

Application Note

PX2 Series and PX3 Series Heavy Duty Pressure Transducers for Potential Use in Industrial Refrigeration

Background

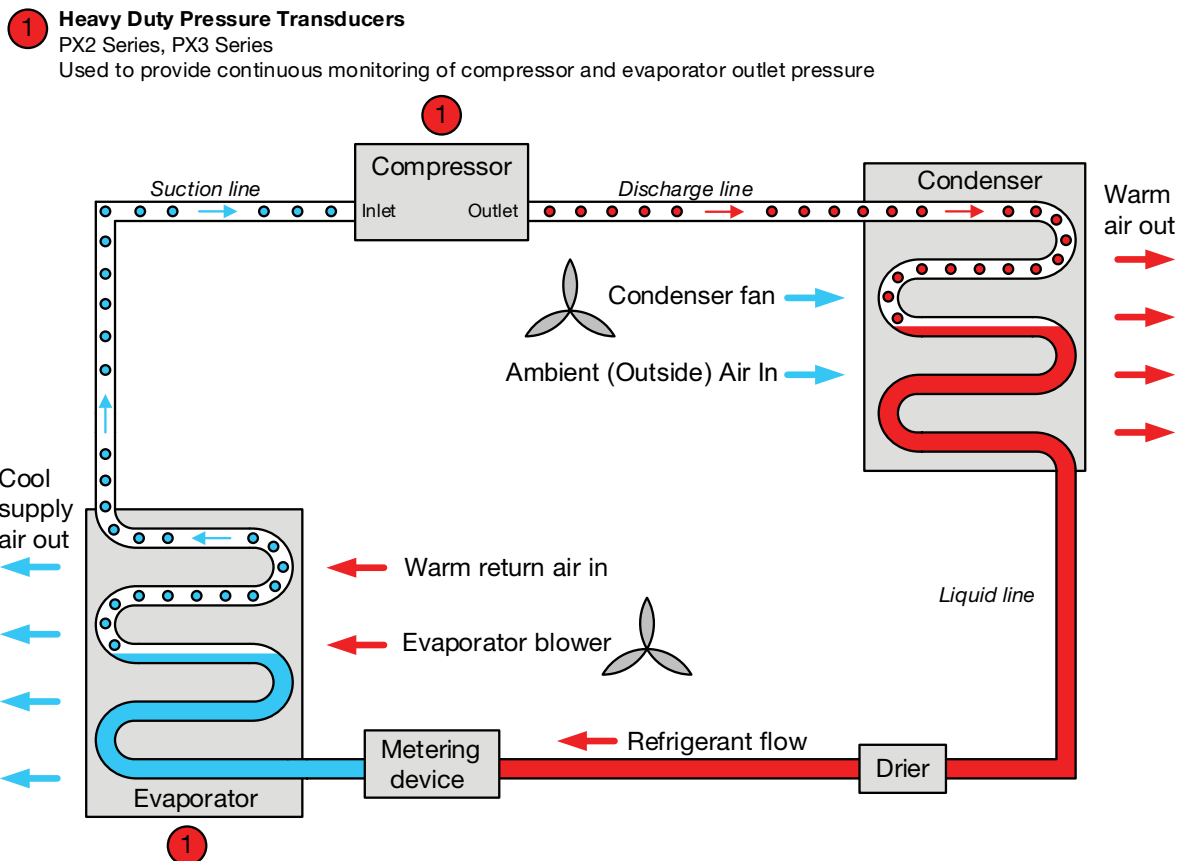
There are four basic components in the HVAC/R cycle used by an industrial refrigeration unit (see Figures 1 and 2):

1. **Compressor:** Cool low pressure vapor full of latent heat from the evaporator is compressed and pumped to the condenser.
2. **Condenser:** Hot high pressure vapor from the compressor releases its latent heat to the ambient air and is condensed to a hot liquid.
3. **Metering device:** Hot liquid from the condenser is forced through a flow restriction to reduce the pressure and change the hot liquid to a cold liquid.
4. **Evaporator:** Takes the cold liquid from the metering device and absorbs latent heat from the return air and changes to a cool gas.

Figure 1. Industrial Refrigeration Unit



Figure 2. Industrial Refrigeration Unit



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The refrigeration cycle works because as the refrigerant changes from one state to another there is a large release or absorption of latent energy. By controlling the pressure of the refrigerant, the temperature of the state change can be controlled. At low pressure, the refrigerant will change from a liquid to a gas and absorb latent heat energy at a lower temperature. At high pressure, the refrigerant gas can change from a gas to a liquid at higher temperatures releasing latent energy.

Due to the high cost of energy refrigeration, systems need to be efficient. Controlling the high side and low side pressure to match refrigeration needs will increase system efficiency and help to reduce energy costs.

Solution

Honeywell's PX2 and PX3 Series are designed to provide continuous monitoring of compressor outlet pressure and evaporator outlet pressure to help control the flow of refrigerant during partial load conditions (see Figure 3).

Table 1: PX2 Series and PX3 Series General Comparison

Characteristic	 PX2 Series	 PX3 Series
Operating, compensated, and storage temp. range	-40 °C to 125 °C [-40 °F to 257 °F]	
Total Error Band	• ± 2 %FSS: -40 °C to 125 °C [-40 °F to 257 °F]	• ± 1.0 %FSS: -20 °C to 85 °C [-4 °F to 185 °F] • ± 2.0 %FSS: <-20 °C, >85 °C [<-4 °F, >185 °F]
Pressure range	• 1 bar to 70 bar • 15 psi to 1000 psi • 100 kPa to 7 MPa	• 1 bar to 46 bar • 15 psi to 667 psi
Pressure reference	• absolute • sealed gage • vented gage	• absolute • sealed gage
Port material	stainless steel 304	brass C36000 (Pb content: 3.7% max.)
Output transfer function	• ratiometric: 5.0 V: 10 %Vs to 90 %Vs, 5 %Vs to 95 %Vs 3.3 V: 10 %Vs to 90 %Vs, 5 %Vs to 95 %Vs • regulated: 1 Vdc to 6 Vdc, 0.25 Vdc to 10.25 Vdc, 0.5 Vdc to 4.5 Vdc, 1 Vdc to 5 Vdc • current: 4 mA to 20 mA	• ratiometric: 0.5 Vdc to 4.5 Vdc
EMC (Radiated Immunity)	100 V/m per ISO 11452-2	200 V/m per ISO 11452-2
Ingress protection	IP65, IP67, IP69K (depends on electrical connector type)	IP67
External freeze/thaw resistance	not specified	>6 cycles from -30 °C to 50 °C [-22 °F to 122 °F]
Media compatibility	• common HFC refrigerants (e.g. R410A) • low GWP refrigerants (e.g. R32, R1234ZE) • engine oil, brake fluid, hydraulic fluid • saline (1%), potable water	• common HFC refrigerants (e.g. R410A) • low GWP refrigerants (e.g. R32, R1234ZE) • engine oil, brake fluid, hydraulic fluid • saline (1%)

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