

Monday, September 3, 2018

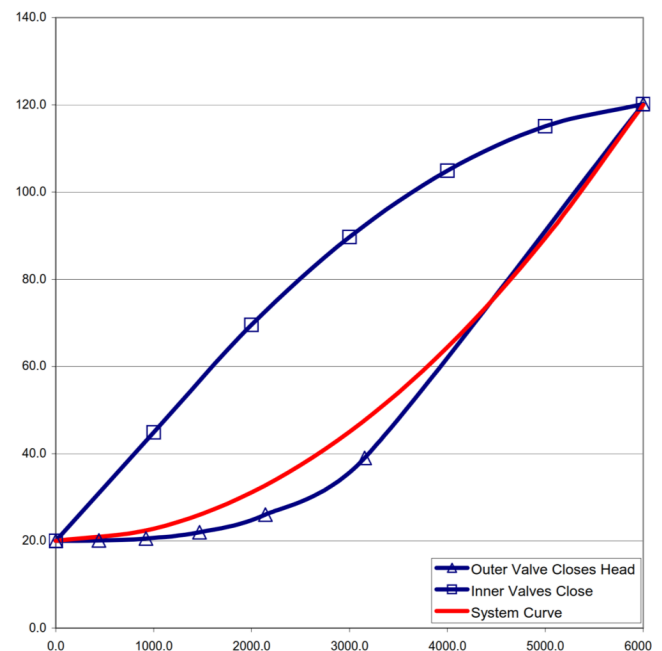
Variable Speed Pump Control & Automatic Balance Valves (Part 4)

Monday Morning Minutes | by Norm Hall, September 3, 2018

A few weeks ago in the R. L. Deppmann Monday Morning Minutes (MMM) [part 3 of this series](#), we showed that direct return systems with a lot of diversity will miss the required flow rate by a large amount when traditional manual balance valves are used. Today, we look at how automatic flow limiting valves can solve this problem.

NOTE: It is recommended that you read the [Variable Speed Pump Area Control & System Diversity \(Part 3\)](#) article before reading this one.

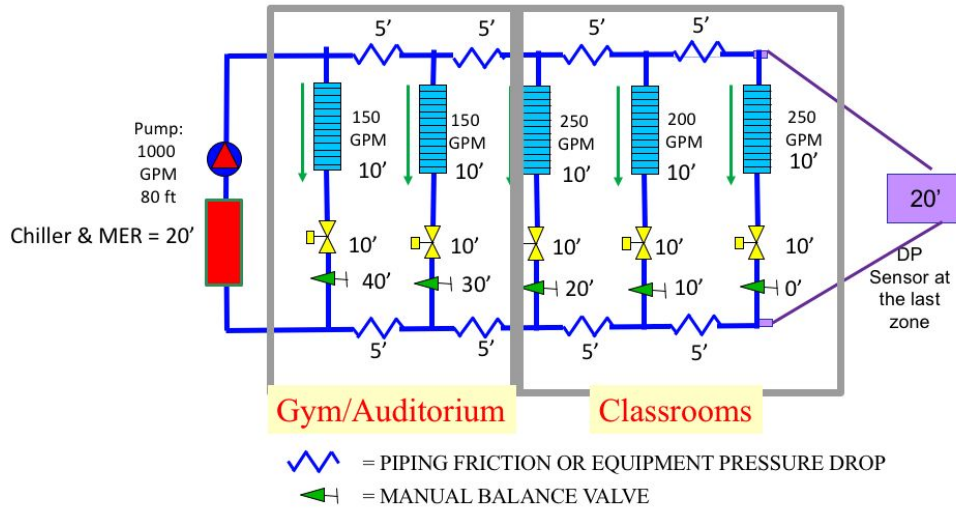
Last week, [the MMM](#) reviewed how automatic balance valves operate and their advantages. Let's look at the high school hydronic system example and the use of automatic balance valves.



Example System with Diversity and Control Area vs. Control Curve

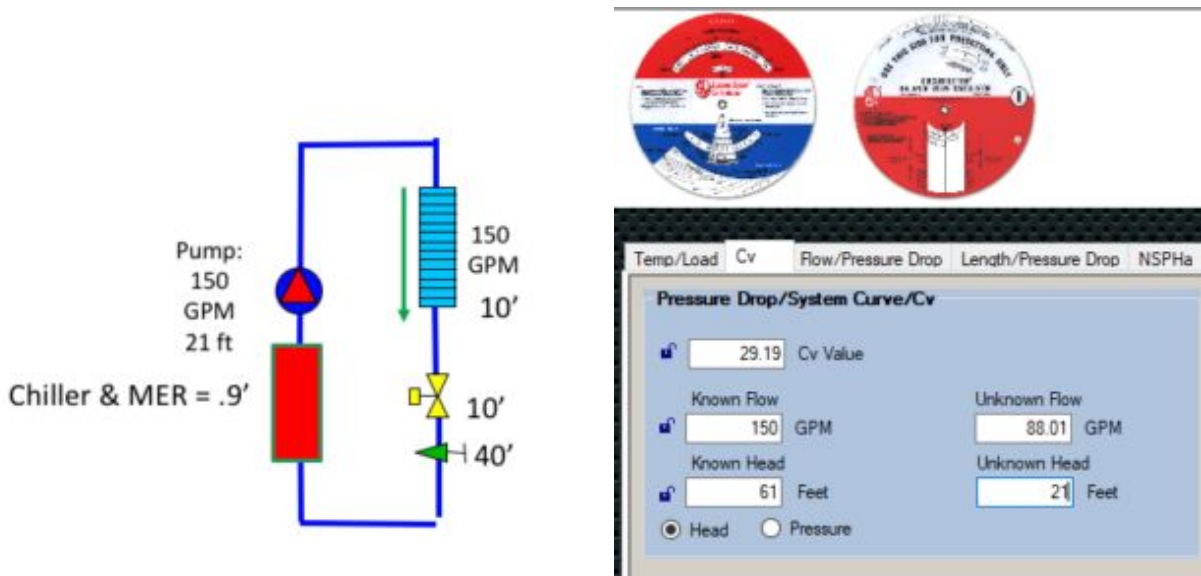
EXAMPLE: Fictional High School in Grand Rapids, Michigan. Total chilled water capacity of 1000 GPM. Primary variable pumping system. The pumping system has one operating variable speed pump with a 100% standby. The capacity of the pump is 1000 GPM at 80 feet at design.

Example System: High School Design Load

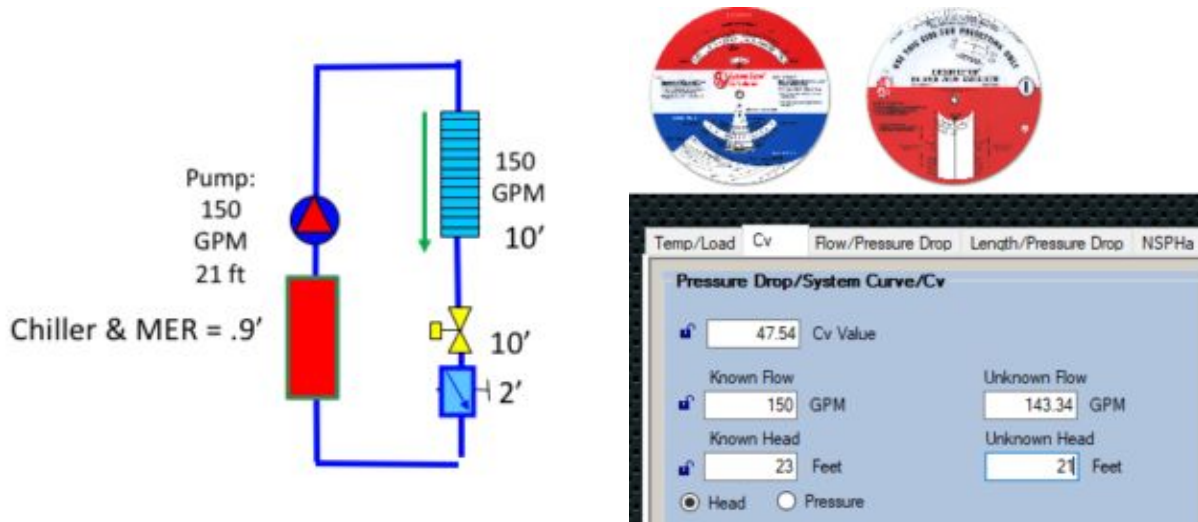


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Let's look at the first zone with manual balance valves and then with automatic balance valves.



If the first zone is calling for 100% design flow rate and everything else is at "0" flow rate, the pump will be operating at 21'; yet the zone requires 60 feet. The pump will only flow 88 GPM to the first zone. We can't get past the 40' pressure drop at 150 GPM with manual balance valves.



With the automatic flow limiting valve, we see a different result. If there are only 21 feet available due to pump speed control, the automatic valve will react and start to open. It will become fully open in this example. Now we require 23' to get 150 GPM. We see from the system syzer that we will achieve 143 GPM which is well within a 10% flow tolerance.

Key Takeaways for Hydronic Design with Diversity

What is the takeaway? What choices should I make in hydronic systems? The first takeaway is that the variable speed pump control choice should be made after determining the diversity of the system.

If the system has little diversity, such as an area of offices on a single floor, your choice of pump speed control can be either curve control (sensor-less) or area control (traditional DP sensor).

If the system has a lot of diversity, your choice of pump speed control should be area control (traditional DP sensor).

Another takeaway is that the diversity of the system will also have an effect on your choice of balance. One size does not fit all.

If there is a large diversity in the system and your choice of piping is direct return, automatic flow limiting valves should be your balancing choice.

R. L. Deppmann is the representative for Bell & Gossett and Griswold automatic flow limiting balance valves in Northern Ohio and Michigan. We stand ready to review these suggestions, your details, and specifications to assist you with clarity and alignment on your projects.