Bell & Gossett CounterPoint™

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Five Good Reasons to Pump Away!

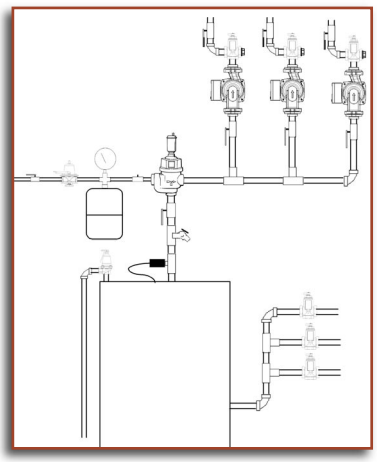
A variety of options are available when deciding how to pump water through a system. However, pumping away is the best choice. There are numerous compelling reasons to "pump away," including improving system performance, and reducing contractor callbacks.

1) When you pump away from the compression tank (steel or diaphragm), the circulator's pressure differential is added to the system's static fill pressure. Whenever the circulator is located so that it is pumping away from "the point of no pressure change," the pressure is increased throughout the entire piping system. This improves the operation of any high vents that may be present in the system. It also prevents any high temperature water from flashing into steam.

2) When you pump away, you drive any air bubbles that are out in the system back into solution. Air (which consists of oxygen, nitrogen and hydrogen) has to follow the basic gas laws. One of those laws states that the more you compress a gas, the more a liquid will be able to absorb it. By increasing the system's pressure with the circulator, any air bubbles exposed to this pressure increase will be driven back into the water. The water will then carry the air back to the boiler water where it will be heated, and the air will be released from the water for efficient separation by an air separator. The airless system will operate much quieter as well. The sloshing and gurgling noises that awake many homeowners will be gone.

3) When you pump away, the circulator's pressure differential will not affect the boiler's relief valve setting or the pressure reducing valve setting. By locating the circulator on the supply, pumping away from the compression tank, its pressure differential will be absorbed by the system and not directed at the relief valve. The pressure-reducing valve should be piped into the line that connects the compression tank to the system. Piped in this manner, the circulator will not be able to "trick" the PRV with any inaccurate system pressures.

4) When you pump away, you prevent the pump from experiencing cavitation and other pumping problems. By locating the circulator so that it pumps away from "the point of no pressure change" (PNPC), the pressure on the suction side of the circulator will not change. If the pressure drop between the PNPC and the pump is small, pressure will remain at whatever the system fill pressure is at the circulator. This helps prevent the water from flashing into vapor inside the circulator's volute. Once the water flashes, very unstable pump operation, mechanical seal failures, and eventually, bearing problems occur.



Typical three-zone system.

5) When you pump away, you will save yourself time, money and expensive callbacks. By installing circulators on the supply, air will no longer be a problem. Any air bubbles out in the system will be driven into solution and brought back to the boiler room. You will not have to bleed the individual radiators. In addition, the system will operate quieter, transfer heat more efficiently, lower energy costs, and make your customers happy while reducing wasteful callbacks!

Now that you know the reasons for—and benefits of—pumping away from the supply, you may be interested in knowing why it is called "the point of no pressure change."

Because:

- Air in a compression tank (steel or diaphragm) has to follow the basic gas laws; a change in air pressure must be accompanied by a change in air volume. (To change the pressure, you must squeeze or expand the gas.)
- A change in the air volume in the tank must be accompanied by a change of water volume within the tank. (The only ways to change air volume are to add/remove water from the tank, or to expand/contract the water by heating/cooling it.)
- A change of water volume within the tank must be accompanied by a change of water volume in the system. (The only ways to change the water volume in the tank is to add water to the system, drain water out of the system, or let it expand/contract with changes in temperature.)
- Since water is incompressible, pump operation cannot increase or decrease system water volume. (Simply turning on the pump does not change the water volume in the system.)

Therefore:

- Pump operation cannot change tank pressure!
- Since tank pressures cannot change due to pump operation; the junction of the compression tank with the system must be a point of no pressure change regardless of whether or not the pump operates!

If you have any hydronic system questions or problems, contact your local Bell & Gossett representative or "Ask Red" on our web site at www.bellgossett.com.