Product Lines - Commercial Refrigeration

- Pressure Controls
- Temperature Controls
- AKO Controls
- Defrost Timers
SUBJECTS WE WILL COVER IN THIS SESSION

- Refrigeration Overview
- Low Pressure Controls
- High Pressure Controls
- Dual Pressure Controls
AC  =  Alternating current voltage  
DI  =  Digital input  
FLA  =  Full load Amps for motors  
IP67  =  Enclosure rating for dust and water exposure  
LED  =  Light emitting diode  
LRA  =  Lock rotor Amps  
NTC  =  Negative temperature coefficient  
Pb1  =  Probe 1  
POS  =  Point of sale  
SPST  =  Single pole single throw  
SPDT  =  Single pole double throw  
TEV  =  Thermal expansion valve (electronic)  
USB  =  Universal serial bus
TECHNICAL TERMS AND DEFINITIONS

- **PSIG**  Pounds per square inch gauge
- **PSIA**  Pounds per square inch absolute
- **BTU**  British Thermal Unit
- **Conduction**  Flow of heat with solids
- **Convection**  Flow of heat with fluids (or gas)
- **Radiation**  Flow of heat with air (or space)
- **Superheat**  Heat added to a refrigerant in the evaporator just after it changes from *liquid to gas* up to the compressor
- **Sub Cooling**  The difference in temperature in the condenser just after it changes from *gas to liquid* up to the expansion device
- **TXV**  Thermal expansion valve
- **Evaporator**  Device used to turn liquid form of a chemical into gas form, typically by absorbing heat
- **Compressor**  Pump or mechanical device that increases pressure of gases
- **Condenser**  Device used to condense substance from gaseous to liquid state, typically by cooling it
TECHNICAL TERMS AND CONCEPTS

- **Refrigerant Thermodynamics** - The transfer of heat from a place where it’s not wanted to a place where it’s not objectionable.

- **Hot Gas Defrost System** – Hot refrigerant is pumped directly to the evaporator tubing. Defrost time is usually 5 to 10 minutes.

- **Rules of Heat**
  - Heat always moves from a warmer to a cooler surface
  - Heat always moves in three ways: conduction, convection, or radiation
  - When a refrigerant substance boils, it absorbs heat
  - When a refrigerant substance condenses, it rejects heat
WHY RANCO PRESSURE CONTROLS?

- Over 38 million Ranco® O controls produced since 1936
- Multiple pressure ranges for most refrigerant types
- Unique Lexan cover and captive set screw
- Offers Super Cap™ for vibration protection
- O Series can also be temperature controls
  - O10-1402 (Pressure Control)
  - O10-1409 (Temperature Control)
WHAT ARE THE DIFFERENCES BETWEEN AIR CONDITIONING AND COMMERCIAL REFRIGERATION?

- Scientific principals are same, however commercial refrigeration systems have:
  - 24/7 operation time
  - More defrost cycles
  - Higher load changes

- Energy conservation important on A/C systems
  - However, more critical on commercial refrigeration applications
REFRIGERATION SYSTEM

- Pressure Control
- Defrost Control
- Temperature Control
PRESSURE CONTROLS

- O Series
- G Series
- P Series for Oil Pressure
## Pressure Controls Selection Guide

<table>
<thead>
<tr>
<th>Flange Type</th>
<th>Switch Type</th>
<th>Control Type</th>
<th>Operating Range and Differential (See Table)</th>
<th>Connection Style (See Table)</th>
<th>Typical UL / CSA Ratings¹</th>
<th>Operating Range</th>
<th>Differential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto</td>
<td>SPST</td>
<td>O10</td>
<td>A, B, C, D, E</td>
<td></td>
<td>24 120 240</td>
<td>5 to 75 PSI</td>
<td>5 to 75 PSI</td>
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<tr>
<td></td>
<td></td>
<td>O11</td>
<td>A, B, F</td>
<td></td>
<td>24 144 144</td>
<td>10 to 90 PSI</td>
<td>10 to 90 PSI</td>
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<tr>
<td></td>
<td>Manual</td>
<td>O12</td>
<td>Low (L) High (H)</td>
<td>1, 2, 3</td>
<td>24 144 720</td>
<td>13 to 40 PSI</td>
<td>13 to 40 PSI</td>
</tr>
<tr>
<td>Auto</td>
<td>SPDT</td>
<td>O16</td>
<td>A, B, C, D, E</td>
<td></td>
<td>120 240 240</td>
<td>100 to 120 PSI</td>
<td>100 to 120 PSI</td>
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<tr>
<td>Manual</td>
<td></td>
<td></td>
<td>F</td>
<td></td>
<td>17 17 20</td>
<td>100 to 120 PSI</td>
<td>Fixed</td>
</tr>
<tr>
<td>Auto</td>
<td>DPST</td>
<td>O30</td>
<td>A, B, C, D, E</td>
<td></td>
<td>120 240 240</td>
<td>100 to 120 PSI</td>
<td>100 to 120 PSI</td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td>F</td>
<td></td>
<td>24 24 125</td>
<td>100 to 120 PSI</td>
<td>Fixed</td>
</tr>
<tr>
<td>Auto /</td>
<td>SPST or</td>
<td>G20, G22</td>
<td>K</td>
<td>1, 2, 3</td>
<td>120 / 240 / 240 / 240</td>
<td>100 to 120 PSI</td>
<td>100 to 120 PSI</td>
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<tr>
<td>Manual</td>
<td>SPDT</td>
<td></td>
<td>L</td>
<td></td>
<td>20 20 20 20 20 20 20</td>
<td>100 to 120 PSI</td>
<td>100 to 120 PSI</td>
</tr>
</tbody>
</table>

1. Capillary with 1/4" sweat tube (depth trip, optional)
2. Capillary with female flare nut (core depressor, optional)
3. Male flare
4. Female flare nut (core depressor, optional)
DUAL PRESSURE CONTROLS

- Combines high and low pressure limit control into one unit
- Low pressure cycles compressor depends on suction pressure
- High pressure controls high pressure shutdown
DUAL PRESSURE PARTS

- Common parts include O12-1549 and O12-4834
**CAPILLARY CONNECTION**

- Capillary tube connected directly into refrigeration line
- Male and female connections
COMMERCIAL REFRIGERATION SUPER CAP

- Super Cap® Capillary Protection System
- Provides 10 times more vibration protection
- Uses unique vibration-dampening cone
- Light weight copper alloy tubing
- Available on single and dual pressure controls
**P30 SERIES FOR LUBE OIL PROTECTION**

- Guards pressure-lubricated refrigeration compressors

<table>
<thead>
<tr>
<th>Part Numbers</th>
<th>Description</th>
<th>Pressure Connection Lube and Suction</th>
<th>Time Delay</th>
<th>Pressure Range</th>
<th>Electrical Rating</th>
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<tbody>
<tr>
<td>P30-3601</td>
<td>Lube Oil Protection Control</td>
<td>36&quot; Capillary with Flare Nut</td>
<td>60 seconds</td>
<td>8-60 PSI Adjustable</td>
<td>120V AC or 240V AC, Pilot Duty 720VA</td>
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<tr>
<td>P30-3701</td>
<td>Lube Oil Protection Control</td>
<td>36&quot; Capillary with Flare Nut</td>
<td>90 seconds</td>
<td>8-60 PSI Adjustable</td>
<td>120V AC or 240V AC, Pilot Duty 720VA</td>
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<tr>
<td>P30-3702</td>
<td>Lube Oil Protection Control</td>
<td>Male Connection 7/16&quot; 20 UNF for a 1/4&quot; Female Flare</td>
<td>90 seconds</td>
<td>8-60 PSI Adjustable</td>
<td>120V AC or 240V AC, Pilot Duty 720VA</td>
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<tr>
<td>P30-3801</td>
<td>Lube Oil Protection Control</td>
<td>36&quot; Capillary with Flare Nut</td>
<td>120 seconds</td>
<td>8-60 PSI Adjustable</td>
<td>120V AC or 240V AC, Pilot Duty 720VA</td>
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<tr>
<td>P30-5826</td>
<td>Lube Oil Protection Control</td>
<td>36&quot; Capillary with Flare Nut</td>
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<td>P30-5839</td>
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<td>Male Connection 7/16&quot; 20 UNF for a 1/4&quot; Female Flare</td>
<td>120 seconds</td>
<td>0 PSID Fixed</td>
<td>120V AC or 240V AC, Pilot Duty 720VA</td>
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<td>P30-5848</td>
<td>Lube Oil Protection Control</td>
<td>Male Connection 7/16&quot; 20 UNF for a 1/4&quot; Female Flare</td>
<td>120 seconds</td>
<td>0 PSID Fixed</td>
<td>120V AC or 240V AC, Pilot Duty 720VA</td>
</tr>
</tbody>
</table>
G SERIES FOR REFRIGERATION COMPRESSORS

- Applications (Pressure and Temperature Control)
  - G20 used to protect against loss of charge
    - Evaporator freeze-up
    - Low pressure
  - G23 provides high head pressure protection
    - High pressure

- To Determine Part:
  - Determine current and voltage settings
  - Determine pounds per square inch (PSI) pressure settings
  - Determine auto or manual
  - Determine temperature setpoints
MANUFACTURERS OF PRESSURE CONTROLS

- Ranco®
- Robertshaw®

Ranco advantages include:
  - Lexan cover – Won’t break, dent, or rust. Doesn’t conduct electricity.
  - Super Cap®
  - Application specific
  - Captive screw