



SERIES 'EES' & 'EESL' VERTICAL PUMPS

OPERATION AND
SERVICE GUIDE
O-915
APRIL 1998

Refer to Bulletin P-308 and
Parts List P-9050.

SAFETY PRECAUTIONS BEFORE STARTING PUMP

1. Read operating instructions and instructions supplied with chemicals to be used.
2. **Refer to a chemical resistance data chart for compatibility of materials in pump with solution to be used.**
3. Note temperature and pressure limitations.
4. **Personnel operating pump should always wear suitable protective clothing: face mask or goggles, apron, gloves.**
5. All piping must be supported and aligned independently.
6. Always close valves slowly to avoid hydraulic shock.
7. Ensure that all fittings and connections are properly tightened.

BEFORE CHANGING APPLICATION OR PERFORMING MAINTENANCE

1. **Wear protective clothing as described in Item 4 above.**
2. Flush pump thoroughly with a neutralizing solution to prevent possible harm to personnel.
3. Shut off power to motor at disconnect switch.

IMPORTANT


1. The pump is constructed of CPVC. Fasteners are stainless steel and protected by CPVC and "O"-rings. Pump shaft is made from stainless steel and protected by a CPVC sleeve. The CPVC must be chemically compatible with the solution being pumped, and care should be taken to protect the pump components against unnecessary wear and physical abuse.
2. Record all model and serial numbers for future reference. Always specify model number and serial number when ordering parts.
3. Pump flow curves are based upon pumping water. Increased motor horsepower may be necessary for pumping other liquids or reduced motor horsepower may be permissible when pumping at higher discharge head/low flow rates. Refer to pump curve on bulletin.
4. Impellers are designed to offer maximum pump output and the motors are sized for non-overloading at maximum flow conditions. Impellers may be trimmed to reduce flow and discharge head, if desired. See Parts List P-9050 for impellers of various diameters.
5. Vertical discharge piping from the pump should be supported so that the pump does not take the forces generated by the weight of the pipe and the liquid being pumped. Refer to pump curve on bulletin.
6. Plastic piping has a high thermal expansion and should be considered when attaching discharge piping. Refer to Bulletin A-213 for pipe, pipe fittings etc.
7. If position of pump discharge is not suitable in relation

to the motor conduit box or support for the mounting plate, the discharge column with mounting plate may be rotated in 90° increments. Refer to PUMP SERVICE to replace column and mounting plate assembly.

8. With suction extension (optional) installed and motor energized continuously, the pump will discharge liquid once solution level is above casing. Discharge flow will continue until solution level reaches bottom of extension. Flow will cease until solution level again rises to casing. If transfer or out-of-tank pumping, be sure to install a siphon break. Refer to Figure A.
9. Level controls and motor starter are recommended for ON-OFF operation of pump-motor assembly.

PRE START-UP

1. Verify that operating temperature is not in excess of pump design temperature. See Bulletin P-308.
2. Connect electrical supply to motor starter. If starter is furnished, verify that starter and motor are wired for the correct operating voltage and correct overload heaters. It is recommended that a motor starter be installed if one was not provided with the pump assembly for overload protection.
3. When mounted either in-tank or out-of-tank, the mounting plate must be supported on two opposite sides.
4. Pump rotation is counterclockwise when looking at the pump suction, or clockwise when looking down on the motor fan. (Check rotation arrow.) For 3-phase motors, it is necessary to verify the correct direction of rotation by momentarily "jogging" the motor. An instantaneous "ON-OFF" of the starter is ample to check rotation. To change direction of rotation, inter-change any two of lines L₁, L₂, or L₃.

 **CAUTION: Running in reverse must be avoided.** To avoid possible problems we recommend checking rotation without liquid to the pumps. This eliminates torque to the impeller. This pump can run dry for extended time without damage.

5. All units are dry tested to confirm that the pump and motor functioned properly at time of shipment. See Technical Bulletin TP-113 for suction extension data.
6. With pump running, listen for any unusual noise, vibration or other abnormal condition which could influence pump performance. Suction casing must be flooded to the level indicated for pump to prime. See sticker on pump column, or drawing below to identify minimum solution level.

**MINIMUM SOLUTION
LEVEL AT START-UP**



7. Check correct operation of level control. Make necessary adjustments for establishing high level and low level.
8. At **maximum** flow conditions, measure amperage on all lines. If in excess of motor nameplate ratings, stop pump and consult Application Engineering Department.

INSTALLATION

A. IN-TANK MOUNTING Refer to Figure A

1. This is the most common method of installation. For safety and security of the pump-motor assembly it is necessary to support the unit on opposite sides of the mounting plate.
2. Drill holes in mounting plate and bolt the assembly to both of the supports.
3. A 3/4" NPT relief port must be above solution level.
4. Relief port may, under some circumstances when operated near shut-off (0 GPM), flow pumped solution back into the tank.

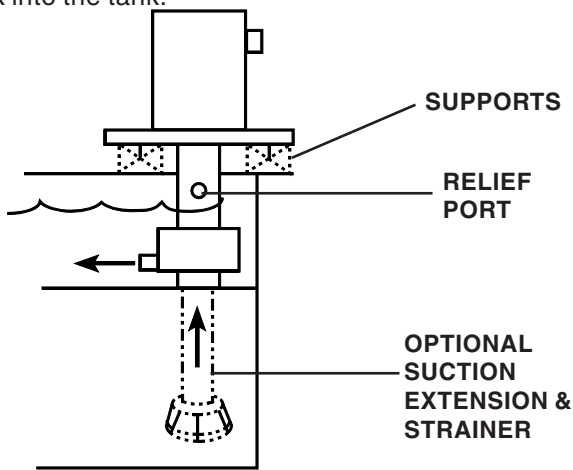


Figure A

B. OUT-OF-TANK MOUNTING Refer to Figure B.

1. This method of installation does not consume tank space. It does, however require dual supports at mounting plate, threaded or flange connections in tank wall and shutoff valves to facilitate pump servicing without lowering solution level.
2. Drill holes in mounting plate and bolt the assembly to both of the supports.
3. A 3/4" NPT relief port must be above solution level.
4. Relief port may, under some circumstances when operated near shut-off (0 GPM), release pumped solution back into the tank.

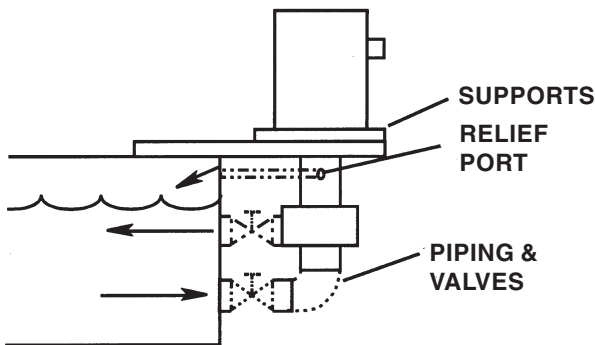


Figure B

PUMPING TIPS

1. When discharging overhead where there may be a considerable volume of liquid in the piping, it is recommended that a check valve be installed in the pump discharge. This will prevent unnecessary back siphoning which could cause cycling of the automatic level control, or flood the motor. Refer to TROUBLE-SHOOTING step 4.
2. Pumps provided with suction extensions must be started with liquid above the impeller. Note sticker on pump column and location on Figure A.
3. Verify proper operation of level controls.
4. Check amperage and fuse size if motor cutout occurs.
5. Review parts list and maintain an inventory of recommended spare parts for emergency replacement. This will assure that the pump is returned to operation with minimum delay.
6. Whenever two pumps are operating alternately in parallel flow, it is important to maintain separate discharge lines to the collection or process tank. If discharges are combined then it is possible for pump **A** to pump down into pump **B** discharge and possibly cause premature failure of motor B. If check valves are installed in each discharge to prevent "pumping down", then there is a possibility that the weight of liquid above the check valve will prevent the pump from opening the check valve when motor is energized. Pump will then improperly pump up column to vent port and underside of motor.

PUMP SERVICE

⚠ CAUTION: Disconnect power to pump before servicing to avoid dangerous or fatal electrical shock hazards.

⚠ If pump has been used to pump hazardous materials, be certain that all materials have been removed prior to working on the pump. Inverting pump with liquid in it could cause liquid to get into motor bearings and cause damage. Before disassembling, be certain all liquid is removed from the pump.

IMPORTANT

Many causes of pump system failure are due to improper system design. Refer to the Troubleshooting List in this guide before carrying out pump inspection.

TROUBLESHOOTING

1. Motor Stops -

Check for correct voltage, wiring and motor direction. See that starter has correct overload heaters. Take an amp meter reading at operating conditions and compare to value on motor nameplate. If higher than nameplate value, check for friction-free rotation by turning motor fan with power disconnected. If high friction, bearings may need replacement.

2. Pump does not deliver correct flow -

Check suction strainer or pump inlet for debris. Compare required flow conditions of original specifications and pump curve. Check motor rotation. Check your data for determining required TDH.

3. Pumps up column at start-up -

Check for low liquid level at start-up. Refer to drawing above.

4. Liquid back flows up column at shut-down - Check for large volume of liquid in pump discharge line. If liquid is surging up the column, install a check valve in the discharge. However, many different types of check valves exist and each has benefits and drawbacks which can adversely affect the pump.

Check with water for proper operation. The check valve and its location may affect the pump's automatic level control feature.

NOTE: Maintain an inventory of replacement parts for minimum downtime of pumps.

TO REPLACE SUCTION CASING OR "O"-RING SEAL

1. Remove the eight cap nut studs holding the suction cover to the column assembly. 'O'-ring can be removed from groove in support cover. 'O'-rings in cap nut studs should be replaced also. When replacing, be sure to lubricate casing 'O'-ring item No. 13 on parts list.
2. Replace (do not overtighten) cap nut studs - tighten alternately to avoid cracking the suction cover.

TO REPLACE IMPELLER

1. Remove suction cover as previously described.
2. Remove motor fan cover and fan.
3. Grip end of motor shaft with vise grips.
4. Remove impeller by turning counterclockwise using impeller tool.
5. Replace and tighten impeller using above method. Use "Locktite Thread Lock" on shaft threads. Replace fan (heat fan in hot water to avoid cracking) and fan cover. Insure fan does not rub.
6. Replace suction casing as described.

TO REPLACE COLUMN MOUNTING PLATE ASSEMBLY

1. Remove suction cover and impeller as previously described.
2. Remove the four cap plug & 3/8" hex bolt assemblies (6, 7, 8, 9) holding the mounting plate to the motor 'C' face.
3. Before removing mounting plate, note position of discharge to motor terminal box.
4. Remove column-mounting plate assembly and four spacers (4) between motor and plate.
5. Replace spacers and column-plate assembly at same position as original or indexed 90°, 180° or 270°. Tighten the four lock bolt and cap assemblies.
6. Reassemble pump as previously described.

TO REPLACE PUMP SHAFT

1. Remove suction cover and column assembly as de-

scribed above.

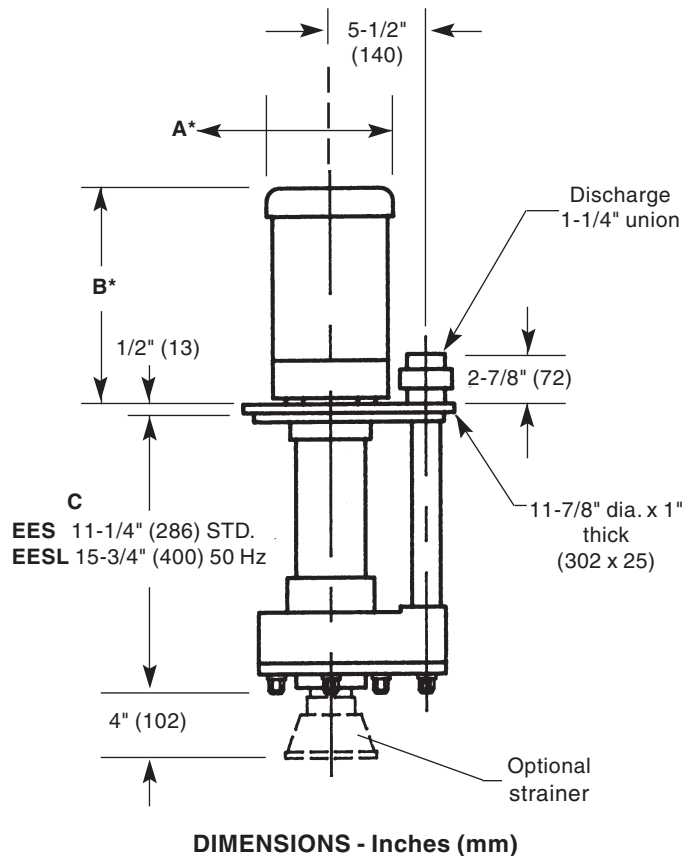
2. Attach vise grips to fan end of motor shaft and use a pipe wrench on shaft. Remove pump shaft by turning counterclockwise.
3. Insert new shaft and use "Locktite Thread Lock" on threads. Tighten pump shaft until it hits against motor shaft.
4. Check run-out (eccentricity) of shaft by turning shaft and measuring at extreme end. It must be less than .005 TIR. Straighten shaft by pressing down on that area of the shaft where maximum run-out occurs.
5. Reassemble column assembly, impeller and suction casing.

REPOSITIONING OF DISCHARGE PORT

Pump discharge may be indexed on 90° increments. Refer to "TO REPLACE COLUMN AND MOUNTING PLATE ASSEMBLY".

TO REPLACE MOTOR

Review instructions as outlined above.



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