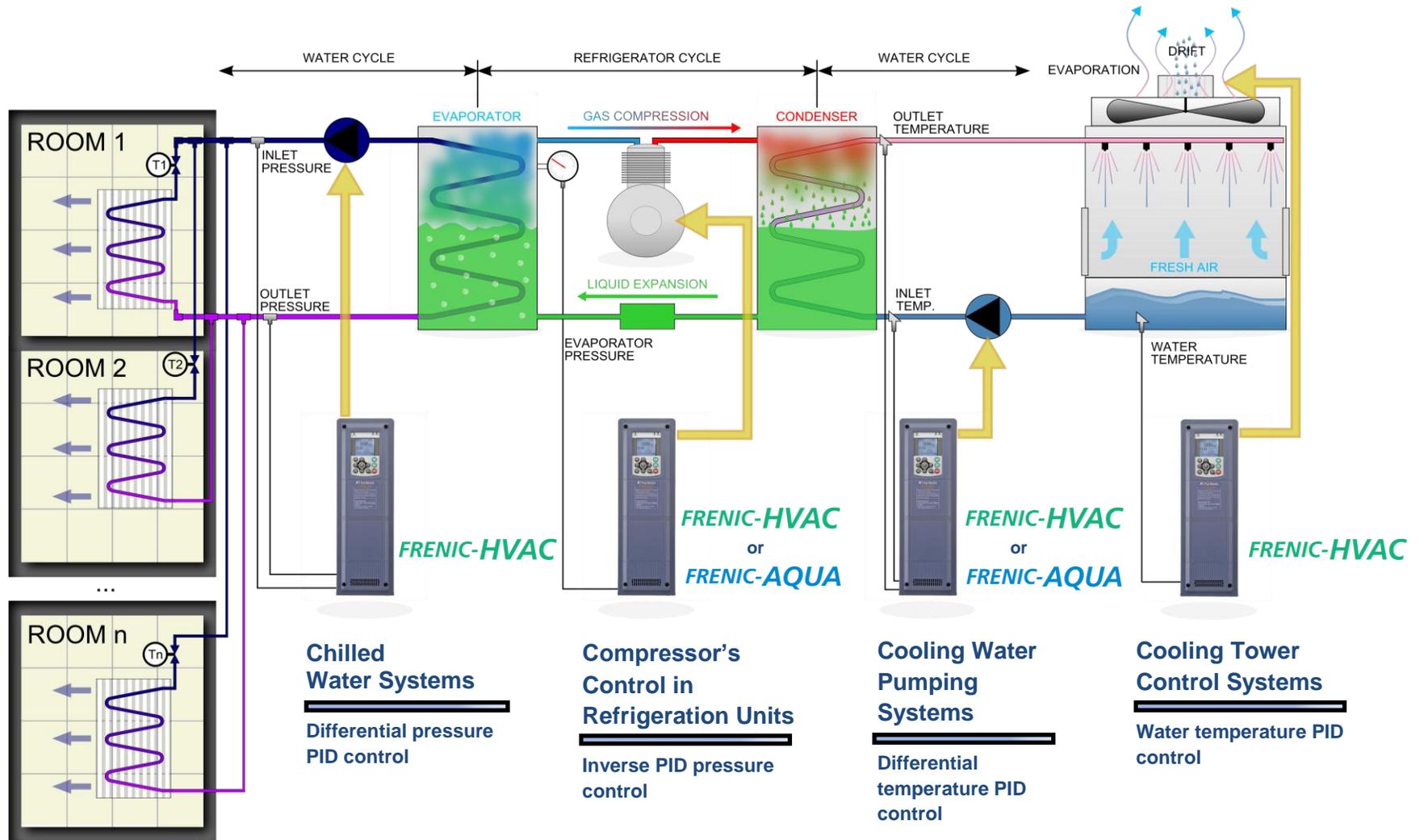


Sales Application Note

Cooling Systems' Summary



FUJI ELECTRIC INVERTERS IN HVAC APPLICATIONS:

Chilled Water Systems

The heat from the air conditioning load is sent to the chiller unit by means of a water system. Cold water is sent to the building (Room1, Room2, Room3 etc..) and will return to the evaporator with the temperature some degrees hotter. This temperature rise is normally known as “delta T” and it’s a key parameter of the installation. Basic control strategy is a PID control of a differential pressure at the end of the water pipes (very long in some applications).

Fuji Electric solution is based on FRENIC-HVAC using built-in complete PID functionalities. The advantages of this solution are a powerful set of PID control functions, customizable logic for the analog signals and linearization function for compensating pressure losses for long pipes.

Compressor’s Control in Refrigeration Units

Gas compression is one of the steps in the refrigeration cycle. It extracts the vapor from the evaporator and increases its pressure and temperature for sending it to the condenser. Basic control strategy is an inverse PID on the evaporator’s pressure. It’s very important for the application to keep this value constant, because it has an influence in key parameters such as the boiling temperature of the refrigerator.

Fuji Electric solution is based on FRENIC-HVAC (single compressor units) or FRENIC-AQUA (multiple compressor units) using their powerful set of PID functionalities for keeping the pressure constant, providing automatic energy saving function, up to 3 jump frequencies and start-up timer, among other useful functions for cold compressors.

Cooling Water Pumping Systems

Cooling water pumps take the cold water from the cooling tower and send it to the condenser from the cooling tower. This is the mean to liquefy the refrigerator gas in the condenser. Basic control strategy is to adapt water flow for keeping the condenser inlet – outlet temperature difference constant.

Fuji Electric solution is based on FRENIC-HVAC (single pump units) or FRENIC-AQUA (multiple pumps units) using the built-in PID in inverse mode. These inverters provide direct connection of temperature sensors (OPC –PT optional card, 2 channels for JPt100, Pt100, Ni100, Pt1000 or Ni1000 sensors). Additionally, mathematical operations of these analog input values can be carried in the inverter, thus avoiding the use of external control equipment. Mutual operation is available with FRENIC-AQUA inverter.

Cooling Tower Control Systems

Cooling towers take a hot liquid (normally water) and cool it down by evaporating a part of this liquid into the surrounding air. Forced air cooling towers increase cooling capacity by installing a fan; this fan increases air flow and as a consequence evaporation also increases. Speed of the fan will be adapted (varying evaporation) to keep the cool water temperature constant.

Speed of the fan will be adapted (varying evaporation) to keep the cool water temperature constant. Fuji Electric solution is based in FRENIC-HVAC inverter for controlling the fan speed with its complete PID control set of functions. Wet bulb temperature estimation function allows the inverter to decrease energy consumption; it is possible to reduce fan speed when no more water evaporation is possible due to surrounding air condition.