Miniature Proportional Valves
Precision Fluidics
ENGINEERING YOUR SUCCESS.
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<td></td>
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</tbody>
</table>
Miniature Proportional Valve

VSO®, Voltage Sensitive Orifice, is a miniature solenoid valve that controls the flow of gas in proportion to input current. You can drive the valve with either DC current or pulse width modulation and use closed loop feedback to deliver optimal system performance. Medical and analytical OEMs worldwide choose the VSO® as their preferred miniature proportional valve.

Features
- Operating pressures up to 150 psig and a range of orifice sizes.
- Satisfies a 0.2 sccm leakage specification of He for 100 million life cycles and offers high repeatability.
- Thermally compensated to maintain ideal flow.
- All valves are cleaned for Oxygen and Analytical Service use.
- Serialized performance traceability.
- Uses either DC current or pulse width modulation with closed loop feedback to deliver optimal system performance.
- RoHS compliant.

Performance Data

Typical Applications:
- Gas Chromatography
- Mass Spectrometry
- Ventilators
- O₂ Concentrators/Conservers
- Anaesthesia Delivery & Monitors
- Pressure & Flow Control
- Mass Flow Control

Valve Type:
2-Way Normally Closed

Media:
Air, argon, helium, hydrogen, methane, nitrogen, oxygen, & others

Operating Environment:
32 to 131°F (0 to 55°C)

Storage Temperature:
-40 to 158°F (-40 to 70°C)

Length:
1.785 in (45.34 mm)

Width:
0.625 in (16.51 mm)

Height:
0.67 in (17.02 mm)

Porting:
Barbs or 10-32 female; manifold mount (with screens available)

Weight:
2.2 oz (62.86 grams)

Internal Volume:
0.031 in³ (0.508 cm³)

Filtration:
Models 1 & 2: 17 micron
Models 3, 4, 5, & 6: 40 micron

Flow Direction:
Inlet Port Port 2
Outlet Port Port 1

Power:
2.0 Watts maximum

Voltage:
See Table 2

Electrical Termination:
18 in Wire Leads, PC Mount, Quick Disconnect Spade

Wetted Materials

Series 11 Body:
360 HO₂, Brass

Series 25 Body:
Nickel-Plated Brass

Stem Base:
430 FR Stainless Steel and Brass
360 HT

All Others:
FKM; FFKM; 430 FR Stainless Steel; 300 Series Stainless Steel

Vacuum:
0-27 in Hg (0-686 mm Hg)

Orifice Sizes:
0.010 in (0.245 mm)
0.020 in (0.510 mm)
0.030 in (0.762 mm)
0.04 in (1.016 mm)
0.05 in (1.270 mm)
0.065 in (1.651 mm)

Hysteresis:
7% of full scale current (Typical)
15% of full scale current (Max)

Leak Rate:
The leakage shall not exceed the following values:
Internal 0.2 SCCM of He with a differential pressure of 1 psid, 25 psid and 150 psid
External 0.016 SCCM of He at 150 psi

Pressure:
0 to 50 psi (3.45 bar)
0 to 75 psi (5.17 bar)
0 to 100 psi (6.89 bar)
0 to 150 psi (10.34 bar)
See Table 1

Electrical:
2.0 Watts maximum

Voltage:
See Table 2

Electrical Termination:
18 in Wire Leads, PC Mount, Quick Disconnect Spade

Wetted Materials

Series 11 Body:
360 HO₂, Brass

Series 25 Body:
Nickel-Plated Brass

Stem Base:
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360 HT

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Vacuum:
0-27 in Hg (0-686 mm Hg)

Orifice Sizes:
0.010 in (0.245 mm)
0.020 in (0.510 mm)
0.030 in (0.762 mm)
0.04 in (1.016 mm)
0.05 in (1.270 mm)
0.065 in (1.651 mm)

Hysteresis:
7% of full scale current (Typical)
15% of full scale current (Max)
VSO® Thermally Compensated Proportional Valve

Table 1: Pressure and Flow Capabilities

<table>
<thead>
<tr>
<th>Orifice Diameter</th>
<th>Maximum Operating Inlet Pressure</th>
<th>Maximum Operating Pressure Differential</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.010in (0.245mm)</td>
<td>150 psig (10.34 bar)</td>
<td>150 psid (10.34 bar)</td>
</tr>
<tr>
<td>0.020in (0.510mm)</td>
<td>150 psig (10.34 bar)</td>
<td>150 psid (10.34 bar)</td>
</tr>
<tr>
<td>0.030in (0.762mm)</td>
<td>150 psig (10.34 bar)</td>
<td>150 psid (10.34 bar)</td>
</tr>
<tr>
<td>0.040in (1.016mm)</td>
<td>150 psig (10.34 bar)</td>
<td>75 psid (5.17 bar)</td>
</tr>
<tr>
<td>0.050in (1.270mm)</td>
<td>150 psig (10.34 bar)</td>
<td>100 psid (6.89 bar)</td>
</tr>
<tr>
<td>0.065in (1.651mm)</td>
<td>150 psig (10.34 bar)</td>
<td>50 psid (3.45 bar)</td>
</tr>
</tbody>
</table>

Table 2: Electrical Requirements

<table>
<thead>
<tr>
<th>Minimum Available Voltage (VDC)</th>
<th>Nominal Coil Resistance @ 20°C (Qhms)</th>
<th>Input Current for Full Flow (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.5</td>
<td>11</td>
<td>304</td>
</tr>
<tr>
<td>8.0</td>
<td>23</td>
<td>212</td>
</tr>
<tr>
<td>11.5</td>
<td>47</td>
<td>152</td>
</tr>
<tr>
<td>13.5</td>
<td>68</td>
<td>125</td>
</tr>
<tr>
<td>20.0</td>
<td>136</td>
<td>91</td>
</tr>
<tr>
<td>29.0</td>
<td>274</td>
<td>66</td>
</tr>
<tr>
<td>41.0</td>
<td>547</td>
<td>47</td>
</tr>
<tr>
<td>56.0</td>
<td>1094</td>
<td>32</td>
</tr>
</tbody>
</table>
**VSO® Thermally Compensated Proportional Valve**

**VSO® Sizing Charts**

- **0.010" (0.265 mm) Orifice**
- **0.020" (0.510 mm) Orifice**
- **0.030" (0.762 mm) Orifice**
- **0.040" (1.016 mm) Orifice**
- **0.050" (1.270 mm) Orifice**
- **0.065" (1.651 mm) Orifice**

Flow Rate [slpm] vs. Pressure [bar] for different orifices.
**VSO® Thermally Compensated Proportional Valve**

**VSO® Series 11 Manifold Mount**

**Pneumatic Interface**
- VSO® Series 11 Barbed
- VSO® Series 25 10-32 Threaded

**Electrical Interface**
- 18” Wire Lead
- 4 PC Pin
- Quick Connect Spade

**VSO® Series 11 Manifold Mount and Barbed Body Basic Valve Dimensions**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>.156 [3.97]</td>
<td></td>
</tr>
<tr>
<td>.312 [7.92]</td>
<td></td>
</tr>
<tr>
<td>PORT 2 (INLET)</td>
<td></td>
</tr>
<tr>
<td>.125 [3.18]</td>
<td></td>
</tr>
<tr>
<td>.281 [7.14]</td>
<td></td>
</tr>
<tr>
<td>.500 [12.7]</td>
<td></td>
</tr>
<tr>
<td>.500 [12.7]</td>
<td></td>
</tr>
<tr>
<td>.055 [1.40]</td>
<td></td>
</tr>
<tr>
<td>.055 [1.40]</td>
<td></td>
</tr>
<tr>
<td>2X Ø.125 [3.18]</td>
<td></td>
</tr>
</tbody>
</table>

**VSO® Series 25 10-32 Threaded Body Basic Valve Dimensions**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>.194 [4.93]</td>
<td></td>
</tr>
<tr>
<td>.31 [7.87]</td>
<td></td>
</tr>
<tr>
<td>.155 [3.81]</td>
<td></td>
</tr>
<tr>
<td>.524 [13.31]</td>
<td></td>
</tr>
<tr>
<td>.594 [15.09]</td>
<td></td>
</tr>
<tr>
<td>.683 [17.35]</td>
<td></td>
</tr>
<tr>
<td>.67 [17.02]</td>
<td></td>
</tr>
<tr>
<td>.1785 [45.34]</td>
<td></td>
</tr>
<tr>
<td>.305 [7.75]</td>
<td></td>
</tr>
</tbody>
</table>
**VSO® Thermally Compensated Proportional Valve**

**VSO® Installation and Use**

Typical Valve Set-up

- **Pressure setup shown above.** Vacuum setup is also available.

**Valve Electrical Control**

**Basic Control:**
The VSO® valve can be controlled by either voltage or current; however, it is highly recommended that current control be employed to ensure the most repeatable valve flow performance.

**PWM Control:**
For PWM control, the signal applied to the valve should have a frequency between 5-12kHz. Optimum frequency will be application dependent.

**Suggested VSO® Current Driver Schematic**

<table>
<thead>
<tr>
<th>MIN COIL VOLTAGE (VDC)</th>
<th>I RANGE (mA)</th>
<th>R1 (Ω)</th>
<th>R2 (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.5</td>
<td>0-304</td>
<td>5100</td>
<td>330</td>
</tr>
<tr>
<td>8.0</td>
<td>0-212</td>
<td>4990</td>
<td>221</td>
</tr>
<tr>
<td>11.5</td>
<td>0-152</td>
<td>5100</td>
<td>160</td>
</tr>
<tr>
<td>13.5</td>
<td>0-125</td>
<td>4420</td>
<td>113</td>
</tr>
<tr>
<td>20.0</td>
<td>0-91</td>
<td>4420</td>
<td>82</td>
</tr>
<tr>
<td>29.0</td>
<td>0-66</td>
<td>4990</td>
<td>66.5</td>
</tr>
<tr>
<td>41.0</td>
<td>0-47</td>
<td>4990</td>
<td>47.5</td>
</tr>
<tr>
<td>56.0</td>
<td>0-32</td>
<td>4990</td>
<td>32.4</td>
</tr>
</tbody>
</table>
VSO® Thermally Compensated Proportional Valve
VS0® Low Flow
Thermally Compensated Proportional Valve

The VS0® LF (Low Flow) offers the same benefits as the VS0® valve with enhanced flow control for applications where control is critical or flow is required between 0 - 500 sccm. This miniature solenoid-operated valve automates the flow of gas in proportion to the input current.

Features
- Lowest flow of any proportional valve on the market.
- Uses either DC current or pulse width modulation; closed loop feedback delivers optimal system performance.
- Offers computer automated calibrations and full calibration traceability.
- Rated for 10 million life cycles.
- Maintains ideal flow through thermal compensation.
- Highly repeatable.
- RoHS compliant.

Typical Applications:
- Gas Chromatography
- Mass Spectrometry
- Pressure & Flow Control
- Mass Flow Control

Performance Data

Physical Properties

| Valve Type: | 2-Way Normally Closed |
| Media: | Air, argon, helium, hydrogen, methane, nitrogen, oxygen, & others |
| Operating Environment: | 32 to 122°F (0 to 50°C) |
| Storage Temperature: | -40 to 158°F (-40 to 70°C) |
| Length: | 1.785 in (45.34 mm) |
| Width: | 0.625 in (16.51 mm) |
| Height: | 0.67 in (17.02 mm) |
| Porting: | Manifold mount |
| Weight: | 2.2 oz (62.86 grams) |

Features

- Lowest flow of any proportional valve on the market.
- Uses either DC current or pulse width modulation; closed loop feedback delivers optimal system performance.
- Offers computer automated calibrations and full calibration traceability.
- Rated for 10 million life cycles.
- Maintains ideal flow through thermal compensation.
- Highly repeatable.
- RoHS compliant.

Typical Applications:
- Gas Chromatography
- Mass Spectrometry
- Pressure & Flow Control
- Mass Flow Control

Performance Characteristics

Leak Rate:
The leakage shall not exceed the following values:
- Internal 0.2 SCCM of He with a differential pressure of 1 psid, 25 psid and 150 psid
- External 0.016 SCCM of He at 150 psi

Pressure:
- 0 to 150 psi (10.34 bar)
- See Table 1

Vacuum:
- 0-27 in Hg (0-686 mm Hg)

Orifice Size:
- 0.003” (0.076 mm)

Hysteresis:
- 7% of full scale current (Typical)
- 15% of full scale current (Max)

Filtration:
(Suggested and Available)

Body: 360 HO2 Brass
Stem Base:
- 430 FR Stainless Steel and Brass 360 HT
All Others:
- FKM; 430 FR Stainless Steel; 300 Series Stainless Steel
**VSO® Low Flow** Thermally Compensated Proportional Valve

**Typical Air Flow with 13.5 VDC Coil**

![Typical Air Flow with 13.5 VDC Coil](image)

**VSO® Low Flow Pressure vs Flow Curve**

**Table 1: Pressure and Flow Capabilities**

<table>
<thead>
<tr>
<th>Orifice Diameter</th>
<th>Maximum Operating Inlet Pressure</th>
<th>Maximum Operating Pressure Differential</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.003&quot; (0.076mm)</td>
<td>150 psig (10.34 bar)</td>
<td>150 psid (10.34 bar)</td>
</tr>
</tbody>
</table>

**Table 2: Electrical Requirements**

<table>
<thead>
<tr>
<th>Minimum Available Voltage (VDC)</th>
<th>Nominal Coil Resistance @ 20°C (Ohms)</th>
<th>Input Current for Full Flow (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.5</td>
<td>47</td>
<td>130</td>
</tr>
<tr>
<td>8.0</td>
<td>68</td>
<td>115</td>
</tr>
<tr>
<td>12.0</td>
<td>136</td>
<td>80</td>
</tr>
<tr>
<td>18.0</td>
<td>274</td>
<td>60</td>
</tr>
<tr>
<td>24.0</td>
<td>547</td>
<td>43</td>
</tr>
</tbody>
</table>
**VSO® Low Flow** Thermally Compensated Proportional Valve

**Pneumatic Interface**

VSO® Low Flow Manifold Mount

**Electrical Interface**

VSO® Low Flow 18” Wire Lead

**VSO® Low Flow Manifold Body Basic Valve Dimensions**
**VSO® Low Flow** Thermally Compensated Proportional Valve

**VSO® Low Flow Installation and Use**

**Typical Valve Set-up**

![Diagram of valve setup](image)

**Valve Electrical Control**

**Basic Control:**
The VSO® Low Flow valve can be controlled by either voltage or current; however, it is highly recommended that current control be employed to ensure the most repeatable valve flow performance.

**PWM Control:**
For PWM control, the signal applied to the valve should have a frequency between 5-12kHz. Optimum frequency will be application dependent.

**Suggested VSO® Low Flow Current Driver Schematic**

![Schematic diagram](image)

**Table:**

<table>
<thead>
<tr>
<th>MIN COIL VOLTAGE (VDC)</th>
<th>CURRENT RANGE (mA)</th>
<th>R1(Ω)</th>
<th>R2(Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.5</td>
<td>0-130</td>
<td>4990</td>
<td>102</td>
</tr>
<tr>
<td>8.0</td>
<td>0-115</td>
<td>4990</td>
<td>73</td>
</tr>
<tr>
<td>12.0</td>
<td>0-80</td>
<td>5100</td>
<td>34.4</td>
</tr>
<tr>
<td>18.0</td>
<td>0-60</td>
<td>8560</td>
<td>28.7</td>
</tr>
<tr>
<td>24.0</td>
<td>0-43</td>
<td>8560</td>
<td>15.4</td>
</tr>
</tbody>
</table>
VSO® Low Flow Thermally Compensated Proportional Valve

Manifold & O-Ring Dimensions & Design
Not shipped with valves.

Ordering Information

<table>
<thead>
<tr>
<th>Sample Part ID</th>
<th>910</th>
<th>000200</th>
<th>001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Options</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Options:
- 001: 6.5 VDC
- 002: 8 VDC
- 003: 12 VDC
- 004: 18 VDC
- 007: 24 VDC

* Max Voltage for continuous full flow, ambient Temp 55°C.

In order to provide the best possible solution for your application, please provide the following requirements when contacting Applications Engineering:

- Media, Inlet & Outlet Pressures
- Minimum Required Flow Rate
- System Supply Voltage
- Media & Ambient Temperature Range.

NOTE: Please consult Parker Precision Fluidics for other considerations. For more detailed information, visit us on the Web, or call and refer to Performance Spec. #790-002160-002 and Drawing #890-003022-022.

For more information call +1 603 595 1500 or email ppfinfo@parker.com
Visit www.parker.com/precisionfluidics

PPF-MPV-002/US  September 2011
Lone Wolf Normally Open Miniature Proportional Valve

With its patented technology, the Lone Wolf valve has the highest performance characteristics of any Normally Open proportional valve available on the market. The Lone Wolf valve offers silent operation, provides repeatable high-speed performance, and ensures maximum accuracy.

Features
- Achieves rapid, stable performance.
- Enhances system control and patient comfort.
- Maintains ideal flow through Normally Open valve with thermal compensation.
- Extremely reliable.
- RoHS compliant.

Typical Applications:
- Blood Pressure Monitoring
- Vitreo Retinal Surgery

Performance Data

<table>
<thead>
<tr>
<th>Physical Properties</th>
<th>Internal Volume: 0.031 in³ (0.508 cm³)</th>
<th>Filtration: (Suggested and Available) 40 micron Flow Direction: Inlet Port Port 1 Outlet Port Port 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length:</td>
<td>1.785 in (45.34 mm)</td>
<td>Electrical Power: 2.0 Watts maximum</td>
</tr>
<tr>
<td>Width:</td>
<td>0.625 in (16.51 mm)</td>
<td>Voltage: See Table 2</td>
</tr>
<tr>
<td>Height:</td>
<td>0.67 in (17.02 mm)</td>
<td>Electrical Termination: 18 in Wire Leads, PC Mount</td>
</tr>
<tr>
<td>Porting:</td>
<td>Barbs; manifold mount (with screens available)</td>
<td>Wetted Materials Body: 360 HO2 Brass</td>
</tr>
<tr>
<td>Weight:</td>
<td>2.2 oz (62.86 grams)</td>
<td>Stem Base: 430 FR Stainless Steel and Brass 360 HT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All Others: FKM; 430 FR Stainless Steel; 300 Series Stainless Steel</td>
</tr>
</tbody>
</table>

Leak Rate:
The leakage shall not exceed the following values:
- Internal 0.2 SCCM of He with a differential pressure of 1 psid, 25 psid and 150 psid
- External 0.016 SCCM of He at 150 psi

Pressure:
- 0 to 10 psi (0.69 bar)
- 0 to 20 psi (1.37 bar)
- 0 to 25 psi (1.72 bar)  
  See Table 1

Vacuum:
- 0-20 in Hg (0-508 mm Hg)

Orifice Sizes:
- 0.024 in (0.609 mm)
- 0.030 in (0.762 mm)
- 0.036 in (0.914 mm)

Hysteresis:
- 7% of full scale current (Typical)
- 15% of full scale current (Max)
**Lone Wolf**  
Thermally Compensated Proportional Valve

**Typical Air Flow with 13.5 VDC Coil @ 5psid (0.34 bar)**

![Graph showing typical air flow](image)

**Lone Wolf Pressure vs Flow Curves Model 1-3**

![Graph showing pressure vs flow](image)

**Table 1: Pressure and Flow Capabilities**

<table>
<thead>
<tr>
<th>Orifice Diameter</th>
<th>Maximum Operating Inlet Pressure</th>
<th>Maximum Operating Pressure Differential</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.024in (0.609mm)</td>
<td>0-10 psig (0.69 bar)</td>
<td>150 psid (10.34 bar)</td>
</tr>
<tr>
<td>0.030in (0.762mm)</td>
<td>0-20 psig (1.37 bar)</td>
<td>150 psid (10.34 bar)</td>
</tr>
<tr>
<td>0.036in (0.914mm)</td>
<td>0-25 psig (1.72 bar)</td>
<td>150 psid (10.34 bar)</td>
</tr>
</tbody>
</table>

**Table 2: Electrical Requirements**

<table>
<thead>
<tr>
<th></th>
<th>Model 1 (0.024&quot; orifice)</th>
<th>Model 2 (0.030&quot; orifice)</th>
<th>Model 3 (0.036&quot; orifice)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Available Voltage (VDC)</td>
<td>5.5</td>
<td>8.0</td>
<td>11.5</td>
</tr>
<tr>
<td>Nominal Coil Resistance B 20°C (Ohms)</td>
<td>47</td>
<td>68</td>
<td>136</td>
</tr>
<tr>
<td>Input Current for Full Shut Off (mA)</td>
<td>92</td>
<td>76</td>
<td>68</td>
</tr>
<tr>
<td>Input Current for Full Shut Off (mA)</td>
<td>177</td>
<td>127</td>
<td>68</td>
</tr>
<tr>
<td>Input Current for Full Shut Off (mA)</td>
<td>111</td>
<td>23</td>
<td>67</td>
</tr>
</tbody>
</table>
Lone Wolf Thermally Compensated Proportional Valve

Lone Wolf Sizing Charts

Pressure [bar]

0.024" [0.609 mm] Orifice

Pressure [psi]

Pressure [bar]

0.030" [0.762 mm] Orifice

Pressure [psi]

Pressure [bar]

0.036" [0.914 mm] Orifice

Pressure [psi]
**Lone Wolf** Thermally Compensated Proportional Valve

### Pneumatic Interface

- Lone Wolf Manifold Mount
- Lone Wolf Barbed

### Electrical Interface

- 18" Wire Lead
- 4 PC Pin

### Lone Wolf Manifold Mount and Barbed Body Basic Valve Dimensions
**Lone Wolf**  Thermally Compensated Proportional Valve

**Lone Wolf Installation and Use**

**Typical Valve Set-up**

---

**Valve Electrical Control**

**Basic Control:**
The Lone Wolf valve can be controlled by either voltage or current; however, it is highly recommended that current control be employed to ensure the most repeatable valve flow performance.

**PWM Control:**
For PWM control, the signal applied to the valve should have a frequency between 5-12kHz. Optimum frequency will be application dependent.

**Suggested Lone Wolf Current Driver Schematic**

---

<table>
<thead>
<tr>
<th>Model 1 (0.024” orifice)</th>
<th>Model 2 (0.030” orifice)</th>
<th>Model 3 (0.030” orifice)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min. Coil Voltage (VDC)</td>
<td>R1 (Ω)</td>
<td>R2 (Ω)</td>
</tr>
<tr>
<td>5.5</td>
<td>0 - 92</td>
<td>5600</td>
</tr>
<tr>
<td>8.0</td>
<td>0 - 76</td>
<td>9880</td>
</tr>
<tr>
<td>11.5</td>
<td>0 - 50</td>
<td>9880</td>
</tr>
<tr>
<td>13.5</td>
<td>0 - 40</td>
<td>9880</td>
</tr>
<tr>
<td>29.0</td>
<td>0 - 20</td>
<td>9880</td>
</tr>
</tbody>
</table>
Miniature Proportional Valves

Ordering Information

In order to provide the best possible solution for your application, please provide the following requirements when contacting Applications Engineering:

- Media, Inlet & Outlet Pressures
- Minimum Required Flow Rate
- System Supply Voltage
- Media & Ambient Temperature Range.

NOTE: Please consult Parker Precision Fluidics for other considerations.

For more detailed information, visit us on the Web, or call and refer to Performance Spec. #790-002130-001 and Drawings #890-003079-001 and #890-003079-004.

For more information call +1 603 595 1500 or email ppfinfo@parker.com

Visit www.parker.com/precisionfluidics
**MD PRO**

**Miniature Proportional Valve**

**Non-Thermally Compensated Proportional Valve**

The MD PRO is a miniature solenoid-operated valve that controls gas flow proportionally to input current. This non-thermally compensated MD PRO valve is the solution for pressure and flow control.

**Features**
- Provides repeatability across its operating range.
- Offers a superior combination of value and performance.
- Rated for 10 million life cycles.
- RoHs compliant.

**Typical Applications:**
- O₂ Concentrators/Conservers
- Ventilators
- Anaesthesia
- Pressure & Flow Control
- Patient Monitors

**Physical Properties**

<table>
<thead>
<tr>
<th>Valve Type:</th>
<th>2-Way Normally Closed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Media:</strong></td>
<td>Air, argon, helium, hydrogen, methane, nitrogen, oxygen, &amp; others</td>
</tr>
<tr>
<td><strong>Operating Environment:</strong></td>
<td>32 to 140°F (0 to 60°C)</td>
</tr>
<tr>
<td><strong>Storage Temperature:</strong></td>
<td>-40 to 158°F (-40 to 70°C)</td>
</tr>
<tr>
<td><strong>Length:</strong></td>
<td>1.785 in (45.34 mm)</td>
</tr>
<tr>
<td><strong>Width:</strong></td>
<td>0.625 in (16.51 mm)</td>
</tr>
<tr>
<td><strong>Height:</strong></td>
<td>0.67 in (17.02 mm)</td>
</tr>
<tr>
<td><strong>Porting:</strong></td>
<td>1/8&quot; barbs; manifold mount</td>
</tr>
<tr>
<td><strong>Weight:</strong></td>
<td>2.2 oz (62.86 grams)</td>
</tr>
<tr>
<td><strong>Internal Volume:</strong></td>
<td>0.031 in³ (.508 cm³)</td>
</tr>
<tr>
<td><strong>Filtration</strong> (Suggested and Available):</td>
<td>43 micron</td>
</tr>
<tr>
<td><strong>Flow Direction:</strong></td>
<td>Inlet Port Port 2 Outlet Port Port 1</td>
</tr>
</tbody>
</table>

**Electrical**

- **Power:** 2.0 Watts maximum
- **Voltage:** See table 2
- **Electrical Termination:** 18" Wire Leads 33.5 AWG, PC Mount, Quick Disconnect Spade

**Wetted Materials**

- **Body:** 360 HO₂ Brass
- **Stem Base:** 430 FR Stainless Steel and Brass 360 HT
- **All Others:** FKM; 430 FR Stainless Steel; 300 Series Stainless Steel

**Performance Characteristics**

- **Leak Rate:**
  - The leakage shall not exceed the following values:
  - Internal 0.2 SCCM of air with a differential pressure of 1 psid, 25 psid and 150 psid
  - External 0.016 SCCM of air at 150 psi

- **Pressure:**
  - 0 to 50 psi (3.45 bar)
  - 0 to 75 psi (5.17 bar)
  - 0 to 100 psi (6.89 bar)
  - See Table 1

- **Vacuum:**
  - 0-27 in Hg (0-686 mm Hg)

- **Orifice Sizes:**
  - 0.040 in (1.016 mm)
  - 0.050 in (1.270 mm)
  - 0.065 in (1.651 mm)

- **Hysteresis:**
  - 7% of full scale current (Typical)
  - 15% of full scale current (Max)
MD PRO Non-Thermally Compensated Proportional Valve

Typical Air Flow with 20 VDC Coil @ 25psid (1.7 bar)

Table 1: Pressure Capabilities

<table>
<thead>
<tr>
<th>Orifice Diameter</th>
<th>Maximum Operating Inlet Pressure</th>
<th>Maximum Operating Pressure Differential</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.040in (1.016mm)</td>
<td>150 psig (10.34 bar)</td>
<td>75 psid (5.17 bar)</td>
</tr>
<tr>
<td>0.050in (1.270mm)</td>
<td>150 psig (10.34 bar)</td>
<td>100 psid (6.89 bar)</td>
</tr>
<tr>
<td>0.065in (1.651mm)</td>
<td>150 psig (10.34 bar)</td>
<td>50 psid (3.45 bar)</td>
</tr>
</tbody>
</table>

Table 2: Electrical Requirements

<table>
<thead>
<tr>
<th>Minimum Available Voltage (VDC)</th>
<th>Nominal Coil Resistance @ 20°C (Ohms)</th>
<th>Input Current for Full Flow (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.5</td>
<td>11</td>
<td>304</td>
</tr>
<tr>
<td>8.0</td>
<td>23</td>
<td>212</td>
</tr>
<tr>
<td>11.5</td>
<td>47</td>
<td>152</td>
</tr>
<tr>
<td>13.5</td>
<td>68</td>
<td>125</td>
</tr>
<tr>
<td>20.0</td>
<td>136</td>
<td>91</td>
</tr>
<tr>
<td>29.0</td>
<td>274</td>
<td>66</td>
</tr>
</tbody>
</table>
**MD PRO** Non-Thermally Compensated Proportional Valve

**MD PRO Sizing Charts**

- **0.040" (1.016 mm) Orifice**
  - Flow Rate (slpm)
  - Pressure (bar)
- **0.050" (1.270 mm) Orifice**
  - Flow Rate (slpm)
  - Pressure (bar)
- **0.065" (1.651 mm) Orifice**
  - Flow Rate (slpm)
  - Pressure (bar)
MD PRO Non-Thermally Compensated Proportional Valve

**Pneumatic Interface**
- MD PRO Manifold Mount
- MD PRO Barbed

**Electrical Interface**
- 18” Wire Lead
- 4 PC Pin
- Quick Connect Spade

**MD PRO Manifold Mount and Barbed Body Basic Valve Dimensions**

![Diagram of MD PRO Valve Dimensions]
**MD PRO** Non-Thermally Compensated Proportional Valve

**MD PRO  Installation and Use**

**Typical Valve Set-up**

```
INLET

PRESSURE REGULATOR

INPUT SIGNAL

MD PRO VALVE

VALVE DRIVER CIRCUIT

FLOW OR PRESSURE SENSOR/METER

OUTLET
```

Pressure setup shown above. Vacuum setup is also available.

**Valve Electrical Control**

**Basic Control:**
The MD PRO valve can be controlled by either voltage or current; however, it is highly recommended that current control be employed to ensure the most repeatable valve flow performance.

**PWM Control:**
For PWM control, the signal applied to the valve should have a frequency between 5-12kHz. Optimum frequency will be application dependent.

**Suggested MD PRO Current Driver Schematic**

![Suggested MD PRO Current Driver Schematic]

<table>
<thead>
<tr>
<th>MIN COIL VOLTAGE (VDC)</th>
<th>I_RANGE (mA)</th>
<th>R1(Ω)</th>
<th>R2(Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.5</td>
<td>0–304</td>
<td>5100</td>
<td>330</td>
</tr>
<tr>
<td>6.0</td>
<td>0–212</td>
<td>4990</td>
<td>221</td>
</tr>
<tr>
<td>11.5</td>
<td>0–152</td>
<td>5100</td>
<td>160</td>
</tr>
<tr>
<td>13.5</td>
<td>0–125</td>
<td>4420</td>
<td>113</td>
</tr>
<tr>
<td>20.0</td>
<td>0–91</td>
<td>4420</td>
<td>82</td>
</tr>
<tr>
<td>29.0</td>
<td>0–66</td>
<td>4990</td>
<td>66.5</td>
</tr>
</tbody>
</table>
**Miniature Proportional Valves**

**MD PRO**   Non-Thermally Compensated Proportional Valve

**Manifold & O-Ring Dimensions & Design**

Not shipped with valves.

---

**Ordering Information**

<table>
<thead>
<tr>
<th>Sample Part ID</th>
<th>Description</th>
<th>Standard</th>
<th>Model Number</th>
<th>Elastomer/Body</th>
<th>Coil Selection*</th>
<th>Electrical Interface</th>
<th>Pneumatic Interface</th>
<th>Cleaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDPRO4 V A F 8S</td>
<td>Sample Part ID</td>
<td>MDPRO4</td>
<td>V A F 8S</td>
<td>Options</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Options**

- **4**: 75 psid/0.040"
- **5**: 100 psid/0.050"
- **6**: 50 psid/0.065"

*Max Operating Pressure/Orifice Size

**Accessories**

- **40 Micron Screen**

---

In order to provide the best possible solution for your application, please provide the following requirements when contacting Applications Engineering:

- Media, Inlet & Outlet Pressures
- Minimum Required Flow Rate
- System Supply Voltage
- Media & Ambient Temperature Range.

**NOTE:** Please consult Parker Precision Fluidics for other considerations.

For more detailed information, visit us on the Web, or call and refer to Performance Spec. #790-002206-001 and Drawings #890-003022-001 and #890-003022-003.

---

For more information call +1 603 595 1500 or email ppinfo@parker.com
Visit www.parker.com/precisionfluidics
PACE Hf  Miniature Ultra High Flow, Low Power Proportional Valve
Maximum Flow Proportional Valve

The PACE Hf is a high flow proportional valve utilizing a Parker Advanced Technology actuator to deliver precise control, elevated flow, and minimal power consumption in a small package. The PACE Hf is the ideal solution for applications sensitive to repeatability, hysteresis, and response time, delivering 180 slpm of air at 30 psi while consuming less than 1 watt of power.

Features
• Wide controllable range and tight control under varying inlet pressures.
• High inlet pressure capable (100 psi).
• Inlet and outlet pressure balanced make it ideal for pressure control
• Low power consumption, low heat generation.
• Proven performance tested to 100 million cycles.
• Small size and light weight, highest flow capacity in class.
• RoHs compliant.

Performance Data

Electrical
Power Steady State:
Rapid Response - 0.45 Watts
Digital Compensation - 0.6 Watts

Power:
Steady state 0.6 Watts (MAX)
Cycling 15Hz 1.2 Watts

Supply Voltage:
12 VDC (-5% + 10%)

Control Voltage:
0 to 10 VDC

Wetted Materials
Body:
C36000 Brass
All Others:
FKM; 17-4 PH Stainless Steel

Performance Characteristics
Internal Leak Rate:
< 5.0 sccm of air @ 100 psig (6.89 bar)

External Leak Rate:
< 1 sccm of air @ 100 psig (6.89 bar)

Pressure:
Operating -10 to 100 psig (6.89 bar)
Proof 150 psig (10.34 bar)

Orifice Size:
0.128” effective (3.35 mm)

Hysteresis:
Rapid Response - 23%
Digital Compensation - 3%

Response Time:
Rapid Response - 5 msec typical
Digital Compensation - 10 msec typical

Typical Applications:
• Acute & Sub-Acute Ventilators
• Portable Ventilators
• Anaesthesia
• Pressure & Flow Control
• Mass Flow Controllers

Technical Specifications:
Valve Type:
2-Way Normally Closed

Media:
Air, oxygen, hydrogen, heliox, carbon dioxide, argon, nitrogen & others

Operating Environment:
32 to 131°F (0 to 55°C)

Storage Temperature:
-40 to 158°F (-40 to 70°C)

Length:
1.35 in (58 mm)

Width:
1.0 in (25 mm)

Height:
2.29 in (35 mm)

Porting:
Manifold Mount;
1/8 NPT Optional Manifold

Weight:
0.104 lbs (47 grams)

Filtration:
40 Micron (Customer Supplied)

Oxygen Service Clean:
Standard
PACE Hf  Miniature Ultra High Flow, Low Power Proportional Valve

Rapid Response Typical Flow Curves (Tested w/air 20°C)

Rapid Response:
- Hysteresis extremely stable at 23%
- Steady state power: 0.45 Watts maximum
- Optimized for closed loop systems
- Controllable range to <0.5 slpm

Rapid Response Typical Low Flow Curves (Tested w/air 20°C)
PACE Hf Miniature Ultra High Flow, Low Power Proportional Valve

Digital Compensation Typical Flow Curves (Tested w/air 20°C)

Digital Compensation:
- Hysteresis digitally compensated to 3% via Microprocessor
- Steady state power: 0.60 Watts
- Optimized for open loop systems
- Controllable range to <0.5 slpm

Digital Compensation Typical Low Flow Curves (Tested w/air 20°C)
PACE Hf  Miniature Ultra High Flow, Low Power Proportional Valve

Dimensions
Manifold Mount

Manifold (Optional)

Test Lead Connector 9"

Ordering Information

<table>
<thead>
<tr>
<th>Sample Part ID</th>
<th>Description</th>
<th>Series</th>
<th>Elastomer</th>
<th>Pneumatic Interface</th>
<th>Body</th>
<th>Control Method</th>
<th>Compensation</th>
<th>Calibration</th>
</tr>
</thead>
<tbody>
<tr>
<td>941</td>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

**NOTE:** Please consult Parker Precision Fluidics for other considerations. For more detailed information, visit us on the Web, or call and refer to Performance Spec. Digital Compensation #790-002309-001, Rapid Response #790-002309-002 and Drawing #890-003248-001.

For more information call +1 603 595 1500 or email ppinfo@parker.com
Visit www.parker.com/precisionfluidics
Miniature High Flow Proportional Valve
Non-Thermally Compensated Proportional Valve

The VSO®- MAX is a high flow proportional valve that provides maximum flow capabilities to 240 slpm while consuming less than two watts of power. By offering 18% more flow and using 25% less power than the nearest competitive valve on the market, VSO®- MAX becomes the ideal solution for applications requiring low hysteresis and fast response, such as ventilators with fresh breathing circuit gas delivery, as well as other medical, analytical, and pathogen detection devices. This valve can be used with inlet pressures of up to 60 psig (4 bar) and features three standard control voltage ranges, including 5, 12, and 24 VDC.

Features
- Capable of 240 slpm flow and pressures up to 60 psig (4 bar).
- Face seal manifold mount; manifold available with 1/8 NPT ports.
- Proven performance to minimum 25 million life cycles.
- Light weight (70 grams).
- Low power solution.
- RoHS compliant.

Performance Data

Physical Properties

<table>
<thead>
<tr>
<th>Valve Type:</th>
<th>2-Way Normally Closed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Media:</td>
<td>Air, argon, helium, hydrogen, methane, nitrogen, oxygen, &amp; others</td>
</tr>
<tr>
<td>Operating Environment:</td>
<td>41 to 131°F (5 to 55°C)</td>
</tr>
<tr>
<td>Storage Temperature:</td>
<td>-40 to 158°F (-40 to 70°C)</td>
</tr>
<tr>
<td>Length:</td>
<td>2.02 in (51.3 mm)</td>
</tr>
<tr>
<td>Width:</td>
<td>0.625 in (16.51 mm)</td>
</tr>
<tr>
<td>Height:</td>
<td>0.68 in (17.01 mm)</td>
</tr>
<tr>
<td>Porting:</td>
<td>Manifold mount</td>
</tr>
<tr>
<td>Weight:</td>
<td>0.153 lbs. (70 gm)</td>
</tr>
</tbody>
</table>

Filtration:
- 40 Micron (Customer Supplied)

Flow Direction:
- Inlet Port Port 1
- Outlet Port Port 2

Electrical
- Power: 2.0 Watts maximum @ 20°C

Orifice Sizes:
- 0.166" effective (2.946 mm)

Wetted Materials
- Body: 360 HO2 Brass
- Stem Base: 430 FR Stainless Steel and Brass
- All Others: FKM; 430 FR Stainless Steel; 300 Series Stainless Steel

Leak Rate:
The leakage shall not exceed the following values:
- Internal 5.0 SCCM of air with a differential pressure of 60 psi (4 bar)
- External 0.5 SCCM of air at 60 psi (4 bar)

Pressure:
- Operating 5 - 60 psig (4.14 bar)
- Proof 160 psig (11 bar)

Hysteresis:
- 7% of full scale current (Typical)
- 15% of full scale current (Max)

VSO is a registered trademark of Parker Hannifin Corporation.
Non-Thermally Compensated Proportional Valve

**Typical Air Flow with 12VDC 68 Ohm coil (Tested w/air 20°C)**

<table>
<thead>
<tr>
<th>Orifice Diameter</th>
<th>Maximum Operating Inlet Pressure</th>
<th>Maximum Operating Pressure Differential</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.116&quot; (2.946mm)</td>
<td>60 psig (4.14 bar)</td>
<td>60 psid (4.14 bar)</td>
</tr>
</tbody>
</table>

**Table 2: Electrical Requirements**

<table>
<thead>
<tr>
<th>Minimum Available Voltage (VDC)</th>
<th>Nominal Coil Resistance @ 20°C (Ohms)</th>
<th>Input Current for Full Flow (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>11.9</td>
<td>423</td>
</tr>
<tr>
<td>12</td>
<td>68.4</td>
<td>170</td>
</tr>
<tr>
<td>24</td>
<td>273.6</td>
<td>85</td>
</tr>
</tbody>
</table>
VSO® Non-Thermally Compensated Proportional Valve

Pneumatic Interface

VSO® Manifold Mount

Electrical Interface

18” Wire Lead

VSO® Manifold Body Basic Valve Dimensions

NOTES:
1- ALL DIMENSIONS ARE REFERENCE.
2- DIMENSIONS ARE INCH[MM].
**VSO®** Non-Thermally Compensated Proportional Valve

**VSO® Installation and Use**

**Typical Valve Set-up**

![Typical Valve Set-up Diagram]

Pressure setup shown above. Vacuum setup is also available.

**Valve Electrical Control**

**Basic Control:**
The VSO®-MAX valve can be controlled by either voltage or current; however, it is highly recommended that current control be employed to ensure the most repeatable valve flow performance.

**PWM Control:**
For PWM control, the signal applied to the valve should have a frequency between 5-12kHz. Optimum frequency will be application dependent.

**Suggested VSO® Current Driver Schematic**

![Suggested VSO® Current Driver Schematic Diagram](image_url)

**Table: Suggested VSO® Current Driver Schematic**

<table>
<thead>
<tr>
<th>MIN COIL VOLTAGE (VDC)</th>
<th>I_RANGE (mA)</th>
<th>R1(Ω)</th>
<th>R2(Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.0</td>
<td>0–423</td>
<td>1000</td>
<td>95.3</td>
</tr>
<tr>
<td>12.0</td>
<td>0–170</td>
<td>2260</td>
<td>33.6</td>
</tr>
<tr>
<td>24.0</td>
<td>0–85</td>
<td>4990</td>
<td>18.2</td>
</tr>
</tbody>
</table>
Miniature Proportional Valves

**Ordering Information**

In order to provide the best possible solution for your application, please provide the following requirements when contacting Applications Engineering:

- Media, Inlet & Outlet Pressures
- Minimum Required Flow Rate
- System Supply Voltage
- Media & Ambient Temperature Range.

**NOTE:** Please consult Parker Precision Fluidics for other considerations. For more detailed information, visit us on the Web, or call and refer to Performance Spec. #790-002288-001 and Drawing #890-003230-001.

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For more information call +1 603 595 1500 or email ppfinfo@parker.com

Visit [www.parker.com/precisionfluidics](http://www.parker.com/precisionfluidics)
**HF PRO** High Flow Proportional Valve
Non-Thermally Compensated Proportional Valve

The HF PRO controls the flow of gas proportionally to input current. The valve may be driven with DC current or Pulse Width Modulation. HF PRO achieves optimal system performance when it uses closed loop feedback.

**Features**
- Capable of 60 lpm flow and pressures up to 50 psig.
- Face seal manifold mount or 5mm barbed body options.
- Proven performance to minimum 35 million life cycles.
- Non-thermally compensated proportional valve.
- RoHS compliant.

**Typical Applications:**
- Ventilators
- O₂ Concentrators/Conservers
- Anaesthesia
- Patient Monitors
- Pressure & Flow Control

**Performance Data**

<table>
<thead>
<tr>
<th>Physical Properties</th>
<th>Physical Properties</th>
<th>Performance Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Valve Type:</strong></td>
<td>Internal Volume:</td>
<td><strong>Leak Rate:</strong></td>
</tr>
<tr>
<td>2-Way Normally Closed</td>
<td>0.031 in³ (0.508 cm³)</td>
<td>The leakage shall not exceed</td>
</tr>
<tr>
<td><strong>Media:</strong></td>
<td>Filtration:</td>
<td>the following values:</td>
</tr>
<tr>
<td>Air, argon, helium,</td>
<td>43 micron</td>
<td>Internal 0.5 SCCM of N₂</td>
</tr>
<tr>
<td>hydrogen, methane,</td>
<td></td>
<td>External 0.016 SCCM of N₂</td>
</tr>
<tr>
<td>nitrogen, oxygen, &amp;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>others</td>
<td><strong>Flow Direction:</strong></td>
<td><strong>Pressure:</strong></td>
</tr>
<tr>
<td></td>
<td>Inlet Port</td>
<td>0 to 50 psi (3.45 bar)</td>
</tr>
<tr>
<td></td>
<td>Port 2</td>
<td>See Table 1</td>
</tr>
<tr>
<td></td>
<td>Outlet Port</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Port 1</td>
<td></td>
</tr>
<tr>
<td><strong>Operating Environment:</strong></td>
<td>Oxygen and Analytically Clean:</td>
<td>Standard</td>
</tr>
<tr>
<td>32 to 131°F (0 to 55°C)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Storage Temperature:</strong></td>
<td></td>
<td><strong>Vacuum:</strong></td>
</tr>
<tr>
<td>-40 to 158°F (-40 to 70°C)</td>
<td></td>
<td>0-27 in Hg (0-686 mm Hg)</td>
</tr>
<tr>
<td><strong>Length:</strong></td>
<td><strong>Orifice Size:</strong></td>
<td></td>
</tr>
<tr>
<td>1.785 in (45.34 mm)</td>
<td>0.070” (1.8 mm)</td>
<td></td>
</tr>
<tr>
<td><strong>Width:</strong></td>
<td><strong>Hysteresis:</strong></td>
<td>7% of full scale current (Typical)</td>
</tr>
<tr>
<td>0.625 in (16.51 mm)</td>
<td>15% of full scale current (Max)</td>
<td></td>
</tr>
<tr>
<td><strong>Height:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.67 in (17.02 mm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Porting:</strong></td>
<td><strong>Filtration:</strong></td>
<td></td>
</tr>
<tr>
<td>1/8” Barbs, Manifold Mount</td>
<td>43 micron</td>
<td></td>
</tr>
<tr>
<td><strong>Weight:</strong></td>
<td><strong>Flow Direction:</strong></td>
<td></td>
</tr>
<tr>
<td>2.2 oz (62.86 grams)</td>
<td>Inlet Port</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Port 2</td>
<td>Outlet Port Port 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Oxygen and Analytically Clean:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Standard</td>
</tr>
<tr>
<td><strong>Electrical</strong></td>
<td><strong>Power:</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.0 Watts maximum</td>
<td></td>
</tr>
<tr>
<td><strong>Voltage:</strong></td>
<td><strong>See Table 2</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Electrical Termination:</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>18 in Wire Leads</td>
<td></td>
</tr>
<tr>
<td><strong>Filtration:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>Inlet Port Port 2</td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
<td></td>
</tr>
<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>Standard</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Internal Volume:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.031 in³ (0.508 cm³)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Filtration:</strong></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>18 in Wire Leads</td>
<td></td>
</tr>
</tbody>
</table>

**Wetted Materials**
- **Body:** 360 HO2 Brass
- **Stem Base:** 430 FR Stainless Steel and Brass 360 HT
- **All Others:** FKM; 430 FR Stainless Steel; 300 Series Stainless Steel

**VSO** is a registered trademark of Parker Hannifin Corporation.
HF PRO Non-Thermally Compensated Proportional Valve

Typical Air Flow with 20 VDC Coil

HF PRO Pressure vs Flow Curve

Pressure (bar)

Flow Rate (slpm)

0.070" (1.8 mm) Orifice

Pressure (psi)

Table 1: Pressure and Flow Capabilities

<table>
<thead>
<tr>
<th>Orifice Diameter</th>
<th>Maximum Operating Inlet Pressure</th>
<th>Maximum Operating Pressure Differential</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.070in (1.8 mm)</td>
<td>150 psig (10.34 bar)</td>
<td>50 psid (3.45 bar)</td>
</tr>
</tbody>
</table>

Table 2: Electrical Requirements

<table>
<thead>
<tr>
<th>Minimum Available Voltage (VDC)</th>
<th>Nominal Coil Resistance @ 20°C (Ohms)</th>
<th>Input Current for Full Flow (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>11.9</td>
<td>435</td>
</tr>
<tr>
<td>12</td>
<td>68</td>
<td>175</td>
</tr>
<tr>
<td>24</td>
<td>274</td>
<td>87</td>
</tr>
</tbody>
</table>
Miniature Proportional Valves

HF PRO Non-Thermally Compensated Proportional Valve

Pneumatic Interface

HF PRO Manifold Mount

HF PRO Barbed

Electrical Interface

HF PRO 18” Wire Lead

HF PRO Manifold Mount Option

HF PRO Barbed Mount Option

Port 2 (OUTLET)

BRASS BODY AND BARBS

2X Ø 0.125 [Ø3.18 ± .05] THRU

2X #26 AWG, BLACK WIRES
18.5” ± .50 [469.9 ± 12.7] LG.

.60 [15.24]

.505 [12.83]

.50 [12.7]

.61 [15.50]

.505 [12.83]

.75 [.19]

.60 [.15]

.305 [.77]

.305 [7.75] ± .016

.305 [7.75] ± .016

.125 [.31] ± .02 [.78 ± .05]

.166 [.42]

.125 [.31] ± .02 [.78 ± .05]

.281 [.71] ± .09 [.14 ± .06]

1.53 [.39] ± .86 [3.96] APPROX.

2X Ø .228

2X Ø .268 [.068]

(.067)

.325 [.825]

2X Ø .263 [.067]

(.068)

.605 [.153]

2X Ø .125 [Ø3.18] THRU

Port 1 (INLET)

2X #26 AWG, BLACK WIRES
18.5” ± .50 [469.9 ± 12.7] LG.

.50 [12.7]

.505 [12.83]

.60 [15.24]

.505 [12.83]

.75 [.19]

.60 [.15]

.305 [.77]

.305 [7.75] ± .016

.305 [7.75] ± .016

.125 [.31] ± .02 [.78 ± .05]

.166 [.42]

.125 [.31] ± .02 [.78 ± .05]

.281 [.71] ± .09 [.14 ± .06]

1.53 [.39] ± .86 [3.96] APPROX.

2X Ø .228

2X Ø .268 [.068]

(.067)

.325 [.825]

2X Ø .263 [.067]

(.068)

.605 [.153]
HF PRO Non-Thermally Compensated Proportional Valve

HF PRO Installation and Use

Typical Valve Set-up

Valve Electrical Control

Basic Control:
The HF PRO valve can be controlled by either voltage or current; however, it is highly recommended that current control be employed to ensure the most repeatable valve flow performance.

PWM Control:
For PWM control, the signal applied to the valve should have a frequency between 5-12kHz. Optimum frequency will be application dependent.

Suggested HF PRO Current Driver Schematic

<table>
<thead>
<tr>
<th>MIN. COIL VOLTAGE (VDC)</th>
<th>L_RANGE (mA)</th>
<th>R1(Ω)</th>
<th>R2(Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>0–435</td>
<td>1000</td>
<td>95.3</td>
</tr>
<tr>
<td>12</td>
<td>0–175</td>
<td>2260</td>
<td>33.6</td>
</tr>
<tr>
<td>24</td>
<td>0–87</td>
<td>4990</td>
<td>18.2</td>
</tr>
</tbody>
</table>
HF PRO Non-Thermally Compensated Proportional Valve

Manifold & O-Ring Dimensions & Design
Not shipped with valves.

<table>
<thead>
<tr>
<th>Sample Part ID</th>
<th>Sample Part Description</th>
<th>Sample Part ID</th>
<th>Sample Part Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Part ID</td>
<td>Sample Part Description</td>
<td>Sample Part ID</td>
<td>Sample Part Description</td>
</tr>
</tbody>
</table>

Ordering Information

<table>
<thead>
<tr>
<th>Series</th>
<th>Model Number</th>
<th>Elastomer/Body</th>
<th>Coil Selection</th>
<th>Electrical Interface</th>
<th>Pneumatic Interface</th>
<th>Cleaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>V</td>
<td>A</td>
<td>F</td>
<td></td>
<td></td>
<td>O</td>
</tr>
</tbody>
</table>

Options

- Max. Operating Pressure/Orifice Size
  - 7: 50 psid/0.070"
- Elastomer/Body
  - V: FKM/Brass
  - X: Max Voltage* = 144VDC, 90°C

- Max Voltage for continuous full flow, ambient temperature 55°C

- Wire Leads, 18"

- Manifold Mount
- Barbed Body

In order to provide the best possible solution for your application, please provide the following requirements when contacting Applications Engineering:

- Media, Inlet & Outlet Pressures
- Minimum Required Flow Rate
- System Supply Voltage
- Media & Ambient Temperature Range.

NOTE: Please consult Parker Precision Fluidics for other considerations.

For more detailed information, visit us on the Web, or call and refer to Performance Spec. #790-002243-001 and HF PRO Barbed Drawing #890-003192-001 and HF PRO Manifold Mount Drawing #890-003191-001.

For more information call +1 603 595 1500 or email ppfinfo@parker.com
Visit www.parker.com/precisionfluidics

PPF-MPv-002/US  September 2011


Value Added  Application-Specific Solutions

Gassing Control System

- Mixed gassing logic design includes VSO® proportional valves.
- Mixed pneumatic logic design
- X-Valve®, pressure switch, pressure sensors, and PCB interface

Pneumatic Module

- Integrated valve manifold
- Compact design
- Single electrical connection
- Valves configured per specifications

Vacuum Gas Control Module

- Tested to $1 \times 10^7$ cc/sec/atm Helium
- Assembly tested on mass spectrometer

6 Position VSO® Proportional Pneumatic Manifold Assembly

- Quick connect fittings
- Circuit board with mass electrical termination

Magnum Manifold Assembly

- Integrated circuit board with single connection
- Compact design
- Easily adaptable
- 2 way and 3 way designs

8 Position SRS Model Pneumatic Manifold

- Integrated pressure/vacuum sensors
- Mixed pneumatic logic design
- Ultem® manifold pressure/vacuum sensors

10 Position X-Valve® Pneumatic Manifold

- Mixed pneumatic logic design
- Ultra-miniature design with PCB for mass termination

10 Position SRS Model Pneumatic Manifold

- Integrated pressure/vacuum sensors
- Mixed pneumatic logic design
- Ultem® manifold pressure/vacuum sensors
WARNING

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY, AND PROPERTY DAMAGE.

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