



Bell & Gossett
a xylem brand

INSTRUCTION MANUAL

DN-0132
REVISION F

Domestic® Pump Vented Boiler Feed Units Series CM,TM CSM,TM CBEM,TM CBM,TM CMED,TM and CMHDTM



CMED Boiler Feed Unit



CBEM Boiler Feed Unit



CBM Boiler Feed Unit

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

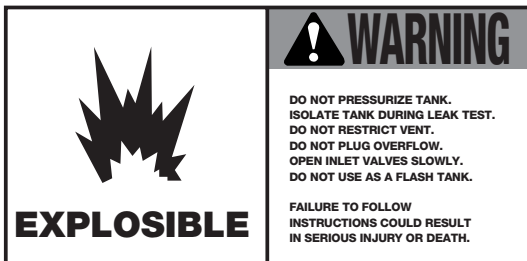


SAFETY INSTRUCTIONS

This safety alert symbol will be used in this manual and on the unit 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 THESE INSTRUCTIONS MAY RESULT IN A SAFETY HAZARD.**

If the decals as noted below are missing or are illegible contact your local B&G representative for a replacement.

1. Electrical connections to be made by qualified Electrician in accordance with all National, State and Local codes.
2. Motor must have properly sized starter with properly sized heaters to provide overload and undervoltage protection.
3. If pump, motor or piping are operating at extremely high or low temperatures, guarding or insulation is required.
4. Operating personnel should be trained in the operation of boiler feed units.



(2) All Units
DN0483 (Small) - DN0484 (Large)



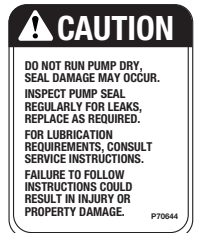
(2) All Units
DN0485 (Small)
DN0486 (Large)

TM					
SERIES					
MODEL					
SERIAL					
GPM	PSI	PUMP			
CFM	IN HG.	PUMP			
DWGS					
POWER V.		PH.	HZ 60		
CONTROL V.		PH. 1	HZ 60		
TOTAL FL. AMP		LARGEST MOTOR FL. AMP			
DN0016					
Bell & Gossett Morton Grove, Illinois 60053					

DN0116
Units with Panel

TM					
SERIES					
MODEL					
SERIAL					
GPM	PSI	PUMP			
CFM	IN HG.	PUMP			
DWGS					
POWER V.		PH.	HZ 60		
CONTROL V.		PH. 1	HZ 60		
TOTAL FL. AMP		LARGEST MOTOR FL. AMP			
DN0019					
Bell & Gossett Morton Grove, Illinois 60053					

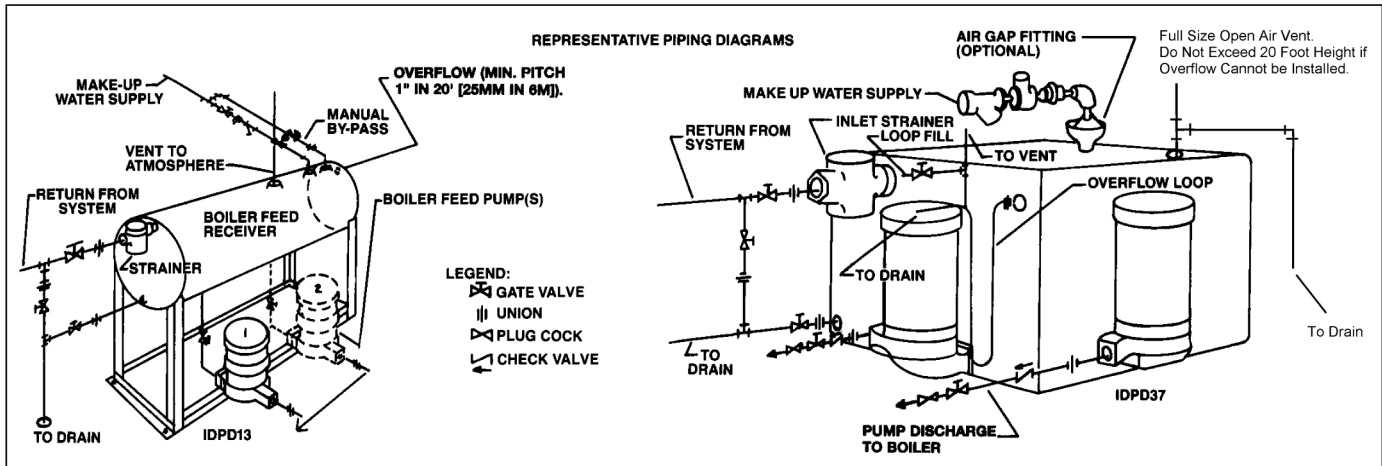
DN0019
Units Less/Panel



P70644
All Units

INSTALLATION AND DESCRIPTION

(Vented Condensate Units)



DESCRIPTION

Boiler feed units are designed to pump water into an operating boiler. The pumps are controlled by level controls on the boiler.

Boiler feed units are normally sized to accommodate system surges and also to provide for the addition of fresh water as required.

Low water cut-off switches and alarms are often included in the boiler feed system.

Various electrical controls are offered to meet system requirements.

Receivers are non-code cast iron or steel.



WARNING: EXPLOSIBLE

Do not pressurize receiver. Isolate receiver during leak test. Do not plug overflow. Do not restrict vent opening to atmosphere. Open valves slowly. Failure to follow these instructions could result in serious injury or death.

PRELIMINARY INSPECTION

Assure that there is no shipping damage.

Assure that nameplate ratings agree with job specifications and actual conditions.

HANDLING

Use care in installing unit.



CAUTION: UNIT LIFTING EYE

Use unit lifting eyes only to lift unit as shipped from factory. Unit must be empty and disconnected from pipes, anchors and other restraints. Use proper rigging procedures. Failure to follow these instructions could result in injury or property damage.

LOCATION

Place unit for easy access to all parts. Allow adequate space for servicing. Check ambient conditions.

NOTICE / TEMPERATURE LIMITS

Motors are designed to operate in 104°F. (40°C) max. ambient. Insulate or ventilate as required.

PIPING (General)

Pipe the unit per the Elementary Piping Diagram. Locate and support piping so as to not load the pump discharge.



CAUTION: NOT A CHEMICAL PUMP

Inject boiler feed compounds from chemical feed tank into boiler feed piping - never into condensate tank. Failure to follow these instructions could result in injury or property damage.

PIPING (Returns)

Gravity return lines from system should be properly pitched down to unit inlet. Returns must also be trapped to prevent steam entry into the unit. An inlet basket strainer is recommended.

PIPING (Vent)

Install a vent pipe to atmosphere. Pipe to be size of vent port on unit. Do not restrict or reduce vent opening or exceed 20 feet vertical height unless an overflow connection is provided.

PIPING (Overflow)

Pipe overflow port to drain using an overflow loop when condensate temp will exceed 200°F. (93°C).

FLOAT SWITCHES

Floats are locked in place to prevent damage during shipment. Remove shipping locks. Check factory settings. Floats are adjustable for various levels of operation.

PIPING (Pump Discharge)

Connect the pump discharge(s) to the boiler in accordance with diagrams furnished with the unit. This piping must be coordinated with electrical controls in the case of multiple pumps and multiple boilers.

Boiler feed systems are supplied to meet a wide variety of system specifications. Except for the simplest units, the electrical controls and piping systems must be coordinated. Carefully study diagrams supplied with the unit.

Low water cut-off switches and alarms are often included in the boiler feed system.

The water make-up float switch should "make" at a higher level than low water cut-off switch "breaks."

ELECTRICAL WIRING & CONTROLS

Connect power wiring per National Electrical Code. Recheck nameplate vs. specifications and conditions. All single phase motors have internal thermal protection.



WARNING: HIGH VOLTAGE ELECTRICITY

Disconnect and lock out power before connecting or servicing unit. Failure to follow these instructions could result in serious injury or death.

Three phase motors must use starters with properly sized overload relays. Overload relays furnished are designed for manual reset.

PUTTING THE UNIT INTO SERVICE

1. Assure that the unit is piped in accordance with instructions on page 2.



WARNING: EXPLOSIBLE

Do not pressurize receiver. Isolate receiver during leak test. Do not plug overflow. Do not restrict vent opening to atmosphere. Open valves slowly. Failure to follow these instructions could result in serious injury or death.

2. Isolate tank before performing any system leak test. Do not pressurize the tank as part of the leak test. Failure to do this can result in serious injury or death.
3. Check floats and alternators for free operation.
4. Check power leads in accordance with wiring diagram enclosed in control cabinet (when furnished).



WARNING: HIGH VOLTAGE

Disconnect and lock out power before connecting or servicing unit. Failure to follow these instructions could result in serious injury or death.

5. Install drain plugs.
6. Fill receiver half full of water to prime pump(s) and prevent possible damage to pump seals. Avoid freezing conditions after unit receiver has been filled.
7. Check for proper rotation of all three phase motors. Rotation must be clockwise looking down on the motor as indicated by directional arrow on pump casting. If pump runs backwards, interchange two wires (3 phase only).



CAUTION: DO NOT REVERSE

Reverse operation can cause extensive damage to pumps. Jog the motor to test for direction of rotation. Failure to follow these instructions could result in injury or property damage.

8. Throttle plug cock in discharge line until pressure at pump (while pump is discharging) approaches pump rated pressure. Tighten plug nut to secure adjustment.
9. Connect the water make-up assembly to city water. Use piping at least as large as valve piping provided. Provide a manual fill valve if not included on the unit.

10. Boiler Level Controls

Assure that the controls on and related to the boiler match the control systems provided on the unit (see the wiring diagram furnished) (applicable when electrical control panel is furnished).



WARNING: MAINTAIN BOILER SAFETY FEATURES

When connecting the boiler feed unit to the boiler, assure that all boiler safety controls (burner cutoff, etc.) are and remain operational. With certain control arrangements, dedicated boiler controllers are required for the boiler feed pumps. Failure to follow these instructions could result in serious injury, death or extensive property damage.

11. Check that the pump discharge pressure exceeds the maximum operating pressure of the boiler.
12. Manually move the make-up water float indicator and assure that the make-up solenoid admits water.
13. Manually move the low water cut-off float switch indicator to check for pump shut-off.



CAUTION: DO NOT RUN DRY.

SEAL DAMAGE MAY OCCUR.

Inspect pump seal regularly for leaks. Replace as required. Failure to follow these instructions could result in injury or property damage.

14. Remove start-up label (below) from panel (if applicable) after complying with instructions.

ELECTRICIAN/INSTALLER/OPERATOR

REMOVE AND DESTROY THIS TAG AFTER —

1. ASSURING THAT ALL PUMPS ROTATE CLOCKWISE PER ARROWS CAST ON VOLUTES. (JOG PUMP MOMENTARILY TO TEST — INTERCHANGE ANY TWO MOTOR POWER WIRES TO REVERSE 3PH MOTORS.)
2. ASSURING THAT SHIPPING LOCKS HAVE BEEN REMOVED FROM ALL FLOAT SWITCHES.

15. If possible, observe operation thru several cycles.

OPERATION AND MAINTENANCE

Operators must be familiar with all sections of this manual to understand the operation of the unit.

Hot water, steam and electricity can be hazardous.



SAFETY INSTRUCTIONS

SEE COVER OF THIS MANUAL



WARNING: EXPLOSIBLE

Do not pressurize receiver. Isolate receiver during leak test. Do not plug overflow. Do not restrict vent opening to atmosphere. Open valves slowly. Failure to follow these instructions could result in serious injury or death.



WARNING: HIGH VOLTAGE

Disconnect and lock out power before connecting or servicing unit. Failure to follow these instructions could result in serious injury or death.

Check motor nameplate for any lubrication requirements. Pumps require no lubrication.

NOTICE / AUTO RESTART

Single phase motors will restart automatically after thermal overload protector trips.

Overload thermal relays in starters must be reset manually.

A properly installed unit should function unattended for long periods of time. Periodic checks to assure proper operations are highly recommended. Refer to trouble shooting section when necessary.

A variety of control options are available and are furnished in accordance with user specifications. Refer to wiring diagrams (when furnished) to determine control switch settings.

The inlet strainer (when furnished) is intended to protect the pump and system. Periodic cleaning should be included in the maintenance schedule. Check frequently in new systems.



CAUTION: SUBSEQUENT DAMAGE

A unit showing symptoms of possible problems (overflow, noise, leaks, vibrations, continual operation, etc.) must be corrected immediately. Failure to follow these instructions may result in full liability for subsequent injury or property damage.



WARNING: EXPLOSIBLE

The installed boiler feed unit becomes an integral part of the boiler system. Boiler operation and maintenance requires specific skills and training and may require licensing or certification. The boiler feed unit must be operated and maintained so as not to jeopardize the boiler operation. Failure to follow these instructions could result in serious injury, death or extensive property damage.

TROUBLE SHOOTING PROCEDURES

All units are thoroughly tested at the factory before shipment. They should operate satisfactorily without further adjustment if properly installed and providing they have not been damaged by rough handling in transit. If system or unit performance is not satisfactory, refer to the following check list.

Pump Will Not Start

1. The power supply has been interrupted, disconnect switch is open, or selector switch is improperly positioned.
2. Incorrect voltage for motor. Check voltage and wiring with motor characteristics.
3. Incorrect starter coil for power supply.
4. The overload relays and the starter have tripped out and must be reset. Ambient temperature may be too high.
5. Check pump controls or other controls for proper operation.
6. Wiring to control cabinet is incorrect or connections are loose.
7. The strainer is dirty thus retarding flow. Clean periodically.
8. Boiler is full or boiler control switch is defective.
9. The low water cut-off float switch is open due to low water, incorrect adjustment or failure.

Pump Runs Continuously

1. Pump is running backward. Rotation of three phase motors may be corrected by interchanging any two of the three wires. Rotation should be clockwise looking down on motor.
2. Steam traps are blowing through causing condensate to return at excessive temperatures. This may reduce the capacity of pump below its rating, depending on the unit and type of pump furnished. Traps should be repaired or replaced.
3. Pump discharge pressure is less than operating pressure of the boiler.
4. The total required pressure at the pump discharge is greater than the pressure for which the pump was designed. Check the total pressure which includes atmospheric pressure, the friction head and the static head.
5. A valve in the discharge line is closed or throttled too tightly. Check valve is installed backwards.

6. The impeller eye is clogged.
7. Pump is too small for system.

Boiler Feed Pump is Noisy

1. The pump is working against a lower pressure than designed for. While pump is discharging, adjust plug cock in discharge line until pressure at pump approaches pump rated pressure.
2. Excessive condensate temperature. Correct system conditions. However, this applies to certain units only; others are designed to handle boiling water.
3. Magnetic hum or bearing noise in motor. Consult motor manufacturer's authorized service station nearest unit location.
4. Starter chatters. Trouble is caused by low line voltage, poor connections, defective starter coil, or burned contacts.
5. Pump is running backward.

The System is Noisy

1. Banging in the steam mains is usually caused by steam "imploding" in condensate lying in low points in lines. These problems can be eliminated by dripping low points, properly supporting the pipe, or by increasing the pitch of the lines.
2. Improper dripping of the steam mains and risers; where there is a rise in the steam main, or where it branches off into a riser, a drip trap must be installed in the drain line.
3. The piping is too small to drain properly.
4. A defective trap is holding condensate in steam supply line.
5. Defective check valve permits steam to vent thru pump into the boiler feed tank.
6. A priming boiler is discharging water with the steam. Consult boiler manufacturer.

Excessive Water Overflow From Unit

1. Receiver sized too small to accommodate system surges.
2. Water make-up valve open or float switch set too high.
3. Water make-up valve leaks.

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.
SEE RATING NAMEPLATE.
2. Suction and discharge pipe pressure gauge readings.
3. Ampere draw of the motor.
4. A sketch of the pump hook-up and piping.
5. Provide complete information on boiler control switches and any motorized or solenoid valves in the boiler feed piping.

TM		
SERIES TM		
MODEL		
SERIAL		
GPM	PSI	PUMP
CFM	IN HG.	PUMP
DWGS		
POWER V.	PH.	HZ 60
CONTROL V.	PH. 1	HZ 60
TOTAL F.L. AMP	LARGEST MOTOR F.L. AMP	
DN0016		
Bell & Gossett		
Morton Grove, Illinois 60053		

PUMP SERVICE INSTRUCTIONS FOR 609PF CENTRIFUGAL PUMPS

These close coupled vertical centrifugal pumps are equipped with mechanical seals. If system has not been properly cleaned prior to installation of pump, foreign matter such as dirt, pipe scale, core sand, etc. may clog the impeller and damage the seal. A strainer is recommended in return line to pump. *Pump must not be operated dry.* Seals may be damaged if operated without water present.

1. Close inlet line gate valve and operate pump momentarily to remove as much liquid as possible from pump. Close discharge line gate valve.



CAUTION: HOT SURFACES

Surfaces are hot when system is in operation. Do not touch hot receiver, let unit cool before servicing. Failure to follow these instructions could result in injury or property damage.

2. Shut-off and lock-out power.



WARNING: HIGH VOLTAGE

Disconnect and lock out power before connecting or servicing unit. Failure to follow these instructions could result in serious injury or death.

3. Disconnect wiring to motor.

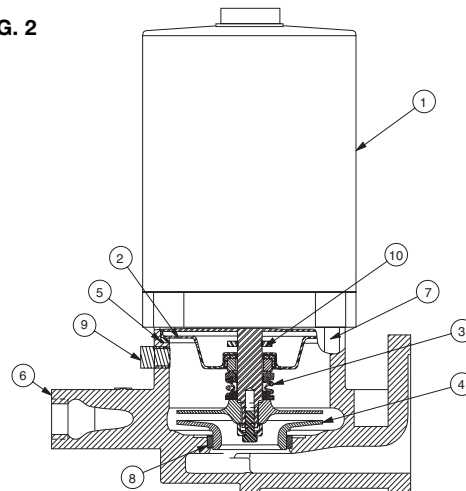


CAUTION: PRESSURIZED SYSTEM

Operating system may contain very hot water under pressure. Close inlet and open drains before servicing. When servicing, *loosen* screws and move components to assure pressure is relieved before *removing* screws. Keep drains open during servicing. Failure to follow these instructions could result in injury or property damage.

4. Make sure unit is cool enough that pump can be handled safely. Open receiver drain to remove remaining liquid.
5. Loosen the motor to pump volute fasteners. Assure that pressure is relieved per caution note.
6. Remove four capscrews (7) holding pump case to motor and lift motor and impeller out of pump case.
7. Remove pump/motor assembly and place on work bench.
8. Hold top end of motor shaft with large screwdriver via screwdriver slot in shaft and back of impeller (counter-clockwise) with a rectangular bar or other flat tool inserted between the vanes of the impeller.
9. Remove the rotating part of the mechanical seal from the end of the shaft.
10. Remove seal holder (2) with stationary ceramic part of mechanical seal and cup rubber from the end of the shaft.
11. Remove stationary ceramic part of mechanical seal and cup rubber from recess in seal holder.
12. To install new seal, proceed as follows: Clean recess in seal holder thoroughly. Orient motor so that conduit opening on motor is to the left when looking at motor shaft. Replace seal holder on the face of the motor maintaining concentricity with motor face. Place new ceramic part of seal in the cup rubber over motor shaft and press firmly into recess of seal holder by hand, making certain both parts bottom evenly. If assembly cannot be bottomed with fingers place a wooden or cardboard tube over shaft onto ceramic and push into place. Using a clean, lint-free cloth, wipe the mating surfaces of the seal clean of any foreign matter. Moisten the carbon section of the rotating part of the seal and place onto shaft to seat against the ceramic. Place seal spring onto shaft.

FIG. 2



- | | | |
|----------------|-------------------------------|--------------|
| 1. Motor | 5. Gasket | 8. Wear Ring |
| 2. Seal Holder | 6. Case | 9. Pipe Plug |
| 3. Seal | 7. Capscrew (motor to volute) | 10. Slinger |
| 4. Impeller | | |

2DPF01

13. Hold motor shaft as described in #8 and replace the impeller on the shaft (clockwise rotation) making sure it is tight.
14. Orient motor for pump reassembly with conduit opening to the left. When mounting the pump case, discharge should be 90° to the right of conduit opening on motor. Use care to insure tight gasket fit to prevent water leakage.
15. Replace four capscrews (7). Tighten down capscrews evenly to avoid damage.
16. Reconnect pump bleed line (where applicable) and motor wiring.



CAUTION: DO NOT RUN DRY. SEAL DAMAGE MAY OCCUR.

Inspect pump seal regularly for leaks. Replace as required. Failure to follow these instructions could result in injury or property damage.

17. Close drain and slowly open inlet valves. See warning.



WARNING: EXPLOSIBLE

Do not pressurize receiver. Isolate receiver during leak test. Do not plug overflow. Do not restrict vent opening to atmosphere. Open valves slowly. Failure to follow these instructions could result in serious injury or death.

18. Jog to check motor rotation. See caution.



CAUTION: DO NOT REVERSE

Reverse operation can cause extensive damage to pumps. Jog the motor to test for direction of rotation. Failure to follow these instructions could result in injury or property damage.

19. Observe operation thru several cycles.

PUMP SERVICE INSTRUCTIONS FOR CENTRIFUGAL PUMPS (EXCEPT 'B' OR 609)

Vertical mounting puts motor above floor dirt and water

Close coupled centrifugal pumps are designed for years of trouble free service. Units have mechanical shaft seals.

1. Close inlet gate valve and operate pump momentarily to remove as much liquid as possible from pump. Close discharge line gate valve.



CAUTION: HOT SURFACES

Surfaces are hot when system is in operation. Do not touch hot receiver, let unit cool before servicing. Failure to follow these instructions could result in serious injury or death.

2. Shut-off and lock out power.



WARNING: HIGH VOLTAGE

Disconnect and lock out power before connecting or servicing unit. Failure to follow these instructions could result in serious injury or death.

3. Make sure unit is cool enough that pump can be handled safely. Open drain to remove remaining liquid.
4. Carefully remove pump drain plug and bleed line. Wait for complete drainage.
5. Loosen the motor bracket to pump volute capscrews. Assure that the pressure is relieved per caution note.

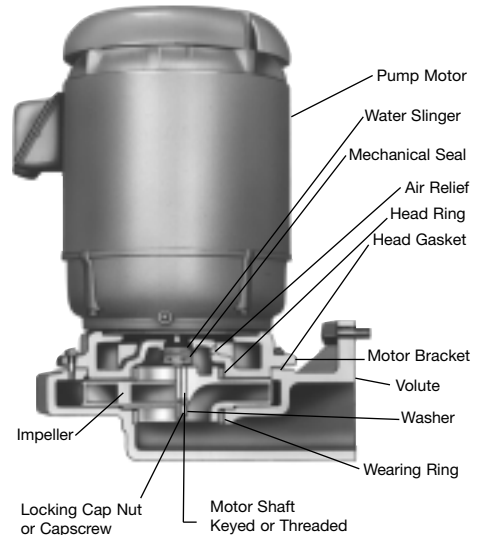


CAUTION: PRESSURIZED SYSTEM:

Operating system may contain very hot water under pressure. Close inlet and open drains before servicing. When servicing, *loosen* screws and move components to assure pressure is relieved before *removing* screws. Keep drains open during servicing. Failure to follow these instructions could result in injury or property damage.

6. Complete the removal of the hardware. Remove pump/motor assembly and place on work bench.
7. Remove self locking stainless steel capscrews and stainless steel washer (or self locking brass cap nut and washer) that secure the impeller in place.
8. To remove impeller from motor shaft proceed as follows:
 - (1) Keyed Shafts. Remove impeller with gear puller or other means which will not damage impeller or bend motor shaft.
 - (2) Threaded Shafts. Hold end of motor shaft opposite pump with large screwdriver or other suitable tool and back impeller off with a rectangular bar or other flat tool inserted between the vanes of the impeller.
9. Remove rotating part of seal from shaft, being careful not break carbon face.
10. Remove capscrews holding motor bracket to motor and remove bracket.
11. Remove stationary part of seal assembly, being careful not to chip or break ceramic seal.
12. To install seal proceed as follows:
 - (1) Clean recess in bracket thoroughly. Coat recess and "rubber" portion of seat with soap solution. Press seat into recess firmly by hand making certain both parts bottom evenly. If seal cannot be bottomed with fingers place cardboard shipping disc on ceramic and force into place with flat tool.
 - (2) Carefully place bracket in position on motor shaft without displacing ceramic seat and secure bracket to motor with capscrews.
 - (3) Place motor vertically with pump end up. Do not attempt assembly of seal and impeller with shaft horizontal.

CUT-AWAY VIEW OF MECHANICAL SEAL TYPE PUMP



- (4) The "carbon" of rotating part of seal should not be loose. If it is, hold in place with grease. Using clean, lint free cloth, wipe mating surfaces perfectly clean. Soap shaft and push seal onto shaft so that carbon will contact ceramic seal. If spacer is required, use grease to cause spacer to adhere to bottom of seal after seal has been put on shaft. Be sure spacer is on larger diameter of shaft so that will not catch between shoulder and impeller.
13. Replace impeller on shaft. Replace stainless steel washer and secure impeller with capscrew or cap nut.
14. Place new gasket on pump volute and reassemble motor and pump subassembly on pump volute.
15. Reconnect pump bleed line and motor wiring.



CAUTION: DO NOT RUN DRY.

SEAL DAMAGE MAY OCCUR.

Inspect pump seal regularly for leaks. Replace as required. Failure to follow these instructions could result in injury or property damage.

16. Close drain and slowly open inlet valves. See warning.



WARNING: EXPLOSIBLE

Do not pressurize receiver. Isolate receiver during leak test. Do not plug overflow. Do not restrict vent opening to atmosphere. Open valves slowly. Failure to follow these instructions could result in serious injury or death.

17. Jog to check motor rotation. See caution.



CAUTION: DO NOT REVERSE

Reverse operation can cause extensive damage to pumps. Jog the motor to test for direction of rotation. Failure to follow these instructions could result in injury or property damage.

18. Observe operation thru several cycles.

PUMP SERVICE INSTRUCTIONS FOR SERIES B35 PUMPS

1. Close pump isolation valve or system return line valve. Operate pump momentarily to discharge as much water as possible. Close pump discharge valve.



CAUTION: HOT SURFACES

Surfaces are hot when system is in operation. Do not touch hot receiver, let unit cool before servicing. Failure to follow these instructions could result in serious injury or death.

2. Shut-off and lock out power.



WARNING: HIGH VOLTAGE

Disconnect and lock out power before connecting or servicing unit. Failure to follow these instructions could result in serious injury or death.

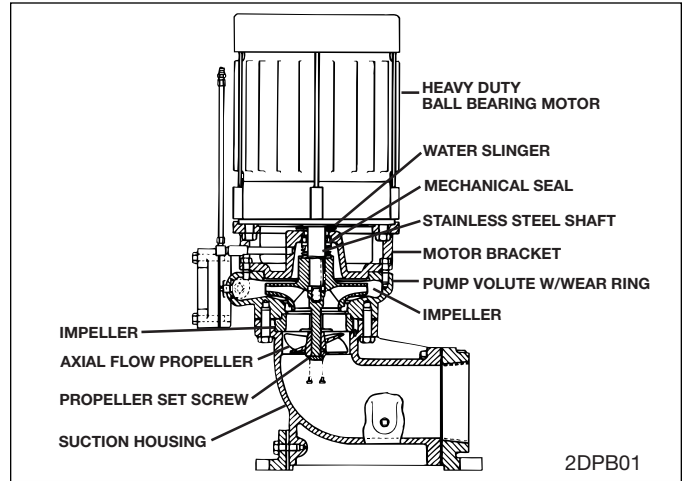
3. Make sure unit is cool enough that pump can be handled safely. Open drain to remove remaining liquid.
4. Carefully remove pump drain plug and bleed line. Wait for complete drainage.
5. Loosen both the discharge connection and the suction housing to pump volute fasteners. Assure that pressure is relieved per caution note.



CAUTION: PRESSURIZED SYSTEM

Operating system may contain very hot water and steam under pressure. Close inlet and open drains before servicing. When servicing, *loosen* screws and move components to assure pressure is relieved before *removing* screws. Keep drains open during servicing. Failure to follow these instructions could result in injury or property damage.

6. Complete the removal of the above hardware. Remove pump/motor assembly and place on work bench.
- 7a. Remove the suction housing capscrews and separate the pump/motor assembly from the suction housing. Note, the diffuser should separate from the suction housing to allow the pump/motor assembly to be removed.
- 7b. Remove propeller, propeller stem and diffuser from the assembly as follows:
 - (1) Threaded Motor Shafts (3Hp and less). Remove propeller lock nut. Remove propeller with propeller stem as an assembly with the diffuser. To install a new propeller, remove the propeller set screws and separate from the stem.
 - (2) Keyed Motor Shafts (5Hp and larger). Remove propeller set screws. Remove propeller, remove diffuser, and unscrew the propeller stem.
8. Remove capscrews holding motor bracket and pump volute together. Remove motor and bracket assembly from volute by lifting straight away from volute.
- 9a. To remove impeller from motor shaft proceed as follows:
 - (1) Keyed Shafts. Remove impeller with gear puller or other means which will not damage impeller or bend motor shaft.
 - (2) Threaded Shafts. Hold end of motor shaft opposite pump with large screwdriver or other suitable tool and back impeller off with a rectangular bar or other flat tool inserted between the vanes of the impeller.



- 9b. Remove rotating part of seal from shaft, being careful not to break carbon face.
10. Remove capscrews holding motor bracket to motor and remove bracket.
11. Remove stationary part of seal assembly, being careful not to chip or break ceramic seal.
12. To install seal proceed as follows:
 - (1) Clean recess in bracket thoroughly. Coat recess and "rubber" portion of seat with soap solution. Press seat into recess firmly by hand making certain both parts bottom evenly. If seal cannot be bottomed with fingers place cardboard shipping disc on ceramic and force into place with tool.
 - (2) Carefully place bracket in position on motor shaft without displacing ceramic seat and secure bracket to motor with capscrews.
 - (3) Place motor vertically with pump end up. Do not attempt assembly of seal and impeller with shaft horizontal.
 - (4) The "carbon" of rotating part of seal should not be loose. If it is, hold in place with grease. Using clean, lint free cloth, wipe mating surfaces perfectly clean. Soap shaft and push seal onto shaft so that carbon with contact ceramic seal. If spacer is required, use grease to cause spacer to adhere to bottom of seal after seal has been put on shaft. Be sure spacer is on larger diameter of shaft so that it will not catch between shoulder and impeller.
13. Place impeller on shaft. Make sure impeller is seated.
14. Reassemble volute to bracket.
15. Install stem over drive pin in impeller eye. Tighten lock nut.
16. Set stem to .004 TIR.
17. Install diffuser.
18. Install propeller and tighten set screws.
19. Using new gasket and noting alignment pin, install assembly on suction housing.
20. Install suction housing and discharge fasteners and tighten.

21. Reconnect pump bleed line and motor wiring.



**CAUTION: DO NOT RUN DRY.
SEAL DAMAGE MAY OCCUR.**

Inspect pump seal regularly for leaks. Replace as required. Failure to follow these instructions could result in injury or property damage.

22. Close drain and slowly open inlet valves. See warning.



WARNING: EXPLOSIBLE

Do not pressurize receiver. Isolate receiver during leak test. Do not plug overflow. Do not restrict vent opening to atmosphere. Open valves slowly. Failure to follow these instructions could result in serious injury or death.

23. Jog to check motor rotation. See caution.



CAUTION: DO NOT REVERSE

Reverse operation can cause extensive damage to pumps. Jog the motor to test for direction of rotation. Failure to follow these instructions could result in injury or property damage.

24. Observe operation thru several cycles.



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