Pressure Transducer Usage for Controlling the Superheat for Industrial Air Conditioning in HVAC and Refrigeration

Controlling the Superheat Applications for Pressure Transducers

Controlling the Superheat

Industrial air conditioning units are responsible for supplying comfortable environments to industrial facilities where efficiency and performance count. Air conditioner control must extend to complex, multi-zone environments with variable humidity and temperature preference. Typical compressor driven industrial air conditioning units make use of the refrigeration cycle. The refrigeration cycle consists of an evaporator, a compressor, a condenser, an expansion valve and system monitoring devices like temperature and pressure transducers. The refrigeration cycle is as follows:

1. Cool, Low pressure gaseous refrigerant enters the compressor
2. Hot, high pressure gaseous refrigerant leaves the compressor and enters the condenser
3. Hot, high pressure gaseous refrigerant in the condenser releases heat to the outside environment
4. Hot, high pressure liquid refrigerant leaves the condenser coil and enters the expansion valve
5. Expansion valve reduces pressure and temperature of the liquid refrigerant
6. Cold, low pressure liquid refrigerant absorbs heat from inside to cool the inside environment
7. Refrigerant leaves the condenser as a cool, low pressure gas and the cycle repeats itself

As efficiency and energy conservation gain importance in today’s society, controlling the superheat of refrigeration cycles has emerged as a simple method to greatly increase the efficiency of air conditioning units. Superheat in the HVAC industry is defined as the difference in temperature between the boiling temperature of the refrigerant and the actual temperature of the refrigerant as it leaves the evaporator coil.

![Figure 1: Typical refrigeration cycle for commercial air conditioning applications](image-url)
The goal to controlling the superheat is to minimize it. This can be done through pressure measurement and temperature measurement using electronic temperature and pressure transducers at the evaporator coil outlet and the compressor inlet.

Pressure measurement and temperature measurement can give specific insight into how to modify the flow rate of refrigerant used to maximize the efficiency of the air conditioning unit. When more, faster cooling is required, automated processes can increase refrigerant flow rate. As less cooling is required, automated processes can decrease the refrigerant flow rate. The automated processes are dependent on accurate, dependable temperature and pressure transducers.

**Pressure Transducer Application for Controlling the Superheat in Industrial Air Conditioning Applications**

Pressure Transducers are used for Controlling the Superheat in HVAC and Refrigeration in the following Industrial Air Conditioning Applications

- Evaporator Coil Outlet Pressure
- Compressor Inlet Pressure
- Evaporator Coil Outlet Temperature (with WIKA Tronic Temperature products)
- Compressor Inlet Temperature (with WIKA Tronic Temperature products)
- Expansion Valve Flow Rate Monitoring

Controlling the superheat in industrial air conditioning applications calls for pressure transducer compatibility with refrigerants and wide pressure ranges. Pressure transducers are responsible for providing pressure information about the evaporator outlet and the compressor inlet to minimize air conditioning superheat and maximize air conditioner efficiency, as well as monitor and regulate the flow rate of refrigerant through the expansion valve. The WIKA R-1 and AC-1 electronic pressure transducers have been designed for performance, reliability and compatibility with all common refrigerants in HVAC and Refrigeration Industrial Air Conditioning applications like controlling the superheat.

**Pressure Transmitter Selection Considerations**

- High accuracy
- High repeatability
- Compatibility with refrigerants
- Condensation proof