



Installation and Maintenance

EPT-400 Series Pumping Trap

This bulletin should be used by experienced personnel as a guide to the start-up and maintenance of the Pumping Trap or Pumping Trap Package. Selection or installation of equipment should always be accompanied by competent technical assistance. We encourage you to contact Armstrong or your local Representative if further information is required.

The maximum design pressure for all Armstrong EPT-400 Series pumping traps is 10 bar g at 250°C. The EPT-400 Series weigh up to 88kg. App: Maximum back pressure is 4 bar g

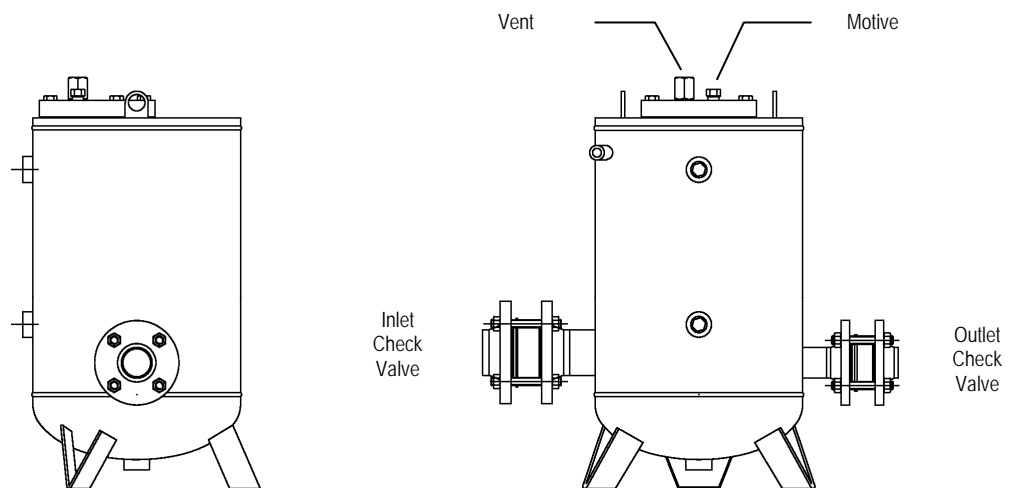


Fig. 1 : EPT-400 Series – Vertical - Steel

Note : Although the maximum operating pressure is 8,5 bar g, it is highly recommended that the motive be set only 1,0 – 1,4 bar above the discharge pressure. This will provide optimum performance and reduce venting time between cycles.



Pumping Trap

Pumping Trap Operation

1. At start up, the float lies at its lowest position in the bottom of the tank. The motive inlet valve is closed and the vent valve is open.
2. Liquid enters the pump body by gravity through the inlet check valve. Back pressure (typically) holds the discharge check valve closed. The float becomes buoyant and begins rising.
3. Continued rising of the float, through linkage, increases spring tension until the float reaches its upper tripping point. Energy is then released instantly from the springs, causing the linkage to snap upwards over center.

This upward motion opens the inlet valve and closes the vent valves simultaneously.

4. Steam, air or gas enters the inlet valve and builds pressure inside the pumping trap. This pressure will close the inlet check valve and force liquid out through the discharge check valve as it opens.
5. The discharge cycle will lower the float level and, through linkage, increase spring tension until the float reaches the lower tripping point. Energy is then released instantly from the springs, causing the linkage to snap over center downward.

This action will close the motive inlet valve and simultaneously open the vent valve.

6. Venting or pressure from the body opens the inlet check valve and closes the discharge check valve. Liquid now flows by gravity through the inlet check valve into the pumping trap body as a new cycle begins.

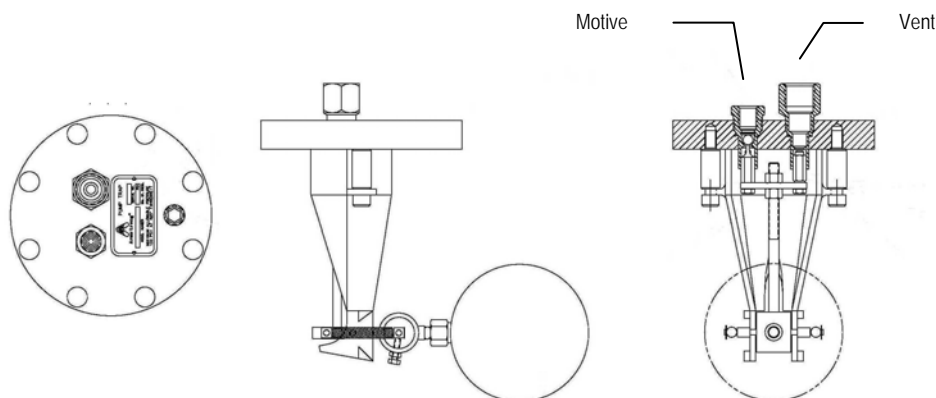


Fig.2 : EPT-400 Series Cap Assembly



Pumping Trap

Note : On pre-piped packaged units, inspect and tighten all threaded fittings (such as unions, etc.) that may have loosened during shipment.

Filling Head :

Install the pumping trap below the equipment being drained. A minimum filling head of 300 mm is recommended for all models of the EPT-400 Series. Filling head is the distance between the bottom of a vented receiver or reservoir pipe and the top of the pumping trap cap. See typical hook-up on page 6 for an example. All inlet fittings must be fully ported and match the pump's liquid inlet connection size. Greater fill heads increase the capacity of the pump trap. Reference (Table CRE-193-4) capacity chart for multiplying factors for other filling heads in Catalog.

Liquid Reservoir :

Liquid flowing from the equipment being drained must be stored during the pump's discharge cycle. A liquid reservoir (pipe reservoir) or vented receiver should be installed in a horizontal plane to prevent flooding of the equipment. Please contact your local Armstrong representative for questions regarding reservoir pipe sizing or reference reservoir sizing data from page CRE-200 in Catalog. Also see typical hook-ups on page 6 in this installation bulletin.

Check Valves :

NOTE : The pumping trap will not function without inlet and discharge check valves.

Connect the Armstrong supplied check valves to the pump. Both inlet and discharge check valves are stainless steel wafer type check valves. **The uses of Armstrong supplied check valves is necessary to ensure the pump will attain published capacities.** Best performance is achieved when a minimum 300mm of horizontal pipe is used before the inlet check valve or after the discharge check valve.

The following guidelines apply if the Pumping Trap is installed without Armstrong supplied check valves.

- Inlet check valves should be PN40 – Class 150 (minimum). Pipe size of the check valve must match the size of the pump's liquid inlet connection.
- Discharge check valves should be PN40 – Class 150 (minimum). Pipe size of the check valve must match the size of the pump's liquid inlet connection.

Motive Inlet Piping :

Connect the motive force piping (steam, air or inert gas) to the inlet connection on the pump cap. Proper piping and trapping of the motive supply line must include a strainer, check valve, properly sized drip leg with mud pocket, and drip trap. The drip trap discharge line should be connected to the reservoir piping or vented receiver when practical. See figure 3 and 4 on page 6. It is recommended to install a union near the motive inlet (valve seat) to provide quick access to the externally removable seat.

Note : To visually determine the location of the **motive** connection for Series EPT-400, look into the pumping trap's **condensate** inlet and the **motive** connection will be the ½" connection in the cap that is not steel plugged.



Pumping Trap

Maximum motive pressure for the pump trap is 8,5 bar g. A pressure reducing valve must be used when the motive pressure exceeds 8,5 bar g. It is also recommended that that motive pressure be set between 1.0 – 1.4 bar above total discharge pressure (total discharge pressure = vertical lift in bar plus return line pressure). This pressure setting keeps venting time to a minimum and, when using steam, reduces the temperature differential. The PRV should be installed as far from the pump trap as possible. A good rule is to use a minimum of 10 pipe diameter from the end source.

Example : DN25 x 10 = 250 mm

Installation of a safety relief valve and pressure gauge is recommended in the motive force supply line. The relief valve should be set for 10 bar.

Vent Connection (“Open System” – vented to atmosphere):

Piping from the pump’s cap connection labeled “Vent” should be installed vertically upward when possible and unrestricted. If piping travels greater than one meter, the piping should be expanded to one inch or greater. If a horizontal run is required, this line should be pitched toward the pump trap in order to be self draining. It is recommended to install a union near the vent connection (valve seat) to provide quick access to the externally removable seat.

Note : To visually determine the location of the vent connection for Series EPT-400, look into the pumping trap’s condensate inlet and the vent connection will be 1” connection in the cap.

Vent Connection (Closed loop system):

From the pump cap connection labeled “Vent”, the equalizing line should be routed to the top of the equipment being drained or it’s outlet piping immediately after the heat exchange equipment. An Armstrong thermostatic air vent is recommended (for steam) at the high point of the exhaust line (see figure 5 on page 7). Piping of the equalizing line should be a minimum DN25 diameter and must be pitched in order to be self draining.

If pressure from the equipment being drained could ever exceed back pressure against the pump, a properly sized inverted bucket steam trap with a large vent or a float and thermostatic trap must be installed between the pump and discharge check valve (see figure 7 on page 7).

Packaged Receiver Vent Connections: The receiver vent must be unrestricted and atmospherically vented unless a PED coded tank is specified.

Packaged Pump Trap Vent Connections: Piping from the pump’s cap connection labeled “vent” should be installed upward to connect with the receiver vent line, and be a minimum DN25 diameter.

Packaged Connections:

NOTE: All receiver tanks should be operated at atmospheric pressure (vented) unless the package was ordered with a PED coded tank.

A pumping trap receiver package designates the number of pumps with a “S” for single (one pump), “D” for duplex (two pump), “T” for triple (three pump), and “Q” for quad (four pumps).



Pumping Trap

START-UP

1. Slowly open motive force (steam, air or inert gas) supply to Pumping Trap providing pressure to the inlet valve. Check for proper operation of drip trap on the motive line if using steam.
2. Open isolation valves leading to pump liquid inlet and discharge lines.
3. Open any additional valves upstream allowing liquid to enter Pumping Trap from the equipment being drained. Pump will begin discharging when body is nearly full.
4. Proper operation includes an audible exhaust after each pump cycle. If operation doesn't seem proper, recheck the installation and start-up procedure. Contact Armstrong or your local Armstrong Representative if necessary.
5. If overflow piping is used on a receiver, check that a water seal has formed to prevent venting of steam during operation. One suggestion would be the use of a "P"-Trap to form a sufficient water seal.

Maintenance

1. Close the valves in the motive supply, vent, condensate supply and discharge lines. Also close the shut-off valve to the receiver for packaged units. **Make sure that the pumping trap is completely relieved of pressure before breaking any connections.**

NOTE: if a problem is suspected with motive or vent valve and seat combinations, the pump cap may not need to be removed. The seats are externally replaceable. This provides for visual inspection and cleaning of the valves without removal of the cap.

2. Break motive inlet and vent (all cap) connections. Remove bolts and lift the cap. A 381 mm withdrawal distance is required in order to remove the mechanism assembly with float for all Armstrong Pumping Traps.

NOTE: mechanism assembly is factory set. No adjustment to mechanism assembly should be made.

3. Inspect the mechanism for freedom of movement. Remove any dirt or scale inhibiting the motion of the mechanism (see figure 2 on page 2).
4. Check condition of the springs. If defective, remove retaining clips and slide springs (with spring ends) from pins. Replace springs (with spring ends) and install new retaining clips. Once the retaining clips have been removed they should **not** be reused.
5. Check the float for pinhole leaks, dents, or corrosion. Immerse in hot water and look for air bubbles to detect pinhole leaks.
6. Inspect seating surfaces of motive inlet and vent valves for evidence of wear. Clean the surfaces. Each valve slides out from its position in the valve actuator. Reinstall or replace parts as necessary. Removal of the inlet or vent seat may require replacement of the appropriate metal gasket before either seat is reinstall or replaced.
7. Inspect inlet and discharge wafer check valves for free movement. It is important that both check valves are able to fully seat. Foreign material or debris may damage seating surfaces.



Pumping Trap

TYPICAL HOOK-UPS

NOTE: Hook-up sketches depict the Pumping Trap for clarity. However, the cap inlet and vent connections are actually located closer to each other than shown.

Vented Systems

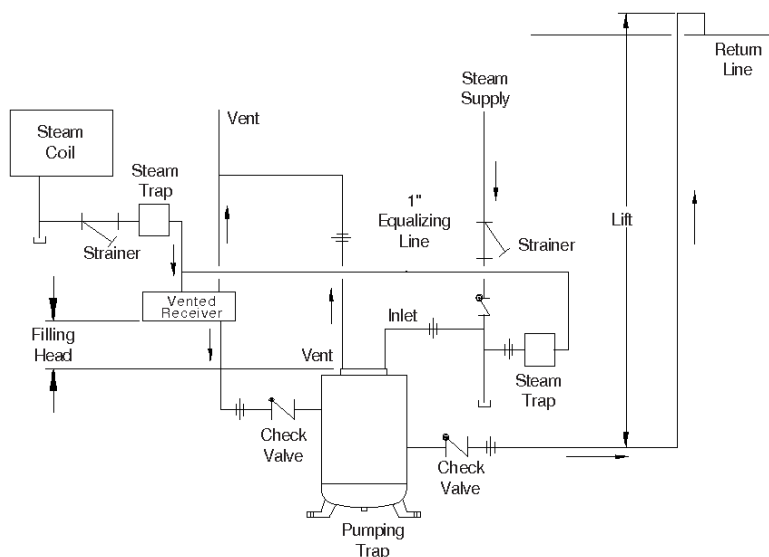


FIGURE 3 : Condensate drainage to vented receiver with overhead condensate return. Use of the Pumping Trap, combined with proper sizing of the steam trap and receiver assures successful coil drainage under low pressure conditions.

Armstrong strongly recommends the use of overflow piping on receiver tanks in open condensate return systems. Properly installed overflow piping increases the efficiency of the system, while addressing potential safety issues involved with the unintentional escape of hot condensate.

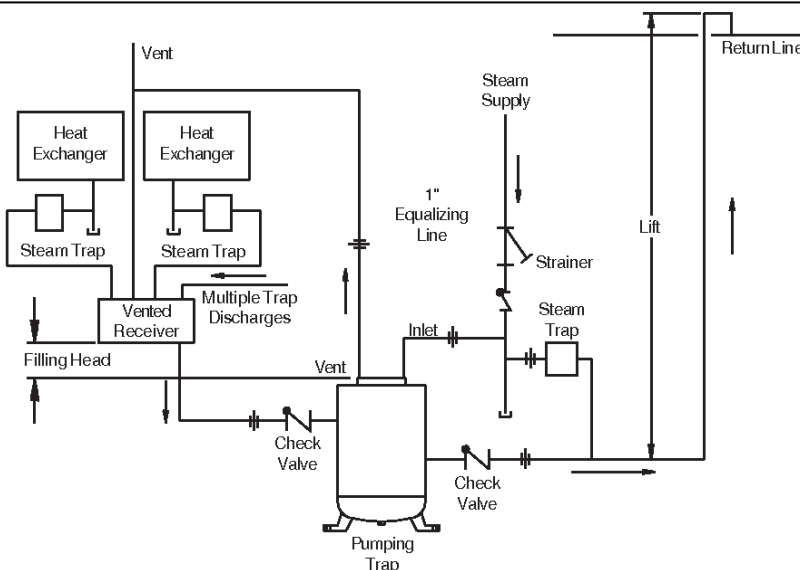


FIGURE 4 : Pumping of condensate from vented receiver handling multiple steam trap discharges. Motive force of steam is depicted.



Pumping Trap

Closed Loop Systems

A closed loop system must be installed with caution and if any questions arise, contact Armstrong Fluid Handling's Application Engineering Department.

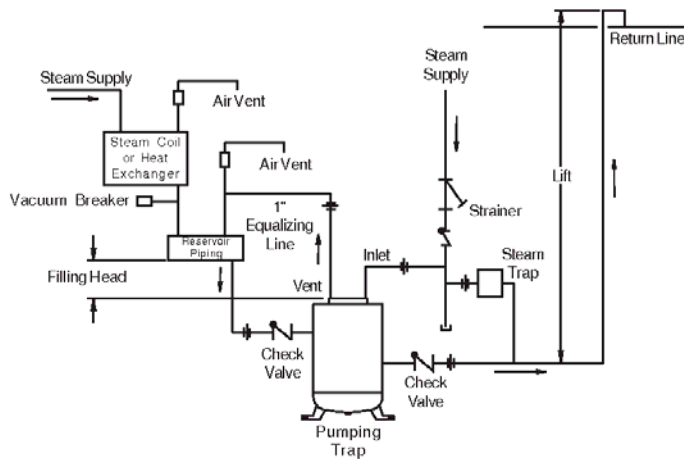


FIGURE 5 : Draining steam coil or heat exchanger when pressure in heat exchanger is lower than return line pressure combined with overhead lift. Please note the equipment is not trapped. In this application the pumping trap is used as both a steam trap and a pump.

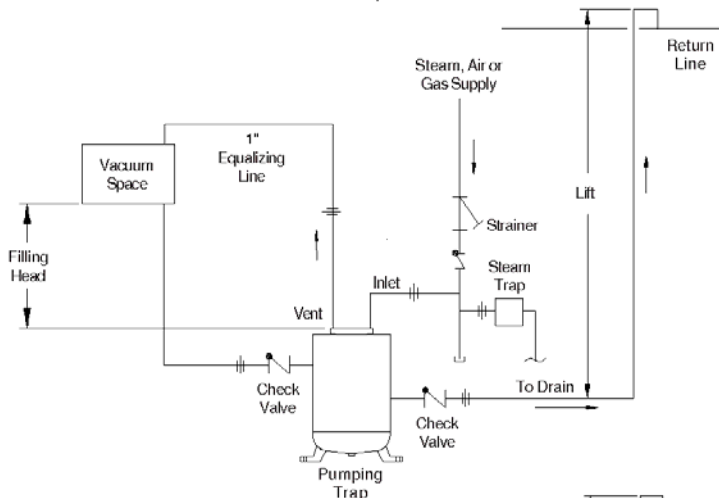


FIGURE 6 : Draining liquid from equipment under vacuum. The Pumping Trap provides drainage assistance whether liquid is to gravity or overhead.

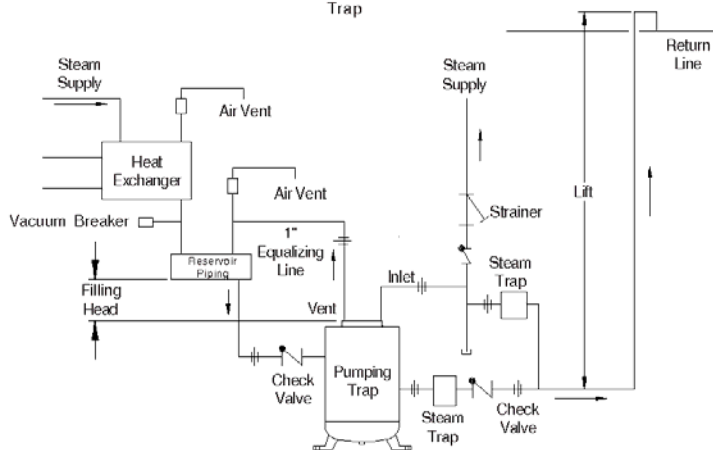


FIGURE 7 : Drainage from a heat exchanger in a closed-loop system where the supply pressure may be higher or lower than the back pressure. If the heat exchanger pressure exceeds the back pressure the pumping trap will be idle and the steam trap will prevent the steam from "blowing through" into the return line. Motive force of steam is depicted.

NOTE: It is suggested that Armstrong's Application Engineering Department be contacted prior to installation.

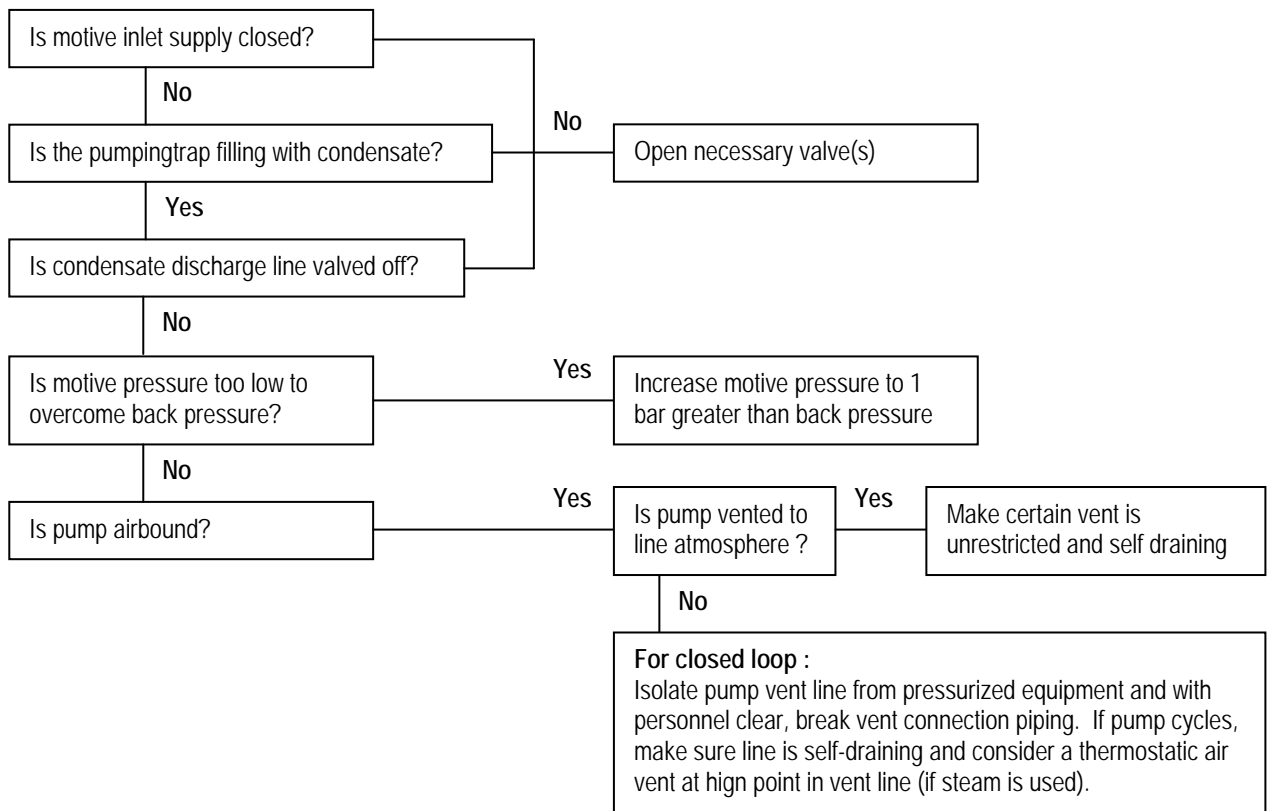


Pumping Trap

TROUBLE SHOOTING FLOW CHART

For Safety of Personnel – Vent line piping should be isolated from equipment and pump pressure should be relieved prior to breaking connections. **WARNING : WATER MAY RUN OUT OF THE VENT CONNECTION WHEN PIPING IS BROKEN. CARE SHOULD BE TAKEN TO AVOID DANGER TO PERSONNEL OR DAMAGE TO NEARBY EQUIPMENT.**

1. Pump Does Not Cycle During Start-Up



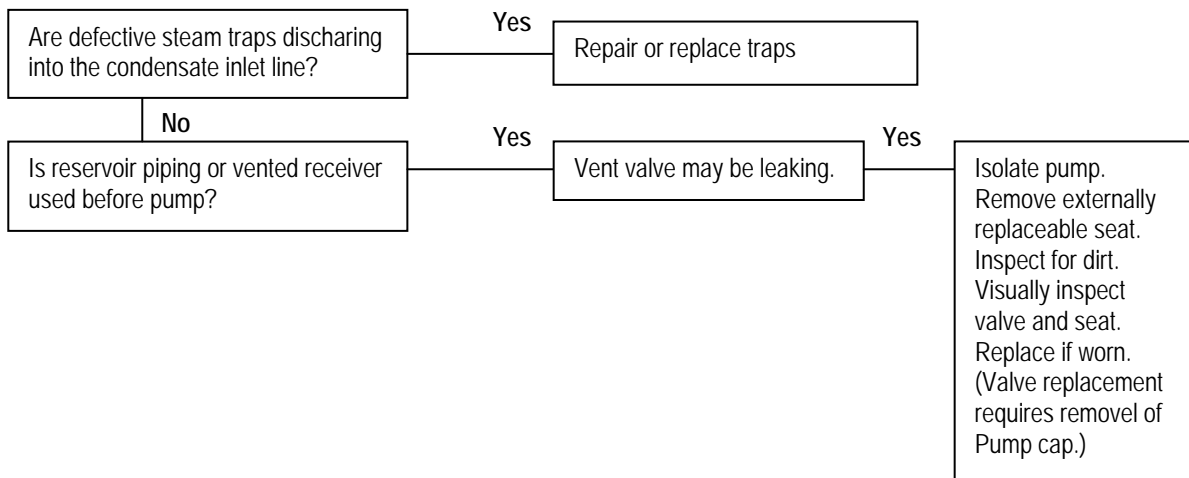


Pumping Trap

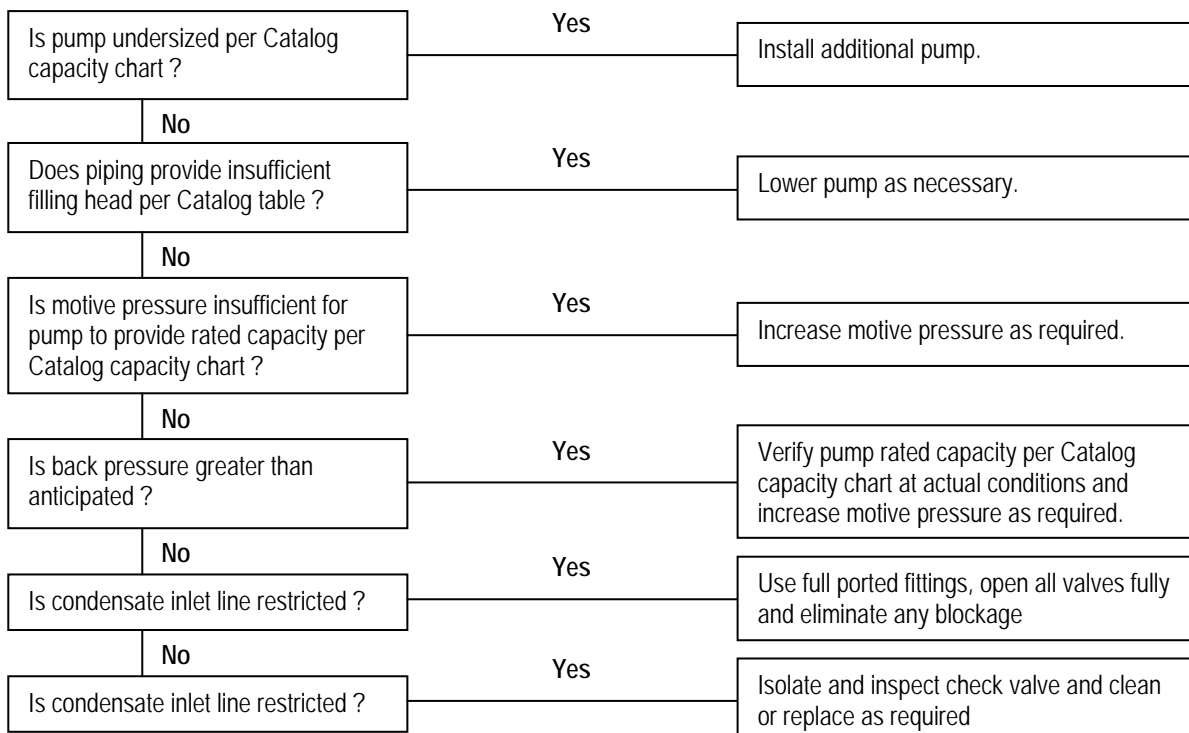
TROUBLE SHOOTING FLOW CHART—Continued...

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2. Excessive flash steam passed through vent



3. Pump cycles but equipment or piping is flooded



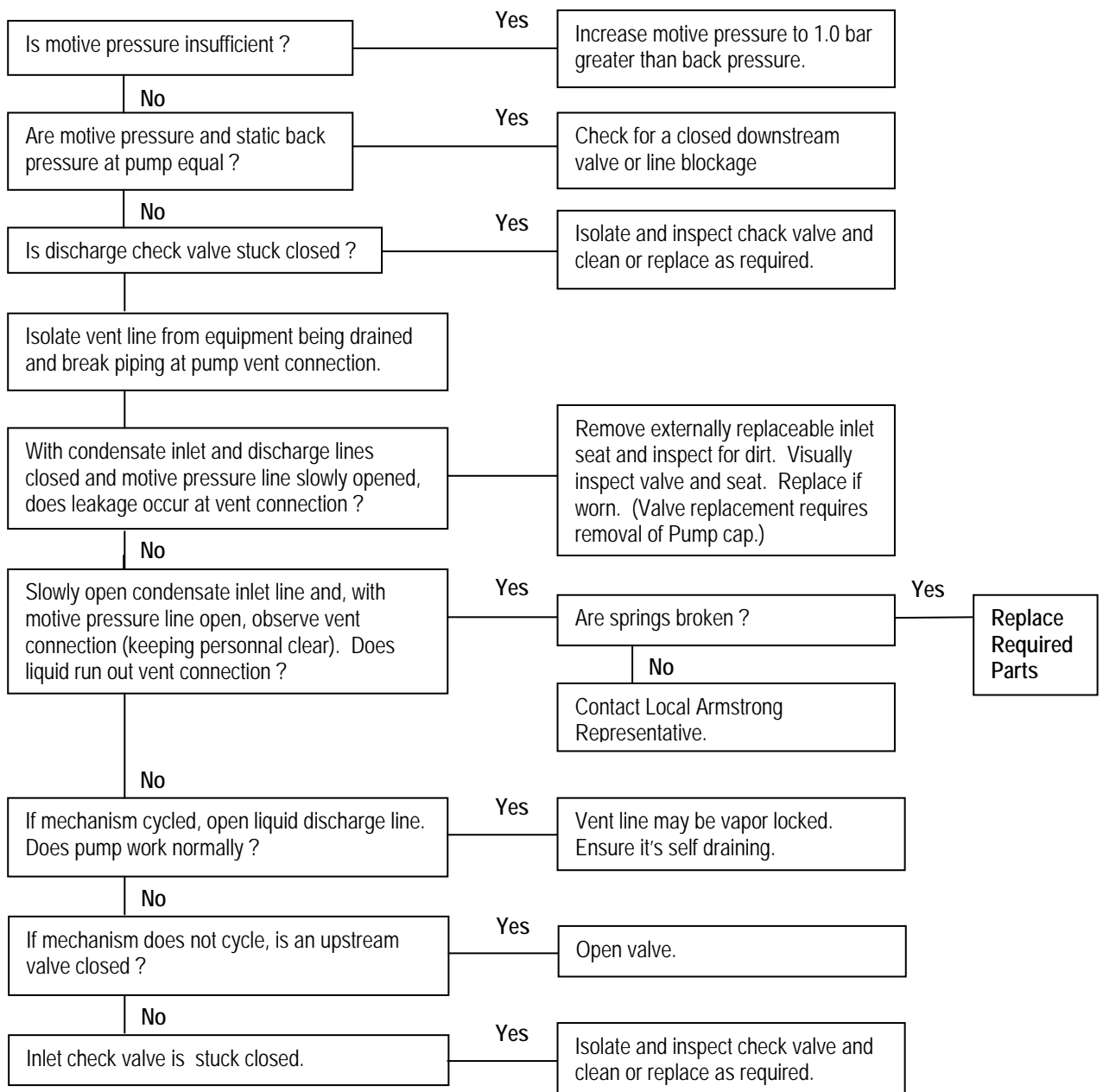


Pumping Trap

TROUBLE SHOOTING FLOW CHART—Continued...

For Safety of Personnel – Vent line piping should be isolated from equipment and pump pressure should be relieved prior to breaking connections. **WARNING : WATER MAY RUN OUT OF THE VENT CONNECTION WHEN PIPING IS BROKEN. CARE SHOULD BE TAKEN TO AVOID DANGER TO PERSONNEL OR DAMAGE TO NEARBY EQUIPMENT.**

4. Pump stops cycling and equipment is flooded



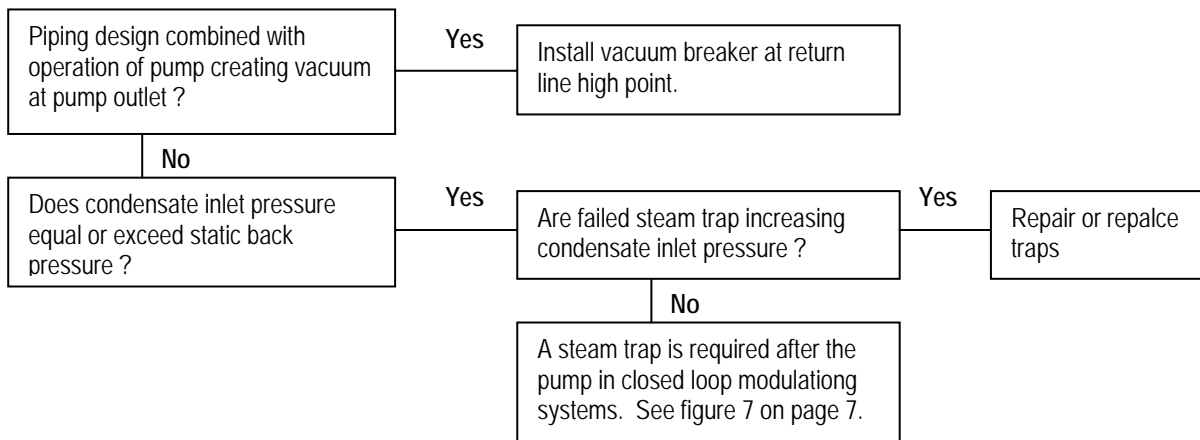


Pumping Trap

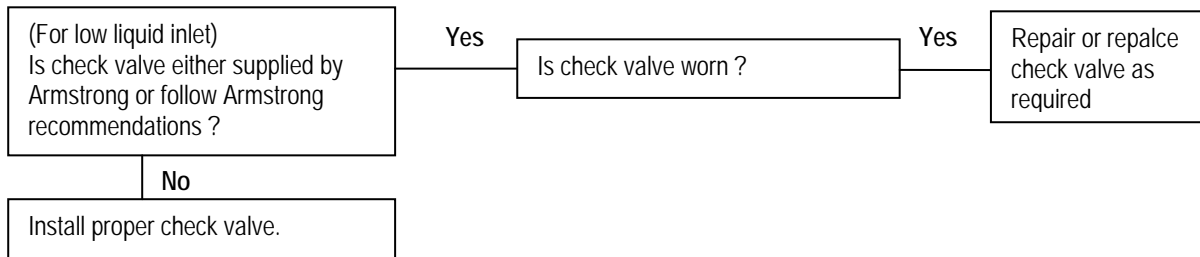
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5. Chattering or knocking in return line after discharge



5. Excessive chatter from inlet check valve



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