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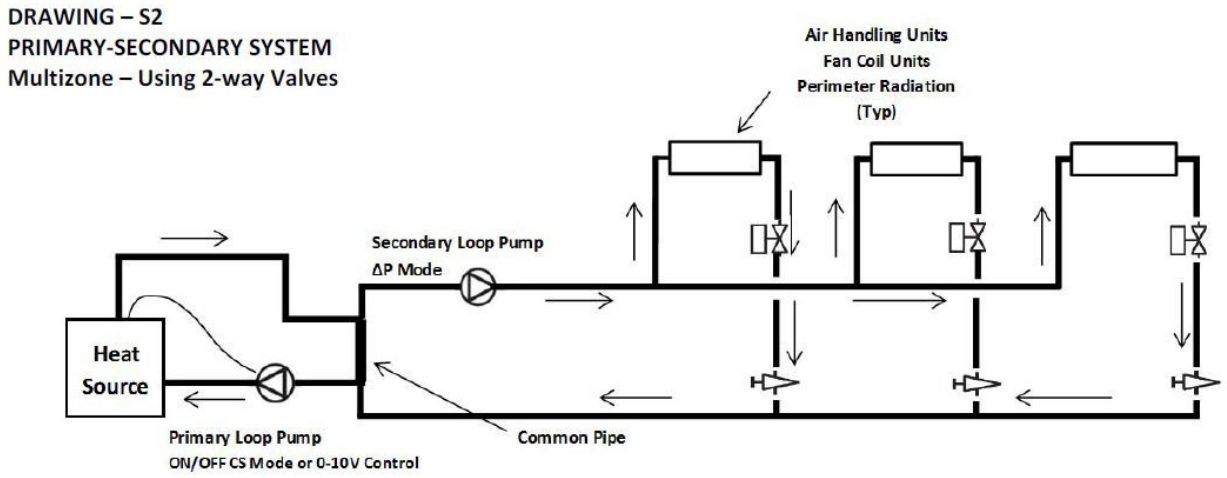
Using HCM Smart Pumps in Secondary Hydronic Systems

Monday Morning Minutes | by Norm Hall, November 20, 2017

This week the R.L. Deppmann Monday Morning Minutes continues to look at the application of ECM High-Efficiency Smart Circulator Pumps applied to the secondary loop of a variable speed primary-secondary hydronic heating or cooling system.

A primary-secondary system has a primary pump or pumps circulating the heat/cool source, and a secondary pump or pumps circulating the terminal units and distribution piping. The most important part of this hydronic piping system is the common pipe, which separates the two pumping systems and is characterized by a very low pressure drop in relation to the pressure drop in either circuit. Gil Carlson, a long time B&G engineer and contributor to ASHRAE, wrote a great technical manual on these systems. If you need more information look at our Selection and Design Tools under the System design portion of our website.

Today, we normally design the terminal units with two way control valves to reduce the energy usage. As the two way valves start to throttle, a constant flow secondary pump will move back on its curve toward 0 GPM. The pump head will rise up as the pump “rides the curve”. Since the system flow rate is less than the design flow rate, the expectation in most systems is that we can reduce the head of the pump as the flow reduces.



We often put a variable speed drive on the secondary pump to reduce the energy, by reducing the speed and the pump head as the demand drops. What about smaller systems where the cost of the drive and controls including mounting and wiring may be cost prohibitive? What about existing systems where the proper location of a differential pressure sensor may be unknown? What if we want to "save the planet" or at least save money on the monthly utility bill?

Using B&G Ecocirc-XL ECM Smart Circulator Pumps in Secondary Hydronic Systems

The Ecocirc-XL ECM smart pump has a built-in variable speed technology and the brains to control it properly. I described the operation in an earlier R. L. Deppmann Monday Morning Minutes.

This primary secondary application uses the B&G Ecocirc-XL in a sensorless variable speed application. The ECM Ecocirc-XL has a proportional pressure (Δ P) mode, which will sense the kilowatt (KW) usage as well as the speed of the pump and reduce the speed as the two-way valves start to close. The pump will slow down by following a straight line from a point at the design flow, and head down to a point at ½ of the design head at 0 GPM.

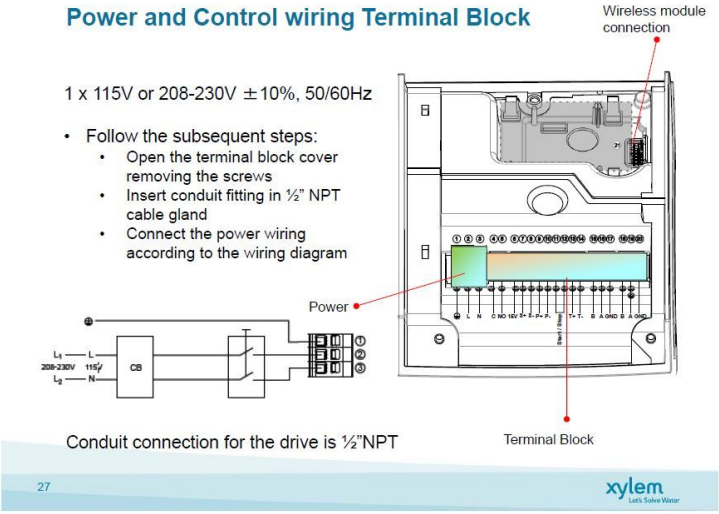
This ECM Smart pump will sense the reduction in flow and drop the power usage. The example I used in the last R. L. Deppmann Monday Morning Minutes showed an example of saving over 50% of the energy using this technology.

If you want to use this type of inline pump technology in your smaller systems, the following will help you.

ECM Smart Hydronic Circulator Pump Specification & Sequence of Operation

A specification example is located on the Xylem Bell & Gossett website for the Ecocirc-XL.

The sequence of operation is as follows:



Secondary Heating/Cooling Pump *(insert tag)* shall be enabled by a call for heat/cool through *(manual on/off switch)* or *(enabling the start/stop contacts 11-1 through a remote relay)*. The internal pump controls shall monitor changes in flow rate and continually adjust the speed. If the flow drops to zero, the internal pump controls will protect the pump from damage. No external bypass or three-way control valves are needed unless shown in the drawings. If a standby pump is shown, the internal pump control shall automatically alternate the pumps and should enable the standby pump if the lead pump fails.

Fault indication will be shown on the pump and may enable an analog input BMS fault indicator throughout terminals 4-5, if shown in documents.

Next week the R. L. Deppmann Monday Morning Minutes will look at the use of ECM Smart Circulator Pumps as the primary pump.