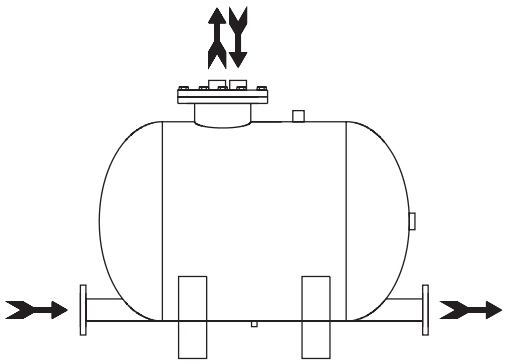
PT-516 Pumping Trap Installation and Maintenance

This bulletin should be used by experienced personnel as a guide to the installation and maintenance of the PT-516 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 operating pressure for the PT-516 Pumping Trap is 150 psig (10.34 bar). The maximum design pressure for the PT-516 model (standard model design) is 150 psig @ 500° F or (10.34 bar @ 260° C). The PT-516 pumping trap weighs approximately 870 pounds (394 kg). Maximum back pressure is 80 psi (5.5 bar).



Note: Although the maximum operating pressure is 150 psig (10.34 bar), Armstrong Fluid Handling recommends that the motive pressure be set to 30 psig (2.07 bar) above the back pressure. This will provide optimum performance and reduce venting time between cycles.

Pump 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.

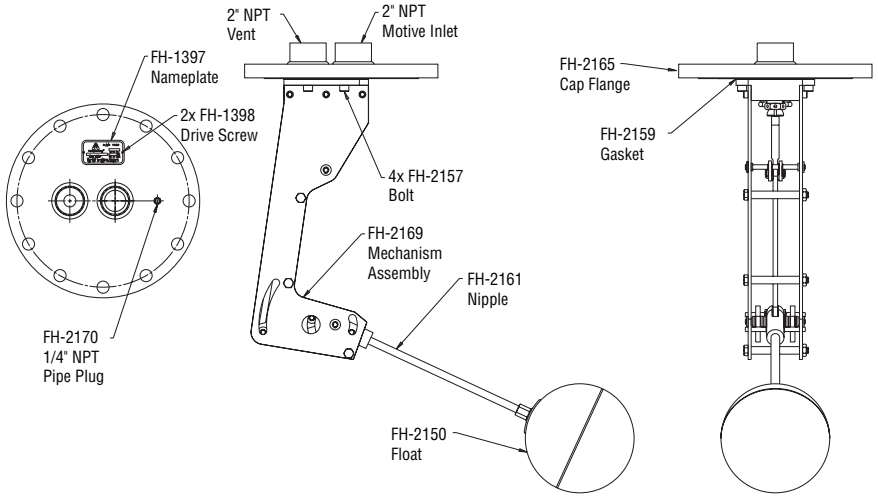
3. Continued rising of the float, through linkage, increases spring compression until it reaches its upper tripping point. The linkage then snaps upward over center. This upward motion opens the inlet valve and closes the vent valve simultaneously.

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 until it reaches its lower tripping point. The compression spring will cause the mechanism to snap over its center point downward. This action will close the motive inlet valve and simultaneously open the vent valve.

6. Venting of 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.

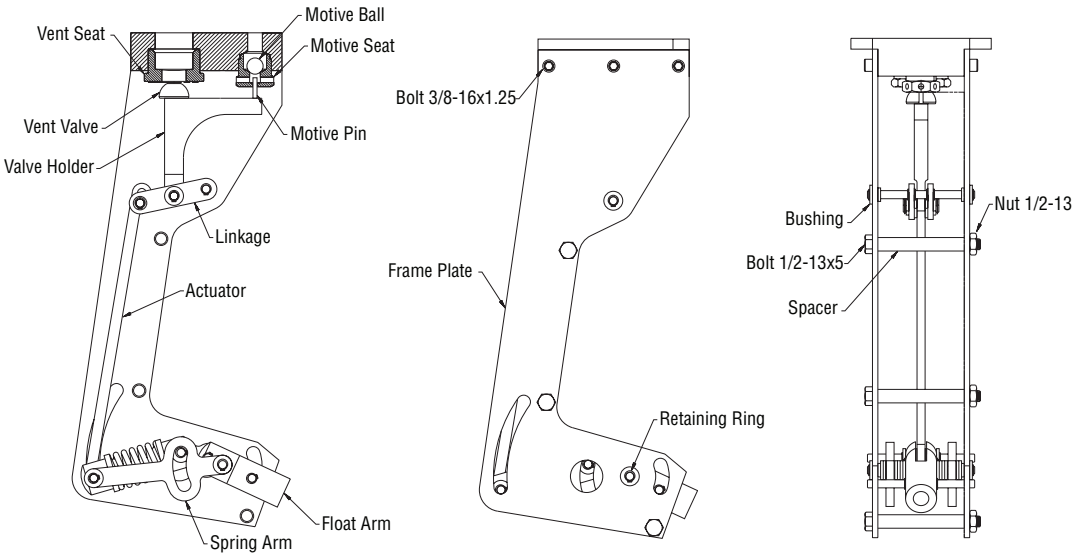
Figure 2



Suggested Installation of Accessories

Gauge Glass Assembly:
The Bronze Gauge Glass Assembly will have male NPT connections.
The PT-516 requires additional parts to mount the gauge glass. Two (2) 1/2” x 3" nipples and two (2) 1/2” couplings.

Cycle Counter:
There is a 1/4” connection on top of the cap where the cycle counter can be mounted. One (1) 1/4” pigtail siphon and 1/4" isolation valve are required. It is very important that a steel siphon or “pig tail” be used prior to the cycle counter to avoid any damage to the cycle counter.



Installation

Note: It is important to check all fittings before start up to ensure that none loosened during shipment.

Filling Head:
Install the PT-516 below the equipment being drained. A minimum filling head of 24" is required for the PT-516. Filling head is measured from the *bottom* of the receiver or reservoir pipe to the *top* of the PT-516 cap. All inlet fittings must be full ported and match the pump's liquid inlet connection size. Greater fill heads may increase the capacity of the pump. Reference Catalog 326 for capacities.

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 equipment. Please contact your local Armstrong representative for questions regarding reservoir sizing or reference sizing data from Catalog 326.

Check Valves:
Note: The PT-516 will not function without inlet and discharge check valves. Connect the Armstrong supplied check valves to the pump. The PT-516 has two (2) 4" flanged connections. **The use of Armstrong supplied check valves is necessary to ensure the pump will attain maximum capacities.** Best performance is achieved when a minimum of horizontal pipe is used before the inlet check valve.

The following guidelines apply if the PT-516 is installed without Armstrong supplied check valves.

1. Both inlet and outlet check valves should be 4" in-line wafer style with a carbon steel body and stainless steel trim, Class 150. All stainless steel 4" in-line wafer check valves may also be used.

Motive Inlet Piping:
Connect the motive force piping (steam, air, or gas) to the inlet connection on the PT-516 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 motive supply line must be a minimum of 2".*** The drip trap discharge line should be connected to the reservoir piping or vented receiver when practical.

Note: The motive inlet connection is the one furthest away from the 1/4" NPT connection on top of the cap.

Maximum operating pressure for the PT-516 is 150 psig (10.34 bar). A pressure reducing valve must be used when the motive pressure exceeds 150 psig (150.34 bar). It is also recommended that the motive pressure be set a minimum of 20 psig (1.3 bar) above the back pressure but high enough to ensure capacity. Reference Catalog 326 for capacity ratings. The PRV should be installed a minimum of 10 feet from the pump. If less than four feet is necessary, then the installation of an accumulator pipe is warranted.

Installation of a safety relief valve and pressure gauge is recommended on the motive force supply line. The relief valve should be set for 150 psig (10.34 bar).

Vent Connection ("Open" System-vented to atmosphere):
Piping from the pump's cap connection should be installed vertically upward when possible and unrestricted. The minimum size of this vent piping should be 2". If piping travels longer than 10 feet, the piping should be expanded to a minimum of 3". If a horizontal run is required, this line should be pitched toward the pump trap in order to be self-draining.

Note: The vent connection is the one closest to the ¼" NPT connection.

Vent Connection ("Closed-loop" system):
From the pump's vent connection, the equalizing line should be routed to the top of the equipment being drained or its 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. Piping of the equalizing line should be a minimum of 2" (50 mm) diameter and must be pitched in order to be self-draining.

Note: The vent line may be plumbed back in to the heat exchange equipment if that equipment has less than a 1/2 psi pressure drop. Otherwise, the vent line should be plumbed back in to the top of the receiver.

If pressure from the equipment being drained could possibly exceed back pressure against the pump, a properly sized float and thermostatic trap must be installed between the pump and discharge check valve.

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

Packaged Pump Trap Vent Connections: Piping from the pump's vent connection should be installed upward to connect with the receiver vent line, and be a minimum of 2 inches (50 mm) in diameter.

Packaged Connections:
Note: All receiver tanks should be operated at atmospheric pressure (vented) unless the package was ordered with an ASME coded tank.

A pumping trap receiver package designates the number of pumps with a "S" for single (one pump), "D" for duplex (two pumps), "T" for triple (three pumps) and "Q" for quad (four pumps). For example: SPT-516RP or DPT-516RP. The "RP" at the end of the model number means receiver package.

The SPT-516RP or single pump receiver package has a 130 gallon (491 liter) receiver tank with one (1) 8" 150# flanged vent connection, one (1) 6" 150# flanged inlet connection, one (1) 4" 150# flanged inlet connection, one (1) 4" 150# flanged side inlet connection and one (1) 2" NPT connection on top.

The DPT-516RP has a 240 gallon (907 liter) receiver tank with one (1) 10" 150# flanged vent connection, one (1) 8" 150# flanged inlet connection, one (1) 4" 150# flanged inlet connection, one (1) 4" 150# flanged side inlet connection and one (1) 3" NPT connection on top.

Both the simplex and duplex receiver tanks have 1/2" (10 mm) gauge glass connections.

NOTE: Replace any temporary plastic in these connections with permanent steel plugs or appropriate fittings before start-up.

Start-Up

1. Drain cool condensate.

2. Slowly open motive force (steam, air or inlet gas) supplying the PT-516 providing pressure to the inlet valve. Check for proper operation of the drip trap on the motive line if using steam.

3. Open vent isolation valve.

4. Open isolation valves leading to the pump liquid inlet and discharge lines.

5. Open any additional valves upstream allowing liquid to enter the PT-516 from the equipment being drained. Pump will begin discharging when body is nearly full.

6. 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.

7. Armstrong strongly recommends the use of overflow piping on receiver tanks in *open condensate return systems*, on ALL pump trap skids. Properly installed overflow piping increases the efficiency of the system, while addressing potential safety issues involved with the unintentional escape of hot condesate. One suggestion would be the use of a "P"-trap to form a sufficient water seal. Be sure to check that a water seal has formed to prevent venting of steam through the overflow connection during operation.

Maintenance

1. Close the valves in the motive supply, vent, condensate and discharge lines. Also, close the shut-off valve(s) to the receiver for packaged units. **Make sure that the PT-516 is completely relieved of pressure before breaking any connections.**

2. Break motive inlet and vent (all cap) connections.

3. Remove cap assembly and inspect mechanism for freedom of movement. Remove any dirt or scale inhibiting the motion of the mechanism.
   IMPORTANT NOTE: The PT-516 mechanism weighs approximately 120 lbs. You will need a forklift or overhead lift to remove the mechanism from the pump body. The withdrawal distance is approximately 18 inches (457mm).

4. Check the float for pinhole leaks, dents or corrosion. Immerse in hot water and look for air bubbles to detect pinhole leaks.

5. Inspect motive and vent valves for wear. Reinstall or replace parts as necessary.

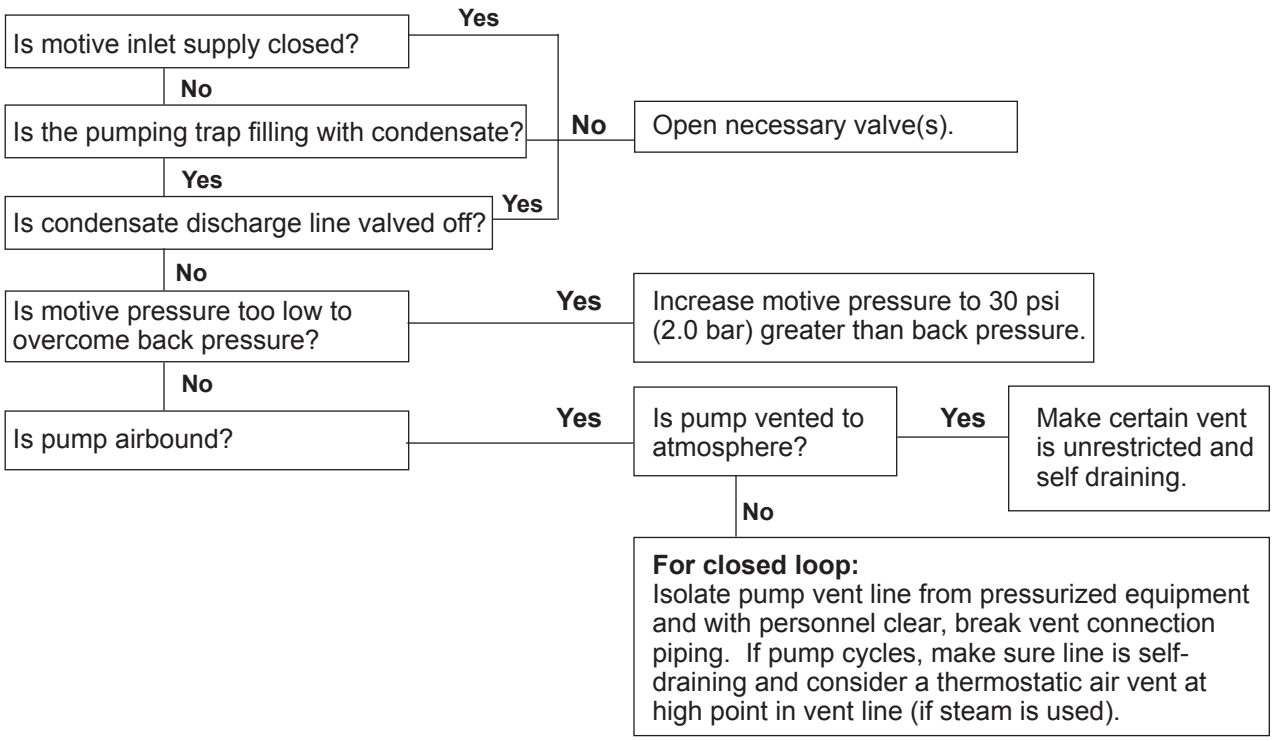
6. Replace gasket if damaged before reattaching the cap assembly to the pump body.

7. Inspect inlet and discharge check valves for freedom of movement. Ensure that both check valves seat properly. It is important that both check valves are able to fully seat. Foreign material or debris may damage seating surfaces.

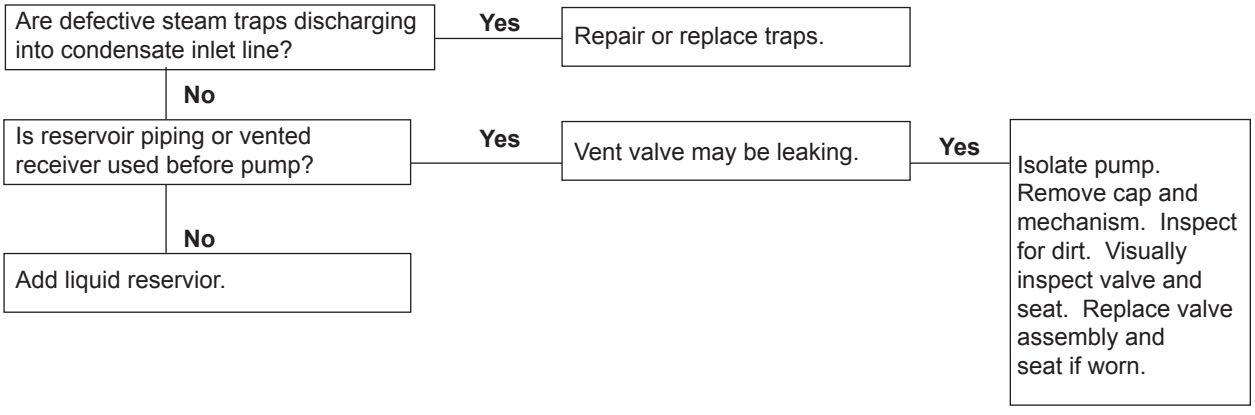
TROUBLESHOOTING FLOW CHARTS

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



2. Excessive flash steam passed through vent



TROUBLESHOOTING FLOW CHARTS - 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.**

3. Pump cycles but equipment or piping is flooded

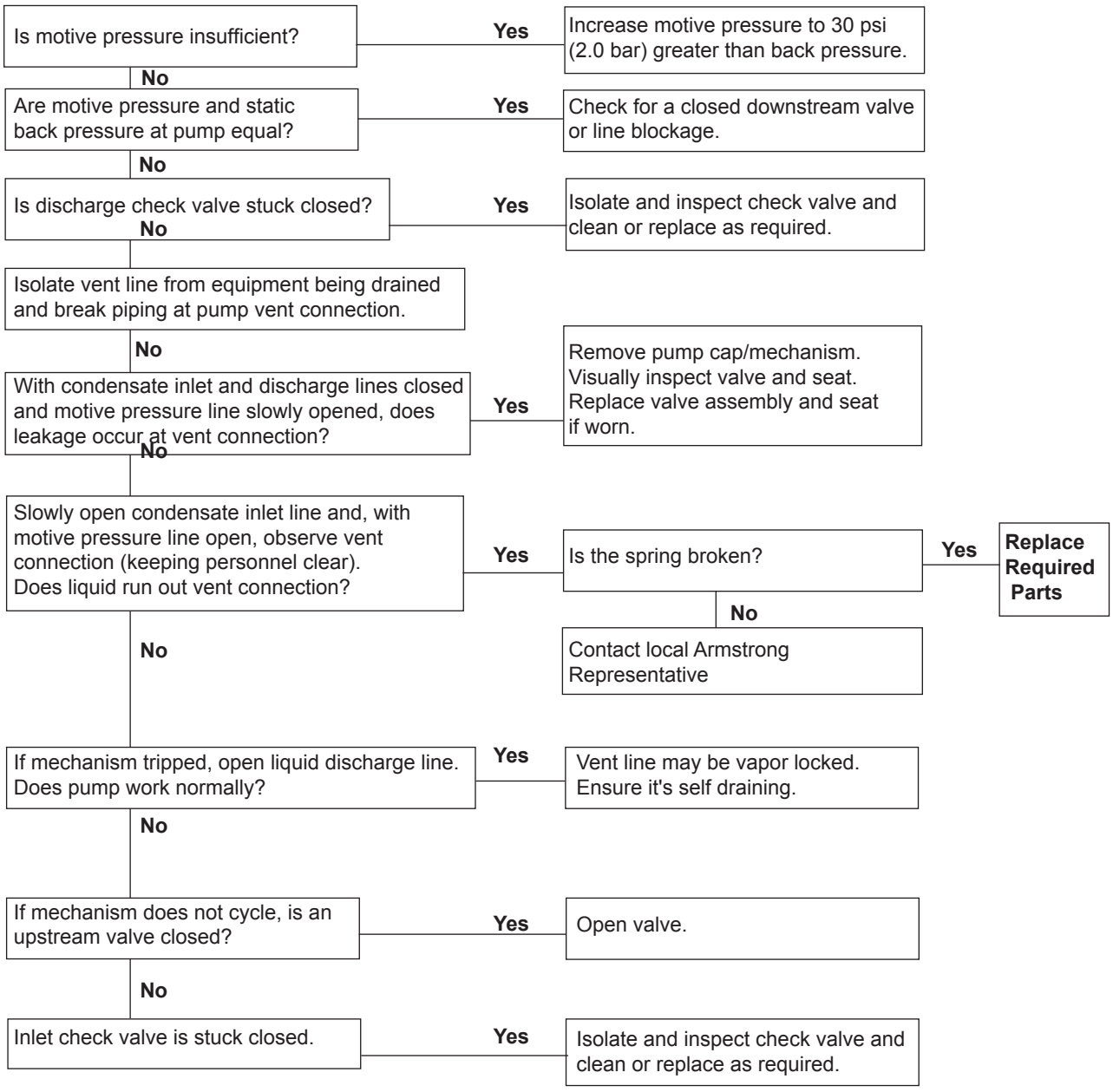
NOTE: See Catalog 326 for sizing.

Is pump undersized per Catalog 326?	**Yes**	Install additional pump.
No		
Does piping provide insufficient filling head per Catalog 326?	**Yes**	Lower pump as necessary.
No		
Is motive pressure insufficient for pump to provide rated capacity per Catalog 326?	**Yes**	Increase motive pressure as required.
No		
Is back pressure greater than anticipated?	**Yes**	Verify pump rated capacity per Catalog 326 at actual conditions and increase motive pressure as required.
No		
Is condensate inlet line restricted?	**Yes**	Use full ported fittings, open all valves fully and eliminate any blockages.
No		
Is inlet check valve hanging open?	**Yes**	Isolate and inspect check valve and clean or replace as required.

TROUBLESHOOTING FLOW CHARTS

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.**

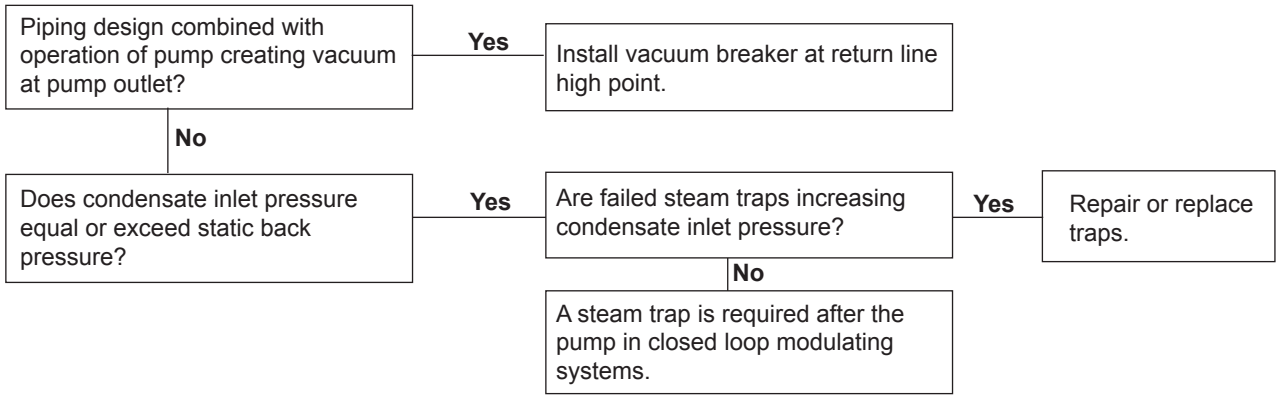
4. Pump stops cycling and equipment is flooded



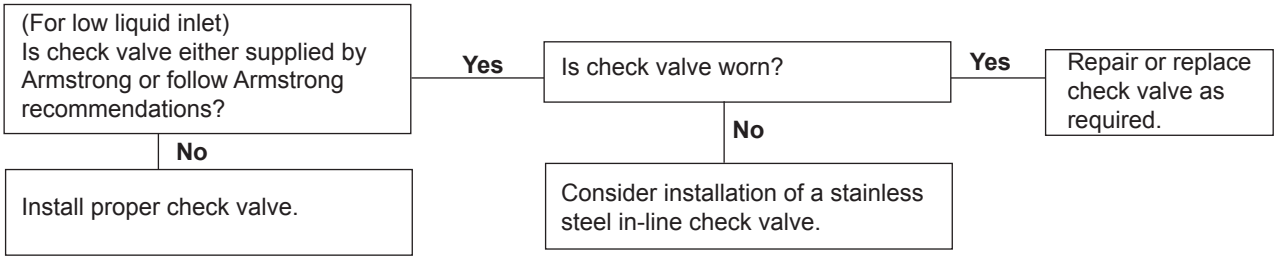
TROUBLESHOOTING FLOW CHARTS - Continued

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.**

5. Chattering or knocking in return line after discharge



6. Excessive chatter from inlet check valve



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Special Warranty Periods are as follows:
Three (3) years after installation, but in no event longer than 39 months after shipment from Armstrong's factory.

PT100, 200, 300, 3500 and 400 Series Standard Pumping Traps.
PT100, 200, 300, 3500 and 400 Series Replacement Cap Assemblies and Rescue Cap ®.

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