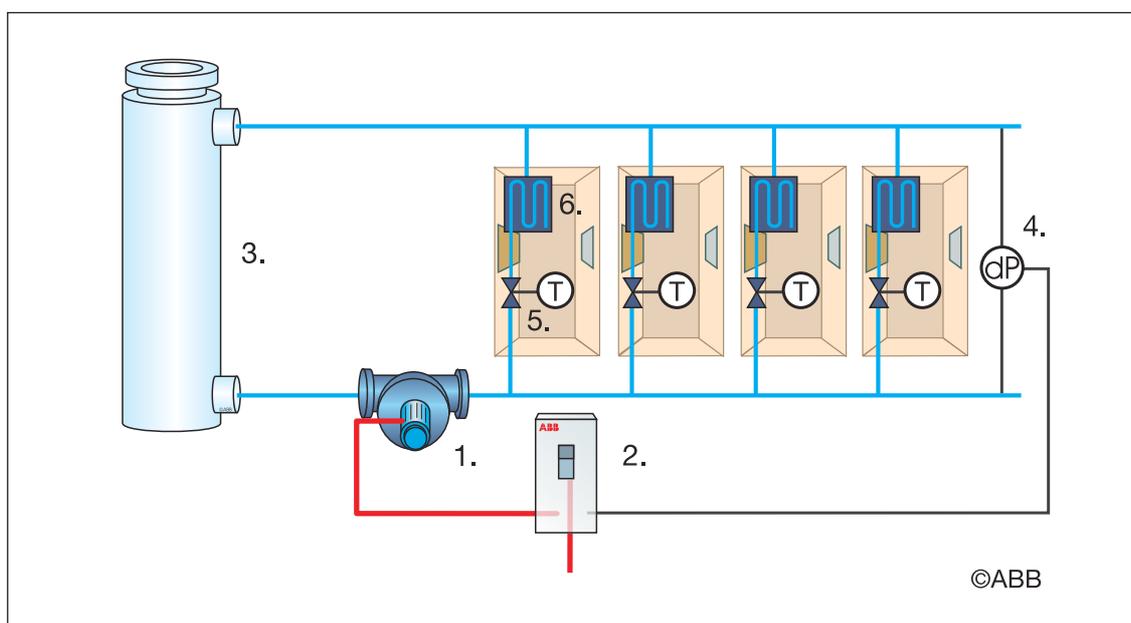


## Variable flow chilled water system



Chilled water system with variable speed drives.

### Application principle

Chilled water supply temperatures typically range from 5 - 10°C and the return water temperature is 5 - 10°C higher. This temperature increase - resulting from the air conditioning load - is the key parameter for the variable flow system, also called delta T. Once the delta T is selected, all equipment must be designed to operate within that range. This means the chillers, air handling unit coils, and the control valves.

Chilled water plants are generally one of two types: variable flow or constant flow. To reduce installation and operation costs, it is best to vary the chilled water flow throughout the building. Doing this allows the delta T to remain constant also during partial load conditions. The main circulating pump must be a variable flow pump. Multiple pumps can be staged on, but variable speed AC drives are more commonly used.

### Detailed description

This system for the space cooling of several rooms has chilled water circulating through an air terminal device (6.) and thermostat controlled valve (5.) in each room. The return water is circulated by a chiller water pump (1.) through the chiller evaporator (3.). The water temperature is reduced by 5 to 10°C in the evaporator and it is then supplied back to the rooms. The variable water circulation is achieved by the AC drive (2.), and the control parameter is the differential water pressure in the most distant room in order to keep the pressure high enough for the thermostat valves. The differential pressure is measured by the transmitter (4.).



### Performance in creating Comfort Zone

The use of variable speed AC drives improves the controllability of the whole chilled water system, making it easy to maintain the Comfort Zone.

The use of variable speed drives usually increases the initial investment costs, but the electrical energy savings for the motors and VSDs alone mean that an investment in VSD has a pay-back time of 0.2 - 3 years.

In addition to savings in electrical energy VSDs provide several important customer benefits:

- Fast control for maintaining comfort zone conditions.
- Accurate control to keep the desired air quality.
- Elimination of water hammer or hydraulic shock due to soft starting and stopping.
- Reduced consumption of electrical energy.
- Only one set of pumps is needed.



A chiller unit (One America Plaza, San Diego, CA, USA).



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