

High-Performance Gas Flow Control Valves

FEATURES

- Ideal for laboratory applications, test benches, and OEMs in analytical process industries
- SmartVO control circuit available for 0–5 VDC, 4–20 mA set point control
- Precise control over wide range of gas mass flow rates up to 1000 slpm
- Valve pressure up to 500 psig (34.5 barg)
- High pressure option with ValFlex™ valve seat up to 5000 psig (345 barg)
- Operates over a wide pressure differential range 0 to 5000 psig (0 to 345 barg)
- Smooth valve performance with proven proprietary frictionless-hovering, direct-acting control valve technology
- All clean gases including corrosives and toxics; specify when ordering
- No leaks; bubble tight shut off
- Wide range of fitting and elastomer configurations available (see p. 3)
- Aluminum, 316L and 416 stainless steel constructions
- Single-sided 24 VDC +/- 10% input power reduces installation cost and complexity
- CE approved
- 24 VDC power supply available
- Optimally tuned to the specific application
- Control circuit and power supply with optional NEMA 4X enclosure available for 0–5 VDC, 4–20 mA set point control



SmartVO is available online and ships from stock the next day:

www.sierrainstruments.com/shop/SmartVO



www.sierrainstruments.com



SmartVO™



DESCRIPTION

Sierra's SmartVO™ control valves offer a robust and field-proven, direct-acting electromagnetic proportional control valve technology to perform over a wide variety of temperature and pressure variations in the gas stream. You can even locally adjust response characteristics for multiple applications or system pressure design changes.

In addition to providing the SmartVO valve, Sierra can provide a complete valve control package with NEMA 4X enclosure, including a 24 VDC power supply and a 0–5 VDC or 4–20 mA control circuit optimally tuned to the specific application.

Sierra has manufactured gas flow control valves since the 1980's as part of our mass flow controller product line—so SmartVO is field proven. In the case of our SmartVO, the customer already has flow or pressure metering in place and just needs a means of precision control.

The SmartVO valve technology offers precision control for on/off partial flow control over a wide range of flow rates from 0 to 50 sccm up to 1000 slpm and pressures up to 5000 psig (345 barg) with our ValFlex™ high-pressure control valve. It provides fast-response to control signal changes and operates over a wide pressure differential range.

The proprietary frictionless-hovering, direct-acting control valve is comprised of a solenoid coil that creates a magnetic field with electrical current designed for use in closed loop flow or pressure control systems.

For precision you can rely on, Sierra's SmartVO is the optimal choice to automate your process.

OPERATION SPECIFICATIONS

Models, Flow Rates, Input Power, & Coil Resistance

The SmartVO requires a valve control circuit and power supply. Supply your own control circuit, or we offer a complete dual solenoid valve control package and power supply. See p. 3 for more information.

VO-100L Economical Low Flow

Maximum flow rate to 50 slpm
 Input power: 24 VDC +/- 10%; at 264 mA
 Coil resistance: 100 Ohms (nominal at room temperature)

VO-100M Medium Flow

Maximum flow rate to 300 slpm
 Input power: 24 VDC +/- 10%; at 629 mA
 Coil resistance: 42 Ohms (nominal at room temperature)

VO-100H High Flow

Maximum flow rate to 1000 slpm
 Input power: 24 VDC +/- 10%; at 1056 mA
 Coil resistance: 25 Ohms (nominal at room temperature)

VO-100HP High Pressure

Maximum flow rate to 20 slpm
 Input power: 24 VDC +/- 10%; at 629 mA
 Coil resistance: 42 Ohms (nominal at room temperature)

VO-101 Ultra Low Flow

Maximum flow rate to 50 sccm
 Input power: 24 VDC +/- 10%; at 264 mA
 Coil resistance: 100 Ohms (nominal at room temperature)

Gases (All Versions)

All clean gases including corrosives and toxics; specify when ordering

Control Range (All Versions)

2% to 100%, control signal dependent

Turndown (All Versions)

50:1

Operating Temperature (All Versions)

32°F to 122°F (0°C to 50°C)

Leak Integrity (All Versions)

5 X 10⁻⁹ atm cc/sec of helium or better

Power Requirements

All configurations require 24 VDC +/- 10%.
 Provide your own power supply or we offer a power supply with fly leads, 12.5 Amps, 110–230 VDC. CE Approved.

Response Time

Immediate

Warranty

1-year factory warranty

PRESSURE SPECIFICATIONS

Gas Pressure Rating

Wide operating pressure 0 psig to 5000 psig (0 barg to 345 barg)

Gas Pressure for SmartVO Versions

VO-100L-AL: 145 psig (10 barg), rated burst pressure to 225 psig (15 barg)
 VO-100L-SS: 500 psig (34.5 barg), rated burst pressure to 750 psig (51.7 barg)
 VO-100M-SS: 500 psig (34.5 barg), rated burst pressure to 750 psig (51.7 barg)
 VO-100H-SS: 500 psig (34.5 barg), rated burst pressure to 750 psig (51.7 barg)
 VO-100HP-SS: 5000 psig (345 barg), rated burst pressure to 7500 psig (517 barg)
 VO-101-SS: 500 psig (34.5 barg), rated burst pressure to 750 psig (51.7 barg)

Minimum Differential Pressure Requirement

(Note: Tested with N₂ at 70°F (21.1°C) and outlet at ambient pressure)

Minimum Differential Pressure Requirement VO-100L, VO-100M & VO-100H				
Flow Rate (slpm)	Pressure Drop in PSI (mbar)			
	Low Flow 1/4-inch fittings 0 - 50 slpm	Low Flow 3/8-inch fittings 10 - 50 slpm	Medium Flow 3/8 or 1/2-inch fittings 20 - 300 slpm	High Flow Small Bore 1/2 or 3/4-inch fittings 100 - 1000 slpm
0.02	1 (69)	N/A	N/A	N/A
0.2	1.5 (103.4)	N/A	N/A	N/A
1	1.88 (129.6)	N/A	N/A	N/A
5	4.7 (324.1)	N/A	N/A	N/A
10	6 (413.7)*	4.75 (327.5)	N/A	N/A
20	12 (827.4)*	8.25 (568.8)	1 (69)	N/A
30	15 (1034.2)*	11.75 (810.1)	1.2 (82.7)	N/A
40	30 (2068.4)*	15.25 (1051.5)	1.6 (110.3)	N/A
50	50 (3447.4)*	18.75 (1292.8)	2 (137.9)	N/A
100	N/A	N/A	5 (344.7)*	0.30 (20.7)
150	N/A	N/A	10 (689.5)*	0.67 (46.2)
200	N/A	N/A	15 (1034.2)*	1.13 (77.9)
250	N/A	N/A	20 (1379)*	1.67 (115.1)
300	N/A	N/A	25 (1723.7)*	2.34 (161.3)
350	N/A	N/A	N/A	3.05 (210.3)
400	N/A	N/A	N/A	3.82 (263)
450	N/A	N/A	N/A	4.61 (317.9)
500	N/A	N/A	N/A	5.45 (375.8)
750	N/A	N/A	N/A	9.14 (630.2)
1000	N/A	N/A	N/A	13.82 (952.9)

*Larger fittings recommended for these flow rates as 1/4-inch fittings reduce overall performance: high pressure version (flow is limited to 20 slpm)

PRESSURE SPECIFICATIONS (CONTINUED)

Minimum Differential Pressure Requirement VO-100HP	
Pressure Drop in PSI (mbar)	
Flow Rate (slpm)	1/4-inch fittings
0.1	5 (344.7)
1	7.5 (517.1)
6	4.75 (327.5)
10	30 (2068.4)
12	8.25 (568.8)
15	11.75 (810.1)
20	60 (4136.9)

Minimum Differential Pressure Requirement for VO-101

30 psi (2040 mbar) optimum
1 psi (68 mbar) minimum at 70°F (21.1°C) with outlet at ambient pressure

PHYSICAL SPECIFICATIONS

Valve Type

Proprietary electromagnetic proportional control with a solenoid coil that creates a magnetic field with electrical current

Flow Body Materials

Aluminum, 316L and 416 stainless steel

Elastomers

Viton®, Buna, Neoprene®, Kalrez®

Valve Seats

Viton®, Buna, Neoprene®, Kalrez®, PFA Teflon®, and ValFlex™

Weight

VO-100L-AL	.76 lbs (1.67 kg)
VO-100L-SS	1.17 lbs (2.57 kg)
VO-100M-SS	3.3 lbs (7.26 kg)
VO-100H-SS	8 lbs (17.6 kg)
VO-100HP-SS	1.8 lbs (3.96 kg)
VO-101-SS	1.17 lbs (2.57 kg)

Electrical Connections

Fly leads, stripped & tinned, spades

Enclosure

NEMA 4X enclosure for valve control circuit

Approvals

CE approved

VALVE CONTROL CIRCUITS

Supply your own control circuit or we offer a complete dual solenoid valve control (see options below) with 24 VDC +/- 10% power supply.

Learn more at sierrainstruments.com/smartvo/control-circuit

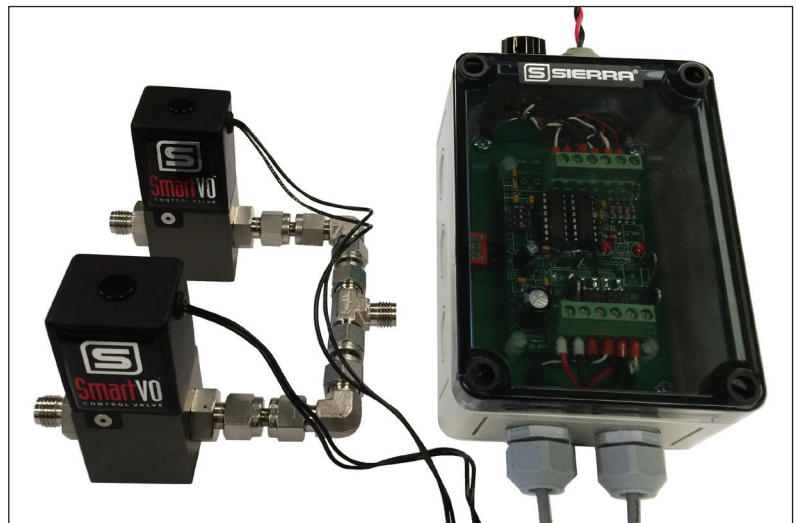
Model Code	Description
VC-2	Dual solenoid valve controller with 0–5 VDC external setpoint control signal.
VC-2P	Dual solenoid valve controller with 0–5 VDC onboard potentiometer setpoint control signal.
VC-2C	Dual solenoid valve controller with 4–20 mA setpoint control signal.

VALVE CONTROL CONFIGURATIONS

VO-100L-SS with Valve Control Circuit in enclosure, cord grips, and Sierra power supply



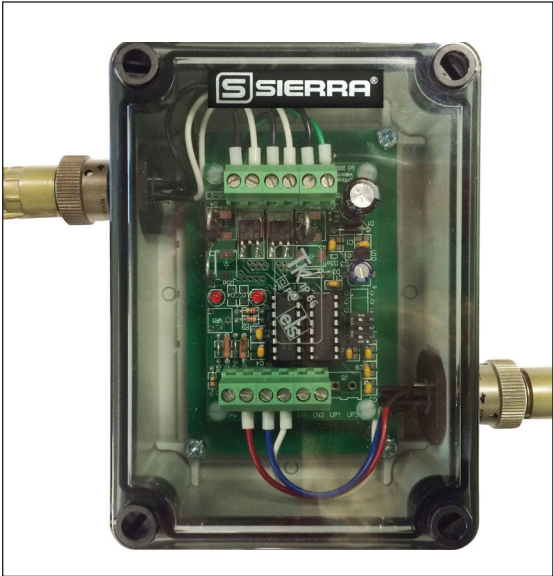
Two VO-100L-AL with Valve Control Circuit in enclosure with potentiometer, and Sierra power supply



One VO-100L and one VO-100M with 6-pin connection, Valve Control Circuit in enclosure, and Sierra power supply



Valve Control Circuit in enclosure



SMARTVO VALVES

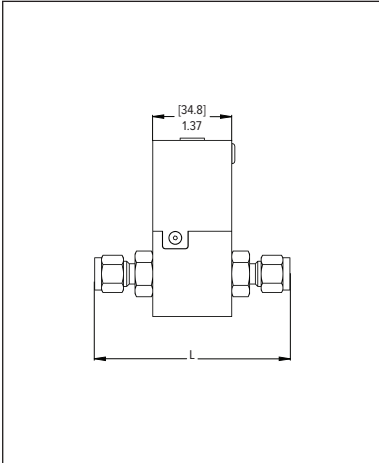
VO-100L-SS Version



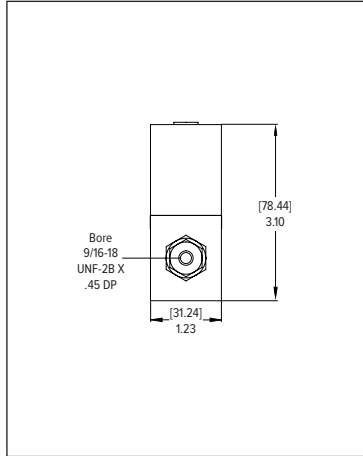
VO-100HP



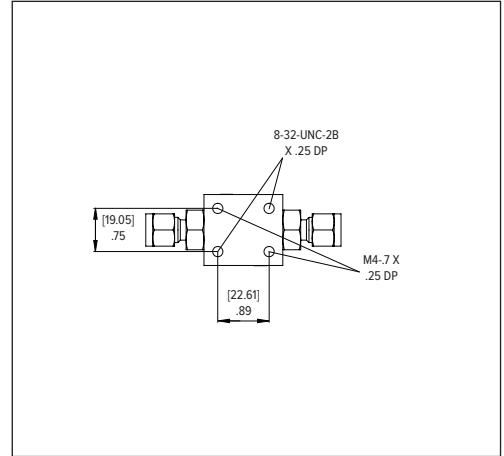
VO-100L & VO-101 Front View



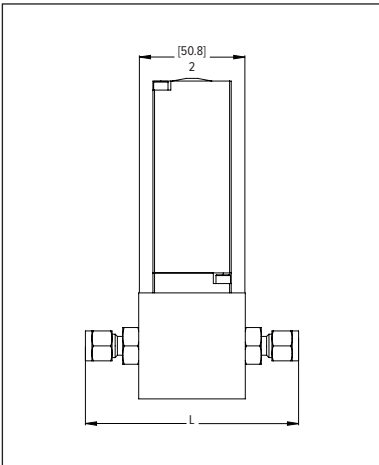
VO-100L & VO-101 Side View



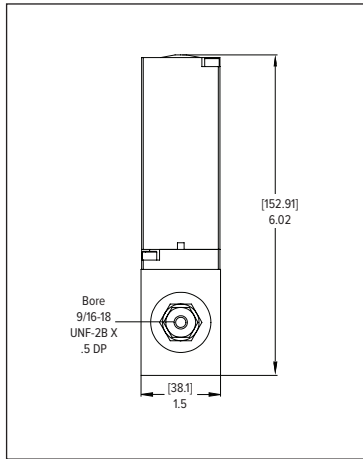
VO-100L & VO-101 Bottom View



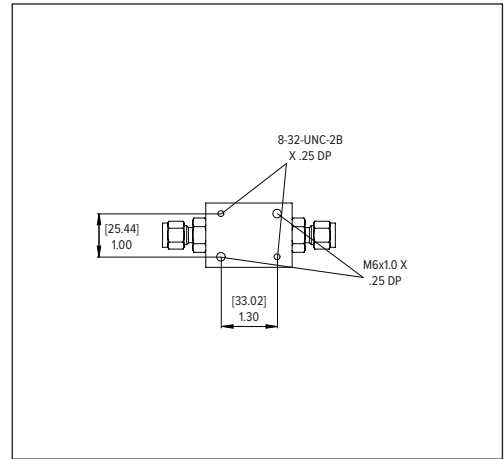
VO-100M Front View



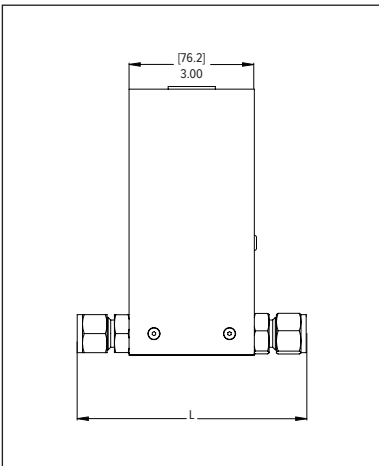
VO-100M Side View



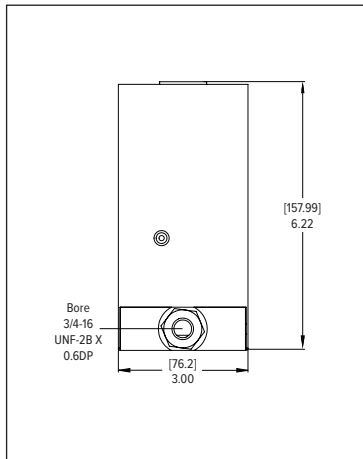
VO-100M Bottom View



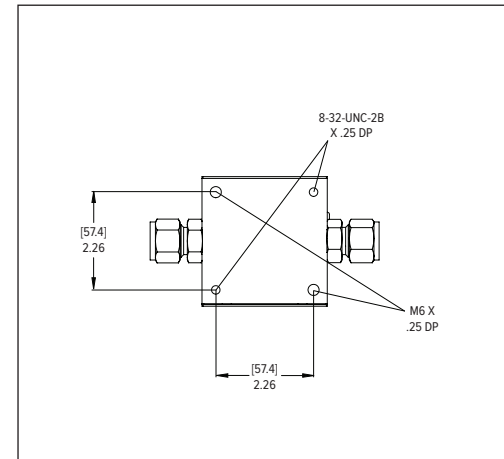
VO-100H Front View



VO-100H Side View

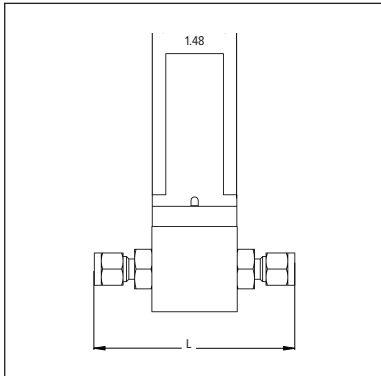


VO-100H Bottom View

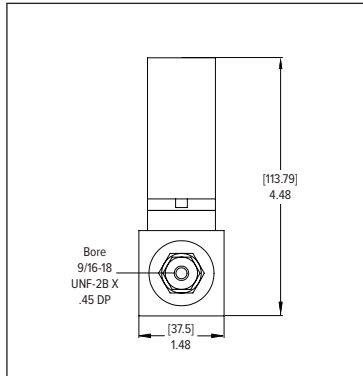


All dimensions are in inches with [mm] in brackets. Certified drawings are available upon request.

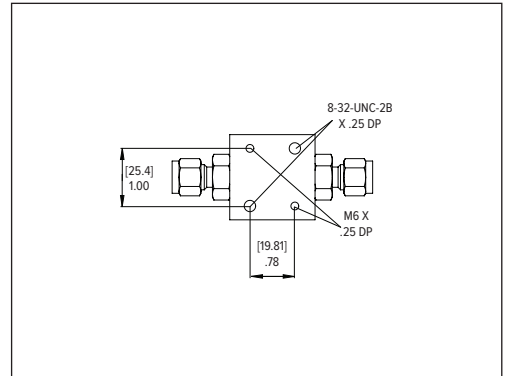
VO-100HP Front



VO-100HP Side View



VO-100HP Bottom View

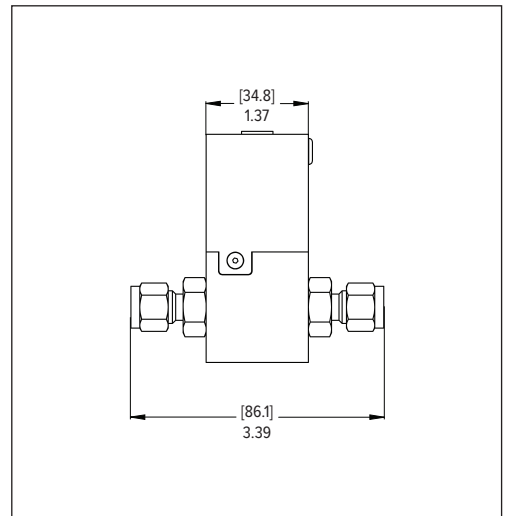


All dimensions are in inches with [mm] in brackets. Certified drawings are available upon request.

Dimension L Length with Fittings in Inches (mm)					
Fittings	VO-101	VO-100L	VO-100M	VO-100H	VO-100HP
No Fittings	1.37 (34.8)	1.37 (34.8)	2 (50.8)	3 (76.2)	1.48 (37.59)
1/8-inch compression	3.21 (82)	3.21 (82)	N/A	N/A	3.32 (84)
1/4-inch compression	3.39 (86)	3.39 (86)	N/A	N/A	3.5 (89)
3/8-inch compression	3.51 (89)	3.51 (89)	4.14 (105)	N/A	3.62 (92)
1/2-inch compression	N/A	N/A	4.3 (109)	5.3 (135)	N/A
1/4-inch VCO	2.93 (74)	2.93 (74)	N/A	N/A	3.04 (77)
1/2-inch VCO	3.37 (86)	3.37 (86)	4 (102)	N/A	3.48 (88)
3/4-inch VCO	4.7 (119)	4.7 (119)	5.33 (135)	N/A	4.81 (122)
1/4-inch VCR	3.25 (83)	3.25 (83)	N/A	N/A	3.36 (85)
1/2-inch VCR	3.55 (90)	3.55 (90)	4.18 (106)	5.18 (132)	3.66 (93)
6 mm compression	3.41 (87)	3.41 (87)	N/A	N/A	3.52 (89)
10 mm compression	N/A	N/A	4.2 (107)	5.2 (132)	N/A
12 mm compression	N/A	N/A	4.38 (111)	5.38 (137)	N/A
1/4-inch FNPT	3.22 (82)	3.22 (82)	3.85 (98)	N/A	3.33 (85)

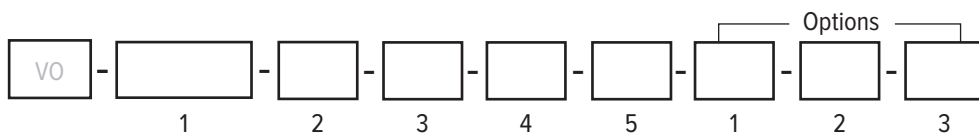
EXAMPLE OF DIMENSIONS WITH FITTINGS

Example: VO-100L with 1/4-inch compression adds 2.02 inches to footprint, so overall dimension is 2.02 + 1.37 = 3.39 inches.



VALVE CONTROL CIRCUIT ENCLOSURE — DIMENSIONS

Hole pattern punched out to customer specification



Instructions: To order a SmartVO, please fill in each feature number block by selecting the codes from the corresponding features below.

Note: All SLPM flow ranges also available in NLPM

Parent Model Number	
VO	SmartVO® High-Performance Gas Flow Control Valves Standard configuration includes: flow body constructed of aluminum or 316L and 416 stainless steel; Viton® (standard) elastomers and valve seats; electrical connectors come stripped and tinned; requires 24 VDC input power; CE approved.

Note: This is a valve only. The valve requires a valve control circuit and a power supply. The end user may supply or a control PCA may be purchased from Sierra. See Options 1 and 2 below.

Feature 1: Flow Body	
100L-AL	VO-100L Economical Low Flow: Aluminum construction; flow up to 50 slpm; operating temperature 122°F (50°C); pressure up to 145 psig (10 barg); requires a 12-30 VDC power supply and a valve positioner
100L-SS	VO-100L Economical Low Flow: Stainless steel construction; flow up to 50 slpm; operating temperature 122°F (50°C); pressure up to 500 psig (34.5 barg), requires a 12-30 VDC power supply and a valve positioner
100M-SS	VO-100M Medium Flow: Stainless steel construction; flow up to 300 slpm; operating temperature 122°F (50°C); pressure up to 500 psig (34.5 barg); requires a 12-30 VDC power supply and a valve positioner
100H-SS	VO-100H High Flow: Stainless steel construction; flow up to 1000 slpm; operating temperature 122°F (50°C); pressure up to 500 psig (34.5 barg); requires a 12-30 VDC power supply and a valve positioner
100HP-SS	VO-100HP High Pressure: Stainless steel construction; flow up to 20 slpm; operating temperature 122°F (50°C); pressure up to 5000 psig (345 barg) burst tested to 7500 psig (517 barg), requires a 12-30 VDC power supply and a valve positioner
101-SS	VO-101 Ultra Low Flow: Stainless steel construction; flow up to 50 sccm; operating temperature 122°F (50°C); pressure up to 500 psig (34.5 barg); requires a 12-30 VDC power supply and a valve positioner

Feature 2: Fittings	
0	No fittings (customer to supply)
1	1/8-inch compression. For low flow bodies (maximum 5 slpm)
2	1/4-inch compression. For low and medium flow bodies (maximum 50 slpm)
3	3/8-inch compression. For low, medium and high flow bodies (maximum 300 slpm)
4	1/2-inch compression. For medium and high flow bodies
5	1/4-inch VCO. For low and medium flow bodies (maximum 50 slpm)
6	1/2-inch VCO. For low and medium flow bodies
7	3/4-inch VCO. For high flow bodies (maximum 300 slpm)
8	1/4-inch VCR. For low and medium flow bodies (maximum 50 slpm)
9	1/2-inch VCR. For low, medium and high flow bodies
10	6 mm compression. For low and medium flow bodies (maximum 50 slpm)
11	10 mm compression. For medium and high flow bodies
12	12 mm compression. For medium and high flow bodies
13	1/4-inch FNPT adapter bushing. For low and medium flow bodies

Feature 3: Elastomers	
OV1	Viton® for low, medium and high flow bodies
OB1	Buna for low, medium and high flow bodies
ON1	Neoprene® for low and medium flow bodies
ON2	Neoprene® for high flow bodies
OK1	Kalrez® for low flow bodies
OK2	Kalrez® for medium flow bodies
OK4	Kalrez® for high flow bodies

Feature 4: Valve Seat	
SV1	Viton® (standard)
SB1	Buna
SN1	Neoprene® or equivalent
SK1	Kalrez® or equivalent for low or medium flow bodies
SK2	Kalrez® or equivalent for high flow bodies
ST1	PFA Teflon® or equivalent (Note: No bubble tight shutoff. Up to 1% FS leak-by)
VX1	ValFlex™ inert, carbon-reinforced Polyamide for HP model only (Note: No bubble tight shutoff. Up to 1% FS leak-by); ValFlex™ required for CO2 above 50% concentration or 250 psi

Feature 5: Electrical Connectors	
ST	Stripped and tinned
HS	Horizontal spade
SS	Slotted spade

Option 1: Valve Control Circuits	
VC-2	Dual solenoid valve controller with 0-5 VDC external setpoint control signal.
VC-2P	Dual solenoid valve controller with 0-5 VDC onboard potentiometer setpoint control signal.
VC-2C	Dual solenoid valve controller with 4-20 mA setpoint control signal.

Option 2: Power Supplies	
100- T10F ()	Low, Medium and High Flow SmartVO. 24 VDC power supply. Supplied with fly leads, 1.25 Amps, 110-230 VAC, CE approved. Specify plug preference in parentheses: (US) for USA plug, (EU) for Euro plug, (UK) for Great Britain plug. Note while VC2 will control two valves, T10F can supply power to two L, M flows but only one 100H

Option 3: Enclosure	
ENCL ()	NEMA 4X enclosure for valve controller PCA. Specify cord grip or 6 pin in parentheses (). Use ADS to specify desired hole pattern.



*Disclaimer: Dependent on availability of stock.



In Stock Products. Ship Next Day.*

<https://sierrainstruments.com/shop/SmartVO>