ASCO®

Miniature Valve Products

Analytical | Medical | Industrial

Isolation Valves

Pinch Valves

Proportional Valves

General Service Valves

Manifolds

EMERSON
Industrial Automation

ASCO Valve, Inc., a division of Emerson (NYSE: EMR), has been the world's leading manufacturer of solenoid valves for over 100 years. ASCO has one of the largest offerings of miniature Isolation, Pinch, Proportional, and General Service valves to reliably control liquids and gases for Analytical and Medical market applications. To adhere to the quality and reliability standards necessary for today's applications; all valves are 100% factory tested before being shipped to our valued customers.

Our miniature valves can be found throughout the world in areas such as:

- Dental Equipment
- Gas Analyzers
- Oxygen Concentrators & Conservers
- Ventilators
- Textile
- Dialysis
- DNA Sequencers & Synthesizers
- Gas & Liquid Chromatography
- Hematology Analyzers
- Homeland Security

In addition to our comprehensive catalog product offering, we have the ability to create customized assemblies that provide the precise solution to meet your fluid control needs. Whether you need a minor modification of a catalog product or a complete flow control solution, our trained sales and engineering departments are ready to assist.

For more information and the latest offerings of ASCO products please visit our website www.ascovalve.com or contact your local ASCO representative or distributor.

ASCO's Oxygen Clean Option

In order to meet the industry's need for product used in Oxygen-enriched environments, ASCO miniature valves are available with an option cleaned for "Oxygen Service".

ASCO has been manufacturing miniature valves cleaned for Oxygen Service for over 15 years. All of the Oxygen Service valves are assembled in an ISO Class 8 equivalent (<100k particles/ft^3) cleanroom.

Key Points:

- State-of-the-art ISO Class 8 equivalent cleanroom with positive pressure HEPA air filtration system monitored daily
- Staff enters and leaves through airlocks with air shower stage and wear protective hair nets, finger cots, shoe covers, lab coats, and masks (when required) to reduce contamination potential
- Environmental controls for humidity and temperature
- Valve components are ultrasonically cleaned to remove any contaminate prior to assembly
- Components are lubricated with Oxygen-compatible PFPE (perfluropolyether) grease and oil, only as required for assembly purposes

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Isolation Valves

Isolation valves control the flow of neutral and aggressive fluids. The key design characteristic of an isolation valve is to isolate the fluid from the solenoid which is crucial for applications requiring high fluid purity and low dead volume.

Applications examples:

- HPLC Analyzers
- Clinical Sterilizers
- Pipette Dispensing

Hematology Analyzers

ASCO's isolation valves are found in a wide range of hermatology analyzers. The valves control the supply and dosing of blood in the analytical process.

DNA Synthesis

Isolation valves are used as pilot valves to control the handling of fluids in a DNA synthesizer.

8mm Diaphragm Isolation

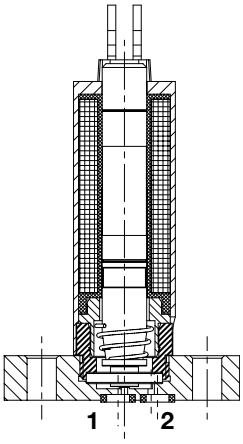
Pad Mount

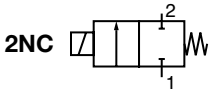
The 282 Series is an 8mm isolation valve utilizing a diaphragm to separate the media from the solenoid. They are characterized by their compact size, long service life, and low dead volume. The 282 Series offers the following benefits:

- Ideal to control the flow of acids, bases, and analytical reagents
- Create separation between the solenoid and fluid
- Easy-to-flush internal cavity and good self-draining capability
- Low dead volume
- Low power consumption
- Easy installation

Construction

Valve Wetted Parts	
Body	PEEK
Diaphragm	FFKM





Electrical

Standard Voltages	12 VDC, 24 VDC
Power Consumption	1.0 Watt
Coil Insulation	311ºF (155ºC)
Electrical Connection	Solder ends
Duty Cycle Rating	Continuous

Valve

Response Time	~ 20 ms
Internal Volume	< 10µl
Maximum Viscosity of Fluid	20 cSt (mm^2/s)

Temperature Range:

Ambient & Media:
50˚F to 104˚F (10˚C to 40˚C)

Approvals:

Meets Applicable CE directives

Alternate Construction/Options

Additional construction and options are available including alternate elastomers and mounting options. Minimum quantities apply.

Specifications

Port Type	Orifice Size (in)	Cv Flow Factor	Operating Pressure (psi)		Power (Watts)	Prefix	Catalog Number	Weight (oz)
			Min.	Max.				
2/2 NC - Normally Closed								
Pad Mount	0.020	0.008	0	7	1.0	L	S282A010xxxx	0.22

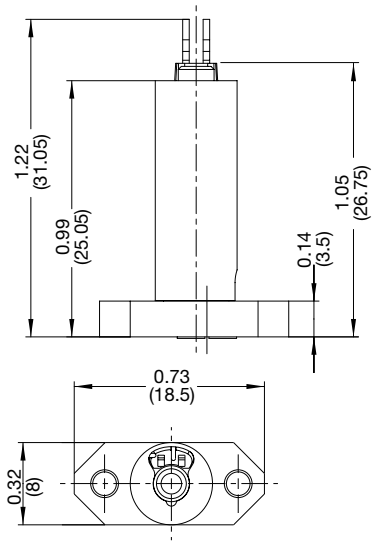
Catalog Number Description and Options

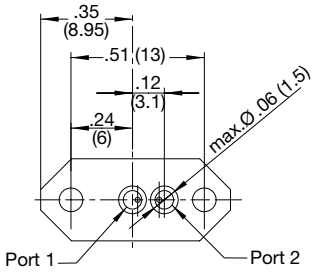
L	S282A010	xxxx
Prefix	**Catalog Number**	**Voltage** 12DC 24DC

Examples

LS282A01012DC = 2-Way normally closed, .020" orifice, FFKM seals, 12 VDC

Dimensions: Inches (mm)



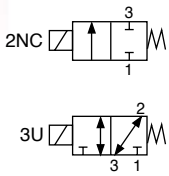


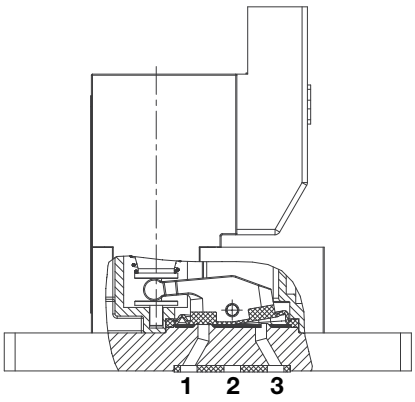
10mm Rocker Isolation Valve

Pad Mount

The 067 Series is a 10mm wide, pad mount, rocker isolation valve designed to control the flow of aggressive chemicals or high purity fluids. The Series 067 offers the following benefits:

- Inert materials of construction, such as PEEK and FFKM
- Small internal volume
- Excellent flushability
- Self draining
- Power savings and reduced heat exchange due to special integrated electronics





Construction

Valve Wetted Parts	
Body	PEEK
Diaphragm	FFKM, EPDM, FKM

Electrical

Standard Voltages	12 VDC, 24 VDC
Coil Insulation	311ºF (155ºC)
Power Consumption	2.5 W (1 W holding with power save electronics)
Duty Cycle Rating	Continuous
Electrical Connector	Connector with 24 AWG leads

Valve

Response Time	~ 10 ms
Internal Volume	< 13µl
Vacuum Rating	26 in-Hg at any port
Maximum Viscosity of Fluid	20 cST (mm^2/s)

Alternate Construction/Options

Many alternate constructions/options are available, including a variety of voltages and normally open construction. Minimum quantities apply.

Temperature Range:

Ambient:
50˚F to 122˚F (10˚C to 50˚C)

Media:
FFKM, FKM = 50ºF to 104ºF (10ºC to 40ºC)
EPDM = 41ºF to 104ºF (5ºC to 40ºC)

Approvals:

Meets Applicable CE directives

Specifications

Port Type	Orifice Size (in)	Flow Coefficient Cv	Operating Pressure (psi)		Electrical Connection/ Type (*)	Prefix	Catalog Number	Const. Ref.	Weight (oz)
			Vac. (in/Hg)	Max.					
2/2 NC - Normally Closed									
Pad Mount	0.024	0.008	26.6	44	1	SC	S067A021xxxxx	1	6.4
					2		S067A022xxxxx	2	6.4
					3	L	S067A025xxxxx	3	7.8
	0.031	0.012	26.6	30	1	SC	S067A026xxxxx	1	6.4
					2		S067A027xxxxx	2	6.4
					3	L	S067A030xxxxx	3	7.8
	0.039	0.02	26.6	22	1	SC	S067A031xxxxx	1	6.4
					2		S067A032xxxxx	2	6.4
					3	L	S067A035xxxxx	3	7.8
	0.053	0.03	26.6	15	1	SC	S067A036xxxxx	1	6.4
					2		S067A037xxxxxx	2	6.4
					3	L	S067A040xxxxx	3	7.8
3/2 U - Universal									
Pad Mount	0.024	0.008	26.6	44	1	SC	S067A101xxxxx	1	6.4
					2		S067A102xxxxx	2	6.4
					3	L	S067A105xxxxx	3	7.8
	0.031	0.012	26.6	30	1	SC	S067A106xxxxx	1	6.4
					2		S067A107xxxxx	2	6.4
					3	L	S067A110xxxxx	3	7.8
	0.039	0.02	26.6	22	1	SC	S067A111xxxxx	1	6.4
					2		S067A112xxxxx	2	6.4
					3	L	S067A115xxxxx	3	7.8
	0.053	0.03	26.6	15	1	SC	S067A116xxxxx	1	6.4
					2		S067A117xxxxx	2	6.4
					3	L	S067A120xxxxx	3	7.8

Electrical Connection/Type Description

(*) Types 1 & 2 with LED
1 = Horizontal connection
2 = Vertical connection
3 = Flying leads, 0.5 m long

Catalog Number Description and Options

SC	S067A021	x	xxxx
Prefix	**Catalog Number**	**Seal Material** "Blank" = FFKM E = EPDM V = FKM	**Voltage** 12DC 24DC

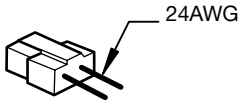
Examples

SCS067A021 12DC = 2-Way normally closed, .024" orifice, FFKM Seals, 12 VDC

LS067A040E24DC = 2-Way normally closed, .053" orifice, EPDM Seals, 24 VDC

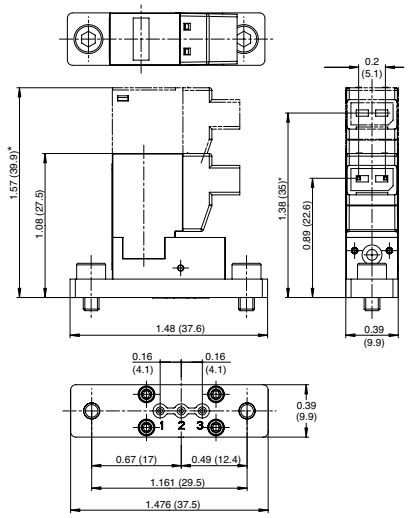
Connectors must be ordered separately, please specify the quantity and codes as necessary
Includes one connector and two wires

Length	Product Code
20" (.5)	88118801
59" (1.5)	88118802
118" (3)	88118803



Dimensions: Inches (mm)

Const. Ref 1



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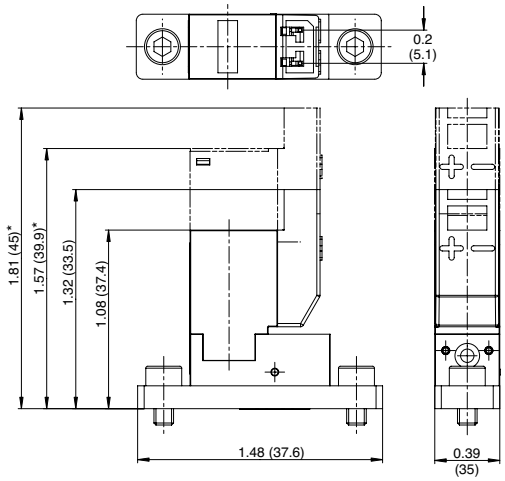

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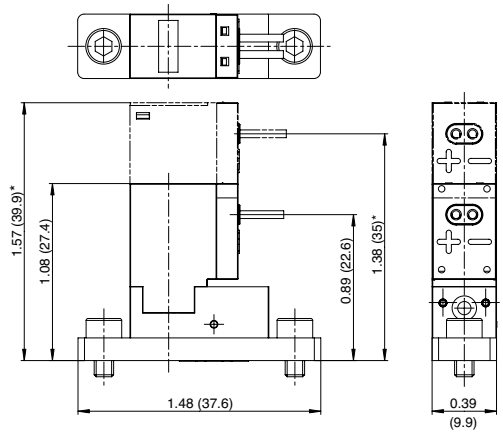
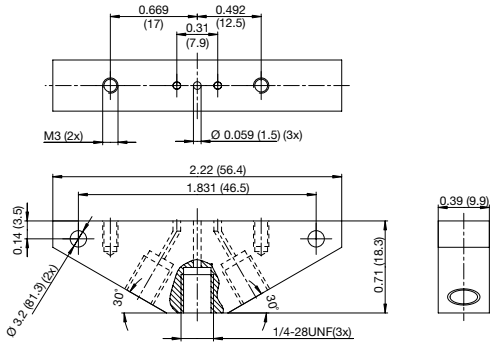


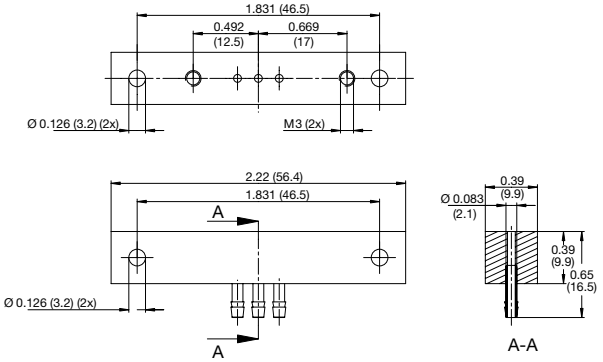
*Note: Taller coil for 0.053" orifice versions.

Single Subbases

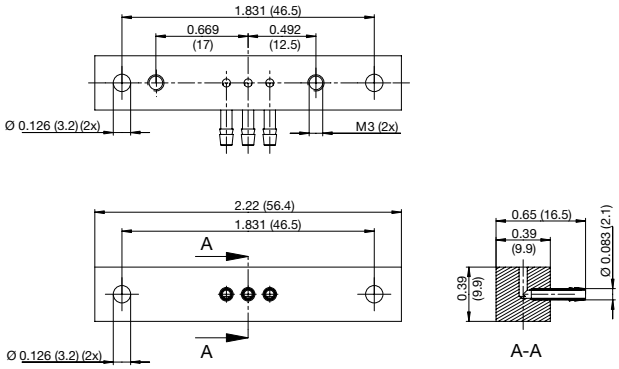
1/4 - 28 UNF thread
(Product Code: 36100040, Material: PEEK)



Bottom 0.080 barb hose connection
(Product Code: 36100042, Material: PEEK)



Side 0.080 barb hose connection
(Product Code: 36100044, Material: PEEK)

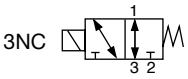


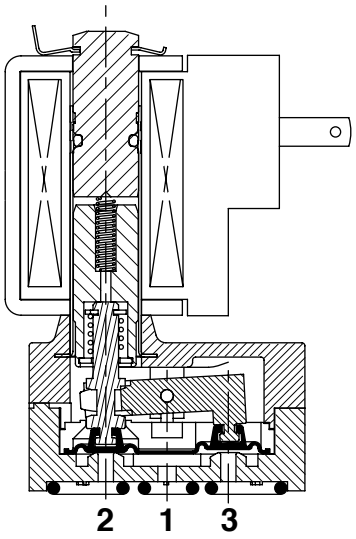
The 385 Series is a 16mm wide, pad mount, rocker isolation valve designed to control the flow of aggressive chemicals or high purity fluids. The Series 385 offers the following benefits:

- Compact manifold design saves space and reduces assembly time.
- Prevents contamination of fluid sample, due to excellent flushing characteristics.
- Create separation between the solenoid and fluid.
- Available with inert materials of construction, such as PEEK and FFKM to handle aggressive chemicals or high purity media.

Construction

Valve Wetted Parts	
Body	PEEK
Diaphragm	FFKM, EPDM, FKM





Electrical

Standard Voltages	12 VDC, 24 VDC
Power Consumption	4 Watts
Duty Cycle Rating	Continuous
Coil Insulation	311ºF (155ºC)
Electrical Connection	DIN SPADE TERMINALS
DIN Connectors	Size 15mm, DIN 43650 Form C

Valve

Response Time	~20 ms
Internal Volume	< 67µl
Vacuum Rating	FFKM: 20" Hg at any port EPDM or FKM: Consult ASCO for use with vacuum
Maximum Viscosity of Fluid	37 cST (mm^2/s)

Temperature Range:

Ambient:
14˚F to 140˚F (-10˚C to 60˚C)

Media:
14ºF to 212ºF (-10ºC to 100ºC)

Approvals:

Meets Applicable CE directives

Specifications

Port Type	Orifice Size (in)	Cv Flow Factor	Operating Pressure (psi) Min.	Operating Pressure (psi) Max.	Diaphragm Material	Prefix	Catalog Number	Const. Ref.	Power (Watts)	Weight (oz)
3/2 NC - Normally Closed										
Pad Mount	0.06	0.035	0	35	FFKM	SC	S385A001xxxx	1	4	1.4
					EPDM	SC	S385A001Exxxx			
					FKM	SC	S385A001Vxxxx			

SC	S385A001	xxxx
Prefix	**Catalog Number**	**Voltage** 12DC 24DC

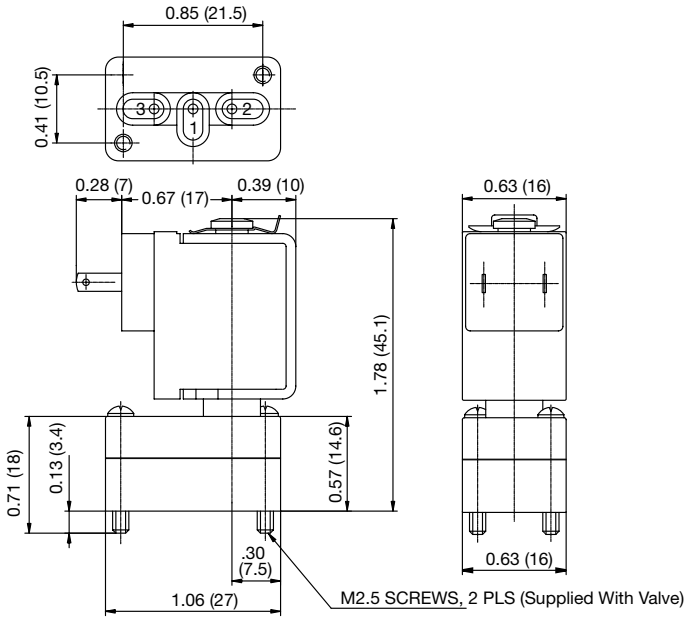
Examples

SCS385A00112DC = 3-Way normally closed, .06" orifice, FFKM Seals, 12VDC

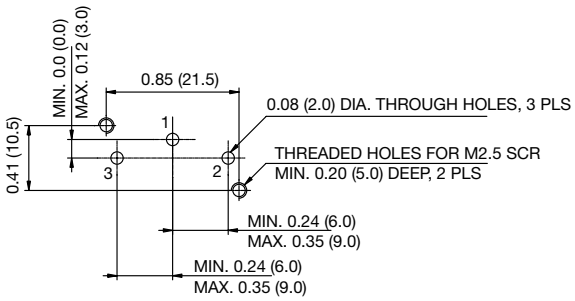
SCS385A001E24DC = 3-Way normally closed, .06" orifice, EPDM Seals, 24VDC

Dimensions: Inches (mm)

Const. Ref 1

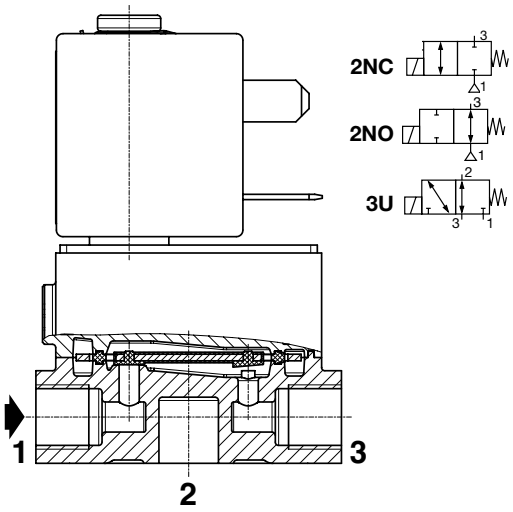


Manifold Machining



The 067 Series is a 22mm wide, pad mount, flapper isolation valve designed to control the flow of neutral or aggressive fluids. The 067 Series offers the following benefits:

- Create separation between the solenoid and fluid
- Excellent self-draining capability and easy-to-flush internal cavity
- "Flapper" mechanism yields no pumping or sticking effect



Construction

Valve Wetted Parts	
Body	PEEK
Diaphragm	FFKM, EPDM, FKM

Electrical

Standard Voltages	12 VDC, 24 VDC
Coil Insulation	311ºF (155ºC)
Power Consumption	10 W
Duty Cycle	Consult ASCO
Electrica Connection	DIN Spade Connectors, Flying Leads
DIN Connector	Size 11mm, DIN 43650 Form B

Valve

Response Time	~10 ms
Internal Volume	< 48µl (connections not included)
Maximum Viscosity of Fluid	20 cSt (mm^2/s)

Alternate Construction Options

Many alternate constructions/options are available, including power save circuit and inline porting. Minimum quantities apply.

Temperature Range:

Ambient:
50˚F to 122˚F (10˚C to 50˚C)

Media:
FFKM = 32ºF to 158ºF (0ºC to 70ºC)
FKM = 50ºF to 104ºF (10ºC to 40ºC)
EPDM = 41ºF to 104ºF (5ºC to 40ºC)

Approvals:

Meets Applicable CE directives

Specifications

Port Type	Orifice Size (in)	Cv Flow Factor	Operating Pressure (psi)		Electrical Connection Type	Prefix	Catalog No.	Const. Ref.	Power (Watts)	Weight (oz)
			Vac. (in Hg)	Max.						
2/2 NC - Normally Closed										
Pad Mount	0.079	0.116	26	145	1	SC	S067A206xxxxx	1	10	4.4
					2	L		2		4.2
	0.118	0.186	26	44	1	SC	S067A207xxxxx	1	10	4.4
					2	L		2		4.2
	0.157	0.348	26	22	1	SC	S067A208xxxxx	1	10	4.4
					2	L		2		4.2
2/2 NO - Normally Open										
Pad Mount	0.079	0.116	26	73	1	SC	S067A212xxxxx	1	10	4.4
					2	L		2		4.2
	0.118	0.186	26	29	1	SC	S067A213xxxxx	1	10	4.4
					2	L		2		4.2
	0.157	0.348	26	15	1	SC	S067A214xxxxx	1	10	4.4
					2	L		2		4.2
3/2 U - Universal Operation										
Pad Mount	0.079	0.116	26	73	1	SC	S067A200xxxxx	1	10	4.4
					2	L		2		4.2
	0.118	0.186	26	29	1	SC	S067A201xxxxx	1	10	4.4
					2	L		2		4.2
	0.157	0.348	26	15	1	SC	S067A202xxxxx	1	10	4.4
					2	L		2		4.2

Electrical Connection Type
1 = DIN Connector
2 = Flying Leads, 18" long

Catalog Number and Options

SC	S067A206	x	xxxx
Prefix	**Catalog Number**	**Seal Material** "Blank" = FFKM E = EPDM V = FKM	**Voltage** 12DC 24DC

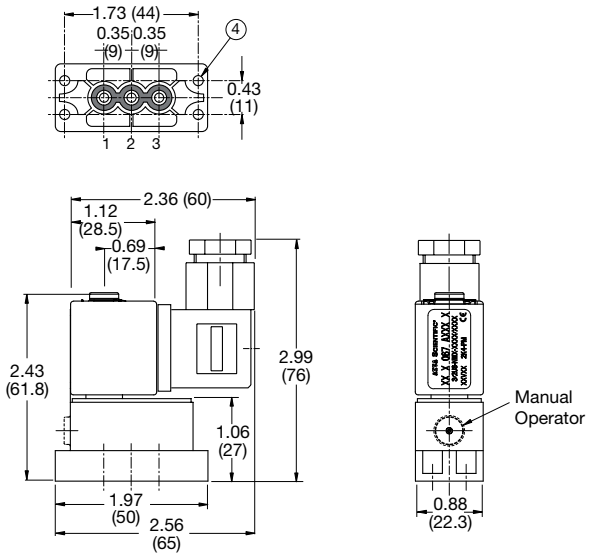
Examples

SCS067A206 12DC = 2-Way normally closed, .079" orifice, FFKM Seals, 12VDC

LS067A202E24DC = 3-Way universal operation, .157" orifice, EPDM Seals, 24VDC

Dimensions: Inches (mm)

Const. Ref. 1



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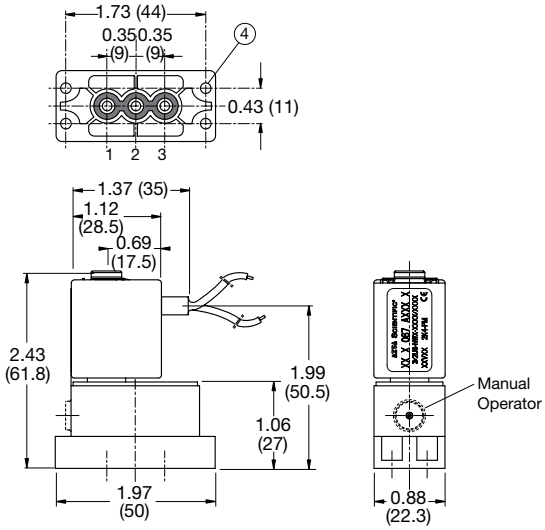
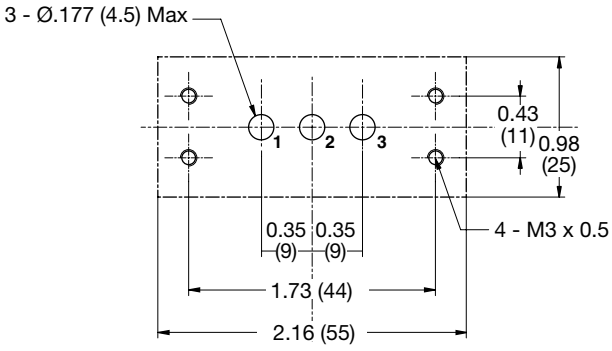


Note: 4-M3 x .8mm stainless steel mounting series included

Sub-Base Mounting Pattern



Rocker Isolation Valves

In-Line or Barb Porting

ASCO’s patented 458 Series rocker isolation valves feature a unique rocker diaphragm mechanism that shields the internal components of the solenoid from the fluid. The design forms an easy to flush, low volume internal cavity.

- Suitable for corrosive media that can attack valves designed for general service duty.
- Prevents contamination of fluid sample, due to excellent flushing characteristics.
- Rocker design significantly reduces erratic flow caused by pumping action in poppet style valves.
- Standard built-in manual operator for testing or troubleshooting.

Construction

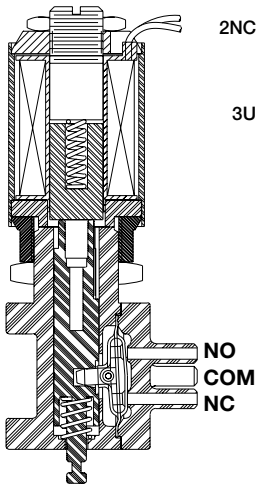
Valve Wetted Parts	
Flange	PSU, PEEK
Diaphragm	EPDM

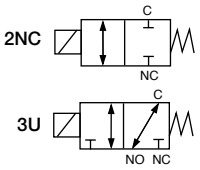
Electrical

Standard Voltages	12 VDC, 24 VDC
Power Consumption	2.5 Watts
Duty Cycle Rating	Continuous
Coil Insulation	266°F (130°C)
Electrical Connection	26 AWG Hard Wire

Valve

Response Time	~20 ms
Internal Volume **-2-Way** **-3-Way**	 51 µL 62 7µL
Options	• Surface or panel mount • Barbed bib ports for 0.062” ID to 0.082” soft tubing • Threaded-flat bottom ports available with #1/4-28 UNF, #10-32 UNF





Temperature Range:

Ambient & Media:
32˚F to 114˚F (0˚C to 45˚C)

Approvals:

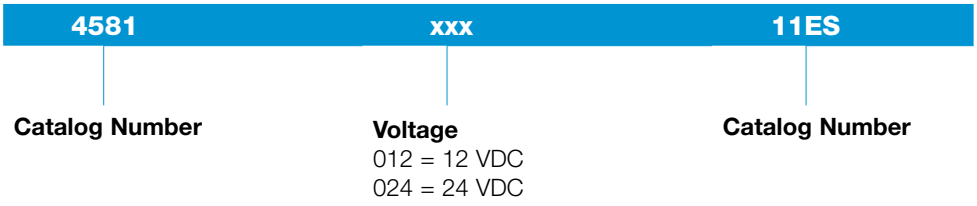
Meets applicable CE directives.

Specifications

Port Type	Orifice Size (in)	Cv Flow Factor(1)	Flange Material	Mount Type	Operating Pressure (psi)		Catalog Number	Power (Watts)	Weight (oz)
					Min.	Max.			
2/2NC - Normally Closed									
Hose Barb	0.062	0.04	PSU	Surface	0	35	4581xxx11ES	2.5	2
Hose Barb	0.062	0.04	PSU	Panel	0	35	4581xxx11EP	2.5	2
#10-32 UNF	0.062	0.04	PEEK	Surface	0	35	4581xxx22ES	2.5	2
#10-32 UNF	0.062	0.04	PEEK	Panel	0	35	4581xxx22EP	2.5	2
1/4-28 UNF	0.062	0.04	PEEK	Surface	0	35	4581xxx32ES	2.5	2
1/4-28 UNF	0.062	0.04	PEEK	Panel	0	35	4581xxx32EP	2.5	2
3/2U - Universal Operation									
Hose Barb	0.062	0.04	PSU	Surface	0	35	4583xxx11ES	2.5	2
Hose Barb	0.062	0.04	PSU	Panel	0	35	4583xxx11EP	2.5	2
#10-32 UNF	0.062	0.04	PEEK	Surface	0	35	4583xxx22ES	2.5	2
#10-32 UNF	0.062	0.04	PEEK	Panel	0	35	4583xxx22EP	2.5	2
1/4-28 UNF	0.062	0.04	PEEK	Surface	0	35	4583xxx32ES	2.5	2
1/4-28 UNF	0.062	0.04	PEEK	Panel	0	35	4583xxx32EP	2.5	2

(1) CV Flow Factors are nominal

Catalog Number Description and Options



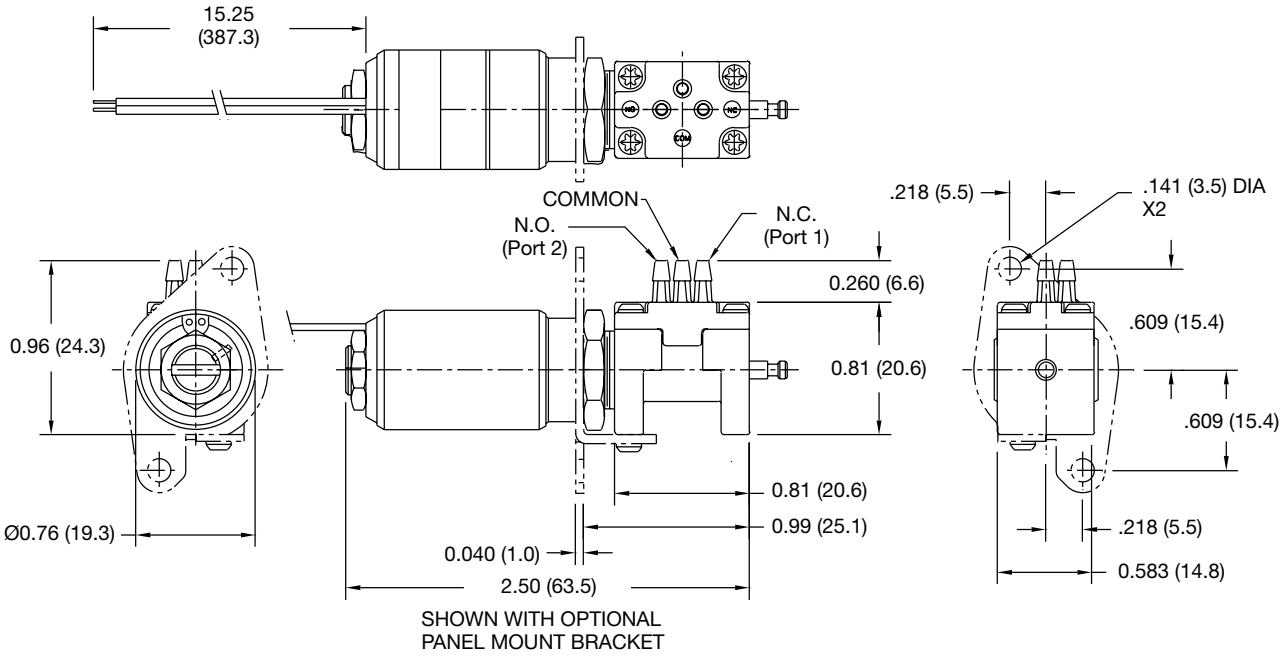
To Construct Catalog Number

- Select catalog number from table
- Insert voltage into the 5th, 6th, and 7th digits denoted by "xxx"

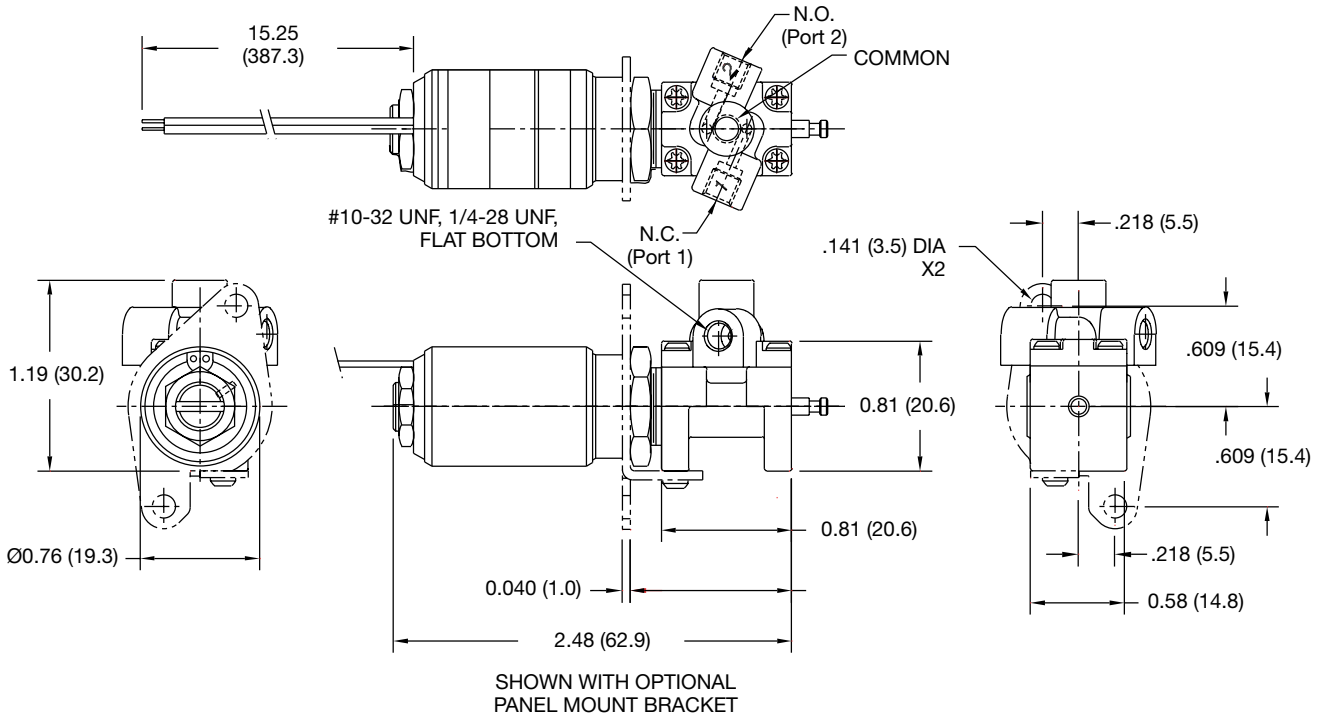
Examples

458102411ES = 2-Way normally closed valve with bib ports, PSU flange, surface mounting, 24 VDC coil

Dimensions 458 Series with Hose Barb Flange: Inches (mm)



Dimensions 458 Series with In-Line Flange: Inches (mm)



Notes

- 3-Way versions shown, 2-Way versions are the same except they do not include the common port.
- Bracket for optional panel mount shown in dashed lines

The 190 & 330 Series are 2-Way, normally closed isolation valves constructed with PTFE materials, which makes them virtually impervious to chemical attack. The 190 Series is a single valve while the 330 Series offers the same valve in a 2, 3, or 4 position manifold configuration for use in chromatography, solvent selection, and process sampling.

- PTFE diaphragm shields the internal components of the solenoid from the media to handle the most aggressive fluids.
- Compact size saves valuable space in equipment.

Construction

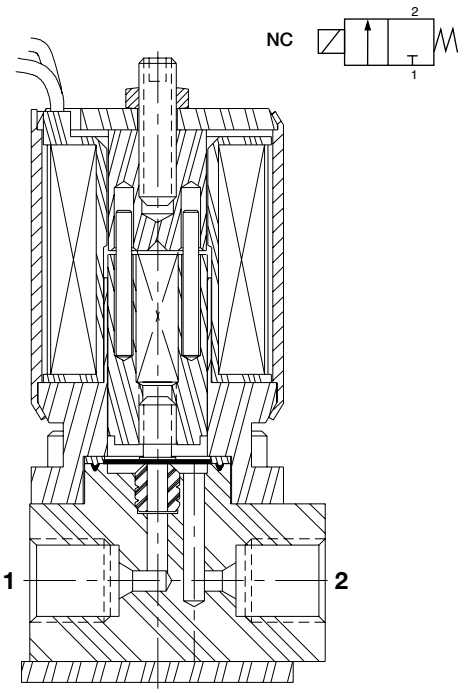
Valve Wetted Parts	
Body	PTFE
Seat	PCTFE
Diaphragm	PTFE

Electrical

Standard Voltages	12 VDC, 24 VDC
Power Consumption	2.9 - 3.8 Watts
Duty Cycle Rating	Continuous
Coil Insulation	356°F (180°C)
Electrical Connection	26 AWG Hard Wire

Valve

Response Time	~5 ms at rated voltage (2 watt coil)
Internal Volume	20 µL from port 1 to seat (not including port) 52 µL from port 2 to seat (not including port)
Vacuum Rating	29" Hg



Temperature Range:

Ambient & Media:
32°F to 77°F (0°C to 25°C)

Approvals:

Meets applicable CE directives.

Specifications

Port Type	Orifice Size (in)	Cv Flow Factor	Operating Pressure (psi)		Catalog Number	No. of Solenoids	Power (Watts)	Weight (oz)
			Vac. (in Hg)	Max.				
2/2NC - Normally Closed								
1/4-28 UNF Flat Bottom	0.062	0.03	29	30	1902xxS30	1	2.9 (12VDC), 3.8 (24VDC)	2.0
1/4-28 UNF Flat Bottom	0.062	0.03	29	30	3302xxS302	2	2.9 (12VDC), 3.8 (24VDC)	4.1
1/4-28 UNF Flat Bottom	0.062	0.03	29	30	3302xxS303	3	2.9 (12VDC), 3.8 (24VDC)	6.5
1/4-28 UNF Flat Bottom	0.062	0.03	29	30	3302xxS304	4	2.9 (12VDC), 3.8 (24VDC)	9.7

Catalog Number Description and Options

3302	xx	S303
Catalog Number	**Voltage** 12 = 12 VDC 24 = 24 VDC	**Catalog Number**

To Construct Catalog Number

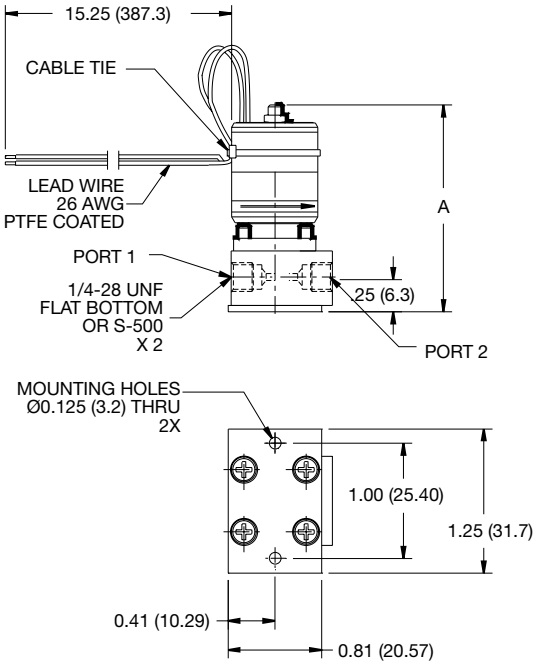
- Select catalog number from table
- Insert voltage into the 5th and 6th digits denoted by "xx"

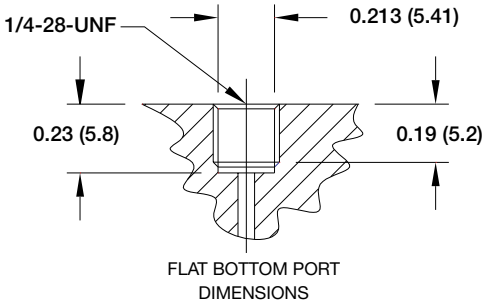
Examples

190212S30 = 2-Way normally closed valve with 1/4 - 28 UNF, flat bottom ports and 12 VDC coil rated at 2.9 Watts

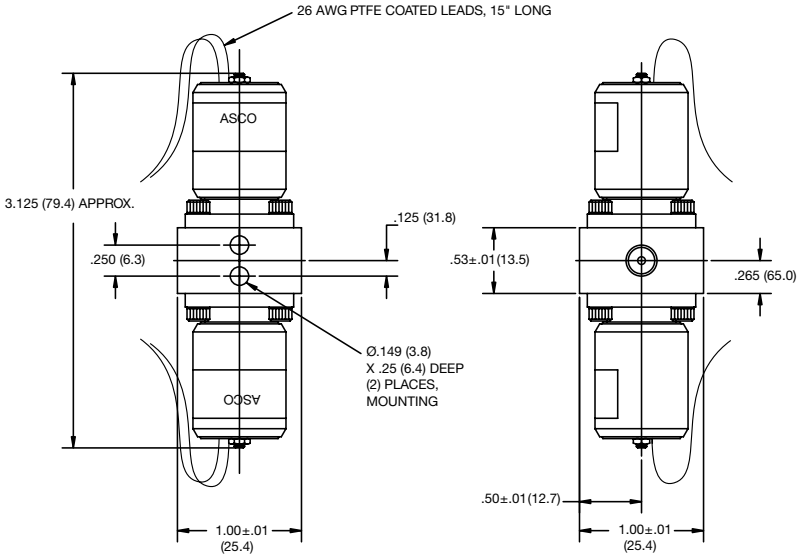
330224S303 = 3, 2-Way normally closed valves mounted on a manifold with 1/4 - 28 UNF, flat bottom ports and 24 vdc coil rated at 3.8 Watts

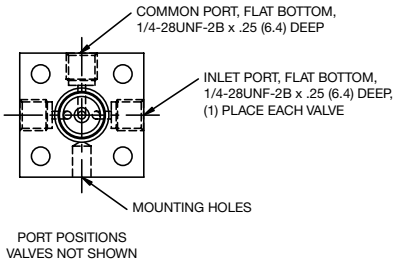
Dimensions 190 Series: Inches (mm)



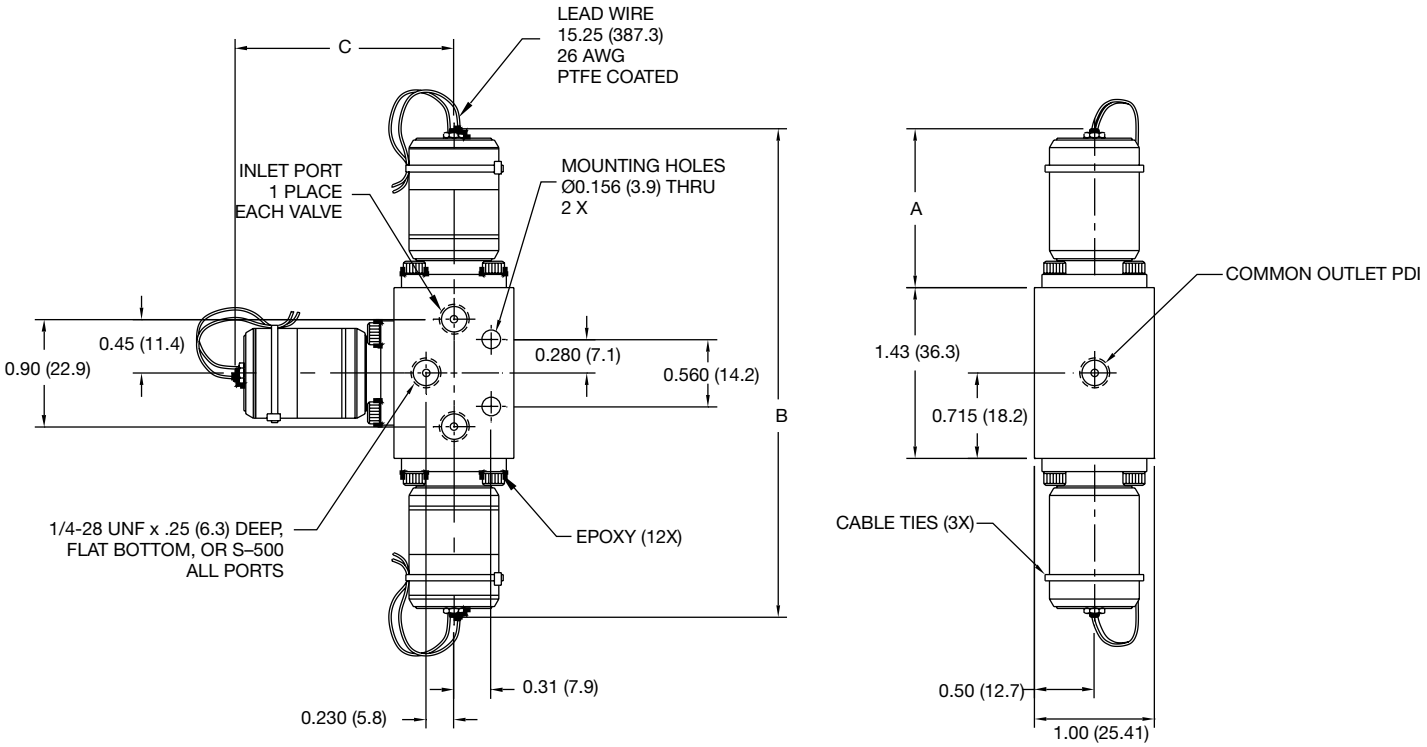


Dimensions 330 Series 2 Position Valve Manifold: Inches (mm)

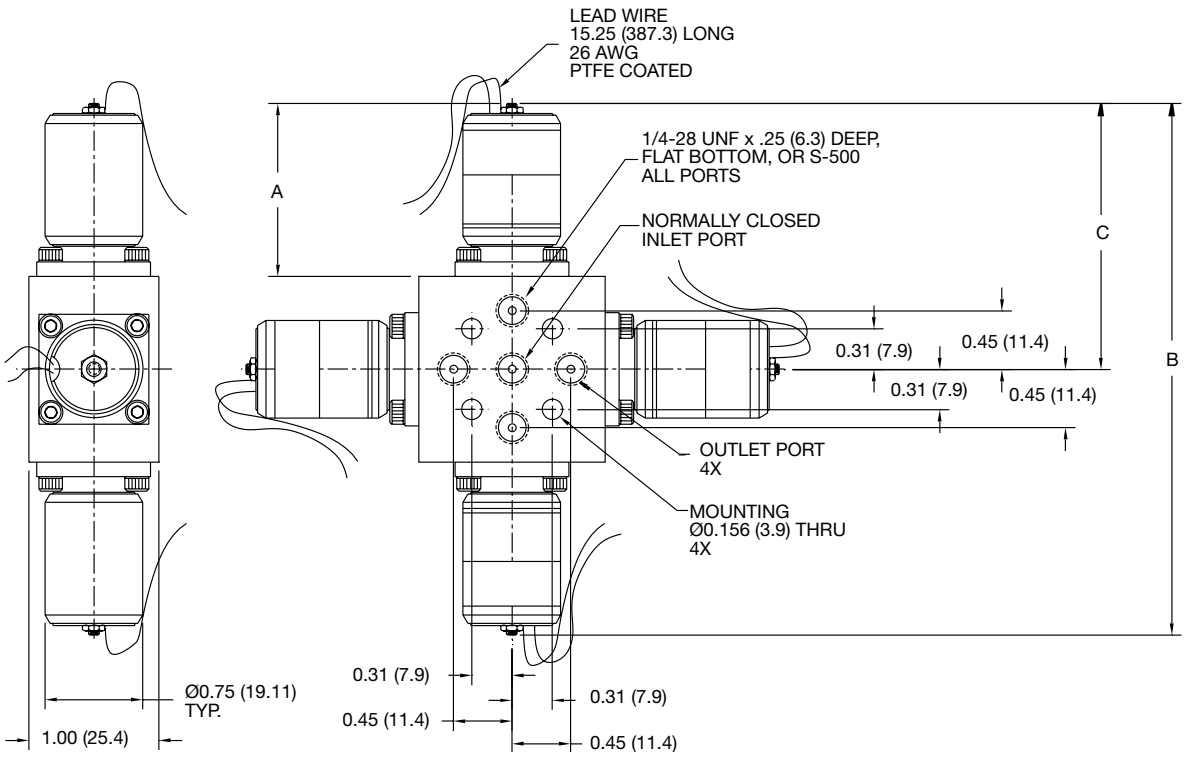




Dimensions 330 Series 3 Position Valve Manifold: Inches (mm)



Dimensions 330 Series 2 Position Valve Manifold: Inches (mm)



The 368 Series are 2-Way and 3-Way isolation valves constructed with PTFE and ETFE materials, which makes them virtually impervious to chemical attack. The Series 368 is a compact construction with a 0.062" orifice to handle standard flow requirements.

- PTFE diaphragm shields the internal components of the solenoid from the media to handle the most aggressive fluids.
- Compact size saves valuable space in equipment.

Construction

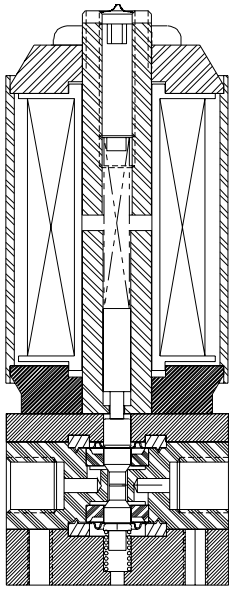
Valve Wetted Parts	
Body	ETFE
Poppet	PTFE
Diaphragm	PTFE

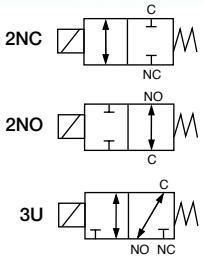
Electrical

Standard Voltages	12 VDC, 24 VDC 115 VAC (with rectifier in lead wires)
Power Consumption	4.5 - 6.8 Watts
Duty Cycle Rating	Continuous
Coil Insulation	356°F (180°C)
Electrical Connection	22 AWG Hardwire

Valve

Response Time	~20 ms
Internal Volume	30 µL from seat to port 10 µL between poppets
Vacuum Rating	29" Hg





Temperature Range:

Ambient & Media:
32°F to 77°F (0°C to 25°C)

Approvals:

Meets applicable CE directives.

Specifications

Port Type	Orifice Size (in)	Cv Flow Factor	Operating Pressure (psi)		Catalog Number	Power (Watts)	Weight (oz)
			Vac. (in Hg)	Max.			
2/2NC - Normally Closed							
1/4-28 UNF Flat Bottom	0.062	0.02	29	30*	3682NCxx30	4.5 (12VDC), 5.3 (24VDC), 6.8 (115 VAC)	4
2/2NO - Normally Open							
1/4-28 UNF Flat Bottom	0.062	0.02	29	30*	3682NOxx30	4.5 (12VDC), 5.3 (24VDC), 6.8 (115 VAC)	4
3/2U - Universal Operation							
1/4-28 UNF Flat Bottom	0.062	0.02	29	30*	36823xx30	4.5 (12VDC), 5.3 (24VDC), 6.8 (115 VAC)	4

Notes
- *Common port: Vacuum to 30 psi
- NC and NO Ports: Vacuum to 10 psi

Catalog Number Description and Options

3682NC	xx	30
Catalog Number	**Voltage** 12 = 12VDC 24 = 24VDC 115 = 115VAC	**Catalog Number**

To Construct Catalog Number

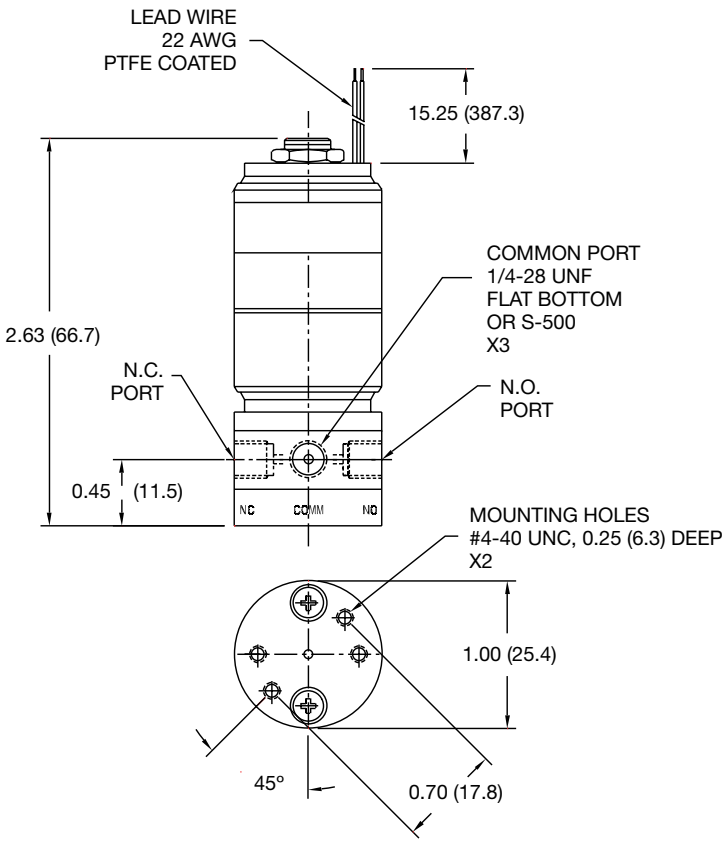
- Select catalog number
- Insert voltage into the 7th and 8th digits denoted by "xx"; use 3 digits for 115 AC voltage

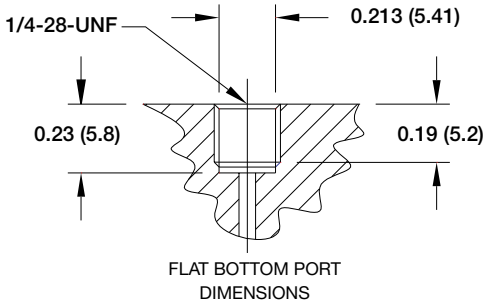
Examples

3682NC1230 = 2-Way normally closed valve with a 0.062" orifice, 1/4 - 28 UNF, flat bottom ports and 12 VDC coil rated at 4.5 Watts

3682311530 = 3-Way valve with a 0.062" orifice, 1/4 - 28 UNF, Flat bottom ports and 115/50-60 VAC coil rectifier

Dimensions 368 Series: Inches (mm)



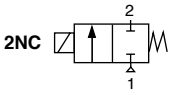


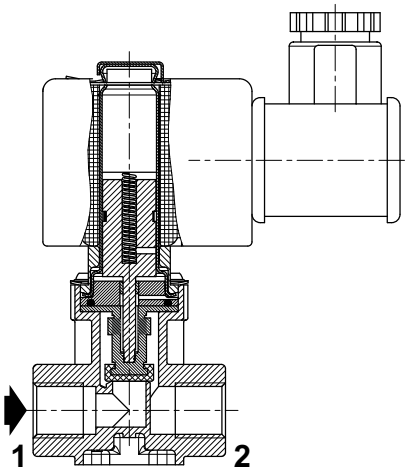
2-Way High Flow Bellow Isolation Valve

1/4" G and NPT Porting

The 8296 Series is a 2-Way, high flow isolation valve designed to control the flow of aggressive liquids and gases in analytical, semiconductor, and environmental equipment. The 8296 Series offers the following benefits:

- Reliable operation with a wide variety of media due to inert wetted materials such as PEEK, PTFE, stainless steel, and FFKM.
- High flow rates of corrosive or high purity fluids.
- Higher pressure ratings than typical isolation valves.





Construction

Valve Wetted Parts	
Body	PEEK, 300 Series Stainless Steel
Seals	FFKM
Bellows	PTFE

Electrical

Standard Voltages	24 VDC
Power Consumption	6.9, 11.2 Watts
Duty Cycle Rating	Continuous
Coil Insulation	311ºF (155ºC)
Electrical Connection	DIN Spade Terminal
DIN Connectors **- 6.9 Watt Coil** **- 11.2 Watt Coil**	 Size 11mm, DIN 43650 Form B Size 18mm, ISO 4400/EN 175301-803 Fom A

Valve

Maximum Viscosity of Fluid	40 cSt (mm^2/s)

Temperature Range:

Ambient:
14˚F to 140˚F (-10˚C to 60˚C)

Media:
14ºF to 194ºF (-10ºC to 90ºC)

Approvals:

Meets applicable CE directives.

Specifications

Port Type	Orifice Size (in)	Cv Flow Factor	Operating Pressure (psi) Min.	Operating Pressure (psi) Max.	Prefix	Catalog Number	Const. Ref.	Power (Watts)	Weight (oz)
PEEK Body									
1/4	0.079	0.13	0	44	SC	x296A007xxxx	1	6.9	5.1
1/4	0.079	0.13	0	87	SC	x296A008xxxx	2	11.2	14.8
1/4	0.157	0.37	0	73	SC	x296A009xxxx	2	11.2	14.8
Stainless Steel Body									
1/4	0.079	0.13	0	44	SC	x296A021xxxx	3	6.9	10.9
1/4	0.079	0.13	0	87	SC	x296A022xxxx	4	11.2	22.9
1/4	0.157	0.37	0	73	SC	x296A023xxxx	4	11.2	22.9

Catalog Number Description and Options

SC	x	296A007	xxxx
Prefix	**Port Threads** G = G (ISO 228/1) 8 = NPT	**Catalog Number**	**Voltage** 24DC

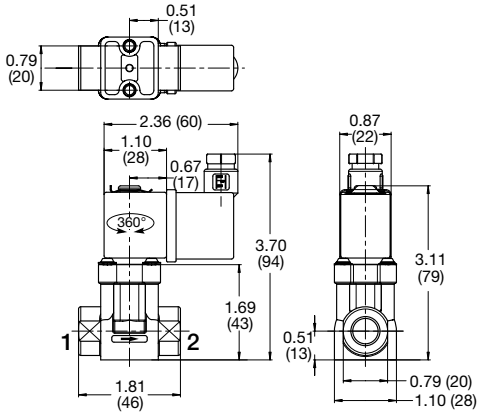
Examples

SCG296A00724DC = PEEK body with G 1/4 ports, .079" orifice, 24 VDC

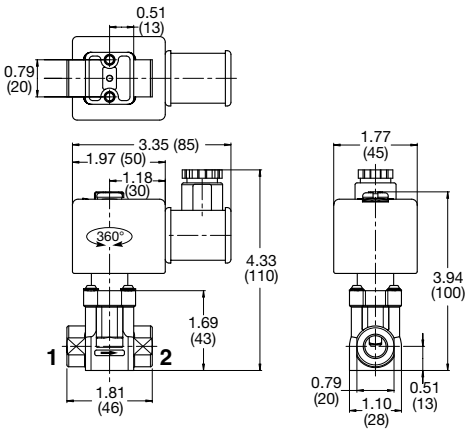
SC8296A02324DC = Stainless steel body with 1/4 NPT ports, .157" orifice, 24 VDC

Dimensions 8296 Series: Inches (mm)

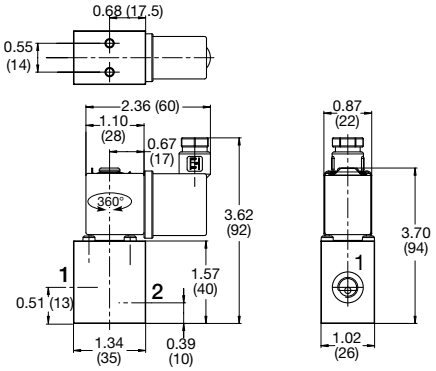
Const. Ref. 1



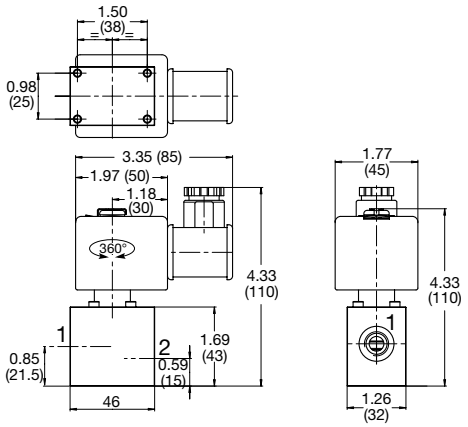
Const. Ref. 2



Const. Ref 3



Const. Ref. 4

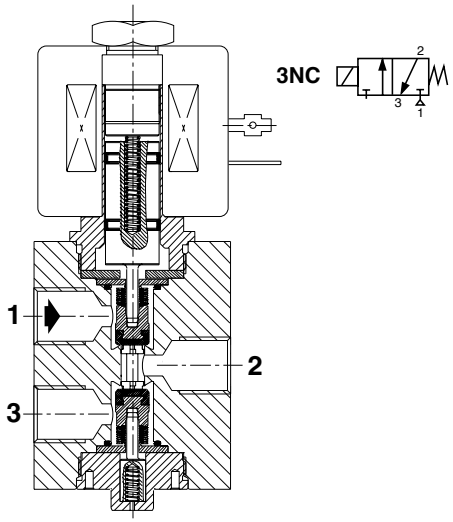


3-Way High Flow Bellow Isolation Valve

1/4" G and NPT Porting

The 8396 Series is a 3-Way, high flow isolation valve designed to control the flow of aggressive liquids and gases in analytical, semiconductor, and environmental equipment. The 8396 Series offers the following benefits:

- Reliable operation with a wide variety of media due to inert wetted materials such as PEEK, PTFE, stainless steel, and FFKM.
- High flow rates of corrosive or high purity fluids.
- Higher pressure ratings than typical isolation valves.



Construction

Valve Wetted Parts	
Body	PEEK, 300 Series Stainless Steel
Seals	FFKM
Bellows	PTFE

Electrical

Standard Voltages	24 VDC
Power Consumption	11.2 Watts
Duty Cycle Rating	Continuous
Coil Insulation	311ºF (155ºC)
Electrical Connection	DIN Spade Terminals
DIN Connectors	Size 18mm, ISO 4400/EN 175301-803 Form A

Valve

Maximum Viscosity of Fluid	40 cSt (mm2/s)

Temperature Range:

Ambient:
14˚F to 167˚F (-10˚C to 75˚C)

Media:
14ºF to 194ºF (-10ºC to 90ºC)

Approvals:

Meets applicable CE directives.

Specifications

Port Type	Orifice Size (in)	Cv Flow Factor	Operating Pressure (psi) Min.	Operating Pressure (psi) Max.	Prefix	Catalog Number	Const. Ref.	Power (Watts)	Weight (oz)
PEEK Body									
1/4	0.157	0.30	0	44	SC	x396A006xxxx	1	11.2	17.3
Stainless Steel Body									
1/4	0.157	0.30	0	44	SC	x396A003xxxx	1	11.2	31.8

Catalog Number Description and Options

SC	x	396A006	xxxx
Prefix	**Port Threads** G = G (ISO 228/1) 8 = NPT	**Catalog Number**	**Voltage** 24DC

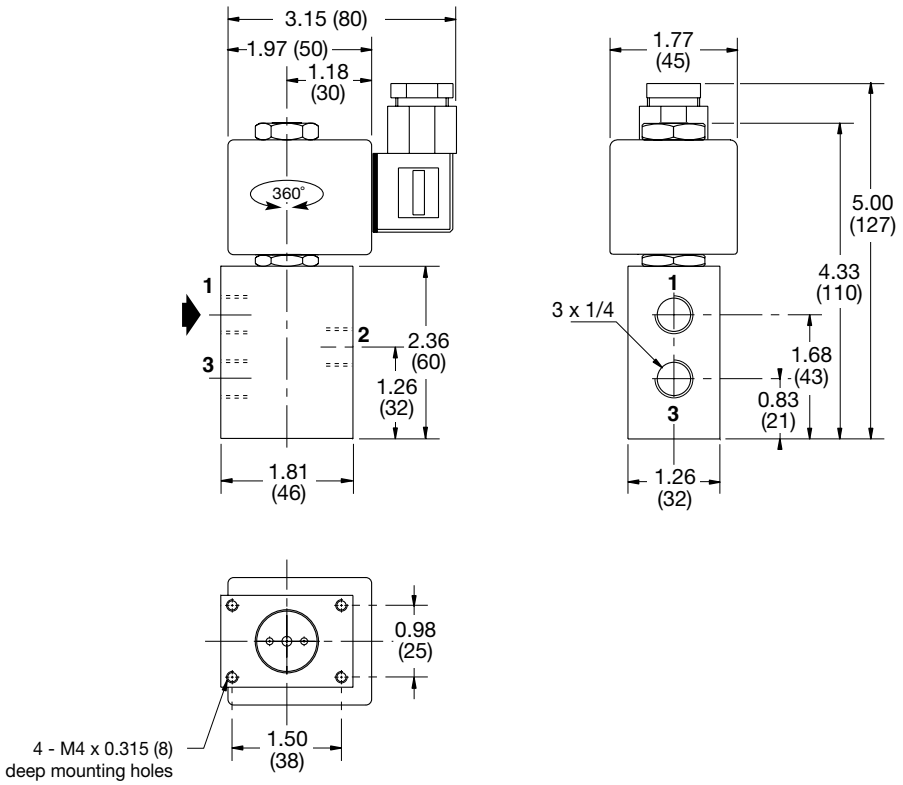
Examples

SCG396A00624DC = PEEK body with G 1/4 ports, .157" orifice, 24 VDC

SC8396A00324DC = Stainless steel body with 1/4 NPT ports, .157" orifice, 24 VDC

Dimensions 8396 Series: Inches (mm)

Const. Ref. 1



2-Way High Flow Diaphragm Isolation Valves

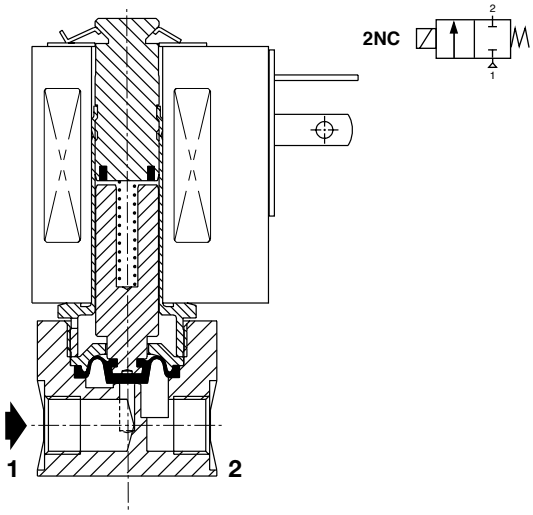
M5 and G1/8 Ports

The 282 Series are 2-Way, normally closed, high flow isolation valves designed to control the flow of aggressive liquids and gases in analytical instruments, clinical diagnostic analyzers, and bioinstrumentation. The 282 Series offers the following benefits:

- High flow rates for corrosive media service.
- Capable of handling a variety of media with several body and diaphragm material options.
- Removable/rotatable coil for easy service and installation.

Construction

Valve Wetted Parts	
Body	300 Series Stainless Steel, PVDF
Seals	VQM, EPDM, FKM



Electrical

Standard Voltages	12 VDC, 24 VDC
Power Consumption	2.5, 9 Watts
Duty Cycle Rating	Continuous
Coil Insulation	311ºF (155ºC)
Electrical Connection	DIN Spade Terminals
DIN Connectors **- 2.5 Watt Coil** **- 9 Watt Coil**	 Size 9.4 mm, DIN 43650 Form C Size 18mm, ISO 4400/EN 175301-803 Form A

Valve

Internal Volume	<70 µL
Response Time	
SCE282B001xxxxx	~10 ms
SCG282B002xxxxx	~20 ms
Maximum Viscosity of Fluid	37 cSt (mm^2/s)

Temperature Range:

Ambient:
14˚F to 140˚F (-10˚C to 60˚C)

Media:
14ºF to 212ºF (-10ºC to 100ºC)

Approvals:

Meets applicable CE directives.

Specifications

Port Type	Orifice Size (in)	Cv Flow Factor	Operating Pressure (psi)		Prefix	Catalog Number	Constr. Ref.	Power (Watts)	Weight (oz)
			Min	Max					
Stainless Steel Body									
M5	0.063	0.046	0	29	SC	E282B001xxxxx	1	2.5	2.9
PVDF Body									
G 1/8	0.157	0.37	0	36	SC	G282B003xxxxx	2	9	7.8

Catalog Number Description and Options

SC	E282B001	x	xxxx
Prefix	**Catalog Number**	**Seal Material** "Blank" = VQM V = FKM E = EPDM	**Voltage** 12DC 24DC

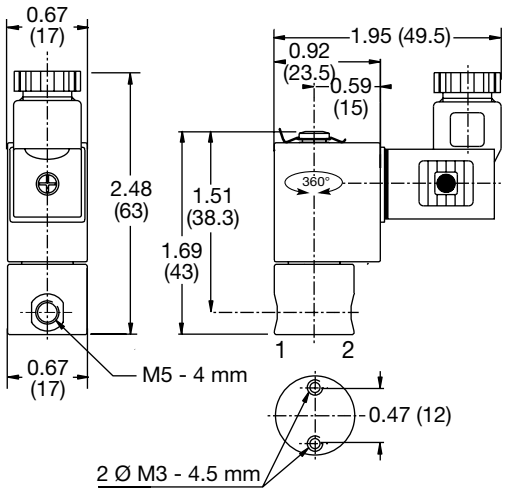
Examples

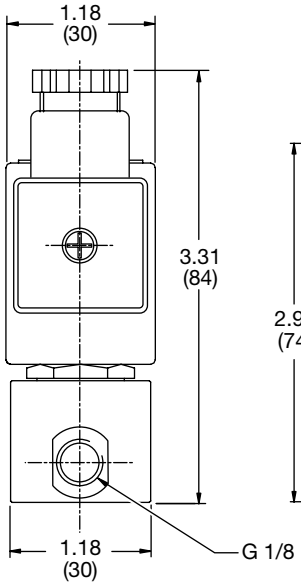
SCE282B001 12DC = Stainless steel body with M5 ports, 0.063" orifice, VQM seals, 12VDC

SCG282B003E24DC = PVDF body with G 1/8 ports, 0.157" orifice, EPDM seals, 24VDC

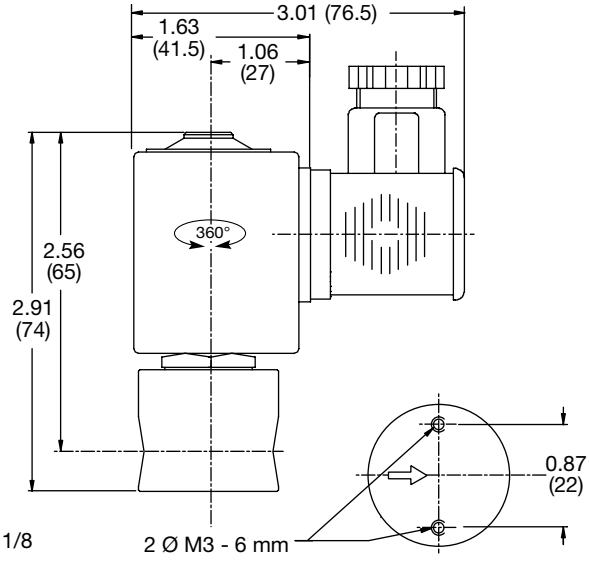
Dimensions 282 Series: Inches (mm)

Const. Ref 1





Const. Ref 2



2-Way High Flow Diaphragm Isolation Valves

G1/4 Ports

The 282 Series are 2-Way, normally closed, high flow isolation valves designed to control the flow of aggressive liquids and gases in analytical instruments, clinical diagnostic analyzers, and bioinstrumentation. The 282 Series offers the following benefits:

- High flow rates for corrosive media service.
- Capable of handling a variety of media with several body and diaphragm material options.
- Removable/rotatable coil for easy service and installation.
- Adjustable flow restrictor incorporated into valve body (range 10% to 100% flow)

Construction

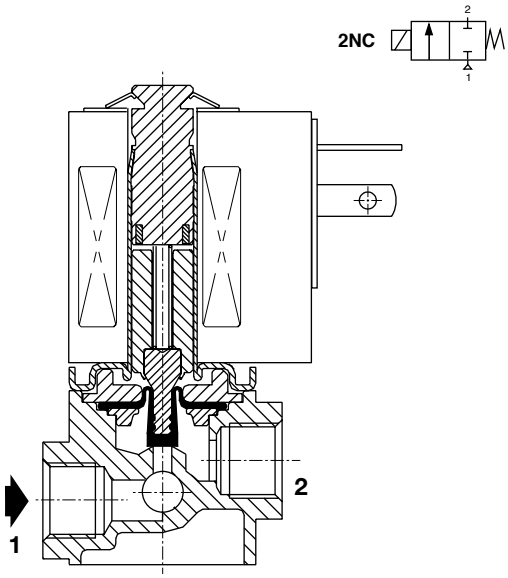
Valve Wetted Parts	
Body	PP (Glass Fiber Reinforced)
Seals	FKM

Electrical

Standard Voltages	12 VDC, 24 VDC
Power Consumption	9 Watts
Duty Cycle Rating	Continuous
Coil Insulation	311ºF (155ºC)
Electrical Connectors	DIN Spade Terminal
DIN Connectors	Size 18mm, ISO 4400/EN 175301-803 Form A

Valve

Response Time	~20 ms
Maximum Viscosity of Fluid	37 cSt (mm^2/s)



Temperature Range:

Ambient:
14˚F to 140˚F (-10˚C to 60˚C)

Media:
14ºF to 176ºF (-10ºC to 80ºC)

Approvals:

Meets applicable CE directives.

Specifications

Ports	Orifice Size (in)	Cv Flow Factor	Differential Pressure (psi)		Prefix	Catalog Number	Power (Watts)	Weight (oz)
			Min.	Max.				
G 1/4	0.177	0.52	0	14.5	SC	G282A005xxxx	9.0	11.3

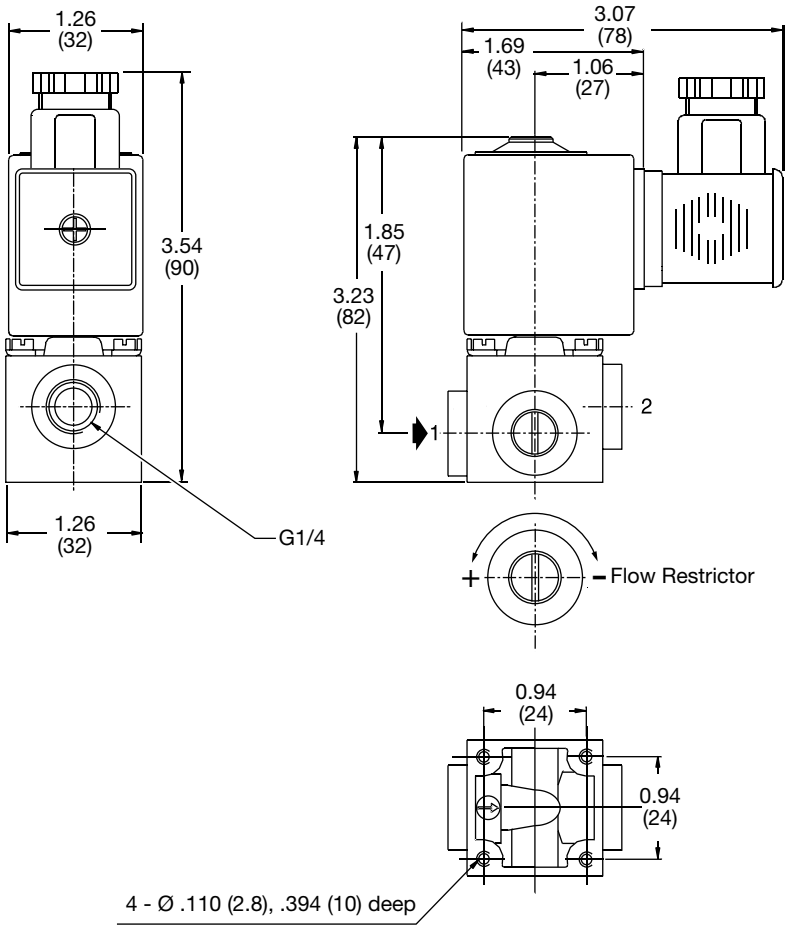
Catalog Number Description and Options

SC	G282A005	xxxx
Prefix	**Catalog Number**	**Voltage** 12DC 24DC

Examples

SCG282A00524DC = G1/4 ports, 0.177" orifice, 24VDC

Dimensions 282 Series: Inches (mm)



Pinch valves provide the ability to control the flow of fluid through an uninterrupted flow path. The fluid stays in its original supply tube and is controlled by the opening and closing "pinch" of the valve. Because the fluid never leaves the supply tube there is zero dead volume and no cross-contamination due to the valve.

Applications examples:

- Drug Dispensing
- Food & Beverage Dispensing
- Urinary Collection Systems

Dialysis Equipment

ASCO pinch valves are found in dialysis equipment and control the supply of dialysate fluid from the reservoir to the patient.

Intravenous (IV) Systems

Pinch valves are used to control the flow of fluids to a patient administered intravenously.

Compact 2-Way Pinch Valves

For use with 3/32" OD to 3/8" OD Soft Tubing

ASCO 388, 390, and 401 Series are 2-Way, normally closed and normally open, solenoid operated pinch valves designed to control the flow of corrosive or high purity fluids in medical equipment and analytical instruments. Pinch valves isolate the fluid from the valve components by locating soft tubing in the mechanism that “pinches” the tubing to block flow and releases to allow flow.

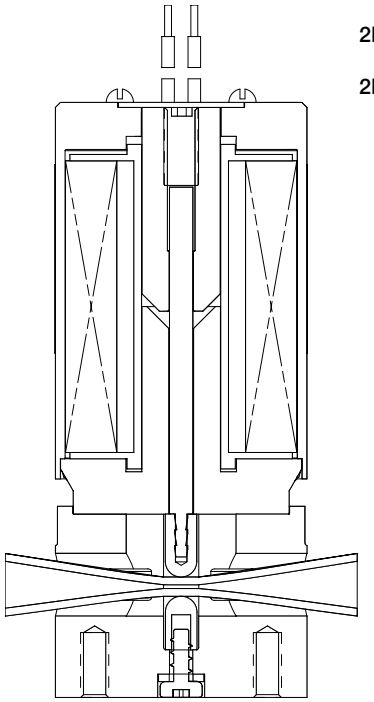
- Saves space in equipment with compact design.
- Large range of tubing sizes available for various flow and pressure requirements.
- Zero dead volume prevents cross-contamination

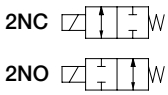
Construction

Valve Wetted Parts	
Recommended Tubing	VQM Max Hardness: 55 Shore A (12” tube supplied with each valve. Additional lengths available, see Pinch Valve Tubing Section)

Electrical

Standard Voltages	12 VDC, 24 VDC, 115 VAC (50/60 Hz)
Power Consumption **-DC** **-AC**	 2.5 to 10.0 Watts 4.0 to 12.0 Watts
Duty Cycle Rating	Continuous
Electrical Connection **-390** **-388, 401**	 26 AWG Hardwire, 15" long 22 AWG Hardwire, 15" long





Temperature Range:

Ambient:
32˚F to 77˚F (0˚C to 25˚C)

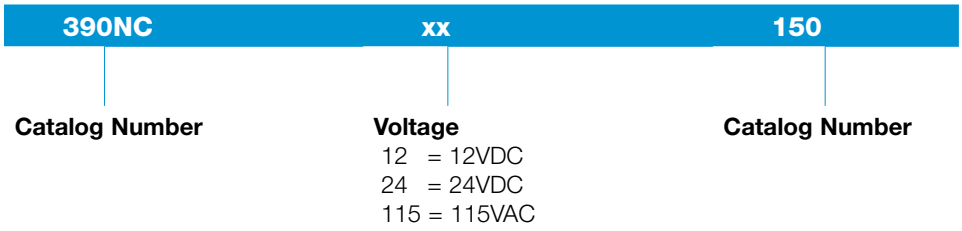
Approvals:

Meets applicable CE directives.

Specifications

Tubing ID (in)	Tubing OD (in)	Tubing Wall (in)	Operating Pressure (psi)		Catalog Number	Const. Ref.	Power (Watts)	Weight (oz)
			Min.	Max.				
2/2NC - Normally Closed								
1/32”	3/32”	1/32”	0	50	390NCxx150	1	2.5 (DC), 4.0 (AC)	2.5
1/16”	1/8”	1/32”	0	30	390NCxx330	1	2.5 (DC), 4.0 (AC)	2.5
1/16”	3/16”	1/16”	0	30	401NCxx430	2	4.5 (12DC), 5.3 (24DC), 6.8 (AC)	4.0
3/32”	5/32”	1/32”	0	15	401NCxx515	2	4.5 (12DC), 5.3 (24DC), 6.8 (AC)	4.0
1/8”	1/4”	1/16”	0	30	401NCxx830	2	4.5 (12DC), 5.3 (24DC), 6.8 (AC)	4.0
3/16”	1/4”	1/32”	0	10	401NCxx1010	2	4.5 (12DC), 5.3 (24DC), 6.8 (AC)	4.0
1/4”	5/16”	1/32”	0	10	388NCxx1110	3	10.0 (DC), 12.0 (AC)	16.0
1/4	3/8"	1/16"	0	15	388NCxx1215	3	10.0 (DC), 12.0 (AC)	16.0
2/2NO - Normally Open								
1/32”	3/32”	1/32”	0	50	390NOxx150	1	2.5 (DC), 4.0 (AC)	2.5
1/16”	1/8”	1/32”	0	30	390NOxx330	1	2.5 (DC), 4.0 (AC)	2.5
1/16”	3/16”	1/16”	0	30	401NOxx430	2	4.5 (12DC), 5.3 (24DC), 6.8 (AC)	4.0
3/32”	5/32”	1/32”	0	15	401NOxx515	2	4.5 (12DC), 5.3 (24DC), 6.8 (AC)	4.0
1/8”	1/4”	1/16”	0	30	401NOxx830	2	4.5 (12DC), 5.3 (24DC), 6.8 (AC)	4.0
3/16”	1/4”	1/32”	0	10	401NOxx1010	2	4.5 (12DC), 5.3 (24DC), 6.8 (AC)	4.0
1/4”	5/16”	1/32”	0	10	388NOxx1110	3	10.0 (DC), 12.0 (AC)	16.0
1/4	3/8"	1/16"	0	15	388NOxx1215	3	10.0 (DC), 12.0 (AC)	16.0

Catalog Number Description and Options



To Construct Catalog Number

- Select catalog number from specification table above.
- Insert desired voltage in place of “xx”; use 3 digits for 115 AC voltage.

Examples

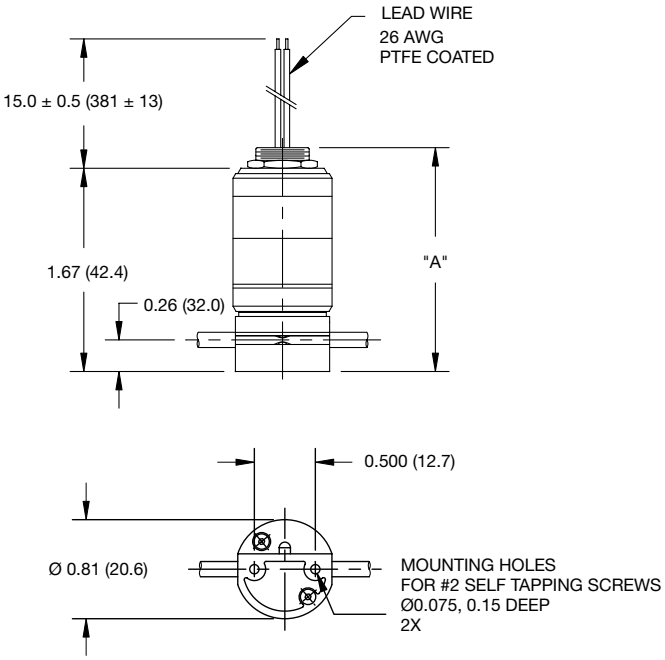
390NO12330 = 1/16" x 1/8" tubing, normally open, 12DC, 30 psi

401NC24830 = 1/8" x 1/4" tubing, normally closed, 24DC, 30 psi

388NC1151215 = 1/4" x 3/8" tubing, normally closed, 115AC, 50/60 Hz, 15 psi

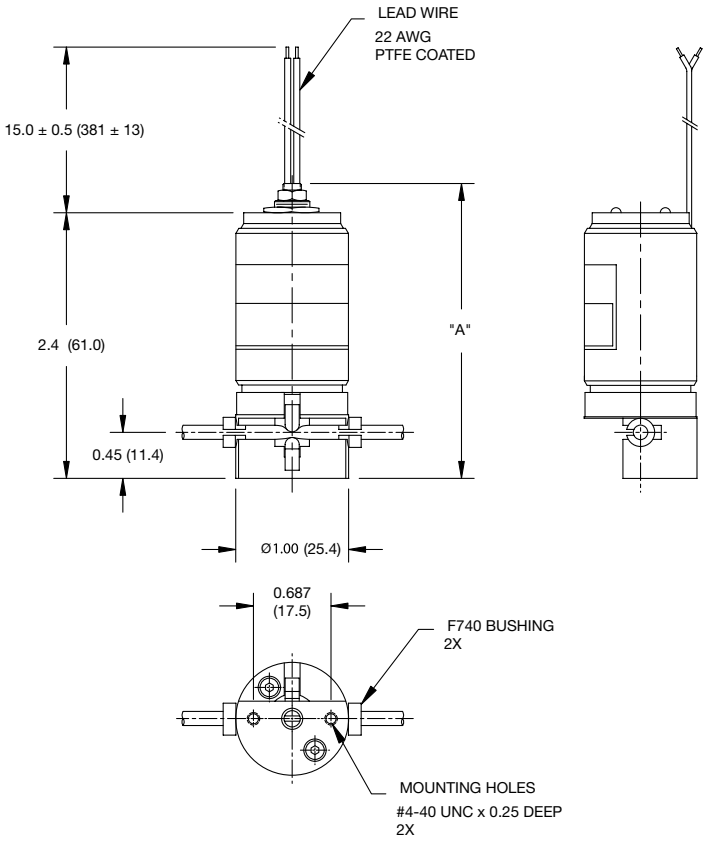
Dimensions: Inches (mm)

Const. Ref 1



MODEL 390	
TYPE	DIM "A"
2 WAY NO	7.75 (44.5) MAX
2 WAY NC	1.90 (48.3) MAX

Const. Ref 2

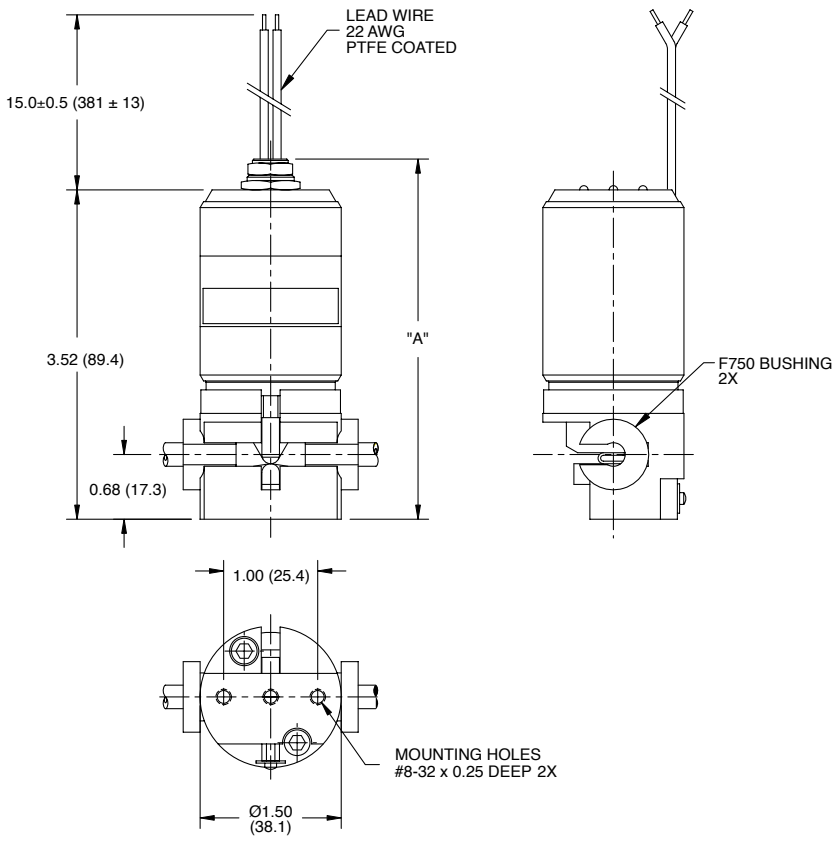


MODEL 401	
TYPE	DIM "A"
2 WAY NO	2.45 (62.2) MAX
2 WAY NC	2.50 (63.5) MAX

Dimensions: Inches (mm)

Const. Ref 3

MODEL 388	
TYPE	DIM "A"
2 WAY NO	3.6 (91.4) MAX
2 WAY NC	4.00 (101.6) MAX

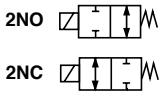


2-Way Pinch Valves

For use with 1/16" OD to 3/8" OD Soft Tubing

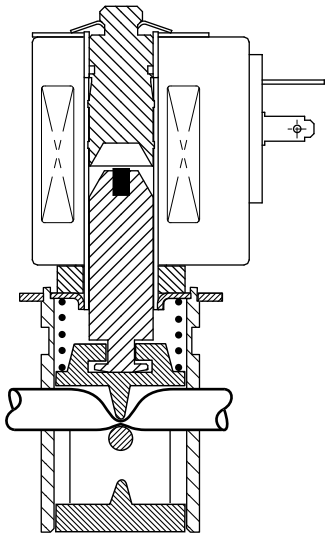
The 284 Series are 2-Way, normally closed and normally open, solenoid operated pinch valves designed to control the flow of corrosive or high purity fluids in medical equipment, analytical instruments, and industrial applications. Pinch valves control fluid flow by locating soft tubing in a mechanism that “pinches” the tubing to block flow and releases to allow flow.

- Large open gap for high flow and handling of particulate media.
- Zero dead volume prevents cross-contamination.
- Electrical connections can be kept separate from fluid area via built-in panel mount bracket.
- Built-in manual operator for easy tubing change out and testing.
- Removable/Rotatable coil for easy service and installation.



Construction

Valve Wetted Parts	
Recommended Tubing	VQM, Max. Hardness 50 Shore A Tubing sold separately. See Pinch Valve Tube Section



Electrical

Standard Voltages	12VDC, 24 VDC
Coil Insulation	311ºF (155ºC)
Power Consumption	4, 9, 13 Watts
Duty Cycle Rating	Continuous
Electrical Connection	DIN SPADE TERMINALS
Din Connectors (Not included with valve, see DIN ELECTRICAL CONNECTORS)	
-4 Watt Coil	Size 9.4 mm, DIN 43650 Form C
-9 Watt Coil	Size 18 mm, ISO 4400/EN 175301-803 Form A
-13 Watt Coil	Size 18 mm, ISO 4400/EN 175301-803 Form A

Valve

Response Time	~20 ms

Temperature Range:

Ambient:
14˚F to 140˚F (-10˚C to 60˚C)

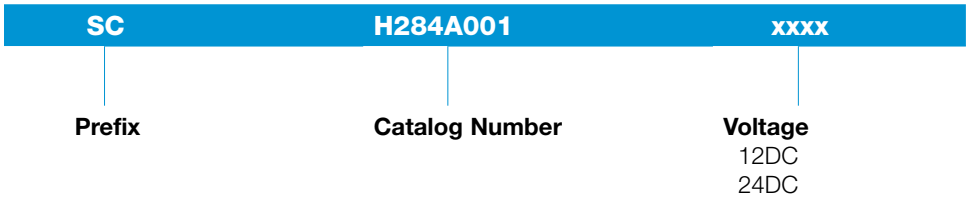
Approvals:

Meets applicable CE directives.

Specifications

Tubing ID (in)	Tubing OD (in)	Operating Pressure (psi)		Prefix	Catalog Number	Const. Ref.	Power (Watts)	Weight (oz)
		Min.	Max					
2/2NC - Normally Closed								
0.030	0.065	0	12	SC	H284A001xxxx	1	4	2.1
0.040	0.085	0	12	SC	H284A002xxxx	1	4	2.1
0.062	0125	0	12	SC	H284A003xxxx	1	4	2.1
0.078	0.125	0	12	SC	H284A004xxxx	1	4	2.1
0.106	0.193	0	12	SC	H284A005xxxx	2	9	9.9
0.189	0.311	0	12	SC	H284B006xxxx	3	13	16.6
0.252	0.374	0	12	SC	H284B007xxxx	3	13	16.6
2/2NO - Normally Open								
0.030	0.065	0	12	SC	H284A009xxxx	4	4	2.1
0.040	0.085	0	12	SC	H284A010xxxx	4	4	2.1
0.062	0125	0	12	SC	H284A011xxxx	4	4	2.1
0.078	0.125	0	12	SC	H284A012xxxx	4	4	2.1
0.106	0.193	0	12	SC	H284A013xxxx	5	9	10.2
0.189	0.311	0	12	SC	H284B014xxxx	6	13	15.9
0.252	0.374	0	12	SC	H284B015xxxx	6	13	15.9

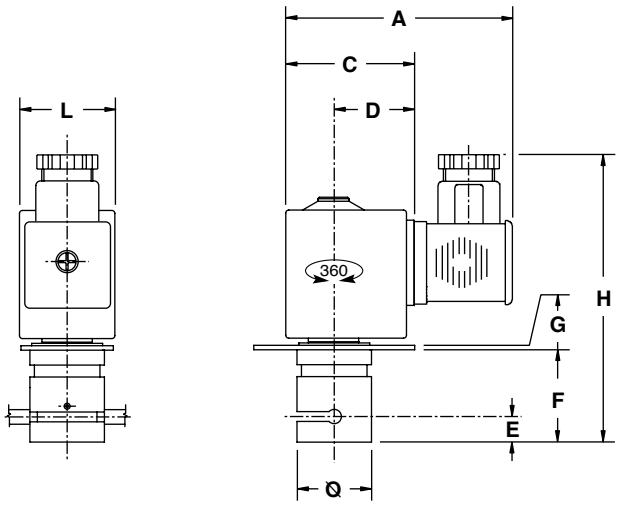
Catalog Number Description and Options

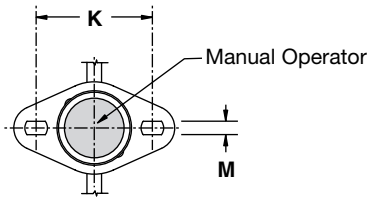


Examples

SCH284A00124DC = Normally closed, 0.030" ID tubing, 24VDC

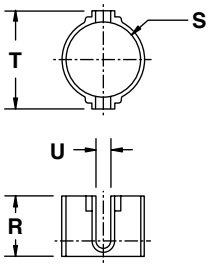
Dimensions: Inches (mm)



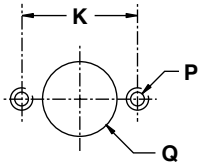


Bottom View

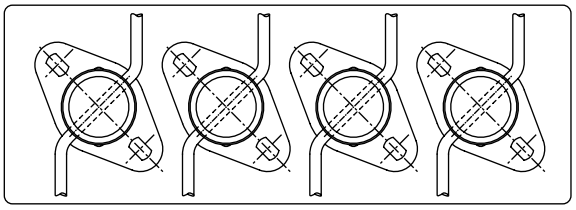
Tube Guiding Device



Arrangement for Wall-Fitting



Example of Banked Assembly



Const. Ref	Catalog Number	Ø	A	C	D	E	F	G	H	K	L	M	P	Q	R	S	T	U
01	SCH248A001/002/003/004	0.63 (16)	1.95 (49.5)	0.92 (23.5)	0.59 (23.5)	0.43 (11)	0.79 (20)	0.04 (1)	2.60 (66)	0.94 (24)	0.87 (17)	0.13 (3.3)	M3	0.65 (16.5)	0.42 (10.7)	0.63 (16)	0.94 (24)	0.09 (2.2)
02	SCH248A005	0.98 (25)	3.07 (78)	1.68 (43)	1.06 (27)	0.69 (17.5)	1.26 (32)	0.06 (1.5)	3.90 (99)	1.53 (39)	1.26 (32)	0.18 (4.5)	M4	1.00 (25.5)	0.55 (14)	0.98 (25)	1.30 (33)	0.12 (3.2)
03	SCH248B006/B007	1.18 (30)	3.31 (94)	1.98 (49)	1.10 (28)	0.97 (24.5)	1.71 (43.5)	0.06 (1.5)	3.90 (99)	1.79 (46.5)	1.65 (42)	0.18 (4.5)	M4	1.20 (30.5)	0.94 (24)	1.18 (30)	1.53 (39)	0.24 (6)
04	SCH284A009/010/011/012	0.63 (16)	1.95 (49.5)	0.92 (23.5)	0.59 (15)	0.24 (6)	0.79 (20)	0.04 (1)	2.60 (66)	0.94 (24)	0.67 (17)	0.13 (3.3)	M3	0.65 (16.5)	0.42 (10.7)	0.63 (16)	0.94 (24)	0.09 (2.2)
05	SCH284A013	0.98 (25)	3.07 (78)	1.69 (43)	1.06 (27)	0.41 (10.5)	1.26 (32)	0.06 (1.5)	3.90 (99)	1.53 (39)	1.26 (32)	0.18 (4.5)	M4	1.00 (25.5)	0.55 (14)	0.98 (25)	1.30 (33)	0.12 (3.2)
06	SCH284B014/B015	1.18 (30)	3.31 (84)	1.93 (49)	1.10 (28)	0.51 (13)	1.71 (43.5)	0.06 (1.5)	3.90 (99)	1.79 (45.5)	1.65 (42)	0.18 (4.5)	M4	1.20 (30.5)	0.94 (24)	1.18 (30)	1.53 (39)	0.24 (6)

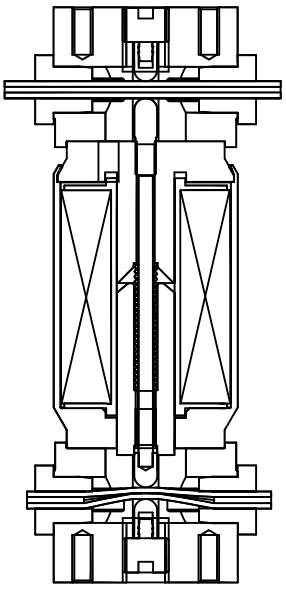
ASCO 373 Series are patented 3-Way solenoid operated pinch valves designed to divert or select the flow of corrosive or high purity fluids in medical equipment and analytical instruments. The fluid is isolated from the valve components by means of silicone tubing and flow is controlled in either direction by the alternating pinching action of the solenoid.

- Saves space in equipment with compact design.
- Large range of tubing sizes available for various flow and pressure requirements.
- Zero dead volume prevents cross-contamination.
- Bi-directional flow

Construction

Valve Wetted Parts	
Recommended Tubing	VQM Max Hardness: 55 Shore A (Two 12" pieces of tubing supplied with each valve. Additional lengths available separately, see Pinch Valve Tubing Section)

3U



Electrical

Standard Voltages	12 VDC, 24 VDC
Power Consumption	4.5 to 5.2 Watts
Duty Cycle Rating	Continuous
Electrical Connection	22 AWG Hardwire, 15" long

Temperature Range:

Ambient:
32°F to 77°F (0°C to 25°C)

Approvals:

Meets applicable CE directives.

Specifications

Tubing ID (in)	Tubing OD (in)	Tubing Wall (in)	Operating Pressure (psi)		Catalog Number	Power (Watts)	Weight (oz)
			Min.	Max.			
3/2U -Universal Operation							
1/32”	5/32”	1/16”	0	50	373xx250	4.5 (12DC), 5.2 (24DC)	5.0
1/16”	3/16”	1/16”	0	30	373xx430	4.5 (12DC), 5.2 (24DC)	5.0
3/32”	5/32”	1/32”	0	15	373xx515	4.5 (12DC), 5.2 (24DC)	5.0
3/32”	7/32”	1/16”	0	30	373xx630	4.5 (12DC), 5.2 (24DC)	5.0
1/8”	3/16”	1/32”	0	15	373xx715	4.5 (12DC), 5.2 (24DC)	5.0
1/8”	1/4”	1/16”	0	30	373xx830	4.5 (12DC), 5.2 (24DC)	5.0
1/8”	1/4”	1/32”	0	10	373xx1010	4.5 (12DC), 5.2 (24DC)	5.0

Catalog Number Description and Options

373	xx	250
Catalog Number	**Voltage** 12 = 12VDC 24 = 24VDC	**Catalog Number**

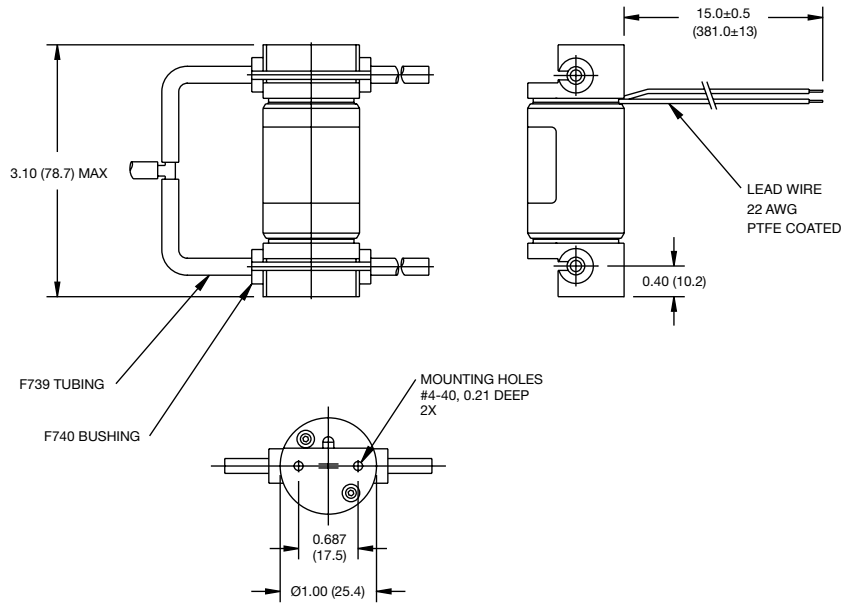
To Construct Catalog Number

- Select catalog number from specification table above.

Examples

37312430 = 1/16" x 3/16” tubing, 12VDC, 30psi max

Dimensions: 373 Series Inches (mm)



The 384 Series are 3-Way, universal, solenoid operated pinch valves designed to control the flow of corrosive or high purity fluids in medical equipment, analytical instruments, and industrial applications. Pinch valves control fluid flow by locating soft tubing in a mechanism that “pinches” the tubing to block flow and releases to allow flow.

- Large open gap for high flow and handling of particulate media.
- Zero dead volume prevents cross-contamination.
- Electrical connections can be kept separate from fluid area via built-in panel mount bracket.
- Built-in manual operator for easy tubing change out and testing.
- Removable/Rotatable coil for easy service and installation.

Construction

Valve Wetted Parts	
Recommended Tubing	VQM, max. hardness 50 Shore A (Tubing sold separately. See Pinch Valve Tube Section.)

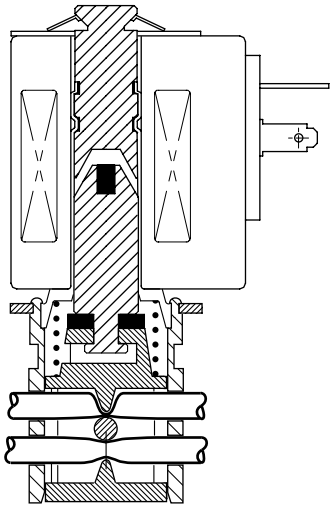
Electrical

Standard Voltages	12 VDC, 24 VDC
Power Consumption	4, 9, 13 Watts
Duty Cycle Rating	Continuous (except where noted otherwise)
Coil Insulation	311ºF (155ºC)
Electrical Connection	DIN SPADE TERMINALS
DIN Connectors (not included with valve. see DIN ELECTRICAL CONNECTORS)	
-4 Watt Coil	Size 9.4 mm, DIN 43650 Form C
-9 Watt Coil	Size 18 mm, ISO 4400/EN 175301-803 Form A
-13 Watt Coil	Size 18 mm, ISO 4400/EN 175301-803 Form A

Valve

Response Time	~20 ms

3U



Temperature Range:

Ambient & Media:
14ºF to 140˚F (-10˚C to 60˚C)

Approvals:

Meets applicable CE directives.

Specifications

Tubing ID (inches)	Tubing OD (inches)	Operating Pressure (psi)		Prefix	Catalog Number	Const. Ref.	Power (Watts)	Weight (oz)
		Min.	Max					
3/2U - Universal Operation								
0.030	0.065	0	12	SC	H384A004xxxx	1	4	2.1
0.040	0.085	0	12	SC	H384A001xxxx	1	4	2.1
0.062	0125	0	12	SC	H384A002xxxx (1)	1	8	2.1
0.078	0.125	0	12	SC	H384A003xxxx (1)	1	6	2.1
0.132	0.183	0	12	SC	H384A005xxxx	2	9	10.6
0.187	0.313	0	12	SC	H384B006xxxx	3	13	15.9
0.250	0.375	0	12	SC	H384B007xxxx	3	13	15.9
(1) Intermittent duty coil. See graph of minimum off time vs. on time to determine applicable duty cycle.								

Catalog Number Description and Options

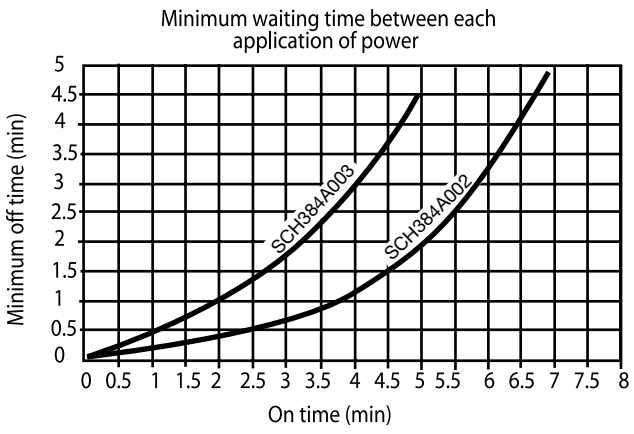
SC	H384A001	xxxx
Prefix	**Catalog Number**	**Voltage** 12DC 24DC

Examples

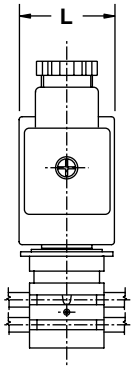
SCH384A00412DC = 0.030" x 0.065" tubing, 12VDC, constant duty

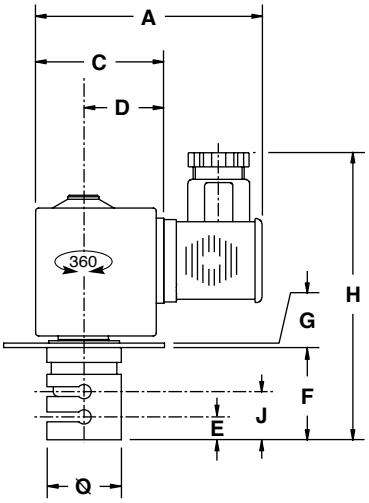
SCH384A00224DC = 0.062" x 0.125" tubing, 24VDC with 7 minute max on-time and 5 minute min off-time

Minimum Off Time vs. On Time
(SCH384A002 & SCH384A003 ONLY)

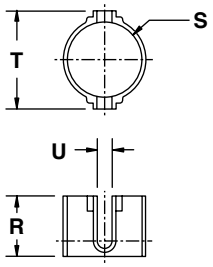


Dimensions: Inches (mm)

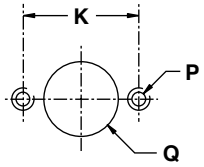


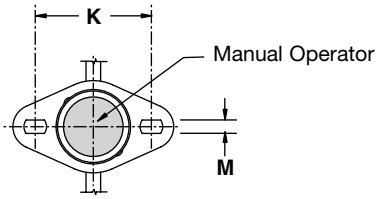


Tube Guiding Device



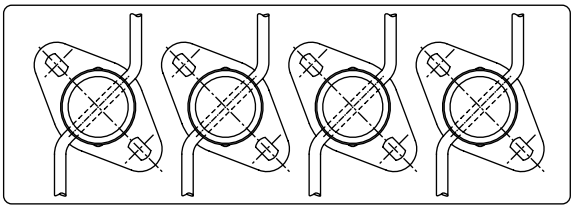
Arrangement for Wall-Fitting





Bottom View

Example of Banked Assembly



Const. Ref	Catalog Number	Ø	A	C	D	E	F	G	H	J	K	L	M	P	Q	R	S	T	U
01	SCH384A001/002 /003/004	0.63 (16)	1.95 (49.5)	0.92 (23.5)	0.59 (15)	0.24 (6)	0.79 (20)	0.04 (1)	2.60 (66)	0.43 (11)	0.94 (24)	0.67 (17)	0.13 (3.3)	M3	0.65 (16.5)	0.42 (10.7)	0.63 (16)	0.94 (24)	0.09 (2.2)
02	SCH384A005	0.98 (25)	3.07 (78)	1.69 (43)	1.06 (27)	0.41 (10.5)	1.26 (32)	0.06 (1.5)	3.90 (99)	0.69 (17.5)	1.53 (39)	1.26 (32)	0.18 (4.5)	M4	1.00 (25.5)	0.55 (14)	0.98 (25)	1.30 (33)	0.12 (3.2)
03	SCH384B006/B007	1.18 (30)	3.31 (84)	1.93 (49)	1.10 (28)	0.51 (13)	1.71 (43.5)	0.06 (1.5)	3.90 (99)	0.96 (24.5)	1.79 (45.5)	1.65 (42)	0.18 (4.5)	M4	1.20 (30.5)	0.94 (24)	1.18 (30)	1.53 (39)	0.24 (6)

Proportional valves control the flow of neutral fluids. By varying the input current you can precisely adjust the valve's flow rate. This eliminates the need for a variable flow system to contain multiple valves with different flow rates.

Applications examples:

- Gas Chromatography
- Endoscopy Equipment
- Anesthesia Equipment
- Respirators

Ventilators

ASCO's proportional valves are utilized in equipment which provides mechanical assistance to patients for breathing. The valves provide the precise mixture of oxygen and air supply to the patient for each breathe.

Blood Pressure Monitoring (Non-invasive)

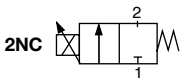
Proportional valves provide the precise control needed for accurate measurement of a patient's blood pressure.

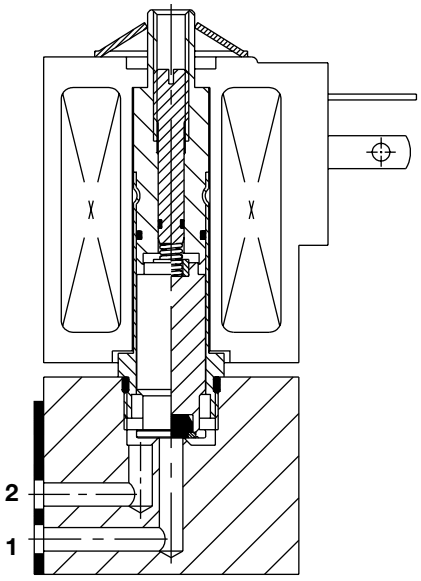
Posiflow Proportional Valves

M5 Threaded Ports or Pad Mount Versions

The Series 202 Posiflow® valves are 2-Way, normally closed, solenoid valves designed to proportionally control the flow of air or inert gases by varying the electrical input to the coil. They are available as stand alone valves with M5 thread ports or pad mount versions for manifold mounting.

- Ideal to precisely control flow rates in medical equipment and analytical instrumentation.
- Compact construction saves valuable space in equipment.
- Valves do not require minimum operating pressure
- Low hysteresis, excellent repeatability, and high sensitivity for precise flow control.





Construction

Valve Wetted Parts	
Body	Brass
Core Tube	Brass
Core and Plugnut	Stainless Steel
Springs	Stainless Steel
Disc and Seals	FKM

Electrical

Standard Voltage	12 VDC, 24 VDC
Electrical Coil Input	0-24 VDC
Power Consumption	3 Watts
Opening Current **12 VDC** **24 VDC**	 Max. 175 mA Max. 125 mA
Recommended PWM Frequency	1000 Hz
Hysteresis	<5%
Repeatablity	<3%
Sensitivity	<2%
Coil Insulation	311ºF (155ºC)
Electrical Connectors	DIN SPADE TERMINALS
DIN Connectors	Size 9.4 mm, DIN 43650 Form C

Temperature Range:

Ambient & Media:
32F to 140˚F (0˚C to 60˚C)

Approvals:

Meets applicable CE directives.

Specifications

Port Type	Orifice Size (in)	Cv Flow Factor	Operating Pressure (psi)		Prefix	Catalog Number	Const. Ref.	Power (Watts)	Weight (oz) (1)
			Vac (in Hg)	Max.					
2/2 Normally Closed									
M5	0.031	0.023	29	174	SC	E202A105Vxxxx	1	3	44.0
M5	0.047	0.058	29	102	SC	E202A106Vxxxx	1	3	44.0
M5	0.063	0.093	29	58	SC	E202A107Vxxxx	1	3	44.0
M5	0.079	0.116	29	36	SC	E202A108Vxxxx	1	3	44.0
2/2 Normally Closed									
Pad Mount	0.031	0.023	29	174	SC	S202A101Vxxxx	2	3	33.5
Pad Mount	0.047	0.058	29	102	SC	S202A102Vxxxx	2	3	33.5
Pad Mount	0.063	0.093	29	58	SC	S202A103Vxxxx	2	3	33.5
Pad Mount	0.079	0.116	29	36	SC	S202A104Vxxxx	2	3	33.5

(1) Incl. coil(s) and connector(s).

Catalog Number Description and Options

SC	E202A105V	xxxx
Prefix	**Catalog Number**	**Voltage** 12DC 24DC

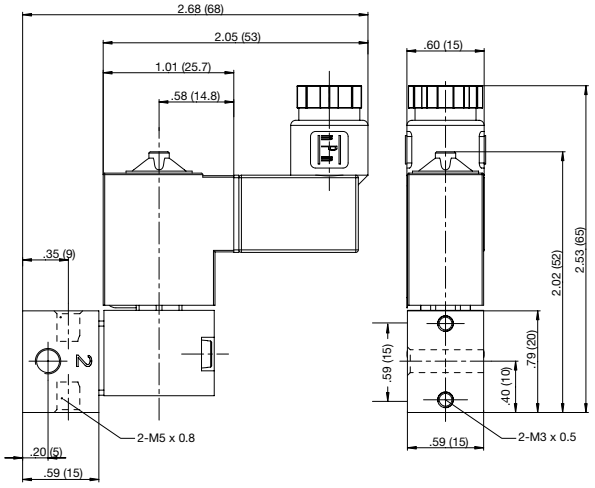
Examples

SCE202A105V12DC = M5 ported with 0.032" orifice, 12VDC

SCS202A104V24DC = Pad mount with 0.079" orifice, 24VDC

Dimensions: Inches (mm)

Const. Ref 1



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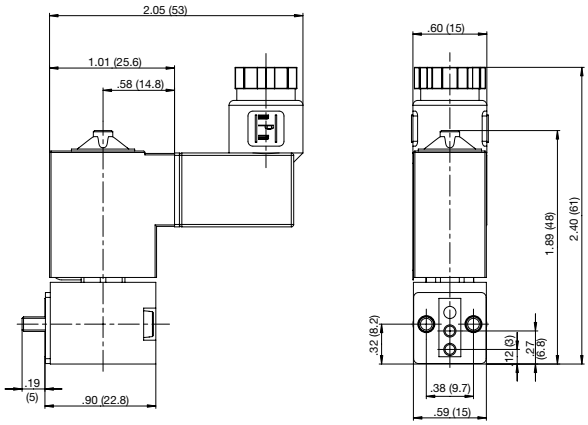
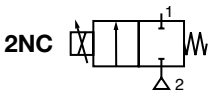


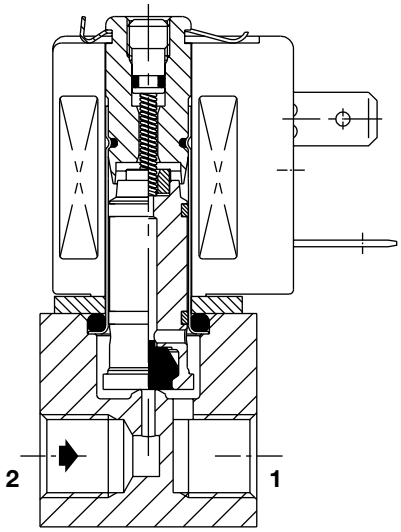
Posiflow Proportional Valves

G1/8 Ports

The Series 202 Posiflow® valves are 2-Way, normally closed, solenoid valves designed to proportionally control the flow of air, inert gases, water, or oil by varying the electrical input to the coil. They are available as stand alone valves with G1/8" thread ports.

- Ideal to precisely control flow rates in medical equipment and analytical instrumentation.
- Compact construction saves valuable space in equipment.
- Valves do not require minimum operating pressure
- Low hysteresis, excellent repeatability, and high sensitivity for precise flow control.





Construction

Valve Wetted Materials		
	Brass Body	**Stainless Steel Body**
Body	Brass	Stainless Steel
Core Tube	Stainless Steel	Stainless Steel
Core and Plugnut	Stainless Steel	Stainless Steel
Springs	Stainless Steel	Stainless Steel
Ring	PTFE	PTFE
Seals	FKM	FKM
Breaker Piece	Stainless Steel	Stainless Steel

Electrical

Standard Voltage	24 VDC
Electrical Coil Input	0 - 24 VDC
Operating Current	100-450 mA
Recommended PWM Frequency	400 Hz
Hysteresis	<5%
Repeatablity	<1%
Sensitivity	<1%
Coil Insulation	311ºF (155ºC)
Electrical Connectors	Spade plug (cable Ø 6-8 mm)
DIN Connectors	Size 11mm, DIN 43650 Form B

Temperature Range:

Ambient:
0ºF to 104˚F (0˚C to 40˚C)

Media:
0ºF to 140ºF (0ºC to 60ºC)

Approvals:

Meets applicable CE directives.

Specifications

Port Type	Orifice Size (in)	Cv Flow Factor	Operating Pressure (psi)			Prefix	Catalog Number	Power (Watts)	Weight (oz) [1]
			Vac (in Hg)	Max (Gas)	Max (Liquid)				
G1/8 Brass Bodied	0.047	0.058	29	116	73	SC	G202A201xxxxx	6.3	7.1
	0.063	0.081	29	87	58	SC	G202A202xxxxx	6.3	7.1
	0.094	0.151	29	58	44	SC	G202A203xxxxx	6.3	7.1
	0.126	0.209	29	36	36	SC	G202A204 xxxxx	6.3	7.1
G1/8 Stainless Steel Bodied	0.047	0.058	29	116	73	SC	G202A205xxxxx	6.3	7.1
	0.063	0.081	29	87	58	SC	G202A206xxxxx	6.3	7.1
	0.094	0.151	29	58	44	SC	G202A207xxxxx	6.3	7.1
	0.126	0.209	29	36	36	SC	G202A208 xxxxx	6.3	7.1

(1) Incl. coil(s) and connector(s).

Catalog Number Description and Options

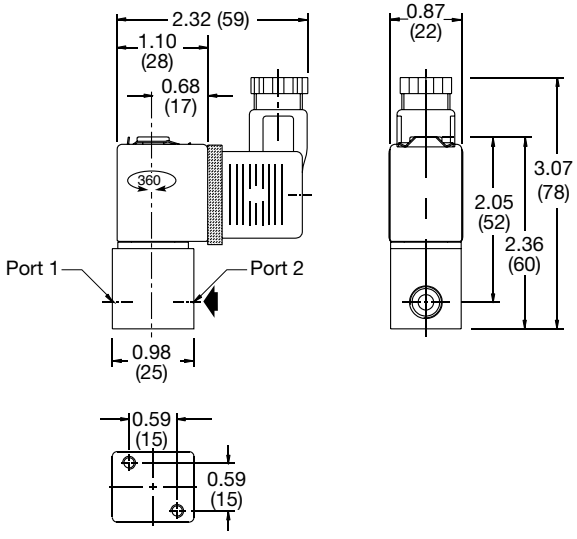
SC	G202A201	x	xxxx
Prefix	**Catalog Number**	**Seals** V = FKM E = EPDM T = PTFE	**Voltage** 12DC 24DC

Examples

SCG202A201V12DC = G1/8 ported brass body with 0.047" orifice, FKM seals, 12VDC

SCG202A205T24DC = G1/8 ported stainless steel body with 0.047" orifice, PTFE seals, 24VDC

Dimensions: Inches (mm)



Preciflow Proportional Valves

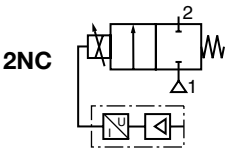
G1/8 and M5 Threaded Ports

The Series 202 Preciflow valves are 2-Way, normally closed, solenoid valves designed to proportionally control the flow of air or inert gases by varying the electrical input to the coil. They are available as stand alone valves with M5 threaded ports.

- Ideal to precisely control flow rates in medical equipment and analytical instrumentation.
- Compact construction saves valuable space in equipment.
- Valves do not require minimum operating pressure
- Low hysteresis, excellent repeatability, and high sensitivity for precise flow control.

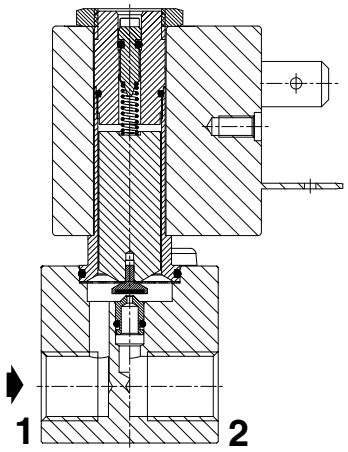
Construction

Valve Wetted Materials	
Body	Brass or PVDF
Core and Plugnut	Stainless Steel
Springs	Stainless Steel
Seals	FKM



Electrical

Standard Voltage	12 VDC, 24 VDC
Electrical Coil Input	0-12 VDC, 0-24 VDC
Power Consumption	1.0, 4.0, 5.0, 9.0 Watts
Opening Current **12 VDC** **24 VDC**	 Max. 85 mA (1.0 Watt), 340 mA (4.0 Watt), 400mA (5.0 Watt), 760mA (9.0 Watt) Max. 40 mA (1.0 Watt), 170 mA (4.0 Watt), 230mA (5.0 Watt), 380mA (9.0 Watt)
Recommended PWM Frequency	1000Hz
Hysteresis	<3%
Repeatability	<1%
Sensitivity	<1%
Coil Insulation	311ºF (155ºC)
Electrical Connectors	DIN Spade Terminal
DIN Connectors	Size 9.4mm, DIN 43650 Form C



Alternate Construction Options

Additional constructions and options are available including alternate body materials, power ratings, and proportional electronic controls. Minimum quantities apply

Temperature Range:

Ambient & Media:
0ºF to 122˚F (0˚C to 50˚C)

Approvals:

Meets applicable CE directives.

Specifications

Port Type	Orifice Size (in)	Cv Flow Factor	Operating Pressure (psi)		Prefix	Catalog Number	Const. Ref	Power (Watts)	Weight (oz)
			Vac (in Hg)	Max					
Brass Body									
M5	0.004	0.0003	26	145	SC	G202A500xxxx	1	1.0	3.5
G1/8	0.031	0.021	26	145	SC	G202A510xxxx	3	5.0	7.1
G1/8	0.047	0.048	26	145	SC	G202A511xxxx	3	5.0	7.1
G1/8	0.063	0.082	26	116	SC	G202A512xxxx	3	5.0	7.1
G1/8	0.079	0.111	26	87	SC	G202A513xxxx	3	5.0	7.1
PVDF Body									
M5	0.008	0.001	26	145	SC	G202A501xxxx	2	1.0	2.1
M5	0.016	0.006	26	145	SC	G202A502xxxx	2	4.0	2.1
M5	0.024	0.011	26	145	SC	G202A503xxxx	2	4.0	2.1
M5	0.031	0.021	26	145	SC	G202A504xxxx	2	4.0	2.1

Catalog Number Description and Options

SC	G202A500	xxxx
Prefix	**Catalog Number**	**Voltage** 12DC 24DC

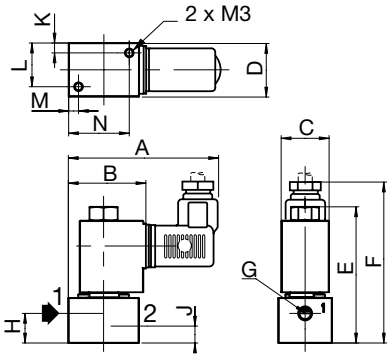
Examples

SCG202A50012DC = Brass body with 0.004" orifice, 12VDC

SCG202A50124DC = PVDF body with 0.008" orifice, 24VDC

Dimensions: Inches (mm)

Const. Ref 1



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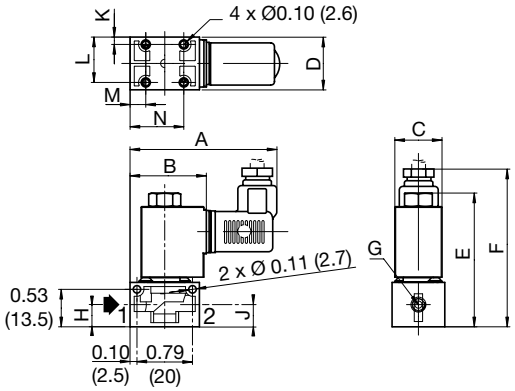

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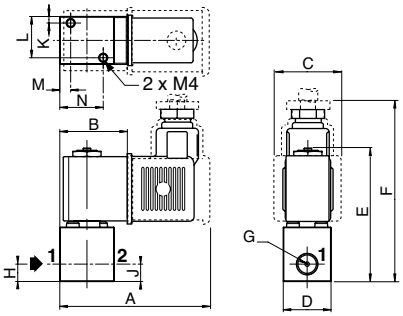


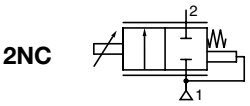
Const. Ref	Catalog Number	A	B	C	D	E	F	G	H	J	K	L	M	N
1	SCG202A500	2.12 (53.9)	1.08 (27.5)	0.67 (17)	0.75 (19)	1.90 (48.2)	2.34 (59.5)	M5	0.41 (10.5)	0.24 (6.0)	0.14 (3.5)	0.61 (15.5)	0.14 (3.5)	0.85 (21.5)
2	SCG202A501/A502/ A503/A504	2.12 (53.9)	1.08 (27.5)	0.67 (17)	0.75 (19)	1.90 (48.2)	2.34 (59.5)	M5	0.31 (8)	0.31 (8)	0.10 (2.65)	0.64 (16.35)	0.22 (5.65)	0.76 (19.35)
3	SCG202A510/A511/ A512	2.49 (63.3)	1.22 (31.1)	0.19 (23)	0.87 (22)	2.38 (60.4)	2.97 (75.4)	G1/8	0.31 (8)	0.31 (8)	0.12 (3)	0.75 (19)	0.20 (5)	0.79 (20)
3	SCG202A513	2.49 (63.3)	1.22 (31.1)	0.18 (30)	0.87 (22)	2.38 (60.4)	2.97 (75.4)	G1/8	0.31 (8)	0.31 (8)	0.12 (3)	0.75 (19)	0.20 (5)	0.79 (20)

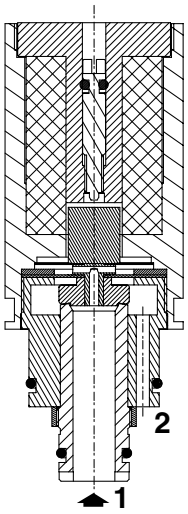
Preciflow IPC Proportional Valves

1/8 Ports, Cartridge, or Pad Mount

The Series 202 Preciflow IPC (Inlet Pressure Compensated) valves are 2-Way, normally closed, solenoid valves designed to proportionally control the flow of air or inert gases by varying the electrical input to the coil. They are available as stand alone valves with cartridge or pad mount versions.

- Ideal to precisely control flow rates in medical equipment and analytical instrumentation.
- Compact construction saves valuable space in equipment.
- Valves do not require minimum operating pressure
- Low hysteresis, excellent repeatability, and high sensitivity for precise flow control.





Construction

Valve Wetted Materials	
Body	Brass, Stainless Steel, or PVDF
Core and Plugnut	Stainless Steel
Springs	Stainless Steel
Seals	FKM

Electrical

Standard Voltage	6 VDC, 12 VDC, 24 VDC
Electrical Coil Input	0-6 VDC, 0-12 VDC, 0-24 VDC
Power Consumption	2.5 Watts
Opening Current **6 VDC** **12 VDC** **24 VDC**	 Max. 420 mA Max. 210 mA Max. 110 mA
Recommended PWM Frequency	2000Hz
Hysteresis	<5%
Repeatability	<1%
Sensitivity	<1%
Coil Insulation	311ºF (155ºC)
Electrical Connectors	24 AWG Leads

Construction

Back Pressure Max.	10% of Inlet Pressure
Containment Pressure Max.	145 psi

Temperature Range:

Ambient & Media:
0ºF to 122˚F (0˚C to 50˚C)

Approvals:

Meets applicable CE directives.

Specifications

Port Type	Orifice Size (in)	Cv Flow Factor	Operating Pressure (psi)		Prefix	Catalog Number	Const. Ref	Power (Watts)	Weight (oz)
			Min	Max					
G1/8 Brass	0.118	0.197	0	102	L	G202A514xxxx	1	2.5	6.5
Cartridge Stainless Steel	0.118	0.197	0	102	L	S202A515xxxx	2	2.5	2.2
Pad Mount PVDF	0.118	0.197	0	102	L	S202A516xxxx	3	2.5	2.6

Catalog Number Description and Options

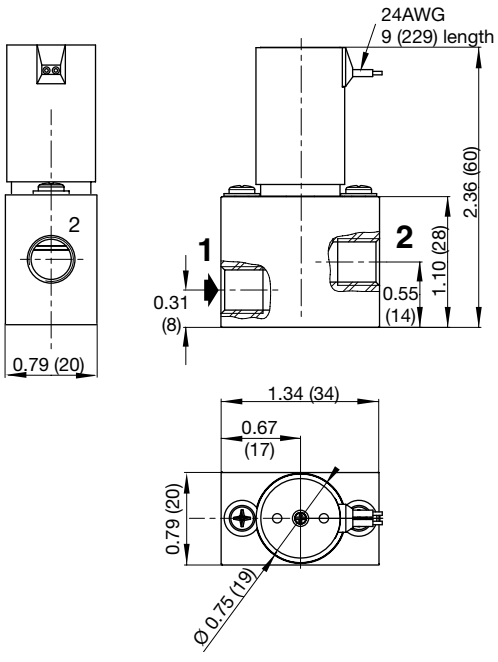
L	G202A514	xxxx
Prefix	**Catalog Number**	**Voltage** 06DC 12DC 24DC

Examples

LG202A51406DC = G1/8 inline mount with 0.118 orifice, 6VDC

Dimensions: Inches (mm)

Const. Ref 1



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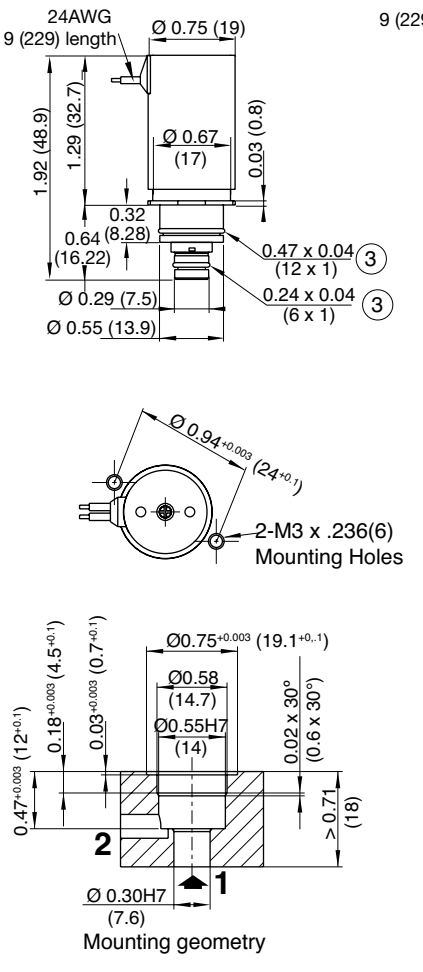

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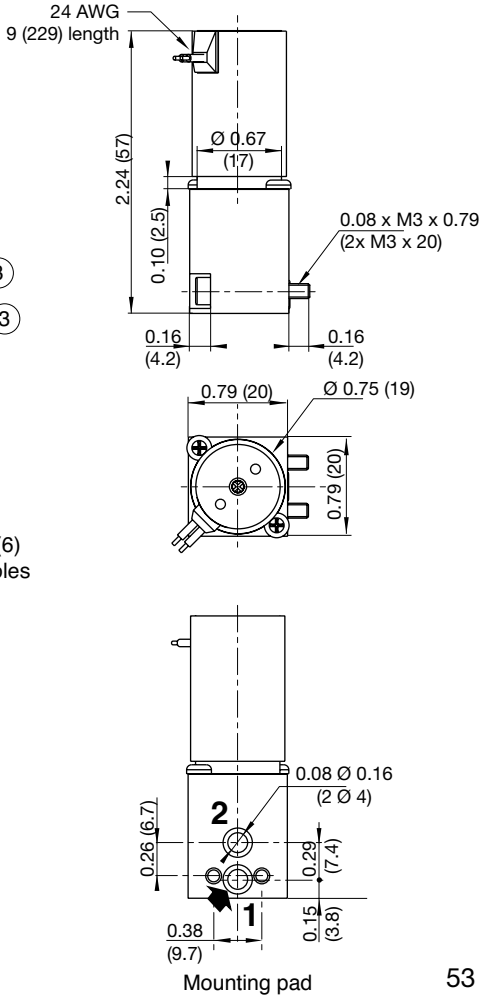


General Service valves control the flow of neutral gases. They are known for their long life and fast response times. The valves are available with multiple mounting configurations and sizes.

Applications examples:

- Blood Pressure Monitoring (non-invasive)
- Oxygen Concentrators
- Dental Equipment
- Air Monitoring Instruments

Pharmaceutical

Special high flow general service valves are utilized in automated pill dispensing equipment. The valves reliably control the pill sorting and counting process.

Textile

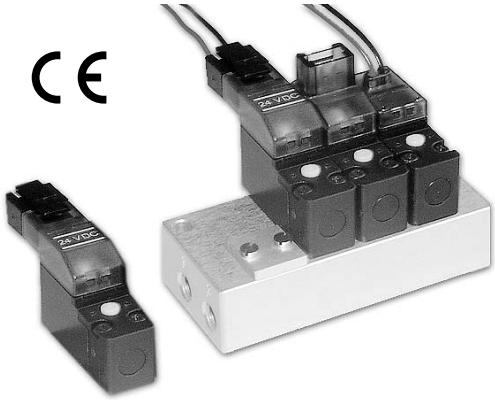
General service valves are utilized in carpet tufting equipment which run 24hrs per day 7 days a week. Under these manufacturing conditions reliability and repeatability are critical. Customer testimonials proclaim usages of ASCO valves exceeding 1 billion cycles.

3-Way 10mm Solenoid Valve

Pad Mount

The Series 188 is a 3-Way, 10mm wide solenoid valve designed to control the flow of air or inert gases. The Series 188 can be used to pilot other valves or cylinders.

- Compact design saves space and reduces assembly time.
- Low power consumption.
- LED and electrical protection comes standard.
- Manual override.

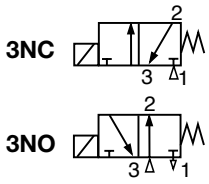


Construction

Valve Wetted Parts	
Body	PA
Seals	NBR
Internal Parts	Stainless Steel, Nickel Plated Steel, Aluminum

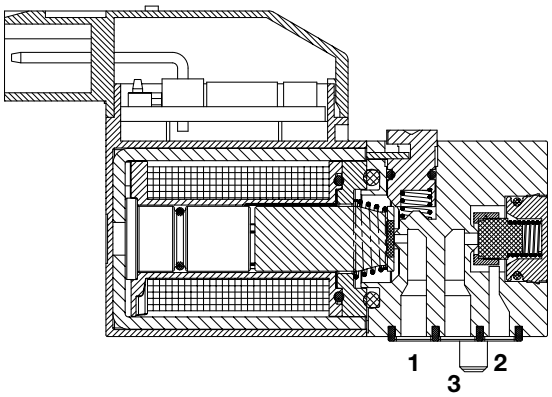
Electrical

Standard Voltages	5 VDC, 12 VDC, 24 VDC
Power Consumption	1.3 Watt
Duty Cycle Rating	Continuous
Coil Insulation	311°F (155°C)
Electrical Connection	Connector with 24 AWG lead wires, LED and diode protection



Valve

Response Time	~10ms



Alternate Construction/Options

Additional constructions and options are available including alternate elastomers, latching coils and electrical connections. Minimum quantities apply.

Temperature Range:

Ambient and Media:
41°F to 122°F (5°C to 50°C)

Approvals:

Meets applicable CE directives.

Specifications

Port Type	Orifice Size (in)	Cv Flow Factor	Operating Pressure (psi)		Catalog Number	Power (Watts)	Weight (oz)
			Min.	Max.			
3/2NC - Normally Closed							
Pad Mount	0.020	0.007	0	115	18801003xxxx	1.3	0.34
	0.031	0.009	0	58	18801081xxxx	1.3	0.34
	0.039	0.011	0	36	18801086xxxx	1.3	0.34
3/2NO - Normally Open							
Pad Mount	0.020	0.007	0	87	18801063xxxx	1.3	0.34
	0.031	0.009	0	44	18801091xxxx	1.3	0.34
	0.039	0.011	0	22	18801096xxxx	1.3	0.34

Catalog Number Description and Options

18801003 **xxxx**

Catalog Number

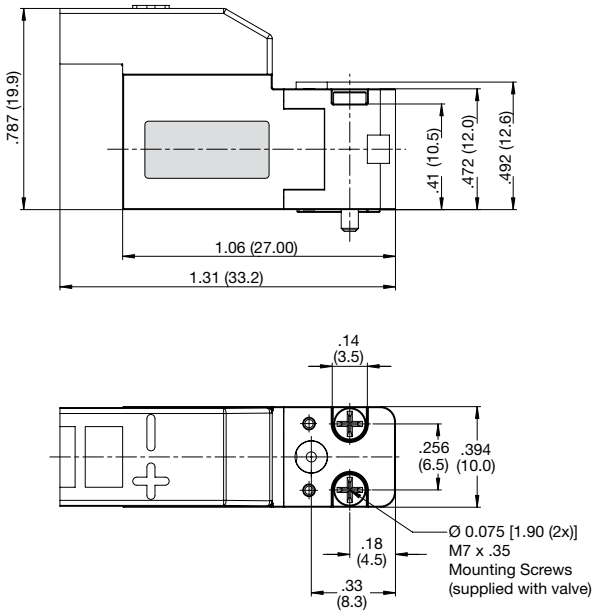
Voltage
05DC
12DC
24DC

Examples

1880100305DC = 3-way normally closed with 0.020" orifice, 5VDC

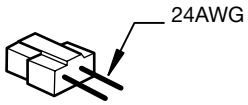
Dimensions: Inches (mm)

Const. Ref 1



The connectors to be ordered separately.
Includes one connector with two wires

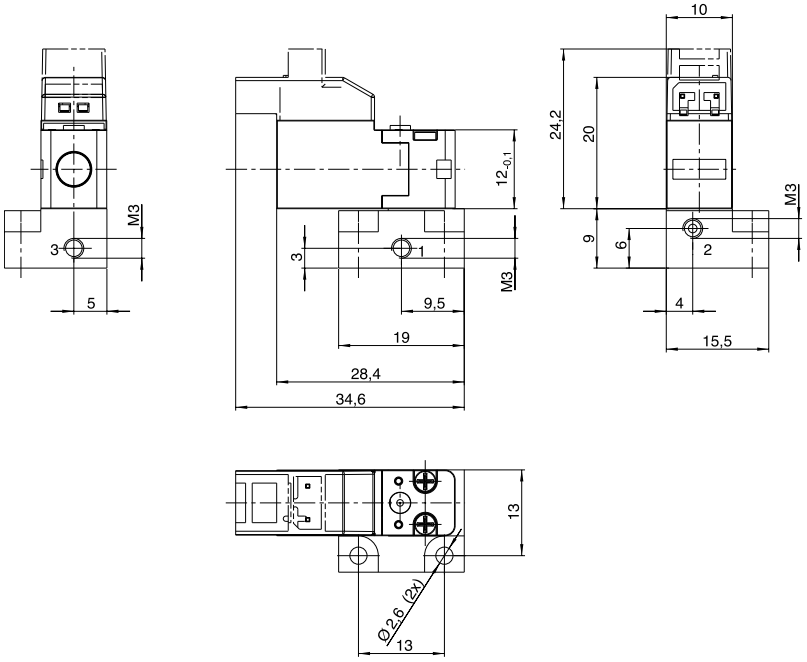
Length	Catalog Number
20" (0.5m)	88118801
59" (1.5m)	88118802
118" (3m)	88118803



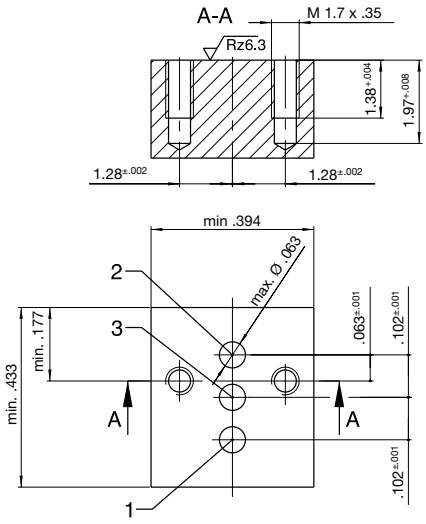
Dimensions (Continued): Inches (mm)

Value Mounted on Single Sub-Base

No. of Valves	Sub-Base Catalog Number	Weight (oz)
1	35300101	2.53



Manifold Interface

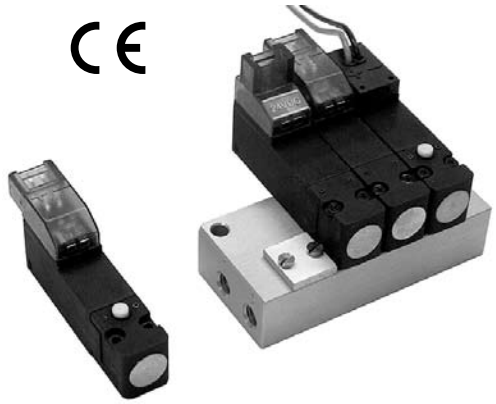


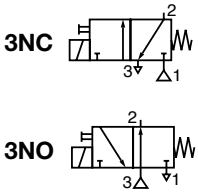
3-Way 10mm High Flow Solenoid

Pad Mount

The 188 LF is a 3-way, 10mm wide "High Flow" solenoid designed to control the flow of air and inert gases. The "High Flow" is a major advantage over similar sized products in this market.

- Compact design saves space and reduces assembly time
- High Flow
- Low Power Consumption





Construction

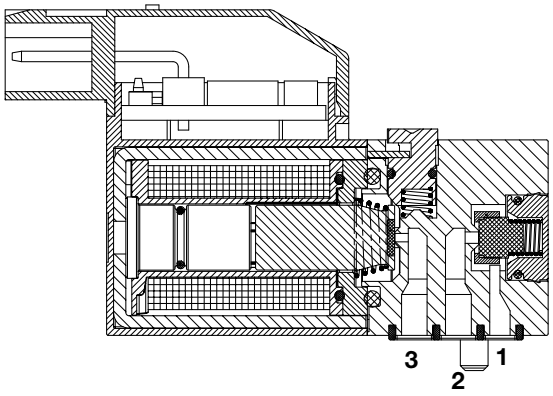
Valve Wetted Parts	
Body	PA
Internal Parts	Stainless steel, nickel-plated steel, aluminum
Seals	NBR

Electrical

Standard Voltages	12 VDC, 24 VDC
Power Consumption **Inrush** **Holding**	 3.2 Watt (100 ms) 1.3 Watt
Duty Cycle Rating	Continuous
Coil Insulation	311ºF (155ºC)
Electrical Connection	Connector with 24 AWG lead wires, and power save circuit

Valve

Response Time	~10 ms



Temperature Range:

Ambient and Media:
41ºF to 122ºF (5ºC to 50ºC)

Approvals:

Meets applicable CE directives.

Alternate Construction/Options

Additional constructions and options are available including alternate elastomers, latching coils and electrical connections. Minimum quantities apply.

Specifications

Port Type	Orifice Size (in)	Cv Flow Factor	Operating Pressure (psi)		Catalog Number	Power (Watts)	Weight (oz)
			Min.	Max.			
3/2NC - Normally Closed							
Pad Mount	0.039	0.012	0	145	18805001xxxx	1.3	0.6
	0.051	0.027	0	87	18805006xxxx	1.3	0.6
	0.063	0.039	0	51	18805011xxxx	1.3	0.6
	0.075	0.044	0	29	18805016xxxx	1.3	0.6
3/2NO - Normally Open							
Pad Mount	0.039	0.012	0	116	18805021xxxx	1.3	0.6
	0.051	0.027	0	58	18805026xxxx	1.3	0.6
	0.063	0.039	0	22	18805031xxxx	1.3	0.6
	0.075	0.044	0	7	18805036xxxx	1.3	0.6

Catalog Number Description and Options

18805001 **xxxx**

Catalog Number

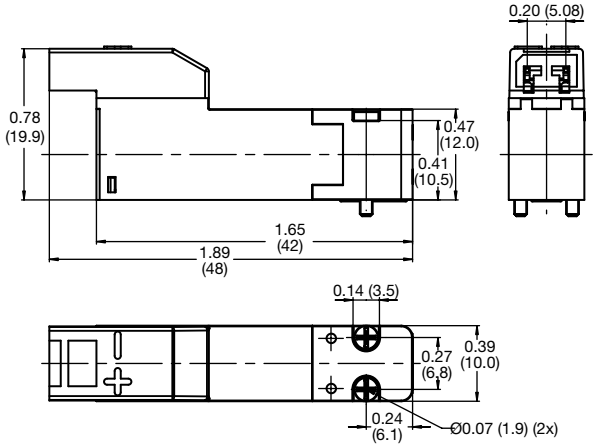
Voltage
12DC
24DC

Examples

1880500124DC = 3-way normally closed with 0.039" orifice

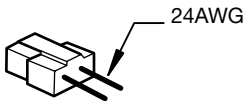
Dimensions: Inches (mm)

Const. Ref 1



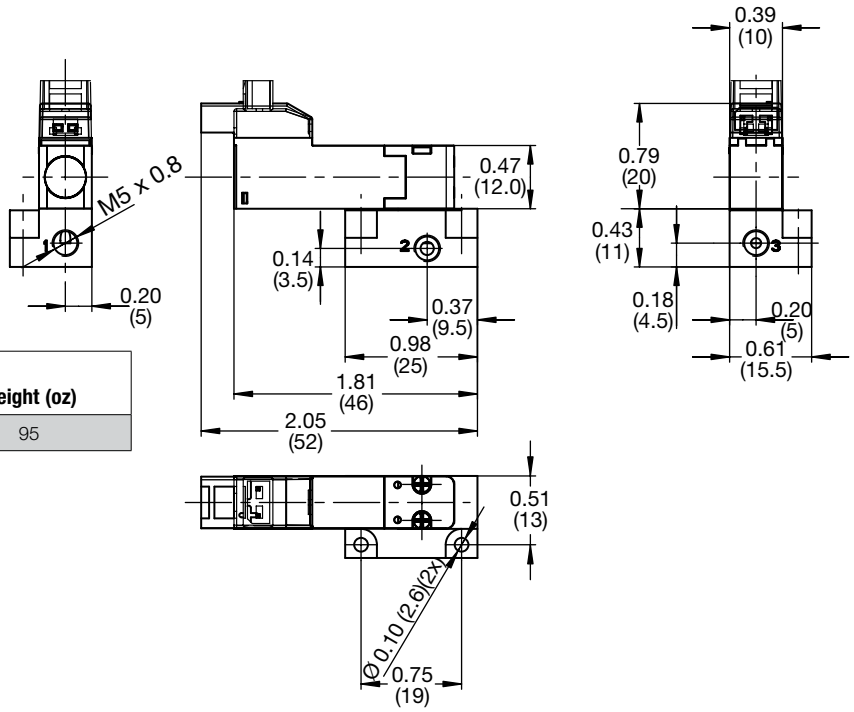
The connectors to be ordered separately.
Includes one connector with two wires

Length	Catalog Number
20" (0.5m)	88118801
59" (1.5m)	88118802
118" (3m)	88118803



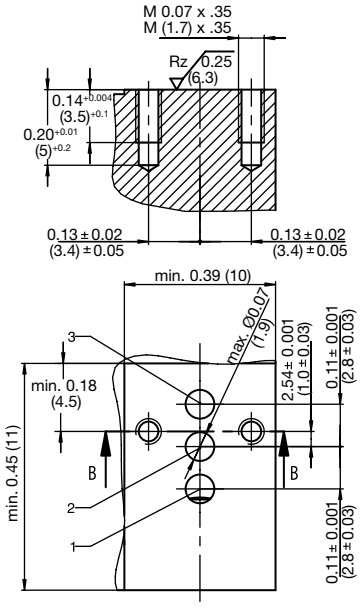
Dimensions (Continued): Inches (mm)

Valve Mounted on Single Sub-Base



Number of Valves	Subbase Catalog Number	Weight (oz)
1	35300207	95

Manifold Interface

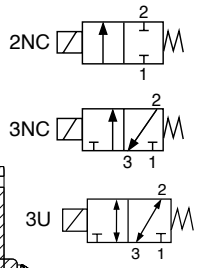


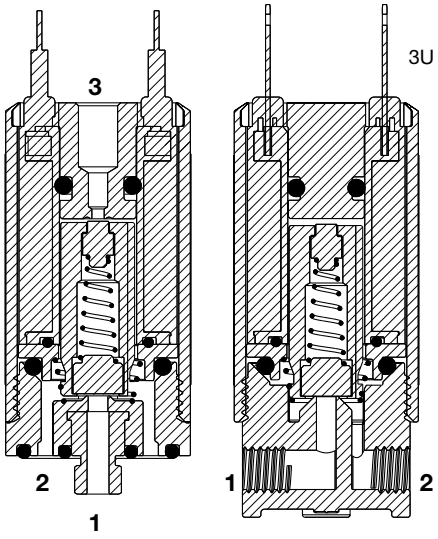
2 and 3-Way Miniature Solenoid Valves

General Service • Manifold & Line Mount

The 411 Series is available in 2-way and 3-way constructions, designed to control the flow of air and inert gases. The valves are suitable for a wide range of OEM applications where small size, low power, and long life are critical.

- Cycle life in the hundreds of millions
- Corrosion resistant materials of construction
- Manifold mount construction allows for easy assembly
- Lower power consumption offers extended battery life





Construction

Valve Wetted Parts	
Body	PBT
Gaskets	FKM, NBR, EPDM
Bobbin/Core Tube	PBT
Core and Plugnut	400 Series Stainless Steel
Springs	300 Series Stainless Steel

Electrical

Standard Voltages	5VDC, 6VDC, 12VDC, 24VDC
Power Consumption	0.65, 2.0 Watts
Duty Cycle Rating	Continuous
Coil Insulation	266˚F (130˚C)
Electrical Connection	.110" Spade, 24 AWG Hardwire

Valve

Response Time	~ 10 ms
Internal Volume (Max.)	Line Mount = 620µl Manifold Mount = 564µl
Vacuum Rating	29" Hg
Options	Oxygen clean available 300 Series Stainless Steel Body

Alternate Construction/Options

Additional constructions and options are available including alternate elastomers and orifice sizes. Minimum quantities apply.

Temperature Range:

Ambient & Media:
32˚F to 140˚F (0˚C to 60˚C)

Approvals:

Meets applicable CE directives.

Specifications

Orifice Size	Cv Flow Factor (1)	Operating Pressure (psi)		Catalog Number	Power (Watts)	Weight (oz)
		Vac (in Hg)	Max.			
2/2NC - Normally Closed						
0.025	.013	29	100	411x11xxxx	0.65	1.6
0.055	.038	29	100	411x21xxxx	2.0	1.6
0.080	.070	29	30	411x31xxxx	2.0	1.6
3/2NC - Normally Closed						
0.025 / .025	.013 / .008	29	100	411x12xxxx	0.65	1.6
0.055 / .050	.038 / .033	29	100	411x22xxxx	2.0	1.6
0.08 / .050	.070 / .033	29	30	411x32xxxx	2.0	1.6
3/2U - Universal Operation						
0.025 / .025	.013 / .008	29	100	411x13xxHx	0.65	1.6
0.055 / .050	.038 / .033	29	50	411x23xxHx	2.0	1.6
0.08 / .050	.070 / .033	29	30	411x33xxHx	2.0	1.6

(1) Cv Flow Factors are nominal

Catalog Number Description and Options

411	x	11	xx	x	x	x
Catalog Number	**Mounting Style** M = Manifold, #10-32 UNF L = Line, #10-32 UNF K = Manifold, M5 J = Line, M5	**Catalog Number**	**Voltage** 05 VDC 06 VDC 12 VDC 24 VDC	**Electrical Connection** F = .110 Spade H = Hardwire	**Sealing Material** V = Viton (FKM) E = EPDM B = Buna (NBR)	**Option Suffix** O = Oxygen Service P = Label Pressure units in kPa S = Stainless Steel Body

To Construct Catalog Number

- Select catalog numbers
- Insert mounting style into 4th digit
- Insert voltage into 7th & 8th digits
- Insert electrical connection into 9th digit
- Insert seal material into 10th digit
- Insert option code into 11th digit (if more than one option code, put in alphabetical order)

Note:
Oxygen Service valves available with Viton or EPDM Seals only

3-Way Universal operation only available with hardwire electrical connection (H)

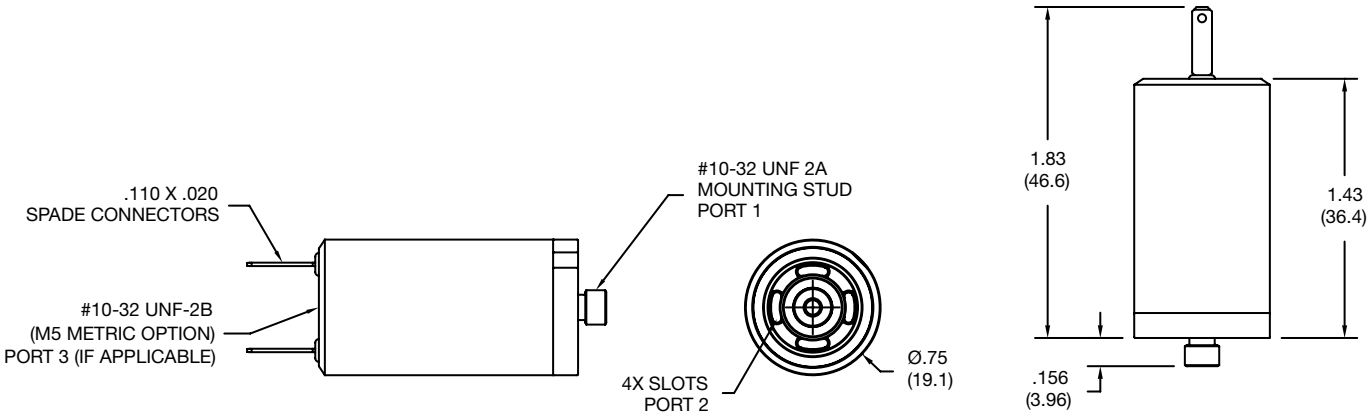
Examples

411M1124FV = 2-way normally closed manifold mount valve with 0.025 orifice, 24VDC coil rating at 0.65 Watts, .110 spade connection, Viton seals

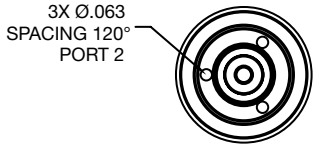
411L3212HV = 3-way normally closed line mount valve with 0.080 orifice, 12VDC coil rating at 2.0 Watts, hard wire coil, Viton seals

411K1124HVOS = 2-way normally closed manifold mount and M5 stud with 0.025 orifice, 24VDC coil rating at 0.65 watts, hardwire coil, Viton seals, clean for Oxygen use and Stainless Steel body

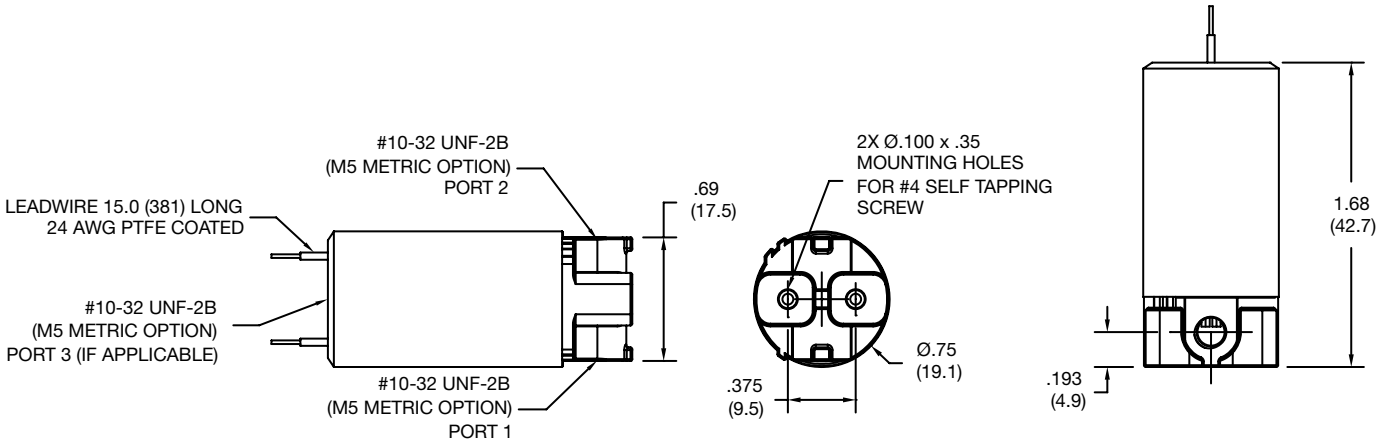
Dimensions: - 2 and 3-Way Manifold Mount Solenoid: Inches (mm)



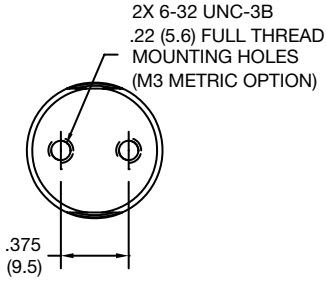
SS BODY OPTION:



Dimensions: - 2 and 3-Way Line Mount Solenoid: Inches (mm)



SS BODY OPTION:



The RB Series is available in 2-way and 3-way constructions, designed to control the flow of air and inert gases. The valves are highly customizable and suitable for a wide range of OEM applications where light weight, low power, and long life are critical.

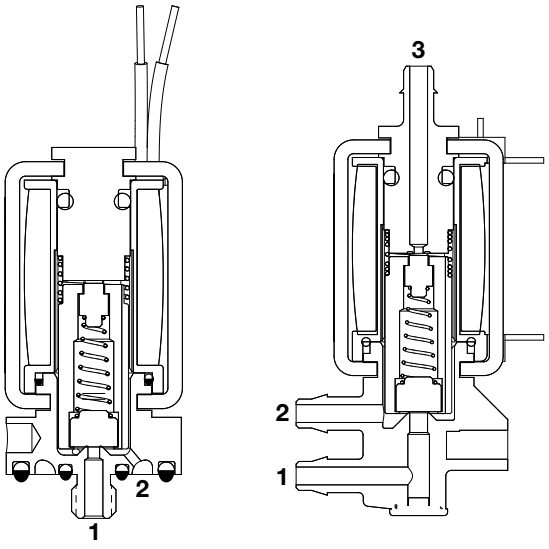
- Cycle life in the hundreds of millions
- Low power consumption and light weight offers extended battery life for portable devices
- Multiple body configurations to suite the applcation needs

Construction

Valve Wetted Parts	
Body	PBT, Brass
Gaskets	FKM, NBR
Bobbin/Core Tube	PBT
Core and Plugnut	400 Series Stainless Steel
Springs	300 Series Stainless Steel

Electrical

Standard Voltages	5 VDC, 12 VDC, 24 VDC
Power Consumption	0.5, 1.0, & 2.0 Watts
Duty Cycle Rating	Continuous
Coil Insulation	266°F (130°C)
Electrical Connection	26 AWG Hardwire, Circuit Board Mount



Valve

Response Time	~10ms
Internal Volume	Line Mount = 718ml Manifold Mount = 604ml Barb Mount = 600ml Pad Mount = 587
Vacuum Rating	29" Hg
Options	Oxygen clean available

Alternate Construction

Many alternative constructions are available and include a variety of voltages, electrical connectors, and porting styles. Minimum orders apply.

Temperature Range:

Ambient & Media:
32°F to 140°F (0°C to 60°C)

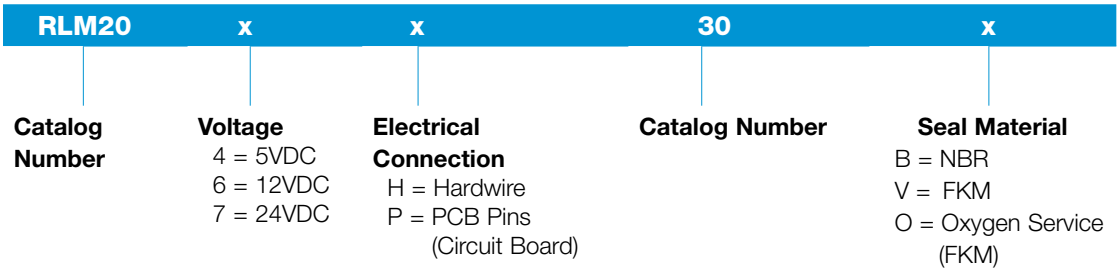
Approvals:

Meets applicable CE directives.

Specifications

Body Style	Orifice Size	Cv Flow Factor	Maximum Pressure (psi)	Catalog Number	Power (Watts)	Weight (oz)
2/2NC - Normally Closed						
# 10-32 Stud Manifold Mount, Brass (M)	0.030	0.025	50	RLM20xx30x	0.5	1.5
	0.030	0.025	100	RHM20xx30x	2.0	1.5
	0.050	0.055	25	RLM20xx50x	0.5	1.5
	0.050	0.055	50	RMM20xx50x	1.0	1.5
	0.050	0.055	100	RHM20xx50x	2.0	1.5
	0.080	0.080	25	RHM20xx80x	2.0	1.5
# 10-32 Female In-Line, Brass (L)	0.030	0.025	50	RLL20xx30x	0.5	1.5
	0.030	0.025	100	RHL20xx30x	2.0	1.5
	0.050	0.055	25	RLL20xx50x	0.5	1.5
	0.050	0.055	50	RML20xx50x	1.0	1.5
	0.050	0.055	100	RHL20xx50x	2.0	1.5
	0.080	0.080	25	RHL20xx80x	2.0	1.5
0.125" Barbed PBT (B)	0.030	0.025	15	RLB20xx30x	0.5	1.2
	0.030	0.025	50	RMB20xx30x	1.0	1.2
	0.030	0.025	100	RHB20xx30x	2.0	1.2
	0.050	0.055	10	RLB20xx50x	0.5	1.2
	0.050	0.055	35	RMB20xx50x	1.0	1.2
	0.050	0.055	70	RHB20xx50x	2.0	1.2
	0.080	0.080	25	RHB20xx80x	2.0	1.2
Pad Mount, PBT (F)	0.030	0.025	15	RLF20xx30x	0.5	1.2
	0.030	0.025	50	RMF20xx30x	1.0	1.2
	0.030	0.025	100	RHF20xx30x	2.0	1.2
	0.050	0.055	10	RLF20xx50x	0.5	1.2
	0.050	0.055	35	RMF20xx50x	1.0	1.2
	0.050	0.055	70	RHF20xx50x	2.0	1.2
	0.08	0.080	25	RHF20xx80x	2.0	1.2

Catalog Number Description and Options



Examples

RLM204H30B = 2-way normally closed, manifold mount with 0.030" orifice, 0.5 watt, hardwire, NBR seals

Body Style	Orifice Size	Cv Flow Factor	Maximum Pressure (psi)	Catalog Number	Power (Watts)	Weight (oz)
3/2NC - Normally Closed						
# 10-32 Stud Manifold Mount, Brass (M)	0.03 / 0.04	0.025	50	RLM3xxx34x	0.5	1.5
	0.03 / 0.04	0.025	100	RHM3xxx34x	2.0	1.5
	0.05 / 0.05	0.055	25	RLM3xxx55x	0.5	1.5
	0.05 / 0.05	0.055	50	RMM3xxx55x	1.0	1.5
	0.05 / 0.05	0.055	100	RHM3xxx55x	2.0	1.5
	0.08 / 0.05	.080 / .055	25	RHM3xxx85x	2.0	1.5
# 10-32 Female In-Line, Brass (L)	0.03 / 0.04	0.025	50	RLL3xxx34x	0.5	1.5
	0.03 / 0.04	0.025	100	RHL3xxx34x	2.0	1.5
	0.05 / 0.05	0.055	25	RLL3xxx55x	0.5	1.5
	0.05 / 0.05	0.055	50	RML3xxx55x	1.0	1.5
	0.05 / 0.05	0.055	100	RHL3xxx55x	2.0	1.5
	0.08 / 0.05	.080 / .055	25	RHL3xxx85x	2.0	1.5
0.125" Barbed PBT (B)	0.03 / 0.04	0.025	15	RLB3xxx34x	0.5	1.2
	0.03 / 0.04	0.025	50	RMB3xxx34x	1.0	1.2
	0.03 / 0.04	0.025	100	RHB3xxx34x	2.0	1.2
	0.05 / 0.05	0.055	10	RLB3xxx55x	0.5	1.2
	0.05 / 0.05	0.055	35	RMB3xxx55x	1.0	1.2
	0.05 / 0.05	0.055	70	RHB3xxx55x	2.0	1.2
	0.08 / 0.05	.080 / .055	25	RHB3xxx85x	2.0	1.2
Pad Mount PBT (F)	0.03 / 0.04	0.025	15	RLF3xxx34x	0.5	1.2
	0.03 / 0.04	0.025	50	RMF3xxx34x	1.0	1.2
	0.03 / 0.04	0.025	100	RHF3xxx34x	2.0	1.2
	0.05 / 0.05	0.055	10	RLF3xxx55x	0.5	1.2
	0.05 / 0.05	0.055	35	RMF3xxx55x	1.0	1.2
	0.05 / 0.05	0.055	70	RHF3xxx55x	2.0	1.2
	0.08 / 0.05	.080 / .055	25	RHF3xxx85x	2.0	1.2

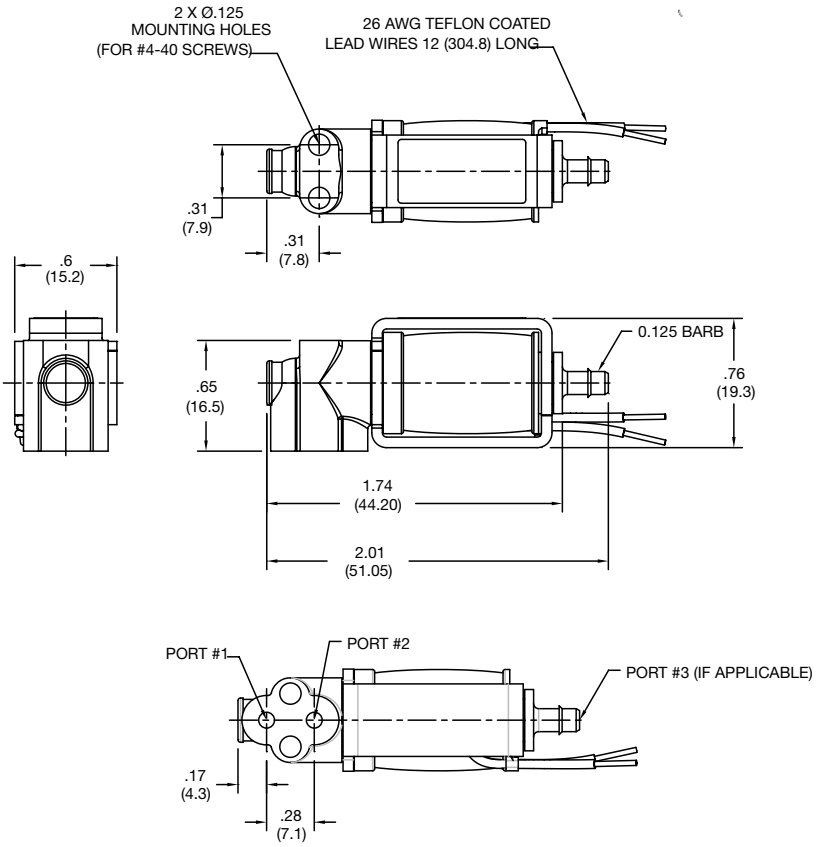
Catalog Number Description and Options

RLM3	x	x	x	30	x
Catalog Number	**Port 3 Style** B = 0.125" Barb F = #10-32 Female	**Voltage** 4 = 5VDC 6 = 12VDC 7 = 24VDC	**Electrical Connection** H = Hardwire P = PCB Pins (Circuit Board)	**Catalog Number**	**Seal Material** B = NBR V = FKM O = Oxygen Service (FKM)

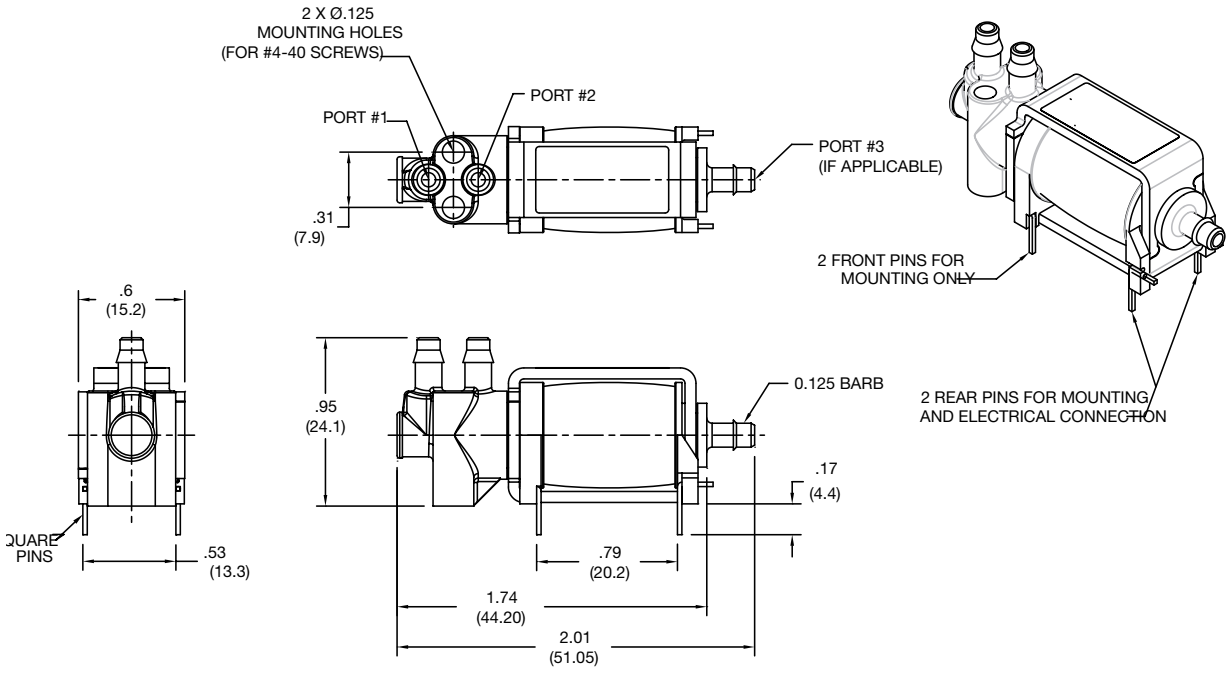
Examples

RLM3B7P34V = 3-way normally closed, manifold mount with 0.030" orifice, 0.5 watt, PCB coil, FKM seals

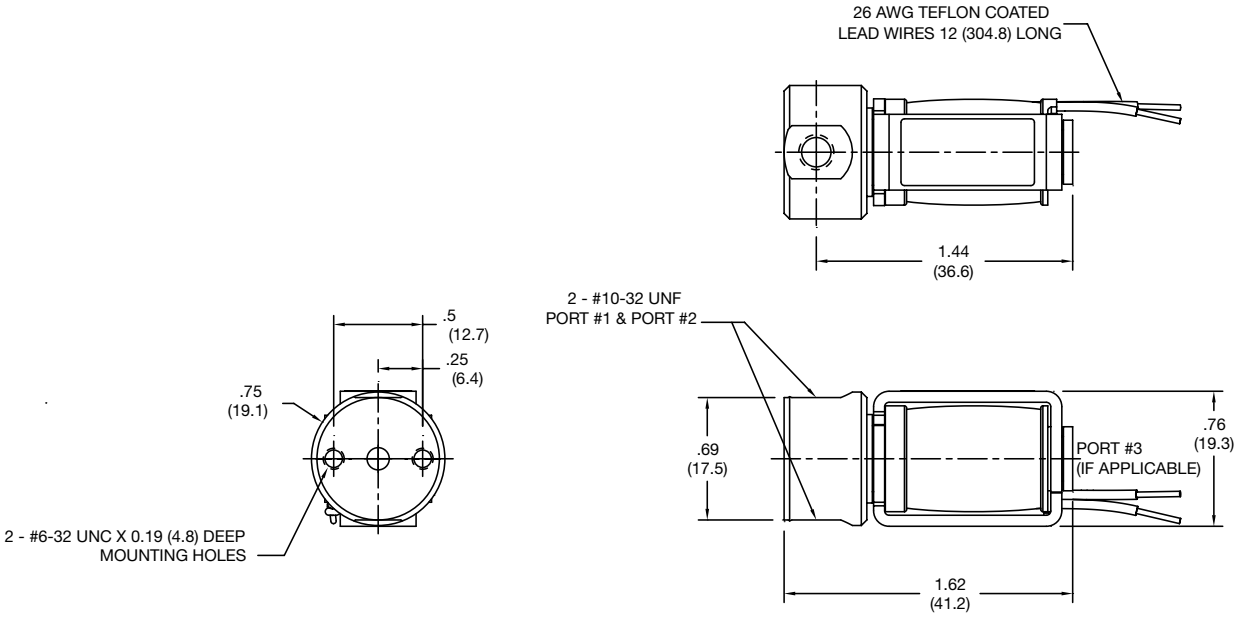
Dimensions - 2 and 3-Way Pad Mount Solenoid: Inches (mm)



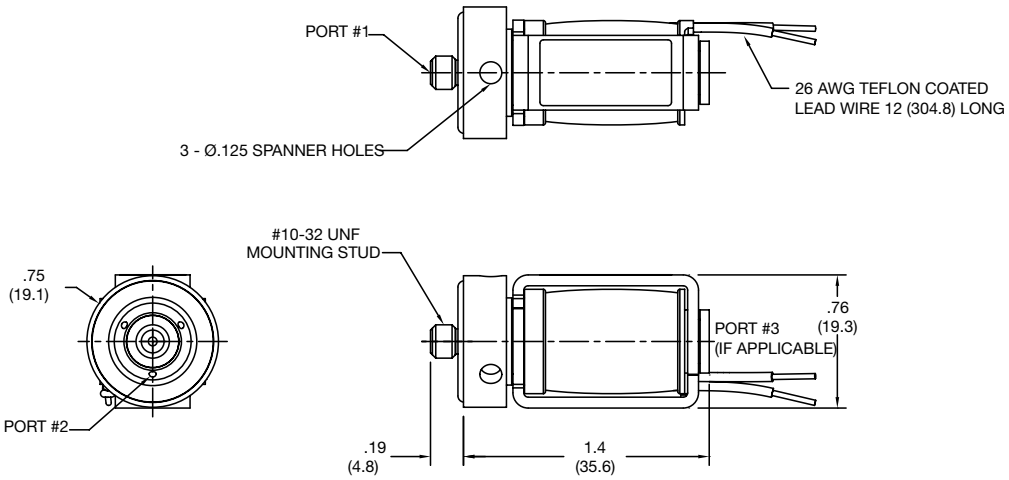
Dimensions - 2 and 3-Way Barb Mount Solenoid: Inches (mm)



Dimensions - 2 and 3-Way Line Mount Solenoid: Inches (mm)



Dimensions - 2 and 3-Way Manifold Mount Solenoid: Inches (mm)



Series 451 Manifolds & Assemblies

411 & RB Series Manifold Mount Valves

The Series 451 are anodized aluminum manifolds used with ASCO's 411 & RB Series solenoid valves. The manifolds are available separately or as completed valve/manifold assembly.

- Valves easily thread into manifold, reducing assembly time, eliminating potential leak points, and avoiding plumbing errors associated with tubing together stand alone valves.
- Manifolds are constructed of corrosion resistant anodized aluminum.
- Standard manifolds feature 1/8 NPTF common port and descrete #10-32 ports to mate with metal or plastic fittings.

Construction

Manifold	Anodized Aluminum
Descrete Manifold Ports	#10-32 UNF Female
Common Manifold Port	1/8" NPTF Female

Manifold Assemblies & Manifold Only Part Numbering

Number of Stations	Manifold Only	Valves Assembled to Manifold
1	51140001-01	Base Valve Number + A01
2	51140002-01	Base Valve Number + A02
4	51140003-01	Base Valve Number + A04
6	51140003-02	Base Valve Number + A06
8	51140003-03	Base Valve Number + A08
10	51140003-04	Base Valve Number + A10
12	51140003-05	Base Valve Number + A12

* Manifold assemblies can only be ordered with 411 & RB manifold mount constructions

To Construct Catalog Number

- Select valve number from appropriate catalog section
- Select number of stations

Examples

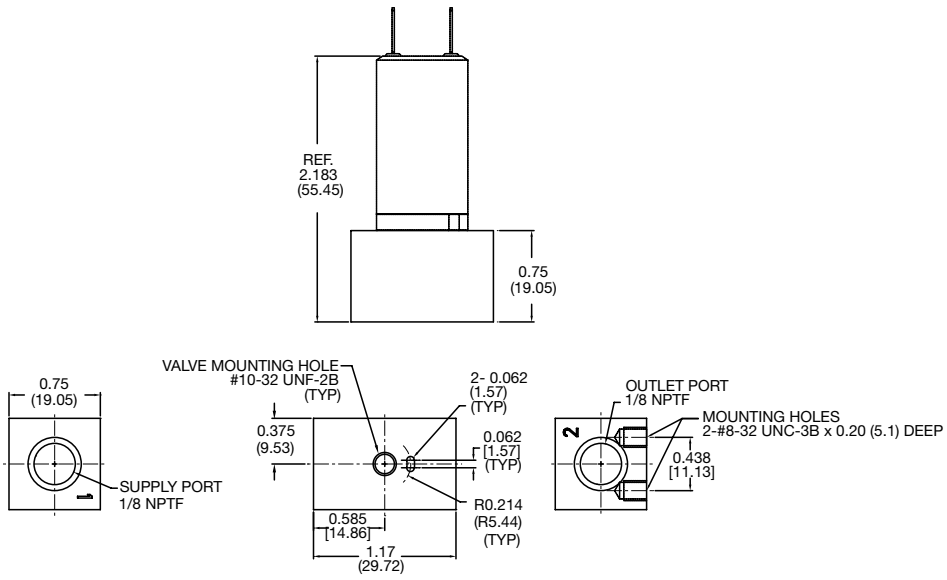
411M1105FVA08 = 8 411 Series catalog valves 411M1105FV mounted on 8 station manifold

RLM201230VA02 = 2 RB Series catalog valves RLM201230V mounted on 2 station manifold

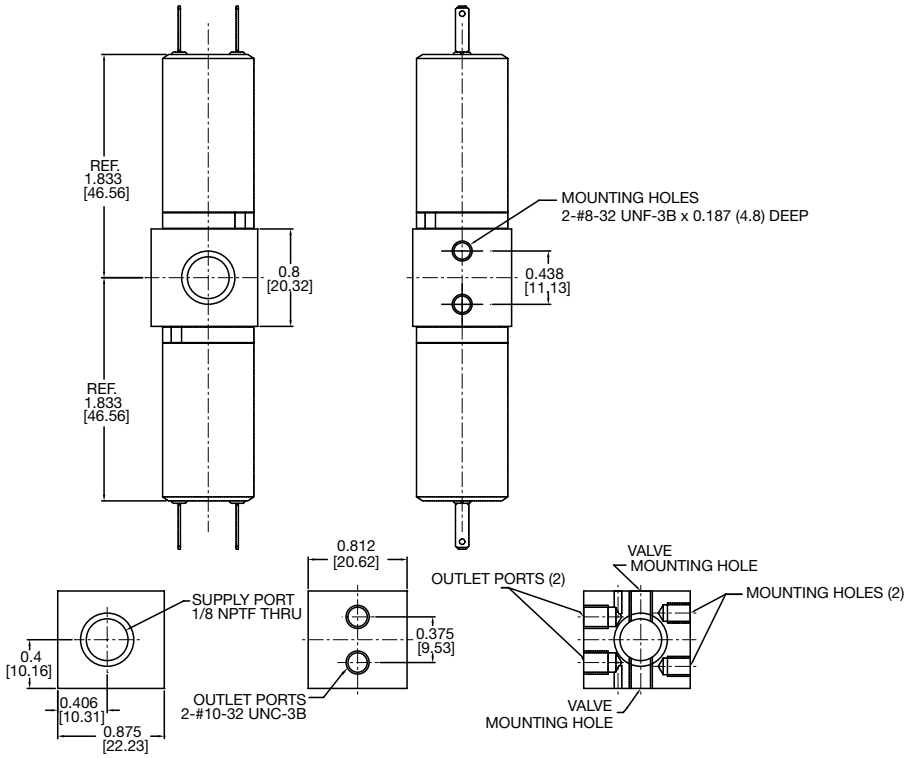
51140003-05 = 12 station manifold (no valves)

Dimensions: Inches (mm)

Single Station Manifold

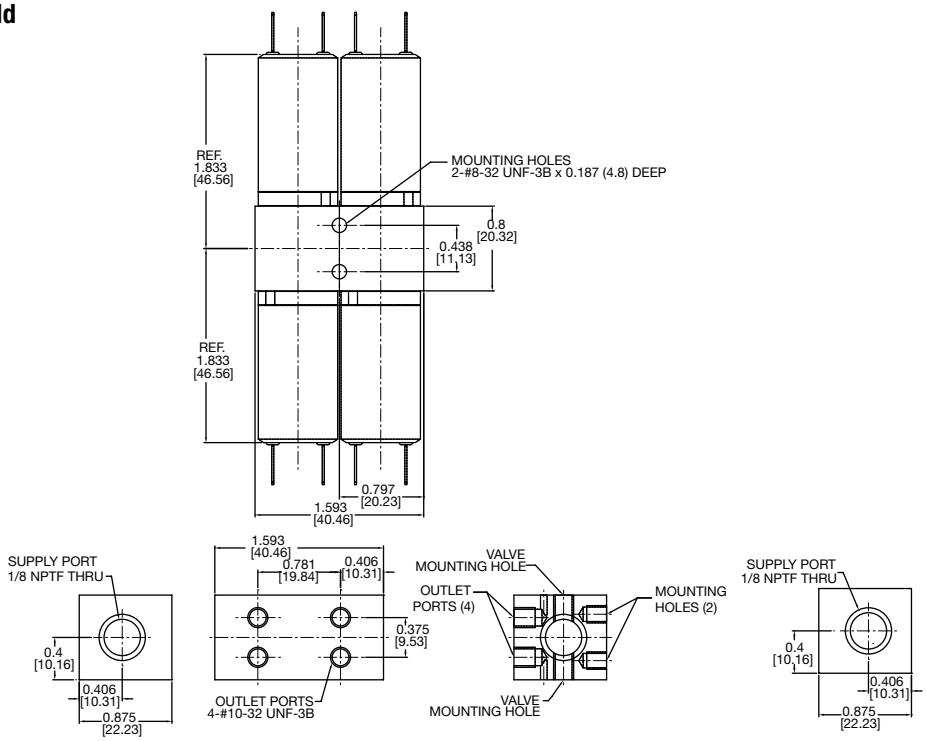


2 Station Manifold



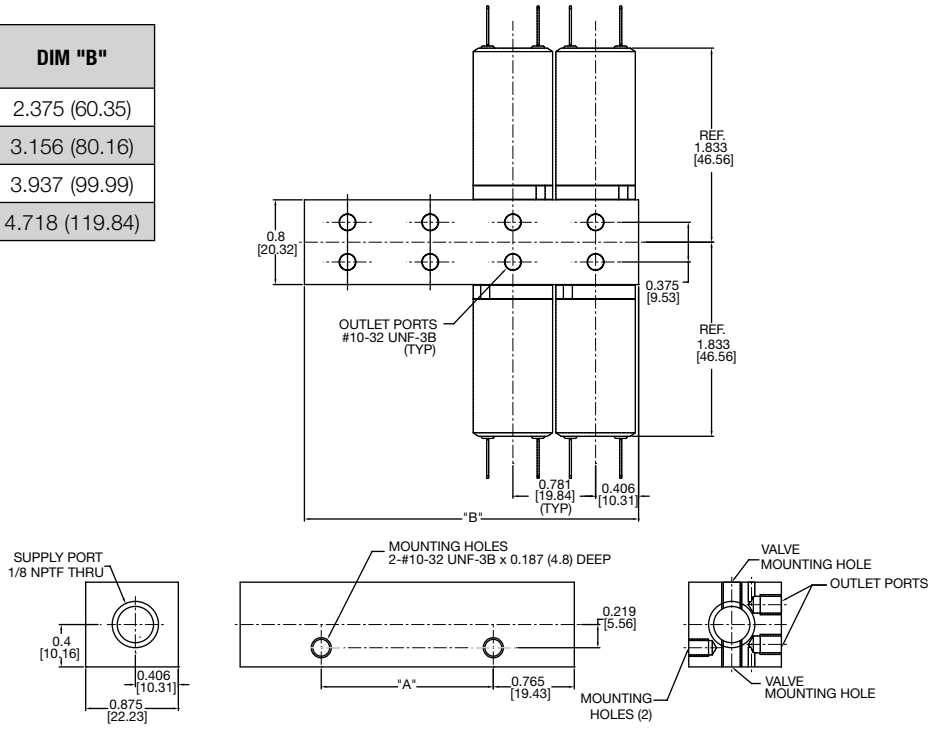
Dimensions (Continued): Inches (mm)

4 Station Manifold



6, 8, 10, 12 Station Manifolds

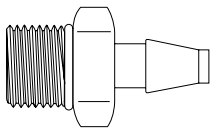
Number of Stations	DIM "A"	DIM "B"
6	.845 (21.46)	2.375 (60.35)
8	1.625 (41.28)	3.156 (80.16)
10	2.406 (61.11)	3.937 (99.99)
12	3.187 (80.95)	4.718 (119.84)



Adapter Fittings

Adapter Fittings for #10-32 UNF ports and Soft Tubing

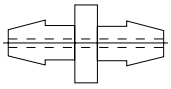
Thread Size	Barb Size	Fitting Material	Seal Material	Part Number
#10-32	1/16" I.D. Tubing	Polypropylene	FKM	F714-12
#10-32	1/8" I.D. Tubing	Polypropylene	FKM	F714-11
#10-32	1/16" I.D. Tubing	Brass	FKM	F765-02
#10-32	1/8" I.D. Tubing	Brass	FKM	F765-01



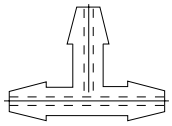
Adapter

Couplings and Tees for Soft Tubing

Type	Barb Size	Fitting Material	Part Number
Coupling	1/16" to 1/16"	Polypropylene	F614-01
Coupling	1/8" to 1/8"	Polypropylene	F614-02
Coupling	1/16" to 1/8"	Polypropylene	F614-03
Tee	1/16"	Polypropylene	F612-01
Tee	1/8"	Polypropylene	F611-01



Coupling



Tee

Tubing

ASCO offers VQM tubing to be used with the Series 284, 384, 373, 388, 390, and 401 pinch valves. It is available in various sizes as listed below.

Specifications

Tubing Material	Platinum Cured VQM
Durometer	55+/-5 Shore "A" in accordance with ASTM D-2240
Standards	Meets requirements of U.S. Pharmacopoeia XX, Class VI-Plastic Containers

Tubing Catalog Numbers

Tubing for Series 373, 388, 390, and 401

Tubing Size (inches)			Tubing Catalog Number
ID	OD	Wall	
1/32	3/32	1/32	F739-01
1/32	5/32	1/16	F739-02
1/16	1/8	1/32	F739-03
1/16	3/16	1/16	F739-04
3/32	5/32	1/32	F739-05
3/32	7/32	1/16	F739-06
1/8	3/16	1/32	F739-07
1/8	1/4	1/16	F739-08
3/16	1/4	1/32	F739-10
1/4	5/16	1/32	F739-11
1/4	3/8	1/16	F739-12
3/8h	1/2h	1/16	F739-13

Tubing for Series 284, 384

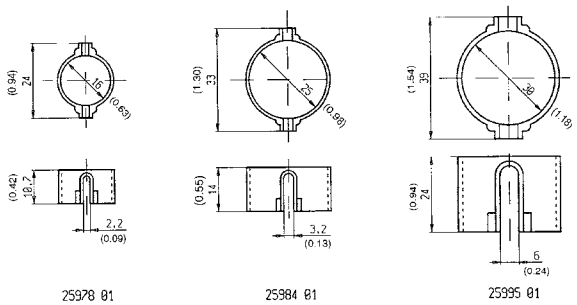
Tubing Size (inches)			Tubing Catalog Number
ID	OD	Wall	
.030	.065	.017	TB030X065SI1P
.040	.085	.022	TB040X085SI1P
.062	.095	.017	TB062X095SI1P
.062	.125	.031	TB062X125SI1P
.078	.125	.031	TB078X125SI1P
.104	.192	.044	TB104X192SI1P
.132	.183	.026	TB132X183SI1P
.187	.313	.063	TB187X313SI1P
.250	.375	.062	TB250X375SI1P

Tubing Guide

ASCO offers plastic tubing guides that slide easily onto the valve body of the Series 284 & 384 pinch valves to retain small OD tubing in the pinch valve body.

Tubing Guide Cat. No	Max OD of Tubing (inches)	Valves Applicable
2597801	.085	SCH284A001
		SCH284A002
		SCH284A003
		SCH284A004
		SCH284A009
		SCH284A010
		SCH284A011
		SCH284A012
		SCH384A001
		SCH384A002
		SCH384A003
		SCH384A004
2598401	138	SCH284A005
		SCH284A013
		SCH394A005
2599501	.236	SCH284B006
		SCH284B007
		SCH284B014
		SCH284B015
		SCH384B006
		SCH384B007

Tubing Guide Dimensions mm (ins.)



Asco's electrical connection devices are designed using the DIN 43650, ISO 4400, and EN 175301-803 form standards consistent with our solenoid valve coil designs permitting industry interchangeability. Each size is available for user wiring or factory prewired installations.

CE

Construction

Housing & Lid	Glass-fiber reinforced polyamide
Seals	NBR

Electrical

Number of Contacts	2 + ground
Contact Resistance	≤ 4 milli-ohm
Electrical Safety	IEC 335
Enclosure Protection	IP65

Size 11 mm, Form B

Catalog Number	Description	Max Voltage	Cable Length (in)	Cable OD (in)	Figure	Weight (oz)
290414-001	Standard rotatable connector without LED indicator	250	-	0.24 - 0.32	A	0.74
88122413	Standard non-rotatable connector without LED indicator	250	79	-	B	5.3

Size 18 mm; ISO 4400/EN 175301-803 Form A

Catalog Number	Description	Max Voltage	Cable Length (in)	Cable OD (in)	Figure	Weight (oz)
290411-001	Standard rotatable connector without LED indicator	250	-	0.24 - 0.32	C	0.74
88122612	Standard non-rotatable connector without LED indicator	250	79	-	D	5.3

Size 9.4 mm; DIN 43650 Form C

Catalog Number	Description	Max Voltage	Cable Length (in)	Cable OD (in)	Figure	Weight (oz)
290417-001	Standard rotatable connector without LED indicator	250	-	0.16 - 0.24	E	0.35
272852-004	Standard non-rotatable connector without LED indicator	250	79	-	F	3.2

Dimensions: Inches (mm)

Figure A

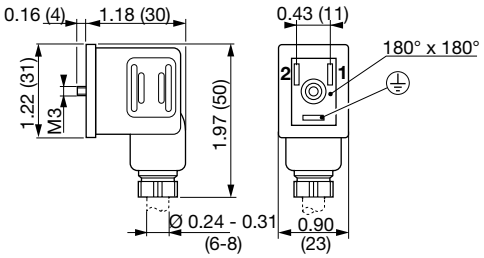


Figure B

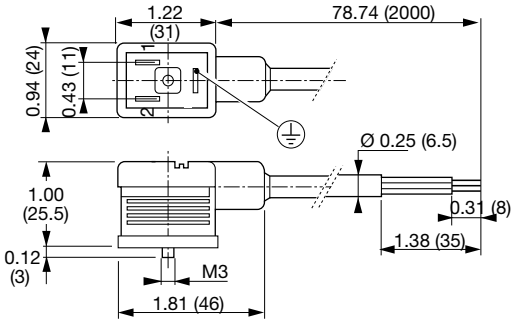


Figure C

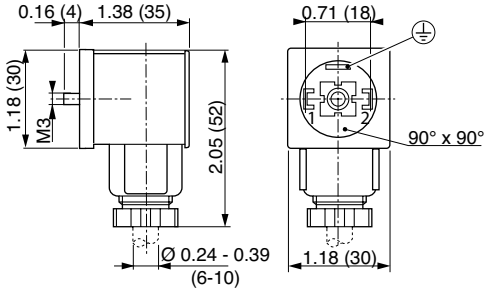


Figure D

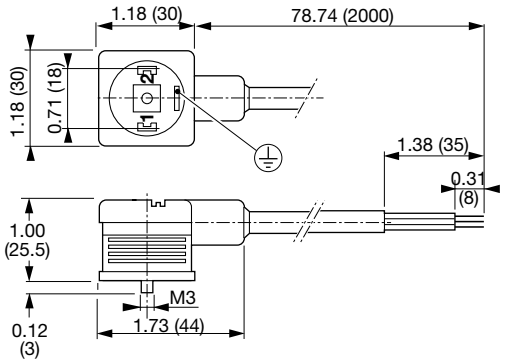


Figure E

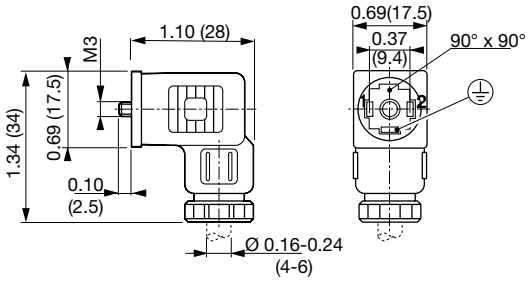
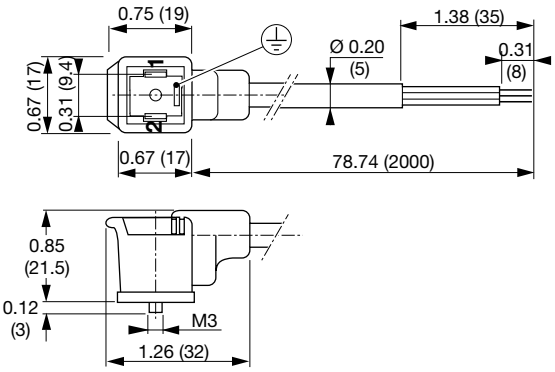
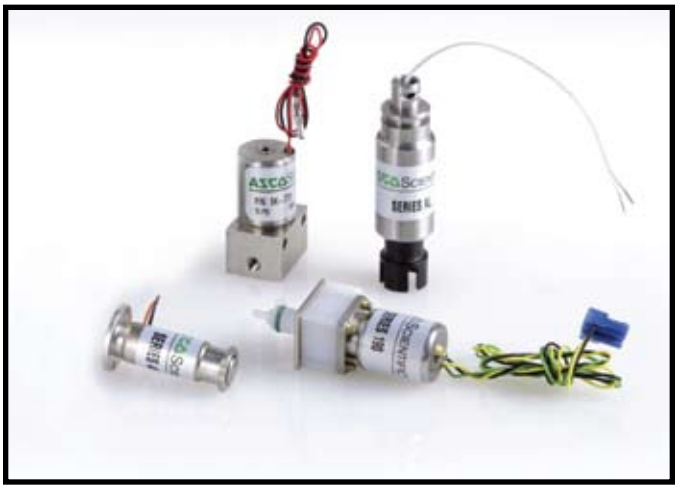


Figure F



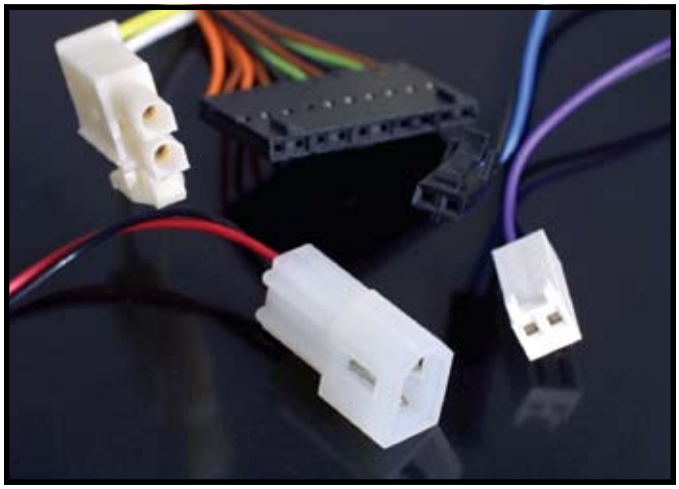
Custom Manifolds & Assemblies

ASCO has the ability to work with you to design a custom manifold for your specific fluid control requirements. We can design manifolds that include our solenoid valves as well as other components such as fittings, pressure sensors, relief valves, etc. Once the design is finalized, we can supply the complete assembly tested and ready for installation into your equipment.



Special body configurations and materials

To fit in a tight space or mount exactly in your equipment, ASCO can create custom body configurations. In addition, we can supply our existing products lines with various body and elastomer materials based on your fluid compatibility requirements.

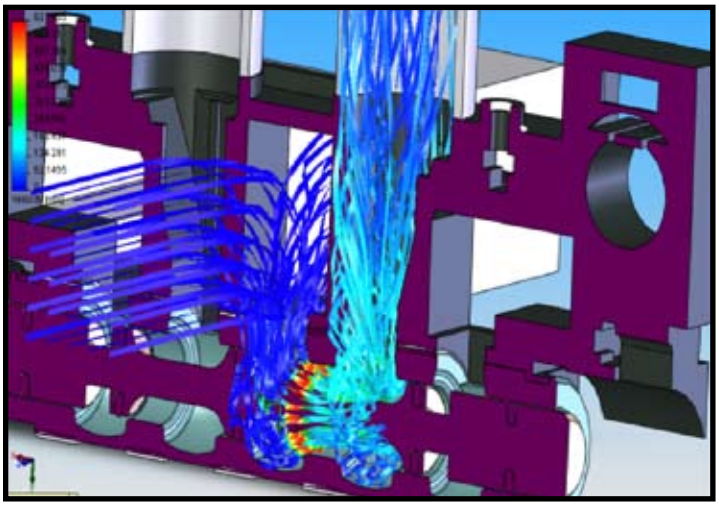


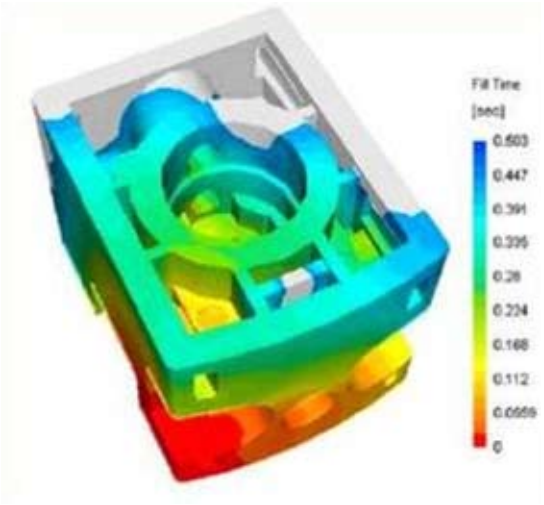
Electrical Connectors/Special Voltage

To simplify your wiring and reduce labor to install solenoid valves, we can provide our valves with any electrical connector you desire. We routinely provide valves with various connectors made by AMP, Molex, and other connector manufacturers.

Customer specific testing and cleaning

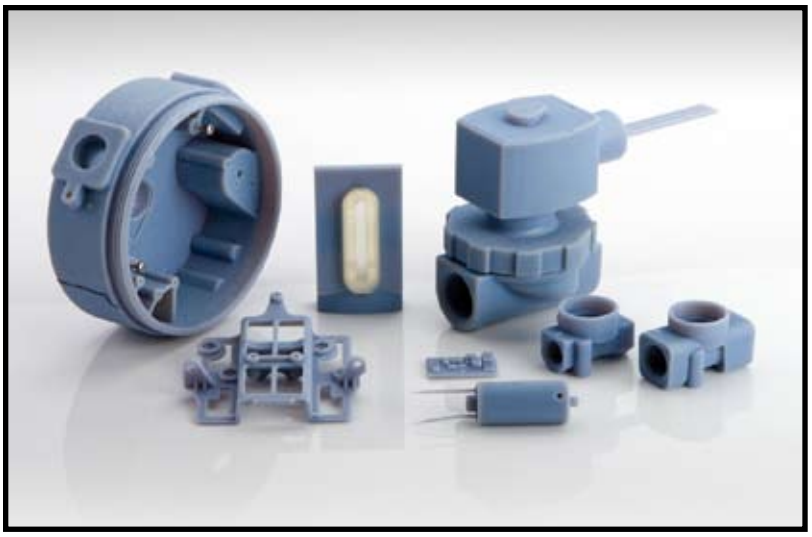
To ensure that our products perform as expected in your equipment, we can develop test procedures based on your exact requirements. Also, we can specially clean our valves and components to prevent contamination of the media in your equipment.





Virtual Analysis

ASCO has the ability to perform virtual analysis of your application whether it is mold flow or FEA analysis of a custom component to a complex computational fluid dynamic (CFD) analysis of your system. These tools greatly reduce the development time and cost of a project..



Rapid Prototyping

Our Engineering group has the capability to take complex 3D model concepts and generate a physical working prototype in relatively short timeframe with multiple in-house rapid prototype machines.

The following is general information for materials that are commonly used in ASCO solenoid valves. This information is not intended as a specific recommendation; factors beyond our control could affect valve operation or material properties of the components used in ASCO's valves may be different then the general material properties listed below.

Elastomers

NBR (nitrile, Buna-n)
NBR is commonly referred to as a Nitrile rubber. It has excellent compatibility for most air, water and light oil applications. Not recommended for highly aromatic gasolenes or acids. It has a working temperature range of 0˚F to 180˚F (-18˚C to 82˚C).

FKM (fluorocarbon elastomer, Viton[1])
FKM has a rather wide range of chemical compatibility. It is a fluorocarbon elastomer, which was primarily developed for handling hydrocarbons such as jet fuels, gasolenes, and solvents that normally caused detrimental swelling to NBR. FKM is not suitable for ketones, halogenated hydrocarbons or freon. FKM has a high temperature range similar to EPDM, but has the advantage of being somewhat more resistant to "dry heat". It has a useful temperature range of 0˚F to 350˚F (-18˚C to 177˚C).

EPDM, EPR (ethylene propylene)
Ethylene propylene is suitable for applications above the NBR temperature range, such as handling hot water and steam. It has a wide range of fluid compatibility and its useful temperature range is -10˚F to 300˚F (-23˚C to 149˚C). Ethylene propylene is not compatible with petroleum based fluids.

FFKM (perfluoroelastomer, Kalrez[1])
FFKM has virtually universal chemical resistance. It is extremely resistant to swelling, a cause of most seal failures. Because of the elasticity (soft seal) associated with FFKM, a virtually unsurpassed seal is created. FFKM will retain elasticity even after long term exposure to temperatures up to 600˚F (316˚C).

VMQ (silicone)
Known as the only elastomer, which under certain conditions, can be utilized for both high and low temperature. Also handles hydrogen peroxide and some acids. VMQ is not suitable for steam service. Fluorosilicone compounds are noted to have better fuel resistance.

Plastics

POM (acetal, Celcon[2])
Acetal resin type thermoplastics, which are extremely rigid but not brittle. They provide good toughness, tensile strength, stiffness and long life. They are odorless, tasteless, non-toxic and resistant to most solvents.

PBT (Valox[3])
PBT is a crystalline thermoplastic polyester with excellent chemical resistance. It has outstanding dimensional stability with high heat resistance and low moisture absorption. PBT also has a high surface gloss with an inherent lubricity.

PPS (polyphenylene sulfide, Ryton[4])
This resin has outstanding chemical resistance and no known solvents below 200˚C. It has low friction, good wear resistance and high tensile strength.

PSU (polysulfone)
Known as one of the most heat resistant thermoplastics. It has excellent chemical resistance when used for inorganic acids, alkalies and aliphatic hydrocarbons.

PEI (polyethermide, Ultem[3])
This resin has good heat deflection characteristics. Good chemical resistance to non-oxidizing acids and polar solvents Questionable usage on alkaline solutions.

PEEK (polyetheretherketone)
High performance thermoplastic that has a continuous working temperature of 250˚C. It has an excellent resistance to a wide variety of chemicals and solvents. PEEK has excellent flexural, tensile, and impact properties combined with outstanding fatigue resistance.

PTFE (Teflon[1])
PTFE is virtually unattacked by any fluid. It has a very wide temperature range. PTFE is not easily fabricated and is known to have objectionable "cold flow" characteristics, which may contribute to objectionable leakage, particularly on gases.

ETFE (ethylene tetrafluoroethylene, Tefzel[1])
ETFE is a fluoropolymer resin with a chemical resistance similar to PTFE. It is a more rugged material than PTFE making it more suitable for valve bodies with threaded ports.

CTFE (chlortrifluoroethylene, Kel-f[5])
Thermoplastic known for its excellent chemical resistance. It has near-zero absorption rate and a low coefficient of thermal expansion. This polymer structure can be used in temperatures ranging from -240˚C to 200˚C. It is nonflammable and liquid oxygen compatible.

Notes:
[1] Dupont Co. trademark
[2] Celanese Plastics Co. trademark
[3] GE Plastics trademark
[4] Chevron Philips trademark
[5] Daikin Industries trademark

General

Our valves are available to control most acids, alcohol, bases, solvents and corrosive gases and liquids. Modified or special designs are sometimes required depending upon the fluid and application.

Corrosion occurs either as a chemical or electro-chemical reaction. Therefore, consideration must be given to both the galvanic and electromotive force series, as well as to pressure, temperature and other factors that might be involved in the application.
This guide provides information on most common corrosive and non-corrosive, unmixed gases and liquids.

Mixtures of different fluids and their temperatures are not included in this table. It's the user's responsibility to ensure the chemical and physical compatibility of the body and other materials with the fluids used.
For applications where abnormal conditions exist and for other types of valves, operations and fluids, contact us with full details of the operating conditions.

fluids ↑ = **Excellent** → = **Acceptable** ↘ = **Not recommended** ↓ = **Do not use** - = **No data available**	body materials													other materials in contact with fluid									
	steel	stainless steel AISI 303/304	stainless steel AISI 316	stainless steel AISI 316L	aluminium	bronze	cast iron	brass	PA	PEEK	PPS	Silver	Copper	CR	EPDM	FFPM	FPM	NBR	UR	PET	POM	PTFE	TPE
Acetaldehyde	↘	↑	↑	↑	→	↑	→	↓	→	↑	→	↑	↓	↘	↑	↑	↓	↓	↓	↘	↑	↑	→
Acetic acid	↘	→	→	→	↘	↘	↘	↓	→	↑	↑	↑	↘	↘	→	↑	→	→	↓	→	↓	↑	↓
Acetic anhydride	↘	→	→	→	→	↘	↘	↓	↘	↑	↑	↑	↘	→	→	↑	↓	↘	↓	→	↓	↑	↓
Acetone	↑	↑	↑	↑	↑	↑	↑	↑	↘	↑	↑	↑	↑	↘	↑	↑	↓	↓	↓	↓	→	↑	↓
Acetonitrile	→	↑	↑	↑	↑	↖	↑	↖	↖	↑	↖	↖	↖	↑	→	↑	↓	↘	↓	→	↗	↑	→
Acetophenone	↖	↑	↑	↑	→	↖	↑	↑	↑	↗	→	↖	↖	↓	↑	↑	↓	↓	↓	→	↗	↑	↖
Acetyl chloride	↑	→	↑	↑	↓	↑	→	→	↘	↗	↑	↖	↑	↓	↘	↑	↑	↓	↓	↓	↓	↑	↓
Acetylene	↑	↑	↑	↑	↑	↘	↑	→	↘	↑	↘	↓	↓	↘	↑	↑	↓	↓	↓	↓	↑	↑	↑
Air (lubricated)	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↖	↖	↑	↘	↑	↑	↑	↑	↑	↑	↑	↑
Air (unlubricated, dry)	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↖	↖	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Alcohol ethyl (ethanol)	↑	↑	↑	↑	→	↑	↑	↓	↑	↖	↖	↑	→	↑	↑	↑	→	↑	↓	↑	↑	↑	↑
Alcohol methyl (methanol)	↑	↑	↑	↑	→	↑	↑	↓	↑	↖	↑	↑	→	↑	↑	↑	↓	↑	↓	↑	↑	↑	↑
Aluminium sulfate	↘	→	↑	↑	↑	↘	↓	↘	↘	↑	↑	→	→	↑	↑	↑	↑	→	↓	↑	↑	↑	→
Ammonia, anhydrous	↑	↑	↑	↑	↘	→	→	↘	↘	↑	↘	↘	↓	↑	↑	→	↓	→	↓	↘	↘	↑	↘
Ammonia, aqueous	↑	→	↑	↑	↓	↘	→	↓	↘	↖	↘	↘	↘	→	↑	→	→	↘	↓	↑	↓	↑	↖
Ammonia, water	↑	→	↑	↑	↓	↘	→	↓	↘	↖	↘	↘	↘	→	↑	↖	→	↘	↓	↑	↓	↑	↖
Ammonium hydroxyde	↘	→	→	→	↘	↘	↘	↓	↘	↑	→	↓	↓	→	↑	→	→	↘	↓	↑	→	↑	→
Amyl acetate	↘	→	→	→	→	↑	↘	→	↑	↑	↑	↖	↑	↓	↑	↑	↓	↓	↓	→	↓	↑	↘
Aniline	↘	→	↑	↑	↘	↘	→	→	↘	↑	→	↑	↓	↓	→	↑	→	↓	↓	↑	↑	↑	↘
Argon	↑	↑	↑	↑	↑	→	→	↑	↑	↑	↑	↑	↘	↓	↑	↑	↑	↘	↑	↖	↖	↑	↑
Barium chloride	↘	→	↑	↑	↓	↑	↘	↑	↘	↑	↑	↖	→	↑	↑	↑	↑	↑	↑	↑	↑	↑	→
Barium hydroxide	↘	→	↑	↑	↓	↘	↘	→	↘	↖	↑	↑	↓	↑	↑	↑	↑	↑	→	↑	↓	↑	→
Benzaldehyde	↑	↑	↑	↑	↑	↑	↑	→	→	↑	→	↓	→	↓	→	↑	↓	↓	↓	↑	↑	↑	→
Benzene pure	→	↑	↑	↑	→	↑	→	→	↘	↑	→	↑	→	↓	↓	↑	↑	↓	↓	→	↑	↑	→
Benzene sulfonic acid	→	↑	↑	↑	↓	→	↓	→	↘	↓	→	↑	↘	→	↘	↑	↑	↘	↓	→	↘	↑	→
Borax	→	↑	↑	↑	↘	↑	↑	→	↘	↑	↑	↖	→	→	↑	↑	↑	→	↑	↑	↑	↑	↑
Bromine	↘	↓	↘	↘	↓	↓	↓	↖	↘	↓	↓	→	↘	↓	↓	↑	↑	↓	↓	→	↓	↑	↓
Butadiene	↑	↑	↑	↑	↑	↑	↑	↑	↘	↖	↑	↖	↘	→	↘	↑	↑	↓	↓	↓	↑	↑	↓
Butane	↘	↑	↑	↑	→	→	→	↑	↑	↑	↑	↖	↘	↑	↓	↑	↑	↑	↘	→	↑	↑	→
Butanol (aqueous, butyl alcohol)	↑	↑	↑	↑	→	↑	→	↑	↑	↖	↑	→	→	↑	→	↑	↑	↑	↓	→	↑	↑	→
Butylene	↘	↑	↑	↑	↑	→	↑	↘	↑	↖	↑	↖	↓	↘	↓	↑	↑	→	↓	→	↑	↑	→
Butyl acetate	↑	↑	↑	↑	↑	↑	↑	→	↑	↑	↑	→	↑	↓	→	↑	↓	↓	↓	→	→	↑	↘
Butylamine	↑	↑	↑	↑	↑	→	↑	↖	↑	↖	↓	↖	↖	↓	↓	↑	↓	↓	↓	→	↓	↑	↓
Butyl ether	↑	↑	↑	↑	↑	↖	↑	↖	↓	↑	↑	↖	↖	↘	↘	↑	↓	→	→	↓	↓	↑	↓
Calcium chloride	↘	→	→	→	↓	→	↓	↖	↘	↑	↑	↑	→	↑	↑	↑	↑	↑	↑	↑	↓	↑	↑
Calcium sulfate	→	→	↑	↑	→	→	↑	↓	↘	↑	↑	↑	→	↑	↑	↑	↑	↑	↑	↑	↓	↑	↖
Carbon dioxide (wet/dry)	↑	↑	↑	↑	↑	→	↑	↓	↑	↖	↑	↑	↑	→	→	↑	↑	↑	↑	↑	↑	↑	↘
Carbon tetrachloride	↑	↘	↘	↘	↓	↑	↓	↑	↘	↑	→	→	↘	↓	↓	↑	↑	↘	↓	→	↑	↑	↓
Caustic soda	→	↑	↑	↑	↓	→	→	→	↑	↑	→	↖	↖	→	↑	↑	→	↘	→	↖	↑	↑	→
Cellosolve	↑	→	↑	↑	→	↖	→	↑	↑	↖	↑	↖	↖	↓	→	↑	↘	↓	↓	↑	↑	↑	↓

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fluids ↑ = **Excellent** → = **Acceptable** ↘ = **Not recommended** ↓ = **Do not use** - = **No data available**	body materials													other materials in contact with fluid									
	steel	stainless steel AISI 303/304	stainless steel AISI 316	stainless steel AISI 316L	aluminium	bronze	cast iron	brass	PA	PEEK	PPS	Silver	Copper	CR	EPDM	FFPM	FPM	NBR	UR	PET	POM	PTFE	TPE
Chlorobenzene	→	→	↑	↑	↓	↑	↘	↑	↘	↑	↑	→	→	↓	↓	↑	↑	↓	↓	→	↓	↑	↓
Chloroform	↘	↑	↑	↑	↓	↑	↘	→	↑	↑	→	↑	→	↓	↓	↑	↑	↓	↓	↓	↑	↑	↘
Chlorosulfonic acid	↘	↘	↘	↘	↓	↘	↓	→	↘	↘	↓	↖	↓	↓	↓	↑	↘	↓	↓	↘	↓	↑	↓
Chlorine (wet)	↘	↘	→	→	↓	→	↘	↓	↘	↓	↓	↖	↖	↓	↘	→	↑	↓	↓	↓	↓	↑	↓
Chromic acid (25%)	↘	↘	↑	↑	↘	↘	↓	↓	↘	↘	↓	↓	↓	↓	↑	↑	↑	↓	↓	→	↓	↑	↓
Chromic acid, concentrated	↘	↘	↘	↘	↓	↘	↓	↓	→	↘	↓	↖	↓	↓	↘	↑	↑	↓	↓	→	↓	↑	↓
City gas	↖	↑	↑	↑	↖	↖	↖	↑	↖	↖	↖	↖	↓	→	↓	↑	↑	↑	→	↖	↖	↑	↖
Coffee	↘	↑	↑	↑	↑	↑	↘	↖	↑	↖	↖	↖	↑	↑	↑	↑	↑	↑	↓	↑	↑	↑	↖
Coke oven gas	↑	↑	↑	↑	↖	→	↑	↘	↖	↖	↖	↑	↑	↘	↓	↑	↑	↘	↓	↖	↖	↑	↖
Detergent	→	↑	↑	↑	↑	↑	→	→	↑	↖	↑	↖	↖	→	↑	↑	↑	↑	↓	↑	↑	↑	→
Diesel fuel	↑	↑	↑	↑	↑	↑	↑	↑	↑	↖	↑	↑	↑	→	↓	↑	↑	↑	↘	→	↑	↑	→
Dimethyl formamide	→	↑	↑	↑	↑	→	→	↘	↑	↑	→	↖	↑	↓	→	↑	↘	→	↓	↑	↘	↑	→
Dimethyl phtalate	↑	↑	↑	↑	↑	↖	↑	↑	↑	↖	↑	↖	↖	↓	→	↑	→	↓	↖	↑	↖	↑	↑
Ethylene chloride	↑	→	↑	↑	→	↑	↘	→	↑	↑	→	↑	↘	↓	↘	↑	→	↓	↓	↘	↑	↑	↘
Ethylene diamine	→	→	↑	↑	↑	→	↑	↓	→	↖	→	↖	↓	↑	↑	→	↓	↑	↓	↑	↑	↑	↖
Ethylene dichloride	↑	→	→	→	→	↑	↑	↑	↑	→	→	↑	→	↓	↘	↑	→	↓	↓	↓	↑	↑	↘
Ethylene glycol	→	→	↑	↑	→	↑	→	→	↑	↑	↑	↑	→	↑	↑	↑	↑	↑	→	↑	→	↑	↑
Ethylene oxide	→	↑	↑	↑	↓	↑	↘	↑	↘	↖	↓	↘	↓	↓	↘	↑	↓	↓	↓	↘	↑	↑	↑
Ferric chloride	↓	↓	↘	↘	↓	↘	↓	↓	↑	→	↑	→	↓	→	↑	↑	↑	↑	↑	↑	→	↑	↑
Ferrous chloride	↓	↓	↘	↘	↓	↘	↓	↓	↘	↑	↑	→	↘	→	↑	↑	↑	↑	↖	↑	→	↑	↑
Formaldehyde	→	↘	↑	↑	→	↑	↓	→	↑	→	↘	↑	→	→	↑	↑	→	→	↓	↑	↑	↑	→
Formic acid	↘	→	↑	↑	↓	↘	↓	→	↘	→	↑	↖	↓	↑	↑	↑	↘	↘	↓	↑	↓	↑	→
Freon 11	→	↑	↑	↑	↘	↑	→	→	↘	↑	↑	↑	↑	↓	↓	→	↑	→	↓	↑	↑	↑	↑
Freon F-12	→	↑	↑	↑	↑	↑	→	→	↘	↑	↑	↑	↑	↑	→	↖	→	→	↑	↑	↑	↑	↓
Freon 22	→	↑	↑	↑	↓	↖	↓	↑	↑	↑	↑	↑	→	→	→	↑	→	↓	↓	↓	↑	↑	↓
Freon T WD602	→	↑	↑	↑	↓	↖	↖	↑	↑	↖	↑	↖	↑	→	→	→	↑	→	↑	↖	↖	↑	↖
Fuel oil	↑	↑	↑	↑	↑	↑	→	→	↑	↖	↑	↑	↘	→	↓	↑	↑	↑	↘	↑	→	↑	→
Fuel oil #6	↑	↑	↑	↑	↘	↑	↑	↑	↑	↖	↑	↖	↘	↓	↓	↑	↑	→	→	↖	↓	↑	↑
Fuel ASTM Ref Fuel A	↑	↑	↑	↑	↘	↑	↑	↑	↑	↖	↑	↖	↘	→	↓	↖	↑	↑	↑	↖	↓	↑	↑
Fuel ASTM Ref Fuel B	↑	↑	↑	↑	↘	↑	↑	↑	↑	↖	↑	↖	↘	↓	↓	↖	↑	↑	→	↖	↓	↑	↑
Fuel ASTM Ref Fuel C	↑	↑	↑	↑	↘	↑	↑	↑	↑	↖	↑	↖	↘	↓	↓	↖	↑	→	↓	↖	↓	↑	↑
Fuel ASTM #1 Oil	↑	↑	↑	↑	↘	↑	↑	↑	↑	↖	↑	↖	↖	↑	↓	↖	↑	↑	↑	↖	↓	↑	↑
Fuel ASTM #2 Oil	↑	↑	↑	↑	↘	↑	↑	↑	↑	↖	↑	↖	↖	→	↓	↖	↑	↑	→	↖	↓	↑	↑
Fuel ASTM #3 Oil	↑	↑	↑	↑	↘	↑	↑	↑	↑	↖	↑	↖	↖	↘	↓	↖	↑	↑	→	↖	↓	↑	↑
Fuel ASTM #4-5 Oil	↑	↑	↑	↑	↘	↑	↑	↑	↑	↖	↑	↖	↖	↓	↓	↖	↑	→	↓	↖	↓	↑	↑
Furan	↖	↑	↑	↑	↑	↖	↑	↖	↖	↖	↑	↖	↖	↓	↓	↑	↘	↓	↖	↘	↓	↑	↖
Furfural	↑	↑	↑	↑	↑	↑	↑	→	→	↖	↑	→	→	↓	→	↑	↓	↓	↘	↓	→	↑	→
Gasoline (petrol)	↑	↑	↑	↑	↖	↑	↑	↑	↑	↑	↑	↑	↘	→	↓	↑	↑	↑	→	↓	↑	↖	↑
Gasoline 100 octane	↖	↑	↑	↑	↖	↖	↖	↘	↑	↖	↑	↖	↖	→	↓	↖	↑	↑	→	↓	↑	↑	↑
Glycogenic acid	↘	↑	↑	↑	↖	→	↘	↖	→	↖	↑	↖	↖	↖	→	↖	↖	↘	→	↑	↑	↑	↖
Glycol	↑	↑	↑	↑	↖	↑	↑	↖	↖	↑	↑	↑	↑	↑	↑	↑	↑	↑	→	↖	↑	↑	↖
Helium	↑	↑	↑	↑	↑	↑	↑	↑	→	↑	↑	↖	↖	↑	↑	↑	↑	↑	↑	↑	↑	↑	↖
Heptane	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	→	↓	↑	↑	↑	→	↖	↑	↑	→
Hydraulic fluids	→	↑	↑	↑	↑	↑	↑	↑	↑	↖	↑	↖	↖	↓	→	↑	↑	↓	↓	↓	→	↑	↑
Hydraulic oil	↑	↑	↑	↑	↑	↑	↑	↑	↘	↖	↑	↑	↑	→	↓	↑	↑	↓	↑	↓	→	↑	↑
Hydrofluoric acid (50%)	↓	↓	↘	↘	↓	↘	↓	↘	↓	↓	↘	→	↓	→	↑	↑	→	↘	↓	→	↓	↑	↓
Hydrogen gas	↑	↑	↑	↑	↓	↑	↑	↑	→	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↖	↑	↑
Hydrogen peroxide (30%)	↘	→	→	→	→	↘	↓	↓	↘	↑	→	↓	↓	↓	→	↑	↑	↓	↖	↑	↓	↑	↓
Hydrogen sulfide (dry hot)	↘	↘	↑	↑	↘	↘	↘	↘	↘	↑	→	↓	↓	→	↑	↑	↓	↓	→	↑	↑	↑	↑
Isobutylene	↑	↑	↑	↑	↑	↑	↑	↑	↑	↖	↘	↖	↖	↓	↓	↑	↑	↘	↘	↖	↖	↑	↖
Jet fuels (JP1 through 5)	↑	↑	↑	↑	↑	↑	↑	↓	↘	↖	↑	↖	↖	↘	↓	↑	↑	↑	→	↑	↑	↑	↖
Jet fuels (JP 6)	↑	↑	↑	↑	↖	↑	↑	↓	↖	↖	↖	↖	↑	↓	↓	↑	↑	↑	↓	↓	↑	↑	↖
Kerosene (kerosine)	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	→	→	↓	↑	↑	↑	→	→	↑	↑	↑
Lactic acid	↘	↑	↑	↑	↘	↘	↓	↓	↘	↑	↑	→	↘	→	→	↑	↑	↘	↖	↑	↑	↑	↓
Liquid natural gas (LNG)	↖	↑	↑	↑	↑	↖	↖	↑	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↑	↖
Liquid oxygen (LOX)	↓	↓	↓	↓	↓	↓	↓	↑	↓	↖	↓	↖	↖	↓	↓	→	↓	↓	↓	↖	↖	↑	↖

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	steel	stainless steel AISI 303/304	stainless steel AISI 316	stainless steel AISI 316L	aluminium	bronze	cast iron	brass	PA	PEEK	PPS	Silver	Copper	CR	EPDM	FFPM	FPM	NBR	UR	PET	POM	PTFE	TPE
Liquid petroleum gas (LPG)	↘	↑	↑	↑	↘	↗	↗	↗	→	↗	↗	↑	↑	→	↓	↑	↑	↑	↑	↓	→	↑	→
Lubricating oils, di-ester	↑	↑	↑	↑	↖	↑	↑	↖	→	↖	↑	↑	↑	↘	↓	↑	↑	→	→	↖	↘	↑	↓
Lubricating oils, petroleum base	↑	↑	↑	↑	↑	↖	↑	↑	↖	↖	↖	↖	→	→	↓	↑	↑	→	→	↘	↑	↑	↑
Lubricating oils, SAE 10, 20, 30, 40	↑	↑	↑	↑	↑	↖	↑	↑	↖	↖	↖	↖	↖	→	↓	↑	↑	↑	→	↘	↑	↑	↑
Magnesium acetate	↑	↑	↑	↑	↓	↘	↘	→	→	↖	↑	↖	↖	↖	↑	↖	↓	↓	↖	↑	↖	↑	↖
Magnesium hydroxide	↑	↑	↑	↑	↓	↘	→	→	→	↑	↑	↘	↘	→	↑	↑	↑	→	↘	↑	↑	↑	→
Methane	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	→	↓	↑	↑	↑	↘	→	↑	↑	→
Methyl ether ketone (MEK)	↑	↑	↑	↑	↑	↑	↑	↓	→	↘	→	↑	↑	↓	↑	↑	↓	↓	↓	↘	→	↑	→
Mineral oil	↑	↑	↑	↑	↑	↑	↑	↑	↑	↖	↑	↑	→	→	↓	↑	↑	↑	↑	→	↑	↑	↑
Morpholine	→	→	→	→	↑	→	→	↖	→	↖	→	↖	↖	↓	↓	↑	↓	↓	↖	↖	↖	↑	↖
Naphta	↑	↑	↑	↑	↑	↑	→	↘	↑	↖	→	↑	→	↘	↓	↑	↑	↘	↘	↘	↑	↑	↑
Natural gas	→	↑	↑	↑	↑	↑	→	→	↑	↑	↑	↑	→	↑	↓	↑	↑	↑	→	↑	↑	↑	→
Nitric acid (10%)	↘	↑	↑	↑	↓	↘	↓	↓	↘	↑	↘	↖	↓	→	→	↑	↑	↓	↘	↑	↘	↑	→
Nitric acid, concentrated	↓	↑	↑	↑	↓	↓	↓	↓	↓	↘	↓	↖	↓	↓	↓	→	↑	↓	↓	↓	↘	↑	↓
Nitro benzene	↑	→	↑	↑	↘	→	↘	↖	↘	↑	→	↑	↘	↓	↓	↑	→	↓	↓	→	→	↑	↓
Nitro methane	→	↑	↑	↑	↑	→	→	↖	→	↖	→	↖	↑	↘	→	↑	↓	↓	↓	↘	↑	↑	↓
Nitrogen	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	→
Nitro propane	↖	↑	↑	↑	↑	↖	↑	↖	↖	↖	↖	↖	↖	↓	→	↑	↓	↓	↓	↖	↖	↑	↖
Octane	↖	↖	↑	↑	↖	↖	↖	↖	↖	↖	↖	↖	↖	↓	↓	↑	↑	↑	↓	↓	↖	↑	↖
Octane carboxylic acid	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↑	↓	↖	↖	↑	↖
Octanol	↖	↖	↑	↑	↖	↖	↖	↖	↖	↖	↖	↖	↖	→	↑	↖	↑	→	↓	↖	↖	↑	↖
Oleic acid	↘	→	↑	↑	↑	→	→	↘	↑	↖	↖	↑	↘	→	↘	↑	→	→	→	↑	↑	↑	↑
Olive oil	↑	→	↑	↑	↑	↑	↑	→	→	↖	↑	↖	↖	→	→	↑	↑	↑	↑	↑	↑	↑	↖
Oxygen, cold	→	→	→	→	→	→	↖	↑	↖	↖	↖	↖	→	↑	↑	↑	↑	→	↑	↖	↖	↑	↖
Oxygen 121 - 204°C (250 - 400 °F)	↖	↖	↖	↖	↖	↖	↖	↖	↓	↖	↓	↖	↖	↓	↓	↑	↓	↓	↓	↖	↖	↑	↖
Oxygen, gas	↑	↑	↑	↑	↖	↑	↑	↑	→	↖	↓	→	↑	→	↑	↖	↑	↓	↑	↖	↖	↑	↖
Ozone (dry)	↑	↑	↑	↑	→	↑	↑	↑	↘	↘	↘	→	↓	↘	↑	↑	↘	↓	↑	↓	↓	↖	↘
Palm oil	↘	↑	↑	↑	↑	↘	↑	↖	↖	↖	↖	↖	↑	↘	↖	↖	↑	↑	→	↖	↑	↑	↖
Palmic acid	↘	→	↑	↑	→	↘	↘	↘	↑	↖	→	↖	→	→	→	↑	↑	↑	↑	↖	↖	↑	↖
Paraffin	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↖	↖	→	→	↓	↑	↑	↑	→	↑	↑	↑	↖
Pentane	↖	→	↑	↑	↑	↖	→	↓	→	↖	↖	↑	→	↑	↓	↑	↑	↑	↓	↖	↑	↑	↖
Pentanol	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↑	↑	↖	→	→	↓	↖	↖	↑	↖
Perchloroethylene (“Perk”)	→	↑	↑	↑	↓	→	→	↖	↘	↑	↓	↑	→	↓	↓	↑	↑	↓	↓	↓	↑	↑	↓
Petrol	→	↑	↑	↑	→	↑	→	↘	↑	↑	↑	↖	↖	→	↓	↑	↑	↑	→	↑	↑	↑	↖
Petroleum benzine	↑	↑	↑	↑	↘	↖	↑	→	→	↖	↑	↖	↖	→	↓	↖	↑	↑	→	↖	↖	↑	↖
Petroleum ether	→	↑	↑	↑	→	↖	→	↑	↑	↑	↑	↖	↖	→	↓	↑	↑	↑	→	↑	↑	↑	↖
Petroleum naphtha	↑	↑	↑	↑	↘	↑	↖	↖	→	↖	↖	↖	↖	→	↓	↖	↑	↑	→	↖	→	↑	↖
Petroleum oil above 121°C (250°F)	↑	↑	↑	↑	↘	↑	↖	↖	→	↖	↖	↖	↖	↓	↓	↑	→	↑	↓	↖	→	↑	↖
Petroleum oil below 121°C (250°F)	↑	↑	↑	↑	↘	↑	↖	↖	→	↖	↖	↑	↑	→	↓	↑	→	↑	→	↖	→	↑	↖
Phenol	→	→	→	→	→	→	↓	→	↘	→	↑	↑	→	↓	↓	↑	↑	↓	↓	↘	↑	↑	↓
Phenilic acid	↖	↖	↖	↖	↖	→	↖	↓	↖	↖	↖	↖	↖	↓	↓	↖	→	↓	↓	↖	↖	↑	↖
Phosphoric acid 10%	→	→	→	→	↓	→	↓	↓	↘	↑	↑	→	↓	→	↑	↑	↑	↑	↑	↑	↓	↑	↖
Phosphoric acid, concentrated	↘	↓	↓	↓	↓	↘	↓	↓	↓	↘	↑	→	↓	↓	→	↑	↑	↓	↑	↑	↓	↑	↓
Pine oil	↖	↑	↑	↑	↑	↑	→	→	↑	↑	→	↖	↖	↓	↓	↑	↑	→	↖	↖	↑	↑	↓
Poly propylene glycol	↑	↑	↑	↑	↑	↑	→	↑	→	↖	↑	↖	↖	↓	↑	↑	↑	↑	↖	↑	↓	↑	↖
Potassium acetate	↖	→	→	→	↓	↖	↑	↖	↖	↖	↖	↑	→	→	↑	↑	↓	→	↓	↑	↑	↑	↖
Potassium bicarbonate	↑	→	→	→	↓	→	↘	↖	→	↖	↖	↖	↓	↑	↖	↑	↑	↑	↖	↖	↘	↑	↖
Potassium carbonate	↑	→	↑	↑	↓	→	↑	→	→	↑	↑	↖	↖	↑	↑	↑	↑	↑	↖	↖	↖	↑	↖
Potassium chloride	↘	↘	↘	↘	→	↑	→	↓	→	↑	↑	↓	→	↑	↑	↑	↑	↑	↑	↑	↑	↑	↓
Potassium hydroxide (50%)	→	↑	↑	↑	↓	↘	↘	↓	↘	↑	→	→	↘	→	→	↑	↘	↘	→	↑	↑	↑	↑
Potassium nitrate	→	↘	↑	↑	↑	↑	→	→	→	↑	↑	↘	→	↑	↑	↑	↑	↑	↑	↑	→	↑	↖
Potassium phosphate	→	→	→	→	↓	↖	↓	→	→	↑	↖	↖	↖	↑	↑	↑	↑	→	↖	↖	↖	↑	↖
Potassium sulfate	↑	→	↑	↑	↓	→	↓	→	→	↑	↑	→	→	↑	↑	↑	↑	↑	↑	↖	↖	↑	↖
Propane	↑	↑	↑	↑	↑	↑	→	→	→	↑	↑	↖	↑	↘	↓	↑	↑	↑	↘	↓	↑	↑	→
Propanol	↑	↑	↑	↑	↖	↖	↑	↑	→	↑	↑	↖	↖	↑	↑	↖	↓	↓	↓	↖	↖	↑	↖
Propylene	↑	↑	↑	↑	↑	↖	↑	↑	↖	↖	↖	↑	↑	↓	↓	↑	↑	↓	↓	↑	↑	↑	↖

Please note that the chemical resistance may be influenced by many factors, such as temperature, concentration, etc.
This data is for information only.

fluids ↑ = **Excellent** → = **Acceptable** ↘ = **Not recommended** ↓ = **Do not use** - = **No data available**	body materials													other materials in contact with fluid									
	steel	stainless steel AISI 303/304	stainless steel AISI 316	stainless steel AISI 316L	aluminium	bronze	cast iron	brass	PA	PEEK	PPS	Silver	Copper	CR	EPDM	FFPM	FPM	NBR	UR	PET	POM	PTFE	TPE
Propylene chloride	↗	→	↑	↑	↓	↗	↑	↗	↗	↗	↗	↗	↗	↓	↓	↑	→	↓	↓	↗	↗	↑	↗
Pydraul 10E, 29ELT	↗	↑	↑	↑	↗	↗	↑	↗	↗	↗	↗	↑	→	↓	→	↑	↑	↓	↓	↗	↗	↑	↗
Pyridine	↑	→	↑	↑	→	→	→	↘	↑	↑	↑	↖	↘	↓	→	↑	↓	↓	↓	↘	→	↑	↘
Saccharose	→	↑	↑	↑	↖	↖	↑	↑	↖	↖	→	↗	→	↑	↑	↖	↑	↑	↓	↖	↖	↑	↗
SAE oils	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	→	→	↓	↖	↑	↑	↑	↖	↖	↑	↖
Salt water	↗	↘	↘	↘	↓	↑	↓	↓	↑	↖	↑	↖	→	↑	↑	↑	↑	↑	↓	↑	↑	↑	↖
Soda	→	↑	↑	↑	↓	→	→	→	↑	↖	↑	↑	→	→	↑	↑	→	↘	→	↖	↑	↑	→
Sodium carbonate	↑	→	↑	↑	↘	↑	→	→	→	↖	↑	↑	→	↑	↑	↑	↑	↑	↖	↑	↑	↑	→
Sodium chloride	↘	↘	→	→	↘	↑	→	↘	→	↑	↘	→	→	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Sodium hydroxide (caustic soda)	↑	→	↑	↑	↓	↑	↘	↓	↑	↑	→	↑	↘	→	↑	↑	→	↘	→	↑	↑	↑	↓
Sodium hypochlorite	↘	↘	↘	↘	↓	↘	↓	↘	↘	↑	↘	→	↓	↘	→	↑	↑	↘	↓	→	↓	↑	↘
Sour natural gas	↖	↖	→	→	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↓	↑	↓	↓	↓	↖	↖	↑	↖
Steam to 107°C (225°F)	↑	↑	↑	↑	↓	↑	↑	↑	↘	↖	→	→	→	↘	↑	↑	↓	↘	↓	↖	↖	↑	↖
Steam 107 - 148°C (225 - 300°F)	↑	↑	↑	↑	↓	↑	↑	↑	↘	↖	→	↖	↖	↓	↑	↑	↓	↓	↓	↖	↖	↑	↖
Steam over 148°C (300°F)	↑	↑	↑	↑	↓	↑	↘	↑	↘	↖	→	↖	↖	↓	↘	↑	↓	↓	↓	↖	↖	↑	↖
Stoddard solvent	↑	↑	↑	↑	↑	↑	↑	↖	↑	↖	↘	↖	↑	↘	↓	↑	↑	↑	↑	↑	↑	↑	↘
Sulphur dioxide, liquid	↑	→	↑	↑	↓	→	↓	↘	↘	↘	↑	↘	↘	→	↑	↑	↑	↓	↖	↑	↓	↑	↓
Sulphuric acid, concentrated	↘	→	→	→	↓	↘	↓	↓	↘	↓	→	↓	↓	↓	→	↑	↑	↓	↓	↘	↓	↑	↘
Tetrachloroethylene	↑	↑	↑	↑	↓	↖	↑	→	↘	↖	→	↑	↑	↓	↓	↑	↑	↓	↓	↓	↑	↑	↖
Tetrahydrofuran	↑	↑	↑	↑	→	↑	↖	↖	↑	↑	↘	↖	↖	↓	→	↑	↓	↓	↘	↘	↓	↑	→
Toluene	→	↑	↑	↑	↑	↑	↑	↑	↑	↑	→	↑	↑	↓	↓	↑	↑	↘	↓	↖	↘	↑	↘
Tri chloro ethylene	→	→	→	→	→	→	→	↑	↘	↑	→	↖	↘	↓	↓	↑	↑	↘	↓	↘	→	↑	↓
Tri chloro acetic acid	↘	↓	↘	↘	↓	↖	↓	↘	↘	↖	↑	↖	↓	↘	→	↑	↘	→	↓	→	↓	↑	↓
Turpentine	↑	→	↑	↑	↑	↑	→	↘	→	↖	↑	↑	→	↓	↓	↑	↑	↑	↓	→	↑	↑	→
Vaseline	↑	↑	↑	↑	↖	↖	↑	↑	↑	↖	↑	↖	↖	→	↓	↖	↑	↑	↑	↖	↖	↑	↖
Vegetable oils	↑	↑	↑	↑	↑	↑	→	→	↑	↖	↖	↖	↖	↓	→	↑	↑	↑	↖	↑	↑	↑	↖
Vinegar	↘	↑	↑	↑	↓	↘	↘	↘	↑	↖	↑	↑	→	→	↑	↑	↑	↘	↓	↑	→	↑	↘
Water	↖	↑	↑	↑	↖	↖	↖	↖	↖	↖	↖	↖	↖	→	↑	↑	→	↑	↘	↖	↖	↑	↑
Water, acid mine	↘	→	↑	↑	↓	↘	↓	↘	↑	↖	↑	↖	↓	↑	↑	↖	↑	→	↖	↑	↑	↑	↑
Water, deionized	↘	↑	↑	↑	↑	→	↘	↑	↓	↖	↑	↖	→	↑	↑	→	↑	→	↖	↖	→	↑	↑
Water, distilled lab	↘	→	↑	↑	→	↑	↘	→	→	↑	↑	↑	↘	↘	↑	↖	↑	↑	↑	↑	→	↑	↑
Water, drinking	↖	↑	↑	↑	↑	↖	↖	↓	↑	↖	↖	↖	↖	→	↓	↖	↑	↑	↓	↖	↖	↑	↑
Water, fresh	↑	↑	↑	↑	→	↑	→	↑	↑	↖	↑	↑	→	→	↑	↖	↑	↑	↑	↑	↑	↑	↑
Water, heavy	↖	↖	↖	↖	↖	↖	↖	↖	↑	↖	↑	↖	↖	→	↑	↑	↑	↑	↓	↑	↑	↑	↑
Water, sea/river	↘	→	→	↑	→	→	↘	↘	→	↑	↑	↑	→	→	↑	↖	↑	→	↑	↑	↑	↑	↑
Water glass	↑	↑	↑	↑	↖	↖	↑	→	↑	↖	↑	↖	→	↑	↑	↖	↑	↑	↘	↑	↑	↑	↑
Waterproofing salt	↖	↘	↘	↘	→	↑	↓	→	↑	↖	↑	↖	↖	→	↖	↖	↖	→	↘	↑	↑	↑	↑
Xenon	↘	↑	↑	↑	↑	↖	↘	↑	↑	↑	↑	↖	↖	↑	↑	↑	↑	↑	↑	↑	↖	↑	↖
Xylene	↑	→	→	→	↑	↑	→	→	→	↑	→	↑	↑	↓	↓	↑	↑	↓	↓	→	↑	↑	→
Zinc chloride	↓	↘	↘	↘	↓	↘	↓	↓	↑	↑	↑	→	↓	↑	↑	↑	↑	↑	↑	↑	↓	↑	↑

Please note that the chemical resistance may be influenced by many factors, such as temperature, concentration, etc.
This data is for information only.

Length

	meter	inch	foot	yard
1 m	1	39.37	3.2808	1.0936
1 in	0.0254	1	0.0833	0.0278
1 ft	0.3048	12	1	0.033
1 yd	0.9144	36	3	1

1 m = 10^{-3} km = 10 dm = 10^{2} cm = 10^{3} mm = 10^{6} µm = 10^{12} nm

Mass

	kilogram	pound	tons	
			short (US)	long (Imp)
1 kg	1	2.205	$1.102x10^{-3}$	$0.9843x10^{-3}$
1 lb	0.4536	1	$0.500x10^{-3}$	$0.4464x10^{-3}$
1 short ton (US)	907.2	2000	1	0.8929
1 long ton (Imp)	1016	2240	1.12	1

1 kg = 10^{3} g = 10^{2} dkg

Area

	cm^2	m^2	sq.inch	sq.foot	sq.yard
1 cm^2	1	$1x10^{-4}$	0.155	$1.0764x10^{-3}$	$1.196x10^{-4}$
1 m^2	$1x10^{4}$	1	1550	10.764	1.196
1 sq in	6.4516	$0.64516x10^{-3}$	1	0.00694	$0.772x10^{-3}$
1 sq ft	929.0	0.0929	144	1	0.1111
1 sq yd	8360	0.8360	1296	9	1

1 m^2 = 10^{-6} km = 10^{-4} ha = 10^{2} dm^2 = 10^{6} mm

Density

	kg/ltr	kg/m^3	pound / cubic foot	pound / gallon	
				Imperial	US
1 kg/ltr	1	1000	62.43	10.022	8.345
1 kg/m^3	0.001	1	0.06243	0.010022	0.008345
1 lb/cu ft	0.01602	16.02	1	0.16054	0.1337
1 lb/gal (Imp)	0.0998	99.78	6.229	1	0.8327
1 lb/gal (US)	0.1198	119.8	7.481	1.201	1

Volume

	liter (dm^3)	m^3	cubic inch	cubic foot	gallons	
					US	Imperial
1 l	1	$1x10^{-3}$	61.024	0.03531	0.2642	0.220
1 m^3	1000	1	61024	35.31	264.2	220
1 cu in	$16.387x10^{-3}$	$16.387x10^{-6}$	1	$0.5787x10^{-3}$	$4.329x10^{-3}$	$3.606x10^{-3}$
1 cu ft	28.320	$28.320x10^{-3}$	1728	1	7.481	6.229
1 US gal	3.785	$3.785x10^{-3}$	231	0.1337	1	0.8327
1 Imp gal	4.546	$4.546x10^{-3}$	277.3	0.1605	1.210	1

Imperial = British

Specific Volume

	ltr/kg	m^3/kg	cubic foot / pound
1 ltr/kg	1	0.001	0.01602
1 m^3/kg	1000	1	16.02
1 cu ft/lb	62.43	0.06243	1

Force

	Newton	kilopound	poundal
1 N	1	0.1020	7.24
1 kp	9.807	1	70.90
1 pdl	0.1383	0.0141	1

1 N = 10^{5} dyn; 1 dyn = 1 g x 1 $\frac{cm}{s^2}$; 1 kg = 1 kg x g
1 Poundal = 1 Pound x g

Pressure

	1 bar = $\frac{10^5\ N}{m^2}$	1 at = $\frac{1\ Kp}{cm^2}$	$\frac{poundal}{sq\ ft}$	$\frac{poundal}{sq\ in}$ = Psi	1 atm = 760 Torr = 760 mm Hg (0°C)	Hg column (0°C)		H_2O column (WC) (4°C)	
						mm Hg = Torr	in Hg	m H_2O	ft H_2O
1 Pa = 1 N/m^2	$1x10^{-5}$	$1.02x10^{-5}$	0.0209	$1.45x10^{-4}$	$9.87x10^{-6}$	0.0075	$2.95x10^{-4}$	$1.02x10^{-4}$	$3.35x10^{-4}$
1 bar	1	1.0197	2089	14.504	0.9869	750	29.5	10.20	33.5
1 at	0.980665	1	2048	14.22	0.96784	735.56	29.0	10.00	32.8
1 pdl/sq ft	$0.4790x10^{-3}$	$0.4882x10^{-3}$	1	$6.944x10^{-3}$	$0.4725x10^{-3}$	0.359	0.141	$4.88x10^{-3}$	0.0160
1 pdl/sq in = Psi	0.06895	0.07031	144	1	0.06806	51.7	2.04	0.703	2.31
1 atm	1.013	1.033	2120	14.70	1	760	29.09	10.33	33.9
1 mm Hg	$1.330x10^{-3}$	$1.360x10^{-3}$	2.78	0.0193	$1.316x10^{-3}$	1	0.0394	0.0136	0.0446
1 in Hg	0.0339	0.0345	70.7	0.4910	0.0334	25.4	1	0.3450	1.133
1 mH_2O	0.0981	0.1000	205	1.4220	0.0968	73.6	2.90	1	3.28
1 ft H_2O	0.0299	0.0305	62.4	0.4340	0.0295	22.4	0.883	0.3050	1

1 $\frac{N}{m^2}$ = Pa (Pascal) = 10 $\frac{dyn}{cm^2}$

1 $\frac{kp}{m^2}$ = 10^{-4} $\frac{kp}{cm^2}$ = 1 mm WC (at 4°C)

Work, Energy, Heat Content

	1 kcal	1 kp m	Btu (British thermal unit)	ft poundal	1 kWh	Horsepower hour (hph)		ton-day of refrigeration	1 Joule = 1 Nm = Ws
						metrical 75 $\frac{kp\ m\ h}{s}$	imperial 550 $\frac{ft.lb\ h}{s}$		
1 kcal	1	427.0	3.968	3088	$1.163x10^{-3}$	$1.581x10^{-3}$	$1.560x10^{-3}$	$13.779x10^{-6}$	4190
1 kpm	$2.342x10^{-3}$	1	$9.294x10^{-3}$	7.233	$2.723x10^{-6}$	$3.704x10^{-6}$	$3.653x10^{-6}$	$32.270x10^{-6}$	9.807
1 Btu	0.252	107.59	1	778.0	$0.293x10^{-3}$	$0.398x10^{-3}$	$0.3931x10^{-3}$	$3.472x10^{-6}$	1055
1 ft pdl	$0.3238x10^{3}$	0.13826	$1.285x10^{-3}$	1	$0.377x10^{-6}$	$0.512x10^{-6}$	$0.505x10^{-6}$	$4.462x10^{-9}$	1.356
1 kWh	860	$367.1x10^{-3}$	3412.8	$2.655x10^{6}$	1	1.360	1.341	$11.850x10^{-3}$	$2.6x10^{6}$
1 PSh	632.3	$270x10^{-3}$	2509	$1.953x10^{6}$	0.7353	1	0.9863	$8.713x10^{-3}$	$2.65x10^{6}$
1 hph	641.1	$273.7x10^{-3}$	2545	$1.980x10^{6}$	0.7457	1.014	1	$8.834x10^{-3}$	$2.68x10^{6}$
1 ton-day	$72.57x10^{-3}$	$30.99x10^{-3}$	$288x10^{3}$	$244.1x10^{6}$	84.39	144.78	113.2	1	$304x10^{6}$
1 J	$0.239x10^{-3}$	0.102	$0.948x10^{-3}$	0.738	$0.278x10^{-6}$	$0.378x10^{-6}$	$0.372x10^{-6}$	$3.280x10^{-9}$	1

1 erg = 1 dyn cm = 10^{-7} Nm; 1 kJ = 10^{3}J

Capacity, Energy Flow, Heat Flow

	1 kcal / h	1 kp m / s	British thermal unit per hour	1 kcal/s = British theor. unit of refrigeration	1 kW = 1 kJ/s	Horsepower hour (HP)		US Standard commercial ton of refrigeration	British commercial ton of refrigeration
						metrical 75 kp m / s	imperial 550 ft lb / s		
1 kcal/h	1	0.1186	3.968	0.278×10^{-3}	1.163×10^{-3}	1.581×10^{-3}	1.560×10^{-3}	0.331×10^{-3}	0.299×10^{-3}
1 kp m/s	8.4312	1	33.455	2.342×10^{-3}	9.804×10^{-3}	13.333×10^{-3}	13.150×10^{-3}	2.792×10^{-3}	2.520×10^{-3}
1 Btu/h	0.252	29.89×10^{-3}	1	0.07×10^{-3}	0.293×10^{-3}	0.398×10^{-3}	0.393×10^{-3}	0.083×10^{-3}	75.310×10^{-3}
1 kcal/s									
Br u r	3600	427.0	14.285×10^{-3}	1	4.186	5.693	5.615	1.190	1.078
1 kW	860.0	102.0	3414	0.2389	1	1.360	1.341	0.2846	0.2572
1 HP	632.3	75	2509.3	0.1756	0.736	1	0.9863	0.2094	0.1891
1 hp	641.2	76.04	2545	0.1781	0.7455	1.014	1	0.2123	0.21227
1 ton	3024	358.2	12.0×10^{3}	0.831	3.513	4.776	4.711	1	0.9037
1 Br ton	3340	396.9	13.26×10^{3}	0.9277	3.888	5.287	5.214	1.1045	1

Enthalpy Difference, Specific Heat

Δh	kJ / kg	kcal / kg	Btu / pound
1 kJ/kg	1	0.239	0.43
1 kcal/kg	4.19	1	1.80
1 Btu/lb	2.33	0.556	1

Entropy Difference, Specific Heat

Δs	kJ / kg K	kcal / kg °C	Btu / pound °F
1 kJ/kg K	1	0.239	0.239
1 kcal/kg °C	4.19	1	1
1 Btu/lb °F	4.19	1	1

$1 \frac{cal}{g} = \frac{kcal}{kg}$

Formulas for Temperature Calculation

T celsius = $\frac{5}{9}$ (Tf - 32)	T fahrenheit = $\frac{9}{5}$ (Tc + 32)	T kelvin = Tc + 273
Tc = temperature Celsius	Tf = temperature Fahrenheit	Tk = temperature Kelvin

Temperatures

Common temperatures in degrees Kelvin and corresponding Celsius and Fahrenheit equivalents

Kelvin (K)	Celsius (°C)	Fahrenheit (°F)	Kelvin (K)	Celsius (°C)	Fahrenheit (°F)
0	- 273	- 459	273	0	32
17	- 256	- 429	289	16	61
33	- 240	- 400	305	32	90
49	- 224	- 371	321	48	118
65	- 208	- 342	337	64	147
81	- 192	- 314	353	80	176
97	- 176	- 285	369	96	205
113	- 160	- 256	385	112	234
129	- 144	- 227	401	128	262
145	- 128	- 198	417	144	291
161	- 112	- 170	433	160	320
177	- 96	- 141	449	176	349
193	- 80	- 112	465	192	378
209	- 64	- 83	481	208	406
225	- 48	- 54	497	224	435
241	- 32	- 26	513	240	464
257	- 16	- 3	529	256	493

Common Orifice Sizes

inches	mm
3/64 (.0469)	1.19
1/16 (.0625)	1.59
5/64 (.0781)	1.98
3/32 (.0937)	2.38
1/8 (.1250)	3.18
5/32 (.1562)	3.97
11/64 (.1719)	4.37
3/16 (.1875)	4.76
7/32 (.2187)	5.55
1/4 (.2500)	6.35
9/32 (.2812)	7.14
5/16 (.3125)	7.94

inches	mm
7/17 (.4375)	11.11
1/2 (.5000)	12.70
5/8 (.6250)	15.88
11/16 (.6875)	17.46
3/4 (.7500)	19.05
1 (1.000)	25.40
1 1/8 (1.250)	28.58
1 1/4 (1.2500)	31.75
1 1/2 (1.5000)	38.10
1 3/4 (1.7500)	44.45
2 (2.0000)	50.80
3 (3.0000)	76.20

Notes

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