

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

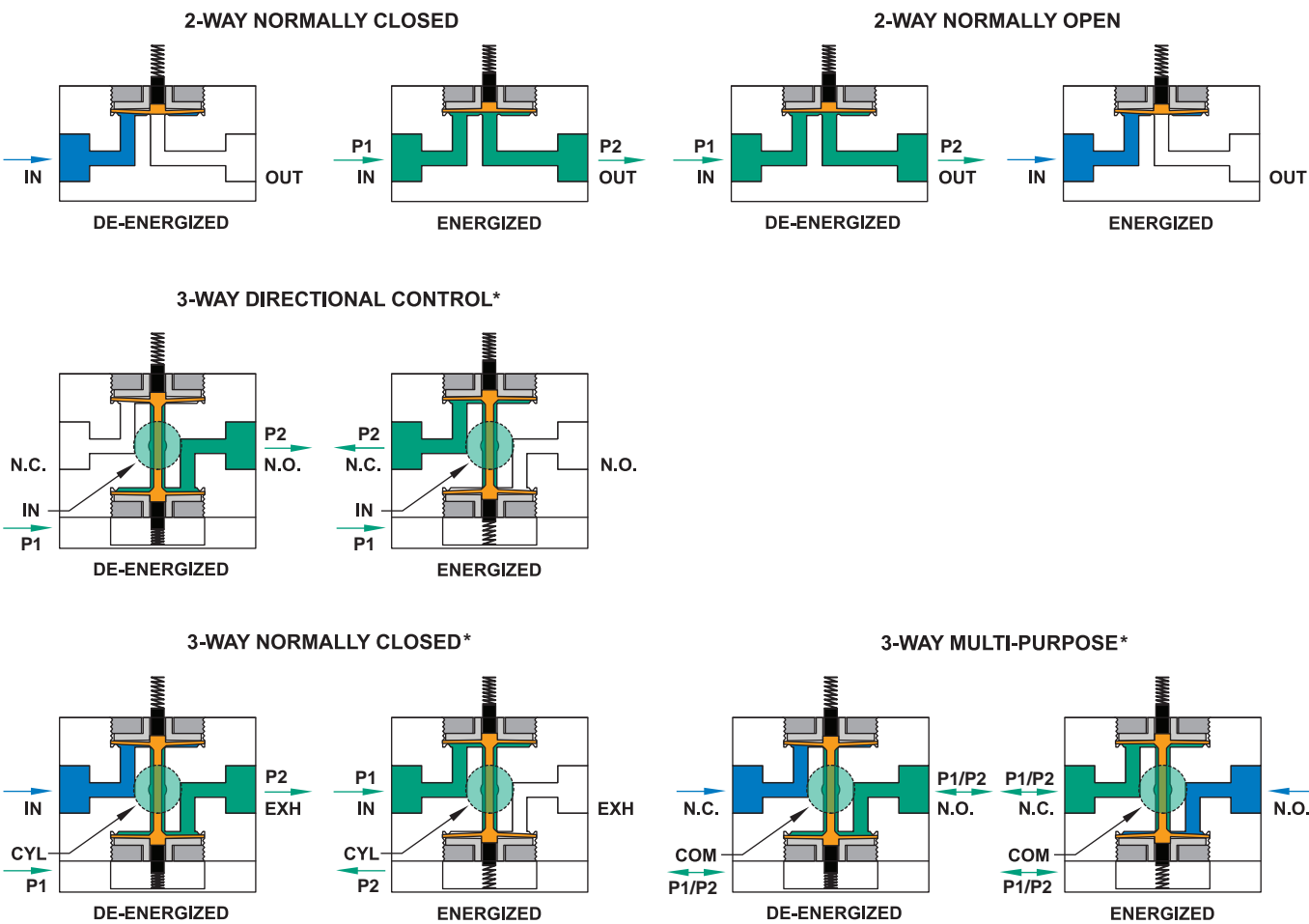
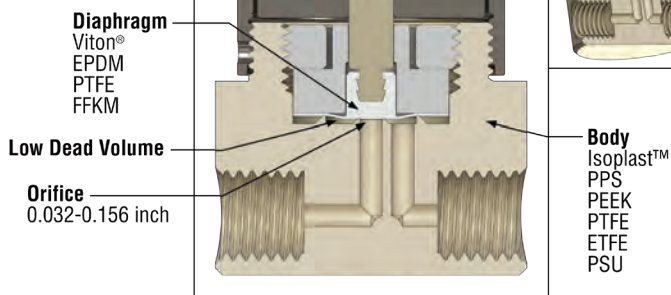
Review Step 1 – Calculating C_v on Page J-2.

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



* 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.

SOLENOID VALVES

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			
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, 1.9	2	2.8, 2.9	4		
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.

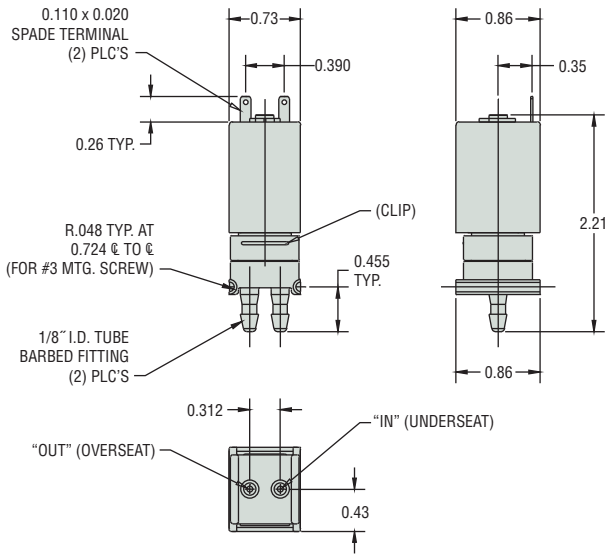
Typical Applications

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

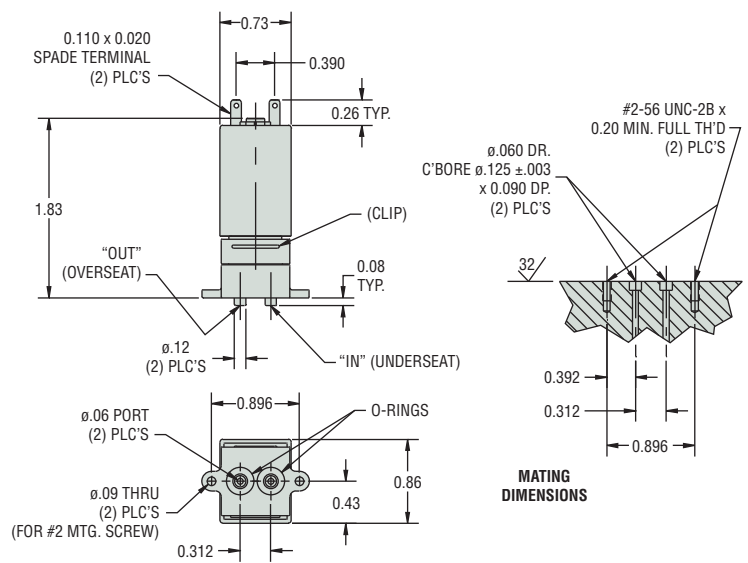


Dimensions

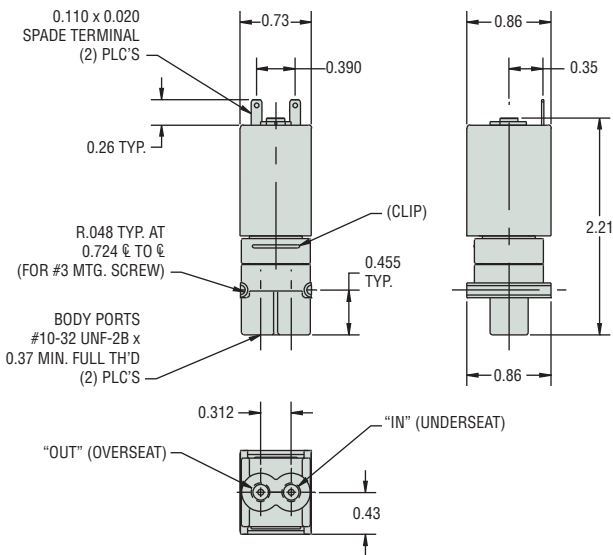
Barb Port Body



Manifold Mount Body

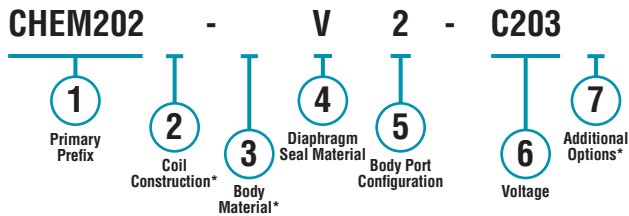


Threaded Port Body



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 _v	① Primary Prefix
		Body	
0.031	70	0.016	CHEM202
0.052	25	0.040	CHEM205

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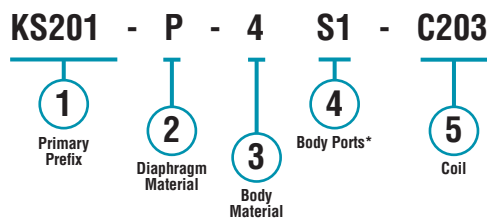
KS Series – 3/8” (9.53 mm) Solenoids

- ▶ 2-Way, Normally Closed
- ▶ MOPD: 20 PSIG (1.38 bar)
- ▶ C_v 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.



* 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 (inch)	MOPD*		C _v	Internal Volume (μl)			① Primary Prefix
		psig	bar		Side Ports	Bottom Ports	Manifold Mount	
2-WAY	0.032	20	1.38	0.008	20	18	13	KS201
N.C.	0.054	20	1.38	0.015	42	35	21	KS203

* 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

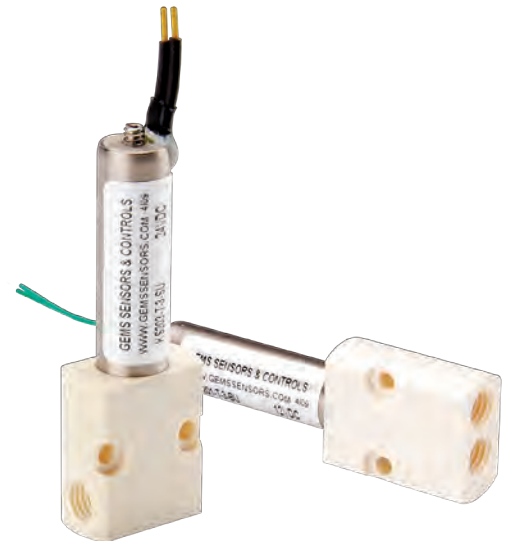
- BM = Manifold mount
- S_ = Threaded side port
- B_ = Threaded bottom port

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

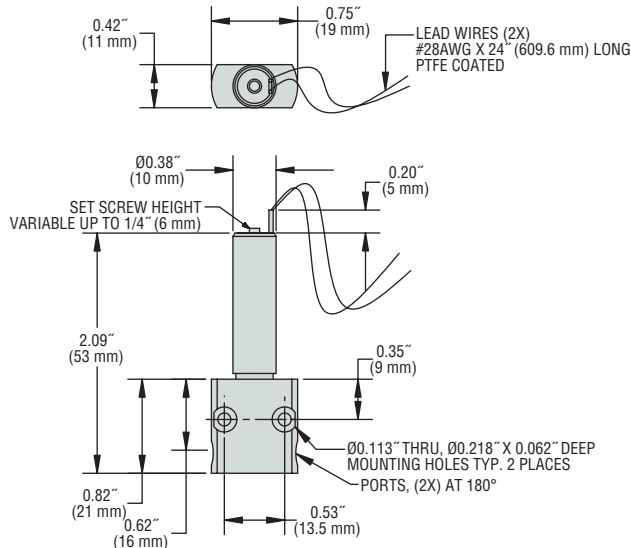
⑤ Coil

- C203 = 12 VDC
- C204 = 24 VDC

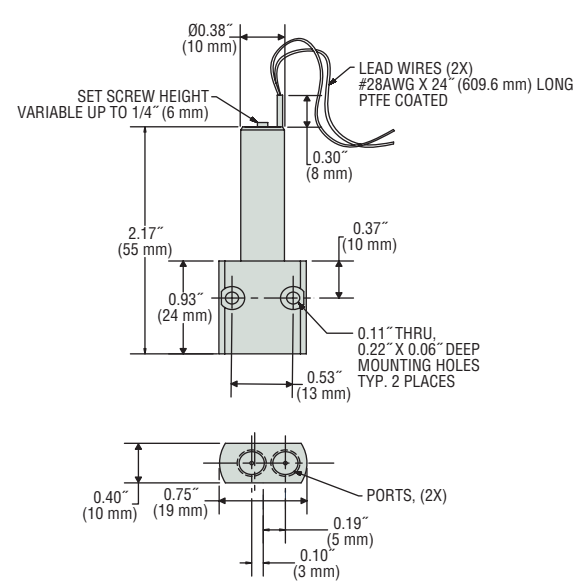


Dimensions – Threaded Port Body

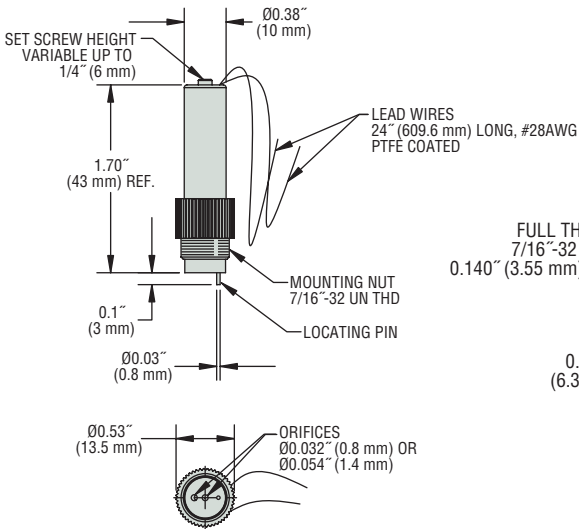
Side Port



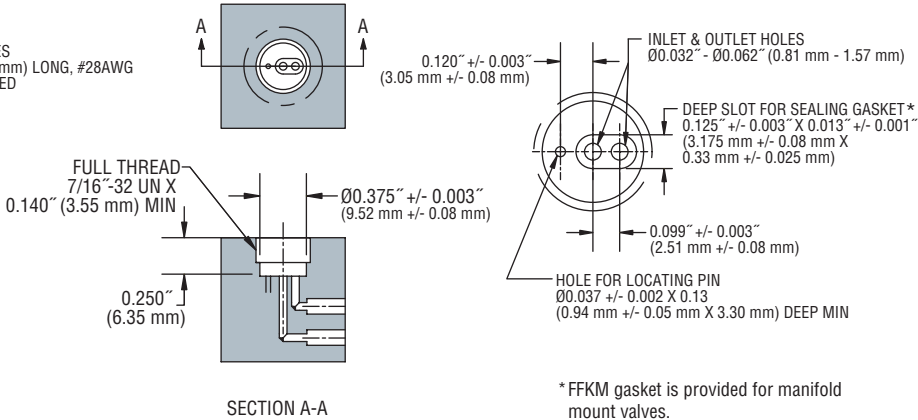
Bottom Port



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

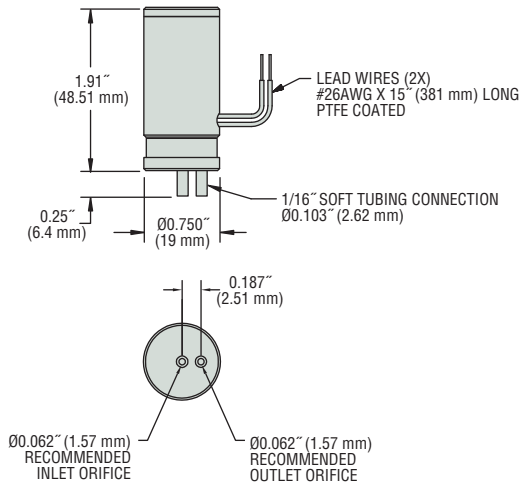
These isolation valves offer 2-way Normally Open (NO) and Closed (NC), or 3-way Directional Control operation. While sharing similar configurations with the KM Series, the KL Series features larger orifice sizes with greater C_v values. Their design ensures that the only wetted parts are the valve diaphragm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

Find Ordering Information on Page J-32.

Dimensions – Tube Mount Body

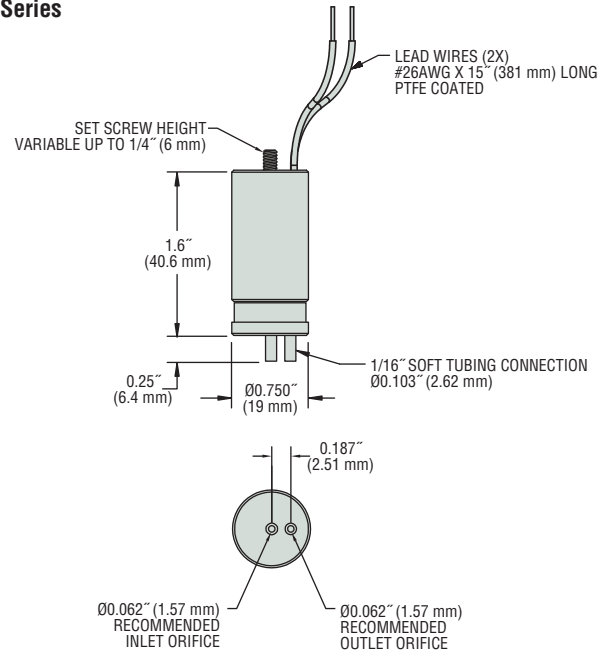
2-Way, Normally Open (N.O.)

KM Series



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

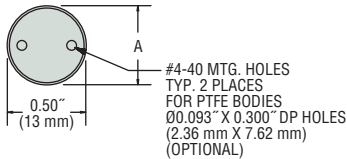
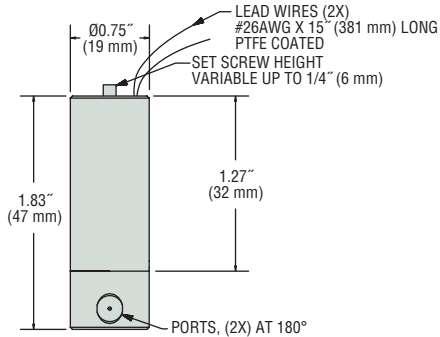
KM Series



Dimensions – Side Port Body

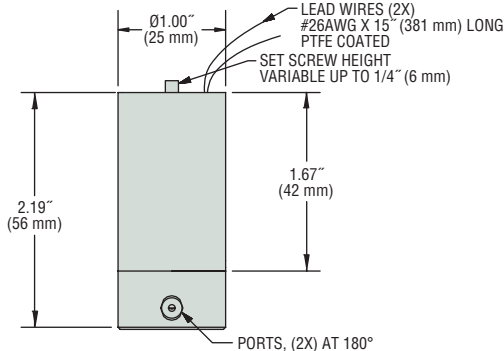
2-Way, Normally Closed (N.C.)

KM Series



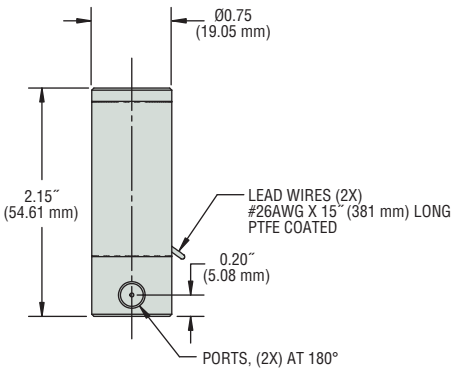
Orifice Size (inch)	Dim A	
	inch	mm
0.032	0.75	19.05
0.054	0.75	19.05
0.062	0.875	22.23

KL Series

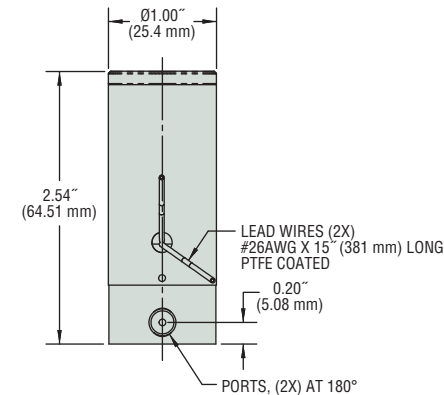


2-Way, Normally Open (N.O.)

KM Series

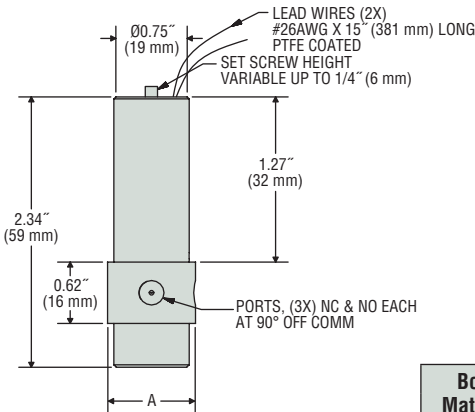


KL Series



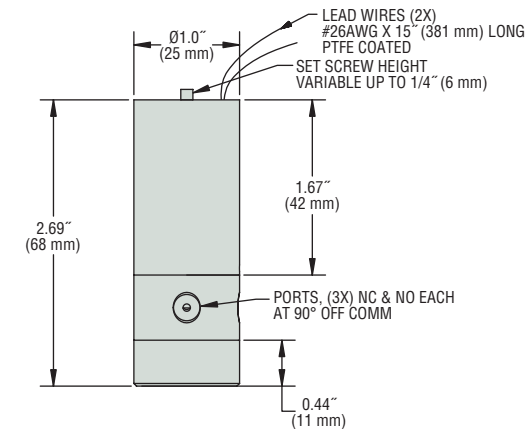
3-Way, Normally Closed (N.C.), Multi-Purpose, Directional Control

KM Series



Body Material	Dim A	
	inch	mm
PTFE	0.875	22.225
All Others	0.75	19.05

KL Series

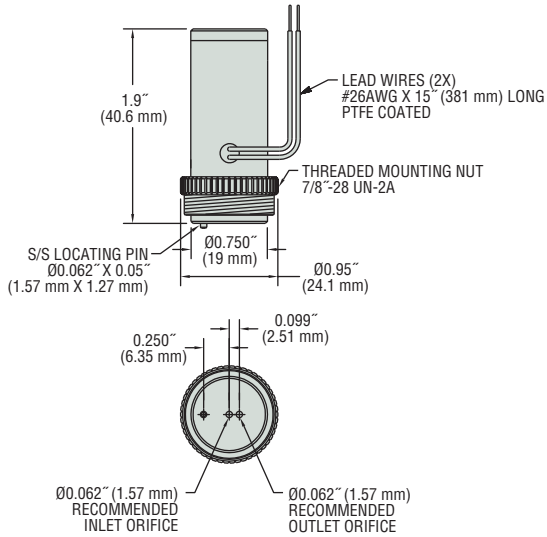


SOLENOID VALVES

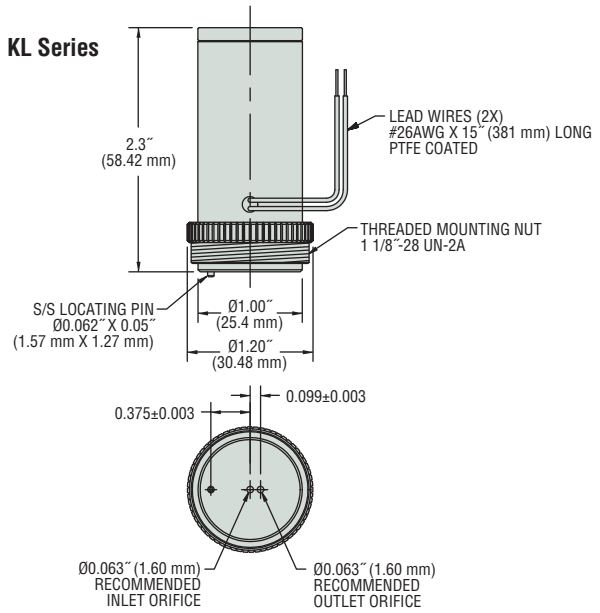
Dimensions – Manifold Mount Body

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

KM Series

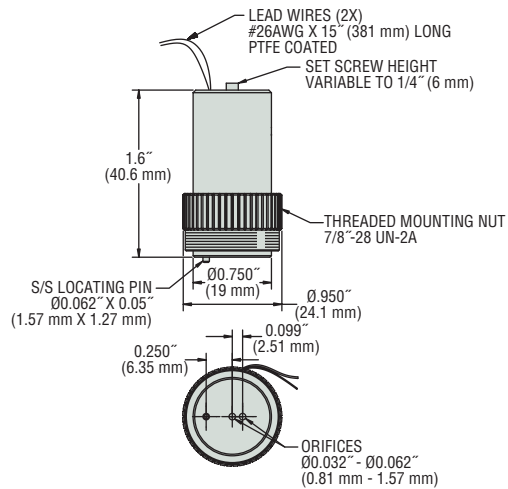


KL Series

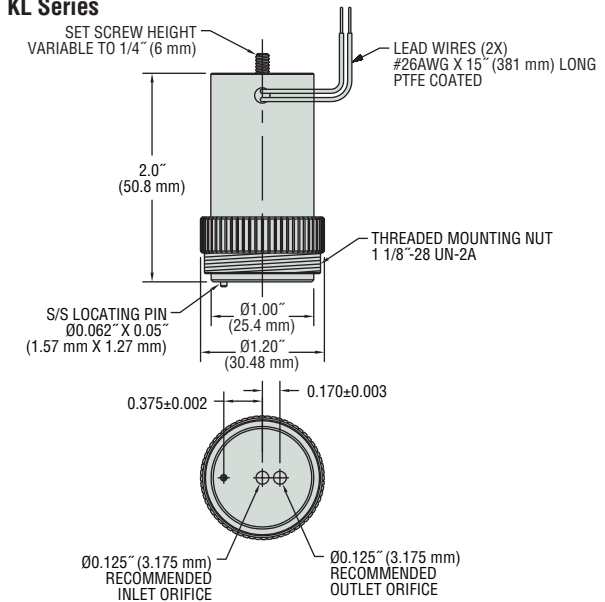


2-Way, Normall Closed (N.C.)

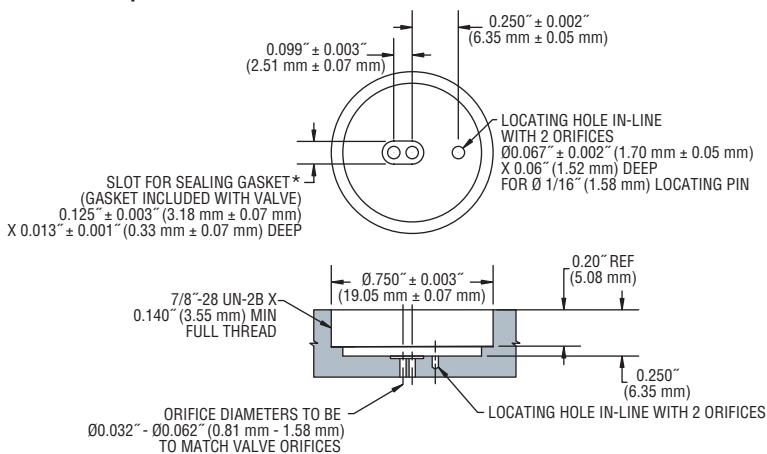
KM Series



KL Series



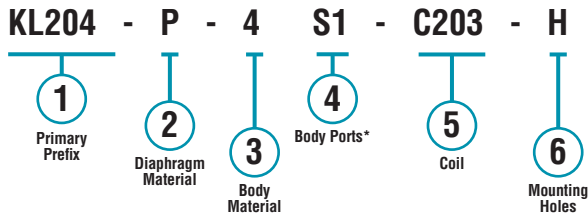
Manifold Preparation – KM Series



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

* Maximum Operational Pressure Differential

② Diaphragm Material

2-Way

T = PTFE Polytetrafluoroethylene
E = EPDM Ethylene Propylene Diene (M)
V = FKM Fluoroelastomers¹
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 Polysulfone²

④ Body Port Configuration

BM = Manifold mount³

BT = Tube mount - accomodates 1/16" ID soft tubing^{3,4}

SL = Syringe - luer common port & 1/4"-28 UNF NC/O ports⁵

SU = Syringe - 1/4"-28 UNF ports⁵

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 = 10-32⁶

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

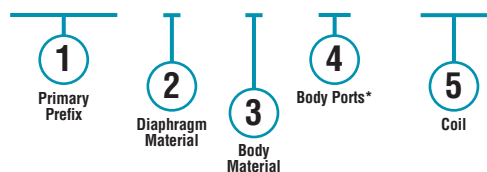
- ▶ 2-Way Normally Closed and 3-Way Directional Control
- ▶ MOPD: 15 PSI to 20 PSI
- ▶ C_v Range: 0.092 to 0.156
- ▶ PTFE Bodies and Diaphragms

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
2-WAY N.C.	0.092	20	0.055	108	KV205
	0.156	15	0.11	239	KW207
3-WAY Directional Controls	0.156	15 (NC/O)	0.14	462	KW347

* Maximum Operational Pressure Differential

② Diaphragm Material

T = PTFE Polytetrafluoroethylene

③ Body Material

1 = PTFE Polytetrafluoroethylene

④ Body Port Configuration

S₁ = 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

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

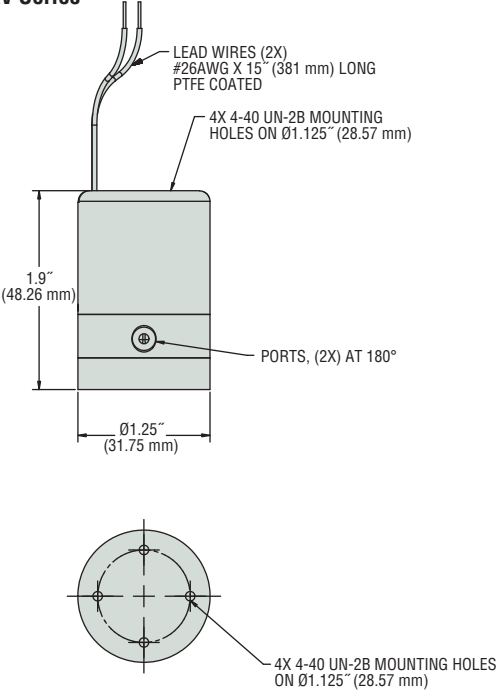
1. Not available with KW Series.



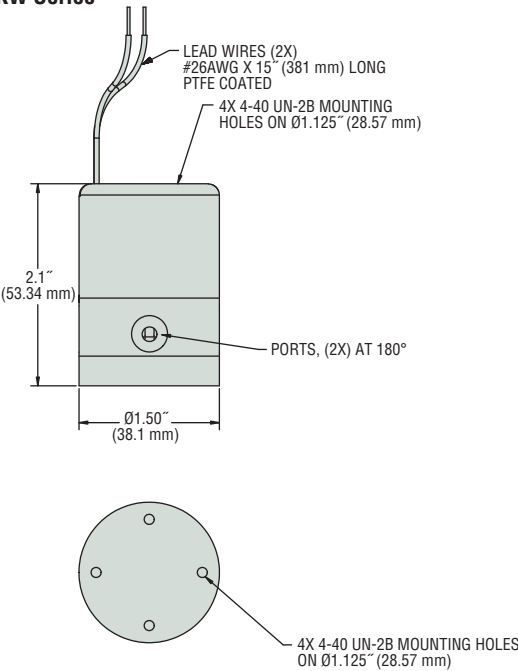
Dimensions – Side Port Body

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

KV Series

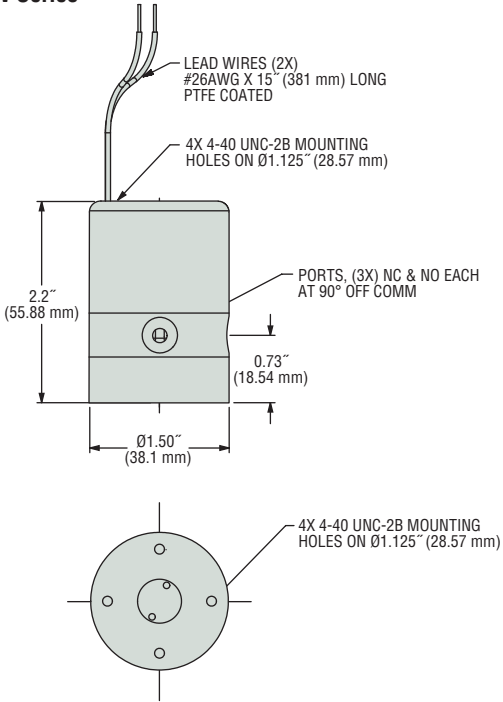


KW Series



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

KW Series



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