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

1. **Compressor**: Low pressure vapor full of latent heat from the evaporator is compressed and pumped to the condenser.
2. **Condenser**: Receives hot, high pressure vapor from the compressor and releases its latent heat to the ambient air. Refrigerant condenses 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.

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 helps to increase efficiency and reduce energy costs.

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 phase 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.

**FIGURE 1. MIP SERIES HEAVY DUTY, MEDIA-ISOLATED PRESSURE TRANSUCERS IN POTENTIAL HVAC/R APPLICATIONS**

- **Compressor**: Suction line, Inlet, Outlet, Discharge line
- **Condenser**: Warm air out, Condenser fan, Ambient (outside) air in
- **Evaporator**: Cool supply air out, Warm return air in, Evaporator blower
- **Metering device**: Refrigerant flow
- **Drier**: Liquid line
- **Heavy Duty, Media-Isolated Pressure Transducers**
  - **MIP Series**
  - Used to provide continuous monitoring of compressor and evaporator outlet pressure
**TABLE 1: MIP SERIES SPECIFICATIONS**

<table>
<thead>
<tr>
<th>CHARACTERISTIC</th>
<th>PARAMETER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating, compensated, and storage temperature range</td>
<td>-40°C to 125°C [-40°F to 257°F]</td>
</tr>
</tbody>
</table>
| Total Error Band | -40°C to 125°C [-40°F to 257°F]:  
  • ±1.0 %FSS (≤10 bar)  
  • ±0.75 %FSS (>10 bar) |
| Pressure range | • 1 bar to 60 bar  
  • 15 psi to 870 psi |
| Pressure reference | • absolute  
  • sealed gage |
| Pressure port material | stainless steel 304L |
| Output transfer function | ratiometric to 5 Vdc supply: 0.5 Vdc to 4.5 Vdc |
| EMC (radiated immunity) | 100 V/m (200 MHz to 2 GHz) per ISO 11452-2 |
| Ingress protection | IP67 (Metri-Pack 150) |
| External freeze/thaw resistance | >6 cycles from -30°C to 50°C [-22°F to 122°F] |
| Media compatibility | • Industrial:  
  - pumps: water, hydraulic fluids  
  - compressors: compressed air  
  - process: food, beverage, oil, gas, steam  
  • HVAC/R: refrigerants (butane, propane, ammonia, CO₂, R134A, R407C, R410A, R448A/Solstice® N40, R32 and R1234ze, R1234yf, glycol + water  
  • Transportation: gasoline, diesel fuel, engine oil, brake fluid, coolants, CNG  
  • Medical: O₂, N₂, CO₂, N₂O, air |

**SOLUTION**

Honeywell’s MIP Series transducers are designed to provide continuous monitoring of compressor outlet pressure and evaporator outlet pressure to help control the flow of refrigerant (see Table 1).

The MIP Series is designed to more effectively resist several cycles of freeze-thaw without frequent failure (see Figure 2 and Table 1).
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Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship during the applicable warranty period. Honeywell’s standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items that Honeywell, in its sole discretion, finds defective. The foregoing is buyer’s sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.

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