EX4-EX8 Electrical Control Valve

The EX4-EX8 are stepper motor driven valves that are optimized for the control of liquid or gaseous mass flow in refrigeration systems. Multifunction capability as expansion valve, hot gas bypass, suction gas throttling, head pressure, liquid line actuator and other applications systems.

Features
- Fully hermetic design
- Fast full stroke time
- Applicable to all common refrigerants (HCFC, HFC), for subcritical CO2 applications
- High resolution and excellent repeatability
- Bi-flow versions for heat pump applications
- Positive shut-off function to eliminate the use of an additional solenoid valve
- Linear flow capacity
- Wide capacity range (10 - 100%)
- Continuous modulation of mass flow, no stress (liquid hammering) in the refrigeration circuit
- Direct coupling of motor and valve for high reliability (no gear mechanism)
- Ceramic slide and port for accurate flow and minimal wear
- Balanced force design
- Corrosion resistant stainless steel body, and connections

Specifications
- CE marking: EX4/EX5: not required
  EX6-EX8: required, Cat I, Module A
- MOPD: EX4-EX6: 580 psid
  EX7: 507 psid
  EX8: 435 psid
- MWP: EX4-EX7: 870 psig
  EX8: 650 psig
- Ambient temperature: -40°F to +130°F
- Humidity: 5 to 95% R.H.
- External leakage: ≤ 0.1 oz/yr (R-22)
- Stepper motor type: Bi-polar, phase current by chopper control (constant current)
- Electrical connection: 4 pin terminal via plug
- Driver supply voltage: Recommended: 24 VDC
  Range: 18-36 VDC
- Phase current (operating): EX4-EX6: 500 mA max
  EX7: 750 mA
  EX8: 800 mA
- Holding current: EX4-EX6: 100 mA
  EX7: 250 mA
  EX8: 500 mA
- Nominal input power per phase: EX4-EX6: 3.5W
  EX7-EX8: 5W
- Phase inductance: EX4-EX6: 30 mH ±25%
  EX7: 20 mH ±25%
  EX8: 22 mH ±25%
- Step mode: 2 phase full step
- Step angle: 1.8° per step ±8%
- Total number of steps: EX4-EX6: 750 full steps
  EX7: 1600 full steps
  EX8: 2600 full steps
- Stepping rate: 500 Hz
- Winding resistance per phase: EX4-EX6: 13 ohm ±10%
  EX7: 8 ohm ±10%
  EX8: 6 ohm ±10%
- Full travel time: EX4-EX6: 1.5 seconds
  EX7: 3.2 seconds
  EX8: 5.2 seconds

Valve Type | Inlet x Outlet (ODF) | B | C | D | E | H1 | H2
---|---|---|---|---|---|---|---
EX4-I21 | 3/8" x 5/8" | 0.3 | 1.8 | 2.2 | 0.4 | 4.4 | 1.0
EX5-U21 | 5/8" x 7/8" | 0.4 | 2.2 | 2.6 | 0.6 | 4.4 | 1.0
EX6-I21 | 7/8" x 1-1/8" | 0.6 | 2.6 | 3.0 | 0.7 | 4.4 | 1.0
EX7-I21 | 1-1/8" x 1-3/8" | 0.8 | 3.1 | 3.2 | 0.9 | 6.2 | 1.7
EX8-I21 | 1-5/8" x 1-5/8" | 0.8 | 3.1 | 3.1 | 0.8 | 7.9 | 2.2

Dimensional Data (in)
EX4-EX8 Electrical Control Valve

EX4/EX5/EX6/EX7/EX8
Nominal capacities as expansion valves and liquid injection valves

Nominal Capacities in Tons (10% - 100%)

<table>
<thead>
<tr>
<th>Valve Type</th>
<th>R-407C</th>
<th>R-22</th>
<th>R-134a</th>
<th>R-404A</th>
<th>R-410A</th>
<th>R-23</th>
<th>R-124</th>
<th>R-744</th>
</tr>
</thead>
<tbody>
<tr>
<td>EX4</td>
<td>0.6 - 5</td>
<td>0.6 - 4.7</td>
<td>0.3 - 3.6</td>
<td>0.3 - 3.3</td>
<td>0.6 - 5.5</td>
<td>0.6 - 5.1</td>
<td>0.3 - 2.6</td>
<td>0.9 - 9.5</td>
</tr>
<tr>
<td>EX5</td>
<td>1.4 - 15.1</td>
<td>1.4 - 14.2</td>
<td>1.1 - 11.1</td>
<td>1.1 - 10</td>
<td>1.7 - 16.5</td>
<td>1.4 - 15.4</td>
<td>0.9 - 8</td>
<td>2.8 - 29</td>
</tr>
<tr>
<td>EX6</td>
<td>4.3 - 35.8</td>
<td>4.3 - 34.1</td>
<td>2.8 - 26.4</td>
<td>2.8 - 23.9</td>
<td>4.3 - 39.8</td>
<td>3.7 - 37</td>
<td>2 - 19.1</td>
<td>6.8 - 69.4</td>
</tr>
<tr>
<td>EX7</td>
<td>10 - 98.7</td>
<td>10 - 93.8</td>
<td>7.1 - 72.5</td>
<td>7.1 - 65.4</td>
<td>11.4 - 108.5</td>
<td>-</td>
<td>-</td>
<td>19.9 - 190.5</td>
</tr>
<tr>
<td>EX8</td>
<td>28.4 - 263</td>
<td>25.6 - 250.2</td>
<td>19.9 - 193.4</td>
<td>17.1 - 174.3</td>
<td>28.4 - 292</td>
<td>-</td>
<td>-</td>
<td>51.2 - 508.7</td>
</tr>
</tbody>
</table>

Note 1: EX Bi-flow versions are not released for use with R-124 and R-23 refrigerants.
Note 2: EX Bi-flow versions have identical capacity in both flow direction.

Refrigerant Evaporating Temperature Condensing Temperature Subcooling

<table>
<thead>
<tr>
<th>Refrigerant</th>
<th>Evaporating Temperature</th>
<th>Condensing Temperature</th>
<th>Subcooling</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-22, R-134a, R-404A, R-410A</td>
<td>+40 °F</td>
<td>+100°F</td>
<td>2°F</td>
</tr>
<tr>
<td>R-407C</td>
<td>+40°F dew point</td>
<td>+100°F dew point</td>
<td>2°F</td>
</tr>
<tr>
<td>R-124</td>
<td>+68°F</td>
<td>+176°F</td>
<td>2°F</td>
</tr>
<tr>
<td>R-23</td>
<td>-76°F</td>
<td>-13°F</td>
<td>2°F</td>
</tr>
<tr>
<td>R-744</td>
<td>-40°F</td>
<td>14°F</td>
<td>2°F</td>
</tr>
</tbody>
</table>

The nominal capacity is based on the following conditions:

Ordering Information

<table>
<thead>
<tr>
<th>Description</th>
<th>Type</th>
<th>Inlet Connection (in)</th>
<th>Outlet Connection (in)</th>
<th>Reference #</th>
<th>PCN</th>
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</thead>
<tbody>
<tr>
<td>EX4 Electrical Control Valve</td>
<td>EX4-I21</td>
<td>3/8</td>
<td>5/8</td>
<td>800615</td>
<td>097719</td>
</tr>
<tr>
<td>EX5 Electrical Control Valve</td>
<td>EX5-U21</td>
<td>5/8</td>
<td>7/8</td>
<td>800619</td>
<td>097720</td>
</tr>
<tr>
<td>EX6 Electrical Control Valve</td>
<td>EX6-I21</td>
<td>7/8</td>
<td>1 1/8</td>
<td>800620</td>
<td>097721</td>
</tr>
<tr>
<td>EX7 Electrical Control Valve</td>
<td>EX7-I21</td>
<td>1 1/8</td>
<td>1 3/8</td>
<td>800624</td>
<td>097722</td>
</tr>
<tr>
<td>EX8 Electrical Control Valve</td>
<td>EX8-I21</td>
<td>1 5/8</td>
<td>1 5/8</td>
<td>804631</td>
<td>097723</td>
</tr>
<tr>
<td>EX4 Bi-Flow Electrical Control Valve</td>
<td>EX4-U31</td>
<td>5/8</td>
<td>5/8</td>
<td>800617</td>
<td>097756</td>
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<tr>
<td>EX5 Bi-Flow Electrical Control Valve</td>
<td>EX5-U31</td>
<td>7/8</td>
<td>7/8</td>
<td>800619</td>
<td>097729</td>
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<tr>
<td>EX6 Bi-Flow Electrical Control Valve</td>
<td>EX6-I31</td>
<td>1 1/8</td>
<td>1 1/8</td>
<td>800622</td>
<td>097757</td>
</tr>
<tr>
<td>EX7 Bi-Flow Electrical Control Valve</td>
<td>EX7-U31</td>
<td>1 3/8</td>
<td>1 3/8</td>
<td>800626</td>
<td>097758</td>
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<tr>
<td>Valve Connector Cable</td>
<td>EXV-M60</td>
<td>N/A</td>
<td>N/A</td>
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