered in this manual could cause death, serious personal injury, or damage to the equipment. This includes any modification to the equipment or use of parts not provided by Xylem. If there is a question regarding the intended use of the equipment, please contact a Xylem representative before proceeding.
- This manual clearly identifies accepted methods for disassembling units. These methods must be adhered to. Trapped liquid can rapidly expand and result in a violent explosion and injury. Never apply heat to impellers, propellers, or their retaining devices to aid in their removal.
- Do not change the service application without the approval of an authorized Xylem representative.

CAUTION:

You must observe the instructions contained in this manual. Failure to do so could result in physical injury, damage, or delays.

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

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:

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

NOTICE:

Never operate a unit unless safety devices are installed. Also see specific information about safety devices in other chapters of this manual.

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.

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.
- 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.
- Allow all system and pump components to cool before you handle them.
- Make sure that the product has been thoroughly cleaned.
- Disconnect and lock out power before you service the pump.
- Check the explosion risk before you weld or use electric hand tools.

Wash the skin and eyes

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.

Condition	Action
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.

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:

Do NOT send the product to the Xylem manufacturer if it has been contaminated by any nuclear radiation. Inform Xylem so that accurate actions can take place.

Electrical installation

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

Recycling guidelines

Always follow local laws and regulations regarding recycling.

Product warranty

Coverage

Xylem undertakes to remedy defects in products from Xylem under these conditions:

- The faults are due to defects in design, materials, or workmanship.
- The faults are reported to an local sales and service 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 Xylem authorized personnel.
- Genuine Xylem parts are used.
- Only Ex-approved spare parts and accessories authorized by an EX-approved Xylem representative are used in Ex-approved products.

Limitations

The warranty does not cover defects caused by these situations:

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

Xylem assumes no liability for these situations:

- Bodily injuries
- Material damages
- Economic losses

Warranty claim

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

Transportation and Storage

Inspect the delivery

Inspect the package

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.
   If the product has been picked up at a distributor, make a claim directly to the distributor.

Inspect the unit

1. Remove packing materials from the product.
   Dispose of all packing materials in accordance with local regulations.
2. Inspect the product to determine if any parts have been damaged or are missing.
3. If applicable, unfasten the product by removing any screws, bolts, or straps.
   For your personal safety, be careful when you handle nails and straps.
4. Contact your sales representative if anything is out of order.

Pump lifting

WARNING:

- Assembled units and their components are heavy. Failure to properly lift and support this equipment can result in serious physical injury and/or equipment damage. Lift equipment only at the specifically identified lifting points. Lifting devices such as eyebolts, slings, and spreaders must be rated, selected, and used for the entire load being lifted.
- Crush hazard. The unit and the components can be heavy. Use proper lifting methods and wear steel-toed shoes at all times.

In order to lift the entire pump, use slings placed around the unit as shown.

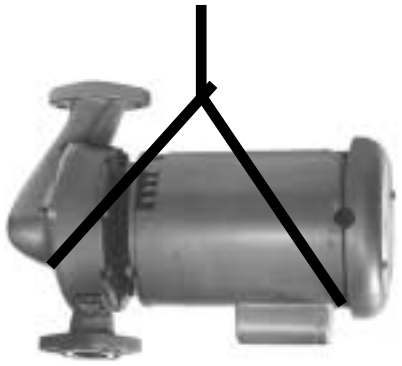

Figure 1: Proper lifting method

Long-term storage

If the unit is stored for more than 6 months, these requirements apply:

- Store in a covered and dry location.
- Store the unit free from heat, dirt, and vibrations.
- Rotate the shaft by hand several times at least every three months.

Treat bearing and machined surfaces so that they are well preserved. Refer to the drive unit and coupling manufacturers for their long-term storage procedures.

For questions about possible long-term storage treatment services, please contact your local Xylem sales representative.

Product Description

General description

The Series 90 in-line mounted centrifugal pump is a close-coupled pump.

This pump is available for pipe sizes that range from 1 inch to 2 inches.

Pump application

WARNING:

California Proposition 65 warning! This product contains chemicals known to the state of California to cause cancer and birth defects or other reproductive harm.

You can use this pump for these types of applications:

- Hydronic heating and cooling
- Domestic hot water
- Cooling towers
- Machinery cooling
- Pressure boosting
- Industrial fluid transfer
- Refrigeration and heater exchanger circulation

This pump is for indoor use only.

Xylem recommends that you use bronze constructed pumps for pumping potable water. For other applications, contact your local sales and service representative.

Operational specifications

Operational limitations

Parameter	Value
Maximum working pressure	175 psi
Pump construction	Iron or bronze Standard mechanical seal

Mechanical seal specifications

Materials of Construction	BUNA carbon/ceramic	EPR carbon/tungsten carbide	EPR Sic/SiC
Standard/optional	Standard	Optional	Optional
Operating temperature range	-20˚F to 225˚F (-29˚C to 107˚C)	-20˚F to 250˚F (-29˚C to 121˚C)	0˚F to 250˚F (-18˚C to 121˚C)
pH range	7.0–9.0	7.0–11.0	7.0–12.0
Maximum glycol/water concentration	50/50%	50/50%	60/40%
Maximum suction pressure	Suction Pressure + TDH must not exceed MWP		

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Maximum suction pressure	Suction Pressure + TDH must not exceed MWP		

Installation

Preinstallation

Precautions

WARNING:

- When installing in a potentially explosive environment, make sure that the motor is properly certified.
- You must earth (ground) all electrical equipment. This applies to the pump equipment, the driver, and any monitoring equipment. Test the earth (ground) lead to verify that it is connected correctly.

NOTICE: Supervision by an authorized Xylem representative is recommended to ensure proper installation. Failure to do so may result in equipment damage or decreased performance.

Pump location guidelines

WARNING:

Assembled units and their components are heavy. Failure to properly lift and support this equipment can result in serious physical injury and/or equipment damage. Lift equipment only at the specifically identified lifting points. Lifting devices such as eyebolts, slings, and spreaders must be rated, selected, and used for the entire load being lifted.

Guideline	Explanation/comment
Keep the pump as close to the liquid source as practically possible.	This minimizes the friction loss and keeps the suction piping as short as possible.
Make sure that the space around the pump is sufficient. Also make sure that you can protect the area below the pump from water damage.	This facilitates ventilation, inspection, maintenance, and service.
If you require lifting equipment such as a hoist or tackle, make sure that there is enough space above the pump.	This makes it easier to properly use the lifting equipment and safely remove and relocate the components to a safe location.
Protect the unit from weather and water damage due to rain, flooding, and freezing temperatures.	This is applicable if nothing else is specified.
Do not install and operate the equipment in closed systems unless the system is constructed with properly-sized safety devices and control devices.	Acceptable devices: • Pressure relief valves • Compression tanks • Pressure controls • Temperature controls • Flow controls If the system does not include these devices, consult the engineer or architect in charge before you operate the pump.
Take into consideration the occurrence of unwanted noise and vibration.	Vibration can be transmitted to the piping system, which can result in objectionable noise away from the pump.

Guideline	Explanation/comment
If the pump location is overhead, undertake special precautions to reduce possible noise transmission.	Consider a consultation with a noise specialist.
When possible, locate the pump below the fluid level.	This facilitates priming, ensures a steady flow of liquid, and provides a positive suction head on the pump.

Mode of discharge

You can install this pump to discharge either vertically or horizontally. The arrow on the pump body must point in the direction of the flow.

You can install the pump with the motor either vertical or horizontal. Do not install the motor below the pump body.

Piping checklist

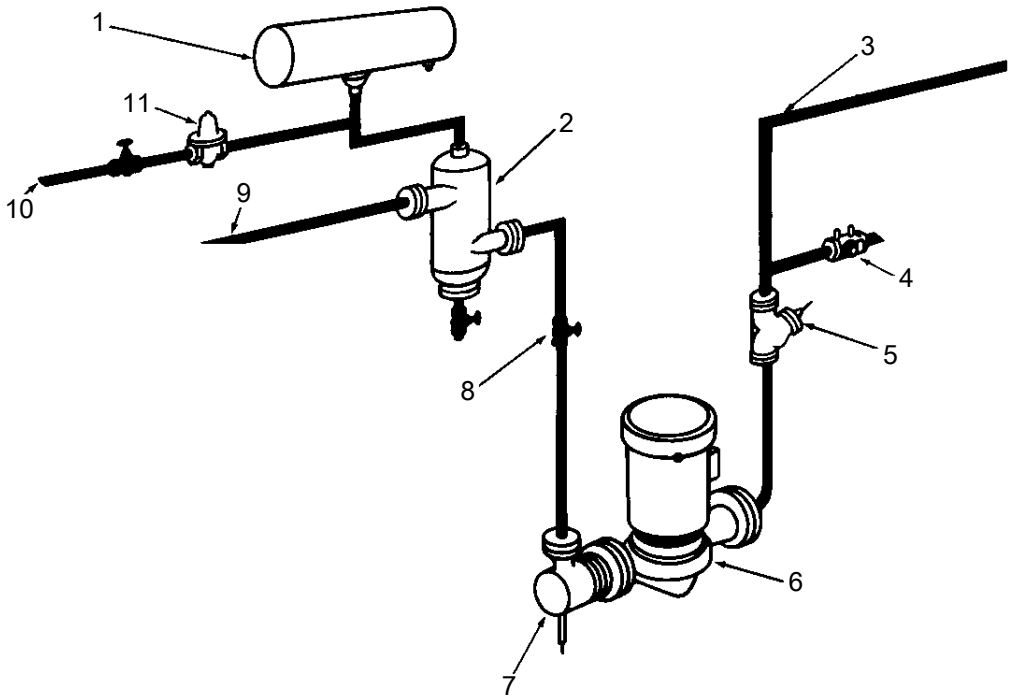
WARNING:

- The heating of water and other fluids causes volumetric expansion. The associated forces can cause the failure of system components and the release of high-temperature fluids. In order to prevent this, install properly sized and located compression tanks and pressure-relief valves. Failure to follow these instructions can result in serious personal injury or death, or property damage.
- Avoid serious personal injury and property damage. Make sure that the flange bolts are adequately torqued.
- Never force piping to make a connection with a pump.

Check	Explanation/comment	Checked
Check that a section of straight pipe, with a length that is five times its diameter, is installed between the suction side of the pump and the first elbow, or that a suction diffuser is installed.	This reduces suction turbulence by straightening the flow of liquid before it enters the pump.	
Check that the suction and discharge pipes are supported independently by use of pipe hangers near the pump .	This eliminates pipe strain on the pump .	
Check that there is a strong, rigid support for the suction and discharge lines.	As a rule, ordinary wire or band hangers are not adequate to maintain proper alignment.	
For pumps with flanges, check that the bolt holes in the pump flanges match the bolt holes in the pipe flanges.	–	
Check that the suction or discharge lines are not forced into position.	Coupling and bearing wear will result if suction or discharge lines are forced into position.	
Check that fittings for absorbing expansion are installed in the system when considerable temperature changes are expected.	This helps to avoid strain on the pump.	
Check that you have a foot valve of equal or greater area than the pump suction piping when you use an open system with a suction lift.	Prevent clogging by using a strainer at the suction inlet next to the foot valve. Make sure that the strainer has an area three times that of the suction pipe with a mesh hole diameter of no less than 0.25 in. (0.64 cm).	
Check that a triple duty valve is installed in the discharge line.	This valve serves as a check valve that protects the pump from water hammer, and serves as an isolation valve for servicing and for throttling.	

Check	Explanation/comment	Checked
Check that the pipeline has isolation valves around the pump and has a drain valve in the suction pipe.	–	
Use PTFE tape sealer or a high quality thread sealant when you install the suction and discharge connections to a threaded pump housing.	–	
On an open system, check that the end of the suction pipe is at least 3 ft. below the surface of the water in the suction well.	This prevents air from being drawn into the pump. Avoid air pockets in the suction line and make sure that each section of the suction pipe is air tight.	
Check that new flange gaskets are installed between the flanges of the pump body end suction and discharge pipes. make sure that these gaskets are clean and grease-free.	Suitable fasteners for this connection are supplied in the Xylem fastener pack. Apply a torque of 8 to 11 ft. lbs (11 to 15 Nm) to each of the flange bolts. Both the suction and discharge flanges must be torqued to the same level.	

Typical installation



1. Locate the compression tank on the suction side of the pump
2. Rolairtrol air separator
3. System supply
4. Circuit setter
5. Triple duty valve
6. Series 90 pump
7. Suction diffuser
8. Isolation valve
9. Pipe from boiler chiller or converter
10. Cold water supply
11. Reducing valve

Special installation

Installation with suction diffuser and triple-duty valve

Do not install and operate triple-duty valves and suction diffusers in closed systems unless the system is designed with these safety and control devices:

- Pressure relief valves
- Compression tanks
- Pressure controlling equipment
- Temperature controlling equipment
- Flow controlling equipment

Check that the control and safety devices have these characteristics:

- Properly sized for their purpose
- Placed correctly in the system before putting the system into operation

Connect the wiring

WARNING:

- Disconnect and lock out electrical power before installing or servicing the pump.
- Motors without built-in protection must be provided with contactors and thermal overload protection for single-phase motors, or starters with heaters for three-phase motors. (See the nameplate on the drive unit to select properly-sized overloads.)

Electrical Hazard:

Make sure that all connections are secure and the conduit box cover is closed before you connect the electrical power.

1. Remove the screws that secure the conduit box cover.
2. Lift off the cover.
3. Attach the appropriately sized connector to the hole in the side of the conduit box.

The circulators are thermally protected by impedance or on-winding thermal protectors and do not require external overload protection.

Commissioning, Startup, Operation, and Shutdown

Preparation for startup

WARNING:

- Failure to follow these precautions before you start the unit will lead to serious personal injury and equipment failure.
- Do not operate the pump below the minimum rated flows or with the suction or discharge valves closed. These conditions can create an explosive hazard due to vaporization of pumped fluid and can quickly lead to pump failure and physical injury.
- If the pump, motor, or piping operate at extremely high or low temperatures, then guarding or insulation is required. Failure to follow these instructions can result in serious personal injury or death, and property damage.
- Never operate the pump without the coupling guard correctly installed.
- Always disconnect and lock out power to the driver before you perform any installation or maintenance tasks. Failure to disconnect and lock out driver power will result in serious physical injury.
- Operating the pump in reverse rotation can result in the contact of metal parts, heat generation, and breach of containment.

NOTICE:

- Verify the driver settings before you start any pump.
- Make sure that the warm-up rate does not exceed 2.5°F (1.4°C) per minute.

You must follow these precautions before you start the pump:

- Flush and clean the system thoroughly to remove dirt or debris in the pipe system in order to prevent premature failure at initial startup.
- Bring variable-speed drivers to the rated speed as quickly as possible.
- If temperatures of the pumped fluid will exceed 200°F (93°C), then warm up the pump prior to operation. Circulate a small amount of fluid through the pump until the casing temperature is within 100°F (38°C) of the fluid temperature.

At initial startup, do not adjust the variable-speed drivers or check for speed governor or over-speed trip settings while the variable-speed driver is coupled to the pump. If the settings have not been verified, then uncouple the unit and refer to instructions supplied by the driver manufacturer.

Check the rotation

WARNING:

- Operating the pump in reverse rotation can result in the contact of metal parts, heat generation, and breach of containment.
- Always disconnect and lock out power to the driver before you perform any installation or maintenance tasks. Failure to disconnect and lock out driver power will result in serious physical injury.

1. Unlock power to the driver.
2. Make sure that everyone is clear, and then jog the driver long enough to determine that the direction of rotation corresponds to the arrow on the pump.

Pump rotation is clockwise when viewed from the back of the motor. An arrow is provided to show rotational direction.

3. Lock out power to the driver.

Lubrication requirements

Motor size	Lubrication schedule
5 hp and smaller	These pumps are permanently lubricated.
7.5, 10, and 15 hp	These pumps are furnished with grease fittings and should be lubricated in accordance with the nameplate instructions from the manufacturer. Xylem supplies a high quality lubricant specifically for this purpose which you can purchase from your Xylem representative (part number L23401).

Prime the pump

CAUTION:

Do not run the pump dry.

Make sure that the pump body is full of liquid before startup. If the system does not automatically fill the pump body with liquid, then you must manually prime the pump.

1. Loosen the vent plugs on the pump body.
2. While venting the air from the pump body, rotate the pump shaft a few times by hand.
3. After all air has been purged from the pump, close the vent plugs.

Start the pump

WARNING:

Pressurize the pump body slowly while you check for leaks at all joints with gaskets. Failure to follow these instructions can result in serious personal injury and/or property damage.

CAUTION:

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

Before you start the pump, you must perform these tasks:

- Open the suction valve.
- Open any recirculation or cooling lines.

1. Fully close or partially open the discharge valve, depending on system conditions.
2. Start the driver.
3. Slowly open the discharge valve until the pump reaches the desired flow.
4. Immediately check the pressure gauge to ensure that the pump quickly reaches the correct discharge pressure.
5. If the pump fails to reach the correct pressure, perform these steps:
   a) Stop the driver.
   b) Restart the driver.
6. Monitor the pump while it is operating:

a) Check the pump for bearing temperature, excessive vibration, and noise.
b) If the pump exceeds normal levels, then shut down the pump immediately and correct the problem.

7. Repeat steps 5 and 6 until the pump runs properly.

Pump operation precautions

General considerations

CAUTION:

- Vary the capacity with the regulating valve in the discharge line. Never throttle the flow from the suction side since this can result in decreased performance, unexpected heat generation, and equipment damage.
- Do not overload the driver. Driver overload can result in unexpected heat generation and equipment damage. The driver can overload in these circumstances:
  - The specific gravity of the pumped fluid is greater than expected.
  - The pumped fluid exceeds the rated flow rate.
- Make sure to operate the pump at or near the rated conditions. Failure to do so can result in pump damage from cavitation or recirculation.

Operation at reduced capacity

WARNING:

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, which results in a violent explosion. You must take all necessary measures to avoid this condition.

CAUTION:

- Avoid excessive vibration levels. Excessive vibration levels can damage the bearings, stuffing box or seal chamber, and the mechanical seal, which can result in decreased performance.
- Avoid increased radial load. Failure to do so can cause stress on the shaft and bearings.
- Avoid heat build-up. Failure to do so can cause rotating parts to score or seize.
- Avoid cavitation. Failure to do so can cause damage to the internal surfaces of the pump.

Operation under freezing conditions

NOTICE:

Do not expose an idle pump to freezing conditions. Drain all liquid that is inside the pump and the cooling coils. Failure to do so can cause liquid to freeze and damage the pump.

Shut down the pump

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

Maintenance

Disassembly

Disassembly precautions

WARNING:

- This manual clearly identifies accepted methods for disassembling units. These methods must be adhered to. Trapped liquid can rapidly expand and result in a violent explosion and injury. Never apply heat to impellers, propellers, or their retaining devices to aid in their removal.
- Make sure that the pump is isolated from the system and that pressure is relieved before you disassemble the pump, remove plugs, open vent or drain valves, or disconnect the piping.
- Always disconnect and lock out power to the driver before you perform any installation or maintenance tasks. Failure to disconnect and lock out driver power will result in serious physical injury.
- Crush hazard. The unit and the components can be heavy. Use proper lifting methods and wear steel-toed shoes at all times.
- After you disassemble a gasket joint, always use a new gasket upon reassembly. Never reuse old gaskets. Failure to follow these instructions can result in serious personal injury, death, and/or property damage.

NOTICE:

Make sure that all replacement parts are available before you disassemble the pump for overhaul.

Drain the pump

CAUTION:

- Allow all system and pump components to cool before you handle them to prevent physical injury.

1. Disconnect the electrical supply and lock it out of service.
2. Loosen the conduit box cover screws and remove the cover.
3. Disconnect the conduit and wiring.
4. Close the isolation valves on the suction and discharge sides of the pump.

   You must drain the system if no valves are installed.
5. Open the drain valve.

   Do not proceed until liquid stops coming out of the drain valve. If liquid continues to flow from the drain valve, the isolation valves are not sealing properly and you must repair them before you proceed.
6. Leave the drain valve open.

   Do not close the drain valve until the reassembly is complete.
7. Drain the liquid from the piping and flush the pump if it is necessary.
8. Disconnect all auxiliary piping and tubing.
9. Loosen the volute capscrews but do not remove them.
10. Shift the pump position slightly in order to allow the pressurized water to escape.

WARNING:

Make certain that the internal pressure is relieved before you continue. Failure to follow these instructions can result in serious personal injury and/or property damage.

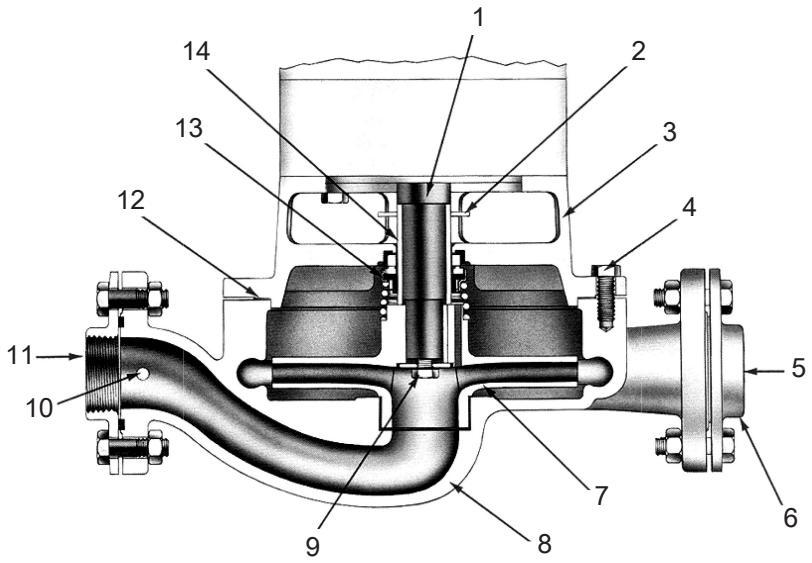
11. Remove the volute capscrews and remove the pump assembly from the volute.

Determine the seal size

All seals, except the 1.25 in. (3.16 cm), require a spring retainer as part of the seal assembly.

1. Determine if you have an A or AA-type pump using these diagrams and refer to these diagrams whenever seal replacement becomes necessary.

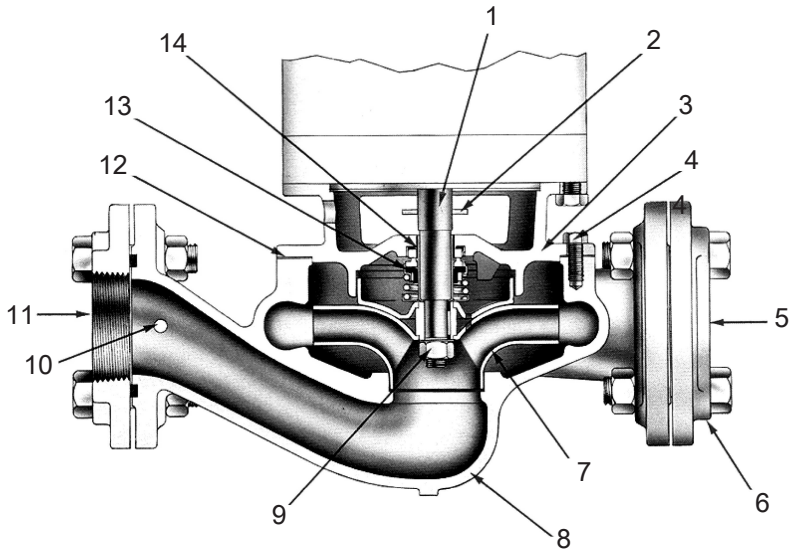
   The primary feature that distinguishes the A from the AA-type pumps is size. Most components of the A and AA pump seals are similar, but not interchangeable.



1. Shaft	8. Volute
2. Slinger	9. Impeller capscrew
3. Bracket coverplate	10. Gauge tapping
4. Volute capscrew	11. Suction
5. Discharge	12. Volute gasket
6. Companion flange	13. Seal assembly

7. Impeller	14. Shaft sleeve

Figure 2: Size A



1. Shaft	8. Volute
2. Slinger	9. Impeller locknut
3. Bracket coverplate	10. Gauge tapping
4. Volute capscrew	11. Suction
5. Discharge	12. Volute gasket
6. Companion flange	13. Seal assembly
7. Impeller	14. Shaft sleeve

Figure 3: Size AA

2. Measure the diameter of the shaft sleeve in order to determine nominal seal size.
   There are three nominal seal sizes:
   - 0.50 in. (1.27 cm)
   - 0.75 in. (1.91 cm)
   - 1.25 in. (3.16 cm)

Remove the seal assembly

1. Remove the motor assembly from the system.
2. Use either a strap wrench or a rag in order to prevent the impeller from turning with one hand while you loosen the impeller nut with the other hand.
3. For all except the 1.25 in. (3.16 cm) seal assembly, lift the spring retainer and the seal spring from the shaft.
4. Remove the compression ring from the seal collar by inserting a small screwdriver underneath the ring and carefully applying an upward force.

NOTICE:

These seal assemblies consist of a stationary seal insert assembly and a rotating seal assembly. Each of these components must be replaced when you replace the mechanical seal. Never replace individual components separately.

5. Remove the ring collar and remaining seal components from the shaft.
6. Use a clean, lint free rag in order to remove any debris that has accumulated in the seal recess.

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 you clean the parts. Failure to do so may result in equipment damage.

Replacement guidelines

Impeller replacement

This table shows the criteria for replacing the impeller:

Impeller parts	When to replace
Impeller vanes	• When grooved deeper than 1/16 in. (1.6 mm), or • When worn evenly more than 1/32 in. (0.8 mm)
Vane edges	When you see cracks, pitting, or corrosion damage

Gaskets, O-rings, and seats replacement

- Replace all gaskets and O-rings at each overhaul and disassembly.
- Inspect the seats. They must be smooth and free of physical defects.
- Replace parts if the seats are defective.

Reassembly

Reassemble the seal assembly

WARNING:

After you disassemble a gasket joint, always use a new gasket upon reassembly. Never reuse old gaskets. Failure to follow these instructions can result in serious personal injury, death, and/or property damage.

1. Install the seal insert:

If your seal size is...	Then...
0.50 in. (1.27 cm) and 0.75 in. (1.91 cm)	1. Place the new retainer in the seal recess of the faceplate. 2. Set the thin seat gasket in the recess and set the seat insert on top of the gasket. A ceramic insert has a top side and bottom side. The bottom is identifiable by its slightly recessed grooves. 3. Make sure the grooves face down towards the rubber gasket.
1.25 in. (3.16 cm)	1. Set the seal insert into the elastomeric seat cup. 2. Lubricate the seat cup with soapy water and set it into the recess of the faceplate.

2. Lubricate the rubber seal collar with soapy water.

   The rotating seal assembly includes these parts:

   - Seal ring
   - Bellows
   - Seal housing

3. Push the entire rotating seal assembly onto the shaft as one unit.

   Do not attempt to assemble the seal by placing the components on the shaft individually. Align the notches in the collar with the recesses found on each side of the carbon ring.

4. Press the seal housing tightly against the upper end of the rubber collar.

   Use a screwdriver and press at several points along the periphery in order to provide a tight and even fit. Do not tap on the seal because you can break the ceramic or carbon insert.

5. Place the seal spring on the shaft and then the spring retainer.

   You do not need to do this for the 1.25 in. (3.16 cm) seal.

6. Place the impeller and lockwasher on the shaft.
7. Thread the impeller nut onto the shaft and tighten according to these values:
   - 3/8 in. nut to 8 – 12 ft. lbs. (11 – 16 Nm)
   - 7/16 in. nut to 17 – 22 ft. lbs (23 – 30 Nm)
   - 3/8 in. capscrews to 10 – 14 ft. lbs (14 – 19 Nm)

   Do not overtighten.

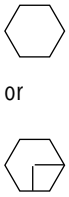
8. Clean the pump body of excess debris.
9. Place a new gasket in the recess of the pump body.
10. Replace the motor assembly by inserting the impeller in the pump body and evenly tighten the eight capscrews.

    See the Capscrew torque values.

Capscrew torque values

Capscrew torque in ft-lbs (Nm)

Capscrew type	Head marking	1/4 in.	5/16 in.	3/8 in.	7/16 in.	1/2 in.	5/8 in.	3/4 in.	7/8 in.	1 in.
SAE grade 2		6 (8)	13 (18)	25 (34)	38 (52)	60 (81)	120 (163)	190 (258)	210 (285)	300 (407)

Capscrew type	Head marking	1/4 in.	5/16 in.	3/8 in.	7/16 in.	1/2 in.	5/8 in.	3/4 in.	7/8 in.	1 in.
Brass or stainless steel		4 (5)	10 (14)	17 (23)	27 (37)	42 (57)	83 (113)	130 (176)	200 (271)	300 (407)
SAE grade 5		10 (14)	20 (27)	35 (47)	60 (81)	90 (122)	180 (244)	325 (441)	525 (712)	800 (1085)

Dealer servicing

If trouble occurs that cannot be rectified, contact your local sales and service representative and be prepared to provide this information:

1. Complete nameplate data of pump and motor
2. Suction and discharge pipe pressure gauge readings
3. Ampere draw of the motor
4. A sketch of the pump hook-up and piping

Xylem |ˈzīləm|

1) The tissue in plants that brings water upward from the roots
2) A leading global water technology company

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The original instruction is in English. All non-English instructions are translations of the original instruction.

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