

# VSO<sup>®</sup> Miniature Proportional Valve

## Thermally Compensated Proportional Valve



### Typical Applications

- Gas Chromatography
- Mass Spectrometry
- Ventilators
- O<sub>2</sub> Concentrators/Conservers
- Anesthesia Delivery & Monitors
- Pressure & Flow Control
- Mass Flow Control

## Product Specifications

### Physical Properties

<b>Valve Type:</b>
2-Way Normally Closed
<b>Media:</b>
Air, argon, helium, hydrogen, methane, nitrogen, oxygen, & others
<b>Operating Environment:</b>
32 to 131°F (0 to 55°C)
<b>Storage Temperature:</b>
-40 to 158°F (-40 to 70°C)
<b>Length:</b>
1.79 in (45.3 mm)
<b>Width:</b>
0.63 in (15.9 mm)
<b>Height:</b>
0.67 in (17.0 mm)
<b>Porting:</b>
1/8" (3 mm) barbs or 10-32 female; manifold mount (available with screens)
<b>Weight:</b>
2.2 oz (63 g)

### Physical Properties

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

### Electrical

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

### Wetted Materials

<b>Series 11 Body:</b>
360 HO <sub>2</sub> Brass or 300 Series Stainless Steel
<b>Series 25 Body:</b>
Nickel-Plated Brass
<b>Stem Base:</b>
430 FR Stainless Steel and Brass 360 HT
<b>All Others:</b>
FKM; FFKM; 430 FR Stainless Steel; 300 Series Stainless Steel

The VSO<sup>®</sup> miniature proportional valve provides enhanced flow control for applications where precise control flow control is required up to 56 slpm. The VSO<sup>®</sup> 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<sup>®</sup> miniature proportional valve is ideally suited for manufacturers of medical and analytical equipment.

### Features

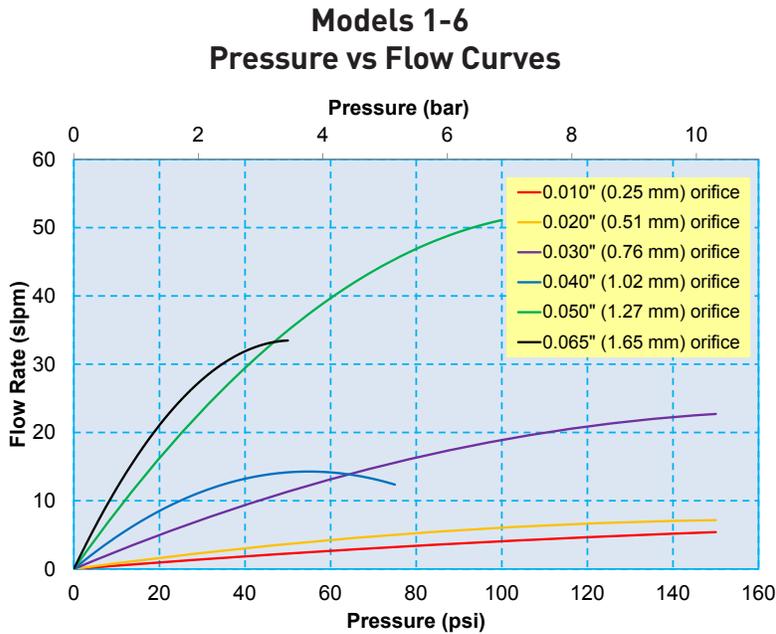
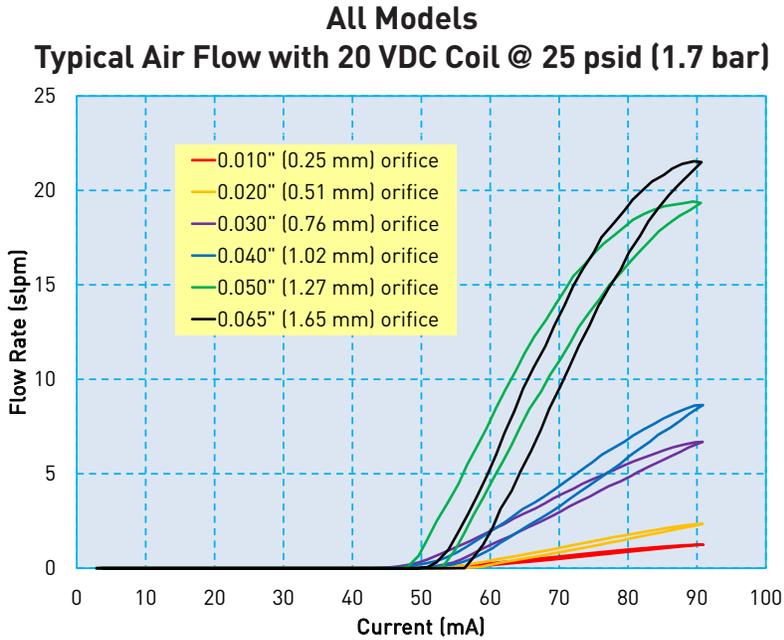
- Enables precise flow control for improved instrument accuracy
- Thermally compensated to maintain precise flow over a wide range of media
- Computer automated calibration and serialization for performance traceability
- Cleaned for Oxygen and Analytical Service use
- Proven performance tested to 100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

### Performance Characteristics

<b>Leak Rate:</b>
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
<b>Pressure:</b>
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
<b>Vacuum:</b>
0-27 in Hg (0-686 mm Hg)
<b>Orifice Sizes:</b>
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)
<b>Hysteresis:</b>
7% of full scale current (Typical) 15% of full scale current (Max)

# VSO<sup>®</sup> Thermally Compensated Proportional Valve

## Typical Flow Curve



## Pressure and Flow Capabilities

Table 1

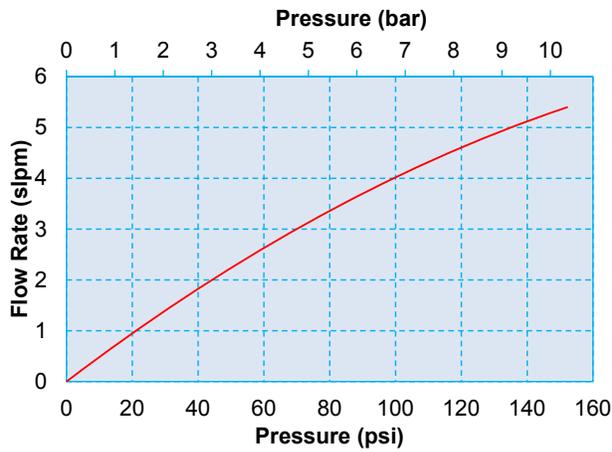
Orifice Diameter	Maximum Operating Inlet Pressure	Maximum Operating Pressure Differential
0.010 in (0.25 mm)	150 psig (10.34 bar)	150 psid (10.34 bar)
0.020 in (0.51 mm)	150 psig (10.34 bar)	150 psid (10.34 bar)
0.030 in (0.76 mm)	150 psig (10.34 bar)	150 psid (10.34 bar)
0.040 in (1.02 mm)	150 psig (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)



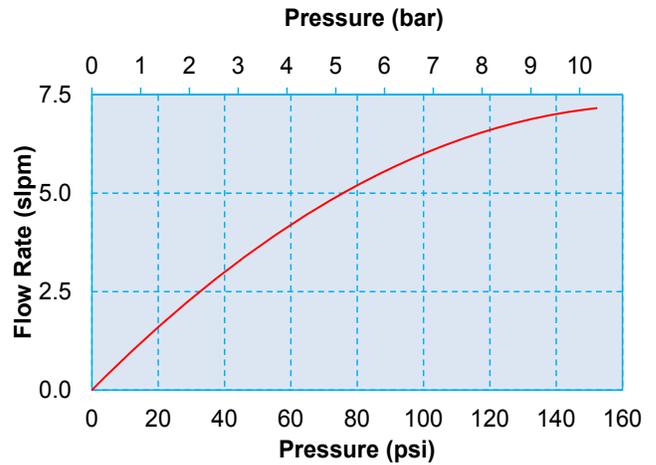
# VSO<sup>®</sup> Thermally Compensated Proportional Valve

## VSO<sup>®</sup> Sizing Charts

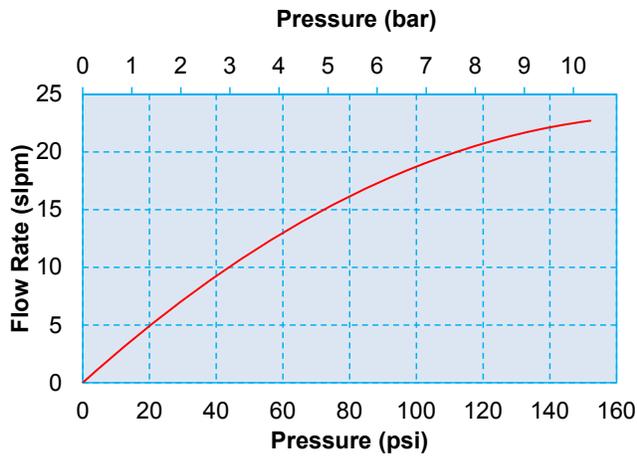
### Model 1 - 0.010" (0.25 mm) Orifice



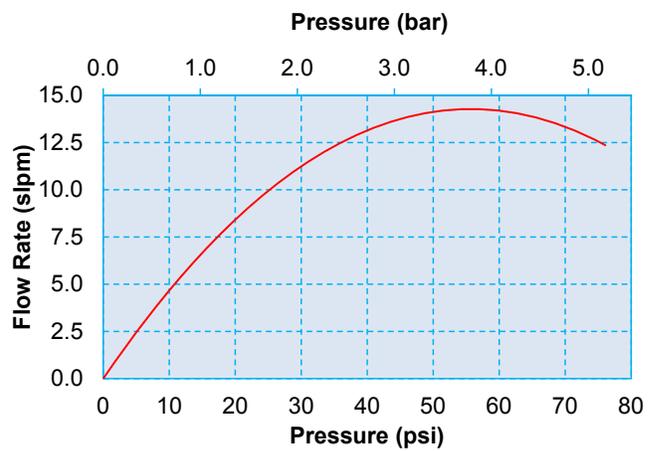
### Model 2 - 0.020" (0.51 mm) Orifice



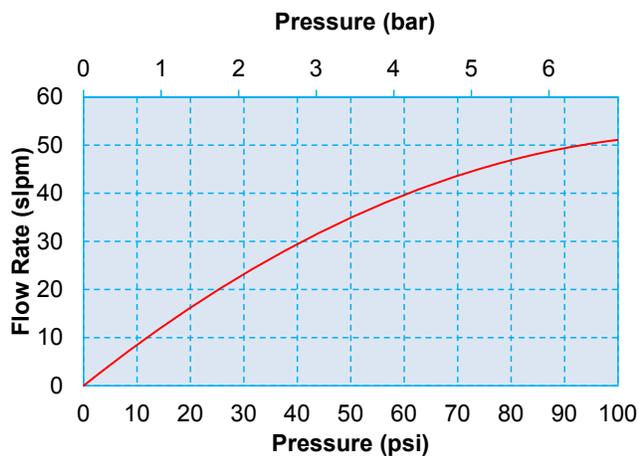
### Model 3 - 0.030" (0.76 mm) Orifice



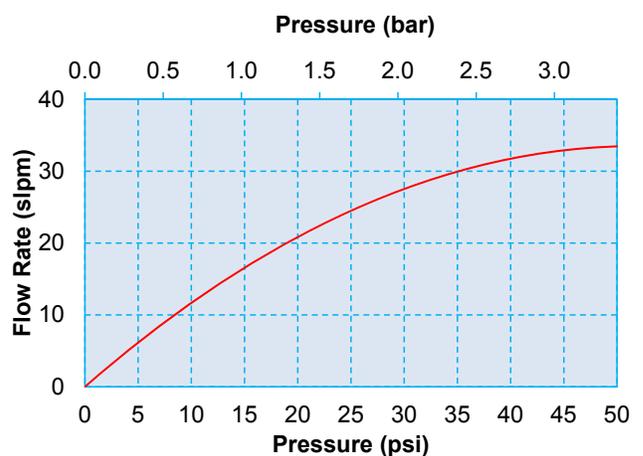
### Model 4 - 0.040" (1.02 mm) Orifice



### 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**

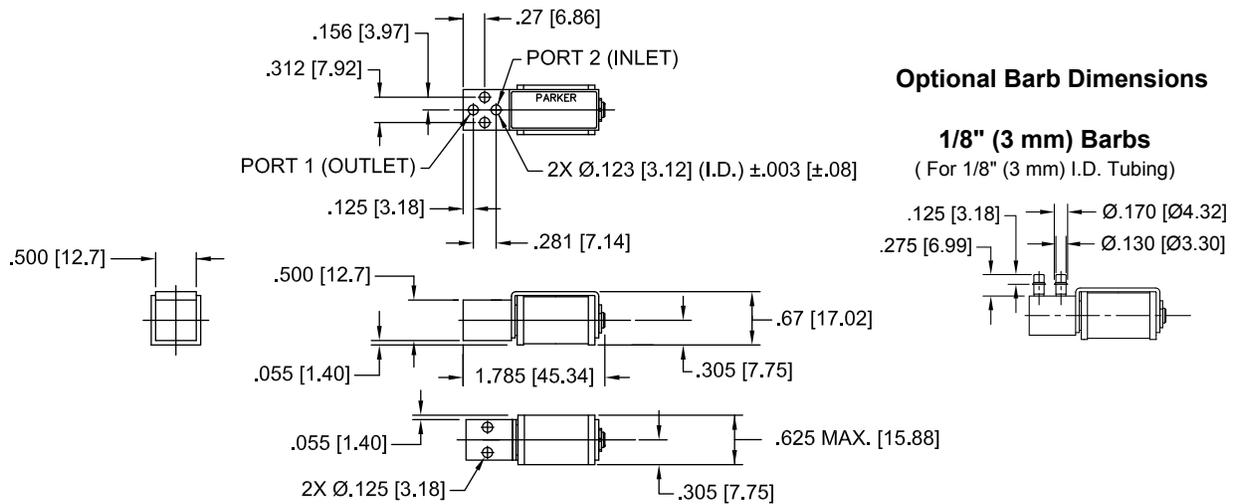


**VSO® Series 25  
10-32 Threaded**

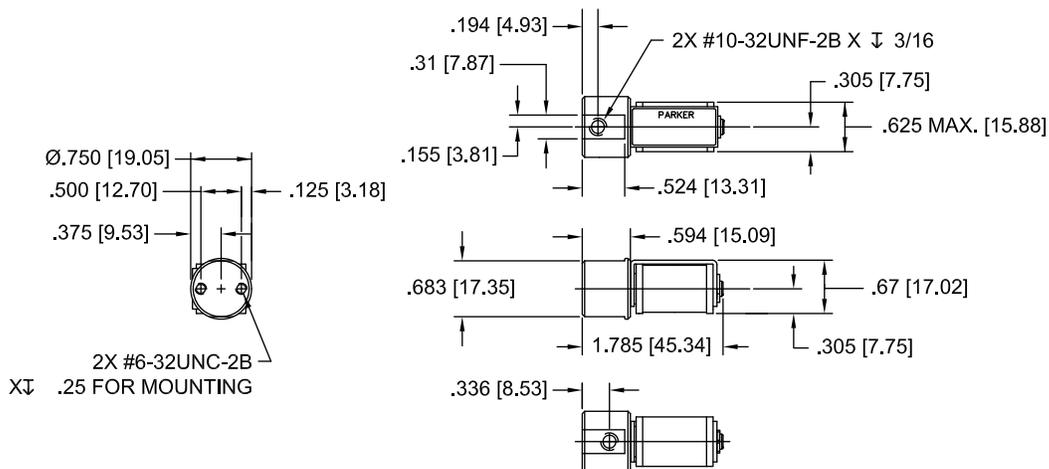


## Mechanical Integration Dimensions

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



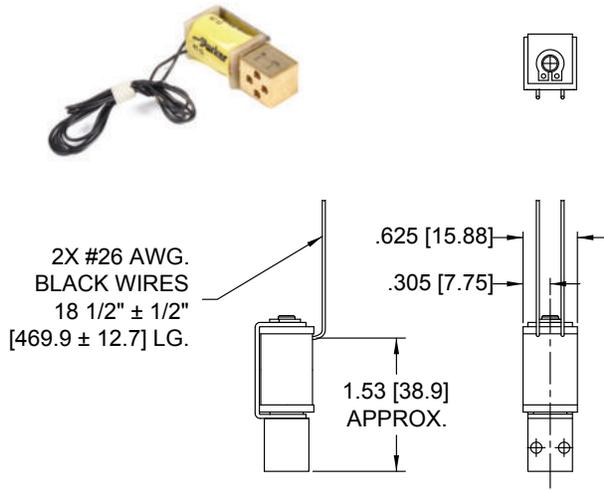
### VSO® Series 25 10-32 Threaded Body Basic Valve Dimensions



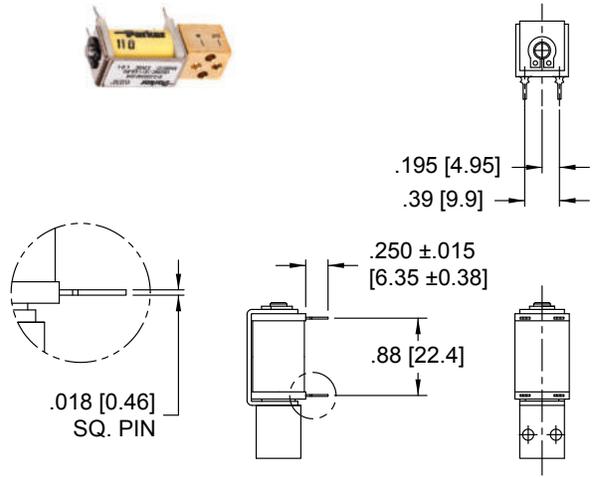
# VSO<sup>®</sup> Thermally Compensated Proportional Valve

## Electrical Interface

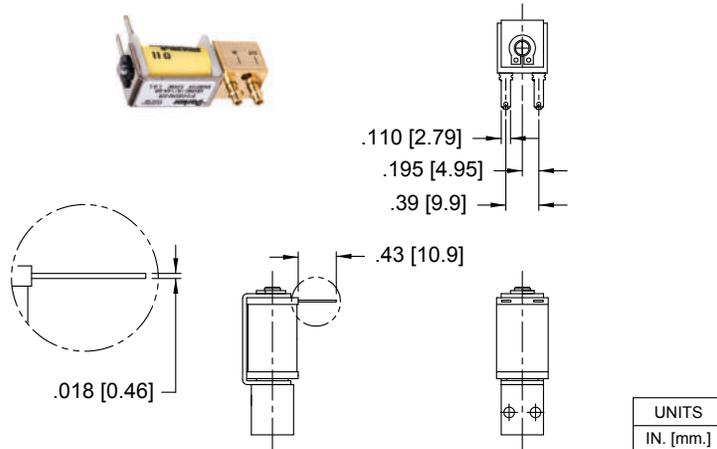
### Coil Type: Wire Leads



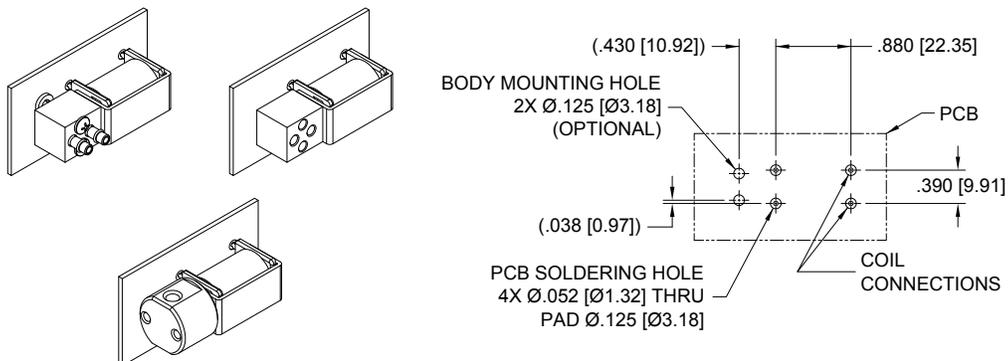
### Coil Type: 4 PC Pin\*



### Coil Type: Quick Connect Spade



### \*PCB Pin Layout (Coil Type 4 PC Pin)



# VSO<sup>®</sup> Thermally Compensated Proportional Valve

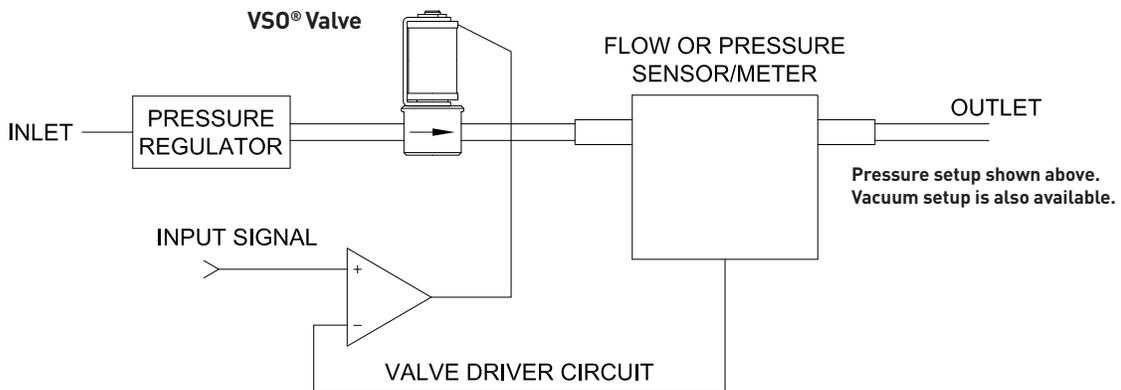
## Electrical Requirements

Table 2

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

## Installation and Use

### Typical Valve Set-up



### Valve Electrical Control

#### Basic Control:

The VSO<sup>®</sup> 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.

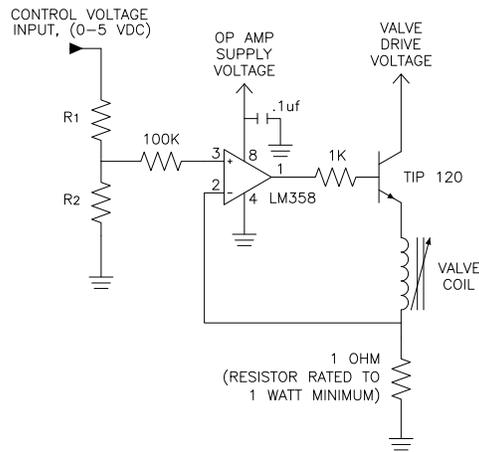
#### PWM Control:

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

# VSO<sup>®</sup> Thermally Compensated Proportional Valve

## Installation and Use

### Suggested VSO<sup>®</sup> Current Driver Schematic



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

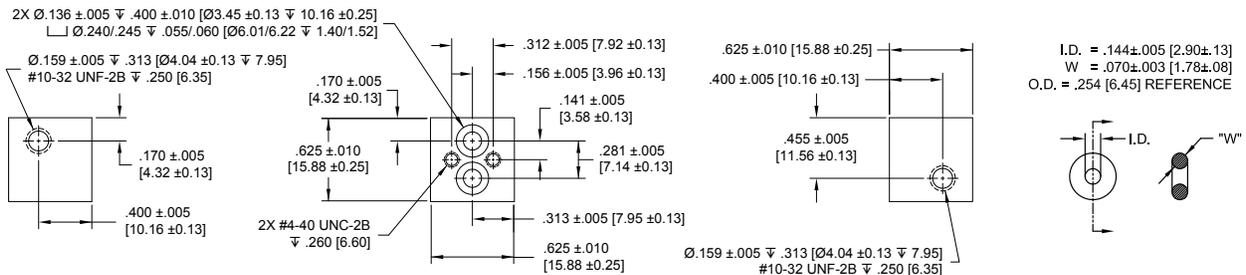
Table 3 (below) describes the recommended R1 and R2 resistor values based upon the full shut-off current.

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

Voltage Supplied to Valve Coil (Reference)	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.

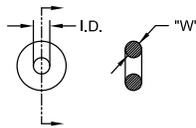


# VSO® Thermally Compensated Proportional Valve

## Accessories

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

I.D. = .144±.005 [2.90±.13]  
W = .070±.003 [1.78±.08]  
O.D. = .254 [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: FKM / Stainless Steel H: FFKM / 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](http://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.