

# VSO® LowPro Miniature Proportional Valve 超微型比例阀

## Low Profile Proportional Valve



### Markets, 应用市场

- Portable Oxygen Concentrators 便携式制氧机
- Ventilators 呼吸机
- Patient Monitors 病人监护

### Typical Applications

- Pressure Control
- Volumetric Flow Control
- Pulse Dose Control

## Product Specifications

### Physical Properties

<b>Valve Type:</b>	2-Way Normally Closed 两通常闭
<b>Media:</b>	Air, Oxygen or any non-reactive, non-condensing gases
<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>	0.80 in (20 mm)
<b>Width:</b>	0.63 in (16 mm)
<b>Height:</b>	0.55 in (14 mm)
<b>Porting:</b>	Face Seal to Manifold with integrated FKM seal
<b>Weight:</b>	0.42 oz (12 g)

The VSO® LowPro is a miniature proportional valve that controls the flow rate of inert gases. Typical flow rates up to 50 SLPM with a maximum of 1.5 Watts at room temperature. At just 16 mm wide by 14 mm tall, the valve can be populated into the smallest portable device improving performance, size and weight. With an orifice of up to 0.080" (2.03 mm) and a weight of 12 g, the VSO® LowPro can perform the function of valves three times its size without sacrificing the power. Mounting only requires a simple, machined manifold.

### Features

- Very low power required of typically 1 Watt enables portable capability and low power control increasing battery life or reducing the size of your power supply or battery
- Low profile design simplifies mounting and eliminates cartridge configurations that require complex & expensive machining
- Delivers consistent performance on every valve
- Reach, RoHS, ISO 15001, IP65, and CE compliant



### Electrical

<b>Power:</b>	1.0 Watt Typical 典型1瓦。2.0 Watt Maximum 最大2瓦
<b>Voltage:</b>	5, 12 and 24 VDC See Table 2
<b>Electrical Termination:</b>	4.5" (114 mm) Wire leads [26 AWG] with Molex 50-57-9402 connector

### Wetted Materials

<b>Body &amp; Cover:</b>	Aluminum 铝 400 Series Stainless Steel 不锈钢
<b>Armature &amp; Spring:</b>	Carbon Steel (Nickel Plated) Stainless Steel
<b>Coil:</b>	Urethane Polyvinyl Butyral
<b>All Others:</b>	FKM, Epoxy
<b>Regulatory: 指令符合</b>	Compliant with RoHS directive (2002/95/EC), REACH EC 1907/2006, ISO 15001, IP65(IEC/EN 60529), and CE

### Performance Characteristics

<b>Leak Rate: 泄漏速率</b>	The leakage shall not exceed the following values: Internal: 0.5 SCCM of Air with a differential pressure of 50 psid External: 0.2 SCCM of Air with a differential pressure of 50 psid
<b>Operating Pressure: 操作压力</b>	0 - 50 psi (3.45 bar) 0 - 30 psi (2.07 bar) See Table 1
<b>Vacuum:</b>	0-27 in Hg (0-686 mm Hg)
<b>Proof Pressure:</b>	100 psi (6.9 bar)
<b>Orifice Sizes: 阀通径</b>	0.040 in (1.02 mm) 0.050 in (1.27 mm) 0.080 in (2.03 mm)
<b>Hysteresis:</b>	10% of full scale current (Typical) 15% of full scale current (Maximum)
<b>Recommended Filtration:</b>	40 µm (not supplied) 推荐过滤
<b>Response time:</b>	10 ms Typical
<b>Reliability:</b>	100 Million Cycles

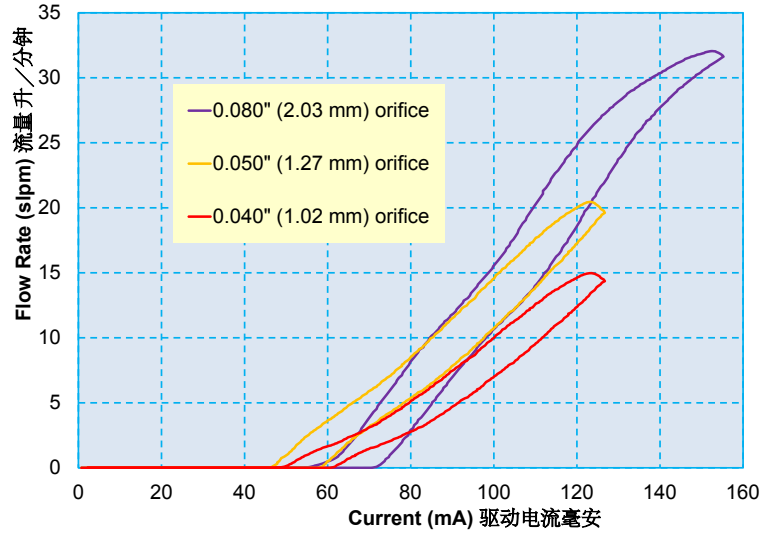
VSO is a registered trademark of Parker Hannifin Corporation.  
Patent pending with the United States Patent and Trademark Office (USPTO).



# VSO<sup>®</sup> LowPro Low Profile Proportional Valve

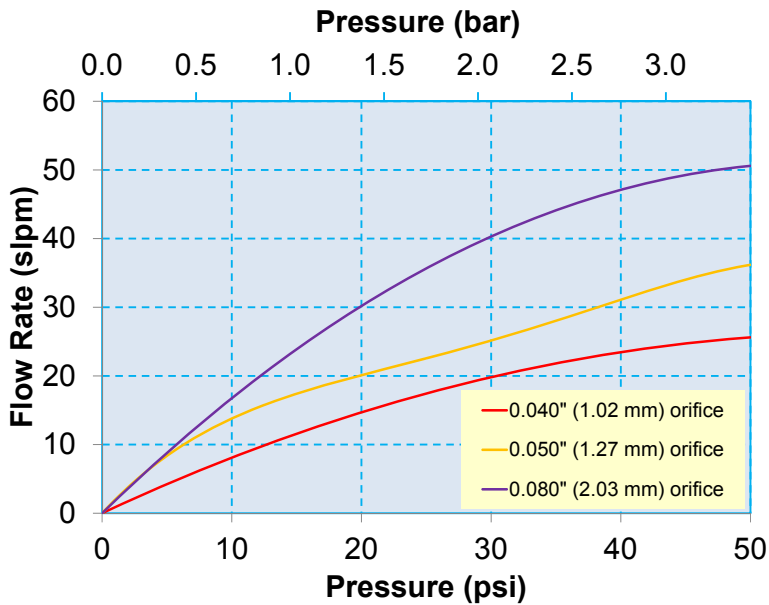
## Typical Flow Curve 典型流量曲线

**All Models**  
**Typical Air Flow with 12 VDC Coil @ 25 psid (1.7 bar)**



### Pressure vs Flow Curve 压力和流量曲线关系

The curve below shows the maximum output flow for each orifice size as a function of inlet pressure up to the maximum rated pressure for the valve.



## Pressure and Flow Capabilities

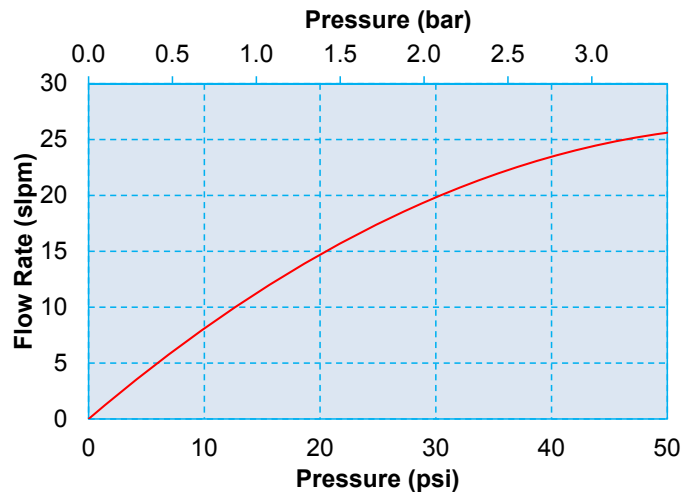
Table 1

Model No.	Orifice Diameter	Cv at Maximum Pressure	Maximum Inlet Pressure	Maximum Differential Pressure
4	0.040" (1.02 mm)	0.010	50psi (3.45 bar)	50 psig (3.45 bar)
5	0.050" (1.27 mm)	0.025	50 psi (3.45 bar)	50 psig (3.45 bar)
8	0.080" (2.03 mm)	0.062	50psi (3.45 bar)	30 psig (2.07 bar)

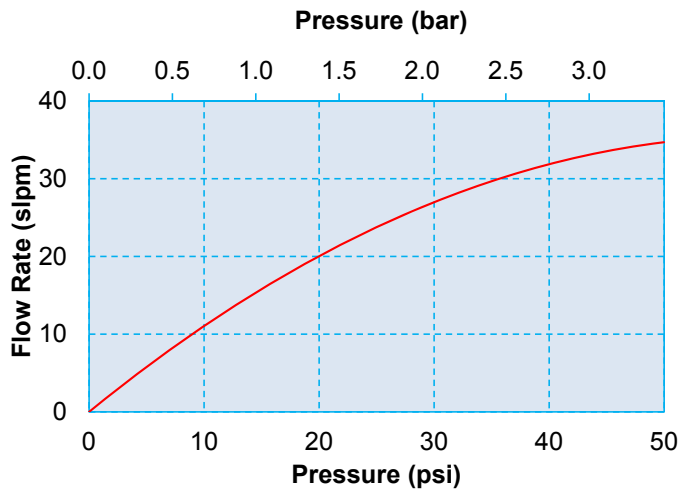
# VSO<sup>®</sup> LowPro Low Profile Proportional Valve

## VSO<sup>®</sup> LowPro Sizing Charts

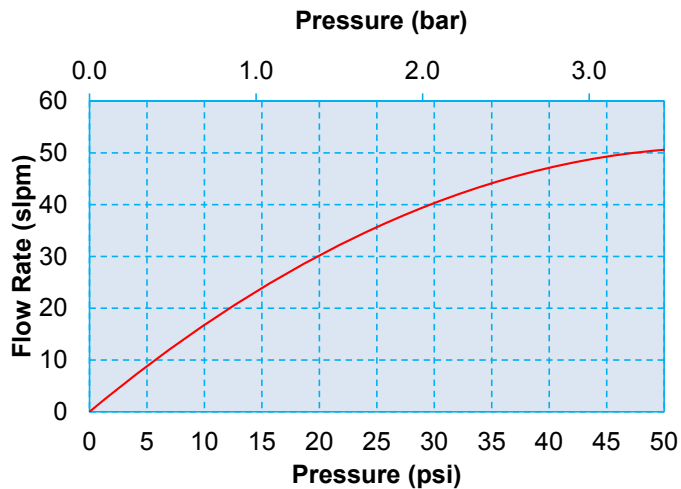
**Model 4 - 0.040" (1.02 mm) Orifice**



**Model 5 - 0.050" (1.27 mm) Orifice**



**Model 8 - 0.080" (2.03 mm) Orifice**



# VSO® LowPro Low Profile Proportional Valve Pneumatic Interface

## VSO® LowPro Manifold Mount

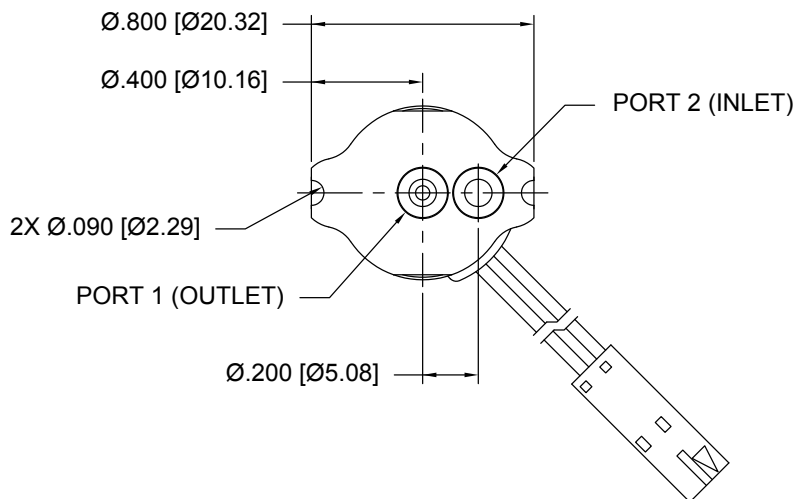
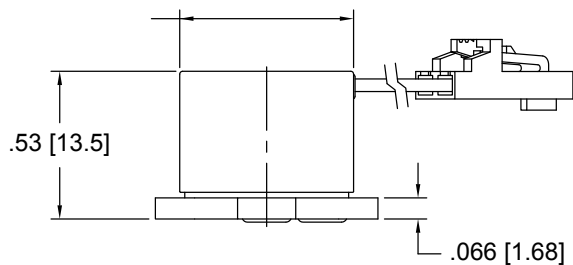


### Mechanical Integration

#### Dimensions

VSO® LowPro Basic Valve Dimensions  $\varnothing.625$  [ $\varnothing15.87$ ] 基础尺寸

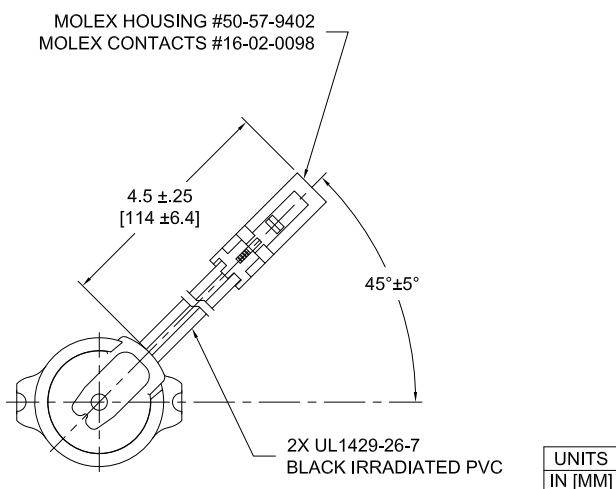
单位：英寸；括号内单位：毫米



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# VSO<sup>®</sup> LowPro Low Profile Proportional Valve

## Electrical Interface



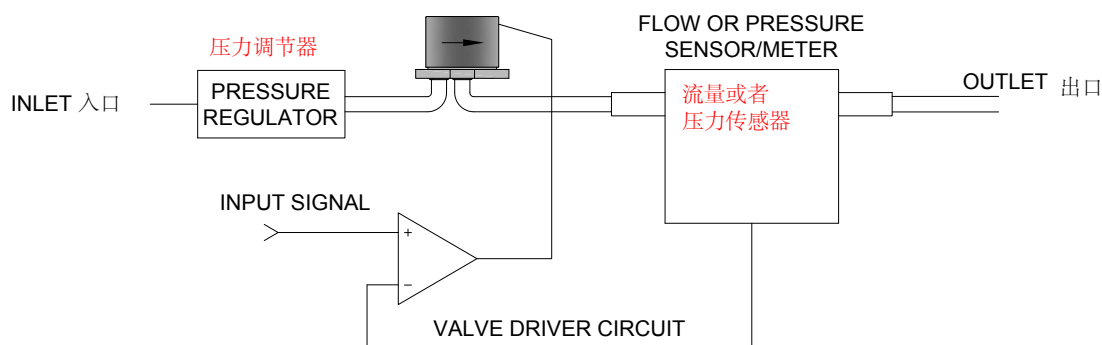
## Electrical Requirements

Table 2

Rated Voltage 电压	Nominal Coil Resistance at 20°C 阻抗	Control Current at Maximum Flow	
		Model 4 & 5	Model 8
5 VDC	10 Ω	320 mA	385 mA
12 VDC	64 Ω	125 mA	156 mA
24 VDC	180 Ω	75 mA	92 mA

## Installation and Use 安装和使用

### Typical Valve Set-up 典型阀设置 VSO<sup>®</sup> LowPro VALVE



### 比例阀驱动电路 Valve Electrical Control

**Basic Control: 基本控制:** 比例阀能够被电压或者电流控制。然而，为了获得优秀的重复性，高度推荐电流控制  
 The VSO<sup>®</sup> LowPro 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.

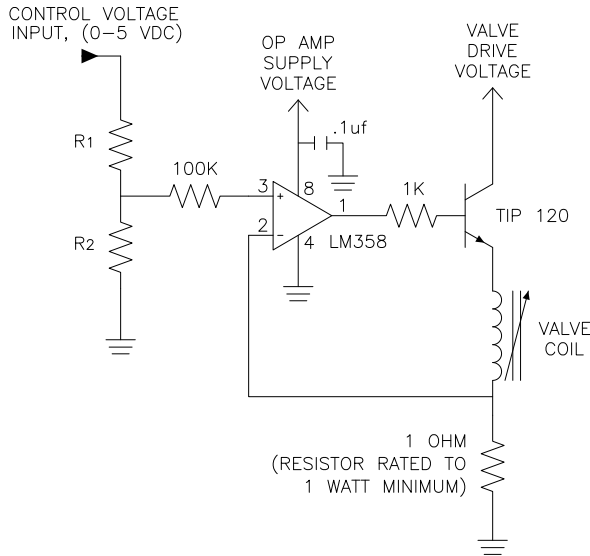
**PWM Control: PMW控制:** 对于PMW控制，推荐使用10kHz的驱动频率，或者更高的频率。  
 For PWM control, the signal applied to the valve should have a frequency of 10 kHz or greater. Optimum frequency will be application dependent.



# VSO® LowPro Low Profile Proportional Valve

## Installation and Use

### Suggested VSO® LowPro Current Driver Schematic



This simple current driver circuit draws only 1 mA at the input control (0-5VDC) and provides control for any VSO® LowPro 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 (Models 4, 5 & 8)**  
对于使用基于LM358的电流驱动器的阻值选择

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	390	4990	422
12	14	68.4	157	8660	115
24	26	273.6	94	8660	34

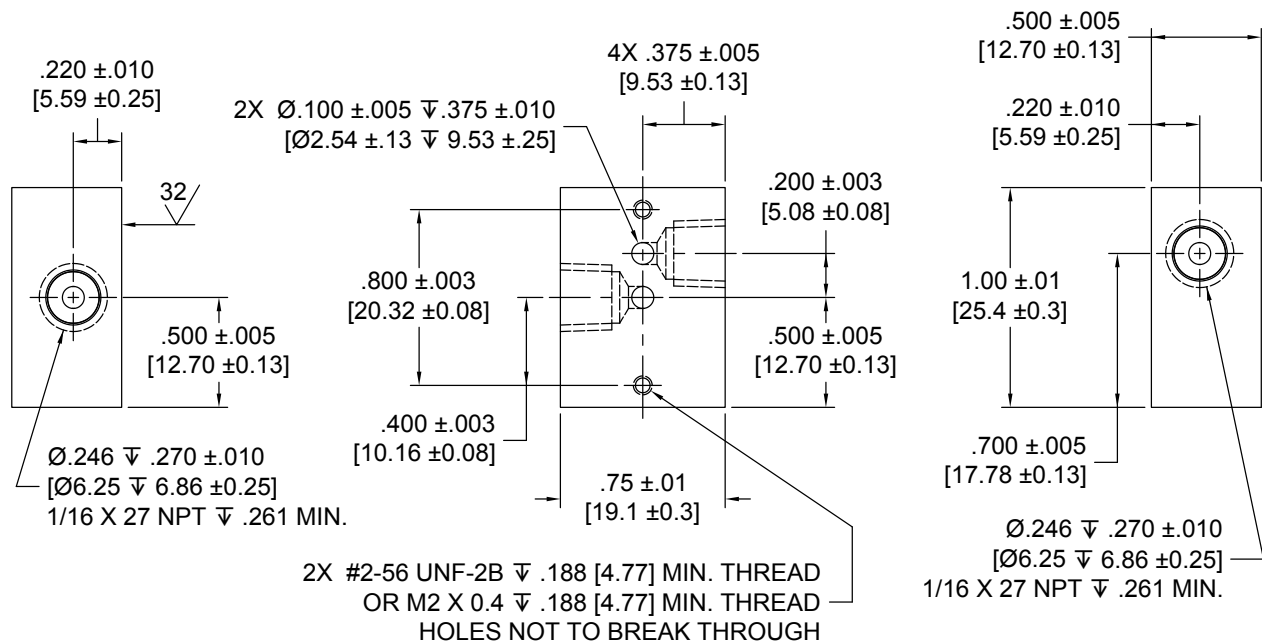
# VSO® LowPro Low Profile Proportional Valve

## Installation and Use 基座设计

### Manifold & Dimensions & Design

Not shipped with valves.

Parker Precision Fluidics recommends 24 in-oz (17 N-cm) of torque for the screws.

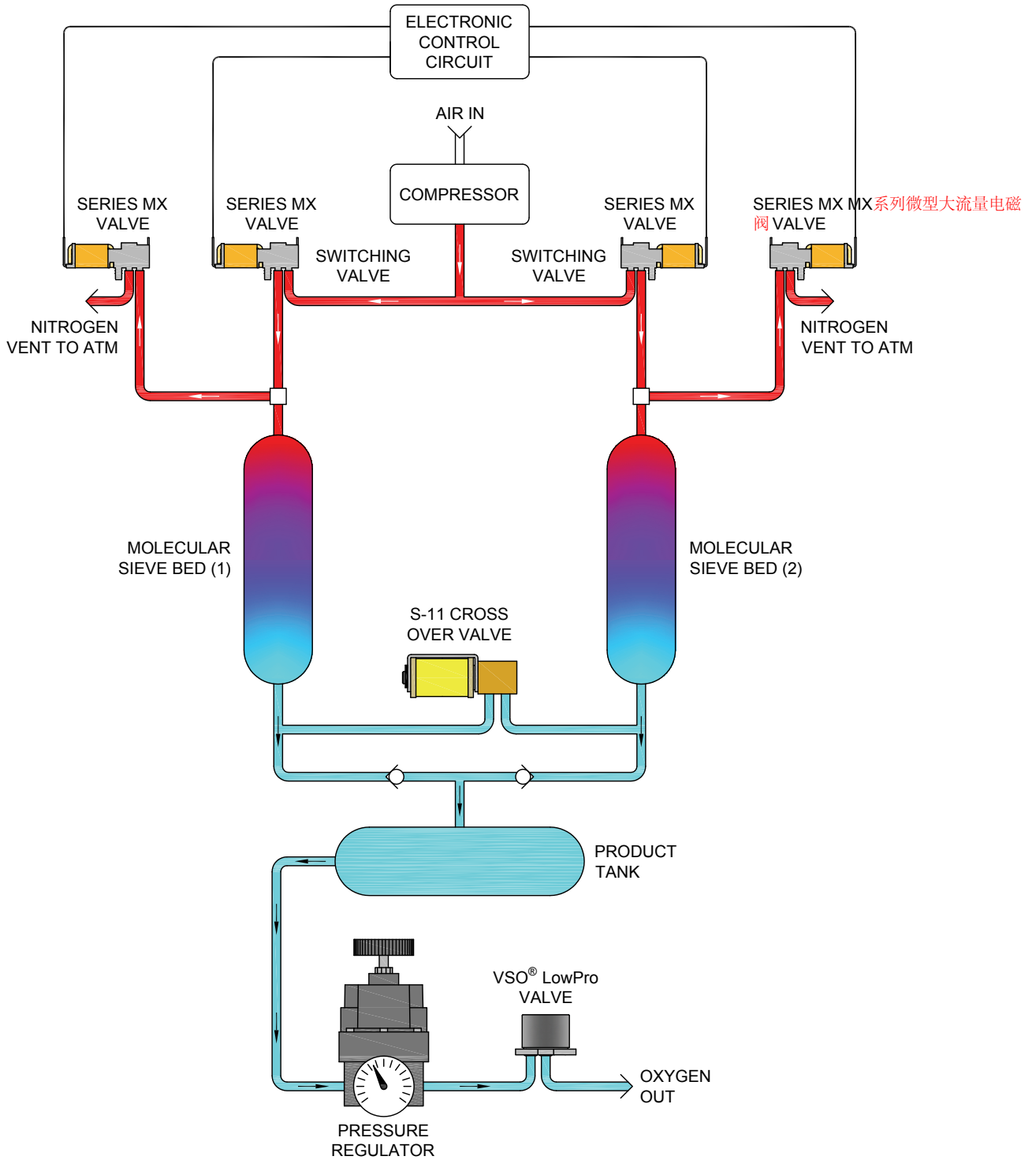


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# VSO® LowPro Low Profile Proportional Valve Typical Flow

## Diagram 便携式制氧机典型应用流路

### Oxygen Concentrator Application





# VSO® LowPro Low Profile Proportional Valve

## Accessories

**12.5" Adapter Wire Leads**  
290-006061-003



**Single Station Manifold**  
890-009042-001



**Screw #2-56 x 3/16"**  
**Socket Head Cap Screw**  
191-000112-404

(see valve mounting recommendations above)



**Manifold O-Ring (FKM)**  
190-007059-001  
(supplied with valve)



## Ordering Information

Sample Part ID	935	-	4	0	0	05	0	-	000
Description	Series		Model Number	Pneumatic Interface	Elastomer	Voltage	Electrical Interface		
Options	935	-	4: 50psi / 0.040" (1.02 mm) 5: 50psi / 0.050" (1.27 mm) 8: 30psi / 0.080" (2.03 mm)	0: Manifold Mount	0: FKM Seals	05: 5 VDC 12: 12 VDC 24: 24 VDC	0: Wire Leads w/ connector	-	000

Accessories	
290-006061-003: 12.5" Wire Leads	Not supplied with the valve.
890-009042-001 Single Station Manifold	Not supplied with the valve.
190-007059-001 Manifold O-Ring (FKM)	Supplied with the valve.
191-000112-404 Screw #2-56 x 3/16" Socket Head Cap Screw	Not supplied with the valve. See valve mounting recommendations above

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 to configure your VSO® LowPro Proportional Valve (or go to [www.parker.com/precisionfluidics/VSOLowProMiniatureProportionalValve](http://www.parker.com/precisionfluidics/VSOLowProMiniatureProportionalValve)). For more detailed information, visit us on the Web, or call and refer to VSO® LowPro Performance Spec. 790-002490-001.

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