YASKAWA

A World of Automation Solutions

Decoupler Systems using a hydraulically decoupled piping arrangement with parallel piped chillers eliminates the control difficulties caused by the variable relationship between chiller and system flow rates. Decoupled systems can easily accommodate the addition of variable speed distribution pumps.

A Yaskawa ac drive is shown to accomplish cooling tower fan flow modulation in response to changing system load, significantly reducing energy required compared to constant flow applications. The drive is controlled by a differential pressure transmitter or sensor and controller connected across one of the cooling loads about 2/3 of the distance to the end of the distribution system. The drive accepts an analog signal from the controller and adjusts pump speed to maintain the differential pressure set point. If a drive with PID control function is used, the set point can be programmed directly into the drive.

As shown in Figure 1, a supply/demand relationship exists at the tee connecting the supply and bypass lines. Whenever supply and demand flows are unequal, water will flow into, or out of, the bypass line.

If demand exceeds supply, for example, water will flow out of the bypass line into the distribution side of the supply line. When the control system senses this change, it will energize the next pump/chiller pair.

Flow through the bypass line will reverse when supply exceeds demand. In this instance, however, a specific amount of surplus flow must exist before a pump/chiller pair is de-energized. That is, the amount of surplus flow through the bypass line must exceed the flow through the next chiller to be shut down.

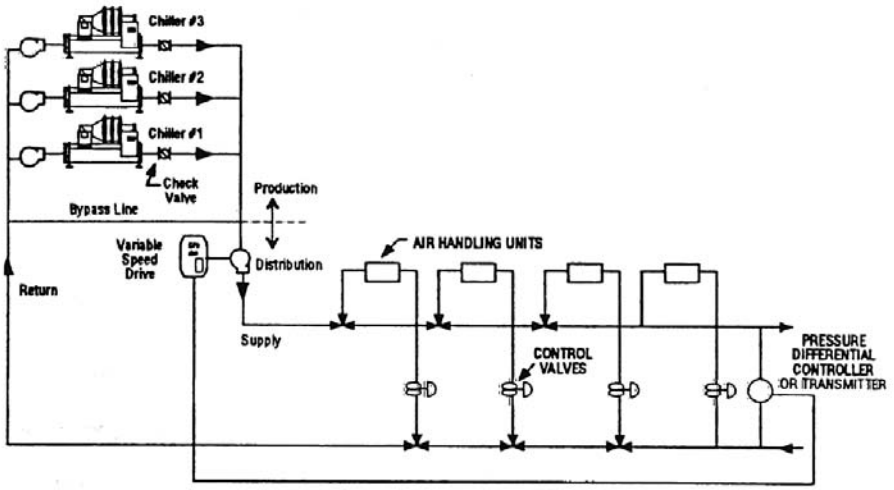

Figure 1.

Because control of the number of chillers operating at any one time is accomplished simply by noting the direction and amount of flow through the bypass line, decoupled systems can greatly simplify control of large chiller plants. In addition, decoupled system staging of pump/chiller pairs and distribution pump modulation provide an energy-efficient sequence of operation.

Application Considerations

- System requires a pump and check valve(s) for each chiller plus a separate distribution pump and drive.
- An additional piping loop, the bypass line, must be installed in the chilled water system.