



Bell & Gossett

INSTRUCTION MANUAL

P81845
REVISION B



Series 3530 Centrifugal Pump

Installation, Operation and Service Instructions

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

Bell & Gossett



ITT Industries
Engineered for life

DESCRIPTION

The Series 3530 Centrifugal Pump is a close coupled pump which features – foot mounting, light weight design, pump casing with top centerline discharge and self flushing mechanical seal. These features make installation, operation and service easy to perform.

PUMP APPLICATION

The Series 3530 Centrifugal Pump's stainless steel construction makes it ideal for service with the following liquids: Domestic water, fresh water, boiler feed water, condensate, hydronic cooling or heating, pressure boosting, general pumping and benign liquids.

For other applications contact your local B&G Representative.

SAFETY INSTRUCTIONS

This safety alert symbol will be used in this manual and on the pump safety instruction decals 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.**

Your Series 3530 Pump should have the following safety instruction decals located approximately as shown. If the decals are missing or illegible contact your local B&G representative for a replacement.

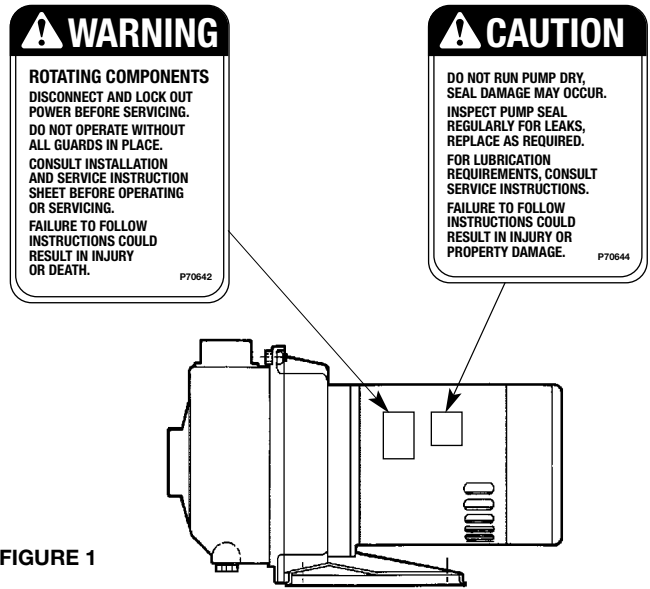




FIGURE 1


ADDITIONAL SAFETY REQUIREMENTS

ELECTRICAL SAFETY:


 **WARNING: Electrical Shock Hazard**
Electrical connections 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 or death, and 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 or death, and property damage.


THERMAL SAFETY:


 **WARNING: Extreme Temperature Hazard**
If 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 or death, and property damage.

MECHANICAL SAFETY:

 **WARNING: Unexpected Start-up Hazard**
Disconnect and lock out power before servicing.
Failure to follow these instructions could result in serious personal injury or death, and property damage.

 **WARNING: Unexpected Startup Hazard**
Single phase motors are equipped with automatic reset overload protectors. Pump can restart without warning. Disconnect and lockout power before servicing.
Failure to follow these instructions could result in serious personal injury or death, and 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 or death, and 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 or death, and property damage.

PUMP LOCATION

Locate the pump so there is sufficient room for inspection, maintenance and service. If the use of a hoist or tackle is needed, allow ample head room.

The best pump location for sound and vibration absorption is on a concrete floor with sub soil underneath. If the pump location is overhead, special precautions should be undertaken to reduce possible sound transmission, consult a sound specialist.

If the pump is not installed on a closed system, it should be placed as near as possible to the source of liquid supply, and located to permit installation with the fewest number of bends or elbows in the suction pipe.

The installation must be evaluated to determine that the Net Positive Suction Head Available (NPSHA) meets or exceeds the Net Positive Suction Head Required (NPSHR), as stated by the pump performance curve.

1. IMPORTANT

- 1.1 Do not install and operate ITT Bell & Gossett Pumps, 3D Valves, Suction Diffusers, etc., in closed systems unless the system is constructed with properly sized safety devices and control devices. Such devices include the use of properly sized and located pressure relief valves, compression tanks, pressure controls, temperature controls, and flow controls as appropriate. If the system does not include these devices, consult the responsible engineer or architect before making pumps operational.



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 or death, and property damage.

- 1.2 Inspect unit for damage. Report any damage to carrier/dealer immediately.
- 1.3 Electrical supply must be a separate branch circuit with fuses or circuit breakers, wire sizes, etc., per National and Local electrical codes. Install an all-leg disconnect switch near pump.



CAUTION: Always disconnect electrical power when handling pump or controls.

Failure to follow these instructions could result in serious personal injury or death, and property damage.

- 1.4 Motors must be wired for proper voltage. Motor wiring diagram is on motor nameplate. Wire size must limit maximum voltage drop to 10% of nameplate voltage at motor terminals, or motor life and pump performance will be lowered.
- 1.5 Always use horsepower-rated switches, contactor and starters.

1.6 Motor Protection

1.6.1 Single-phase: Thermal protection for single-phase units is sometimes built in (check nameplate). If no built-in protection is provided, use a contactor with a proper overload. Fusing is permissible.

1.6.2 Three-phase: Provide three-leg protection with properly sized magnetic starter and thermal overloads.

1.7 Maximum Operating Limits:

Liquid Temperature: 212°F (100°C) with standard seal.
250°F (120°C) with optional high temp seal.

Pressure: 125 PSI.
Starts Per Hour: 20, evenly distributed.

1.8 Regular inspection and maintenance will increase service life. Base schedule on operating time. Refer to Section 8.

2. INSTALLATION

2.1 General

2.1.1 Locate pump as near liquid source as possible (below level of liquid for automatic operation).

2.1.2 Protect from freezing or flooding.

2.1.3 Allow adequate space for servicing and ventilation.

2.1.4 All piping must be supported independently of the pump, and must "line-up" naturally.



CAUTION: Never draw piping into place by forcing the pump suction and discharge connections.

Failure to follow these instructions could result in serious personal injury or death, and property damage.

2.1.5 Avoid unnecessary fittings. Select sizes to keep friction losses to a minimum.

2.2 Units may be installed horizontally, inclined or vertically.



CAUTION: Do not install with motor below pump. Any leakage or condensation will affect the motor.

Failure to follow these instructions could result in serious personal injury or death, and property damage.

2.3 Foundation must be flat and substantial to eliminate strain when tightening bolts. Use rubber mounts to minimize noise and vibration.

2.4 Tighten motor hold-down bolts before connecting piping to pump.

3. SUCTION PIPING

3.1 Low static suction lift and short, direct, suction piping is desired. For suction lift over 10 feet and liquid temperature over 120°F, consult pump performance curve for Net Positive Suction Head Required.

- 3.2 Suction pipe must be at least as large as the suction connection of the pump. Smaller size will degrade performance.
- 3.3 If larger pipe is required, an eccentric pipe reducer (with straight side up) must be installed at the pump.
- 3.4 Installation with pump below source of supply:
 - 3.4.1 Install full flow isolation valve in piping for inspection and maintenance.

CAUTION: Do not use suction isolation valve to throttle pump. Failure to follow these instructions could result in serious personal injury or death, and property damage.

- 3.5 Installation with pump above source of supply:
 - 3.5.1 Avoid air pockets. No part of piping should be higher than pump suction connection. Slope piping upward from liquid source.
 - 3.5.2 All joints must be airtight.
 - 3.5.3 Foot valve to be used only if necessary for priming, or to hold prime on intermittent service.
 - 3.5.4 Suction strainer open area must be at least triple the pipe area.
- 3.6 Size of inlet from liquid source, and minimum submergence over inlet, must be sufficient to prevent air entering pump through vortexing. See Figs. 2-5.
- 3.7 User 3-4 wraps of Teflon tape to seal threaded connections.

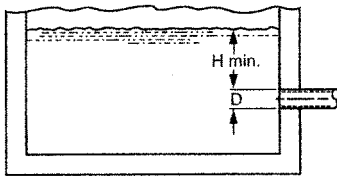


Figure 2

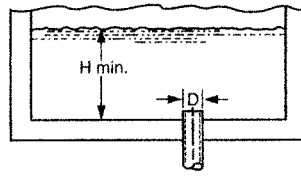


Figure 3

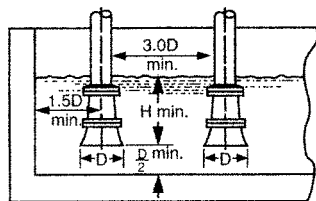


Figure 4

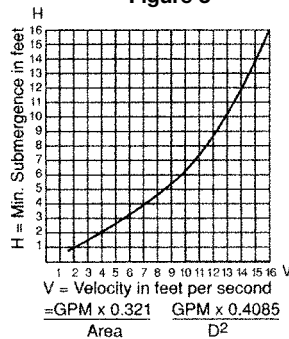


Figure 5

4. DISCHARGE PIPING

- 4.1 Arrangement must include a check valve located between a gate valve and the pump. The gate valve is for regulation of capacity, or for inspection of the pump or check valve.
- 4.2 If an increaser is required, place between check valve and pump.
- 4.3 Use 3-4 wraps of Teflon tape to seal threaded connections.

5. ROTATION

- 5.1 Correct rotation is right-hand (clockwise when viewed from the motor end). Switch power on and off quickly. Observe shaft rotation. To change rotation:
 - 5.1.1 Single-phase motor: Non-reversible.
 - 5.1.2 Three-phase motor: Interchange any two power supply leads.

6. OPERATION

- 6.1 Before starting, pump must be primed (free of air and suction pipe full of liquid) and discharge valve partially open.

CAUTION: Pumped liquid provides lubrication. If pump is run dry, rotating parts will seize and mechanical seal will be damaged. Do not operate at or near zero flow. Energy imparted to the liquid is converted into heat. Liquid may flash to vapor. Rotating parts require liquid to prevent scoring or seizing. Failure to follow these instructions could result in serious personal injury or death, and property damage.

- 6.2 Make complete check after unit is run under operating conditions and temperature has stabilized. Check for expansion of piping.

7. MAINTENANCE


- 7.1 Close-Coupled Unit. Ball bearings are located in and art part of the motor. They are permanently lubricated. No greasing required.

8. DISASSEMBLY

Complete disassembly of the unit will be described. Proceed only as far as required to perform the maintenance work needed.


- 8.1 Turn off power.
- 8.2 Drain system. Flush if necessary.
- 8.3 Remove motor hold-down bolts.
- 8.4 Disassembly of Liquid End:
 - 8.4.1 Remove casing bolts (370).
 - 8.4.2 Remove back pull-out assembly from casing (100).

8.4.3 Remove impeller locknut (304).

 **CAUTION:** Do not insert screwdriver between impeller vanes to prevent rotation of close-coupled units. Remove cap at opposite end of motor. A screwdriver slot or a pair of flats will be exposed. Using them will prevent impeller damage.

Failure to follow these instructions could result in serious personal injury or death, and property damage.

8.4.4 Remove impeller (101) by turning counter-clockwise when looking at the front of the pump. Protect hand with rag or glove.

 **CAUTION:** Failure to remove the impeller in a counter-clockwise direction may damage threading on the impeller, shaft or both.

Failure to follow these instructions could result in serious personal injury or death, and property damage.

8.4.5 With two pry bars 180 degrees apart and inserted between seal housing (184) and the motor adapter (108), carefully separate the two parts. The mechanical seal rotary unit (383) should come off the shaft with the seal housing.

8.4.6 Push out the mechanical seal stationary seat from the motor side of the seal housing.

9. REASSEMBLY

9.1 All parts should be cleaned before assembly.

9.2 Refer to parts list to identify required replacement items. Specify pump index or catalog number when ordering parts.

9.3 Reassembly is the reverse of disassembly.


9.4 Observe the following when reassembling the liquid-end:

9.4.1 All mechanical seal components must be in good condition or leakage may result. Replacement of complete seal assembly, whenever seal has been removed, is good standard practice.

It is permissible to use a light lubricant, such as glycerin, to facilitate assembly. Do not contaminate the mechanical seal faces with lubricant.

9.4.2 Inspect casing O-ring (513) and replace if damaged. This O-ring may be lubricated with petroleum jelly to ease

9.4.3 Inspect guidevane O-ring (349) and replace if worn.

 **CAUTION:** Do not lubricant guidevane O-ring (349). Insure it is not pinched by the impeller on reassembly.

Failure to follow these instructions could result in serious personal injury or death, and property damage.

9.5 Check reassembled unit for binding. Correct as required.

9.6 Tighten casing bolts in a star pattern to prevent O-ring binding.

10. TROUBLE SHOOTING CHART

MOTOR NOT RUNNING

(See causes 1 thru 6)

LITTLE OR NO LIQUID DELIVERED:

(See causes 7 thru 17)

POWER CONSUMPTION TOO HIGH:

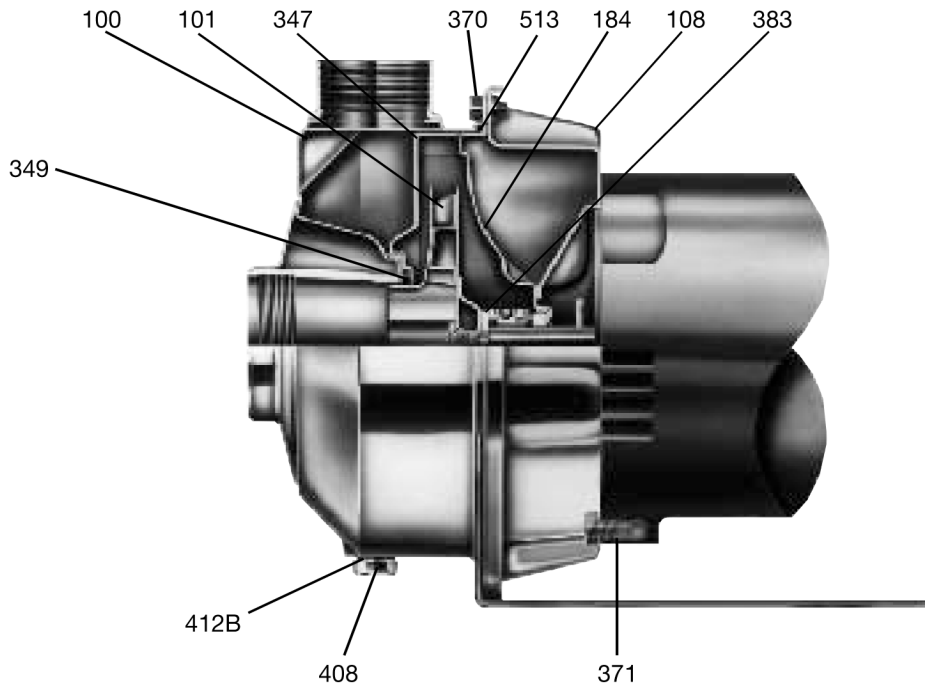
(See causes 4, 17, 18, 19, 22)

EXCESSIVE NOISE AND VIBRATION:

(See causes 4, 6, 9, 13, 15, 16, 18, 20, 21, 22)

PROBABLE CAUSE:

1. Tripped thermal protector
2. Open circuit breaker
3. Blown fuse
4. Rotating parts binding
5. Motor wired improperly
6. Defective motor
7. Not primed
8. Discharge plugged or valve closed
9. Incorrect rotation
10. Foot valve too small, suction not submerged, inlet screen plugged.
11. Low voltage
12. Phase loss (3-phase only)
13. Air or gasses in liquid
14. System head too high
15. NPSHA too low: Suction lift too high or suction losses excessive. Check with vacuum gauge.
16. Impeller worn or plugged
17. Incorrect impeller diameter
18. Head too low causing excessive flow rate
19. Viscosity or specific gravity too high
20. Worn bearings
21. Pump or piping loose
22. Pump and motor misaligned



LIQUID END COMPONENTS		
ITEM NO.	DESCRIPTION	MATERIALS
100	Casing	AISI 316 Stainless Steel
101	Impeller	
184	Seal Housing	
304	Impeller Locknut	
347	Guidevane	
108	Adapter	AISI 304SS
349	O-Ring, Guidevane	Viton
370	Socket Hd. Screws, Casing	AISI 410SS
371	Hex Head Cap Screw, Adapter	Plated Steel
383	Mechanical Seal	Viton/Carbon-Silicon Carbide
408	Drain & Vent Plug, Casing	AISI 316SS
412B	O-Ring, Drain & Vent Plug	Viton
513	O-Ring, Casing	Viton

DEALER SERVICING

If trouble occurs that cannot be rectified, contact your local B&G representative. He will need the following information in order to give you assistance.

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.



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