

aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding



Miniature Proportional Valves

Precision Fluidics



ENGINEERING YOUR SUCCESS.

Innovative solutions for health care success












ENGINEERING **YOUR** SUCCESS.

When you partner with the global leader in motion and control technologies, expect to move your business and the world forward. From miniature solenoid valves to highly integrated automation systems, our innovations are critical to life-saving medical devices and scientific instruments used for drug discovery and pathogen detection. Not to mention, critical to decreasing time to market and lowering your overall cost of ownership. So partner with Parker, and get ready to move, well, anything.



www.parker.com/precisionfluidics 1 603 595-1500

Table of Contents

	product		page
	VSO®	Thermally Compensated Miniature Proportional Valve Thermally compensated design provides precise flow control up to 56 slpm	4
	VSO® Low Flow	Thermally Compensated Low Flow Miniature Proportional Valve Thermally compensated design provides precise controllable low flow of 1 to 500 sccm	12
	VSO®-MI	Thermally Compensated Miniature Proportional Valve High performance, efficient design provides precise flow control up to 40 slpm	17
	MD PRO	Miniature Proportional Valve Economical, non-thermally compensated design provides pressure and flow control up to 56 slpm	24
	Lone Wolf	Normally Open Miniature Proportional Valve Normally open design provides rapid response with stable and accurate performance	31
	PACE Hf	Ultra High Flow, Low Power Miniature Proportional Valve Advanced technology design provides unparalleled controllable flow of 0.5 to 540 slpm	39
	VSO®-MAX	High Flow Miniature Proportional Valve Economical, low power design provides controllable flow up to 240 slpm	44
	HF PRO	High Flow Miniature Proportional Valve Efficient design delivers up to 60 slpm of flow at a pressure of 50 psi (3.4 bar)	50
	Value Added	Application-Specific Solutions	56

VSO® Miniature Proportional Valve

Thermally Compensated Proportional Valve




Typical Applications

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

The VSO® miniature proportional valve provides enhanced flow control for applications where precise control flow control is required up to 56 slpm. The VSO® miniature proportional valve provides precise flow control of gas in proportion to input current. The valve can be controlled with either DC current or pulse width modulation along with closed loop feedback to deliver optimal system performance. Together with its ability to provide precise control over varying temperatures and media types, the VSO® miniature proportional valve is ideally suited for manufacturers of medical and analytical equipment.

Features

- Enables precise flow control for improved instrument accuracy
- Thermally compensated to maintain precise flow over a wide range of media
- Computer automated calibration and serialization for performance traceability
- Cleaned for Oxygen and Analytical Service use
- Proven performance tested to 100 million life cycles
- RoHS compliant 

Physical Properties

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:
1.79 in (45.3 mm)
Width:
0.63 in (15.9 mm)
Height:
0.67 in (17.0 mm)
Porting:
1/8" (3 mm) barbs or 10-32 female; manifold mount (available with screens)
Weight:
2.2 oz (63 g)

Physical Properties

Internal Volume:
0.031 in ³ (0.508 cm ³)
Filtration: (Suggested and Available)
Models 1 & 2: 17 micron Models 3, 4, 5, & 6: 40 micron
Flow Direction:
Inlet Port Port 2 Outlet Port Port 1

Electrical

Power:
2.0 Watts maximum
Voltage:
See Table 2
Electrical Termination:
18" (45.7 cm) Wire Leads, PC Mount, Quick Disconnect Spade

Wetted Materials

Series 11 Body:
360 HO ₂ 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

Performance Characteristics

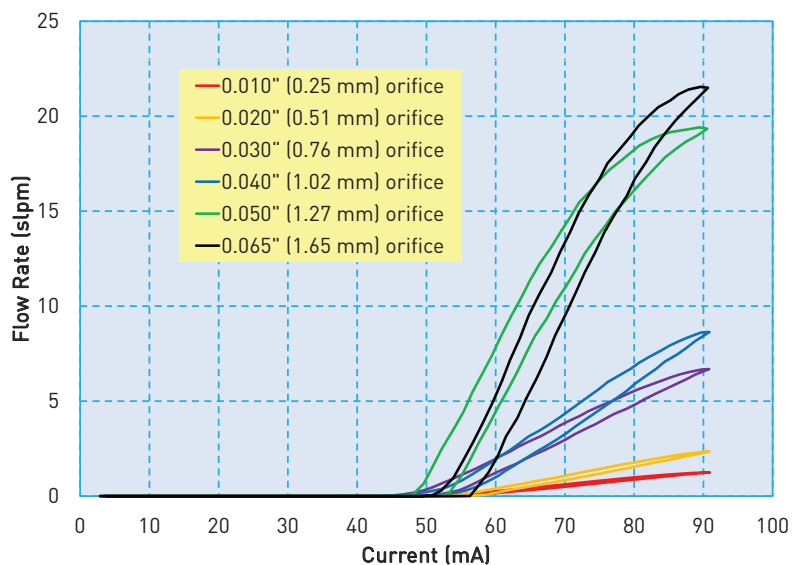
Leak Rate:
The leakage shall not exceed the following values: Internal 0.2 SCCM of He with a differential pressure of 1 psid, 25 psid and 150 psid External 0.016 SCCM of He at 150 psi
Pressure:
0 to 50 psi (3.45 bar) 0 to 75 psi (5.17 bar) 0 to 100 psi (6.89 bar) 0 to 150 psi (10.34 bar) See Table 1
Vacuum:
0-27 in Hg (0-686 mm Hg)
Orifice Sizes:
0.010 in (0.25 mm) 0.020 in (0.51 mm) 0.030 in (0.76 mm) 0.040 in (1.02 mm) 0.050 in (1.27 mm) 0.065 in (1.65 mm)
Hysteresis:
7% of full scale current (Typical) 15% of full scale current (Max)

VSO is a registered trademark of Parker Hannifin Corporation.



VSO® Thermally Compensated Proportional Valve

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



VSO® Pressure vs Flow Curves Models 1-6

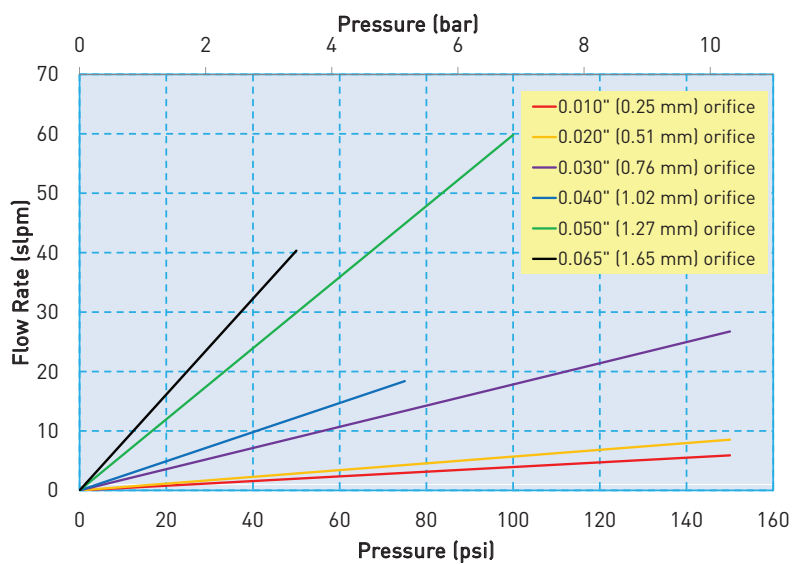


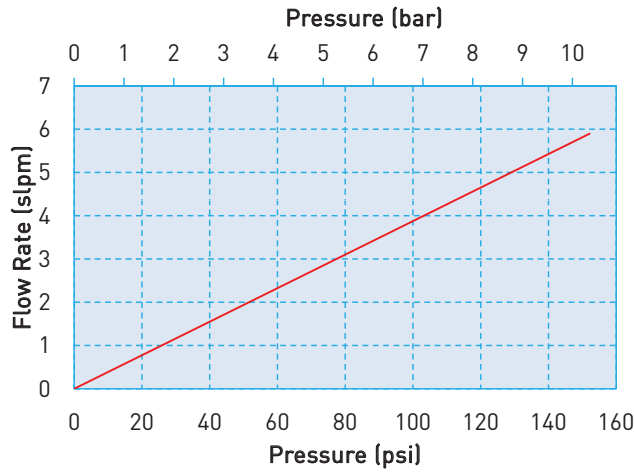
Table 1: Pressure and Flow Capabilities

Orifice Diameter	Maximum Operating Inlet Pressure	Maximum Operating Pressure Differential
0.010 in (0.25 mm)	150 psig (10.34 bar)	150 psid (10.34 bar)
0.020 in (0.51 mm)	150 psig (10.34 bar)	150 psid (10.34 bar)
0.030 in (0.76 mm)	150 psig (10.34 bar)	150 psid (10.34 bar)
0.040 in (1.02 mm)	150 psig (10.34 bar)	75 psid (5.17 bar)
0.050 in (1.27 mm)	150 psig (10.34 bar)	100 psid (6.89 bar)
0.065 in (1.65 mm)	150 psig (10.34 bar)	50 psid (3.45 bar)

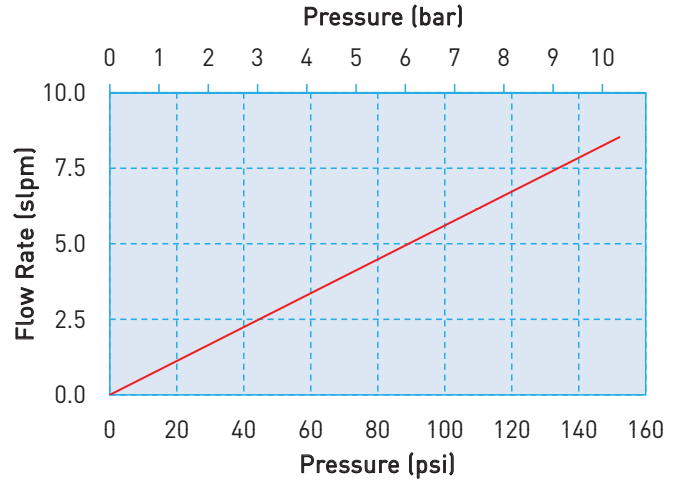
VSO® Thermally Compensated Proportional Valve

VSO® Sizing Charts

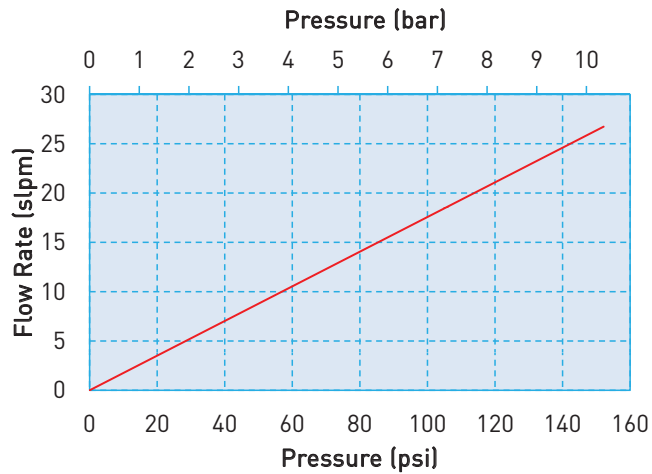
Model 1 - 0.010" (0.25 mm) Orifice



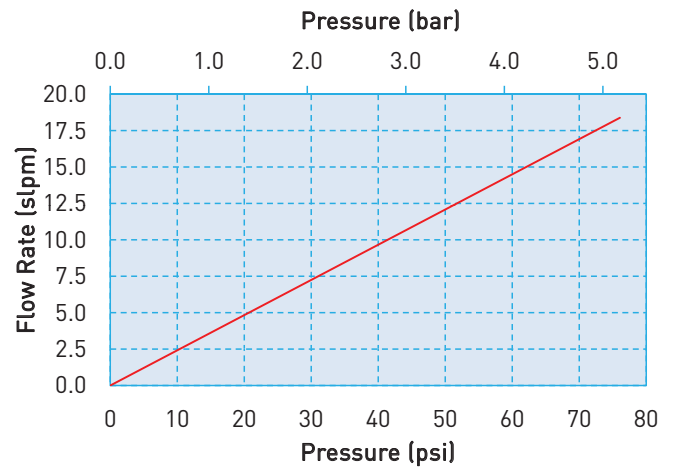
Model 2 - 0.020" (0.51 mm) Orifice



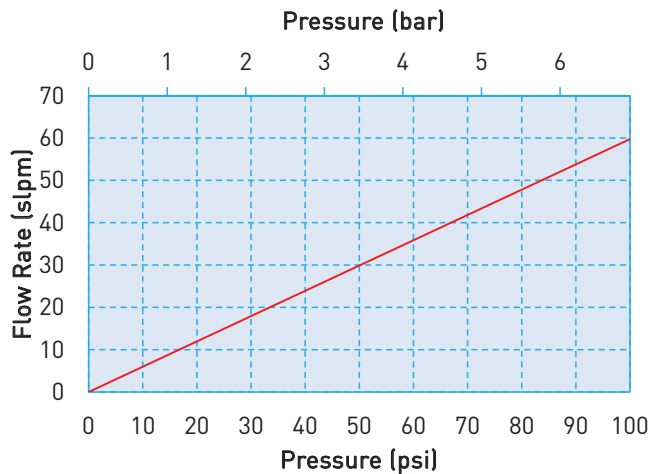
Model 3 - 0.030" (0.76 mm) Orifice



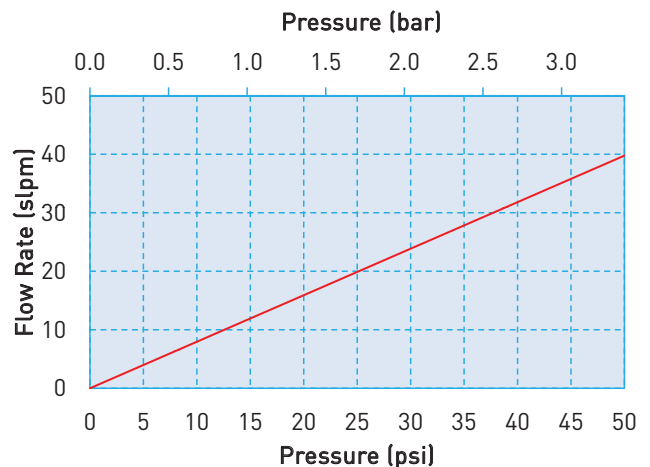
Model 4 - 0.040" (1.02 mm) Orifice



Model 5 - 0.050" (1.27 mm) Orifice



Model 6 - 0.065" (1.65 mm) Orifice



VSO® Thermally Compensated Proportional Valve

Pneumatic Interface

VSO® Series 11 Manifold Mount



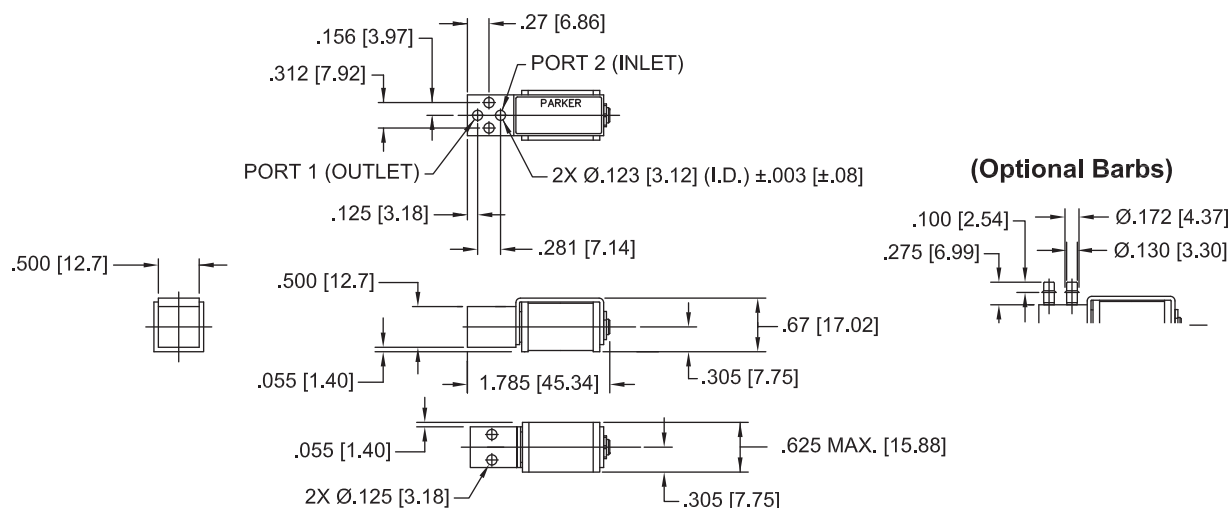
VSO® Series 11 Barbed



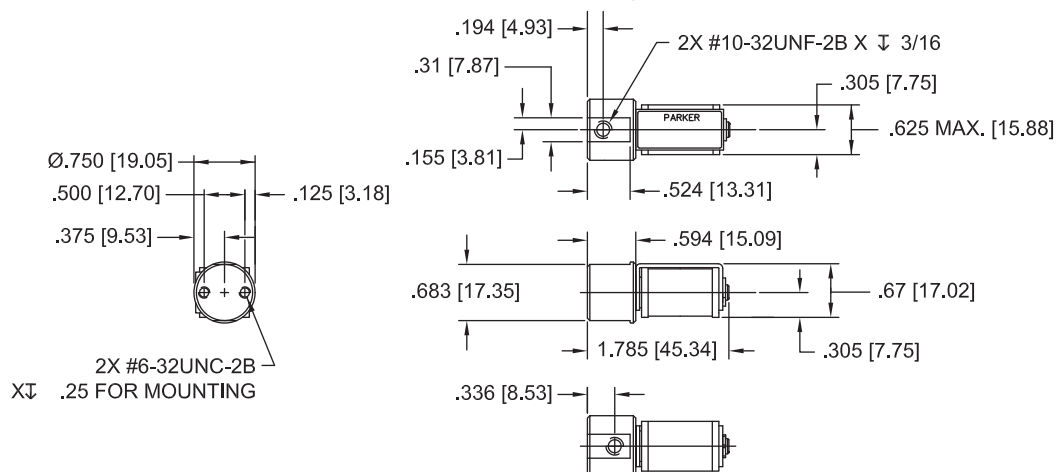
VSO® Series 25 10-32 Threaded



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



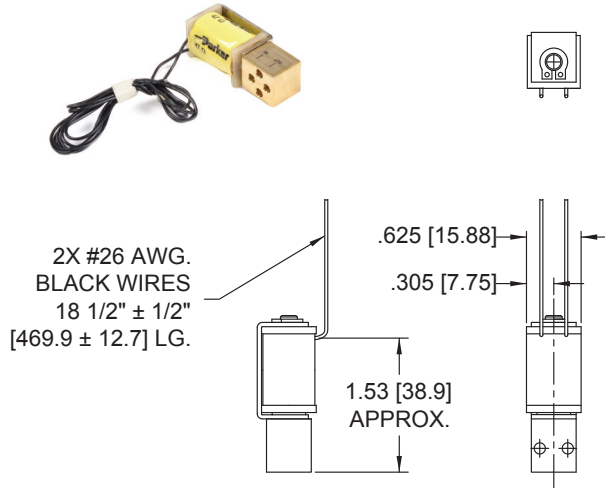
VSO® Series 25 10-32 Threaded Body Basic Valve Dimensions



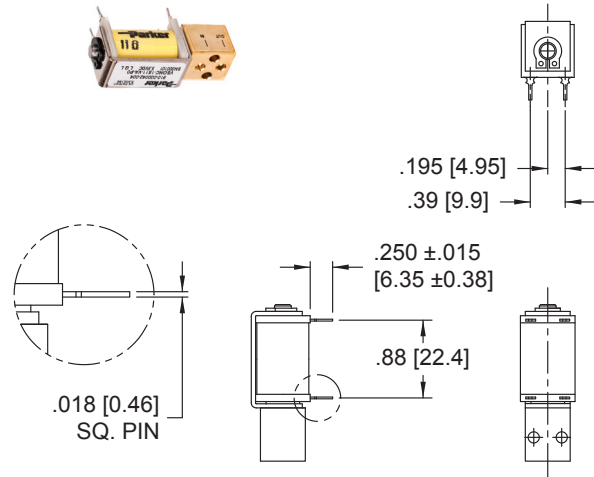
VSO® Thermally Compensated Proportional Valve

Electrical Interface

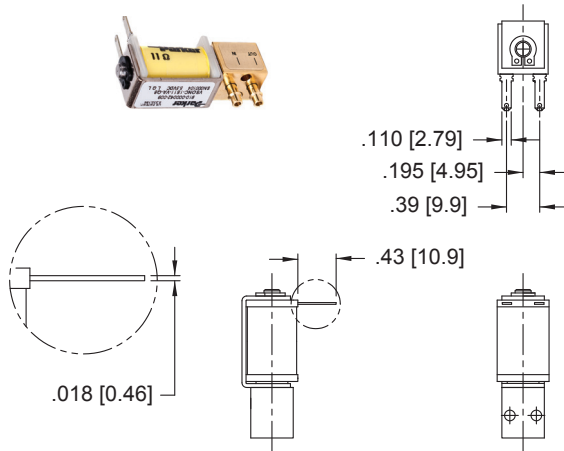
Coil Type: Wire Leads



Coil Type: 4 PC Pin*

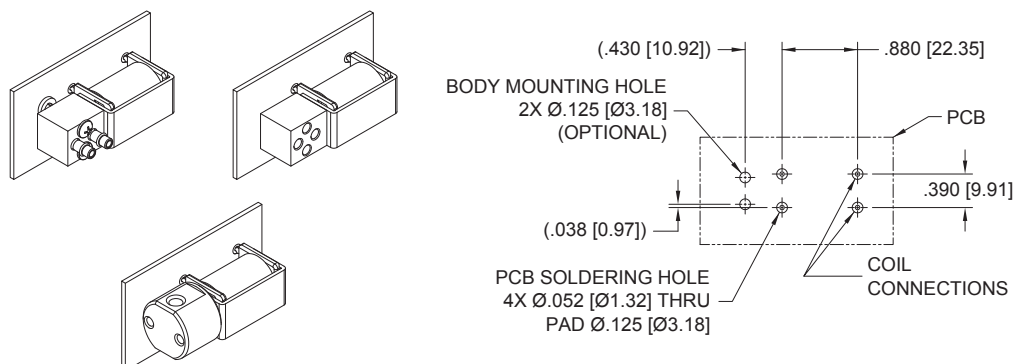


Coil Type: Quick Connect Spade



UNITS
IN. [mm.]

*PCB Pin Layout (Coil Type 4 PC Pin)



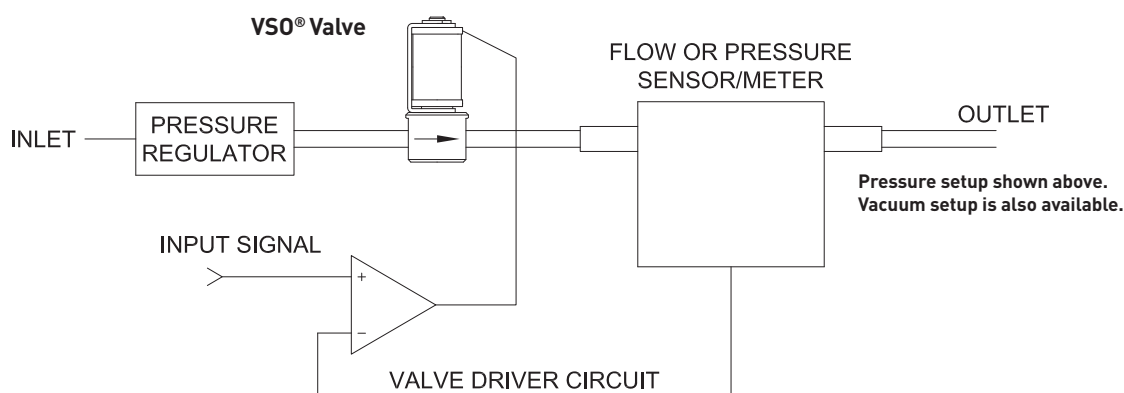
VSO® Thermally Compensated Proportional Valve

Table 2: Electrical Requirements

Minimum Available Voltage (VDC)	Nominal Coil Resistance @ 20 °C (Ohms)	Input Current for Full Flow (mA)
5.5	11	304
8.0	23	212
11.5	47	152
13.5	68	125
20.0	136	91
29.0	274	66
41.0	547	47
56.0	1094	32

VSO® Installation and Use

Typical Valve Set-up



Valve Electrical Control

Basic Control:

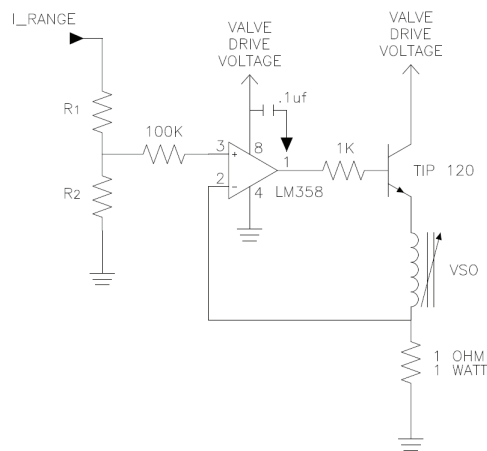
The VSO® valve can be controlled by either voltage or current; however, it is highly recommended that current control be employed to ensure the most repeatable valve flow performance.

PWM Control:

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

VSO® Thermally Compensated Proportional Valve

Suggested VSO® Current Driver Schematic



This simple current driver circuit draws only 1 mA at the input control (0-5VDC) and provides control for any VSO® valve configuration regardless of valve voltage or resistance.

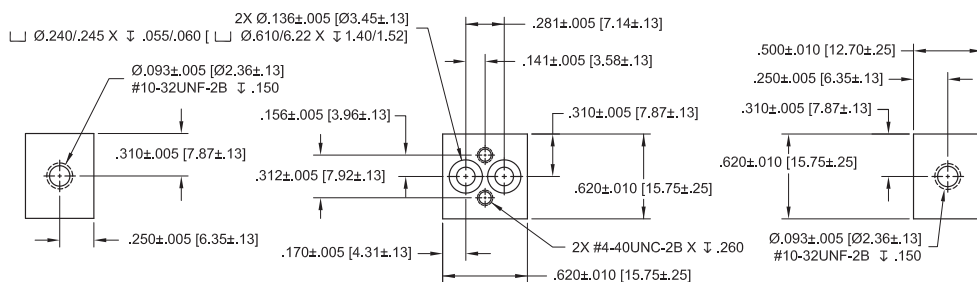
Table 3 (below) describes the recommended R1 and R2 resistor values based upon the full shut-off current.

Table 3: Selectable Resistor Values for a Low Current (1 mA) LM358-Based Current Driver

Minimum Available Voltage (VDC)	Valve Drive Voltage (VDC)	Nominal Coil Resistance @ 20°C (Ohms)	Input Current for Full Flow (mA)	R1 (Ohms)	R2 (Ohms)
5.5	7.5	11	304	5100	330
8.0	10.0	23	212	4990	221
11.5	13.5	47	152	5100	160
13.5	15.5	68	125	4420	113
20.0	22.0	136	91	4420	82
29.0	31.0	274	66	4990	66.5

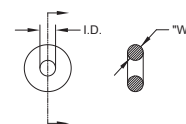
Manifold & O-Ring Dimensions & Design

Not shipped with valves.



O-RING DIMENSIONS

I.D. = Ø.114 ±.005 [Ø2.90 ±0.13]
W = .070 ±.003 [1.78 ±0.08]
O.D. = Ø.254 [Ø6.45] REFERENCE

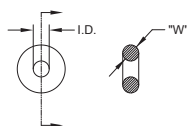


VSO® Thermally Compensated Proportional Valve

Accessories

O-Ring (Manifold Seal) Dimensions 190-007024-002 (2 required for each valve)

I.D. = $\varnothing .114 \pm .005$ [$\varnothing 2.90 \pm 0.13$]
W = $.070 \pm .003$ [1.78 ± 0.08]
O.D. = $\varnothing .254$ [$\varnothing 6.45$] REFERENCE



Screw 4-40 x 5/8" Pan Head, Phillips 191-000115-010 (2 required for each valve)



Ordering Information

Sample Part ID	VSONC	1	S	11	V	A	F	8
Description	Standard	Model Number: Maximum Operating Pressure / Orifice Size	Series	Body Series	Elastomer/ Body Material	Coil Voltage/Coil Resistance/Coil Current*	Electrical Interface	Pneumatic Interface
Options		1: 150 psi / 0.010" (0.25 mm) 2: 150 psi / 0.020" (0.51 mm) 3: 150 psi / 0.030" (0.76 mm) 4: 75 psi / 0.040" (1.02 mm) 5: 100 psi / 0.050" (1.27 mm) 6: 50 psi / 0.065" (1.65 mm)		11: Series 11 25: Series 25	V: FKM / Brass C: FFKM / Brass I: FFKM / Stainless Steel H: FKM / Stainless Steel	A: 5.5 VDC / 11 Ohm / 0.304 Amp B: 8 VDC / 23 Ohm / 0.212 Amp C: 11.5 VDC / 47 Ohm / 0.152 Amp D: 13.5 VDC / 68 Ohm / 0.125 Amp E: 20 VDC / 136 Ohm / 0.091 Amp F: 29 VDC / 274 Ohm / 0.066 Amp * Maximum voltage for continuous full flow, ambient temperature 55°C	F: Wire Leads, 18" (45.7 cm) P: PC Board Mount, 4 Pin Q: Quick Connect, Spade	0: Manifold Mount 1: Manifold Mount w/screens 5: 10-32 Threaded Female (Series 25) 8: 1/8" (3 mm) Barbs

Accessories	
190-007024-002: O-ring, FKM, 0.114" ID x 0.070" Thick*	* Not supplied with the valve. Used as a seal between the valve body and manifold.
191-000115-010: Screw 4-40 x 5/8" Pan Head **	**Not supplied with the valve. Used to mount the valve to a manifold.



NOTE: 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

Please click on the Order On-line button (or go to www.parker.com/precisionfluidics/vso) to configure your VSO® Thermally Compensated Proportional Valve. For more detailed information, visit us on the Web, or call and refer to VSO® Series 11 Performance Spec. #790-002115-001 and Drawings #890-003022-001 and #890-003022-003. VSO® Series 25 Performance Spec. #790-002115-001 and Drawing # 890-003023-001.


VSO® Low Flow

Thermally Compensated Proportional Valve



The VSO® Low Flow valve provides enhanced flow control for applications where precise control flow control is required between 0 - 500 sccm. Like the VSO® miniature proportional valve, the VSO® Low Flow miniature proportional valve provides precise flow control of gas in proportion to input current. The valve can be controlled with either DC current or pulse width modulation along with closed loop feedback to deliver optimal system performance. Together with its ability to provide precise control over a wide range of media, the VSO® Low Flow miniature proportional valve is ideally suited for manufacturers of Gas Chromatography and Mass Spectrometry equipment.

Features

- Enables precise low flow (0 - 500 sccm) control for improved instrument accuracy
- Thermally compensated to maintain precise flow over a wide range of media
- Computer automated calibration and serialization for performance traceability
- Cleaned for Oxygen and Analytical Service use
- Proven performance tested to 10 million life cycles
- RoHS compliant 

Typical Applications

- Gas Chromatography
- Mass Spectrometry
- Pressure & Flow Control
- Mass Flow Control

Physical Properties

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:
1.79 in (45.3 mm)
Width:
0.63 in (15.9 mm)
Height:
0.67 in (17.0 mm)
Porting:
Manifold mount
Weight:
2.2 oz (63 grams)

Physical Properties

Internal Volume:
0.031 in ³ (0.508 cm ³)
Filtration: (Suggested and Available)
Flow Direction:
Inlet Port Port 2
Outlet Port Port 1
Oxygen and Analytically Clean:
Standard

Electrical

Power:
2.0 Watts maximum
Voltage:
See Table 2
Electrical Termination:
18" (45.7 cm) Wire Leads

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

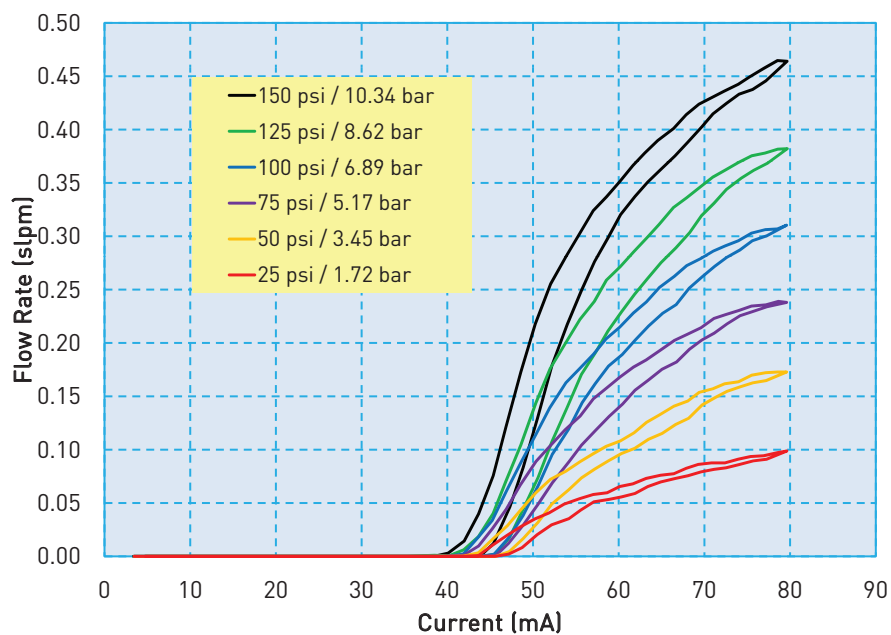
Leak Rate:
The leakage shall not exceed the following values:
Internal 0.2 SCCM of He with a differential pressure of 1 psid, 25 psid and 150 psid
External 0.016 SCCM of He at 150 psi
Pressure:
0 to 150 psi (10.34 bar)
See Table 1
Vacuum:
0-27 in Hg (0-686 mm Hg)
Orifice Size:
0.003" (0.076 mm)
Hysteresis:
7% of full scale current (Typical)
15% of full scale current (Max)

VSO is a registered trademark of Parker Hannifin Corporation.



VSO® Low Flow Thermally Compensated Proportional Valve

Typical Air Flow with 13.5 VDC Coil



VSO® Low Flow Pressure vs Flow Curve

Model L3 - 0.003" (0.076 mm) Orifice

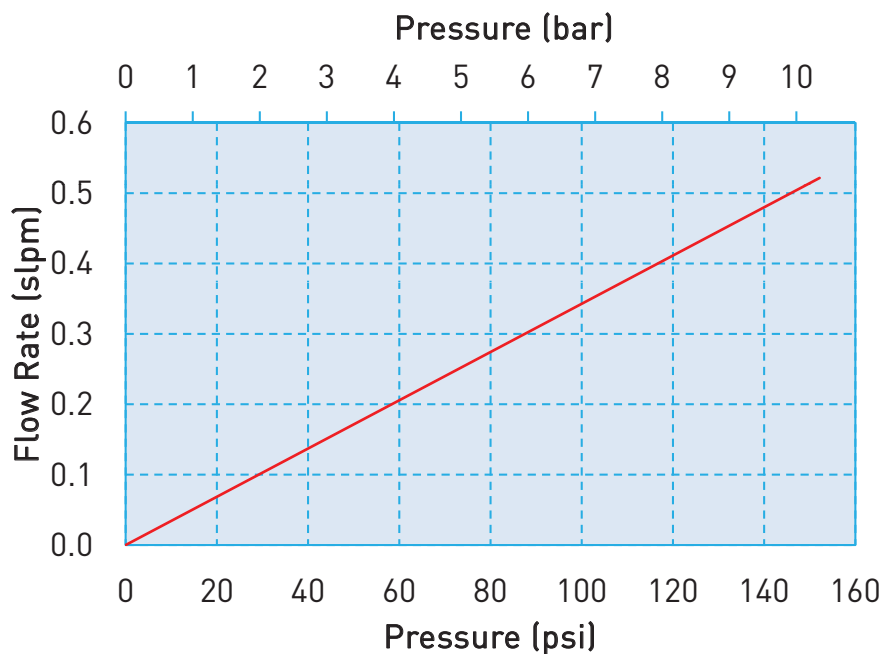


Table 1: Pressure and Flow Capabilities

Orifice Diameter	Maximum Operating Inlet Pressure	Maximum Operating Pressure Differential
0.003 in (0.076 mm)	150 psig (10.34 bar)	150 psid (10.34 bar)

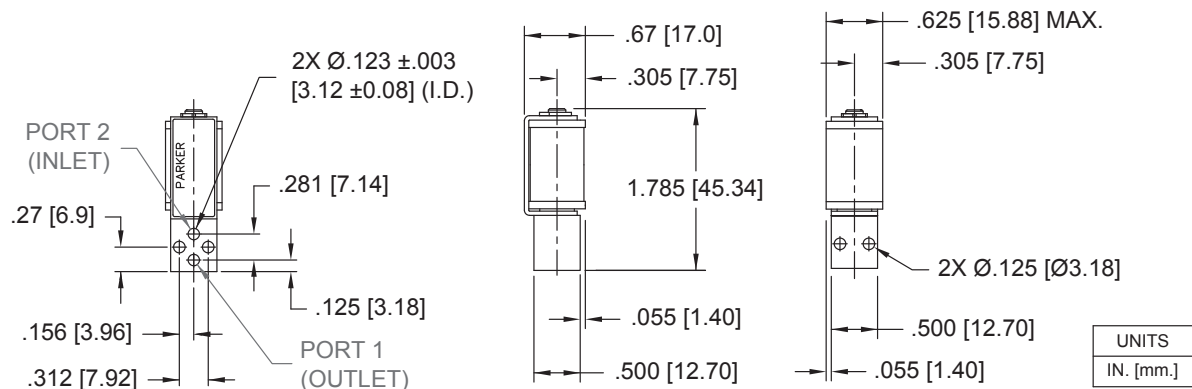
VSO® Low Flow Thermally Compensated Proportional Valve

Pneumatic Interface

**VSO® Low Flow
Manifold Mount**



VSO® Low Flow Basic Valve Dimensions



Electrical Interface

Coil Type: 18" Wire Lead

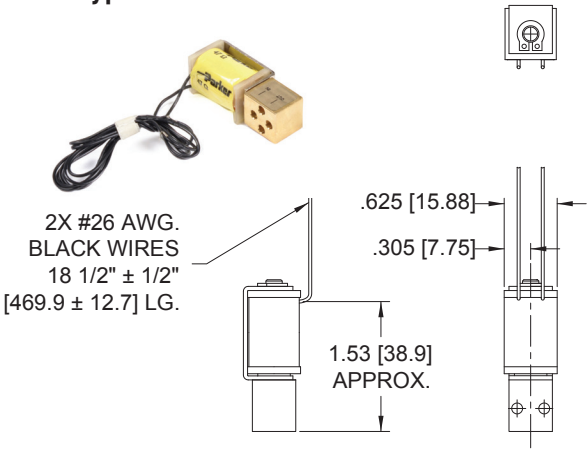


Table 2: Electrical Requirements

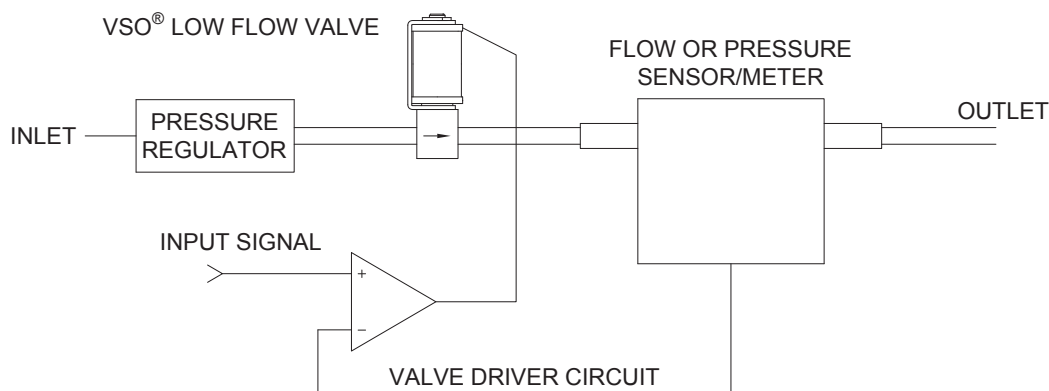
Minimum Available Voltage (VDC)	Nominal Coil Resistance @ 20° C (Ohms)	Input Current for Full Flow (mA)
6.5	47	130
8.0	68	115
12	136	80
18	274	60
24.0	547	43



VSO® Low Flow Thermally Compensated Proportional Valve

VSO® Low Flow Installation and Use

Typical Valve Set-up



Valve Electrical Control

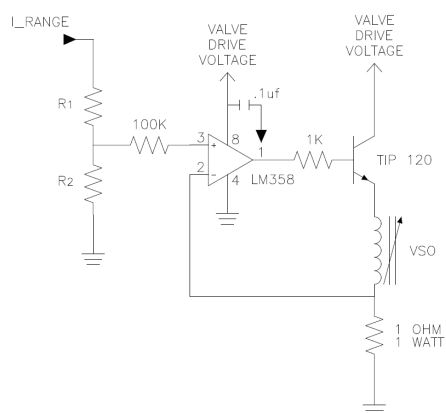
Basic Control:

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



This simple current driver circuit draws only 1 mA at the input control (0-5VDC) and provides control for any VSO® Low Flow configuration regardless of valve voltage or resistance.

Table 3 (below) describes the recommended R1 and R2 resistor values based upon the full shut-off current.

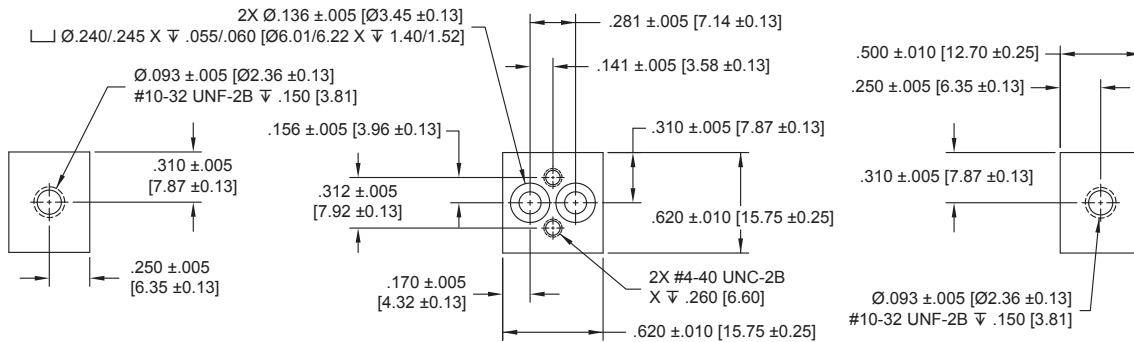
**Table 3: Selectable Resistor Values for a Low Current (1mA)
LM358-Based Current Driver**

Minimum Available Voltage (VDC)	Valve Drive Voltage (VDC)	Nominal Coil Resistance @ 20° C (Ohms)	Input Current for Full Flow (mA)	R1 (Ohms)	R2 (Ohms)
6.5	8.5	47	130	4990	102
8.0	10.0	68	115	4990	73
12.0	14.0	136	80	5100	34.4
18.0	20.0	274	60	8560	28.7
24.0	26.0	547	43	8560	15.4

VSO® Low Flow Thermally Compensated Proportional Valve

Manifold & O-Ring Dimensions & Design

Not shipped with valves.

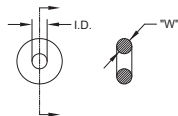


Accessories

O-Ring (Manifold Seal) Dimensions

190-007024-002 (2 required for each valve)

I.D. = Ø.114 ±.005 [Ø2.90 ±.013]
W = .070 ±.003 [1.78 ±.008]
O.D. = Ø.254 [Ø6.45] REFERENCE



Screw 4-40 x 5/8" Pan Head, Phillips

191-000115-010 (2 required for each valve)



Ordering Information

Sample Part ID	910	-	000200	-	001
Description	Series	-	Model Number:	-	Coil Voltage*
Options			VSO Low Flow, 0.003" (0.076 mm) Orifice		001: 6.5 VDC 002: 8 VDC 003: 12 VDC 004: 18 VDC 007: 24 VDC * Maximum voltage for continuous full flow, ambient temperature 55°C

Accessories

190-007024-002: O-ring, FKM, 0.114" ID x 0.070" Thick*	* Not supplied with the valve. Used as a seal between the valve body and manifold.
191-000115-010: Screw 4-40 x 5/8" Pan Head **	**Not supplied with the valve. Used to mount the valve to a manifold.

NOTE: 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

Please click on the Order On-line button (or go to www.parker.com/precisionfluidics/lowflow) to configure your VSO® Low Flow Thermally Compensated Proportional Valve. For more detailed information, visit us on the Web, or call and refer to Performance Spec. #790-002160-002 and Drawing #890-003022-022.



PPF-MPV-002/US September 2012

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

Visit www.parker.com/precisionfluidics



VSO® - MI Miniature Proportional Valve

Thermally Compensated Proportional Valve



Typical Applications

- Ventilators
- Oxygen Concentrators
- Oxygen Conservers
- Anesthesia Delivery & Monitors
- Pressure & Flow Control
- Blood Pressure Monitoring


Performance Data

Physical Properties

Valve Type:
2-Way Normally Closed
Media:
Air, carbon dioxide, nitrogen, oxygen and helium
Operating Environment:
32 - 140°F (0 - 60°C)
Storage Temperature:
-40 to 158°F (-40 to 70°C)
Length:
1.77 in (44.9 mm)
Width:
0.66 in (16.7 mm)
Height:
0.74 in (18.8 mm)
Porting:
Manifold mount with integrated filters and FKM manifold seals
Weight:
1.23 oz (34.9 g)
Mounting Requirements:
See Table 2

The VSO® - MI is a miniature proportional valve designed for medical equipment manufacturers. Based upon Parker Hannifin's benchmark VSO® design, the VSO® - MI miniature proportional valve incorporates thermal compensation to provide precise flow control and stability over a wide range of media. Unlike competitive valves in its class, the VSO® - MI miniature proportional valve has been tested to U.S. Pharmacopoeia (USP) Class VI requirements making it easier to achieve system compliance for toxicity and sensitivity. With integrated filtration, captive O-rings, flush manifold mount capability, low power consumption and light weight, the VSO® - MI is an efficient miniature proportional valve ideally suited for manufacturers of portable and stationary medical equipment.

Features

- Thermally compensated to maintain precision flow and accuracy
- Tested to USP Class VI requirements to ease system compliance
- Proven performance tested to 25 million life cycles
- Integrated filters to protect the valve from damaging upstream and downstream particulates
- Cleaned for Oxygen Service Use
- RoHS compliant 

Physical Properties

Internal Volume:
0.031 in ³ (0.508 cm ³)
Filtration:
Integrated 40 micron filters (inlet and outlet ports)
Flow Direction:
Inlet Port Port 2
Outlet Port Port 1

Electrical

Power:
2.0 Watts maximum
Voltage:
See Table 3
Electrical Termination:
18.5 in (47 cm) Wire Leads, Quick Disconnect Spade, PC Mount

Wetted Materials

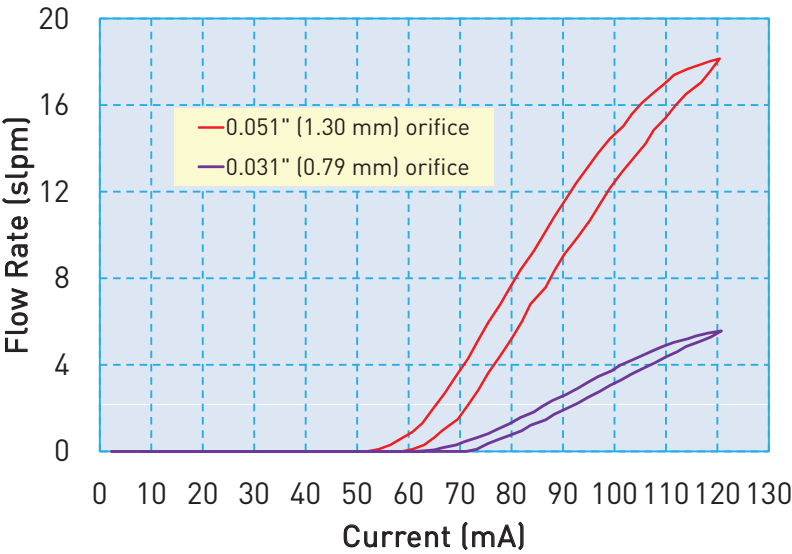
Valve Body:
Polybutylene terephthalate (PBT)
Stem Base:
430 FR Stainless Steel and Brass C3600 HT
All Others:
FKM, 430 FR Stainless Steel, 300 Series Stainless Steel, Brass C3600 HT

Performance Characteristics

Leak Rate:
The leakage shall not exceed the following values: Internal 0.2 SCCM of N ₂ over rated pressure range External 0.016 SCCM of N ₂ at 150 psig
Pressure:
Model 3: 0 to 150 psid (10.34 Bar) Model 5: 0 to 100 psid (6.89 Bar) See Table 1
Vacuum:
0-27 in Hg (0-686 mm Hg)
Orifice Sizes:
0.031 in (0.79 mm) 0.051 in (1.30 mm)
Hysteresis:
7% of full scale current (Typical) 15% of full scale current (Max)

VSO®- MI Miniature Proportional Valve

VSO®- MI Typical Air Flow with 13.5 VDC Coil @ 25 psid (1.7 bar)
All Models



VSO®- MI Pressure vs. Flow Curves @ 20°C
Models 3 & 5

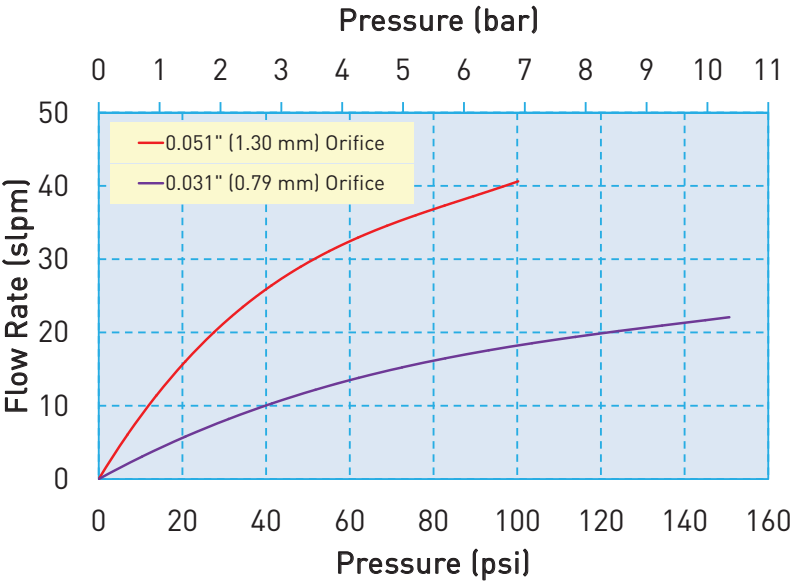


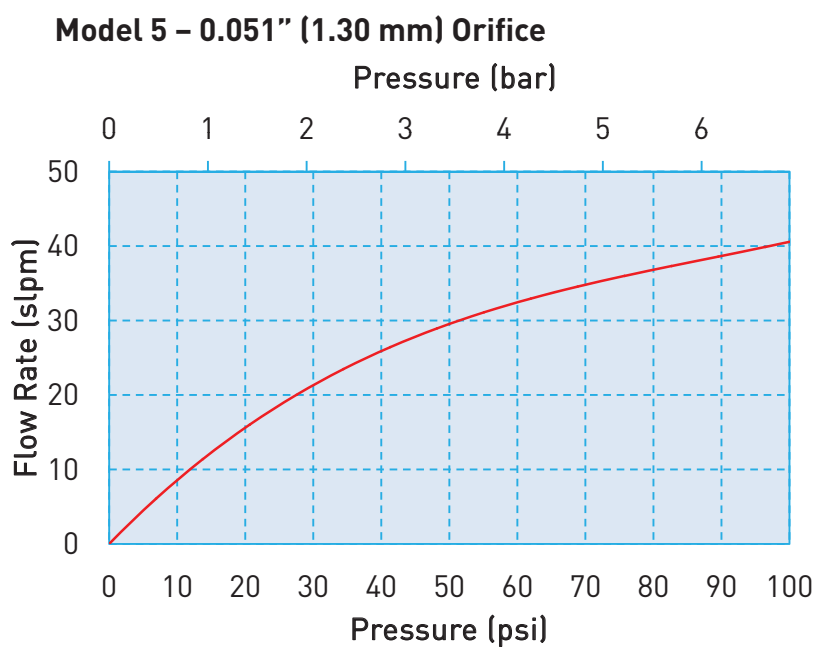
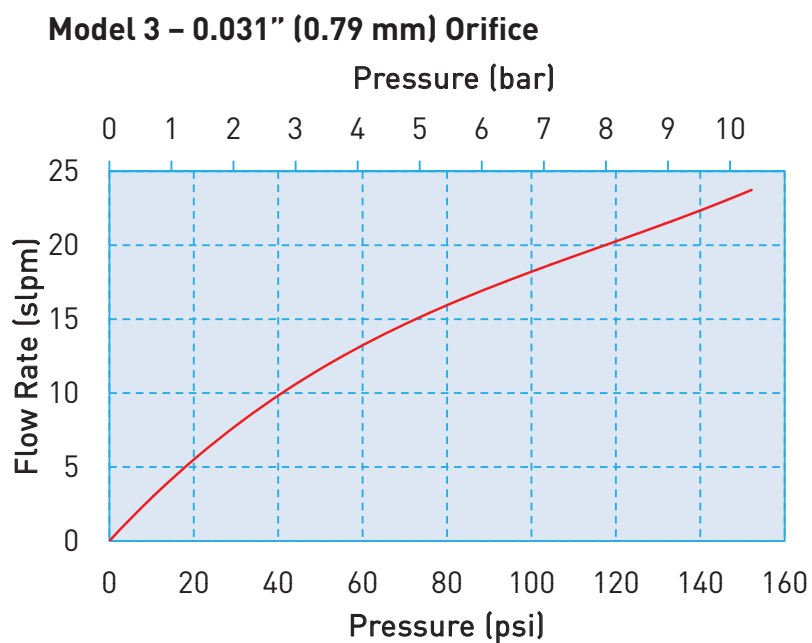
Table 1: Pressure and Flow Capabilities

Model No.	Orifice Diameter	Cv at Maximum Pressure	Maximum Inlet Pressure	Maximum Differential Pressure
3	0.031" (0.79 mm)	0.010	150psi (10.34 bar)	150psig (10.34 bar)
5	0.051" (1.30 mm)	0.025	150psi (10.34 bar)	150psig (10.34 bar)



VSO®- MI Miniature Proportional Valve

VSO® - MI Sizing Charts



VSO®- MI Miniature Proportional Valve

Pneumatic Interface



VSO®- MI Basic Valve Dimensions

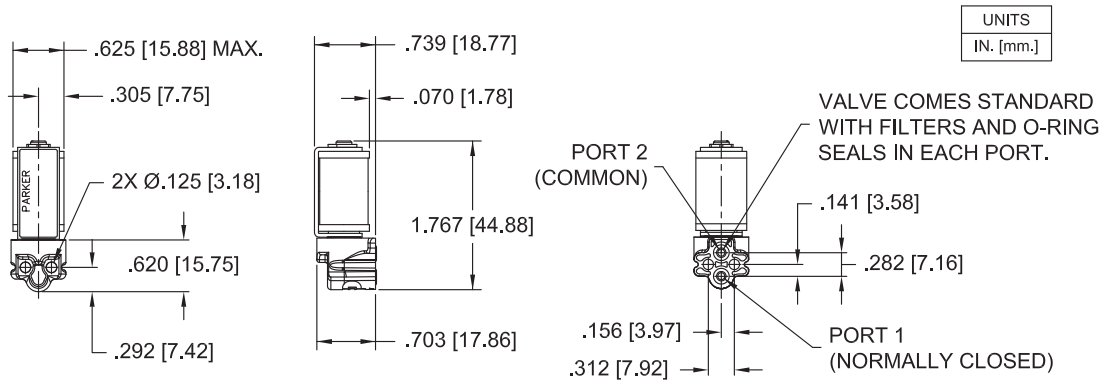
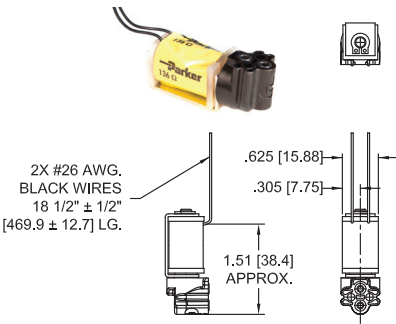


Table 2: Mounting Requirements

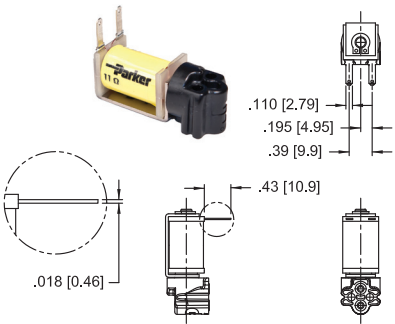
Mounting Screw Sizes (Pan Head Machine Screw)	Mounting Screw Torque
4-40 x 3/4"	45 oz-in
M3 x 20 mm	0.32 N.m.

Electrical Interface

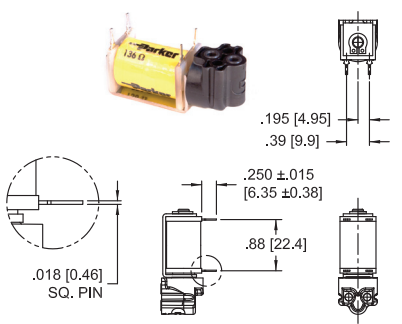
Coil Type: Wire Leads
(for Terminal Block Connection)



Coil Type: Quick Connect Spade
(for Female Spade Terminal Connection)



Coil Type: 4 PC Pins
(For PCB solder mount connection)



UNITS
IN. [mm.]

Table 3: Electrical Requirements

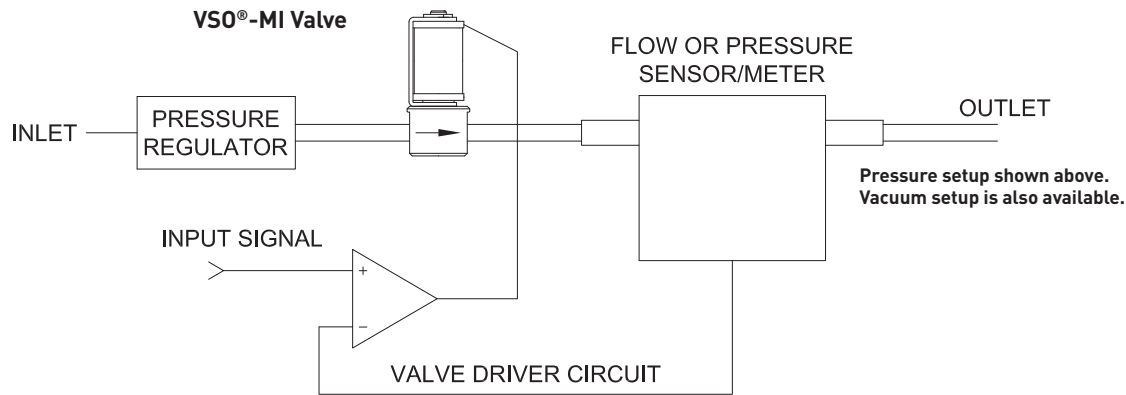
Maximum Supply Voltage (VDC)	Nominal Coil Resistance (Ohms) @ 20°C	Control Current at Maximum Flow (mA)
5.5	11	304
13.5	68	125
29	274	66



VSO®- MI Miniature Proportional Valve

VSO®-MI Installation and Use

Typical Valve Set-up



Valve Electrical Control

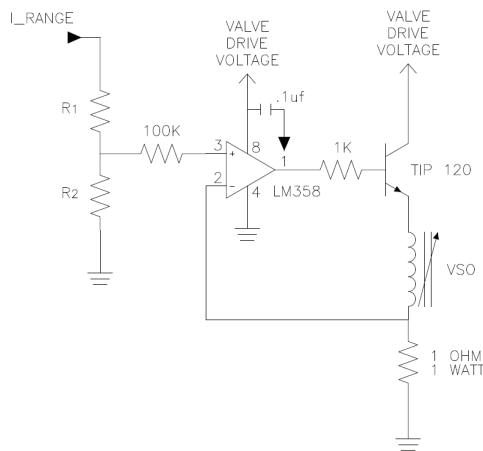
Basic Control:

The VSO®-MI 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®-MI Current Driver Schematic



This simple current driver circuit draws only 1 mA at the input control (0-5VDC) and provides control for any VSO®-MI valve configuration regardless of valve voltage or resistance.

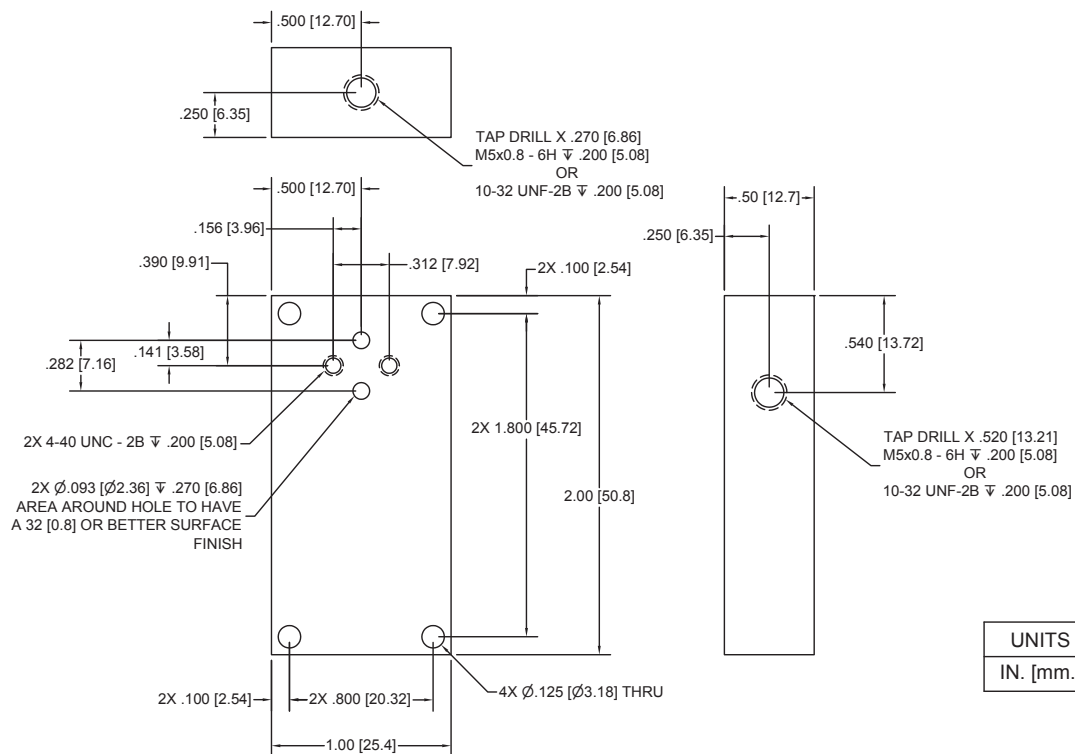
Table 4 (below) describes the recommended R1 and R2 resistor values based upon the full shut-off current.

Table 4: Selectable Resistor Values for a Low Current (1mA) LM358-Based Current Driver

Minimum Available Voltage (VDC)	Valve Drive Voltage (VDC)	Nominal Coil Resistance @ 20°C (Ohms)	Input Current for Full Flow (mA)	R1 (Ohms)	R2 (Ohms)
5.5	7.5	11	304	5100	330
13.5	15.5	68	125	4420	113
29.0	31.0	274	66	4990	66.5

VSO®-MI Miniature Proportional Valve

Recommended VSO®-MI Manifold Dimensions



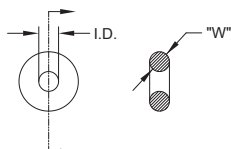
UNITS
IN. [mm.]

Spares and Accessories

O-Ring (Manifold Seal) Dimensions

190-007059-001 (2 supplied with each valve)

I.D. = .114 \pm .006 [2.90 \pm 0.15]
 W = .039 \pm .003 [0.99 \pm 0.08]
 O.D. = .192 [4.88] REFERENCE



Screw 4-40 x 3/4" Pan Head, Phillips

191-000115-012 (2 required for each valve)



VSO®- MI Miniature Proportional Valve

Ordering Information

Sample Part ID	931	3	1	1	05	1	000
Description	Series	Model Number: Operating Pressure / Orifice Size	Elastomer / Body	Pneumatic Interface	Voltage/ Coil Selection	Electrical Interface	
Options	931	3: 150 psid / 0.031" (0.79 mm) 5: 100 psid / 0.051" (1.30 mm)	1: FKM / PBT	1: Manifold Mount* *Includes integrated 40 micron filters and FKM manifold seals	05: 5.5 VDC / 11 Ohm 13: 13.5 VDC / 68 Ohm 29: 29 VDC / 274 Ohm	1: Wire Leads, 18" (45.7 cm) 2: Quick Connect, Spade 3: PC Board Mount, 4 Pin	

Accessories	
190-007059-001: O-ring, FKM, 0.114" ID x 0.039" Thick*	*Supplied with each valve. Used as a seal between the valve body and manifold.
191-000115-012: Screw, Pan head, 4-40 x 3/4", Stainless Steel**	**Not supplied with the valve. Used to mount the valve to a manifold.



NOTE: 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 or Current
- Flow Media & Ambient Temperature Range

Please click on the Order On-line button (or go to www.parker.com/precisionfluidics/vsomi) to configure your VSO®- MI Miniature Proportional Valve. For more detailed information, visit us on the Web, or call and refer to Performance Specification #790-002356-001 and Drawing #890-003292-001.

MD PRO Miniature Proportional Valve

Non-Thermally Compensated Proportional Valve




The MD PRO is a miniature 2-way normally closed (NC) proportional valve that controls gas flow proportionally to input current for flow rates up to 56 slpm. When used with closed loop feedback, the MD PRO is an economical solution that provides repeatable pressure and flow control. The MD PRO is ideal for applications such as respiratory therapy, anaesthesia delivery and patient monitoring devices.

Typical Applications

- O₂ Concentrators/Conservers
- Ventilators
- Anaesthesia Delivery
- Pressure & Flow Control
- Patient Monitors

Features

- Provides repeatability across its operating range for improved accuracy
- Offers a superior combination of value and performance to reduce system cost
- Available Oxygen and Analytical Service use clean
- Proven performance tested to 10 million life cycles
- RoHs compliant 

Physical Properties

Valve Type:

2-Way Normally Closed

Media:

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

Operating Environment:

32 to 140°F (0 to 60°C)

Storage Temperature:

-40 to 158°F (-40 to 70°C)

Length:

1.79 in (45.3 mm)

Width:

0.63 in (15.9 mm)

Height:

0.67 in (17.0 mm)

Porting:

1/8" (3 mm) barbs; manifold mount

Weight:

2.2 oz (63 grams)

Internal Volume:

0.031 in³ (0.508 cm³)

Filtration (Suggested and Available):

40 micron

Flow Direction:

Inlet Port Port 2

Outlet Port Port 1

Electrical

Power:

2.0 Watts maximum

Voltage:

See table 2

Electrical Termination:

18.5" (47 cm) Wire Leads,
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 (1.02 mm)

0.050 in (1.27 mm)

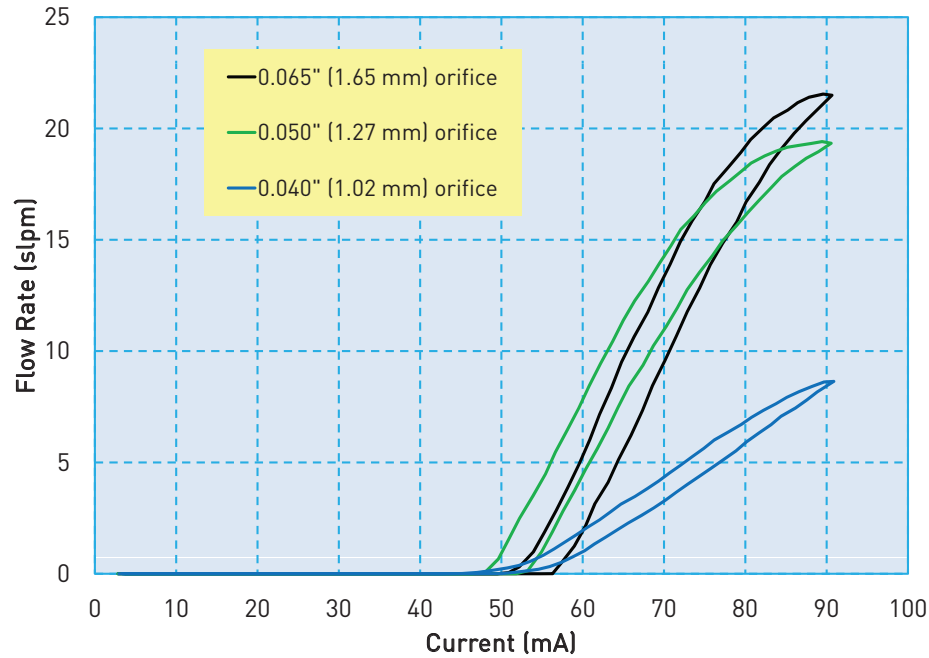
0.065 in (1.65 mm)

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)



MD PRO Pressure vs Flow Curves Model 4-6

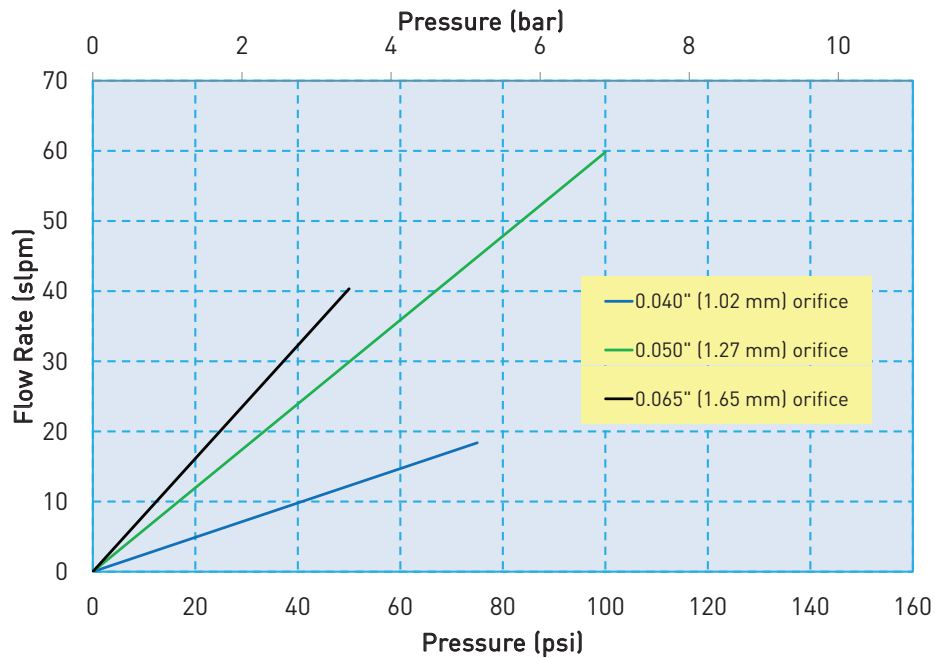


Table 1: Pressure Capabilities

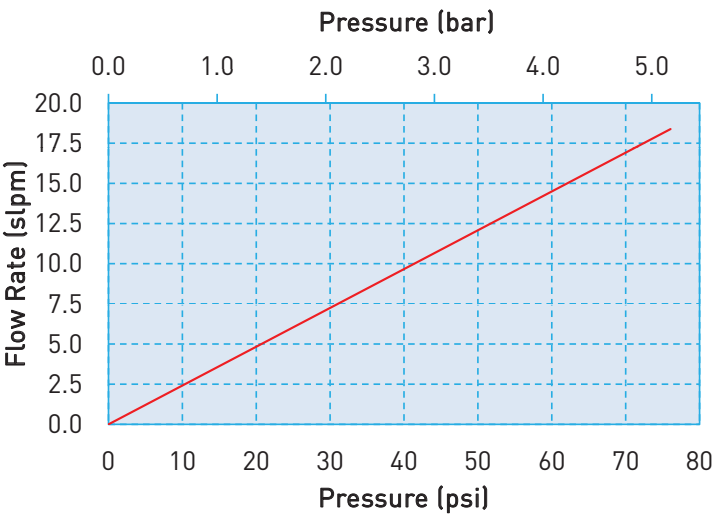
Orifice Diameter	Maximum Operating Inlet Pressure	Maximum Operating Pressure Differential
0.040 in (1.02 mm)	150 psig (10.34 bar)	75 psid (5.17 bar)
0.050 in (1.27 mm)	150 psig (10.34 bar)	100 psid (6.89 bar)
0.065 in (1.65 mm)	150 psig (10.34 bar)	50 psid (3.45 bar)



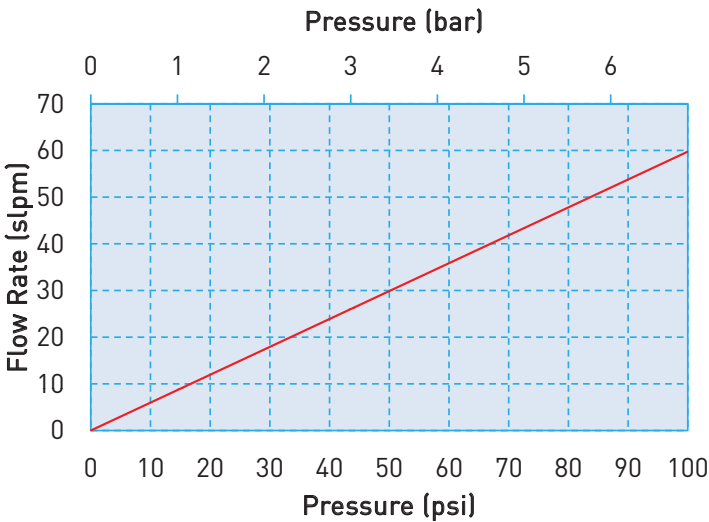
MD PRO Non-Thermally Compensated Proportional Valve

MD PRO Sizing Charts

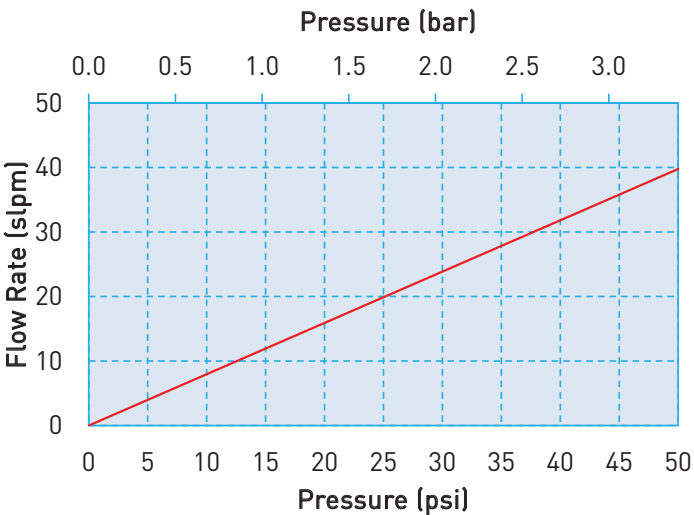
Model 4 - 0.040" (1.02 mm) Orifice



Model 5 - 0.050" (1.27 mm) Orifice



Model 6 - 0.065" (1.65 mm) Orifice



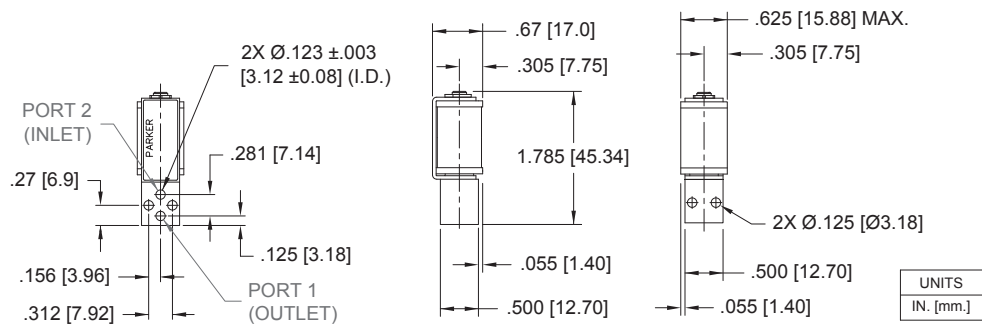
MD PRO Non-Thermally Compensated Proportional Valve

Pneumatic Interface

MD PRO Manifold Mount



MD PRO Basic Valve Dimensions



Pneumatic Interface

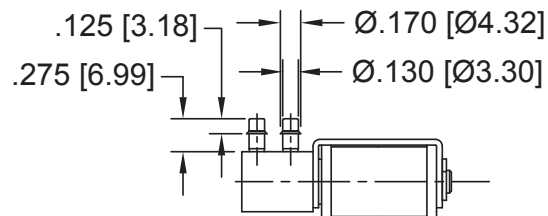
MD PRO Barbed



Barb Options

1/8" (3 mm) Barbs

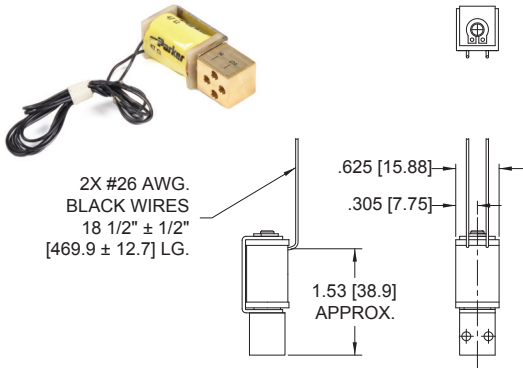
(For 1/8" (3 mm) I.D. Tubing)



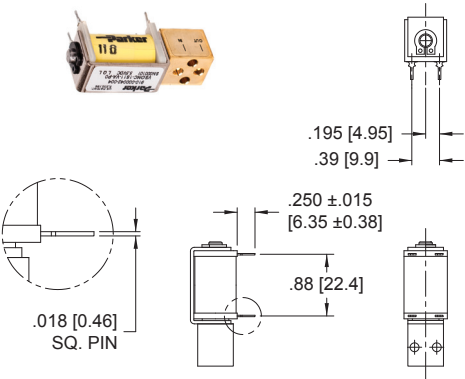
MD PRO Non-Thermally Compensated Proportional Valve

Electrical Interface

Coil Type: Wire Leads



Coil Type: 4 PC Pin



Coil Type: Quick Connect Spade

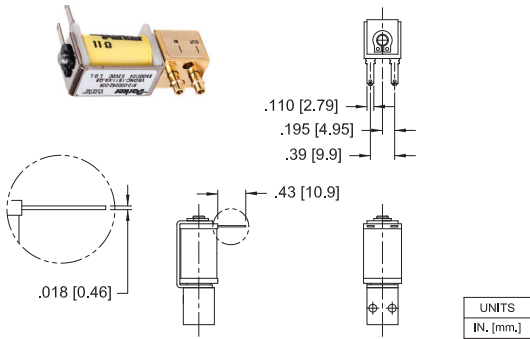


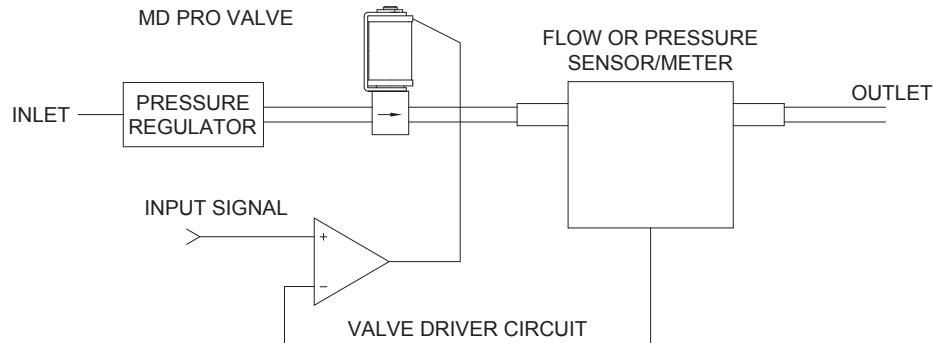
Table 2: Electrical Requirements

Minimum Available Voltage (VDC)	Nominal Coil Resistance @ 20 °C (Ohms)
5.5	11
8.0	23
11.5	47
13.5	68
20.0	136
29.0	274

MD PRO Non-Thermally Compensated Proportional Valve

MD PRO Installation and Use

Typical Valve Set-up



Valve Electrical Control

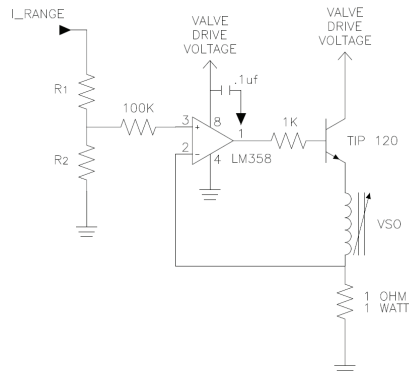
Basic Control:

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



This simple current driver circuit draws only 1 mA at the input control (0-5VDC) and provides control for any MD PRO configuration regardless of valve voltage or resistance.

Table 3 (below) describes the recommended R1 and R2 resistor values based upon the full shut-off current.

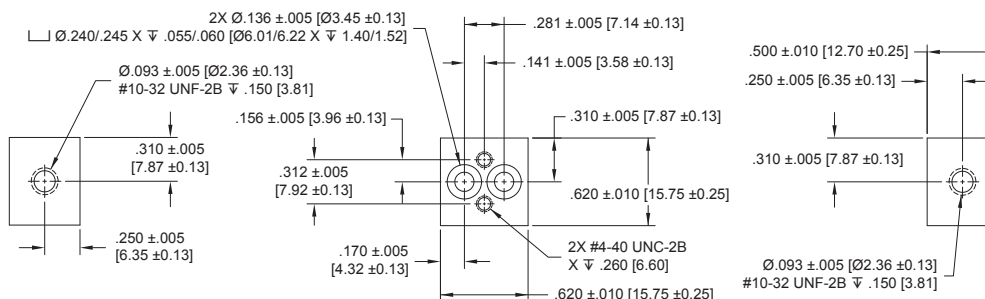
Table 3: Selectable Resistor Values for a Low Current (1 mA) LM358-Based Current Driver

Minimum Available Voltage (VDC)	Valve Drive Voltage (VDC)	Nominal Coil Resistance @ 20°C (Ohms)	Input Current for Full Flow (mA)	R1 (Ohms)	R2 (Ohms)
5.5	7.5	11	304	5100	330
8.0	10.0	23	212	4990	221
11.5	13.5	47	152	5100	160
13.5	15.5	68	125	4420	113
20.0	22.0	136	91	4420	82
29.0	31.0	274	66	4990	66.5

MD PRO Non-Thermally Compensated Proportional Valve

Manifold & O-Ring Dimensions & Design

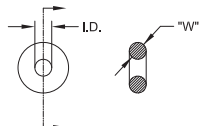
Not shipped with valves.



Accessories

O-Ring (Manifold Seal) Dimensions
190-007024-002 [2 required for each valve]

I.D. = Ø.114 ±.005 [Ø2.90 ±.013]
W = .070 ±.003 [1.78 ±.008]
O.D. = Ø.254 [Ø6.45] REFERENCE



Screw 4-40 x 5/8" Pan Head, Phillips
191-000115-010 [2 required for each valve]



Ordering Information

Sample Part ID	MDPRO	4	V	A	F	8	S
Description	Standard	Model Number: Maximum Operating Pressure / Orifice Size	Elastomer/ Body Material	Coil Voltage/Coil Resistance/Coil Current*	Electrical Interface	Pneumatic Interface	
Options		4: 75 psi / 0.040" (1.02 mm) 5: 100 psi / 0.050" (1.27 mm) 6: 50 psi / 0.065" (1.65 mm)	V: FKM / Brass	A: 5.5 VDC / 11 Ohm / 0.304 Amp B: 8 VDC / 23 Ohm / 0.212 Amp C: 11.5 VDC / 47 Ohm / 0.152 Amp D: 13.5 VDC / 68 Ohm / 0.125 Amp E: 20 VDC / 136 Ohm / 0.091 Amp F: 29 VDC / 274 Ohm / 0.066 Amp *Maximum voltage for continuous full flow, ambient temperature 55°C	F: Wire Leads, 18.5" (47 cm) P: PC Board Mount, 4 Pin Q: Quick Connect, Spade	1: Manifold Mount w/screens* 8: 1/8" (3 mm) Barbs *40 Micron Screen (Port 2)	S: Standard Cleaning O: Oxygen Service

Accessories

190-007024-002: O-ring, FKM, 0.114" ID x 0.070" Thick*
191-000115-010: Screw 4-40 x 5/8" Pan Head**

*Not supplied with the valve. Used as a seal between the valve body and manifold.
**Not supplied with the valve. Used to mount the valve to a manifold.



NOTE: 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

Please click on the Order On-line button (or go to www.parker.com/precisionfluidics/mdpro) to configure your MD PRO® Non-Thermally Compensated Proportional Valve. 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.

PPF-MPV-002/US September 2012

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




Lone Wolf Normally Open Miniature Proportional Valve

Thermally Compensated Proportional Valve



The Lone Wolf miniature proportional valve is a thermally compensated 2-way normally open (NO) proportional valve designed to maintain accurate and repeatable flow over a wide range of media. With the highest performance characteristics of any NO proportional valve available on the market, the Lone Wolf miniature proportional valve is an ideal choice for medical devices and patient monitoring applications that require rapid response along with stable and accurate performance.

Features

- Provides rapid, stable performance to improve system accuracy
- Enhances system control and patient comfort
- Maintains ideal flow across numerous media types and its entire operating temperature range
- Proven performance tested to 100 million life cycles
- RoHS compliant 

Typical Applications

- Blood Pressure Monitoring
- Vitreo Retinal Surgery

Performance Data

Physical Properties

Valve Type:
2-Way Normally Open
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:
1.79 in (45.3 mm)
Width:
0.63 in (16.5 mm)
Height:
0.67 in (17.0 mm)
Porting:
Barbs; manifold mount (with available screens)
Weight:
2.2 oz (62.9 g)

Physical Properties

Internal Volume:
0.031 in ³ (0.508 cm ³)
Filtration: (Suggested and Available)
40 micron
Flow Direction:
Inlet Port Port 1
Outlet Port Port 2

Electrical

Power:
2.0 Watts maximum
Voltage:
See Table 2
Electrical Termination:
18 in Wire Leads, PC Mount

Wetted Materials

Body:
360 HO ₂ Brass
Stem Base:
430 FR Stainless Steel and Brass
360 HT
All Others:
FKM; 430 FR Stainless Steel;
300 Series Stainless Steel

Performance Characteristics

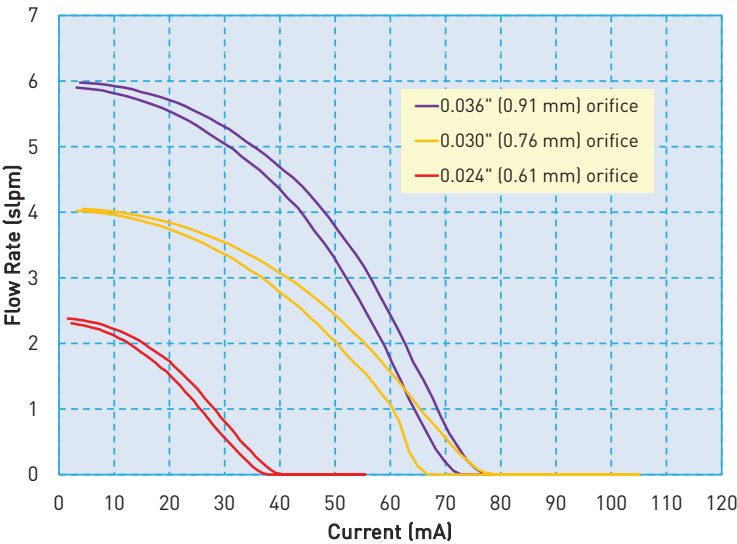
Leak Rate:
The leakage shall not exceed the following values:
Internal 0.2 SCCM of He with a differential pressure of 1 psid, 5 psid and 25 psid
External 0.016 SCCM of He at 25 psig
Pressure:
0 to 10 psi (0.69 bar)
0 to 20 psi (1.37 bar)
0 to 25 psi (1.72 bar)
See Table 1
Vacuum:
0-20 in Hg (0-508 mm Hg)
Orifice Sizes:
0.024 in (0.61 mm)
0.030 in (0.76 mm)
0.036 in (0.91 mm)
Hysteresis:
7% of full scale current (Typical)
15% of full scale current (Max)

VSO is a registered trademark of Parker Hannifin Corporation.



Lone Wolf Thermally Compensated Proportional Valve

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



Lone Wolf Pressure vs Flow Curves
Model 1-3

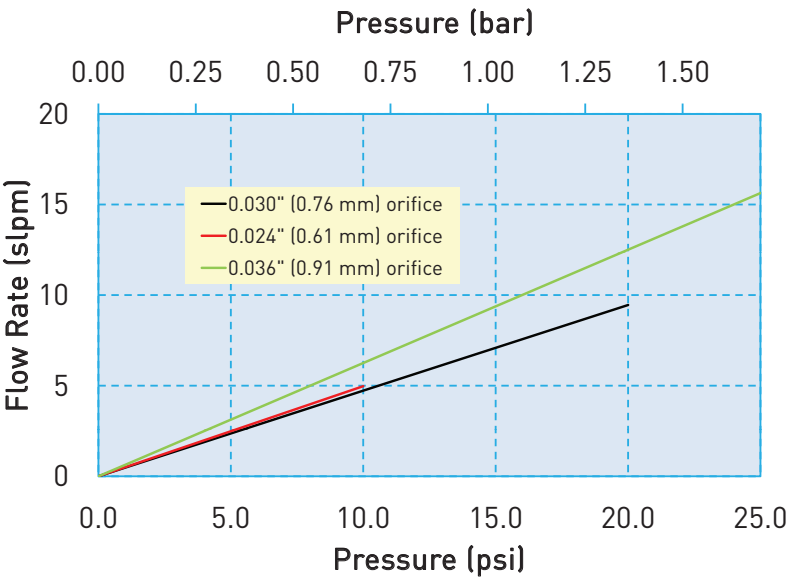


Table 1: Pressure and Flow Capabilities

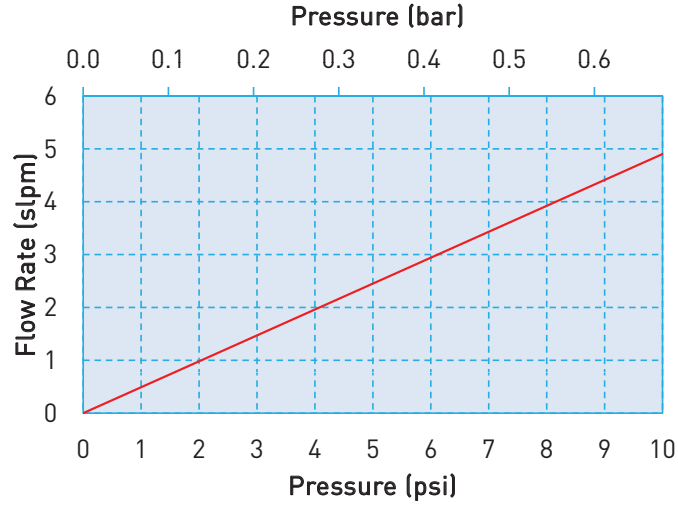
Model no.	Orifice Diameter in (mm)	Maximum Operating Inlet Pressure psig (bar)	Maximum Operating Pressure Differential psid (bar)
1	0.024 [0.61]	0 - 10 [0.69]	150 [10.34]
2	0.030 [0.76]	0 - 20 [1.37]	150 [10.34]
3	0.036 [0.91]	0 - 25 [1.72]	150 [10.34]



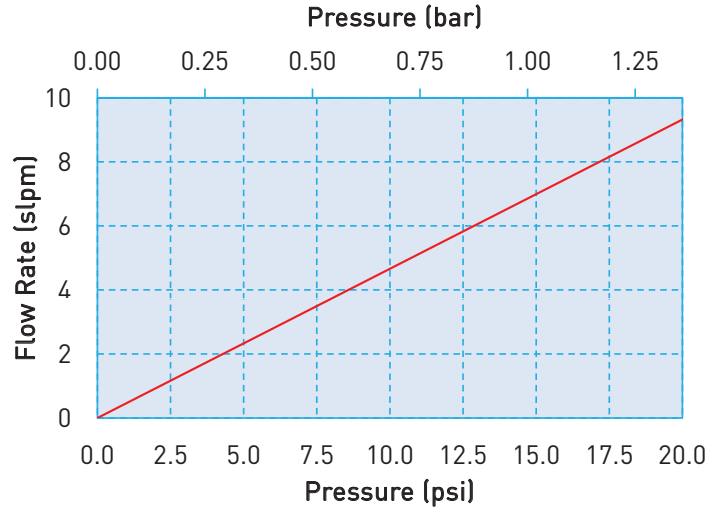
Lone Wolf Thermally Compensated Proportional Valve

Lone Wolf Sizing Charts

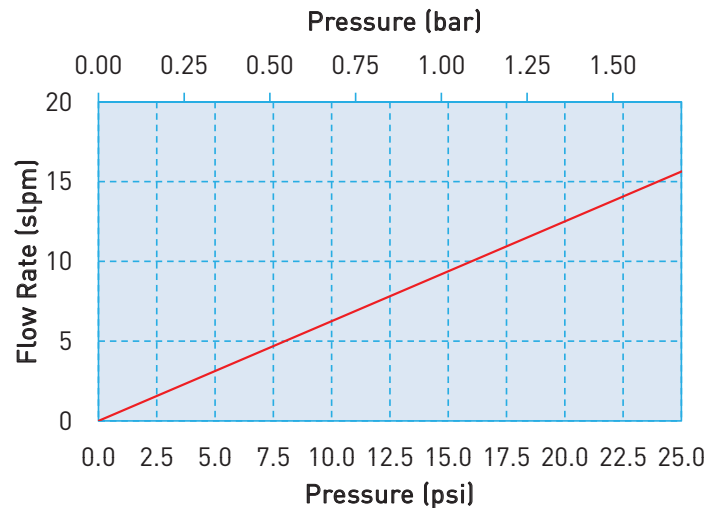
Model 1 – 0.024" (0.61 mm) Orifice



Model 2 – 0.030" (0.76 mm) Orifice



Model 3 – 0.036" (0.91 mm) Orifice



Lone Wolf Thermally Compensated Proportional Valve

Pneumatic Interface

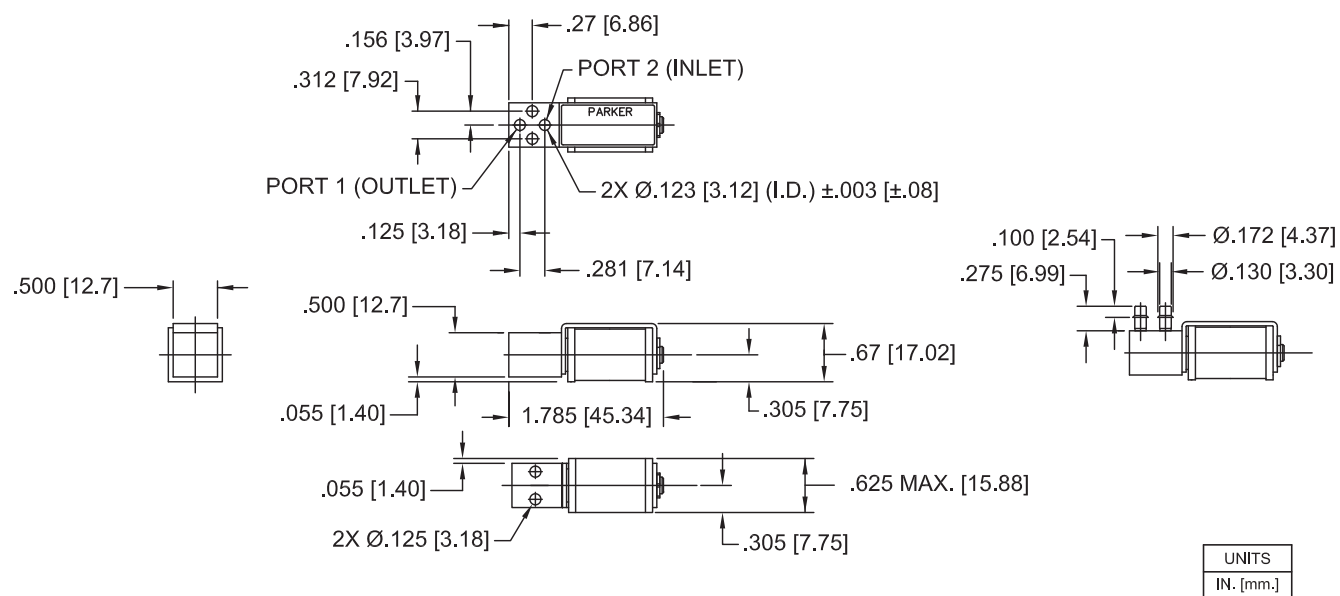
Lone Wolf Manifold Mount



Lone Wolf Barbed



Lone Wolf Manifold Mount and Barbed Body Basic Valve Dimensions



Lone Wolf Thermally Compensated Proportional Valve

Electrical Interface

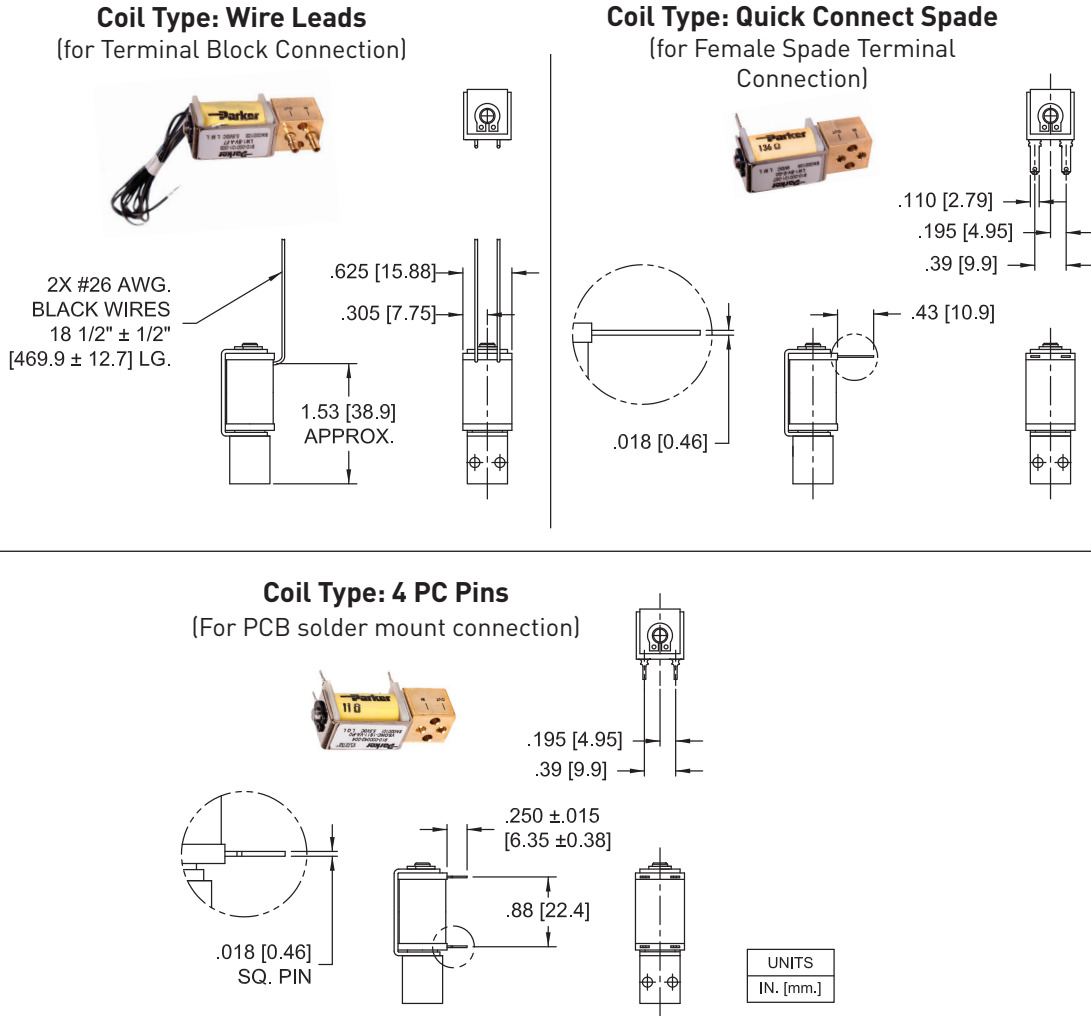


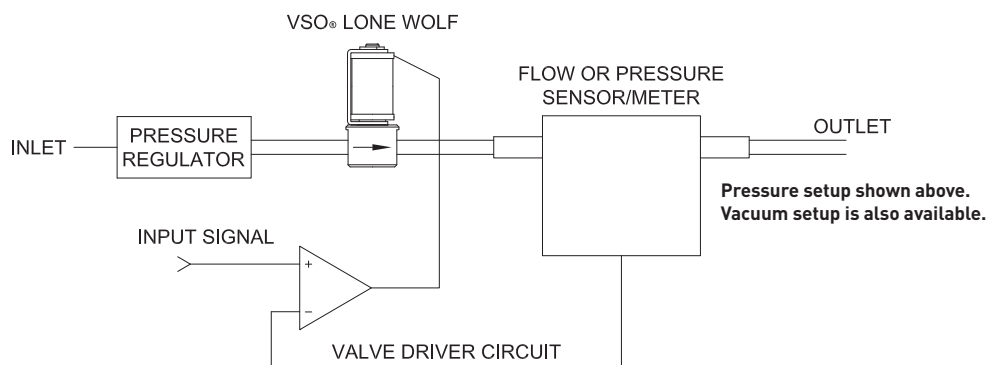
Table 2: Electrical Requirements

Model 1 0.024" (0.61 mm) orifice			Model 2 0.030" orifice (0.76 mm)			Model 3 0.036" (0.91 mm) orifice		
Minimum Available Voltage (VDC)	Nominal Coil Resistance @ 20° C (Ohms)	Input Current for Full Shut Off (mA)	Minimum Available Voltage (VDC)	Nominal Coil Resistance @ 20° C (Ohms)	Input Current for Full Shut Off (mA)	Minimum Available Voltage (VDC)	Nominal Coil Resistance @ 20° C (Ohms)	Input Current for Full Shut Off (mA)
3.0	11	184	4.0	11	254	5.0	11	335
4.0	23	128	5.0	23	177	8.0	23	233
5.0	47	92	7.5	47	127	11.0	47	168
6.0	68	76	9.0	68	105	13.0	68	138
9.0	136	55	13.0	136	76	19.0	136	100
13.0	274	40	19.0	274	55	28.0	274	73
18.0	547	28	26.0	547	40	39.0	547	52
24.0	1094	20	36.0	1094	27	54.0	1094	36

Lone Wolf Thermally Compensated Proportional Valve

Lone Wolf Installation and Use

Typical Valve Set-up



Valve Electrical Control

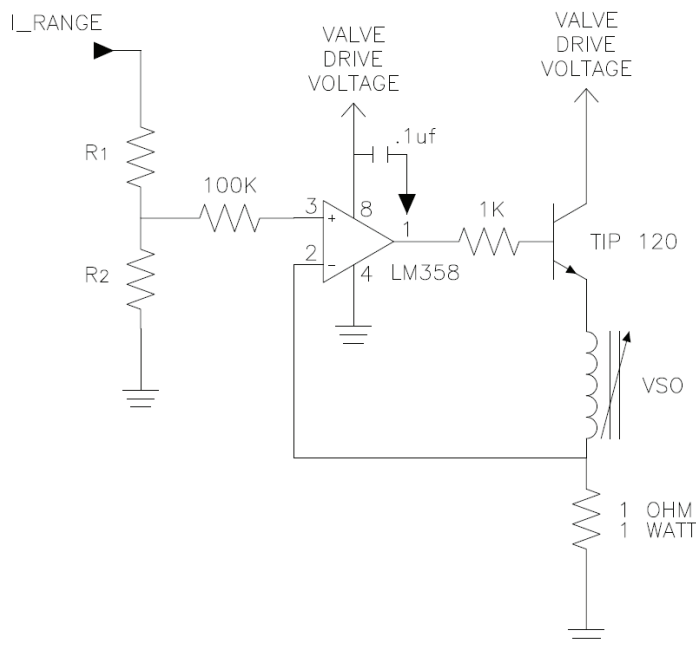
Basic Control:

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



This simple current driver circuit draws only 1 mA at the input control (0-5VDC) and provides control for any Lone Wolf configuration regardless of valve voltage or resistance.

Table 3 (next page) describes the recommended R1 and R2 resistor values based upon the full shut-off current.

Lone Wolf Thermally Compensated Proportional Valve

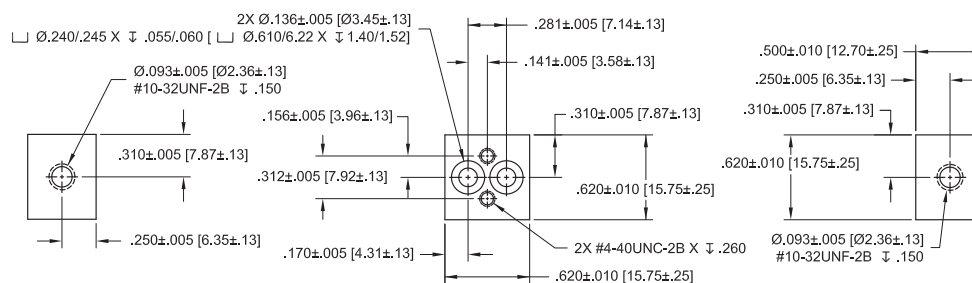
Table 3: Selectable Resistor Values for a Low Current (1mA) LM358-Based Current Driver

Model 1 0.024" (0.61 mm) orifice					
Minimum Available Voltage (VDC)	Valve Drive Voltage (VDC)	Nominal Coil Resistance @ 20°C (Ohms)	Input Current for Full Flow (mA)	R1 (Ohms)	R2 (Ohms)
3.0	5.0	11	184	4816	184
4.0	6.0	23	128	4872	128
5.0	7.0	47	92	4908	92
6.0	8.0	68	76	4924	76
9.0	11.0	136	55	4945	55
13.0	15.0	274	40	4960	40
18.0	20.0	547	28	4972	28
24.0	26.0	1094	20	4980	20

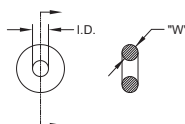
Model 2 0.030" (0.76 mm) orifice					
Minimum Available Voltage (VDC)	Valve Drive Voltage (VDC)	Nominal Coil Resistance @ 20°C (Ohms)	Input Current for Full Flow (mA)	R1 (Ohms)	R2 (Ohms)
4.0	6.0	11	254	4746	254
5.0	7.0	23	177	4723	177
7.5	9.5	47	127	4873	127
9.0	11.0	68	105	4895	105
13.0	15.0	136	76	4924	76
19.0	21.0	274	55	4945	55
26.0	28.0	547	40	4960	40
36.0	38.0	1094	27	4973	27

Model 3 0.036" (0.91 mm) orifice					
Minimum Available Voltage (VDC)	Valve Drive Voltage (VDC)	Nominal Coil Resistance @ 20°C (Ohms)	Input Current for Full Flow (mA)	R1 (Ohms)	R2 (Ohms)
5.0	7.0	11	335	4665	335
8.0	10.0	23	233	4767	233
11.0	13.0	47	168	4832	168
13.0	15.0	68	138	4862	138
19.0	21.0	136	100	4900	100
28.0	30.0	274	73	4927	73
39.0	41.0	547	52	4948	52
54.0	56.0	1094	36	4964	36

Not shipped with valves.



Screw 4-40 x 5/8" Pan Head, Phillips
191-000115-010 (2 required for each valve)



Sample Part ID	LW	1	B	V	A	F	8
Description	Series	Model Number: Max Operating Pressure / Orifice Size	Body/ Material	Elastomer	Coil Resistance*	Electrical Interface	Pneumatic Interface
Options	LW	1: 0-10 psi / 0.024" (0.61 mm) 2: 0-20 psi / 0.030" (0.76 mm) 3: 0-25 psi / 0.036" (0.91 mm)	B: Brass	V: FKM	A: 11 Ohm B: 23 Ohm C: 47 Ohm D: 68 Ohm E: 136 Ohm F: 274 Ohm G: 547 Ohm H: 1094 Ohm	F: Wire Leads, 18" (45.7 cm) P: PC Board Mount, 4 Pin Q: Quick Connect, Spade	0: Manifold Mount 1: Manifold Mount w/screens 8: 1/8" (3 mm) Barbs
*See Table 2: Electrical Requirements to properly reference a coil resistance to the appropriate control voltage for each model							

190-007024-002: O-ring, FKM, 0.114" ID x 0.070" Thick*	* Not supplied with the valve. Used as a seal between the valve body and manifold.
191-000115-010: Screw 4-40 x 5/8" Pan Head **	**Not supplied with the valve. Used to mount the valve to a manifold.



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

Please click on the Order On-line button (or go to www.parker.com/precisionfluidics/lonewolf) to configure your Lone Wolf Thermally Compensated Proportional Valve. 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.

PPF-MPV-002/US September 2012

For more information call +1 603 595 1500 or email ppfinfo@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 miniature proportional valve utilizing a Parker Advanced Technology piezo actuator to deliver precise control over a wide range of flow while consuming less than 1 Watt of power. With an unparalleled controllable flow range of 0.5 to 540 slpm and a lower leak rate than metal seated proportional valves, the PACE Hf is the ideal solution for flow control applications sensitive to repeatability, hysteresis, response time, leak and power consumption.

Features

- Wide controllable flow range and tight control with inlet pressures up to 100 psi (6.89 bar)
- Balanced inlet and outlet ports ideal for precise pressure control
- Low power consumption generates less heat
- Small size and light weight is ideal for portable applications
- Proven performance tested to 100 million life cycles
- RoHs compliant 

Typical Applications

- Acute & Sub-Acute Ventilators
- Portable Ventilators
- Anaesthesia
- Pressure & Flow Control
- Mass Flow Controllers

Physical Properties

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 (34.3 mm)
Width:
1.0 in (25.4 mm)
Height:
2.29 in (58.2 mm)
Porting:
Manifold Mount; 1/8" NPT Optional Manifold
Weight:
1.66 oz (47 g)
Filtration:
40 Micron (Customer Supplied)
Oxygen Service Clean:
Standard

Electrical

Power Steady State:
Rapid Response - 0.45 Watts
Digital Compensation - 0.6 Watts
Power:
Steady State: 0.6 Watts (maximum)
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

Two Versions Available

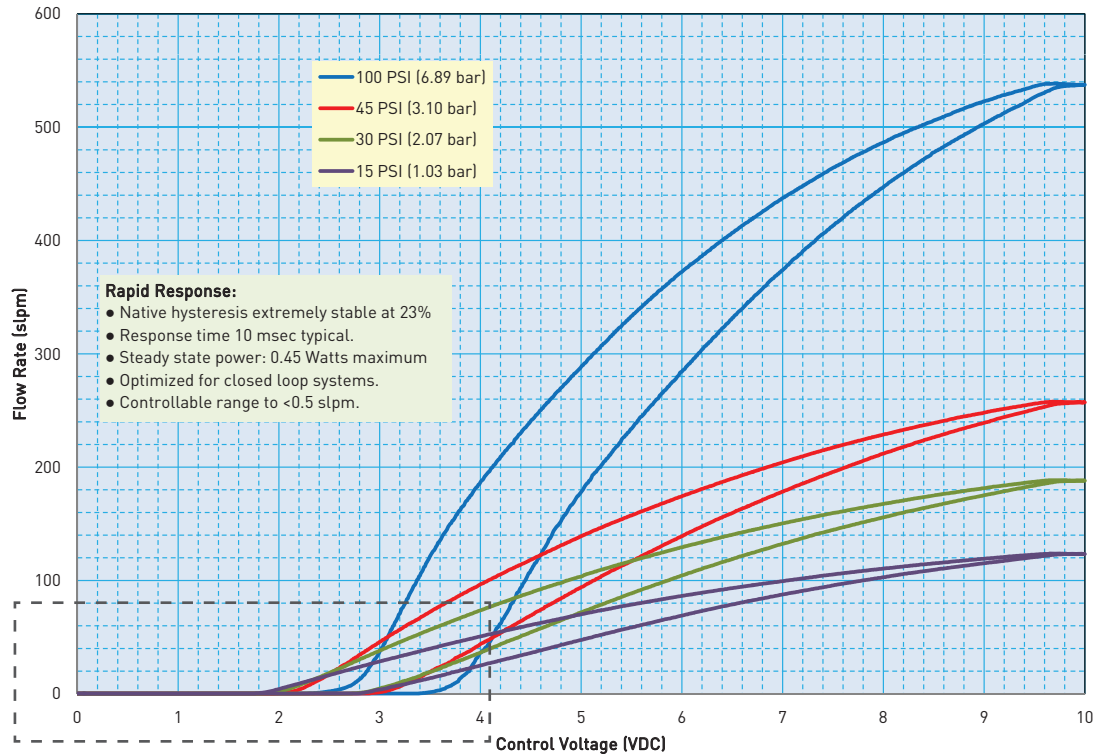
Rapid Response:
Ideal for applications requiring rapid response and repeatable hysteresis (23% typical) in closed loop applications.
Digital Compensation:
Ideal for applications requiring tightly controlled hysteresis (3% typical), or use in open loop applications.

Performance Characteristics

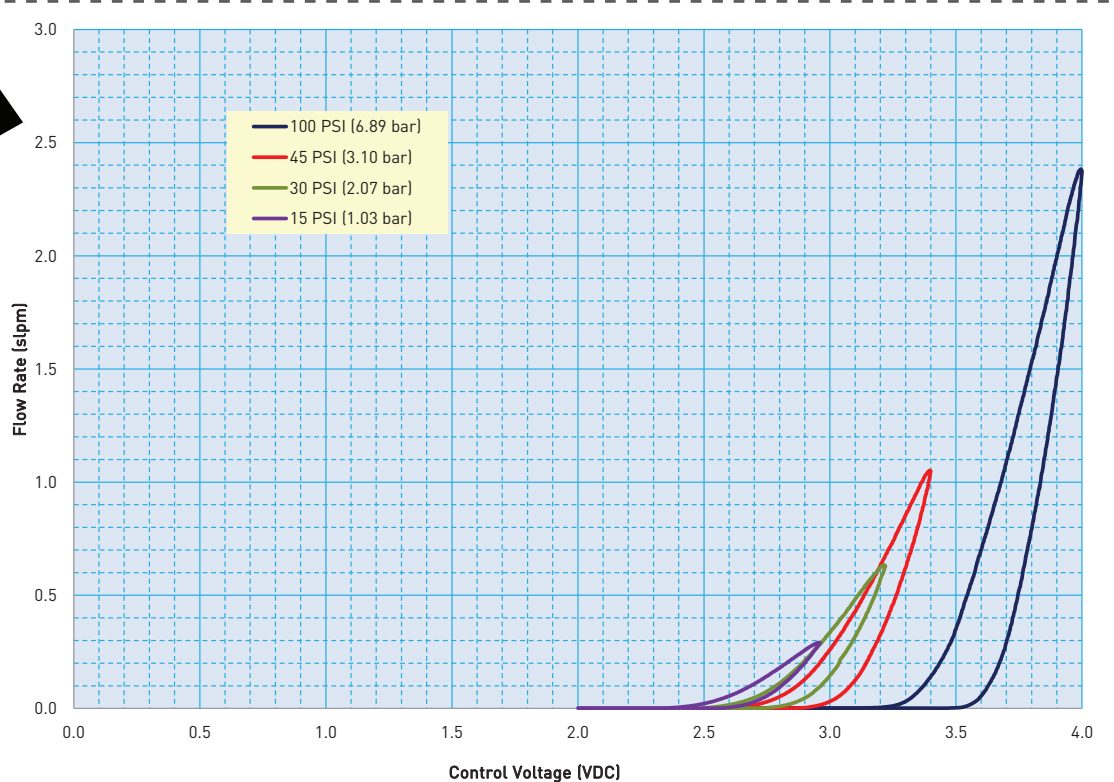
Internal Leak Rate:
< 5.0 sccm of air @ 100 psig (6.89 bar)
External Leak Rate:
< 1 sccm of air @ 100 psig (6.89 bar)
Pressure:
Operating: 10 to 100 psig (6.89 bar)
Proof: 150 psig (10.34 bar)
Orifice Size:
0.128" (3.35 mm) effective
Hysteresis:
Rapid Response - 23%
Digital Compensation - 3%
Response Time:
Rapid Response - 5 msec typical
Digital Compensation - 10 msec typical

PACE Hf Miniature Ultra High Flow, Low Power Proportional Valve

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

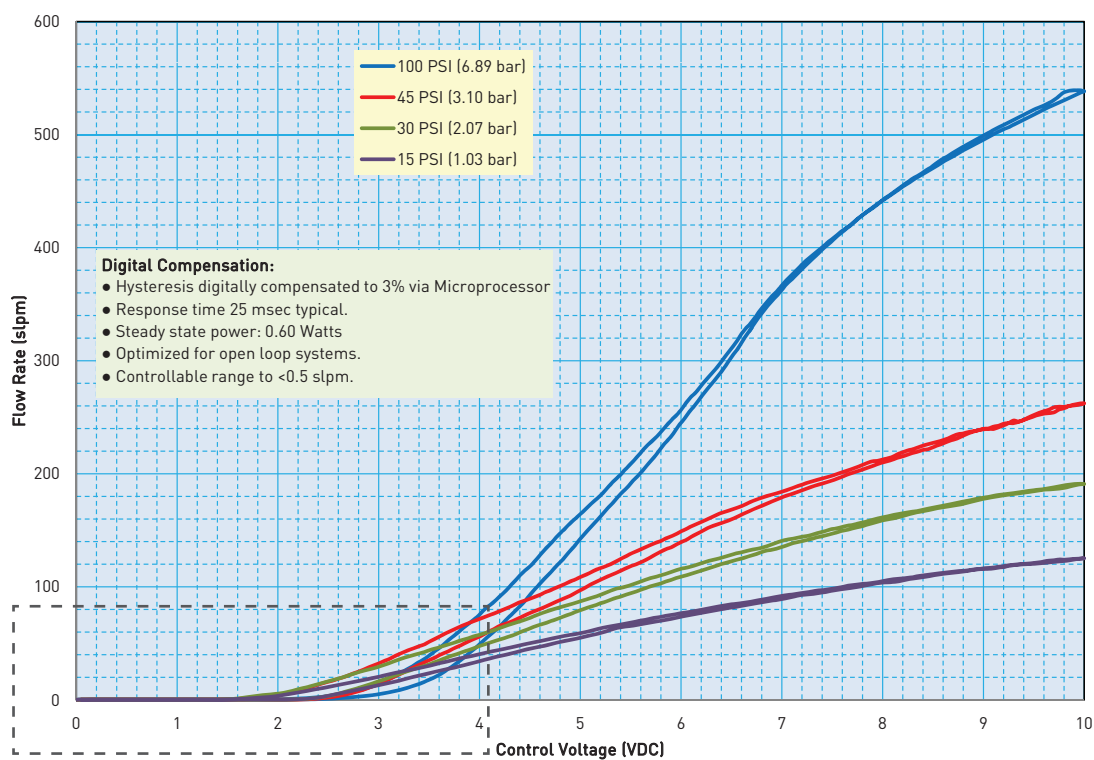


Rapid Response Typical Low Flow Curves (Tested w/air 20°C)

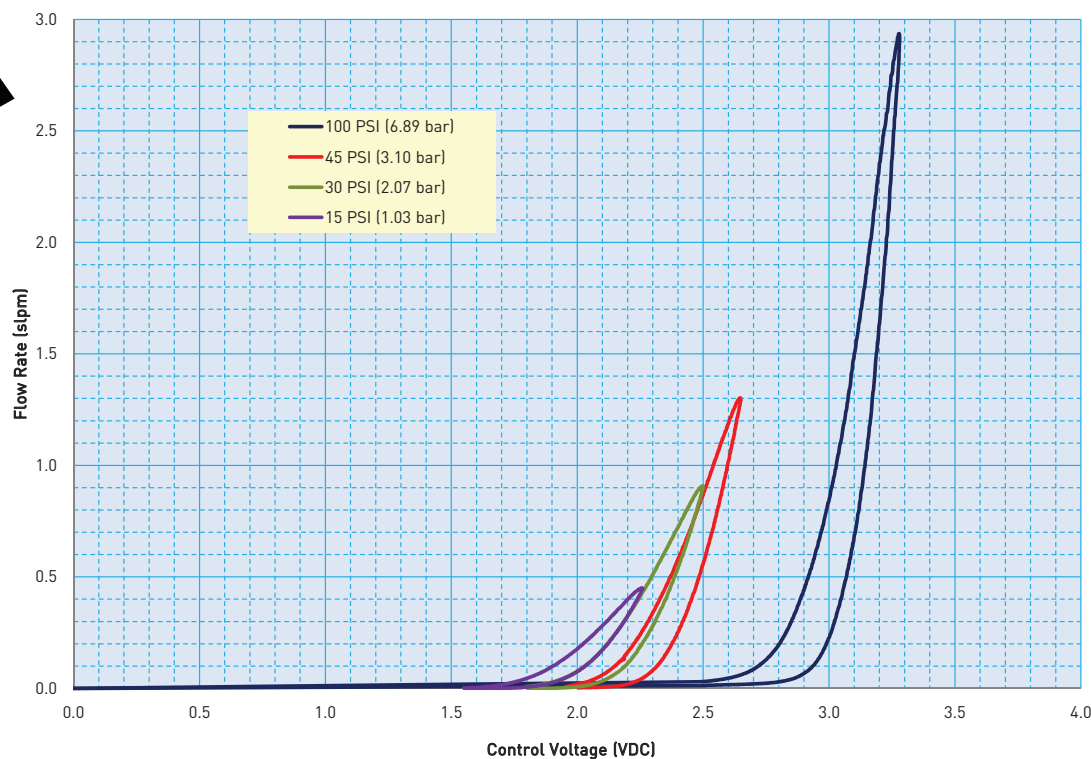


PACE Hf Miniature Ultra High Flow, Low Power Proportional Valve

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



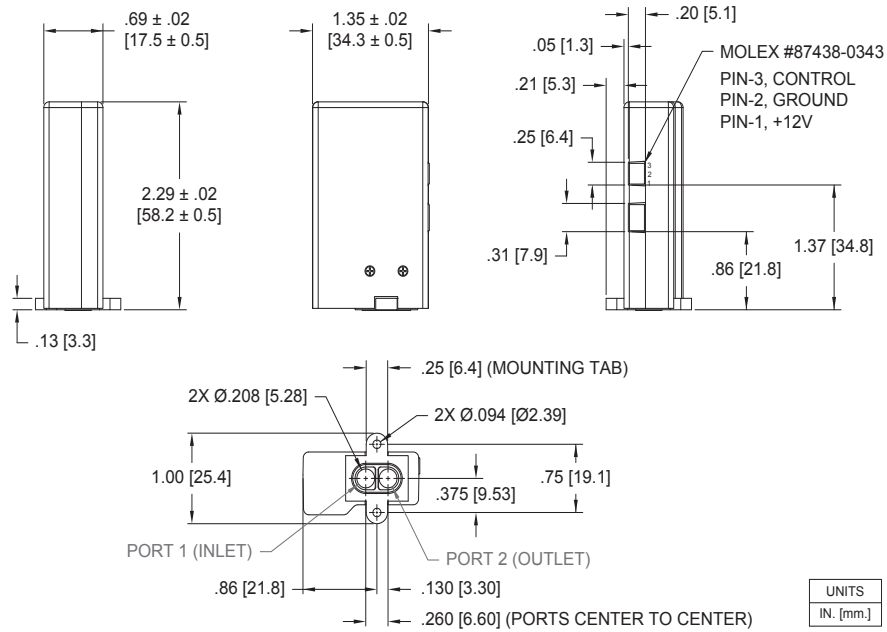
Digital Compensation Typical Low Flow Curves (Tested w/air 20°C)



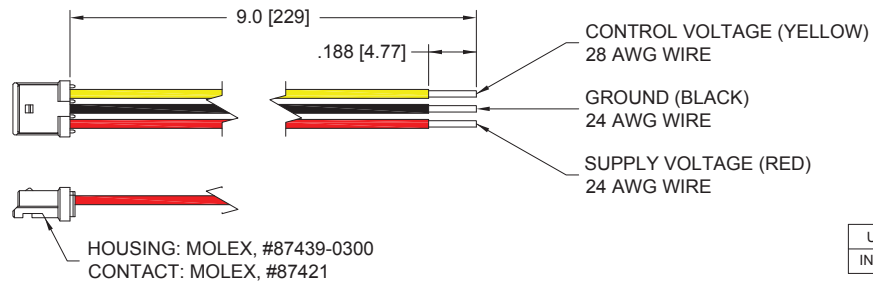
PACE Hf Miniature Ultra High Flow, Low Power Proportional Valve

Dimensions

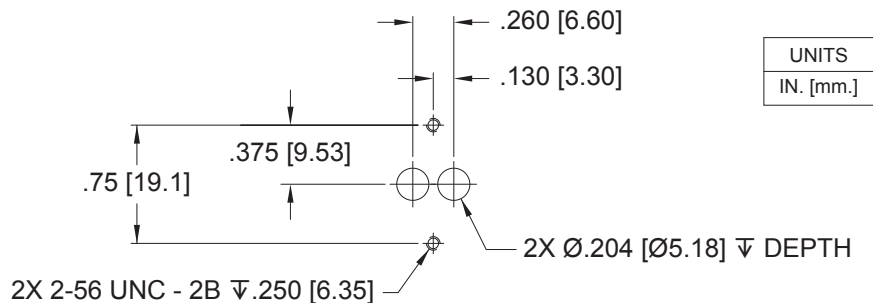
Pace Hf, Basic Valve Dimensions



Pace Hf, Cable Assembly



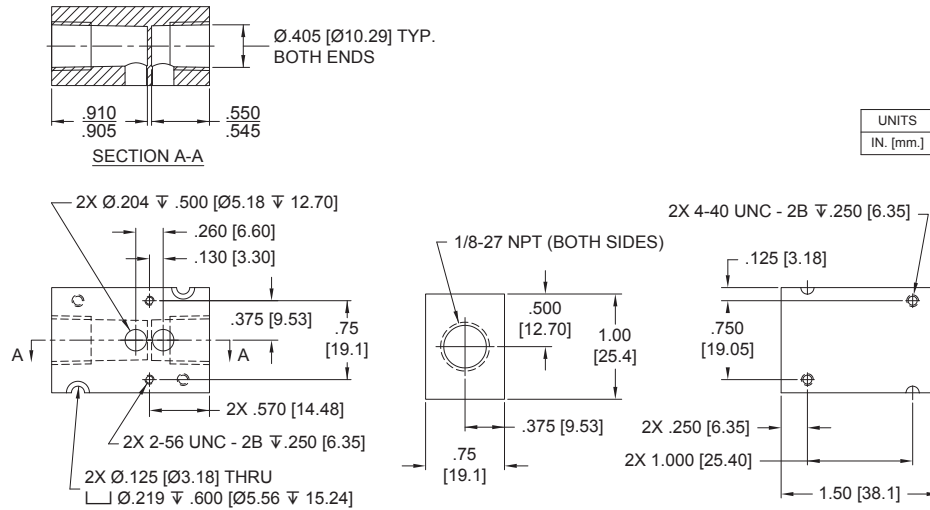
PACE Hf Manifold Mount Diagram



PACE Hf Miniature Ultra High Flow, Low Power Proportional Valve

Test Manifold, Single Station, Pace Hf

890-001051-001



Ordering Information

Sample Part ID	941	1	1	1	2	1	1	000
Description	Series	Elastomer	Pneumatic Interface	Body	Control Method	Compensation	Calibration	
Options		1: FKM	1: Manifold Mount	1: Brass	2: 0 to 10 VDC	1: Rapid Response 2: Digital Compensation	1: 175 slpm @ 30 psi	

Optional Accessories	
890-001046-001: Manifold Gasket, FKM ⁽¹⁾	⁽¹⁾ Supplied with the valve. Used as a seal between the valve body and manifold.
191-000112-405: Screw 2-56 x 1/4" Socket head Cap Screw ⁽²⁾	⁽²⁾ Not supplied with the valve. Used to mount the valve to a manifold.
890-001051-001: Manifold, Single Station, 1/8" NPT ⁽³⁾	⁽³⁾ Not supplied with the valve. Used to evaluate the valve without the need for a production manifold.
590-000095-001: Test Lead Connector, 9" (22.9 cm) ⁽⁴⁾	⁽⁴⁾ Not supplied with the valve. Used to electrically interface with the valve.



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.

Please click on the Order On-line button (or go to www.parker.com/precisionfluidics/pacehf) to configure your Pace Hf Thermally Compensated Proportional Valve.

VSO® - MAX

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 is an 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 5 to 60 psig and features three standard control voltage ranges (5, 12 and 24 VDC).

Typical Applications

- Ventilators
- O₂ Concentrators/Conservers
- Anaesthesia Delivery & Monitors
- Pressure & Flow Control
- Mass Flow Control

Features

- Capable of controllable flow rates of up to 240 slpm and pressures of 60 psig
- Provides repeatability across its operating range for improved accuracy
- Available Oxygen Service use clean
- Low power consumption generates less heat
- Proven performance tested to 25 million life cycles
- RoHS compliant 

Performance Data

Physical Properties

Valve Type:
2-Way Normally Closed
Media:
Air, argon, helium, hydrogen, methane, nitrogen, oxygen, & others
Operating Environment:
41 to 131°F (5 to 55°C)
Storage Temperature:
-40 to 158°F (-40 to 70°C)
Length:
2.02 in (51.4 mm)
Width:
0.63 in (15.9 mm)
Height:
0.69 in (17.4 mm)
Porting:
Manifold mount
Weight:
2.45 oz (69.5 g)

Physical Properties

Filtration:
40 Micron (Customer Supplied)
Flow Direction:
Inlet Port Port 1
Outlet Port Port 2

Electrical

Power:
2.0 Watts maximum @ 20°C
Voltage:
See Table 2
Electrical Termination:
18 in Wire Leads

Wetted Materials

Body:
360 HO ₂ Brass
Stem Base:
430 FR Stainless Steel and Brass
360 HT
All Others:
FKM; 430 FR Stainless Steel;
300 Series Stainless Steel

Performance Characteristics

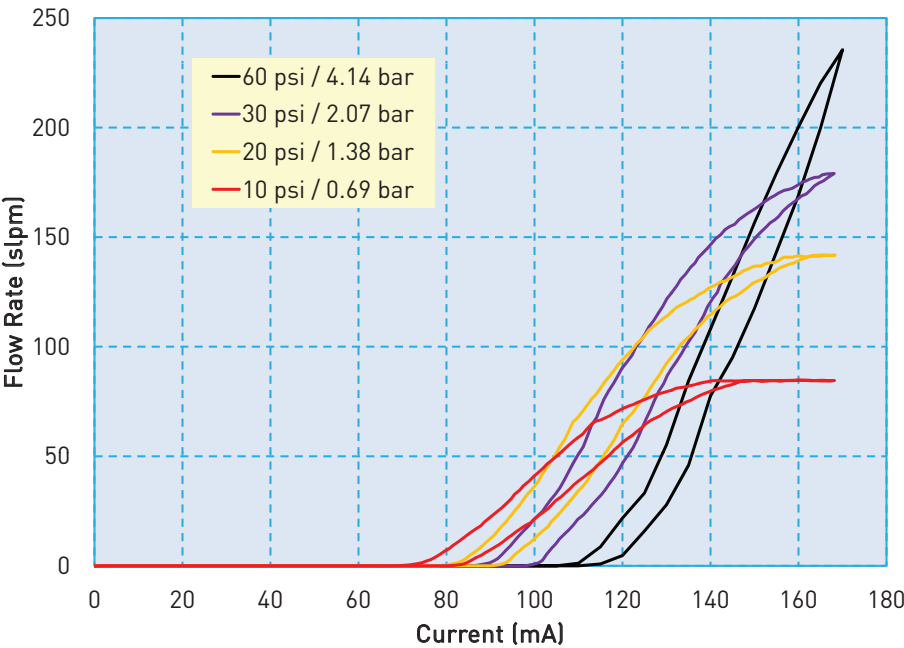
Leak Rate:
The leakage shall not exceed the following values: Internal: 5.0 sccm of Air from 5-60 psig External: 0.5 sccm of Air from 5-60 psig
Pressure:
Operating: 5 - 60 psig 0.35 - 4.14 bar* Proof: 160 psig (11 bar) See Table 1
Orifice Sizes:
0.116" (2.95 mm) effective
Hysteresis:
7% of full scale current (Typical) 15% of full scale current (Max)
*Not recommended for use below an operating pressure of 5 psig.

VSO is a registered trademark of Parker Hannifin Corporation.



VSO®- MAX Non-Thermally Compensated Proportional Valve

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



VSO®- MAX Pressure vs Flow

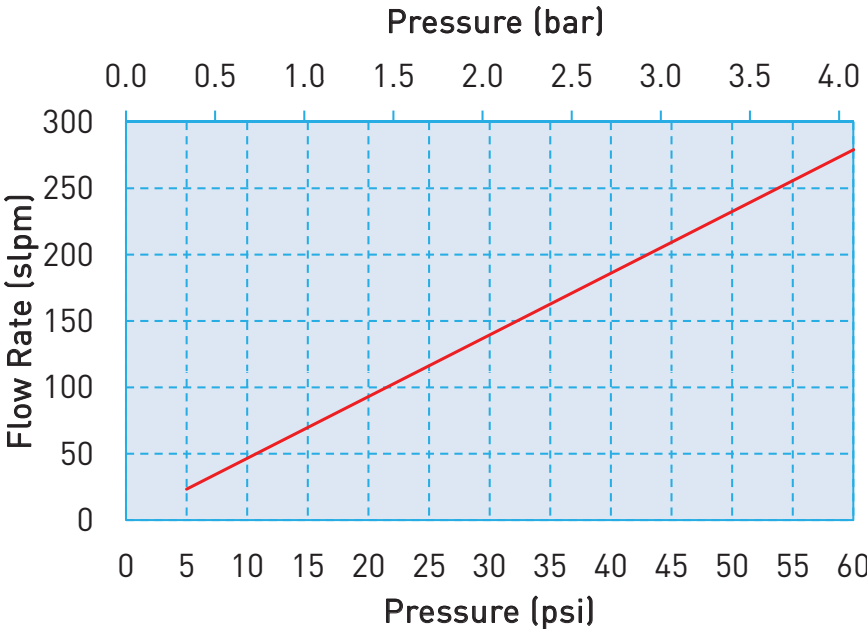


Table 1: Pressure and Flow Capabilities

Orifice Diameter	Maximum Operating Inlet Pressure	Maximum Operating Pressure Differential
0.116 in [2.95 mm]	60 psig [4.14 bar]	60 psid [4.14 bar]



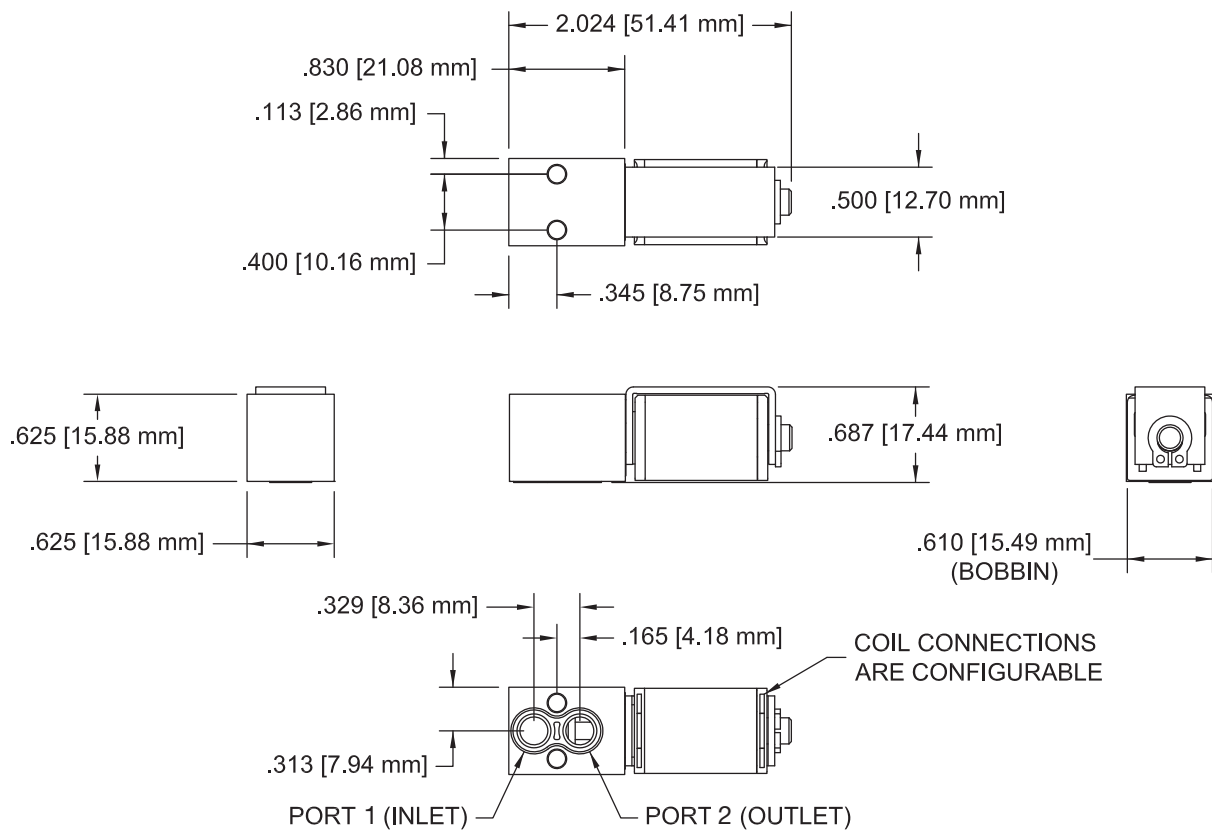
VSO®- MAX Non-Thermally Compensated Proportional Valve

Pneumatic Interface

VSO®- MAX Manifold Mount



VSO® - MAX Manifold Body Basic Valve Dimensions



NOTES:

- 1- ALL DIMENSIONS ARE REFERENCE.
- 2- DIMENSIONS ARE INCH[MM].

VSO®- MAX Non-Thermally Compensated Proportional Valve

Electrical Interface

Coil Type: 18" Wire Lead

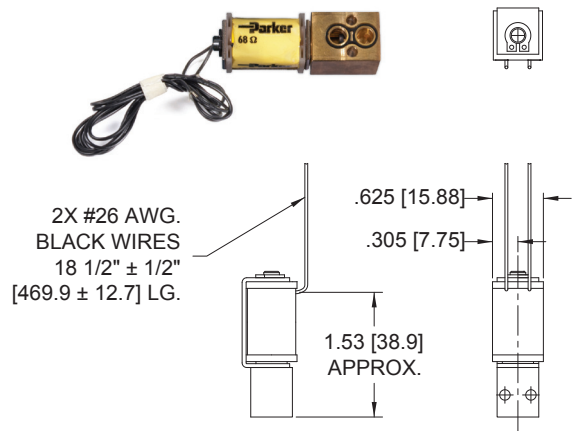


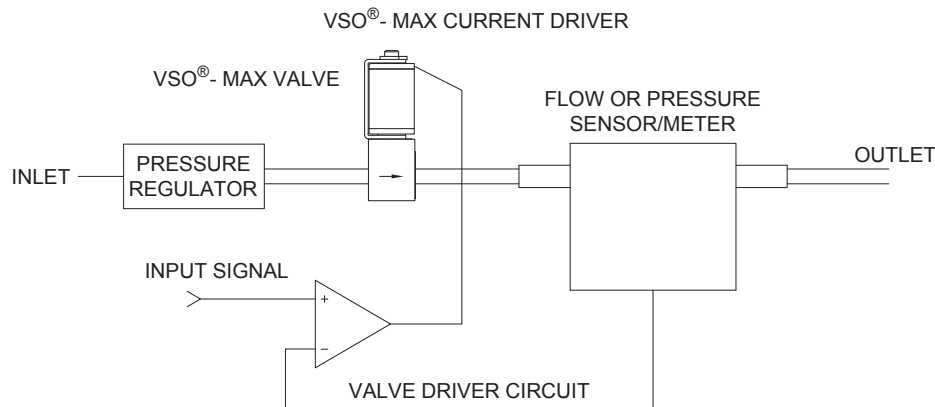
Table 2: Electrical Requirements

Maximum Supply Voltage (VDC)	Nominal Coil Resistance (Ohms) @ 20°C	Control Current at Maximum Flow (mA)
5	11.9	423
12	68.4	170
24	273.6	85

VSO®- MAX Non-Thermally Compensated Proportional Valve

VSO® - MAX Installation and Use

Typical Valve Set-up



Valve Electrical Control

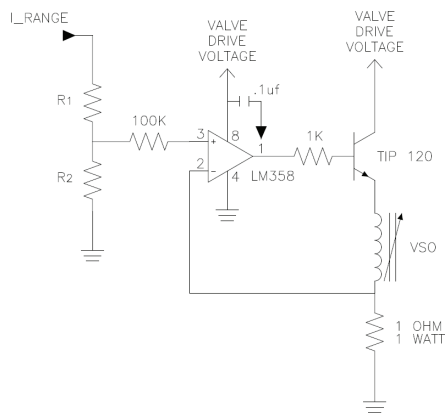
Basic Control:

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®- MAX Current Driver Schematic



This simple current driver circuit draws only 1 mA at the input control (0-5VDC) and provides control for any VSO®-MAX configuration regardless of valve voltage or resistance.

Table 3 (below) describes the recommended R1 and R2 resistor values based upon the full shut-off current.

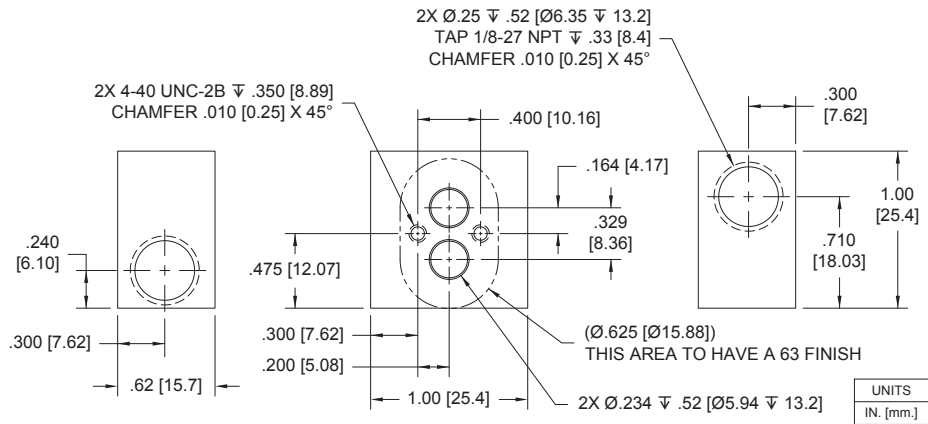
Table 3: Selectable Resistor Values for a Low Current (1mA) LM358-Based Current Driver

Minimum Available Voltage [VDC]	Valve Drive Voltage [VDC]	Nominal Coil Resistance @ 20° C [Ohms]	Input Current for Full Flow [mA]	R1 [Ohms]	R2 [Ohms]
5	7	11.9	423	1000	95.3
12	14	68.4	170	2260	33.6
24	26	273.6	85	4990	18.2

VSO®- MAX Non-Thermally Compensated Proportional Valve

VSO®- MAX Manifold Dimensions

890-009034-001



Ordering Information

Sample Part ID	921	1	1	1	05	1	000
Description	Series	Elastomer	Pneumatic Interface	Body	Coil Voltage	Electrical Interface	
Options		1: FKM	1: Manifold Mount	1: Brass	05: 5 VDC 12: 12 VDC 24: 24 VDC	1: Wire Leads, 18" (45.7 cm)	

Accessories

190-007057-001: Spare Manifold Gasket, FKM*	*Supplied with the valve. Used as a seal between the valve body and manifold.
191-000214-002: Screw 4-40 x 7/8" Stainless Steel, Socket Head Cap**	**Not supplied with the valve. Used to mount the valve to a manifold.
890-009034-001: Manifold, Single Station, 1/8" NPT	

NOTE: 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.

Please click on the Order On-line button (or go to www.parker.com/precisionfluidics/vsmax) to configure your VSO®-Max Non-Thermally Compensated Proportional Valve. For more detailed information, visit us on the Web, or call and refer to Performance Spec. #790-002288-001 and Drawing #890-003230-001.



PPF-MPV-002/US September 2012

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




HF PRO High Flow Proportional Valve

Non-Thermally Compensated Proportional Valve



The HF PRO is a miniature 2-way normally closed (NC) high flow proportional valve that controls gas flow proportionally to input current with flow rates up to 60 slpm at 50 psig. The valve can be controlled with either DC current or pulse width modulation along with closed loop feedback to deliver optimal system performance. The HF Pro miniature proportional valve is an ideal choice for applications that require repeatable pressure and flow control such as respiratory and patient monitoring applications.

Features

- Capable of controllable flow rates of up to 60 slpm and pressures of 50 psig
- Provides repeatability across its operating range for improved accuracy
- Available Oxygen Service use clean
- Proven performance tested to 35 million life cycles
- RoHS compliant 

Typical Applications

- Ventilators
- O₂ Concentrators/Conservers
- Anaesthesia Delivery
- Patient Monitors
- Pressure & 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 131°F (0 to 55°C)
Storage Temperature:
-40 to 158°F (-40 to 70°C)
Length:
1.785 in (45.3 mm)
Width:
0.625 in (16.5 mm)
Height:
0.67 in (17.0 mm)
Porting:
1/8" Barbs, Manifold Mount
Weight:
2.2 oz (62.9 grams)

Physical Properties

Internal Volume:
0.031 in ³ (0.508 cm ³)
Filtration:
43 micron
Flow Direction:
Inlet Port Port 2
Outlet Port Port 1
Oxygen and Analytically Clean:
Standard

Electrical

Power:
3.0 Watts maximum
Voltage:
See Table 2
Electrical Termination:
18 in Wire Leads

Wetted Materials

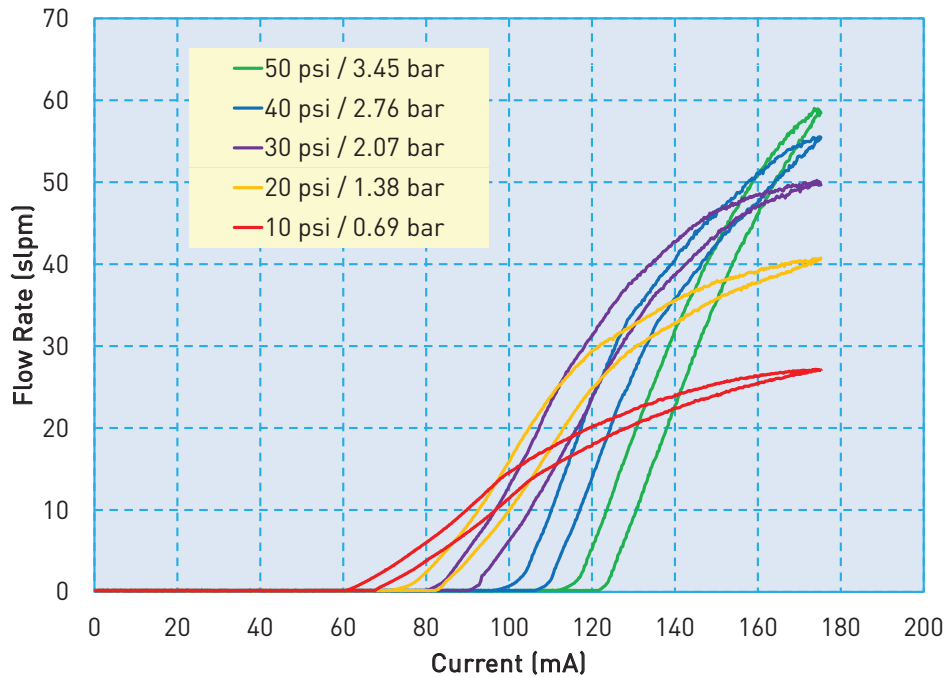
Body: 360 HO2 Brass
Stem Base:
430 FR Stainless Steel and Brass 360 HT
All Others:
FKM; 430 FR Stainless Steel; 300 Series Stainless Steel

Performance Characteristics

Leak Rate:
The leakage shall not exceed the following values: Internal 0.5 SCCM of N ₂ External 0.016 SCCM of N ₂
Pressure:
0 to 50 psi (3.45 bar) See Table 1
Vacuum:
0-27 in Hg (0-686 mm Hg)
Orifice Size:
0.070" (1.8 mm)
Hysteresis:
7% of full scale current (Typical) 15% of full scale current (Max)

HF PRO Non-Thermally Compensated Proportional Valve

Typical Air Flow with 12 VDC Coil



HF PRO Pressure vs Flow Curve

HF Pro - 0.070" (1.8 mm) Orifice

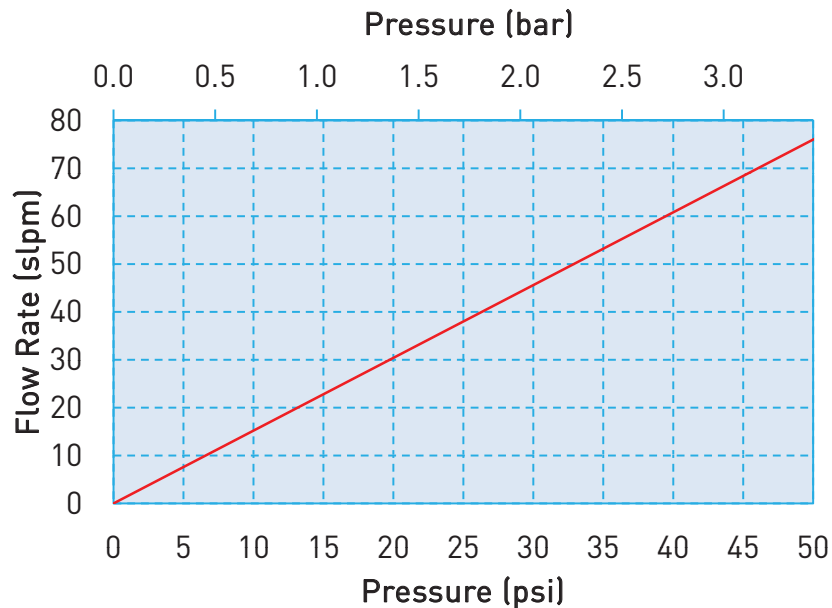


Table 1: Pressure and Flow Capabilities

Orifice Diameter	Maximum Operating Inlet Pressure	Maximum Operating Pressure Differential
0.070 in (1.8 mm)	150 psig (10.34 bar)	50 psid (3.45 bar)

HF PRO Non-Thermally Compensated Proportional Valve

Pneumatic Interface

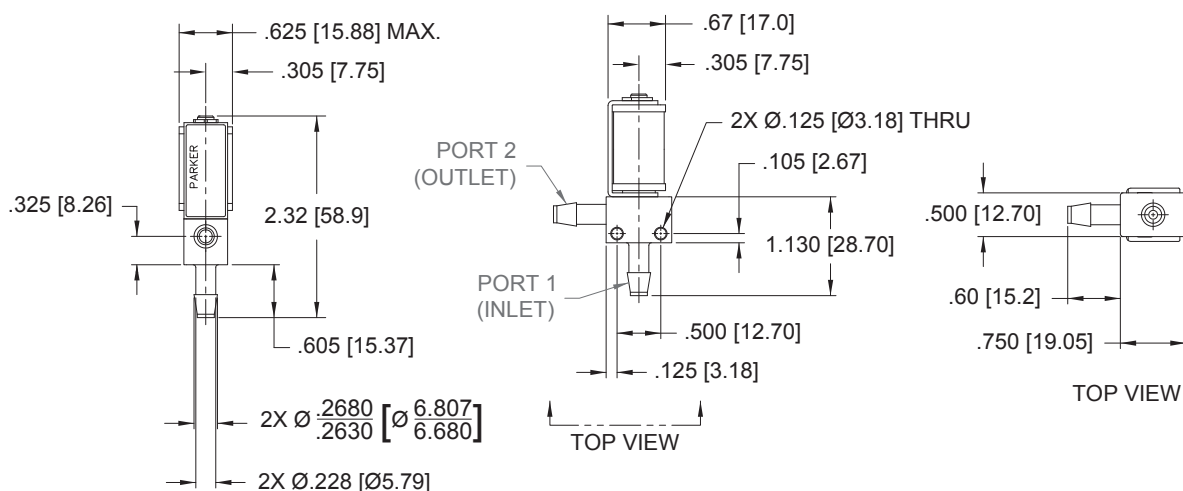
**HF PRO
Manifold Mount**



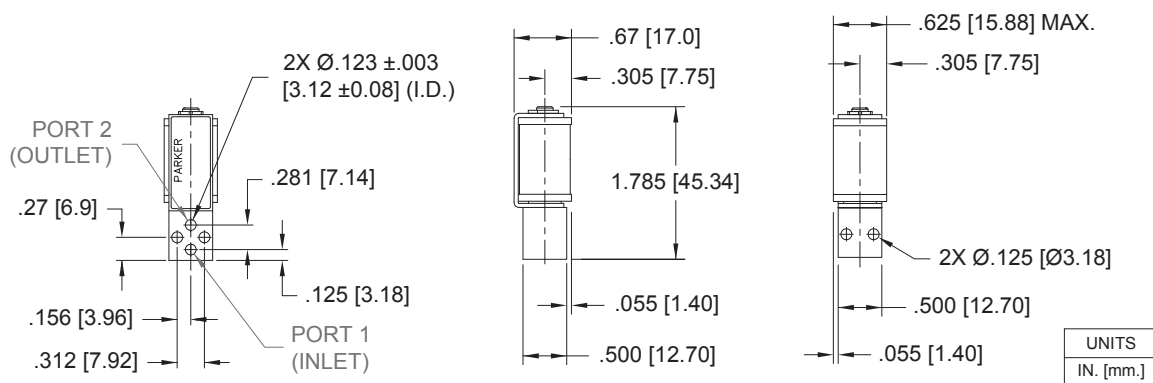
**HF PRO
Barbed**



HF PRO Barb Mount Basic Valve Dimensions



HF PRO Manifold Mount Basic Valve Dimensions



HF PRO Non-Thermally Compensated Proportional Valve

Electrical Interface

Coil Type: 18" Wire Lead

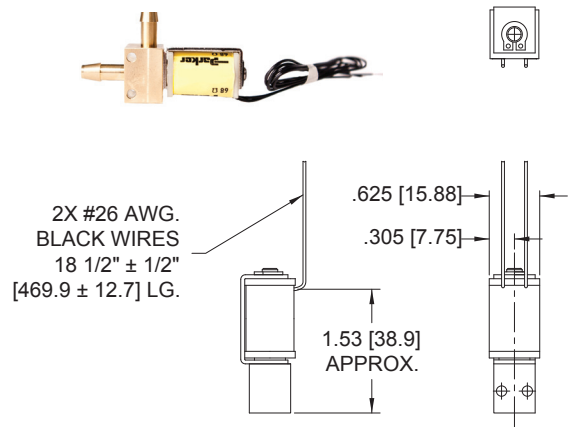


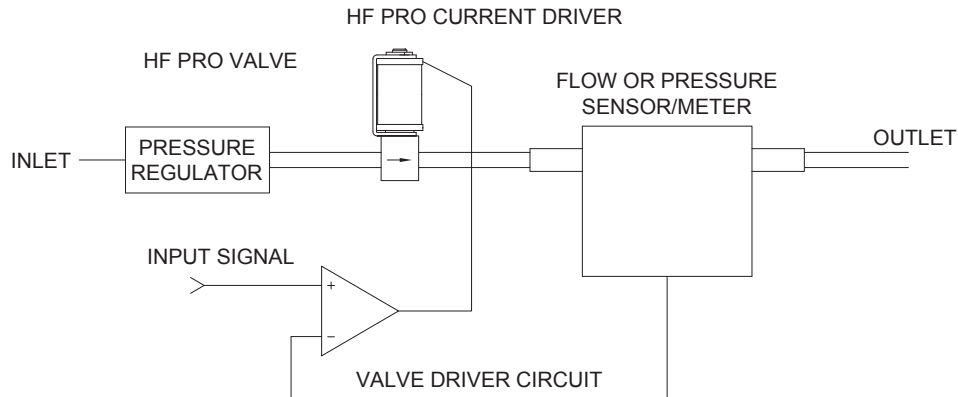
Table 2: Electrical Requirements

Minimum Available Voltage (VDC)	Nominal Coil Resistance @ 20°C (Ohms)	Input Current for Full Flow (mA)
5	11.9	435
12	68	175
24	274	87

HF PRO Non-Thermally Compensated Proportional Valve

HF PRO Installation and Use

Typical Valve Set-up



Valve Electrical Control

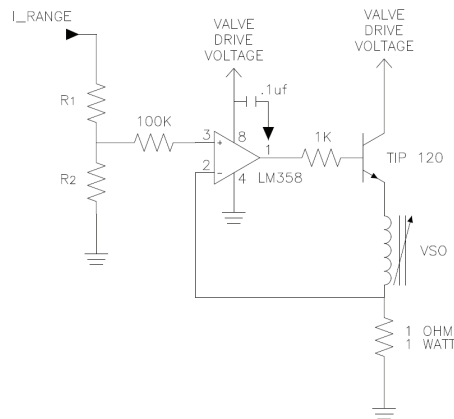
Basic Control:

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



This simple current driver circuit draws only 1 mA at the input control (0-5VDC) and provides control for any HF PRO configuration regardless of valve voltage or resistance.

Table 3 (below) describes the recommended R1 and R2 resistor values based upon the full shut-off current.

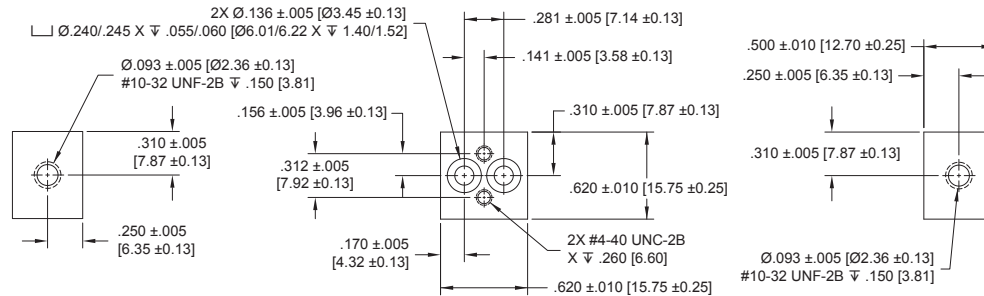
Table 3: Selectable Resistor Values for a Low Current (1mA) LM358-Based Current Driver

Minimum Available Voltage (VDC)	Valve Drive Voltage (VDC)	Nominal Coil Resistance @ 20°C (Ohms)	Input Current for Full Flow (mA)	R1 (Ohms)	R2 (Ohms)
5	7	11.9	435	1000	95.3
12	14	68	175	2260	33.6
24	26	274	87	4990	18.2

HF PRO Non-Thermally Compensated Proportional Valve

Manifold & O-Ring Dimensions & Design

Not shipped with valves.



Ordering Information

Sample Part ID	HFPRO	7	V	A	F	8	O
Description	Series	Model Number: Maximum Operating Pressure / Orifice Size	Elastomer/ Body Material	Coil Voltage*	Electrical Interface	Pneumatic Interface	Cleaning
Options		7: 50 psi / 0.070" (1.78 mm)	V: FKM / Brass	A: 5 VDC D: 12 VDC F: 24 VDC *Maximum voltage for continuous full flow, ambient temperature 55°C	F: Wire Leads, 18" (45.7 cm)	1: Manifold Mount 8: 1/4" (6 mm) Barbs	O: Oxygen Service

Accessories	
190-007024-002: O-ring, FKM, 0.114" ID x 0.070" Thick*	*Not supplied with the valve. Used as a seal between the valve body and manifold.
191-000115-010: Screw 4-40 x 5/8" Pan Head**	**Not supplied with the valve. Used to mount the valve to a manifold.



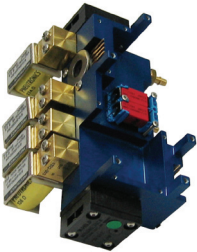
NOTE: In order to provide the best possible solution for your application, please provide the following requirements when contacting Applications Engineering:

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

Please click on the Order On-line button (or go to www.parker.com/precisionfluidics/hfpro) to configure your HF PRO Non-Thermally Compensated Proportional Valve. 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.

Value Added Application-Specific Solutions

Gassing Control System



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

Pneumatic Module



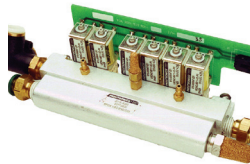
- Integrated valve manifold
- Compact design
- Single electrical connection
- Valves configured per specifications

Vacuum Gas Control Module



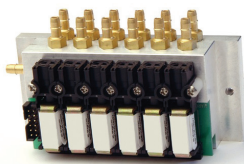
- Tested to 1×10^7 cc/sec/atm Helium
- Assembly tested on mass spectrometer

6 Position VSO® Proportional Pneumatic Manifold Assembly



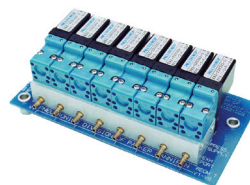
- Quick connect fittings
- Circuit board with mass electrical termination

Magnum Manifold Assembly



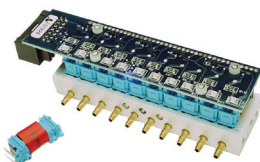
- Integrated circuit board with single connection
- Compact design
- Easily adaptable
- 2 way and 3 way designs

8 Position SRS Model Pneumatic Manifold



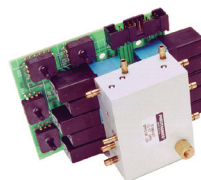
- Integrated pressure/vacuum sensors
- Mixed pneumatic logic design
- Ultem® manifold pressure/vacuum sensors

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.

This document and other information from Parker Hannifin Corporation, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of your application and review the information concerning the product or systems in the current product catalog. Due to the variety of operating conditions and applications for these products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the products and systems assuring that all performance, safety and warning requirements of the application are met.

The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice.



Parker Hannifin Corporation
Precision Fluidics Division
26 Clinton Dr., Unit 103
Hollis, NH 03049
phone 603 595 1500
fax 603 595 8080
www.parker.com/precisionfluidics