

Appendix J

Circulator Placement Options

In any hydronic system, the location of the circulator can dramatically impact the operation. Proper circulator location relative to the expansion tank is most critical in commercial applications, but can also impact residential jobs.

Most residential boilers come packaged with the circulator piped on the “return,” pumping into the boiler as shown in **Figure J-1**. Although manufacturers package the boilers to make shipping easier and less expensive, there are no performance advantages to locating the circulator on the return. **Figure J-2** shows the circulator located on the supply, pumping away from the expansion tank. This circulator location promotes a quiet and reliable system operation, eliminates potential air problems and can extend circulator life because of the circulator’s location in relation to the system’s “point of no pressure change.”

The point of no pressure change is where the expansion tank connects to the system piping in a closed-loop hydronic system. It’s the one place in the heating system where the circulator cannot change the system’s pressure. When a system is first filled, water is added to the system until the desired pressure, usually 12 psi, is reached. This pressure comes from the air cushion in the expansion tank pushing against the water.

Since air is compressible and water is not, the only way to change the system pressure at that point is to either add or remove water from the expansion tank. Because the system is completely filled

with a fixed amount of water, the circulator cannot add or remove water from the expansion tank, and therefore cannot alter system pressure at that point. The two ways to change system pressure are to add more water through the fill valve or heat the water, causing it to expand. The circulator can do neither of these.

Part of a circulator’s job is to create pressure differential to help overcome the friction, or “head loss” in a system. When placed on the supply, pumping away from the expansion tank, the circulator can add its pressure differential to a system. Water under higher pressure is better able to absorb air bubbles, promoting even flow and quiet operation, and preventing possible cavitation of the circulator.

When placed on the return, pumping into the expansion tank, a circulator cannot add its pressure differential to a system because of its position relative to the point of no pressure change. Therefore, to create flow, the circulator would show its pressure differential as a negative on its suction side, dropping system pressure. As a result, the system water will be less able to hold air bubbles in solution, creating gurgling sounds and uneven flow. In addition, the circulator will labor and cavitation is likely, shortening the circulator’s life.

So where should the circulator be located? Commercially, **Figure J-2** is the preferred piping arrangement. Residentially, **Figure J-1** is generally acceptable, especially if the boiler circulator comes prepackaged with the boiler from the manufacturer.

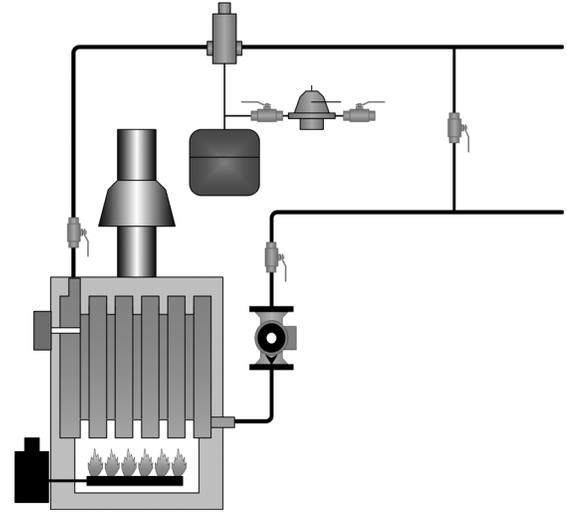


Figure J-1

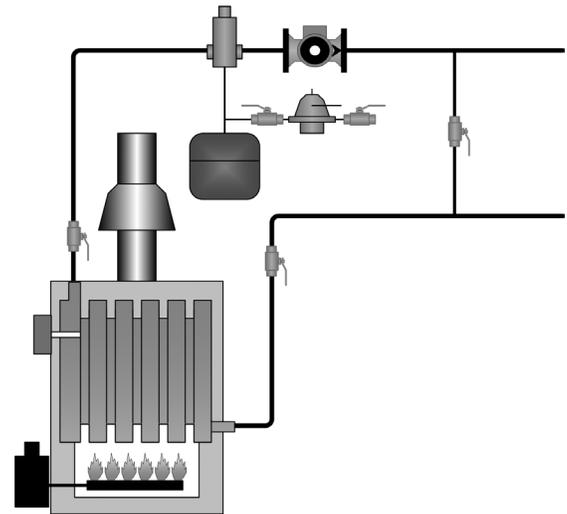


Figure J-2

However, if some of the symptoms previously described occur, shifting the circulator to the supply as shown in **Figure J-2** may solve the problem.

