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Miniature Proportional Valves

Precision Fluidics

Parker

ENGINEERING YOUR SUCCESS.

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VSO® MAX HP

Miniature High Flow Proportional Valve

The VSO® MAX HP series is a miniature high flow proportional valve that provides flow capabilities to meet your OEM application needs. The valve delivers a high range of controllable flow while consuming 25% less power than comparable miniature proportional solenoid valves, assisting with battery life savings. VSO® MAX HP Model 2 delivers a flow at 200 slpm at 45 PSI and is designed for higher range of operating pressures 120 psi (8.27 bar) commonly found on systems without a regulator. Model 4 delivers a flow of 180 slpm at 25 PSI and is designed for higher flow at lower pressure commonly found on systems with regulators. This translates to a smaller, sleek medical device design and offers potential savings and features three standard control voltage ranges (5, 12 and 24 VDC).

Markets

- Respiratory
- Surgical (High Flow)

Applications

- Ventilators
- Insufflators
- Anesthesia Delivery & Monitors
- Pressure and Flow Control

Features

- Low power consumption generates less heat
- Proven performance tested to 100 million life cycles
- Cleaned for Oxygen use per ISO 15001
- Meets ISO 10993 and ISO 18562 Biocompatibility (aluminum body version only)
- Reach and RoHS compliant

Product Specifications

Physical Properties

Valve Type:
2-Way Normally Closed
Media:
Air, Oxygen, Nitrous Oxide, Carbon Dioxide, Heliox & other medical gases
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) Brass
1.41 oz (40.0g) Aluminum

Electrical

Power:
2.0 Watts Typical @ 20°C Model 2
2.2 Watts Typical @ 20°C Model 4
Voltage:
5, 12, 24 VDC
Electrical Termination:
18 in Wire Leads

Wetted Materials

Body:
Brass or Aluminum
Stem:
430 FR Stainless Steel Brass or Aluminum
All Others:
FKM; 430 FR Stainless Steel; Stainless Steel; Aluminum

Contact factory for customized configurations: eg custom calibration and electrical connections.

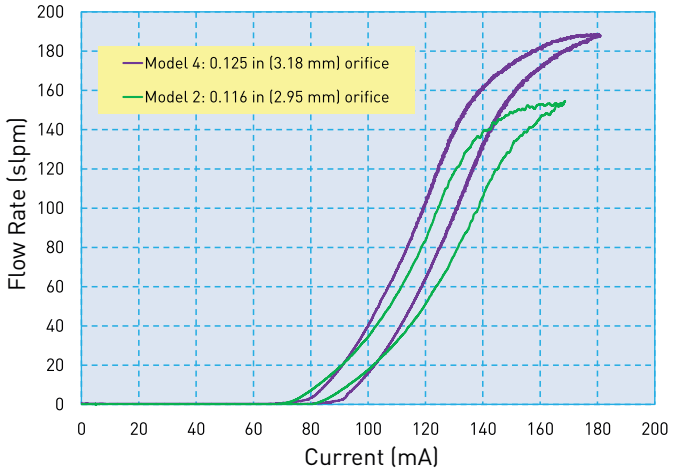
Performance Characteristics

Leak Rate:
The leakage shall not exceed the following values: Internal: 5.0 sccm of Air up to 120 psi (8.27 bar) External: 0.5 sccm of Air up to 120 psi (8.27 bar)
Operating Pressure:
Model 2: 0 - 120 psi (0 - 8.27 bar) Model 4: 0 - 101 psi (0 - 7 bar) Proof: 300 psi (20.7 bar)
Orifice Sizes:
Model 2: 0.116 in (2.95 mm) effective Model 4: 0.125 in (3.18 mm) effective
Hysteresis:
7% of full scale current (Typical) 15% of full scale current (Max)
Recommended Filtration:
Optional Integrated Filtration 400 µm
Response time:
10 ms Typical
Reliability:
100 Million Cycles 0.95 Reliability Factor 95% Confidence Interval

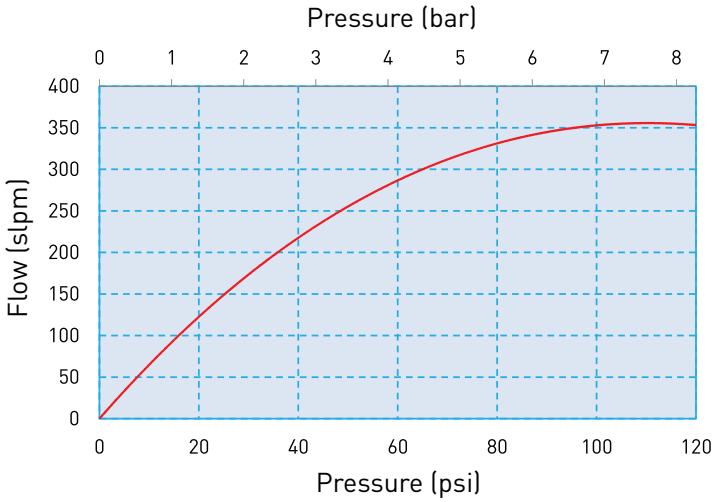
VSO® MAX HP Miniature High Flow Proportional Valve

Typical Flow Curves

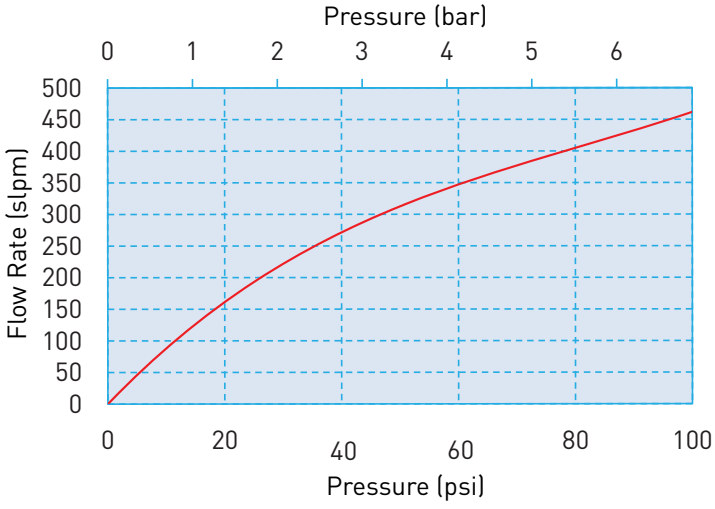
VSO® MAX HP Current vs. Flow with 12 VDC Coil @ 25 psid (1.7 bar)



VSO® MAX HP Model 2 Pressure vs.Flow Curve



VSO® MAX HP Model 4 Pressure vs. Flow Curve



VSO® MAX HP Miniature High Flow Proportional Valve

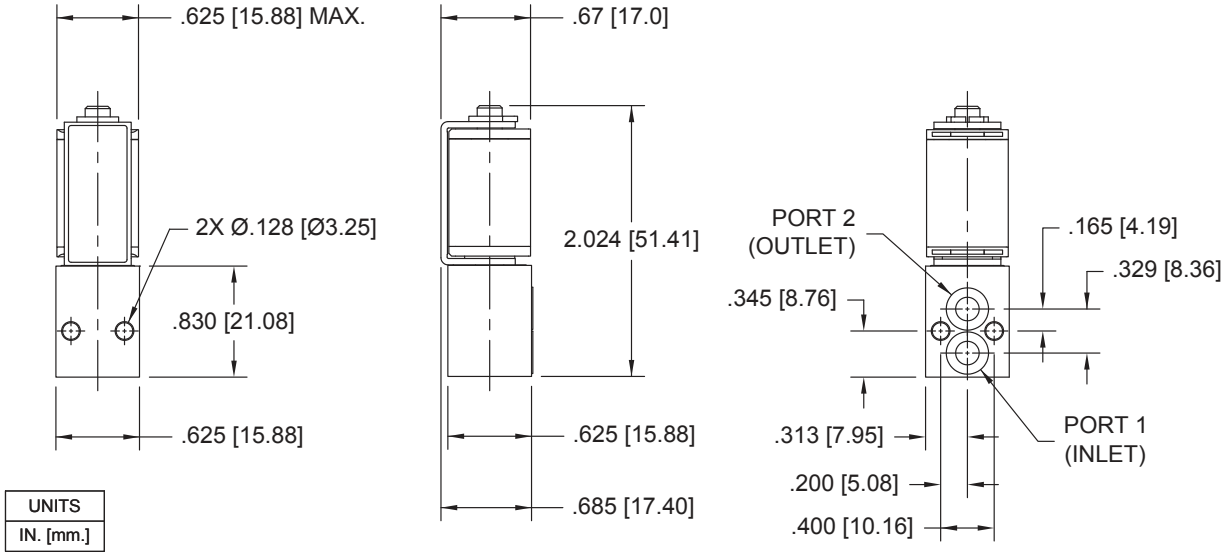
Pneumatic Interface

VSO® MAX HP Manifold Mount

Mechanical Integration

Dimensions

VSO® MAX HP Manifold Body Basic Valve Dimensions

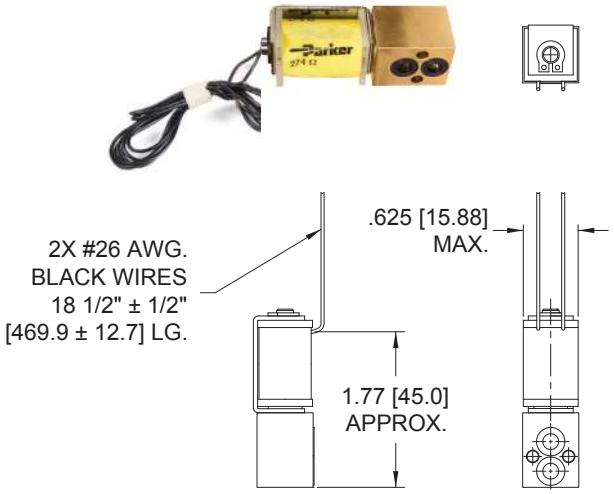


VSO® MAX HP Miniature High Flow Proportional Valve

Electrical Interface

VSO® MAX HP Manifold Mount

Coil Type: 18 in Wire Lead



Contact factory for customized lead wire lengths.

Electrical Requirements

Table 1

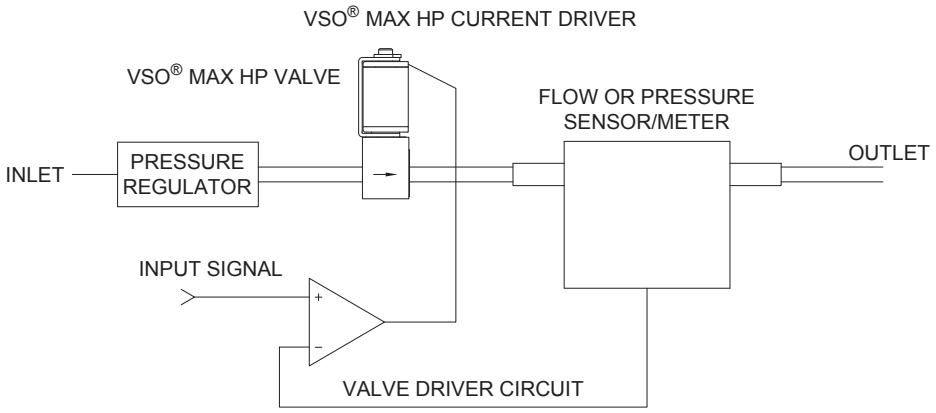
Nominal Supply Voltage (VDC)	Nominal Coil Resistance (Ohms) @ 20°C	Model 2 Control Current at Maximum Flow (mA)	Model 4 Control Current at Maximum Flow (mA)
5	11.9	423	430
12	68.4	170	180
24	273.6	85	90

Note: VSO® MAX HP Model 4 may require 20% higher voltage allowance to obtain maximum flow at high operating temperatures.

VSO® MAX HP Miniature High Flow Proportional Valve

Installation and Use

Typical Valve Set-up

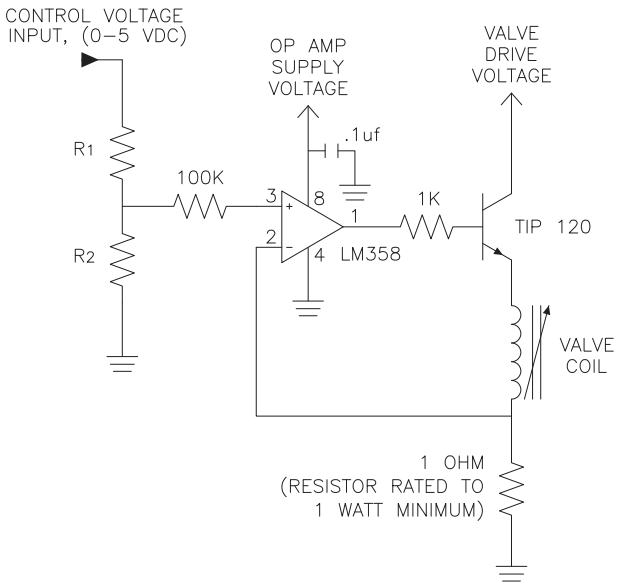


Valve Electrical Control

Basic Control:
The VSO® MAX HP 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 of 5 kHz or greater. Optimal frequency will be application dependent.

Suggested VSO® MAX HP 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 HP configuration regardless of valve voltage or resistance.

Table 2 (below) describes the recommended R1 and R2 resistor values based upon the full shut-off current.

VSO® MAX HP Miniature High Flow Proportional Valve

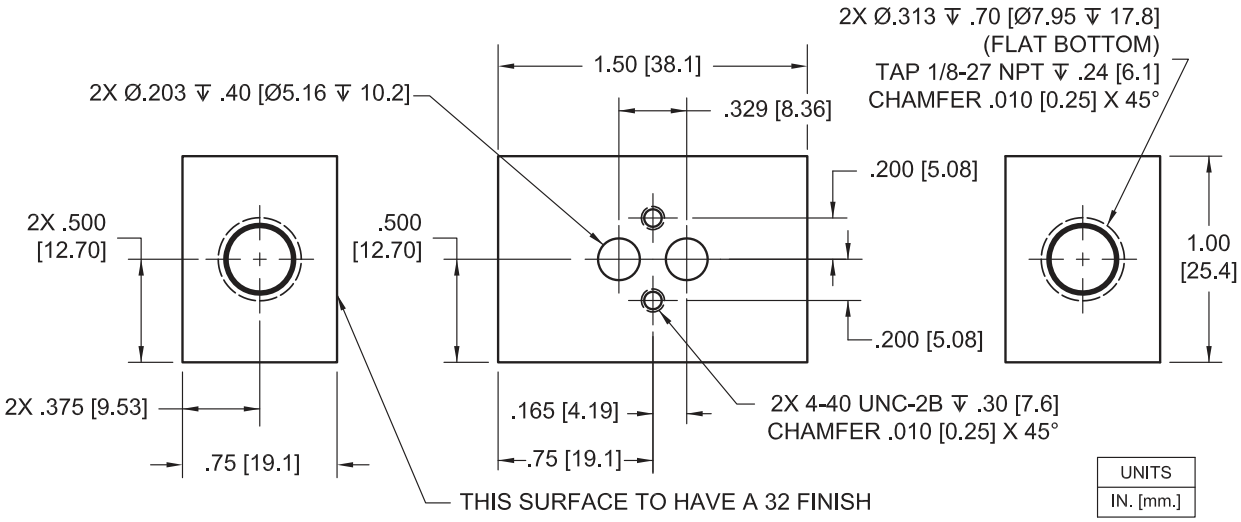
Installation and Use

Table 2: Selectable Resistor Values for a Low Current (1mA) LM358-Based Current Driver

Specified Solenoid Voltage (VDC)	Circuit Supply Voltage (VDC)	Nominal Coil Resistance @ 20°C (Ohms)	R1 (Ohms)	R2 (Ohms)
5	7	11.9	4990	464
12	14	68.4	4990	178
24	26	273.6	4990	86.6

Installation and Use

VSO® MAX HP Manifold Dimensions & Design



Accessories

Manifold, Single Station, 1/8" NPT
890-009034-001

Screw 4-40 x 7/8" Stainless Steel, Socket Head Cap
**Not supplied with the valve. Used to mount the valve to a manifold.
191-000214-002

Optional Filter
**Supplied if selected option
195-000291-001

Spare Manifold Gasket, Quad Ring FKM
*Supplied with the valve. Used as a seal between the valve body and manifold. (2 Required)
190-007060-001

VSO® MAX HP Miniature High Flow Proportional Valve

Ordering Information

Sample Part ID	921	2	1	1	05	1	000
Description	**Series**	**Model Number: Operating Pressure / Orifice Size**	**Pneumatic Interface**	**Body /Elastomer**	**Coil Voltage**	**Electrical Interface**	
Options		2: 120 PSI / 0.116 in (2.95 mm) 4: 101 PSI / 0.125 in (3.18 mm)	1: Manifold Mount 2: Manifold Mount with filter	0: Aluminum / FKM 1: Brass / FKM Note: Only Option "0": Aluminum / FKM meets ISO 10993 and ISO 18562 Biocompatibility.	05: 5 VDC 12: 12 VDC 24: 24 VDC	1: Wire Leads, 18 in (45.7 cm)	

Accessories		
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.
190-007060-001:	Spare Manifold Gasket, Quad Ring FKM*	*Supplied with the valve. Used as a seal between the valve body and manifold.(2 Required)
890-009034-001:	Manifold, Single Station, 1/8" NPT	
195-000291-001:	Optional Filter**	**Supplied if selected option

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/vsomaxhp) to configure your VSO® MAX HP Miniature High Flow Proportional Valve. For more detailed information, visit us on the Web, or call and refer to Performance Spec. #790-002506-001 (Model 2) or Performance Spec # 790-002535-001 (Model 4) and Drawing #890-003423-001.