

## Sales Application Note

# Chilled Water Systems

### APPLICATION

In centrally located cooling systems, chilled water is the way used to extract the heat from the building coils to the refrigeration system. This water is sent to the air conditioning load at a cold temperature, and returns to the chiller system from 5 to 10°C hotter. This temperature differential is the key parameter of the installation, and all the system equipment will be designed according to this parameter.



Among all the pumping schematics, direct primary variable flow pumps using VSD's provides very important advantages in keeping the temperature differential (or delta T) constant independently of the load and in energy savings.

### APPLICATION REQUIREMENTS

Basic control strategy is based on a PID control of a differential pressure at the very end of water pipe. A fast and accurate control to maintain delta T constant regardless of water flow demand is required. Some chillers have minimum flow requirements. Therefore, minimum speed for pumps selectable in inverter might be also needed. Additional requirements may lead to a limited water flow variation (restrictions coming from chiller construction).

### FUJI ELECTRIC SOLUTION

Fuji Electric solution is based on FRENIC-HVAC inverter, using the inverter built-in PID control. Pressure transducer is connected to current analog input (0 to 20mA or 4 to 20mA selectable).



## ADVANTAGES OF FUJI ELECTRIC SOLUTION

- Powerful PID control built in the inverter (1 main PID, 2 gains set and 3 auxiliary PID).
- Customizable logic built in FRENIC-HVAC inverter allows to make analog calculations, avoiding extra costs in differential pressure sensors, unit conversion, limiting water flow change rate, etc.
- DC Reactor and EMC filter built-in up to 90kW (C2 supported, 2<sup>nd</sup> environment supported), EMC filter built-in 110kW to 710kW (C3 supported, 2<sup>nd</sup> environment).
- Protective structure IP21 or IP55 can be selected with the model up to 90kW.
- Real time clock built in the inverter (using optional battery) to adapt the system behavior to different working conditions depending on shifts or holidays (up to 30 holiday dates selectable, summer time adapted).
- Linearization function can be used to estimate and compensate the pressure losses in long pipes, avoiding the use of long cables for pressure transducer feedback and leading to energy savings through avoiding pressure set-point overestimation.

