

## 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](mailto:info@gemssensors.com).

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### Get Help Quick

An application data sheet (ADS), located on page J-32, 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](http://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.



## 4 Steps to Valve Selection

The steps described in this section will help you identify the performance criteria needed to meet your application requirements and select the right valve.

### Step 1 – Calculating $C_v$

Begin by calculating the valve flow coefficient ( $C_v$ ) using: operating pressure differential; flow rate for your application; Specific Gravity; and in some circumstances, temperature. If you already know your  $C_v$  please go directly to Step 2.

$C_v$  combines the effects of all flow restrictions in the valve into a single number.  $C_v$  represents the quantity of water, at 68°F and in gallons per minute (GPM) that will flow through your valve with a 1 psi pressure differential.  $C_v$  can also be calculated for gases.

Specific Gravity (SG) for liquid is the ratio of the density, or specific weight of the liquid, relative to that of water. Similarly, the SG for gas is the ratio of the density, or specific weight of the gas, relative to that of air. The SG of your media is important in calculating  $C_v$  because it directly correlates to the flow rate through your valve.

### Liquid Flow

Because liquids are incompressible, their flow rate depends only on the difference between the inlet and outlet pressures ( $P_1 - P_2$  or  $\Delta P$ , pressure differential. Figure 1).

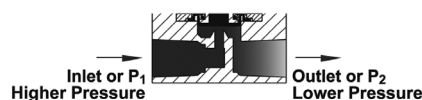
The  $C_v$  of any valve flowing liquid media can be determined with the equation shown to the right.

**Example:** Using Water at 68°F:

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

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

**Fig. 1: Press Differential**



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

### Gas Flow

Since gases are compressible fluids there are two separate equations for high and low-pressure differential flow.

**Example:** Using Air:

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

Since this is high-pressure differential flow ( $14.7 \leq 34.7 / 2$ ), we use the following equation:

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

### Temperature and $C_v$

Temperature is not included in the  $C_v$  calculation for non-compressible fluids (liquids) and is only used in determining SG. Conversely, because gases are compressible, temperature (T) has a greater effect on volume and therefore is included as a separate variable in gas  $C_v$  calculations. flow rate through your valve.

#### Liquid Flow Formula

$$C_v = \frac{V}{\sqrt{\frac{\Delta P}{SG}}}$$

**Where:**

**CV** = Valve flow coefficient  
**V** = Flow rate in GPM  
 **$\Delta P$**  = Pressure differential (PSID)  
**SG** = Specific Gravity

#### Gas Flow $C_v$ Formula

- Low-pressure differential flow is when  $P_2 > \frac{P_1}{2}$  and the following equation is used:

$$C_v = \frac{V}{16.05 \sqrt{\frac{(P_1^2 - P_2^2)}{(SG) T}}}$$

- High-pressure differential flow is when  $P_2 \leq \frac{P_1}{2}$  and the following equation is used:

$$C_v = \frac{V}{13.61 P_1 \sqrt{\frac{1}{(SG) T}}}$$

**Where:**

**CV** = Valve flow coefficient  
**V** = Flow rate in SCFM  
**P1** = Inlet pressure in PSIA  
**P2** = Outlet pressure in PSIA  
**SG** = Specific Gravity  
**T** = Temperature of gas in Degree Rankine

16.05 and 13.61 are constants used in gas flow equations

For help calculating your  $C_v$ , please contact a Gems valve engineer at 800-378-1600 or info@gemssensors.com.

## Step 2 – Valve Function

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

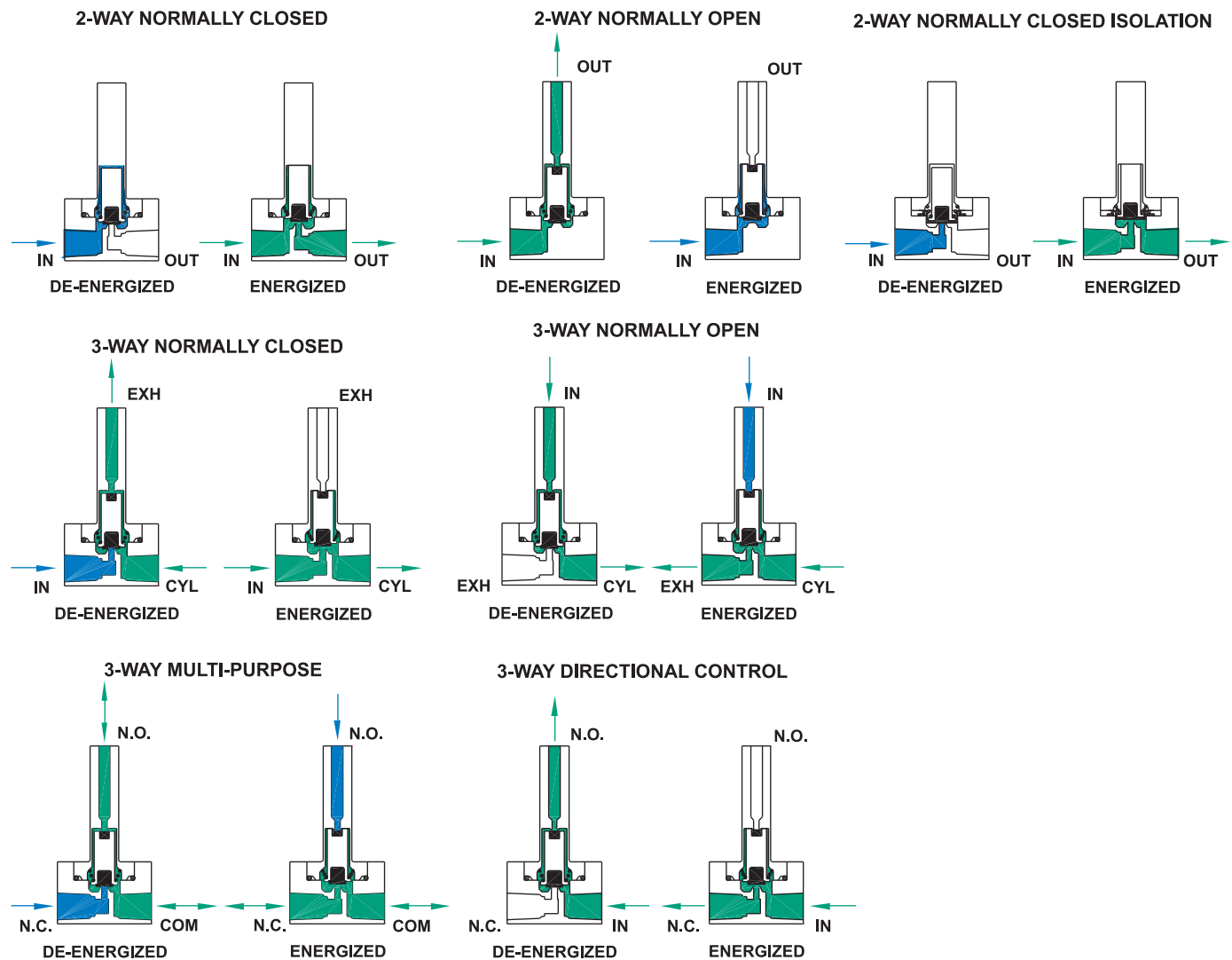
### An important note regarding $C_v$ and valve function:

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](mailto: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 maximum operating pressure differential (MOPD), the  $C_v$ , function, and additional specifications needed for your application to select possible 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	
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
Power (watt)	0.65, 2		0.5, 1, 2	6	7		10
MOPD (psi)	175	250	100	1000	400		900
Valve Series	E, EH	G, GH	M	A	B	C	D
Pages	J-7, J-8	J-9, J-10	J-5, J-6	J-11, J-12	J-13, J-14	J-15, J-16	J-17, J-18

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		Miniature	
$C_v$ Range	0.020 - 0.300			0.045 - 0.440	0.040 - 0.770	0.018 - 0.43	
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	
Power (watt)	4.5, 7			9	15	5 - 9	
MOPD (psi)	50 (Plastic Body), 150			900	1000*	100	
Valve Series	AS		BS	B-Cryo	D-Cryo	BL	
Pages	J-19, J-20		J-21, J-22	J-23, J-24	J-25, J-26	J-27, J-28	

\*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, quick connect spade, grommet, conduit, yoke, etc.)
- Port configuration
- Manifold assembly
- Voltage

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.

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.

# M Series – Subminiature

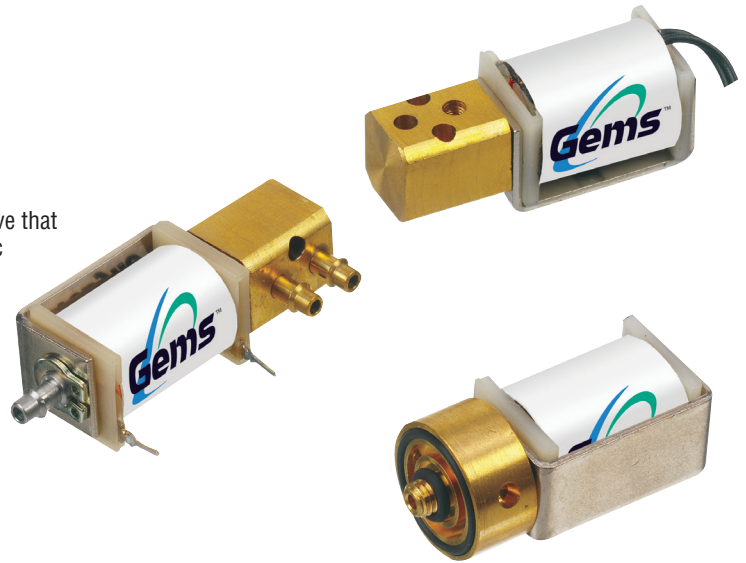
- ▶ MOPD: 100 PSI
- ▶ C<sub>v</sub> Range: 0.018 to 0.070
- ▶ As Low As 0.5 Watts

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

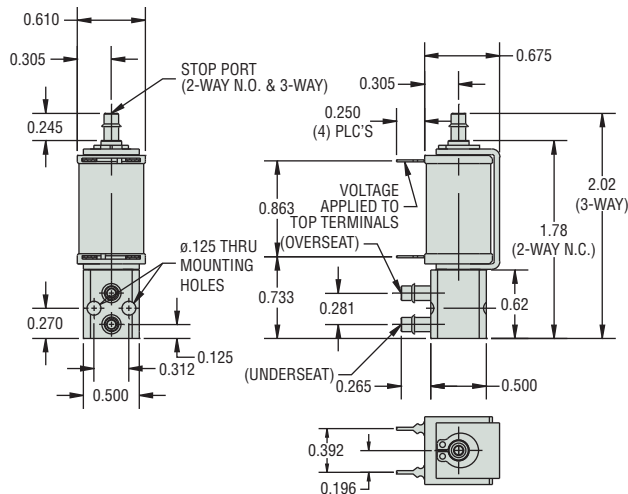
Ideal for inline PC interfacing and manifold assemblies:

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

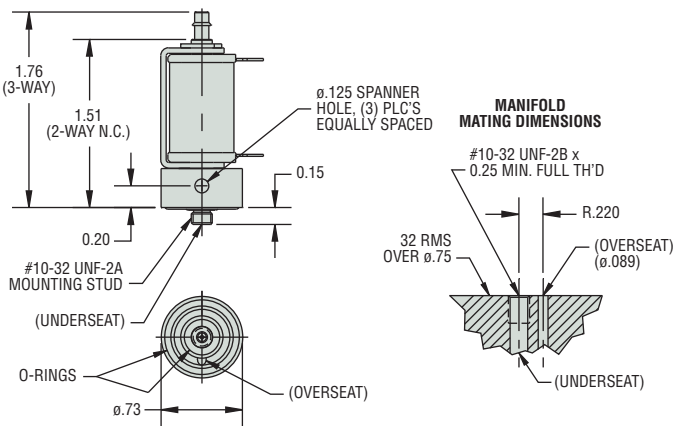


## Dimensions

### Threaded Port Body

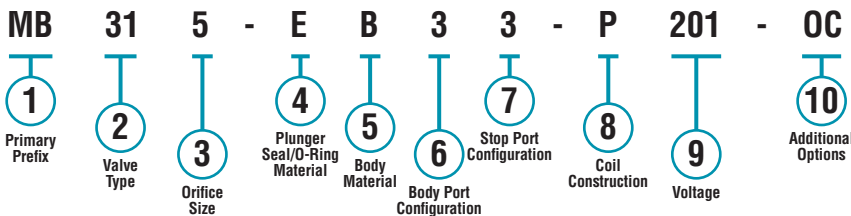


### Manifold Mount Body



## How To Order

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



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" orifice, EPDM plunger seal/o-ring, brass body, 1/8" barb mount 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 (psig)	C <sub>v</sub>	① Primary Prefix
			Body	
0.5 Watt	0.031	25	0.020	MA
	0.052	10	0.038	MA
1 Watt	0.031	50	0.020	MB
	0.052	25	0.038	MB
2 Watts	0.031	100	0.020	MC
	0.052	50	0.038	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"
- 5 = 0.052"

④ Plunger Seal / O-Ring Material

- V = Viton®
- N = Nitrile
- E = EPDM

⑤ Body Material

- B = Brass
- A = Aluminum

⑥ Body Port Configuration<sup>1</sup>

- 0 = Face mount
- 1 = 1/16" barb
- 2 = 5/64" or 3/32" barb
- 3 = 1/8" barb
- 4 = Manifold mount, #10-32 UNF-2A stud<sup>†</sup>
- 5 = #10-32 UNF-2B female thread (180° apart only)
- 6 = 1/8"-27 NPT ports (180° apart only)

⑦ Stop Port Configuration<sup>1</sup>

- 0 = No barb (Standard for 2-way NC & 3-way free vent)<sup>2,3</sup>
- 1 = 1/16" barb (.031" orifice only)
- 2 = 5/64" or 3/32" barb
- 3 = 1/8" barb

⑧ Coil Construction (Tape-Wrapped, 130°C Class B)

- U = P.C. board solderable (2-pin)
- P = P.C. board mount (4-pin)<sup>4</sup>
- Q = Quick connect 0.110 spade
- L = Lead-wires, #26 AWG, 18" 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)

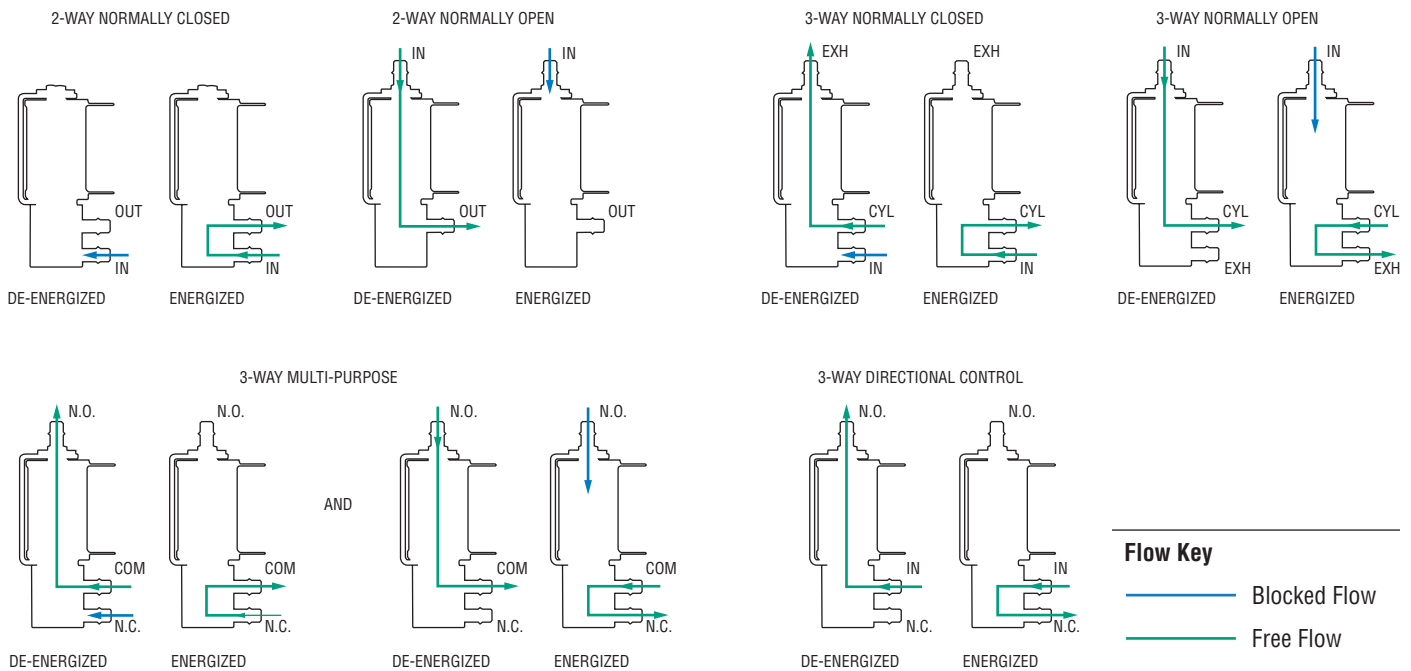
Notes

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.

<sup>†</sup> Teflon® o-ring not suitable for manifold mount.

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Flow Schematic



## E & EH Series – Subminiature Gas

- ▶ MOPD: 175 PSI
- ▶  $C_v$  Range: 0.018 to 0.070
- ▶ 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.

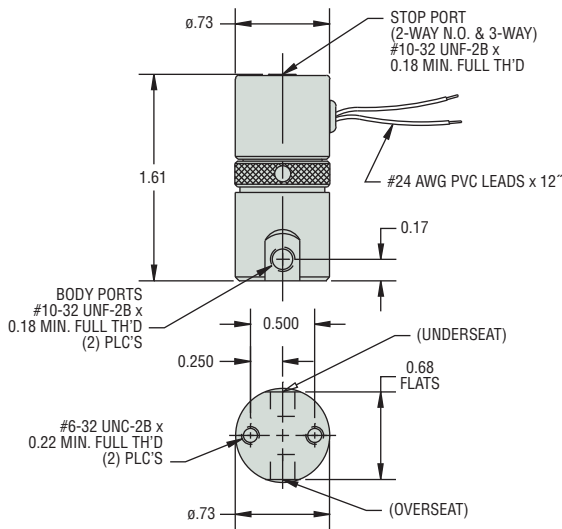
### Typical Applications

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

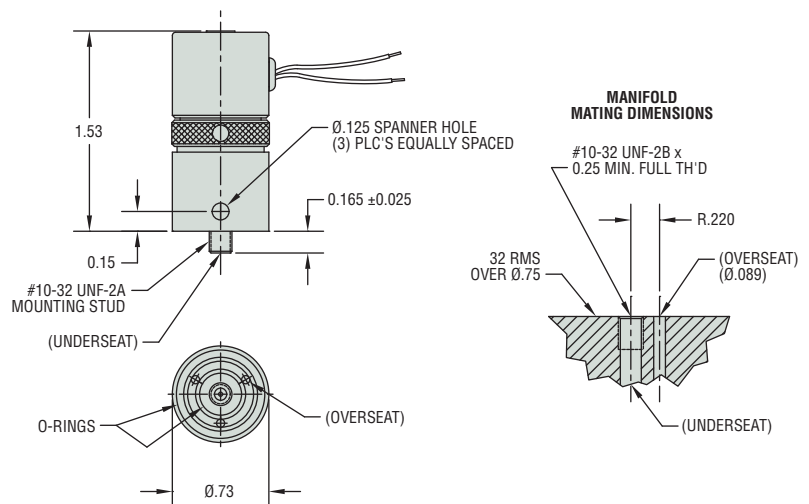


### Dimensions

#### Threaded Port Body

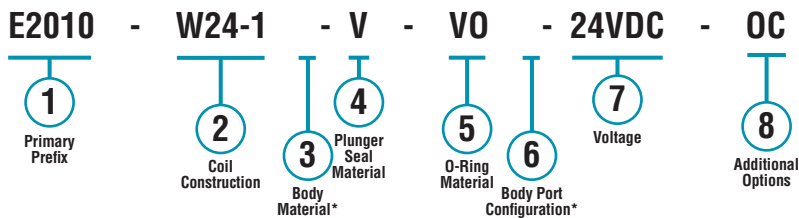


#### Manifold Mount Body



### How To Order

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



\* 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" 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 (psig)	C <sub>v</sub>		① Primary Prefix
		Body	Stop		Body	Stop	
2-WAY N.C.	0.65W	1/32	—	125	0.018	—	E2010
		3/64	—	70	0.023	—	E2011
		1/16	—	40	0.036	—	E2012
		5/64	—	20	0.070	—	E2013
	2W	1/32	—	175	0.018	—	EH2010
		3/64	—	150	0.023	—	EH2011
		1/16	—	100	0.036	—	EH2012
		5/64	—	50	0.070	—	EH2013
2-WAY N.O.	0.65W	—	1/32	125	—	0.018	E2210
		—	3/64	70	—	0.023	E2211
		—	1/16	40	—	0.032	E2212
	2W	—	1/32	175	—	0.018	EH2210
		—	3/64	150	—	0.023	EH2211
		—	1/16	100	—	0.032	EH2212
3-WAY N.C. Line Connection	0.65W	1/32	1/32	125	0.018	0.018	E3110
		3/64	3/64	70	0.023	0.023	E3111
		1/16	1/16	40	0.036	0.032	E3112
	2W	1/32	1/32	175	0.018	0.018	EH3110
		3/64	3/64	150	0.023	0.023	EH3111
		1/16	1/16	100	0.036	0.032	EH3112
3-WAY N.O.	0.65W	1/32	1/32	125	0.018	0.018	E3210
		3/64	3/64	70	0.023	0.023	E3211
		1/16	1/16	40	0.036	0.032	E3212
	2W	1/32	1/32	175	0.018	0.018	EH3210
		3/64	3/64	150	0.023	0.023	EH3211
		1/16	1/16	100	0.036	0.032	EH3212
3-WAY Multi Purpose	0.65W	1/32	1/32	80	0.018	0.018	E3310
		3/64	3/64	40	0.023	0.023	E3311
		1/16	1/16	20	0.036	0.032	E3312
	2W	1/32	1/32	150	0.018	0.018	EH3310
		3/64	3/64	100	0.023	0.023	EH3311
		1/16	1/16	50	0.036	0.032	EH3312
3-WAY Directional Control	0.65W	1/32	1/32	135	0.018	0.018	E3410
		3/64	3/64	80	0.023	0.023	E3411
		1/16	1/16	45	0.036	0.032	E3412
	2W	1/32	1/32	190	0.018	0.018	EH3410
		3/64	3/64	165	0.023	0.023	EH3411
		1/16	1/16	80	0.036	0.032	EH3412

② Coil Construction

(blank) = Tape-wrapped, Class-B, with lead-wires (12" long)\*  
 W\_\_ = Lead-wires, non-standard length (specify in inches)  
 1 = Encapsulated coil  
 5 = Encapsulated coil with 0.110 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")

⑦ Voltage

\_\_VDC = DC (specify voltage)  
 \_\_VAC = AC rectified 2-watt only (specify voltage)

⑧ Additional Options

OC = Cleaned for oxygen use  
 QQ = Quiet operation (2-way N.C.)  
 VAC = Vacuum application (0 to 29.5" Hg)

\* 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.

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## G & GH Series – Subminiature

- ▶ MOPD: 250 PSI
- ▶  $C_v$  Range: 0.018 to 0.070
- ▶ 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 materials 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:

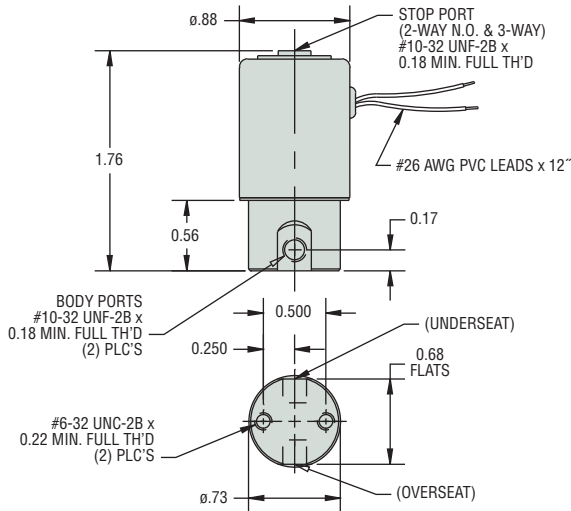
- Hospital Equipment
- Laboratory Equipment
- Air Sampling Systems

Acetal Bodies:

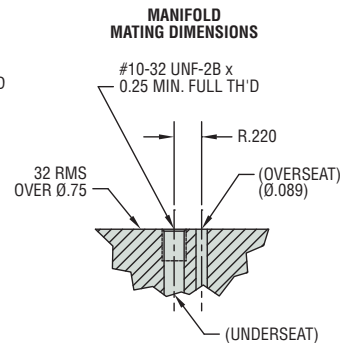
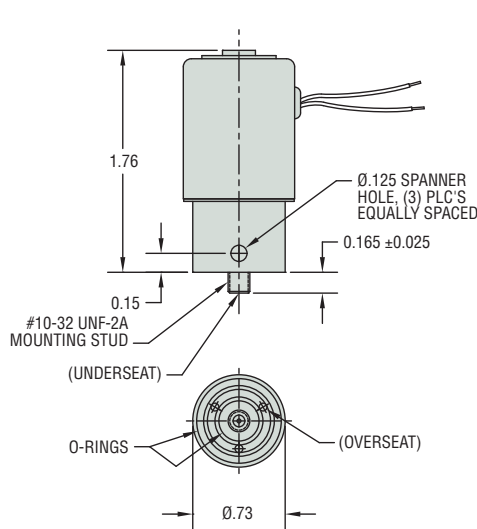
- Water Purification Systems
- Analytical Equipment

### Dimensions

#### Threaded Port Body

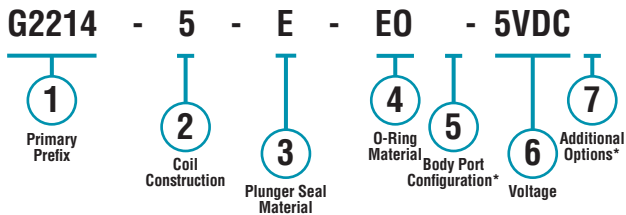


#### Manifold Mount Body



### How To Order

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



\* 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 lead-wires (12" long), encapsulated coil with 0.110 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 (psig)	C <sub>v</sub>		① Primary Prefix
		Body	Stop		Body	Stop	303 Stainless Steel <sup>1</sup>
2-WAY N.C.	0.65W	0.030	—	125	0.018	—	G2012
		0.040	—	70	0.023	—	G2013
		0.055	—	40	0.038	—	G2014
		0.078	—	20	0.063	—	G2015
	2W	0.030	—	250	0.018	—	GH2012
		0.040	—	175	0.023	—	GH2013
		0.055	—	100	0.038	—	GH2014
		0.078	—	50	0.063	—	GH2015
2-WAY N.O.	0.65W	—	0.030	125	—	0.018	G2212
		—	0.040	70	—	0.023	G2213
		—	0.055	40	—	0.038	G2214
		—	0.078	20	—	0.057	G2215
	2W	—	0.030	200	—	0.018	GH2212
		—	0.040	150	—	0.023	GH2213
		—	0.055	100	—	0.038	GH2214
		—	0.078	50	—	0.057	GH2215
3-WAY N.C.	0.65W	0.030	0.030	125	0.018	0.018	G3112
		0.040	0.040	70	0.023	0.023	G3113
		0.055	0.055	40	0.038	0.038	G3114
		0.078	0.078	20	0.063	0.057	G3115
	2W	0.032	0.030	200	0.018	0.018	GH3112
		0.040	0.040	150	0.023	0.023	GH3113
		0.055	0.055	100	0.038	0.038	GH3114
		0.078	0.078	50	0.063	0.057	GH3115
3-WAY N.O.	0.65W	0.030	0.030	125	0.018	0.018	G3212
		0.040	0.040	70	0.023	0.023	G3213
		0.055	0.055	40	0.038	0.038	G3214
		0.078	0.078	20	0.057	0.057	G3215
	2W	0.030	0.030	175	0.018	0.018	GH3212
		0.040	0.040	150	0.023	0.023	GH3213
		0.055	0.055	80	0.038	0.038	GH3214
		0.078	0.078	40	0.057	0.057	GH3215
3-WAY Multi Purpose	0.65W	0.030	0.030	80	0.018	0.018	G3312
		0.040	0.040	40	0.023	0.023	G3313
		0.055	0.055	20	0.036	0.029	G3314
		0.078	0.078	10	0.063	0.053	G3315
	2W	0.030	0.030	110	0.018	0.018	GH3312
		0.040	0.040	85	0.023	0.023	GH3313
		0.055	0.055	50	0.036	0.029	GH3314
		0.078	0.078	25	0.063	0.057	GH3315
3-WAY Directional Control	0.65W	0.030	0.030	135	0.018	0.018	G3412
		0.040	0.040	80	0.023	0.023	G3413
		0.055	0.055	45	0.029	0.029	G3414
		0.078	0.078	20	0.063	0.055	G3415
	2W	0.030	0.030	190	0.018	0.018	GH3412
		0.040	0.040	165	0.023	0.020	GH3413
		0.055	0.055	80	0.038	0.038	GH3414
		0.078	0.078	40	0.063	0.063	GH3415

② Coil Construction

(blank) = Tape-wrapped, Class-B, with lead-wires (12" long)\*  
 W\_\_ = Lead-wires, non-standard length (specify in inches)  
 1 = Encapsulated coil  
 5 = Encapsulated coil with 0.110 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)

\* 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.

## A Series

- ▶ MOPD: 1000 PSI
- ▶  $C_v$  Range: 0.019 to 0.3
- ▶ 6 Watts

The A Series gives you a highly adaptable design for practically all applications requiring flow between  $C_v$  0.019 and 0.300. 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

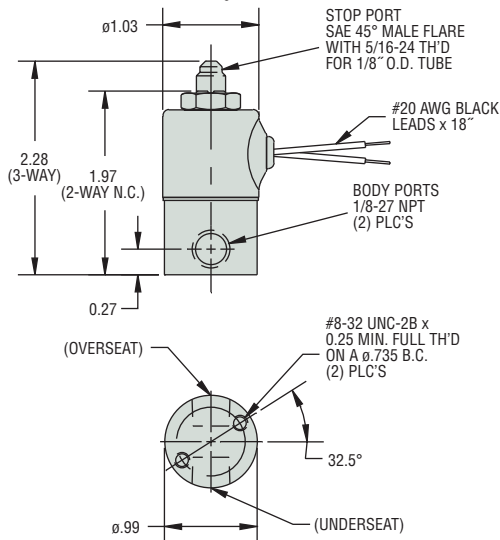
Brass Bodies:

- Industrial Applications
- Automotive
- Water Transfer Systems

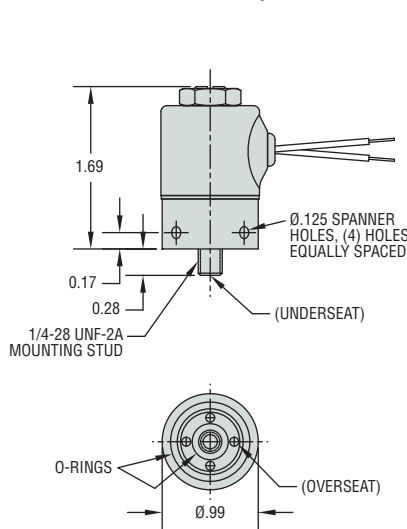


### Dimensions

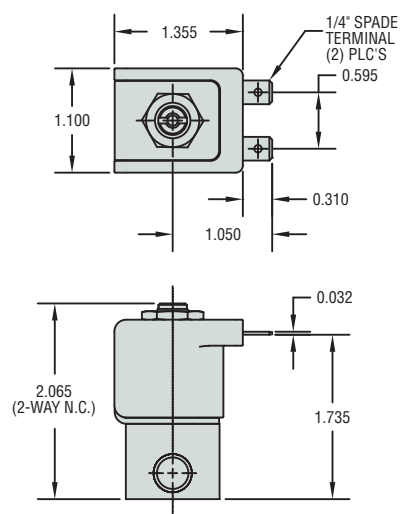
#### Threaded Port Body



#### Manifold Mount Body



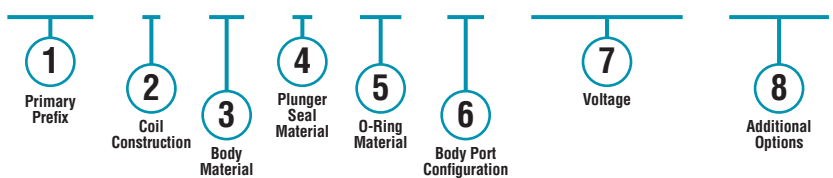
#### Molded Coil



### 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**



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

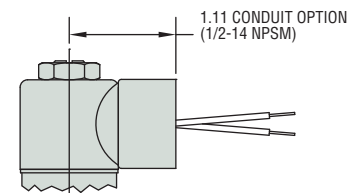
#### Example:

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.

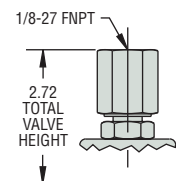
### Alternate 1/2" Conduit Housing

Available on all body configurations



### Stop Port

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



Part Prefix Table ①

	Orifice		MOPD (psig)	C <sub>v</sub>		① Primary Prefix	
	Body	Stop		Body	Stop	Grommet Housing	Conduit Housing
2-WAY N.C.	1/32	—	1000	0.020	—	A2011	A2021
	3/64	—	500	0.035	—	A2012	A2022
	1/16	—	300	0.065	—	A2013	A2023
	5/64	—	200	0.090	—	A2014	A2024
	3/32	—	175	0.155	—	A2015	A2025
	1/8	—	100	0.240	—	A2016	A2026
	5/32	—	50	0.300	—	A2017	A2027
2-WAY N.O. (option AD standard)	—	1/32	200	—	0.019	A2211	A2221
	—	3/64	150	—	0.040	A2212	A2222
	—	1/16	100	—	0.075	A2213	A2223
3-WAY N.C. Free Vent	1/32	1/32	200	0.019	0.019	A3011	A3021
	3/64	3/64	150	0.040	0.040	A3012	A3022
	1/16	3/64	100	0.070	0.040	A3013	A3023
	1/16	1/16	75	0.070	0.070	A3014	A3024
	3/32	3/64	50	0.170	0.040	A3015	A3025
3-WAY N.C. Line Connection	1/32	1/32	200	0.019	0.019	A3111	A3121
	3/64	3/64	150	0.040	0.040	A3112	A3122
	1/16	3/64	100	0.070	0.040	A3113	A3123
	1/16	1/16	75	0.070	0.070	A3114	A3124
	3/32	3/64	50	0.170	0.040	A3115	A3125
3-WAY N.O.	1/32	1/32	150	0.019	0.019	A3211	A3221
	3/64	3/64	100	0.040	0.040	A3212	A3222
	1/16	3/64	90	0.070	0.040	A3213	A3223
	1/16	1/16	75	0.070	0.070	A3214	A3224
	3/32	3/64	50	0.170	0.040	A3215	A3225
3-WAY Multi Purpose	1/32	1/32	125	0.019	0.019	A3311	A3321
	3/64	3/64	100	0.040	0.040	A3312	A3322
	1/16	3/64	90	0.070	0.040	A3313	A3323
	1/16	1/16	75	0.070	0.070	A3314	A3324
	3/32	3/64	25	0.170	0.040	A3315	A3325
3-WAY Directional Control	1/32	1/32	225	0.019	0.019	A3411	A3421
	3/64	3/64	150	0.040	0.040	A3412	A3422
	1/16	3/64	100	0.070	0.040	A3413	A3423
	1/16	1/16	75	0.070	0.070	A3414	A3424
	3/32	3/64	50	0.155	0.040	A3415	A3425

② Coil Construction

- (blank) = Tape-wrapped, Class-B, with 18" lead wires\*
- W \_\_\_ = Tape-wrapped coil, lead-wires, non-standard length (specify length)
- 1M = Over molded coil, Class-B, lead-wires
- 2M = Over molded coil, Class-F, lead-wires
- 3M = Over molded coil, Class-H, lead-wires
- 4M = Over molded coil, Class-B, 1/4" spade terminals
- 5M = Over molded coil, Class F, 1/4" spade terminals
- 6M = Over molded coil Class H, 1/4" spade terminals
- 4 = Encapsulated coil, Class-B, 3/16" spade terminals
- 5 = Encapsulated coil, Class-B, 0.110" spade terminals
- 8 = Encapsulated coil, Class F, 3/16" spade terminals
- 10 = Externally rectified coil (lead wires only)
- 11 = Tape-wrapped coil, Class H, lead wires
- HC = molded coil, Class F, EN175301-803 Form B DIN, Industrial, 11mm, 2+1 poles
- 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 valves only)
- N = Neoprene
- NS = Nitrile (NSF/FDA, 2-way valves only)
- PF = Perfluoroelastomer
- R = Rulon® (2-way valves only)
- T = PTFE
- 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) = 1/8-27 NPT female thread\*
- LB = 1/4-18 NPT female thread
- BD = #10-32 female straight thread (max. orifice = 1/8")
- LT = 1/8-28 BSPT female thread (2-way valves only)
- LU = 1/4-19 BSPT female thread (2-way 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")
- BI = Bottom over-seat port, female thread (max. orifice = 1/8")
- BIM = Bottom over-seat port, 1/8-27 NPT male thread (max orifice = 5/64") 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") 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)

- \_\_\_ 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)
- 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.

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 Series – Modular

- ▶ MOPD: 400 PSI
- ▶  $C_v$  Range: 0.018 to 0.430
- ▶ 7 Watts

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 is an excellent choice for most general-purpose application requiring a  $C_v$  of 0.018 to 0.430.

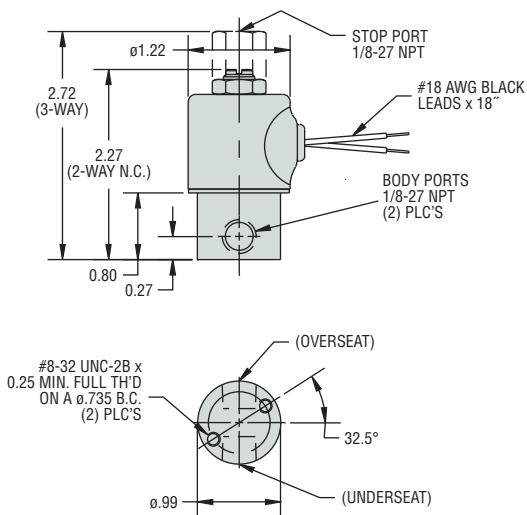


### Typical Applications

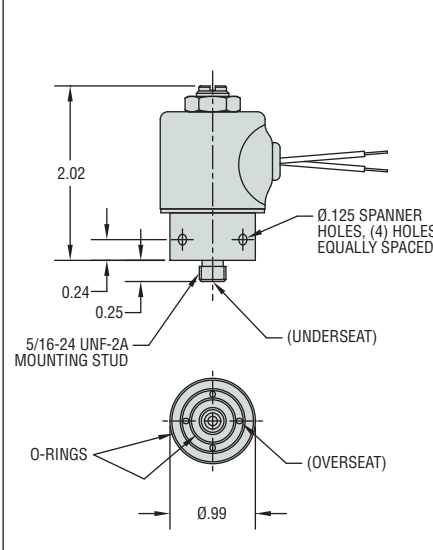
- Printing
- HVAC
- Semiconductor Equipment
- Medical Equipment

### Dimensions

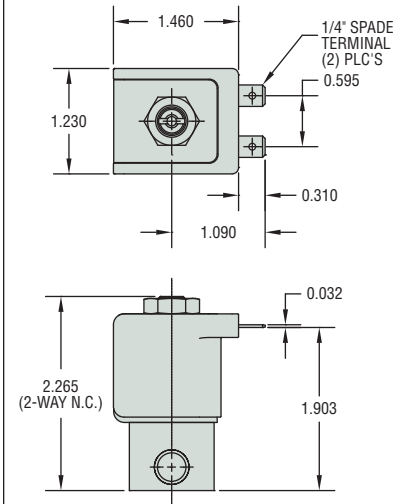
#### Threaded Port Body



#### Manifold Mount Body

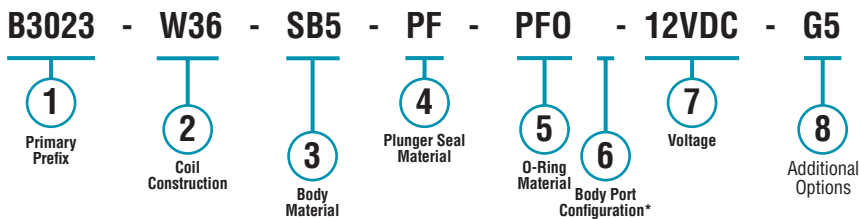


#### Molded Coil



### How To Order

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



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

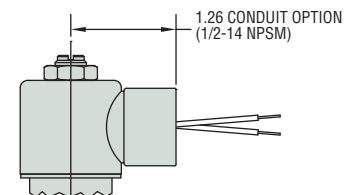
#### Example:

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

2-Way N.C. Free Vent (with 1.26 Conduit Option) solenoid valve, with 36" 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



Part Prefix Table ①

	Orifice		MOPD (psig)	C <sub>v</sub>		① Primary Prefix	
	Body	Stop		Body	Stop	Grommet Housing	Conduit Housing
2-WAY N.C.	1/16	—	400	0.065	—	B2011	B2021
	5/64	—	300	0.090	—	B2012	B2022
	3/32	—	250	0.155	—	B2013	B2023
	7/64	—	200	0.200	—	B2014	B2024
	1/8	—	150	0.240	—	B2015	B2025
	5/32	—	100	0.300	—	B2016	B2026
	3/16	—	50	0.430	—	B2017	B2027
2-WAY N.O.	—	1/32	400	—	0.019	B2211	B2221
	—	3/64	300	—	0.040	B2212	B2222
	—	1/16	200	—	0.075	B2213	B2223
	—	5/64	150	—	0.090	B2214	B2224
3-WAY N.C. Free Vent	1/32	1/32	250	0.018	0.018	B3011	B3021
	3/64	3/64	175	0.040	0.040	B3012	B3022
	1/16	1/16	125	0.065	0.070	B3013	B3023
	5/64	5/64	100	0.090	0.090	B3014	B3024
	3/32	5/64	75	0.155	0.090	B3015	B3025
	1/8	5/64	50	0.240	0.090	B3016	B3026
	5/32	5/64	15	0.300	0.090	B3017	B3027
3-WAY N.C. Line Connection	1/32	1/32	250	0.018	0.018	B3111	B3121
	3/64	3/64	175	0.040	0.040	B3112	B3122
	1/16	1/16	125	0.065	0.070	B3113	B3123
	5/64	5/64	100	0.090	0.090	B3114	B3124
	3/32	5/64	75	0.155	0.090	B3115	B3125
	1/8	5/64	50	0.240	0.090	B3116	B3126
3-WAY N.O.	1/32	1/32	200	0.018	0.018	B3211	B3221
	3/64	3/64	150	0.040	0.040	B3212	B3222
	1/16	1/16	125	0.065	0.070	B3213	B3223
	5/64	5/64	100	0.090	0.090	B3214	B3224
	3/32	5/64	75	0.155	0.090	B3215	B3225
	1/8	5/64	50	0.240	0.090	B3216	B3226
3-WAY Multi Purpose	1/32	1/32	175	0.018	0.018	B3311	B3321
	3/64	3/64	125	0.040	0.040	B3312	B3322
	1/16	1/16	100	0.065	0.070	B3313	B3323
	5/64	5/64	75	0.090	0.090	B3314	B3324
	3/32	5/64	50	0.155	0.090	B3315	B3325
	1/8	5/64	25	0.240	0.090	B3316	B3326
3-WAY Directional Control	1/32	1/32	275	0.018	0.018	B3411	B3421
	3/64	3/64	200	0.040	0.040	B3412	B3422
	1/16	1/16	150	0.065	0.070	B3413	B3423
	5/64	5/64	100	0.090	0.090	B3414	B3424
	3/32	5/64	75	0.155	0.090	B3415	B3425
	1/8	5/64	50	0.240	0.090	B3416	B3426
	5/32	5/64	25	0.300	0.090	B3417	B3427

② Coil Construction

- (blank) = Tape-wrapped, Class-B, with 18" lead wires\*  
 W\_\_\_ = Tape-wrapped coil, lead-wires, non-standard length (specify length)  
 1 = Encapsulated coil, Class B, Lead Wires  
 3 = Encapsulated coil, Class H, Lead Wires  
 4 = Encapsulated coil, Class-B, 3/16" spade terminals  
 5 = Encapsulated coil, Class-B, 0.110" spade terminals  
 8 = Encapsulated coil, Class F, 3/16" spade terminals  
 10 = Externally rectified coil (lead wires only)  
 11 = Tape-wrapped coil, Class H, lead wires

② Coil Construction, continued

- HC = molded coil, Class F, EN175301-803 Form B DIN, Industrial, 11mm, 2+1 poles  
 HC2 = Encapsulated coil, Class B, EN175301-803 Form C DIN, Industrial, 9.4mm, 2+1 poles  
 TK = Higher efficiency coil (2-way N.C. only)

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 (NSF/FDA material)  
 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")  
 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)†††  
 MMB = 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")  
 BIM = Bottom over-seat port, 1/8-27 NPT male thread (max. orifice = 5/64", 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", 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)

- \_\_\_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  
 QQ = Quiet operation (2-way N.C. only)  
 S = Silver shading ring  
 OC = Cleaned for oxygen use  
 VAC = Vacuum application (0 to 29.5" Hg)  
 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.

## C Series – High Flow

- ▶ MOPD: 400 PSI
- ▶  $C_v$  Range: 0.019 to 0.420
- ▶ 7 Watts

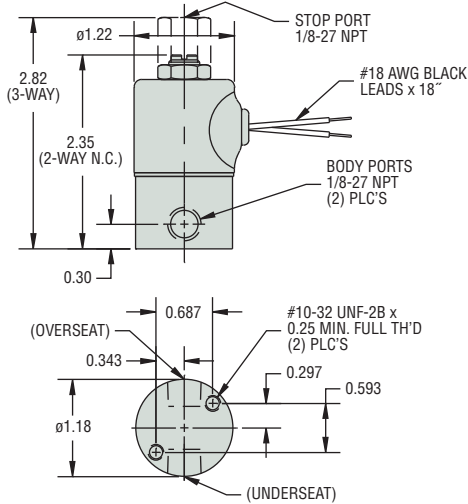
The C Series, available only in brass, is a highly durable miniature 2- or 3-way direct acting valve for applications that require a higher flow control. The C Series also utilizes a larger diameter body and larger port connections for higher  $C_v$  valves rates. The free machining brass body allows 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

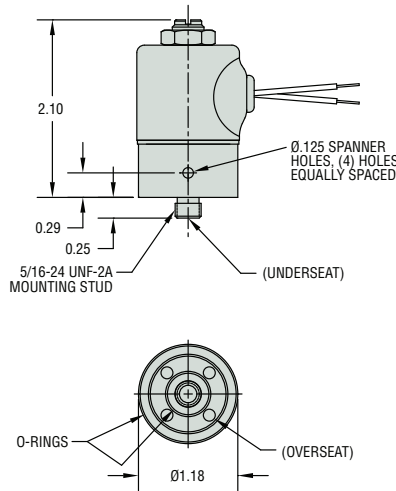
- Therapeutic Beds
- Automotive Applications
- Packaging Equipment

### Dimensions

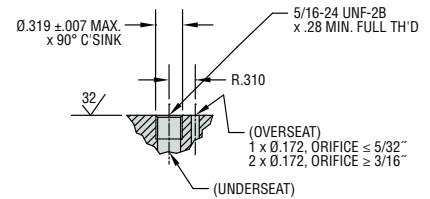
#### Threaded Port Body



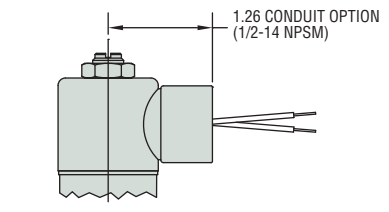
#### Manifold Mount Body



#### 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.

<b>C2016</b>	-	<b>11</b>	-	<b>E</b>	-	<b>EO</b>	-	<b>LB</b>	-	<b>48VDC</b>	-	<b>VAC</b>		
<b>1</b>		<b>2</b>		<b>3</b>		<b>4</b>		<b>5</b>		<b>6</b>		<b>7</b>		<b>8</b>
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) option.



Part Prefix Table ①

	Orifice		MOPD (psig)	C <sub>v</sub>		① Primary Prefix	
	Body	Stop		Body	Stop	Grommet Housing	Conduit Housing
2-WAY N.C.	1/16	—	400	0.080	—	C2011	C2021
	7/64	—	200	0.180	—	C2012	C2022
	1/18	—	150	0.240	—	C2013	C2023
	5/32	—	100	0.300	—	C2014	C2024
	3/16	—	75	0.360	—	C2015	C2025
	7/32	—	40	0.420	—	C2016	C2026
2-WAY N.O.	—	1/32	400	—	0.019	C2211	C2221
	—	3/64	300	—	0.040	C2212	C2222
	—	1/16	200	—	0.075	C2213	C2223
	—	5/64	150	—	0.105	C2214	C2224
3-WAY N.C. Free Vent	1/16	1/16	125	0.080	0.075	C3011	C3021
	5/64	5/64	100	0.105	0.105	C3012	C3022
	1/8	5/64	50	0.240	0.105	C3013	C3023
	3/16	5/64	25	0.360	0.105	C3014	C3024
	7/32	5/64	VAC	0.420	0.105	C3015	C3025
3-WAY N.C. Line Connection	1/16	1/16	125	0.080	0.075	C3111	C3121
	5/64	5/64	100	0.105	0.105	C3112	C3122
	1/8	5/64	50	0.240	0.105	C3113	C3123
	3/16	5/64	25	0.360	0.105	C3114	C3124
	7/32	5/64	VAC	0.420	0.105	C3115	C3125
3-WAY N.O.	1/16	1/16	125	0.080	0.075	C3211	C3221
	5/64	5/64	100	0.105	0.105	C3212	C3222
	1/8	5/64	75	0.240	0.105	C3213	C3223
	3/16	5/64	40	0.360	0.105	C3214	C3224
	7/32	5/64	VAC	0.420	0.105	C3215	C3225
3-WAY Multi Purpose	1/16	1/16	100	0.080	0.075	C3311	C3321
	5/64	5/64	75	0.105	0.105	C3312	C3322
	1/8	5/64	25	0.240	0.105	C3313	C3323
	3/16	5/64	10	0.360	0.105	C3314	C3324
	7/32	5/64	5	0.420	0.105	C3315	C3325
3-WAY Directional Control	1/16	1/16	150	0.080	0.075	C3411	C3421
	5/64	5/64	100	0.105	0.105	C3412	C3422
	1/8	5/64	50	0.240	0.105	C3413	C3423
	3/16	5/64	25	0.360	0.105	C3414	C3424
	7/32	5/64	5	0.420	0.105	C3415	C3425

② Coil Construction

- (blank) = Tape-wrapped, Class-B, with 18" 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" spade terminals (3/16" 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")
- 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<sup>†</sup> (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)
- GT = 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.

<sup>†</sup> Can be AC rectified without shading ring. Use coil construction Code 10.  
<sup>††</sup> 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.



## D Series – High Flow

- ▶ MOPD: 900 PSI
- ▶  $C_v$  Range: 0.045 to 0.880
- ▶ 10 Watts

For maximum flow in a miniature solenoid valve the D Series valves delivers a wide range of  $C_v$  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.

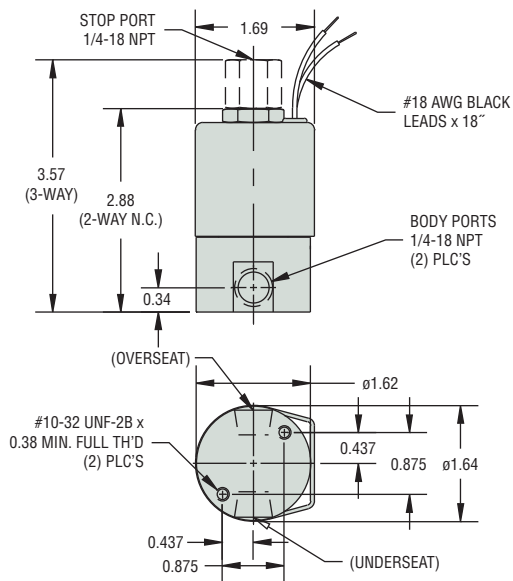


### Typical Applications

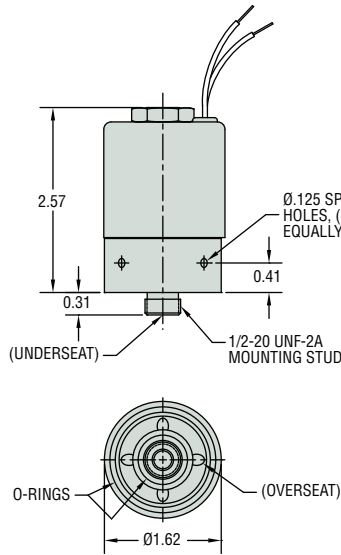
- Agriculture
- Defense
- Sterilization Equipment
- Industrial Automation

### Dimensions

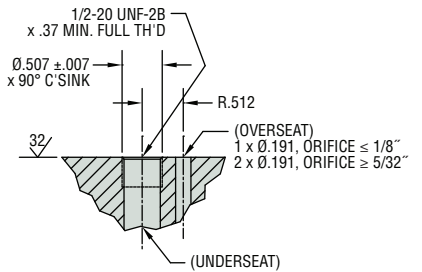
#### Threaded Port Body



#### Manifold Mount Body

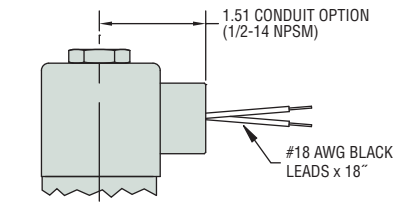


#### MANIFOLD MATING DIMENSIONS



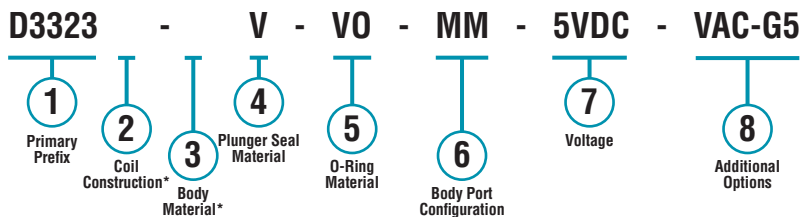
#### Alternate 1/2" Conduit Housing

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.



\* Blank entry indicates a "Standard" selection (Tape-wrapped, Class-B, with 18" 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" lead-wires, 430F stainless steel body, Viton® plunger seal, Viton® o-ring, manifold mount (1/2-20 UNF-2A mounting stud, max. orifice = 14"), operating at 5 VDC, and includes vacuum application (0 to 29.5" Hg) and one piece 316 stainless steel guide assembly options.

Part Prefix Table ①

	Orifice		MOPD (psig)	C <sub>v</sub>		① Primary Prefix	
	Body	Stop		Body	Stop	Grommet Housing	Conduit Housing
2-WAY N.C.	3/64	—	900	0.045	—	D2011	D2021
	1/16	—	650	0.080	—	D2012	D2022
	3/32	—	350	0.150	—	D2013	D2023
	1/8	—	225	0.210	—	D2014	D2024
	5/32	—	130	0.380	—	D2015	D2025
	3/16	—	85	0.430	—	D2016	D2026
	1/4	—	50	0.700	—	D2017	D2027
	5/16	—	20	0.850	—	D2018	D2028
2-WAY N.O.	3/8	—	10	0.880	—	D2019	D2029
	—	3/64	900	—	0.045	D2211	D2221
	—	1/16	550	—	0.080	D2212	D2222
	—	5/64	300	—	0.110	D2213	D2223
	—	3/32	175	—	0.150	D2214	D2224
3-WAY N.C. Free Vent	—	1/8	110**	—	0.210	D2215	D2225
	—	5/32	60**	—	0.380	D2216	D2226
	1/16	1/16	175	0.080	0.080	D3011	D3021
	5/64	5/64	150	0.110	0.110	D3012	D3022
	3/32	3/32	125	0.150	0.150	D3013	D3023
	1/8	1/8	85**	0.210	0.210	D3014	D3024
3-WAY N.C. Line Connection	5/32	5/32	45**	0.380	0.380	D3015	D3025
	3/16	5/32	30**	0.430	0.380	D3016	D3026
	1/4	5/32	10**	0.700	0.380	D3017	D3027
	1/16	1/16	175	0.080	0.080	D3111	D3121
	5/64	5/64	150	0.110	0.110	D3112	D3122
	3/32	3/32	125	0.150	0.150	D3113	D3123
	1/8	1/8	85**	0.210	0.210	D3114	D3124
3-WAY N.O.	5/32	5/32	45**	0.380	0.380	D3115	D3125
	3/16	5/32	30**	0.430	0.380	D3116	D3126
	1/4	5/32	10**	0.700	0.380	D3117	D3127
	1/16	1/16	200	0.080	0.080	D3211	D3221
	5/64	5/64	175	0.110	0.110	D3212	D3222
	3/32	3/32	150	0.150	0.150	D3213	D3223
	1/8	1/8	100**	0.210	0.210	D3214	D3224
3-WAY Multi Purpose	5/32	5/32	50**	0.380	0.380	D3215	D3225
	3/16	5/32	35**	0.430	0.380	D3216	D3226
	1/4	5/32	15**	0.700	0.380	D3217	D3227
	1/16	1/16	160	0.080	0.080	D3311	D3321
	5/64	5/64	130	0.110	0.110	D3312	D3322
	3/32	3/32	110	0.150	0.150	D3313	D3323
	1/8	1/8	75**	0.210	0.210	D3314	D3324
3-WAY Directional Control	5/32	5/32	40**	0.380	0.380	D3315	D3325
	3/16	5/32	25**	0.430	0.380	D3316	D3326
	1/4	5/32	10**	0.700	0.380	D3317	D3327
	1/16	1/16	225	0.080	0.080	D3411	D3421
	5/64	5/64	185	0.110	0.110	D3412	D3422
	3/32	3/32	150	0.150	0.150	D3413	D3423
	1/8	1/8	110**	0.210	0.210	D3414	D3424
	5/32	5/32	60**	0.380	0.380	D3415	D3425
	3/16	5/32	40**	0.430	0.380	D3416	D3426
	1/4	5/32	20**	0.700	0.380	D3417	D3427

\*\* DC or rectified coil only

② Coil Construction

(blank) = Tape-wrapped, Class-B, with 18" 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, 1/4" spade terminals  
**10** = Externally rectified coil (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")  
**N** = Neoprene (2-way normally closed valves only, max. orifice = 1/4")  
**NS** = Nitrile (NSF/FDA, max. orifice = 1/4")  
**PF** = Perfluoroelastomer (max. orifice = 1/4")  
**R** = Rulon® (2-way normally closed valves only, max. orifice = 1/4")  
**T** = PTFE (max. orifice = 1/4")  
**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")  
**LD** = 3/8-18 NPT female thread  
**LT** = 1/8-28 BSPT female thread (max. orifice = 5/16")  
**LU** = 1/4-19 BSPT female thread  
**MM** = Manifold mount (1/2-20 UNF-2A mounting stud, max. orifice = 1/4")††  
**OB** = Omit body (operator style)  
**BI** = Bottom over-seat port, female thread (max. orifice = 1/4")  
**BO** = Bottom under-seat port, female thread

⑦ Voltage† (see note below)

\_\_\_ **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)  
**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.

## AS Series

- ▶ MOPD: 110 PSI (Plastic Body) or 150 PSI (Metal Body)
- ▶  $C_v$  Range: 0.020 to 0.300
- ▶ 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.

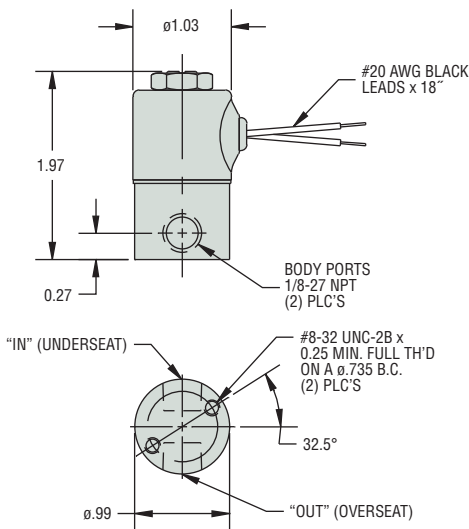
### Typical Applications

- Analytical Instruments
- Clinical Diagnostic Analyzers
- Bio-Instrumentation

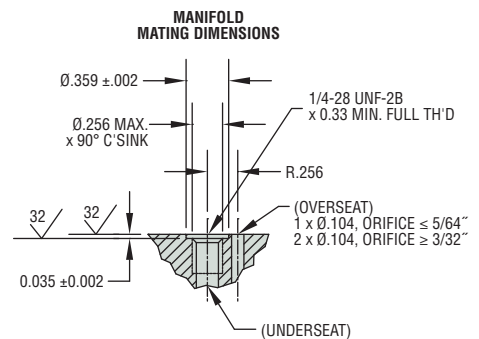
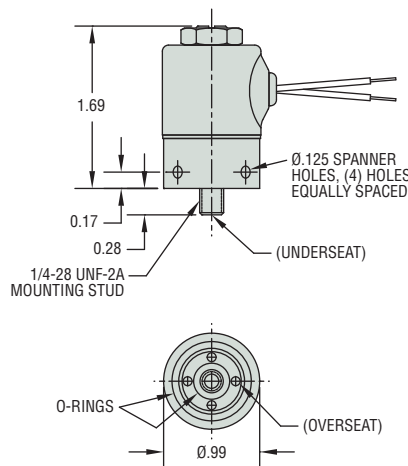


### Dimensions

#### Threaded Port Body

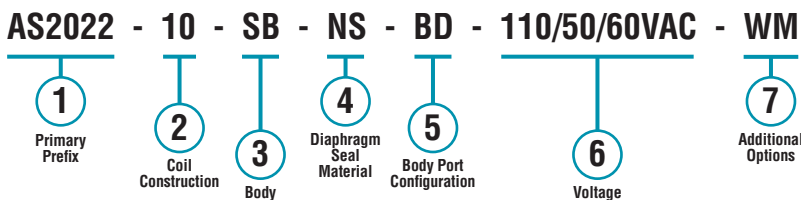


#### Manifold Mount Body



### How To Order

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

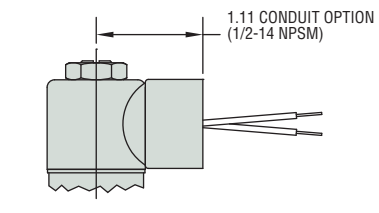


#### Example:

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

2-Way N.C. (1/2" 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.

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



#### 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	MOPD (psig)	Max Back Pressure	C <sub>v</sub>	① Primary Prefix	
	Body				Grommet Housing	Conduit Housing
303 Stainless Steel <sup>1</sup>	1/32	150	10	0.020	AS2011	AS2021
	3/64	110	10	0.035	AS2012	AS2022
	1/16	90	10	0.065	AS2013	AS2023
	5/64	70	10	0.090	AS2014	AS2024
	3/32	45	10	0.155	AS2015	AS2025
	1/8	15	5	0.240	AS2016	AS2026
	5/32	5	5	0.300	AS2017	AS2027
Polypropylene (1/8-27 NPT Female Thread body port only)	3/64	110	10	0.035	AS2032	AS2042
	1/8	15	10	0.240	AS2036	AS2046

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

### ② Coil Construction

(blank) = Tape-wrapped, Class-B, with 18" 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" spade terminals (1/4" 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<sup>2</sup>

BD = #10-32 female straight thread (max. orifice = 1/8")<sup>2</sup>

LT = 1/8-28 BSPT female thread<sup>2</sup>

LU = 1/4-19 BSPT female thread<sup>2</sup>

MM = Manifold mount (1/4-28 UNF-2A mounting stud)<sup>2†</sup>

MM3 = Manifold mount (5/16-24 UNF-2A mounting stud)<sup>2†</sup>

OB = Omit body (operator style)<sup>2</sup>

BI = Bottom over-seat port, female thread (max. orifice = 1/8")<sup>2</sup>

BIM = Bottom over-seat port, 1/8-27 NPT male thread

(max. orifice = 5/64", brass body only)<sup>2</sup>

BO = Bottom under-seat port, female thread<sup>2</sup>

BOM = Bottom under-seat port, 1/8-27 NPT male thread

(max. orifice = 1/8", brass body only)<sup>2</sup>

RL = 90° porting - left hand<sup>2</sup>

RR = 90° porting - right hand<sup>2</sup>

### 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 (Plastic Body) or 150 PSI (Metal Body)
- ▶  $C_v$  Range: 0.035 to 0.300
- ▶ 4.5 Watts (Plastic Body) or 7 Watts (Metal Body)

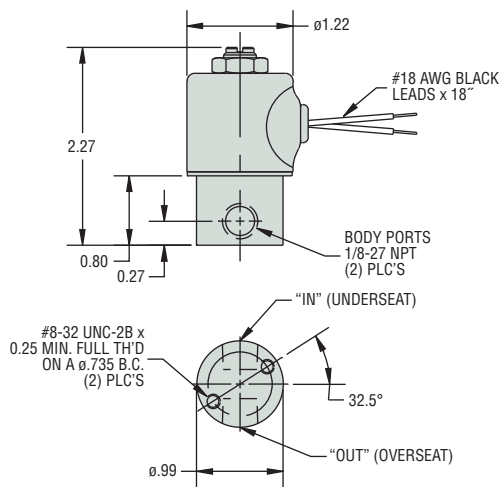
The BS Series is a 2-way, high flow, isolation valve that is designed to be virtually impervious to chemical attack and to protect high purity media. When your media cannot come in contact with any metallic materials, this highly versatile, modular valve delivers the protection you need for accurate 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

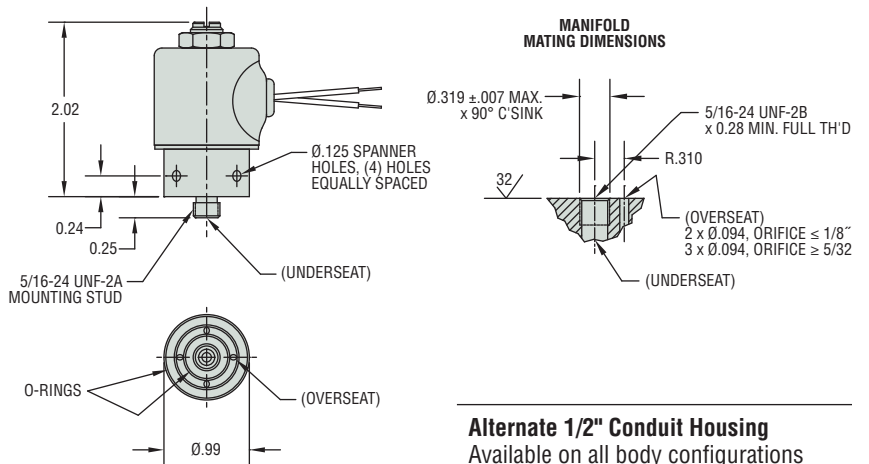
- Remediation Equipment
- Clinical Chemistry Equipment
- Analytical Instrumentation

## Dimensions

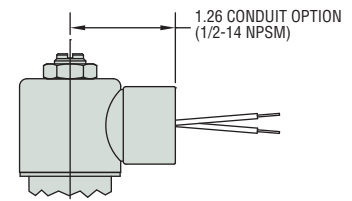
### Threaded Port Body



### Manifold Mount Body

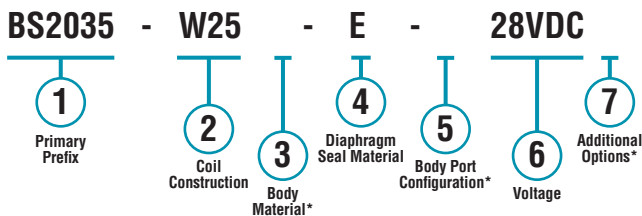


### Alternate 1/2" Conduit Housing Available on all body configurations



## How To Order

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



\* 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" 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	MOPD (psig)	Max Back Pressure	C <sub>v</sub>	① Primary Prefix	
	Body				Grommet Housing	Conduit Housing
303 Stainless Steel <sup>1</sup>	3/64	150	15	0.035	BS2010	BS2020
	1/16	110	10	0.065	BS2011	BS2021
	5/64	85	10	0.090	BS2012	BS2022
	3/32	70	10	0.155	BS2013	BS2023
	7/64	25	10	0.200	BS2014	BS2024
	1/8	10	5	0.240	BS2015	BS2025
	5/32	5	5	0.300	BS2016	BS2026
Polypropylene (1/8-27 NPT Female Thread body port only)	3/64	150	15	0.035	BS2030	BS2040
	1/8	10	5	0.240	BS2035	BS2045

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

### ② Coil Construction

(blank) = Tape-wrapped, Class-B, with 18" 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" spade terminals (3/16" 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<sup>2</sup>

BD = #10-32 female straight thread (max. orifice = 1/8")<sup>2</sup>

LT = 1/8-28 BSPT female thread<sup>2</sup>

LU = 1/4-19 BSPT female thread<sup>2</sup>

MM = Manifold mount (1/4-28 UNF-2A mounting stud)<sup>12</sup>

MM3 = Manifold mount (5/16-24 UNF-2A mounting stud)<sup>12</sup>

OB = Omit body (operator style)<sup>2</sup>

BI = Bottom over-seat port, female thread (max. orifice = 1/8")<sup>2</sup>

BIM = Bottom over-seat port, 1/8-27 NPT male thread

(max. orifice = 5/64", brass body only)<sup>2</sup>

BO = Bottom under-seat port, female thread<sup>2</sup>

BOM = Bottom under-seat port, 1/8-27 NPT male thread

(max. orifice = 1/8", brass body only)<sup>2</sup>

RL = 90° porting - left hand<sup>2</sup>

RR = 90° porting - right hand<sup>2</sup>

### 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

- 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).
- Not available with Polypropylene bodies.

<sup>†</sup> 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
- ▶ C<sub>v</sub> Range: 0.045 to 0.440
- ▶ 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<sub>v</sub> between 0.045 and 0.440. 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.

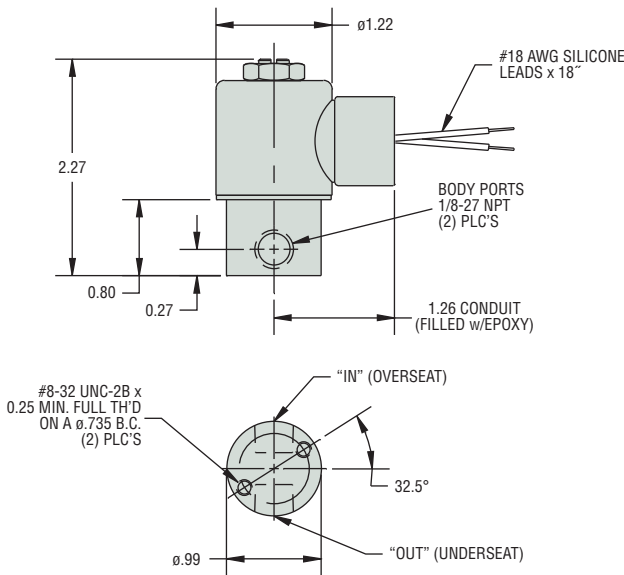


### Typical Applications

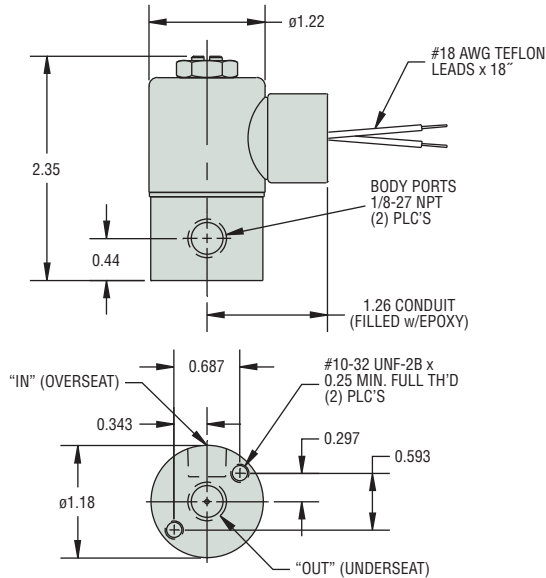
- Environmental Chambers
- Food Processing
- Laser Surgical Equipment
- Semiconductor Manufacturing

### Dimensions

#### LN2-Liquid Nitrogen



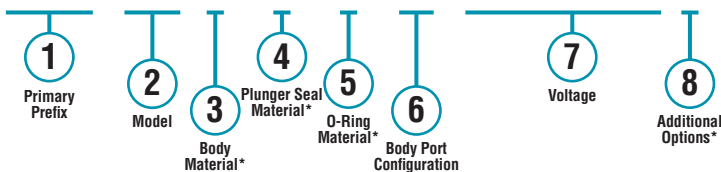
#### LCO2-Liquid Carbon Dioxide



### 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**



\* 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

		① Primary Prefix			
Orifice Body	MOPD (psig)	C <sub>v</sub> Body	Class H, Encapsulated Coils		
			Lead Wires—Filled Conduit Housing	Lead Wires—Unfilled Conduit Housing	Lead Wires— Grommet Housing
3/64	900	0.045	B2060	B2020	B2010
1/16	405	0.075	B2061	B2021	B2011
5/64	270	0.105	B2062	B2022	B2012
3/32	160	0.160	B2063	B2023	B2013
7/64	110	0.190	B2064	B2024	B2014
1/8	80	0.255	B2065	B2025	B2015
5/32	65	0.365	B2066	B2026	B2016
3/16	30	0.440	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")

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", 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
- ▶  $C_v$  Range: 0.040 to 0.770
- ▶ 15 Watts

The D-Cryo Series is a 2-way, high flow, miniature Cryogenic valve designed and built for service down to  $-320^{\circ}\text{F}$  ( $-196^{\circ}\text{C}$ ). 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.

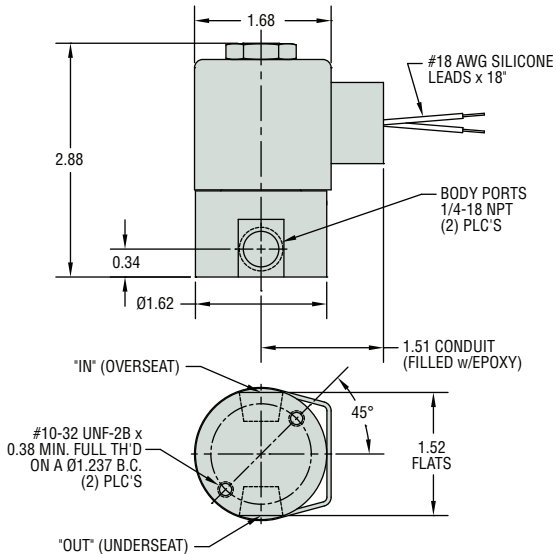


### Typical Applications

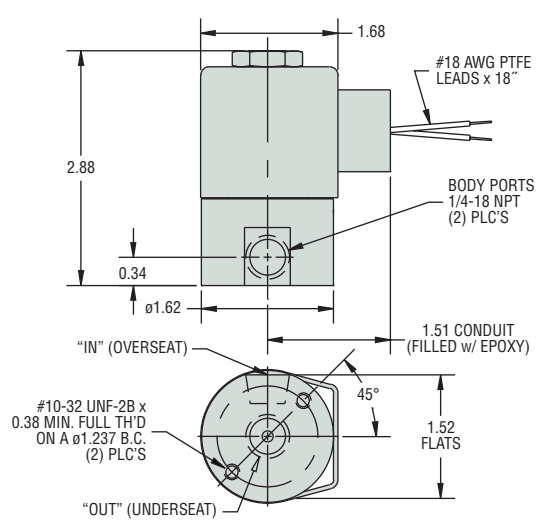
- Environmental Chambers
- Food Processing
- Laser Surgical Equipment
- Semiconductor Manufacturing

### Dimensions

#### LN2-Liquid Nitrogen



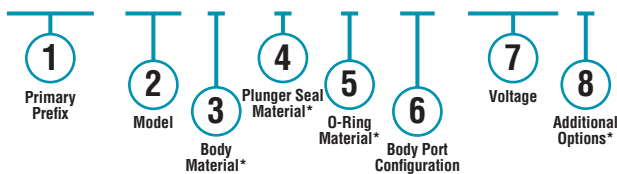
#### LCO2-Liquid Carbon Dioxide



### How To Order

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

#### D2062 - LN2 - LT - 12VDC



\* 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

		① Primary Prefix			
Orifice Body	MOPD (psig)	C <sub>v</sub> Body	Class H, Encapsulated Coils		
			Lead Wires—Filled Conduit Housing	Lead Wires—Unfilled Conduit Housing	Lead Wires— Grommet Housing
3/64	1000*	0.040	D2061	D2021	D2011
1/16	1000*	0.070	D2062	D2022	D2012
3/32	640	0.165	D2063	D2023	D2013
1/8	375	0.305	D2064	D2024	D2014
5/32	185	0.365	D2065	D2025	D2015
3/16	130	0.470	D2066	D2026	D2016
1/4	40	0.770	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
- ▶ 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.

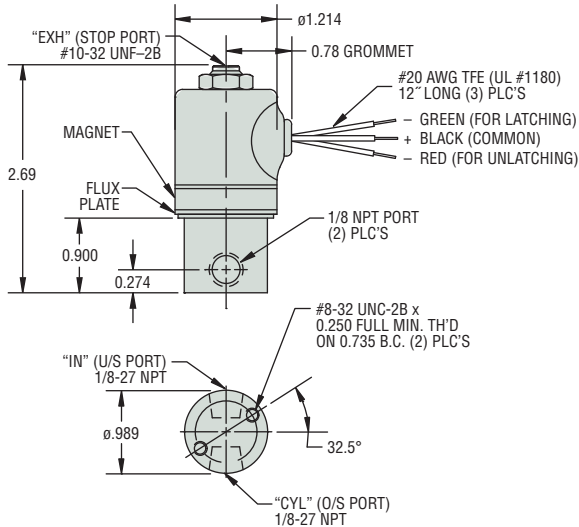


### Typical Applications

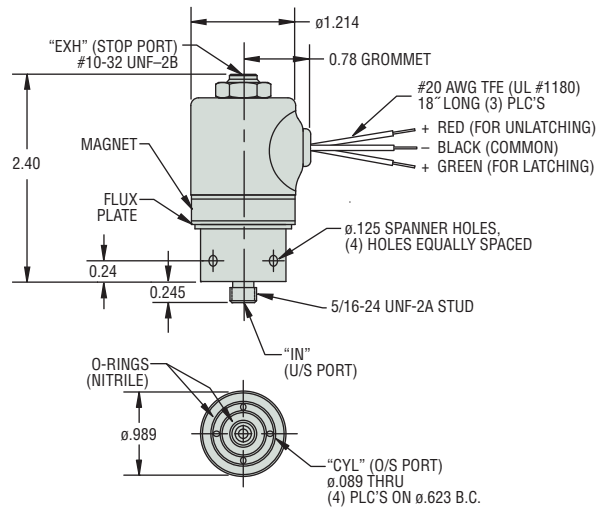
- Natural Gas Plunger Lifts
- Natural Gas Separators
- Gas Chromatography
- Irrigation Systems

### Dimensions

#### Threaded Port Body

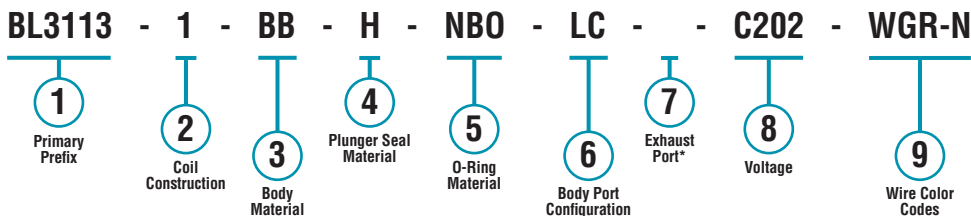


#### Manifold Mount Body



### How To Order

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



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

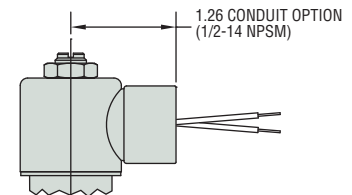
#### Example:

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



Part Prefix Table ①

	Orifice		MOPD (psi)	C <sub>v</sub>		① Primary Prefix	
	Body	Stop		Body	Stop	Grommet Housing	Unfilled Conduit Housing
3-WAY	1/32	3/64	100	0.018	0.040	BL3111	BL3121
	1/16	1/16	50	0.070	0.070	BL3113	BL3123
2-WAY	1/16	—	240	0.065	—	BL2011	BL2021
	5/64	—	180	0.09	—	BL2012	BL2022
	3/32	—	150	0.155	—	BL2013	BL2023
	7/64	—	120	0.2	—	BL2014	BL2024
	1/8	—	90	0.24	—	BL2015	BL2025
	5/32	—	60	0.3	—	BL2016	BL2026
	3/16	—	30	0.43	—	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

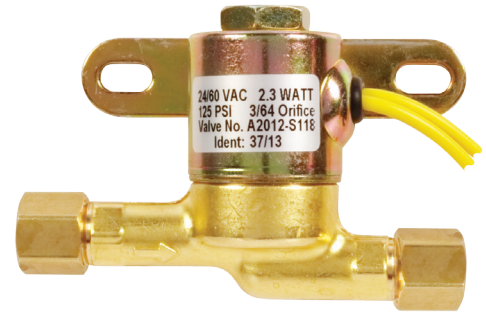
- WGR-N = White common (+), Green latch (-), Red Unlatch (-)
- BRG-P = Black common (-), Red latch (+), Green Unlatch (+)
- BGR-N = Black common (+), Green latch (-), Red Unlatch (-)

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

## Humidifier Solenoid Valves

- ▶ MOPD: 125 PSI
- ▶ 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.

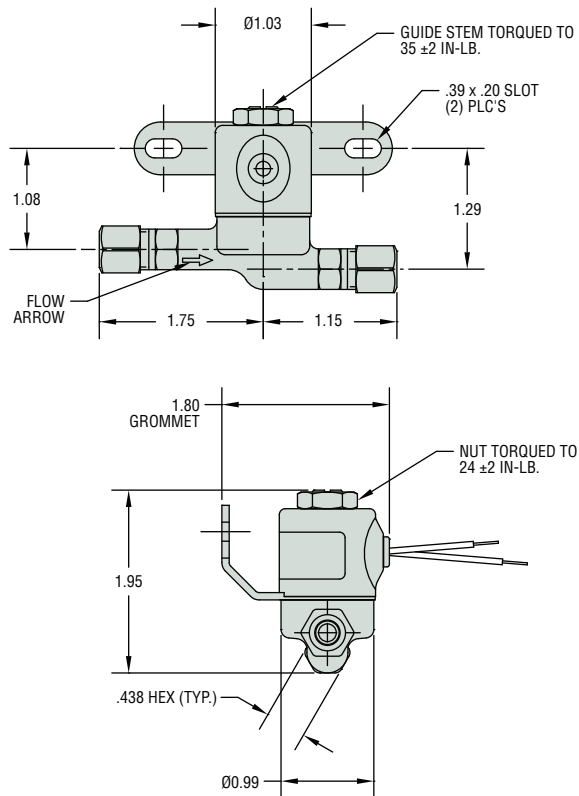


### Typical Application

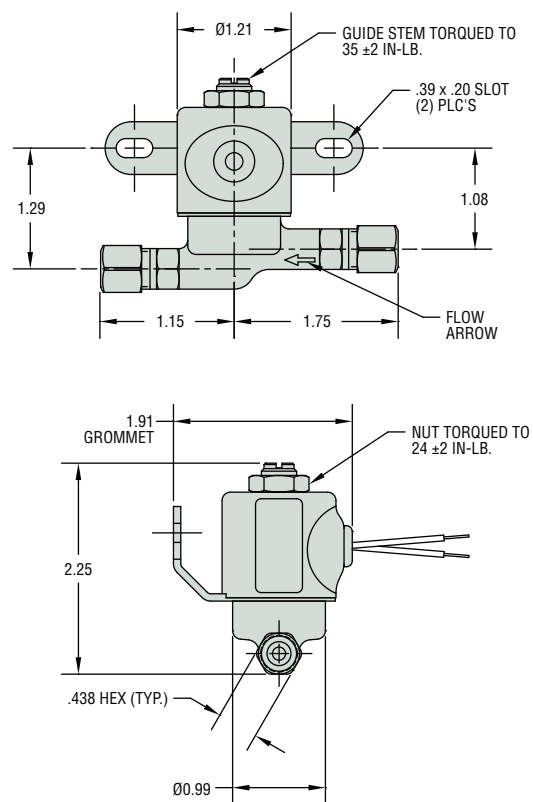
- Replacement solenoid valve for commercial and in-home humidifiers

### Dimensions

24V, 60Hz AC



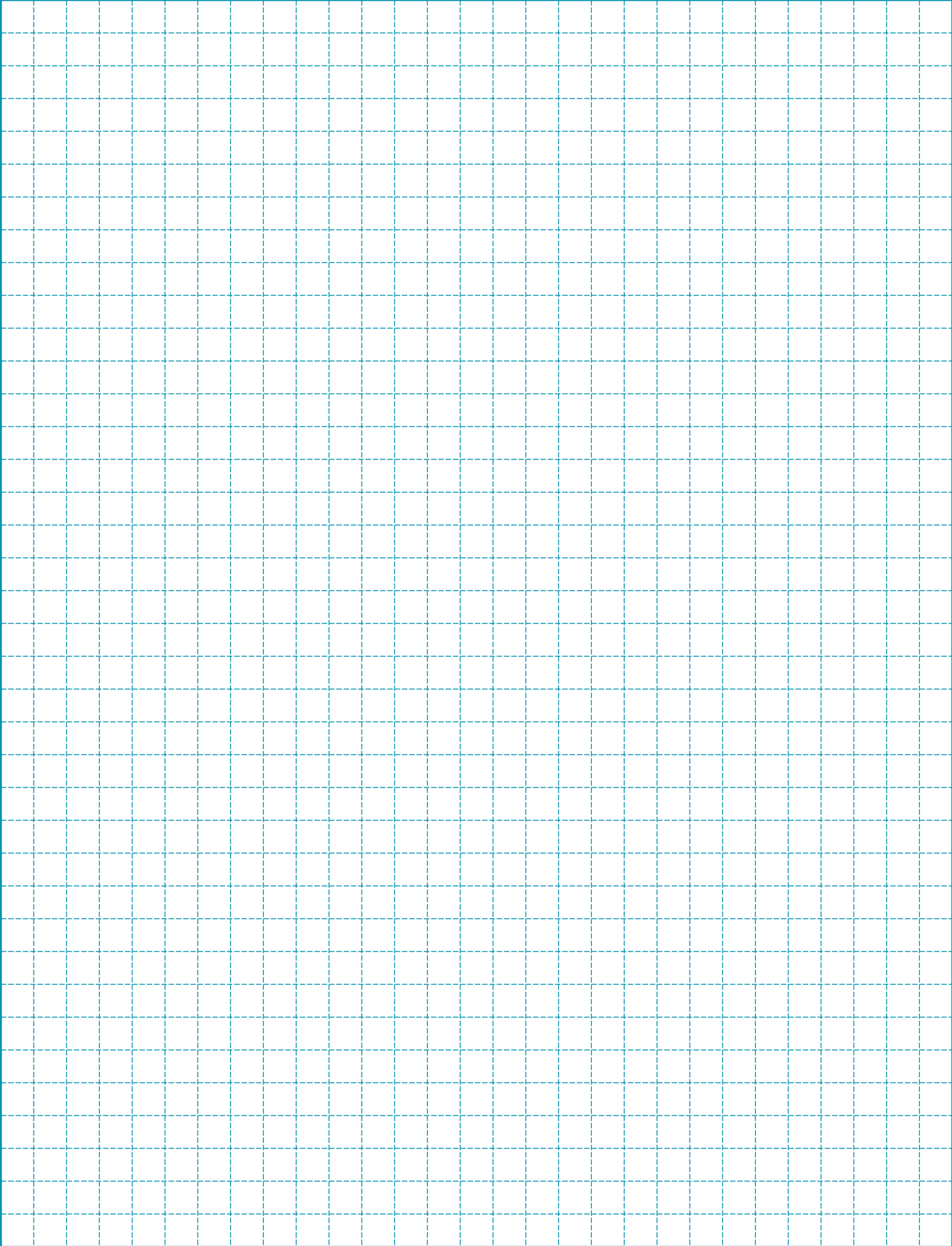
120V, 60Hz, AC



### How To Order

Orifice	Voltage (VAC)	MOPD (PSI)	Part Number
3/64	24/60	125	A2012-S150
3/32	120/60	125	B2015-S135

NOTES



## 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](mailto: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](mailto:info@gemssensors.com).





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

**FLOW REQUIREMENTS**

C<sub>v</sub>: Body \_\_\_\_\_, Stop \_\_\_\_\_ Orifice Diameter: Body \_\_\_\_\_, Stop \_\_\_\_\_  
 Flow at the Body Orifice \_\_\_\_\_ (GPMO or SCFM) with a \_\_\_\_\_ psig at the Inlet, and \_\_\_\_\_ psig at the outlet  
 Flow at the Stop Orifice \_\_\_\_\_ (GPMO or SCFM) with a \_\_\_\_\_ psig at the Inlet, and \_\_\_\_\_ psig at the outlet

**PRESSURE**

Operating Pressure \_\_\_\_\_  
 Max. Pressure \_\_\_\_\_  
 Min. Pressure \_\_\_\_\_  
 Max. Back Pressure \_\_\_\_\_

**TEMPERATURE**

Media Temp. \_\_\_\_\_  
 Max. Media Temp. \_\_\_\_\_  
 Min. Media Temp. \_\_\_\_\_  
 Ambient Temp. \_\_\_\_\_  
 Max. Ambient Temp. \_\_\_\_\_  
 Min Ambient Temp. \_\_\_\_\_

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 Max. Time ON \_\_\_\_\_  
 Intermittent Duty 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**

- |  |  |   |  |  |  |
|--|--|---|--|--|--|
| <input type="checkbox"/> Single Valve Body       | <input type="checkbox"/> Body Port<br>1/8" NPT | <input type="checkbox"/> Stop Port (If Different)<br>1/8" NPT | <input type="checkbox"/> Body Port Orientation<br>180° | <input type="checkbox"/> Female Bottom Port<br>Specify Port Size _____ | <input type="checkbox"/> Male Bottom Porting<br>1/8" NPT (Brass) |
| <input type="checkbox"/> Manifold Mount          | <input type="checkbox"/> 1/4" NPT              | <input type="checkbox"/> 1/4" NPT                             | <input type="checkbox"/> 1/4" NPT                      | <input type="checkbox"/> 90° Right                                     | <input type="checkbox"/> Pressure Over-Seat                      |
| <input type="checkbox"/> Operator Only (No Body) | <input type="checkbox"/> 3/8" NPT              | <input type="checkbox"/> #10-32                               | <input type="checkbox"/> 3/8" NPT                      | <input type="checkbox"/> 90° Left                                      | <input type="checkbox"/> Pressure Under Seat                     |
| <input type="checkbox"/> Metering                | <input type="checkbox"/> #10-32                | <input type="checkbox"/> #10-32                               |  |  |  |
|  | <input type="checkbox"/> 1/8" BSPT             | <input type="checkbox"/> 1/8" BSPT                            |  |  |  |
|  | <input type="checkbox"/> M5 x 0.8              | <input type="checkbox"/> 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.