

Series 60[®] In-Line Centrifugal Pumps Maintenance Free

Installation, Operation and Service Instructions

INSTALLER: PLEASE LEAVE THIS MANUAL FOR THE OWNER'S USE.

DESCRIPTION

The Series 60 Maintenance Free pump is the culmination of compact design, quiet operation and, of course, Bell & Gossett quality. The compact design of the Series 60 centrifugal pump facilitates direct in-line mounting. Permanently lubricated pump and motor bearings enable years of maintenance free operation. The back pull-out design eases all service operations. The combination of these features make the Series 60 ideal for many primary and secondary applications.

The Series 60 is available in sizes from 1" to 2" to meet a range of system pipe specifications. Equally versatile is the Series 60's availability at several power levels – ranging from 1/4 to 3 HP at 1750 RPM.



Your Series 60 Pump should have this warning label affixed to the motor near the conduit box cover. If this warning is missing or illegible, contact your local Bell & Gossett Representative for a replacement.

SAFETY INSTRUCTION

This safety alert symbol will be used in this manual and on the pump instruction decal to draw attention to safety related instructions. When used, the safety alert symbol means **ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED! FAILURE TO FOLLOW THE INSTRUCTIONS MAY RESULT IN A SAFETY HAZARD.**

Bell & Gossett

 **ITT Industries**
Engineered for life

OPERATIONAL LIMITS

Unless special provisions have been made for your pump by Bell & Gossett, the operational limits for Series 60 Pumps are as follows:

Maximum Working Pressure:
175 PSI.

Pump Construction:
Bronze Fitted or All Bronze
Standard Mechanical Seal

Motors:
208-230/460 Volts – Three Phase
115/230 Volts – Single Phase
(w/built-in overload protection)


Mechanical Seal:
Standard: Buna/Carbon/Ceramic – PH Limitations 7-9;
Temperature Range: -20 to +225°F
Optional: EPR/Carbon/Tungsten – PH Limitations 7-11;
Temperature Range: -20 to +250°F
Optional: Viton/Carbon/Ceramic – PH Limitations 7-9;
Temperature Range: -20 to +225°F


PUMP APPLICATION

Bell & Gossett Centrifugal Pumps may be used for hydronic heating and cooling systems, domestic water, industrial applications and general service operations. Bell & Gossett recommends that all bronze constructed pumps be used for pumping potable water. This pump is for indoor use only.


SAFETY REQUIREMENTS


ELECTRICAL SAFETY

 **WARNING: Electrical Shock Hazard**
Electrical connections are to be made by a qualified electrician in accordance with all applicable codes, ordinances and good practices. Failure to follow these instructions could result in serious personal injury, death and/or property damage.


 **WARNING: Electrical Overload Hazard**
Three phase motors must have properly sized heaters to provide overload and under voltage protection. Single phase motors have built-in overload protectors. Failure to follow these instructions could result in serious personal injury, death and/or property damage.


THERMAL SAFETY


 **WARNING: Extreme Temperature Hazard**
If the pump, motor, or piping are operating at extremely high or low temperatures, guarding or insulation is required. Failure to follow these instructions could result in serious personal injury, death and/or property damage.

 **WARNING: Hot Water Hazard**
When disassembling a gasketed joint, always use a new gasket upon reassembly. NEVER RE-USE OLD GASKETS. Failure to follow these instructions could result in serious personal injury, death and/or property damage.

MECHANICAL SAFETY

 **WARNING: Unexpected Startup Hazard**
Disconnect and lockout power before servicing. Failure to follow these instructions could result in serious personal injury, death and/or property damage.

 **WARNING: Excessive System Pressure Hazard**
The maximum working pressure of the pump is listed on the nameplate – DO NOT EXCEED THIS PRESSURE. Failure to follow these instructions could result in serious personal injury, death and/or property damage.

 **WARNING: Excessive Pressure Hazard – Volumetric Expansion**
The heating of water and other fluids causes volumetric expansion. The associated forces may cause failure of system components and release of high temperature fluids. This will be prevented by installing properly sized and located compression tanks and pressure relief valves. Failure to follow these instructions could result in serious personal injury, death and/or property damage.

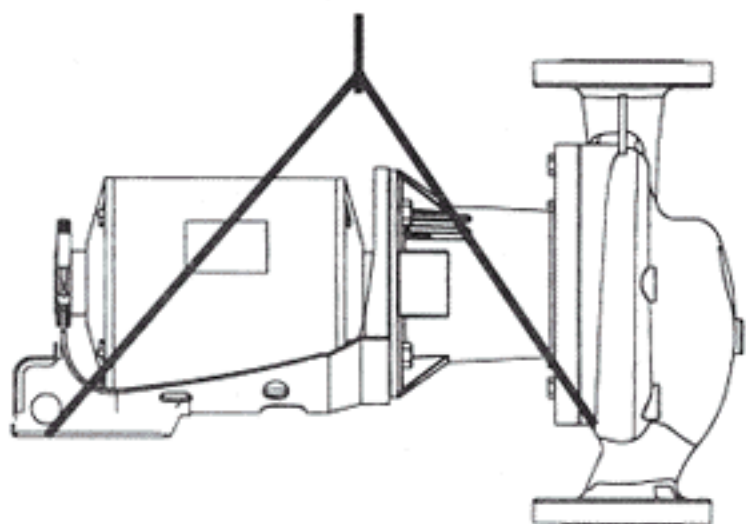
PUMP INSTALLATION

PUMP SUPPORT AND LOCATION

The Bell & Gossett Series 60 pump should be installed where there will be sufficient room for future inspection and service. It is highly recommended that service (isolation) valves be installed on each side of the pump to facilitate servicing or replacing the pump without draining the system. If the pump is to be located near a noise sensitive area, consult a sound specialist. Special precautions should be taken to avoid sound and vibration transmission.

IMPORTANT: Do not support the pump by placing hangers or floor supports on the motor. Shaft misalignment may occur.

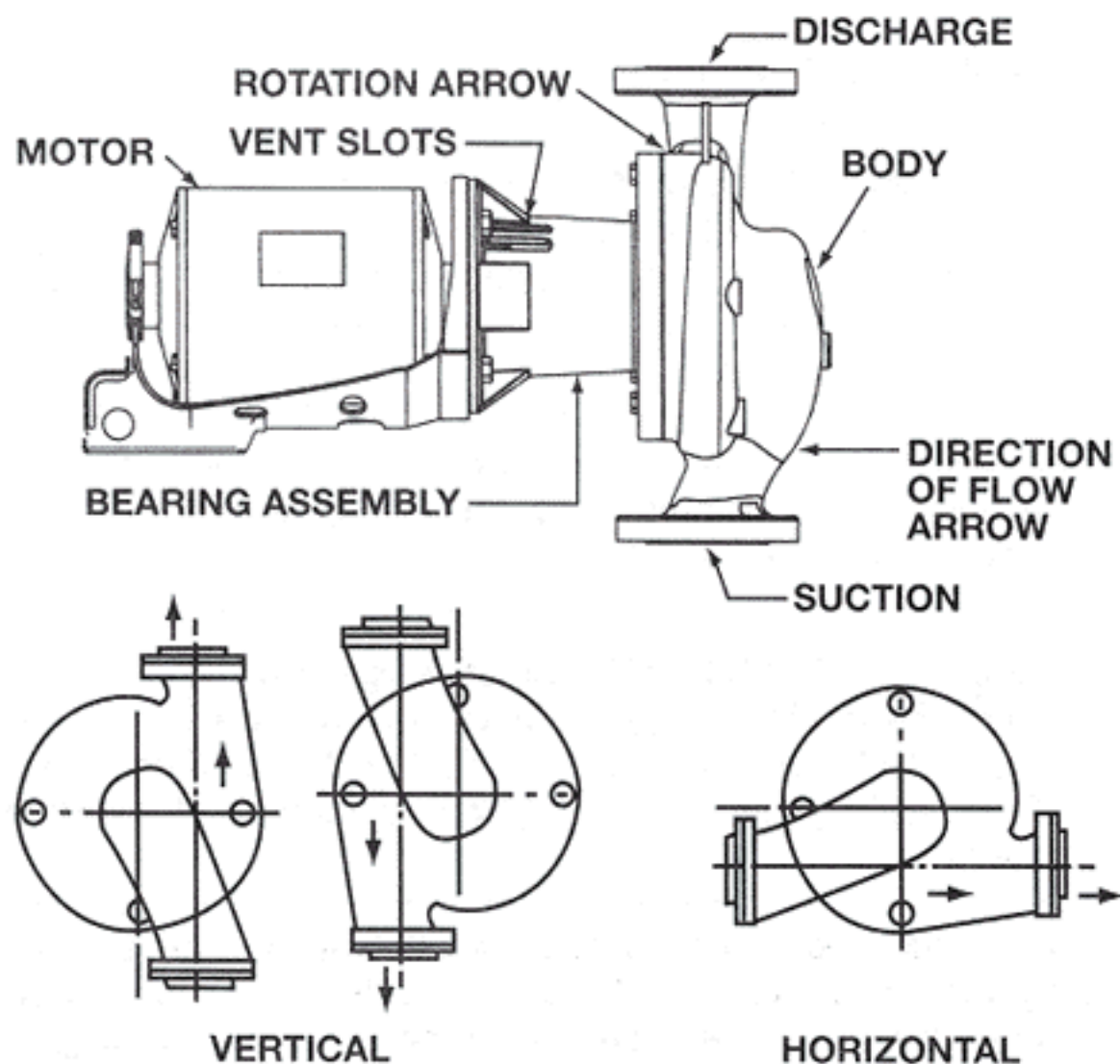
If it is required to lift the entire pump, do so with slings placed around the pump assembly as shown:



IMPORTANT: In closed systems, do not install and operate Bell & Gossett pumps, 3D valves, suction diffusers, etc., without properly sized safety and control devices. Such devices include properly sized and located pressure relief valves, compression tanks and pressure, temperature, and flow controls. If the system is not equipped with these devices, consult the responsible engineer or architect before operating.

PUMP ORIENTATION

B&G Series 60 In-Line pumps can be installed to discharge up, down, left or right. The pump body can be repositioned by removing the body bolts and rotating the body about the bearing assembly. **Pumps should only be installed with the motor shaft horizontal.** The bearing assembly vent slots/coupler access window must always face up. Do not reposition the motor on the bearing assembly. **THE ARROW ON THE PUMP BODY MUST POINT IN THE DIRECTION OF THE FLOW.**



SYSTEM PIPING

Always install a straight length of pipe between the suction side of the pump and the first elbow. The length of this pipe should be equal to five times the diameter of the suction pipe size. This reduces turbulent flow into the pump suction by straightening the liquid flow path.

Air must be kept out of the system. On an open system always place the end of the suction pipe at least three feet (3') below the surface of the water in the suction well to prevent air from being drawn into the pump. Avoid air pockets in the suction line and ensure that each section of the suction pipe is absolutely air tight.

If high temperature variations are anticipated, expansion fittings should be installed to help reduce pump strain.

Install the suction and discharge flanges on the pipe ends using teflon tape sealer or high quality thread sealant. Minimize strain on the pump by supporting the suction and discharge piping with pipe hangers near the pump. **Do not support the pump by placing hangers or floor supports on the motor. This could lead to shaft misalignment and subsequent premature coupler breakage and bearing wear.** Line up the vertical and horizontal piping so that the bolt-holes in both the pump and pipe flanges are aligned. **DO NOT ATTEMPT TO SPRING THE SUCTION OR DISCHARGE LINES INTO POSITION. THIS MAY RESULT IN UNWANTED STRESS IN THE PUMP BODY, FLANGE CONNECTIONS AND/OR PIPING.** The code for pressure piping, ANSIB31.1, lists types of supports available for various applications.

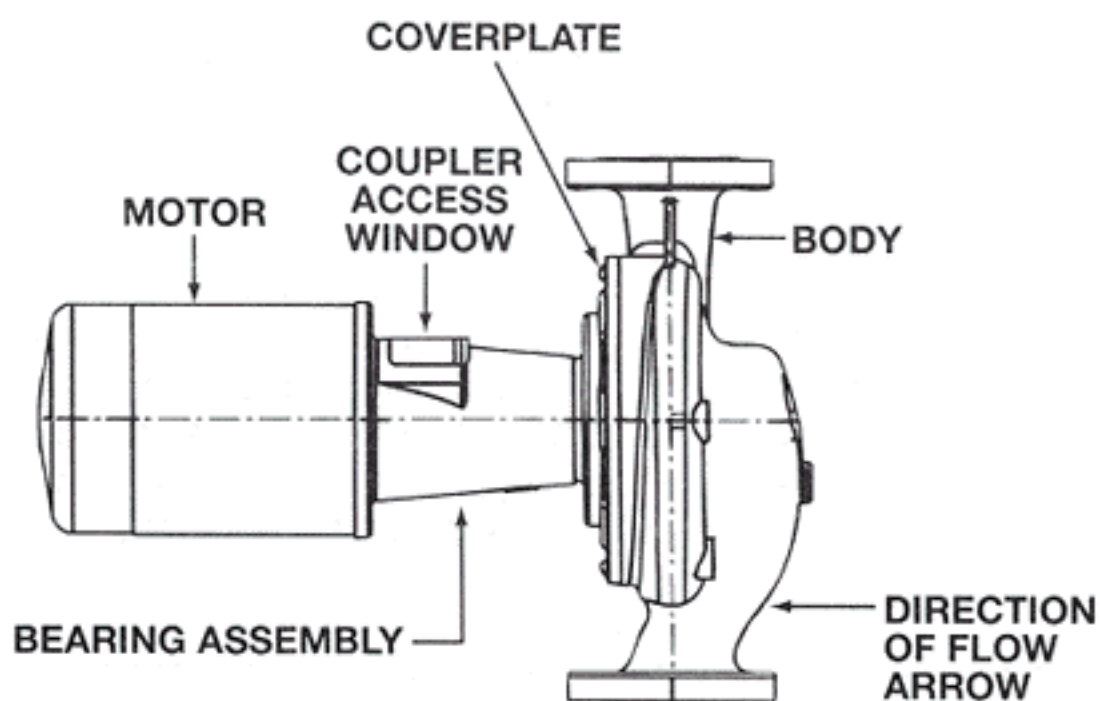
Ordinary wire or band hangers are not adequate to maintain alignment. It is very important to provide strong, rigid support for the suction and discharge lines.

New Bell & Gossett flange gaskets must be installed between the flanges of the pump body and suction and discharge pipes. The gaskets should be clean and grease-free; old gaskets should never be reused. Suitable fasteners for this connection are supplied in the B&G fastener pack. Apply a torque of 8-11 ft. lbs. to each of the flange bolts. Both the suction and discharge flanges must be torqued to the same level.



WARNING: Hot Water Leakage Hazard

Make certain that the flange bolts have been adequately torqued. Failure to follow these instructions could result in serious personal injury and/or property damage.



WIRING INSTRUCTIONS



WARNING: Electrical Shock Hazard

Disconnect and lockout the power before making electrical connections. Failure to follow these instructions could result in serious personal injury or death.

Remove the screws securing the conduit box cover (wiring compartment) and lift off the cover. Attach the appropriate size connector to the hole in the side of the conduit box.

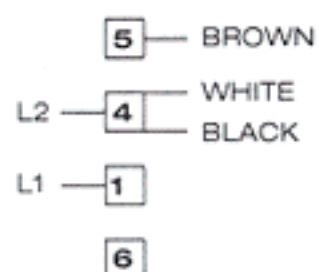
Important: The motor should run **clockwise** when viewed from the back of the motor.

Note: The wiring diagrams shown are typical and may not be representative for all motor types. Refer to the motor or motor nameplate for specific diagrams.

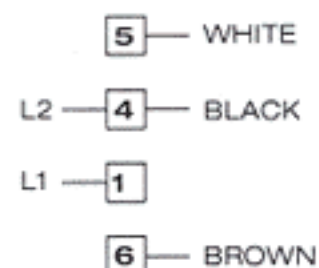
I. SINGLE PHASE MOTORS

Single phase motors can operate at low voltage (115V) as well as high voltage (230V). Select the voltage at which you want to operate your B&G pump, and make wiring connections according to the following diagrams (these diagrams are also found on the motor nameplate):

LOW VOLTAGE

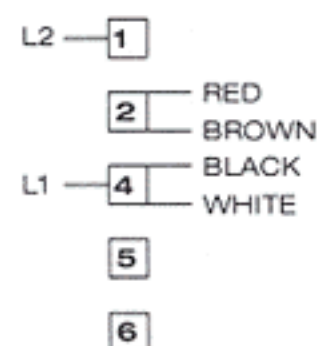


HIGH VOLTAGE

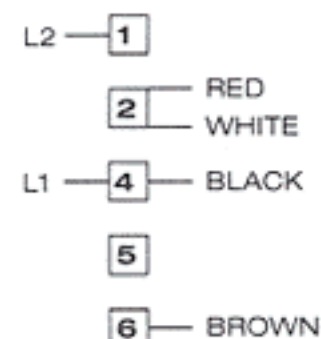


FOR 1 HP, 1 PHASE MOTORS ONLY

LOW VOLTAGE



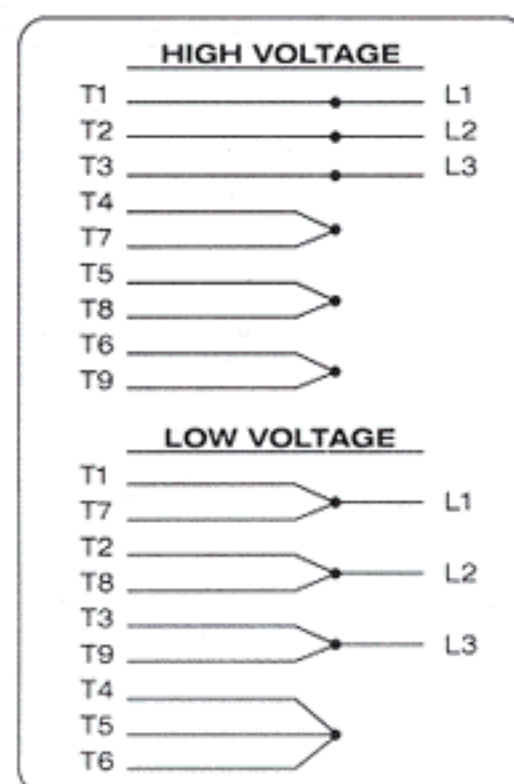
HIGH VOLTAGE



NOTE: Bell & Gossett Single Phase Motors are protected with inherent overheating devices and do not require external overload protection.

II. THREE PHASE MOTORS

Series 60 three phase motors can operate at either low voltage (208-230V) or at high voltage (460V). Select the voltage at which you want to operate your B&G pump and make wiring connections according to the following diagrams (these diagrams are also found on the motor nameplate):



WARNING: Be certain that all connections are secure and the conduit box cover is closed before electrical power is connected. Failure to follow these instructions could result in serious personal injury, death and/or property damage.

OPERATING INSTRUCTIONS

SYSTEM PREPARATION

Prior to pump start up, closed heating and cooling systems should be flushed and drained. The system should then be filled.

LUBRICATION

Standard Series 60 pumps with K99 or later date codes do not need to be relubricated. The pumps are provided with sealed, permanently lubricated pump and motor bearings. However, if a pump was ordered with a special motor (explosion proof, TEFC, etc.) that requires relubrication, then refer to the motor nameplate for motor lubrication instructions.

ROTATION

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

PRIMING AND STARTING



CAUTION: Seal Damage Hazard

Do not run the pump dry, seal damage may occur. Failure to follow these instructions could result in moderate personal injury and/or property damage.

Before starting, the Series 60 pump must be filled with water. Manual priming may be necessary if the system does not fill the pump body automatically. Vent plugs are provided on the pump body to vent the air.



WARNING: Hot Water Leakage Hazard

Pressurize the pump body slowly while checking for leaks at all gasketed joints. Failure to follow these instructions could result in serious personal injury and/or property damage.

The pump should be started with the discharge valve closed and the suction valve fully open. After the pump is at operating speed, the discharge valve should be opened gradually.

SERVICE INSTRUCTIONS

GENERAL INSTRUCTIONS

1. Inspect the pump regularly for leaking seals, worn gaskets, and loose or damaged components. Repair or replace as required.
2. Drain the pump if there is a chance that the system will freeze.

MOTOR REPLACEMENT

Motor Removal

1. Turn off and lock out power to the motor.



WARNING: Electrical Shock Hazard

Disconnect and lockout the power before making electrical connections. Failure to follow these instructions could result in serious personal injury or death.



WARNING: Unexpected Startup Hazard

Disconnect and lockout power before servicing. Failure to follow these instructions could result in serious personal injury, death and/or property damage.

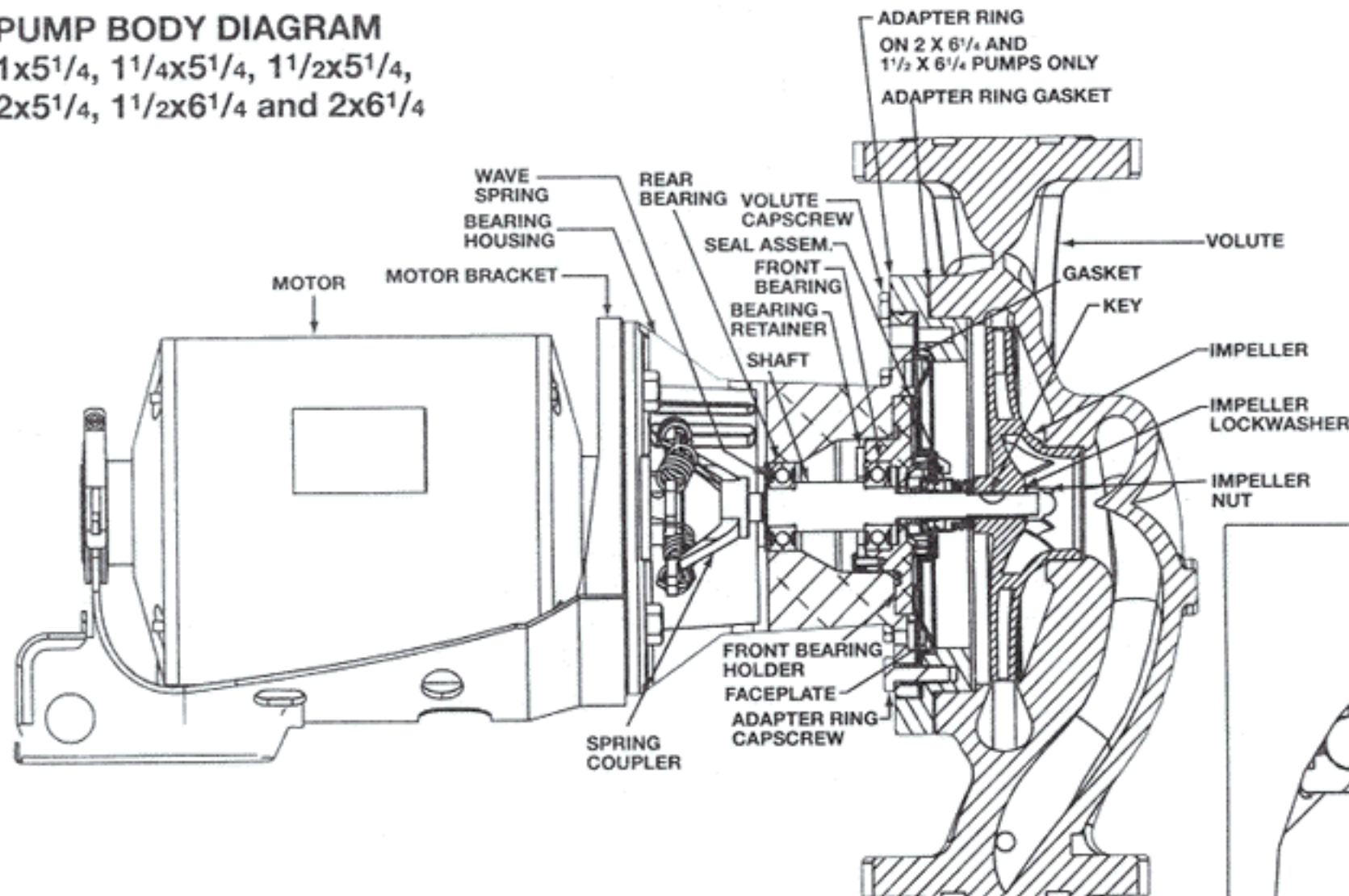
2. Remove conduit box cover.
3. Disconnect power leads from motor leads.
4. Remove conduit and power leads from conduit box.
5. Support the motor, and then remove the four screws that hold the motor to the bearing assembly.
6. Pull the motor off the bearing assembly. **Note:** On pumps with spring type couplers it will be necessary to remove the motor side coupler half from the motor shaft before the motor can be pulled completely away from the bearing assembly. Remove the coupler half by almost completely backing out the coupler setscrew(s), and then sliding the coupler half off the motor shaft.

Motor Installation

1. Install the coupler and motor as outlined in the "Spring or Elastomeric Type Coupler Replacement" sections under the heading "Coupler Installation," starting with step #2. **Note:** Check for proper motor rotation after the motor has been reconnected. The proper rotation is clockwise when viewed from the back of the motor.

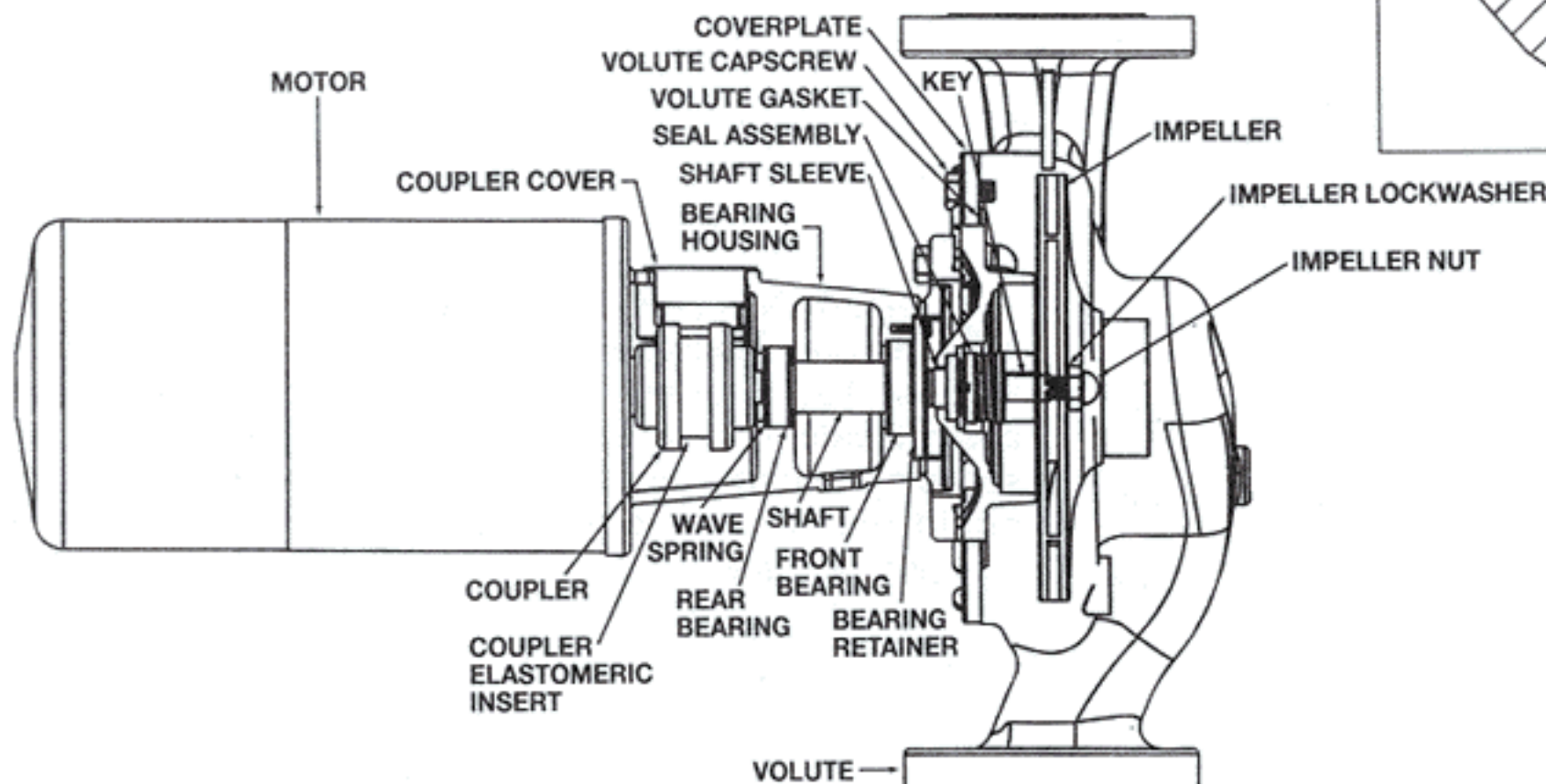
PUMP BODY DIAGRAM

1x5¹/₄, 1¹/₄x5¹/₄, 1¹/₂x5¹/₄,
2x5¹/₄, 1¹/₂x6¹/₄ and 2x6¹/₄



PUMP BODY DIAGRAM

1¹/₂x7 and 2x7



SPRING TYPE COUPLER REPLACEMENT

Coupler Removal

1. Remove the motor as outlined in the section titled "Motor Removal."
2. Remove old coupler from the pump shaft by almost completely backing-out the setscrew located in the pump side coupler half.

Coupler Installation

1. Install the new coupler on the pump shaft. Ensure the coupler set screw is seated in the shaft dimple.
2. Lift the motor into position and attach the motor side coupler half. Ensure the coupler set screw is seated in the shaft dimple.
3. Complete the installation by reversing the steps outlined in the section titled "Motor Removal," starting with step #5.
Note: Check for proper motor rotation after motor has been reconnected.

ELASTOMERIC TYPE COUPLER REPLACEMENT

Coupler Removal

1. Remove the motor as outlined in the section titled "Motor Removal."
2. Loosen the coupler setscrew(s), some contain two setscrews, and remove the coupler halves from the pump and motor shafts.

Coupler Installation

1. Position the coupler half on the pump shaft as follows:
 - a. On pump shafts that contain a dimple: Locate the coupler half on the shaft so that a coupler set screw is positioned over the dimple. Tighten the set screw making sure it seats in the dimple. Tighten the other set screw if there is one.
 - b. For a keyed pump shaft with a size 3J coupler: Slide the coupler half onto the shaft. Do not tighten the set screws.
 - c. For a keyed pump shaft with a size 4J coupler: Slide the coupler half onto the shaft so that the shaft end extends $\frac{1}{4}$ " past the coupler half flange face. Tighten the set screws.
 - d. For a keyed pump shaft with a size 5J coupler: Slide the coupler half onto the shaft so that the shaft end is flush with the coupler half flange face. Tighten the set screws.
2. Position the coupler half on the motor shaft as follows:
 - a. On motor shafts that contain a dimple: Locate the coupler half on the shaft so that a coupler set screw is positioned over the dimple. Tighten the set screw making sure it seats in the dimple. Tighten the other set screw if there is one.
 - b. For couplers going on keyed motor shafts: Slide the coupler half onto the motor shaft. Do not tighten the set screws.
3. Place the new insert in the pump side coupler half.
4. Lift the motor into position, align the insert and motor coupler half, then bolt the motor in place.
5. Proceed as follows:
 - a. On pumps where the motor and pump shafts both contain a dimple:
 1. Complete the procedure by reversing the steps outlined in the section titled "Motor Removal," starting with step #4. **Note:** Check for proper motor rotation after motor has been reconnected.

- b. On motor shafts that contain a dimple used with keyed pump shafts:
 1. Use a screwdriver to slide the pump side coupler over the insert as far as possible.
 2. Gap the coupler by sliding the pump coupler half back $\frac{1}{16}$ ". **Important:** When an elastomeric type coupler is used with a keyed pump and/or motor shaft, **do not** leave the insert compressed between the coupler halves. There needs to be a gap between the ends of the insert and the coupler flanges to accommodate shaft expansion and contraction. If the insert is not gapped, the pump and motor bearings will be subjected to excessive loads, which will lead to their premature failure. However, it is possible to have too large a gap. The gap is considered excessive when the insert teeth are not completely engaged in the coupler halves.
 3. Tighten the set screws.
 4. Complete the procedure by reversing the steps outlined in the section titled "Motor Removal," starting with step #4. **Note:** Check for proper motor rotation after motor has been reconnected.
- c. For keyed motor shafts with either dimpled or keyed pump shafts:
 1. Use a screwdriver to slide the motor side coupler over the insert as far as possible.
 2. Gap the coupler by sliding the motor coupler half back $\frac{1}{16}$ ". **Important:** When an elastomeric type coupler is used with a keyed pump and/or motor shaft, **do not** leave the insert compressed between the coupler halves. There needs to be a gap between the ends of the insert and the coupler flanges to accommodate shaft expansion and contraction. If the insert is not gapped, the pump and motor bearings will be subjected to excessive loads, which will lead to their premature failure. However, it is possible to have too large a gap. The gap is considered excessive when the insert teeth are not completely engaged in the coupler halves.
 3. Tighten the set screws.
 4. Complete the procedure by reversing the steps outlined in the section titled "Motor Removal," starting with step #4. **Note:** Check for proper motor rotation after motor has been reconnected.

BEARING ASSEMBLY REPLACEMENT

1. Shut the system off and allow it to cool to at least 100°F before servicing the pump.
2. Close the system fill valve.
3. If there are service (isolation) valves located on either side of the pump, close them. If not, drain the system by opening the system drain valve and a vent located near the top of the system. Ensure the water drains to a safe location.
4. Remove the motor as outlined in the section titled "Motor Removal."



WARNING: Hot Water Hazard

Before draining the system, allow water to cool to at least 100°F, open the drain valve (take precautions against water damage) and leave the drain valve open until servicing is complete. Failure to follow these instructions could result in serious personal injury, death and/or property damage.

5. Remove the eight capscrews that hold the bearing assembly or adapter ring to the volute.

**WARNING: High Pressure Hazard**

Pressure may be present in the pump body. This pressure can be relieved by loosening the eight volute capscrews and shifting the bearing assembly slightly to allow the pressurized water to escape. Failure to follow these instructions could result in serious personal injury or death.

6. Remove the bearing assembly.
7. Insert a long punch between the impeller vanes or grasp the impeller with a strap wrench to prevent the impeller from turning, then loosen the impeller nut.
8. Remove the impeller nut, lock washer, impeller, and adapter ring (if present).
9. If used, install the adapter ring and gasket on the new bearing assembly.
10. Install the impeller on the new bearing assembly. Use the new impeller nut and lock washer provided with the new bearing assembly.
11. Insert a long punch between the impeller vanes or grasp the impeller with a strap wrench to prevent the impeller from turning, then torque the impeller nut to 96 – 144 lb.-in. for nuts used on $\frac{3}{8}$ " fine threaded shafts, or 204-264 lb.-in. for nuts used on $\frac{7}{16}$ " fine threaded shafts.
12. Clean the old body gasket from the volute.
13. Put a new body gasket on the assembly, and then install the assembly on the pump body.

**WARNING: Hot Water Hazard**

Whenever the bearing assembly is removed from the piping, use a new gasket when reinstalling. Failure to follow these instructions could result in serious personal injury and/or property damage.

14. Install the eight volute capscrews, tighten them per the torque spec shown in Table 1.
15. Install the coupler and motor as described in the "Coupler Installation" section for the particular coupler used on the pump.
16. Fill and bleed the system, check for leaks, then start system.

**WARNING: Hot Water Leakage Hazard**

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

SEAL REPLACEMENT

1. Remove the bearing assembly and the impeller as outlined in the section titled "Bearing Assembly Replacement," steps #1 through #8.
2. Remove the spring retainer and seal spring.
3. Pry the compression ring off the seal boot.
4. Insert a standard screwdriver under the seal head and carefully pry the seal head off the shaft. Do not scratch the shaft sleeve.

5. Use a small screwdriver to loosen and remove the seal seat and gasket.
6. If the seat retainer is in good condition, leave it in the faceplate. If not, pry it out and replace it with the new one provided in the seal kit.
7. Clean the shaft sleeve and seal seat recess. Crocus cloth can be used to polish the sleeve. Do not scratch or gouge the recess or sleeve.
8. Install the seat gasket and seat into the seat recess in the faceplate or coverplate. **Important:** On ceramic seats there are two dimples located on one of the faces. The dimples indicate the side of the seat that mates against the seat gasket. Tungsten carbide faces can be inserted with either face against the gasket.
9. Lubricate the seal boot with soapy water, then slide the complete seal head (carbon ring, seal boot, driver, and compression ring) over the shaft. Do not attempt to install the seal head by placing the components on the shaft individually.
10. Slide the seal head on until the carbon ring contacts the seat. Ensure the protrusions in the driver have remained engaged in the notches in the carbon.
11. Using the flat face of a screwdriver, firmly press on the top edge of the compression ring at several locations to ensure the seal head is sitting flat against the seat.
12. Place the spring then spring retainer on top of the seal head.
13. Install the impeller, lockwasher, and impeller nut.
14. Torque the impeller nut to 96 – 144 lb.-in. of torque for nuts used on $\frac{3}{8}$ " fine threaded shafts, or 204-264 lb.-in. for nuts used on $\frac{7}{16}$ " fine threaded shafts.
15. Clean the old body gasket and any other debris from the volute and the bearing assembly.
16. Place a new body gasket on the bearing assembly, and then install the bearing assembly on the pump body.

**WARNING: Hot Water Hazard**

Whenever the bearing assembly is removed from the pump, use a new gasket when re-installing. Failure to follow these instructions could result in serious personal injury and/or property damage.

17. Install the eight volute capscrews, tighten them per the torque spec shown in Table 1.
18. Install the coupler and motor as described in the "Coupler Installation" section for the particular coupler used on the pump.
19. Fill and bleed the system, check for leaks, then start system.

**WARNING: Hot Water Leakage Hazard**





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

ADDITIONAL PUMP REPAIR

Refer to the following manual for further repair instructions for the Bell & Gossett Series 60 pump:

Coupler & Motor Mount Replacement ... #P06452

TABLE 1 – TORQUE CHART

CAPSCREW TYPE	HEAD MARKING	CAPSCREW TORQUE (FOOT-POUND)								
		CAPSCREW DIAMETER								
		1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1
SAE Grade 2		6	13	25	38	60	120	190	210	300
Brass Stainless Steel	 or 	4	10	17	27	42	83	130	200	300
SAE Grade 5		10	20	35	60	90	180	325	525	800

DEALER SERVICING

If your pump requires further repair, contact your local B&G Representative. Having the following information at hand will facilitate your representative's ability to assist you:

1. Complete data from nameplate.
2. Suction and discharge pipe pressure gauge readings.
3. Ampere draw of the motor.
4. A sketch of the pumping system (include pipes, valves, etc.).

AUTHORIZED REPRESENTATIVE



**ISO 9001
Certified**

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