Miniature and Subminiature Solenoid Valves

Gems specializes in made-to-order fluidic systems, and a major segment of that activity includes the integration of miniature solenoid valves and manifold assemblies. Our miniature and subminiature solenoid valves are utilized in solutions that serve industries ranging from medical and biotech to automotive and industrial equipment.

Gems solenoid valves are designed to your specifications for each unique application. Each series offers a broad range of construction/performance options to build an endless array of configurations—too many to list in this catalog. From custom coils and manifolds to exotic materials and flow characteristics, there is very little that we cannot accomplish. Whether pneumatic or liquid, cryogenic or high temperature, vacuum or high-pressure, we partner with you to identify, create, and produce the best possible fluidic solution.

If at any time, you have a question or simply want to give us your requirements and have Gems Sensor and Controls design your valve or system, please contact us by phone at 800-378-1600 or email us at info@gemssensors.com.

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Get Help Quick

An application data sheet (ADS), located on page J-41, will help you select performance criteria and options. Fax it directly to a Gems Valve Engineer at 860-747-4244 or configure your valve online for RFQ at www.gemssensors.com.

General Purpose Valves

A broad range of 2- and 3-way solenoid valves in both miniature and subminiature sizes. A wide selection of configuration options allows easy customization to match specific application requirements.

Isolation Valves

Isolation diaphragms protect media and moving parts alike. Ideal for high-purity and aggressive media applications.

Cryogenic Valves

These valves provide reliable service to media temperatures as low as -320°F (-196°C). Ideal for liquid Nitrogen and Carbon Dioxide use.

SOLENOID VALVES

4 Steps to Valve Selection

The steps described in this section will help you identify and select the right valve.

Step 1 – Calculating Flow Coefficient

C_V – For Imperial Units of Measure

K_V – For Metric Units of Measure

Begin by calculating the valve Flow Coefficient (C_V or K_V) using operating pressure differential; flow rate for your application; Specific Gravity (or Liquid Density); and in some circumstances, temperature. If you already know the Flow Coefficient go directly to Step 2.

The Flow Coefficient combines the effects of all flow restrictions in the valve into a single number, and is used for both liquids and gases (non-compressible and compressible fluids):

C_V represents the quantity of water, at 68°F and in gallons per minute (GPM) that will flow through your valve with a 1psi pressure differential.

K_V represents the flow of water with temperature ranging between 5°C and 30°C through a valve in cubic meters per hour with a pressure drop of 1 bar.

Temperature Factor

Temperature is not included in the Flow Coefficient calculation for non-compressible fluids (liquids) and is only used in determining SG or Liquid Density. Conversely, because gases are compressible, temperature (T) has a greater effect on volume and therefore is included as a separate variable in gas C_V/K_V calculations.

Relationship Between C_V and K_V

C_V and K_V may be converted to one another using the formulas below:

$$C_V = 1.56 \cdot K_V$$
$$K_V = 0.853 \cdot C_V$$

Liquid Flow

Because liquids are non-compressible, their flow rate depends only on the difference between the inlet and outlet pressures (P1 - P2 or ΔP, pressure differential. Figure 1).

The C_V or K_V of liquid media can be determined with the equations below.

Liquid Flow Formulas

$$C_V = V\sqrt{\frac{SG}{\Delta P}} \qquad K_V = V\sqrt{\frac{\rho}{\Delta P}}$$

Where:

- **C_V** = Valve flow coefficient
- **V** = Flow rate in GPM or m³/h
- **ΔP** = Pressure differential (PSI or bar)
- **SG** = Specific Gravity @ 60°F and 14.7 PSIA
- **ρ** = Density of liquids in kg/m³ (water = 1000)

Fig. 1: Press Differential

Pressure differential is the difference between the inlet and outlet pressures.

C_V Example: Using Water at 68°F:

V = 3.08 GPM
P_1 = 100 PSI
P_2 = 40 PSI
SG = 1

$$C_V = 3.08\sqrt{\frac{1}{100-40}} = .398$$

K_V Example: Using Water at 25°C:

V = 0.45 m³/h
ρ = 1
P_1 = 8.01 ABS bar
P_2 = 3.2 ABS bar
ΔP = 8.01 - 3.20 = 4.81 bar

$$K_V = 0.45\sqrt{\frac{1}{4.81}} = .20$$

Gas Flow

Gases are compressible fluids and there are separate equations for high and low-pressure differential flow.

Gas Flow Coefficient Formulas

- **Low-pressure** differential flow is when $P_2 > \frac{P_1}{2}$. Use the following equations:

$$C_V = \frac{V}{16.05\sqrt{\frac{(P_1^2 - P_2^2)}{(SG)\,T}}} \qquad K_V = \frac{V_G}{519}\sqrt{\frac{\rho_G\,T_1}{\Delta P\,P_2}}$$

- **High-pressure** differential flow is when $P_2 \leq \frac{P_1}{2}$. Use the following equations:

$$C_V = \frac{V}{13.61\,P_1\sqrt{\frac{1}{(SG)\,T}}} \qquad K_V = \frac{V_G}{259.5\,P_1}\sqrt{\rho_G\,T_1}$$

Where:

- **C_V** = Valve flow coefficient
- **V** = Flow rate in SCFM or m³/h
- **P_1** = Inlet pressure in PSIA or bar
- **P_2** = Outlet pressure in PSIA or bar
- **SG** = Specific Gravity @ 60°F and 14.7 PSIA
- **ρ** = Density of gases @ 0°C and 1013 mbar in kg/m³
- **T** = Temperature of gas in Degree Rankine (°F + 460) or Degree Kelvin (°C + 298)

16.05 and 13.61 (519 and 259.5) are constants used in gas flow equations

Examples: Using Air with **High Differential** flow where P:

Since these are high-pressure differential flow examples, we use the following equations:

V = 10 SCFM
P_1 = 20 PSIG = 34.7 PSIA (20 + 14.7)
P_2 = 0 PSIG = 14.7 PSIA (0 + 14.7)
SG = 1
T = 72° F = 532° Rankine (72 + 460)

$$C_V = \frac{10}{13.61 \cdot 34.7\sqrt{\frac{1}{(1)\,532}}} = .49$$

V_G = 16.99 m³/h
P_1 = 2.39 ABS bar
P_2 = 1.01 ABS bar
ρ_G = 1.284 Kg/m³
T_1 = 25°C = 298°K (25 + 273)

$$K_V = \frac{16.99}{519}\sqrt{\frac{1.284\,(298)}{1.38\,(1.01)}} = .54$$

Step 2 – Valve Function

Identify how your valve will function in your application. Pick from the choices below.

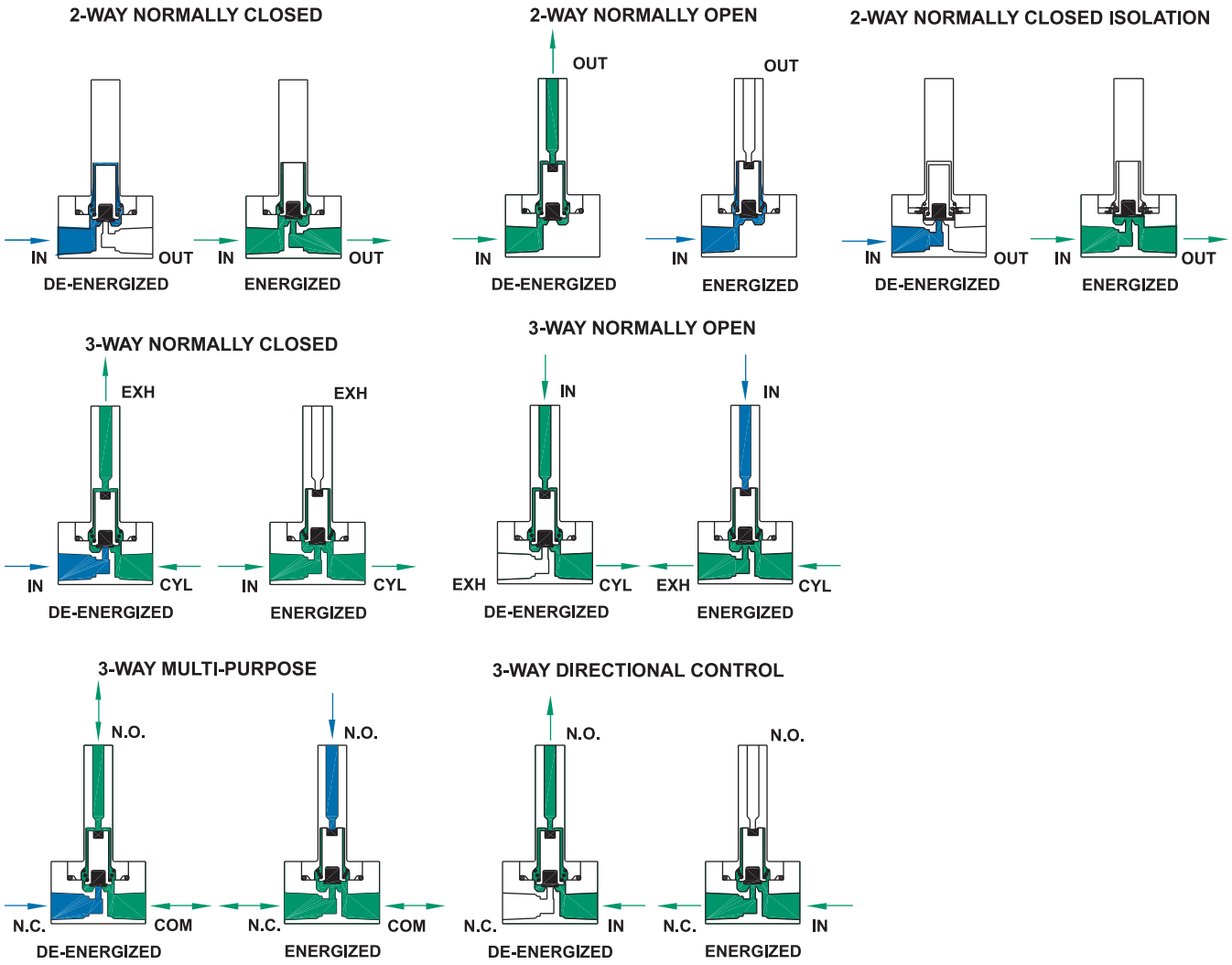
An important note regarding C_V and valve function:

The C_V calculated will apply to either the Body Orifice or the Stop Orifice depending on the valve's function.

For example, the Stop Orifice for a 3-way normally closed valve, when de-energized, is the exhaust port. In other words, C_V is calculated using the specific Inlet Pressure (P1) and Outlet Pressure (P2) for the flow paths described below.

Flow Key

- Blocked Flow
- Free Flow



Gems specializes in the design and manufacturing of custom solenoid valves and fluidic systems. If you don't see what you're looking for, or have a question, contact us at 800-378-1600 or info@gemssensors.com.

Step 3 – Identify Your Valve Series

Select possible valve series candidate using the overview charts below. Begin by choosing the category for your application:

• General Purpose • Isolation • Cryogenic

Using the charts, select specifications needed for your application to target appropriate valve series. The detailed performance specs for each series are located on the corresponding pages listed on the chart.

If you would like assistance with your selection, want to modify a valve, or simply want a sounding board please contact a Gems™ valve engineer at 800-378-1600 or info@gemssensors.com.

	General Purpose						
Function	2- & 3-Way						
Media	Gas Only	Gas & Liquid					
Size	Sub-Miniature			Miniature			
C_v Range	0.018 - 0.070			0.019 - 0.430			0.045 - 0.880
K_v Range	0.015 - 0.063			0.016 - 0.357			0.038 - 0.595
Port Configuration	#10-32 Manifold Mount		Barb (1/16, 5/64, 1/8), Manifold or Face-Mount	#10-32, 1/8, 1/4 NPT, Manifold Mount			1/8, 1/4, 3/8 NPT, Manifold Mount
Orifice Dia (in)	0.032 - 0.078		0.031 - 0.052	0.032 - 0.156	0.062 - 0.210		0.047 - 0.375
Orifice Dia (mm)	0.813 - 1.981		0.787 - 1.321	0.813 - 3.962	1.575 - 5.334		1.194 - 9.525
Power (watt)	0.65, 2		0.5, 1, 2	6	7		10
MOPD (psi)	175	250	100	1000	400		900
MOPD (bar)	12.06	17.23	6.89	68.95	27.58		62.05
Valve Series	**E, EH**	**G, GH**	**M**	**A**	**B**	**C**	**D**
Pages	**J-7**	**J-10**	**J-5**	**J-14**	**J-18**	**J-22**	**J-26**

	Isolation		Cryogenic		Latching
Function	2-Way, Normally Closed Only		2-Way, Normally Closed Only		2- & 3-Way
Media	Gas & Liquid		Liquid		Gas & Liquid
Size	Miniature		Miniature		Minature
C_v Range	0.020 - 0.300		0.045 - 0.440	0.040 - 0.770	0.018 - 0.43
K_v Range	0.017 - 0.256		0.038 - 0.374	0.034 - 0.655	
Port Configuration	#10-32, 1/8 NPT, 1/4 NPT, Manifold Mount		1/8, 1/4 NPT	1/8, 1/4, 3/8 NPT	#10-32, 1/8 NPT, 1/4 NPT, Manifold Mount
Orifice Dia (in)	0.032 - 0.156		0.046 - 0.188	0.046 - 0.250	0.032 - 0.156
Orifice Dia (mm)					
Power (watt)	4.5, 7		9	15	5 - 9
MOPD (psi)	50 (Plastic Body), 150		900	1000*	100
MOPD (bar)					
Valve Series	**AS**	**BS**	**B-Cryo**	**D-Cryo**	**BL**
Pages	**J-29**	**J-31**	**J-33**	**J-35**	**J-37**

*Consult factory for higher MOPD.

Step 4 – Make Your Selection and Configure Your Valve

Complete your valve design by selecting the additional design parameters to build the best possible valve. For example:

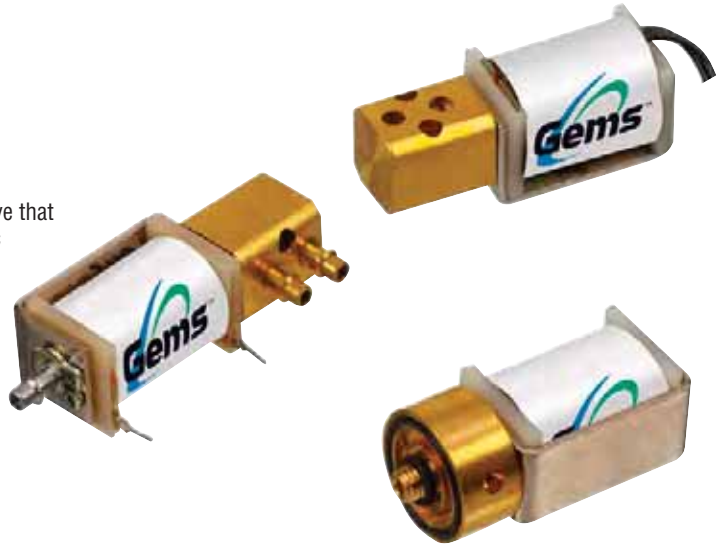
- Materials needed for your media (stainless steel, brass, fluoroelastomer, EPDM, etc.)
- Coil construction (lead wire, qick connect spade, grommet, conduit, yoke, etc.)
- Port configuration
- Manifold assembly
- Voltage

We specialize in application specific valves. Our modular valve designs, coupled with our cutting edge 3D modeling and innovative CNC manufacturing capabilities, result in fluidic systems that are truly adaptable to any originally manufactured equipment.

For help selecting the additional options for your valve or if you want to confirm that your selection is the best choice or work with an engineer on integrating a fluidic system into your application, contact us at 800-378-1600 or info@gemssensors.com. We are happy to assist. You can also place orders through these same channels.

M Series – Subminiature

- MOPD: 100 PSI (6.9 Bar)
- C_V Range: 0.018 to 0.070 (K_V Range: 0.017 to 0.032)
- As Low As 0.5 Watts



The M Series implements efficient power conservation in a solenoid valve that is specifically designed for sub-miniature two- and three-way pneumatic and select liquid applications. Field proven to exceed performance requirements in battery-powered applications, the M Series can be designed for extreme low wattage conditions. With a compact size, consistent high-speed response time, and reliable operation over 200 million cycles, the M Series delivers extended performance and precision flow control in a small lightweight environment.

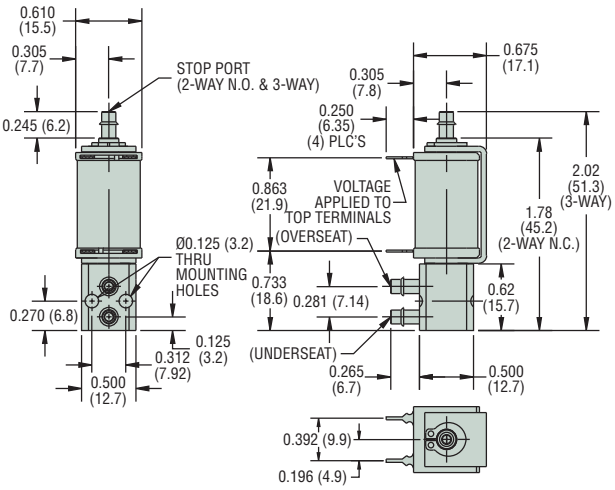
Typical Applications

Ideal for inline PC interfacing and manifold assemblies:

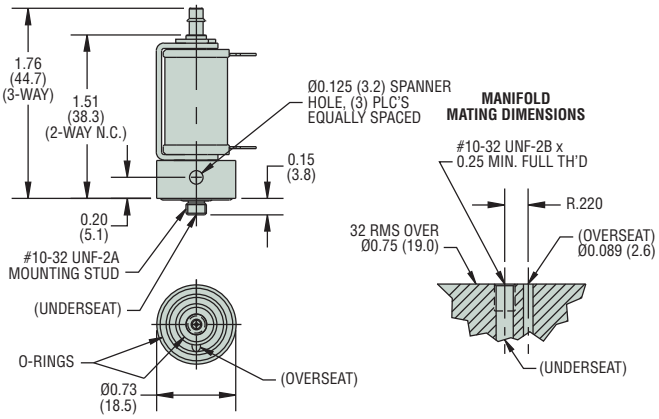
- Medical and Therapeutic Healthcare
- Clinical Chemistry and Analysis Equipment
- Drop-on-Demand Printing
- Environmental Instrumentation

Dimensions

Threaded Port Body



Manifold Mount Body



How To Order

Use the **Bold** characters from the choices listed on the following page to construct a product code.

MB	**31**	**5**	-	**E**	**B**	**3**	**3**	-	**P**	**201**	-	**OC**
1	2	3		4	5	6	7		8	9		10
Primary Prefix	Valve Type	Orifice Size		Plunger Seal/O-Ring Material	Body Material	Body Port Configuration	Stop Port Configuration		Coil Construction	Voltage		Additional Options

Note: After the Primary Prefix, any "-Code" may be blank when standard (blank) selections are specified.

Example:

MB315-EB33-P-201

1 Watt 3-Way N.C. solenoid valve with a 0.052˝ (1.321mm) orifice, EPDM plunger seal/o-ring, brass body, 1/8˝ barb body and stop port, P.C. board mount (4-pin), operating at 5 VDC, and is cleaned for oxygen use.

Part Prefix Table ①

Power Rating	Orifice		MOPD		C_V	K_V	① Primary Prefix
	inches	mm	psi	bar	Body		
0.5 Watt	0.031	0.787	25	1.7	0.018	0.015	MA
	0.052	1.321	10	0.7	0.037	0.032	MA
1 Watt	0.031	0.787	50	3.4	0.018	0.015	MB
	0.052	1.321	25	1.7	0.037	0.032	MB
2 Watts	0.031	0.787	100	6.9	0.018	0.015	MC
	0.052	1.321	50	3.4	0.037	0.032	MC

② Valve Type
- **20** = 2-Way normally closed
- **22** = 2-Way normally open
- **30** = 3-Way normally closed (free vent)
- **31** = 3-Way normally closed (line connection)
- **32** = 3-Way normally open
- **33** = 3-Way multi-purpose
- **34** = 3-Way directional control

③ Orifice Size
- **2** = 0.031″ (0.79mm)
- **5** = 0.052″ (1.32mm)

④ Plunger Seal / O-Ring Material
- **V** = Viton®
- **N** = Nitrile
- **E** = EPDM

⑤ Body Material
- **B** = Brass
- **A** = Aluminum

⑥ Body Port Configuration[1]
- **0** = Face mount
- **1** = 1/16″ (1.6mm) barb
- **2** = 5/64″ (2.0mm) or 3/32″ (2.4mm) barb
- **3** = 1/8″ (3.2mm) barb
- **4** = Manifold mount, #10-32 UNF-2A stud†
- **5** = #10-32 UNF-2B female thread (180° apart only)
- **6** = 1/8″-27 NPT ports (180° apart only)

⑦ Stop Port Configuration[1]
- **0** = No barb (Standard for 2-way NC & 3-way free vent)[2 3]
- **1** = 1/16″ (1.6mm) barb (.031″ orifice only)
- **2** = 5/64″ (2.0mm) or 3/32″ (2.4mm) barb
- **3** = 1/8″ (3.2mm) barb

⑧ Coil Construction (Tape-Wrapped, 130°C Class B)
- **U** = P.C. board solderable (2-pin)
- **P** = P.C. board mount (4-pin)[4]
- **Q** = Quick connect 0.110″ (2.79mm) spade
- **L** = Lead-wires, #26 AWG, 18″ (45.7cm) long
- **W__** = Lead-wires (Specify length in inches)

⑨ Voltage
- **200** = 3 VDC
- **201** = 5 VDC
- **203** = 12 VDC
- **204** = 24 VDC
- **___VDC** = DC (specify voltage)
- **___VAC** = AC Rectified 2-watt coil only (specify voltage, lead-wires only)

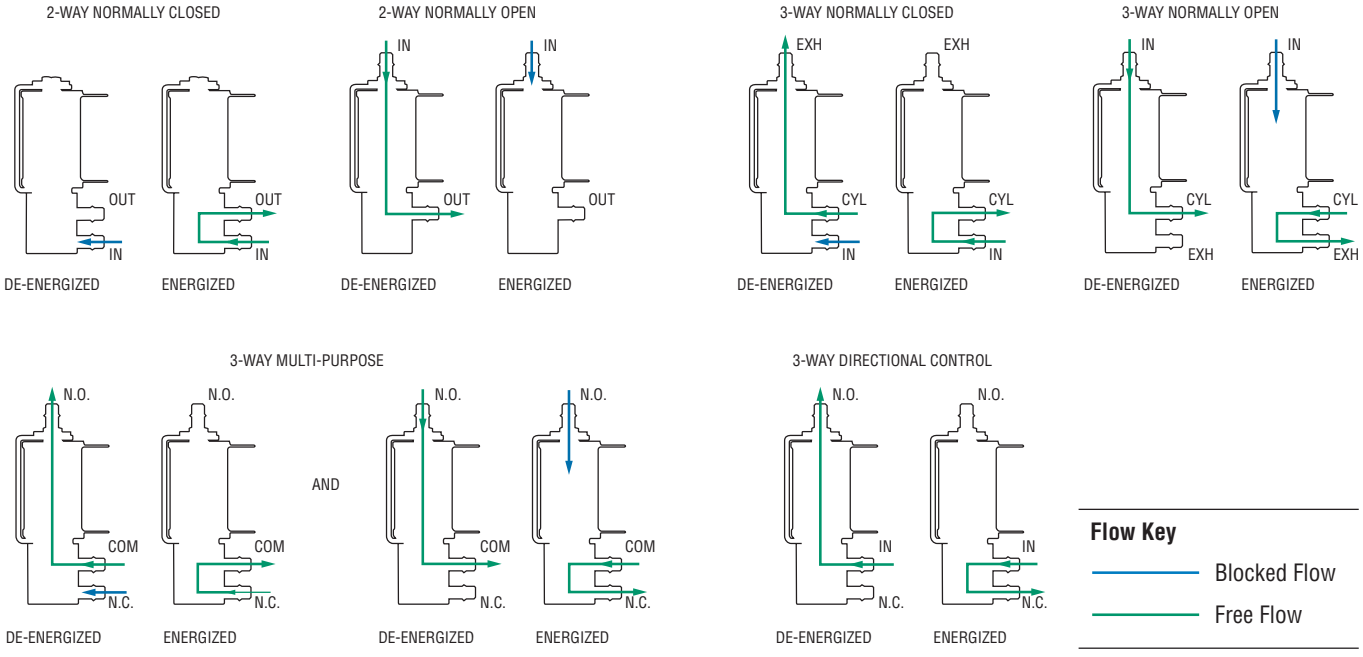
⑩ Additional Options
- **OC** = Cleaned for oxygen use
- **VAC** = Vacuum application – 0 to 27″ Hg (0 to 914 mBar)

Notes
1. Barbs are brass.
2. For Stop Port Configuration, must select "0" for valve type 20 (2-way NC) and for type 30 (3-way NC Free Vent).
3. For Stop Port Configuration, must select "1" or "2" or "3" for valve types 22 (2-way NO), 31 (3-way NC Line Connect), 32 (3-way NO), 33 (3-way MP), and 34 (3-way DC). Selection "0" can not be used.
4. 2 pins near stop are active.

† Teflon® o-ring not suitable for manifold mount.

Gems specializes in the design and manufacturing of custom solenoid valves and fluidic systems. If you don't see what you're looking for, or have a question, contact us at 800-378-1600 or info@gemssensors.com.

Flow Schematic



E & EH Series – Subminiature Gas

- MOPD: 175 PSI (12 Bar)
- C_V Range: 0.018 to 0.070 (K_V Range: 0.015 to 0.060)
- 0.65 Watts or 2 Watts

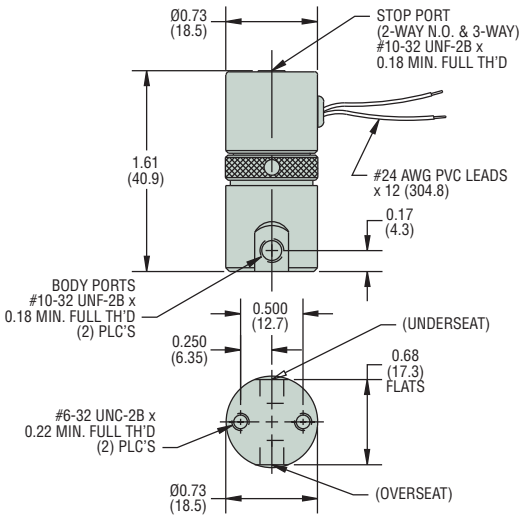
A 2- or 3-way sub-miniature solenoid valve that delivers faster response times—and higher flow rates, the E & EH Series is specifically engineered for air and dry gas applications. A nickel-plated body and coil housing construction produces a highly durable, corrosion resistant valve. With a wattage range of 0.65–2 the E & EH Series provides versatility for power conserving, high pressure, and high flow applications.

Typical Applications

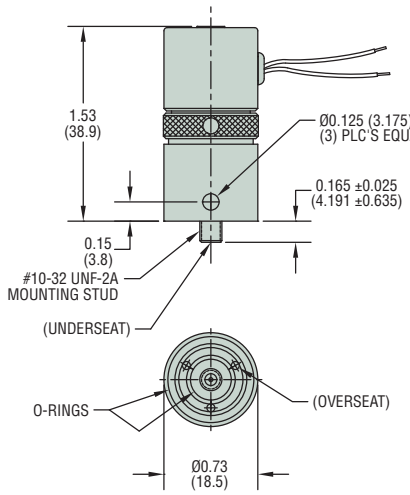
- Medical and Respiratory Healthcare
- Printing Machinery and Sorting Equipment
- Automated Packaging Equipment
- Air Monitoring Systems

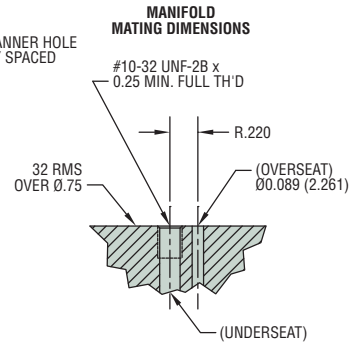
Dimensions

Threaded Port Body



Manifold Mount Body





How To Order

Use the **Bold** characters from the choices listed on the following page to construct a product code.

E2010 - **W24-1** - **V** - **VO** - **24VDC** - **OC**

1. **Primary Prefix**
2. **Coil Construction**
3. **Body Material***
4. **Plunger Seal Material**
5. **O-Ring Material**
6. **Body Port Configuration***
7. **Voltage**
8. **Additional Options**

* Blank entry indicates a "Standard" selection (#10-32 straight thread ports, in this case).

Example:

E2010-W24-1-V-VO-24VDC-OC

E-Series 2-Way N.C. solenoid valve, with 24″ (61cm) lead-wires from an encapsulated coil, nickel-plated brass body, Viton® plunger seal, Viton® o-ring, #10-32 straight thread ports, operating at 24 VDC, and is cleaned for oxygen use.

Part Prefix Table ①

	Power Rating	Orifice				MOPD		C_v		K_v		① Primary Prefix
		Body		Stop								
		inches	mm	inches	mm	psig	bar	Body	Stop	Body	Stop	
2-WAY N.C.	0.65W	1/32	0.79	—	—	125	9	0.018	—	0.015	—	**E2010**
		3/64	1.19	—	—	70	5	0.023	—	0.020	—	**E2011**
		1/16	1.59	—	—	40	3	0.036	—	0.031	—	**E2012**
		5/64	1.98	—	—	20	1	0.070	—	0.060	—	**E2013**
	2W	1/32	0.79	—	—	175	12	0.018	—	0.015	—	**EH2010**
		3/64	1.19	—	—	150	10	0.023	—	0.020	—	**EH2011**
		1/16	1.59	—	—	100	7	0.036	—	0.031	—	**EH2012**
		5/64	1.98	—	—	50	3	0.070	—	0.060	—	**EH2013**
2-WAY N.O.	0.65W	—	—	1/32	0.79	125	9	—	0.018	—	0.015	**E2210**
		—	—	3/64	1.19	70	5	—	0.023	—	0.020	**E2211**
		—	—	1/16	1.59	40	3	—	0.032	—	0.027	**E2212**
	2W	—	—	1/32	0.79	175	12	—	0.018	—	0.015	**EH2210**
		—	—	3/64	1.19	150	10	—	0.023	—	0.020	**EH2211**
		—	—	1/16	1.59	100	7	—	0.032	—	0.027	**EH2212**
3-WAY N.C. Line Connection	0.65W	1/32	0.79	1/32	0.79	125	9	0.018	0.018	0.015	0.015	**E3110**
		3/64	1.19	3/64	1.19	70	5	0.023	0.023	0.020	0.020	**E3111**
		1/16	1.59	1/16	1.59	40	3	0.036	0.032	0.031	0.027	**E3112**
	2W	1/32	0.79	1/32	0.79	175	12	0.018	0.018	0.015	0.015	**EH3110**
		3/64	1.19	3/64	1.19	150	10	0.023	0.023	0.020	0.020	**EH3111**
		1/16	1.59	1/16	1.59	100	7	0.036	0.032	0.031	0.027	**EH3112**
3-WAY N.O.	0.65W	1/32	0.79	1/32	0.79	125	9	0.018	0.018	0.015	0.015	**E3210**
		3/64	1.19	3/64	1.19	70	5	0.023	0.023	0.020	0.020	**E3211**
		1/16	1.59	1/16	1.59	40	3	0.036	0.032	0.031	0.027	**E3212**
	2W	1/32	0.79	1/32	0.79	175	12	0.018	0.018	0.015	0.015	**EH3210**
		3/64	1.19	3/64	1.19	150	10	0.023	0.023	0.020	0.020	**EH3211**
		1/16	1.59	1/16	1.59	100	7	0.036	0.032	0.031	0.027	**EH3212**
3-WAY Multi Purpose	0.65W	1/32	0.79	1/32	0.79	80	6	0.018	0.018	0.015	0.015	**E3310**
		3/64	1.19	3/64	1.19	40	3	0.023	0.023	0.020	0.020	**E3311**
		1/16	1.59	1/16	1.59	20	1	0.036	0.032	0.031	0.027	**E3312**
	2W	1/32	0.79	1/32	0.79	150	10	0.018	0.018	0.015	0.015	**EH3310**
		3/64	1.19	3/64	1.19	100	7	0.023	0.023	0.020	0.020	**EH3311**
		1/16	1.59	1/16	1.59	50	3	0.036	0.032	0.031	0.027	**EH3312**
3-WAY Directional Control	0.65W	1/32	0.79	1/32	0.79	135	9	0.018	0.018	0.015	0.015	**E3410**
		3/64	1.19	3/64	1.19	80	6	0.023	0.023	0.020	0.020	**E3411**
		1/16	1.59	1/16	1.59	45	3	0.036	0.032	0.031	0.027	**E3412**
	2W	1/32	0.79	1/32	0.79	190	13	0.018	0.018	0.015	0.015	**EH3410**
		3/64	1.19	3/64	1.19	165	11	0.023	0.023	0.020	0.020	**EH3411**
		1/16	1.59	1/16	1.59	80	6	0.036	0.032	0.031	0.027	**EH3412**

Gems specializes in the design and manufacturing of custom solenoid valves and fluidic systems. If you don't see what you're looking for, or have a question, contact us at 800-378-1600 or info@gemssensors.com.

② Coil Construction
- **(blank)** = Tape-wrapped, Class-B, with 12″ (30.48cm) long lead-wires*
- **W__** = Lead-wires, non-standard length (specify in inches)
- **1** = Encapsulated coil
- **5** = Encapsulated coil with 0.110″ (2.79mm) spade terminals
- **10** = Rectified coil for AC voltage (2 watt only)

③ Body Material
- **(blank)** = Nickel-plated brass*

④ Plunger Seal Material
- **(blank)** = Nitrile*
- **V** = Viton®
- **E** = EPR
- **MQ** = Silicone

⑤ O-Ring Material
- **(blank)** = Nitrile*
- **VO** = Viton®
- **EO** = EPR
- **MQO** = Silicone

⑥ Body Port Configuration
- **(blank)** = #10-32 straight thread ports*
- **BM** = M5 x 0.8 ports
- **MM** = Manifold mount with #10-32 threaded stud†
- **MM2** = Manifold mount with M5 x 0.8 threaded stud†
- **BO** = Bottom under-seat port – max orifice = 1/16″ (1.59mm)

⑦ Voltage
- **___VDC** = DC (specify voltage)
- **___VAC** = AC rectified 2-watt only (specify voltage)

⑧ Additional Options
- **OC** = Cleaned for oxygen use
- **QO** = Quiet operation (2-way N.C.)
- **VAC** = Vacuum application – 0 to 29.5″ Hg (0 to 1000 mBar)

* Standard selection; will be used unless otherwise specified. Standard selections are not referenced in final part number.

† Teflon® o-ring not suitable for manifold mount.

NOTES

G & GH Series – Subminiature

- MOPD: 250 PSI (17 Bar)
- C_V Range: 0.018 to 0.070 (K_V Range: 0.015 to 0.054)
- 0.65 Watts or 2 Watts

This extremely versatile 2- or 3-way sub-miniature valve gives you the option of choosing the highly durable stainless steel or the lightweight corrosion resistant acetal body, to meet your overall design parameters. Select stainless steel or Delrin®, and other meterials available to resist corrosion in most acids and alkaline solutions, or pick acetal for a tough and heat resistant metal substitute to meet your weight and chemical inert requirements.

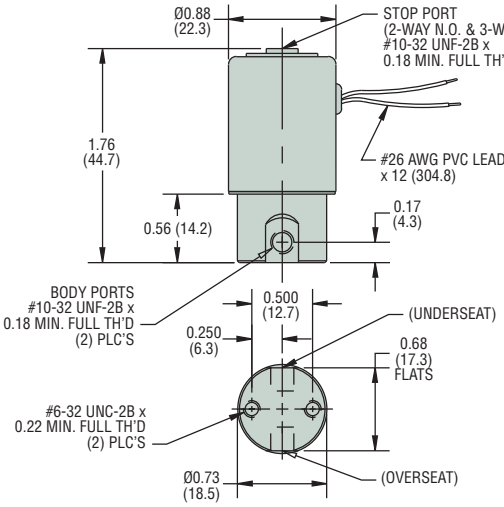
Typical Applications

Stainless Steel Bodies:
- Hospital Equipment
- Laboratory Equipment
- Air Sampling Systems

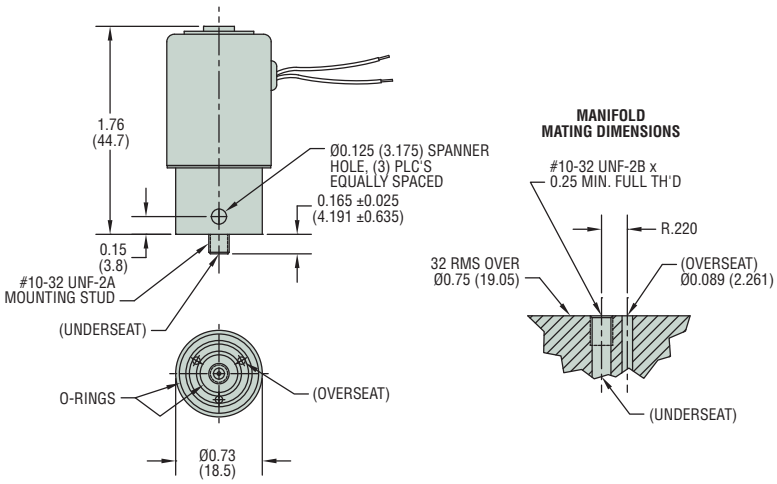
Acetal Bodies:
- Water Purification Systems
- Analytical Equipment

Dimensions

Threaded Port Body



Manifold Mount Body



How To Order

Use the **Bold** characters from the choices listed on the following page to construct a product code.

G2214 - 5 - E - EO - 5VDC

1	2	3	4	5	6	7
Primary Prefix	Coil Construction	Plunger Seal Material	O-Ring Material	Body Port Configuration*	Voltage	Additional Options*

* Blank entry indicates a "Standard" selection (#10-32 straight thread ports, in this case).

Example:

G2214-5-E-EO-5VDC

G-Series 303 Stainless Steel 2-Way N.O. solenoid valve, with tape-wrapped, Class-B, with 12˝ (30.48cm) long lead-wires, encapsulated coil with 0.110˝ (2.79mm) spade terminals, EPR plunger seal, EPR o-ring, #10-32 straight thread ports, operating at 5 VDC.

Part Prefix Table ①

	Power Rating	Orifice				MOPD		C_v		K_v		① Primary Prefix
		Body		Stop		psig	bar	Body	Stop	Body	Stop	303 Stainless Steel[1]
		inches	mm	inches	mm							
2-WAY N.C.	0.65W	0.030	0.762	—	—	125	8.6	0.015	0.018	—	—	G2012
		0.040	1.016	—	—	70	4.8	0.020	0.023	—	—	G2013
		0.055	1.397	—	—	40	2.8	0.032	0.038	—	—	G2014
		0.078	1.981	—	—	20	1.4	0.054	0.063	—	—	G2015
	2W	0.030	0.762	—	—	250	17	0.015	0.018	—	—	GH2012
		0.040	1.016	—	—	175	12	0.020	0.023	—	—	GH2013
		0.055	1.397	—	—	100	6.9	0.032	0.038	—	—	GH2014
		0.078	1.981	—	—	50	3.4	0.054	0.063	—	—	GH2015
2-WAY N.O.	0.65W	—	—	0.030	0.762	125	8.6	—	—	0.018	0.015	G2212
		—	—	0.040	1.016	70	4.8	—	—	0.023	0.020	G2213
		—	—	0.055	1.397	40	2.8	—	—	0.038	0.032	G2214
		—	—	0.078	1.981	20	1.4	—	—	0.057	0.049	G2215
	2W	—	—	0.030	0.762	200	14	—	—	0.018	0.015	GH2212
		—	—	0.040	1.016	150	10	—	—	0.023	0.020	GH2213
		—	—	0.055	1.397	100	6.9	—	—	0.038	0.032	GH2214
		—	—	0.078	1.981	50	3.4	—	—	0.057	0.049	GH2215
3-WAY N.C.	0.65W	0.030	0.762	0.030	0.762	125	8.6	0.018	0.015	0.0153	0.018	G3012
		0.040	1.016	0.040	1.016	70	4.8	0.023	0.020	0.01955	0.023	G3013
		0.055	1.397	0.055	1.397	40	2.8	0.038	0.032	0.0323	0.038	G3014
		0.078	1.981	0.078	1.981	20	1.4	0.063	0.054	0.04845	0.057	G3015
	2W	0.030	0.762	0.030	0.762	200	14	0.018	0.015	0.01955	0.023	GH3012
		0.040	1.016	0.040	1.016	150	10	0.023	0.020	0.01955	0.023	GH3013
		0.055	1.397	0.055	1.397	100	6.9	0.038	0.032	0.0323	0.038	GH3014
		0.078	1.981	0.078	1.981	50	3.4	0.063	0.054	0.04845	0.057	GH3015
3-WAY N.O.	0.65W	0.030	0.762	0.030	0.762	125	8.6	0.015	0.018	0.018	0.015	G3212
		0.040	1.016	0.040	1.016	70	4.8	0.020	0.023	0.023	0.020	G3213
		0.055	1.397	0.055	1.397	40	2.8	0.032	0.038	0.038	0.032	G3214
		0.078	1.981	0.078	1.981	20	1.4	0.048	0.057	0.057	0.049	G3215
	2W	0.030	0.762	0.030	0.762	175	12	0.015	0.018	0.018	0.015	GH3212
		0.040	1.016	0.040	1.016	150	10	0.020	0.023	0.023	0.020	GH3213
		0.055	1.397	0.055	1.397	80	5.5	0.032	0.038	0.038	0.032	GH3214
		0.078	1.981	0.078	1.981	40	2.8	0.048	0.057	0.057	0.049	GH3215
3-WAY Multi Purpose	0.65W	0.030	0.762	0.030	0.762	80	5.5	0.015	0.018	0.018	0.015	G3312
		0.040	1.016	0.040	1.016	40	2.8	0.020	0.023	0.023	0.020	G3313
		0.055	1.397	0.055	1.397	20	1.4	0.031	0.036	0.029	0.024	G3314
		0.078	1.981	0.078	1.981	10	0.7	0.054	0.063	0.053	0.045	G3315
	2W	0.030	0.762	0.030	0.762	110	7.6	0.015	0.018	0.018	0.015	GH3312
		0.040	1.016	0.040	1.016	85	5.9	0.020	0.023	0.023	0.020	GH3313
		0.055	1.397	0.055	1.397	50	3.4	0.031	0.036	0.029	0.024	GH3314
		0.078	1.981	0.078	1.981	25	1.7	0.054	0.063	0.057	0.049	GH3315
3-WAY Directional Control	0.65W	0.030	0.762	0.030	0.762	135	9.3	0.015	0.018	0.018	0.015	G3412
		0.040	1.016	0.040	1.016	80	5.5	0.020	0.023	0.023	0.020	G3413
		0.055	1.397	0.055	1.397	45	3.1	0.025	0.029	0.029	0.024	G3414
		0.078	1.981	0.078	1.981	20	1.4	0.054	0.063	0.055	0.046	G3415
	2W	0.030	0.762	0.030	0.762	190	13	0.015	0.018	0.018	0.015	GH3412
		0.040	1.016	0.040	1.016	165	11	0.020	0.023	0.020	0.017	GH3413
		0.055	1.397	0.055	1.397	80	5.5	0.032	0.038	0.038	0.032	GH3414
		0.078	1.981	0.078	1.981	40	2.8	0.054	0.063	0.063	0.053	GH3415

② Coil Construction
- **(blank)** = Tape-wrapped, Class-B, with 12˝ (30.48cm) long lead-wires*
- **W__** = Lead-wires, non-standard length (specify in inches)
- **1** = Encapsulated coil
- **5** = Encapsulated coil with 0.110˝ (2.79mm) spade terminals
- **10** = Rectified coil for AC voltage (2-watt only)

③ Plunger Seal Material
- **(blank)** = Viton®*
- **NB** = Nitrile
- **E** = EPR
- **N** = Neoprene

④ O-Ring Material
- **(blank)** = Viton®*
- **NBO** = Nitrile
- **EO** = EPR
- **NO** = Neoprene

⑤ Body Port Configuration
- **(blank)** = #10-32 straight thread ports*
- **LC** = 1/8˝-27 NPT ports (2-way valves only)
- **BM** = M5 x 0.8 ports
- **MM** = Manifold mount with #10-32 threaded stud†
- **MM2** = Manifold mount with M5 x 0.8 threaded stud†

⑥ Voltage
- **___VDC** = DC (specify voltage)
- **___VAC** = AC Rectified 2-watt only (specify voltage)

⑦ Additional Options
- **OC** = Cleaned for oxygen use
- **TP** = PTFE coated plunger
- **VAC** = Vacuum application – 0 to 29.5˝ Hg (0 to 1000 mBar)

* Standard selection; will be used unless otherwise specified. Standard selections are not referenced in final part number.

Notes
1. Use prefixes from this column if you plan to select a Body Port Configuration other than the #10-32 straight thread ports.

† Teflon® o-ring not suitable for manifold mount.

Gems specializes in the design and manufacturing of custom solenoid valves and fluidic systems. If you don't see what you're looking for, or have a question, contact us at 800-378-1600 or info@gemssensors.com.

NOTES

A Series

- MOPD: 1000 PSI (69 Bar)
- C_V Range: 0.019 to 0.3 (K_V Range: 0.016 to 0.256)
- 6 Watts

Next Day Shipping
On Many Configurations

The A Series gives you a highly adaptable design for practically all applications requiring flow between C_V 0.019 and 0.300 (K_V 0.016 to 0.259). This robust 2- or 3-way miniature solenoid utilizes a stainless steel body to resist corrosion for most acids, alkaline solutions, and harsh environments. Also available in plastic—from polypropylene to Delrin®—when specific inert or demanding requirements are needed. Available in numerous port configurations, orifice sizes, and material combinations, the A Series is a highly flexible valve that fulfills the requirements for most applications.

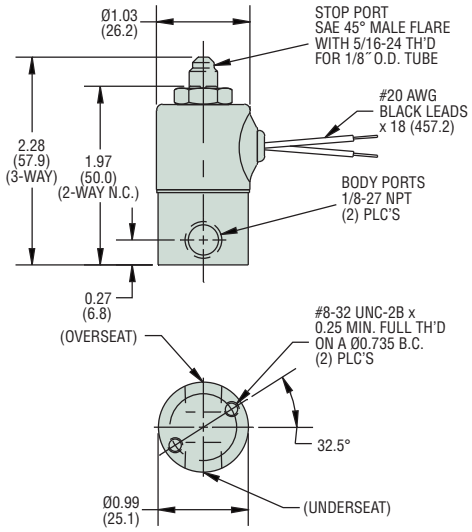
Typical Applications

Stainless Steel Bodies:
- Medical Equipment
- Laboratory Equipment
- Food Processing Equipment

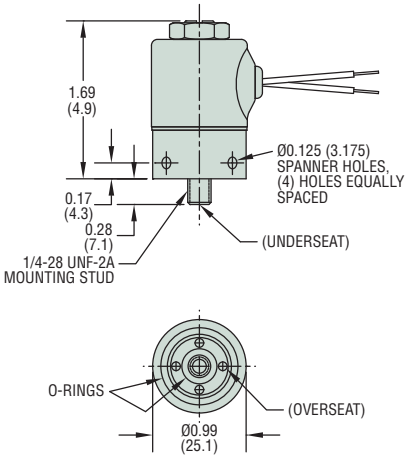
Brass Bodies:
- Industrial Applications
- Automotive
- Water Transfer Systems

Dimensions

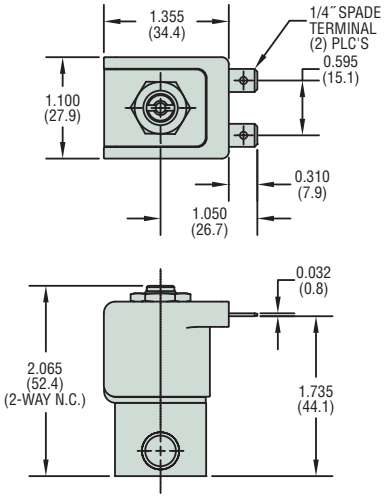
Threaded Port Body



Manifold Mount Body



Molded Coil



How To Order

Use the **Bold** characters from the choices listed on the following page to construct a product code.

A2213 - 3 - BB - N - NO - LB - 110/60VAC - WM-TP

1	2	3	4	5	6	7	8
Primary Prefix	Coil Construction	Body Material	Plunger Seal Material	O-Ring Material	Body Port Configuration	Voltage	Additional Options

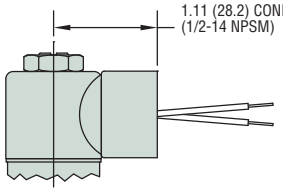
Note: After the Primary Prefix, any "-Code" may be blank when standard (blank) selections are specified.

Example:

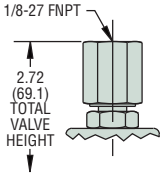
A2213-3-BB-N-NO-LB-110/60VAC-WM-TP

2-Way N.O. (with 1/8˝-27 NPT stop port adaptor) solenoid valve, with brass body, neoprene plunger seal, neoprene O-ring, 1/4˝-18 FNPT body ports, operating at 110/60 VAC/Hz, and includes the mounting bracket and PTFE coated plunger options.

Alternate 1/2" Conduit Housing
Available on all body configurations



Stop Port
Standard on 2-way N.O.;
Option "AD" on 3-Way.



Take advantage of next day shipping by making your selections from those marked with the Lightning Bolt icon.

Part Prefix Table ①

	Orifice				MOPD		C_v		K_v		① Primary Prefix	
	Body		Stop		psig	bar	Body	Stop	Body	Stop	Grommet Housing	Conduit Housing
	inches	mm	inches	mm								
2-WAY N.C.	1/32	0.79	—	—	1000	69	0.020	—	0.017	—	A2011	A2021
	3/64	1.19	—	—	500	34	0.035	—	0.030	—	A2012	A2022
	1/16	1.59	—	—	300	21	0.065	—	0.055	—	A2013	A2023
	5/64	1.98	—	—	200	14	0.090	—	0.077	—	A2014	A2024
	3/32	2.38	—	—	175	12	0.155	—	0.132	—	A2015	A2025
	1/8	3.18	—	—	100	6.9	0.240	—	0.205	—	A2016	A2026
	5/32	3.97	—	—	50	3.4	0.300	—	0.256	—	A2017	A2027
2-WAY N.O. (option AD standard)	—	—	1/32	0.79	200	14	—	0.019	—	0.016	A2211	A2221
	—	—	3/64	1.19	150	10	—	0.040	—	0.034	A2212	A2222
	—	—	1/16	1.59	100	6.9	—	0.075	—	0.064	A2213	A2223
3-WAY N.C. Free Vent	1/32	0.79	1/32	0.79	200	14	0.019	0.019	0.016	0.016	A3011	A3021
	3/64	1.19	3/64	1.19	150	10	0.040	0.040	0.034	0.034	A3012	A3022
	1/16	1.59	3/64	1.19	100	6.9	0.070	0.040	0.060	0.034	A3013	A3023
	1/16	1.59	1/16	1.59	75	5.2	0.070	0.070	0.060	0.060	A3014	A3024
	3/32	2.38	3/64	1.19	50	3.4	0.170	0.040	0.145	0.034	A3015	A3025
3-WAY N.C. Line Connection	1/32	0.79	1/32	0.79	200	14	0.019	0.019	0.016	0.016	A3111	A3121
	3/64	1.19	3/64	1.19	150	10	0.040	0.040	0.034	0.034	A3112	A3122
	1/16	1.59	3/64	1.19	100	6.9	0.070	0.040	0.060	0.034	A3113	A3123
	1/16	1.59	1/16	1.59	75	5.2	0.070	0.070	0.060	0.060	A3114	A3124
	3/32	2.38	3/64	1.19	50	3.4	0.170	0.040	0.145	0.034	A3115	A3125
3-WAY N.O.	1/32	0.79	1/32	0.79	150	10	0.019	0.019	0.016	0.016	A3211	A3221
	3/64	1.19	3/64	1.19	100	6.9	0.040	0.040	0.034	0.034	A3212	A3222
	1/16	1.59	3/64	1.19	90	6.2	0.070	0.040	0.060	0.034	A3213	A3223
	1/16	1.59	1/16	1.59	75	5.2	0.070	0.070	0.060	0.060	A3214	A3224
	3/32	2.38	3/64	1.19	50	3.4	0.170	0.040	0.145	0.034	A3215	A3225
3-WAY Multi Purpose	1/32	0.79	1/32	0.79	125	8.6	0.019	0.019	0.016	0.016	A3311	A3321
	3/64	1.19	3/64	1.19	100	6.9	0.040	0.040	0.034	0.034	A3312	A3322
	1/16	1.59	3/64	1.19	90	6.2	0.070	0.040	0.060	0.034	A3313	A3323
	1/16	1.59	1/16	1.59	75	5.2	0.070	0.070	0.060	0.060	A3314	A3324
	3/32	2.38	3/64	1.19	25	1.7	0.170	0.040	0.145	0.034	A3315	A3325
3-WAY Directional Control	1/32	0.79	1/32	0.79	225	16	0.019	0.019	0.016	0.016	A3411	A3421
	3/64	1.19	3/64	1.19	150	10	0.040	0.040	0.034	0.034	A3412	A3422
	1/16	1.59	3/64	1.19	100	6.9	0.070	0.040	0.060	0.034	A3413	A3423
	1/16	1.59	1/16	1.59	75	5.2	0.070	0.070	0.060	0.060	A3414	A3424
	3/32	2.38	3/64	1.19	50	3.4	0.155	0.040	0.132	0.034	A3415	A3425

2 Coil Construction

(blank) = Tape-wrapped, Class B, with 18˝ (45.7cm) lead wires* ⚡
W___ = Tape-wrapped coil, lead wires, non-standard length (specify length)
1 = Encapsulated coil, Class B, lead wires
2M = Over molded coil, Class F, lead wires
3 = Encapsulated coil, Class H, lead wires
3M = Over molded coil, Class H, lead wires
4 = Encapsulated coil, Class B, 3/16˝ (4.76mm) spade terminals
5M = Over molded coil, Class F, 1/4˝ (6.35mm) spade terminals
6M = Over molded coil, Class H, 1/4˝ (6.35mm) spade terminals
10 = Externally rectified coil, AC Voltages (lead wires only) ⚡
11 = Tape-wrapped coil, Class H, lead wires
HC2 = Encapsulated coil, Class B, EN175301-803 Form C DIN, Industrial, 9.4mm, 2+1 poles

3 Body Material

(blank) = 303 Stainless Steel* ⚡
BB = Brass
SB = 304 Stainless Steel
SB5 = 316 Stainless Steel
SBF = 430F Stainless Steel

4 Plunger Seal Material

(blank) = Nitrile* ⚡
E = EPR ⚡
GV = Gasoline Viton® (2-way N.C. valves only)
N = Neoprene ⚡
NS = Nitrile (NSF/FDA, 2-way N.C. valves only) ⚡
PF = Perfluoroelastomer ⚡
R = Rulon® (2-way N.C. valves only)
T = PTFE
V = Viton® ⚡

5 O-Ring Material

(blank) = Nitrile* ⚡
EO = EPR ⚡
NO = Neoprene ⚡
NSO = Nitrile (NSF/FDA, 2-way N.C. valves only) ⚡
PFO = Perfluoroelastomer ⚡
TO = PTFE
VO = Viton® ⚡

6 Body Port Configuration

(blank) = 1/8-27 NPT female thread* ⚡
LB = 1/4-18 NPT female thread
BD = #10-32 female straight thread – max. orifice = 1/8˝ (3.18mm)
LT = 1/8-28 BSPT female thread (2-way N.C. valves only)
LU = 1/4-19 BSPT female thread (2-way N.C. valves only)
MM = Manifold mount (1/4-28 UNF-2A mounting stud)†††
MM3 = Manifold mount (5/16-24 UNF-2A mounting stud)†††
OB = Omit body (operator style)
MB = Bottom metering – max. orifice = 3/32˝ (2.38mm)
BI = Bottom over-seat port, female thread – max. orifice = 1/8˝ (3.18mm)
BIM = Bottom over-seat port, 1/8-27 NPT male thread – max orifice = 5/64˝ (1.98mm) brass body only
BO = Bottom under-seat port, female thread
BOM = Bottom under-seat port, 1/8-27 NPT male thread – max orifice = 1/8˝ (3.18mm) brass body only
RL = 90° porting - left hand
RR = 90° porting - right hand
BS = Stop port, #10-32 female straight thread†

7 Voltage†† (see note below)

C203 = 12 VDC ⚡
C204 = 24 VDC ⚡
C301 = 120/50/60R (add Coil Option -10) ⚡
C303 = 240/50/60R (add Coil Option -10) ⚡
___VDC = DC (specify DC voltage)
___VAC = AC (specify AC voltage; includes copper shading ring)

8 Additional Options

Y = Yoke
WM = Mounting bracket
TP = PTFE coated plunger
AD = 1/8 - 27 NPT stop port adapter (3-way valves only) ⚡
QO = Quiet operation (2-way valves only)
S = Silver shading ring
OC = Cleaned for oxygen use
VAC = Vacuum application – 0 to 29.5˝ Hg (0 to 1000mBar)
G1 = One-piece 303 Stainless Steel guide assembly
G5 = One piece 316 Stainless Steel guide assembly

* Standard selection; will be used unless otherwise specified. Standard selections are not referenced in final part number.

† Plastic body available, contact Gems.
†† Can be AC rectified without shading ring. Use coil construction Code 10.
††† Teflon® o-ring not suitable for manifold mount.

⚡ Take advantage of next day shipping by making your selections from those marked with the Lightning Bolt icon.

Gems specializes in the design and manufacturing of custom solenoid valves and fluidic systems. If you don't see what you're looking for, or have a question, contact us at 800-378-1600 or info@gemssensors.com.

NOTES

B Series – Modular

- MOPD: 400 PSI (28 Bar)
- C_V Range: 0.018 to 0.430 (K_V Range: 0.016 to 0.372)
- 7 Watts

Next Day Shipping
On Many Configurations

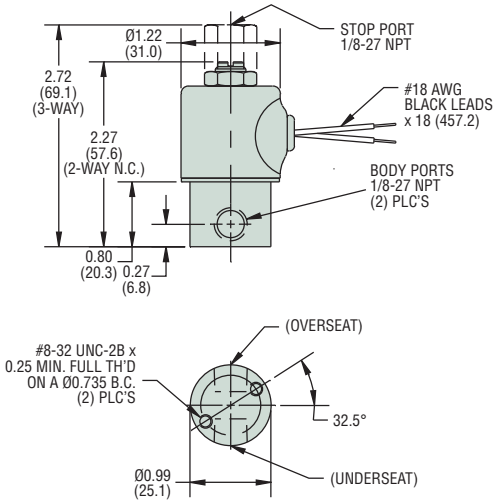
The B Series is a direct acting solenoid valve, available in 2- or 3-way functionality. Like all of our valves, the B Series has bubble tight plunger construction and is designed to last for millions of cycles in general purpose liquid, gas, and vacuum applications. The B Series is available in various orifice sizes, a variety of body materials, wattages, and coil constructions for the utmost adaptability to your application requirements. The B Series in an excellent choice for most general-purpose application requiring a C_V of 0.018 to 0.430 (K_V of 0.016 to 0.372).

Typical Applications

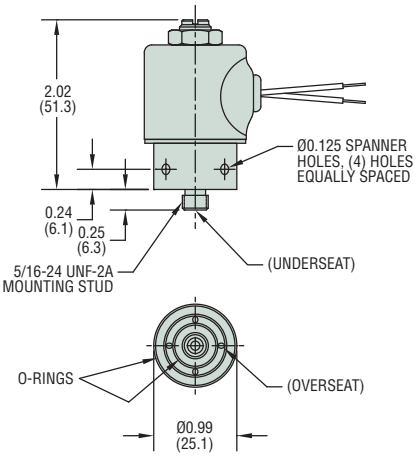
- Printing
- HVAC
- Semiconductor Equipment
- Medical Equipment

Dimensions

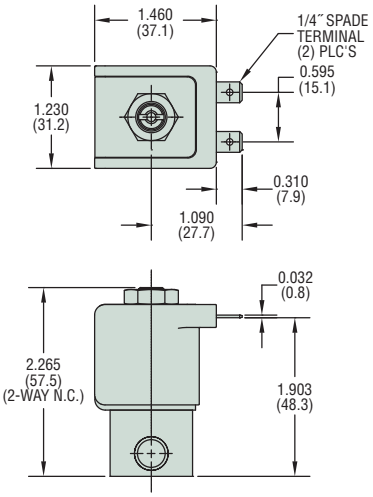
Threaded Port Body



Manifold Mount Body



Molded Coil



How To Order

Use the **Bold** characters from the choices listed on the following page to construct a product code.

B3023 - W36 - SB5 - PF - PFO - 12VDC - G5

1	2	3	4	5	6	7	8
Primary Prefix	Coil Construction	Body Material	Plunger Seal Material	O-Ring Material	Body Port Configuration*	Voltage	Additional Options

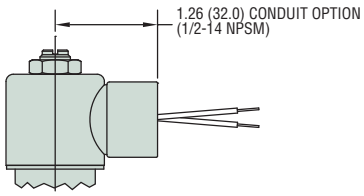
* Blank entry indicates a "Standard" selection (1/8-27 NPT female thread, in this case).

Example:

B3023-W36-SB5-PF-PFO-12VDC-G5

2-Way N.C. Free Vent (with 1.26 Conduit Option) solenoid valve, with 36˝ (91cm) tape-wrapped coil, lead-wired, non-standard length, 316 stainless steel body, perfluoroelastomer plunger seal, perfluoroelastomer o-ring, 1/8-27 NPT female thread, operating at 12 VDC, and includes a one piece 316 stainless steel guide assembly option.

Alternate 1/2" Conduit Housing
Available on all body configurations



Take advantage of next day shipping by making your selections from those marked with the Lightning Bolt icon.

Part Prefix Table ①

	Orifice				MOPD		C_v		K_v		① Primary Prefix	
	Body		Stop		psig	bar	Body	Stop	Body	Stop	Grommet Housing	Conduit Housing
	inches	mm	inches	mm								
2-WAY N.C.	1/16	1.59	—	—	400	28	0.065	—	0.056	—	B2011	B2021
	5/64	1.98	—	—	300	21	0.090	—	0.078	—	B2012	B2022
	3/32	2.38	—	—	250	17	0.155	—	0.134	—	B2013	B2023
	7/64	2.78	—	—	200	14	0.200	—	0.173	—	B2014	B2024
	1/8	3.18	—	—	150	10	0.240	—	0.208	—	B2015	B2025
	5/32	3.97	—	—	100	6.9	0.300	—	0.259	—	B2016	B2026
	3/16	4.76	—	—	50	3.4	0.430	—	0.372	—	B2017	B2027
2-WAY N.O.	—	—	1/32	0.79	400	28	—	0.019	—	0.016	B2211	B2221
	—	—	3/64	1.19	300	21	—	0.040	—	0.035	B2212	B2222
	—	—	1/16	1.59	200	14	—	0.075	—	0.065	B2213	B2223
	—	—	5/64	1.98	150	10	—	0.090	—	0.078	B2214	B2224
3-WAY N.C. Free Vent	1/32	0.79	1/32	0.79	250	17	0.018	0.018	0.016	0.016	B3011	B3021
	3/64	1.19	3/64	1.19	175	12	0.040	0.040	0.035	0.035	B3012	B3022
	1/16	1.59	1/16	1.59	125	8.6	0.065	0.070	0.056	0.061	B3013	B3023
	5/64	1.98	5/64	1.98	100	6.9	0.090	0.090	0.078	0.078	B3014	B3024
	3/32	2.38	5/64	1.98	75	5.2	0.155	0.090	0.134	0.078	B3015	B3025
	1/8	3.18	5/64	1.98	50	3.4	0.240	0.090	0.208	0.078	B3016	B3026
	5/32	3.97	5/64	1.98	15	1.0	0.300	0.090	0.259	0.078	B3017	B3027
3-WAY N.C. Line Connection	1/32	0.79	1/32	0.79	250	17	0.018	0.018	0.016	0.016	B3111	B3121
	3/64	1.19	3/64	1.19	175	12	0.040	0.040	0.035	0.035	B3112	B3122
	1/16	1.59	1/16	1.59	125	8.6	0.065	0.070	0.056	0.061	B3113	B3123
	5/64	1.98	5/64	1.98	100	6.9	0.090	0.090	0.078	0.078	B3114	B3124
	3/32	2.38	5/64	1.98	75	5.2	0.155	0.090	0.134	0.078	B3115	B3125
	1/8	3.18	5/64	1.98	50	3.4	0.240	0.090	0.208	0.078	B3116	B3126
	5/32	3.97	5/64	1.98	15	1.0	0.300	0.090	0.259	0.078	B3117	B3127
3-WAY N.O.	1/32	0.79	1/32	0.79	200	14	0.018	0.018	0.016	0.016	B3211	B3221
	3/64	1.19	3/64	1.19	150	10	0.040	0.040	0.035	0.035	B3212	B3222
	1/16	1.59	1/16	1.59	125	8.6	0.065	0.070	0.056	0.061	B3213	B3223
	5/64	1.98	5/64	1.98	100	6.9	0.090	0.090	0.078	0.078	B3214	B3224
	3/32	2.38	5/64	1.98	75	5.2	0.155	0.090	0.134	0.078	B3215	B3225
	1/8	3.18	5/64	1.98	50	3.4	0.240	0.090	0.208	0.078	B3216	B3226
	5/32	3.97	5/64	1.98	15	1.0	0.300	0.090	0.259	0.078	B3217	B3227
3-WAY Multi Purpose	1/32	0.79	1/32	0.79	175	12	0.018	0.018	0.016	0.016	B3311	B3321
	3/64	1.19	3/64	1.19	125	8.6	0.040	0.040	0.035	0.035	B3312	B3322
	1/16	1.59	1/16	1.59	100	6.9	0.065	0.070	0.056	0.061	B3313	B3323
	5/64	1.98	5/64	1.98	75	5.2	0.090	0.090	0.078	0.078	B3314	B3324
	3/32	2.38	5/64	1.98	50	3.4	0.155	0.090	0.134	0.078	B3315	B3325
	1/8	3.18	5/64	1.98	25	1.7	0.240	0.090	0.208	0.078	B3316	B3326
	5/32	3.97	5/64	1.98	15	1.0	0.300	0.090	0.259	0.078	B3317	B3327
3-WAY Directional Control	1/32	0.79	1/32	0.79	275	19	0.018	0.018	0.016	0.016	B3411	B3421
	3/64	1.19	3/64	1.19	200	14	0.040	0.040	0.035	0.035	B3412	B3422
	1/16	1.59	1/16	1.59	150	10	0.065	0.070	0.056	0.061	B3413	B3423
	5/64	1.98	5/64	1.98	100	6.9	0.090	0.090	0.078	0.078	B3414	B3424
	3/32	2.38	5/64	1.98	75	5.2	0.155	0.090	0.134	0.078	B3415	B3425
	1/8	3.18	5/64	1.98	50	3.4	0.240	0.090	0.208	0.078	B3416	B3426
	5/32	3.97	5/64	1.98	25	1.7	0.300	0.090	0.259	0.078	B3417	B3427

2 Coil Construction
- **(blank)** = Tape-wrapped, Class B, with 18˝ (45.7cm) lead wires* ⚡
- **W___** = Tape-wrapped coil, lead wires, non-standard length (specify length)
- **1** = Encapsulated coil, Class B, lead wires
- **2M** = Over molded coil, Class F, lead wires (2-way N.C. only)
- **3** = Encapsulated coil, Class H, lead wires
- **3M** = Over molded coil, Class H, lead wires (2-way N.C. only)
- **4** = Encapsulated coil, Class B, 3/16˝ (4.76mm) spade terminals
- **5M** = Over molded coil, Class F, 1/4˝ (6.35mm) spade terminals (2-way N.C. only)
- **6M** = Over molded coil, Class H, 1/4˝ (6.35mm) spade terminals (2-way N.C. only)
- **10** = Externally rectified coil, AC Voltages (lead wires only) ⚡
- **11** = Tape-wrapped coil, Class H, lead wires
- **HC2** = Encapsulated coil, Class B, EN175301-803 Form C DIN, Industrial, 9.4mm, 2+1 poles

3 Body Material
- **(blank)** = 303 Stainless Steel* ⚡
- **BB** = Brass
- **SB** = 304 Stainless Steel
- **SB5** = 316 Stainless Steel
- **SBF** = 430F Stainless Steel

4 Plunger Seal Material
- **(blank)** = Nitrile* ⚡
- **E** = EPR ⚡
- **GV** = Gasoline Viton® (2-way N.C. only)
- **N** = Neoprene ⚡
- **NS** = Nitrile (NSF/FDA material) ⚡
- **PF** = Perfluoroelastomer ⚡
- **R** = Rulon® (2-way N.C. only)
- **T** = PTFE
- **V** = Viton® ⚡

5 O-Ring Material
- **(blank)** = Nitrile* ⚡
- **EO** = EPR ⚡
- **NO** = Neoprene ⚡
- **NSO** = Nitrile (NSF/FDA material) ⚡
- **PFO** = Perfluoroelastomer ⚡
- **TO** = PTFE
- **VO** = Viton® ⚡

6 Body Port Configuration
- **(blank)** = 1/8-27 NPT female thread* ⚡
- **LB** = 1/4-18 NPT female thread
- **BD** = #10-32 female straight thread – max. orifice = 1/8˝ (3.18mm)
- **LT** = 1/8-28 BSPT female thread
- **LU** = 1/4-19 BSPT female thread (2-way N.C. only)
- **MM** = Manifold mount (1/4-28 UNF-2A mounting stud)†††
- **MM3** = Manifold mount (5/16-24 UNF-2A mounting stud)†††
- **OB** = Omit body (operator style)
- **MB** = Bottom metering (2-way N.C. only)
- **BI** = Bottom over-seat port, female thread – max. orifice = 1/8˝ (3.18mm)
- **BIM** = Bottom over-seat port, 1/8-27 NPT male thread – max. orifice = 5/64˝ (1.98mm), brass body only
- **BO** = Bottom under-seat port, female thread
- **BOM** = Bottom under-seat port, 1/8-27 NPT male thread – max. orifice = 1/8˝ (3.18mm), brass body only
- **RL** = 90° porting - left hand
- **RR** = 90° porting - right hand
- **BS** = Stop port, #10-32 female straight thread

7 Voltage†† (see note below)
- **C203** = 12 VDC ⚡
- **C204** = 24 VDC ⚡
- **C301** = 120/50/60R (add Coil Option -10) ⚡
- **C303** = 240/50/60R (add Coil Option -10) ⚡
- **___VDC** = DC (specify DC voltage)
- **___VAC** = AC (specify AC voltage; includes copper shading ring)

8 Additional Options
- **Y** = Yoke (2-way N.C. only)
- **WM** = Mounting bracket
- **TP** = PTFE coated plunger
- **QO** = Quiet operation (2-way N.C. only)
- **S** = Silver shading ring
- **OC** = Cleaned for oxygen use
- **VAC** = Vacuum application – 0 to 29.5˝ Hg (0 to 1000mBar)
- **G1** = One-piece 303 Stainless Steel guide assembly (standard on 2-way normally open and all 3-way valves)
- **G5** = One piece 316 Stainless Steel guide assembly
- **SH** = 1˝ Diameter housing, grommet
- **SC** = 1˝ Diameter housing, conduit

* Standard selection; will be used unless otherwise specified. Standard selections are not referenced in final part number.

† Internal rectified available. Consult factory.
†† Can be AC rectified without shading ring. Use coil construction Code 10.
††† Teflon® o-ring not suitable for manifold mount.

⚡ Take advantage of next day shipping by making your selections from those marked with the Lightning Bolt icon.

NOTES

C Series – High Flow

- MOPD: 400 PSI (28 Bar)
- C_V Range: 0.019 to 0.420 (K_V Range: 0.016 to 0.357)
- 7 Watts

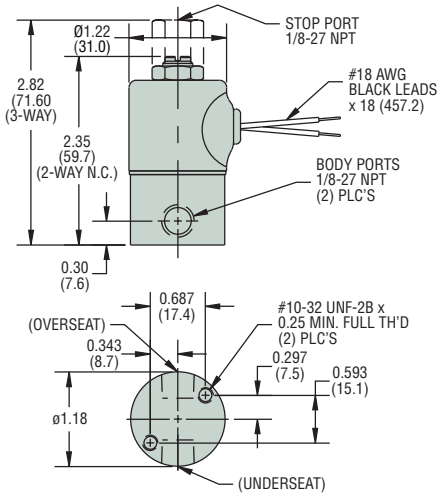
The C Series, available only in brass, is a highly durable miniature 2- or 3-way direct acting valve for applications that require a higher flow control. The C Series also utilizes a larger diameter body and larger port connections for higher C_V (K_V) valves rates. The free machining brass body allows for fast and precise machining, translating into lower product costs as compared to stainless steel. Design engineers appreciate the quality inherent in solid brass components.

Typical Applications

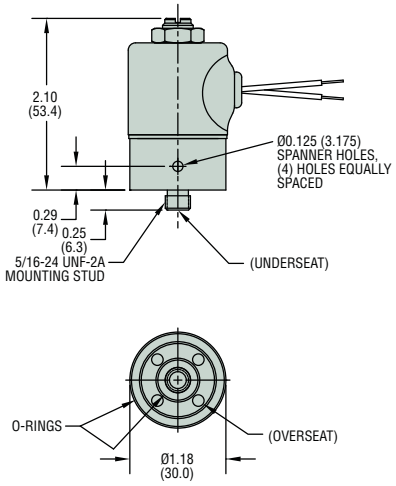
- Therapeutic Beds
- Automotive Applications
- Packaging Equipment

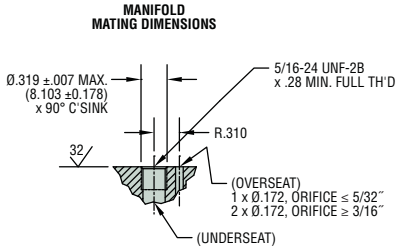
Dimensions

Threaded Port Body

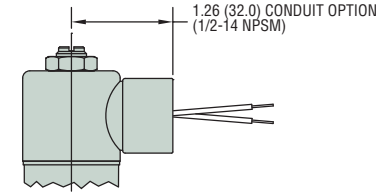


Manifold Mount Body





Alternate 1/2" Conduit Housing
Available on all body configurations



How To Order

Use the **Bold** characters from the choices listed on the following page to construct a product code.

C2016 - 11 - E - EO - LB - 48VDC - VAC

1	2	3	4	5	6	7	8
Primary Prefix	Coil Construction	Body Material*	Plunger Seal Material	O-Ring Material	Body Port Configuration	Voltage	Additional Options

* Blank entry indicates a "Standard" selection (Brass, in this case).

Example:

C2016-11-E-EO-LB-48VDC-VAC

2-Way N.C. solenoid valve, with tape-wrapped coil, Class-H, lead-wires, brass body, EPR plunger seal, EPR o-ring, 1/4-18 NPT female thread, operating at 48 VDC, and includes a vacuum application – 0 to 29.5″ Hg (0 to 1000mBar) option.

Part Prefix Table ①

	Orifice				MOPD		C_v		K_v		① Primary Prefix	
	Body		Stop		psig	bar	Body	Stop	Body	Stop	Grommet Housing	Conduit Housing
	inches	mm	inches	mm								
2-WAY N.C.	1/16	1.59	—	—	400	28	0.080	—	0.068	—	C2011	C2021
	7/64	2.78	—	—	200	14	0.180	—	0.153	—	C2012	C2022
	1/18	3.18	—	—	150	10	0.240	—	0.204	—	C2013	C2023
	5/32	3.97	—	—	100	6.9	0.300	—	0.255	—	C2014	C2024
	3/16	4.76	—	—	75	5.2	0.360	—	0.306	—	C2015	C2025
	7/32	5.56	—	—	40	2.8	0.420	—	0.357	—	C2016	C2026
2-WAY N.O.	—	—	1/32	0.79	400	28	—	0.019	—	0.016	C2211	C2221
	—	—	3/64	1.19	300	21	—	0.040	—	0.034	C2212	C2222
	—	—	1/16	1.59	200	14	—	0.075	—	0.064	C2213	C2223
	—	—	5/64	1.98	150	10	—	0.105	—	0.089	C2214	C2224
3-WAY N.C. Free Vent	1/16	1.59	1/16	1.59	125	8.6	0.080	0.075	0.068	0.064	C3011	C3021
	5/64	1.98	5/64	1.98	100	6.9	0.105	0.105	0.089	0.089	C3012	C3022
	1/8	3.18	5/64	1.98	50	3.4	0.240	0.105	0.204	0.089	C3013	C3023
	3/16	4.76	5/64	1.98	25	1.7	0.360	0.105	0.306	0.089	C3014	C3024
	7/32	5.56	5/64	1.98	VAC	1000 mbar	0.420	0.105	0.357	0.089	C3015	C3025
3-WAY N.C. Line Connection	1/16	1.59	1/16	1.59	125	8.6	0.080	0.075	0.068	0.064	C3111	C3121
	5/64	1.98	5/64	1.98	100	6.9	0.105	0.105	0.089	0.089	C3112	C3122
	1/8	3.18	5/64	1.98	50	3.4	0.240	0.105	0.204	0.089	C3113	C3123
	3/16	4.76	5/64	1.98	25	1.7	0.360	0.105	0.306	0.089	C3114	C3124
	7/32	5.56	5/64	1.98	VAC	1000 mbar	0.420	0.105	0.357	0.089	C3115	C3125
3-WAY N.O.	1/16	1.59	1/16	1.59	125	8.6	0.080	0.075	0.068	0.064	C3211	C3221
	5/64	1.98	5/64	1.98	100	6.9	0.105	0.105	0.089	0.089	C3212	C3222
	1/8	3.18	5/64	1.98	75	5.2	0.240	0.105	0.204	0.089	C3213	C3223
	3/16	4.76	5/64	1.98	40	3.4	0.360	0.105	0.306	0.089	C3214	C3224
	7/32	5.56	5/64	1.98	VAC	1000 mbar	0.420	0.105	0.357	0.089	C3215	C3225
3-WAY Multi Purpose	1/16	1.59	1/16	1.59	100	6.9	0.080	0.075	0.068	0.064	C3311	C3321
	5/64	1.98	5/64	1.98	75	5.2	0.105	0.105	0.089	0.089	C3312	C3322
	1/8	3.18	5/64	1.98	25	1.7	0.240	0.105	0.204	0.089	C3313	C3323
	3/16	4.76	5/64	1.98	10	0.7	0.360	0.105	0.306	0.089	C3314	C3324
	7/32	5.56	5/64	1.98	5	0.3	0.420	0.105	0.357	0.089	C3315	C3325
3-WAY Directional Control	1/16	1.59	1/16	1.59	150	10	0.080	0.075	0.068	0.064	C3411	C3421
	5/64	1.98	5/64	1.98	100	6.9	0.105	0.105	0.089	0.089	C3412	C3422
	1/8	3.18	5/64	1.98	50	3.4	0.240	0.105	0.204	0.089	C3413	C3423
	3/16	4.76	5/64	1.98	25	1.7	0.360	0.105	0.306	0.089	C3414	C3424
	7/32	5.56	5/64	1.98	5	0.3	0.420	0.105	0.357	0.089	C3415	C3425

(2) Coil Construction

- **(blank)** = Tape-wrapped, Class-B, with 18˝ (45.7cm) lead-wires*
- **W__** = Tape-wrapped coil, lead-wires, non-standard length (specify in inches)
- **1** = Encapsulated coil, Class-B, lead-wires
- **3** = Encapsulated coil, Class-H, lead-wires
- **4** = Encapsulated coil, Class-B, 1/4˝ (6.35mm) spade terminals – 3/16˝ (4.76mm) spade optional
- **10** = Externally rectified coil (lead-wires only)
- **11** = Tape-wrapped coil, Class-H, lead-wires
- **HC2** = Encapsulated coil, Class-B, EN175301-803 Style C, Industrial, 9.4mm, 2+1 poles

(3) Body Material

- **(blank)** = Brass*
- **SB** = 304 Stainless Steel
- **SB1** = 303 Stainless Steel
- **SB5** = 316 Stainless Steel
- **SBF** = 430F Stainless Steel

(4) Plunger Seal Material

- **(blank)** = Nitrile*
- **E** = EPR
- **GV** = Gasoline Viton® (2-way N.C. only)
- **N** = Neoprene
- **NS** = Nitrile (NSF/FDA material)
- **PF** = Perfluoroelastomer
- **R** = Rulon® (2-way N.C. only)
- **T** = PTFE
- **V** = Viton®

(5) O-Ring Material

- **(blank)** = Nitrile*
- **EO** = EPR
- **NO** = Neoprene
- **NSO** = Nitrile (NSF/FDA material)
- **PFO** = Perfluoroelastomer
- **TO** = PTFE
- **VO** = Viton®

(6) Body Port Configuration

- **(blank)** = 1/8-27 NPT female thread*
- **LB** = 1/4-18 NPT female thread
- **BD** = #10-32 female straight thread – 2-way N.C. only, max. orifice = 1/8˝ (3.18mm)
- **LU** = 1/4-19 BSPT female thread (2-way N.C. only)
- **OB** = Omit body (operator style)
- **BO** = Bottom under-seat port, female thread
- **RL** = 90° porting - left hand
- **RR** = 90° porting - right hand
- **MM4** = Manifold mount (5/16-24 UNF-2A mounting stud)††
- **BS** = Stop port, #10-32 female straight thread

(7) Voltage† (see note below)

- **___VDC** = DC (specify voltage)
- **___VAC** = AC (specify voltage; includes copper shading ring)

(8) Additional Options

- **WM** = Mounting bracket
- **TP** = PTFE coated plunger
- **QO** = Quiet operation (2-way normally closed valves only)
- **S** = Silver shading ring
- **OC** = Cleaned for oxygen use
- **VAC** = Vacuum application – 0 to 29.5˝ Hg (0 to 1000 mBar)
- **G1** = One-piece 303 Stainless Steel guide assembly (standard on 2-way normally open and all 3-way valves)
- **G5** = One piece 316 Stainless Steel guide assembly

* Standard selection; will be used unless otherwise specified. Standard selections are not referenced in final part number.

† Can be AC rectified without shading ring. Use coil construction Code 10.
†† Teflon® o-ring not suitable for manifold mount.

Gems specializes in the design and manufacturing of custom solenoid valves and fluidic systems. If you don't see what you're looking for, or have a question, contact us at 800-378-1600 or info@gemssensors.com.

NOTES

D Series – High Flow

- MOPD: 900 PSI (62 Bar)
- C_V Range: 0.045 to 0.880 (K_V Range: 0.038 to 0.748)
- 10 Watts

Next Day Shipping
On Many Configurations

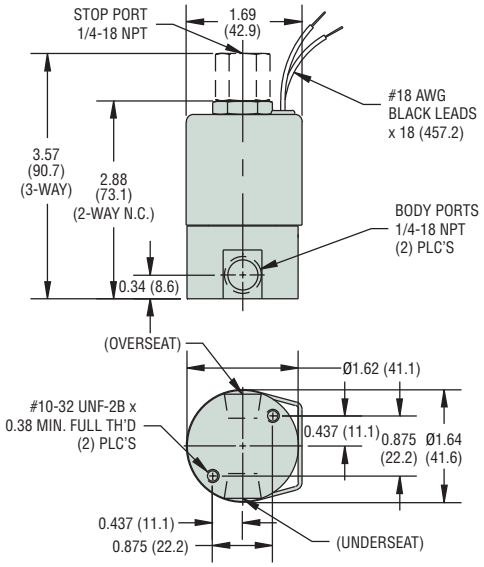
For maximum flow in a miniature solenoid valve the D Series valves delivers a wide range of C_V (K_V) values and maximum operating pressures. The D Series is also available in multiple body materials, seal materials, coil constructions, voltages, and wattages. Proven to perform for millions of cycles without failure, the D valve—as with the entire valve series—is ideal for manifold configurations, sub-assemblies, and complete fluidic systems. The D Series is the largest in a progression—A Series, B Series, and C Series—of the highly flexible, modular design, (general purpose) valves.

Typical Applications

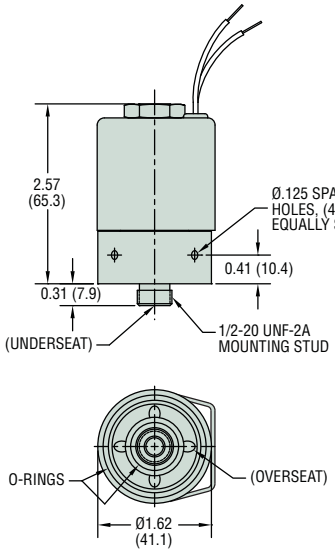
- Agriculture
- Defense
- Sterilization Equipment
- Industrial Automation

Dimensions

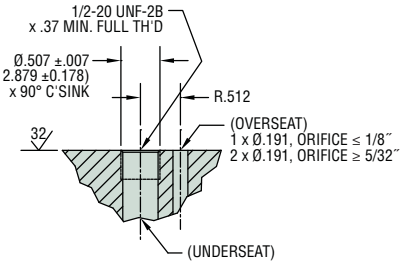
Threaded Port Body



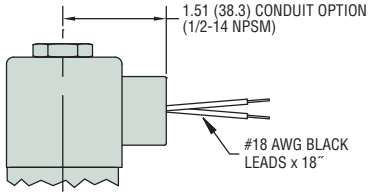
Manifold Mount Body



MANIFOLD MATING DIMENSIONS



Alternate 1/2" Conduit Housing
Available on all body configurations



How To Order

Use the **Bold** characters from the choices listed on the following page to construct a product code.

D3323 - V - VO - MM - 5VDC - VAC-G5

1	2	3	4	5	6	7	8
Primary Prefix	Coil Construction*	Body Material*	Plunger Seal Material	O-Ring Material	Body Port Configuration	Voltage	Additional Options

* Blank entry indicates a "Standard" selection
(Tape-wrapped, Class-B, with 18″ (46cm) lead-wires and 430F Stainless Steel, in this case).

Example:

D3323-V-VO-MM-5VDC-VAC-G5

3-Way Multi Purpose (with 1.26 Conduit Option) solenoid valve, with tape-wrapped, Class-B, with 18″ (46cm) lead-wires, 430F stainless steel body, Viton® plunger seal, Viton® o-ring, manifold mount (1/2-20 UNF-2A mounting stud, max. orifice = 14″ (35.6cm)), operating at 5 VDC, and includes vacuum application (0 to 29.5″Hg (0 to 1000mBar)) and one piece 316 stainless steel guide assembly options.

Take advantage of next day shipping by making your selections from those marked with the Lightning Bolt icon.

Part Prefix Table ①

	Orifice				MOPD		C_v		K_v		① Primary Prefix	
	Body		Stop									
	inches	mm	inches	mm	psig	bar	Body	Stop	Body	Stop	Grommet Housing	Conduit Housing
2-WAY N.C.	3/64	1.19	—	—	900	62	0.045	—	0.038	—	D2011	D2021
	1/16	1.98	—	—	650	45	0.080	—	0.068	—	D2012	D2022
	3/32	2.38	—	—	350	24	0.150	—	0.128	—	D2013	D2023
	1/8	3.18	—	—	225	16	0.210	—	0.179	—	D2014	D2024
	5/32	3.97	—	—	130	9.0	0.380	—	0.323	—	D2015	D2025
	3/16	4.76	—	—	85	5.9	0.430	—	0.366	—	D2016	D2026
	1/4	6.35	—	—	50	3.4	0.700	—	0.595	—	D2017	D2027
	5/16	7.94	—	—	20	1.4	0.850	—	0.723	—	D2018	D2028
	3/8	9.53	—	—	10	0.7	0.880	—	0.748	—	D2019	D2029
2-WAY N.O.	—	—	3/64	1.19	900	62	—	0.045	—	0.038	D2211	D2221
	—	—	1/16	1.59	550	38	—	0.080	—	0.068	D2212	D2222
	—	—	5/64	1.98	300	21	—	0.110	—	0.094	D2213	D2223
	—	—	3/32	2.38	175	12	—	0.150	—	0.128	D2214	D2224
	—	—	1/8	3.18	110**	7.6	—	0.210	—	0.179	D2215	D2225
	—	—	5/32	3.97	60**	4.1	—	0.380	—	0.323	D2216	D2226
3-WAY N.C. Free Vent	1/16	1.59	1/16	1.59	175	12	0.080	0.080	0.068	0.068	D3011	D3021
	5/64	1.98	5/64	1.98	150	10	0.110	0.110	0.094	0.094	D3012	D3022
	3/32	2.38	3/32	2.38	125	8.6	0.150	0.150	0.128	0.128	D3013	D3023
	1/8	3.18	1/8	3.18	85**	5.9	0.210	0.210	0.179	0.179	D3014	D3024
	5/32	3.97	5/32	3.97	45**	3.1	0.380	0.380	0.323	0.323	D3015	D3025
	3/16	4.76	5/32	3.97	30**	2.1	0.430	0.380	0.366	0.323	D3016	D3026
	1/4	6.35	5/32	3.97	10**	0.7	0.700	0.380	0.595	0.323	D3017	D3027
3-WAY N.C. Line Connection	1/16	1.59	1/16	1.59	175	12	0.080	0.080	0.068	0.068	D3111	D3121
	5/64	1.98	5/64	1.98	150	10	0.110	0.110	0.094	0.094	D3112	D3122
	3/32	2.38	3/32	2.38	125	8.6	0.150	0.150	0.128	0.128	D3113	D3123
	1/8	3.18	1/8	3.18	85**	5.9	0.210	0.210	0.179	0.179	D3114	D3124
	5/32	3.97	5/32	3.97	45**	3.1	0.380	0.380	0.323	0.323	D3115	D3125
	3/16	4.76	5/32	3.97	30**	2.1	0.430	0.380	0.366	0.323	D3116	D3126
	1/4	6.35	5/32	3.97	10**	0.7	0.700	0.380	0.595	0.323	D3117	D3127
3-WAY N.O.	1/16	1.59	1/16	1.59	200	14	0.080	0.080	0.068	0.068	D3211	D3221
	5/64	1.98	5/64	1.98	175	12	0.110	0.110	0.094	0.094	D3212	D3222
	3/32	2.38	3/32	2.38	150	10	0.150	0.150	0.128	0.128	D3213	D3223
	1/8	3.18	1/8	3.18	100**	6.9	0.210	0.210	0.179	0.179	D3214	D3224
	5/32	3.97	5/32	3.97	50**	3.4	0.380	0.380	0.323	0.323	D3215	D3225
	3/16	4.76	5/32	3.97	35**	2.4	0.430	0.380	0.366	0.323	D3216	D3226
	1/4	6.35	5/32	3.97	15**	1.0	0.700	0.380	0.595	0.323	D3217	D3227
3-WAY Multi Purpose	1/16	1.59	1/16	1.59	160	11	0.080	0.080	0.068	0.068	D3311	D3321
	5/64	1.98	5/64	1.98	130	9.0	0.110	0.110	0.094	0.094	D3312	D3322
	3/32	2.38	3/32	2.38	110	7.6	0.150	0.150	0.128	0.128	D3313	D3323
	1/8	3.18	1/8	3.18	75**	5.2	0.210	0.210	0.179	0.179	D3314	D3324
	5/32	3.97	5/32	3.97	40**	2.8	0.380	0.380	0.323	0.323	D3315	D3325
	3/16	4.76	5/32	3.97	25**	1.7	0.430	0.380	0.366	0.323	D3316	D3326
	1/4	6.35	5/32	3.97	10**	0.7	0.700	0.380	0.595	0.323	D3317	D3327
3-WAY Directional Control	1/16	1.59	1/16	1.59	225	16	0.080	0.080	0.068	0.068	D3411	D3421
	5/64	1.98	5/64	1.98	185	13	0.110	0.110	0.094	0.094	D3412	D3422
	3/32	2.38	3/32	2.38	150	10.3	0.150	0.150	0.128	0.128	D3413	D3423
	1/8	3.18	1/8	3.18	110**	7.6	0.210	0.210	0.179	0.179	D3414	D3424
	5/32	3.97	5/32	3.97	60**	4.1	0.380	0.380	0.323	0.323	D3415	D3425
	3/16	4.76	5/32	4.76	40**	2.8	0.430	0.380	0.366	0.323	D3416	D3426
	1/4	6.35	5/32	3.97	20**	1.4	0.700	0.380	0.595	0.323	D3417	D3427

** DC or rectified coil only

2 Coil Construction
- **(blank)** = Tape-wrapped, Class B, with 18˝ (45.7cm) lead wires* ⚡
- **W__** = Tape-wrapped coil, lead wires, non-standard length (specify in inches)
- **1** = Encapsulated coil, Class B, lead wires
- **3** = Encapsulated coil, Class H, lead wires
- **4** = Encapsulated coil, Class B, 1/4˝ (6.35mm) spade terminals
- **10** = Externally rectified coil, AC Voltages (lead-wires only) ⚡
- **11** = Tape-wrapped coil, Class H, lead wires
- **HC** = Encapsulated coil, Class B, EN175301-803 Style A, Industrial, 18mm, 2+1 poles
- **HC2** = Encapsulated coil, Class B, EN175301-803 Style C, Industrial, 9.4mm, 2+1 poles

3 Body Material
- **(blank)** = 430F Stainless Steel* ⚡
- **BB** = Brass
- **SB1** = 303 Stainless Steel
- **SB5** = 316 Stainless Steel

4 Plunger Seal Material
- **(blank)** = Nitrile* ⚡
- **E** = EPR ⚡
- **GV** = Gasoline Viton® – 2-way normally open and 3-way valves max. orifice = 3/32˝ (2.38mm)
- **N** = Neoprene – 2-way normally closed valves only, max. orifice = 1/4˝ (6.35mm) ⚡
- **NS** = Nitrile – NSF/FDA, max. orifice = 1/4˝ (6.35mm) ⚡
- **PF** = Perfluoroelastomer – max. orifice = 1/4˝ (6.35mm) ⚡
- **R** = Rulon® – 2-way normally closed valves only, max. orifice = 1/4˝ (6.35mm)
- **T** = PTFE – max. orifice = 1/4˝ (6.35mm)
- **V** = Viton® ⚡

5 O-Ring Material
- **(blank)** = Nitrile* ⚡
- **EO** = EPR ⚡
- **NO** = Neoprene ⚡
- **NSO** = Nitrile (NSF/FDA, 2-way valves only) ⚡
- **PFO** = Perfluoroelastomer ⚡
- **TO** = PTFE
- **VO** = Viton® ⚡

6 Body Port Configuration
- **(blank)** = 1/4-18 NPT female thread* ⚡
- **LC** = 1/8-27 NPT female thread – max. orifice = 5/16˝ (7.94mm)
- **LD** = 3/8-18 NPT female thread
- **LT** = 1/8-28 BSPT female thread – max. orifice = 5/16˝ (7.94mm)
- **LU** = 1/4-19 BSPT female thread
- **MM** = Manifold mount – 1/2-20 UNF-2A mounting stud, max. orifice = 1/4˝ (6.35mm)††
- **OB** = Omit body (operator style)
- **BI** = Bottom over-seat port, female thread – max. orifice = 1/4˝ (6.35mm)
- **BO** = Bottom under-seat port, female thread

7 Voltage† (see note below)
- **C203** = 12 VDC ⚡
- **C204** = 24 VDC ⚡
- **C301** = 120/50/60R (add Coil Option -10) ⚡
- **C303** = 240/50/60R (add Coil Option -10) ⚡
- **___VDC** = DC (specify voltage)
- **___VAC** = AC (specify voltage; includes copper shading ring)

8 Additional Options
- **WM** = Mounting bracket on the coil housing
- **TP** = PTFE coated plunger
- **CP** = Chamfered plunger
- **QO** = Quiet operation (2-way valves only)
- **S** = Silver shading ring
- **OC** = Cleaned for oxygen use
- **VAC** = Vacuum application – 0 to 29.5˝ Hg (0 to 1000mBar)
- **G5** = One piece 316 Stainless Steel guide assembly

* Standard selection; will be used unless otherwise specified. Standard selections are not referenced in final part number.

† Can be AC rectified without shading ring. Use coil construction Code 10.
†† Teflon® o-ring not suitable for manifold mount.

⚡ Take advantage of next day shipping by making your selections from those marked with the Lightning Bolt icon.

F Series – Model 1

High Flow, 2-Way, Direct Acting

- Normally Closed
- Line Sizes to 1˝ NPT
- Vibration Resistance to 9g
- Speed to 100 Cycles/Min.

Note: Dimensional drawings available. Contact Gems.

These high flow solenoid valves offer broad media capability, including Liquefied Petroleum Gas (LPG) and Compressed Natural Gas (CNG). They are direct acting, 2-way models with primary wetted parts made of non-reactive stainless steel. They are particularly well suited to CNG compressors used at wellhead and transit booster stations.

Media

LPG, CNG, Air, Inert Gases, Water, Free Flowing Liquid, Oil, Diesel, Kerosene

Specifications

Wetted Parts	
Body Material	316 Stainless Steel, CF8M
Guide Assembly	304 Stainless Steel
Plunger, Insert	430 Stainless Steel
Shading Ring	Copper
Spring	302 Stainless Steel
Seals	See Below
Pressure Range	0 to 145 psi (0 to 10 bar)
Fluid / Ambient Temperature	-4°F to +176°F (-20°C to +80°C)
Expected Life (cycles)	>2 Million

How To Order

Example: F-1-20-V-S-06-DN-C203

F - 1 - 20 - X - S - X - X - X

F Series

Model Type
- **1** = Direct Acting

Valve Type
- **20** = 2-Way, Normally Closed

Plunger Seal
- **N** = Buna N
- **V** = FKM

Body Material
- **S** = 316 Stainless Steel

Port Size (Orifice Size)[1]
- **04** = 1/2˝ NPT – 4.68 C_v (15/32˝)
- **06** = 3/4˝ NPT – 8.892 C_v (25/32˝)
- **08** = 1˝ NPT – 14.976 C_v (1˝)

Termination
- **LW** = Lead Wires, 18 AWG, 22˝ to 24˝[2]
- **DN** = DIN 43650 Connection (IP67)
- **JB** = Junction Box[3]

Voltage
- **C203** = 12VDC, 30W
- **C204** = 24VDC, 30W
- **C106** = 110VAC/60Hz, 30W[4]

Notes:
1. C_v = Quantity of water, at 68°F and in gallons per minute (GPM) that will flow through your valve with a 1psi pressure differential.
2. Not available with 110AC Voltage option.
3. Junction Box termination is available with explosion-proof options (UL, ATEX, IECEX). Please contact Gems for details.
4. Internally rectified.

F Series – Model 2

High Flow, 2-Way, Diaphragm Operated

- Normally Closed or Normally Open
- Line Sizes to 2-1/2˝ NPT
- Vibration Resistance to 9g

These diaphragm operated solenoid valves offer Gems' highest flow capability for a broad range of media, including Liquefied Petroleum Gas (LPG) and Compressed Natural Gas (CNG). They are 2-way models, available with either N.O. or N.C. operation, and feature primary wetted parts made of non-reactive stainless steel. They are particularly well suited to CNG compressors used at wellhead and transit booster stations.

Normally Closed

Note: Dimensional drawings available. Contact Gems.

Media

LPG, CNG, Air, Inert Gases, Water, Free Flowing Liquid, Oil, Diesel, Kerosene

Specifications

Wetted Parts	
Body Material	316 Stainless Steel, CF8M
Guide Assembly	304 Stainless Steel
Plunger, Insert	430 Stainless Steel
Spring	302 Stainless Steel
Seals	See Below
Pressure Range	7 to 145 psi (0.5 to 10 bar)
Fluid / Ambient Temperature	41°F to 176°F (5°C to 80°C)
Expected Life (cycles)	>2 Million

How To Order

Example: F-2-20-V-S-06-DN-C203

F - 2 - X - X - X - X - X - X

F Series

Model Type
- **2** = Pilot Operated Diaphragm

Valve Type
- **20** = 2-Way, Normally Closed
- **22** = 2-Way, Normally Open

Diaphragm Material
- **N** = Buna N
- **E** = EPDM
- **V** = FKM
- **H** = Hytrel®[1]

Body Material
- **A** = Annodized Aluminum
- **S** = 316 Stainless Steel

Port Size (Orifice Size)[2]
- **04** = 1/2˝ NPT – 5.616 C_V (15/32˝)
- **06** = 3/4˝ NPT – 10.296 C_V (25/32˝)
- **08** = 1˝ NPT – 17.316 C_V (1˝)
- **10** = 1-1/2˝ NPT – 41.184 C_V (1-9/16˝)
- **16** = 2˝ NPT – 60.84 C_V (1-31/32˝)
- **20** = 2-1/2˝ NPT – 74.88 C_V (2-9/16˝)

Termination
- **LW** = Lead Wires, 18 AWG, 22˝ to 24˝[3]
- **DN** = DIN 43650 Connection (IP67)
- **JB** = Junction Box[4]

Voltage
- **C203** = 12VDC, 8W
- **C204** = 24VDC, 8W
- **C106** = 110VAC/60Hz, 6W

Notes:
1. Hytrel® must be selected for port sizes of 2˝ or greater.
2. C_V = Quantity of water, at 68°F and in gallons per minute (GPM) that will flow through your valve with a 1psi pressure differential.
3. Not available with 110AC Voltage option.
4. Junction Box termination is available with explosion-proof options (UL, ATEX, IECEX). Please contact Gems for details.

F Series – Model 3

High Flow, 3-Way, Direct Acting

- 3/2 Universal Operation
- Line Sizes to 1/2˝ NPT
- Suitable for Vacuum to 9.34 x 10^{-7} psi (10^{-6} torr)
- Speed to 800 Cycles/Min.

These universal 3-way solenoid valves offer exceptional flow characteristics with bubble tight shut off. Main components are non-reactive stainless steel, are vibration resistant to 9g, and provide a life expectancy exceeding ten million cycles. They are ideal for single acting actuators or cylinders, control valve actuation, or diverting and mixing fluids.

Note: Dimensional drawings available. Contact Gems.

Media

LPG, Air, Inert Gases, Water, Vacuum, Free Flowing Liquid, Oil, Diesel, Kerosene

Specifications

Wetted Parts	
Body Material	316 Stainless Steel
Guide Assembly	304 Stainless Steel
Plunger, Insert	430 Stainless Steel
Spring	302 Stainless Steel
Seals	See Below
Pressure Range	0 to 232 psi (0 to 16 bar)
Fluid / Ambient Temperature	-40°F to +176°F (-20°C to +80°C)
Expected Life (cycles)	>10 Million

How To Order

Example: F-3-33-V-S-04-DN-C203

F - 3 - 33 - X - X - X - X - X - X

F Series

Model Type
- **3** = High Flow

Valve Type
- **33** = 3-Way, Multi-Purpose

Plunger Seal
- **N** = Buna N
- **V** = FKM

Body Material
- **A** = Annodized Aluminum
- **B** = Brass
- **S** = 316 Stainless Steel

Port Size (Orifice Size)[1]
- **02** = 1/4˝ NPT – 0.7488 C_V (3/16˝)
- **03** = 3/8˝ NPT – 2.34 C_V (9/32˝)
- **04** = 1/2˝ NPT – 2.808 C_V (3/8˝)

Termination
- **LW** = Lead Wires, 18 AWG, 22˝ to 24˝[2]
- **DN** = DIN 43650 Connection (IP67)
- **JB** = Junction Box[3]

Voltage
- **C203** = 12VDC, 13W
- **C204** = 24VDC, 13W
- **C106** = 110VAC/60Hz, 13W[4]

Notes:
1. C_V = Quantity of water, at 68°F and in gallons per minute (GPM) that will flow through your valve with a 1psi pressure differential.
2. Not available with 110AC Voltage option.
3. Junction Box termination is available with explosion-proof options (UL, ATEX, IECEX). Please contact Gems for details.
4. Internally rectified.

F Series – Model 4

High Pressure, 2-Way, Direct Acting

- Normally Open
- Pressure to 5802 psi (400 bar)
- Ideal for Fuel Gas Cutoff
- Vibration Resistance to 9g
- Speed to 300 Cycles/Min.

These high pressure solenoid valves offer broad media capability, including Liquefied Petroleum Gas (LPG) and Compressed Natural Gas (CNG). They are direct acting, normally closed, 2-way models with primary wetted parts made of non-reactive stainless steel. They are particularly well suited to CNG compressors used at wellhead, transit booster stations, and high pressure dispenser stations.

Note: Dimensional drawings available. Contact Gems.

Media

LPG, CNG, Oil, Diesel, Kerosene, Air, Inert Gases, Water, Free Flowing Liquid

Specifications

Wetted Parts	
Body Material	316 Stainless Steel
Guide Assembly	304 Stainless Steel
Plunger, Insert	430 Stainless Steel
Spring	302 Stainless Steel
Seals	See Below
Pressure Range	0 to 5802 psi (0 to 400 bar)
Fluid / Ambient Temperature	-40°F to +176°F (-20°C to +80°C)
Expected Life (cycles)	>2 Million

How To Order

Example: F-4-20-V-S-04-DN-C203

F - 4 - 20 - X - X - X - X - X

F Series

Model Type
- **4** = High Pressure

Valve Type
- **20** = 2-Way, Normally Closed

Plunger Seal
- **N** = Buna N
- **P** = PTFE
- **V** = FKM

Body Material
- **B** = Brass
- **S** = 316 Stainless Steel

Port Size (Orifice Size)[1]
- **02** = 1/4˝ NPT – 0.0468 C_V (1/16˝)
- **04** = 1/2˝ NPT – 0.05616 C_V (1/16˝)

Termination
- **LW** = Lead Wires, 18 AWG, 22˝ to 24˝[2]
- **DN** = DIN 43650 Connection (IP67)
- **JB** = Junction Box[3]

Voltage
- **C203** = 12VDC, 13W
- **C204** = 24VDC, 13W
- **C106** = 110VAC/60Hz, 13W[4]

Notes:
1. C_V = Quantity of water, at 68°F and in gallons per minute (GPM) that will flow through your valve with a 1psi pressure differential.
2. Not available with 110AC Voltage option.
3. Junction Box termination is available with explosion-proof options (UL, ATEX, IECEX). Please contact Gems for details.
4. Internally rectified.

AS Series

- MOPD: 110 PSI (7.5 Bar) Plastic Body or 150 PSI (10 Bar) Metal Body
- C_V Range: 0.020 to 0.300 (K_V Range: 0.017 to 0.256)
- 4.5 Watts (Plastic Body) or 7 Watts (Metal Body)

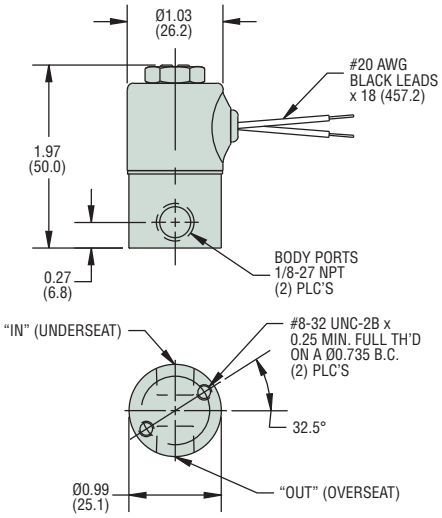
The AS Series is a 2-way isolation valve, designed to control the flow of various aggressive liquids and gases with several body and diaphragm materials. With a modular design, the AS offers performance flexibility and the protection your media needs from the solenoid's internal components. Numerous port configurations, voltage options, and coil constructions enable the AS Series to be a truly versatile miniature inert isolation valve, easily integrated into any complex or demanding system.

Typical Applications

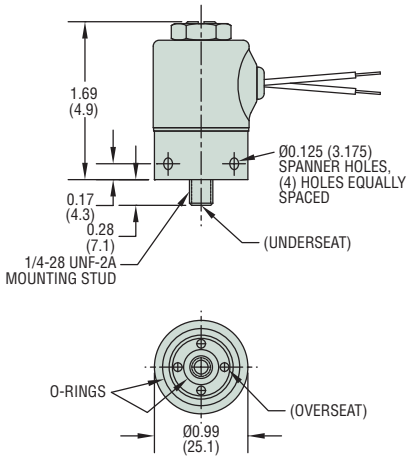
- Analytical Instruments
- Clinical Diagnostic Analyzers
- Bio-Instrumentation

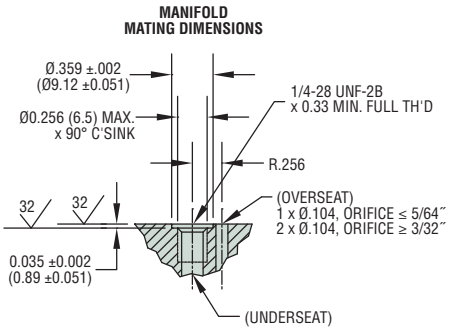
Dimensions

Threaded Port Body

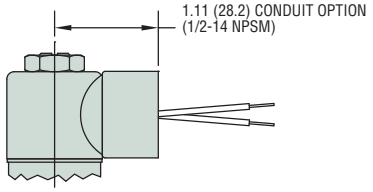


Manifold Mount Body





Alternate 1/2˝ Conduit Housing
Available on all body configurations



How To Order

Use the **Bold** characters from the choices listed on the following page to construct a product code.

AS2022 - 10 - SB - NS - BD - 110/50/60VAC - WM

1	2	3	4	5	6	7
Primary Prefix	Coil Construction	Body Material[2]	Diaphragm Seal Material	Body Port Configuration	Voltage	Additional Options

Example:

AS2022-10-SB-NS-BD-110/50/60VAC-WM

2-Way N.C. (1/2˝ (12.70mm) conduit housing) solenoid valve, with externally rectified coil (lead-wires only), 304 stainless steel body, nitrile (NSF/FDA) diaphragm seal, #10-32 female straight thread, operating at 110/50/60 Volt AC with rectified coil and mounting bracket.

Notes
1. After the Primary Prefix, any "-Code" may be blank when standard (blank) selections are specified.
2. The Body Material option code, when specified, supercedes the standard body material indicated by the Primary Prefix.

Part Prefix Table ①

Body Material	Orifice Body inches	Orifice Body mm	MOPD psig	MOPD bar	Max Back Pressure psig	Max Back Pressure bar	C_v Body	K_v Body	① Primary Prefix Grommet Housing	① Primary Prefix Conduit Housing
303 Stainless Steel[1]	1/32	0.79	150	10	10	0.7	0.020	0.017	**AS2011**	**AS2021**
	3/64	1.19	110	7.6	10	0.7	0.035	0.030	**AS2012**	**AS2022**
	1/16	1.59	90	6.2	10	0.7	0.065	0.055	**AS2013**	**AS2023**
	5/64	1.98	70	4.8	10	0.7	0.090	0.077	**AS2014**	**AS2024**
	3/32	2.38	45	3.1	10	0.7	0.155	0.132	**AS2015**	**AS2025**
	1/8	3.18	15	1.0	5	0.3	0.240	0.205	**AS2016**	**AS2026**
	5/32	3.97	5	0.3	5	0.3	0.300	0.256	**AS2017**	**AS2027**
Polypropylene (1/8-27 NPT Female Thread body port only)	3/64	1.19	110	7.6	10	0.7	0.035	0.030	**AS2032**	**AS2042**
	1/8	3.18	15	1.0	10	0.7	0.240	0.205	**AS2036**	**AS2046**

* Other body orifice sizes may be available, consult factory.

② Coil Construction
- **(blank)** = Tape-wrapped, Class-B, with 18˝ (45.7cm) lead-wires*
- **W__** = Tape-wrapped coil, lead-wires, non-standard length (specify in inches)
- **1** = Encapsulated coil, Class-B, lead-wires
- **2** = Molded coil, Class-F, lead-wires
- **3** = Encapsulated coil, Class-H, lead-wires
- **4** = Encapsulated coil, Class-B, 3/16˝ (4.76mm) spade terminals – 1/4˝ (6.35mm) spade optional
- **10** = Externally rectified coil (lead-wires only)
- **11** = Tape-wrapped coil, Class-H, lead-wires
- **HC2** = Encapsulated coil, Class-B, EN175301-803 Style C, Industrial, 9.4mm, 2+1 poles

③ Body Material (Replaces Standard 303 SS)
- **BB** = Brass
- **SB** = 304 Stainless Steel
- **SB5** = 316 Stainless Steel

④ Diaphragm Seal Material
- **(blank)** = Viton® diaphragm*
- **E** = EPR diaphragm
- **NS** = Nitrile (NSF/FDA) diaphragm
- **PF** = Perfluoroelastomer diaphragm

⑤ Body Port Configuration
- **(blank)** = 1/8-27 NPT female thread*
- **LB** = 1/4-18 NPT female thread[2]
- **BD** = #10-32 female straight thread – max. orifice = 1/8˝ (3.18mm)[2]
- **LT** = 1/8-28 BSPT female thread[2]
- **LU** = 1/4-19 BSPT female thread[2]
- **MM** = Manifold mount (1/4-28 UNF-2A mounting stud)[2†]
- **MM3** = Manifold mount (5/16-24 UNF-2A mounting stud)[2†]
- **OB** = Omit body (operator style)[2]
- **BI** = Bottom over-seat port, female thread – max. orifice = 1/8˝ (3.18mm)[2]
- **BIM** = Bottom over-seat port, 1/8-27 NPT male thread – max. orifice = 5/64˝ (1.98mm), brass body only)[2]
- **BO** = Bottom under-seat port, female thread[2]
- **BOM** = Bottom under-seat port, 1/8-27 NPT male thread – max. orifice = 1/8˝ (3.18mm), brass body only)[2]
- **RL** = 90° porting - left hand[2]
- **RR** = 90° porting - right hand[2]

⑥ Voltage
- **___VDC** = DC (specify voltage)
- **___VAC** = AC Rectified only (specify voltage)

⑦ Additional Options
- **Y** = Yoke
- **WM** = Mounting bracket
- **OC** = Cleaned for oxygen use

* Standard selection; will be used unless otherwise specified. Standard selections are not referenced in final part number.

Notes
1. Use Prefixes from these rows if you want to use any of the other Body Materials listed under selection ③. Simply add the respective material code in the 3rd part number position (See Example).
2. Not available with Polypropylene bodies.

† Teflon® o-ring not suitable for manifold mount.

Gems specializes in the design and manufacturing of custom solenoid valves and fluidic systems. If you don't see what you're looking for, or have a question, contact us at 800-378-1600 or info@gemssensors.com.

BS Series – Higher Flow

- MOPD: 150 PSI (10 Bar)
- C_V Range: 0.035 to 0.300 (K_V Range: 0.030 to 0.256)
- 4.5 Watts (Plastic Body) or 7 Watts (Metal Body)

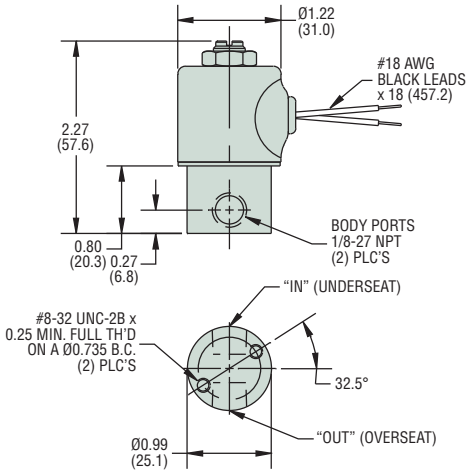
The BS Series is a 2-way, high flow, isolation valve that is designed to be virtually impervious to chemical attack and to protect high purity media. When your media cannot come in contact with any metallic materials, this highly versatile, modular valve delivers the protection you need for accurate and reliable flow control for millions of cycles. With a variety of body, and diaphragm materials, plus numerous port configurations, voltage options, and coil constructions, the BS Series is truly a miniature inert isolation valve that can be built to your exact applications requirements.

Typical Applications

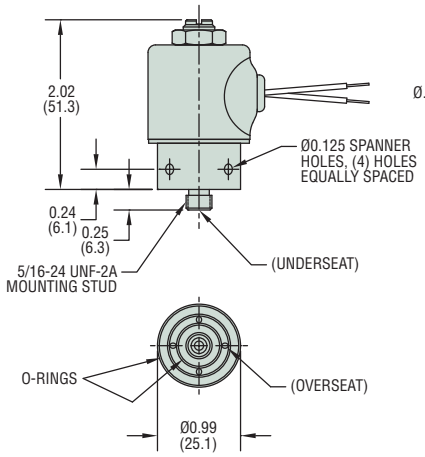
- Remediation Equipment
- Clinical Chemistry Equipment
- Analytical Instrumentation

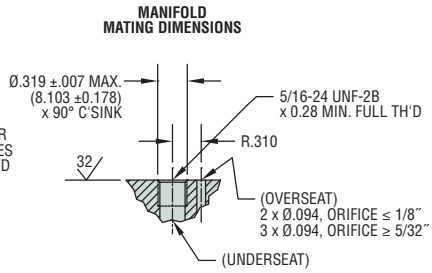
Dimensions

Threaded Port Body

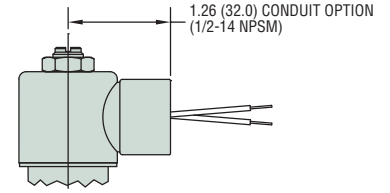


Manifold Mount Body





Alternate 1/2″ Conduit Housing
Available on all body configurations



How To Order

Use the **Bold** characters from the choices listed on the following page to construct a product code.

BS2035 - W25 - E - 28VDC

1	2	3	4	5	6	7
Primary Prefix	Coil Construction	Body Material*	Diaphragm Seal Material	Body Port Configuration*	Voltage	Additional Options*

* Blank entry indicates a "Standard" selection (1/8-27NPT female thread, in this case).

Example:

BS2035-W25-E-28VDC

2-Way N.C. Polypropylene (grommet housing, 1/8-27 NPT female thread only) solenoid valve, with 25″ (63.5cm) tape-wrapped coil, lead-wires, non-standard length, EPR diaphragm seal, 1/8-27 NPT female thread, operating at 28 VDC.

Part Prefix Table ①

Body Material	Orifice Body inches	Orifice Body mm	MOPD psig	MOPD bar	Max Back Pressure psig	Max Back Pressure bar	C_v Body	K_v Body	①Primary Prefix Grommet Housing	①Primary Prefix Conduit Housing
303 Stainless Steel[1]	3/64	1.19	150	10	15	0.7	0.035	0.030	**BS2010**	**BS2020**
	1/16	1.59	110	7.6	10	0.7	0.065	0.055	**BS2011**	**BS2021**
	5/64	1.98	85	6.2	10	0.7	0.090	0.077	**BS2012**	**BS2022**
	3/32	2.38	70	4.8	10	0.7	0.155	0.132	**BS2013**	**BS2023**
	7/64	2.78	25	3.1	10	0.3	0.200	0.171	**BS2014**	**BS2024**
	1/8	3.18	10	1.0	5	0.3	0.240	0.205	**BS2015**	**BS2025**
	5/32	3.97	5	0.3	5	0.3	0.300	0.256	**BS2016**	**BS2026**
Polypropylene (1/8-27 NPT Female Thread body port only)	3/64	1.19	150	10	15	0.7	0.035	0.030	**BS2030**	**BS2040**
	1/8	3.18	10	1.0	5	0.3	0.240	0.205	**BS2035**	**BS2045**

* Other body orifice sizes may be available, consult factory.

② Coil Construction

(blank) - Tape-wrapped, Class-B, with 18˝ (45.7cm) lead-wires*
W__ = Tape-wrapped coil, lead-wires, non-standard length (specify in inches)
1 = Encapsulated coil, Class-B, lead-wires
3 = Encapsulated coil, Class-H, lead-wires
4 = Encapsulated coil, Class-B, 1/4˝ (6.35mm) spade terminals – 3/16˝ (4.76mm) spade optional
10 = Externally rectified coil (lead-wires only)
11 = Tape-wrapped coil, Class-H, lead-wires
HC2 = Encapsulated coil, Class-B, EN175301-803 Style C, Industrial, 9.4mm, 2+1 poles

③ Body Material (Replaces Standard 303 SS)

BB = Brass
SB = 304 Stainless Steel
SB5 = 316 Stainless Steel

④ Diaphragm Seal Material

(blank) = Viton® diaphragm*
E = EPR diaphragm
NS = Nitrile (NSF/FDA) diaphragm
PF = Perfluoroelastomer diaphragm

⑤ Body Port Configuration

(blank) = 1/8-27 NPT female thread*
LB = 1/4-18 NPT female thread[2]
BD = #10-32 female straight thread – max. orifice = 1/8˝ (3.18mm)[2]
LT = 1/8-28 BSPT female thread[2]
LU = 1/4-19 BSPT female thread[2]
MM = Manifold mount (1/4-28 UNF-2A mounting stud)†[2]
MM3 = Manifold mount (5/16-24 UNF-2A mounting stud)†[2]
OB = Omit body (operator style)[2]
BI = Bottom over-seat port, female thread – max. orifice = 1/8˝ (3.18mm)[2]
BIM = Bottom over-seat port, 1/8-27 NPT male thread – max. orifice = 5/64˝ (1.98mm), brass body only)[2]
BO = Bottom under-seat port, female thread[2]
BOM = Bottom under-seat port, 1/8-27 NPT male thread – max. orifice = 1/8˝ (3.18mm), brass body only[2]
RL = 90° porting - left hand[2]
RR = 90° porting - right hand[2]

⑥ Voltage

___VDC = DC (specify voltage)
___VAC = AC Rectified only (specify voltage)

⑦ Additional Options

WM = Mounting bracket
OC = Cleaned for oxygen use

* Standard selection; will be used unless otherwise specified. Standard selections are not referenced in final part number.

Notes
1. Use Prefixes from these rows if you want to use any of the other Body Materials listed under selection ③. Simply add the respective material code in the 3rd part number position (See Example).
2. Not available with Polypropylene bodies.

† Teflon® o-ring not suitable for manifold mount.

Gems specializes in the design and manufacturing of custom solenoid valves and fluidic systems. If you don't see what you're looking for, or have a question, contact us at 800-378-1600 or info@gemssensors.com.

B-Cryo Series

- MOPD: 900 PSI (62 Bar)
- C_V Range: 0.045 to 0.440 (K_V Range: 0.038 to 0.374)
- 9 Watts

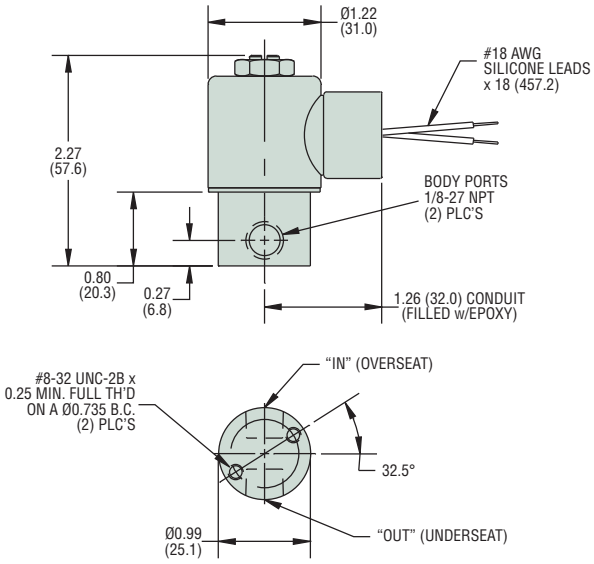
The B-Cryo Series is a 2-way miniature Cryogenic valve designed and built for service down to -320°F (-196°C) in applications needing a C_V between 0.045 and 0.440 (K_V between 0.038 and 0.374). Depending on your temperature requirements, the B-Cryo Series can be configured for liquid nitrogen (LN2), liquid carbon dioxide (LCO2), and other extreme temperature media. PTFE coated plungers, 316 Stainless Steel guide tubes and plunger springs, encapsulated coils, and PTFE or Rulon® seat seals produce a truly robust Cryogenic valve for applications requiring high cycle life and media temperature control.

Typical Applications

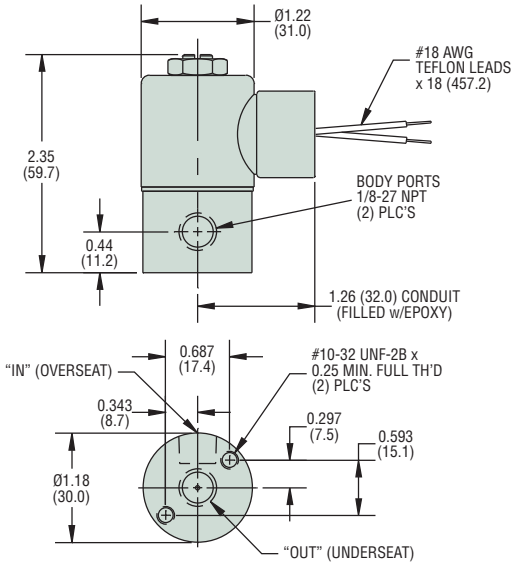
- Environmental Chambers
- Food Processing
- Laser Surgical Equipment
- Semiconductor Manufacturing

Dimensions

LN2–Liquid Nitrogen



LCO2–Liquid Carbon Dioxide



How To Order

Use the **Bold** characters from the choices listed on the following page to construct a product code.

B2062 - LN2 - LB - 120/50/60VAC

1	2	3	4	5	6	7	8
Primary Prefix	Model	Body Material*	Plunger Seal Material*	O-Ring Material*	Body Port Configuration	Voltage	Additional Options*

* Blank entry indicates a "Standard" selection
(430F Stainless Steel, Rulon® and Variseal®, in this case).

Example:

B2062-LN2-LB-120/50/60VAC

2-Way N.C. Liquid Nitrogen Class-H Encapsulated Coil with lead-wires, conduit filled housing solenoid valve, with 430F stainless steel body, Rulon® plunger seal, Variseal® o-ring, 1/4-18 NPT female thread, operating at 120/50/60 Volt AC.

Part Prefix Table ①

Orifice		MOPD		C_v	K_v	① Primary Prefix		
						Class 180°C (H), Encapsulated Coils		
Body		psig	bar	Body		Lead Wires—Filled Conduit Housing	Lead Wires—Unfilled Conduit Housing	Lead Wires—Grommet Housing
inches	mm							
3/64	1.19	900	62	0.045	0.038	**B2060**	**B2020**	**B2010**
1/16	1.59	405	28	0.075	0.064	**B2061**	**B2021**	**B2011**
5/64	1.98	270	19	0.105	0.089	**B2062**	**B2022**	**B2012**
3/32	2.38	160	11	0.160	0.136	**B2063**	**B2023**	**B2013**
7/64	2.78	110	7.6	0.190	0.162	**B2064**	**B2024**	**B2014**
1/8	3.18	80	5.5	0.255	0.217	**B2065**	**B2025**	**B2015**
5/32	3.97	65	4.5	0.365	0.310	**B2066**	**B2026**	**B2016**
3/16	4.76	30	2.1	0.440	0.374	**B2067**	**B2027**	**B2017**

② Model

-LN2 = Liquid Nitrogen model
-LCO2 = Liquid Carbon Dioxide model

③ Body Material

LN2 Only

(blank) = 430F Stainless Steel*

LCO2 Only

(blank) = 303 Stainless Steel*
BB = Brass
SB = 304 Stainless Steel
SB5 = 316 Stainless Steel

④ Plunger Seal Material

LN2 Only

(blank) = Rulon®*

LCO2 Only

(blank) = PTFE*
MQ = Silicone (consult factory)

⑤ O-Ring Material

LN2 Only

(blank) = Variseal® (PTFE material with internal spring)*
TO = PTFE (consult factory)

LCO2 Only

(blank) = Variseal® (PTFE material with internal spring)*
TO = PTFE (consult factory)

⑥ Body Port Configuration

LN2 Only

(blank) = 1/8-27 NPT female thread*
LB = 1/4-18 NPT female thread
LT = 1/8-28 BSPT female thread
LU = 1/4-19 BSPT female thread
BI = Bottom over-seat port, female thread
– max. orifice = 1/8˝ (3.18mm)
BO = Bottom under-seat port, female thread
RL = 90° porting - left hand
RR = 90° porting - right hand

LCO2 Only

(blank) = 1/8-27 NPT, bottom under-seat port, female thread*
LB = 1/4-18 NPT female thread (in-line porting only)
LT = 1/8-28 BSPT female thread
LU = 1/4-19 BSPT female thread (in-line porting only)
BOM = Bottom under-seat port, male thread
– max. orifice = 1/8˝ (3.18mm), brass body only)
IL = Inline porting, 180° apart

⑦ Voltage

LN2 Only

___**VDC** = DC (specify voltage)
___**VAC** = AC Rectified (specify voltage)

LCO2 Only

___**VDC** = DC (specify voltage)
___**VAC** = AC Rectified (specify voltage)

⑧ Additional Options

LN2 Only

(blank) = Chamfered and PTFE coated plunger*
(blank) = 316 Stainless Steel 1-piece guide assembly*
(blank) = 316 Stainless Steel spring*

LCO2 Only

(blank) = Chamfered and PTFE coated plunger*
(blank) = 316 Stainless Steel 1-piece guide assembly*
(blank) = 316 Stainless Steel spring*

* Standard selection; will be used unless otherwise specified.
Standard selections are not referenced in final part number.

D-Cryo Series

- MOPD: 1000 PSI (69 Bar)
- C_V Range: 0.040 to 0.770 (K_V Range: 0.034 to 0.655)
- 15 Watts

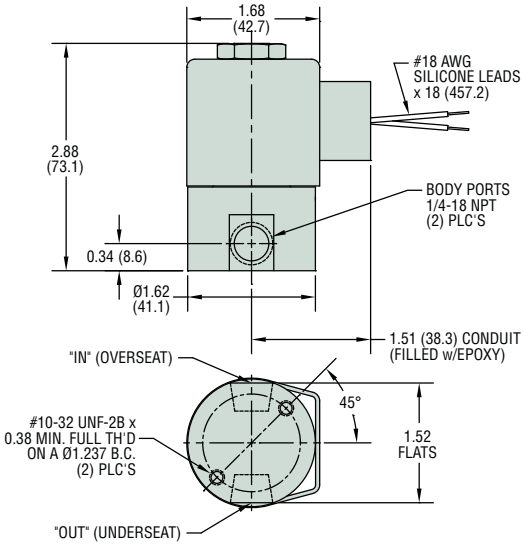
The D-Cryo Series is a 2-way, high flow, miniature Cryogenic valve designed and built for service down to –320°F (-196°C). Depending on your temperature requirements, the D-Cryo Series can be configured for liquid nitrogen (LN2), liquid carbon dioxide (LCO2), and other extreme temperature media. PTFE coated plungers, 316 Stainless Steel guide tubes and plunger springs, encapsulated coils, and PTFE or Rulon® seat seals produce a truly robust Cryogenic valve for applications requiring high cycle life and media temperature control.

Typical Applications

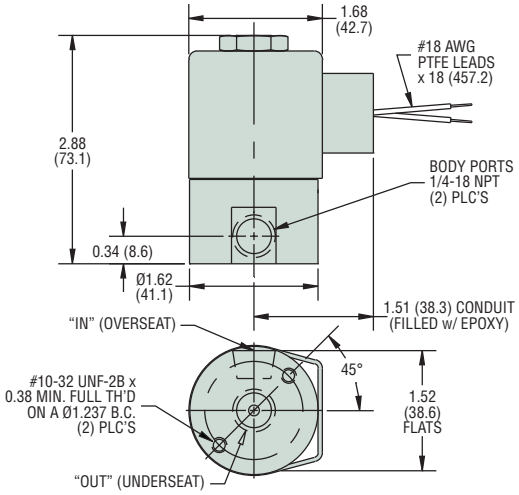
- Environmental Chambers
- Food Processing
- Laser Surgical Equipment
- Semiconductor Manufacturing

Dimensions

LN2–Liquid Nitrogen



LCO2–Liquid Carbon Dioxide



How To Order

Use the **Bold** characters from the choices listed on the following page to construct a product code.

D2062 - LN2 - LT - 12VDC

1	2	3	4	5	6	7	8
Primary Prefix	Model	Body Material*	Plunger Seal Material*	O-Ring Material*	Body Port Configuration	Voltage	Additional Options*

* Blank entry indicates a "Standard" selection
(430F Stainless Steel, Rulon® and Variseal®, in this case).

Example:

D2062-LN2-LT-12VDC

2-Way N.C. Liquid Nitrogen Class-H Encapsulated Coil with lead-wires, conduit filled housing solenoid valve, with 430F stainless steel body, Rulon® plunger seal, Variseal® o-ring, 1/8-28 BSPT female thread, operating at 12 DC with rectified coil.

Part Prefix Table ①

Orifice		MOPD		C_v	K_v	① Primary Prefix		
						Class 180°C (H), Encapsulated Coils		
Body		psig	bar	Body		Lead Wires—Filled Conduit Housing	Lead Wires—Unfilled Conduit Housing	Lead Wires—Grommet Housing
inches	mm							
3/64	1.19	1000*	69	0.040	0.034	**D2061**	**D2021**	**D2011**
1/16	1.59	1000*	69	0.070	0.060	**D2062**	**D2022**	**D2012**
3/32	2.38	640	44	0.165	0.140	**D2063**	**D2023**	**D2013**
1/8	3.18	375	26	0.305	0.259	**D2064**	**D2024**	**D2014**
5/32	3.97	185	13	0.365	0.310	**D2065**	**D2025**	**D2015**
3/16	4.76	130	9	0.470	0.400	**D2066**	**D2026**	**D2016**
1/4	6.35	40	3	0.770	0.655	**D2067**	**D2027**	**D2017**

* For higher pressure, consult factory.

② Model

-LN2 = Liquid Nitrogen model
-LCO2 = Liquid Carbon Dioxide model

③ Body Material

LN2 Only

(blank) = 430F Stainless Steel*

LCO2 Only

(blank) = 430F Stainless Steel*
BB = Brass

④ Plunger Seal Material

LN2 Only

(blank) = Rulon®*

LCO2 Only

(blank) = PTFE*
MQ = Silicone (consult factory)

⑤ O-Ring Material

LN2 Only

(blank) = Variseal® (PTFE material with internal spring)*

LCO2 Only

(blank) = Fluorosilicone*
TO = PTFE

⑥ Body Port Configuration

LN2 Only

(blank) = 1/4-18 NPT female thread*
LC = 1/8-27 NPT female thread
LD = 3/8-18 NPT female thread
LT = 1/8-28 BSPT female thread
LU = 1/4-19 BSPT female thread
BI = Bottom over-seat port, female thread
BO = Bottom under-seat port, female thread

LCO2 Only

(blank) = 1/4-18 NPT, bottom under-seat port, female thread*
LC = 1/8-27 NPT female thread
LD = 3/8-18 NPT female thread (in-line porting only)
LT = 1/8-28 BSPT female thread
LU = 1/4-19 BSPT female thread
IL = Inline porting, 180° apart

⑦ Voltage

LN2 Only

___VDC = DC (specify voltage)
___VAC = AC Rectified (specify voltage)

LCO2 Only

___VDC = DC (specify voltage)
___VAC = AC Rectified (specify voltage)

⑧ Additional Options

LN2 Only

(blank) = Chamfered and PTFE coated plunger*
(blank) = 316 Stainless Steel 1-piece guide assembly*
(blank) = 316 Stainless Steel spring*

LCO2 Only

(blank) = Chamfered and PTFE coated plunger*
(blank) = 316 Stainless Steel 1-piece guide assembly*
(blank) = 316 Stainless Steel spring*

* Standard selection; will be used unless otherwise specified.
Standard selections are not referenced in final part number.

BL Series – Latching Valve

- 2 Way or 3 Way Valves
- Low Power Requirements
- MOPD: 100 PSI (6.9 bar)
- Dual Diode Protection Optional

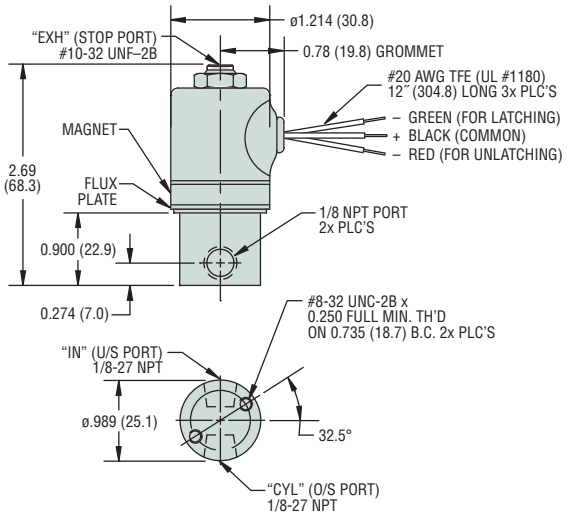
The BL series latching valve allows the user to pulse the valve and have it change state. The voltage does not need to be constantly applied in order to hold it in a state. These valves are ideal for controlling larger pneumatic valves in remote applications where power is limited or when the temperature of the media cannot be impacted as it flows through the valve. The larger pneumatic valves can close and open large pipes and these latching valves control them. The term Latch refers to the valve in the open state where supply pressure goes to the external valve. The unlatched state is when the supply is cut off and the external valve is exhausted to ambient.

Typical Applications

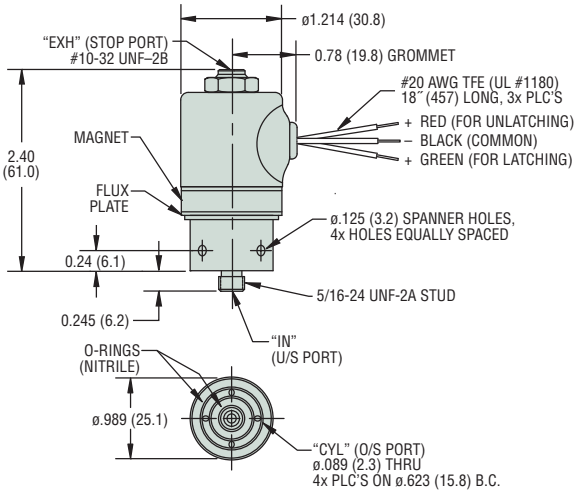
- Natural Gas Plunger Lifts
- Natural Gas Separators
- Gas Chromatography
- Irrigation Systems

Dimensions

Threaded Port Body



Manifold Mount Body



How To Order

Use the **Bold** characters from the choices listed on the following page to construct a product code.

BL3113 - 1 - BB - H - NBO - LC - - C202 - WGR-N

1	2	3	4	5	6	7	8	9
Primary Prefix	Coil Construction	Body Material	Plunger Seal Material	O-Ring Material	Body Port Configuration	Exhaust Port*	Voltage	Wire Color Codes

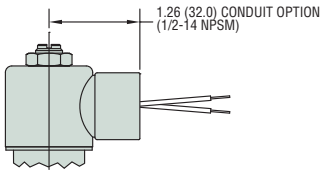
* Blank entry indicates a "Standard" selection (#10-32 female thread, in this case).

Example:

BL3113-1-BB-H-NBO-LC-C202-WGR-N

3-Way Latching valve, 18″ epoxy coil, brass body, Hydrin® seal, Nitrile® o-ring, 1/8″ NPT body port, free vent 6 Vdc coil, White/Common, Green/Latch, Red/Unlatch negative pulse leads.

Alternate 1/2″ Conduit Housing
Available on all body configurations



SOLENOID VALVES

Part Prefix Table ①

	Orifice				MOPD		C_v		K_v		① Primary Prefix	
	Body		Stop		psi	bar	Body	Stop	Body	Stop	Grommet Housing	Unfilled Conduit Housing
	inches	mm	inches	mm								
3-WAY	1/32	0.79	3/64	1.19	100	6.9	0.018	0.040	0.0153	0.034	**BL3111**	**BL3121**
	1/16	1.59	1/16	1.59	50	3.4	0.070	0.070	0.060	0.060	**BL3113**	**BL3123**
2-WAY	1/16	1.59	—	—	240	16.5	0.065	—	0.056	—	**BL2011**	**BL2021**
	5/64	1.98	—	—	180	12.4	0.09	—	0.078	—	**BL2012**	**BL2022**
	3/32	2.38	—	—	150	10	0.155	—	0.134	—	**BL2013**	**BL2023**
	7/64	2.78	—	—	120	8.3	0.2	—	0.173	—	**BL2014**	**BL2024**
	1/8	3.18	—	—	90	6.2	0.24	—	0.208	—	**BL2015**	**BL2025**
	5/32	3.97	—	—	60	4.1	0.3	—	0.259	—	**BL2016**	**BL2026**
	3/16	4.76	—	—	30	2.1	0.43	—	0.372	—	**BL2017**	**BL2027**

② Coil Construction
- **1** = Encapsulated Coil, Class-B (130°C), Lead Wires 18˝ Long, #20 AWG
- **2** = Encapsulated Coil, Class-F (155°C), Lead Wires 18˝ Long, #20 AWG

③ Body Material
- **BB** = Brass
- **SB1** = 303 Stainless Steel
- **SB5** = 316 Stainless Steel

④ Plunger Seal Material
- **H** = Hydrin®
- **V** = Viton®
- **PF** = Perfluoroelastomer

⑤ O-Ring Material
- **NBO** = Nitrile®
- **VO** = Viton®
- **PFO** = Perfluoroelastomer

⑥ Body Port Configuration
- **LC** = 1/8˝ NPT female ports
- **LD** = 1/4˝ NPT female ports
- **MM3** = Manifold-Mount (5/16˝ thread stud)

⑦ Exhaust Port
- **(blank)** = #10-32 female thread*
- **AB** = 1/8˝ Brass Barb Fitting
- **AD** = 1/8˝ NPT Brass Adapter

⑧ Voltage
- **C202** = 6 VDC, 7 Watts Latching, 5 Watts Unlatching
- **C203** = 12 VDC, 9 Watts Latching, 7 Watts Unlatching
- **C204** = 24 VDC, 9 Watts Latching, 7 Watts Unlatching
- **C202D** = 6 VDC, 7 Watts Latching, 5 Watts Unlatching with internal diodes
- **C203D** = 12 VDC, 9 Watts Latching, 7 Watts Unlatching with internal diodes
- **C204D** = 24 VDC, 9 Watts Latching, 7 Watts Unlatching with internal diodes

⑨ Wire Color Codes
- **WGR-N** = White common (+), Green latch (-), Red Unlatch (-)
- **BRG-P** = Black common (-), Red latch (+), Green Unlatch (+)
- **BGR-N** = Black common (+), Green latch (-), Red Unlatch (-)

* Standard selection; will be used unless otherwise specified. Standard selections are not referenced in final part number.

Humidifier Solenoid Valves

- MOPD: 125 PSI (8.6 bar)
- 2.3 Watts

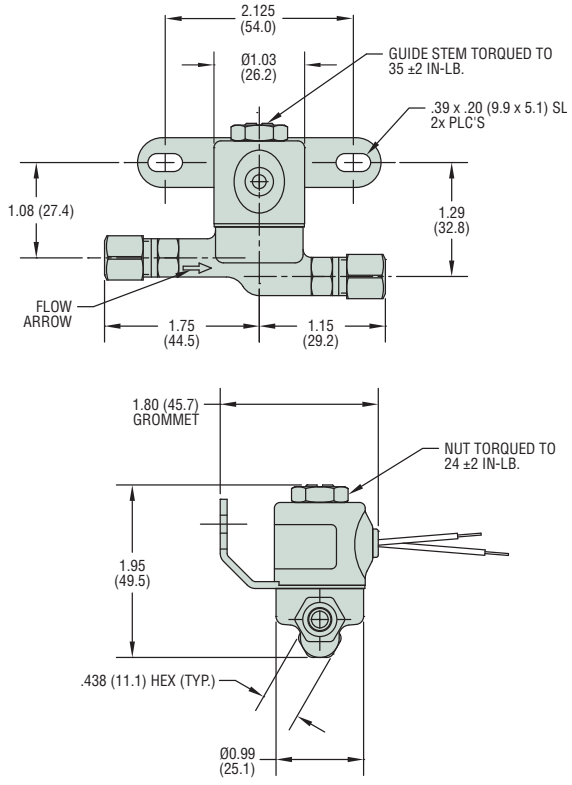
Originally designed and manufactured for original equipment manufacturers (OEM's), the humidifier solenoid valve is now available as a replacement solenoid valve for in-home and commercial humidifiers. Available in two orifice sizes, the humidifier solenoid has a brass body and is constructed with an in-line strainer for added protection to humidifier water lines.

Typical Application

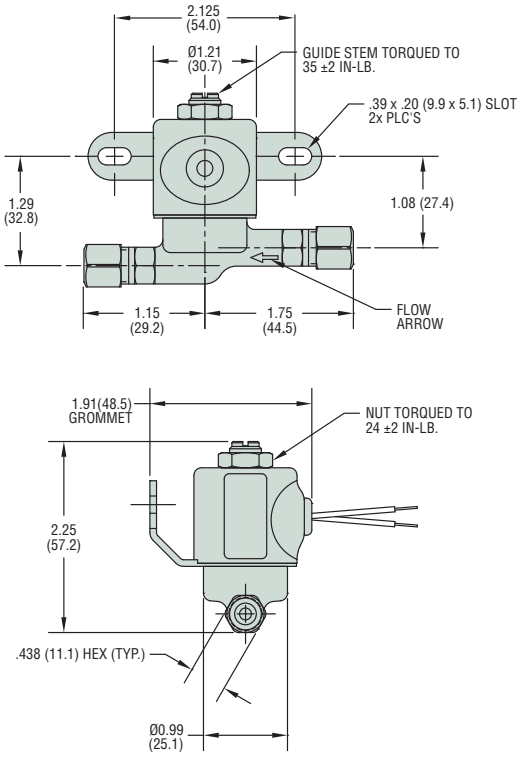
• Replacement solenoid valve for commercial and in-home humidifiers

Dimensions

24V, 60Hz AC



120V, 60Hz, AC



How To Order

Orifice		Voltage (VAC)	MOPD		Part Number
inch	mm		psi	bar	
3/64	1.19	24/60	125	8.6	**A2012-S150**
3/32	2.38	120/60	125	8.6	**B2015-S135**

SOLENOID VALVES

Manifold Assemblies

Gems Valve Engineers specialize in working with OEMs to design and manufacture integrated valve and manifold assemblies to meet most any fluidic system requirements. Our expert team of field and in-house engineers can deliver AutoCAD® or SolidWorks drawings in days for easy integration into OEM equipment. Whether it is a single or multiple position manifold–made from plastic, aluminum, brass or stainless steel–final systems are delivered completely assembled, tested, and ready for installation into your equipment.

Gems Manifold Assemblies offer features you require, in a compact package, at a competitive price. Integrated manifold assemblies provide:

- Simplified fluidic systems
- Decreased number of potential leak paths
- Reduction in the amount of mounting hardware
- Reduced quantity of fittings and tubing via common passages
- Compact package
- Design opportunity for multiple valve configurations to handle complex and precise flow control
- Reduced labor content required by OEMs
- Easy valve maintenance or replacement

All Gems valve families can be integrated into a manifold system. Contact your Gems Valve Engineer for a manifold assembly that will fulfill all of your application requirements. Contact us at 800-378-1600 or info@gemssensors.com.

Fluidic Systems

Purchasing a complete fluidic system through Gems eliminates the time and effort of multiple purchase orders and reduces receiving, inspection, and coordination of different parts down to a single assembly. Plus, buying from a single source gives OEMs one contact point for design changes, expediting, and warranty questions.

Gems valve engineers and manufacturing have a 50-year history of working with OEMs to develop, design, and manufacture their complex fluidic systems; from simple wiring harnesses and connectors to plug and play sub-assemblies and additional integrated fluidic components.

Designing and purchasing a complete turnkey fluidic system from Gems Sensors & Controls has many advantages.

- Receiving a complete 100% tested system that can be installed directly into your end product
- Reducing the number of suppliers required
- Decreasing the assembly of numerous third-party parts
- Minimizing the number of potential leak-points by eliminating tubing and fittings
- Reducing multiple components into a smaller and simplified final system

Our team of experts can integrate:

- Multiple valve types, including 3rd party manufacturers, into one assembly
- Numerous tube and pipe fittings
- Various electrical terminations
- Sensors/Switches/Gauges:
  - Pressure switch, transducer or gauge
  - Fluid flow sensor
  - Fluid level sensor
  - Temperature switch or transducer
- Inline media filters
- Heaters and thermistors

Contact your Gems Valve Engineer for a fluidic system that will fulfill all of your application requirements. Contact us at 800-378-1600 or info@gemssensors.com.

Gems Sensors & Controls

Send your ADS directly to a Gems Engineer!
Fax#: 860-747-4244 • This form may also be completed online at gemssensors.com for RFQ.

One Cowles Road
Plainville, CT 06062
Toll Free: 800.378.1600

Name Title Email

Company Phone Fax

Address Address 2

City State Zip Date / /

Please describe your application:

❑ Liquid ❑ Pneumatic ❑ Vacuum Service ❑ Oxygen Service ❑ Liquid CO2 Cryogenic ❑ Liquid N2 Cryogenic

Immediate quantity required _____ Estimated annual quantity _____

Valve Configuration or Function

DE-ENERGIZED STATE
- ❑ 2-Way Normally Closed
- ❑ 2-Way Normally Open
- ❑ 2-Way Normally Closed (Diaphragm)
- ❑ 2-Way Normally Closed Dual Purpose
- ❑ 3-Way Normally Closed Free Vent
- ❑ 3-Way Normally Closed Line Connect
- ❑ 3-Way Normally Open
- ❑ 3-Way Multi-Purpose
- ❑ 3-Way Directional Control

IMPERIAL MEASUREMENT FLOW REQUIREMENTS

C_V: Body_____, Stop_____ Orifice Diameter: Body_____, Stop_____

Flow at the Body Orifice_____ (GPM0 or SCFM) with a_____ psig at the Inlet, and_____ psig at the outlet

Flow at the Stop Orifice_____ (GPM0 or SCFM) with a_____ psig at the Inlet, and_____ psig at the outlet

PRESSURE
- Operating Pressure_____psig
- Max. Pressure_____psig
- Min. Pressure_____psig
- Max. Back Pressure_____psig

TEMPERATURE
- Media Temp._____°F
- Max. Media Temp._____°F
- Min. Media Temp._____°F
- Ambient Temp._____°F
- Max. Ambient Temp_____°F
- Min Ambient Temp._____°F

METRIC MEASUREMENT FLOW REQUIREMENTS

K_V: Body_____, Stop_____ Orifice Diameter: Body_____, Stop_____

Flow at the Body Orifice_____ (m^3/h) with a_____ bar at the Inlet, and_____ bar at the outlet

Flow at the Stop Orifice_____ (m^3/h) with a_____ bar at the Inlet, and_____ bar at the outlet

PRESSURE
- Operating Pressure_____bar
- Max. Pressure_____bar
- Min. Pressure_____bar
- Max. Back Pressure_____bar

TEMPERATURE
- Media Temp._____°C
- Max. Media Temp._____°C
- Min. Media Temp._____°C
- Ambient Temp._____°C
- Max. Ambient Temp_____°C
- Min Ambient Temp._____°C

MEDIA(S)_____

BODY MATERIAL
- ❑ Brass
- ❑ Stainless Steel
- ❑ Aluminum
- ❑ Polypropylene
- ❑ Other_____

PLUNGER SEAL MATERIAL
- ❑ Nitrile
- ❑ Viton®
- ❑ Ethylene Propylene
- ❑ Neoprene
- ❑ Silicone
- ❑ Perfluoroelastomer
- ❑ Other_____

O-RING MATERIAL
- ❑ Nitrile
- ❑ Viton®
- ❑ Ethylene Propylene
- ❑ Neoprene
- ❑ Silicone
- ❑ Perfluoroelastomer
- ❑ Other_____

ELECTRICAL REQUIREMENTS

❑ AC ❑ DC
Max. Voltage_____
Min. Voltage_____

Operating Voltage_____, (_____Hz)
❑ Continuous Duty
❑ Intermittent Duty

Max. Time ON_____
Min. Time OFF_____

Max. Wattage_____
Max. Cycle Rate_____
Life Cycle Expectancy_____

COIL REQUIREMENTS

❑ Class B
❑ Class F
❑ Class H
❑ Tape Wound
❑ Encapsulated
❑ Molded

❑ Lead Wire (Specify Length If required) _____)
❑ 3/16" Spades
❑ 1/4" Spades
❑ 0.110" Spades
❑ 18 mm DIN
❑ 11 mm DIN
❑ 9.4 mm DIN

❑ Rectified
❑ Arc Suppression Diode
❑ Special Connectors
(Please Specify)_____
_____
_____
_____

HOUSE STYLE

❑ Grommet
❑ Conduit, 1/2-14 NPS
❑ Grommet with Bracket
❑ Conduit with Bracket
❑ Other_____

BODY CONFIGURATION

	Body Port	Stop Port (If Different)	Body Port Orientation	Female Bottom Port	Male Bottom Porting
❑ Single Valve Body	❑ 1/8" NPT	❑ 1/8" NPT	❑ 180°	❑ Specify Port Size_____	❑ 1/8" NPT (Brass)
❑ Manifold Mount	❑ 1/4" NPT	❑ 1/4" NPT	❑ 1/4" NPT	❑ 90° Right	❑ Pressure Over-Seat
❑ Operator Only (No Body)	❑ 3/8" NPT		❑ 3/8" NPT	❑ 90° Left	❑ Pressure Under Seat
❑ Metering	❑ #10-32	❑ #10-32			
	❑ 1/8" BSPT	❑ 1/8" BSPT			
	❑ M5 x 0.8	❑ M5 x 0.8			

What will be the Valves Environment?

Will the valve be exposed to moisture? ❑ Yes ❑ No Will the valve be exposed to external contamination? ❑ Yes ❑ No

Will the valve be in close proximity to a heat-generating source (e.g. Transformer, pump, motor)? ❑ Yes ❑ No

Will the valve be subject to vibration or shock? ❑ No ❑ Yes If yes: Vibration_____CPS at_____Gs, Shock_____GS duration for_____ms.

NOTES