

## 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-40, 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 1psi 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).

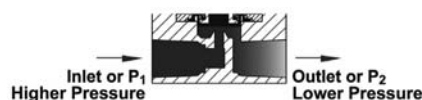
The  $C_v$  of any valve flowing liquid media can be determined with the equation shown to the right.

**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)  
 $SG = 1$   
 $T = 72^\circ F = 532^\circ \text{ Rankine } (72 + 460)$

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

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

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

### 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

## 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:

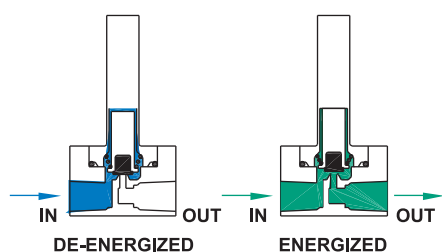
The  $C_v$  calculated will apply to either the Body Orifice or the Stop Orifice depending on the valve's function.

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.

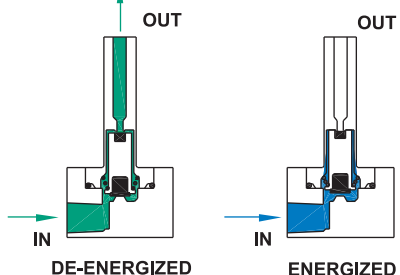
#### Flow Key

- Blocked Flow
- Free Flow

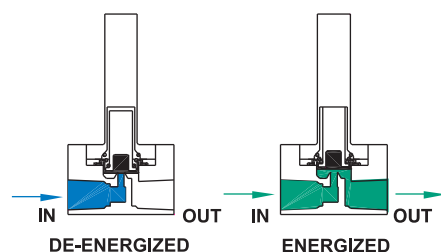
#### 2-WAY NORMALLY CLOSED



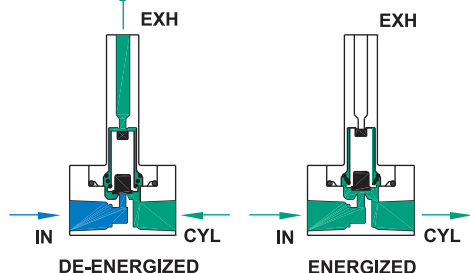
#### 2-WAY NORMALLY OPEN



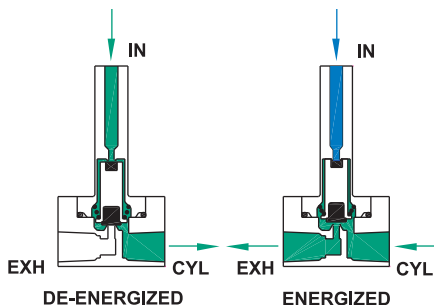
#### 2-WAY NORMALLY CLOSED ISOLATION



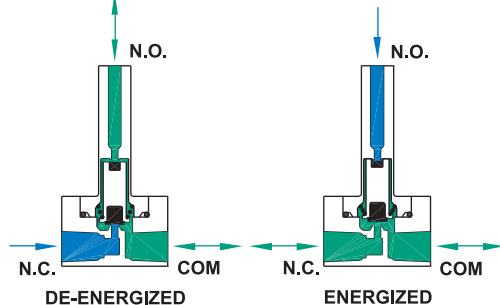
#### 3-WAY NORMALLY CLOSED



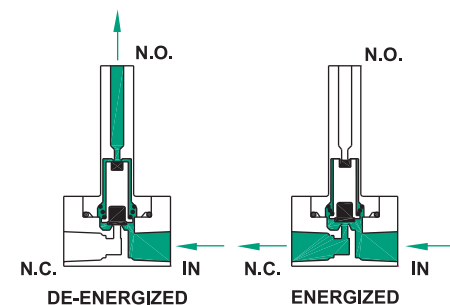
#### 3-WAY NORMALLY OPEN



#### 3-WAY MULTI-PURPOSE



#### 3-WAY DIRECTIONAL CONTROL



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).

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](mailto:info@gemssensors.com).

|                      | General Purpose          |              |                                                   |                                            |               |                                      |               |
|----------------------|--------------------------|--------------|---------------------------------------------------|--------------------------------------------|---------------|--------------------------------------|---------------|
| Function             | 2- & 3-Way               |              |                                                   |                                            |               |                                      |               |
| Media                | Gas Only                 | Gas & Liquid |                                                   |                                            |               |                                      |               |
| Size                 | Sub-Miniature            |              |                                                   | Miniature                                  |               |                                      |               |
| C <sub>v</sub> Range | 0.018 - 0.070            |              |                                                   | 0.019 - 0.430                              |               | 0.045 - 0.880                        |               |
| Port Configuration   | #10-32<br>Manifold Mount |              | Barb (1/16, 5/64, 1/8),<br>Manifold or Face-Mount | #10-32,<br>1/8, 1/4 NPT,<br>Manifold Mount |               | 1/8, 1/4, 3/8 NPT,<br>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    |

|                      | Cryogenic                   |                   | Isolation                                      |            | Inert Isolation |
|----------------------|-----------------------------|-------------------|------------------------------------------------|------------|-----------------|
| Function             | 2-Way, Normally Closed Only |                   | 2-Way, Normally Closed Only                    |            | See page J-24   |
| Media                | Liquid                      |                   | Gas & Liquid                                   |            |                 |
| Size                 | Miniature                   |                   | Miniature                                      |            |                 |
| C <sub>v</sub> Range | 0.045 - 0.440               | 0.040 - 0.770     | 0.020 - 0.300                                  |            |                 |
| Port Configuration   | 1/8, 1/4 NPT                | 1/8, 1/4, 3/8 NPT | #10-32,<br>1/8 NPT, 1/4 NPT,<br>Manifold Mount |            |                 |
| Orifice Dia (in)     | 0.046 - 0.188               | 0.046 - 0.250     | 0.032 - 0.156                                  |            |                 |
| Power (watt)         | 9                           | 15                | 4.5, 7                                         |            |                 |
| MOPD (psi)           | 900                         | 1000*             | 50 (Plastic Body), 150                         |            |                 |
| Valve Series         | B-Cryo                      | D-Cryo            | AS                                             | BS         |                 |
| Pages                | J-35, J-36                  | J-37, J-38        | J-19, J-20                                     | J-21, J-22 |                 |

\*Consult factory for higher MOPD.

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](mailto:info@gemssensors.com). We are happy to assist. You can also place orders through these same channels.

## M Series – Subminiature

- ▶ MOPD: 100 PSI
- ▶  $C_v$  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

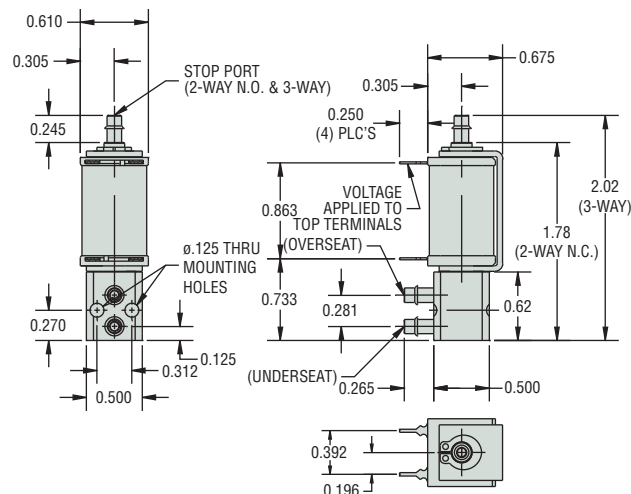
Ideal for inline PC interfacing and manifold assemblies:

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

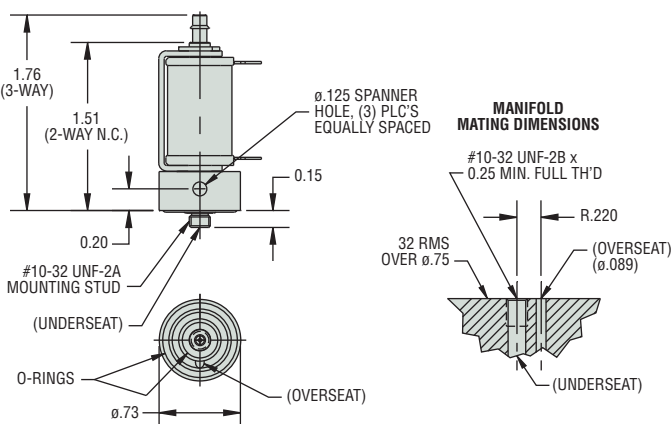


## Dimensions

### Threaded Port Body

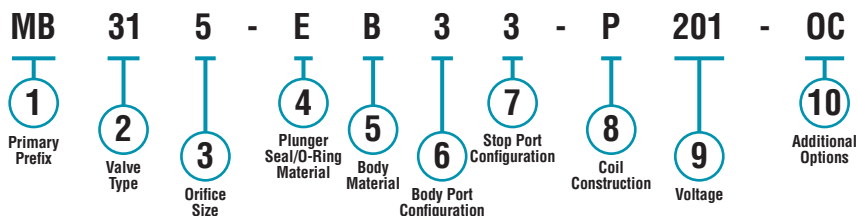


## Manifold Mount Body



## 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 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 (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

- 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†  
 5 = #10-32 UNF-2B female thread (180° apart only)  
 6 = 1/8"-27 NPT ports (180° apart only)

## ⑦ Stop Port Configuration

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

## ⑧ Coil Construction

- U = P.C. board solderable (2-pin)  
 P = P.C. board mount (4-pin)  
 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)

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

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## E & EH Series – Subminiature Gas

- ▶ MOPD: 175 PSI
- ▶  $C_v$  Range: 0.018 to 0.070
- ▶ 0.65 Watts or 2 Watts

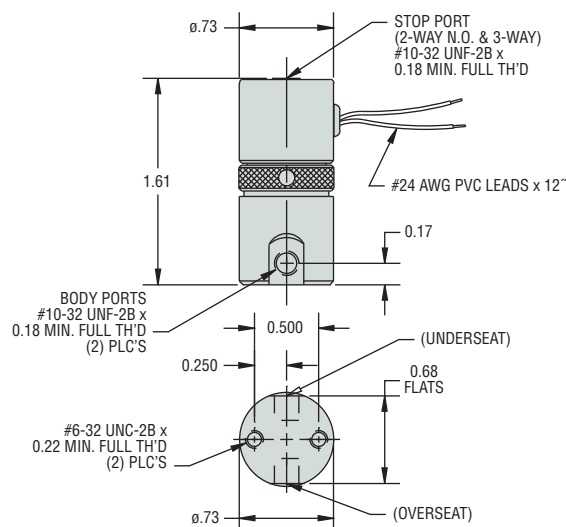
A 2- or 3-way sub-miniature solenoid valve that delivers faster response times—and higher flow rates, the E & EH Series is specifically engineered for air and dry gas applications. A nickel-plated body and coil housing construction produces a highly durable, corrosion resistant valve. With a wattage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

### Typical Applications

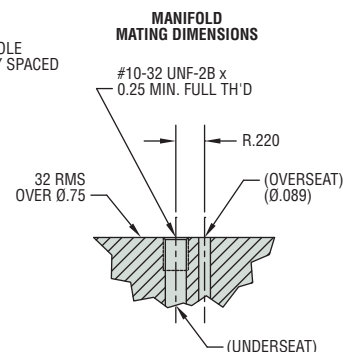
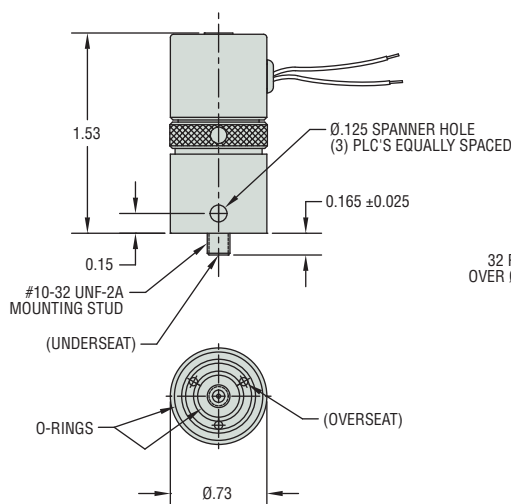
- Medical and Respiratory Healthcare
- Printing Machinery and Sorting Equipment
- Automated Packaging Equipment
- Air Monitoring Systems

### Dimensions

#### Threaded Port Body

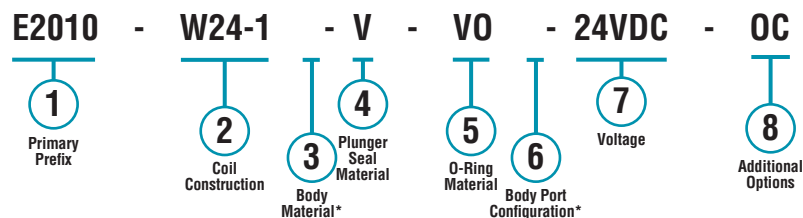


#### Manifold Mount Body



### 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.                | 0.65W        | 1/32    | 1/32 | 125         | 0.018          | 0.018 | E3010            |
|                           |              | 3/64    | 3/64 | 70          | 0.023          | 0.023 | E3011            |
|                           |              | 1/16    | 1/16 | 40          | 0.036          | 0.032 | E3012            |
|                           | 2W           | 1/32    | 1/32 | 175         | 0.018          | 0.018 | EH3010           |
|                           |              | 3/64    | 3/64 | 150         | 0.023          | 0.023 | EH3011           |
|                           |              | 1/16    | 1/16 | 100         | 0.036          | 0.032 | EH3012           |
| 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

QO = 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

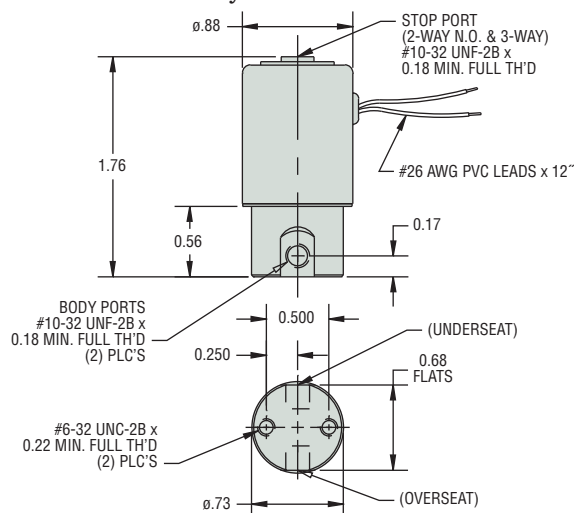
Acetal Bodies:

- Water Purification Systems
- Analytical Equipment

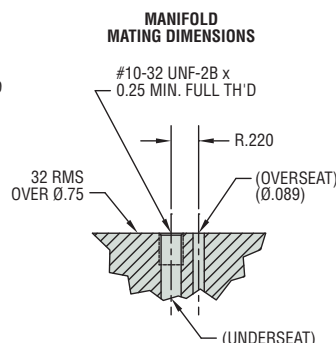
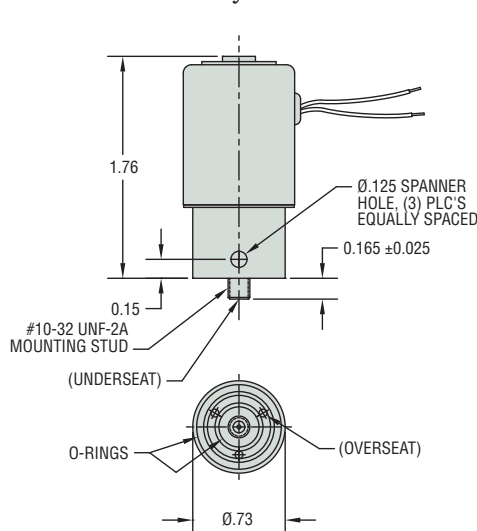


### Dimensions

#### Threaded Port Body

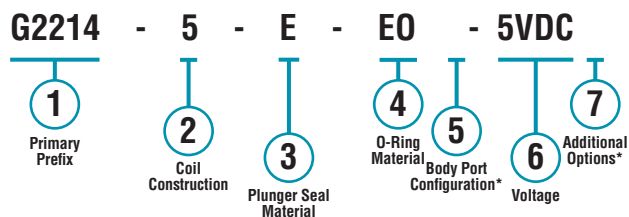


#### Manifold Mount Body



### 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>†</sup> | Acetal (#10-32 port only) |
| 2-WAY N.C.                | 0.65W        | 0.030   | —     | 125         | 0.018          | —     | G2012                            | G2032                     |
|                           |              | 0.040   | —     | 70          | 0.023          | —     | G2013                            | G2033                     |
|                           |              | 0.055   | —     | 40          | 0.038          | —     | G2014                            | G2034                     |
|                           |              | 0.078   | —     | 20          | 0.063          | —     | G2015                            | G2035                     |
|                           | 2W           | 0.030   | —     | 250         | 0.018          | —     | GH2012                           | GH2032                    |
|                           |              | 0.040   | —     | 175         | 0.023          | —     | GH2013                           | GH2033                    |
|                           |              | 0.055   | —     | 100         | 0.038          | —     | GH2014                           | GH2034                    |
|                           |              | 0.078   | —     | 50          | 0.063          | —     | GH2015                           | GH2035                    |
| 2-WAY N.O.                | 0.65W        | —       | 0.030 | 125         | —              | 0.018 | G2212                            | G2232                     |
|                           |              | —       | 0.040 | 70          | —              | 0.023 | G2213                            | G2233                     |
|                           |              | —       | 0.055 | 40          | —              | 0.038 | G2214                            | G2234                     |
|                           |              | —       | 0.078 | 20          | —              | 0.057 | G2215                            | G2235                     |
|                           | 2W           | —       | 0.030 | 200         | —              | 0.018 | GH2212                           | GH2232                    |
|                           |              | —       | 0.040 | 150         | —              | 0.023 | GH2213                           | GH2233                    |
|                           |              | —       | 0.055 | 100         | —              | 0.038 | GH2214                           | GH2234                    |
|                           |              | —       | 0.078 | 50          | —              | 0.057 | GH2215                           | GH2235                    |
| 3-WAY N.C.                | 0.65W        | 0.030   | 0.030 | 125         | 0.018          | 0.018 | G3012                            | G3032                     |
|                           |              | 0.040   | 0.040 | 70          | 0.023          | 0.023 | G3013                            | G3033                     |
|                           |              | 0.055   | 0.055 | 40          | 0.038          | 0.038 | G3014                            | G3034                     |
|                           |              | 0.078   | 0.078 | 20          | 0.063          | 0.057 | G3015                            | G3035                     |
|                           | 2W           | 0.032   | 0.030 | 200         | 0.018          | 0.018 | GH3012                           | GH3032                    |
|                           |              | 0.040   | 0.040 | 150         | 0.023          | 0.023 | GH3013                           | GH3033                    |
|                           |              | 0.055   | 0.055 | 100         | 0.038          | 0.038 | GH3014                           | GH3034                    |
|                           |              | 0.078   | 0.078 | 50          | 0.063          | 0.057 | GH3015                           | GH3035                    |
| 3-WAY N.O.                | 0.65W        | 0.030   | 0.030 | 125         | 0.018          | 0.018 | G3212                            | G3232                     |
|                           |              | 0.040   | 0.040 | 70          | 0.023          | 0.023 | G3213                            | G3233                     |
|                           |              | 0.055   | 0.055 | 40          | 0.038          | 0.038 | G3214                            | G3234                     |
|                           |              | 0.078   | 0.078 | 20          | 0.057          | 0.057 | G3215                            | G3235                     |
|                           | 2W           | 0.030   | 0.030 | 175         | 0.018          | 0.018 | GH3212                           | GH3232                    |
|                           |              | 0.040   | 0.040 | 150         | 0.023          | 0.023 | GH3213                           | GH3233                    |
|                           |              | 0.055   | 0.055 | 80          | 0.038          | 0.038 | GH3214                           | GH3234                    |
|                           |              | 0.078   | 0.078 | 40          | 0.057          | 0.057 | GH3215                           | GH3235                    |
| 3-WAY Multi Purpose       | 0.65W        | 0.030   | 0.030 | 80          | 0.018          | 0.018 | G3312                            | G3332                     |
|                           |              | 0.040   | 0.040 | 40          | 0.023          | 0.023 | G3313                            | G3333                     |
|                           |              | 0.055   | 0.055 | 20          | 0.036          | 0.029 | G3314                            | G3334                     |
|                           |              | 0.078   | 0.078 | 10          | 0.063          | 0.053 | G3315                            | G3335                     |
|                           | 2W           | 0.030   | 0.030 | 110         | 0.018          | 0.018 | GH3312                           | GH3332                    |
|                           |              | 0.040   | 0.040 | 85          | 0.023          | 0.023 | GH3313                           | GH3333                    |
|                           |              | 0.055   | 0.055 | 50          | 0.036          | 0.029 | GH3314                           | GH3334                    |
|                           |              | 0.078   | 0.078 | 25          | 0.063          | 0.057 | GH3315                           | GH3335                    |
| 3-WAY Directional Control | 0.65W        | 0.030   | 0.030 | 135         | 0.018          | 0.018 | G3412                            | G3432                     |
|                           |              | 0.040   | 0.040 | 80          | 0.023          | 0.023 | G3413                            | G3433                     |
|                           |              | 0.055   | 0.055 | 45          | 0.029          | 0.029 | G3414                            | G3434                     |
|                           |              | 0.078   | 0.078 | 20          | 0.063          | 0.055 | G3415                            | G3435                     |
|                           | 2W           | 0.030   | 0.030 | 190         | 0.018          | 0.018 | GH3412                           | GH3432                    |
|                           |              | 0.040   | 0.040 | 165         | 0.023          | 0.020 | GH3413                           | GH3433                    |
|                           |              | 0.055   | 0.055 | 80          | 0.038          | 0.038 | GH3414                           | GH3434                    |
|                           |              | 0.078   | 0.078 | 40          | 0.063          | 0.063 | GH3415                           | GH3435                    |

## 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 = EPDM  
N = Neoprene

## ④ O-Ring Material

(blank) = Viton®\*  
NBO = Nitrile  
EO = EPDM  
NO = Neoprene

## ⑤ Body Port Configuration

(blank) = #10-32 straight thread ports\*  
LC = 1/8"-27 NPT ports (2-way valves only)<sup>2</sup>  
BM = M5 x 0.8 ports<sup>2</sup>  
MM = Manifold mount with #10-32 threaded stud<sup>2†</sup>  
MM2 = Manifold mount with M5 x 0.8 threaded stud<sup>2†</sup>

## 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.
2. Not available on Acetal 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.

## 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:

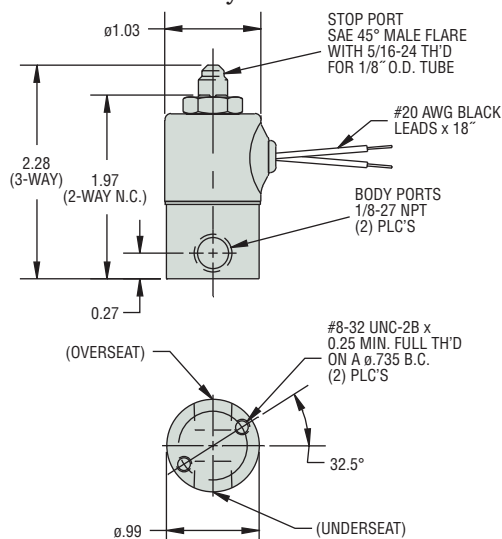
- Medical Equipment
- Laboratory Equipment
- Food Processing Equipment

Brass Bodies:

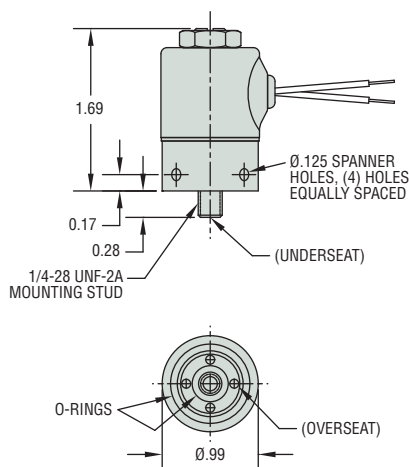
- Industrial Applications
- Automotive
- Water Transfer Systems

### Dimensions

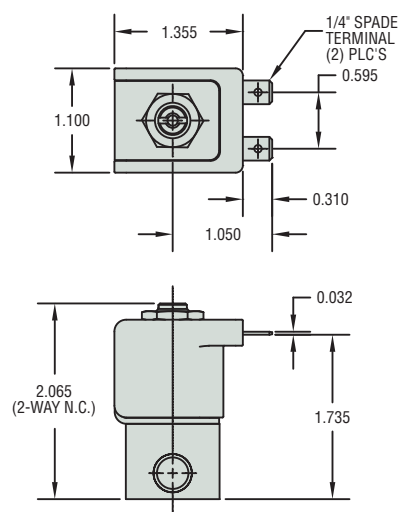
#### Threaded Port Body



#### Manifold Mount Body



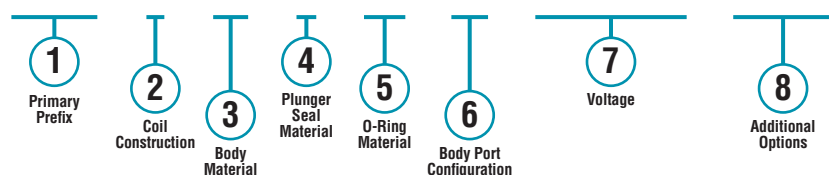
#### Molded Coil



### 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:

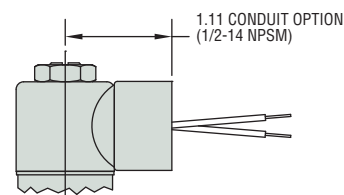
A2213-3-BB-N-NO-LB-110/60VAC-WM-TP

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.



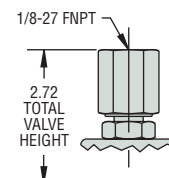
#### Alternate 1/2" Conduit Housing

Available on all body configurations



#### Stop Port

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



Part Prefix Table ①

|                                       | Orifice |      | MOPD<br>(psig) | C <sub>v</sub> |       | ① Primary Prefix   |                    |
|---------------------------------------|---------|------|----------------|----------------|-------|--------------------|--------------------|
|                                       | Body    | Stop |                | Body           | Stop  | Grommet<br>Housing | Conduit<br>Housing |
| 2-WAY<br>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<br>N.O. (option<br>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<br>N.C.<br>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-WAY<br>N.C.<br>Line<br>Connection   | 3/32    | 3/64 | 50             | 0.170          | 0.040 | A3015              | A3025              |
|                                       | 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-WAY<br>N.O.                         | 3/32    | 3/64 | 50             | 0.170          | 0.040 | A3115              | A3125              |
|                                       | 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-WAY<br>Multi<br>Purpose             | 3/32    | 3/64 | 50             | 0.170          | 0.040 | A3215              | A3225              |
|                                       | 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-WAY<br>Directional<br>Control       | 3/32    | 3/64 | 25             | 0.170          | 0.040 | A3315              | A3325              |
|                                       | 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](mailto: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.

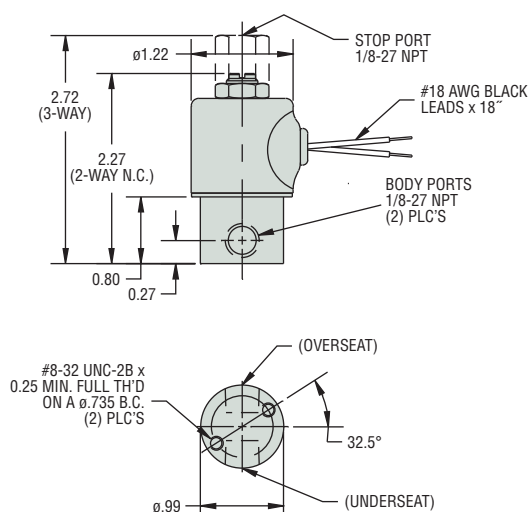
### Typical Applications

- Printing
- HVAC
- Semiconductor Equipment
- Medical Equipment

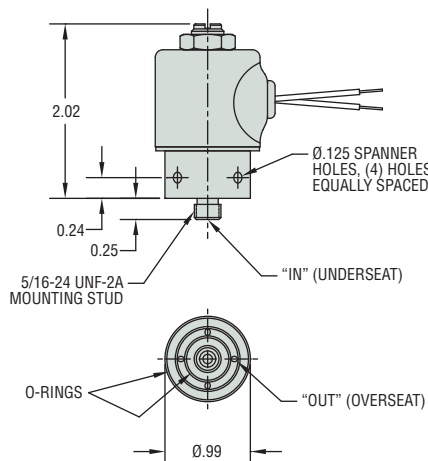


### Dimensions

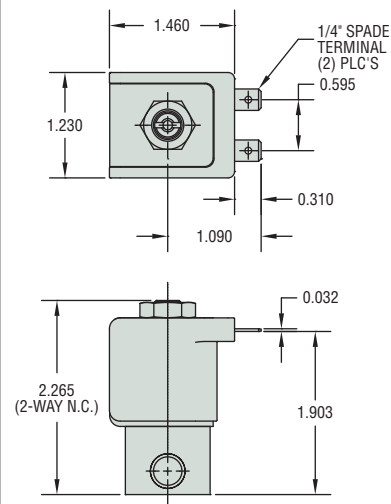
#### Threaded Port Body



#### Manifold Mount Body

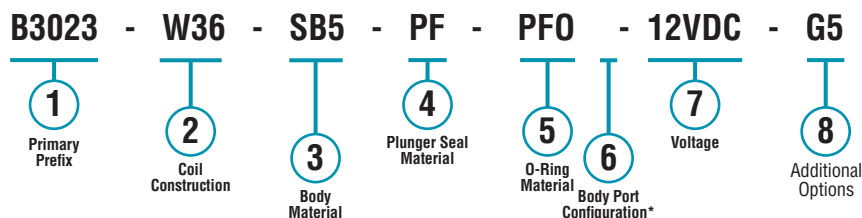


#### Molded Coil



### 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).

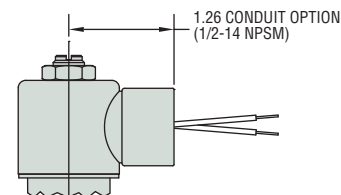
#### Example:

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<br>(psig) | C <sub>v</sub> |       | ① Primary Prefix   |                    |
|-------------------------------------|---------|------|----------------|----------------|-------|--------------------|--------------------|
|                                     | Body    | Stop |                | Body           | Stop  | Grommet<br>Housing | Conduit<br>Housing |
| 2-WAY<br>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<br>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<br>N.C.<br>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<br>N.C.<br>Line<br>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<br>N.O.                       | 5/32    | 5/64 | 15             | 0.300          | 0.090 | B3117              | B3127              |
|                                     | 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              |
| 3-WAY<br>Multi<br>Purpose           | 1/8     | 5/64 | 50             | 0.240          | 0.090 | B3216              | B3226              |
|                                     | 5/32    | 5/64 | 15             | 0.300          | 0.090 | B3217              | B3227              |
|                                     | 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-WAY<br>Directional<br>Control     | 3/32    | 5/64 | 50             | 0.155          | 0.090 | B3315              | B3325              |
|                                     | 1/8     | 5/64 | 25             | 0.240          | 0.090 | B3316              | B3326              |
|                                     | 5/32    | 5/64 | 15             | 0.300          | 0.090 | B3317              | B3327              |
|                                     | 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)

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

## 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

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)†††

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")

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

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)

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

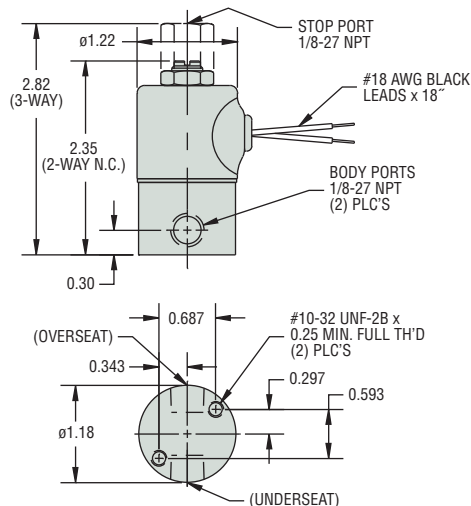
The C Series, available only in brass, is a highly durable miniature 2- or 3-way direct acting valve for applications that require a higher flow control. The C Series also utilizes a larger diameter body and larger port connections for higher  $C_v$  valves rates. The free machining brass body allows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

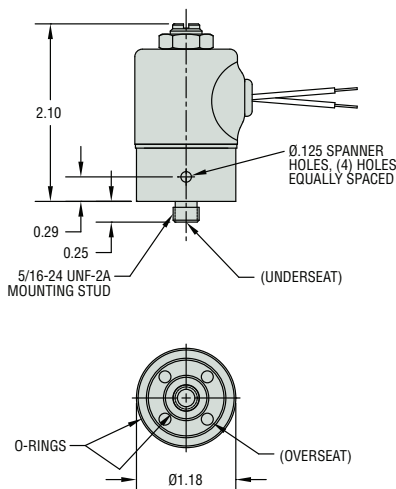
- Therapeutic Beds
- Automotive Applications
- Packaging Equipment

### Dimensions

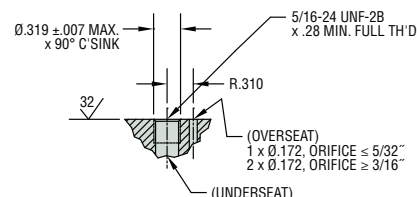
#### Threaded Port Body



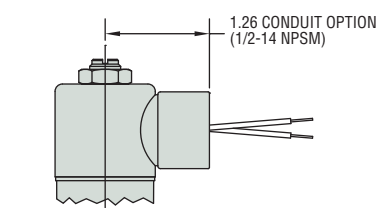
#### Manifold Mount Body



#### 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<br>(psig) | C <sub>v</sub> |       | ① Primary Prefix   |                    |
|-------------------------------------|---------|------|----------------|----------------|-------|--------------------|--------------------|
|                                     | Body    | Stop |                | Body           | Stop  | Grommet<br>Housing | Conduit<br>Housing |
| 2-WAY<br>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<br>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<br>N.C.<br>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<br>N.C.<br>Line<br>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<br>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<br>Multi<br>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<br>Directional<br>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)<sup>††</sup>

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)

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.<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

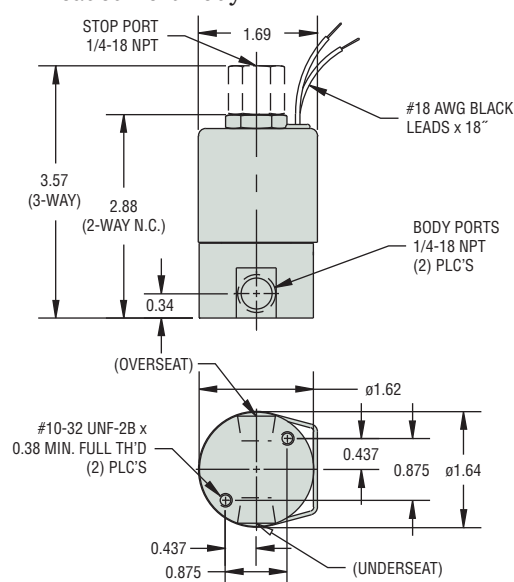
For maximum flow in a miniature solenoid valve the D Series valves delivers a wide range of  $C_v$  values and maximum operating pressures. The D Series is also available in multiple body materials, seal materials, coil constructions, voltages, and wattages. Proven to perform for millions of cycles without 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

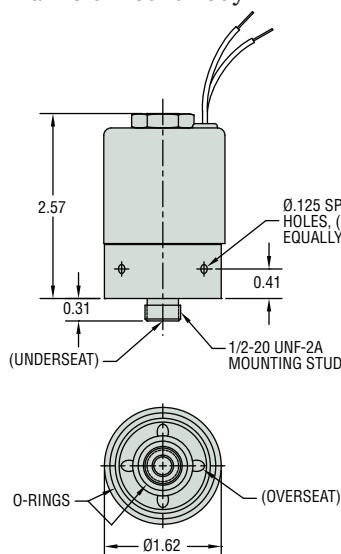
- Agriculture
- Defense
- Sterilization Equipment
- Industrial Automation

### Dimensions

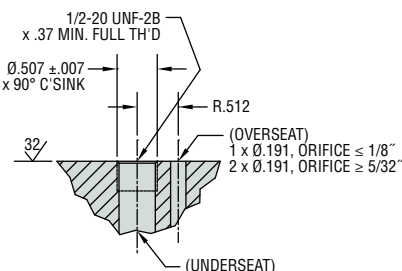
#### Threaded Port Body



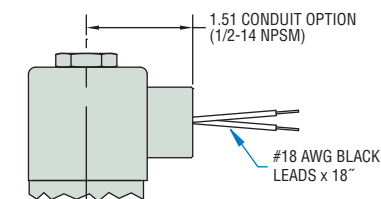
#### Manifold Mount Body



#### MANIFOLD MATING DIMENSIONS

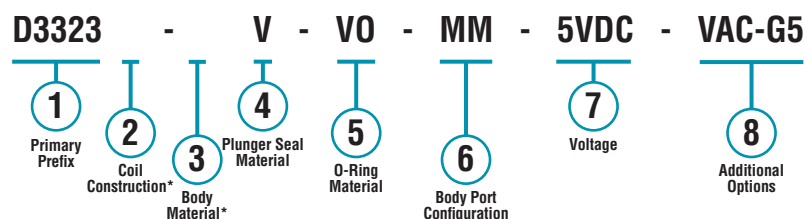


#### Alternate 1/2" Conduit Housing Available on all body configurations



### 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<br>(psig) | C <sub>v</sub> |       | ① Primary Prefix   |                    |
|-------------------------------------|---------|------|----------------|----------------|-------|--------------------|--------------------|
|                                     | Body    | Stop |                | Body           | Stop  | Grommet<br>Housing | Conduit<br>Housing |
| 2-WAY<br>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<br>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<br>N.C.<br>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              |
| 3-WAY<br>N.C.<br>Line<br>Connection | 1/8     | 1/8  | 85**           | 0.210          | 0.210 | D3014              | D3024              |
|                                     | 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              |
| 3-WAY<br>N.O.                       | 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              |
|                                     | 5/32    | 5/32 | 45**           | 0.380          | 0.380 | D3115              | D3125              |
|                                     | 3/16    | 5/32 | 30**           | 0.430          | 0.380 | D3116              | D3126              |
| 3-WAY<br>Multi<br>Purpose           | 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<br>Directional<br>Control     | 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-WAY<br>Multi<br>Purpose           | 3/32    | 3/32 | 110            | 0.150          | 0.150 | D3313              | D3323              |
|                                     | 1/8     | 1/8  | 75**           | 0.210          | 0.210 | D3314              | D3324              |
|                                     | 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              |
| 3-WAY<br>Directional<br>Control     | 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-WAY<br>Directional<br>Control     | 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)

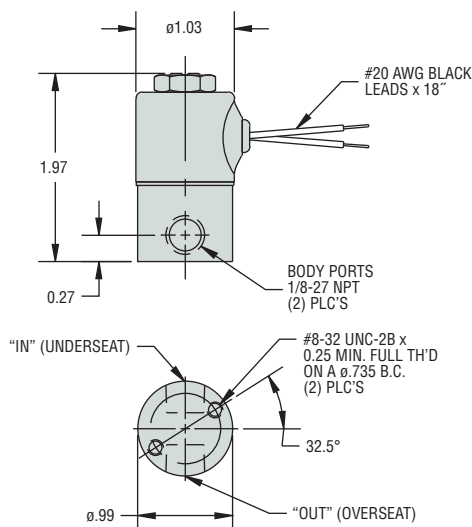
The AS Series is a 2-way isolation valve, designed to control the flow of various aggressive liquids and gases with several body and diaphragm materials. With a modular design, the AS offers performance flexibility and the protection your media needs from the solenoid's internal components. Numerous 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

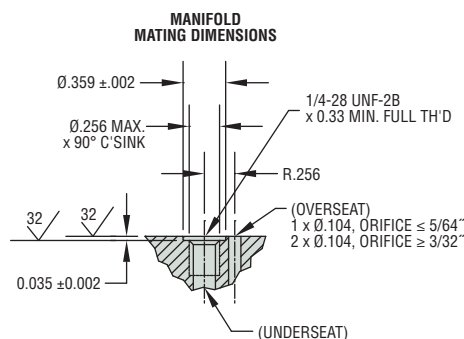
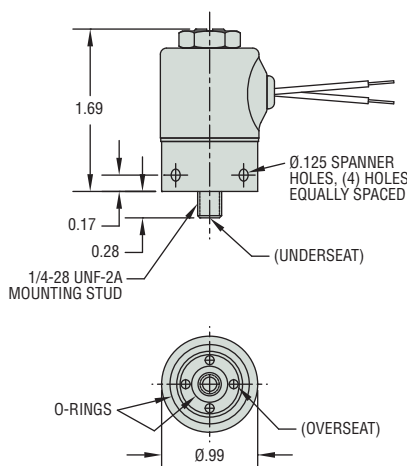
- Analytical Instruments
- Clinical Diagnostic Analyzers
- Bio-Instrumentation

### Dimensions

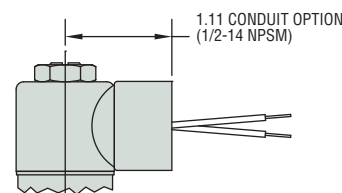
#### Threaded Port Body



#### Manifold Mount Body



#### 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**

Primary Prefix

**2**

Coil Construction

**3**

Body Material<sup>2</sup>

**4**

Diaphragm Seal Material

**5**

Body Port Configuration

**6**

Voltage

**7**

Additional Options

#### 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.

#### 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>†</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.

## ③ 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](mailto: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)

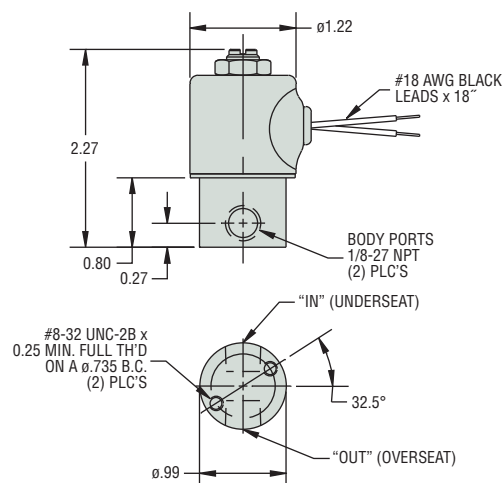
The BS Series is a 2-way, high flow, isolation valve that is designed to be virtually impervious to chemical attack and to protect high purity media. When your media cannot come in contact with any metallic materials, this highly versatile, modular valve delivers the protection you need for accurate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

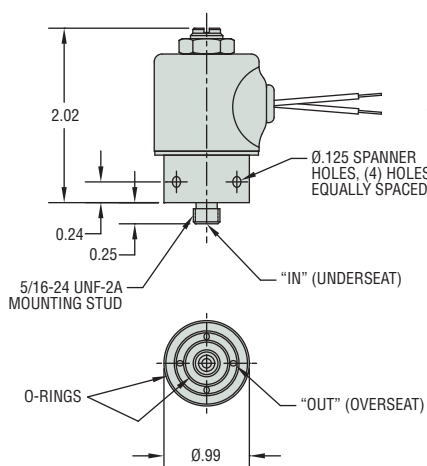
- Remediation Equipment
- Clinical Chemistry Equipment
- Analytical Instrumentation

### Dimensions

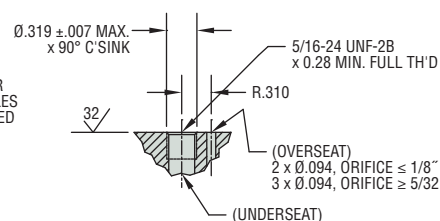
#### Threaded Port Body



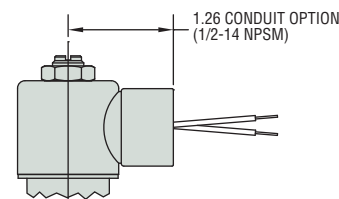
#### Manifold Mount Body



#### MANIFOLD MATING DIMENSIONS

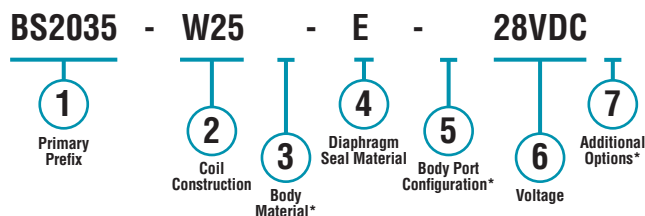


#### Alternate 1/2" Conduit Housing Available on all body configurations



### 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 (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

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.

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

## 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 $C_v$

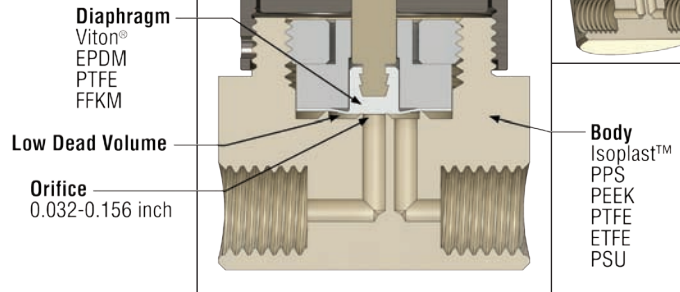
Review Step 1 – Calculating  $C_v$  on Page J-2.

### Step 2 – Valve Function

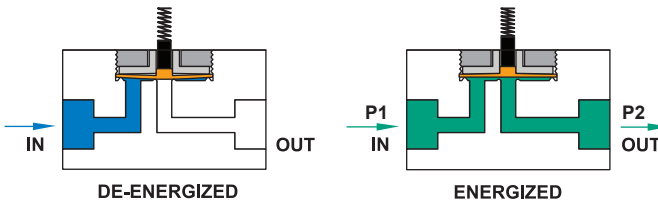
Identify how your valve will function in your application. Pick from the choices below.

#### Flow Key

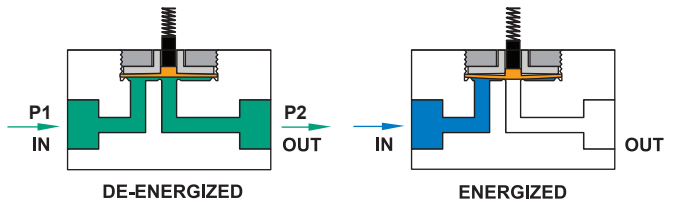
- Blocked Flow
- Free Flow
- Dual Diaphragm/Poppet



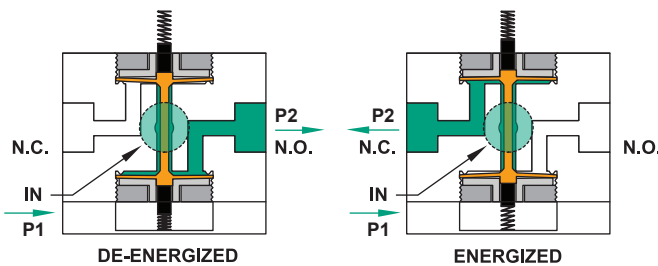
#### 2-WAY NORMALLY CLOSED



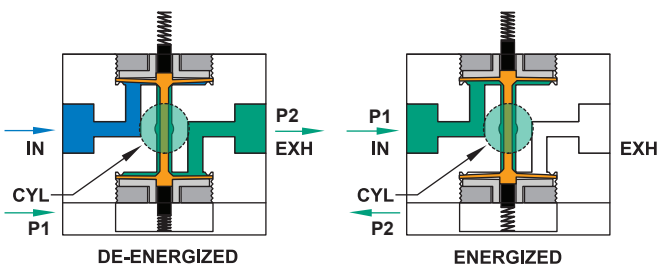
#### 2-WAY NORMALLY OPEN



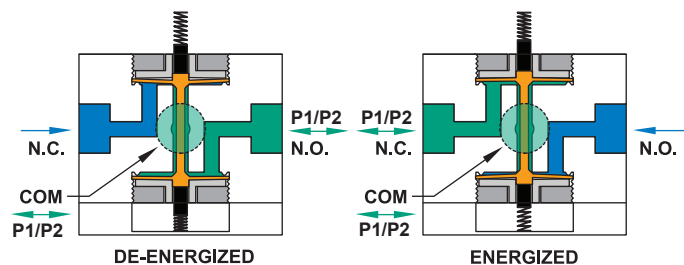
#### 3-WAY DIRECTIONAL CONTROL\*



#### 3-WAY NORMALLY CLOSED\*



#### 3-WAY MULTI-PURPOSE\*



\* K-Series 3-way valves are classified as directional control. For alternate uses contact Gems.

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 chart below.

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.

|                    | Inert Isolation                                                               |                                                   |                                                                                                    |                        |                                                               |            |
|--------------------|-------------------------------------------------------------------------------|---------------------------------------------------|----------------------------------------------------------------------------------------------------|------------------------|---------------------------------------------------------------|------------|
| Function           | 2-Way, Normally Closed                                                        |                                                   | 2- & 3-Way                                                                                         |                        | 2-Way, Normally Closed                                        | 2- & 3-Way |
| Media              | Liquid                                                                        | Gas & Liquid                                      | Liquid                                                                                             |                        |                                                               |            |
| Size               | Sub-Miniature                                                                 |                                                   | Miniature                                                                                          |                        |                                                               |            |
| $C_v$ Range        | 0.008 - 0.015                                                                 | 0.016 - 0.040                                     | 0.011 - 0.105                                                                                      |                        | 0.055 - 0.14                                                  |            |
| Port Configuration | 1/4"-28 UNF flat bottom, #10-32, 5/16"-24, 1/8" NPT, M6 X 1.0, Manifold Mount | 1/8 Barb, Face-Mount, #10-32 Threaded Flat Bottom | 1/4"-28 UNF flat bottom, #10-32, 5/16"-24, 1/8" NPT, M6 X 1.0, Tube Mount, Syringe, Manifold Mount |                        | 1/4"-28 UNF flat bottom, #10-32, 5/16"-24, 1/8" NPT, M6 X 1.0 |            |
| Orifice Dia (in)   | 0.032 - 0.054                                                                 | 0.032 & 0.052                                     | 0.032 - 0.125                                                                                      |                        | 0.092                                                         | 0.156      |
| Power (watt)       | 1.8                                                                           | 2                                                 | 2.6, 2.8                                                                                           | 4.8                    | 5.1                                                           | 8          |
| MOPD (psig)        | 20                                                                            | 70                                                | 15 - 50                                                                                            | 10 - 60                | 20                                                            | 15         |
| Valve Series       | KS                                                                            | Chem-S™                                           | KM                                                                                                 | KL                     | KV                                                            | KW         |
| Pages              | J-27, J-28                                                                    | J-25, J-26                                        | J-29, J-30, J-31, J-32                                                                             | J-29, J-30, J-31, J-32 | J-33, J-34                                                    | J-33, J-34 |

### 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 (bodies and diaphragms, fluoroelastomer, EPDM, etc.)
- Coil voltage
- Port configuration

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.



## Chem-S™ Series – Subminiature

- ▶ MOPD: 70 PSI
- ▶  $C_v$  Range: 0.016 to 0.040
- ▶ 2 Watts

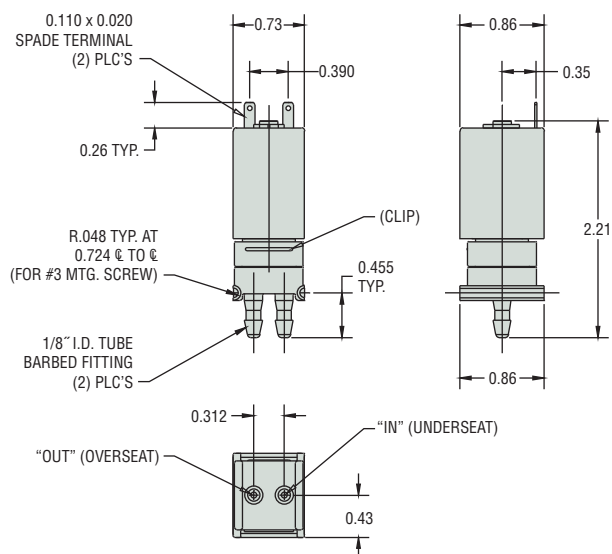
The Chem-S™ utilizes revolutionary diaphragm technology in a liquid compatible, sub-miniature inert isolation valve. With a compact size, flexible diaphragm design, low power consumption, and low cost the Chem-S provides a unique and valuable option for the medical and scientific instrumentation industries. The Chem-S specifically targets the performance and price void between the limited pinch valve and the very expensive rocker style solenoid.

### Typical Applications

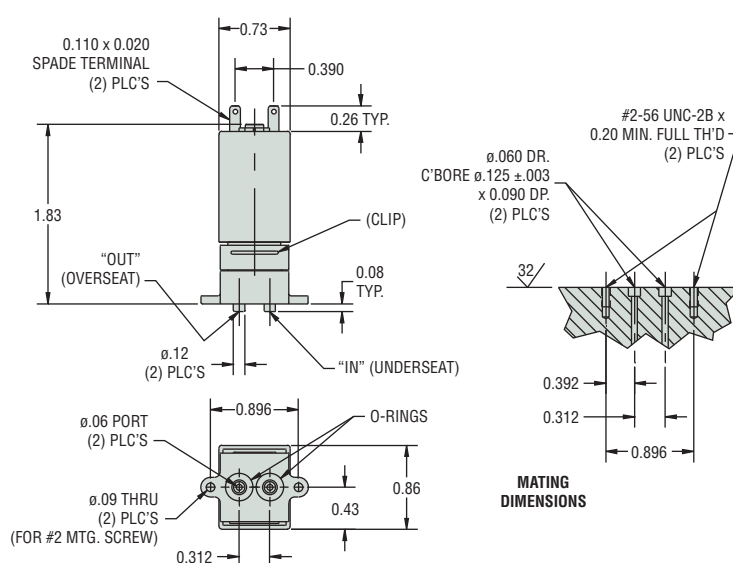
- Analytical Instrumentation
- Clinical Chemistry Equipment
- Medical Diagnostic and Testing Machinery

### Dimensions

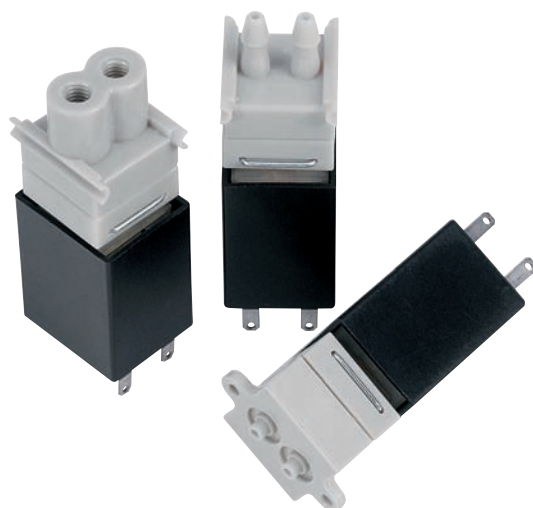
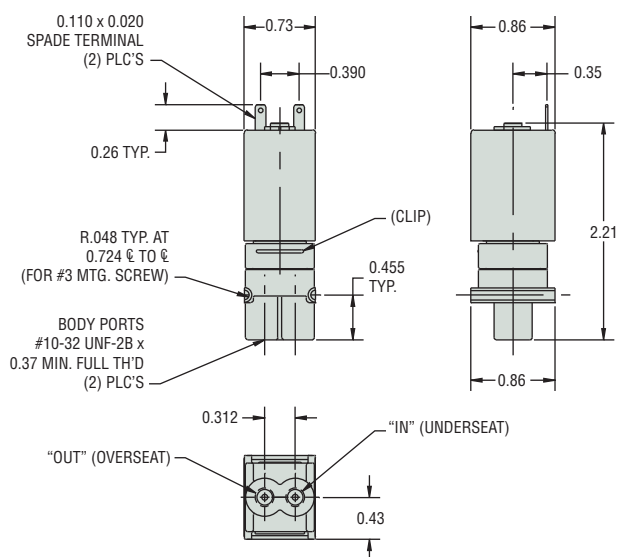
#### Barb Port Body



#### Manifold Mount Body

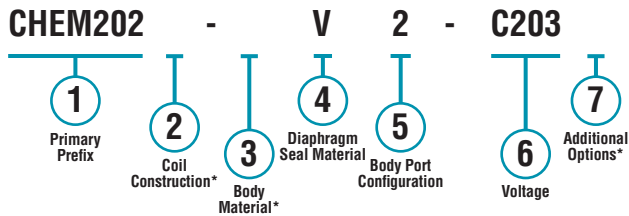


#### Threaded Port Body



## How To Order

Use the **Bold** characters from the choices listed below to construct a product code.



\* Blank entry indicates a "Standard" selection  
(Quick connect 0.110 spade and Polyurethane (Isoplast™), in this case).

### Example:

CHEM202-V2-C203

2-Way N.C. solenoid valve, with quick connect 0.110 spade, polyurethane (Isoplast™) body, Viton® diaphragm seal, manifold mount, operating at 12 VDC.

## Part Prefix Table ①

| Orifice | MOPD (psig) | C <sub>v</sub> | ① Primary Prefix |
|---------|-------------|----------------|------------------|
|         |             | Body           |                  |
| 0.031   | 70          | 0.016          | <b>CHEM202</b>   |
| 0.052   | 25          | 0.040          | <b>CHEM205</b>   |

### ② Coil Construction

(blank) = Quick connect 0.110 spade\*

### ③ Body Material

(blank) = Polyurethane (Isoplast™)\*

### ④ Diaphragm Seal Material

V = Viton®

E = EPDM

### ⑤ Body Port Configuration

1 = 1/8" barb

2 = Manifold mount†

3 = #10-32 flat bottom straight thread ports

### ⑥ Voltage

**C201** = 5 VDC

**C203** = 12 VDC

**C204** = 24 VDC

**\_\_\_ VDC** = DC (specify voltage)

Please Note: Usable for vacuum applications (0-27" Hg). When using for vacuum applications apply vacuum to "IN" port.

\* 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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## KS Series – 3/8" (9.53 mm) Solenoids

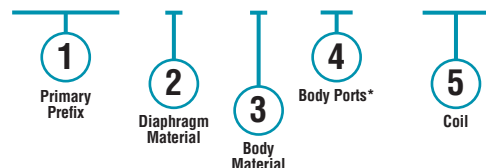
- ▶ 2-Way, Normally Closed
- ▶ MOPD: 20 PSIG (1.38 bar)
- ▶ C<sub>v</sub> Range: 0.008 to 0.015
- ▶ 1.8 Watts

KS Series isolation valves are 2-way, Normally Closed (NC) valves featuring 0.38" (10 mm) solenoid shell diameters. The isolation valve design ensures that the only wetted parts are the valve diaphragm and the valve body. For exceptional chemical compatibility the KS Series utilizes PEEK or PPS bodies, with a choice of diaphragm materials to meet your specific needs.

### How To Order

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

**KS201 - P - 4 S1 - C203**



\* Combination of Body Port Configuration and Port Thread; Manifold Mount (BM) does **not** use the Thread Size designator

#### Example:

KS201-P-4 S1-C203

Small 2-Way N.C. Perfluoroelastomer solenoid valve, with a Polyaryletheretherketone body and 1/4"-28 UNF flat bottom threaded side ports, operating at 12 VDC.

### Part Prefix Table ①

|              | Orifice<br>(inch) | MOPD* |      | C <sub>v</sub> | Internal Volume (μl) |              |                | ① Primary Prefix |
|--------------|-------------------|-------|------|----------------|----------------------|--------------|----------------|------------------|
|              |                   | psig  | bar  |                | Side Ports           | Bottom Ports | Manifold Mount |                  |
| <b>2-WAY</b> | 0.032             | 20    | 1.38 | 0.008          | 20                   | 18           | 13             | <b>KS201</b>     |
| <b>N.C.</b>  | 0.054             | 20    | 1.38 | 0.015          | 42                   | 35           | 21             | <b>KS203</b>     |

\* Maximum Operational Pressure Differential

#### ② Diaphragm Material

**T** = PTFE Polytetrafluoroethylene  
**E** = EPDM Ethylene Propylene Diene (M)  
**P** = FFKM Perfluoroelastomer

#### ③ Body Material

**3** = PPS Polyphenylene Sulfide  
**4** = PEEK Polyaryletheretherketone

#### ④ Body Port Configuration

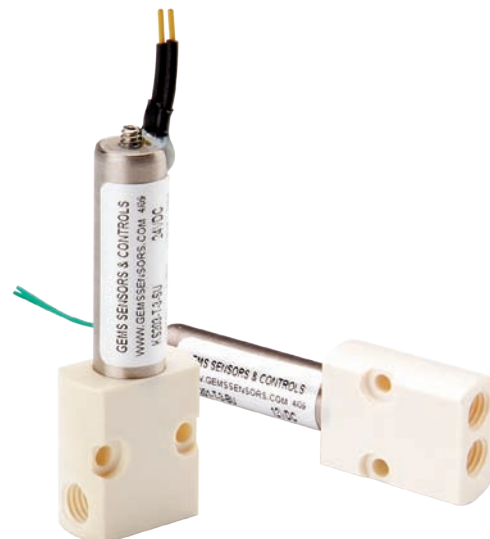
**BM** = Manifold mount  
**S\_** = Threaded side port  
**B\_** = Threaded bottom port

Port Thread (Used in conjunction with Threaded Port Configurations)

**1** = 1/4"-28 UNF flat bottom (Standard)  
**2** = 10-32  
**3** = 5/16"-24  
**4** = 1/8" NPT  
**5** = M6 X 1,0

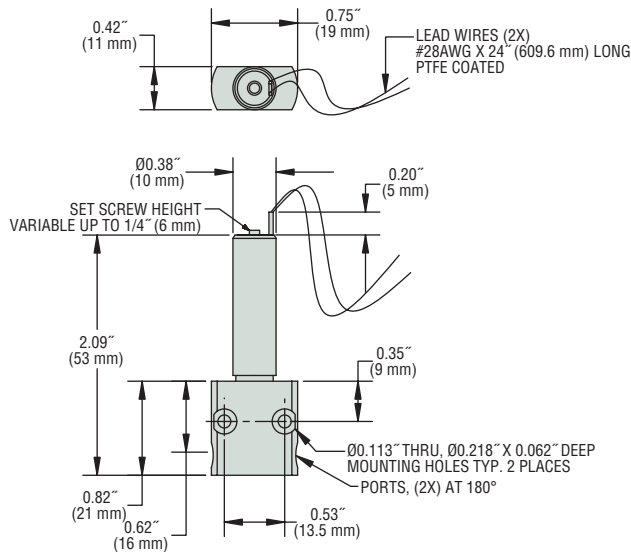
#### ⑤ Coil

**C203** = 12 VDC  
**C204** = 24 VDC

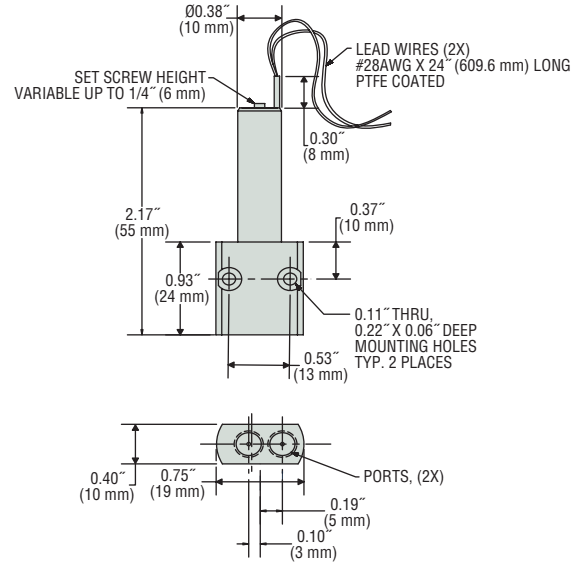


## Dimensions – Threaded Port Body

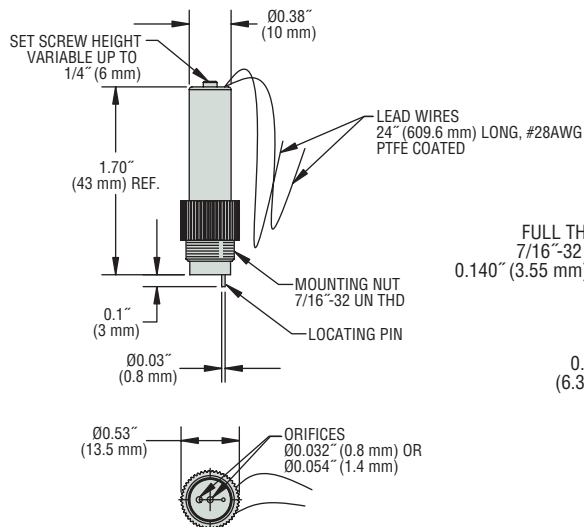
### Side Port



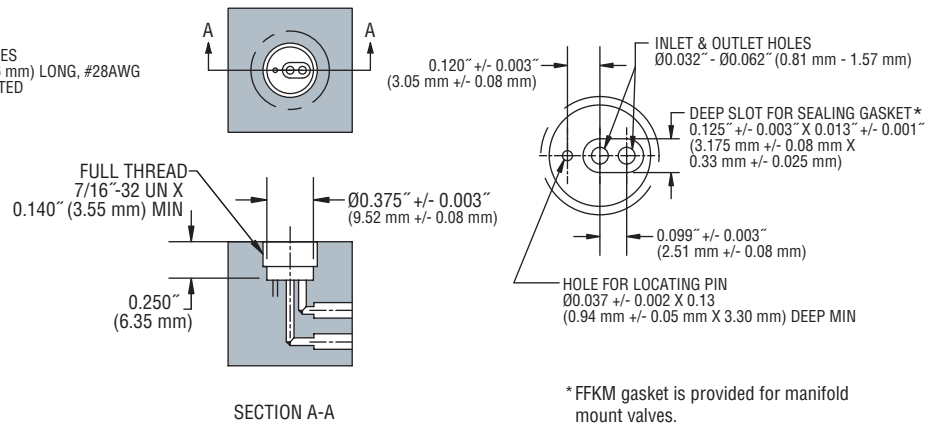
### Bottom Port



## Dimensions – Manifold Mount Body



### Manifold Preparation



\* FFKM gasket is provided for manifold mount valves.

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## KM/KL Series – 0.75" (19.05 mm) and 1.0" (25.4 mm) Solenoids

- ▶ 2-Way Normally Open/Closed; 3-Way Directional
- ▶ MOPD: 10 PSIG to 30 PSIG (0.69 bar to 2.07 bar); to 60 PSIG (4.17 bar) on 3-Way
- ▶  $C_v$  Range: 0.011 to 0.105
- ▶ As Low as 2.8 Watts

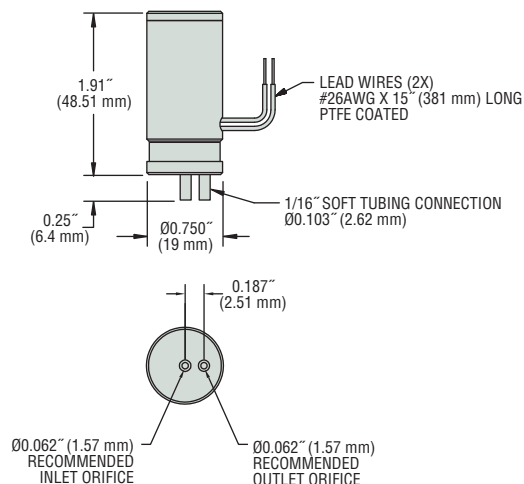
These isolation valves offer 2-way Normally Open (NO) and Closed (NC), or 3-way Directional Control operation. While sharing similar configurations with the KM Series, the KL Series features larger orifice sizes with greater  $C_v$  values. Their design ensures that the only wetted parts are the valve diaphragm and body.

Find Ordering Information on Page J-32.

### Dimensions – Tube Mount Body

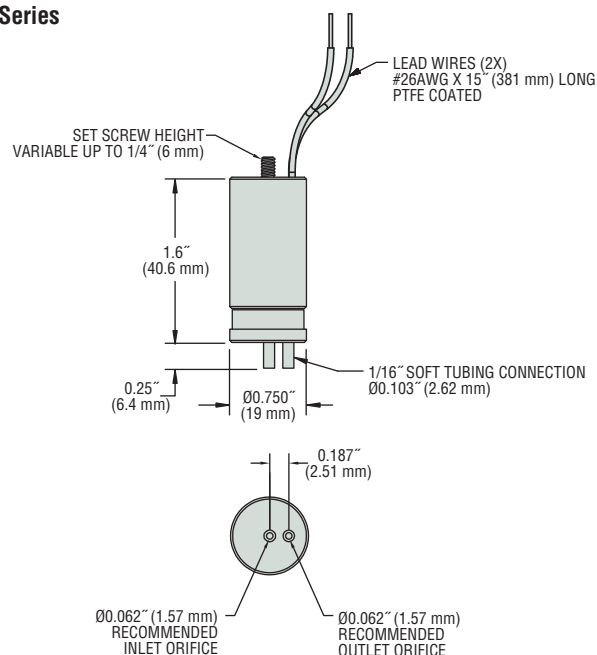
2-Way, Normally Open (N.O.)

**KM Series**



2-Way, Normally Closed (N.C.)

**KM Series**

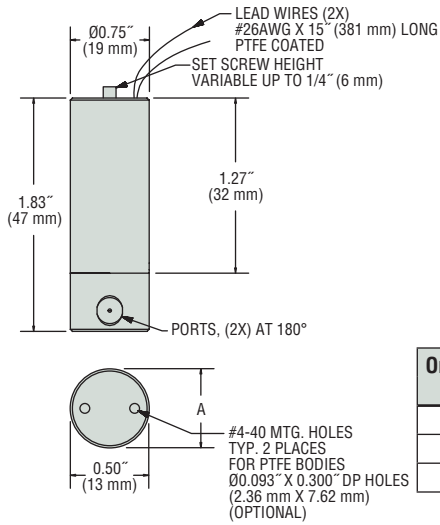




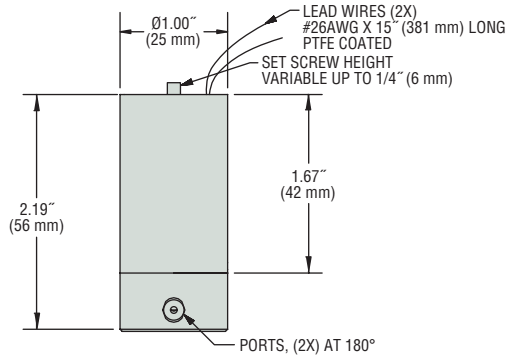
## Dimensions – Side Port Body

### 2-Way, Normally Closed (N.C.)

#### KM Series

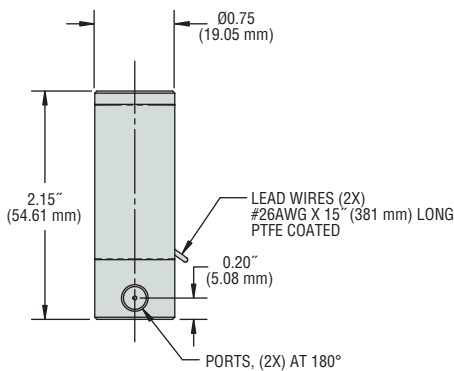


#### KL Series

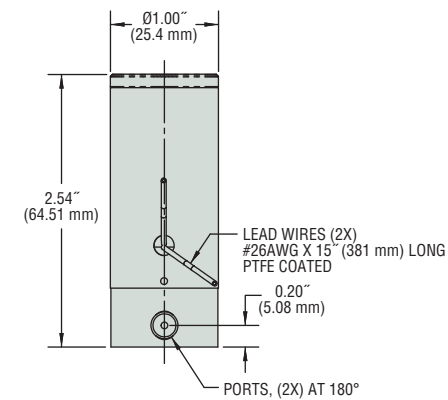


### 2-Way, Normally Open (N.O.)

#### KM Series

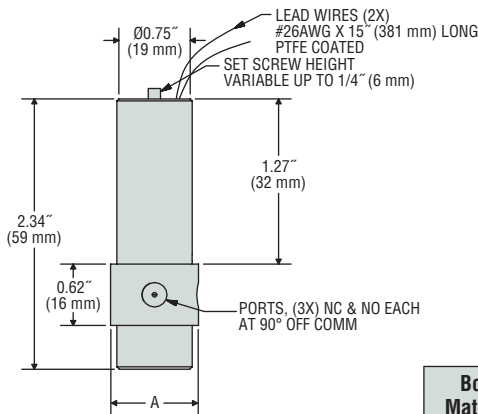


#### KL Series

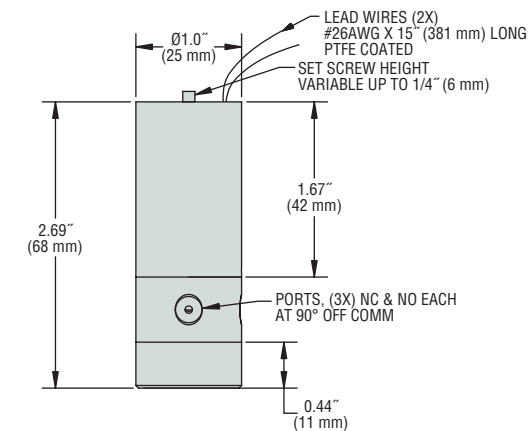


### 3-Way, Normally Closed (N.C.), Multi-Purpose, Directional Control

#### KM Series



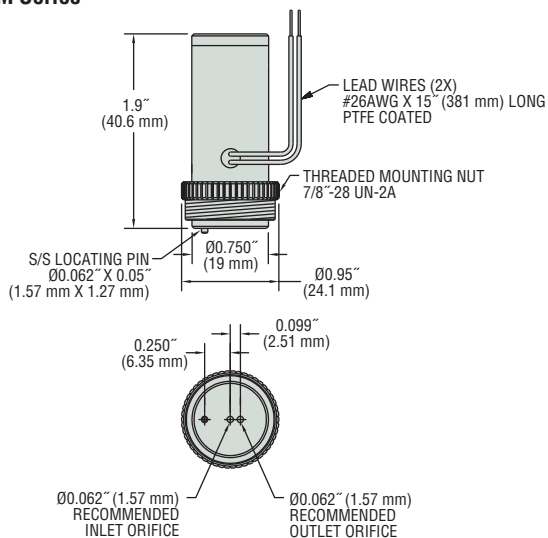
#### KL Series



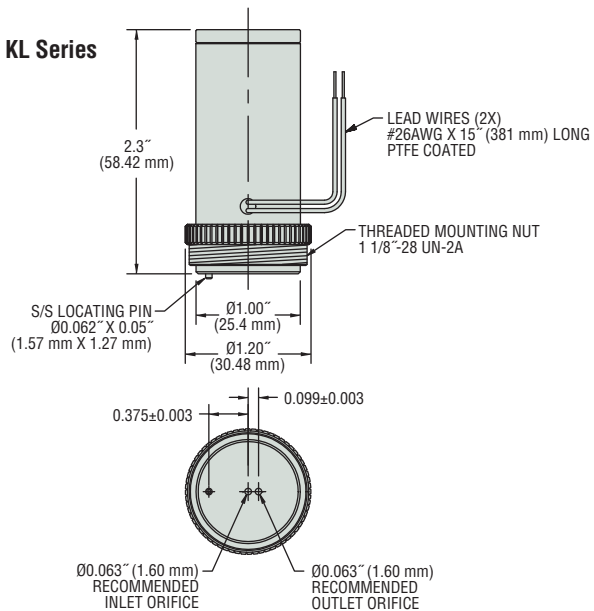
## Dimensions – Manifold Mount Body

### 2-Way, Normally Open (N.O.)

#### KM Series

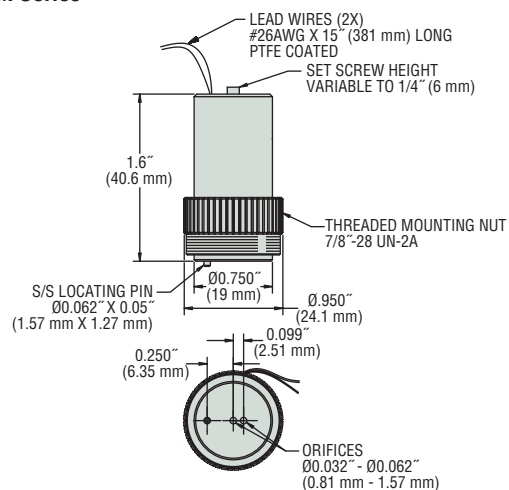


#### KL Series

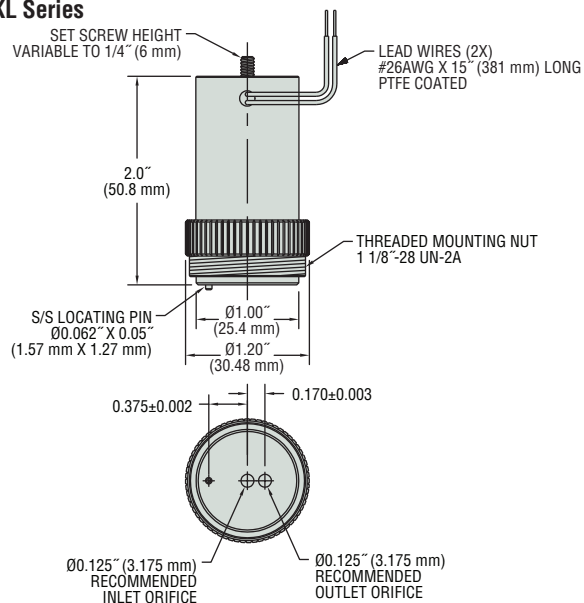


### 2-Way, Normall Closed (N.C.)

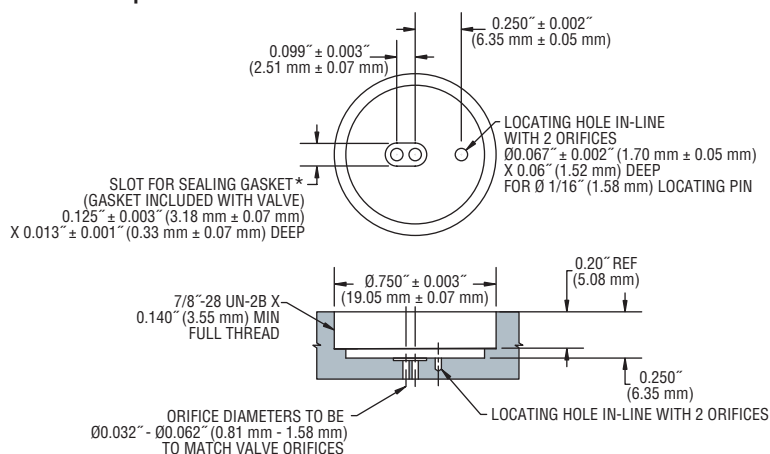
#### KM Series



#### KL Series



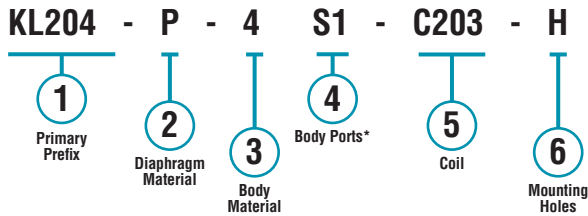
### Manifold Preparation – KM Series



Note: Valve spacing to be 1.00" (25.4 mm) min. center to center  
\*FFKM gasket is provided for manifold mount valves.

## How To Order

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



\* Combination of Body Port Configuration and Port Thread; BM, BT, SL and SU do **not** use the Thread Size designator

**Example:** KL204-P-4 S1-C203-H

2-Way N.C. solenoid valve with a PEEK body and FFKM diaphragm configured with 1/4"-28 UNF threaded Side Ports, optional mounting holes, and operating at 12 VDC.

## Part Prefix Table ①

|                                   | Orifice (inch) | MOPD*                 |                           | C <sub>v</sub> | Internal Volume (μl) |                |            | ① Primary Prefix |
|-----------------------------------|----------------|-----------------------|---------------------------|----------------|----------------------|----------------|------------|------------------|
|                                   |                | psig                  | bar                       |                | Side Mount           | Manifold Mount | Tube Mount |                  |
| <b>2-WAY N.C.</b>                 | 0.032          | 20                    | 1.38                      | 0.011          | 19                   | 33             | —          | <b>KM201</b>     |
|                                   | 0.054          | 20                    | 1.38                      | 0.027          | 39                   | N/A            | —          | <b>KM203</b>     |
|                                   | 0.062          | 20                    | 1.38                      | 0.03           | 54                   | 52             | 106        | <b>KM204</b>     |
|                                   | 0.062          | 30                    | 2.07                      | 0.042          | 55                   | 55             | —          | <b>KL204</b>     |
|                                   | 0.092          | 15                    | 1.03                      | 0.08           | 133                  | N/A            | —          | <b>KL205</b>     |
|                                   | 0.125          | 10                    | 0.69                      | 0.105          | 296                  | 223            | —          | <b>KL206</b>     |
| <b>2-WAY N.O.</b>                 | 0.032          | 20                    | 1.38                      | 0.011          | 19                   | 33             | —          | <b>KM221</b>     |
|                                   | 0.054          | 20                    | 1.38                      | 0.027          | 39                   | N/A            | —          | <b>KM223</b>     |
|                                   | 0.062          | 20                    | 1.38                      | 0.03           | 54                   | 52             | 106        | <b>KM224</b>     |
|                                   | 0.062          | 30                    | 2.07                      | 0.042          | 55                   | 55             | —          | <b>KL224</b>     |
|                                   | 0.092          | 10                    | 0.69                      | 0.08           | 133                  | N/A            | —          | <b>KL225</b>     |
|                                   | 0.125          | 10                    | 0.69                      | 0.105          | 296                  | 223            | —          | <b>KL226</b>     |
| <b>3-WAY Directional Controls</b> | 0.032          | 15 (NC/O)<br>20 (Com) | 1.03 (NC/O)<br>1.38 (Com) | 0.01           | 45                   | N/A            | —          | <b>KM341</b>     |
|                                   | 0.046          | 15 (NC/O)<br>20 (Com) | 1.03 (NC/O)<br>1.38 (Com) | 0.023          | 52                   | N/A            | —          | <b>KM342</b>     |
|                                   | 0.032          | 30 (NC/O)<br>60 (Com) | 2.07 (NC/O)<br>4.14 (Com) | 0.01           | 47                   | N/A            | —          | <b>KL341</b>     |
|                                   | 0.062          | 30 (NC/O)<br>60 (Com) | 2.07 (NC/O)<br>4.14 (Com) | 0.028          | 87                   | N/A            | —          | <b>KL344</b>     |

\* Maximum Operational Pressure Differential

### ② Diaphragm Material

2-Way

**T** = PTFE Polytetrafluoroethylene  
**E** = EPDM Ethylene Propylene Diene (M)  
**V** = FKM Fluoroelastomers<sup>1</sup>  
**P** = FFKM Perfluoroelastomer

3-Way KM

**T** = PTFE Polytetrafluoroethylene  
**E** = EPDM Ethylene Propylene Diene (M)  
**P** = FFKM Perfluoroelastomer

3-Way KL

**T** = PTFE Polytetrafluoroethylene

### ③ Body Material

**1** = PTFE Polytetrafluoroethylene  
**2** = ETFE Ethylene Tetrafluoroethylene  
**3** = PPS Polyphenylene Sulfide  
**4** = PEEK Polyaryletheretherketone  
**5** = PSU Polysulfone<sup>2</sup>

### ④ Body Port Configuration

**BM** = Manifold mount<sup>3</sup>

**BT** = Tube mount - accomodates 1/16" ID soft tubing<sup>3,4</sup>

**SL** = Syringe - luer common port & 1/4"-28 UNF NC/O ports<sup>5</sup>

**SU** = Syringe - 1/4"-28 UNF ports<sup>5</sup>

**S** = Threaded side port

**B** = Threaded bottom port

Port Thread (Used in conjunction with Threaded Port Configurations)

**1** = 1/4"-28 UNF flat bottom (Standard)

**2** = 10-32<sup>6</sup>

**3** = 5/16"-24

**4** = 1/8" NPT

**5** = M6 X 1,0

### ⑤ Coil

**C203** = 12 VDC

**C204** = 24 VDC

**C109** = 115 VAC

**C116** = 220 VAC

### ⑥ Mounting Holes

**(blank)** = Holes not required

**H** = Mounting Holes in body

Notes

1. Not available in KL2X5 or KL2X6.

2. Available in KM2X4, E/V diaphragms, BM/BT port configurations.

3. See internal volume chart for available orifices.

4. PSU body only.

5. Available in KM3XX, PEEK body, PTFE diaphragm.

6. Not available in KL2X5 or KL2X6.

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## KV/KW Series – 1.25" (31.75 mm) and 1.5" (38.1 mm) Solenoids

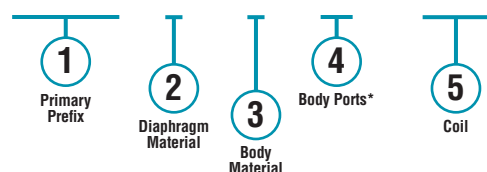
- ▶ 2-Way Normally Closed and 3-Way Directional Control
- ▶ MOPD: 15 PSI to 20 PSI
- ▶  $C_v$  Range: 0.055 to 0.14
- ▶ PTFE Bodies and Diaphragms

Our largest orifice sizes for the highest flow rates, with a reduced component height. They feature all-PTFE wetted parts for extreme chemical compatibility.

### How To Order

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

**KV205 - T - 1 S1 - C203**



\* Combination of Body Port Configuration and Port Thread; Manifold Mount (BM) does **not** use the Thread Size designator

### Example:

KV205-T-1 S1-C203-H

2-Way N.C. PTFE solenoid valve, with a PTFE body, 1/4"-28 UNF flat bottom threaded side ports and mounting holes, operating at 12 VDC.

### Part Prefix Table ①

|                                   | Orifice (inch) | MOPD* (psig) | $C_v$ | Internal Volume (μl) | ① Primary Prefix |
|-----------------------------------|----------------|--------------|-------|----------------------|------------------|
| <b>2-WAY</b>                      | 0.092          | 20           | 0.055 | 108                  | <b>KV205</b>     |
| <b>N.C.</b>                       | 0.156          | 15           | 0.11  | 239                  | <b>KW207</b>     |
| <b>3-WAY Directional Controls</b> | 0.156          | 15 (NC/O)    | 0.14  | 462                  | <b>KW347</b>     |

\* Maximum Operational Pressure Differential

### ② Diaphragm Material

T = PTFE Polytetrafluoroethylene

### ③ Body Material

1 = PTFE Polytetrafluoroethylene

### ④ Body Port Configuration

S\_ = Threaded side port

Port Thread (Used in conjunction with Threaded Port Configurations)

1 = 1/4"-28 UNF flat bottom<sup>1</sup> (Standard for KV)

2 = 10-32<sup>1</sup>

3 = 5/16"-24

4 = 1/8" NPT (Standard for KW)

5 = M6 X 1.0<sup>1</sup>

### ⑤ Coil

C203 = 12 VDC

C204 = 24 VDC

C109 = 115 VAC

C116 = 220 VAC

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

Note

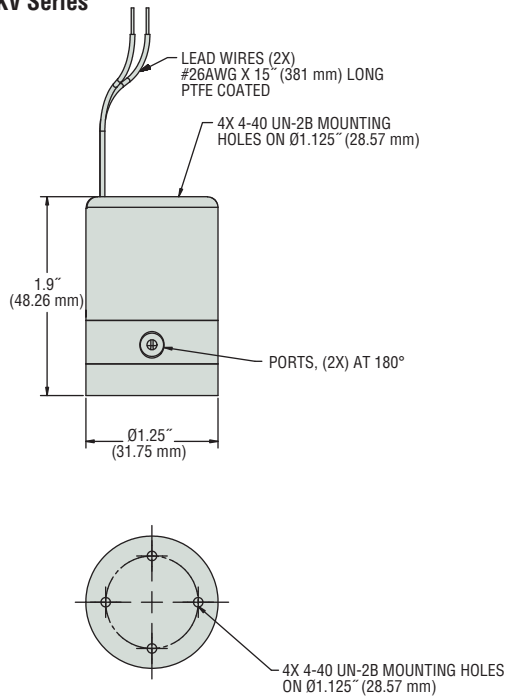
1. Not available with KW Series.



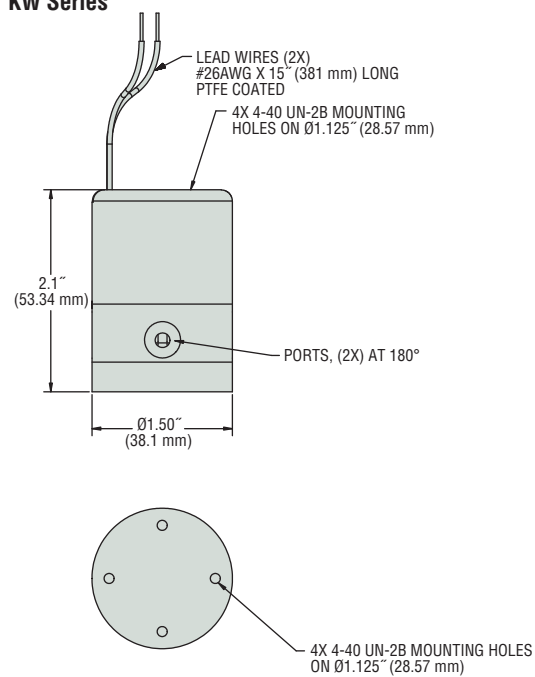
## Dimensions – Side Port Body

### 2-Way, Normally Closed (N.C.)

#### KV Series

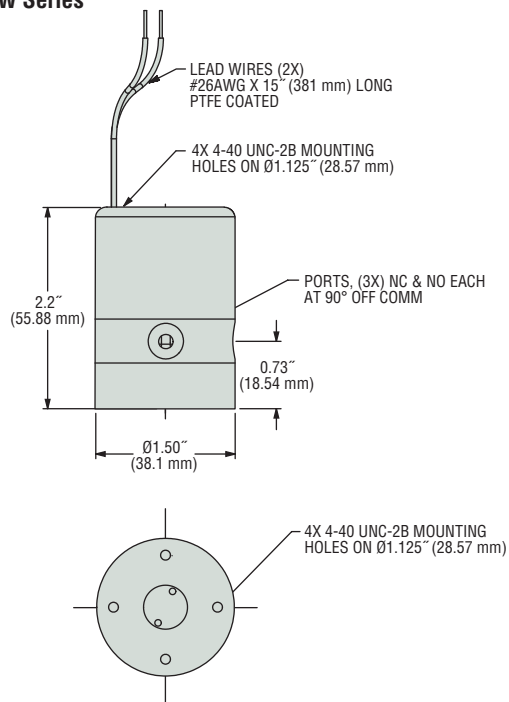


#### KW Series



### 3-Way, Normally Closed (N.C.), Multi-Purpose, Directional Control

#### KW Series



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## B-Cryo Series

- ▶ MOPD: 900 PSI
- ▶  $C_v$  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  $C_v$  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.

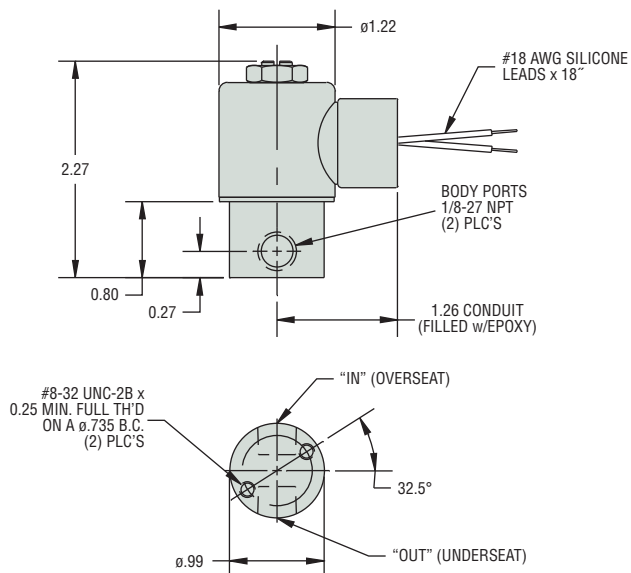


### Typical Applications

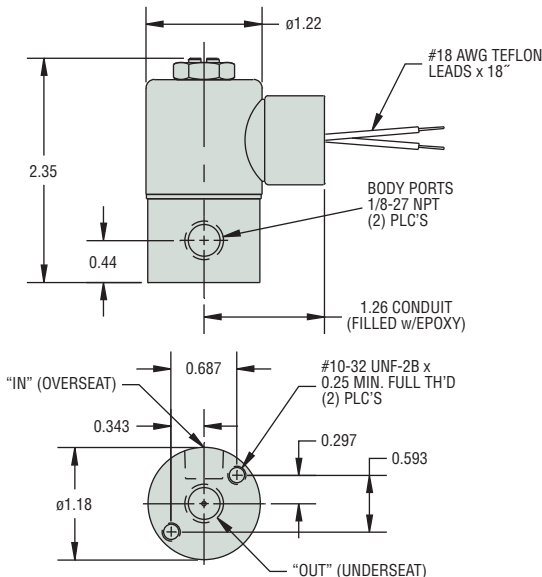
- Environmental Chambers
- Food Processing
- Laser Surgical Equipment
- Semiconductor Manufacturing

### Dimensions

#### LN2-Liquid Nitrogen



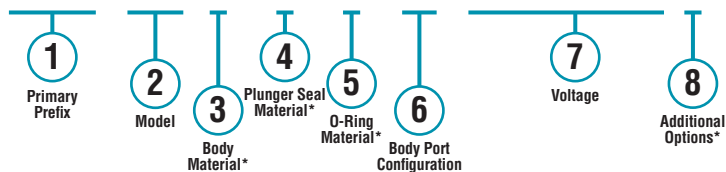
#### LCO2-Liquid Carbon Dioxide



### 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

| Orifice<br>Body | MOPD<br>(psig) | C <sub>v</sub><br>Body | ① Primary Prefix                     |                                        |                                |
|-----------------|----------------|------------------------|--------------------------------------|----------------------------------------|--------------------------------|
|                 |                |                        | Class H, Encapsulated Coils          |                                        |                                |
|                 |                |                        | Lead Wires—Filled<br>Conduit Housing | Lead Wires—Unfilled<br>Conduit Housing | Lead Wires—<br>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

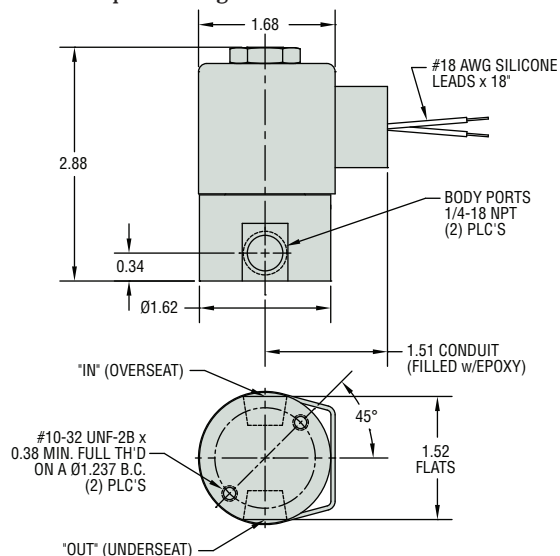
The D-Cryo Series is a 2-way, high flow, miniature Cryogenic valve designed and built for service down to  $-320^{\circ}\text{F}$  ( $-196^{\circ}\text{C}$ ). Depending on your temperature requirements, the D-Cryo Series can be configured for liquid nitrogen (LN2), liquid carbon dioxide (LCO2), and other 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

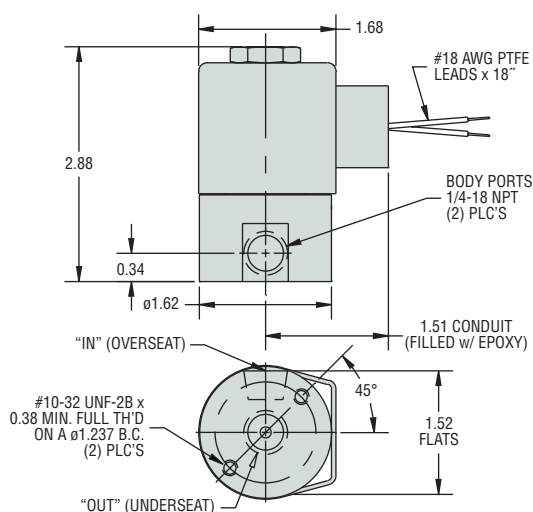
- Environmental Chambers
- Food Processing
- Laser Surgical Equipment
- Semiconductor Manufacturing

### Dimensions

#### LN2-Liquid Nitrogen



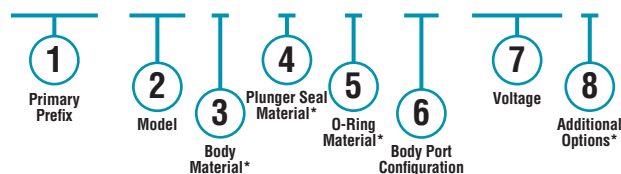
#### LCO2-Liquid Carbon Dioxide



### 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

| Orifice<br>Body | MOPD<br>(psig) | C <sub>v</sub><br>Body | ① Primary Prefix                     |                                        |                                |
|-----------------|----------------|------------------------|--------------------------------------|----------------------------------------|--------------------------------|
|                 |                |                        | Class H, Encapsulated Coils          |                                        |                                |
|                 |                |                        | Lead Wires—Filled<br>Conduit Housing | Lead Wires—Unfilled<br>Conduit Housing | Lead Wires—<br>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

-LC02 = Liquid Carbon Dioxide model

## ③ Body Material

LN2 Only

(blank) = 430F Stainless Steel\*

LC02 Only

(blank) = 430F Stainless Steel\*

BB = Brass

## ④ Plunger Seal Material

LN2 Only

(blank) = Rulon®\*

LC02 Only

(blank) = PTFE\*

MQ = Silicone (consult factory)

## ⑤ O-Ring Material

LN2 Only

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

LC02 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

LC02 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)

LC02 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\*

LC02 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.

## 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: 888.840.1230

|          |           |       |
|----------|-----------|-------|
| 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 \_\_\_\_\_ (GPM or SCFM) with a \_\_\_\_\_ psig at the Inlet, and \_\_\_\_\_ psig at the outlet  
Flow at the Stop Orifice \_\_\_\_\_ (GPM 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"/> 1/8" NPT  | <input type="checkbox"/> Stop Port (If Different) | <input type="checkbox"/> 180°     | <input type="checkbox"/> Female Bottom Port      | <input type="checkbox"/> Male Bottom Porting |
| <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"/> Specify Port Size _____ | <input type="checkbox"/> 1/8" NPT (Brass)    |
| <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° Right               | <input type="checkbox"/> Pressure Over-Seat  |
| <input type="checkbox"/> Metering                | <input type="checkbox"/> #10-32    | <input type="checkbox"/> 1/8" BSPT                |                                   | <input type="checkbox"/> 90° Left                | <input type="checkbox"/> Pressure Under Seat |
|                                                  | <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.