

Installation, Operation, & Service Instructions

VCS, VJS, VES, VNS Condensate and Boiler Feed Units

KEEP THESE INSTRUCTIONS NEAR THE PUMP FOR USE OF OPERATOR

WARNING

Before attempting to examine or repair a pump or any other powered component, disconnect the power supply to that component. Powered components will operate with no advance warning, and serious harm or fatal electrical shock may result from mishandling powered or electrically live equipment.

Before working with any electrical component, disconnect electrical power from all associated or nearby wires. Contact with live wires can result in a fatal electrical shock.

Tanks, pumps, and motors can all be dangerously hot when in operation. Test before coming in contact with tanks or pumps and allow motors to cool before performing maintenance.

INSTALLATION INSTRUCTIONS

Locating Pump: Install the pump in a clean, dry, well-ventilated and drained location. The top of the pump receiver should be below the lowest return since it is best to keep the return lines dry. If receiver inlet is above the lowest return line, the returns will be wet, and the system will not free itself of air.

Piping: Connect returns to inlet of receiver with a gate valve in each return and a union or flange joint next to receiver. Provide a drain to sewer from each return. Connect discharge of pump to boiler using a union, swing check valve and gate valve, with the swing check valve as close to pump as possible. If discharge line is longer than 50 feet, use pipe one size larger. Piping must be of proper length and size to prevent any strain upon the unit.

Wiring: The electrical connections between the motor, float switch and control panel (if furnished) are made at the factory. Connect the electric service to the float switch or automatic starter using conduit and wire sizes as required by state/local codes. Provide a fused main line switch in motor circuit. CAUTION: The motor is wired at the factory to operate at the specified voltage. If voltage is other than originally specified, consult motor manufacturer's instructions accompanying unit for proper wiring. Where a polyphase motor is furnished with only a float switch, it will be necessary to install a suitable phase protector switch in the motor circuit to prevent motor burnouts should a single-phase condition occur.

Fuses: Be sure fuses are installed which comply in size with National Electrical Code recommendations. When a fuse blows out, it indicates that something is wrong either in the motor, pump, switch, fuse rating or electric service. Do not replace fuse until the cause for it blowing out has been determined. If a thermal cut-out is used, an element with a maximum tripping current rating 50% greater than motor nameplate current may be selected. Condensate boiler feed pumps are only operating intermittently and therefore it is permissible.

OPERATING INSTRUCTIONS

CAUTION: New or repaired heating systems should be operated several days with the returns open to sewer until water appears clear, in order to thoroughly flush and clean the lines and prevent clogging of the pump when it is put in operation. This may take from a few days to two weeks.

This pump is equipped with a mechanical seal instead of packing. Be sure that pump receiver is filled with condensate before starting because the mechanical seal will be damaged if ran dry.

LUBRICATION: Motors that do not have regrease capability are factory lubricated for the life of the bearings. If a motor does have regrease capability, please see the manufacturer's recommended schedule for lubrication instructions.

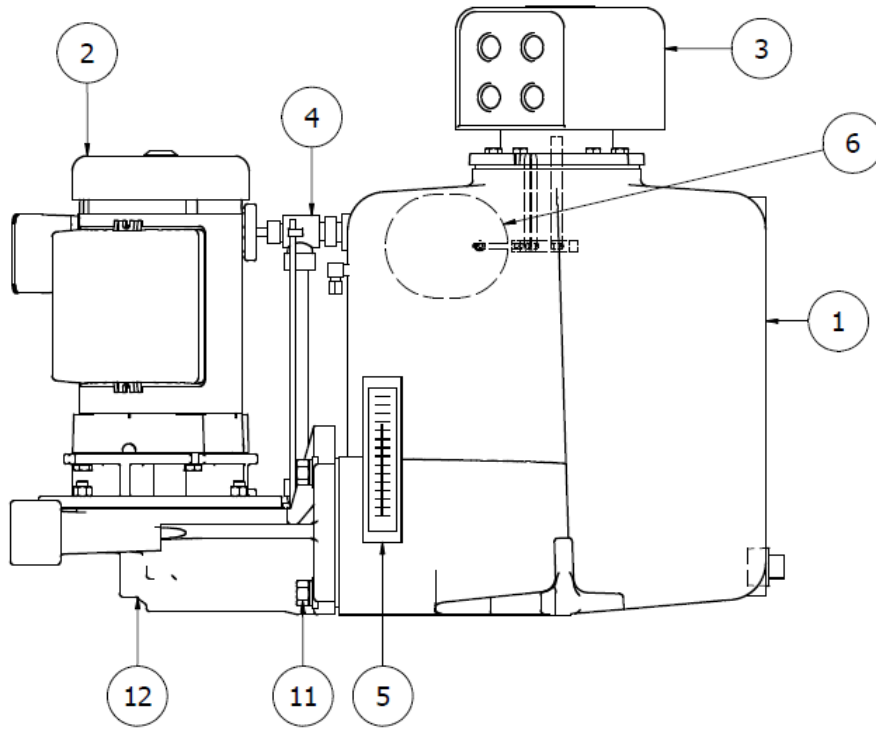


Figure 1. Detail of Tank Assembly with Pump and Float Control

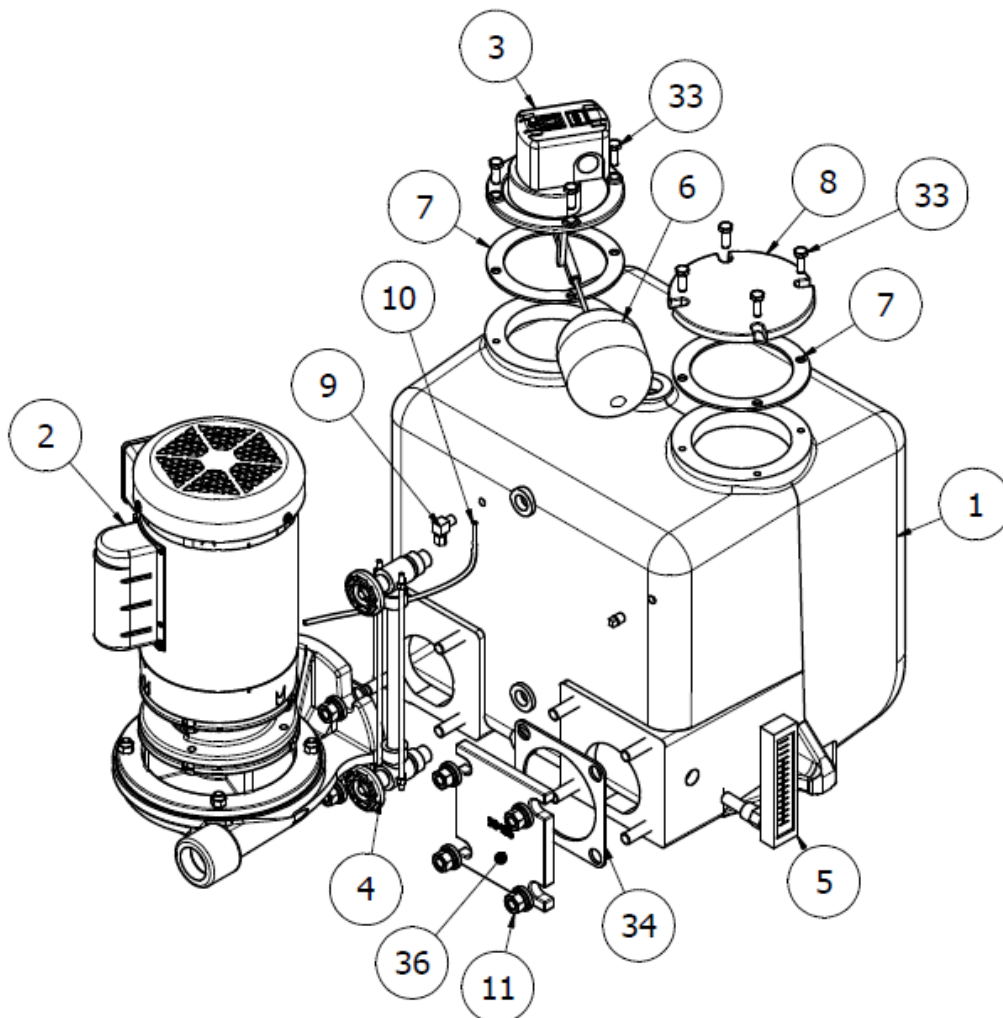


Figure 2. Detail of Pump Internals and Float Control

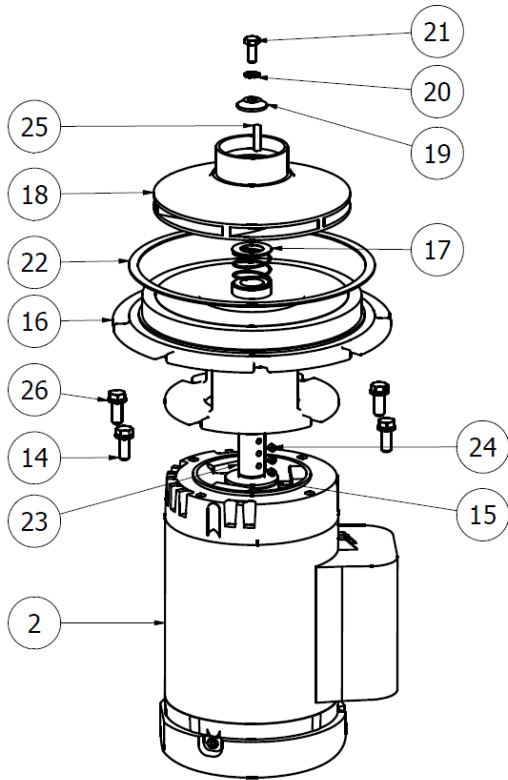


Figure 3. Detail of VES Series Pump Internals

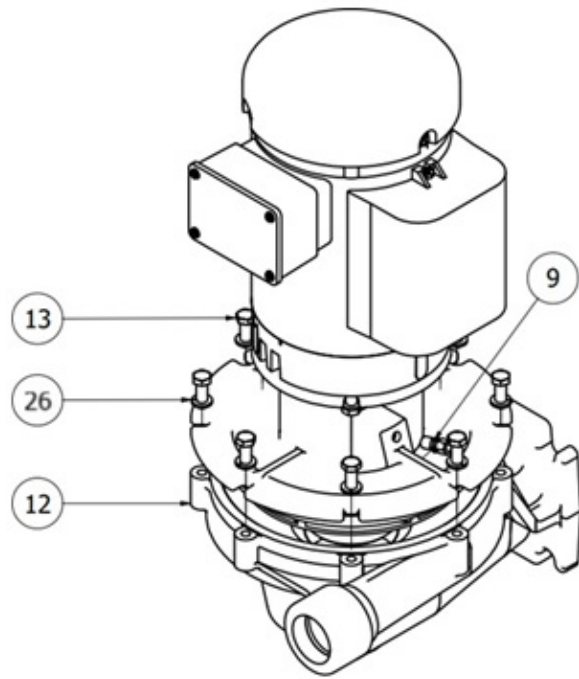


Figure 4. Detail of VES Series Pump Components.

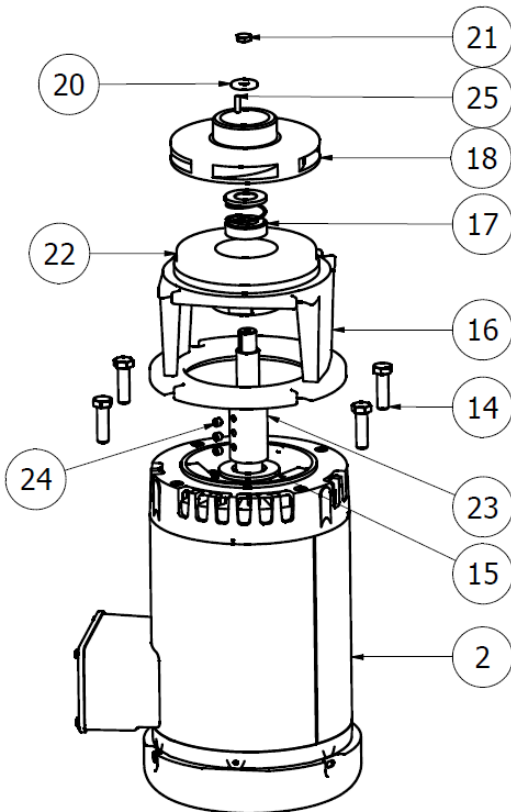


Figure 5. Detail of VNS Series Pump Internals

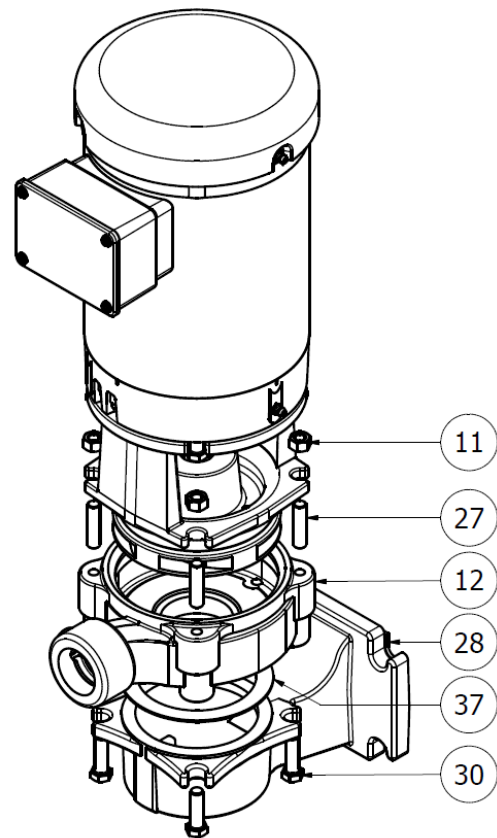


Figure 6. Detail of VNS Series Pump Component

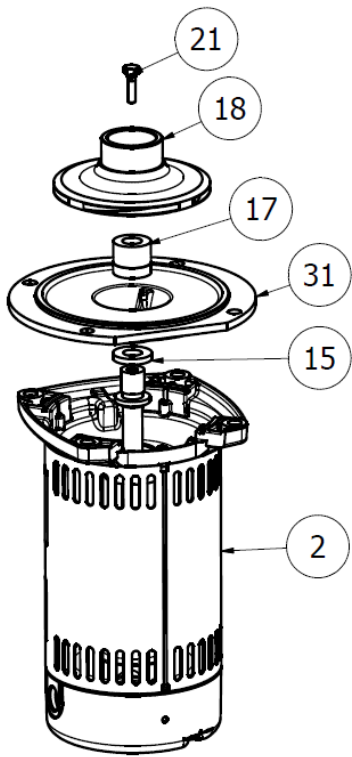


Figure 7. Detail of VJS Pump Internals.

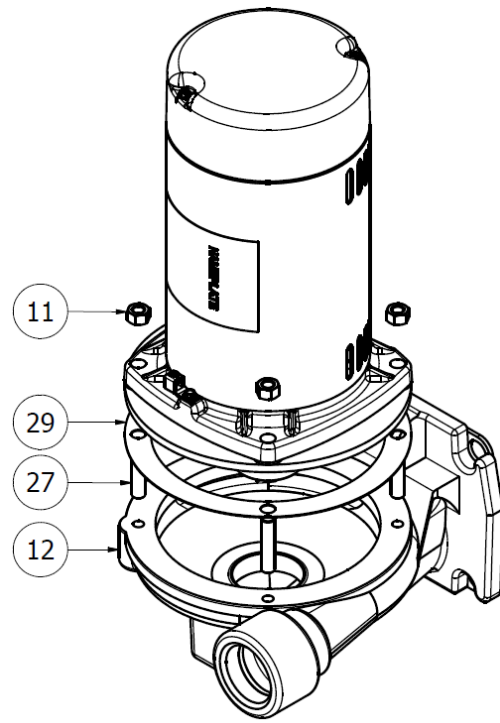


Figure 8. Detail of VJS Pump Components.

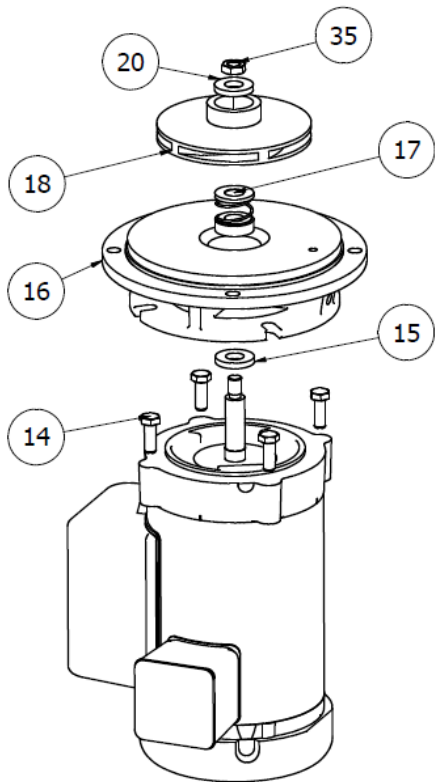


Figure 9. Detail of VCS Pump Internals.

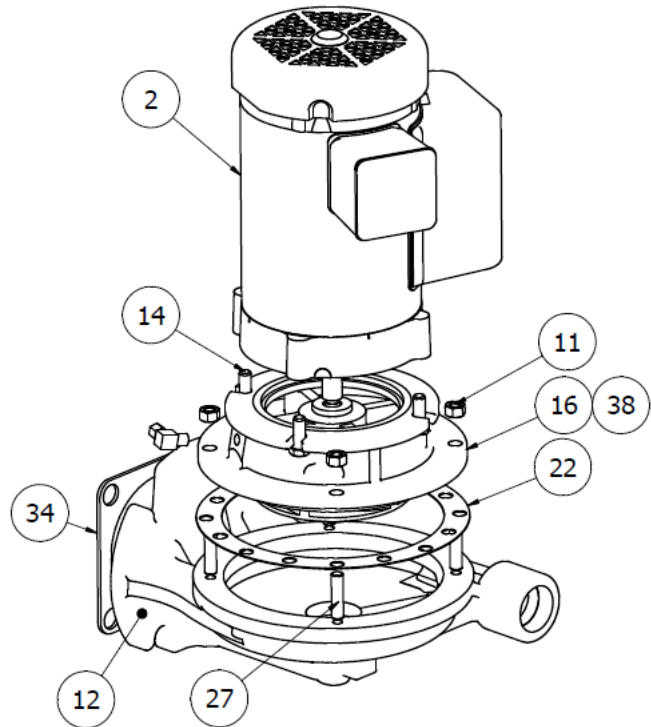


Figure 10. Detail of VCS Pump Components.

PARTS LIST

1	Tank/Receiver	20	Impeller Washer
2	Electric Motor	21	Impeller Shaft Bolt
3	Float Control	22	Motor Bracket to Volute Seal
4	Gauge Glass Assembly	23	Extension Shaft
5	Thermometer	24	Extension Shaft Set Screws
6	Float Control Rod and Ball	25	Impeller/Shaft Key
7	Float Control Gasket	26	Washer
8	Float Control Cover Plate	27	Volute Stud
9	Vent Line Fitting	28	Suction Adapter
10	Vent Line	29	Seal Plate Gasket
11	Nuts & Washers – Motor Bracket to Volute	30	Suction Adapter Bolt
12	Volute	31	Seal Plate
13	Bolts – Motor Bracket to Volute	32	Isolation Valve
14	Bolts – Motor Bracket to Motor	33	Float Control Hardware
15	Water Slinger	34	Pump Flange to Tank Gasket
16	Motor Bracket	35	Impeller Lock Nut
17	Mechanical Seal Assembly	36	Pump Flange Cover
18	Impeller	37	Suction Adapter to Volute Gasket
19	Impeller Brass Hub Washer	38	Motor Bracket to Volute Seal - #2 (VCS Only)

INSPECTION BEFORE STARTING UNIT FOR FIRST TIME

1. Check motor shaft and be sure it rotates freely. If the shaft is tight, inspect pump end and motor for foreign matter, rust, corrosion, clogging pump, or something lodged in the motor.
2. Check supply voltage and be sure the unit controls and pump motor wiring matches.
3. Be sure piping connections to pump have been made as per instructions and that air vent pipe from receiver is open to atmosphere.
4. Be sure that the engineering characteristics of the complete pump are identical to the capacity, discharge pressure and other requirements of the system.
5. Be sure that the float ball in the receiver is free to operate float switch

Starting: Open valves in discharge and return lines, close valves in drain lines and close fused knife switch. If an automatic starter with selector switch is installed, be sure selector switch button is in "Auto" position.

INSPECTION AFTER STARTING

1. With the vent pipe open to atmosphere, air and vapor can escape as fast as condensation flows into receiver. If vent is not open, or is restricted, the receiver will not fill and can cause a dangerous condition if receiver is allowed to pressurize.
2. Be sure pump and motor rotate in proper direction. Correct direction of rotation is CLOCKWISE when looking at top of motor. (If rotation is reversed, immediately follow power lockout procedure then refer to motor instruction card .)
3. Check motor bearings for overheating.
4. Check float switch to see that it starts and stops motor as receiver fills and empties.
5. Check all piping connections for leaks.
6. Observe operation of unit closely for several hours after initial startup and at regular intervals for several days following. A new unit is frequently stiff, and the bearings & other components can be tight and therefore should be watched during the break-in period. After the break in period, an output pressure should again be established for each pump and pressure recalibrated if needed.

SERVICE AND CARE OF UNIT

1. Inspection: To ensure best operation of unit, make a systematic inspection at least once a week.
2. Cleanliness: Keep the interior and exterior of motor and automatic switches free from moisture, oil, and dirt. If necessary, use compressed air for blowing out any contamination. Periodically drain and flush pump tank/receiver to remove sediment and pipe scale, thereby keeping the pump suction clear of debris.
3. Motor Bearings: If motor bearings are serviceable, lubricate according to service manual. Frequency depends on pumps duty cycle and is further subjected to atmospheric and overall cleanliness of location. When bearings are worn and the unit becomes noisy, it is suggested to replace the worn bearings immediately so as not to cause unwanted wear on other parts or components.
4. Automatic Switches: Occasionally examine contacts of automatic switches and see that they make full contact and break the circuit quickly, looking for signs of carbon deposits around contact points. Be sure terminal connections are tight and free of visual damage.
5. Mechanical Shaft Seal: Periodically examine water slinger Part No. 15 on motor shaft and look for water leakage. Any leakage will also be visible on Part No. 16 motor bracket. Leakage indicates that the seal surfaces are worn, and Part No. 17 will need to be replaced. (For proper procedure in replacing these parts, refer to instructions under Disassembly of Pump.) CAUTION: NEVER OPERATE PUMP WHEN RECEIVER IS EMPTY, BECAUSE THE SEAL WILL BE DAMAGED IF RAN DRY.
6. Shutting Down: At the end of heating season, open main line switch, close valves in return line and discharge piping, and drain receiver and pump(s). If necessary, cover the electric motor and automatic switches to protect them against dirt, oil, and moisture.
7. Caution: Never operate pump when the receiver is empty or expose it to freezing temperature when filled with water.

REMOVING PUMP AND MOTOR UNIT

No return piping or pump discharge piping need to be disturbed to remove pump and motor unit, processed as follows:

1. Loosen or remove vent line compression nut on No. 9 and swing tube away from pump.
2. Disconnect wiring and flexible conduit at motor terminal box by making sure to label wires for later re-installation.
3. Remove nuts or hex head cap screws No. 13 and lift motor and pump unit from volute No. 12 for inspection, repair, or replacement.

DISMANTLING PUMP AND MOTOR UNIT

FOR VJS PUMP UNIT, proceed as follows:

1. Remove drip cover from top end of motor. With the cover off, locate and remove plastic protective cap covering the end of the motor shaft. Note slow in top end of motor shaft (or two flats on motor if it extends above end-bell). Use either a heavy, wide blade, screwdriver, or open the end with a wrench to hold motor shaft securely.
2. Remove No. 21 impeller bolt with socket head wrench by turning CLOCKWISE.
3. With the motor sitting on its top end and still holding motor shaft securely, remove No. 18 impeller by turning COUNTERCLOCKWISE. Impeller hub is threaded and screws onto the threaded motor shaft. Threaded end of the impeller should be facing down, towards the motor.
4. Remove No. 17 mechanical seal assembly with spring by sliding along motor shaft.
5. Remove No. 32 seal plate carefully over motor shaft.
6. Water slinger No. 15 is now visible and can be removed.

FOR VCS, VES and VNS PUMP UNITS, proceed as follows:

1. Insert blade of screwdriver in one of the peripheral vane openings of impeller to keep shaft from turning. Using a socket and ratchet or wrench, remove No. 21 impeller shaft bolt or No. 35 impeller lock nut by turning COUNTERCLOCKWISE. Also remove brass hub washer No. 19 and lock washer No.20, if applicable.
2. With the motor sitting on its top and two screwdriver blades 180° apart and positioned between impeller No. 18 and bracket No. 16; using even force, pry impeller up & away from motor shaft. The impeller hub has a straight bore and mates to a keyed motor shaft. Remove key No. 25 from either motor shaft or impeller bore. Keyed end should be facing down, towards the motor.
3. Remove No. 17 mechanical seal assembly with spring by sliding along motor shaft.
4. Remove No. 14 hex. cap screws holding No. 16 motor bracket to the motor, then carefully separate.
5. Water slinger No. 15 is now visible and can be removed.

REPLACING MECHANICAL SHAFT SEAL AND REASSEMBLING PUMP

1. Pump and motor unit must be completely dismantled as indicated above.
2. Remove No. 17 ceramic stationary portion of the mechanical seal seat and rubber vibration ring from motor bracket No. 16 or seal plate No. 32.
3. Be sure counterbore in bracket No. 16 or seal plate 32 is perfectly clean before inserting new ceramic seat and ring.
4. Use a only water-based lubricant or liquid dish washing soap on the entire diameter of vibration ring and press it together with the ceramic seat into the machined bored of bracket No. 16. Press as far as it will go and be sure it is in the proper position with seat surface at a perfect 90° angle with respect to motor shaft. Use caution so as NOT to SCRATCH or MAR lapped surfaces of ceramic seat.
5. Slide No. 16 motor bracket over motor shaft and replace fasteners No. 14. (Seal plate No. 31 for VJS pumps.)
6. Use a water-based lubricant or liquid dish soap on the lower end of motor shaft and slip rotating seal assembly No. 17 onto motor shaft as far as it will go. CAUTION: Be careful not to SCRATCH OR MAR lapped surface of carbon ring.
7. Insert seal spring and be sure it seats properly against shaft seal, with the flat end facing up , towards the motor. While the spring end is facing down, towards the volute.
8. VJS PUMP UNIT: Hold top end of motor shaft with screwdriver or open-end wrench and thread impeller No. 18 CLOCKWISE onto motor shaft until it is tight. The seal spring will center itself on the impeller hub and this will properly load the spring and seal assembly. Replace impeller bolt No. 21 and turn COUNTERCLOCKWISE until it is tight.
9. VCS, VES and VNS PUMP UNITS: Replace impeller key on motor shaft, then line up and slide impeller onto shaft. With impeller in its proper place, the inside hub will be almost flush with end of motor shaft and will provide proper loading on mechanical seal assembly. Insert screwdriver blade in one of the impeller peripheral openings to keep it from turning, and replace No. 19 brass hub washer, lock washer No. 20, impeller bolt No. 21, or locknut No. 35 where applicable. Tighten impeller bolt or locknut by turning CLOCKWISE.
10. Replace gasket(s)/O-Ring No. 22 and pump motor unit onto volute No. 12 and replace volute nuts & washers No. 11 or bolts No. 13 and tighten securely.
11. Replace tube vent line No. 10 and tighten fittings No. 9.
12. Reconnect wiring and flexible conduit at motor terminal box and unit is now ready to power up for a quick jog to confirm proper pump shaft rotation prior to automatic operation.
13. CAUTION: NEVER RUN PUMP WITH RECEIVER EMPTY, BECAUSE BOTH ELEMENTS OF MECHANICAL SHAFT SEAL WILL BE DAMAGED.

OVERFLOWS AND VENTS – INSTALLATION INSTRUCTIONS

Proper installation of overflow and vent piping is critical to the success of your installation. The tank you have purchased is **not a pressure vessel**, and properly locating the overflow and vent piping will help prevent damage to the tank. Overflow and vent piping should always be properly supported to avoid damaging the tank.

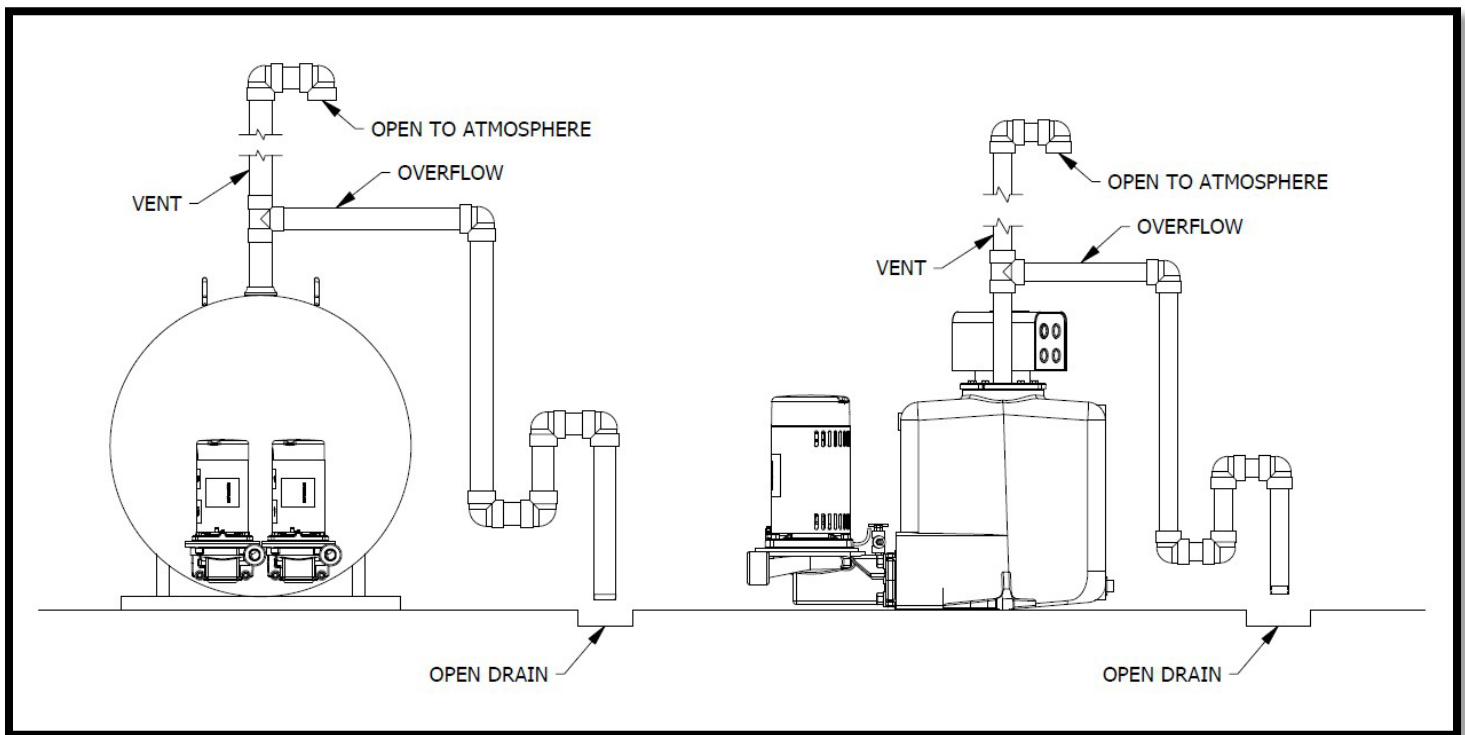
The purpose of the **overflow** is to provide a path for the tank contents to escape the tank in the event of flooding caused by mechanical or technical failure. An overflow should extend no higher than one foot above the top of the tank, because each additional foot of height in the overflow adds about 0.5 PSI to the pressure in the vessel if the tank floods. Overflows typically are directed into floor drains.

The purpose of the **vent** is to maintain atmospheric pressure on top of the liquid in the tank (that is, to prevent pressurization of the tank). There is no limit to the height of the vent since it is only carrying air at low velocity. Tall vents should be supported from above to ensure stability and to reduce weight load on the tank.

Some tanks have separate vent and overflow ports, while others have a single port that must serve both purposes. See The figures below for the proper method for plumbing vent and overflow to a single port. **Never reduce pipe size on vent or overflow lines.**

WARNING

FAILURE TO PROPERLY INSTALL VENT AND OVERFLOW PIPING AS DESCRIBED HEREIN COULD ENDANGER PERSONNEL AND RESULT IN DAMAGE TO PROPERTY.



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