APPLICATION NOTE: Insertion Mag Meter Ensures Proper Flow to Critical Chiller

A chiller's primary function is to move heat from one location (usually process equipment) to another place (usually outside the manufacturing facility). Typically air, water or a water/glycol solution is used to transfer the heat to and from the chiller.

Industrial chillers are used to control the temperature of water going to a wide variety of equipment and processes. Water-cooled chillers are a popular choice for large facilities because of their compact size, high efficiency, long life expectancy and quiet operation.

Basic Operation and Components

A water-cooled chiller's basic operation includes a pumping system to circulate cool water or a water/glycol solution from the chiller to the process. The fluid removes heat from the process and the warm fluid returns to the chiller. The process water is the means by which heat transfers from the process to the chiller. The main chiller components are the compressor, condenser, evaporator and expansion valve.

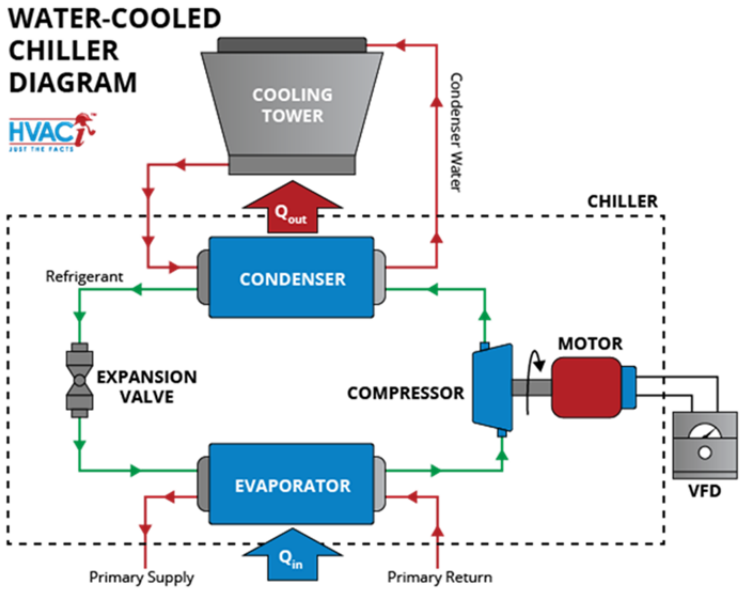

Diagram showing the main chiller components

HIGHLIGHTS

Industry: Pharmaceutical
Service: Flow Rate/Total
Fluid: Water

Application

Monitor flow of water to condenser of critical chiller system

Problem

- Expanding production facility needs to ensure proper cooling without the ability to shut down the process
- Need an accurate, low-maintenance flow measurement solution
- Additional monitoring for predictive maintenance, detect leaks and poor pump performance

Solution

- FTI EL 1222 Insertion Electromagnetic Flow Meter
- MC 608A/B Magnetic Flow Transmitter

The evaporator, located between the expansion valve and the compressor, is a heat exchanger that removes the building heat from the chilled water, lowering the water temperature in the process. In the evaporator, heat from the process water or water/glycol solution boils the refrigerant, which changes it from a low-pressure liquid to a low-pressure gas. The low-pressure gas is then sent to the compressor.

The compressor creates a pressure difference to move the refrigerant around the system. The compressor is located between the evaporator and the condenser. The refrigeration cycle begins with the compressor, which takes low-pressure, low-temperature refrigerant in gas form and compresses it into a high-pressure high-temperature gas.

The condenser is located after the compressor and before the expansion valve. Its purpose is to remove heat from the refrigerant. Water-cooled condensers will repetitively cycle “condenser water” between the cooling tower and the condenser; the hot refrigerant which enters the condenser from the compressor, will transfer its heat into this water which is transported up to the cooling tower and rejected from the building. After giving off its heat, the refrigerant condenses down into a high-pressure liquid and returns to the evaporator or goes to the process.

The expansion valve is located between the condenser and the evaporator. Its purpose is to expand the refrigerant, reducing its pressure and increasing its volume which will allow it to pick up the unwanted heat in the evaporator. The high-pressure liquid travels to the expansion valve, which controls how much liquid refrigerant enters the evaporator, thereby beginning the refrigeration cycle again.

Customer Application and Solution

A pharmaceutical manufacturer producing various vaccines needed to upgrade the monitoring and efficiency of a critical chiller system. Measuring the flow of water to the condenser ensures that proper flow rates are maintained. If the flow rate is too low, the heat transfer will be less efficient and may not provide adequate cooling to maintain proper process temperature. The additional monitoring also allows for predictive maintenance to detect leaks and poor pump performance. Additional flow meters will be added near critical points of the process to ensure proper cooling is sustained.

FTI Flow Technology’s EL 1222 insertion electromagnetic flow meter and MC608A/B magnetic flow transmitter were selected for its low maintenance design and due to its hot tap installation that allowed installation without taking the service down. The customer is utilizing the flow transmitter’s local rate display for easy visual spot checks by employees. They are also using 4-20mA output to provide feedback to the PLC and adjust pump speed as needed.

FTI Flow Technology, Inc.
8930 S. Beck Ave., Suite 107, Tempe, AZ, 85284 USA
Tel: (480) 240-3400 • Fax: (480) 240-3401
ftimarket@ftimeters.com • www.ftimeters.com