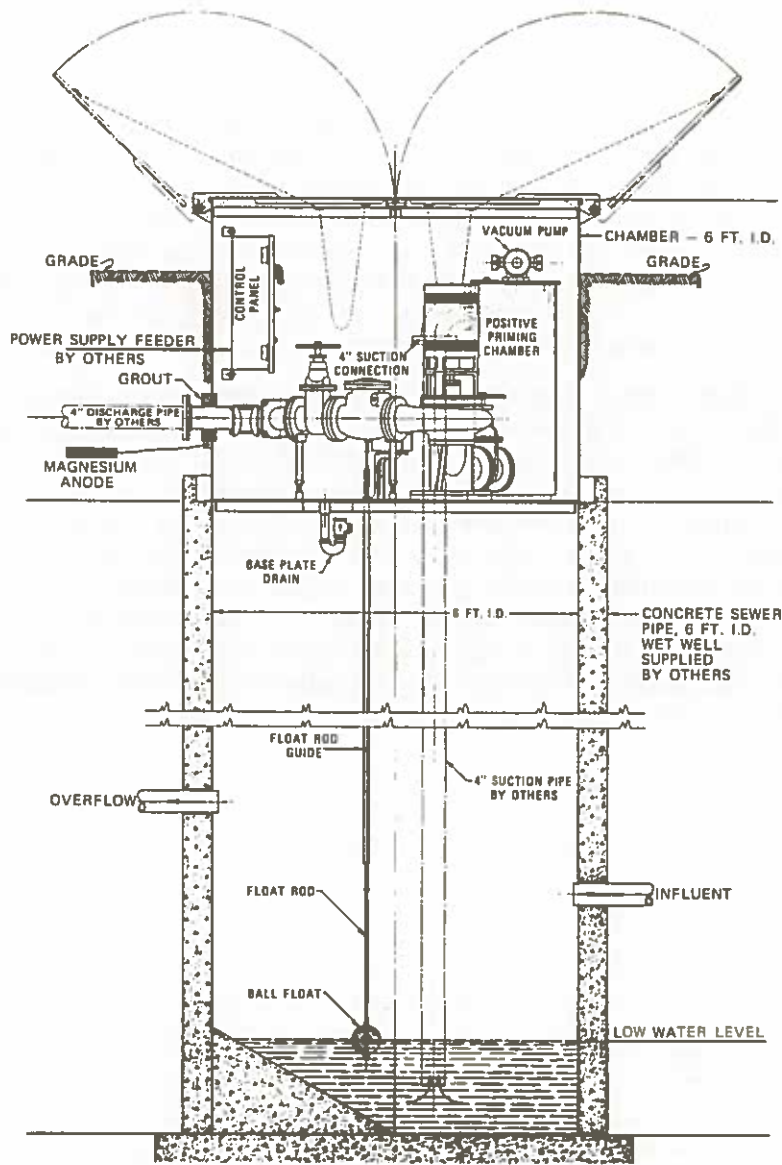


INSTALLATION & MAINTENANCE MANUAL FOR ENPO-CORNALL POSI-PRIME® PUMPING STATION



TYPICAL INSTALLATION



Enpo-Cornell Pump Company A DIVISION OF
Roper Industries, Inc. (Ohio) 420 EAST THIRD STREET, PIQUA, OHIO 45356

**FACTORY BUILT
POSI-PRIME
PUMPING STATION**



Enpo-Cornell Pump Company

A DIVISION OF

Roper Industries, Inc. (Ohio)

420 EAST THIRD STREET, PIQUA, OHIO 45356

WARRANTY

Enpo-Cornell Pump Company warrants its Posi-Prime Pumping Station to be free from defects in material or workmanship under normal use and service when used in applications for which the design is intended for a period of one year after the date the station is first operated, provided that such operation is by authorized personnel, but the liability on this warranty shall be limited to repair or replacement of any station or a part thereof which is returned to the Enpo-Cornell factory, the nearest service outlet authorized by Enpo-Cornell or, if a component made by another is defective, the nearest service outlet authorized by the manufacturer of the defective component, transportation charges and handling fees prepaid, within the said time period, and which is found by Enpo-Cornell or its duly authorized representative to have been thus defective in material or workmanship.

Except as expressly stated above, Enpo-Cornell makes no warranty of merchantability and no warranty of fitness for any particular purpose nor does it make any warranty, express or implied, of any nature whatsoever with respect to the station, any part thereof, or the use thereof. The foregoing is the full extent of the responsibility of Enpo-Cornell and, by way of illustration and not limitation, in no event shall Enpo-Cornell be liable for delay caused by defects, for consequential damages, or for any charges or expenses of any nature incurred without its written consent. This warranty does not apply to any station or part thereof which has been repaired or altered in a way or at a place not authorized above in this warranty in any respect which, in the judgment of Enpo-Cornell, affects its quality, condition, or operation or any station which has not been placed in operation within 30 days after shipment or has been subject to careless handling, tampering, misuse, accident, damage by flooding or power outage, or faulty or improper installation or application.



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INSTALLATION INSTRUCTIONS

Your Enpo-Cornell Posi-Prime Station has been completely pretested and adjusted at the factory before shipment. Close adherence to the following instructions will result in the least effort and assure correct installation.

ELECTRICAL SUPPLY —

Have electrical power on site ready for hook up immediately following the placement of the Posi-Prime Station. Damage can be done to electrical circuits, controls, etc., if the station is left for any length of time without power.

PLACING OF STATION —

Using the lifting lugs provided, position the Posi-Prime Station onto the wet well using a hoist, with at least 5,000 pound capacity for stations with chamber and 3,000 pound capacity for stations without chamber, and anchor station. **NOTE:** On units with base plate drain, connect the piping assembly supplied with the unit to the coupling on the underside of baseplate before placing station in position.

SUCTION PIPE —

Length of Suction Pipe —

A minimum clearance of one pipe diameter from bottom of the wet well to the end of the pipe.

Reduce Entrance Loss —

Round the inlet end of the suction pipe on the inside diameter.

CONNECTING SUCTION PIPE —

Remove 90 degree flanged elbow mounted on vacuum tank. Connect elbow to suction piping supplied by others. Lower suction pipe through flanged opening into wet well and connect to vacuum tank. Tighten 2-bolt base plate flange. **NOTE:** Coat the faces of the 90 degree elbow flange gaskets with John Crane Plastic Lead Seal No. 2 or equivalent.

DISCHARGE LINE —

A minimum static head of liquid 42 inches above the top of the base plate must be maintained in the discharge line beyond the station.

Posi-Prime Pumping Stations are manufactured with either horizontal discharge line or vertical discharge line down thru base plate.

CONNECTING HORIZONTAL DISCHARGE LINE . . . Thru Station With Chamber —

The four inch flanged end discharge line may be connected with a flexible or flanged joint supplied by others. Connect piping and fill opening between piping and enclosure sleeve with expanding type grout. Coat grout with epoxy paint after grout has set up. Grout and paint furnished by Enpo-Cornell.

CONNECTING HORIZONTAL DISCHARGE LINE . . . On Station Without Chamber —

The 4 inch flanged end discharge line may be connected with a flexible or flanged joint supplied by others.

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INSTALLATION INSTRUCTIONS (continued)

CONNECTING VERTICAL DISCHARGE LINE THRU BASE PLATE . . . On Station With Or Without Chamber —

Loosen the 2-bolt base plate sealing flange and the 3-bolt compression coupling mounted on the discharge manifold tee. Connect 4 inch piping, supplied by others, to compression coupling and tighten connections.

CONNECTING ELECTRICAL POWER —

All electrical equipment furnished by Enpo-Cornell Pump Company have circuit breakers or disconnect switches located in the control panel.

Turn off all circuit breakers or disconnect switches in panel before connecting main power source to station.

Station With Chamber —

The power line is fed into the station thru the 1½ inch N.P.T. pipe coupling located in the side of chamber and wires to be connected to the terminals of the right hand disconnect switch or circuit breaker for the main pumps in the control panel. The power line connection thru the chamber must be water tight.

Station Without Chamber —

Power is fed directly into the control panel and connected to the terminals of the right hand disconnect switch or circuit breaker for the main pump.

CONNECTING THE MAGNESIUM ANODE . . . Station With Chamber Only —

Connect the anode lead wire to the bolt located on the outside of the chamber near the discharge line. Loosen the bolt and clean the area to bright metal to provide a good connection. Strip 3 inches of insulation from the end of the lead wire. Loop the stripped end of the lead wire around the bolt approximately 2 turns. Tighten bolt to secure connection. Paint connection area with epoxy touch up paint. Bury the magnesium anode approximately six feet from the station and six feet deep in the ground.

BACK FILLING . . . Station With Chamber Only —

Before back filling carefully inspect the station for handling abrasions. Sand all abrasions to clean metal and paint with epoxy touch up paint furnished with station by Enpo-Cornell. The life of the station will be extended by taking care that no bare metal is left exposed.

VACUUM PUMP VENT TO OUTSIDE ATMOSPHERE . . . Station Without Chamber —

Connect piping supplied by others from ¼ inch pipe tee outlet located on top of vacuum pump to outside atmosphere. Use ¼ inch minimum pipe size for run length up to 6 feet. For run lengths over 6 feet, increase pipe size accordingly.

WET WELL LIQUID LEVEL CONTROL —

See instruction sheet covering appropriate equipment.



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START UP INSTRUCTIONS

Following the service connections and with sufficient pumpage in the wet well, the station is ready for start up.

1. Turn on the electrical power momentarily to one main pump at a time and check motor rotation. **NOTE:** The shaft seals will be destroyed if the pump is run dry. Rotation is in the direction of the discharge nozzle, counter clockwise for left hand unit and clockwise for right hand unit facing the priming tank. If rotation is backward and the power is three phase, reverse any two of the motor leads. For single phase power refer to motor nameplate.
2. Turn off electrical power to main pumps after checking rotation of motors.
3. Close discharge gate valves.
4. Turn on circuit breaker for vacuum pump. The vacuum pump will start and draw pumpage from the wet well into the priming chamber and shut off when the priming level is reached. The running time of the vacuum pump varies according to suction lift. The running time for maximum suction lift is approximately five minutes. If the vacuum pump continues to run after five minutes, check for suction pipe leaks.
5. Turn on electrical power and start one pump at a time. Open the seal gland vent plug item 29 on parts list and purge trapped air from the shaft seal chamber. Allow pump to run until a steady flow of water is emitting from vent plug, then close vent plug. **NOTE:** Running seals dry will destroy them.
6. Open discharge gate valves.
7. Operate alternately each main pump manually until the discharge line is filled. The level of the pumpage in the wet well must be checked while the pumps are being manually operated to prevent a low water condition that will cause pumps to lose prime and to assure that each pump is producing.
8. **DRAINS —**
 - Station With Base Plate Drain Hole —**
Fill the drain piping with water. The check valve in the drain line will open when water is within approximately one inch from the top. If the drain does not hold water, check the piping connected on the underside of base plate.
 - Station With Sump Pump —**
Fill the sump pump pit with water. Turn on circuit breaker for sump pump, located in control panel, and check operation of pump and control. Do not pump sump pit dry, leave sufficient water in pit to cover suction end of pump.
9. **AUXILIARY EQUIPMENT —**
Turn on circuit breakers, located in the control panel and operate equipment and controls.
10. Turn on the electrical power to the main pump for automatic operation and station is in operation.

NORMAL OPERATION —

With pumpage being supplied to the wet well the pumps will operate on demand from the wet wells liquid level control. The priming chamber will remain filled with pumpage unless the suction pipe is restricted. The vacuum pump is controlled by a liquid level control in the priming chamber and operates only when the main pumps are off and the level in the priming chamber is below operating level. The priming chamber is designed to hold sufficient pumpage to start the station without vacuum; therefore, the station will operate when the vacuum has been lost without the vacuum pump running. The running of either main pump will also restore the vacuum to the priming chamber without the vacuum pump running.

The following information is provided for your reference:

1. The first section of the document discusses the importance of maintaining accurate records.

2. The second section details the procedures for handling confidential information.

3. The third section outlines the responsibilities of all personnel involved in the process.

4. The fourth section provides a summary of the key findings and recommendations.

5. The fifth section contains the conclusions and next steps for the project.



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PERIODIC INSPECTION AND MAINTENANCE

The following lists suggested checks to be made during routine maintenance inspection of the station. Always be sure the power is off in any electrical circuit that must be jumped or disconnected to perform any of the following checks.

Should any check reveal a defective component, refer to the specific repair instructions for that item.

STATION CHAMBER —

Check general appearance of inside of station. There should be no accumulation of water on station floor. If there is, disconnect main power supply to the station at once.

ELECTRICAL CONTROL PANEL —

Check the control panel for blown fuses or tripped circuit breakers in the main pumps and auxiliary equipment circuits. Blown fuses or tripped circuit breakers indicates malfunctioning equipment.

WET WELL LEVEL CONTROLS —

Check the controls to assure the pumps do start and stop at the specified conditions.

HEATER —

The heater is equipped with intergal thermostat with 50 - 90 degrees F. temperature range. A knob enables selection of heat level. The thermostat controls both the heater and fan circuit. The heater element is protected with an automatic reset thermal cutout which will disconnect the element in case of over heating from any cause and allow the fan to continue to operate. The circuit breaker for the heater is located in the control panel. Before and during cold weather turn knob to highest setting and check that both the fan and heating element operate.

The front and rear bearings of the fan should be lubricated after three years of duty, not more than 5,000 hours of actual operation, with a good grade of SAE 10 non-detergent oil. The rear grill has to be removed to lubricate the fan.

SUMP PUMP —

Fill the sump pit with sufficient water to start the sump pump and check its operation. Do not pump pit dry, leave sufficient water to cover suction end of pump.

BASE PLATE DRAIN —

Fill the base plate drain with water. The check valve will open when water is within one inch from the top. Pour sufficient water to assure the line is open.

OTHER EQUIPMENT —

All equipment should be started and checked for operation performance.

MAIN PUMPS —

Partially close the discharge gate valves to prevent the pumps from pumping the wet well dry when a low liquid level may exist during inspection check.

Pumps equipped with H-O-A switches mounted on the front of the control panel will start when the switch is turned to the hand position. Pumps without H-O-A switches have to be manually started for inspection check.

Start one pump at a time and watch the lever arm on the check valve adjacent to the pump. If the pump is producing the lever arm will move upward indicating the opening of the check valve by the pumps discharge pressure. The check valve is fully closed when the lever arm is horizontal.

1. Introduction
2. Experimental
3. Results
4. Discussion
5. Conclusions

The first part of the study was devoted to the investigation of the reaction of the metal with the gas. The results show that the reaction is first order with respect to the metal and second order with respect to the gas. The activation energy of the reaction was found to be 15 kcal/mole. The reaction is believed to proceed via a surface intermediate.

The second part of the study was devoted to the investigation of the reaction of the metal with the liquid. The results show that the reaction is first order with respect to the metal and first order with respect to the liquid. The activation energy of the reaction was found to be 10 kcal/mole. The reaction is believed to proceed via a surface intermediate.



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TROUBLE SHOOTING

MAIN PUMPS

Runs But Will Not Pump —

1. Pump rotating backwards.
2. Gate valve closed.
3. Check valve stuck.
4. Pump speed too low. Check to see if line voltage is same as rating of pump.
5. No pumpage in vacuum priming tank. Remove pipe plug on top of tank and check level.
6. Suction pipe plugged.
7. Impeller clogged.
8. Discharge line plugged.
9. Discharge head too high.
10. Pump air locked.

Runs But Will Not Shut Off —

Check liquid level control for sticking contacts or float.

Check magnetic starter for sticking contacts.

Check manual override switch as it may be turned on.

Will Not Run —

- No. 1** Check Voltage At . . . Line terminals in motor control box.
If No Voltage . . . Check line fuses and/or circuit breakers.
If Voltage . . . Proceed to No. 2.
- No. 2** Check Voltage At . . . Pump motor terminals in motor control panel.
If No Voltage . . . Check magnetic starter overloads and liquid level controls.
If Voltage . . . Check starting relay and capacitor on 1 phase motors.
Check pump for binding impeller.

VACUUM PUMP

Runs Continuous When Main Pumps Are Off —

1. Liquid leaking externally from station's components. Check station for signs of leakage.
2. Defective vacuum priming chamber liquid level sensor.
3. Liquid escaping from the priming chamber by a siphoning action of the discharge line.
NOTE: The system requires a static head of liquid 42 inches above the base plate of the station to seat the check valve and prevent the discharge flow from generating a syphon action causing the system to lose priming liquid.

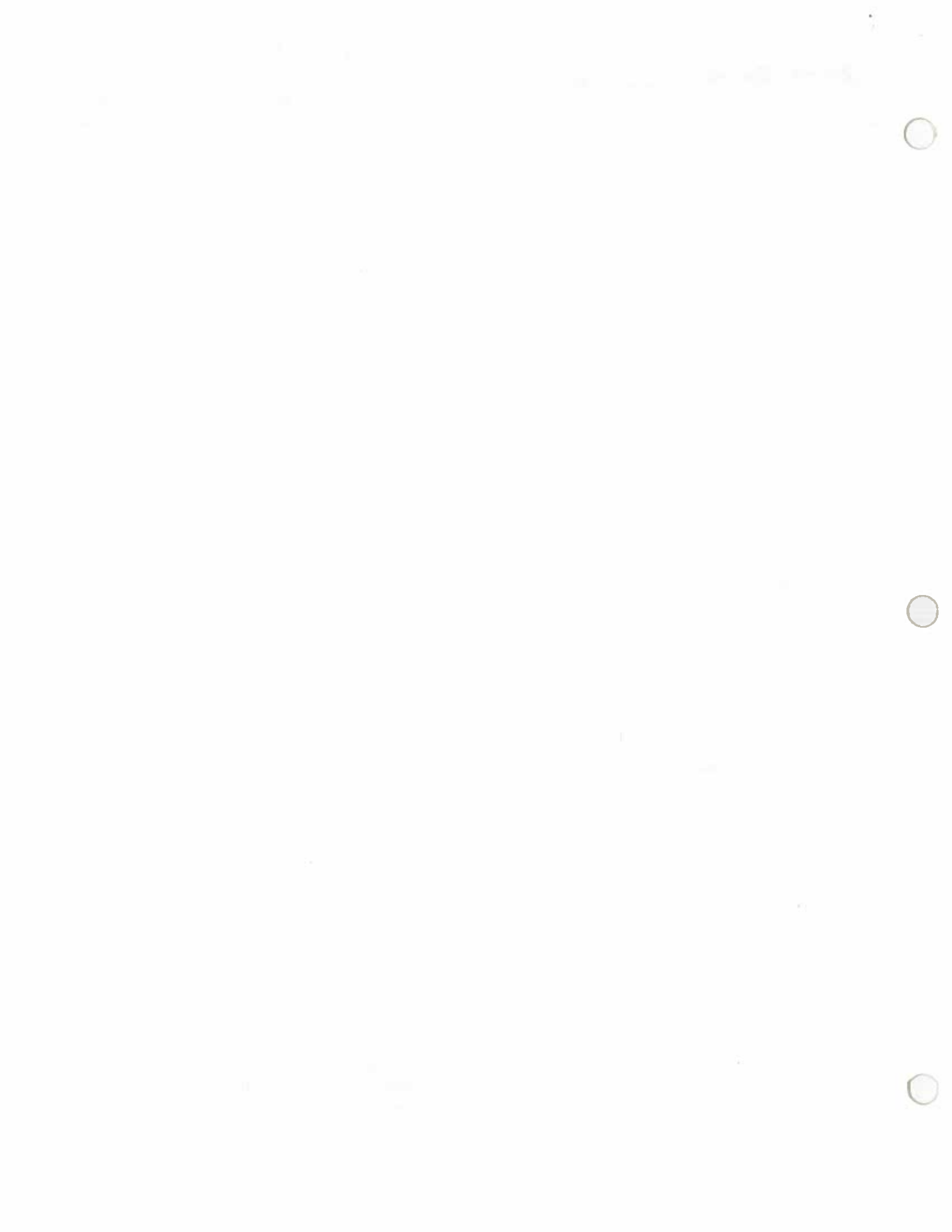
To check for a defective level sensor or liquid escaping from the priming chamber remove the pipe plug from the top of priming chamber and measure the level of liquid in the chamber.

If the liquid is level with or $\frac{1}{4}$ inch below the bottom of the suction inlet elbow opening the level sensor is defective.

If the level is less than noted above fill the chamber with liquid to above levels. **NOTE:** On systems with sufficient discharge static head the chamber may be filled by lifting the lever arm on the side of one discharge check valve.

Fails to start when the liquid in the priming chamber is lower than the bottom of the electrical junction box mounted on the side of the priming chamber and the main pumps are off.

1. Defective liquid level sensor in priming chamber. Check circuit from control panel to vacuum pump.
2. Defective vacuum pump motor.





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REPAIR INSTRUCTIONS

INSTALLATION AND REMOVAL OF DOUBLE MECHANICAL SEAL —

1. Disconnect electrical power to pump requiring service.
2. Close valves on both sides of pump being serviced.
3. Disconnect bleed line from pump to top of vacuum tank at the vacuum tank and plug the connection to the vacuum tank.
4. Close the stop cock and disconnect the piping from the filter to the seal chamber.
5. Remove the bolts holding the back side plate No. 38 to the volute.
6. Using a suitable lifting rig withdraw the motor and impeller assembly straight up from the volute housing. Use the eye bolts located on the top of motor for lifting purposes.

7. DISMANTLING —

If The Seal Is To Be Saved . . . Unbolt the seal gland and carefully move it back on the shaft. The drive end stationary seat and stationary seat gasket will usually remain in the seal gland, so use care not to damage these parts. Dismantle the pump end. The pump end stationary seat gasket, stationary seat and seal spacer will usually remain in the seal chamber. Use care not to damage these parts. Remove any burrs or deposits on the shaft, checking carefully to remove any upset from the thrust washer. Work the friction rings free from the shaft and remove them along with seal faces and spring.

Remove the seal gland. Clean contaminants from parts and from the seal chamber using care not to scratch or mar the sealing surfaces.

If The Seal Is To Be Replaced . . . Use same procedure except that extreme care of sealing surfaces and other seal parts need not be exercised. The old stationary seats and stationary seat gaskets should be removed from the seal gland and seal chamber. The seal spacer need not be removed. Clean seal gland and seal chamber.

8. INSTALLING —

In the case of re-installing a used seal, some of the parts may not have been removed from seal gland and seal chamber. In this event disregard any of the following description which does not apply.

Be sure that the bores in the seal gland and seal chamber are free of nicks and burrs and are thoroughly clean. Be sure the seal spacer is squarely and firmly in place. Coat the bores with a light grade of oil. Insert the stationary seats with stationary seat gaskets. Use every caution not to scratch or mar the sealing surface. Place a piece of cardboard on the sealing surface before pressing on it. Be sure that these parts are squarely and firmly in place.

Slide the seal gland with stationary seat and stationary seat gasket on to the shaft as far as possible or until the back of the stationary seat touches a shaft shoulder. Do not jar this part out of position in the seal gland. Slide the seal gland gasket to the seal gland. Again, remove all burrs, then clean, polish and oil the shaft. Be sure the shoulder on the shaft has a slight radius with no sharp edge. Lightly oil the inside diameter of the friction rings and slide the entire rotating element onto the shaft. Slide on and/or compress the spring not further than necessary to get the pump end sealing washer and friction ring past the shaft shoulder. Reassemble the pump end.

CAUTION: The pump end sealing washer is in the seal chamber and its bore must be carefully lined up on the shaft or the sealing surface will strike the end of the shaft or a shaft shoulder and be ruined.

Line up the seal gland and seal gland gasket squarely, and evenly tighten the capscrews.

Once the rotating element has been placed on the shaft, the rest of the installation must be made at once. Delay may result in the friction rings seizing on the shaft at an improper position.

Do not scratch or mar sealing surfaces.

Do not scuff or cut friction rings.



REPAIR INSTRUCTIONS (continued)

9. Lower unit into position on volute and reassemble.
10. Open valve on vacuum tank side of pump.
11. Open seal gland vent plug and the stop cock in the filter line and purge the trapped air. Close the vent plug when water is emitted. **NOTE:** Running seals dry will destroy them.
12. Check motor rotation.
13. Open discharge valve and start pump. Open the vent plug and allow the pump to run until a steady flow of water is emitting from the vent plug, then close vent plug. Pump is now ready for operation.

REPLACING VACUUM PRIMING CHAMBER LIQUID LEVEL SENSOR —

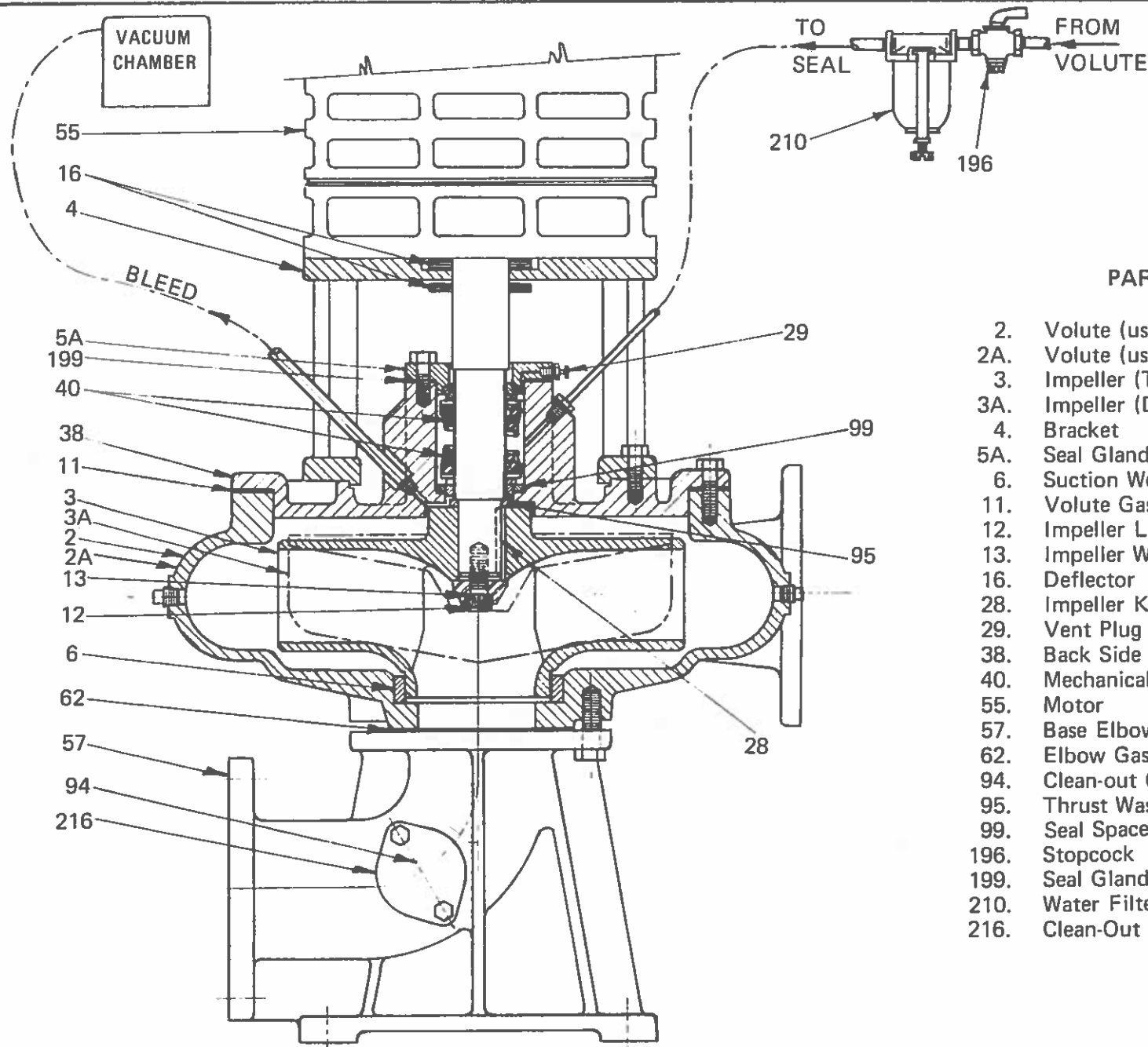
1. Turn off electrical power to main pumps and vacuum pump.
2. Disconnect electrical connections in the junction box located on the side of the vacuum tank.
3. Disconnect tubing connections located on the top of the vacuum tank. Also disconnect piping from the vacuum pump exhaust to the outside atmosphere vent.
4. Remove bolts holding vacuum cover to tank and lift off cover complete with vacuum pump assembly.
5. Remove Respirator Assembly . . . Disconnect tubing connector fitting. Remove bolt clamping respirator assembly to vacuum tank and withdraw assembly from vacuum tank.
6. Remove Level Sensor . . . Remove the two mounting bolts from the inside of the vacuum tank and withdraw the assembly complete with sealing gasket, plastic terminal feed-thru, and lead wire ends from the tank.
7. Install Level Sensor . . . Position sealing gasket on the plastic terminal feed-thru and lower level sensor assembly into tank and mount. **NOTE:** Be sure gasket surfaces are clean.
8. Provide Air Volume For Respirator Contraction . . . Remove end cap from protector housing and withdraw respirator from housing.

NOTE: The respirator must be replaced if the inside is contaminated with moisture or liquid.

Roll up the respirator, start from the end opposite the inlet tube, leaving a length of 2-1/8 inches unrolled. Inflate the unrolled portion of the respirator by blowing air from the mouth into the inlet tube. Hold the rolled portion so it cannot inflate. With the unrolled portion inflated, place one finger over the end of the tube to prevent the inflated air from escaping from the respirator. Unroll the respirator and distribute the inflated air through the respirator. Place the respirator into the protector housing and release finger from end of tube. Install protector housing end cover.

9. Connect Respirator Assembly To Level Sensor . . . The respirator must be mounted in the vacuum tank with the drain holes in the protector housing facing down.
10. Reassemble vacuum tank cover, electrical connections and piping.
NOTE: Use a new tank cover gasket if required.
11. Station is ready for operation.

Follow procedure for placing station in operation as noted on installation instruction sheet.



PARTS LIST

- 2. Volute (use with 3)
- 2A. Volute (use with 3A)
- 3. Impeller (Two Port)
- 3A. Impeller (Delta)
- 4. Bracket
- 5A. Seal Gland
- 6. Suction Wear Ring (use with 2. only)
- 11. Volute Gasket
- 12. Impeller Lock Screw
- 13. Impeller Washer (use with 3. only)
- 16. Deflector
- 28. Impeller Key
- 29. Vent Plug
- 38. Back Side Plate
- 40. Mechanical Seal (Double)
- 55. Motor
- 57. Base Elbow
- 62. Elbow Gasket
- 94. Clean-out Cover
- 95. Thrust Washer
- 99. Seal Spacer
- 196. Stopcock
- 199. Seal Gland Gasket
- 210. Water Filter
- 216. Clean-Out Cover Gasket

NON CLOG



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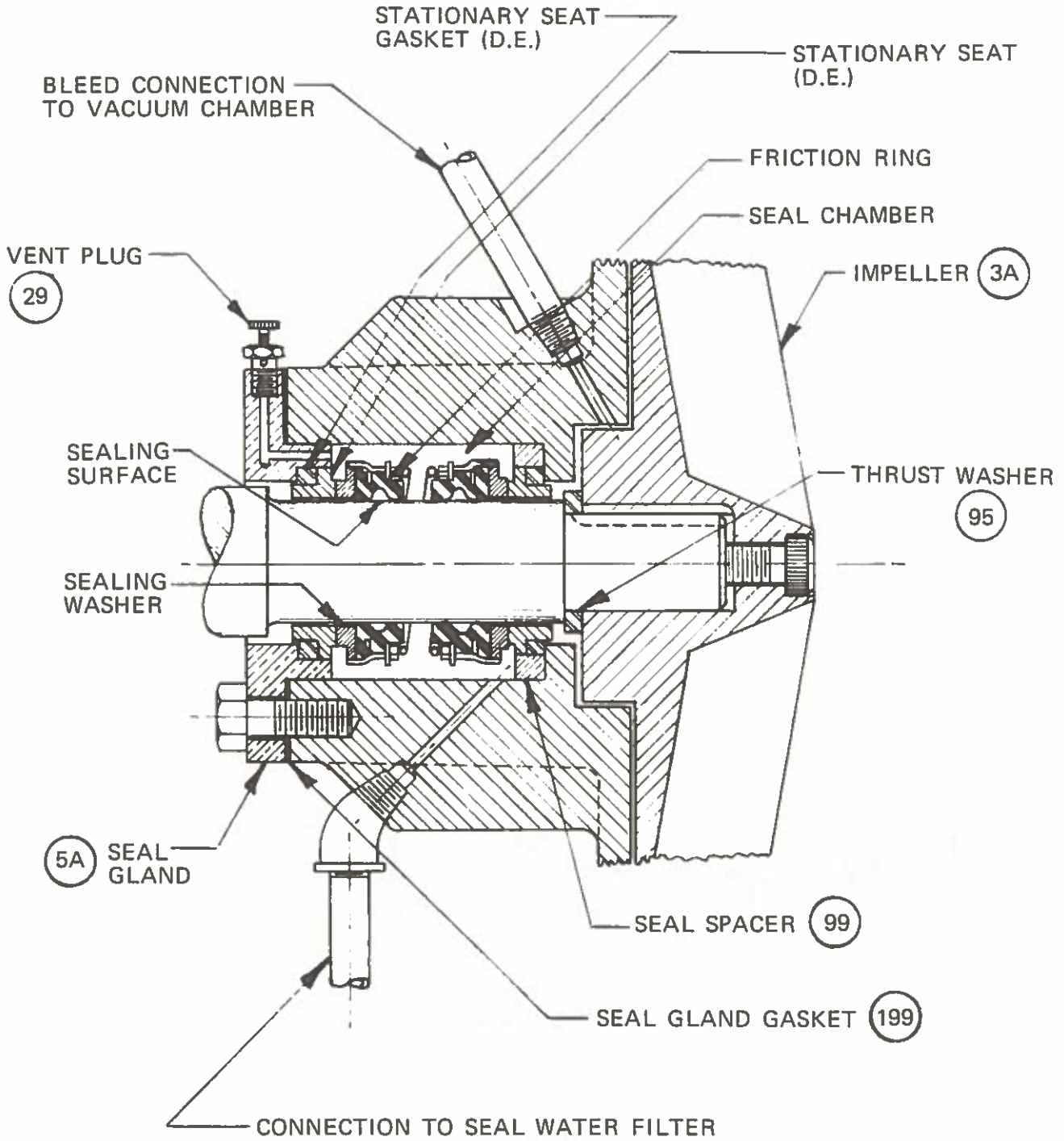
**MODEL NM & NN SERIES VERTICAL CLOSE COUPLE
ELECTRIC MOTOR DRIVE**



CENTRIFUGAL PUMPS

WITH DOUBLE MECHANICAL SEAL

SEAL LUBRICATION - WATER



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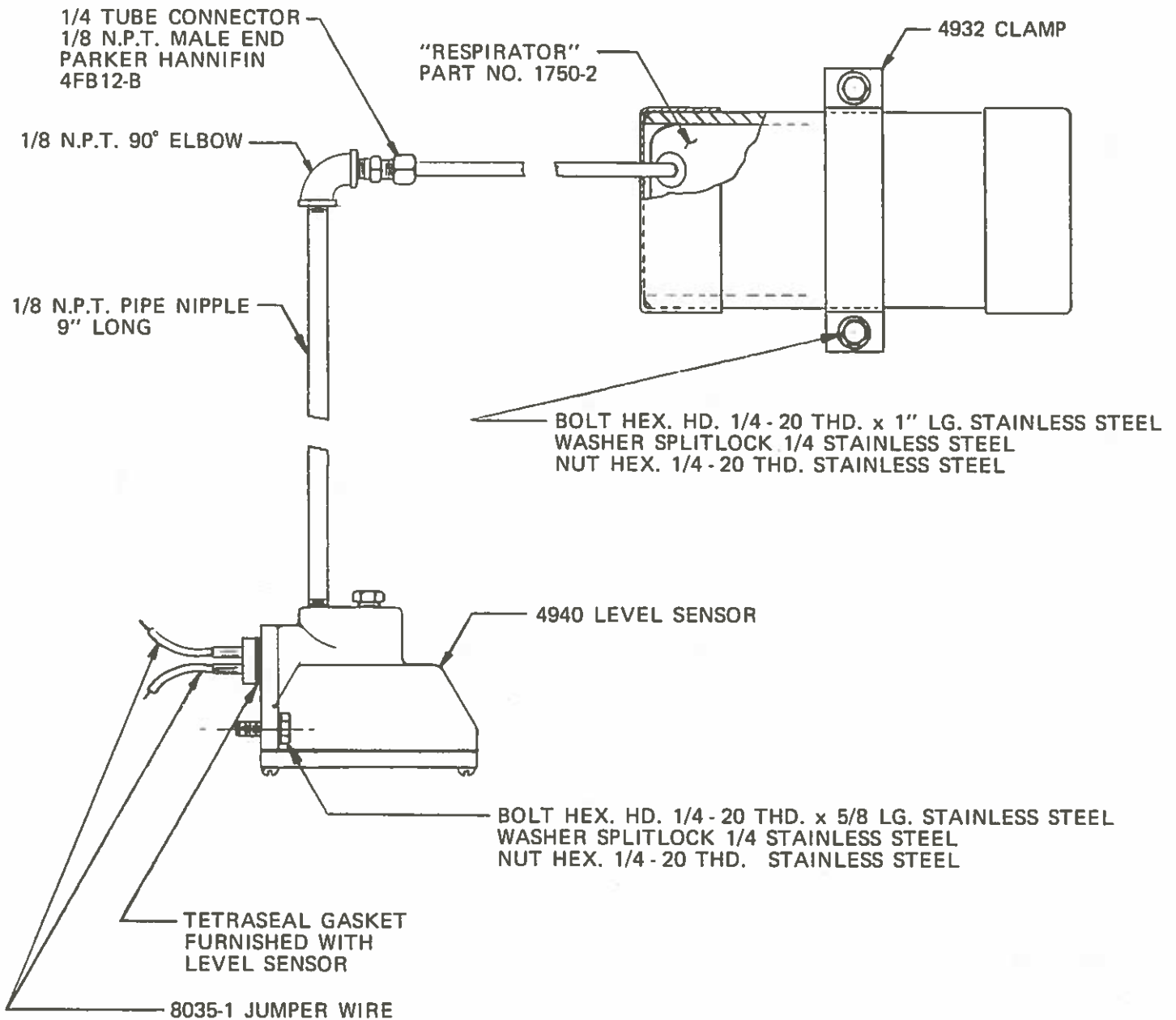
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**FACTORY BUILT
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PARTS LIST VACUUM PRIMING CHAMBER LIQUID LEVEL SENSOR



FACTORY BUILT
POSI-PRIME
PUMPING STATION



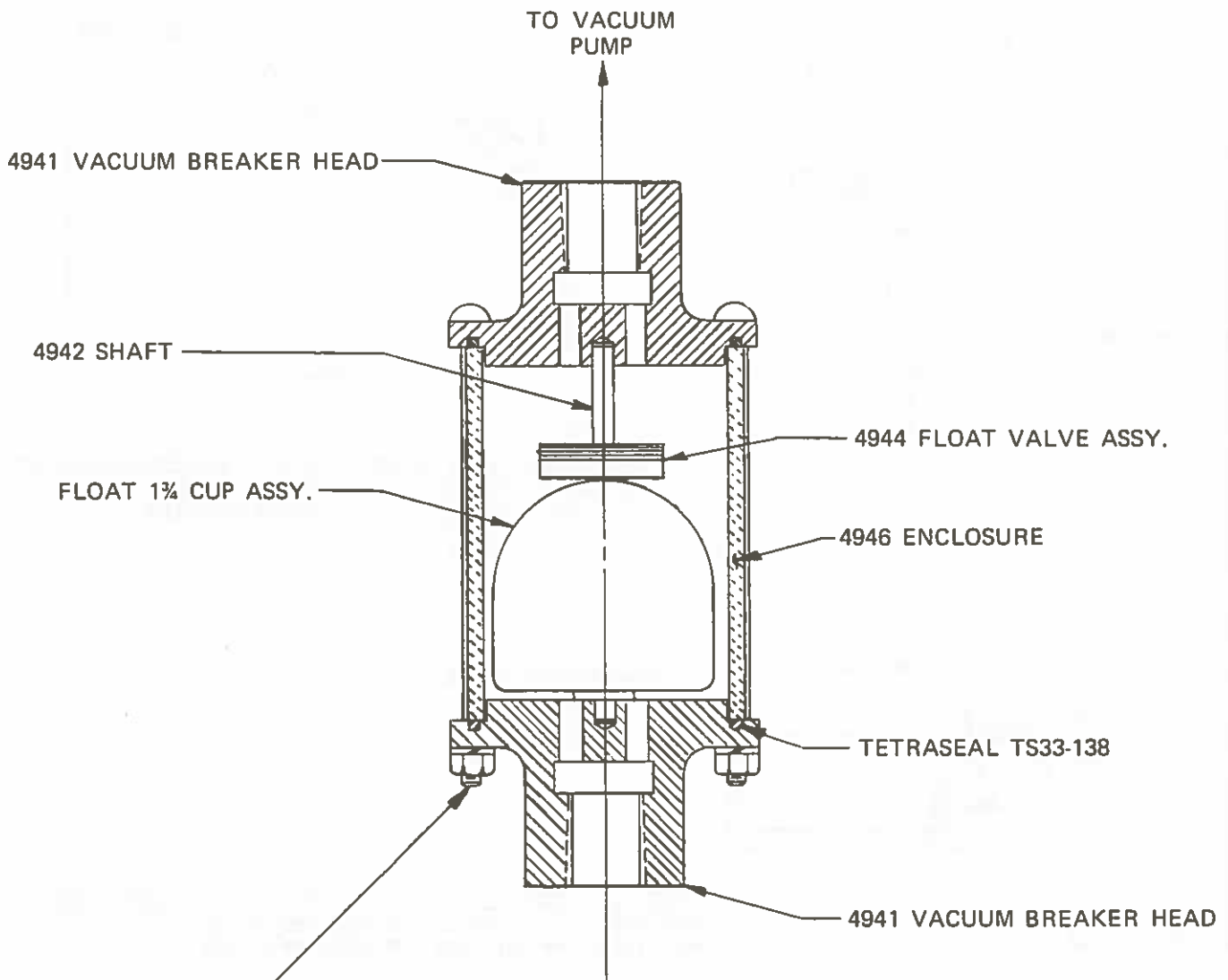
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PARTS LIST 4937 VACUUM BREAKER



BOLT RD. HD. #10 - 32 THD. x 3 3/4 LG.
WASHER SPLIT LOCK #10
NUT #10 - 32 THD. HEX.
(ZINC PLTD. STEEL 4 EACH REQ'D)



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INSTALLATION INSTRUCTIONS OF MECHANICAL ALTERNATOR LIQUID LEVEL CONTROL ON POSI-PRIME PUMPING STATION

The Mechanical Alternator Switch is completely wired to the control panel when shipped with a Posi-Prime Pumping Station. The float, float rod, guide rod pipe and sundries are separately packaged.

1. Remove the three mounting bolts holding the switch assembly to the cover plate of the base plate access hole and set assembly aside.
2. Remove cover plate from base plate access hole and connect float guide pipe to the underside of cover plate.
3. Assemble float and two stop collars to lower end of float rod. Locate the stops at desired levels for starting and stopping pump.
4. Insert the float rod into guide rod pipe until approximately 12 inches of float rod protrudes thru the cover plate. Install a stop collar to hold the float rod in position.
5. Lower assembled unit thru access hole in base plate into wet well and install cover bolts and gasket.
6. Assemble mechanical alternator switch to cover plate.
7. Remove stop collar used for holding float rod in position. Install the rubber bellows float rod seal and one stop collar on protruded end of float rod. Pass float rod thru mechanical alternator switch arm and install stop collar allowing 1/2 inch of the float rod to stick up above stop collar.
8. Locate the lower stop collar 1 - 3/8 inches from bottom of the switch arm to allow the switch arm to move freely.
9. The compensating spring in the mechanical alternator has been adjusted at the factory for the length of float rod supplied. Lengthening or shortening the float rod will require readjustment of this spring.

MECHANICAL ALTERNATOR LIQUID LEVEL CONTROL

