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.

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.

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 CV

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 (P1 - P2 or ΔP, 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:

\[ C_v = \sqrt{\frac{V}{100-40}} \]

\[ V = 3.08 \text{ GPM} \]
\[ P1 = 100 \text{ PSI} \]
\[ P2 = 40 \text{ PSI} \]
\[ SG = 1 \]

\[ C_v = \sqrt{\frac{3.08}{100-40}} = 0.398 \]

Gas Flow

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

Example: Using Air:

\[ V = 10 \text{ SCFM} \]
\[ P1 = 20 \text{ PSIG} = 34.7 \text{ PSIA} \]
\[ P2 = 0 \text{ PSIG} = 14.7 \text{ PSIA} \]
\[ SG = 1 \]
\[ T = 72^\circ F = 532^\circ \text{ Rankine} \]

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

\[ C_v = \frac{10}{13.61 \cdot 34.7 \sqrt{\frac{1}{(1) 532}}} = 0.49 \]

Temperature and C_v

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

Flow rate through your valve.

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

**Step 2 – Valve Function**
Identify how your valve will function in your application. Pick from the choices below.

**An important note regarding Cᵥ and valve function:**
The Cᵥ 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, Cᵥ is calculated using the specific Inlet Pressure (P₁) and Outlet Pressure (P₂) for the flow paths described below.

**Flow Key**
- Blue: Blocked Flow
- Green: Free Flow

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**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**

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Gems specializes in the design and manufacturing of custom solenoid valves and fluidic systems. If you don’t see what you’re looking for, or have a question, contact us at 800-378-1600 or info@gemssensors.com.
Step 3 – Identify Your Valve Series
Select possible valve series candidate using the overview charts below. Begin by choosing the category for your application:

- General Purpose
- Isolation
- Cryogenic

Using the charts, select 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.

### General Purpose

<table>
<thead>
<tr>
<th>Function</th>
<th>2- &amp; 3-Way</th>
</tr>
</thead>
<tbody>
<tr>
<td>Media</td>
<td>Gas Only</td>
</tr>
<tr>
<td>Size</td>
<td>Sub-Miniature, Miniature</td>
</tr>
<tr>
<td>$C_v$ Range</td>
<td>0.018 - 0.070, 0.019 - 0.430, 0.045 - 0.880</td>
</tr>
<tr>
<td>Port Configuration</td>
<td>#10-32, Barb (1/16, 5/64, 1/8), #10-32, 1/8, 1/4 NPT, 1/8, 1/4, 3/8 NPT, 1/8, 1/4, 3/8 NPT, 1/8, 1/4, 3/8 NPT, Manifold Mount</td>
</tr>
<tr>
<td>Orifice Dia (in)</td>
<td>0.032 - 0.078, 0.031 - 0.052, 0.032 - 0.156, 0.062 - 0.210, 0.047 - 0.375</td>
</tr>
<tr>
<td>Power (watt)</td>
<td>0.65, 2, 0.5, 1, 2, 6, 7, 10</td>
</tr>
<tr>
<td>MOPD (psi)</td>
<td>175, 250, 100, 1000, 400, 900</td>
</tr>
<tr>
<td>Valve Series</td>
<td>E, EH, G, GH, M, A, B, C, D</td>
</tr>
<tr>
<td>Pages</td>
<td>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</td>
</tr>
</tbody>
</table>

### Cryogenic

<table>
<thead>
<tr>
<th>Function</th>
<th>2-Way, Normally Closed Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Media</td>
<td>Liquid, Gas &amp; Liquid</td>
</tr>
<tr>
<td>Size</td>
<td>Miniature</td>
</tr>
<tr>
<td>$C_v$ Range</td>
<td>0.045 - 0.440, 0.040 - 0.770, 0.020 - 0.300</td>
</tr>
<tr>
<td>Port Configuration</td>
<td>1/8, 1/4 NPT, 1/8, 1/4, 3/8 NPT, #10-32, 1/8, 1/4, 3/8 NPT, 1/8, 1/4, 3/8 NPT, 1/8, 1/4, 3/8 NPT, Manifold Mount</td>
</tr>
<tr>
<td>Orifice Dia (in)</td>
<td>0.046 - 0.188, 0.046 - 0.250, 0.032 - 0.156</td>
</tr>
<tr>
<td>Power (watt)</td>
<td>9, 15, 4.5, 7</td>
</tr>
<tr>
<td>MOPD (psi)</td>
<td>900, 1000*, 50 (Plastic Body), 150</td>
</tr>
<tr>
<td>Valve Series</td>
<td>B-Cryo, D-Cryo, AS, BS</td>
</tr>
<tr>
<td>Pages</td>
<td>J-35, J-36, J-37, J-38, J-19, J-20, J-21, J-22</td>
</tr>
</tbody>
</table>

*Consult factory for higher MOPD.

### Inert Isolation

<table>
<thead>
<tr>
<th>Function</th>
<th>2-Way, Normally Closed Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Media</td>
<td>Day-Specific, Gas &amp; Liquid</td>
</tr>
<tr>
<td>Size</td>
<td>Miniature</td>
</tr>
<tr>
<td>$C_v$ Range</td>
<td>0.045 - 0.440, 0.040 - 0.770, 0.020 - 0.300</td>
</tr>
<tr>
<td>Port Configuration</td>
<td>1/8, 1/4 NPT, 1/8, 1/4, 3/8 NPT, #10-32, 1/8, 1/4, 3/8 NPT, 1/8, 1/4, 3/8 NPT, 1/8, 1/4, 3/8 NPT, Manifold Mount</td>
</tr>
<tr>
<td>Orifice Dia (in)</td>
<td>0.046 - 0.188, 0.046 - 0.250, 0.032 - 0.156</td>
</tr>
<tr>
<td>Power (watt)</td>
<td>9, 15, 4.5, 7</td>
</tr>
<tr>
<td>MOPD (psi)</td>
<td>900, 1000*, 50 (Plastic Body), 150</td>
</tr>
<tr>
<td>Valve Series</td>
<td>B-Cryo, D-Cryo, AS, BS</td>
</tr>
<tr>
<td>Pages</td>
<td>J-35, J-36, J-37, J-38, J-19, J-20, J-21, J-22</td>
</tr>
</tbody>
</table>

*Consult factory for higher MOPD.

### Step 4 – Make Your Selection and Configure Your Valve

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

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

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

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

- MOPD: 100 PSI
- C, 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

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Threaded Port Body</th>
<th>Manifold Mount Body</th>
</tr>
</thead>
<tbody>
<tr>
<td>STOP PORT (2-WAY N.O. &amp; 3-WAY)</td>
<td>0.305</td>
<td>1.75 (3-WAY)</td>
</tr>
<tr>
<td>ø.125 THRU MOUNTING HOLES</td>
<td>0.733</td>
<td>ø.73</td>
</tr>
<tr>
<td>(UNDERSEAT)</td>
<td>0.280</td>
<td></td>
</tr>
<tr>
<td>ø.196</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ø.610</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

How To Order

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

**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.

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

Part Prefix Table

| Power Rating | Orifice | MOPD (psig) | $C_v$ | Body | Prefix
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 Watt</td>
<td>0.031</td>
<td>25</td>
<td>0.020</td>
<td>MA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.052</td>
<td>10</td>
<td>0.038</td>
<td>MA</td>
<td></td>
</tr>
<tr>
<td>1 Watt</td>
<td>0.031</td>
<td>50</td>
<td>0.020</td>
<td>MB</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.052</td>
<td>25</td>
<td>0.038</td>
<td>MB</td>
<td></td>
</tr>
<tr>
<td>2 Watts</td>
<td>0.031</td>
<td>100</td>
<td>0.020</td>
<td>MC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.052</td>
<td>50</td>
<td>0.038</td>
<td>MC</td>
<td></td>
</tr>
</tbody>
</table>

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
- 0 = 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-28 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.
E & EH Series – Subminiature Gas

- MOPD: 175 PSI
- Cₜₚ 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.

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

*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.
<table>
<thead>
<tr>
<th>Power Rating</th>
<th>Orifice Body</th>
<th>MOPD (psig)</th>
<th>Orifice Stop</th>
<th>CV</th>
<th>Primary Prefix</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-WAY N.C.</td>
<td>0.65W</td>
<td>1/32</td>
<td>125</td>
<td>0.018</td>
<td>E2010</td>
</tr>
<tr>
<td></td>
<td>3/64</td>
<td>70</td>
<td>0.023</td>
<td>E2011</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1/16</td>
<td>40</td>
<td>0.036</td>
<td>E2012</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5/64</td>
<td>20</td>
<td>0.070</td>
<td>E2013</td>
<td></td>
</tr>
<tr>
<td>2W</td>
<td>1/32</td>
<td>175</td>
<td>0.018</td>
<td>E2010</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3/64</td>
<td>150</td>
<td>0.023</td>
<td>E2011</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1/16</td>
<td>100</td>
<td>0.036</td>
<td>E2012</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5/64</td>
<td>50</td>
<td>0.070</td>
<td>E2013</td>
<td></td>
</tr>
</tbody>
</table>

| 2-WAY N.O.  | 0.65W       | 1/32        | 125         | 0.018 | E2210         |
|             | 3/64        | 70          | 0.023       | E2211 |
|             | 1/16        | 40          | 0.032       | E2212 |
|             | 1/32        | 175         | 0.018       | E2210 |
|             | 3/64        | 150         | 0.023       | E2211 |
|             | 1/16        | 100         | 0.032       | E2212 |

| 3-WAY N.C.  | 0.65W       | 1/32        | 125         | 0.018 | E3010         |
|             | 3/64        | 70          | 0.023       | E3011 |
|             | 1/16        | 40          | 0.036       | E3012 |
|             | 1/32        | 175         | 0.018       | E3010 |
|             | 3/64        | 150         | 0.023       | E3011 |
|             | 1/16        | 100         | 0.036       | E3012 |

| 3-WAY N.O.  | 0.65W       | 1/32        | 125         | 0.018 | E3210         |
|             | 3/64        | 70          | 0.023       | E3211 |
|             | 1/16        | 40          | 0.036       | E3212 |
|             | 1/32        | 175         | 0.018       | E3210 |
|             | 3/64        | 150         | 0.023       | E3211 |
|             | 1/16        | 100         | 0.036       | E3212 |

| 3-WAY Multi Purpose | 0.65W       | 3/64        | 40          | 0.023 | E3110         |
|                     | 1/16        | 20          | 0.036       | E3112 |
|                     | 1/32        | 150         | 0.018       | E3110 |
|                     | 3/64        | 100         | 0.023       | E3111 |
|                     | 1/16        | 50          | 0.036       | E3112 |

| 3-WAY Directional Control | 0.65W       | 3/64        | 80          | 0.023 | E3410         |
|                          | 1/16        | 45          | 0.036       | E3412 |
|                          | 1/32        | 190         | 0.018       | E3410 |
|                          | 3/64        | 165         | 0.023       | E3411 |
|                          | 1/16        | 80          | 0.036       | E3412 |

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

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 = Quite operation (2-way N.C.)
   - VAC = Vacuum application (0 to 29.5” Hg)

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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.
G & GH Series – Subminiature

- MOPD: 250 PSI
- C, 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.

**G2214** - **5** - **E** - **EO** - **5VDC**

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

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

Example:
G2214-5-E-EO-5VDC

G-Series 303 Stainless Steel 2-Way N.O. solenoid valve, with tape-wrapped, Class-B, with 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.
## SOLENOID VALVES

### Power Rating

<table>
<thead>
<tr>
<th>Orifice MOPD (psig)</th>
<th>CV</th>
<th>1 Primary Prefix</th>
<th>Body Stop</th>
<th>Body Stop</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Body</strong></td>
<td><strong>Stop</strong></td>
<td><strong>Body</strong></td>
<td><strong>Stop</strong></td>
<td></td>
</tr>
<tr>
<td><strong>2-WAY N.C.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>0.65W</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.030 —</td>
<td>125</td>
<td>0.018 —</td>
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<td></td>
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<tr>
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<td>0.063</td>
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</tbody>
</table>

**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.

---

**Solenoid Valves**

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
- Cₐ, Range: 0.019 to 0.3
- 6 Watts

The A Series gives you a highly adaptable design for practically all applications requiring flow between Cₐ, 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

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

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.
Part Prefix Table ①

<table>
<thead>
<tr>
<th>Orifice</th>
<th>MOPD (psig)</th>
<th>C2</th>
<th>Primary Prefix</th>
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<tr>
<td>Body</td>
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<td>—</td>
<td>100</td>
<td>A2011 A2021</td>
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<td>50</td>
<td>A2012 A2022</td>
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<td>—</td>
<td>300</td>
<td>A2013 A2023</td>
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<td>—</td>
<td>200</td>
<td>A2014 A2024</td>
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<td>A2017 A2027</td>
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<td>150</td>
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<tr>
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<td>3/64</td>
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<td>A3414 A3424</td>
</tr>
</tbody>
</table>

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, 1/16˝ 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)
P = Perfluoroelastomer
RT = Rulon® (2-way valves only)
T = Teflon®
V = Viton®

⑤ O-Ring Material
(blank) = Nitrile*
EO = EPR
NO = Neoprene
NSO = Nitrile (NSF/FDA, 2-way valves only)
PFO = Perfluoroelastomer
TO = Teflon®
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)
D = DC (specify DC voltage)
V = AC (specify AC voltage; includes copper shading ring)

⑧ Additional Options
Y = Yoke
WM = Mounting bracket
TP = Teflon® coated plunger
AD = 1/8 - 27 NPT stop port adapter (3-way valves only)
Q0 = 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.

B Series – Modular

- MOPD: 400 PSI
- C, 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 in an excellent choice for most general-purpose application requiring a C, of 0.018 to 0.430.

Typical Applications
- Printing
- HVAC
- Semiconductor Equipment
- Medical Equipment

Dimensions

Threaded Port Body

- STOP PORT 1/8-27 NPT
- #18 AWG BLACK LEADS x 18”
- BODY PORTS 1/8-27 NPT (2) PLC’S
- #8-32 UNC-2B x 0.25 MIN. FULL TH’D ON A ø.735 B.C. (2) PLC’S

Manifold Mount Body

- Ø.99 ±.007 MAX.
- 5/16-24 UNF-2A x 0.28 MIN. FULL TH’D (UNDERSEAT)
- Ø.125 SPANNER HOLES, (4) HOLES EQUALLY SPACED
- Ø.094, ORIFICE ≤ 1/8˝ (OVERSEAT)
- Ø.094, ORIFICE ≥ 5/32˝ (UNDERSEAT)
- 5/16-24 UNF-2A MOUNTING STUD
- “IN” (UNDERSEAT)
- “OUT” (OVERSEAT)

Molded Coil

- 1/4” SPADE TERMINAL (2) PLC’S
- 0.032 (2-WAY N.C.)
- 1.903 (2-WAY N.C.)
- 1.230 (2-WAY N.C.)
- 1.460 (2-WAY N.C.)
- 0.310 (2-WAY N.C.)

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.

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

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

* Blank entry indicates a “Standard” selection (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.

## Part Prefix Table

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<td>Body</td>
<td>Stop</td>
</tr>
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<tr>
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<td>50</td>
<td>0.430</td>
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### 2-WAY N.C.
- 2-WAY N.O.
  - 1/32
  - 3/64
  - 1/16
  - 5/64

### 3-WAY N.C.
- 3-WAY N.C.
  - Free Vent
  - Line Connection
- 3-WAY N.O.
  - 1/32
  - 3/64
  - 1/16
  - 5/64
- 3-WAY Multi Purpose
  - 1/32
  - 3/64
  - 1/16
  - 5/64
- 3-WAY Directional Control
  - 1/32
  - 3/64
  - 1/16
  - 5/64
  - 1/8

### 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

### Body Material
- (blank) = 303 Stainless Steel
- B = Brass
- SB = 304 Stainless Steel
- SB5 = 316 Stainless Steel
- SBF = 430F Stainless Steel

### Plunger Seal Material
- (blank) = Nitrile
- E = EPR
- GV = Gasoline Viton®
- N = Neoprene
- NS = Nitrile (NSF/FDA material)
- PF = Perfluoroelastomer
- R = Rulon®
- T = PTFE
- V = Viton®

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

### Voltage
- [see note below]
  - VDC = DC (specify DC voltage)
  - VAC = AC (specify AC voltage; includes copper shielding ring)

### 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)
- GS = One piece 316 Stainless Steel guide assembly
- SH = 1’’ Diameter housing, grommet
- SC = 1’’ Diameter housing, conduit

---

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

C Series – High Flow

- MOPD: 400 PSI
- C<sub>i</sub> 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 Cv 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

How To Order

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

**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

<table>
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<th>MOPD (psig)</th>
<th>C2</th>
<th>Primary Prefix</th>
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<td>Stop</td>
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<td>2-WAY N.C.</td>
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### 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

### Body Material

- **Brass**:
  - **SB**: 304 Stainless Steel
  - **SB1**: 303 Stainless Steel
  - **SB5**: 316 Stainless Steel
  - **SBF**: 430F Stainless Steel

### Body Stop

- **Body Stop Grommet**:
  - **HC2**: One-piece 303 Stainless Steel guide assembly
  - **SB5**: Gasoline Viton® (2-way N.C. only).
  - **SB5**: Nitrile (NSF/FDA material)
  - **SB5**: Perfluoroelastomer
  - **SB5**: 2 (2-way N.C. only)
  - **SB5**: PTFE
  - **SB5**: Viton®

### O-Ring Material

- **O-Ring Material**:
  - **NS**: Nitrile (NSF/FDA material)
  - **NS**: Perfluoroelastomer
  - **NS**: PTFE
  - **NS**: Viton®

### Voltage

- **VDC**: DC (specify voltage)
- **VAC**: AC (specify voltage; includes copper shading ring)

### Body Port Configuration

- **BB**: Body port, #10-32 female straight thread
- **BS**: Body port, #10-32 female straight thread
- **BD**: Body port, 1/4-19 BSPT female thread
- **BL**: Bottom under-seat port, female thread
- **BR**: Bottom under-seat port, female thread
- **SL**: Stop port, #10-32 female straight thread
- **EO**: Epoxy
- **TO**: Teflon®
- **VO**: Viton®

### Plunger Seal Material

- **Plunger Seal Material** (blank): Nitrile
  - **E**: EPR
  - **G**: 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®

### Note

2. Teflon® o-ring not suitable for manifold mount.
3. Standard selection; will be used unless otherwise specified. Standard selections are not referenced in final part number.

---

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, 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, 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

How To Order

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

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

* 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.

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** DC or rectified coil only

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2. Body Material
   - (blank) = 430F Stainless Steel*
   - BB = Brass
   - SB1 = 303 Stainless Steel
   - SB5 = 316 Stainless Steel
3. Plunger Seal Material
   - (blank) = Nitrile*
   - E = EPDM
   - G = 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®
4. O-Ring Material
   - (blank) = Nitrile*
   - E = EPDM
   - N = Neoprene
   - NS = Nitrile (NSF/FDA, 2-way valves only)
   - PF = Perfluoroelastomer
   - TO = PTFE
   - VO = Viton®
5. 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
6. Voltage (see note below)
   - ___VDC = DC (specify voltage)
   - ___VAC = AC (specify voltage; includes copper shading ring)
7. Additional Options
   - WM = Mounting bracket on the coil housing
   - TP = PTFE coated plunger
   - CP = Chamfered plunger
   - QQ = Quiet operation (2-way valves only)
   - S = Silver shading ring
   - OC = Cleaned for oxygen use
   - VAC = Vacuum application (0 to 29.5" Hg)
   - GS = One piece 316 Stainless Steel guide assembly

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

AS Series

- MOPD: 110 PSI (Plastic Body) or 150 PSI (Metal Body)
- C, Range: 0.020 to 0.300
- 4.5 Watts (Plastic Body) or 7 Watts (Metal Body)

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

Typical Applications
- Analytical Instruments
- Clinical Diagnostic Analyzers
- Bio-Instrumentation

Dimensions

Threaded Port Body

Manifold Mount Body

How To Order

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

Example:

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

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

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.
### SOLENOID VALVES

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

#### ISOLATION VALVES

#### Voltage

- **VDC** = DC (specify voltage)
- **VAC** = AC Rectified only (specify voltage)

#### Additional Options

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

### 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.
3. Teflon® o-ring not suitable for manifold mount.

---

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BS Series – Higher Flow

- MOPD: 150 PSI (Plastic Body) or 150 PSI (Metal Body)
- CV 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

How To Order

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

BS2035 - W25 - E - 28VDC

* 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.
SOLENOID VALVES

<table>
<thead>
<tr>
<th>Body Material</th>
<th>Orifice MOPD (psig)</th>
<th>Max Back Pressure</th>
<th>CV</th>
<th>Body Prefix</th>
<th>Grommet Housing</th>
<th>Conduit Housing</th>
</tr>
</thead>
<tbody>
<tr>
<td>303 Stainless Steel¹</td>
<td>3/64</td>
<td>150</td>
<td>15</td>
<td>0.035</td>
<td>BS2010</td>
<td>BS2020</td>
</tr>
<tr>
<td></td>
<td>1/16</td>
<td>110</td>
<td>10</td>
<td>0.065</td>
<td>BS2011</td>
<td>BS2021</td>
</tr>
<tr>
<td></td>
<td>5/64</td>
<td>85</td>
<td>10</td>
<td>0.090</td>
<td>BS2012</td>
<td>BS2022</td>
</tr>
<tr>
<td></td>
<td>3/32</td>
<td>70</td>
<td>10</td>
<td>0.155</td>
<td>BS2013</td>
<td>BS2023</td>
</tr>
<tr>
<td></td>
<td>7/64</td>
<td>25</td>
<td>10</td>
<td>0.200</td>
<td>BS2014</td>
<td>BS2024</td>
</tr>
<tr>
<td></td>
<td>1/8</td>
<td>10</td>
<td>5</td>
<td>0.240</td>
<td>BS2015</td>
<td>BS2025</td>
</tr>
<tr>
<td></td>
<td>5/32</td>
<td>5</td>
<td>5</td>
<td>0.300</td>
<td>BS2016</td>
<td>BS2026</td>
</tr>
<tr>
<td>Polypropylene (1/8-27 NPT Female Thread body port only)</td>
<td>3/64</td>
<td>150</td>
<td>15</td>
<td>0.035</td>
<td>BS2030</td>
<td>BS2040</td>
</tr>
<tr>
<td></td>
<td>1/8</td>
<td>10</td>
<td>5</td>
<td>0.240</td>
<td>BS2035</td>
<td>BS2045</td>
</tr>
</tbody>
</table>

¹ Other body orifice sizes may be available, consult factory.

ISOLATION VALVES

<table>
<thead>
<tr>
<th>Voltage</th>
<th>VDC = DC (specify voltage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAC</td>
<td>AC Rectified only (specify voltage)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Additional Options</th>
<th>WM = Mounting bracket</th>
</tr>
</thead>
<tbody>
<tr>
<td>OC</td>
<td>Cleaned for oxygen use</td>
</tr>
</tbody>
</table>

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.
3. 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.
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 $C_v$


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

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

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Step 3 – Identify Your Valve Series
Select possible valve series candidate using the overview chart below.

Select maximum operating pressure differential (MOPD), the Cv 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.

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.

### Inert Isolation

<table>
<thead>
<tr>
<th>Function</th>
<th>2-Way, Normally Closed</th>
<th>2- &amp; 3-Way</th>
<th>2-Way, Normally Closed</th>
<th>2- &amp; 3-Way</th>
</tr>
</thead>
<tbody>
<tr>
<td>Media</td>
<td>Liquid</td>
<td>Gas &amp; Liquid</td>
<td>Liquid</td>
<td></td>
</tr>
<tr>
<td>Size</td>
<td>Sub-Miniature</td>
<td>Miniature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cv Range</td>
<td>0.008 - 0.015</td>
<td>0.016 - 0.040</td>
<td>0.011 - 0.105</td>
<td>0.055 - 0.14</td>
</tr>
<tr>
<td>Port Configuration</td>
<td>1/4”-28 UNF flat bottom, #10-32, 5/16”-24, 1/8” NPT, M6 X 1.0, Manifold Mount</td>
<td>1/8 Barb, Face-Mount, #10-32 Threaded Flat Bottom</td>
<td>1/4”-28 UNF flat bottom, #10-32, 5/16”-24, 1/8” NPT, M6 X 1.0, Tube Mount, Syringe, Manifold Mount</td>
<td>1/4”-28 UNF flat bottom, #10-32, 5/16”-24, 1/8” NPT, M6 X 1.0</td>
</tr>
<tr>
<td>Orifice Dia (in)</td>
<td>0.032 - 0.054</td>
<td>0.032 &amp; 0.052</td>
<td>0.032 - 0.125</td>
<td>0.092</td>
</tr>
<tr>
<td>Power (watt)</td>
<td>1.8</td>
<td>2</td>
<td>2.6, 2.8</td>
<td>4.8</td>
</tr>
<tr>
<td>MOPD (psig)</td>
<td>20</td>
<td>70</td>
<td>15 - 50</td>
<td>10 - 60</td>
</tr>
<tr>
<td>Valve Series</td>
<td>KS</td>
<td>Chem-S™</td>
<td>KM</td>
<td>KL</td>
</tr>
</tbody>
</table>

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, Range: 0.016 to 0.040
- 2 Watts

The Chem-S™ utilizes revolutionary diaphragm technology in a liquid compatible, subminiature 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

Threaded Port Body

Manifold Mount Body
How To Order
Use the Bold characters from the choices listed below to construct a product code.

**CHEM202** - **V** 2 - **C203**

*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**

<table>
<thead>
<tr>
<th>Orifice</th>
<th>MOPD (psig)</th>
<th>C₂</th>
<th>1 Primary Prefix</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.031</td>
<td>70</td>
<td>0.016</td>
<td>CHEM202</td>
</tr>
<tr>
<td>0.052</td>
<td>25</td>
<td>0.040</td>
<td>CHEM205</td>
</tr>
</tbody>
</table>

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.

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.
KS Series – 3/8” (9.53 mm) Solenoids

- 2-Way, Normally Closed
- MOPD: 20 PSIG (1.38 bar)
- Cv 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

Part Prefix Table

<table>
<thead>
<tr>
<th>Orifice (inch)</th>
<th>MOPD*</th>
<th>Cv</th>
<th>Internal Volume (µl)</th>
<th>Primary Prefix</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>psig</td>
<td>bar</td>
<td>Side Ports</td>
<td>Bottom Ports</td>
</tr>
<tr>
<td>2-WAY N.C.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.032</td>
<td>20</td>
<td>1.38</td>
<td>0.008</td>
<td>20</td>
</tr>
<tr>
<td>0.054</td>
<td>20</td>
<td>1.38</td>
<td>0.015</td>
<td>42</td>
</tr>
</tbody>
</table>

* 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.

Diaphragm Material
- T = PTFE Polytetrafluoroethylene
- E = EPDM Ethylene Propylene Diene (M)
- P = FFKM Perfluoroelastomer

Body Material
- 3 = PPS Polyphenylene Sulfide
- 4 = PEEK Polyaryletheretherketone

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

Coil
- C203 = 12 VDC
- C204 = 24 VDC
Dimensions – Threaded Port Body

**Side Port**

- Lead Wires (2x) #28 AWG X 24" (609.6 mm) Long PTFE Coated
- Full Thread 7/16"-32 UN X 0.140" (3.55 mm) Min
- Inlet & Outlet Holes Ø0.032 - Ø0.062 (0.81 mm - 1.57 mm)
- Deep Slot For Sealing Gasket* Ø0.125 +/- 0.003" X 0.013" +/- 0.001" (3.17 mm +/- 0.08 mm X 0.33 mm +/- 0.025 mm)
- Hole For Locating Pin Ø0.037 +/- 0.002 X 0.13 (0.94 mm +/- 0.05 mm X 3.30 mm) Deep Min

**Bottom Port**

- Lead Wires (2x) #28 AWG X 24" (609.6 mm) Long PTFE Coated

**Dimensions – Manifold Mount Body**

- Lead Wires 24" (609.6 mm) Long, #28 AWG PTFE Coated
- Orifices Ø0.032 (0.8 mm) Or Ø0.054 (1.4 mm)
- Mounting Nut 7/16"-32 UN Thd
- Locating Pin Ø0.53 (13.5 mm)
- Full Thread 7/16"-32 UN X 0.140" (3.55 mm) Min
- Inlet & Outlet Holes Ø0.032 - Ø0.062 (0.81 mm - 1.57 mm)
- Deep Slot For Sealing Gasket* Ø0.125 +/- 0.003" X 0.013" +/- 0.001" (3.17 mm +/- 0.08 mm X 0.33 mm +/- 0.025 mm)
- Hole For Locating Pin Ø0.037 +/- 0.002 X 0.13 (0.94 mm +/- 0.05 mm X 3.30 mm) Deep Min

*FFKM gasket is provided for manifold mount valves.

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.
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

![Image of KM Series Dimensions]

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tube Mount Body</td>
<td>1.91” (48.51 mm)</td>
</tr>
<tr>
<td>LEAD WIRES (2X)</td>
<td>#26 AWG X 15” (381 mm) LONG PTFE COATED</td>
</tr>
<tr>
<td>Ø0.75” (19 mm)</td>
<td>Ø0.103” (2.62 mm)</td>
</tr>
<tr>
<td>Ø0.062” (1.57 mm)</td>
<td>Ø0.062” (1.57 mm)</td>
</tr>
<tr>
<td>RECOMMENDED INLET ORIFICE</td>
<td>RECOMMENDED OUTLET ORIFICE</td>
</tr>
</tbody>
</table>

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

KM Series

![Image of KM Series Dimensions]

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tube Mount Body</td>
<td>1.6” (40.6 mm)</td>
</tr>
<tr>
<td>LEAD WIRES (2X)</td>
<td>#26 AWG X 15” (381 mm) LONG PTFE COATED</td>
</tr>
<tr>
<td>Ø0.75” (19 mm)</td>
<td>Ø0.103” (2.62 mm)</td>
</tr>
<tr>
<td>Ø0.062” (1.57 mm)</td>
<td>Ø0.062” (1.57 mm)</td>
</tr>
<tr>
<td>RECOMMENDED INLET ORIFICE</td>
<td>RECOMMENDED OUTLET ORIFICE</td>
</tr>
</tbody>
</table>

CV Range: 0.011 to 0.105

As Low as 2.8 Watts
Dimensions – Side Port Body

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

**KM Series**

<table>
<thead>
<tr>
<th>Orifice Size (inch)</th>
<th>Dim A inch</th>
<th>mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.032</td>
<td>0.75</td>
<td>19.05</td>
</tr>
<tr>
<td>0.054</td>
<td>0.75</td>
<td>19.05</td>
</tr>
<tr>
<td>0.062</td>
<td>0.875</td>
<td>22.23</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Body Material</th>
<th>Dim A inch</th>
<th>mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTFE</td>
<td>0.875</td>
<td>22.225</td>
</tr>
<tr>
<td>All Others</td>
<td>0.75</td>
<td>19.05</td>
</tr>
</tbody>
</table>

---

**KL Series**

<table>
<thead>
<tr>
<th>Orifice Size (inch)</th>
<th>Dim A inch</th>
<th>mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.100</td>
<td>25</td>
<td>63.50</td>
</tr>
</tbody>
</table>

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

**KM Series**

<table>
<thead>
<tr>
<th>Orifice Size (inch)</th>
<th>Dim A inch</th>
<th>mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.075</td>
<td>19.05</td>
<td>48.50</td>
</tr>
</tbody>
</table>

**KL Series**

<table>
<thead>
<tr>
<th>Orifice Size (inch)</th>
<th>Dim A inch</th>
<th>mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.100</td>
<td>25.4</td>
<td>64.00</td>
</tr>
</tbody>
</table>

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

**KM Series**

<table>
<thead>
<tr>
<th>Orifice Size (inch)</th>
<th>Dim A inch</th>
<th>mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.075</td>
<td>19.05</td>
<td>48.50</td>
</tr>
</tbody>
</table>

**KL Series**

<table>
<thead>
<tr>
<th>Orifice Size (inch)</th>
<th>Dim A inch</th>
<th>mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.100</td>
<td>25</td>
<td>63.50</td>
</tr>
</tbody>
</table>
Dimensions – Manifold Mount Body

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

KM Series

KL Series

2-Way, Normal 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. +FKM gasket is provided for manifold mount valves.
### INERT ISOLATION VALVES

#### How To Order

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

**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

<table>
<thead>
<tr>
<th>Orifice (inch)</th>
<th>MOPD*</th>
<th>(C_v)</th>
<th>Internal Volume (µl)</th>
<th>Primary Prefix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Side Mount</td>
<td>Manifold Mount</td>
<td>Tube Mount</td>
<td>Primary Prefix</td>
<td></td>
</tr>
<tr>
<td>0.032</td>
<td>20</td>
<td>1.38</td>
<td>0.011</td>
<td>KM201</td>
</tr>
<tr>
<td>0.054</td>
<td>20</td>
<td>1.38</td>
<td>0.027</td>
<td>KM203</td>
</tr>
<tr>
<td>0.062</td>
<td>30</td>
<td>2.07</td>
<td>0.042</td>
<td>KL204</td>
</tr>
<tr>
<td>0.092</td>
<td>15</td>
<td>1.03</td>
<td>0.08</td>
<td>KL205</td>
</tr>
<tr>
<td>0.125</td>
<td>10</td>
<td>0.69</td>
<td>0.105</td>
<td>KL206</td>
</tr>
<tr>
<td>0.032</td>
<td>20</td>
<td>1.38</td>
<td>0.011</td>
<td>KM221</td>
</tr>
<tr>
<td>0.054</td>
<td>20</td>
<td>1.38</td>
<td>0.027</td>
<td>KM223</td>
</tr>
<tr>
<td>0.062</td>
<td>30</td>
<td>2.07</td>
<td>0.042</td>
<td>KL224</td>
</tr>
<tr>
<td>0.092</td>
<td>10</td>
<td>0.69</td>
<td>0.08</td>
<td>KL225</td>
</tr>
<tr>
<td>0.125</td>
<td>10</td>
<td>0.69</td>
<td>0.105</td>
<td>KL226</td>
</tr>
</tbody>
</table>

### Notes

1. Not available in KL2X5 or KL2X6.
3. See internal volume chart for available orifices.
4. PSU body only.
5. Available in KM3XX, PEEK body, PTFE diaphragm.

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.
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
- Cᵥ 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

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

<table>
<thead>
<tr>
<th>Orifice (inch)</th>
<th>MOPD* (psig)</th>
<th>Cᵥ</th>
<th>Internal Volume (µl)</th>
<th>Primary Prefix</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-WAY N.C.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.092</td>
<td>20</td>
<td>0.055</td>
<td>108</td>
<td>KV205</td>
</tr>
<tr>
<td>0.156</td>
<td>15</td>
<td>0.11</td>
<td>239</td>
<td>KW207</td>
</tr>
<tr>
<td>3-WAY Directional Controls</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.156</td>
<td>15 (NC/O)</td>
<td>0.14</td>
<td>462</td>
<td>KW347</td>
</tr>
</tbody>
</table>

* 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.

Diaphragm Material
T = PTFE Polytetrafluoroethylene

Body Material
1 = PTFE Polytetrafluoroethylene

Body Port Configuration
S = Threaded side port

Port Thread (Used in conjunction with Threaded Port Configurations)
1 = 1/4”-28 UNF flat bottom¹ (Standard for KV)
2 = 10-32¹
3 = 5/16”-24
4 = 1/8” NPT (Standard for KW)
5 = M6 X 1.0¹

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

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

KW Series

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

- MOPD: 900 PSI
- Cg, 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 Cg 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**

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

* Blank entry indicates a “Standard” selection (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.
The page contains a table for Cryogenic Valves, including prefixes, orifices, and various options for body material, plunger seal material, voltage, and additional options. The table is organized as follows:

### Part Prefix Table

<table>
<thead>
<tr>
<th>Prefix</th>
<th>MOPD (psig)</th>
<th>CV</th>
<th>Body</th>
<th>Conduit Housing</th>
<th>Lead Wires—Filled</th>
<th>Lead Wires—Unfilled</th>
<th>Lead Wires—Grommet Housing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body</td>
<td></td>
<td></td>
<td>Body</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/64</td>
<td>900</td>
<td>0.045</td>
<td>B2060</td>
<td>B2020</td>
<td>B2010</td>
<td></td>
<td></td>
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<tr>
<td>1/16</td>
<td>405</td>
<td>0.075</td>
<td>B2061</td>
<td>B2021</td>
<td>B2011</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5/64</td>
<td>270</td>
<td>0.105</td>
<td>B2062</td>
<td>B2022</td>
<td>B2012</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/32</td>
<td>160</td>
<td>0.160</td>
<td>B2063</td>
<td>B2023</td>
<td>B2013</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7/64</td>
<td>110</td>
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<td>B2064</td>
<td>B2024</td>
<td>B2014</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/8</td>
<td>80</td>
<td>0.255</td>
<td>B2065</td>
<td>B2025</td>
<td>B2015</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5/32</td>
<td>65</td>
<td>0.365</td>
<td>B2066</td>
<td>B2026</td>
<td>B2016</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/16</td>
<td>30</td>
<td>0.440</td>
<td>B2067</td>
<td>B2027</td>
<td>B2017</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Model
- **LN2** = Liquid Nitrogen model
- **LCO2** = Liquid Carbon Dioxide model

### Body Material
- **LN2** Only
  - (blank) = 430F Stainless Steel*
- **LCO2** Only
  - (blank) = 303 Stainless Steel*
  - BB = Brass
  - SB = 304 Stainless Steel
  - SB5 = 316 Stainless Steel

### Plunger Seal Material
- **LN2** Only
  - (blank) = Rulon®
- **LCO2** Only
  - (blank) = PTFE*

### 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)

### 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
  - BOM = Bottom under-seat port, male thread
  - (max. orifice = 1/8", brass body only)
  - IL = Inline porting, 180° apart
  - (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)

### Voltage
- **LN2** Only
  - VDC = DC (specify voltage)
  - VAC = AC Rectified (specify voltage)
- **LCO2** Only
  - VDC = DC (specify voltage)
  - VAC = AC Rectified (specify voltage)

### 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*
D-Cryo Series

- MOPD: 1000 PSI
- Cv 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°F (-196°C). Depending on your temperature requirements, the D-Cryo Series can be configured for liquid nitrogen (LN2), liquid carbon dioxide (LCO2), and other extreme temperature media. PTFE coated plungers, 316 Stainless Steel guide tubes and plunger springs, encapsulated coils, and PTFE or Rulon® seat seals produce a truly robust Cryogenic valve for applications requiring high cycle life and media temperature control.

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

Dimensions

**LN2—Liquid Nitrogen**

- Ø1.62
- 0.34
- 2.88
- #18 AWG PTFE LEADS x 18”
- 1.51 CONDUIT (FILLED w/EPOXY)
- BODY PORTS 1/4-18 NPT (2) PLC’S
- #10-32 UNF-2B x 0.38 MIN. FULL TH’D ON A Ø1.237 B.C. (2) P.L.C’S
- “IN” (OVERSEAT)
- “OUT” (UNDERSEAT)
- 45°
- 1.52 FLATS

**LCO2—Liquid Carbon Dioxide**

- Ø1.62
- 0.34
- 2.88
- #18 AWG PTFE LEADS x 18”
- 1.51 CONDUIT (FILLED w/EPOXY)
- BODY PORTS 1/4-18 NPT (2) PLC’S
- #10-32 UNF-2B x 0.38 MIN. FULL TH’D ON A Ø1.237 B.C. (2) P.L.C’S
- “IN” (OVERSEAT)
- “OUT” (UNDERSEAT)
- 45°
- 1.52 FLATS

How To Order

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

**D2062 - LN2 - LT - 12VDC**

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

* Blank entry indicates a "Standard" selection
  (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.

**SOLENOID VALVES**

**Part Prefix Table**

<table>
<thead>
<tr>
<th>Orifice</th>
<th>MOPD (psig)</th>
<th><em>C</em>₀</th>
<th>Lead Wires—Filled Conduit Housing</th>
<th>Lead Wires—Unfilled Conduit Housing</th>
<th>Lead Wires—Grommet Housing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body</td>
<td></td>
<td></td>
<td>D2061</td>
<td>D2021</td>
<td>D2011</td>
</tr>
<tr>
<td>3/64</td>
<td>1000*</td>
<td>0.040</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/16</td>
<td>1000*</td>
<td>0.070</td>
<td>D2062</td>
<td>D2022</td>
<td>D2012</td>
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<tr>
<td>3/32</td>
<td>640</td>
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<td>375</td>
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<td>D2064</td>
<td>D2024</td>
<td>D2014</td>
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<tr>
<td>5/32</td>
<td>185</td>
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<td>D2025</td>
<td>D2015</td>
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<td>0.470</td>
<td>D2066</td>
<td>D2026</td>
<td>D2016</td>
</tr>
<tr>
<td>1/4</td>
<td>40</td>
<td>0.770</td>
<td>D2067</td>
<td>D2027</td>
<td>D2017</td>
</tr>
</tbody>
</table>

* For higher pressure, consult factory.

**Model**

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

**Body Material**

- LN2 Only
  
  (blank) = 430F Stainless Steel*

**Plunger Seal Material**

- LN2 Only
  
  (blank) = Rulon®*

**O-Ring Material**

- LN2 Only
  
  (blank) = Variseal® (PTFE material with internal spring)*

**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

**Voltage**

- LN2 Only
  
  _VDC_ = DC (specify voltage)
  
  _VAC_ = AC Rectified (specify voltage)

**Additional Options**

- LN2 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.

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.
**Valve Configuration or Function**

**FLOW REQUIREMENTS**
- **C:v Body**, **Stop Orifice Diameter:**  
  - Flow at the Body Orifice (GPM0 or SCFM) with a __________ psig at the Inlet, and __________ psig at the outlet
  - Flow at the Stop Orifice (GPM0 or SCFM) with a __________ psig at the Inlet, and __________ psig at the outlet

**PRESSURE**
- Operating Pressure___________
- Max. Pressure___________
- Min. Pressure___________
- Max. Back Pressure___________

**TEMPERATURE**
- Media Temp.___________
- Max. Media Temp.___________
- Min. Media Temp.___________
- 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**___________
- Continuous Duty Max. Time ON___________
- Intermittent Duty Min. Time OFF___________

**House Style**
- Rectified
- Grommet
- Conduit, 1/2-14 NPS
- Grommet with Bracket
- Conduit with Bracket
- Other___________

**COIL REQUIREMENTS**
- **Class B**
- Lead Wire (Specify Length if required)___________
- **Class F**
- 3/16" Spades
- **Class H**
- 1/4" Spades
- **Tape Wound**
- 0.110" Spades
- **Encapsulated**
- 18 mm DIN
- **Molded**
- 11 mm DIN
- 9.4 mm DIN

**BODY CONFIGURATION**
- **Body Port**
- **Stop Port (If Different)**
- **Body Port Orientation**
- **Female Bottom Port**
- **Male Bottom Porting**

**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?  Yes  No  If yes: Vibration_______ CPS at_______ Gs, Shock________ GS duration for________ ms.