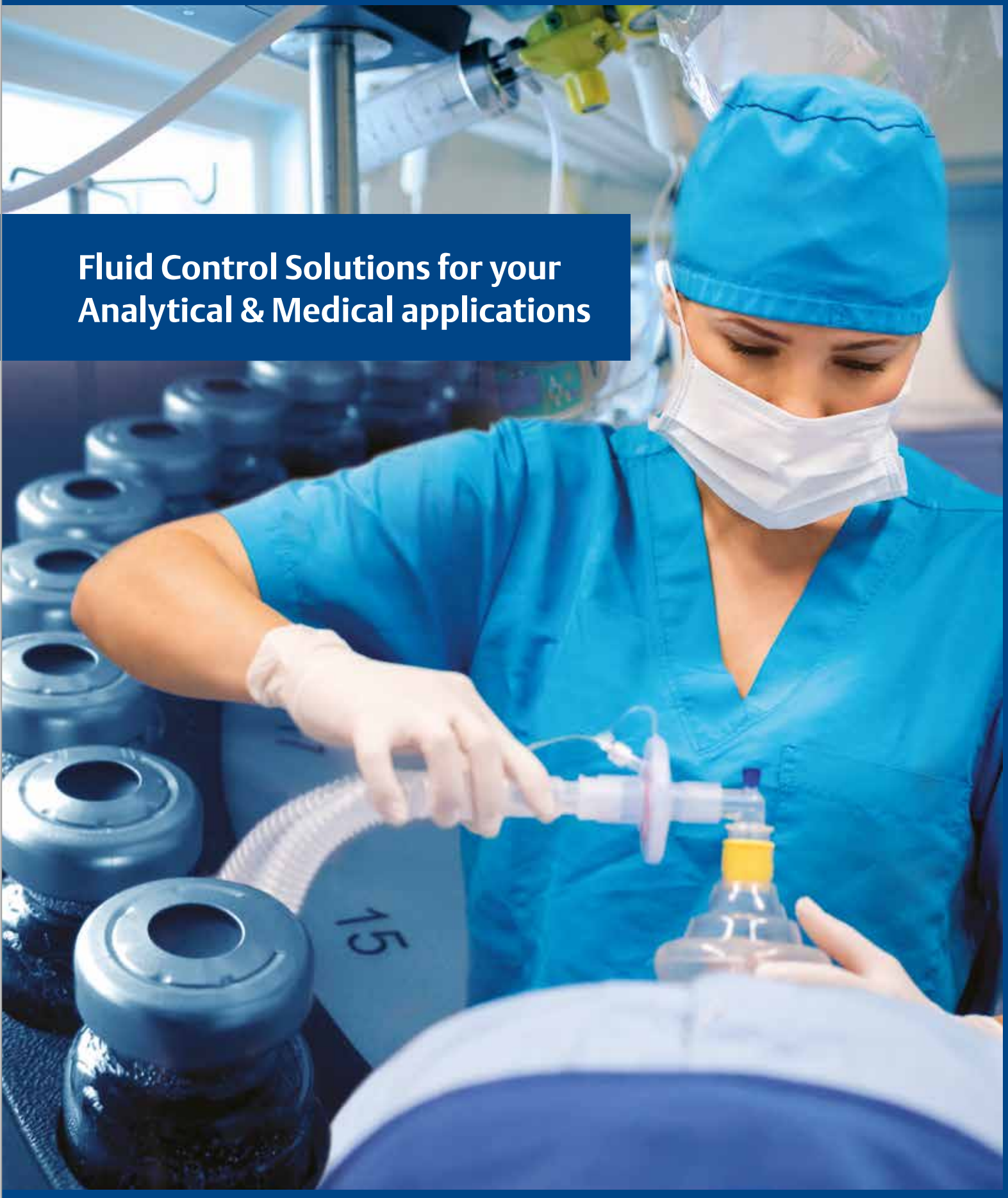


Fluid Control Solutions for your Analytical & Medical applications

Market-leading fluid control solutions addressing the world's most critical needs

EMERSON™

A.P.O. - ELMOS v.o.s., Pražská 90, 509 01 Nová Paka, Tel.: +420 493 504 261, E-mail: apo@apoelmos.cz, Internet: www.apoelmos.cz

Table of Contents:

Emerson – your Partner in Analytical and Medical Technology

Emerson fluid control solutions help customers maximize instrument efficiencies and optimize their Medical & Analytical applications. Our global scale increases speed to market and shapes how we work with customers. Our deep expertise across applications rapidly transforms ideas into measurable outcomes.

We offer miniature Isolation, Pinch, Proportional, and General Service valves to reliably control gases and liquids. 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 applications such as:

- Bioinstrumentation
- Chromatography
- Clinical Diagnostics
- Dental Equipment
- Hemodialysis
- Industrial Analyzers
- Oxygen Therapy
- Patient Monitoring
- Sterilizers
- Surgical Instruments
- Therapy Equipment
- Ventilators

In addition to our comprehensive catalog product offering, we have the expertise 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 teams are ready to assist.

ISO Class 8 equivalent Cleanroom Manufacturing

Emerson takes great care to minimize contamination during manufacturing. That's why Emerson's miniature valves are assembled in ISO Class 8 equivalent cleanrooms.

Key Points:

- State-of-the-art ISO Class 8 equivalent cleanrooms with positive pressure HEPA air filtration systems monitored daily
- Staff members enter and leave 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
- The environment is controlled for humidity and temperature
- Valve components are ultrasonically cleaned to remove any contaminate prior to assembly

Global Infrastructure

With 8,000 employees worldwide supporting our Fluid Control & pneumatics product lines, working from manufacturing and sales offices in over 45 countries, Emerson is ready to handle your most demanding design challenges. Whether you need a minor modification of a catalog product or a complete flow control system, our trained sales and engineering staff are ready to assist.

Fluid Control & Pneumatics

With manufacturing facilities in Europe, America and Asia you can be assured that you will get the right product, when you need it.

Medical Technologies

Focus on safety for patients

We specialize in developing fluid handling solutions for medical devices and processes used to monitor and/or treat diseases or medical conditions, with the intent to improve quality of life. Our design engineers have decades of experience in creating solutions that support our customers exact requirements.

The ASCO miniature valve product line is ideally suited for use in the following medical applications:

- Dental Delivery Systems
- Oxygen Therapy
- Patient Monitoring
- Therapeutic Support Surfaces
- Ventilators
- Hemodialysis
- Chemical Sterilizers
- Surgical Instruments

As samples are precious and results are fundamental for diagnosis, precise dosage and minimal external influence are central requirements. The special design of our isolation valves reduces heat transfer to thermally sensitive media and reduces unnecessary waste of costly reagents.

Analytical Technologies

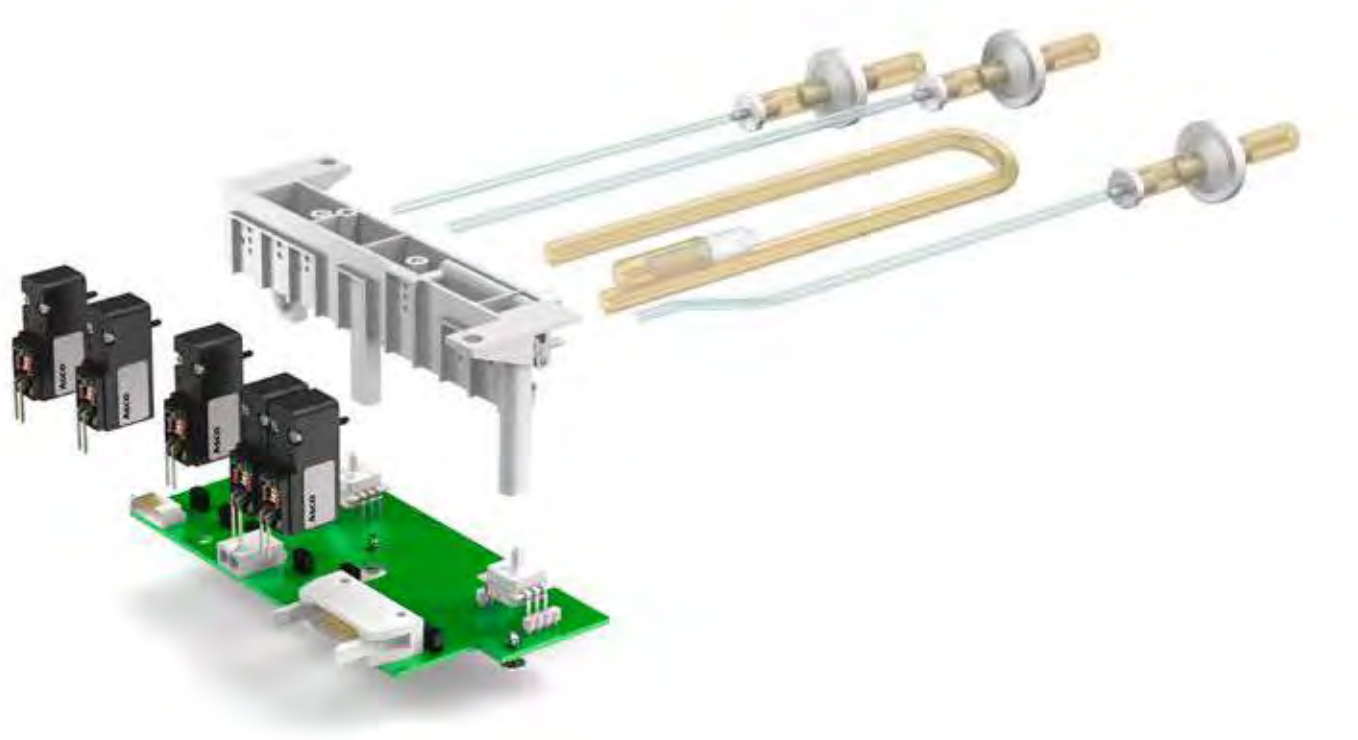
Highest precision and functionality – especially suitable for aggressive fluids

Analytical technologies involve a scientific instrument used to analyze a chemical species or a patient sample. Typically, analytical applications require resistance to aggressive fluids, a low internal volume, and an easy-to-flush internal cavity to minimize cross-contamination. Power consumption of the miniature product line is also minimized to reduce heat transfer to expensive reagents and biological fluids.

The miniature valve product line is ideally suited for use in the following analytical applications:

- Clinical Chemistry
- Hematology
- Sample Preparation
- DNA Sequencing
- Immunoassay
- Chromatography
- Molecular Diagnostics
- Industrial Analyzers

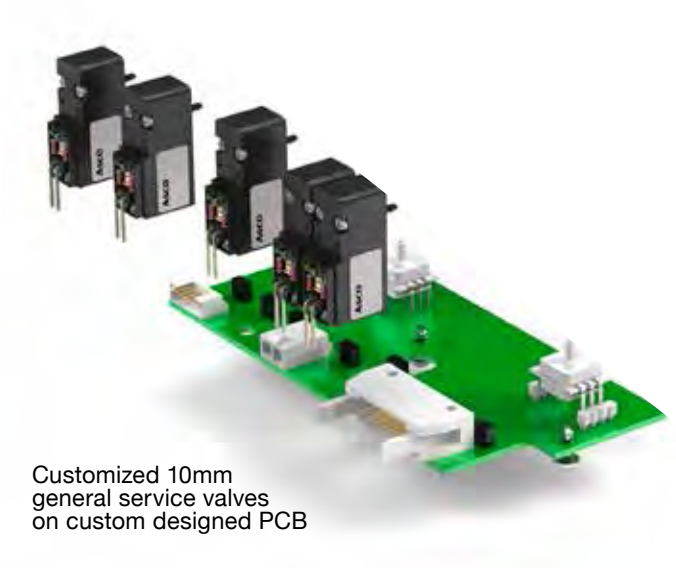
Emerson's Solutions Approach: Rapid Engineered Solutions



The Analytical and Medical marketplace is driven mainly by customization of products in order to meet varying customer instrumentation demands. The ability to quickly customize a valve product, or provide a solution, is increasingly demanded by OEM engineers. Instrumentation development times are being reduced, and as a result instrument complexity is being consolidated into modular components to accelerate speed-to-market.

Rapid Engineered Solutions are focused on miniature valve products that fulfill the needs of the analytical and medical instrument markets. Backed by the group's prototype labs, valves and assemblies are designed for quick and efficient manufacturing. Our local technical support teams provide the personal support you need during your development processes.

Customized Solutions



Customized 10mm general service valves on custom designed PCB

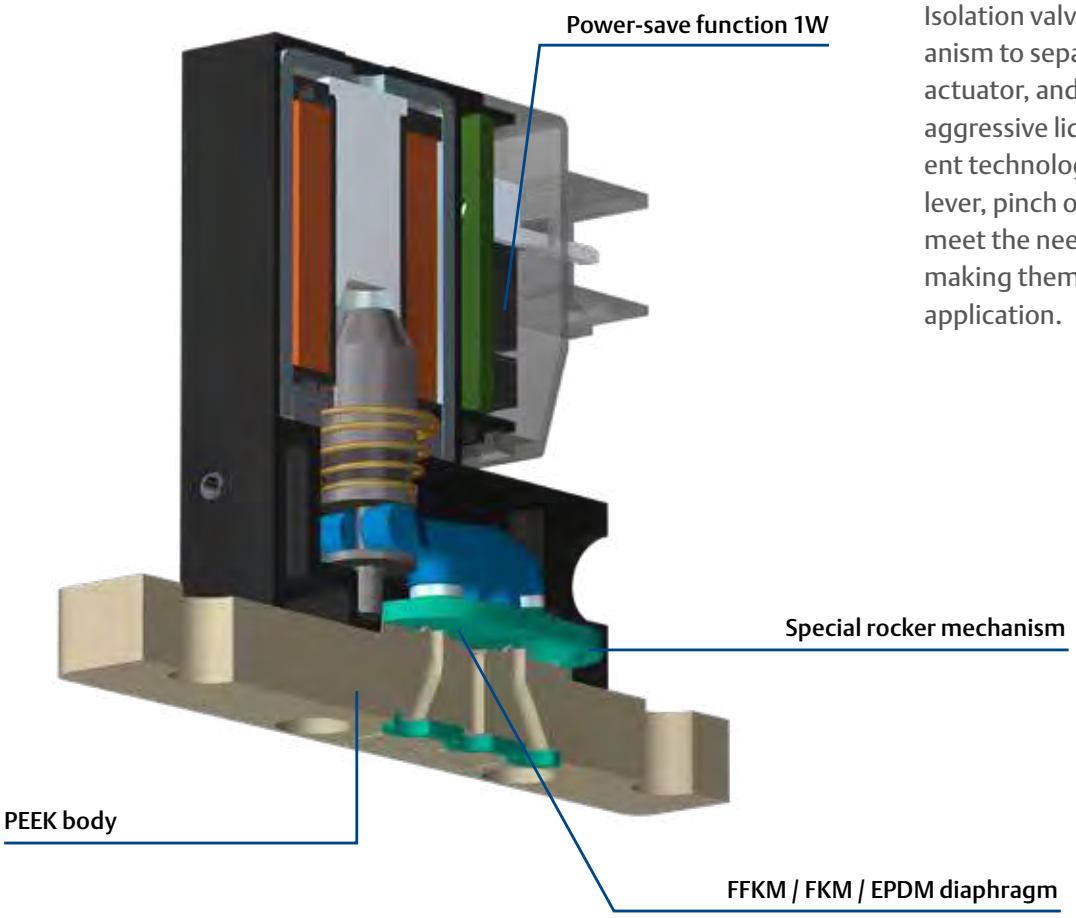
Plastic manifold for stability and mounting into the device based on customer needs (e.g. injection molded or machined parts)

Tubings and fittings for direct connection to specified fluidic path within the medical device

Capabilities

Our technical expertise and product customization capabilities enable fast turnaround on complex, high-performing fluidic systems. Our experts understand how to simplify your fluidic path designs, which in turn maximizes performance efficiencies and reduces your manufacturing and operating costs. From concept to production, we deliver your complete manifold assembly, including valves, electrical terminations, pins and housings – anything needed to create the right solution.

Fluid Isolation Valves



Isolation valves use a sealing mechanism to separate the fluid from the actuator, and are designed to handle aggressive liquids and gases. Different technologies such as a flapper, lever, pinch or rocker are designed to meet the needs of virtually any media, making them suitable for all kinds of application.

Fluid isolation technologies ...

Diaphragm mechanism

- Diaphragm valves are known for their compact size, long service life and very low internal volume.
- The valve bodies are made of stainless steel or synthetic material (PTFE/PVDF).

Diaphragm valves ► p. 25

Rocker mechanism

- Rocker mechanism valves are designed to reduce the pumping effect seen in some low-viscous fluid applications.
- Multiple standard body configurations and connection types allow these valves to be exceptionally versatile across numerous applications.

Rocker valves ► pp. 31, 43, 73

... for a wide variety of analytical and medical applications

Flapper mechanism

- High pressures (up to 10 bar) are possible by the use of the special flapper mechanism and large orifice sizes.
- Holding power is lowered down to 1.5 watts, thus minimising the heat transfer into the fluid.

Flapper valves ► p. 35

Lever mechanism

- Lever valves can be used at high differential pressures and large flow volumes.
- Lever valves are suitable for use at high ambient temperatures since the offset control mechanism provides optimal heat dissipation in the electromagnetic component.

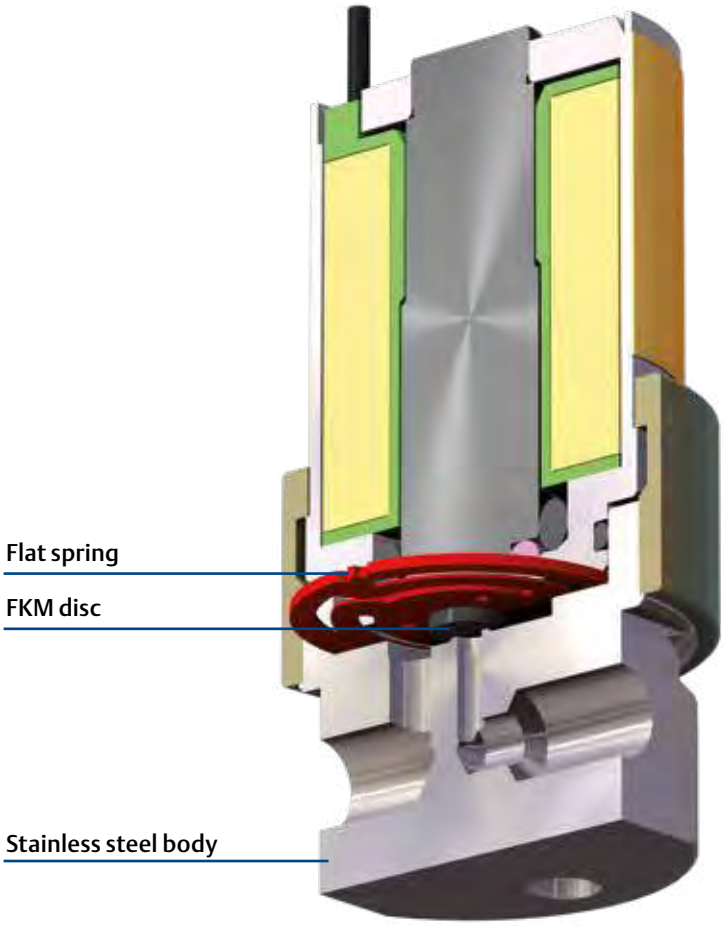
Lever valves ► p. 57

Pinch mechanism

- Characterized by their long service life, pinch valves offer exceptional versatility and reliability.
- Any risk of contamination is reliably avoided by changing the fluidic path tubing.

Pinch valves ► pp. 21, 49, 63

General Service Valves



General service valves are used in handling inert gases in nearly any analytical or medical application, and are known for their long service life and reliability.

Their compact size and easy installation allow several valves to be mounted on a subbase or custom valve manifold.

General service technologies ...

Miniature Solenoid Valves

- Micro solenoid valves are used mainly as pilot valves or for the handling of inert gases.
- These series are suitable for applications in almost all areas of analytical and medical technology.
- Their compact size and easy installation allow several valves to be mounted on a subbase or custom valve module.

... for a wide variety of analytical and medical applications

9 - 11 mm

Series 188 ▶ p. 99

11 - 15 mm

Series RB ▶ p. 125

15 - 22 mm

Series S ▶ p. 131

Series 096 ▶ p. 89

Series 065 ▶ p. 77

Series 411 ▶ p. 117

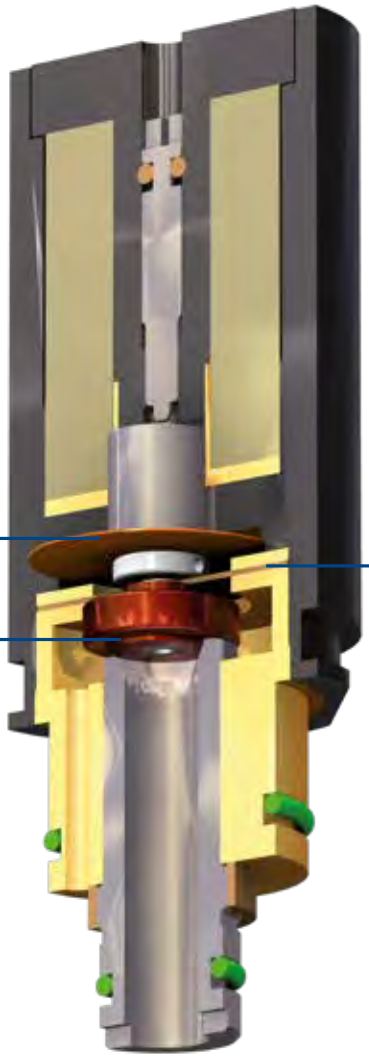
Series 226 ▶ p. 107

> 22 mm

Series L256 ▶ p. 121

Series L123 / L257 / L323 ▶ p. 91

Proportional Valves



Proportional valves quickly and accurately adjust output pressure in relation to an electrical control signal. They are designed for applications with quickly changing flow demands and are highly customizable.

Proportional technologies ...

Preciflow

- Series 202 2/2 proportional valves can be used in any Analytical & Medical application.
- Frictionless suspension of the core reduces hysteresis and provides stepless control in the lower and upper ranges.

Series 202, Preciflow ► p. 137

Preciflow IPC

- Series 202 Preciflow IPC valves are Inlet Pressure Compensated flow control valves. Inlet Pressure Compensation allows high pressures and flows at low solenoid coil power consumption.
- Typical applications for these valves are in medical (e.g. respirators) and analytical apparatus (e.g. mass flow controllers).

Series 202, Preciflow IPC ► p. 143

... for a wide variety of analytical and medical applications

Piezotronic

- Series 630 2/2 piezo valves for flow control are a high-tech solution designed in particular for applications requiring extremely low power consumption.
- They are suitable for use in battery-operated equipment or in potentially explosive areas.

Series 630, Piezotronic ► p. 151

Flapper Proportional

- This series 068 valve equipped with the flapper technology, one of the safest and most reliable solutions for media separation. It is combined with the advantages of the Proportional technology to ensure optimum flexibility to control of liquid media.

Series 068, Flapper Proportional ► p. 135

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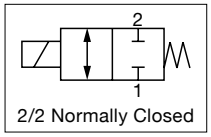
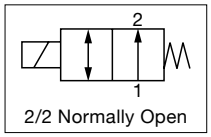
ASCO™ MINIATURE SOLENOID VALVES

PINCH VALVES, COMPACT 2-WAY / 3-WAY SOLENOID

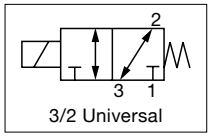
- The 045 Series are compact 2-way and 3-way solenoid pinch valves designed for use with highly aggressive or high-purity liquids in analytical and medical instrumentation, and industrial applications
- Hermetic separation of control mechanism and the fluid within the tubing prevents particulate contamination caused by friction of moving parts, assuring maximum purity of liquids
- Available in a range of body sizes to accommodate a wide variety of tubing sizes
- Meets all relevant CE directives, and is RoHS compliant
- Typical applications include:
  - Hemodialysis
  - Bioinstrumentation
  - Surgical Fluid Management
  - Pharmaceutical



2/2 Normally Closed



2/2 Normally Open

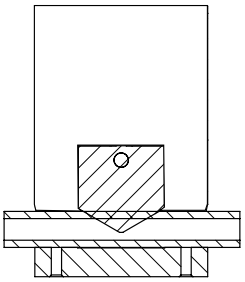


3/2 Universal

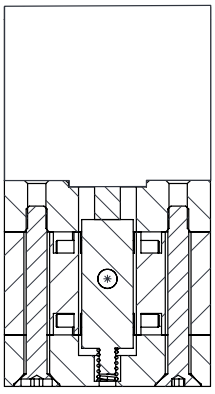
2-way

Fluids*	Temperature Range
Air, Inert Gases, Water, Oil or Liquids	0°C to 70°C (32°F to 158°F)

* Ensure that the compatibility of the materials in contact with the fluids is verified.


2-way

Materials in Contact with Fluid	
Recommended Tubing	VMQ (silicone) (max. hardness: 50 Shore A)
Other Materials	
Body	Aluminum
Pinch Mechanism	POM, Aluminum
Internal Parts	Stainless Steel
Response Time	5 to 25ms


3-way

Electrical Characteristics	
Coil Insulation Class	F
Connector	22 AWG or 24 AWG Lead wires, 457mm (18in) long, PTFE coated
Electrical Safety	IEC 335
Electrical Enclosure Protection	IP64
Standard Voltages	12 VDC, 24 VDC
Power Consumption	1.0 to 7.2 Watts

Specifications

Tube O.D.	Tube I.D.	Operating Pressure bar (psi)		Power Rating	Tubing Size
mm (inches)	mm (inches)	min.	max.	W	
1.65 (0.065)	0.762 (0.030)	0	2.07 (30)	1	01
2.38 (3/32)	0.794 (1/32)	0	2.07 (30)	1.5	02
3.17 (1/8)	1.59 (1/16)	0	2.07 (30)	1.5	03
4.76 (3/16)	1.59 (1/16)	0	2.07 (30)	4.2	04
6.35 (1/4)	3.17 (1/8)	0	1.38 (20)	4.2	05
7.94 (5/16)	4.76 (3/16)	0	1.38 (20)	7.2	06
9.52 (3/8)	6.35 (1/4)	0	1.38 (20)	7.2	07

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How to Order

P045A 1 01 L0 A00 F1

Catalog Number

Operation Mode
1 = Normally Closed
2 = Normally Open
3 = 3-Way (1 tube NO/1 tube NC)

Tubing Size
01 = 0.065 O.D. x 0.030 I.D.
02 = 3/32" O.D. x 1/32" I.D.
03 = 1/8" O.D. x 1/16" I.D
04 = 3/16" O.D. x 1/16" I.D.
05 = 1/4" O.D. x 1/8" I.D.
06 = 5/16" O.D. x 3/16" I.D.
07 = 3/8" O.D. x 1/4" I.D.

Electrical Connection Type
L0 = Leaded coil: lead length 457mm (18in)

Seal Material
A00 = No Options

Voltage
F1 = 24 VDC Class F
F3 = 12 VDC Class F

Options

- Contact us for information regarding the usage of different tubing other than those recommended

Installation

- The solenoid valves can be mounted in any position without affecting operation, however, for optimum performance it is recommended that they be fitted with the solenoid operator at the top.
- In case the tubing is not placed in its seat, the solenoid valve could operate incorrectly.
- 305mm (12in) Flexible tubing is pre-installed with each valve.

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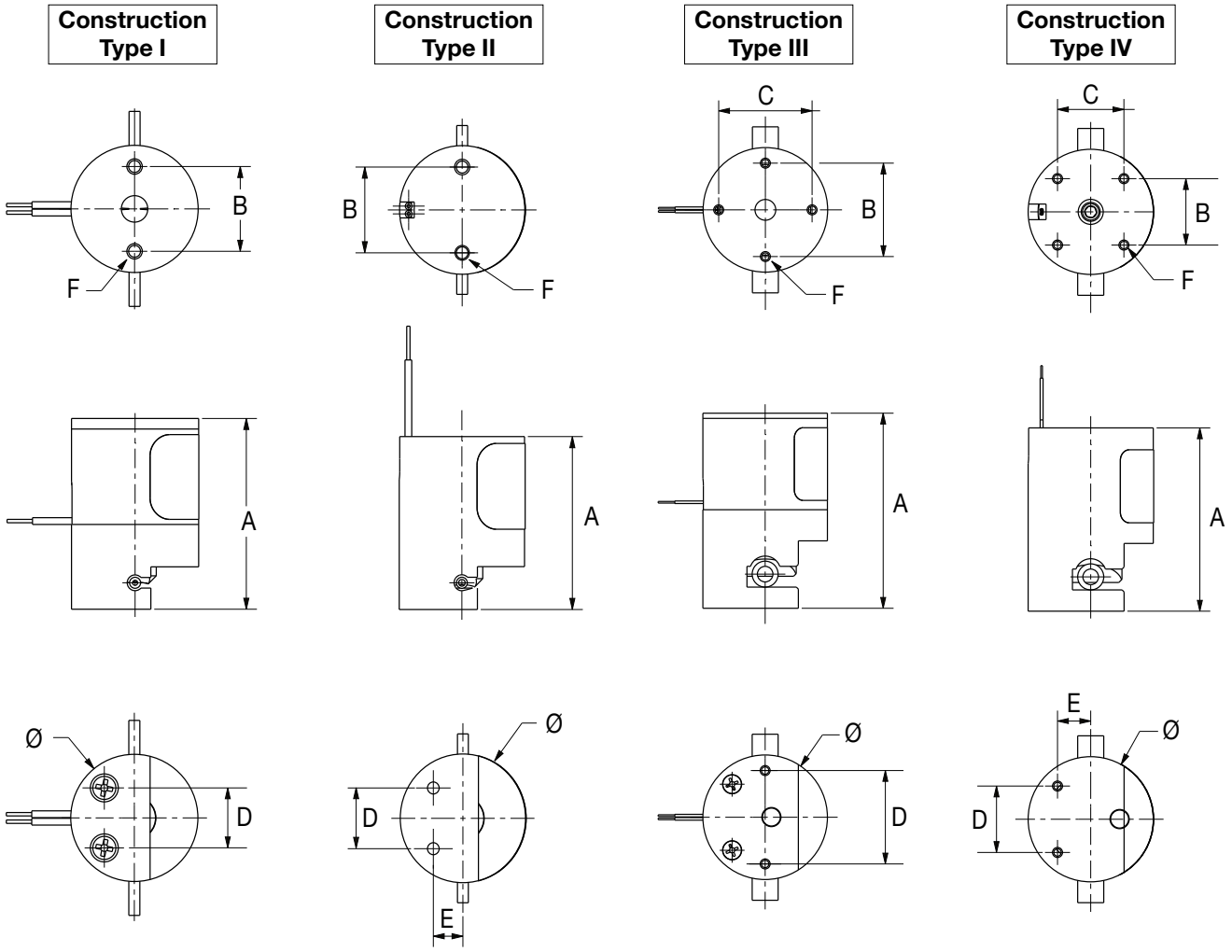
Asco

ASCO™ MINIATURE SOLENOID VALVES

PINCH VALVES, COMPACT 2-WAY / 3-WAY SOLENOID

Dimensions: mm (inches)

2-Way Solenoid



Config-uration	Construction Type	Tubing Size	Ø	A	B	C	D	E	F
NO	I	01	19.05 (0.750)	28.58 (1.125)	12.70 (0.500)	-	-	-	#2-56
NC	II	01		25.45 (1.002)	12.70 (0.500)	-	8.99 (0.354)	4.50 (0.177)	
NO	III	02 / 03	25.40 (1.000)	37.25 (1.467)	17.45 (0.687)	17.45 (0.687)	17.45 (0.687)	-	#4-40
NC	IV	02 / 03		37.12 (1.462)	12.34 (0.486)	12.34 (0.486)	12.34 (0.486)	6.17 (0.243)	
NO	III	04 / 05	31.75 (1.250)	50.79 (2.000)	22.45 (0.884)	22.45 (0.884)	22.45 (0.884)	-	#4-40
NC	IV	04 / 05		46.91 (1.847)	15.90 (0.626)	15.90 (0.626)	15.90 (0.626)	7.95 (0.313)	
NO	III	06 / 07	38.10 (1.500)	59.68 (2.350)	28.58 (1.125)	28.58 (1.125)	28.58 (1.125)	-	#4-40
NC	IV	06 / 07		55.80 (2.197)	20.22 (0.796)	20.22 (0.796)	20.22 (0.796)	10.11 (0.398)	

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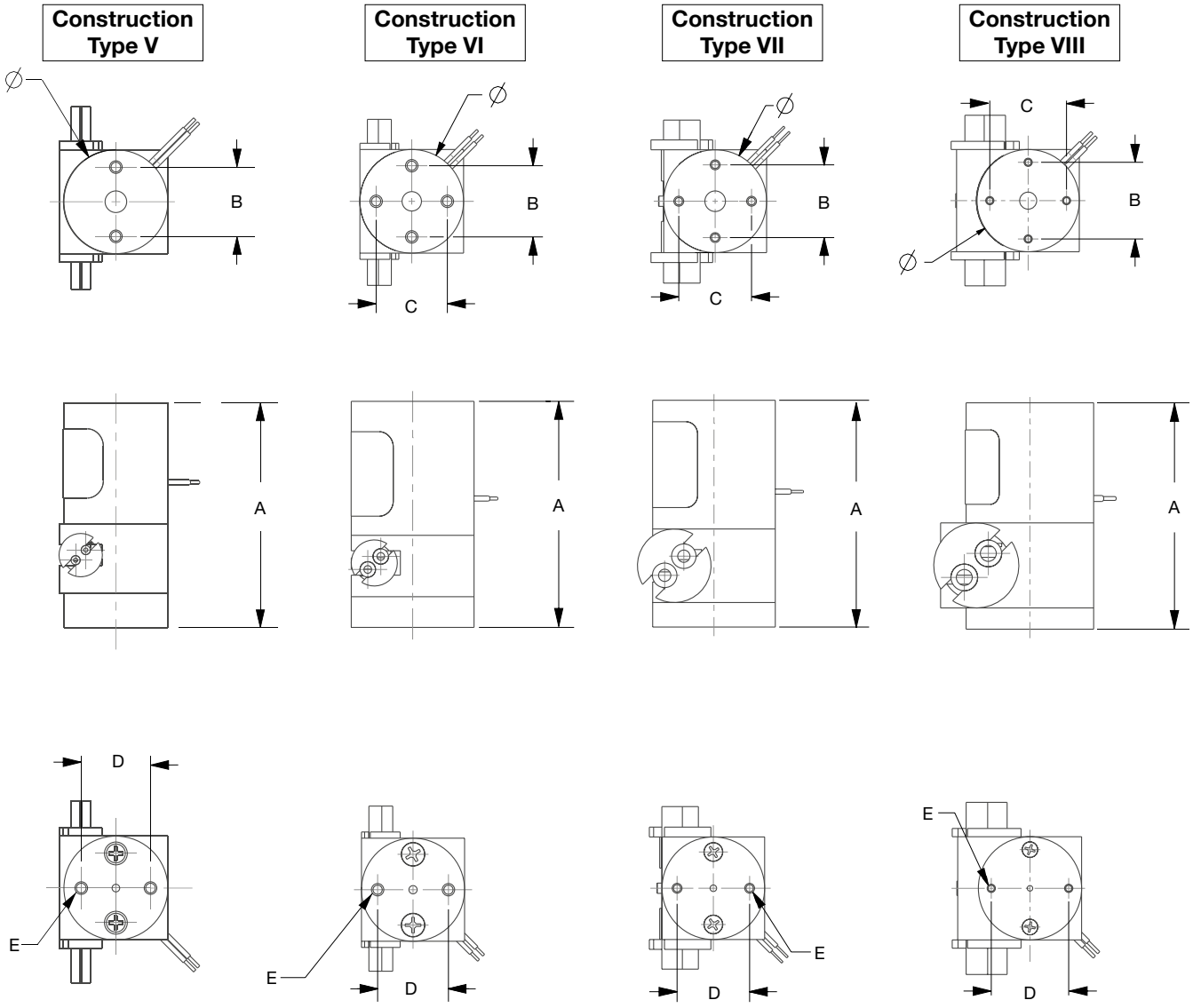
Dimensions: mm (inches)

3-Way Solenoid



Construction Type	Tubing Size	Ø	A	B	C	D	E
V	01	19.05 (0.750)	41.28 (1.625)	12.70 (0.500)	-	12.70 (0.500)	#2-56
VI	02	25.40 (1.000)	46.77 (1.842)	17.45 (0.687)	17.40 (0.687)	17.45 (0.687)	#4-40
	03						
VII	04	31.75 (1.250)	58.74 (2.313)	22.45 (0.884)	22.45 (0.884)	22.45 (0.884)	#4-40
	05						
VIII	06	38.1 (1.500)	67.63 (2.663)	28.58 (1.125)	28.58 (1.125)	28.58 (1.125)	#4-40

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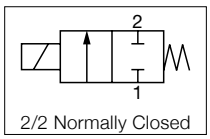
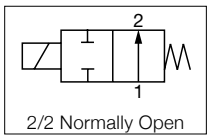
ASCO™ MINIATURE SOLENOID VALVES

PTFE DIAPHRAGM FLUID ISOLATION VALVES

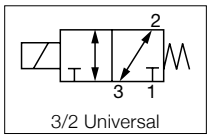
- PTFE isolation valves are designed for use with highly aggressive liquids
- The PTFE body and diaphragm isolates the internal solenoid components from the media
- Excellent self-draining capability and easy-to-flush low-volume internal cavity
- Compact architecture make them ideal for analytical bench-top instrumentation
- Available in 2-Way normally closed, 2-Way normally open, and 3-Way universal; comes with #10-32, 1/4-28, or 1/8 NPSC in-line porting for exceptional versatility
- Meets all relevant CE directives
- Typical applications include:
  - Chromatography
  - Solvent Selection/Diversion
  - Sample Preparation
  - DNA Sequencing



2/2 Normally Closed



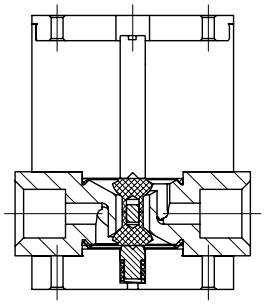
2/2 Normally Open



3/2 Universal

Fluids*	Temperature Range	Seal Materials*
Aggressive liquids	0°C to 70°C (32°F to 158°F)	PTFE

*Ensure that the compatibility of the materials in contact with the fluids is verified



General Valve Information*	
Body	PTFE / Stainless steel
Poppet	PTFE
Diaphragm	PTFE
Response Time	< 20ms
Internal Volume	As low as 18 µl

* Ensure that the compatibility of the materials in contact with the fluids is verified

Electrical Characteristics	
Coil Insulation Class	F
Connector	22 AWG or 24 AWG Lead wires, 457mm (18in) long, PTFE coated
Standard Voltages	12 VDC, 24 VDC
Power Consumption	1.0 to 7.2 Watts

Specifications

Connection	Orifice Size	Flow Coefficient		Operating Pressure bar (psi)		Power Rating (W)
				min.	max.	
	mm (inches)	Kv (m³/h)	Cv		gas / liquids	
#10-32	1.02 (0.040)	0.010	0.012	-0.9 (-13)	2.07 (30)	1
1/4-28	1.57 (0.062)	0.023	0.027	-0.9 (-13)	2.07 (30)	1.5
1/4-28	2.36 (0.093)	0.050	0.058	-0.9 (-13)	2.07 (30)	4.2
1/8 NPSC	3.96 (0.156)	0.186	0.215	-0.9 (-13)	2.07 (30)	7.2

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ASCO™ MINIATURE SOLENOID VALVES

PTFE DIAPHRAGM FLUID ISOLATION VALVES

How to Order

0055A 1 01 L0 T00 F1

Catalog Number

Operation Mode
1 = 2/2 Normally Closed (NC)
2 = 2/2 Normally Open (NO)
3 = 3/2 Universal (U)

Orifice Size/Connection Type
01 = 0.040 x 10-32
02 = 0.062 x 1/4-28
03 = 0.093 x 1/4-28
04 = 0.156 x 1/8 NPSC

Voltage
F1 = 24 VDC Class F
F3 = 12 VDC Class F

Seal Material
T00 = PTFE

Electrical Connection Type
L0 = Leaded coil:
lead length 457mm (18in)

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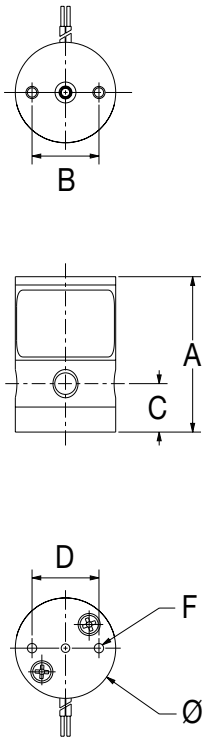
ASCO™ MINIATURE SOLENOID VALVES

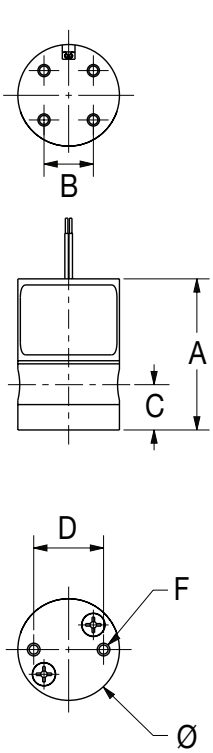
PTFE DIAPHRAGM FLUID ISOLATION VALVES

Dimensions: mm (inches)

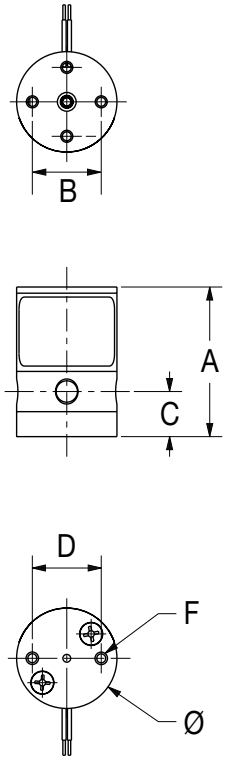
Type 01



Type 02



Type 03



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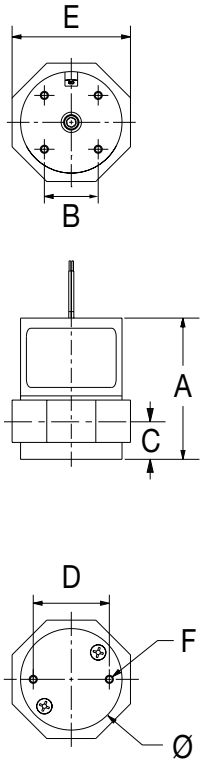
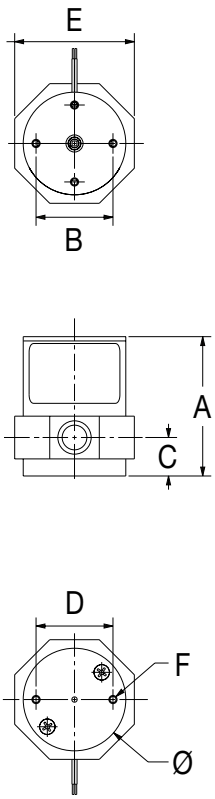


Type 05



Configuration	Type	Catalog Number	Ø	A	B	C	D	E	F
2-Way NC	01	0055A101L0T00xx	19.05 (0.750)	29.34 (1.155)	12.70 (0.500)	9.220 (0.363)	12.70 (0.500)	-	#2-56
	02	0055A102L0T00xx	25.40 (1.000)	37.78 (1.488)	12.34 (0.486)	11.43 (0.450)	17.45 (0.687)	-	#4-40
	04	0055A103L0T00xx	31.75 (1.250)	47.32 (1.863)	15.90 (0.626)	12.70 (0.500)	22.45 (0.884)	38.10 (1.500)	
	04	0055A104L0T00xx	38.10 (1.500)	53.04 (2.088)	20.22 (0.796)	14.27 (0.562)	28.58 (1.125)	44.45 (1.750)	
2-Way NO	01	0055A201L0T00xx	19.05 (0.750)	29.54 (1.163)	12.70 (0.500)	9.220 (0.363)	12.70 (0.500)	-	#2-56
	03	0055A202L0T00xx	25.40 (1.000)	37.91 (1.493)	17.45 (0.687)	11.43 (0.450)	17.45 (0.687)	-	#4-40
	05	0055A203L0T00xx	31.75 (1.250)	46.06 (1.814)	22.45 (0.884)	12.70 (0.500)	22.45 (0.884)	38.10 (1.500)	
	05	0055A204L0T00xx	38.10 (1.500)	51.78 (2.039)	28.58 (1.125)	14.27 (0.562)	28.58 (1.125)	44.45 (1.750)	
3-Way	01	0055A301L0T00xx	19.05 (0.750)	29.49 (1.161)	12.70 (0.500)	9.220 (0.363)	12.70 (0.500)	-	#2-56
	03	0055A302L0T00xx	25.40 (1.000)	37.88 (1.492)	17.45 (0.687)	11.42 (0.450)	17.45 (0.687)	-	#4-40
	05	0055A303L0T00xx	31.75 (1.250)	46.06 (1.814)	22.45 (0.884)	12.70 (0.500)	22.45 (0.884)	38.10 (1.500)	
	05	0055A304L0T00xx	38.10 (1.500)	51.75 (2.038)	28.58 (1.125)	14.27 (0.562)	28.58 (1.125)	44.45 (1.750)	

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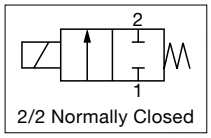
ASCO™ MINIATURE SOLENOID VALVES

DIAPHRAGM COMPACT 2-WAY SOLENOID ISOLATION VALVE

- Direct acting solenoid valve for use with neutral or aggressive liquids in analytical instruments
- Media separating soft-seal PTFE diaphragm, prevents any potential leakage of critical reagents within the instrument compartment
- Low power consumption results in less heat transfer to thermally sensitive reagents and samples
- Small form-factor saves space in OEM instruments and is well-suited for portable and hand-held field devices
- Typical application include:
  - Clinical Diagnostics
  - DNA Sequencing
  - Liquid Chromatography
  - Sample Preparation



2/2 Normally Closed

Fluids*	Temperature Range	Seal Materials*
Liquids or Gases	0°C to 40°C (32°F to 104°F)	FKM, FFKM

* Ensure that the compatibility of the materials in contact with the fluids is verified.

General Valve Information	
Body	PPS, PEEK
Diaphragm	PTFE
Response Time	< 10ms
Internal Volume	29µl
Max Viscosity	20 cSt (mm2/s)

Electrical Characteristics	
Coil Insulation Class	F
Connector	Lead Wires
Connector Specification	28 AWG PTFE coated
Electrical Safety	IEC 335
Electrical Enclosure Protection	IP65 (EN 60529)
Standard Voltages*	12 VDC, 24 VDC (±5%)

Electrical Connection	Power Ratings				Ambient Temperature Range
	Inrush	Holding		Hot/Cold	
	VA	VA	W	W	C° (F°)
L0	-	-	-	2.8	0 to 40 (32 to 104)

Specifications

Connection	Orifice Size	Flow Coefficient		Operating Pressure bar (psi)			
				min.	max.	Power Rating (W)	Catalog Number
	mm (inches)	Kv (m3/h)	Cv		gas / liquids		
2/2 NC - Normally Closed							
Pad Mounting	1.00 (0.04)	0.018	0.021	-0.2 bar (-2.9 psi)	2.0 bar (29 psi)	2.8	R058A001L0XXXXX
Pad Mounting	1.00 (0.04)	0.018	0.021	-0.2 bar (-2.9 psi)	2.0 bar (29 psi)	2.8	R058A002L0XXXXX

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ASCO™ MINIATURE SOLENOID VALVES

DIAPHRAGM COMPACT 2-WAY SOLENOID ISOLATION VALVE

How to Order

R 058 A 001 L0 V00 F1

Connection Type
R = Pad Mounting

Product Series
058 = 14mm Diaphragm Isolation Valve

Revision
A = Initial Release

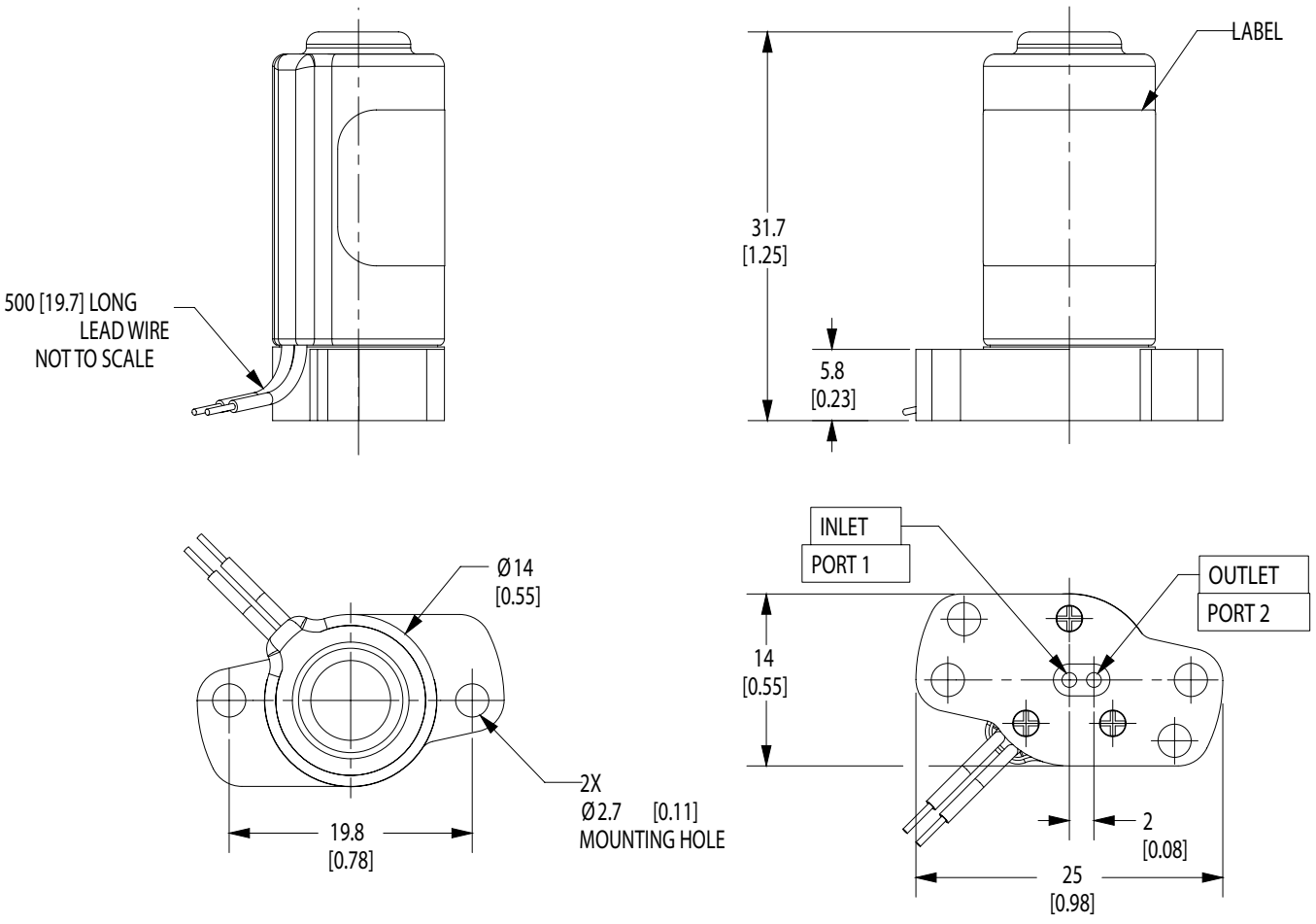
Orifice/ Body Material
001 = 1.0mm PEEK
002 = 1.0mm PPS

Voltage
F1 = 24 VDC Class F
F3 = 12 VDC Class F

Seal Material
V00 = FKM
X00 = FFKM

Electrical Connection Type
L0 = Leaded Coil

Dimensions: mm (inches)



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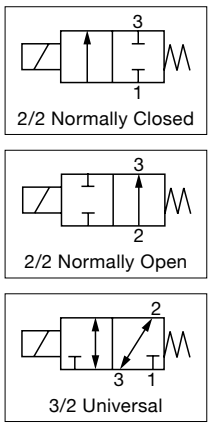
ASCO™ MINIATURE SOLENOID VALVES

ROCKER SOLENOID FLUID ISOLATION VALVES

SERIES
067

- Rocker isolation valves are designed for use with neutral or highly aggressive liquids in analytical instrumentation
- Special rocker mechanism, combined with a separating diaphragm, prevents heat transfer to the fluid and eliminates the sticking effect of the valve seat
- Hermetic separation of control mechanism prevents particulate contamination caused by friction of moving parts, assuring maximum purity of liquid samples
- Excellent self-draining capability and easy-to-flush low-volume internal cavity make these valves ideal in applications where cross-contamination must be minimized
- "Hit and Hold" feature utilizes an integrated power-save switch that reduces analytical instrument power consumption
- Meets all relevant CE directives, and is RoHS compliant
- Typical applications include:
  - Pipette Dispensing
  - In-vitro Diagnostics
  - DNA Sequencing
  - Surgical Fluid Management



Fluids*	Temperature Range	Seal Materials*
Liquids or Gases	10 °C to 40 °C (50 °F to 104 °F)	FKM/FFKM
	5 °C to 40 °C (41 °F to 104 °F)	EPDM

*Ensure that the compatibility of the materials in contact with the fluids is verified.

General Valve Information	
Body	PEEK
Others	Stainless Steel
Response Time	< 10ms
Internal Volume	10µl
Max. Viscosity	20 cSt (mm^2/s)

Electrical Characteristics	
Coil Insulation Class	F
Connector	Pin Header with 2 Contacts
Electrical Safety	EN 60335
Electrical Enclosure Protection	IP65 (EN 60529)
Standard Voltages*	12 VDC, 24 VDC (-5%/+10%)

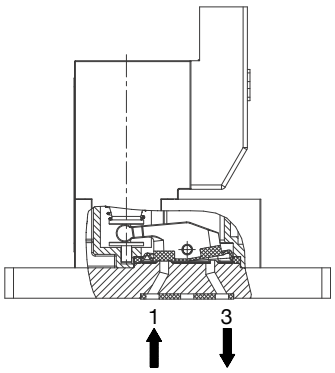
* Other voltages on request

Coil Type[1]	Power Rating	Ambient Temperature Range	Protection	Electrical Connection
	Inrush/ Holding			
	W	°C (°F)	VA	
Specific	2.5/1.0*	10 to 50 (50 to 122)	IP40	Connector with two 0.5mm^2 lead wires + built-in LED and electrical protection or lead wires, 0.5m (19.7in) long

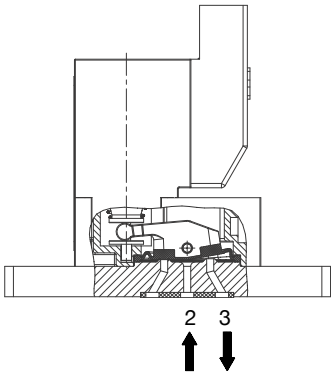
* With power-save electronics

[1] The coil used for orifice size 1.35mm (0.053in) is longer by 12.5mm (0.49in) than that used for the other orifice sizes, see drawings on following pages

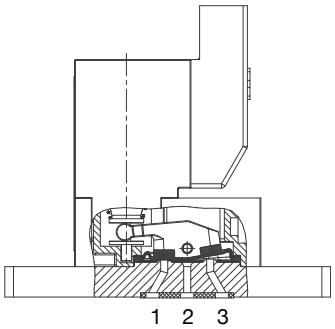
Functional Principle



Function 2/2 NC



Function 2/2 NO



Function 3/2 U

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ASCO™ MINIATURE SOLENOID VALVES

ROCKER SOLENOID FLUID ISOLATION VALVES

Specifications

Connection	Orifice Size	Flow Coefficient		Operating Pressure bar (psi)			Electrical Connection/ Type*	Catalog Number	Seal Material[2]	
				min.	max.					
	mm (inches)	Kv (m3/h)	Cv		gases	liquids			FKM	EPDM
2/2 NC - Normally Closed										
Long Flange[1]	0.6 (0.024)	0.006	0.007	-0.9 (-13)	3 (43.5)	3 (43.5)	1	SC S067A 021	V	E
							2	SC S067A 022		
							3	SC S067A 023		
							4	SC S067A 024		
							5	L S067A 025		
	0.8 (0.031)	0.010	0.012	-0.9 (-13)	2 (29.0)	2 (29.0)	1	SC S067A 026	V	E
							2	SC S067A 027		
							3	SC S067A 028		
							4	SC S067A 029		
							5	L S067A 030		
	1.0 (0.040)	0.017	0.020	-0.9 (-13)	1.5 (21.8)	1.5 (21.8)	1	SC S067A 031	V	E
							2	SC S067A 032		
							3	SC S067A 033		
							4	SC S067A 034		
							5	L S067A 035		
	1.35 (0.053)	0.026	0.030	-0.9 (-13)	1.0 (14.5)	1.0 (14.5)	1	SC S067A 036	V	E
							2	SC S067A 037		
							3	SC S067A 038		
							4	SC S067A 039		
							5	L S067A 040		
2/2 NO - Normally Open										
Long Flange[1]	0.6 (0.024)	0.006	0.007	-0.9 (-13)	3 (43.5)	3 (43.5)	1	SC S067A 061	V	E
							2	SC S067A 062		
							3	SC S067A 063		
							4	SC S067A 064		
							5	L S067A 065		
	0.8 (0.031)	0.010	0.012	-0.9 (-13)	2 (29.0)	2 (29.0)	1	SC S067A 066	V	E
							2	SC S067A 067		
							3	SC S067A 068		
							4	SC S067A 069		
							5	L S067A 070		
	1.0 (0.040)	0.017	0.020	-0.9 (-13)	1.5 (21.8)	1.5 (21.8)	1	SC S067A 071	V	E
							2	SC S067A 072		
							3	SC S067A 073		
							4	SC S067A 074		
							5	L S067A 075		
	1.35 (0.053)	0.026	0.030	-0.9 (-13)	1.0 (14.5)	1.0 (14.5)	1	SC S067A 076	V	E
							2	SC S067A 077		
							3	SC S067A 078		
							4	SC S067A 079		
							5	L S067A 080		
3/2 U-Universal										
Long Flange[1]	0.6 (0.024)	0.006	0.007	-0.9 (-13)	3 (43.5)	3 (43.5)	1	SC S067A 101	V	E
							2	SC S067A 102		
							3	SC S067A 103		
							4	SC S067A 104		
							5	L S067A 105		
	0.8 (0.031)	0.010	0.012	-0.9 (-13)	2 (29.0)	2 (29.0)	1	SC S067A 106	V	E
							2	SC S067A 107		
							3	SC S067A 108		
							4	SC S067A 109		
							5	L S067A 110		
	1.0 (0.040)	0.017	0.020	-0.9 (-13)	1.5 (21.8)	1.5 (21.8)	1	SC S067A 111	V	E
							2	SC S067A 112		
							3	SC S067A 113		
							4	SC S067A 114		
							5	L S067A 115		
	1.35 (0.053)	0.026	0.030	-0.9 (-13)	1.0 (14.5)	1.0 (14.5)	1	SC S067A 116	V	E
							2	SC S067A 117		
							3	SC S067A 118		
							4	SC S067A 119		
							5	L S067A 120		

*** Types 1 to 5 with power-save electronics, LED and electrical protection, mm (inches)**

1 = width: 5.08 (0.2)
2 = width: 5.08 (0.2)
3 = width: 2.54 (0.1)
4 = width: 2.54 (0.1)
5 = Flying Leads, 0.5 (19.7) long (see drawings on following page)

[1] 2 hexagon socket head cap mounting screws M3x6mm (0.24in), stainless steel, ISO4762 supplied

[2] To order FFKM seals, leave the corresponding designation in the catalog number "blank".

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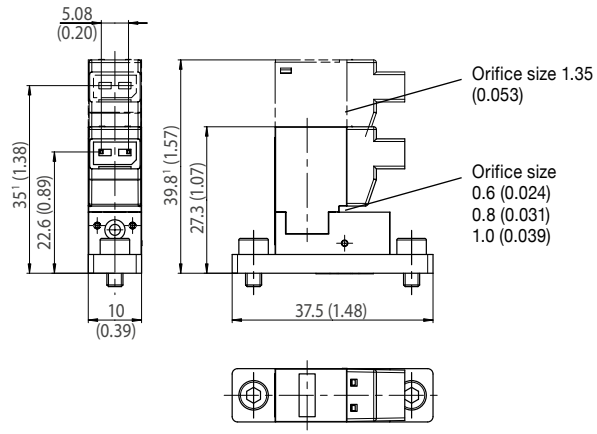
ASCO™ MINIATURE SOLENOID VALVES

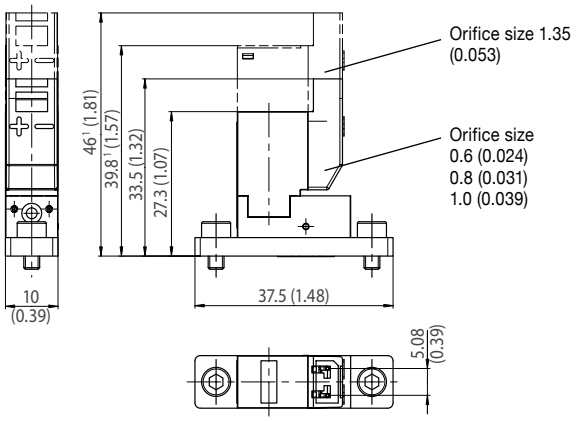
ROCKER SOLENOID FLUID ISOLATION VALVES

Dimensions: mm (inches)

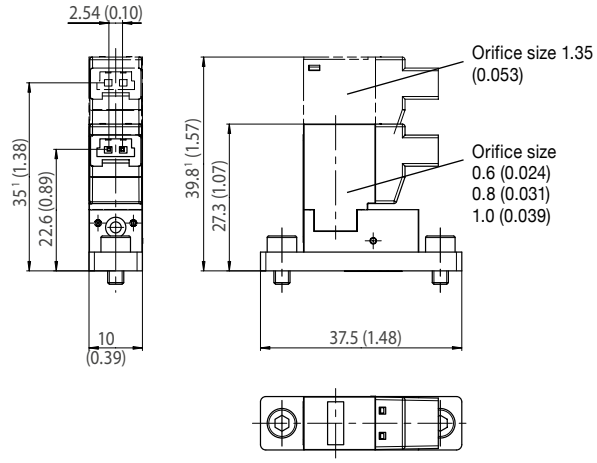
Type 1



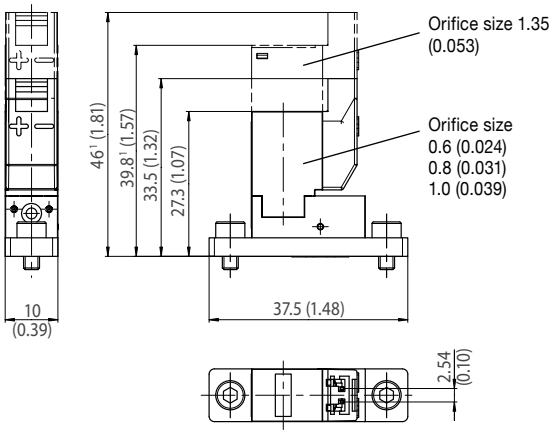
Type 2



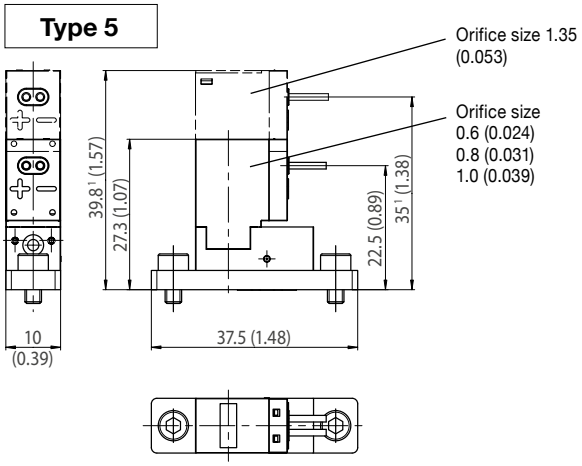
Type 3



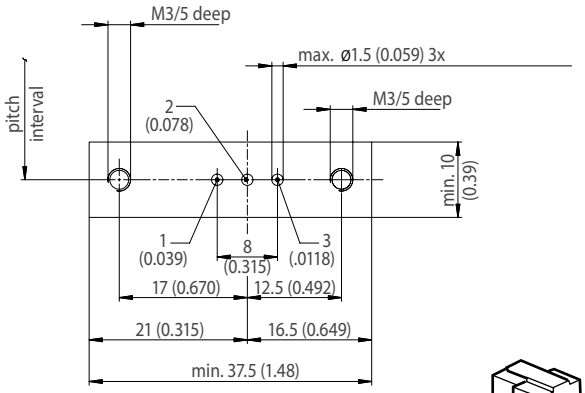
Type 4

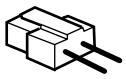


Type 5



Mounting Pad





[1] The coil used for orifice size 1.35mm (0.053in) is longer by 12.5mm (0.492in) than that used for the other orifice sizes

NOTE: Connectors must be ordered separately, please specify the quantity and Catalog numbers required:

Pin spacing 5.08 (0.20)	0.5m (19.7in) long	Catalog number:	**88118801**	Pin spacing 2.54 (0.10)	0.5m (19.7in) long	Catalog number:	**88118806**
	1.5m (59in) long	Catalog number:	**88118802**		1.5m (59in) long	Catalog number:	**88118807**
	3m (118in) long	Catalog number:	**88118803**		3m (118in) long	Catalog number:	**88118808**

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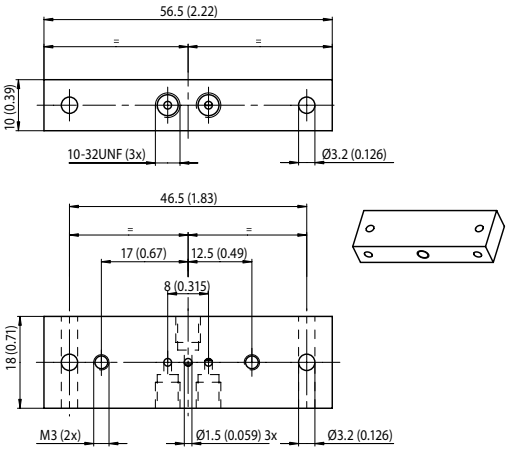
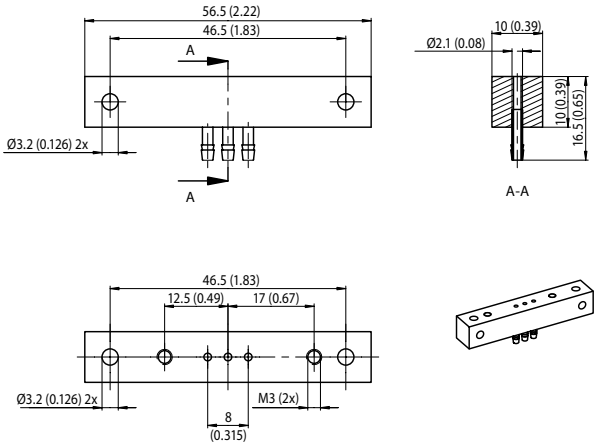
Dimensions: mm (inches)

Single Subbases
PEEK

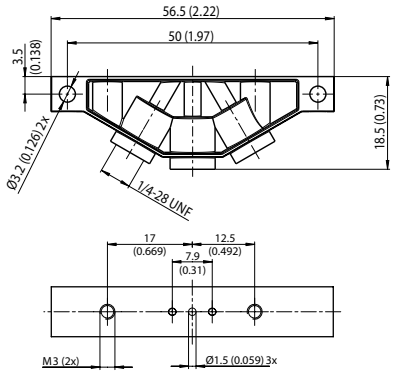
UNF thread -
Catalog number 36100038



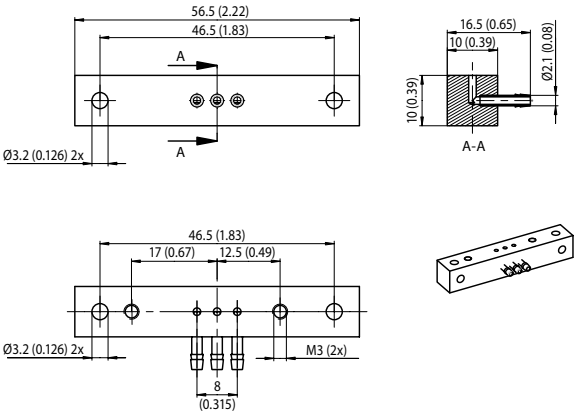
Bottom push-in hose connection -
Catalog number 36100042



UNF thread -
Catalog number 36100040



Side push-in hose connection -
Catalog number 36100044



Options

- Subbases available on request
- Manual operator (impulse-type)

Installation

- The solenoid valves can be mounted in any position without affecting operation

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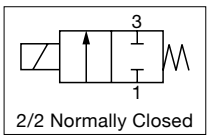
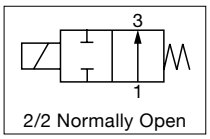
ASCO™ MINIATURE SOLENOID VALVES

FLAPPER FLUID ISOLATION VALVES, 16mm

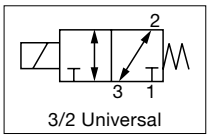
- Flapper isolation valves are designed for use with neutral or highly aggressive liquids in analytical and medical systems
- Special Flapper mechanism results in no pumping or sticking effects
- Reduced heat transfer between control mechanism and fluid make them ideal for use with heat-sensitive reagents and biological samples
- Hermetic separation of control mechanism prevents particulate contamination caused by friction of moving parts, assuring maximum purity of liquid samples
- Excellent self-draining capability and easy-to-flush low-volume internal cavity make these valves ideal in application where cross-contamination must be minimized
- Meets all relevant CE directives, and is RoHS compliant
- Typical applications include:
  - In-vitro Diagnostics
  - Hematology
  - DNA Sequencing
  - Industrial Liquid Analyzers



2/2 Normally Closed

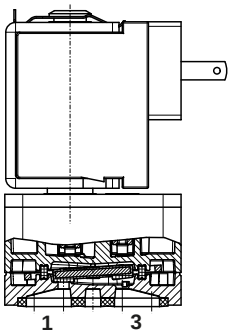


2/2 Normally Open

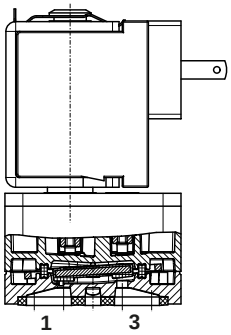


3/2 Universal

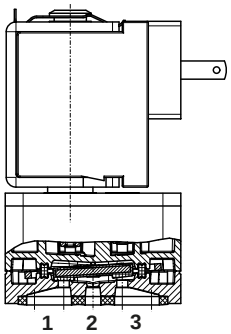
Functional Principle



Function 2/2 NC



Function 2/2 NO



Function 3/2 U

Fluids*	Temperature Range	Seal Materials*
Liquids or Gases[1]	5 °C to 50 °C (41 °F to 122 °F)	FFKM
		FKM
		EPDM

[1] Filtration: 50µm
* Ensure that the compatibility of the materials in contact with the fluids is verified

General Valve Information	
Body	PEEK
Others	Stainless Steel
Response Time	< 20ms
Internal Volume	75µl
Max. Viscosity	20 cSt (mm²/s)

Electrical Characteristics	
Coil Insulation Class	F
Connector	Spade terminals or lead wires[2]
Connector Specification	Spade terminals: DIN 46340, lead wires: 24 AWG
Electrical Safety	IEC 335
Electrical Enclosure Protection	Molded IP65 spade terminals (EN 60529) Molded IP66 lead wires (EN 60529)
Standard Voltages*	12 VDC, 24 VDC (-5%/+10%)

Electrical Connection	Power Ratings				Ambient Temperature Range	Type1
	Inrush	Holding		Hot/Cold		
	VA	VA	W	W	°C (°F)	
S0	-	-	-	4	5 to 50 (41 to 122)	01
L0	-	-	-			02

* Other voltages or coil with red LED for power supply signal on request
[1] Refer to the drawings on following pages
[2] 0.5m (19.7in) lead wires

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Specifications						
Connection	Orifice Size	Flow Coefficient		Operating Pressure bar (psi)		Power Rating (W)
				min.	max.	
	mm (inches)	Kv (m³/h)	Cv		gases or liquids	
Pad Mounting1	0.8 (0.031)	0.021	0.024	-0.9 (-13)	8 (116)	4
	1.2 (0.047)	0.036	0.042	-0.9 (-13)	4 (58)	4
	1.6 (0.063)	0.042	0.049	-0.9 (-13)	2 (29)	4
1/4-28 UNF	0.8 (0.031)	0.021	0.024	-0.9 (-13)	8 (116)	4
	1.2 (0.047)	0.036	0.042	-0.9 (-13)	4 (58)	4
	1.6 (0.063)	0.042	0.049	-0.9 (-13)	2 (29)	4
Push-in Hose Connection	0.8 (0.031)	0.021	0.024	-0.9 (-13)	8 (116)	4
	1.2 (0.047)	0.036	0.042	-0.9 (-13)	4 (58)	4
	1.6 (0.063)	0.042	0.049	-0.9 (-13)	2 (29)	4

1 2 hexagon socket head cap mounting screws M2.5, stainless steel, supplied

How to Order

R 068A 2 1 2 SO V 00 F1

Prefix
R = Pad Mount
0 = 1/4-28 UNF
6 = Push-in hose connection

Series and release

Mounting width
2 = 16mm

Function
1 = 2/2 NC
2 = 2/2 NO
3 = 3/2 U

Orifice size
2 = 0.8mm
4 = 1.2mm
6 = 1.6mm

Electrical connection
S0 = DIN spade plug
L0 = Leaded coil

Seal material
V = FKM
1 = FFKM
E = EPDM

Valve type
00 = On/off valve

Voltage
F1 = 24 VDC
F3 = 12 VDC

Options

Description	Catalog Number
Push-in-Hose Barb Kit 3/2	
Subbase Qty: 1 Hex nut Qty: 2	534662-001
Push-in-Hose Barb Kit 2/2 Codification	
Subbase Qty: 1 Hex nut Qty: 2	534662-002
1/4-28 Threaded Kit 3/2	
Subbase Qty: 1 Hex nut Qty: 2	534661-001
1/4-28 Threaded Kit 2/2	
Subbase Qty: 1 Hex nut Qty: 2	534661-002

Subbases available on request

Installation

- The solenoid valves can be mounted in any position without affecting operation
- Pad-mounting solenoid valve supplied with seal

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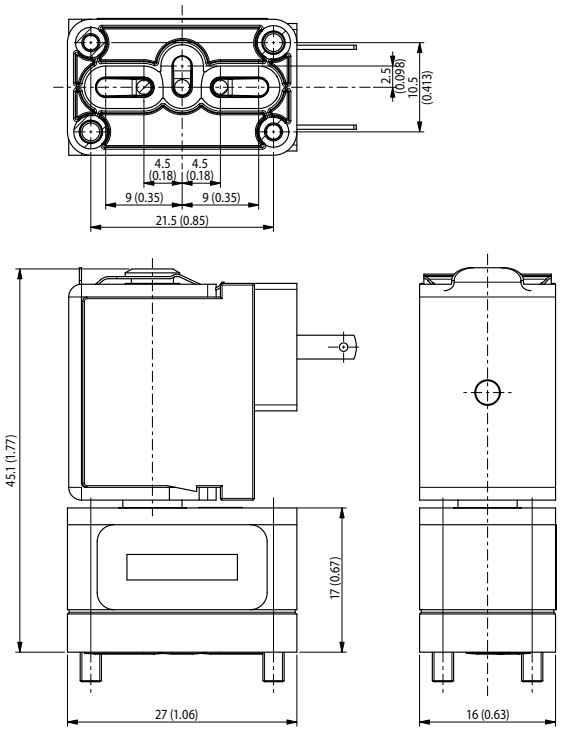
ASCO™ MINIATURE SOLENOID VALVES

FLAPPER FLUID ISOLATION VALVES, 16mm

Dimensions: mm (inches)

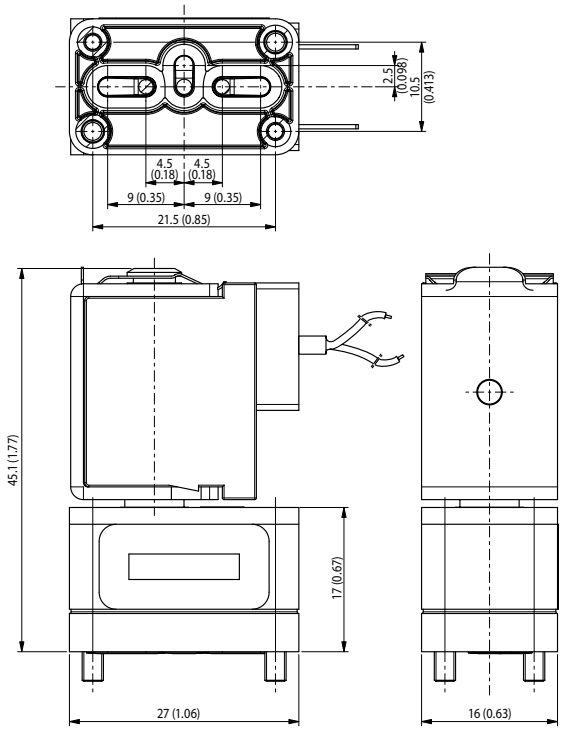
Type 01

Solenoid with spade terminals (S0)
DIN 46340
IP40



Type 02

Leaded coil (L0)
24 AWG, lead wires:
500mm (19.7in) long
IP66



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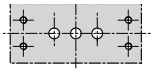
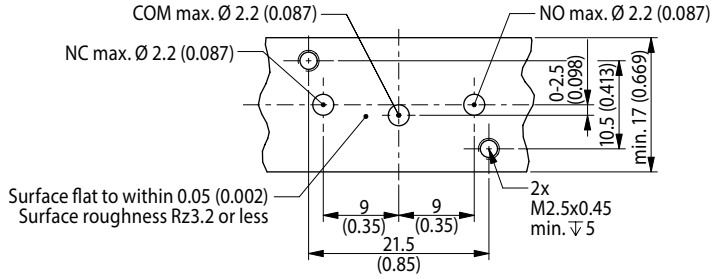
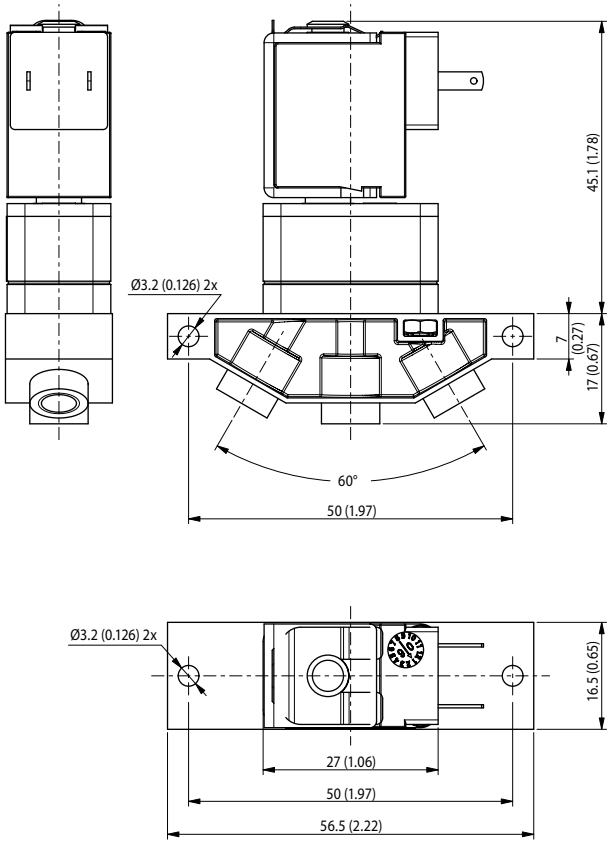
Dimensions: mm (inches)

Subbase Mounting Pattern

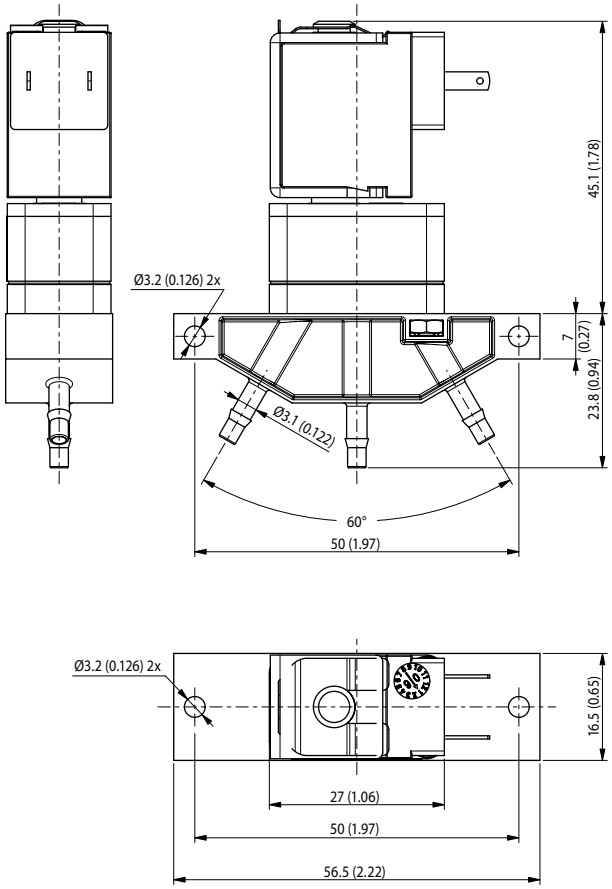




1/4 - 28 UNF Version



Version with Push-in Hose Connection



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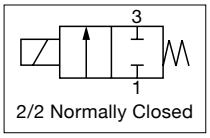
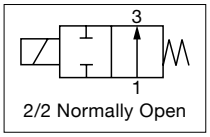
ASCO™ MINIATURE SOLENOID VALVES

FLAPPER SOLENOID FLUID ISOLATION VALVES, 22mm

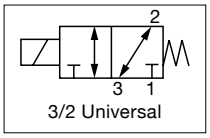
- Flapper isolation valves are designed for use with neutral or highly aggressive liquids in analytical and medical systems
- Special Flapper mechanism results in no pumping or sticking effects
- Reduced heat transfer between control mechanism and fluid make them ideal for use with heat-sensitive reagents and biological samples
- Hermetic separation of control mechanism prevents particulate contamination caused by friction of moving parts, assuring maximum purity of liquid samples
- Excellent self-draining capability and easy-to-flush low-volume internal cavity make these valves ideal in application where cross-contamination must be minimized
- Meets all relevant CE directives, and is RoHS compliant
- Typical applications include:
  - In-vitro Diagnostics
  - Hematology
  - DNA Sequencing
  - Industrial Liquid Analyzers



2/2 Normally Closed



2/2 Normally Open



3/2 Universal

Fluids*	Temperature Range	Seal Materials*
Liquids or Gases[1]	5 °C to 50 °C (41 °F to 122 °F)	FFKM
		FKM
		EPDM

1 Filtration: 50µm
* Ensure that the compatibility of the materials in contact with the fluids is verified

General Valve Information	
Body	PEEK
Others	Stainless Steel
Response Time	< 10ms
Internal Volume	0.48ml
Max. Viscosity	20 cSt (mm^2/s)

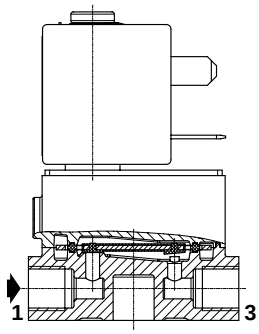
Electrical Characteristics	
Coil Insulation Class	F
Connector	Spade plug (Ø6 to 8mm) or Lead Wires[1]
Connector Specification	DIN 43650, 11mm (0.43in), industry standard B
Electrical Safety	IEC 335 (lead wires: EN 60730)
Electrical Enclosure Protection	Molded IP65 (EN 60529)
Standard Voltages*	12 VDC, 24 VDC (-5%/+10%)

* Other voltages on request
1 0.45m (17.7in) lead wires

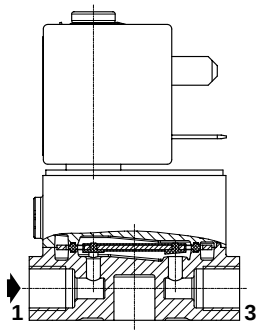
Prefix Option	Power Ratings				Ambient Temperature Ranges	Replacement Coil		Type[1]
	Inrush	Holding		Hot/Cold				
	VA	VA	W	W	°C (°F)	12 VDC	24 VDC	
S1	-	-	-	9.6	5 to 50 (50 to 122)	400129-005	-	01
				10		-	400129-007	
L0	-	-	-	10	5 to 50 (50 to 122)	400119-011D	400119-008D	02

1 Refer to the drawings on following pages

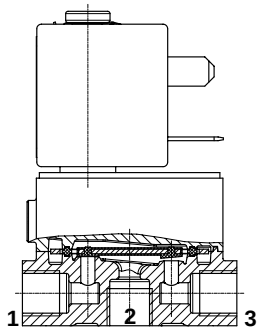
Functional Principle



Function 2/2 NC



Function 2/2 NO



Function 3/2 U

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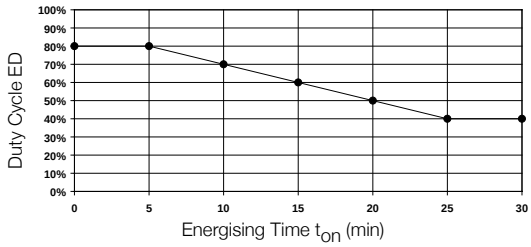
ASCO™ MINIATURE SOLENOID VALVES

FLAPPER SOLENOID FLUID ISOLATION VALVES, 22mm

RECOMMENDATION FOR MAXIMUM DUTY CYCLE



De-energising time: $t_{off} = t_{on} \times (100\% / ED - 1)$

Example:
1) Determine energising time in minutes (t_{on}):
t_{on} = 15 min
2) Find maximum duty cycle value in diagram:
ED = 60%
3) Calculate de-energising time:
t_{off} = 15 min x (100% / 60% - 1) = 10 min
4) Complete cycle time:
$t_{cycle} = t_{on} + t_{off}$ = 15 min + 10 min = 25 min

Note: 100% duty cycle possible when using the power-save connector (catalogue number [24 V DC]: 88100934, catalogue number [12 V DC]: 833-150063)

Specifications

Connection	Orifice Size	Flow Coefficient		Operating Pressure bar (psi)		Power Rating	Catalog Number
				min.	max.		Body PEEK
	mm (inches)	Kv (m^3/h)	Cv		gases or liquids	W	
2/2 NC - Normally Closed							
G1/8	2 (0.079)	0.10	0.12	-0.9 (-13)	5 (72.5)	10	G068A317xxx00xx
	3 (0.118)	0.16	0.18	-0.9 (-13)	3 (43)	10	G068A318xxx00xx
	4 (0.157)	0.30	0.35	-0.9 (-13)	1.5 (22)	10	G068A319xxx00xx
Pad Mounting[1]	2 (0.079)	0.10	0.12	-0.9 (-13)	5 (72.5)	10	R068A317xxx00xx
	3 (0.118)	0.16	0.18	-0.9 (-13)	3 (43)	10	R068A318xxx00xx
	4 (0.157)	0.30	0.35	-0.9 (-13)	1.5 (22)	10	R068A319xxx00xx
2/2 NO - Normally Open							
G1/8	2 (0.079)	0.10	0.12	-0.9 (-13)	5 (72.5)	10	G068A327xxx00xx
	3 (0.118)	0.16	0.18	-0.9 (-13)	2 (29)	10	G068A328xxx00xx
	4 (0.157)	0.30	0.35	-0.9 (-13)	1 (14.5)	10	G068A329xxx00xx
Pad Mounting[1]	2 (0.079)	0.10	0.12	-0.9 (-13)	5 (72.5)	10	R068A327xxx00xx
	3 (0.118)	0.16	0.18	-0.9 (-13)	2 (29)	10	R068A328xxx00xx
	4 (0.157)	0.30	0.35	-0.9 (-13)	1 (14.5)	10	R068A329xxx00xx
3/2 U-Universal							
G1/8	2 (0.079)	0.10	0.12	-0.9 (-13)	5 (72.5)	10	G068A337xxx00xx
	3 (0.118)	0.16	0.18	-0.9 (-13)	2 (29)	10	G068A338xxx00xx
	4 (0.157)	0.30	0.35	-0.9 (-13)	1 (14.5)	10	G068A339xxx00xx
Pad Mounting[1]	2 (0.079)	0.10	0.12	-0.9 (-13)	5 (72.5)	10	R068A337xxx00xx
	3 (0.118)	0.16	0.18	-0.9 (-13)	2 (29)	10	R068A338xxx00xx
	4 (0.157)	0.30	0.35	-0.9 (-13)	1 (14.5)	10	R068A339xxx00xx

[1] 4 hexagon socket head cap mounting screws M3 x 8mm (0.31in), stainless steel, ISO 4762 supplied

How to Order

R 068A 3 1 8 S1 V 00 F1

Prefix
R = Pad Mount
G = G 1/8

Series and release

Mounting width
3 = 22mm

Function
1 = 2/2 NC
2 = 2/2 NO
3 = 3/2 U

Orifice size
7 = 2.0mm
8 = 3.0mm
9 = 4.0mm

Electrical connection
S1 = DIN spade plug
L0 = Leaded coil

Seal material
V = FKM
1 = FFKM
E = EPDM

Valve type
00 = On/off valve

Voltage
F1 = 24 VDC
F3 = 12 VDC

Options

- Subbases available on request
- Power-save connector (2.5 W after 140ms of operation), 24 VDC version: 88100934, 12 VDC version: 833-150063
- Impulse manual operator

Installation

- The solenoid valves can be mounted in any position without affecting operation
- Pad-mounting solenoid valve supplied with seal
- Pipe connections 1/8 have standard thread according to ISO 228/1

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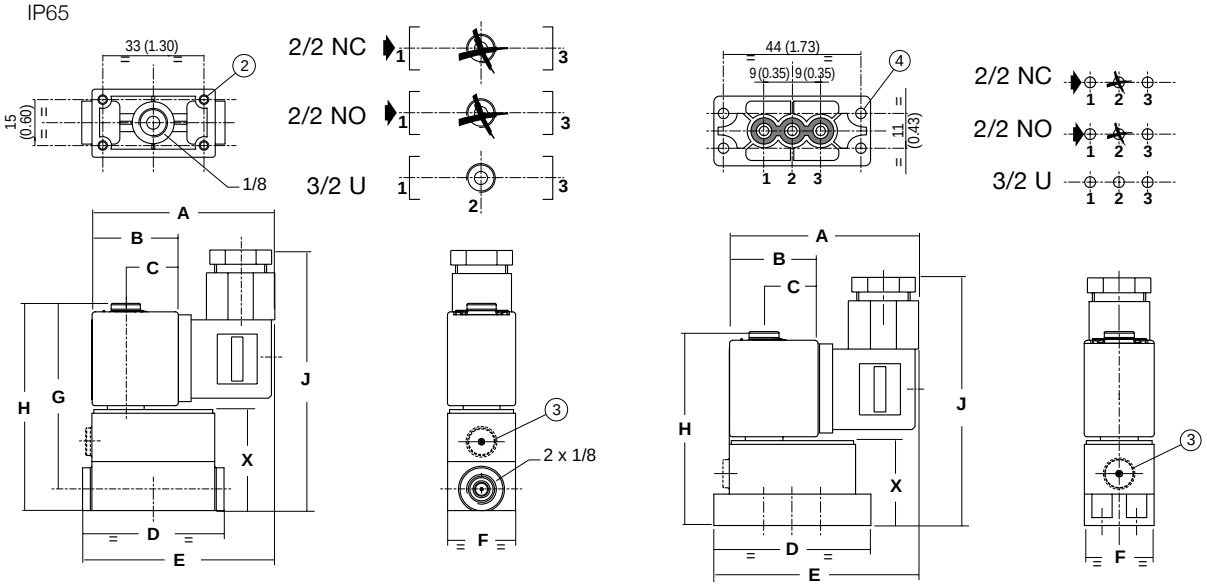
ASCO™ MINIATURE SOLENOID VALVES

FLAPPER SOLENOID FLUID ISOLATION VALVES, 22mm

Dimensions: mm (inches)

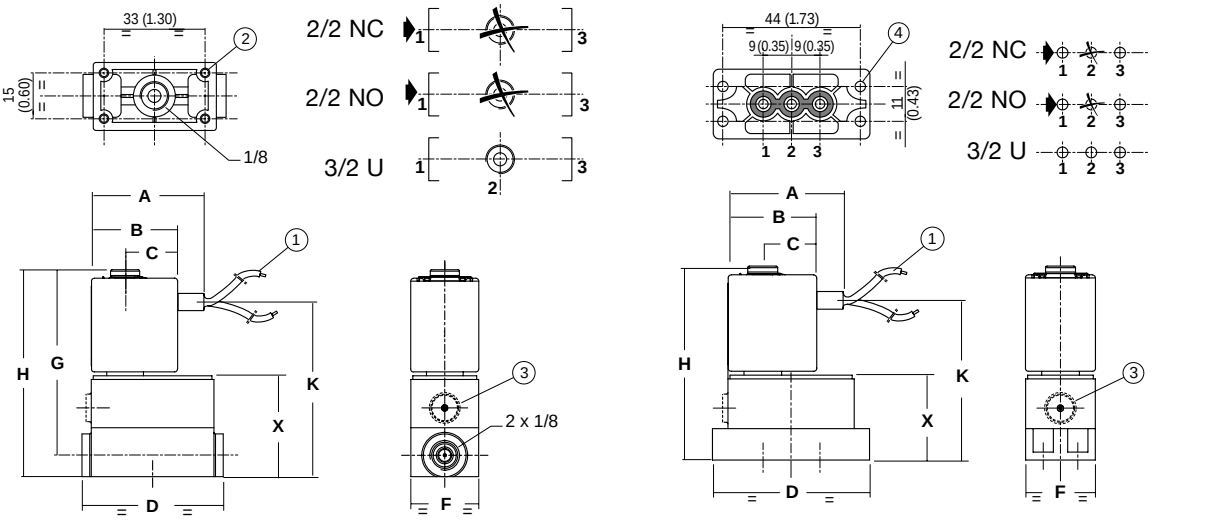
Type 01

Solenoid with spade plug connector (S1)
Epoxy molded
IEC 335/DIN 43650
IP65



Type 02

Leaded coil (L0)
IEC 335, lead wires:
0.45m (17.7in) long
IP40



Type	Prefix Option	Catalog Number	A	B	C	D	E	F	G	H	J	K	X	weight kg[1]
01	S1	G068A...S1..	60 (2.36)	28.5 (1.12)	17.5 (0.69)	46.2 (1.82)	62.5 (2.46)	22.3 (0.88)	60.8 (2.40)	67.8 (2.67)	82 (3.23)	-	33 (1.30)	0.130
		R068A...S1..	60 (2.36)	28.5 (1.12)	17.5 (0.69)	50 (1.97)	65 (2.56)	22.3 (0.88)	-	61.8 (2.43)	76 (3.00)	-	27 (1.06)	0.124
02	L0	G068A...L0..	35 (1.38)	28.5 (1.12)	17.5 (0.69)	46.2 (1.82)	-	22.3 (0.88)	60.8 (2.40)	67.8 (2.67)	-	56.5 (2.22)	33 (1.30)	0.124
		R068A...L0..	35 (1.38)	28.5 (1.12)	17.5 (0.69)	50 (1.97)	-	22.3 (0.88)	-	61.8 (2.43)	-	50.5 (1.99)	27 (1.06)	0.120

[1] Type 01: includes coil(s) and connector(s); Type 02: with 0.45m (17.7in) lead wires

(1) 2 wires, length 0.45m (17.7in)

(2) 4 mounting holes, max. depth 7mm (0.27in), for self-tapping screw (type EJOT PT, K30)

(3) Manual operator location

(4) 4 mounting holes Ø3.2mm (0.126in) (4 hexagon socket head cap mounting screws M3 x 8mm (0.315in), stainless steel, ISO 4762 supplied)

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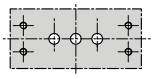
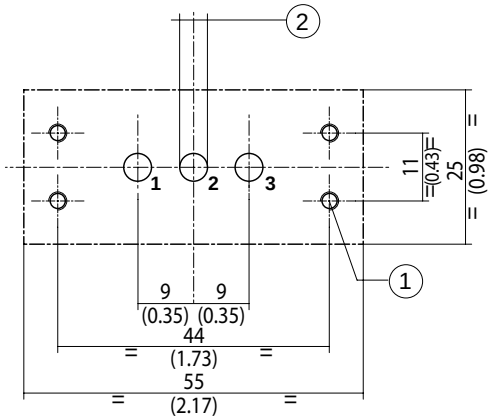
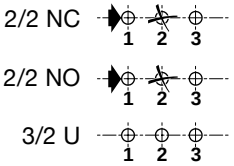
Dimensions: mm (inches)

Subbase Mounting Pattern





1. 4 mounting holes Ø3.2mm (0.126in)
2. Max. diameter 4.5mm (0.177in) 3x



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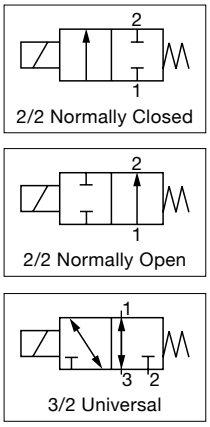
ASCO™ MINIATURE SOLENOID VALVES

ROCKER MECHANISM, FLUID ISOLATION, HOSE CONNECTIONS

- Valves for medical analysers, biotechnology, gas analysers
- Can be used to control acids and bases, as well as analytical reagents
- Any application where the fluid may not come into contact with metal parts and with the electromagnetic control section of the solenoid valves
- The valves are ideal for controlling aggressive fluids or when high purity is demanded and have easy to flush internal cavities
- They can also be used as a very small internal volume flow-through sampling valve due to rocker technology
- Hermetic separation of control mechanism and fluid
- Reduced heat exchange between coil and fluid
- Protected manual operator
- The use of first class materials and thorough valve testing ensure high reliability and a lifetime of at least 1 million cycles
- The solenoid valves satisfy all relevant EC directives
- Typical applications include:
  - Hematology



Fluids*	Temperature Range	Seal Materials*
Liquids or gases	0 °C to 40 °C (32 °F to 104 °F)	EPDM (ethylene-propylene)

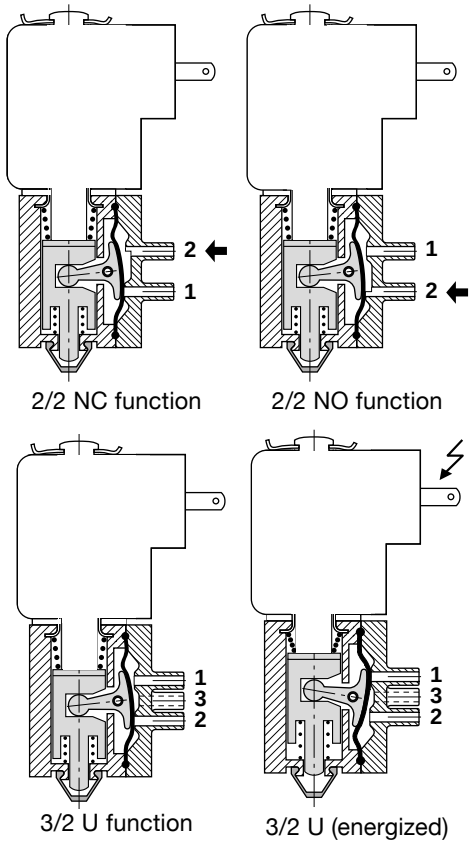
* Ensure that the compatibility of the materials in contact with the fluids is verified.

General Valve Information*	
Body	PA12
Internal parts	Stainless steel
Diaphragm-poppets	EPDM
Cover	PA12 (transparent), enabling flow of fluid to be seen
Differential pressure	-0.7 to +2 bar (usable in 0.3 bar abs. vacuum) [1 bar =100 kPa]
Maximum viscosity	20 cSt (mm^2/s)
Response Time	< 20ms
Internal Volume	< 75 µl (connections not included)

* Ensure that the compatibility of the materials in contact with the fluids is verified

Electrical Characteristics	
Coil Insulation Class	F
Duty cycle	100%
Coil	Two spade terminals 2.8 x 0.5 mm (DIN 46340
Electrical Safety	IEC 335
Electrical Enclosure Protection	IP65 (EN60529)
Standard Voltages*	12 VDC, 24 VDC

* Other voltages on request



	Power Ratings				Ambient Temperature Ranges	Replacement Coil		Type[1]
	Inrush	Holding		Hot/Cold				
	VA	VA	W	W	°C (°F)	-	24 VDC	
	-	-	-	4 / 5	-5 to 40 (23 to 104)	-	43004663	01

[1] Refer to the dimensional drawings on the following page

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ASCO™ MINIATURE SOLENOID VALVES

ROCKER MECHANISM, FLUID ISOLATION, HOSE CONNECTIONS

Specifications										
Connection	Orifice Size	Flow Coefficient			Operating Pressure bar (psi)			Power Rating	Catalog Number (protected impulse manual operator)	
					min.	max.			Rear Mounting	central support plate mounting
	mm (inches)	Kv (m^3/h)	Cv	l/min		gases	liquids	W		
Hose connection to ID 1.5 mm flexible tubing	**2/2 NC - Normally closed / 2 connections**									
	1.5 (0.059)	0.05	0.058	0.75	-0.7 (-10)	2 (29)	2 (29)	5	11000006	11000010--P2
	2/2 NO - Normally open / 2 connections									
	1.5 (0.059)	0.05	0.058	0.75	-0.7 (-10)	2 (29)	2 (29)	5	11000005--P2	11000009
	3/2 U - Universal / 3 connections									
	1.5 (0.059)	0.05	0.058	0.75	-0.7 (-10)	2 (29)	2 (29)	5	11000007--P2	11000011--P2
	3/2 U - Universal / 4 connections									
	1.5 (0.059)	0.05	0.058	0.75	-0.7 (-10)	2 (29)	2 (29)	5	11000008	11000012

How to Order

11000006
11000010--P2
Catalog number

12V/DC
24V/DC
Voltage

Options

- Stainless steel support plate for mounting between body and coil for:
  - 1 solenoid valve, catalogue number 88211001
  - 2 solenoid valves, catalogue number 88211002
  - 3 solenoid valves, catalogue number 88211003
  - 4 solenoid valves, catalogue number 88211004
  - 5 solenoid valves, catalogue number 88211005

  For more, contact us
- FKM (fluoroelastomer) diaphragm

Installation

- The solenoid valves can be mounted in any position without affecting operation
- Rear or control support plate mounting possible (see below)
- Hose connection of flexible tubing Ø 1.5 mm ID
- Compact size and simple tubing (see following page)
- Replacement coils are available
- Installation/maintenance instructions are included with each valve

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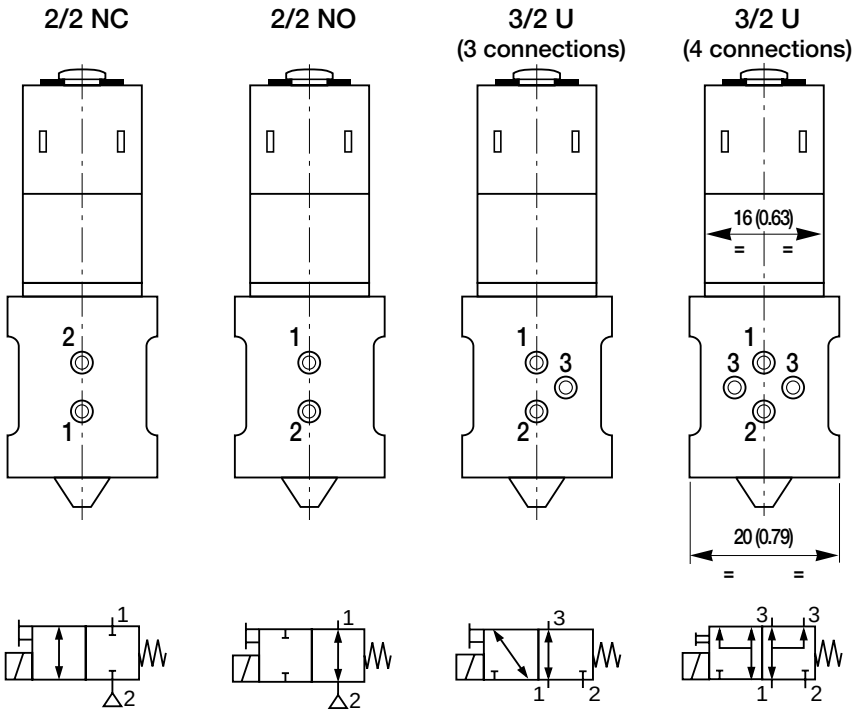
ASCO™ MINIATURE SOLENOID VALVES

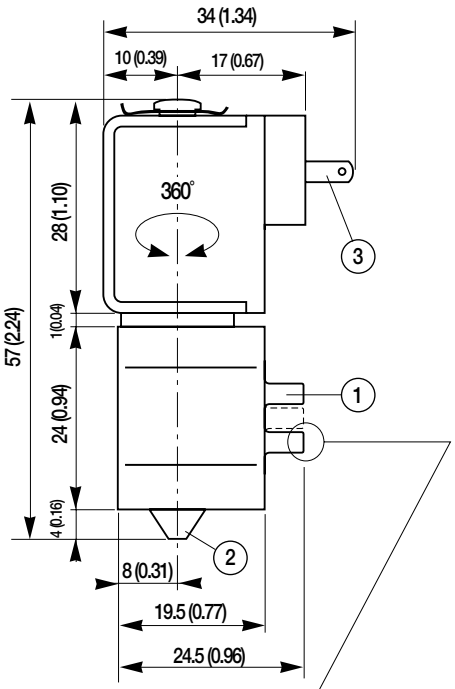
ROCKER MECHANISM, FLUID ISOLATION, HOSE CONNECTIONS

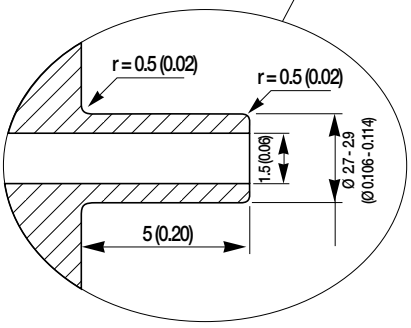
Dimensions: mm (inches)

TYPE 01
Prefix "SC" Solenoid
DIN 43340

11000005..12







Details of hose bib

① Hose bibs for connection of ID 1.5 mm flexible tubing

② Protected impulse type manual operator

③ Coil with two spade terminals 2.8 x 0.5 (DIN 46340)

Type	Prefix option	Weight [1] kg
01	SC	0.46

[1] Incl. coil

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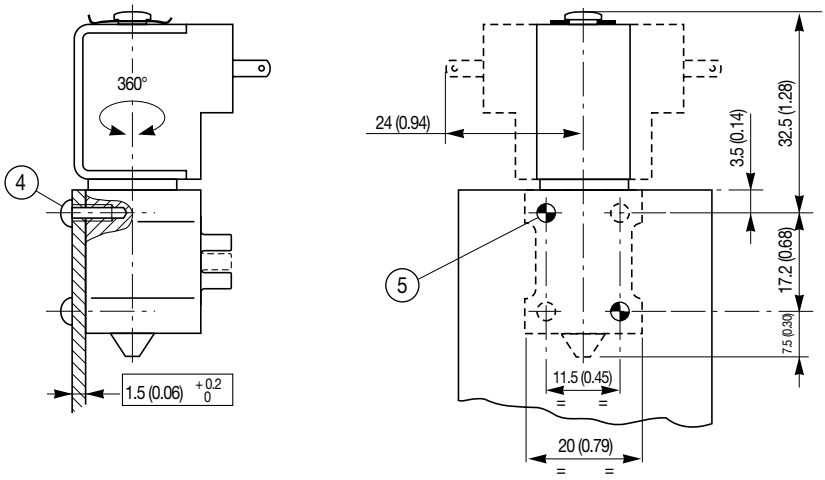
Dimensions: mm (inches)

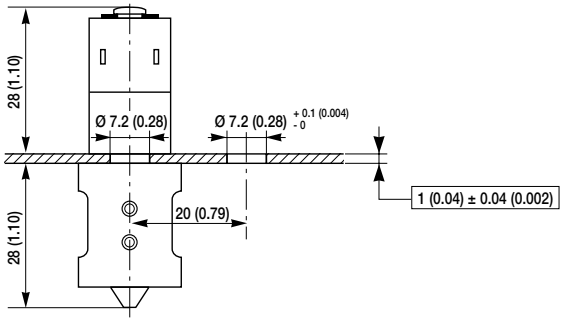
REAR MOUNTING



④ 2 self thread cutting «Torx» screws K 22 x 6 - A2 stainless steel (screws delivered)
- use these screws only
- use plate with correct thickness
- max. torque: 0.3 Nm

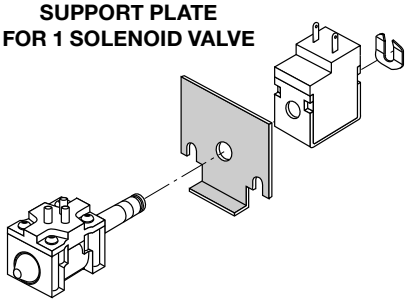
⑤ Two mounting holes 2.5 mm dia. Solenoid valve body has four holes for mounting purpose

SUPPORT PLATE MOUNTING (For solenoid valve of corresponding type)

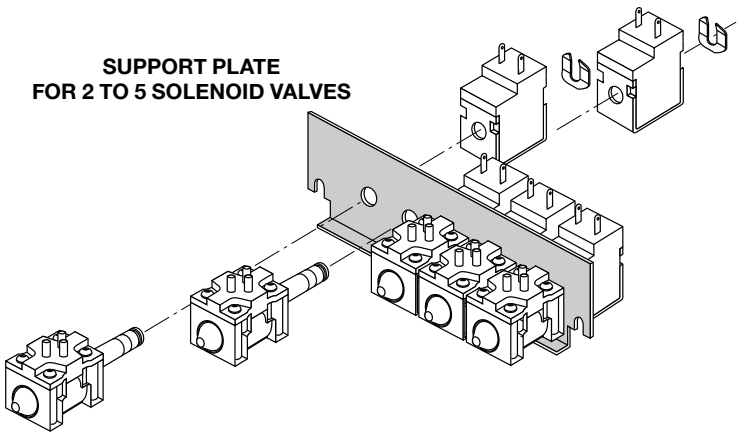


- The panel must be of non-magnetic material.
- To fit to panel, remove the clip and the solenoid valve coil and install as indicated below.

SUPPORT PLATE FOR 1 SOLENOID VALVE



SUPPORT PLATE FOR 2 TO 5 SOLENOID VALVES



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ASCO™ MINIATURE SOLENOID VALVES

ROCKER MECHANISM, FLUID ISOLATION, HOSE CONNECTIONS

SUPPORT PLATE FOR 1 TO 5 SOLENOID VALVES

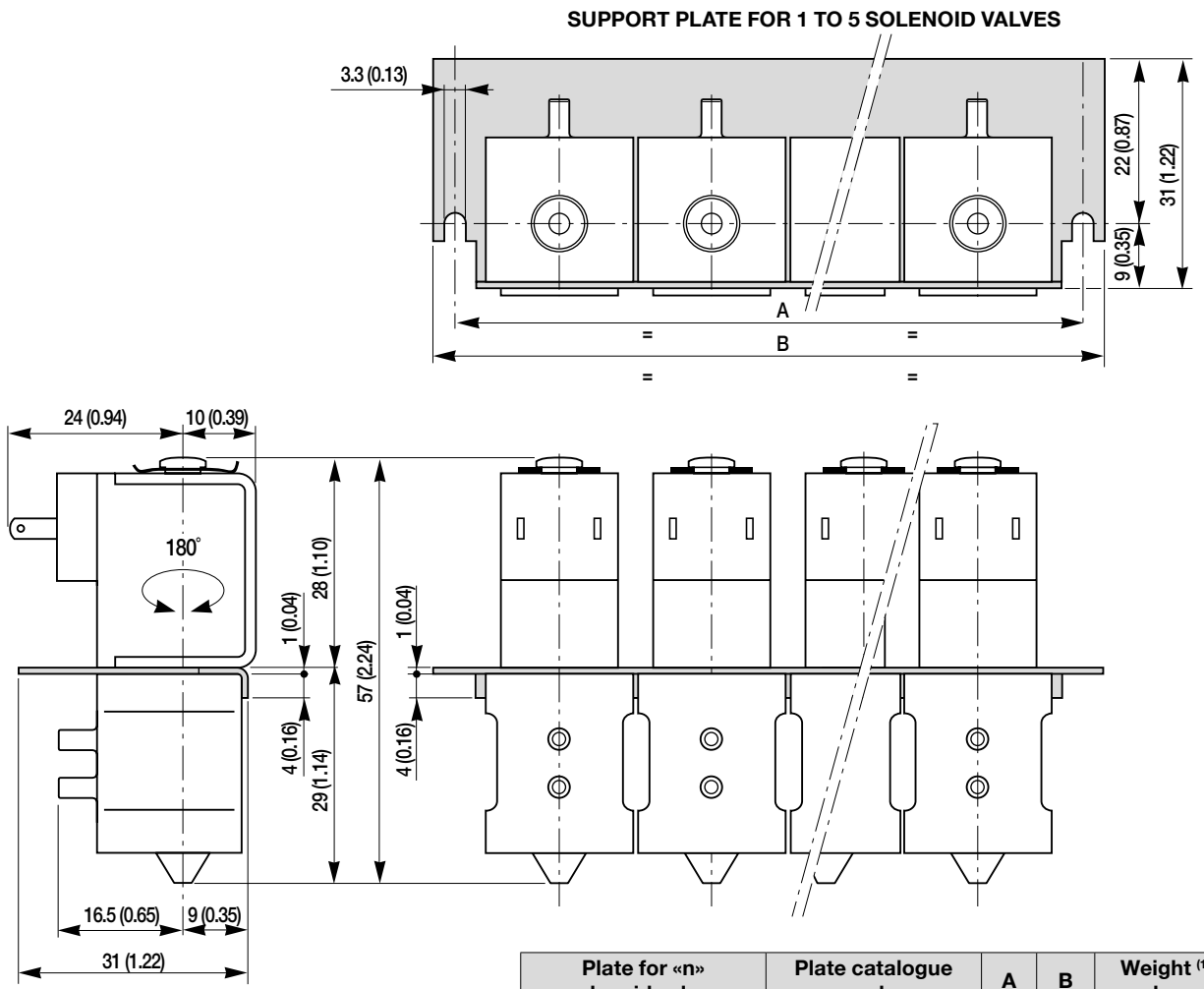
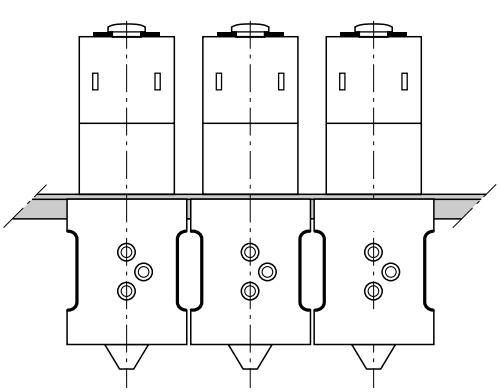


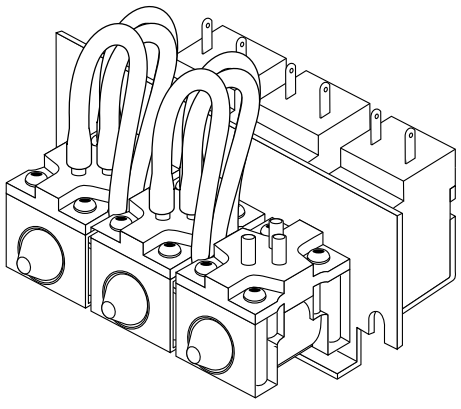
Plate for «n» solenoid valves	Plate catalogue number	A	B	Weight [1] kg
1	88211001	31	40	0.1
2	88211002	51	60	0.15
3	88211003	72	80	0.2
4	88211004	92	100	0.25
5	88211005	113	121	0.3

[1] Plate only.

SIMPLE TUBING

When valves mounted side by side on a support plate, an area is left open so that tubes pass between valve bodies





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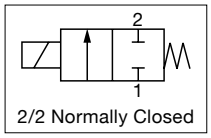
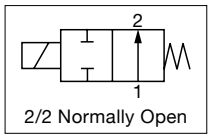
ASCO™ MINIATURE SOLENOID VALVES

STEPPER MOTOR PINCH VALVES

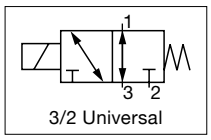
- Stepper motor pinch valve, suitable to shut off media without producing neither turbulent flows, nor dead spaces. Particularly suitable for most of the analytical, medical and food applications.
- If equipped with fitting control electronics, the valve can perform ON-OFF functions, as well as analog input and potentiometer control. The “OPEN” and “CLOSE” positions of the valve will be set as indicated in the section “OPERATING INSTRUCTIONS.
- The system allows a bi-directional through flow and a high flow rate.
- The valve is suitable for elastic tubings with hardness up to 90 Shore A.
- The tubing (not included in our supply) is the only material in contact with the fluid.
- Typical applications include:
  - Blood analysis devices
  - Sample handling
  - Devices with dynamic regulation



2/2 Normally Closed



2/2 Normally Open



3/2 Universal

General Valve Information*	
Body	Anodized aluminium
Pinching device	POM (reinforced acetal copolymer)
Engine cover	PA (Polyamide)
Board cover	PA (Polyamide)
Internal components	Brass and Stainless Steel
max. Tube hardness	90 Shore A
Ambient temperature	-10°C +60°C
Minimum step	0.033mm/step

* Ensure that the compatibility of the materials in contact with the fluids is verified.

Electrical Characteristics		
	Versions without electronic board	**Versions with electronic board**
Continous duty	ED 100%	ED 100%
Insulation class	B (130°C)	B (130°C)
Drive methods	1-2 phase	
Drive circuit	bipolar chopper	
Windings resistance	24Ω	
Current / phase	500mA	
Electric connection	Molex pitch 2.54mm 4 pins	Molex pitch 2.54mm 6 pins Molex pitch 2.54mm 2 pins
Protection degree	IP 40 (DIN40050)	IP 40 (EN 60529)

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Specifications

Catalog number	Tubing		Pinching strength (N)	Closing speed (mm/s)	Power Rating (W)	Voltage	Operation	LED indicators			
	max. O.D. (mm)	orifice size (mm)						Green	Yellow	Red	Blue
2-way											
S170XA01X0900XX	9.5		up to 80N	3.33	9	12V DC	Wiring	N/A			
2-way On/Off											
S170XA01X1900VU	9.5	6.4	up to 80N	3.33	9	[12%24] V	Wiring	Valve open	Valve closed	Alarm/ Malfunction	Programming mode
S170XA01X2900VU							Analog input (0-5V)	see Operating instructions			
S170XA01X3900VU							Analog input (4-20mA)				
S170XA01X4900VU							Potentiometer	Valve open	Valve closed		
S170XA01X5900VU							Fail saving	Valve open	Valve closed		
2-way normally open											
S170XA01X8900VU	9.5	6.4	up to 80N	3.33	9	[12%24] V	Fail saving controlled via Potentiometer proportional flow control	Valve open	Valve closed	Alarm/ Malfunction	Programming mode
2-way normally closed											
S170XA01X8901VU	9.5	6.4	up to 80N	3.33	9	[12%24] V	Fail saving controlled via Potentiometer proportional flow control	Valve open	Valve closed	Alarm/ Malfunction	Programming mode
S170XA02X1900VU							On/Off				
3-way											
S370XA01X0900XX	9.5		up to 80N	3.33	9	[12%24] V	Wiring	N/A			
3-way On/Off											
S370XA01X1900VU	9.5	6.4	up to 80N	3.33	9	[12%24] V		Upper Tube open Lower Tube closed	Upper Tube closed Lower Tube Open	Alarm/ Malfunction	Programming mode

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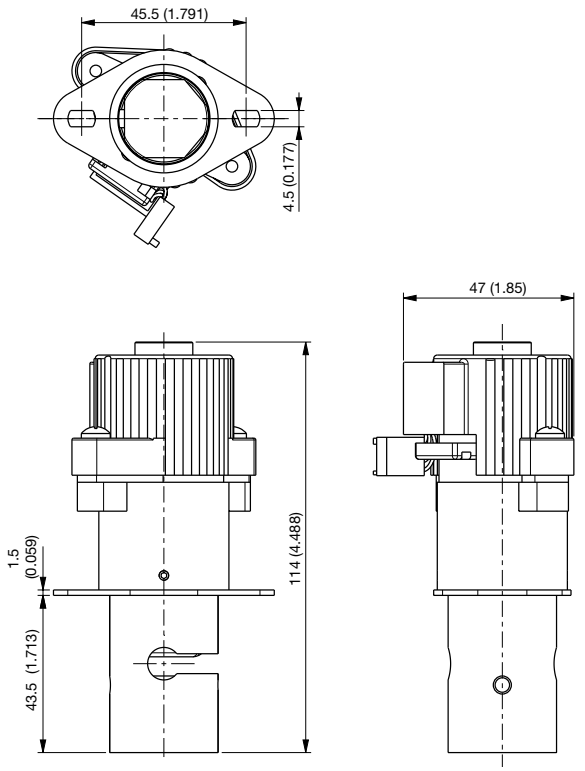
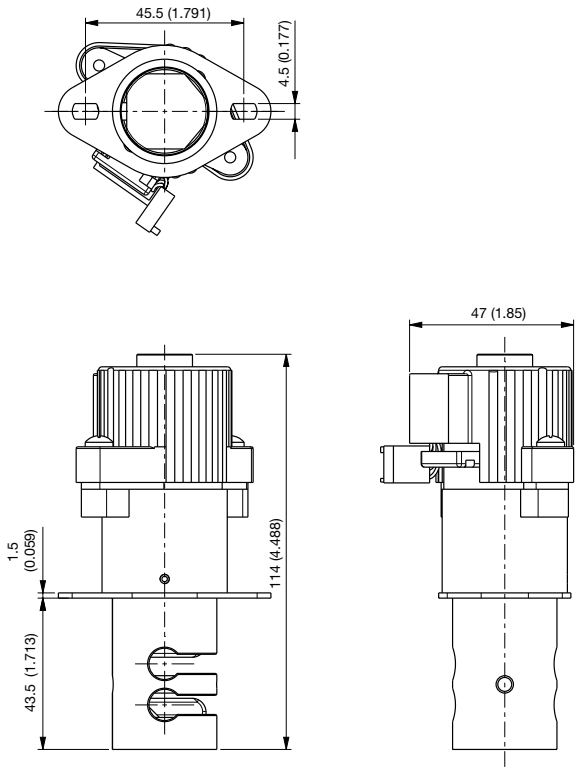
ASCO™ MINIATURE SOLENOID VALVES
STEPPER MOTOR PINCH VALVES

Dimensions: mm (inches)

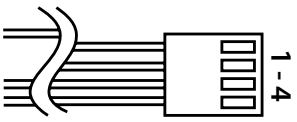
S170-XA01X0900XX



S370-XA01X0900XX



STEPPER MOTOR WIRING



PIN NO.	WIRE COLOR	MOTOR
1	YELLOW	B3
2	ORANGE	B1
3	BROWN	A3
4	BLACK	A1

WIRE COLOUR CODE

HEAD SPINDLE IN				
CONNECTOR PIN NO.	STEP			
	1	2	3	4
1	+	+	-	-
2	-	-	+	+
3	-	+	+	-
4	+	-	-	+

HEAD SPINDLE out				
CONNECTOR PIN NO.	STEP			
	1	2	3	4
1	-	-	+	+
2	+	+	-	-
3	-	+	+	-
4	+	-	-	+

Notes

- Some data, e.g. actuating time and power absorption, are directly depending on the electronic control and can vary accordingly
- For the use of a tubing with outside diameter smaller than 6mm, it is necessary to install the tubing guide sleeve (drawing K29501)

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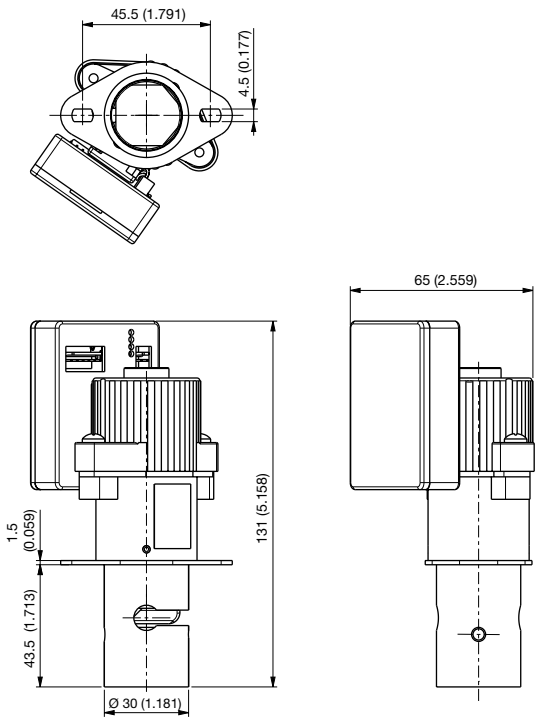
Dimensions: mm (inches)

S170XA01X1900VU
S170XA01X2900VU
S170XA01X3900VU
S170XA01X4900VU
S170XA01X5900VU
S170XA02X1900VU



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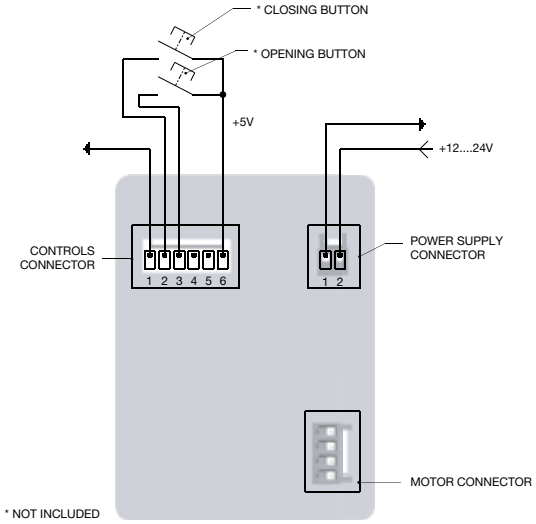
ASCO™ MINIATURE SOLENOID VALVES
STEPPER MOTOR PINCH VALVES

Electrical connection



S170XA01X1900VU

Operating Instructions

When power is supplied, the valve will reset (red and green LEDs on) and will automatically move to OPEN position (red LED off).

1. Insert the tube in the respective slot

The valve is now operational and by providing the opening or closing pulse (minimum 10ms), the valve will act accordingly.

LED signals meaning:

- Green LED on -> Valve open
- Yellow LED on -> Valve closed

Notes

- Valve position fixed on loss of power.
- When the power will be restored, the valve will reset (red and green LEDs on) and will automatically move to OPEN position (red LED off).
- For use with different tubings, the min/max opening of the pinching device can be modified as indicated in the Maintenance Instructions.As an alternative, it is also possible to order the valves already programmed, with the desired strokes.
- Some data, e.g. actuating time and power absorption, are directly depending on the electronic control and can vary accordingly
- Valve position fixed on loss of power. “Fail Saving” function available on demand.

S170XA02X1900VU

Operating Instructions

When power is supplied, the valve will reset (red and green LEDs on) and will automatically move to CLOSED position (red LED off).

1. Give an OPEN command
2. Insert the tube in the respective slot

The valve is now operational and by providing the opening or closing pulse (minimum 10ms), the valve will act accordingly.

LED signals meaning:

- Green LED on -> Valve open

Notes

- Valve position fixed on loss of power.
- When the power will be restored, the valve will reset (red and green LEDs on) and will automatically move to CLOSED position (red LED off).

S370XA01X1900VU

Operating Instructions

When power is supplied, the valve will not move and the red LED will be on.

By simultaneously providing the opening and closing pulses, the valve will reset (red, yellow and green LEDs on) and will automatically move to OPEN position (red and yellow LEDs off).

1. Insert the tube in the upper slot
2. Provide a closing command and insert the tube in the lower slot

The valve is now operational and by providing the opening or closing pulse (minimum 10ms), the valve will act accordingly.

LED signals meaning:

- Green LED on -> upper slot open – lower slot closed
- Yellow LED on -> upper slot closed – lower slot open

Notes

- Valve position fixed on loss of power.
- When the power will be restored, the valve will not move and the red LED will be on.
- Remove the tube from the lower slot. If the current position of the valve makes it difficult to remove the tube, use the closing command to facilitate this operation. During this phase, the yellow and red LEDs will be on.
- After removing the tube, provide simultaneously the opening and closing pulses, so that the valve resets (red, yellow and green LEDs on). This way, the valve will automatically move to OPEN position (red and yellow LEDs off). Perform a closing command and insert the tube in the lower slot.

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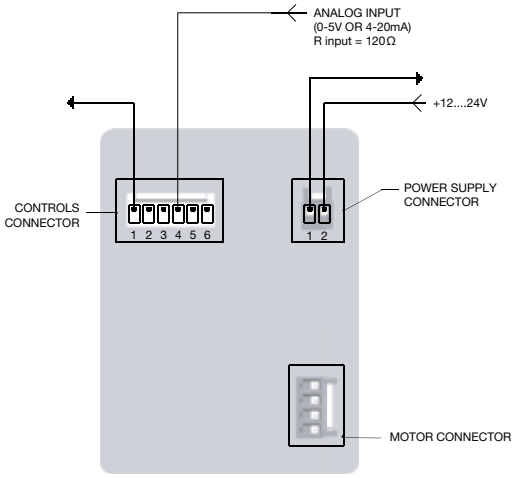
Electrical connection



S170XA01X2900VU
S170XA01X3900VU

Operating Instructions

When power is supplied, the valve will reset (red and green LEDs on) and will automatically move to CLOSED position.

Depending on the version, there will be:

a. green LED on and yellow LED flashing for the “voltage version” [0 ÷ 5]V
b. yellow LED on and green LED flashing for the “current version” [4 ÷ 20]mA.

1. Depending on the chosen version, supply 5V or 20mA input to have a complete opening of the valve.
2. Insert the tube in the respective slot

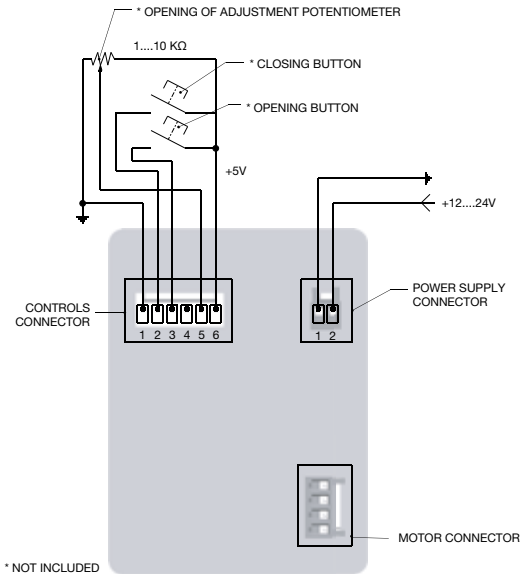
The valve is now operational and by providing a [4 ÷ 20]mA or a [0 ÷ 5]V signal (depending on the chosen version), the valve will act accordingly.

LED signals meaning:

- green LED on and yellow LED flashing -> analogic input on (“voltage version”)
- yellow LED on and green LED flashing -> analogic input on (“current version”)

Notes

- Valve position fixed on loss of power.
- When the power will be restored, the valve will reset (red and green LEDs on) and will automatically move to the position set by the input analog signal.
- For use with different tubings, the min/max opening of the pinching device can be modified as indicated in the Maintenance Instructions.As an alternative, it is also possible to order the valves already programmed, with the desired strokes.
- Some data, e.g. actuating time and power absorption, are directly depending on the electronic control and can vary accordingly
- Valve position fixed on loss of power. “Fail Saving” function available on demand.



S170XA01X4900VU

Operating Instructions

When power is supplied, the valve will reset (red and green LEDs on) and will automatically move to OPEN position (red LED off).

If the position of the potentiometer doesn’t allow a complete opening of the valve (the yellow LED will be on, in addition to the red and green ones), adjust the potentiometer so as to have a complete opening.

1. Insert the tube in the respective slot

The valve is now operational and by providing the opening or closing pulse (minimum 10ms), the valve will act accordingly.

LED signals meaning:

- Green LED on -> Valve open*
- Yellow LED on -> Valve closed

*the opening degree is controlled by the position of the potentiometer.

Notes

- Valve position fixed on loss of power. When the power will be restored, the valve will reset (red and green LEDs on) and will automatically move to OPEN position (red LED off). If the potentiometer is not in complete opening position, the yellow LED will be on.
  NB: With the open valve, it will be possible to adjust the opening degree according to your needs, by adjusting the potentiometer.
- For use with different tubings, the min/max opening of the pinching device can be modified as indicated in the Maintenance Instructions.As an alternative, it is also possible to order the valves already programmed, with the desired strokes.
- Some data, e.g. actuating time and power absorption, are directly depending on the electronic control and can vary accordingly
- Valve position fixed on loss of power. “Fail Saving” function available on demand.

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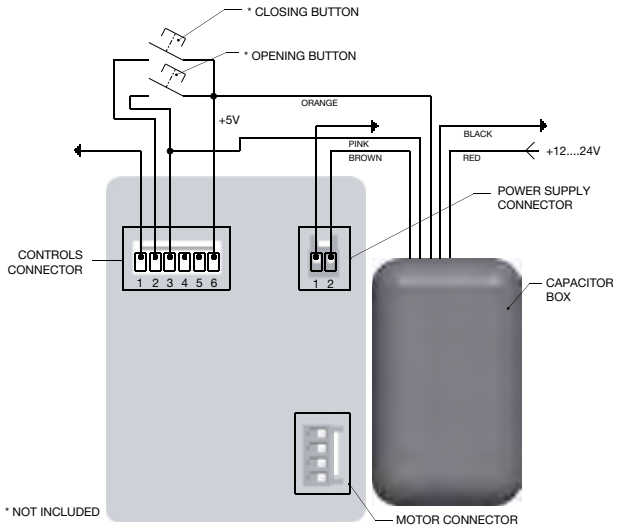
ASCO™ MINIATURE SOLENOID VALVES
STEPPER MOTOR PINCH VALVES

Electrical connection



S170XA01X5900VU

Operating Instructions

When power is supplied, the valve will be in OPEN position (green LED on).

1. Insert the tube in the respective slot

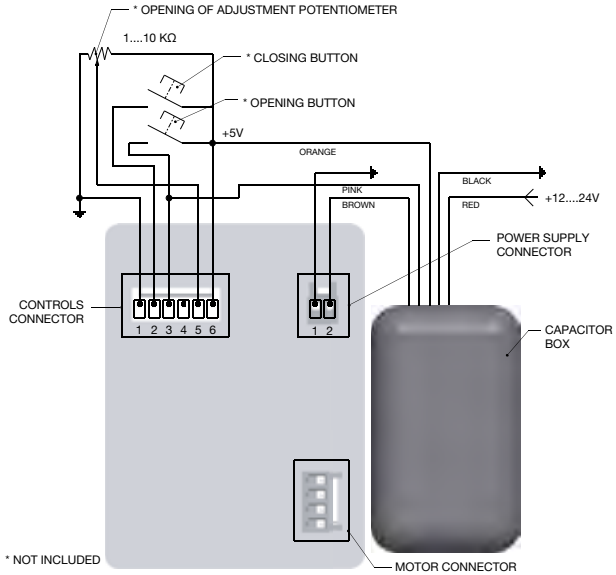
The valve is now operational and by providing the opening or closing pulse (minimum 10ms), the valve will act accordingly.

LED signals meaning:

- Green LED on -> Valve open
- Yellow LED on -> Valve closed

Notes

- The valve, being normally open on loss of power (through the condenser block), will move to OPEN position.
- For use with different tubings, the min/max opening of the pinching device can be modified as indicated in the Maintenance Instructions. As an alternative, it is also possible to order the valves already programmed, with the desired strokes.
- Some data, e.g. actuating time and power absorption, are directly depending on the electronic control and can vary accordingly



S170XA01X8900VU
S170XA01X8901VU

Operating Instructions

When power is supplied, the valve will reset (red and green LEDs on) and will automatically move to OPEN position (red LED off).

If the position of the potentiometer doesn't allow a complete opening of the valve (the yellow LED will be on, in addition to the red and green ones), adjust the potentiometer so as to have a complete opening.

1. Insert the tube in the respective slot

The valve is now operational and by providing the opening or closing pulse (minimum 10ms), the valve will act accordingly.

LED signals meaning:

- Green LED on -> Valve open*
- Yellow LED on -> Valve closed

*the opening degree is controlled by the position of the potentiometer.

Notes

- The normally closed valve will, in case of loss of power (through the capacitor box), move to CLOSED position. The normally open valve will, in case of loss of power (through the capacitor box), move to OPEN position*. NB: With the open valve, it will be possible to adjust the opening degree according to your needs, by adjusting the potentiometer.
- For use with different tubings, the min/max opening of the pinching device can be modified as indicated in the Maintenance Instructions.As an alternative, it is also possible to order the valves already programmed, with the desired strokes.
- Some data, e.g. actuating time and power absorption, are directly depending on the electronic control and can vary accordingly

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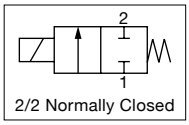
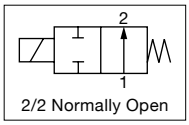
ASCO™ MINIATURE SOLENOID VALVES

LEVER SOLENOID FLUID ISOLATION VALVES

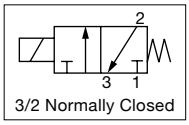
- Lever mechanism isolation valves designed for use with aggressive and corrosive liquids and gases in analytical instrumentation and the chemical manufacturing industries
- Large orifice sizes make these valves ideal for high flow-rate and high pressure applications
- Ideally suited for quickly flushing systems of corrosive media and routing aggressive reagents to chemical reaction vessels and waste containers
- Available in both a 2-Way normally closed and normally open versions, as well as 3-Way normally closed, normally open and universal versions; each with multiple connection options
- Meets all relevant CE directives, and is RoHS compliant
- Typical applications include:
  - Raw-material Chemical Manufacturing
  - Pharmaceutical
  - Chip/Wafer Manufacturing
  - Waste Water Treatment



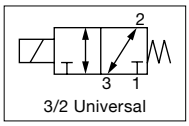
2/2 Normally Closed



2/2 Normally Open



3/2 Normally Closed



3/2 Universal

Fluids*	Temperature Range	Seal Materials*
Air, Inert Gases, Filtered Water, Oil or Liquids	-10 °C to 100 °C (14 °F to 212 °F)	VMQ (silicone) FKM (fluoroelastomer) EPDM (ethlyene-propylene)

* Ensure that the compatibility of the materials in contact with the fluids is verified

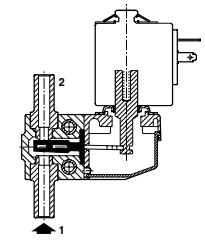
General Valve Information		
Body	PEI (polyetherimide)	G 1/2: PPS (polypropylene sulphide)
Response Time	~ 25ms	
Max. Viscosity	37 cSt (mm^2/s)	

Electrical Characteristics	
Coil Insulation Class	F
Connector	Spade plug (cable Ø6-8mm or Ø6-10mm)
Connector Specification	with coil 6W/6W (BMX) DIN 43650, 11mm, industry standard B, with coil 8W/9W (AMX) ISO 4400/EN 175301-803, form A
Electrical Safety	IEC 335
Electrical Enclosure Protection	Molded IP65 (EN 60529)
Standard Voltages[1]	12 VDC, 24 VDC AC ~: 24 V to 115 V to 230 V/50 Hz (BMX = 50 – 60 Hz)

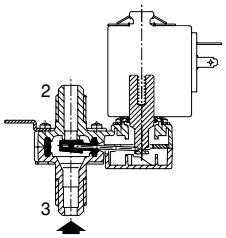
[1] Other voltages and 60 Hz available on request

Prefix Option	Power Ratings				Ambient Temperature Range	Replacement Coil		Type[1]
	Inrush	Holding		Hot/ Cold				
	VA	VA	W	W	°C (°F)	230 V/50 Hz	24 VDC	
SC	16	10	6	6	-10 to 60 (14 to 40)	43005164	43005149	01 (BMX)
	23	14	8	9	-10 to 60 (14 to 40)	43005149	43005144	02 (AMX)
	44	24	8	13	-10 to 60 (14 to 40)	43005320	43005317	03 (FNX)

[1] Refer to the dimensional drawings on the following page



2/2 NC Function



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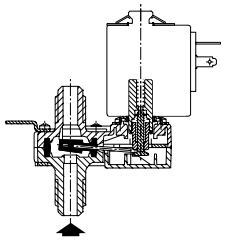
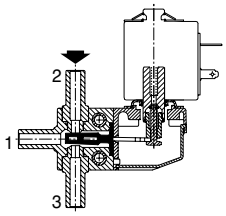
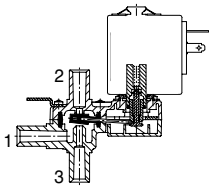

2/2 NO Function



3/2 NC Function



3/2 U Function

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ASCO™ MINIATURE SOLENOID VALVES

LEVER SOLENOID FLUID ISOLATION VALVE

Specifications

Spigot O.D.	Pipe connection	Orifice Size	Flow coefficient		Operating Pressure bar (psi)			Power Rating (W)		Catalog number	Options	
					min.	max.						
mm (inches)		mm (inches)	Kv (m³/h)	Cv		inert gases	liquids	~	=		FKM	EPDM
2/2 NC - Normally closed, VMQ Seals												
8 (0.31)	-	2.7 (0.11)	0.23	0.27	0	5 (72.5) [10/145]	5 (72.5)	6	6	SCH283A003	V	E
8 (0.31)	-	3.4 (0.13)	0.30	0.35	0	3 (43.5) [6/87]	3 (43.5)	6	6	SCH283A004	V	E
11 (0.43)	-	5.5 (0.22)	0.55	0.64	0	1.5 (21.8)	1 (14.5)	8	9	SCH283A010	-	-
-	G 1/4	3.2 (0.13)	0.32	0.37	0	1.5 (21.8)	1.5 (21.8)	8	9	SCG283A013	-	-
-	G 1/4	5.5 (0.22)	0.55	0.64	0	1.5 (21.8)	1 (14.5)	8	9	SCG283A014	-	-
2/2 NC - Normally closed, EPDM Seals												
11 (0.43)	-	5.5 (0.22)	0.55	0.64	0	4.5 (65.3)	1 (14.5)	8	9	SCH283A008E	V	-
-	G 1/4	3.2 (0.13)	0.32	0.37	0	10 (145)	2.4 (34.81)	8	9	SCG283A011E	V	-
-	G 1/4	5.5 (0.22)	0.55	0.64	0	4.5 (65.3)	1 (14.5)	8	9	SCG283A012E	V	-
-	G 1/2	10 (0.394)	1.6	1.85	0	1.6 (23.2)	0.25 (3.63)	13	13	SCG283C006E	V	-
2/2 NO - Normally open, VMQ Seals												
8 (0.31)	-	3.4 (0.13)	0.30	0.35	0	3 (43.5) [6/87]	3 (43.5)	6	6	SCH283A016	V	E
2/2 NO - Normally open, FKM Seals												
11 (0.43)	-	5.5 (0.22)	0.55	0.64	0	1.5 (21.8)	1 (14.5)	8	9	SCH283A018V	-	-
3/2 NC - Normally closed, VMQ Seals												
8 (0.31)	-	3.4 (0.13)	0.30	0.35	0	1 (14.5)	1 (14.5)	6	6	SCH383A003	V	E
3/2 NO - Normally open, FKM Seals												
8 (0.31)	-	3.4 (0.13)	0.30	0.35	0	2.5 (36.2)	2 (29)	6	6	SCH383A004V	-	-
-	G 1/2	9 (0.35)	1.6	1.85	0	0.4 (5.8)	-	13	-*	SCG383C006	-	-
3/2 NO - Normally open, EPDM Seals												
8 (0.31)	-	3.4 (0.13)	0.30	0.35	0	2.5 (36.2)	2 (29)	6	6	SCH383A004E	-	-
3/2 U - Universal, VMQ Seals												
11 (0.43)	-	3.2 (0.12)	0.28	0.32	0	1.5 (21.8)	1.5 (21.8)	8	9	SCH383A007	V	E
-	G 1/4	3.2 (0.12)	0.28	0.32	0	1.5 (21.8)	1.5 (21.8)	8	9	SCG383A008	V	E

* AC Version available only
[ ] Value for pressure with FKM and EPDM seals

How to Order

SC H 283A0xx V xx

- **Prefix** — SC
- **Pipe Thread** — H
- **Catalog Number** — 283A0xx
- **Seal Material** — V
  - V = FKM
  - E = EPDM
- **Voltage** — xx
  - 12 = 12 VDC
  - 24 = 24 VDC

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ASCO™ MINIATURE SOLENOID VALVES

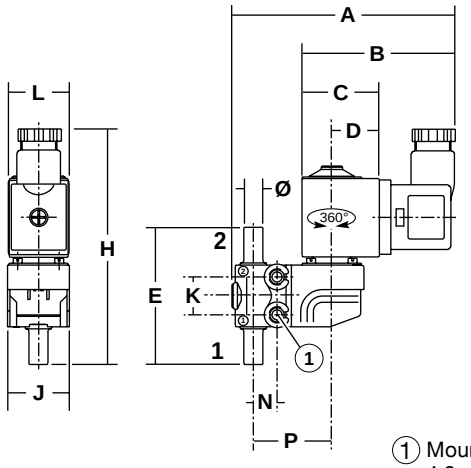
LEVER SOLENOID FLUID ISOLATION VALVE

Dimensions: mm (inches)

TYPE 01
Prefix "SC" Solenoid
DIN 43650

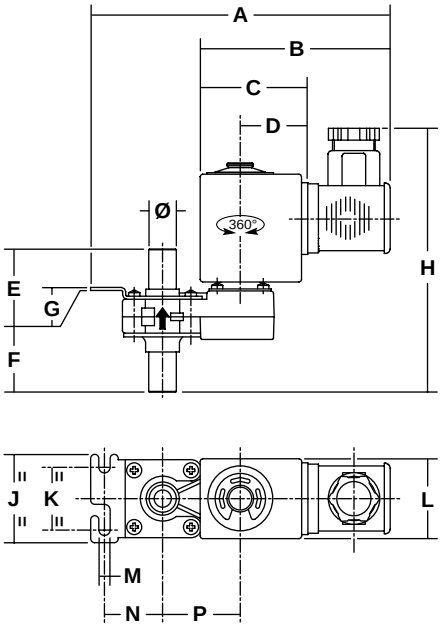
TYPE 02
Prefix "SC" Solenoid
ISO 4400

SCH283A003/A004/A016



① Mounting: 2 holes
4.3mm (0.17in)

SCH283A010/A008/A018V



Pressure inlet:
NC function: orifice 1 (type 01) or arrow on body (type 02)
NO function: orifice 2 (type 01) or arrow on body (type 02)

Type	Prefix Option	Catalog Number	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Weight[2] kg
01	SC	SCH283A003/A004	94 (3.7)	64.5 (2.54)	33.5 (1.32)	21 (0.83)	58 (2.28)	-	-	97 (3.82)	26 (1.02)	16 (0.63)	25 (0.98)	-	10 (0.39)	33 (1.30)	0.170
		SCH283A016															0.200
02	SC	SCH283A010/ A008E/018V	121.5 (4.78)	78 (3.07)	43 (1.69)	27 (1.06)	16.5 (0.65)	40.5 (1.59)	1.2 (0.047)	105 (4.13)	35 (1.38)	25 (0.98)	32 (1.26)	4.5 (0.18)	23 (0.91)	31 (1.22)	0.285

[2] Including coil(s) and connector(s)

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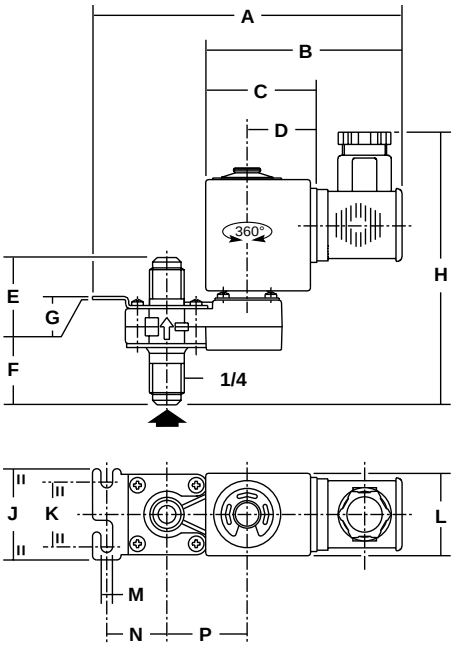
Dimensions: mm (inches)

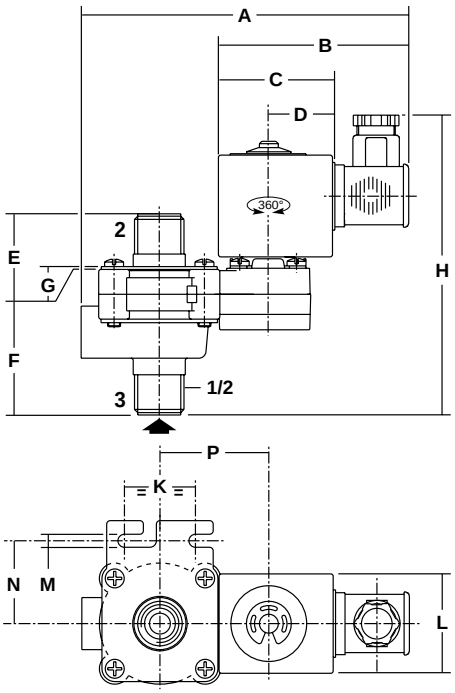
TYPE 01
Prefix "SC" Solenoid
ISO 4400

TYPE 02
Prefix "SC" Solenoid
ISO 4400

SCG283A011/012/ 013/014/019V



SCG283C006



Pressure inlet:
NC function: arrow on body (type 01) or orifice 3 (type 02)
NO function: arrow on body (type 01)

Type	Prefix Option	Catalog Number	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Weight[2] kg
01	SC	SCG283A011E/ 012E/013/014/019V	121.5 (4.78)	78 (3.07)	43 (1.69)	27 (1.06)	16.5 (0.65)	40.5 (1.59)	1.2 (0.047)	105 (4.13)	35 (1.38)	25 (0.98)	32 (1.26)	4.5 (0.177)	23 (0.906)	31 (1.22)	0.285
02	SC	SCG283C006E	142.5 (5.61)	84 (3.31)	49 (1.93)	28 (1.10)	23.5 (0.93)	61.5 (2.42)	1.2 (0.047)	128 (5.04)	-	30 (1.18)	42 (1.65)	5.5 (0.217)	35 (1.38)	46 (1.81)	0.57

[2] Including coil(s) and connector(s).

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ASCO™ MINIATURE SOLENOID VALVES

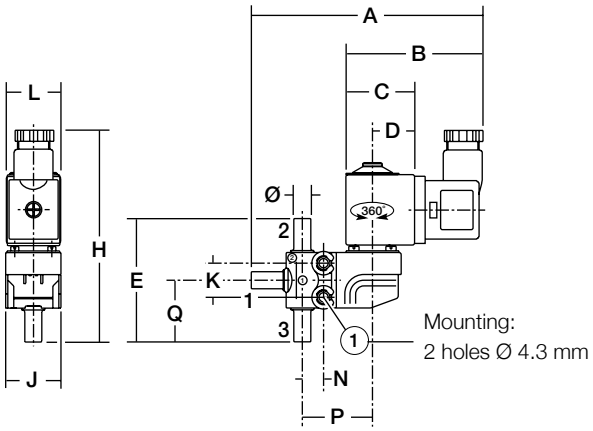
LEVER SOLENOID FLUID ISOLATION VALVE

Dimensions: mm (inches)

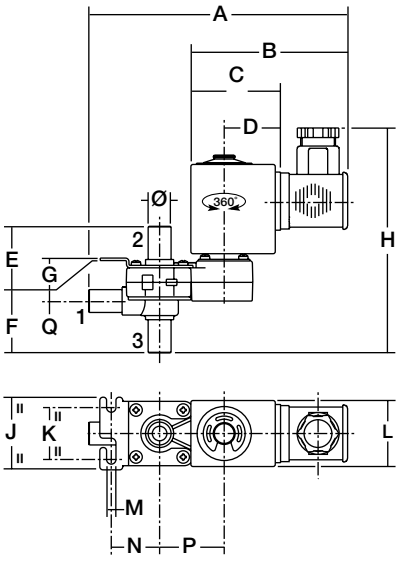
TYPE 01
Prefix "SC" Solenoid
DIN 43650

TYPE 02
Prefix "SC" Solenoid
ISO 4400

SCH383A003 / A004V / A004E



SCH383A007



Pressure inlet:
NC function: orifice 2 (type 01)
NO function: orifice 3 (type 01)
U function: all orifices (type 02)

Type	Prefix Option	Catalogue number	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	Weight[2] kg
01	SC	SCH383A003/A004V/ A004E	111 (4.37)	64.5 (2.54)	33.5 (1.32)	21 (0.83)	58 (2.28)	-	-	97 (3.82)	26 (1.02)	16 (0.63)	25 (0.98)	-	10 (0.39)	33 (1.30)	29 (1.14)	0.200
02	SC	SCH383A007	127 (5.0)	78 (3.07)	43 (1.69)	27 (1.06)	16.5 (0.65)	40.5 (1.59)	1.2 (0.05)	105 (4.13)	35 (1.38)	25 (0.98)	32 (1.26)	4.5 (0.18)	23 (0.91)	31 (1.22)	19.5 (0.77)	0.345

[2] Including coil(s) and connector(s).

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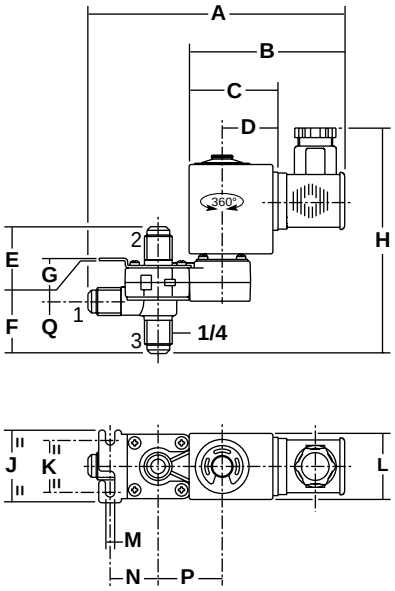
Dimensions: mm (inches)

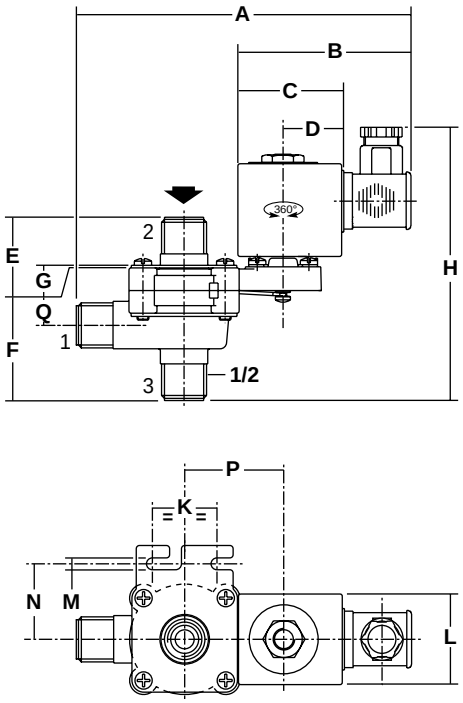
TYPE 01
Prefix "SC" Solenoid
ISO 4400

SCG383A008

TYPE 02
Prefix "SC" Solenoid
ISO 4400

SCG383C006





Type	Prefix option	Catalogue number	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	Weight[2] kg
01	SC	SCG383A008	127 (5.0)	78 (3.07)	43 (1.69)	27 (1.06)	16.5 (0.65)	44.5 (1.75)	1.2 (0.05)	109 (4.29)	35 (1.38)	25 (0.98)	32 (1.26)	4.5 (0.18)	23 (0.91)	31 (1.22)	19.5 (0.77)	0.345
02	SC	SCG383C006	159 (6.26)	84 (3.31)	49 (1.93)	28 (1.10)	23.5 (0.93)	61.5 (2.42)	1.2 (0.05)	128 (5.04)	-	30 (1.18)	42 (1.65)	5.5 (0.22)	35 (1.38)	46 (1.81)	26.5 (1.04)	0.51

[2] Including coil(s) and connector(s).

Options

- Valves can also be supplied with FKM (fluoroelastomer) and EPDM (ethylene-propylene) seals.
- Plug with visual indication and peak voltage suppression or with cable length of 2m (78.7in)

Installation

- The solenoid valves can be mounted in any position without affecting operation. For optimum performance mount solenoid vertical and upright
- Replacement coils are available: BMX: DC: 12 V, cat. no.: **43005158** /AC: 24 V, cat. no.: **43005161**; 115 V, cat. no.: **43005162**
  AMX: DC: 12 V, cat. no.: **43005143**/AC: 24 V, cat. no.: **43005146**; 115 V, cat. no.: **43005147**

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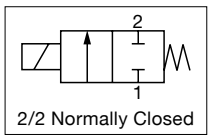
Asco

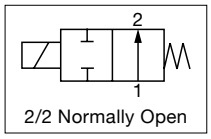
ASCO™ MINIATURE SOLENOID VALVES

PINCH VALVES, COMPACT 2-WAY SOLENOID

- The 284 Series are 2-Way normally closed and normally open solenoid operated pinch valves designed for use with highly aggressive or high-purity liquids in analytical and medical instrumentation, and industrial applications
- Hermetic separation of control mechanism and the fluid within the tubing prevents particulate contamination caused by friction of moving parts, assuring maximum purity of liquids
- Removable and rotatable electrical coils allow for easy installation and worry-free maintenance
- Bi-directional flow for exceptional versatility
- Available in a large range of body sizes to accommodate a wide variety of tubing sizes
- Meets all relevant CE directives, and is RoHS compliant
- Typical applications include:
  - Hemodialysis
  - Urinary Collection Systems
  - Intravenous (IV) Systems
  - Drug Dispensing



2/2 Normally Closed



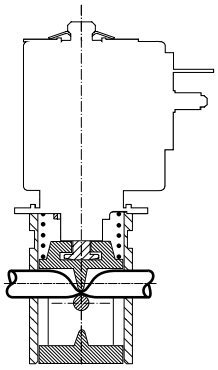
2/2 Normally Open

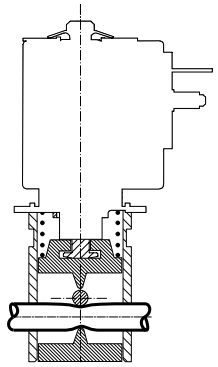
Fluids*	Temperature Range
Air, Inert Gases, Water, Oil or Liquids	0 °C to 50 °C (32 °F to 122 °F)

* Ensure that the compatibility of the materials in contact with the fluids is verified

General Valve Information*		
Body	Aluminum, anodized	POM (Graphite-reinforced polyacetal)
Pinch Mechanism	POM (Graphite-reinforced polyacetal)	
Others	Stainless Steel	
Guide Tube	Nickel-plated brass	
Coil frame		Galvanized steel
Recommended Tubing	VMQ (silicone) (max. Hardness: 50 Shore A) Tubing not supplied with valve	VMQ (silicone) (max. Hardness: 50 Shore A) 30cm (12in) tubing supplied with valve

* Ensure that the compatibility of the materials in contact with the fluids is verified


2/2 Normally Closed


2/2 Normally Open

Electrical Characteristics		
	Aluminium Body	**POM Body**
Coil Insulation Class	F	A
Connector	Spade plug; cable Ø4-6mm (0.16-0.24in), Ø6-10mm (0.24-0.40in)	305mm (12in) Lead Wires
Connector Specification	4 W (DNX-4) DIN 43650, 9.4mm (0.37in), industry standard B 6 W/13 W (AMX/FNX) ISO 4400/EN 175301-803, form A	
Electrical Safety	IEC 335	IEC 335
Electrical Enclosure Protection	Coil type 01 = IP65 Coil type 02-03 = IP65	IP30 (EN 60529)
Standard Voltages [1]	12 VDC, 24 VDC	12 VDC, 24 VDC
Power Consumption	4 W, 9 W, 13 W	2.8 W
Response Time	< 20ms	<10 ms

[1] Other voltages on request

Prefix Option	Power Ratings				Ambient Temperature Ranges	Replacement Coil		Type [2]
	Inrush ~	Holding ~		Hot/Cold =				
	VA	VA	W	W	°C (°F)	12 VDC	24 VDC	
SC	-	-	-	4	-10 to 60 (14 to 140)	43005268	43005269	01 (DNX-4)
				9		43005143	43005144	02 (AMX)
				13		43005316	43005317	03 (FNX)
				2.8		-	-	-

[2] Refer to the dimensional drawings on the following page

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Specifications

Tube I.D.	Tube O.D.	Pinch Force	Operating Pressure bar (psi)			Power Rating		Catalog Number		
			min.	max.				Aluminium	POM	
mm (inches)	mm (inches)	daN		air, inert gas	liquids	W			24 VDC	12 VDC
2/2 NC - Normally Closed										
0.76 (0.030)	1.65 (0.065)	0.18	0	0.8 (11.6)	0.8 (11.6)	-	4	SCH284B001	-	-
1.02 (0.040)	2.16 (0.085)	0.22	0	0.8 (11.6)	0.8 (11.6)	-	4	SCH284B002	-	-
1.57 (0.062)	3.18 (0.125)	0.28	0	0.8 (11.6)	0.8 (11.6)	-	4	SCH284B003	-	-
1.98 (0.078)	3.18 (0.125)	0.25	0	0.8 (11.6)	0.8 (11.6)	-	4	SCH284B004	-	-
2.7 (0.106)	4.9 (0.193)	0.65	0	0.8 (11.6)	0.8 (11.6)	-	9	SCH284A005	-	-
4.8 (0.189)	7.9 (0.311)	1.1	0	0.8 (11.6)	0.8 (11.6)	-	13	SCH284B006	-	-
6.4 (0.252)	9.5 (0.374)	1.4	0	0.8 (11.6)	0.8 (11.6)	-	13	SCH284B007	-	-
1.6 (0.063)	3.2 (0.126)	0.28	0	1.5 (21.8)	1.5 (21.8)	-	2.8	-	P284A020LCA00V1	P284A020LCA00V3
1.6 (0.063)	3.2 (0.126)	0.28	0	1.5 (21.8)	1.5 (21.8)	-	2.8	-	P284A021LCA00V1 2)	P284A021LCA00V3 2)
2) P284A021LCA00V1/P284A021LCA00V3 = The flange is rotatable with 90° (please see "Pic. 2" on following page)										
2/2 NO - Normally Open										
0.76 (0.030)	1.65 (0.065)	0.18	0	0.8 (11.6)	0.8 (11.6)	-	4	SCH284B009	-	-
1.02 (0.040)	2.16 (0.085)	0.22	0	0.8 (11.6)	0.8 (11.6)	-	4	SCH284B010	-	-
1.57 (0.062)	3.18 (0.125)	0.28	0	0.8 (11.6)	0.8 (11.6)	-	4	SCH284B011	-	-
1.98 (0.078)	3.18 (0.125)	0.25	0	0.8 (11.6)	0.8 (11.6)	-	4	SCH284B012	-	-
2.7 (0.106)	4.9 (0.193)	0.65	0	0.8 (11.6)	0.8 (11.6)	-	9	SCH284A013	-	-
4.8 (0.189)	7.9 (0.311)	1.1	0	0.8 (11.6)	0.8 (11.6)	-	13	SCH284B014	-	-
6.4 (0.252)	9.5 (0.374)	1.4	0	0.8 (11.6)	0.8 (11.6)	-	13	SCH284B015	-	-
1.6 (0.063)	3.2 (0.126)	0.28	0	1.5 (21.8)	1.5 (21.8)	-	2.8	-	P284A022LCA00V1	P284A022LCA00V3
1.6 (0.063)	3.2 (0.126)	0.28	0	1.5 (21.8)	1.5 (21.8)	-	2.8	-	P284A023LCA00V1 2)	P284A023LCA00V3 2)

2) P284A023LCA00V1/P284A023LCA00V3 = The flange is rotatable with 90° (please see "Pic. 2" on following pages)

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ASCO™ MINIATURE SOLENOID VALVES

PINCH VALVES, COMPACT 2-WAY SOLENOID

How to Order

Aluminium body

SC H 284B001 xxxx

Prefix

Pipe Thread

Catalog Number
284B001
284B015

Voltage
12DC
24DC

How to Order

POM Body

P 284 A 020 LC A00 V1

Connection Type
P = No Direct Connection

Product Series
284 = 2-Way Pinch Solenoid Valve

Item Number
020 = NC 1.6 I.D. x 3.2 O.D. Pinch Valve 1.5 bar
021 = NC 1.6 I.D.x 3.2 O.D. Pinch Valve 1.5 bar Rotatable Flange
022 = NO 1.6 I.D. x 3.2 O.D. Pinch Valve 1.5 bar
023 = NO 1.6 I.D. x 3.2 O.D. Pinch Valve 1.5 bar Rotatable Flange

Voltage
V3 = 12 VDC
V1 = 24 VDC

Options
A00 = No Options

Connection Type
LC = Leaded Coil 305mm (12in) Leads

Options

- Flexible tubes having to use an external guiding device for optimum support (see dimensions):
  - With an outside diameter lower than 2.2mm (0.087in) (catalog numbers **SCH284B001** to **..B004**)
  - With an outside diameter lower than 3.5mm (0.138in) (catalog number **SCH284A005**)
  - With an outside diameter lower than 6mm (0.236in) (catalog numbers **SCH284B006** and **..007**)
- Contact us for information regarding the usage of different tubing other than those recommended
- Plug with visual indication and peak voltage suppression or with cable length of 2m (78.7in)

Installation

- The solenoid valves can be mounted in any position without affecting operation, however, for optimum performance it is recommended that they be fitted with the solenoid operator at the top
- Fixing plate built in between the body and the coil for assembly in a bank on a base plate
- Flexible tubes are not included with valve
- In case the tubing is not placed in its seat, the solenoid valve could operate incorrectly.

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Dimensions: mm (inches)

Type 01

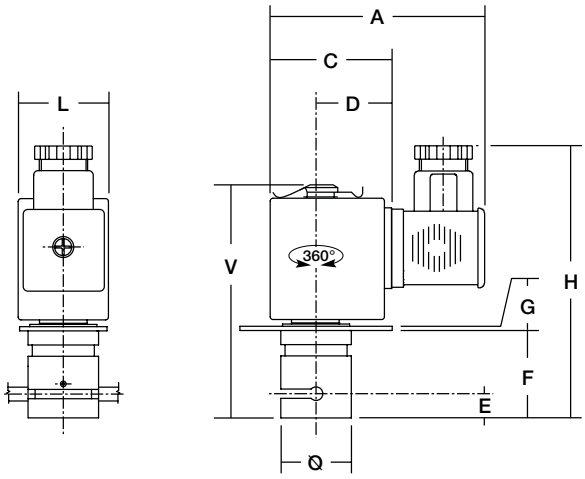
Prefix "SC" solenoidd
IEC 335/DIN 43650
IP65

Type 01: SCH284B001/002/003/004/ 009/010/011/012

Type 02-03

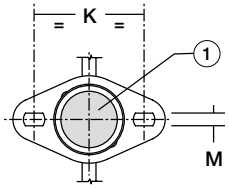
Prefix "SC" solenoid
IEC 335/ISO 4400
IP65

Type 02: SCH284A005/A013
Type 03: SCH284B006/B007/B014/B015

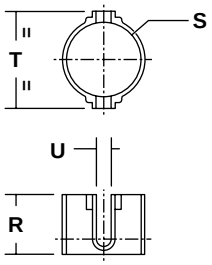


① Impulse Manual Operator

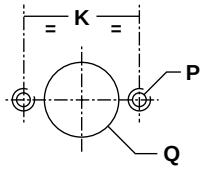
Bottom View



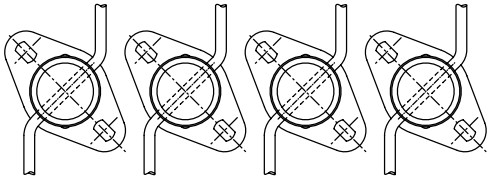
Tube Guiding Device



Arrangement for Mounting



Example of Banked Assembly



Type	Prefix Option	Catalog Number	Ø	A	C	D	E	F	G	H	K	L	M	P	Q	R	S	T	U	V	Weight[1] kg	Tube Guiding Device: Catalog Number	Tube Guiding Device: Weight[1] kg
01	SC	SCH284B001/002 /003/004/009 /010/011/012	16 (0.63)	49.5 (1.95)	23.5 (0.93)	15 (0.60)	11 (0.43)	20 (0.79)	1 (0.04)	66 (2.60)	24 (0.95)	17 (0.67)	3.3 (0.13)	M3	16.5 (0.65)	10.7 (0.42)	16 (0.63)	24 (0.95)	2.2 (0.09)	51.2 (2.02)	0.06	C140094	0.005
02	SC	SCH284A005/ A013	25 (0.98)	78 (3.07)	43 (1.69)	27 (1.06)	17.5 (0.69)	32 (1.26)	1.5 (0.06)	99 (3.90)	39 (1.54)	32 (1.26)	4.5 (0.18)	M4	25.5 (1.00)	14 (0.55)	25 (0.98)	33 (1.30)	3.2 (0.13)	82.5 (3.25)	0.28	C140095	0.009
03	SC	SCH284B006/ B007 /B014/B015	30 (1.18)	84 (3.31)	49 (1.93)	28 (1.10)	24.5 (0.96)	43.5 (1.71)	1.5 (0.06)	99 (3.90)	45.5 (1.80)	42 (1.65)	4.5 (0.18)	M4	30.5 (1.20)	24 (0.94)	30 (1.18)	39 (1.54)	6 (0.24)	99 (3.90)	0.47	C140096	0.015

[1] Including coil(s) and connectors

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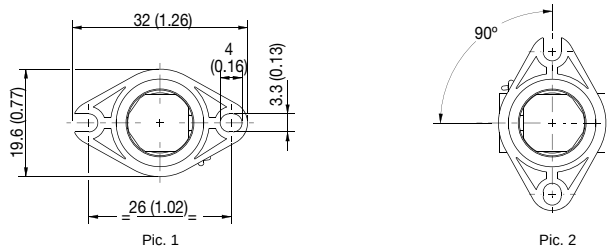
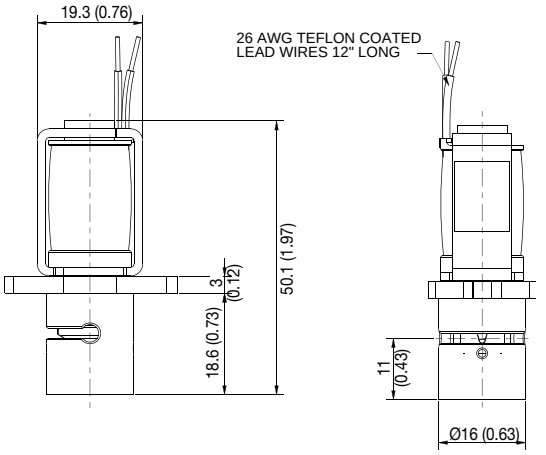
ASCO™ MINIATURE SOLENOID VALVES

PINCH VALVES, COMPACT 2-WAY SOLENOID

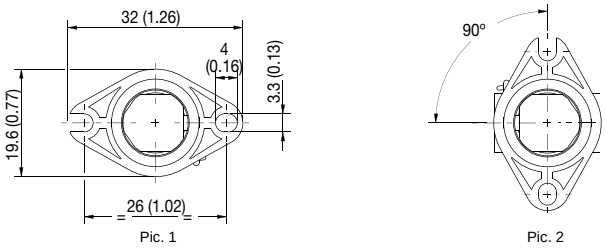
Dimensions: mm (inches)

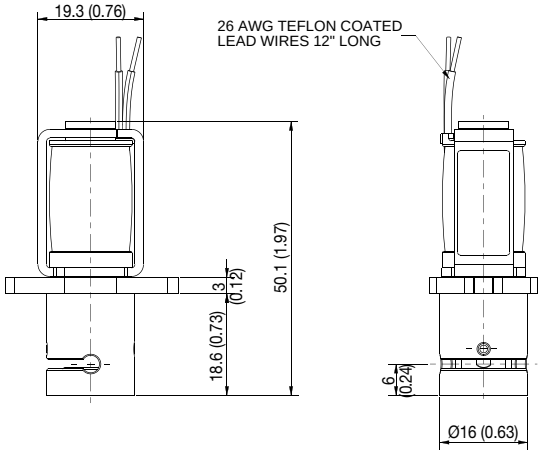
2/2 Normally Closed



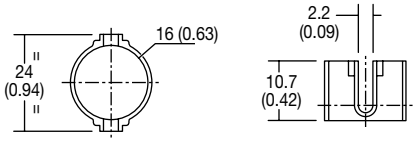


2/2 Normally Open

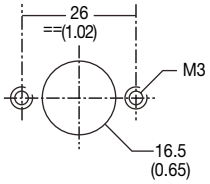




Tube Guiding Device



Arrangement for Wall-fitting



Catalog Number	Weight kg
P284A020LCA00V1/V3	0.04
P284A021LCA00V1/V3	
P284A022LCA00V1/V3	
P284A023LCA00V1/V3	

Tube Guiding Device	
Catalog Number	Weight kg
25978-01	0.005

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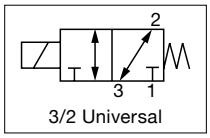
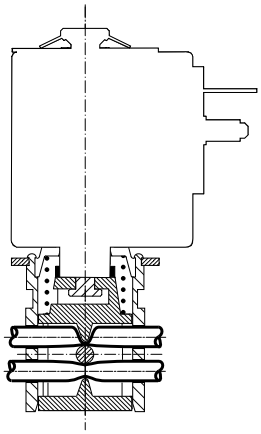
ASCO™ MINIATURE SOLENOID VALVES

PINCH VALVES, COMPACT 3-WAY SOLENOID

- The 384 Series is a 3-Way universal solenoid-operated pinch valve designed for use with highly aggressive or high-purity liquids in analytical and medical instrumentation, and industrial applications
- Hermetic separation of control mechanism and the fluid within the tubing prevents particulate contamination caused by friction of moving parts, assuring maximum purity of liquids
- Available in a large range of body sizes to accommodate a wide variety of tubing sizes
- Removable and rotatable electrical coils allow for easy installation and worry-free maintenance
- Bi-directional flow for exceptional versatility
- Meets all relevant CE directives, and is RoHS compliant
- Typical applications include:
  - Hemodialysis
  - Urinary Collection Systems,
  - Intravenous (IV) Systems
  - Drug Dispensing



3/2 Universal



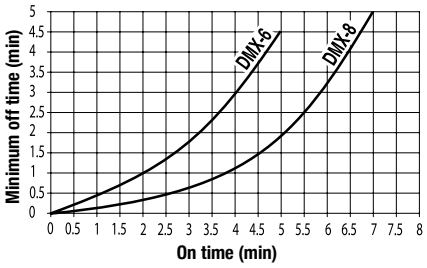
Fluids*	Temperature Range
Air, Inert Gases, Water, Oil or Liquids	0 °C to 50 °C (32 °F to 122 °F)

* Ensure that the compatibility of the materials in contact with the fluids is verified

General Valve Information*		
Body	**Aluminum, anodized**	**POM (Graphite-reinforced polyacetal)**
Pinch Mechanism	POM (Graphite-reinforced polyacetal)	
Others	Stainless Steel	
Guide Tube	Nickel-plated Brass	
Coil frame		Galvanized steel
Recommended Tubing	VMQ (silicone) (max. hardness: 50 Shore A) (Tubing not supplied with valve)	VMQ (silicone) (max. Hardness: 50 Shore A) 30cm (12in) tubing supplied with valve

USE IN INTERMITTENT SERVICE

Minimum waiting time between each application of power



Electrical Characteristics		
	Aluminium body	**POM body**
Coil Insulation Class	F	F
Connector	Spade plug; cable Ø4-6mm (0.16-0.24in), Ø6-10mm (0.24-0.40in)	305mm (12in) Lead Wires
Connector Specification	4 W/8 W/6 W (DMX); DIN 43650, 9.4 mm, industry standard B; 6 W/13 W (AMX/FNX); ISO 4400/EN 175301-803, form A	
Electrical Safety	IEC 335	IEC 335
Electrical Enclosure Protection	Coil type 01 = IP65 / Coil type 02-03 = IP65	IP30 (EN 60529)
Standard Voltages1	12 VDC, 24 VDC	12 VDC, 24 VDC
Power Consumption	4W, 6W, 8W, 9W, 13W	3.5W
Response Time	< 20ms	< 10ms

1 Other voltages on request

Prefix Option	Power Ratings				Ambient Temperature Ranges	Replacement Coil		Type2
	Inrush	Holding		Hot/Cold				
	VA	VA	W	W	°C (°F)	12 VDC	24 VDC	
SC	-	-	-	4	-10 to 60 (14 to 140)	43005268	43005269	01 (DNX-4)
				8		500701-001	500701-002	
				6		500701-003	500701-004	
				9		43005143	43005144	02 (AMX)
				13		43005316	43005317	03 (FNX)

2 Refer to the dimensional drawings on the following page

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ASCO™ MINIATURE SOLENOID VALVES

PINCH VALVES, COMPACT 3-WAY SOLENOID

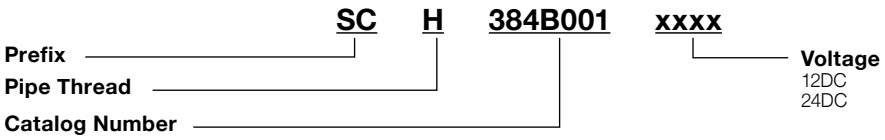
Specifications

Tube I.D.	Tube O.D.	Pinch Force	Operating Pressure bar (psi)			Power Rating		Catalog Number		
			min.	max.					POM body	
mm (inches)	mm (inches)	daN		inert gases	liquids	W		Aluminium body	24 VDC	12 VDC
0.76 (0.030)	1.65 (0.065)	0.12	0	0.8 (11.6)	0.8 (11.6)	-	4	SCH384B004	-	-
1.02 (0.040)	2.16 (0.085)	0.18	0	0.8 (11.6)	0.8 (11.6)	-	4	SCH384B001	-	-
1.57 (0.062)	3.18 (0.125)	0.22	0	0.8 (11.6)	0.8 (11.6)	-	8	SCH384B002[3]	-	-
1.98 (0.078)	3.18 (0.125)	0.18	0	0.8 (11.6)	0.8 (11.6)	-	6	SCH384B003[3]	-	-
3.4 (0.132)	4.7 (0.183)	0.4	0	0.8 (11.6)	0.8 (11.6)	-	9	SCH384A005	-	-
4.8 (0.187)	7.9 (0.313)	0.85	0	0.8 (11.6)	0.8 (11.6)	-	13	SCH384B006	-	-
6.4 (0.250)	9.5 (0.375)	1.1	0	0.8 (11.6)	0.8 (11.6)	-	13	SCH384B007	-	-
1.6 (0.063)	3.2 (0.126)	0.22	0	1.5 (21.8)	1.5 (21.8)	-	3.5	-	P384A024LCA00V1	P384A024LCA00V3
1.6 (0.063)	3.2 (0.126)	0.22	0	1.5 (21.8)	1.5 (21.8)	-	3.5	-	P384A025LCA00V1[4]	P384A025LCA00V3[4]

[3] Observe the minimum of time stated, see graph above [4] The flange is rotatable with 90° (please see "Pic. 2" on following page)

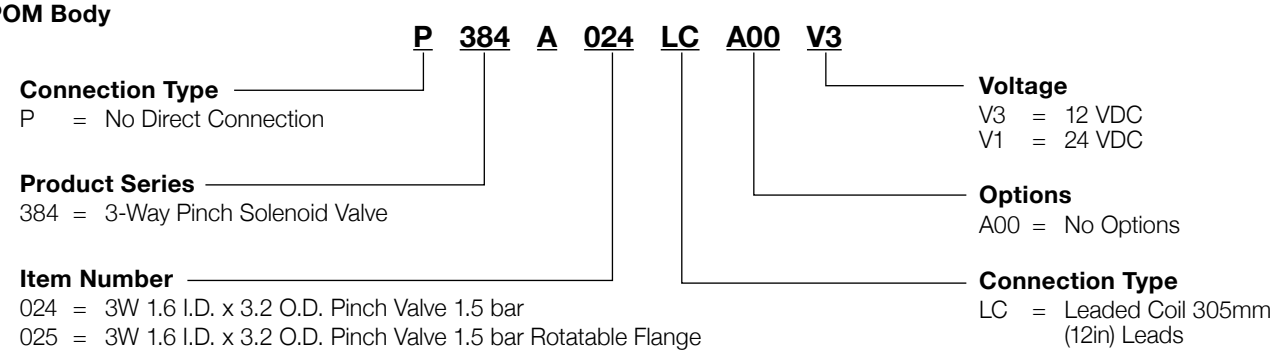
How to Order

Aluminum body



How to Order

POM Body



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ASCO™ MINIATURE SOLENOID VALVES

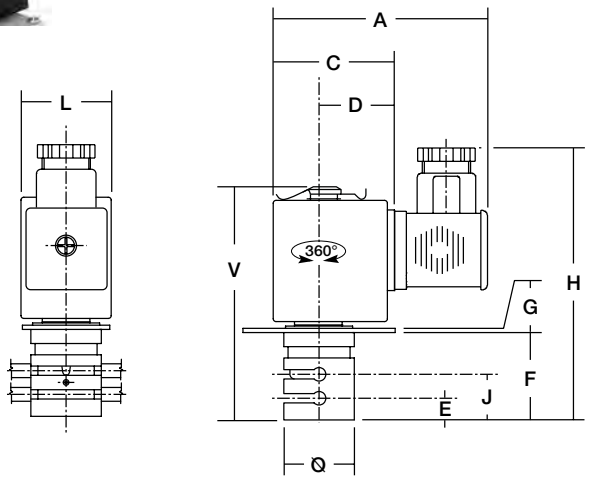
PINCH VALVES, COMPACT 3-WAY SOLENOID

Dimensions (Aluminium body): mm (inches)

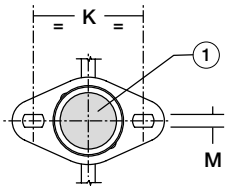
Type 01

Prefix "SC" solenoidd
IEC 335/DIN 43650
IP65

Type 01: SCH384B001/0002/003/004



Bottom View



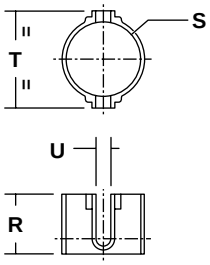
(1) Impulse Manual Operator

Type 02-03

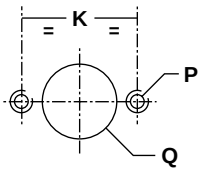
Prefix "SC" solenoid
IEC 335/ISO 4400
IP65

Type 02: SCH384A005
Type 03: SCH384B006/B007

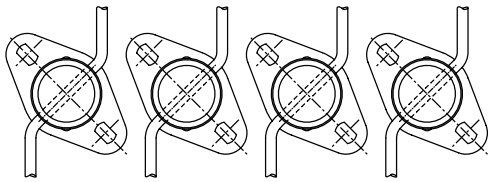
Tube Guiding Device



Arrangement for Wall-Fitting



Example of Banked Assembly



Type	Prefix Option	Catalog Number	Ø	A	C	D	E	F	G	H	K	L	M	P	Q	R	S	T	U	V	Weight[1] kg
01	SC	SCH384B001/002 /003/004	16 (0.63)	49.5 (1.95)	23.5 (0.92)	15 (0.59)	11 (0.24)	20 (0.79)	1 (0.04)	66 (2.60)	24 (0.43)	17 (0.67)	3.3 (0.13)	M3	16.5 (0.65)	10.7 (0.42)	16 (0.63)	24 (0.94)	2.2 (0.09)	51.2 (2.02)	0.06
02	SC	SCH384A005	25 (0.98)	78 (3.07)	43 (1.69)	27 (1.06)	17.5 (0.41)	32 (1.26)	1.5 (0.06)	99 (3.90)	39 (1.54)	32 (1.26)	3.3 (0.18)	M4	25.5 (1.00	14 (0.55)	25 (0.98)	33 (1.30)	3.2 (0.12)	82.5 (3.25)	0.30
03	SC	SCH384B006/ B007	30 (1.18)	84 (3.31)	49 (1.93)	28 (1.10)	24.5 (0.96)	43.5 (1.71)	1.5 (0.06)	99 (3.90)	45.5 (1.79)	42 (1.65)	4.5 (0.18)	M4	30.5 (1.20)	24 (0.94)	30 (1.18)	39 (1.54)	6 (0.24)	99 (3.90)	0.45

Tube Guiding Device	
Catalog Number	Weight[1] kg
C140094	0.005
C140095	0.009
C140096	0.015

[1] Including coil(s) and connectors

Options (Aluminium body)

- Flexible tubes having to use an external guiding device for optimum support (see dimensions):
  - With an outside diameter lower than 2.2mm (0.087in) (catalog numbers **SCH384B001** to ..**B004**)
  - With an outside diameter lower than 3.5mm (0.138in) (catalog number **SCH384A005**)
  - With an outside diameter lower than 6mm (0.240in) (catalog numbers **SCH384B006** and **..007**)
  - Contact us for information regarding the usage of different tubing other than those recommended
- Plug with visual indication and peak voltage suppression or with cable length of 2m (78.7in)

Installation (Aluminium body)

- The solenoid valves can be mounted in any position without affecting operation, however, for optimum performance it is recommended that they be fitted with the solenoid operator at the top
- Fixing plate built in between the body and the coil for assembly in a bank on a base plate
- Flexible tubes are not included in our supply
- In case the tubing is not placed in its seat, the solenoid valve could operate incorrectly.

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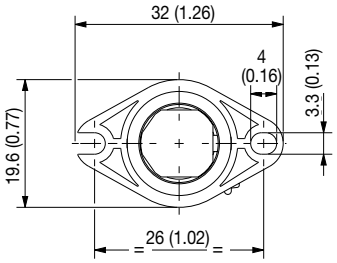
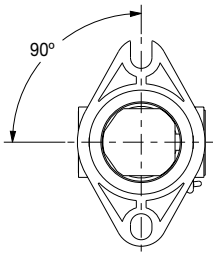
ASCO™ MINIATURE SOLENOID VALVES

PINCH VALVES, COMPACT 3-WAY SOLENOID

Dimensions (POM body): mm (inches)

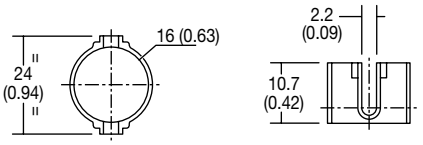


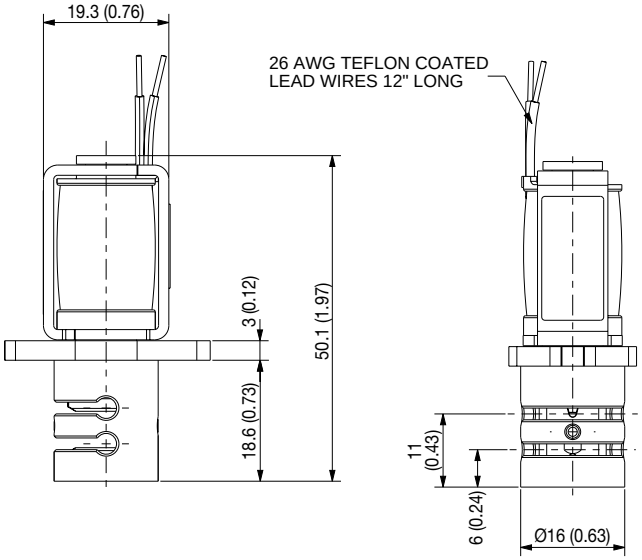
Pic. 1



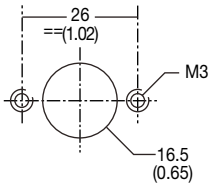
Pic. 2

Tube Guiding Device





Arrangement for Wall-fitting



Catalog Number	Weight[1] kg
P384A024LCA00V1/V3	0.04
P384A025LCA00V1/V3	

[1] Including coil(s) and connectors

Tube Guiding Device	
Catalog Number	Weight[1] kg
25978-01	0.005

Options (POM body)

- Flexible tubes having to use an external guiding device for optimum support (see dimensions):
- With an outside diameter lower than 2.2mm (0.087in)
- Contact us for information regarding the usage of different tubing other than those recommended

Installation (POM body)

- The solenoid valves can be mounted in any position without affecting operation, however, for optimum performance it is recommended that they be fitted with the solenoid operator at the top
- Fixing plate built in between the body and the coil for assembly in a bank on a base plate
- In case the tubing is not placed in its seat, the solenoid valve could operate incorrectly.

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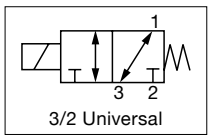
ASCO™ MINIATURE SOLENOID VALVES

ROCKER MECHANISM, FLUID ISOLATION VALVES

SERIES
385

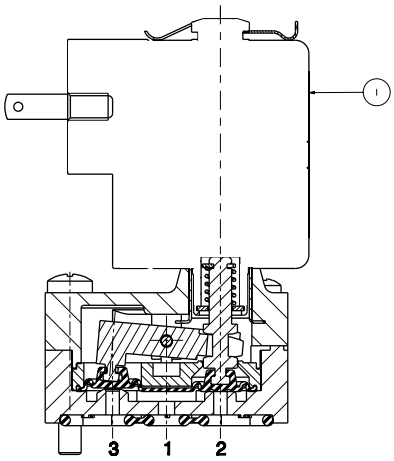
- Rocker isolation valves are designed for use with neutral or highly aggressive liquids in analytical instrumentation
- Special rocker mechanism, combined with a separating diaphragm, prevents heat transfer to the fluid and eliminates the sticking effect of the valve seat
- Hermetic separation of control mechanism prevents particulate contamination caused by friction of moving parts, assuring maximum purity of liquid samples
- Excellent self-draining capability and easy-to-flush low-volume internal cavity make these valves ideal in application where cross-contamination must be minimized
- Removable and rotatable electrical coils allow for easy installation and worry-free maintenance
- Meets all relevant CE directives
- Typical applications include:
  - In-vitro Diagnostics
  - Hematology
  - DNA Sequencing
  - Surgical Fluid Management



3/2 Universal

Fluids*	Temperature Range	Seal Materials*
liquids or gases	10°C to +80°C (14°F to 176°F)	FFKM (perfluoroelastomer) or EPDM (ethylene-propylene)

* Ensure that the compatibility of the materials in contact with the fluids is verified



General Valve Information		
	PEEK Body	**PA Body**
Body	PEEK	PA (polyamide 12)
Differential pressure	See «Specifications» [1 bar =100 kPa] 0.7 bar abs. (vacuum on polyamide body only)	
Maximum viscosity	37 cSt (mm2/s)	
Response time	20 ms	
Internal volume	< 67 µl	

Electrical Characteristics	
Coil insulation class	F
Coil	Detachable and rotatable. Two spade terminals 2.8 x 0.5 mm (DIN 46340) (or detachable size 15 connector)
Electrical enclosure protection	Moulded IP 65 spade terminals Moulded IP 66 Solenoid lead wires (EN 60529)
Standard voltages *	12 VDC, 24 VDC

* Other voltages on request.

Prefix option	Power ratings				Ambient temperature range	Replacement coil		Type (1)
	Inrush	Holding		Hot/Cold				
	VA	VA	W	W	°C (°F)	12 VDC	24 VDC	
SC	-	-	-	4	-10 to 60 (14 to 140)	43005268	43005269	1
L	-	-	-	4	-10 to 60 (14 to 140)	43005408	43005430	2

(1) Refer to the dimensional drawings on the following page.

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ASCO™ MINIATURE SOLENOID VALVES

ROCKER MECHANISM, FLUID ISOLATION VALVES

Specifications													
Pipe Size	Orifice Size	Flow Coefficient			Operating Pressure bar (psi)			Power Rating (W)		Catalog Number		Seal Materials	
					min.	max. (PS)						FKM	EPDM
						Gases (*)	Liquids (*)						
	(mm)	Kv (m3/h)	Cv	(l/min)		=	=	~	=	PEEK Body	PA Body		
Pad mount	1.5	0.03	0.034	0.5	0	2.4 (34.8)	2.4 (34.8)	-	4	SCS385A001		V	E
1/4" - 28 UNF thread										SCE385A001			
Barbed fitting										SCH385A001			
Pad mount	1.5	0.03	0.034	0.5	0	2 (29.0)	2 (29.0)	-	4		SCS385A002E	-	-
1/4" - 28 UNF thread											SCE385A002E		
Barbed fitting											SCH385A002E		

How To Order

SC S 385A001 V 12DC

Prefix
- SC = Din Type Coil
- L = 500mm Leaded Coil

Pipe Thread
- S = Sub Base
- E = ¼-28UNF
- H = Barb Fitting

Catalog Number
- 001 = 3/2 U - Universal, PEEK Body, FFKM Seals
- 002 = 3/2 U - Universal, PA Body, EPDM Seals

Seal Material
- V = FKM
- E = EPDM

Voltage
- 12DC
- 24DC

Options

- Connector size 15, catalogue number 88143581

Installation

- The solenoid valves can be mounted in any position without affecting operation.
- Can be used for the following functions, depending on how the ports are connected:
- Installation/maintenance instructions are included with each valve.

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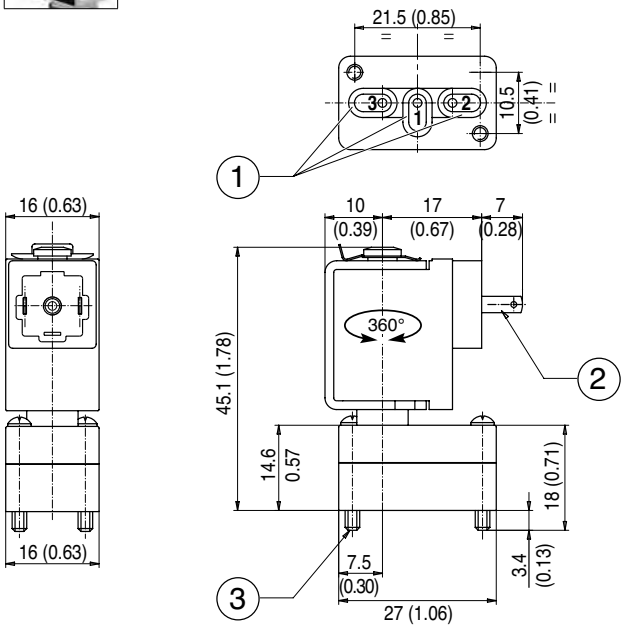
ASCO™ MINIATURE SOLENOID VALVES

ROCKER MECHANISM, FLUID ISOLATION VALVES

Dimensions: mm (inches)

Type 01
Solenoid with spade terminals (SC)
EN 60529
IP 65



① 1 mounting pad seal.

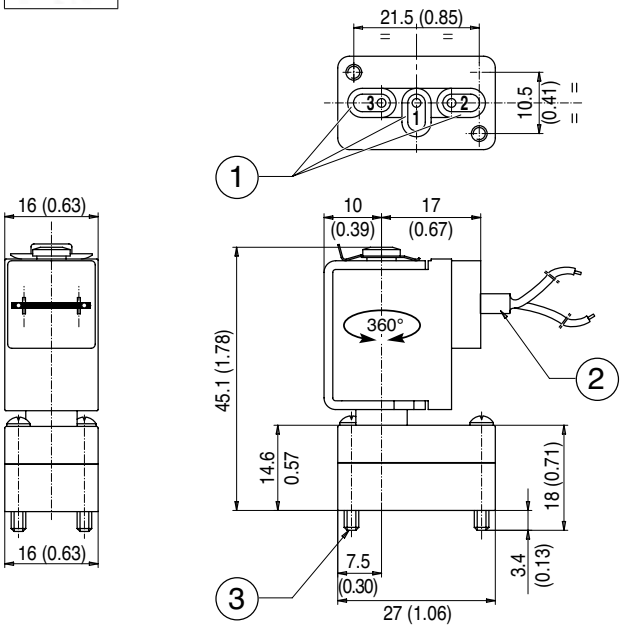
② Coil with 2 Faston-type terminals 2.8 x 0.5 (DIN 46340).

③ Mounting : 2 screws M2.5 x 18.

Type	Prefix option	Weight (1) kg
01	SC	0.04

(1) Including coil, without connector.

Type 02
Leaded Coil (L)
24 AWG, lead wires: 500 mm (19.7 in) long
IP 66



① 1 mounting pad seal.

② Coil with 24 AWG, lead wires: 500mm (19.7in) long

③ Mounting : 2 screws M2.5 x 18.

Type	Prefix option	Weight (1) kg
02	L	0.04

(1) Including coil, without connector.

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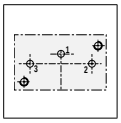
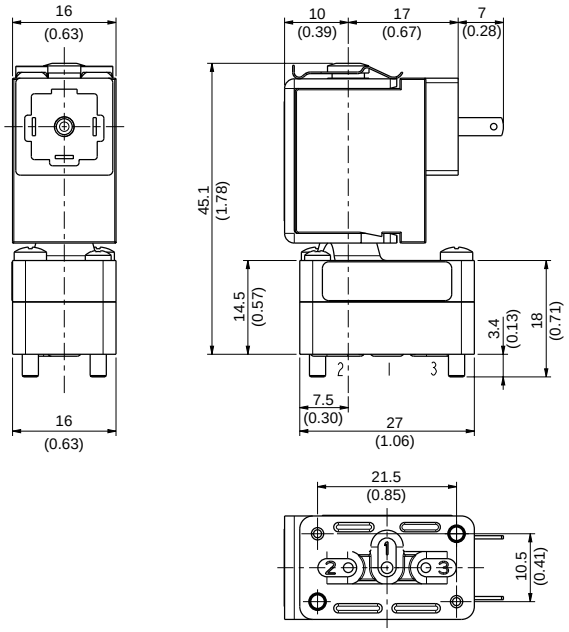
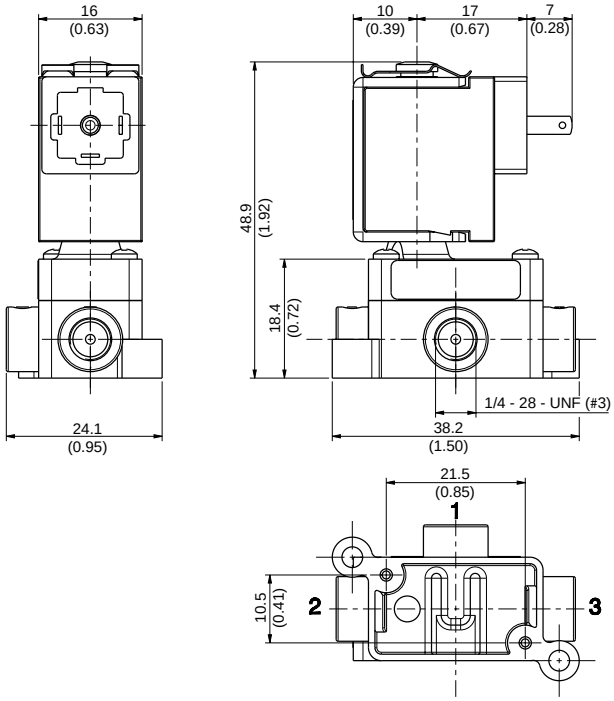
Dimensions: mm (inches)



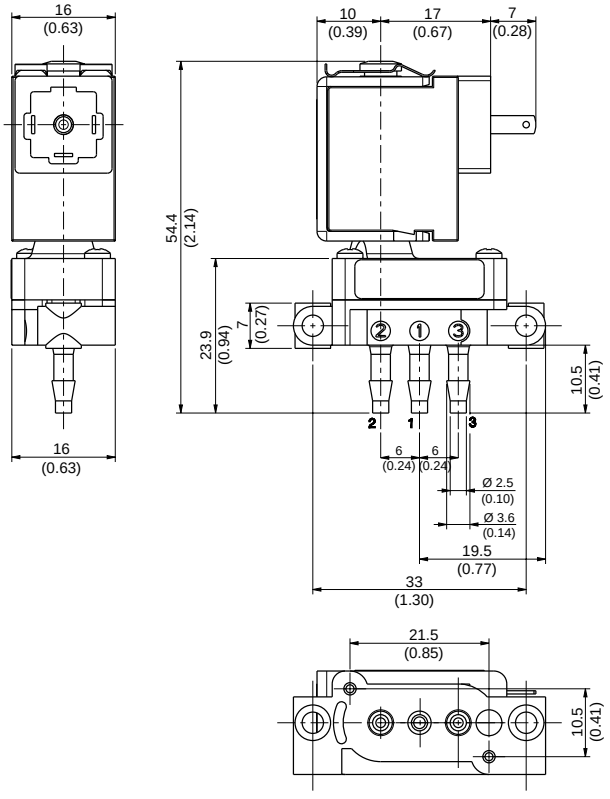
Pad Mount



1/4" - 28 UNF thread



Barbed Fitting



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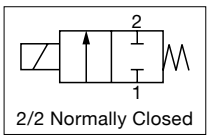
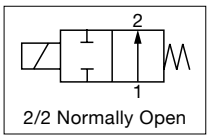
Asco

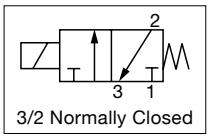
ASCO™ MINIATURE SOLENOID VALVES

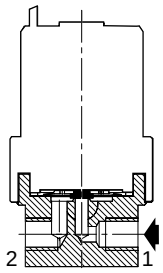
GENERAL SERVICE VALVES, FLAT SPRING SOLENOID

- The 065 Series 2-Way and 3-Way manifold mount valves are designed for analytical and medical applications where high gas flow is required
- Flat spring technology ensures no contamination of gases (no friction)
- The valves have a service life of more than 1 billion cycles when used with inert gases
- Very short response times allow these valves to be used in applications that require precise media control
- Small form factor saves valuable space in portable devices
- Available in a variety of versions for a wide range of applications: threaded connections or pad-mount for installation on multiple manifolds
- Meets all relevant CE directives, and is RoHS compliant
- Typical applications include:
  - Respiratory Therapy
  - Patient Monitoring
  - Compression Therapy (DVT)
  - Industrial Air Monitoring

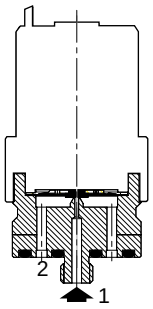




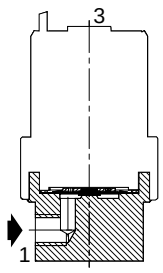




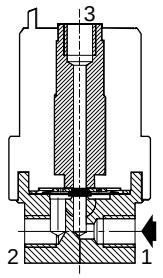
2/2 NC Function



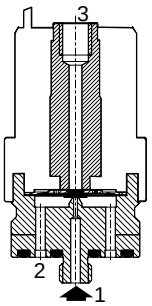
2/2 NC Function, Manifold Mount Body



2/2 NO Function



3/2 NC Function



3/2 NC Function, Manifold Mount Body

Fluids*	Temperature Range	Seal Materials*
Air, Inert Gases	0 °C to 60 °C (0 °F to 140 °F)	FKM (fluoroelastomer), EPDM, NBR [1]

1 FFKM seals for corrosive fluids avalable on request
* Ensure that the compatibility of the materials in contact with the fluids is verified.

General Valve Information	
Body	Stainless steel, AISI 303 (1.4305)
Others	Stainless steel, FKM
Response Time	< 10ms
Vacuum Rating	-1 bar (-14.5 psi)
Maximum Viscosity	20 cSt (mm^2/s)

Electrical Characteristics	
Coil Insulation Class	F
Electrical Safety	IEC 335
Standard Voltages	6 VDC, 12 VDC, 24 VDC
Power Consumption	2 W at 20 °C

Protection	Power Rating				Ambient Temperature Range	Electrical Connection	Type[1]
	Inrush	Holding		Hot/ Cold			
VA	VA	VA	W	W	°C (°F)		
IP40 (EN 60529)	-	-	-	2.1/2.1	0 to 60 (0 to 140)	Lead wires (ETFE), length 0.35m (13.8in)	01

1 Refer to the dimensional drawings on the following page

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ASCO™ MINIATURE SOLENOID VALVES

GENERAL SERVICE VALVES, FLAT SPRING SOLENOID

Specifications								
Connection	Orifice Size	Flow Coefficient		Operating Pressure bar (psi)		Power Rating	Catalog Number	
	mm (inches)	Kv (m3/h)	Cv	min.	max.	W	threaded	manifold-mount body
2/2 NC - Normally Closed								
M5 [1]	0.6 (0.024)	0.013	0.015	0	7 (101)	2.1	LE065A001V	LS065A001V
	1.0 (0.040)	0.025	0.029	0	5 (72.5)	2.1	LE065A002V	LS065A002V
	1.4 (0.055)	0.032	0.037	0	3 (43.5)	2.1	LE065A003V	LS065A003V
	2.0 (0.080)	0.057	0.066	0	1.5 (21.8)	2.1	LE065A004V	LS065A004V
2/2 NO - Normally Open								
M5	0.6 (0.024)	0.013	0.015	0	7 (101)	2.1	LE065A005V	-
	1.0 (0.040)	0.025	0.029	0	5 (72.5)	2.1	LE065A006V	-
	1.4 (0.055)	0.032	0.037	0	3 (43.5)	2.1	LE065A007V	-
	2.0 (0.080)	0.057	0.066	0	1.5 (21.8)	2.1	LE065A008V	-
3/2 NC - Normally Closed								
M5 [1]	0.6 (0.024)	0.013	0.015	0	7 (101)	2.1	LE065A009V	LS065A009V
	1.0 (0.040)	0.025	0.029	0	5 (72.5)	2.1	LE065A010V	LS065A010V
	1.4 (0.055)	0.032	0.037	0	3 (43.5)	2.1	LE065A011V	LS065A011V
	2.0 (0.080)	0.057	0.066	0	1.5 (21.8)	2.1	LE065A012V	LS065A012V

1 External thread with pad-mount body

How to Order

L **x** **065Axxx** **V** **xxV/DC**

Prefix

Pipe Thread
E = M5 Threaded Connection
S = Manifold Mount Body

Catalog Number

Voltage
06 = 6 VDC
12 = 12 VDC
24 = 24 VDC

Seal Material
V = FKM
E = EPDM
B = NBR

Options

- Cleaned for oxygen service
- Other pipe connections are available
- 0.7 W rated coil available on request

Installation

- The solenoid valves can be mounted in any position without affecting operation
- Threaded solenoid valves have 2 mounting holes in body

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ASCO™ MINIATURE SOLENOID VALVES

GENERAL SERVICE VALVES, FLAT SPRING SOLENOID

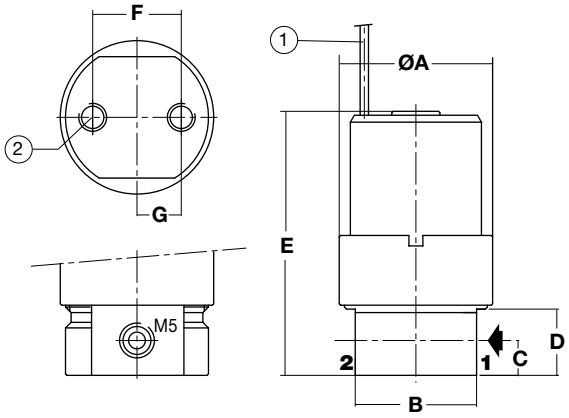
Dimensions: mm (inches)

2-Way Flat Spring Solenoid

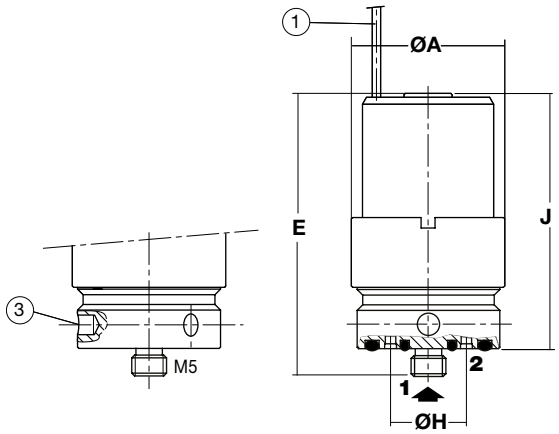
Type 01

Prefix "L" solenoid
Leaded Coil
IP40

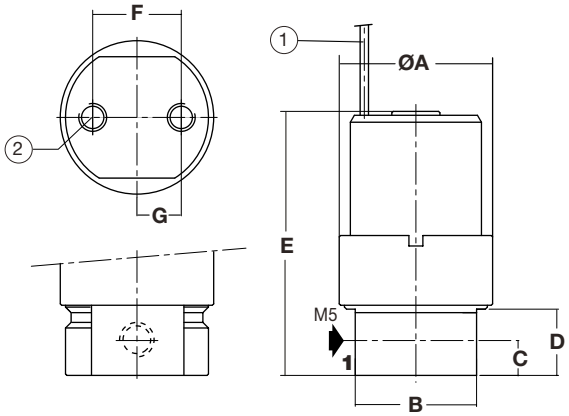
LE065A001V/002V/003V/004V



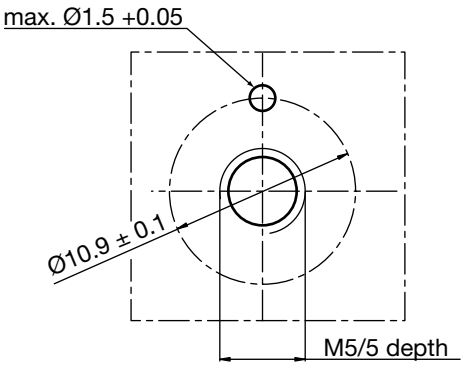
LS065A001V/002V/003V/004V



LE065A005V/006V/007V/008V



Mounting pad



(1) 2 electrical supply wires, length: 0.35m (13.8in)
(2) 2 mounting holes ØM4, depth: 6mm (0.24in)
(3) Mounting with hook spanner wrench DIN 1810B

Type	Prefix Option	Catalog Number	A	B	C	D	E	F	G	H	J
01	L	LE065A001V/002V/003V/004V	22 (0.87)	17.4 (0.69)	5 (0.20)	9.5 (0.37)	38 (1.50)	12.7 (0.50)	6.35 (0.25)	-	-
		LS065A001V/002V/003V/004V	22 (0.87)	-	-	-	41 (1.61)	-	-	10.9 (0.43)	37 (1.46)
		LE065A005V/006V/007V/008V	22 (0.87)	17.4 (0.69)	5 (0.20)	9.5 (0.37)	38 (1.50)	12.7 (0.50)	6.35 (0.25)	-	-

[1] Including leads, length: 0.35m (13.8in)

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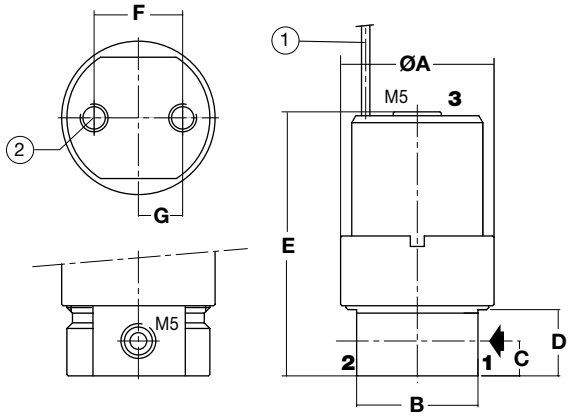
Dimensions: mm (inches)

3-Way Flat Spring Solenoid

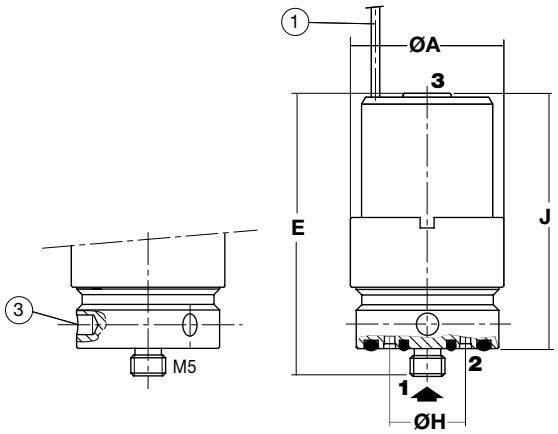
Type 01

Prefix "L" solenoid
Leaded Coil
IP40

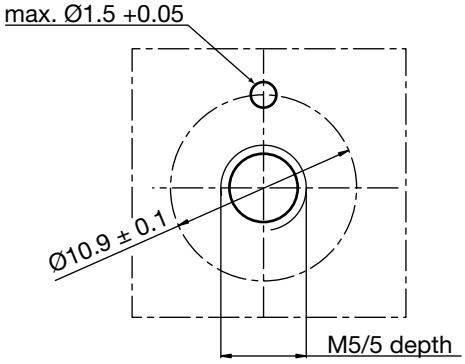
LE065A009V/010V/011V/012V



LS065A009V/010V/011V/012V



Mounting pad



1 2 electrical supply wires, length: 0.35m (13.8in)
2 2 mounting holes ØM4, depth: 6mm (0.24in)
3 Mounting with hook spanner wrench DIN 1810B

Type	Prefix Option	Catalog Number	A	B	C	D	E	F	G	H	J
01	L	LE065A009V/010V/011V/012V	22 (0.87)	17.4 (0.69)	5 (0.20)	9.5 (0.37)	38 (1.50)	12.7 (0.50)	6.35 (0.25)	-	-
		LS065A009V/010V/011V/012V	22 (0.87)	-	-	-	41 (1.61)	-	-	10.9 (0.43)	37 (1.46)

1 Including leads, length: 0.35m (13.8in)

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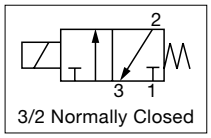
ASCO™ MINIATURE SOLENOID VALVES

GENERAL SERVICE VALVES, MINIATURE SOLENOID

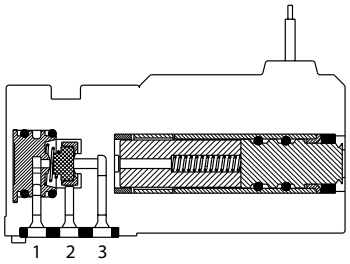
- Series 076 solenoid valves are designed for use with air and inert gases and can also be used to pilot other valves or cylinders.
- Compact architecture and low power consumption of only 0.9 W make them ideal for portable medical devices.
- Option for side-by-side mounting on complex manifold solutions is ideal for control of multiple flow paths in portable or small envelope applications.
- Meets all relevant CE directives, and is RoHS compliant.
- Typical applications include:
  - Respiratory Therapy
  - Patient Simulators
  - Pilot Valves
  - Wide Range of Other General Service Needs



3/2 Normally Closed

Fluids	Temperature Range	Seal Materials
Air or Inert Gas, non-lubricated	-5 °C to 50 °C (23 °F to 122 °F)	FKM

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



3/2 NC Pad Mount Body

General Valve Information	
Body	PA / PBT
Others	Acetal, Brass, Nickel, Stainless Steel
Response Time	< 10ms

Electrical Characteristics	
Standard Voltages*	5 VDC, 12 VDC, 24 VDC
Power Consumption	0.9 W

* Other voltages on request
NOTE: The solenoid valves are designed for continuous operation within the maximum ambient temperature limits.

Insulation Class	Coil Insulation	Protection	Ambient Temperature Range	Electrical Connection
	°C (°F)	VA	°C (°F)	
F	155 (311)	IP40	-5 to 50 (23 to 122)	24 AWG Lead wires, 0.3m (12.0in) long, PTFE coated

Specifications

Orifice Size mm (inches)				Flow Coefficient		Operating Pressure bar (psi)		Power Rating	Voltage	Catalog Number
						min.	max.			
1	2	2	3	Kv (m³/h)	Cv		gases, liquids	W		
3/2 NC - Normally Closed										
0.7 (0.028)		0.8 (0.032)		0.011	0.009	-0.9 (-13)	6.9 (100)	0.9	24 VDC	R076A101L0V00F1
									12 VDC	R076A101L0V00F3
									5 VDC	R076A101L0V00D1

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How to Order

R 076 A 1 01 L0 V00 F1

Connection Type
Connection type per:
Global Codification First Digit List
R = Pad Mount

Product Series
076 = General Service Valve

Revision
Based on solenoid revision level
A = Initial Release

Function
1 = NC 0.9W

Item

	Size	Body Material
01 =	7.6 mm	PBT

Voltage
Voltage Code per: **Global Voltage Code List**
F1 = 24/DC Class F
F3 = 12/DC Class F
D1 = 5/DC Class F

Options
Elastomer per:
Global Red Hat Suffixes and Options List
V00 = FKM

Electrical Connection Type
Electrical Connection Type per:
Global Red Hat Prefix List
L0 = Leaded Coil (12")

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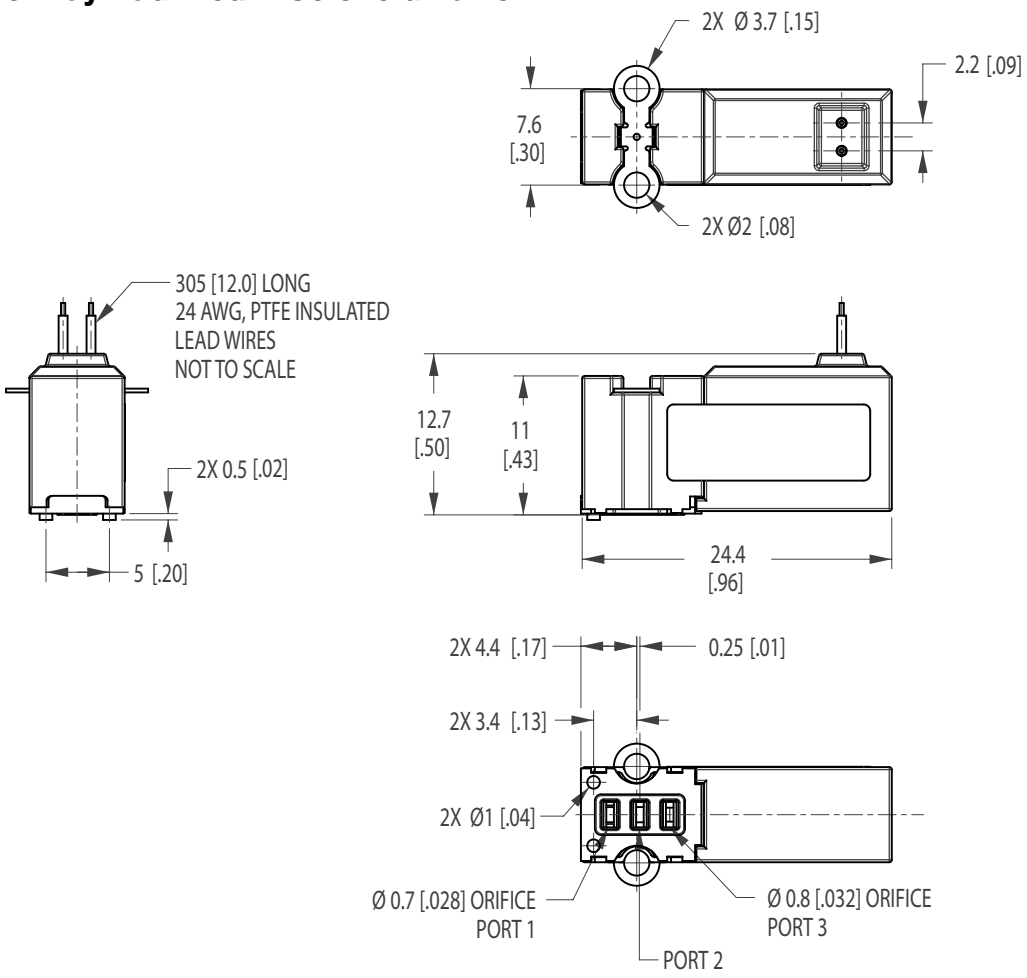
ASCO™ MINIATURE SOLENOID VALVES

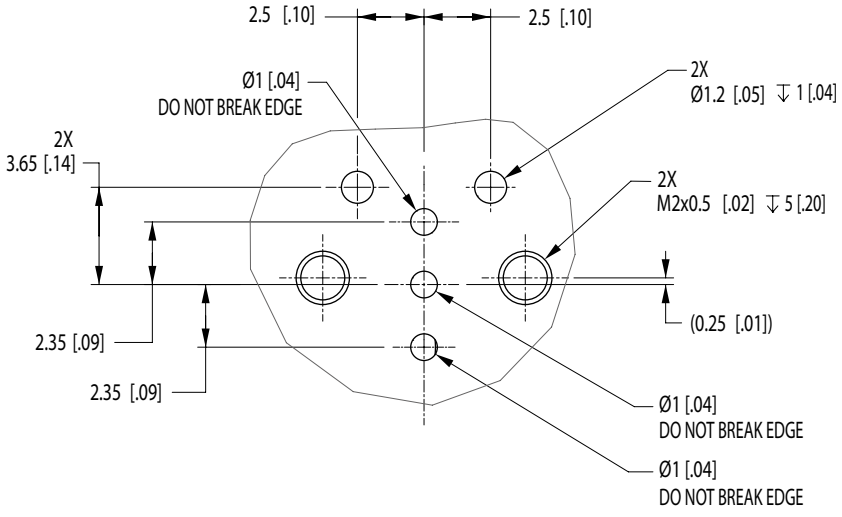
GENERAL SERVICE VALVES, MINIATURE SOLENOID

Dimensions: mm (inches)

3-Way Pad Mount Solenoid Valve



Manifold Interface



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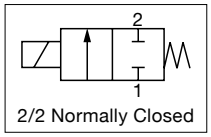
ASCO™ MINIATURE SOLENOID VALVES

GENERAL SERVICE VALVES

- Series 090 solenoid valves are designed for use with air and inert gases
- Flow to size ratio ideal for portable oxygen therapy applications
- Compact light-weight architecture and low power consumption make them ideal for portable medical devices
- Exceptional service lifetime over 50 million cycles that increases OEM instrument reliability
- Meets all relevant CE directives, and is RoHS compliant
- Typical applications include:
  - Oxygen Delivery
  - Compression Therapy
  - Gas Analyzers



2/2 Normally Closed

Fluids*	Temperature Range	Seal Materials*
Air or Inert Gas[1]	0 °C to 60 °C (32 °F to 140 °F)	FKM

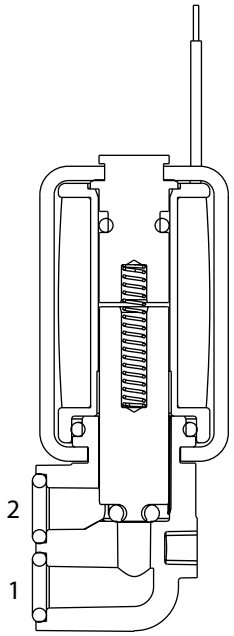
[1] filtered at 10µm
* Ensure that the compatibility of the materials in contact with the fluids is verified.

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

General Valve Information	
Body	PBT
Others	Stainless Steel
Response Time	< 15ms
Vacuum Rating	-0.9 bar (13 psi)

Electrical Characteristics	
Duty Cycle	Intermittent, must use spike and hold noted below
Spike and Hold	Spike at nominal voltage for 500 – 5000 ms max. Hold at 50% of nominal voltage.
Connector	Lead wires
Connector Specification	28 AWG PVC insulated
Standard Voltages*	12 VDC, 24 VDC
Power Rating	4.3 W Inrush, 1.0 W Hold

* Other voltages on request



2/2 NC
Pad Mount

Insulation Class	Coil Insulation	Ambient Temperature Range	Electrical Connection
	°C (°F)	°C (°F)	
F	155 (311)	0 to 60 (32 to 140)	28 AWG PVC insulated

Specifications

Connection	Orifice Size	Flow Coefficient		Operating Pressure bar (psi)		Power Rating (W)		Catalog Number
				min.	max.			
	mm (inches)	Kv (m3/h)	Cv		Air, inert gas	Inrush	Hold	
2/2 NC - Normally Closed								
Pad Mount, PBT (F)	2.4 (0.093)	0.183	0.072	-0.9 (-13)	1.4 (20)	4.3	1.0	R090x220LAV00Fx

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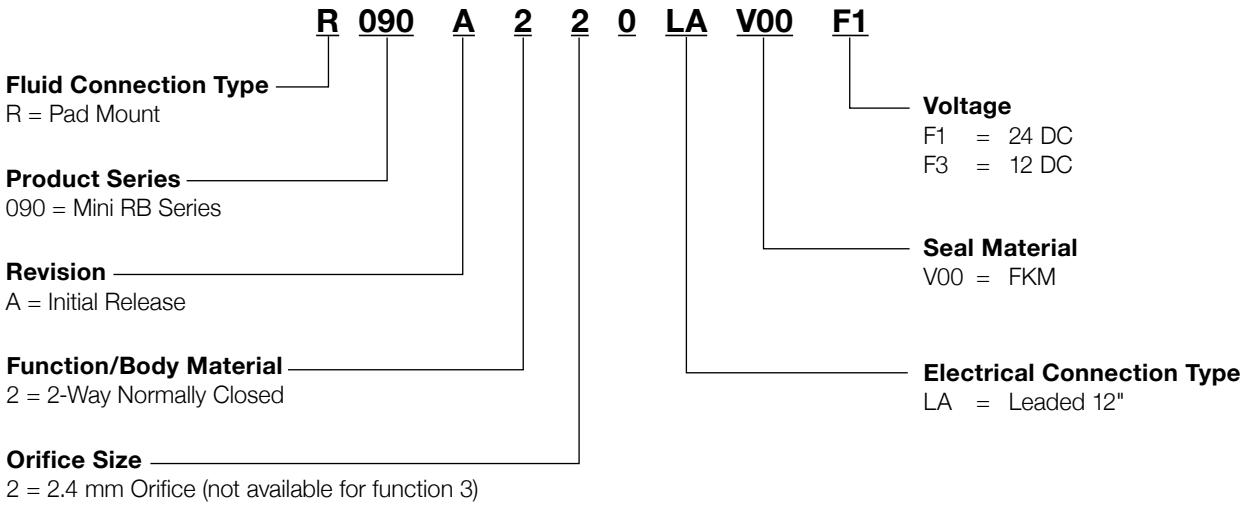
How to Order



Options

- Other seal materials available on request
- Other voltages and electrical connections available
- Oxygen service

Installation

- The solenoid valves can be mounted in any position without affecting operation.

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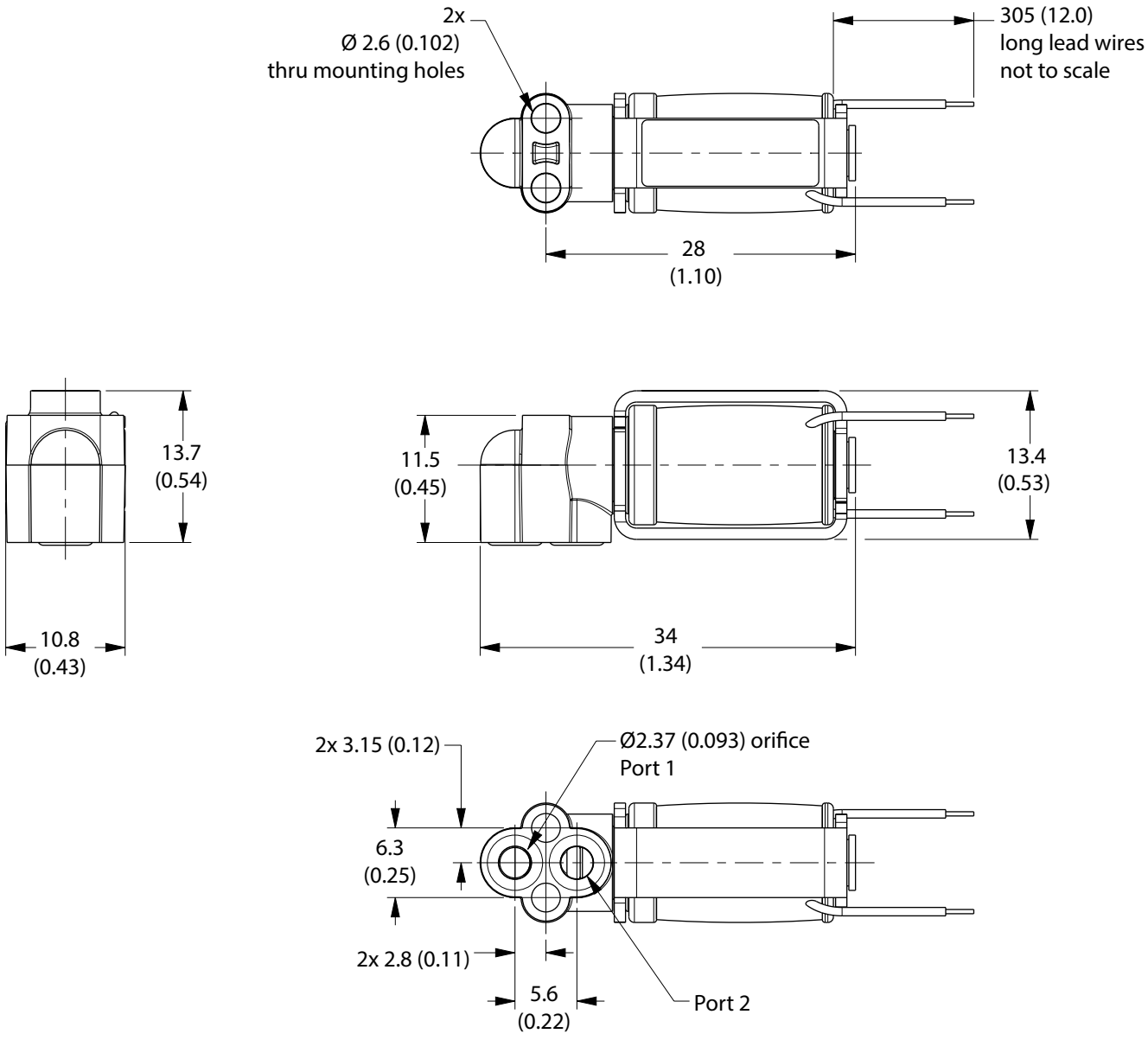
Dimensions: mm (inches)

2-Way and Pad Mount Solenoid Valve



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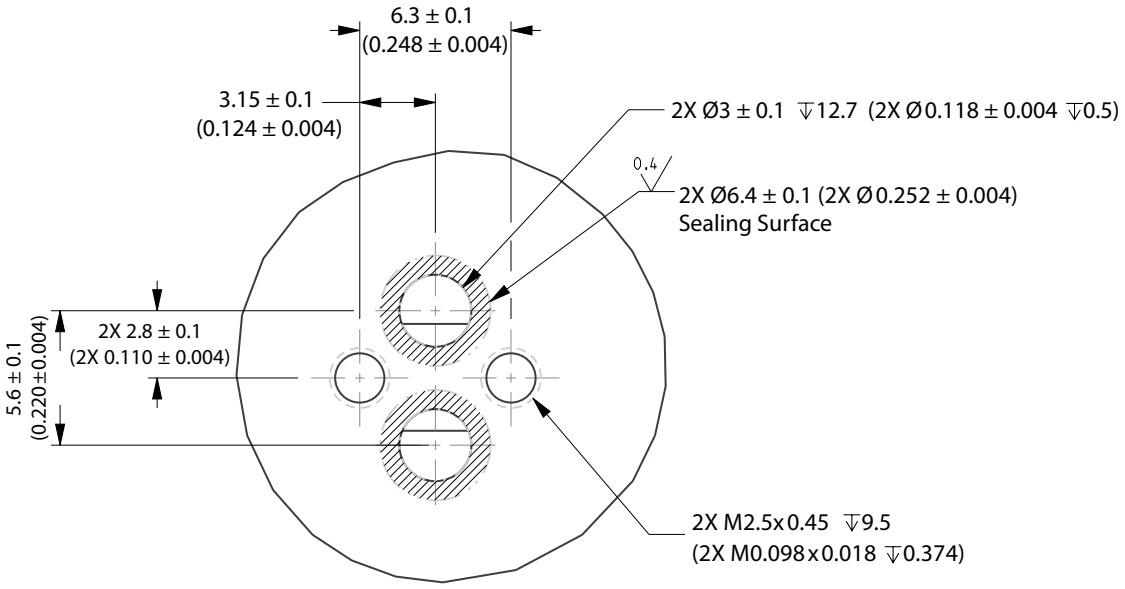
Dimensions: mm (inches)

Mounting Pattern for Pad Mount Solenoid Valve



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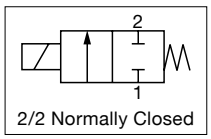
ASCO™ MINIATURE SOLENOID VALVES

GENERAL SERVICE VALVE, COMPACT 2-WAY SOLENOID

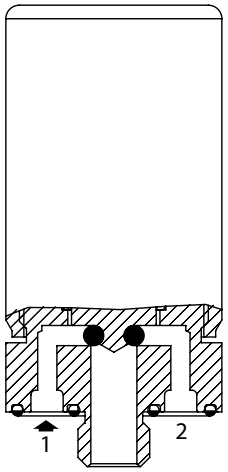
- Direct acting solenoid valve for use with air and inert gases
- Manifold mount construction that is suitable for a wide variety of gas application
- Exceptionally long service lifetime ensures maximum reliability
- High-flow design is ideal for quickly inflating / deflating therapeutic air bladders in support surface applications
- Typical applications include
  - Hospital Beds
  - Therapeutic Support Surfaces
  - Endoscopy Drying Systems
  - Deep Vein Thrombosis (DVT)



2/2 Normally Closed

Fluids*	Temperature Range	Seal Materials*
Air, inert gases	0°C to 55°C (32°F to 131°F)	NBR

* Ensure that the compatibility of the materials in contact with the fluids is verified.



2/2 Normally Closed

General Valve Information	
Body	Stainless Steel

Electrical Characteristics	
Coil Insulation Class	B
Duty Cycle	Intermittent, must use spike and hold noted below
Spike and Hold	Spike at nominal voltage for 500 - 5000 ms max. Hold at 50% of nominal voltage.
Connector	Lead Wires
Connector Specification	28 AWG PVC Insulated
Electrical Enclosure Protection	IP40
Standard Voltages*	12 VDC

* Other voltages on request.

Electrical Connection	Power Ratings		Ambient Temperature Range
	Inrush	Holding	
	W	W	°C (°F)
Lead Wires	7.6	1.9	0 to 55 (32 to 131)

Specifications								
Connection	Orifice Size	Flow Coefficient		Operating Pressure bar (psi)		Power Rating (W)		Catalog Number
	mm (inches)	Kv (m^3/h)	Cv	min.	max.	Inrush	Hold	
2/2 NC - Normally Closed								
1/4-28 UNF Stud Manifold Mount	4.0 (0.16)	2.621	0.387	0 bar (0 psi)	0.34 bar (5 psi)	7.6	1.9	R096A001L0N00V3

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ASCO™ MINIATURE SOLENOID VALVES

GENERAL SERVICE VALVE, COMPACT 2-WAY SOLENOID

How to Order

R 096 A 001 L0 N00 V3

Connection Type
R = Manifold Mount

Product Series
096

Revision
A = Initial Release

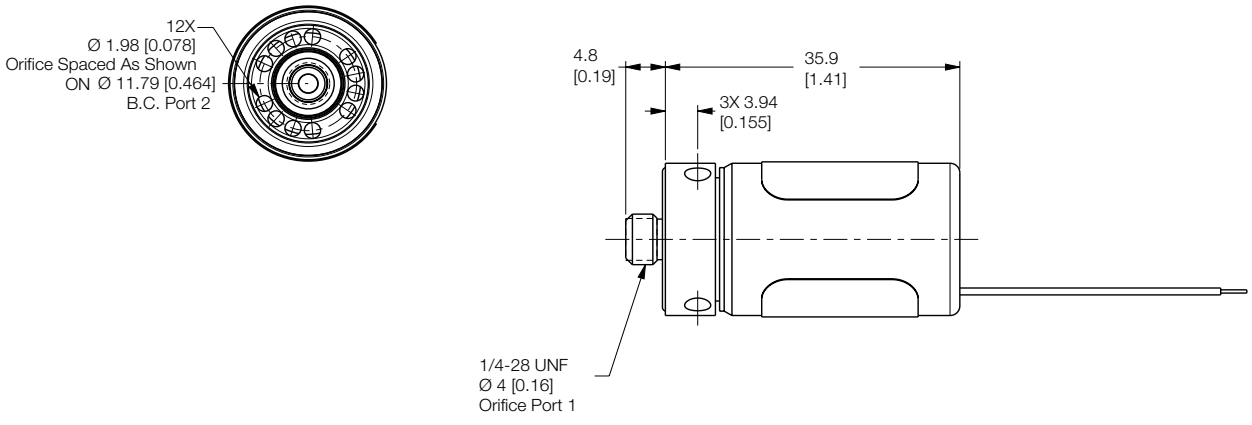
Pilot Connection Type
001 = 1/4" UNF Stud

Voltage
V3 = 12/DC

Seal Material
N00 = NBR

Electrical Connection Type
L0 = Leaded Coil

Dimensions: mm (inches)



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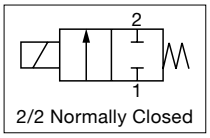
ASCO™ MINIATURE SOLENOID VALVES

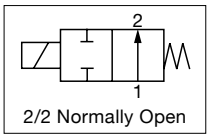
GENERAL SERVICE VALVES

SERIES
L123 / L257 / L323

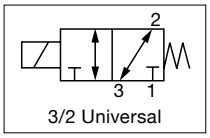
- Direct acting solenoid valve.
- Suitable to shut off liquid and gaseous fluids; suitable for low pressure steam and applications in sterilising autoclaves (verify the compatibility of materials with fluids in contact).
- Typical applications include
  - Dental equipment
  - Steam sterilizers
  - Bio-medical analyzers
  - Low pressure steam



2/2 Normally Closed



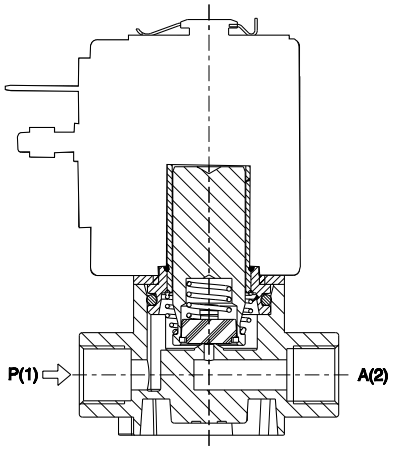
2/2 Normally Open



3/2 Universal

General Valve Information	
Body	PPS
Seals*	FKM
Internal Components	Stainless Steel Stainless Steel and PPS
Seat	PPS
Core Tube	Stainless Steel
Shading coil	Copper
Fluids	Liquids or gases
Fluid temperature	0°C +130°C
Differential pressure	see "Specifications" [1 bar = 100 kPa]
Response time	~ 20ms
Max. Viscosity	37 cSt (mm²/s)

* Ensure that the compatibility of the materials in contact with the fluids is verified



Electrical Characteristics				
		ZA10A (UL class F - for UL cl.H: ZA34 (E153691))	**ZA10B (UL class F - for UL cl.H: ZA34 (E153691))**	**ZA10G (UL class F - for UL cl.H: ZA34 (E153691))**
Continous duty		ED 100%	ED 100%	ED 100%
Coil Insulation Class		F (155°C) on request class H (180°C)	F (155°C)	F (155°C) on request class H (180°C)
Connector		DIN 46340 - 3 pole connector (EN175301-803)	DIN 46340 - 3 pole connector (EN175301-803)	DIN 46340 - 3 pole connector (EN175301-803)
Encapsulation material		PPS (polyphenilsulfure) fiberglass reinforced	PET (polyethylene-terephtalate) fiberglass reinforced	PPS (polyphenilsulfure) fiberglass reinforced)
Electrical Enclosure Protection		IP67 (EN60529) with plug connector	IP65 (EN60529) with plug connector	IP67 (EN60529) with plug connector
Standard Voltages*	DC	12-24 V (+10% -5%)	24V (+10% -5%) (UL)	12-24 V (+10% -5%)
	AC	24V/50Hz - 110V/50Hz (120V/60Hz) - 230V/50Hz (+10% -15%)		

* other voltages and frequencies on request

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Specifications

Pipe Connection	Orifice Size	Flow Coefficient		Operating Pressure, bar					Power Rating (W)			Catalog Number		Sealing Materials*	Notes
				min.	max.										
					Gases		Liquids		AC (VA)		DC (W)	Threaded Body			
	mm	Kv (m^3/h)	Cv		AC	DC	AC	DC	Inrush	Holding			Coil		
2/2 NC - Normally Closed															
G1/8	1.6	0.09	0.10	0	10	10	10	10	23	14	9	L123V01	ZA10A	FKM	1,2,3
	2.3	0.15	0.17		10	10	10	10							
	3.2	0.25	0.29		10	4	10	4							
Barbed ports	1.6	0.09	0.10		10	10	10	10				L123V02			2,3
	2.3	0.15	0.17		10	10	10	10							
	3.2	0.25	0.29		10	4	10	4							
Barbed ports with ring nut	1.6	0.09	0.10		10	10	10	10				L123V03			2,3,4
	2.3	0.15	0.17		10	10	10	10							
	3.2	0.25	0.29		10	4	10	4							
Barbed ports	2.3	0.15	0.17		10	10	10	10				L132V04			3,5
	3.2	0.25	0.29		10	4	10	4							
2/2 NO - Normally Open															
G1/8	3	0.18	0.21	0	3	3	3	3	23	14	9	L257V02	ZA10A	FKM	1, 3,5
Barbed ports												L257V01			2,3
Barbed ports with ring nut		0.15	0.17									L257V03			2,3,4
G1/4	4.2	0.33	0.38		2.5		2.5		23	14		L257V04	ZA10A		1,3
						2.5		2.5			10		ZA10B		
Barbed ports		0.26	0.30		2.5		2.5		23	14		L257V05	ZA10A		3
						2.5		2.5			10		ZA10B		
Barbed ports	2.5	0.14	0.16		5	5	5	5	23	14	9	L257V06	ZA10A		2,3
	3	0.18	0.21		3	3	3	3							
3/2 U - Universal															
G1/8	2.3	0.2	0.23	0	4		4		23	14		L323V01G	ZA10A	FKM	1,2,3
						4		4			12		ZA10G		
Barbed ports					4		4		23	14		L323V02G	ZA10A		2,3
						4		4			12		ZA10G		
Barbed ports with ring nut		0.12	0.14		4		4		23	14		L323V03G	ZA10A		2,3,4
						4		4			12		ZA10G		
Barbed ports		0.2	0.23		4		4		23	14		L323V04G	ZA10A		2,3
						4		4			12		ZA10G		

* Sealings: FKM = Fluoro-carbon elastomer
1 Maximum driving torque of the pipe fittings for thread connections = 2Nm
2 Only for use with steam, consider following values: PSmax 2.8 bar (max fluid temperature 130°)
3 The pressure values shown in the table refer to the potential of the valve: they can be lower depending on the connection system used
4 Maximum driving torque of ring nut 1.2Nm
5 Only for use with steam, consider following values: PSmax 2.8 bar (max fluid temperature 130°)

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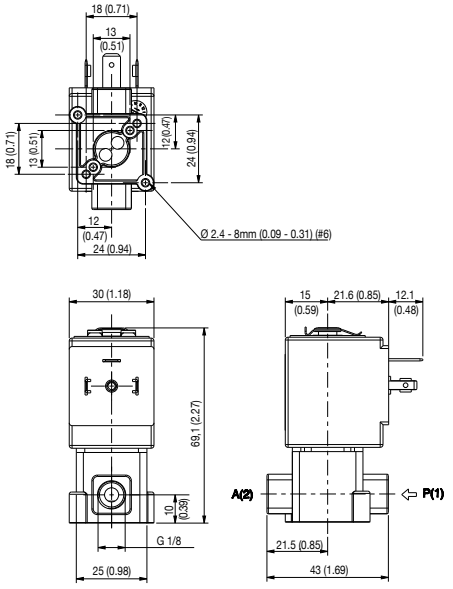
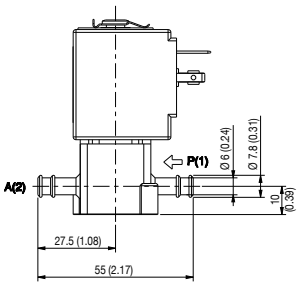
ASCO™ MINIATURE SOLENOID VALVES
GENERAL SERVICE VALVES

Dimensions: mm (inches)

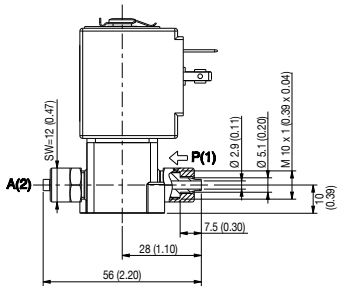
L123V01



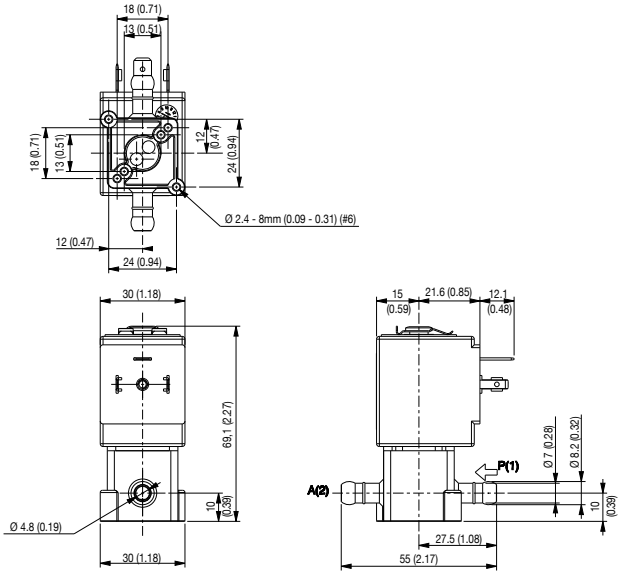
L123V02



L123V03



L123 V04



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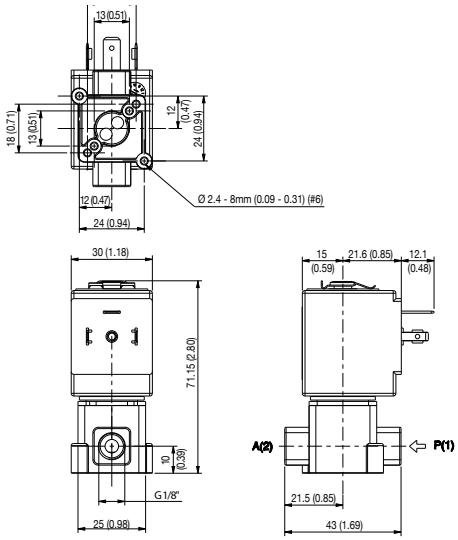
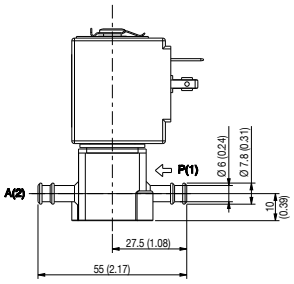
Dimensions: mm (inches)

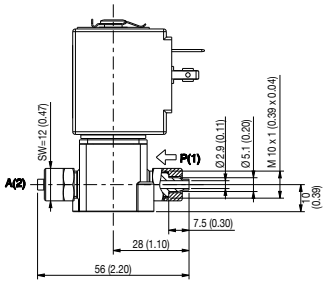
L257V02



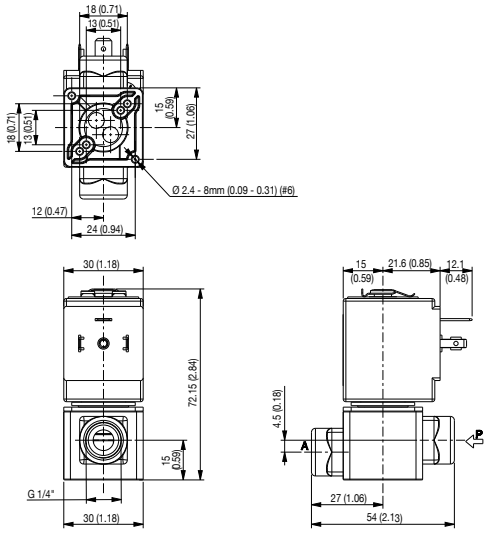
L257V01



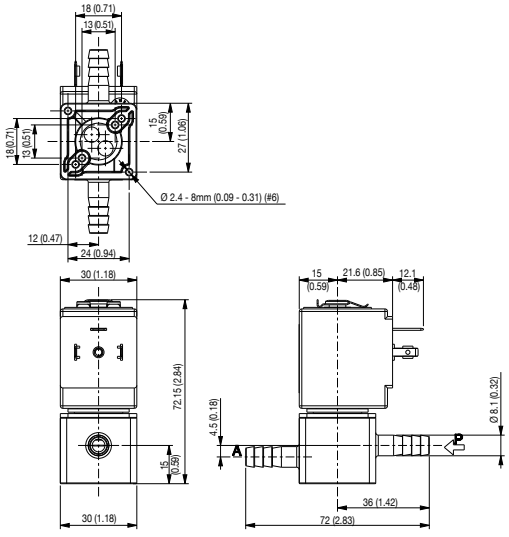
L257V03



L257V04



L257V05



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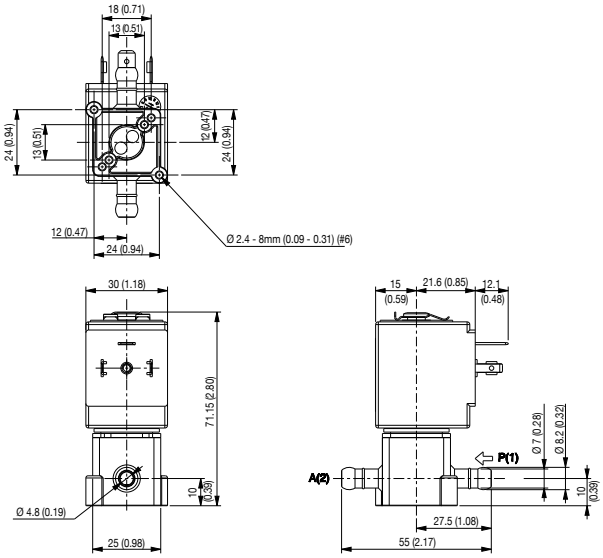
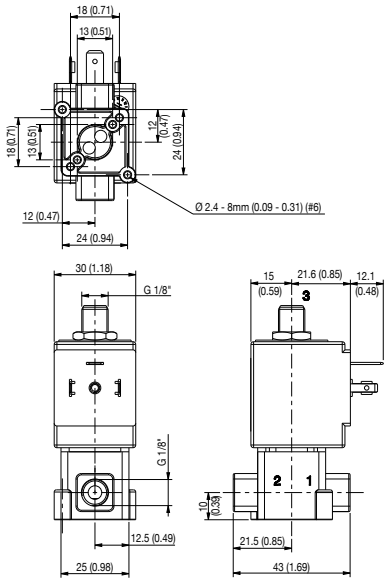
ASCO™ MINIATURE SOLENOID VALVES
GENERAL SERVICE VALVES

Dimensions: mm (inches)

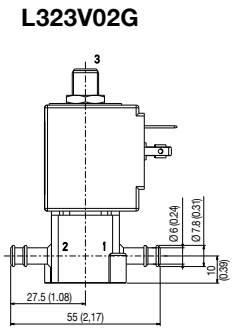
L257V06



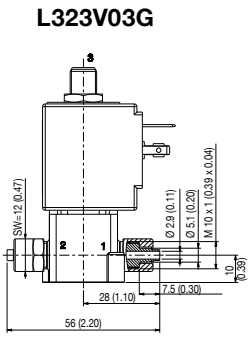
L323V01G



L323V02G



L323V03G



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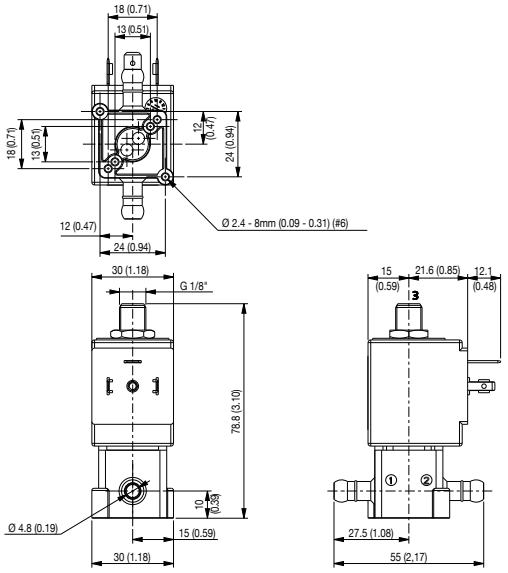
Dimensions: mm (inches)

L323-V04G



Spare Part Kits

L123-V01/V02/V03/V04

Kit description	Kit P.N.	Consisting of:
Core kit	G3139401	Core
Core return spring kit	G3022401	N.10 core return spring
O-Ring guide assembly kit	GU2428000017	N.10 O-Ring guide assembly
Guide assembly kit	G31487	Guide assembly Coil clip
Coil	ZA10A	Coil

L257-V01/V02/V03

Kit description	Kit P.N.	Consisting of:
Core kit	G3138301	Core return spring Core O-Ring guide assembly Pusher Sealing disc return spring Sealing disc
Core return spring kit	G290513-001	N°.10 Core return spring
O-Ring guide assembly kit	GU2428000015	N°.10 OR guide assembly
Guide assembly kit	G31488	Guide assembly Coil clip
Coil	ZA10A	Coil

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L257-V04 / L257-V05

Kit description	Kit P.N.	Consisting of:
Core kit	G3138301	Core return spring Core O-Ring guide assembly Pusher Sealing disc return spring Sealing disc
Core return spring kit	G290513-001	N°.10 Core return spring
O-Ring guide assembly kit	GU2428000015	N°. 10 OR guide assembly
Guide assembly kit	G31488	Guide assembly Coil clip
Coil	ZA10A ZA10B	Coil

L257-V06

Kit description	Kit P.N.	Consisting of:
Core kit	G3138301	Core return spring Core O-Ring guide assembly Pusher Sealing disc return spring Sealing disc
Core return spring kit	G290513-001	N°.10 Core return spring
O-Ring guide assembly kit	GU2428000015	N°. 10 OR guide assembly
Guide assembly kit	G31488	Guide assembly Coil clip
Coil	ZA10A	Coil

L323-V01G/V02G/V03G/V04G

Kit description	Kit P.N.	Consisting of:
Core kit	G3065101	Core
Core return spring kit	G3022401	N.10 core return spring
O-Ring guide assembly kit	GU2428000017	N.10 O-Ring guide assembly
Guide assembly	290564-001R	Guide assembly
Coil	ZA10A ZA10G	Coil

Installation

- Solenoid valve can be mounted in any position; vertical with coil upwards preferred.
- When using any sealant for fittings, please check its chemical compatibility with body material (PPS).
- In case of disassembling for usual maintenance, the fixing screws of the guide assembly have to be tightened with 0.6÷0.7 Nm torque.

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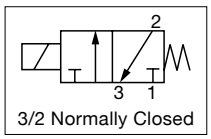
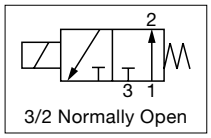
ASCO™ MINIATURE SOLENOID VALVES

GENERAL SERVICE VALVES, MINIATURE SOLENOID

- The 188 Series solenoid valves are designed for use with air and inert gases, and can also be used to pilot other valves or cylinders
- Compact architecture and low power consumption of only 1.3 W make them ideal for portable medical devices
- Also available in a 1 W version for increased versatility
- LED visual indicator and electrical protection circuitry are standard features
- Meets all relevant CE directives, and is RoHS compliant
- Typical applications include:
  - Respiratory Therapy
  - Dental
  - Anesthesia Delivery
  - Industrial Gas Analyzers



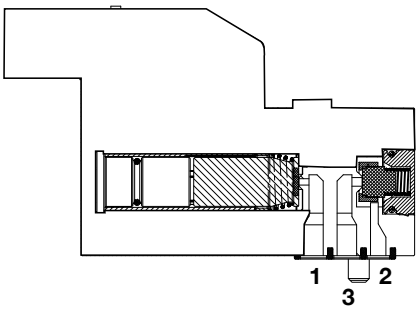
3/2 Normally Closed



3/2 Normally Open

Fluids	Temperature Range	Seal Materials
Air or Inert Gas, non-lubricated [1]	5 °C to 50 °C (41 °F to 122 °F)	NBR (Nitrile)
		FKM

[1] filtered at 25 µm
NOTE: Additional constructions and options are available including alternate elastomers and orifice sizes. Minimum quantities apply.



3/2 NC or 3/2 NO Function
Pad Mount Body

General Valve Information	
Body	PA (polyamide) MXD6
Others	Stainless steel, nickel-plated steel, synthetic material, aluminum
Response Time	< 10ms
Options	Oxygen clean available 300 Series Stainless Steel Body

Electrical Characteristics	
Standard Voltages*	5 VDC, 12 VDC, 24 VDC (-15%/+10%)
Power Consumption	1 - 1.3 W

* Other voltages on request
NOTE: The solenoid valves are designed for continuous operation within the maximum ambient temperature limits.

Insulation Class	Coil Insulation	Protection	Ambient Temperature Range	Electrical Connection
	°C (°F)	VA	°C (°F)	
F	155 (311)	IP40	5 to 50 (41 to 122)	Connector with two 0.5mm² lead wires + built-in LED and electrical protection or lead wires, 0.5m (19.7in) long

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ASCO™ MINIATURE SOLENOID VALVES

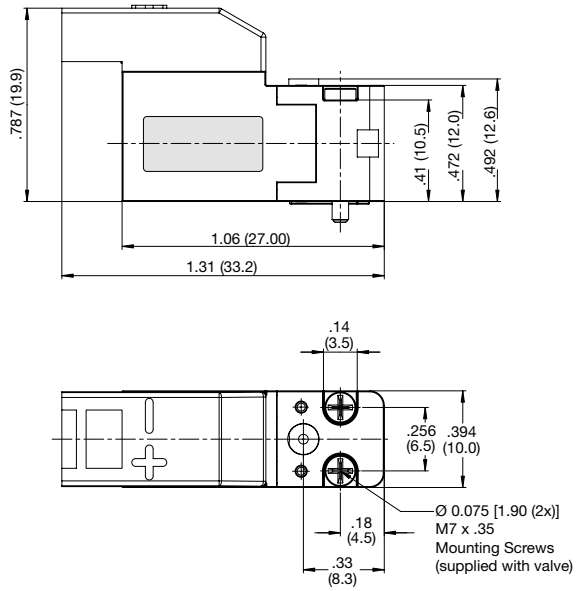
GENERAL SERVICE VALVES, MINIATURE SOLENOID

Specifications

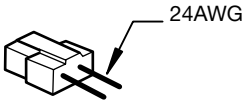
Orifice Size mm (inches) 1 ➡ 2	Orifice Size mm (inches) 2 ➡ 3	Flow Coefficient Kv (m³/h)	Flow Coefficient Cv	Operating Pressure bar (psi) min.	Operating Pressure bar (psi) max. gases, liquids	Power Rating W	Type of Electrical Connection*	Catalog Number
3/2 NC - Normally Closed								
0.5 (0.020)	0.7 (0.028)	0.006	0.007	0	8 (116)	1.3	01	18801003
							02	18801076
							03	18801074
							04	18801078
						1	05	18801072
0.8 (0.031)	0.8 (0.031)	0.007	0.008	0	4 (58)	1.3	01	18801081
							02	18801082
							03	18801083
							04	18801084
						1	05	18801085
1.0 (0.040)	1.0 (0.040)	0.011	0.013	0	2.5 (36)	1.3	01	18801086
							02	18801087
							03	18801088
							04	18801089
						1	05	18801090
3/2 NO - Normally Open								
0.5 (0.020)	0.5 (0.020)	0.006	0.007	0	6 (87)	1.3	01	18801063
							02	18801077
							03	18801075
							04	18801079
						1	05	18801073
0.8 (0.031)	0.8 (0.031)	0.007	0.008	0	3 (43.5)	1.3	01	18801091
							02	18801092
							03	18801093
							04	18801094
						1	05	18801095
1.0 (0.040)	1.0 (0.040)	0.011	0.013	0	1.5 (21.8)	1.3	01	18801096
							02	18801097
							03	18801098
							04	18801099
						1	05	18801100

* Type 01, 02, 03, 04 with LED and electrical protection
01 = horizontal, width 5.08mm (0.2in)
02 = vertical, width 5.08mm (0.2in)
03 = horizontal, width 2.54mm (0.1in)
04 = vertical, width 2.54mm (0.1in)
05 = cable ends 0.5m long (19.7in), 0.25mm²

Dimensions: mm (inches)



NOTE: 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

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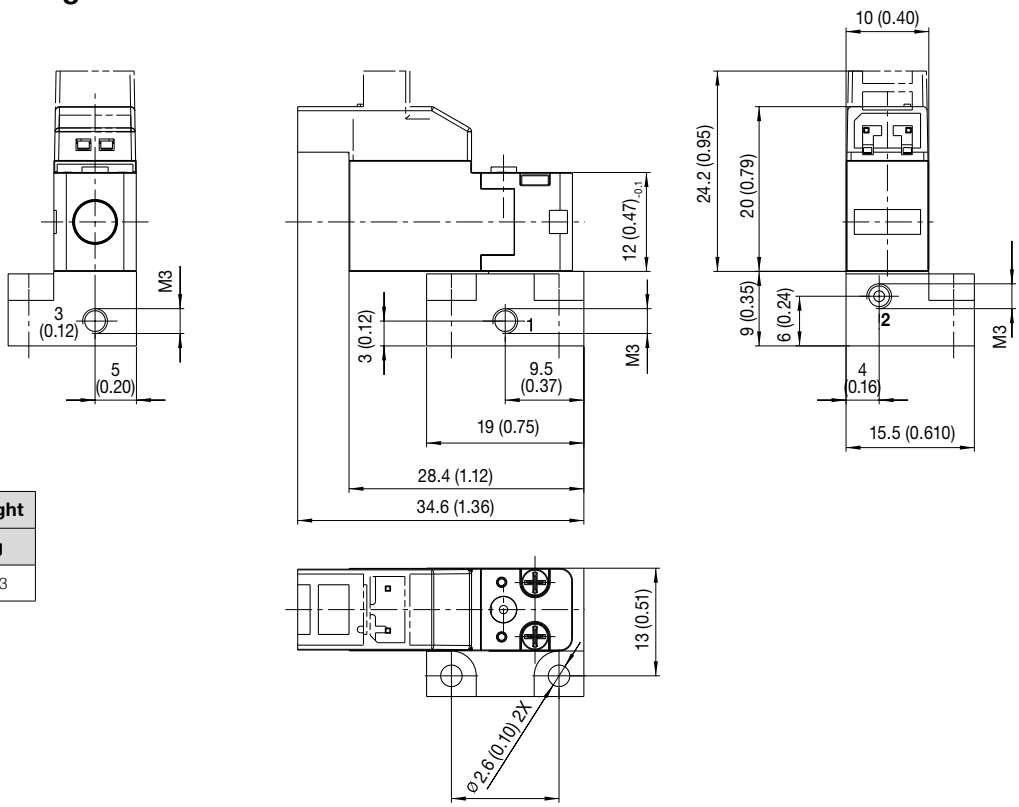
ASCO™ MINIATURE SOLENOID VALVES

GENERAL SERVICE VALVES, MINIATURE SOLENOID

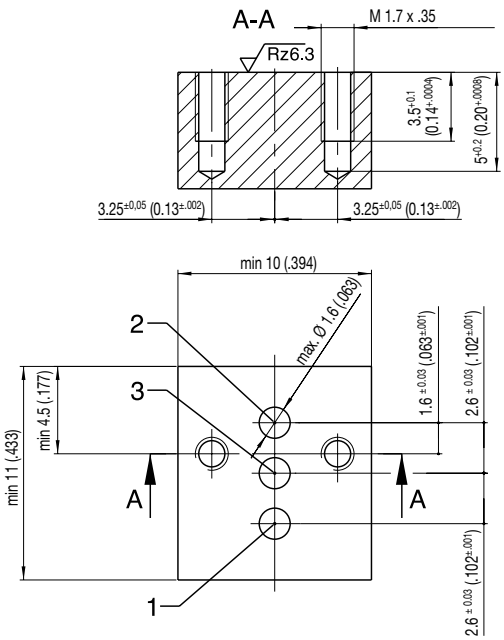
Dimensions: mm (inches)

Valve Mounted on Single Subbase



Number of Valves	Subbase Catalog Number	Weight kg
1	35300101	2.53

Manifold Interface



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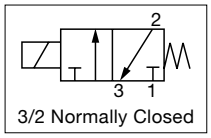
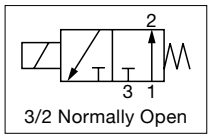
ASCO™ MINIATURE SOLENOID VALVES

GENERAL SERVICE VALVES, MINIATURE SOLENOID WITH LATCHING COIL

- The 188 Series latching coil solenoid valves are designed for use with air and inert gases, and can also be used to pilot other valves or cylinders
- The benefit of the latching coil is that no power consumption is needed to hold the valve in the open position
- Compact architecture and low power consumption of only 1.3 W make them ideal for portable medical devices
- Also available in a 1 W version for increased versatility
- LED visual indicator and electrical protection circuitry are standard features
- Meets all relevant CE directives, and is RoHS compliant
- Typical applications include:
  - Respiratory Therapy
  - Dental
  - Anesthesia Delivery
  - Industrial Gas Analyzers



3/2 Normally Closed



3/2 Normally Open

Fluids	Temperature Range	Seal Materials
Air or Inert Gas, non-lubricated[1]	5 °C to 50 °C (41 °F to 122 °F)	NBR (Nitrile)
		FKM

[1] filtered at 25µm

General Valve Information*	
Body	PA (polyamide) MXD6
Others	Stainless steel, nickel-plated steel, synthetic material, aluminum
Response Time	< 10ms
Options	Oxygen clean available 300 Series Stainless Steel Body

* Other materials on request

Electrical Characteristics	
Standard Voltages*	5 VDC, 12 VDC, 24 VDC (-15%/+10%)
Power Consumption	1 - 1.3 W

* Other voltages on request

Insulation Class	Coil Insulation	Protection	Ambient Temperature Range	Electrical Connection
	°C (°F)	VA	°C (°F)	
F	155 (311)	IP40	5 to 50 (41 to 122)	Connector with two 0.5mm² lead wires + built-in LED and electrical protection or lead wires, 0.5m (19.7in) long

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ASCO™ MINIATURE SOLENOID VALVES

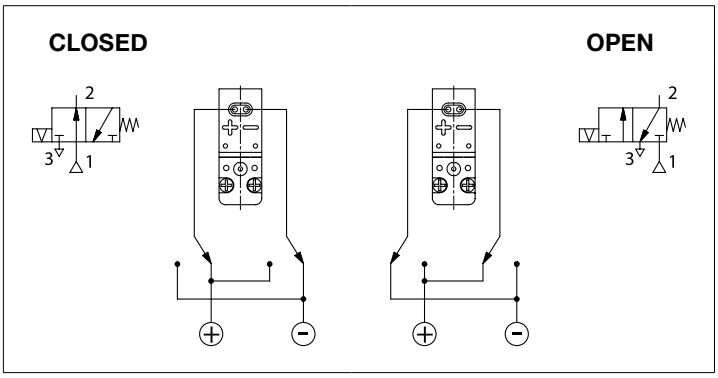
GENERAL SERVICE VALVES, MINIATURE SOLENOID WITH LATCHING COIL

Specifications

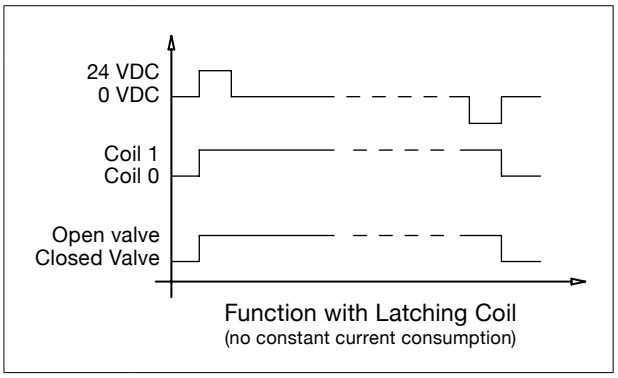
Orifice Size mm (inches)		Flow Coefficient		Operating Pressure bar (psi)		Power Rating	Type of Electrical Connection*	Catalog Number
				min.	max.			
1 ➡ 2	2 ➡ 3	Kv (m^3/h)	Cv		gases, liquids	W		
3/2 NC/NO								
0.5 (0.020)	0.7 (0.028)	0.007	0.008	0	7 (101)	1.3	01	18801101
							02	18801102
							03	18801103
							04	18801104
						1	05	18801105
0.8 (0.031)	0.8 (0.031)	0.009	0.010	0	3 (43.5)	1.3	01	18801106
							02	18801107
							03	18801108
							04	18801109
						1	05	18801110
1.0 (0.040)	1.0 (0.040)	0.011	0.013	0	1 (14.5)	1.3	01	18801111
							02	18801112
							03	18801113
							04	18801114
						1	05	18801115

* Type 01, 02, 03, 04 with LED and electrical protection
01 = horizontal, width 5.08mm (0.2in)
02 = vertical, width 5.08mm (0.2in)
03 = horizontal, width 2.54mm (0.1in)
04 = vertical, width 2.54mm (0.1in)
05 = cable ends 0.5m long (19.7in), 0.25mm²

Wiring Diagram



Functional Diagram



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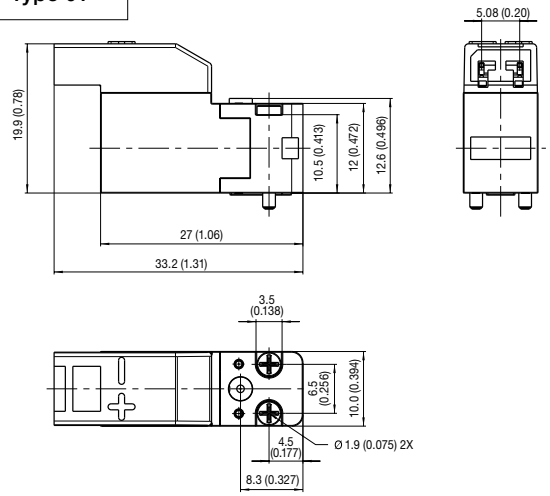
ASCO™ MINIATURE SOLENOID VALVES

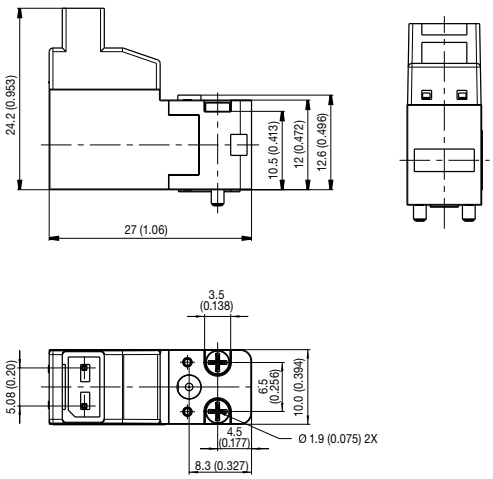
GENERAL SERVICE VALVES, MINIATURE SOLENOID WITH LATCHING COIL

Dimensions: mm (inches)

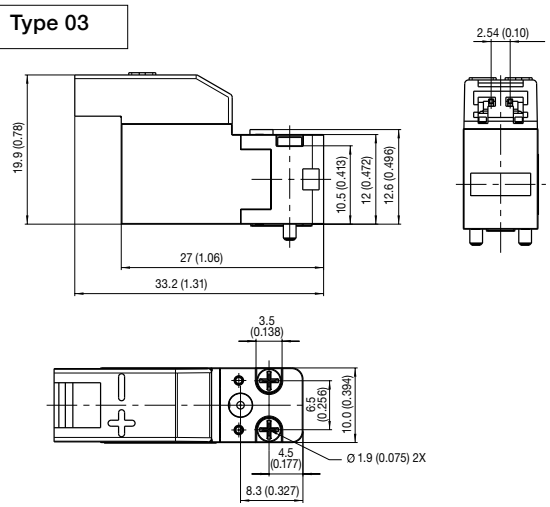
Type 01



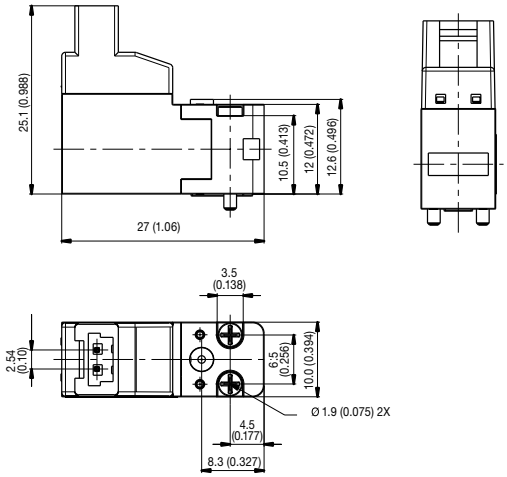
Type 02



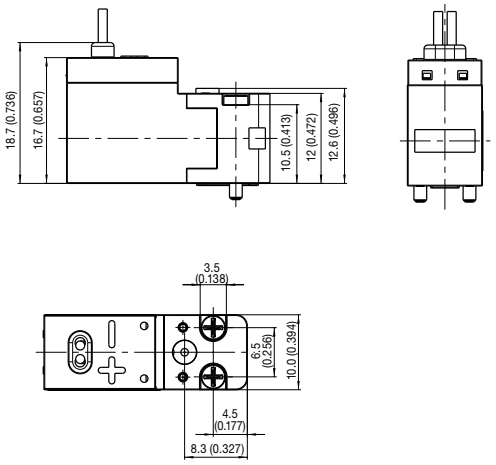
Type 03



Type 04



Type 05



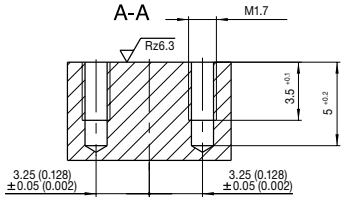
Flange Facing

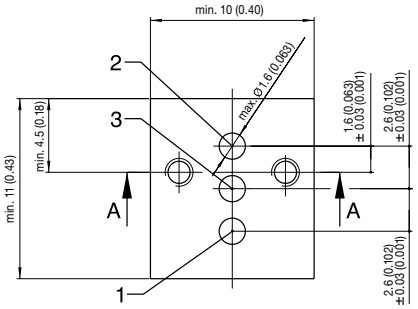
NO
3 = Pressure 2 = Outlet 1 = Exhaust

NC
1 = Pressure 2 = Outlet 3 = Exhaust

Use in vacuum (NO)
3 = Vacuum pump 2 = Outlet 1 = Atmosphere

Use in vacuum (NC)
1 = Vacuum pump 2 = Outlet 3 = Atmosphere





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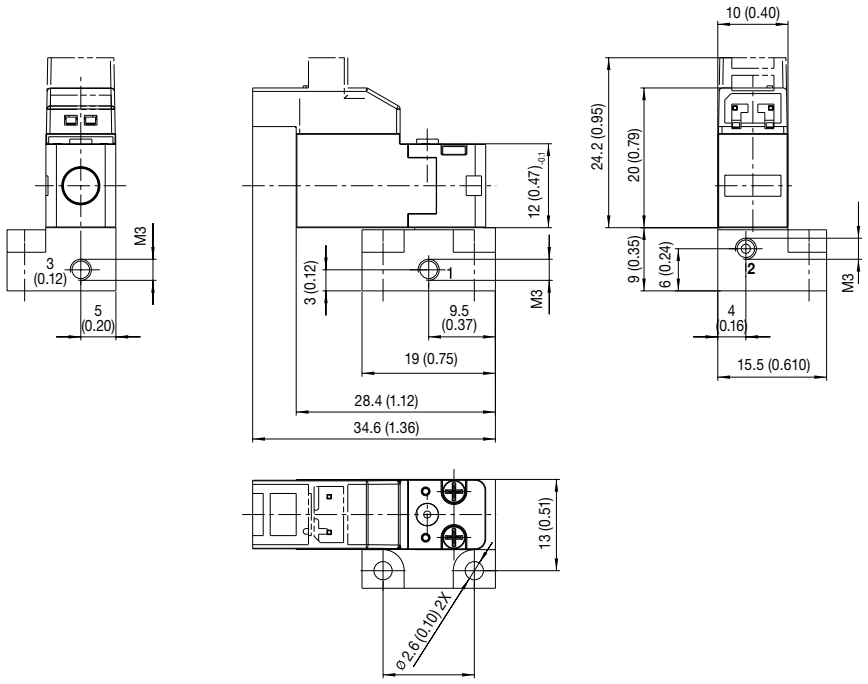
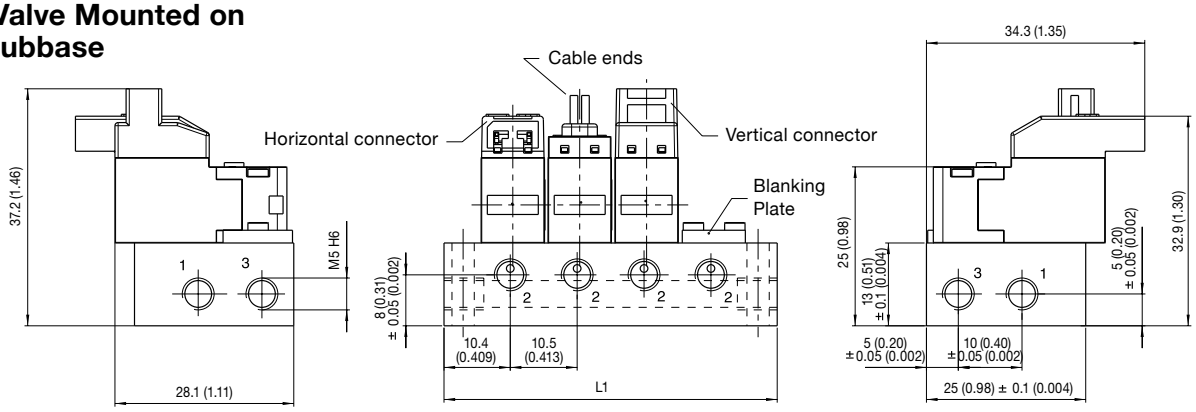
Dimensions: mm (inches)

Solenoid Valve Mounted on Single Subbase

Number of Valves	Subbase Catalog Number	Weight kg
1	35300101	0.015

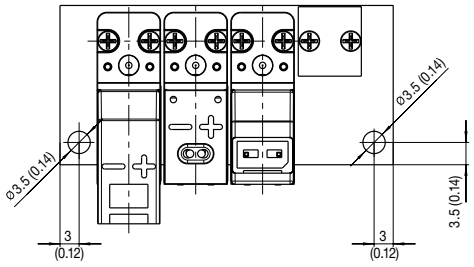


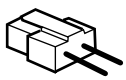
Solenoid Valve Mounted on Multiple Subbase



Number of Valves	Subbase Catalog Number*	Length	
		L1	L2
2	35300102	33.5 (1.32)	27.5 1.08)
3	35300103	44 (1.73)	38 (1.50)
4	35300104	54.5 (2.15)	48.5 (1.91)
5	35300105	65 (2.56)	59 (2.32)
6	35300106	75.5 (2.97)	69.5 (2.74)
7	35300107	86 (3.39)	80 (3.15)
8	35300108	96.5 (3.80)	90.5 (3.56)
9	35300109	107 (4.21)	101 (3.98)
10	35300110	117.5 (4.63)	111.5 (4.39)

A : Blanking plate, cat. number 88135305





NOTE:
The connectors must be ordered separately, please indicate the quantity and one of the following codes:
Connector, 2 wires:

Distance between contacts 5.08mm (0.2in)
- Length 0.5m (19.7in) - cat. no.: **88118801**
- Length 1.5m (59.1in) - cat. no.: **88118802**
- Length 3m (118in) - cat. no.: **88118803**

Distance between contacts 2.54mm (0.1in)
- Length 0.5m (19.7in) - cat. no.: **88118806**
- Length 1.5m (59.1in) - cat. no.: **88118807**
- Length 3m (118in) - cat. no.: **88118808**

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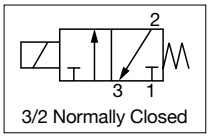
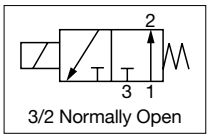
ASCO™ MINIATURE SOLENOID VALVES

GENERAL SERVICE VALVES, 3-WAY UNIVERSAL

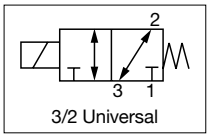
- The Series 226 3-way direct acting solenoid valve can be used with both liquids and gases
- Low power consumption, as well as latching coil versions, results in a decrease in OEM instrument power consumption as well as a decrease in heat transferred to the fluid media
- Small form-factor saves space in OEM instruments and are well-suited for portable and hand-held field devices
- Multiple electrical connection options offer greater flexibility in OEM instrument design and serviceability
- Meets all relevant CE directives, and is RoHS compliant
- Typical applications include:
  - Dental Equipment
  - Gas Chromatography
  - Industrial Analyzers
  - Respiratory Devices



3/2 Normally Closed



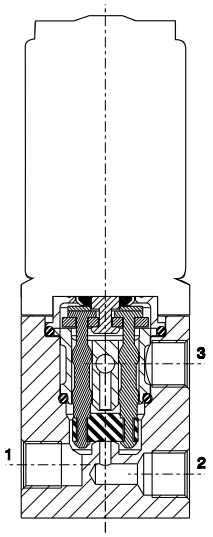
3/2 Normally Open



3/2 Universal

Fluids*	Temperature Range	Seal Materials*
Liquids and gases	-10°C to 90°C (14°F to 194°F) (NBR) 0°C to 90°C (32°F to 194°F) (FKM)	NBR or FKM

* Ensure that the compatibility of the materials in contact with the fluids is verified.



General Valve Information	
Body	Brass
Internal components	Brass, PEI (Polyetherimide) and stainless steel
Seat	1 ↔ 2: Brass - 1 ↔ 3: PEI
Core tube	Brass
Maximum allowable pressure (PS)	16 bar (232 psi)
Response Time	<10ms
Max viscosity	3°E (22 cStokes or mm2/s)

Electrical Characteristics	
Continuous duty	ED 100%
Encapsulation material	PA (Polyamide) fiberglass reinforced
Insulation class	F (155°C)
Ambient temperature	-10°C to 60°C (14°F to 140°F)
Electric connection*	DIN 46340 – micro plug connector
Electrical Enclosure Protection	IP 65 (EN 60529) with micro plug connector
Standard Voltages	DC: 12 VDC, 24 VDC (+10% - 5%)

* leaded coil on request

NOTE:
These micro-solenoid valves are not suitable for stagnating media subject to vaporization which deposit solid, calcareous, incrusting residues or similar.
Sealings: NBR = Nitrile Butadiene Rubber FKM = Fluoro-carbon elastomer.
1 - For reference, F1 = 24 VDC; F3 = 12 VDC

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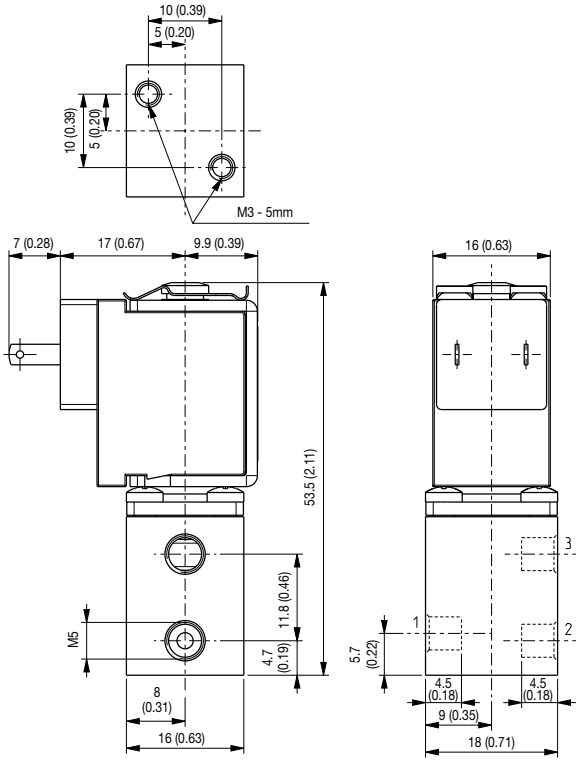
Specifications

Port size ISO UNI 4534	Orifice Size mm (inches)	Operating Pressure, bar (psi)					Kv (m3/h)	Cv	Power Absorption			Sealings	Catalog Number	Voltage	
		Δp min	Δp max						AC (VA)		DC (W)			12V DC	24V DC
			Gases		Liquids				Inrush	Holding					
			AC	DC	AC	DC									
M5	1.2 (0.047)	0	-	6 (87)	-	6 (87)	0.04	0.05	-	-	2.5	NBR	H226A556S0A00	F3	F1
				8 (116)		8 (116)					4		H226A557S0A00	F3	F1
				6 (87)		6 (87)					2.5		H226A559S0A00	-	F1
				8 (116)		8 (116)					4		H226A560S0A00	-	F1
	2 (0.079)			6 (87)		6 (87)					4		H226A566S0A00	-	F1
				6 (87)		6 (87)						FKM	H226A562S0A00	-	F1
				2.5 (36)		2.5 (36)	0.08	0.09				NBR	H226A558S0A00	-	F1
				1.5 (22)		1.5 (22)							H226A567S0A00	F3	-
				1.5 (22)		1.5 (22)						FKM	H226A563S0A00	F3	-

Dimensions: mm (inches)



Installation

Solenoid valve can be mounted in any position; vertical with coil upwards preferred.

NOTE:
It is necessary to keep the current circulating in the coil constant, so as to maintain the solenoid valve in any pre-determined position. In case the solenoid valve is energised by voltage variation, it has to be considered that the resistance of winding increases because of the continued energizing and consequently the power decreases. Therefore, it is necessary to compensate such power decrease by increasing the voltage to re-establish the initial current value.

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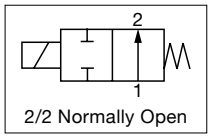
ASCO™ MINIATURE SOLENOID VALVES

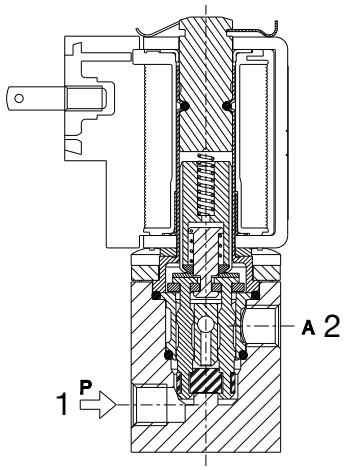
GENERAL SERVICE VALVES, 2-WAY NORMALLY OPEN

- The Series 226 direct acting solenoid valve can be used with both liquids and gases
- Low power versions (0.5W), and latching coil versions (power consumption close to zero) results in a decrease in OEM instrument power consumption as well as a decrease in heat transferred to the fluid media
- Small form-factor saves space in OEM instruments and are well-suited for portable and hand-held field devices
- Multiple electrical connection options offer greater flexibility in OEM instrument design and serviceability
- Meets all relevant CE directives, and is RoHS compliant
- Typical applications include:
  - Dental Equipment
  - Gas Chromatography
  - Industrial Analyzers
  - Respiratory Devices



Fluids*	Temperature Range	Seal Materials*
Liquids and gases	-10°C +90°C (14°F to 194°F)	NBR

* Ensure that the compatibility of the materials in contact with the fluids is verified.



General Valve Information	
Body	Brass
Sealing	NBR
Internal components	Brass, PEI (Polyetherimide) and stainless steel
Seat	PEI
Core tube	Brass
Maximum allowable pressure (PS)	16 bar (232 psi)
Response Time	<10ms
Fluid temperature	-10°C +90°C (14°F to 194°F)
Max viscosity	3°E (22 cStokes or mm2/s)

Electrical Characteristics	
Continuous duty	ED 100%
Encapsulation material	PA (Polyamide) fiberglass reinforced
Coil insulation class	F (155°C)
Ambient temperature	-10°C to 60°C (14°F to 140°F)
Electric connection*	DIN 46340
Electrical Enclosure Protection	IP 65 (EN 60529) with micro plug connector
Voltages DC	12 VDC, 24 VDC (-5%/+10%)

* leaded coil on request

Specifications

Port size ISO-UNI 4534	Orifice Size (mm)	Operating Pressure, bar (psi)					Flow Coefficient		Power absorption			Seals	Catalog Number	Voltage	
		Δp min	Δp max				Kv (m3/h)	Cv	AC. (VA)		DC. (W)		Valve	12V DC	24V DC
			Gases		Liquids				Inrush	Holding					
			AC	DC	AC	DC									
M5	1 (0.039)	0	-	10 (145)	-	10 (145)	0.04	0.05	-	-	4	NBR	H226A554S0A00 H226A554S0A00	F3 -	- F1
	2 (0.079)			3.5 (51)		3.5 (51)	0.10	0.12					H226A555S0A00 H226A555S0A00	F3 -	- F1

NOTE:
These micro-solenoid valves are not suitable for stagnating media subject to vaporization which deposit solid, calcareous, incrusting residues or similar.
Seal: NBR = Nitrile Butadiene Rubber
1 - For reference, F1 = 24 VDC; F3 = 12 VDC

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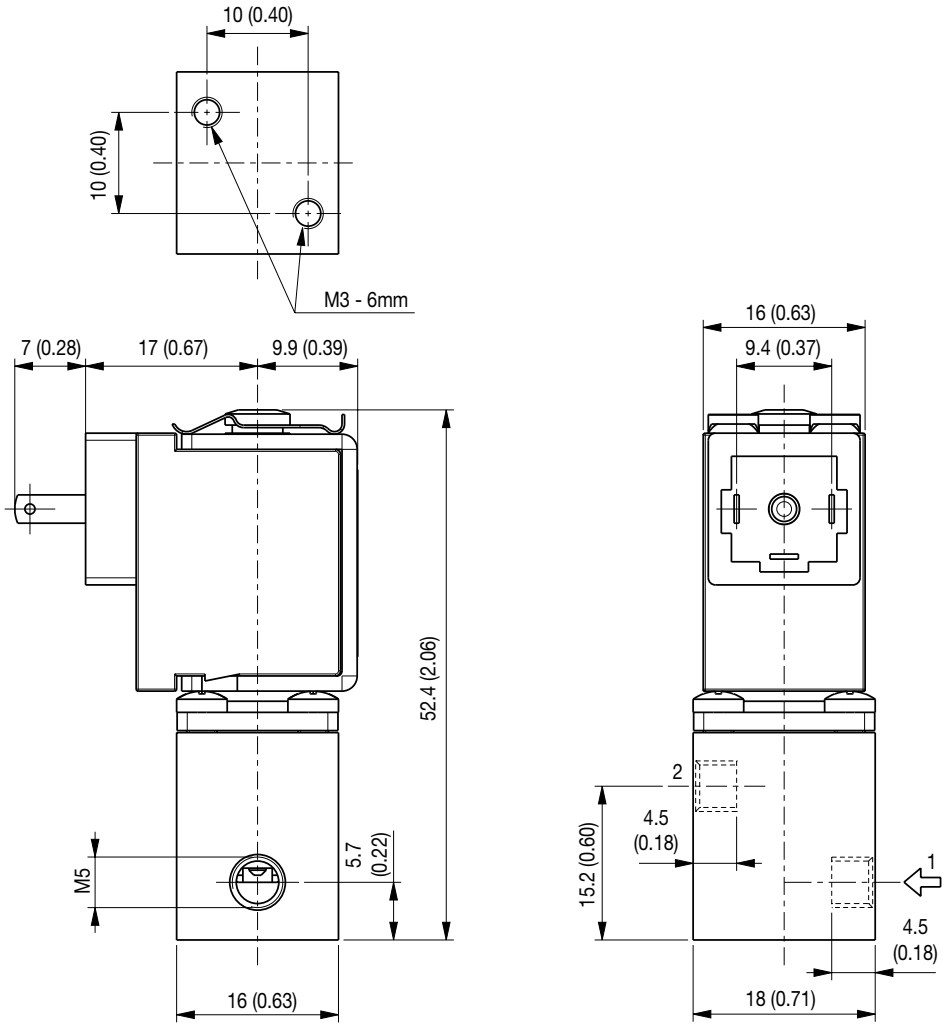
Dimensions: mm (inches)



Mounting

- Solenoid valve can be mounted in any position; vertical with coil upwards preferred.

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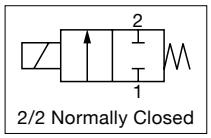
ASCO™ MINIATURE SOLENOID VALVES

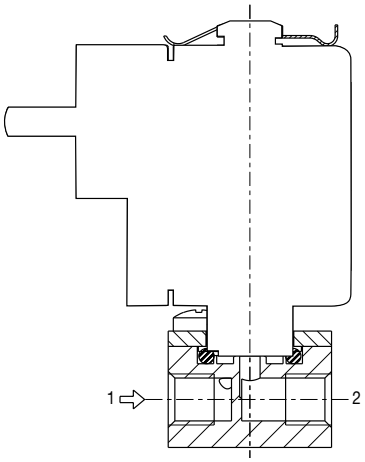
GENERAL SERVICE VALVES, 2-WAY NORMALLY CLOSED - HIGH PRESSURE

- The Series 226 direct acting solenoid valve can be used with both liquids and gases
- Low power versions (0.5W), and latching coil versions (power consumption close to zero) results in a decrease in OEM instrument power consumption as well as a decrease in heat transferred to the fluid media
- Small form-factor saves space in OEM instruments and are well-suited for portable and hand-held field devices
- Multiple electrical connection options offer greater flexibility in OEM instrument design and serviceability
- Meets all relevant CE directives, and is RoHS compliant
- Typical applications include:
  - Dental Equipment
  - Gas Chromatography
  - Industrial Analyzers
  - Respiratory Devices



Fluids*	Temperature Range	Seal Materials*
Liquids and gases	0°C to 130°C (32°F to 266°F) (FKM) 0°C to 140°C (32°F to 284°F) (FFKM) -10°C to 90°C (14°F to 194°F) (HNBR)	FKM or FFKM or HNBR

* Ensure that the compatibility of the materials in contact with the fluids is verified.



General Valve Information	
Body	Brass
Internal components	Stainless Steel
Maximum allowable pressure (PS)	16 bar (232 psi)
Response Time	<10ms
Max viscosity	3°E (22 cStokes or mm^2/s)
Guide assembly	Stainless Steel

Electrical Characteristics	
Continuous duty	ED 100%
Encapsulation material	PA (Polyamide) fiberglass reinforced
Coil insulation class	F (155°C)
Ambient temperature	-10°C to 60°C (14°F to 140°F)
Electric connection*	DIN 46340
Electrical Enclosure Protection	IP65 (EN 60529) with plug micro-connector
Standard Voltages	DC: 12 VDC, 24 VDC (+10% - 5%)

* leaded coil on request

NOTE:
These micro-solenoid valves are not suitable for stagnating media subject to vaporization which deposit solid, calcareous, incrusting residues or similar.
Seal: FKM = Fluoro-carbon elastomer FFKM = Perfluorate elastomer HNBR = Hydrogenated nitrile-butylene elastomer

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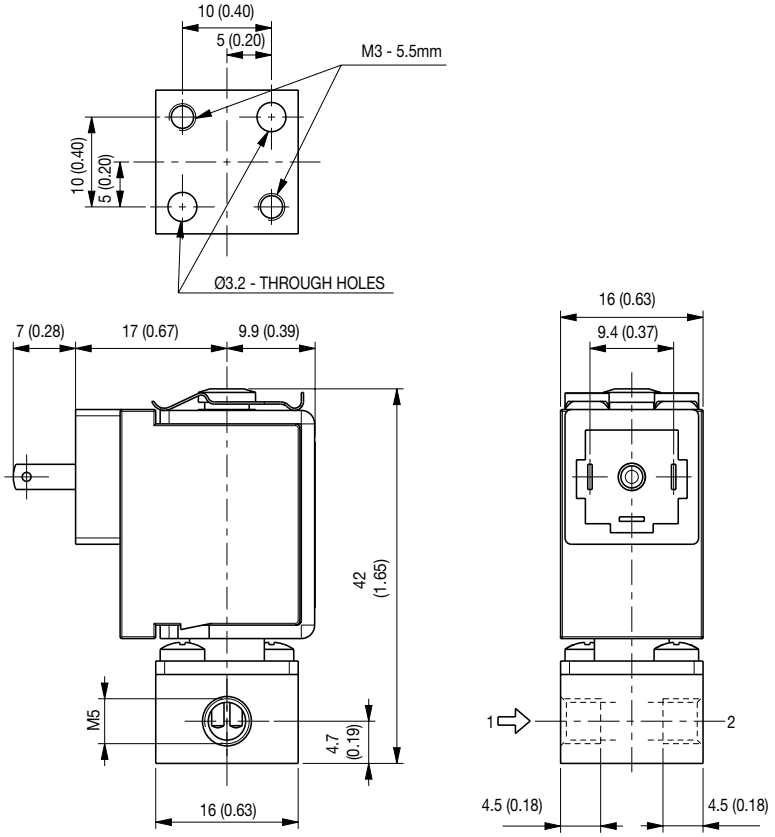
ASCO™ MINIATURE SOLENOID VALVES

GENERAL SERVICE VALVES, 2-WAY NORMALLY CLOSED - HIGH PRESSURE

Specifications

Con-nection	Orifice Size mm (inches)	Operating Pressure bar (psi)					Kv (m^3/h)	Cv	Power Rating			Sealings	Catalog Number	Voltage	
		Δp min	Δp max						AC (VA)		DC (W)			12V DC	24V DC
			Gases		Liquids				Inrush	Holding					
			AC	DC	AC	DC									
M5	1.1 (0.043)	0	-	0.5 (7.25)	-	0.5 (7.25)	0.04	0.05	-	-	0.5	FKM	H226A540S0A00	F3	-
				10 (145)		10 (145)					2.5		H226A542S0A00	-	F1
													H226A541S0A00	F3	F1
				14 (203)		14 (203)					4		H226A543S0A00	F3	F1
												HNBR	H226A564S0A00	-	F1
	2 (0.079)			1.5 (21.8)		1.5 (21.8)	0.10	0.12			2.5	FKM	H226A549S0A00	-	F1
				4 (58)		4 (58)					4		H226A551S0A00	F3	F1
												FFKM	H226A552S0X00	-	F1

Dimensions: mm (inches)



Mounting

- Solenoid valve can be mounted in any position; vertical with coil upwards preferred.

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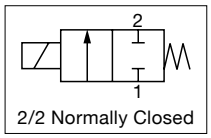
ASCO™ MINIATURE SOLENOID VALVES

GENERAL SERVICE VALVES , 2-WAY NORMALLY CLOSED - PROPORTIONAL INLINE

- Series 226 proportional valves are designed to proportionally control the flow of neutral and aggressive liquids and gases by varying the electrical input signal to the coil
- Optional manual set-screw version available to optimize flow rate / electrical signal
- Reduced heat transfer between control mechanism and fluid make them ideal for use with heat-sensitive reagents and biological samples
- Small form-factor saves space in OEM instruments and are well-suited for portable and hand-held field devices
- Multiple electrical connection options and a rotatable coil create greater flexibility in OEM instrument design and serviceability
- Various connections are available so that the valve can easily be integrated into virtually any fluidic path
- Meets all relevant CE directives, and is RoHS compliant
- Typical applications include:
  - Dental Equipment
  - Gas Chromatography
  - Industrial Analyzers
  - Respiratory Devices



Fluids*	Temperature Range	Seal Materials*
Liquids and gases	-10°C +90°C (14°F to 194°F)	NBR

* Ensure that the compatibility of the materials in contact with the fluids is verified.

General Valve Information	
Body	Brass
Internal components	Stainless steel
Seat	Brass
Core tube	Stainless steel
Maximum allowable pressure (PS)	16 bar (232 psi)
Max viscosity	3°E (22 cStokes or mm2/s)

Electrical Characteristics	
Continuous duty	ED 100%
Encapsulation material	PA (Polyamide) fiberglass reinforced
Insulation class	F (155°C)
Ambient temperature	-10°C to 60°C (14°F to 140°F)
Electric connection[1]	DIN 46340
Protection degree	IP 65 (EN 60529) with micro plug connector
Voltages[2]	12 VDC, 24 VDC (-5%/+10%)

1 leaded coil on request
2 other voltages on request.

Specifications

Port size ISO-UNI 4534	Orifice Size (mm)	Operating Pressure bar (psi)		Flow Coefficient		Power Rating			Seals	Series and Type	Voltage	
						AC. (VA)		DC. (W)		Valve	12V DC	24V DC
		Min	Max	Kv (m3/h)	Cv	Inrush	Holding					
M5	1.6	0.5 (7.25)	5 (72.5)	0.04	0.05	-	-	4	NBR	H226A546S0A00 H226A546S0A00 H226A547S0A00 H226A547S0A00	F3 - F3 -	- F1 - F1
		0.2 (2.90)	3 (43.5)					2.5		H226A545S0A00 H226A545S0A00	F3 -	- F1

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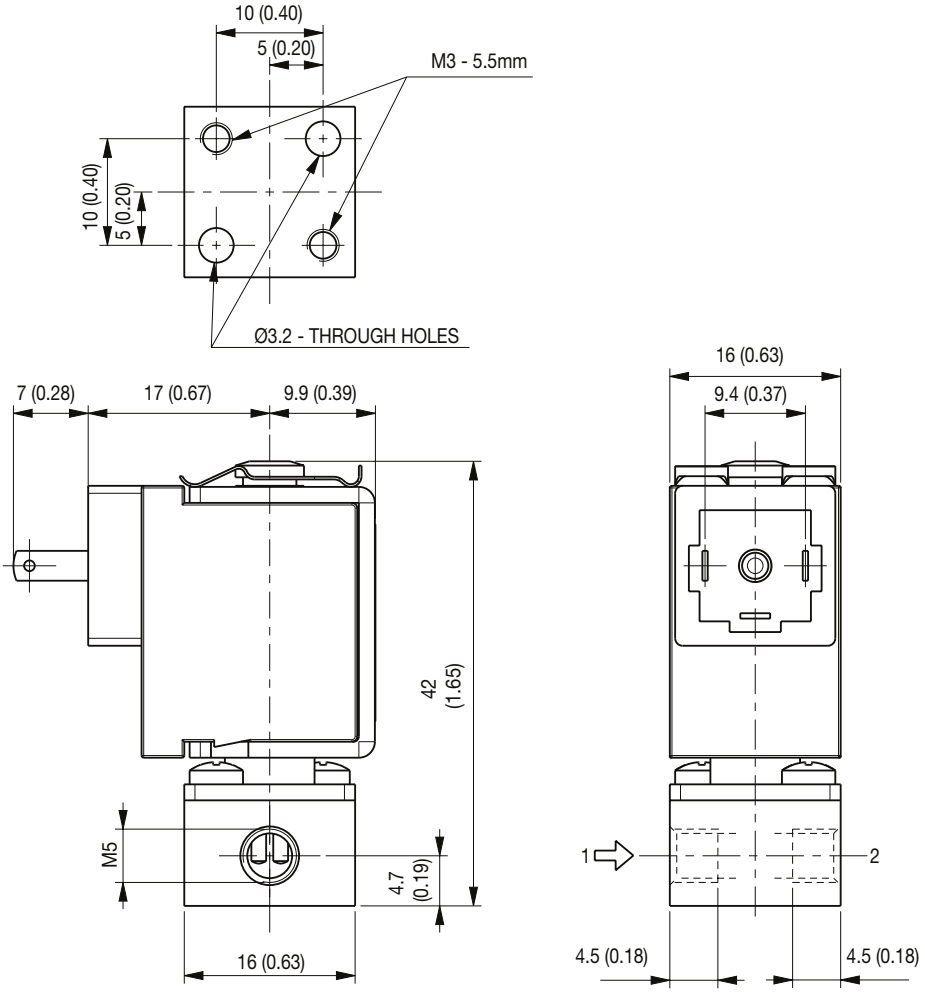
ASCO™ MINIATURE SOLENOID VALVES

GENERAL SERVICE VALVES , 2-WAY NORMALLY CLOSED - PROPORTIONAL INLINE

Dimensions: mm (inches)



Installation

- Solenoid valve can be mounted in any position; vertical with coil upwards preferred.

NOTE:

- These micro-solenoid valves are not suitable for stagnating media subject to vaporization which deposit solid, calcareous, incrusting residues or similar.
- Seal: NBR = Nitrile butylene elastomer. Other options available on request
- It is necessary to keep the current circulating in the coil constant, so as to maintain the solenoid valve in any pre-determined position. In case the solenoid valve is energised by voltage variation, it has to be considered that the resistance of winding increases because of the continued energizing and consequently the power decreases. Therefore, it is necessary to compensate such power decrease by increasing the voltage to re-establish the initial current value.

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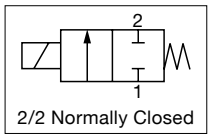
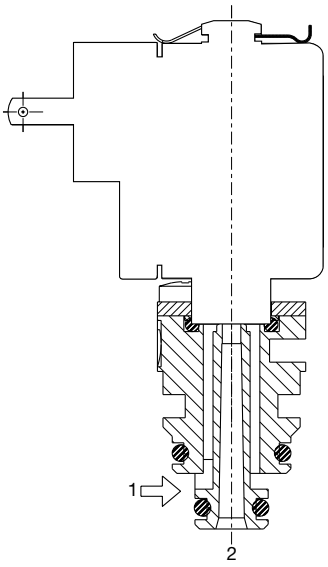
ASCO™ MINIATURE SOLENOID VALVES

GENERAL SERVICE VALVES, 2-WAY NORMALLY CLOSED - CARTRIDGE

- The Series 226 direct acting solenoid valve can be used with both liquids and gases
- Low power versions (0.5W), and latching coil versions (power consumption close to zero) results in a decrease in OEM instrument power consumption as well as a decrease in heat transferred to the fluid media
- Small form-factor saves space in OEM instruments and are well-suited for portable and hand-held field devices
- Multiple electrical connection options and a rotatable coil create greater flexibility in OEM instrument design and serviceability
- Various connections are available so that the valve can easily be integrated into virtually any fluidic path
- Meets all relevant CE directives, and is RoHS compliant
- Typical applications include:
  - Dental Equipment
  - Gas Chromatography
  - Industrial Analyzers
  - Respiratory Devices





Fluids*	Temperature Range	Seal Materials*
Liquids and gases	-10°C to 100°C (14°F to 212°F)	EPDM

* Ensure that the compatibility of the materials in contact with the fluids is verified.

General Valve Information	
Body	POM
Internal components	Stainless steel
Seat	POM
Core tube	Stainless steel
Maximum allowable pressure	16 bar (232 psi)
Response Time	<10ms
Max viscosity	3°E (22 cStokes or mm2/s)

Electrical Characteristics	
Continuous duty	ED 100%
Encapsulation material	PA (Polyamide) fiberglass reinforced
Ambient temperature	-10°C to 60°C (14°F to 140°F)
Electric connection*	DIN 46340
Electrical Enclosure Protection	IP 65 (EN 60529) with micro plug connector
Standard Voltages	12 VDC, 24 VDC (-5%/+10%)

* leaded coil on request

Specifications

Connection	Orifice size	Operating Pressure bar (psi)					Flow Coefficient		Power Rating			Seals	Catalog Number	Voltage	
		Ap min	Ap max.				Kv (m^3/h)	Cv	AC (VA)		W		Valve	12V DC	24V DC
	mm (inches)		Gases		Liquids				Inrush	Holding					
			AC	DC	AC	DC									
-	2 (0.079)	0	-	6 (87)	-	6 (87)	0.10	0.12	-	-	4	EPDM	P226A550S0A00	F3	F1

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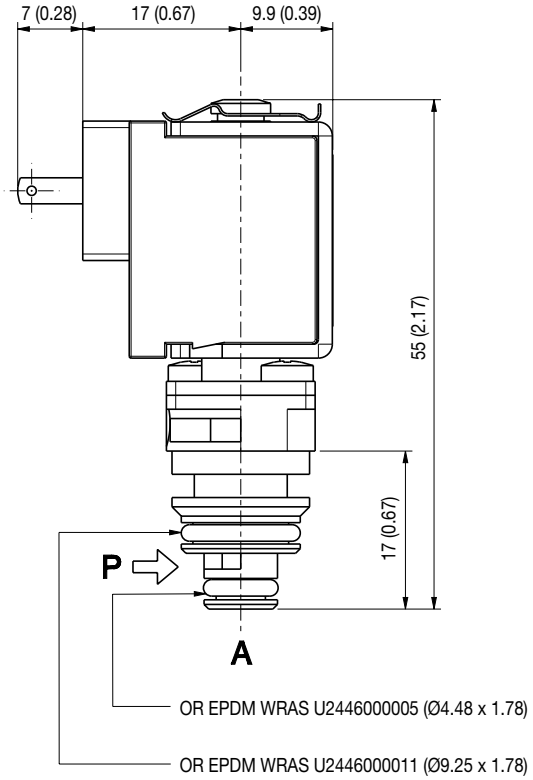
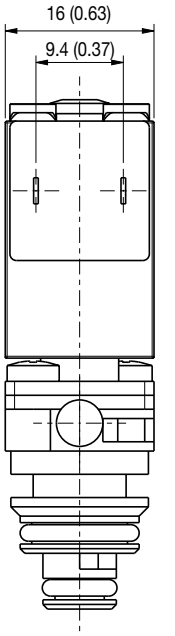
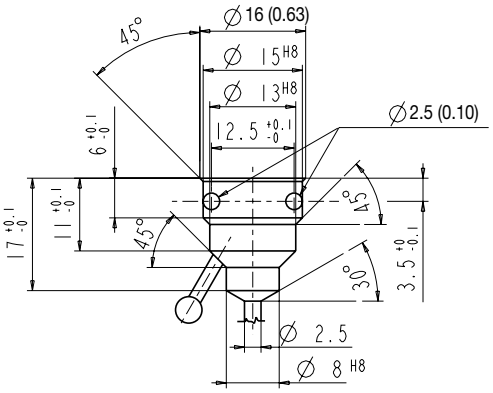
ASCO™ MINIATURE SOLENOID VALVES

GENERAL SERVICE VALVES, 2-WAY NORMALLY CLOSED - CARTRIDGE

Dimensions: mm (inches)







Dimensions of Cartridge Manifold Seat

Installation

- Solenoid valve can be mounted in any position; vertical with coil upwards preferred.

NOTE:

- These micro-solenoid valves are not suitable for stagnating media subject to vaporization which deposit solid, calcareous, incrusting residues or similar.
- Sealings: EPDM = WRAS approved ethylene-propylene elastomer

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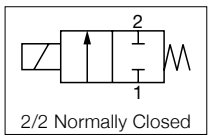
ASCO™ MINIATURE SOLENOID VALVES

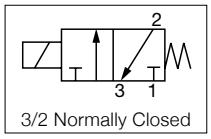
GENERAL SERVICE VALVES

SERIES 411

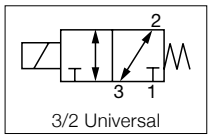
- The 411 Series solenoid valves are designed for use with air and inert gases
- Manifold mount construction that is suitable for a wide variety of gas applications
- Compact light-weight architecture and low power consumption make them ideal for portable medical devices
- Exceptional service lifetime over 100 million cycles that increases OEM instrument reliability
- Meets all relevant CE directives, and is RoHS compliant
- Typical applications include:
  - Respiratory Therapy
  - Patient Monitoring
  - Compression Therapy (DVT)
  - Robotic Pharmacy Dispensing



2/2 Normally Closed



3/2 Normally Closed

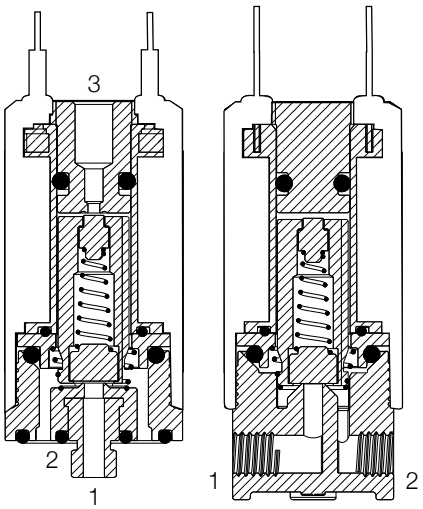


3/2 Universal

Fluids	Temperature Range	Seal Materials
Air or Inert Gas, non-lubricated[1]	-23 °C to 60 °C (-10 °F to 140 °F)	FKM, NBR, EDPM

[1] filtered at 10 µm

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



General Valve Information*	
Body	PBT, 300 Series stainless steel
Others	PBT, 400 Series stainless steel, 300 Series stainless steel
Response Time	< 10ms
Vacuum Rating	-0.9 bar (-13 psi)

* Other materials on request

Electrical Characteristics	
Standard Voltages*	5 VDC, 6 VDC, 12 VDC, 24 VDC
Power Consumption	0.65 to 2.0 W

* Other voltages on request

NOTE: The solenoid valves are designed for continuous operation within the maximum ambient temperature limits.

Insulation Class	Coil Insulation	Protection	Ambient Temperature Range	Electrical Connection
	°C (°F)	VA	°C (°F)	
B	130 (266)	-	-23 to 60 (-10 to 140)	0.11in Spade, 24 AWG Lead Wire

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Specifications									
Orifice Size		Flow Coefficient				Operating Pressure bar (psi)		Power	Catalog Number
mm (inches)		Kv (m³/h)		Cv		min.	max.		
Port 1	Port 3	Port 1	Port 3	Port 1	Port 3			W	
2/2 NC - Normally Closed									
0.76 (0.030)	-	0.022	-	0.013	-	-0.9 (-13)	6.9 (100)	0.65	411x11xxxx
1.4 (0.055)	-	0.066	-	0.040	-	-0.9 (-13)	6.9 (100)	2.0	411x21xxxx
2.0 (0.080)	-	0.116	-	0.071	-	-0.9 (-13)	2.1 (30)	2.0	411x31xxxx
3/2 NC - Normally Closed									
0.76 (0.030)	0.63 (0.025)	0.022	0.010	0.013	0.006	-0.9 (-13)	6.9 (100)	0.65	411x12xxxx
1.4 (0.055)	1.3 (0.050)	0.066	0.055	0.040	0.033	-0.9 (-13)	6.9 (100)	2.0	411x22xxxx
2.0 (0.080)	1.3 (0.050)	0.116	0.055	0.071	0.033	-0.9 (-13)	2.1 (30)	2.0	411x32xxxx
3/2 U - Universal									
0.76 (0.030)	0.63 (0.025)	0.022	0.010	0.013	0.006	-0.9 (-13)	6.9 (100)	0.65	411x13xxHx
1.4 (0.055)	1.3 (0.050)	0.066	0.055	0.040	0.033	-0.9 (-13)	3.4 (50)	2.0	411x23xxHx
2.0 (0.080)	1.3 (0.050)	0.116	0.055	0.071	0.033	-0.9 (-13)	2.1 (30)	2.0	411x33xxHx

How to Order

411 x 11 xx x x x

Catalog Number
411

Mounting Style
M = Manifold, 10-32 UNF
L = Line, 10-32 UNF
K = Manifold, M5
J = Line, M5

Base Number
(see Specifications table)

Voltage
12 = 12 VDC
24 = 24 VDC
05 = 5 VDC
06 = 6 VDC

Option Suffix
O = Oxygen Service
P = Label Pressure units in kPa
S = Stainless Steel Body

Seal Material
V = FKM
E = EPDM
B = NBR

Electrical Connection
F = 0.11in Spade
H = Leaded Coil

NOTE: Oxygen Service valves available with FKM or EPDM Seals only. UL / CSA available with 300 Series Stainless Steel Body. 3-Way Universal operation only available with leaded coil electrical connection (H).

Ordering Examples:

411M1124FV = 2-way normally closed manifold mount valve with 0.76mm (0.030in) orifice, 24 VDC coil rating at 0.65 Watts, .110 spade connection, FKM seals
411L3212HV = 3-way normally closed line mount valve with 2.0mm (0.080in) orifice, 12 VDC coil rating at 2.0 Watts, leaded coil, FKM seals
411K1124HVOS = 2-way normally closed manifold mount and M5 stud with 0.76mm (0.030in) orifice, 24 VDC coil rating at 0.65 Watts, leaded coil, FKM seals, clean for Oxygen use and Stainless Steel body

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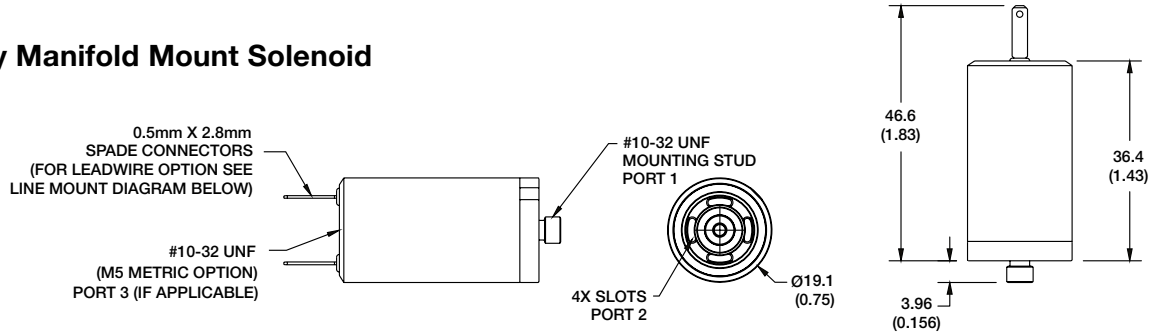
ASCO™ MINIATURE SOLENOID VALVES

GENERAL SERVICE VALVES

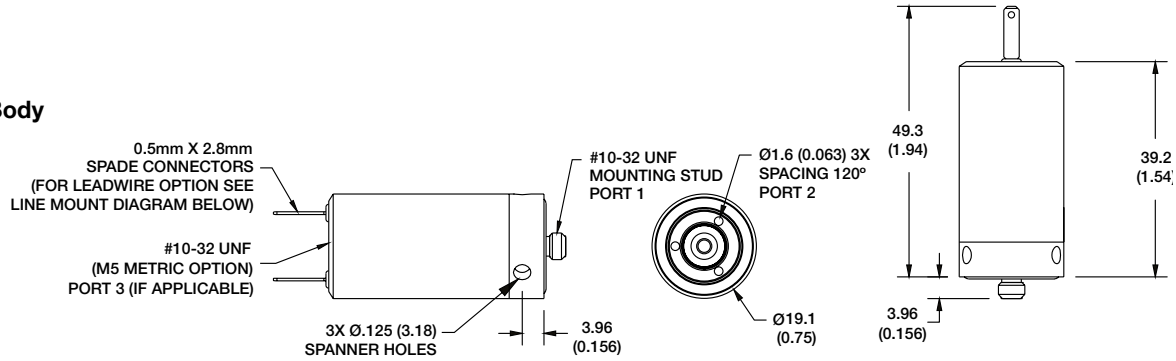
Dimensions: mm (inches)

2- and 3-Way Manifold Mount Solenoid

PBT Body

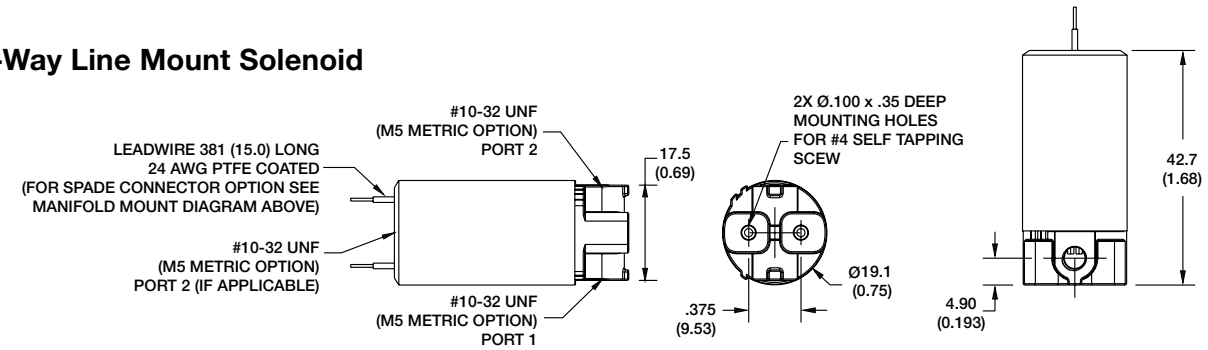


Stainless Steel Body

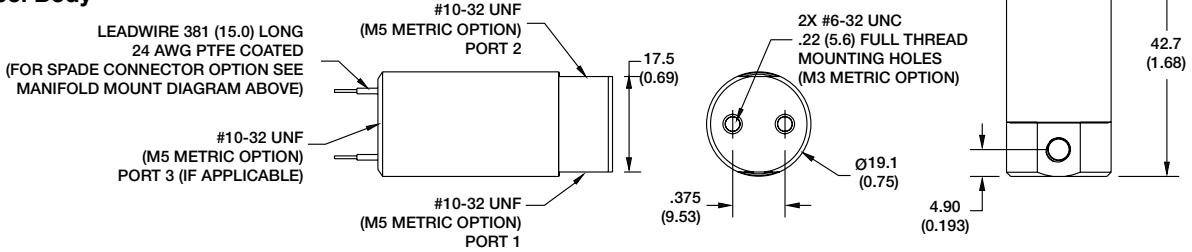


2- and 3-Way Line Mount Solenoid

PBT Body



Stainless Steel Body



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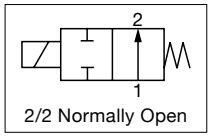
ASCO™ MINIATURE SOLENOID VALVES

GENERAL SERVICE VALVES

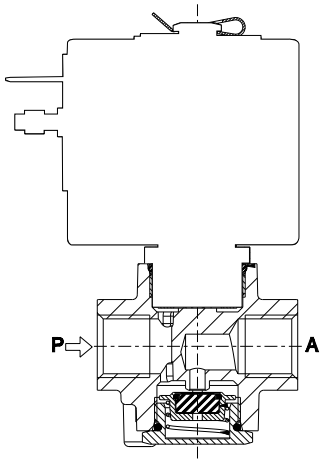
- Direct acting solenoid valve, suitable for vacuum at port “P” (PA – PP = 1 bar)
- Suitable to shut off liquid and gaseous fluids (verify the compatibility of fluid with materials in contact), particularly suitable in the applications in sterilising autoclaves.
- Typical applications include:
  - Oil burners
  - Air compressor
  - Water steam sterilizers,
  - Gas oil burners
  - Naphta burners



2/2 Normally Open

General Valve Information	
Body	Brass or chemically nickel coated (Ni-P) brass
Seals*	FKM, Stainless steel or CR70N
Internal Components	Stainless Steel
Seat	Brass or Stainless Steel
Core Tube	Stainless Steel
Shading coil	Copper
Fluids	Liquids or gases
Fluid temperature	-10°C +170°C (stainless steel) 0°C +130°C (FKM) -10°C +90°C (CR70N)
Differential pressure	see "Specifications" [1 bar = 100 kPa]
Response time	~ 20-30ms
Max. Viscosity	37 cSt (mm²/s)

* Ensure that the compatibility of the materials in contact with the fluids is verified



Electrical Characteristics			
		ZA130A	**ZA10A (UL class F - for UL cl.H: ZA34 (E153691))**
Continous duty		ED 100%	ED 100%
Coil Insulation Class		F (140°C), on request class H (165°C) - UL	F (155°C) on request class H (180°C)
Connector		DIN 46340 - 3 pole connector (DIN 43650)	DIN 46340 - 3 pole connector (DIN 43650)
Encapsulation material		PET (polyethylene terephtalate) fiberglass reinforced	PPS (polyphenilsulfure) fiberglass reinforced)
Electrical Enclosure Protection		Molded IP65 (EN 60529)	IP67 (EN60529) with plug connector
Standard Voltages *	DC	12-24 V (+10% -5%)	12-24 V (+10% -5%)
	AC	24V/50Hz - 110V/50Hz (120V/60Hz) - 230V/50Hz (+10% -15%)	24V/50Hz - 110V/50Hz (120V/60Hz) - 230V/50Hz (+10% -15%)

*Other voltages and frequencies on request

Specifications

Pipe Connection	Orifice Size	Flow Coefficient		Operating Pressure bar			Power Rating (W)			Catalog Number		Body Material	Seat Materials	Sealing Materials
				min.	max.		AC (VA)		DC (W)	Threaded Body				
	mm	Kv	Cv		Gases	Liquids	Inrush	Holding			Coil			
G 1/4	3	0.22	0.25	0	-	30	44	24	13	L256M02	Z130A	Brass	Stainless Steel	Stainless Steel
	3.2	0.3	0.35		12	10				L256V01			Brass	FKM
	4.5	0.45	0.52		5	4								
G 1/4	3.2	0.3	0.35	0	4	4	23	14	9	L256V12 (*)	ZA10A	Chemically nickel coated (Ni-P) brass	Stainless Steel	FKM
										L256V14 (*)				
	4.5	0.45	0.52		2.5	2.5				L256V12		Brass		
G1/8	1.6	0.08	0.09	0	25	22	23	14	9	L256N07	ZA10A	Brass	Brass	CR70N
1/4 NPT	3.2	0.3	0.35	0	12	10	44	24	13	L256V09	Z130A	Brass	Brass	FKM

(*) Only for use with steam, consider following values: max pressure 2.8 bar (max fluid temperature 130° C)

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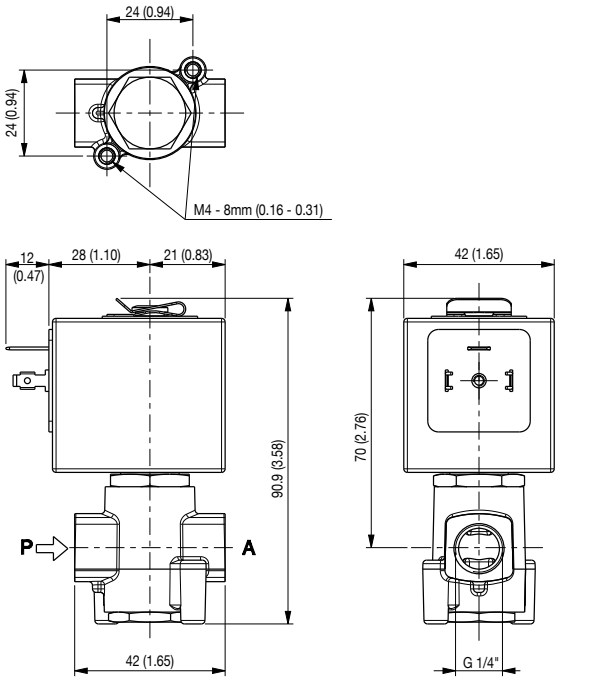
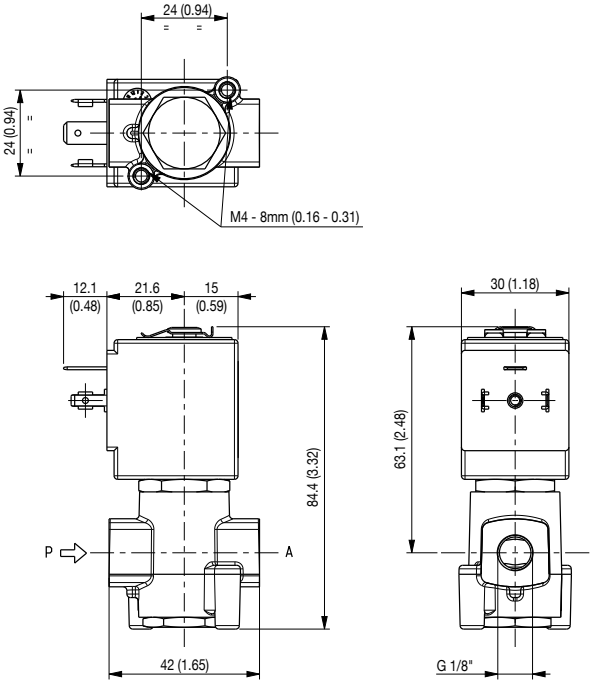
Dimensions: mm (inches)

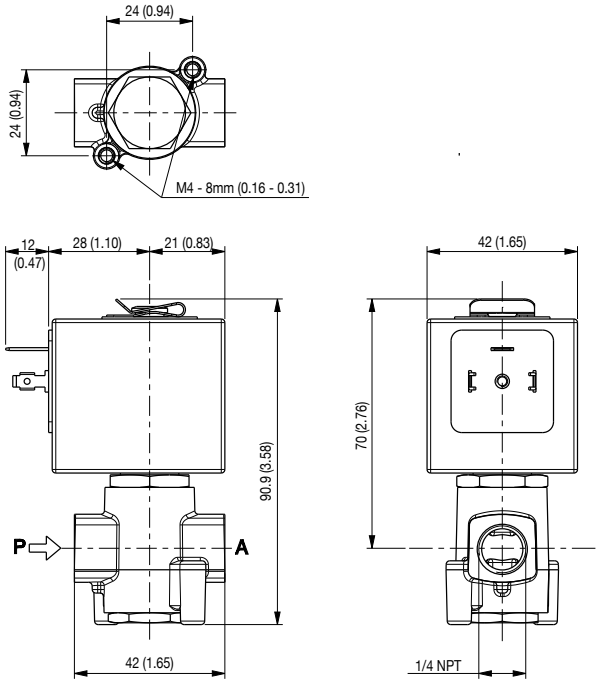
L256V01 / L256MO2



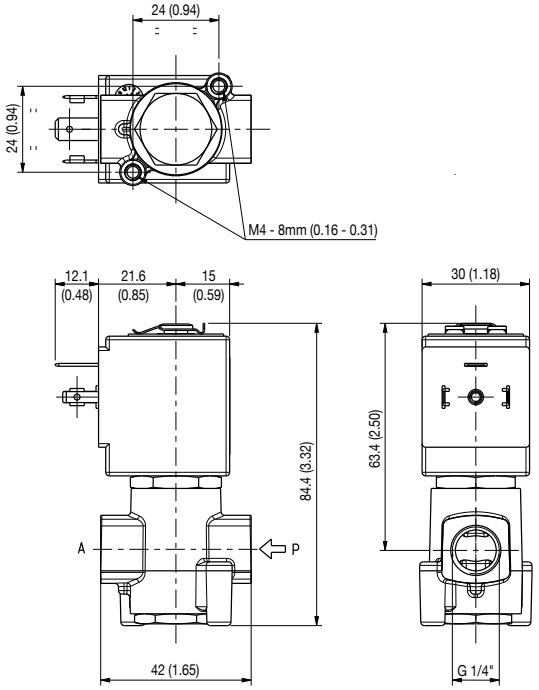
L256N07



L256V09



L256V12 / L256V14



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Spare Part Kits

L256V01 / L256MO2

Kit description	Model	Diameter	Kit P.N.	Consisting of:
Core sealing assembly kit	L256M02		G3093201	Sealing group Sealing return spring OR cap
	L256V01	Ø 3.2	G3093101	
	L256V01	Ø 4.5	G3093104	
OR guide assembly kit			GU2424000017	N°.10 OR guide assembly
OR cap kit			GU2424000155	N°.10 OR cap
Coil			Z130A	Coil

L256N07

Kit description	Kit P.N.	Consisting of:
Sealing assembly kit	G3093103	Sealing group Sealing return spring OR cap
OR guide assembly kit	GU2445000017	N°.10 OR guide assembly
OR cap kit	GU2445000155	N°.10 OR cap
Coil	ZA10A	Coil

L256V09

Kit description	Kit P.N.	Consisting of:
Core sealing assembly kit	G3093101	Sealing group Sealing return spring OR cap
OR guide assembly kit	GU2424000017	N°.10 OR guide assembly
OR cap kit	GU2424000155	N°.10 OR cap
Coil	Z130A	Coil

L256V12 / L256V14

Kit description	Kit P.N.	Consisting of:
Sealing assembly kit	G3124301	Sealing group Sealing return spring OR cap
OR guide assembly kit	GU2424000017	N°.10 OR guide assembly
OR cap kit	GU2424000155	N°.10 OR cap
Coil	ZA10A	Coil

Installation

- Solenoid valve can be mounted in any position; vertical with coil upwards preferred.

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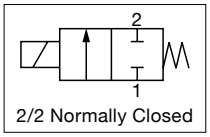
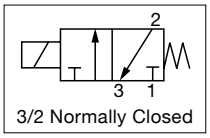
ASCO™ MINIATURE SOLENOID VALVES

GENERAL SERVICE VALVES

- The RB Series solenoid valves are designed for use with air and inert gases
- Highly customizable construction that is suitable for a wide variety of gas applications
- Compact light-weight architecture and low power consumption make them ideal for portable medical devices
- Exceptional service lifetime over 100 million cycles that increases OEM instrument reliability
- Meets all relevant CE directives, and is RoHS compliant
- Typical applications include:
  - Respiratory Therapy
  - Patient Monitoring
  - Compression Therapy (DVT)
  - Robotic Pharmacy Dispensing



2/2 Normally Closed



3/2 Normally Closed

Fluids*	Temperature Range	Seal Materials*
Air or Inert Gas[1]	0 °C to 60 °C (32 °F to 140 °F)	FKM
		NBR

[1] filtered at 10µm
* Ensure that the compatibility of the materials in contact with the fluids is verified.

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

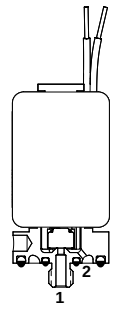
General Valve Information	
Body	PBT, brass
Others	Stainless steel
Response Time	< 10ms
Vacuum Rating	-0.9 bar (13 psi)

Electrical Characteristics	
Standard Voltages*	5 VDC, 12 VDC, 24 VDC
Power Consumption	0.5 to 2.0 W

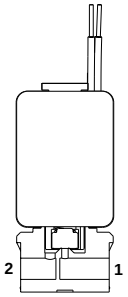
* Other voltages on request

NOTE: The solenoid valves are designed for continuous operation within the maximum ambient temperature limits

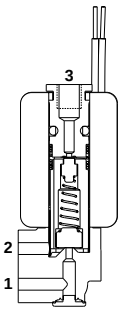
Insulation Class	Coil Insulation	Protection	Ambient Temperature Range	Electrical Connection
	°C (°F)	VA	°C (°F)	
B	130 (266)	IP30 (EN 60529)	0 to 60 (32 to 140)	Lead wires 26 AWG or circuit board mount



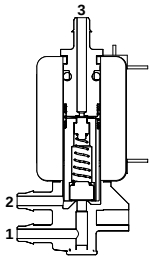
2/2 NC
Manifold Mount



2/2 NC
Line Mount



3/2 NC
Pad Mount



3/2 NC
Push-in Hose
Connection

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Specifications							
Connection	Orifice Size	Flow Coefficient		Operating Pressure bar (psi)		Power Rating	Catalog Number
				min.	max.		
	mm (inches)	Kv (m^3/h)	Cv		air, inert gas	W	
2/2 NC - Normally Closed							
10-32 UNF Stud Manifold Mount, Brass (M)	0.8 (0.031)	0.018	0.011	-0.9 (-13)	3.4 (50)	0.5	RLM20xx30x
	0.8 (0.031)	0.018	0.011	-0.9 (-13)	6.9 (100)	2.0	RHM20xx30x
	1.30 (0.051)	0.066	0.030	-0.9 (-13)	1.0 (15)	0.5	RLM20xx50x
	1.30 (0.051)	0.058	0.033	-0.9 (-13)	3.4 (50)	1.0	RMM20xx50x
	1.30 (0.051)	0.058	0.033	-0.9 (-13)	6.9 (100)	2.0	RHM20xx50x
	2.00 (0.079)	0.097	0.056	-0.9 (-13)	1.0 (15)	2.0	RHM20xx80x
10-32 UNF Female Line Mount, Brass (L)	0.8 (0.031)	0.018	0.011	-0.9 (-13)	3.4 (50)	0.5	RLL20xx30x
	0.8 (0.031)	0.018	0.011	-0.9 (-13)	6.9 (100)	2.0	RHL20xx30x
	1.30 (0.051)	0.066	0.030	-0.9 (-13)	1.0 (15)	0.5	RLL20xx50x
	1.30 (0.051)	0.058	0.033	-0.9 (-13)	3.4 (50)	1.0	RML20xx50x
	1.30 (0.051)	0.058	0.033	-0.9 (-13)	6.9 (100)	2.0	RHL20xx50x
	2.00 (0.079)	0.097	0.056	-0.9 (-13)	1.0 (15)	2.0	RHL20xx80x
3.17mm (0.125in) Push-in Hose Connecton PBT (B)	0.8 (0.031)	0.026	0.010	-0.9 (-13)	1.0 (15)	0.5	RLB20xx30x
	0.8 (0.031)	0.018	0.011	-0.9 (-13)	3.4 (50)	1.0	RMB20xx30x
	0.8 (0.031)	0.018	0.011	-0.9 (-13)	6.9 (100)	2.0	RHB20xx30x
	1.30 (0.051)	0.079	0.031	-0.9 (-13)	0.7 (10)	0.5	RLB20xx50x
	1.30 (0.051)	0.058	0.033	-0.9 (-13)	2.4 (35)	1.0	RMB20xx50x
	1.30 (0.051)	0.058	0.033	-0.9 (-13)	4.8 (70)	2.0	RHB20xx50x
	2.00 (0.079)	0.097	0.056	-0.9 (-13)	1.7 (25)	2.0	RHB20xx80x
Pad Mount, PBT (F)	0.8 (0.031)	0.026	0.010	-0.9 (-13)	1.0 (15)	0.5	RLF20xx30x
	0.8 (0.031)	0.018	0.011	-0.9 (-13)	3.4 (50)	1.0	RMF20xx30x
	0.8 (0.031)	0.018	0.011	-0.9 (-13)	6.9 (100)	2.0	RHF20xx30x
	1.30 (0.051)	0.079	0.031	-0.9 (-13)	0.7 (10)	0.5	RLF20xx50x
	1.30 (0.051)	0.058	0.033	-0.9 (-13)	2.4 (35)	1.0	RMF20xx50x
	1.30 (0.051)	0.058	0.033	-0.9 (-13)	4.8 (70)	2.0	RHF20xx50x
	2.00 (0.079)	0.097	0.056	-0.9 (-13)	1.7 (25)	2.0	RHF20xx80x

How to Order

RLM20 **x** **x** **30** **x**

Catalog Number

Voltages
4 = 5 VDC
6 = 12 VDC
7 = 24 VDC

Electrical Connection
H = Leaded Coil
P = PCB pins (circuit board)

Seal Material
V = FKM
B = NBR
O = Oxygen service (FKM)

Base Number
(see Specifications table)

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ASCO™ MINIATURE SOLENOID VALVES

GENERAL SERVICE VALVES

Specifications										
Connection	Orifice Size		Flow Coefficient				Operating Pressure bar (psi)		Power Coil	Catalog Number
	mm (inches)		Kv (m^3/h)		Cv		min.	max.		
	Port 1	Port 3	Port 1	Port 3	Port 1	Port 3		air, inert gas	W	
3/2 NC - Normally Closed										
10-32 UNF Stud Manifold Mount, Brass (M)	0.8 (0.031)	1.0 (0.040)	0.018	0.031	0.011	0.018	-0.9 (-13)	3.4 (50)	0.5	RLM3xxx34x
	0.8 (0.031)	1.0 (0.040)	0.018	0.031	0.011	0.018	-0.9 (-13)	6.9 (100)	2.0	RHM3xxx34x
	1.30 (0.051)	1.3 (0.051)	0.066	0.052	0.030	0.024	-0.9 (-13)	1.0 (15)	0.5	RLM3xxx55x
	1.30 (0.051)	1.3 (0.051)	0.058	0.050	0.033	0.029	-0.9 (-13)	3.4 (50)	1.0	RMM3xxx55x
	1.30 (0.051)	1.3 (0.051)	0.058	0.050	0.033	0.029	-0.9 (-13)	6.9 (100)	2.0	RHM3xxx55x
	2.00 (0.079)	1.3 (0.051)	0.097	0.050	0.056	0.029	-0.9 (-13)	1.7 (25)	2.0	RHM3xxx85x
10-32 UNF Female Line Mount, Brass (L)	0.8 (0.031)	1.0 (0.040)	0.018	0.031	0.011	0.018	-0.9 (-13)	3.4 (50)	0.5	RLL3xxx34x
	0.8 (0.031)	1.0 (0.040)	0.018	0.031	0.011	0.018	-0.9 (-13)	6.9 (100)	2.0	RHL3xxx34x
	1.30 (0.051)	1.3 (0.051)	0.066	0.052	0.030	0.024	-0.9 (-13)	1.0 (15)	0.5	RLL3xxx55x
	1.30 (0.051)	1.3 (0.051)	0.058	0.050	0.033	0.029	-0.9 (-13)	3.4 (50)	1.0	RML3xxx55x
	1.30 (0.051)	1.3 (0.051)	0.058	0.050	0.033	0.029	-0.9 (-13)	6.9 (100)	2.0	RHL3xxx55x
	2.00 (0.079)	1.3 (0.051)	0.097	0.050	0.056	0.029	-0.9 (-13)	1.7 (25)	2.0	RHL3xxx85x
3.17mm (0.125in) Push-in Hose Connecton PBT (B)	0.8 (0.031)	1.0 (0.040)	0.026	0.033	0.010	0.013	-0.9 (-13)	1.0 (15)	0.5	RLB3xxx34x
	0.8 (0.031)	1.0 (0.040)	0.018	0.031	0.011	0.018	-0.9 (-13)	3.4 (50)	1.0	RMB3xxx34x
	0.8 (0.031)	1.0 (0.040)	0.018	0.031	0.011	0.018	-0.9 (-13)	6.9 (100)	2.0	RHB3xxx34x
	1.30 (0.051)	1.3 (0.051)	0.079	0.059	0.031	0.023	-0.9 (-13)	0.7 (10)	0.5	RLB3xxx55x
	1.30 (0.051)	1.3 (0.051)	0.058	0.050	0.033	0.029	-0.9 (-13)	2.4 (35)	1.0	RMB3xxx55x
	1.30 (0.051)	1.3 (0.051)	0.058	0.050	0.033	0.029	-0.9 (-13)	4.8 (70)	2.0	RHB3xxx55x
	2.00 (0.079)	1.3 (0.051)	0.097	0.050	0.056	0.029	-0.9 (-13)	1.7 (25)	2.0	RHB3xxx85x
Pad Mount, PBT (F)	0.8 (0.031)	1.0 (0.040)	0.026	0.033	0.010	0.013	-0.9 (-13)	1.0 (15)	0.5	RLF3xxx34x
	0.8 (0.031)	1.0 (0.040)	0.018	0.031	0.011	0.018	-0.9 (-13)	3.4 (50)	1.0	RMF3xxx34x
	0.8 (0.031)	1.0 (0.040)	0.018	0.031	0.011	0.018	-0.9 (-13)	6.9 (100)	2.0	RHF3xxx34x
	1.30 (0.051)	1.3 (0.051)	0.079	0.059	0.031	0.023	-0.9 (-13)	0.7 (10)	0.5	RLF3xxx55x
	1.30 (0.051)	1.3 (0.051)	0.058	0.050	0.033	0.029	-0.9 (-13)	2.4 (35)	1.0	RMF3xxx55x
	1.30 (0.051)	1.3 (0.051)	0.058	0.050	0.033	0.029	-0.9 (-13)	4.8 (70)	2.0	RHF3xxx55x
	2.00 (0.079)	1.3 (0.051)	0.097	0.050	0.056	0.029	-0.9 (-13)	1.7 (25)	2.0	RHF3xxx85x

How to Order

RLM3 x x x 30 x

Catalog Number

Port 3 Style
B = 3.2mm (0.125in) push-in hose connection
F = 10-32 UNF female

Voltages
4 = 5 VDC
6 = 12 VDC
7 = 24 VDC

Seal Material
V = FKM
B = NBR
O = Oxygen service (FKM)

Base Number
(see Specifications table)

Electrical Connection
H = Leaded Coil
P = PCB pins (circuit board)

Options

- Other seal materials available on request
- Other voltages and electrical connections available
- Oxygen service
- Other pipe connections available on request

Installation

- The solenoid valves can be mounted in any position without affecting operation
- Line Mount solenoid valves have 2 mounting holes in body

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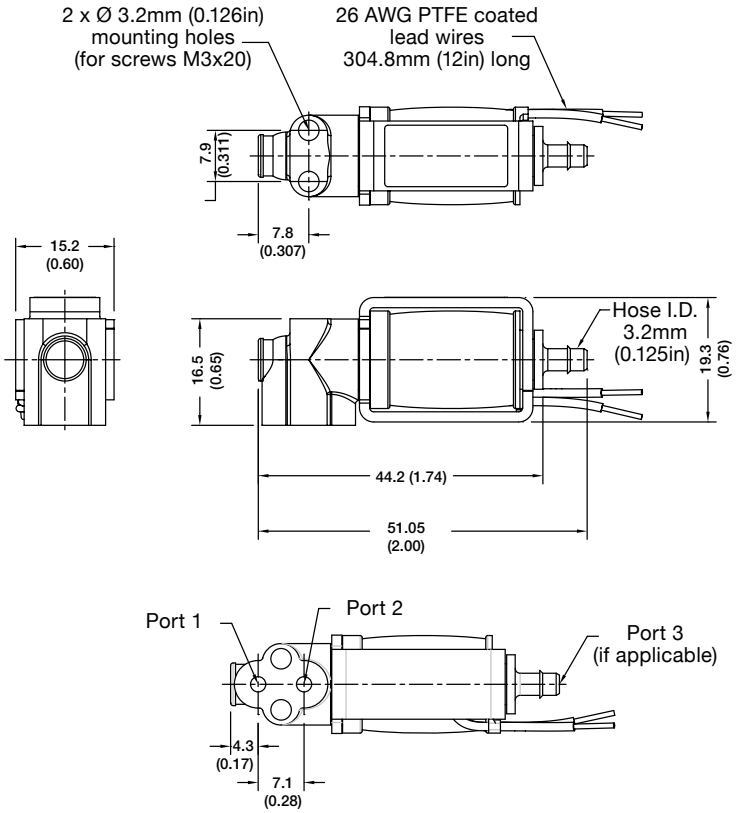
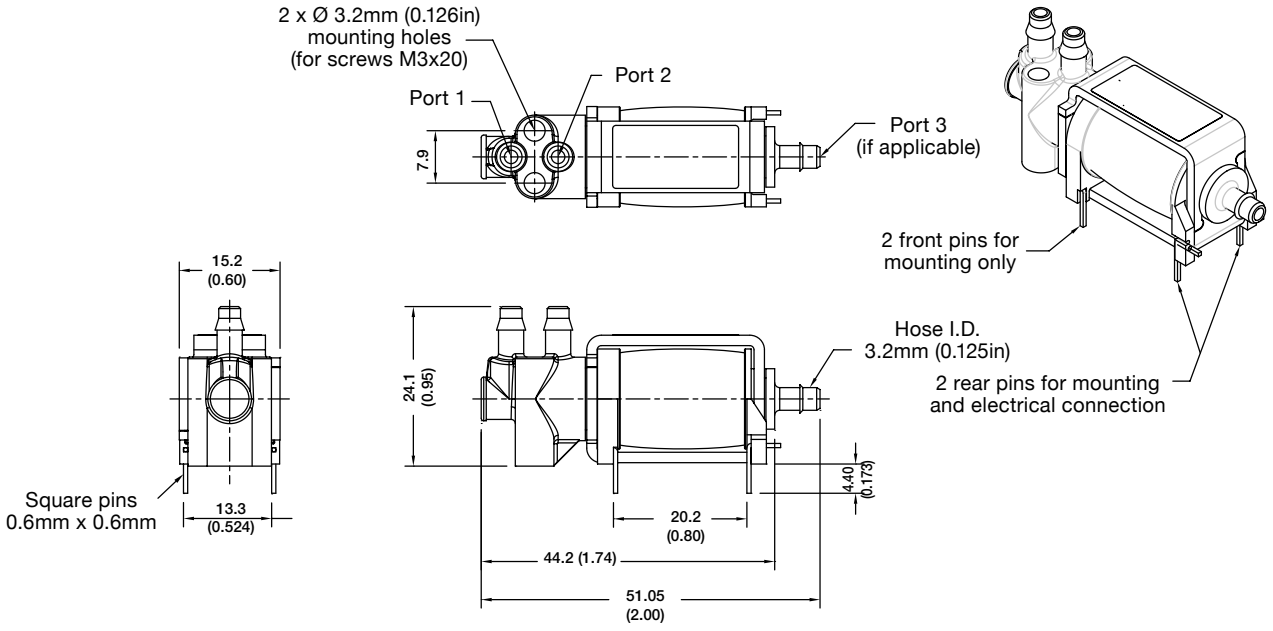
Dimensions: mm (inches)

2- and 3-Way Pad Mount Solenoid Valve



2- and 3-Way Solenoid Valve with Push-in Hose Connection



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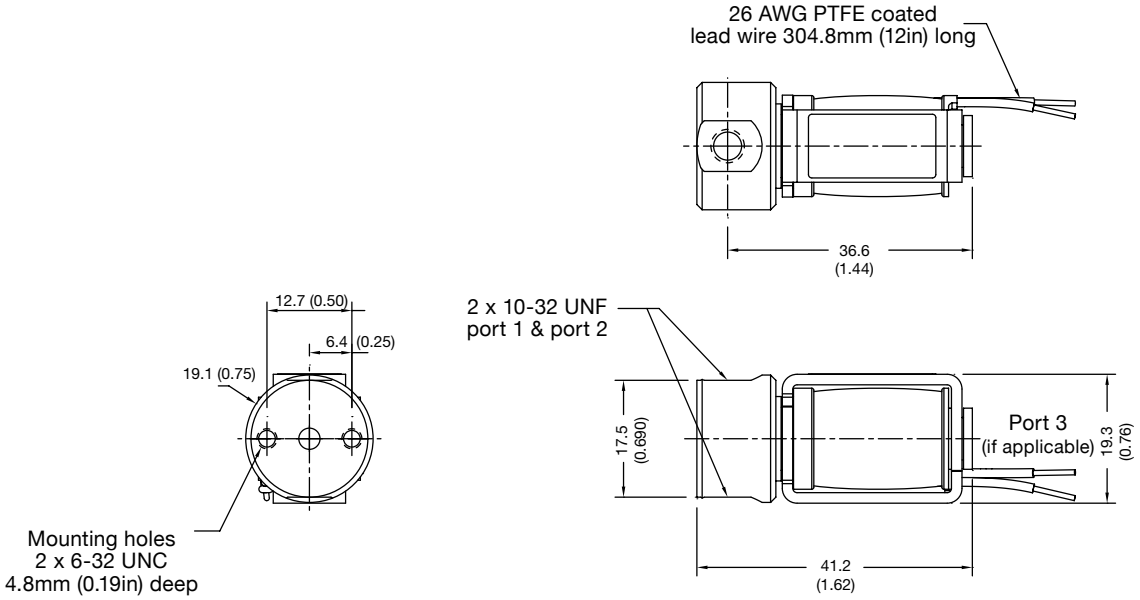
ASCO™ MINIATURE SOLENOID VALVES

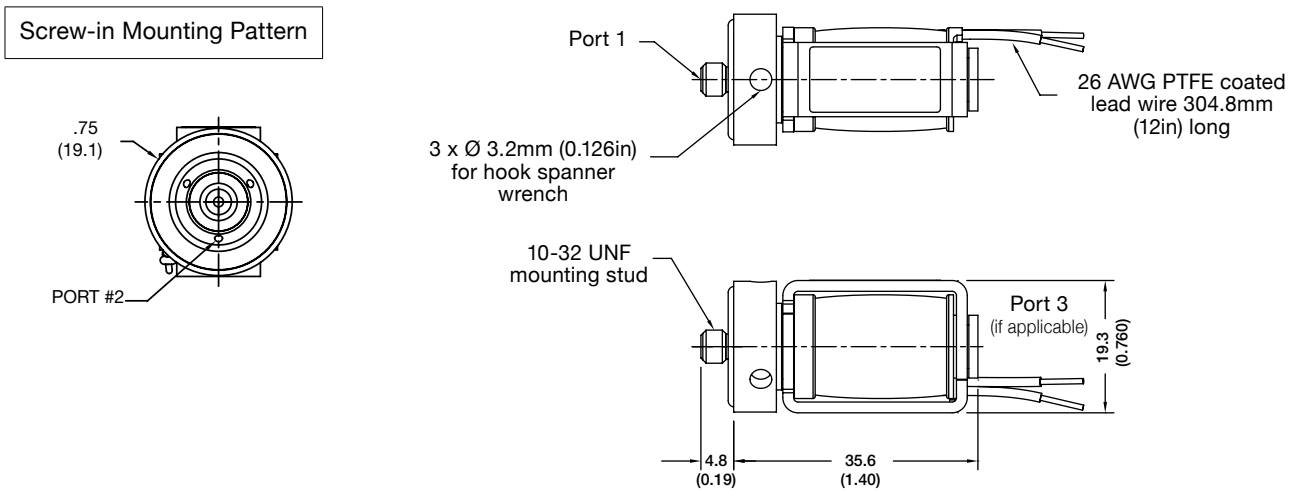
GENERAL SERVICE VALVES

Dimensions: mm (inches)

2- and 3-Way Line Mount Solenoid Valve



2- and 3-Way Manifold Mount Solenoid Valve



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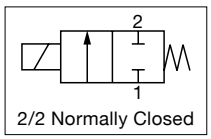
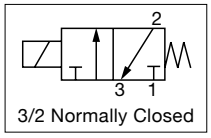
ASCO™ MINIATURE SOLENOID VALVES

GENERAL SERVICE VALVES

- The S Series solenoid valves are designed for use with air and inert gases
- Compact light-weight architecture and low power consumption make them ideal for portable medical devices
- Larger orifice sizes and vacuum capability make these valves extremely versatile across multiple disciplines
- Available in a variety of different porting configurations for manifold and in-line mounting
- Meets all relevant CE directives, and is RoHS compliant
- Typical applications include:
  - Respiratory Therapy
  - Anesthesia Delivery
  - Dental
  - Industrial Gas Analyzers



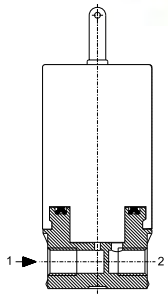
2/2 Normally Closed



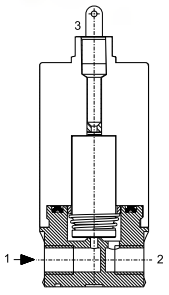
3/2 Normally Closed

Fluids*	Temperature Range	Seal Materials*
Air or Inert Gases[1]	-23 °C to 66 °C (-10 °F to 150 °F)	FKM (fluoroelastomer), (EPDM on request)

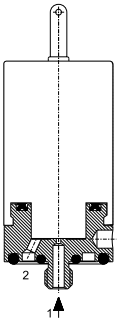
1 Filtered at 10µm
* Ensure that the compatibility of the materials in contact with the fluids is verified.



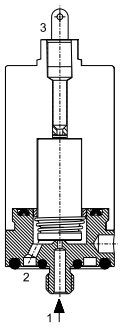
2/2 NC Line Mount



3/2 NC Line Mount



2/2 NC Manifold Mount



3/2 NC Manifold Mount

General Valve Information	
Body	Stainless steel
Others	Stainless steel
Response Time	< 10ms
Vacuum Rating	-1 bar (-14.5 psi)

Electrical Characteristics	
Standard Voltages	12 VDC, 24 VDC
Power Consumption	0.65, 2.0 W

Insulation Class	Coil Insulation	Protection	Power Ratings				Ambient Temperature Range	Electrical Connection	Type[1]
			Inrush	Holding		Hot/ Cold			
	°C (°F)	VA	VA	VA	W	W	°C (°F)		
B	-	IP40 (EN 60529)	-	-	-	1.5/1.5	-23 to 66 (-10 to 150)	Spade plug or lead wires 20 AWG, length 300mm (11.8in)	01

1 Refer to the dimensional drawings on the following page

Specifications

Connection	Orifice Size	Flow Coefficient		Operating Pressure, bar (psi)			Power Rating		Catalog Number	
				min.	max.					
	mm (inches)	Kv (m^3/h)	Cv		air and gases		W		Line Mount Body	Screw-in Type Body
2/2 NC - Normally Closed										
M5	0.75 (0.03)	0.025	0.016	-0.9 (-13)	-	7 (102)	-	1.5	HSM2Lxx00V	HSM2Mxx00V
	1 (0.04)	0.041	0.027	-0.9 (-13)	-	7 (102)	-	1.5	HSM2Lxx10V	HSM2Mxx10V
	2 (0.08)	0.085	0.057	-0.9 (-13)	-	3.5 (51)	-	1.5	HSM2Lxx50V	HSM2Mxx50V
3/2 NC - Normally Closed										
	Port 1	Port 2								
M5	0.75 (0.03)	1 (0.04)	0.025	0.016	-0.9 (-13)	-	7 (102)	-	1.5	HSM3Lxx00V	HSM3Mxx00V
	1 (0.04)	1 (0.04)	0.041	0.027	-0.9 (-13)	-	7 (102)	-	1.5	HSM3Lxx10V	HSM3Mxx10V
	2 (0.08)	1 (0.04)	0.085	0.057	-0.9 (-13)	-	3.5 (51)	-	1.5	HSM3Lxx50V	HSM3Mxx50V

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How to Order

HSM 2 L x x 00 V

Prefix
HSM = Catalog number

Function
2 = 2/2 NC
3 = 3/2 NC

Body type
L = Line Mount body
M = Screw-in type body

Voltage
6 = 12 VDC
7 = 24 VDC

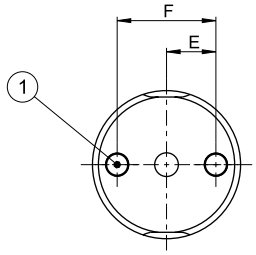
Electrical connection
F = Spade plug
H = Leaded Coil

Orifice size (Port 1)
00 = 0.75mm
10 = 1.0mm
50 = 2.0mm

Seal materials
V = FKM

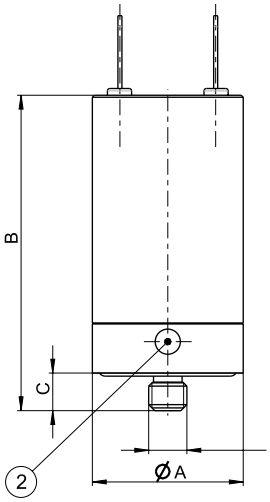
Dimensions: mm (inches)

HSM2Lxx00V/HSM2Lxx10V/HSM2Lxx50V
HSM2Mxx00V/HSM2Mxx10V/HSM2Mxx50V



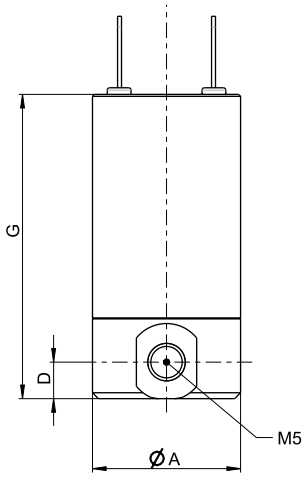
1 2 mounting holes ØM3x0.5

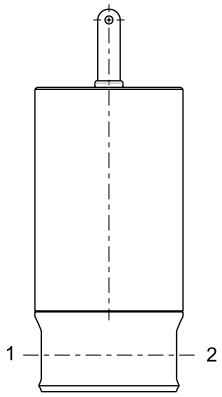
2 Mounting with hook spanner wrench DIN 1810B



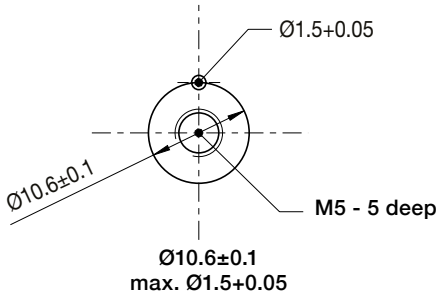
M5/10-32 UNF-3B*

* Supplied with 10-32 UNF-3B male thread compatible with M5 female counter-thread





Screw-in Mounting Pattern



Ø10.6±0.1
max. Ø1.5+0.05

1 2 mounting holes ØM3x0.5

2 Mounting with hook spanner wrench DIN 1810B

Connection Type	Catalog Number	A	B	C	D	E	F	G
Line Mount body	HSM2Lxx00V/HSM2Lxx10V/HSM2Lxx50V	19.05 (0.75)	-	-	4.7 (0.18)	6.35 (0.25)	12.7 (0.50)	39.11 (1.54)
Screw-in type body	HSM2Mxx00V/HSM2Mxx10V/HSM2Mxx50V	19.05 (0.75)	39.62 (1.56)	4.8 (0.19)	-	-	-	-

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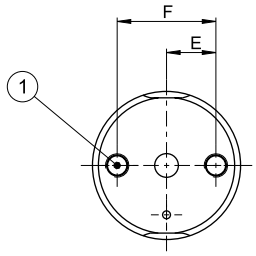
ASCO™ MINIATURE SOLENOID VALVES

GENERAL SERVICE VALVES

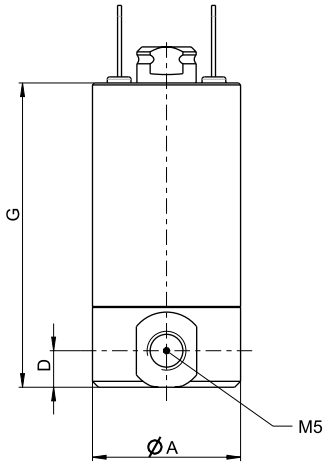
Dimensions: mm (inches)

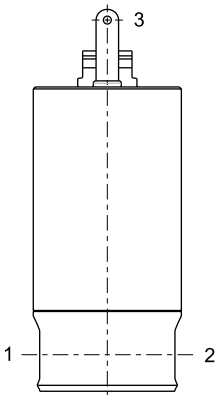
HSM3Lxx00V/HSM3Lxx10V/HSM3Lxx50V
HSM3Mxx00V/HSM3Mxx10V/HSM3Mxx50V

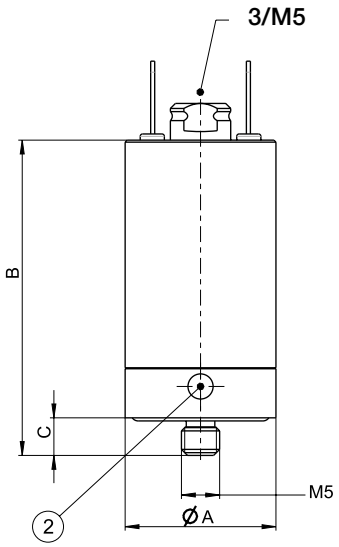


① 2 mounting holes ØM3x0.5

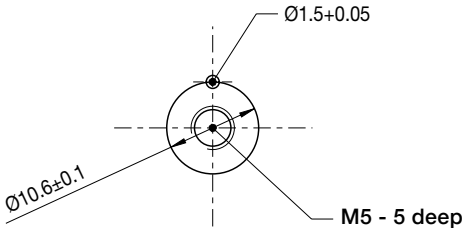
② Mounting with hook spanner wrench DIN 1810B







Manifold Mounting Pattern



Ø10.6±0.1
max. Ø1.5+0.05

Connection Type	Catalog Number	A	B	C	D	E	F	G
Line Mount body	HSM3Lxx00V/HSM3Lxx10V/HSM3Lxx50V	19.05 (0.75)	-	-	4.7 (0.18)	6.35 (0.25)	12.7 (0.50)	39.11 (1.54)
Screw-in type body	HSM3Mxx00V/HSM3Mxx10V/HSM3Mxx50V	19.05 (0.75)	39.62 (1.56)	4.8 (0.19)	-	-	-	-

Options

- EPDM seals available on request
- Oxygen service
- Other pipe connections available on request (10-32 UNF-3B)

Installation

- The solenoid valves can be mounted in any position without affecting operation
- Line Mount solenoid valves have 2 mounting holes in body

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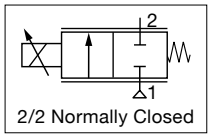
ASCO™ MINIATURE SOLENOID VALVES

FLAPPER PROPORTIONAL FLUID ISOLATION VALVES

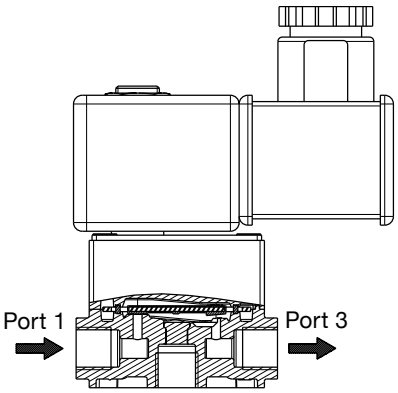
- Flapper proportional valves are designed to proportionally control the flow of neutral and aggressive liquids and gases by varying the electrical input signal to the coil
- Special Flapper mechanism results in no pumping or sticking effects
- Reduced heat transfer between control mechanism and fluid make them ideal for use with heat-sensitive reagents and biological samples
- Hysteresis (< 20%), excellent repeatability (< 5%), and high sensitivity (< 1%) make these valves ideal for high precision flow control of liquids
- Excellent self-draining capability and easy-to-flush internal cavity
- Valves do not require a minimum operating pressure
- Meets all relevant CE directives, and is RoHS compliant
- Typical Applications include:
  - Chromatography
  - DNA Sequencing
  - In-vitro Diagnostics
  - Industrial Liquid Analyzers



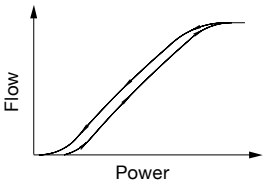
2/2 Normally Closed

Fluids*	Temperature Range	Seal Materials*
Liquids or Gases[1]	5 °C to 50 °C (41 °F to 122 °F)	FKM/FFKM/EPDM

[1] Filtration: 50µm
* Ensure that the compatibility of the materials in contact with the fluids is verified



General Valve Information	
Body	PEEK
Others	Stainless Steel
Response Time	< 20ms
Internal Volume	0.48ml
Max. Viscosity	20 cSt (mm^2/s)



Electrical Characteristics	
Coil Insulation Class	F
Connector	Lead Wires 24 AWG; L = 500mm (19.685in)
Electrical Safety	IEC 335
Electrical Enclosure Protection	IP65 (EN 60529)
Standard Voltages	12 VDC, 24 VDC (-5%/+10%)
Voltage Regulation	0-12 VDC, 0-24 VDC Pulse-width Modulation (> 1000Hz)
Flow Regulation Characteristics	Hysteresis typ. 20%; Repeatability typ. 5%; Sensitivity typ.1%

Voltage	Max. Operating Current	Power Ratings				Ambient Temperature Range
		Inrush	Holding		Hot/ Cold	
V	mA	VA	VA	W	W	°C (°F)
12	0	-	-	-	9	5 to 50 (41 to 122)
	750				9	
24	0				9	
	375				9	

Specifications

Connection	Orifice Size	Flow Coefficient		Operating Pressure, bar (psi)		Power Rating (W)	Catalog Number
				min.	max. gases, liquids		Body PEEK
	mm (inches)	Kv (m3/h)	Cv				
G1/8	2 (0.079)	0.069	0.080	0	4.5 (65)	9	G068A317xxx10xx
	3 (0.118)	0.123	0.142	0	2.0 (29)	9	G068A318xxx10xx
Pad Mounting[1]	2 (0.079)	0.069	0.080	0	4.5 (65)	9	R068A317xxx10xx
	3 (0.118)	0.123	0.142	0	2.0 (29)	9	R068A318xxx10xx

[1] 4 hexagon socket screws M3 x 8mm (0.315), stainless steel, ISO 4762 (supplied)

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ASCO™ MINIATURE SOLENOID VALVES

FLAPPER PROPORTIONAL FLUID ISOLATION VALVES

How to Order

R 068A 3 1 8 S1 V 00 F1

Prefix
R = Pad Mount
G = G 1/8

Series and release

Mounting width
3 = 22mm

Function
1 = 2/2 NC

Orifice size
7 = 2.0mm
8 = 3.0mm

Electrical connection
S1 = DIN spade plug

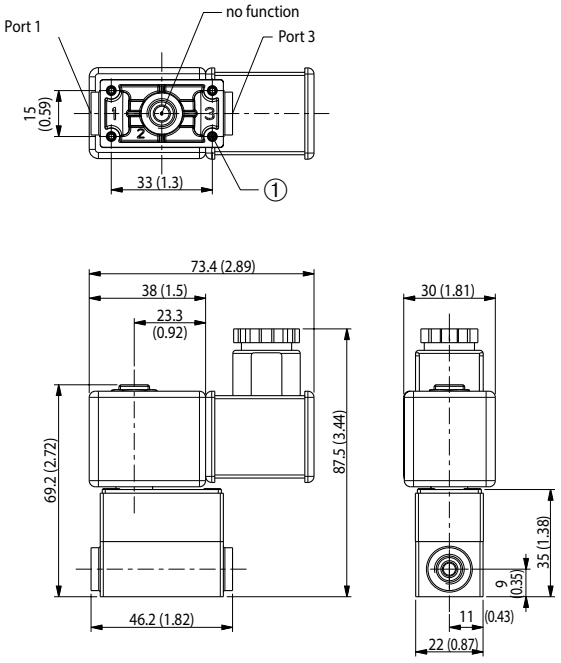
Valve type
10 = Proportional valve

Seal material
V = FKM
1 = FFKM
E = EPDM

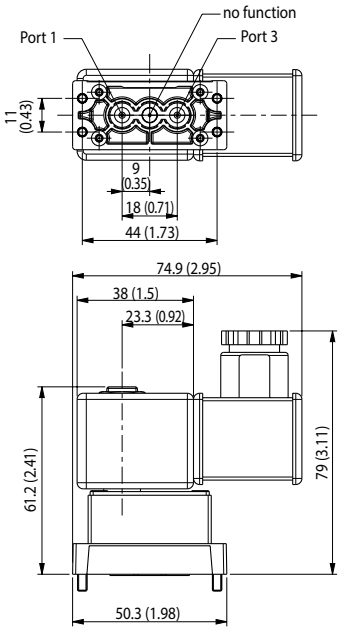
Voltage
F1 = 24 VDC
F3 = 12 VDC

Dimensions: mm (inches)

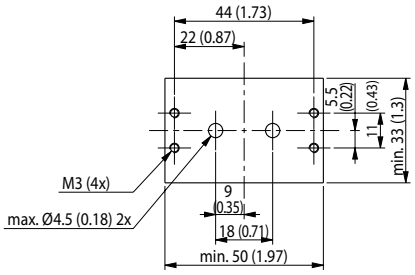
G 1/8



Pad-mounting Body



Subbase Mounting Pattern



① 4 mounting holes, max. depth 7mm (0.276in), for self-tapping screw (type EJOT PT, K30)

Options

- Digital control module Control^{D} for DIN EN 50022 rail mounting
  - Used as a current regulator in open loop applications
  - Used with an external sensor for closed-loop applications
- Other voltages and leaded coil on request
- Subbases available on request

Installation

- The solenoid valves can be mounted in any position without affecting operation
- Pad-mounting solenoid valve supplied with seal
- Pipe connections 1/8 have standard thread according to ISO 228/1

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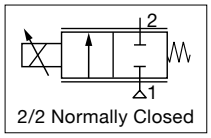
ASCO™ MINIATURE SOLENOID VALVES

PROPORTIONAL VALVES, PRECIFLOW 12.7 mm

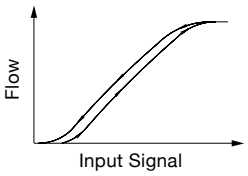
- Preciflow solenoid valves are designed to proportionally control the flow of air and inert gases by varying the electrical input signal to the coil
- Low hysteresis (typ. < 5%), excellent repeatability (typ. < 1%), and high sensitivity (typ. < 0.1%) make these valves ideal for high precision flow control
- Compact frictionless architecture saves valuable space in analytical and medical instrumentation
- Valves do not require a minimum operating pressure, and are well-suited for vacuum operation
- Power consumption as low as 1 W to meet the most stringent instrument power requirements
- Meets all relevant CE directives, and is RoHS compliant
- Typical applications include:
  - Gas Chromatography
  - Mass Flow Controllers
  - Dental Equipment
  - Blood Pressure Monitoring

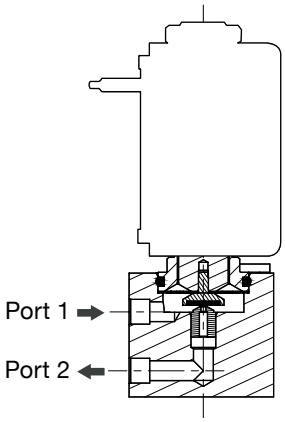


Fluids*	Temperature Range	Seal Materials*
Air, Oxygen, Inert Gas[1]	0 °C to 55 °C (32 °F to 131 °F)	FKM/FFKM

* Ensure that the compatibility of the materials in contact with the fluids is verified.
[1] Filtration: 5µm

General Valve Information	
Body	Brass
Others	Stainless Steel





Electrical Characteristics	
Coil Insulation Class	F
Connector	Lead Wires 24 AWG; L = 500mm (19.7in)
Electrical Safety	IEC 335
Electrical Enclosure Protection	IP50
Standard Voltages	6 VDC, 12 VDC, 24 VDC
Input Signal	0-6 VDC, 0-12 VDC, 0-24 VDC Pulse-width Modulation (> 1000Hz), Current control recommended
Flow Regulation Characteristics	Hysteresis typ. 5%; Repeatability typ. 1%; Sensitivity typ. 0.1%

Voltage	Max. Operating Current	Power Ratings				Ambient Temperature Ranges
		Inrush	Holding		Hot/Cold	
V	mA	VA	VA	W	W	°C (°F)
6	170	-	-	-	1	0 to 55 (32 to 131)
	420				2.5	
12	85				1	
	210				2.5	
24	45				1	
	110				2.5	

Specifications						
Orifice Size	Flow Coefficient		Operating Pressure bar (psi)		Power Rating	Catalog Number
mm (inches)	Kv (m3/h)	Cv	min.	max.	W	pad mount version
0.045 (0.0018)	0.00006	0.00007	-0.9 (-13)	10 (145)	1	R202A540L0xxxxx
0.07 (0.0023)	0.00012	0.00014	-0.9 (-13)	10 (145)	1	R202A541L0xxxxx
0.1 (0.0040)	0.0003	0.00035	-0.9 (-13)	10 (145)	1	R202A542L0xxxxx
0.2 (0.0079)	0.0012	0.0014	-0.9 (-13)	10 (145)	1	R202A543L0xxxxx
0.4 (0.0157)	0.0048	0.0055	-0.9 (-13)	10 (145)	2.5	R202A544L0xxxxx
0.6 (0.0236)	0.0096	0.0111	-0.9 (-13)	10 (145)	2.5	R202A545L0xxxxx
0.8 (0.0315)	0.018	0.0208	-0.9 (-13)	10 (145)	2.5	R202A546L0xxxxx

* Inlet or outlet filter available on request

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How to Order

R202A540 L0 x xx xx

Catalog Number
(see Specifications table)

Electrical Connection

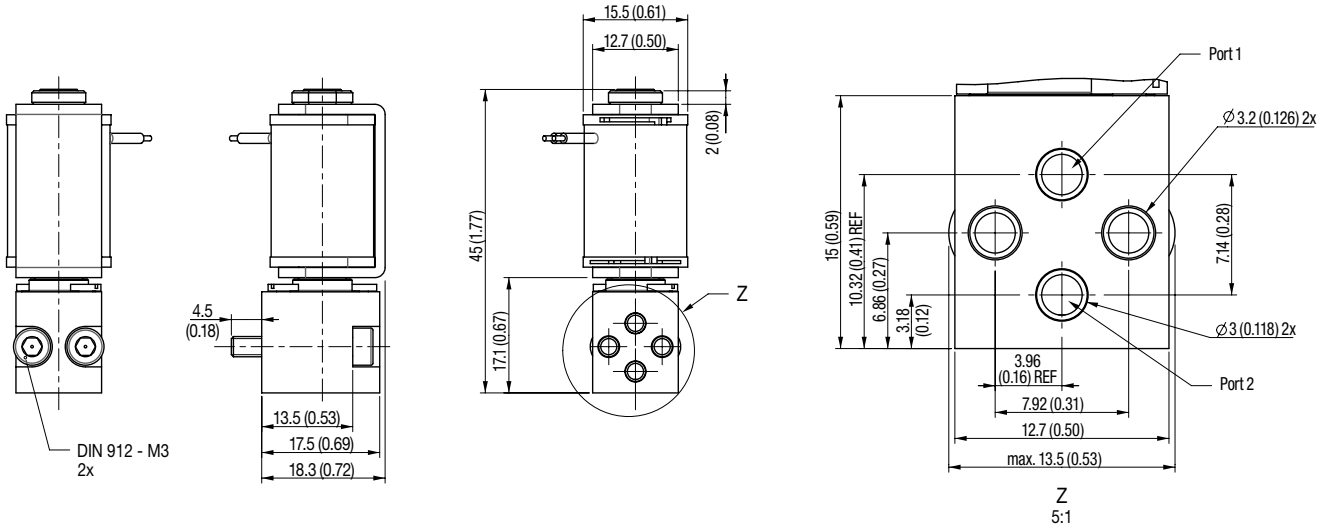
Voltage
E7 = 6 VDC
F3 = 12 VDC
F1 = 24 VDC

Options
00 = no option

Seal Materials
V = FKM
1 = FFKM

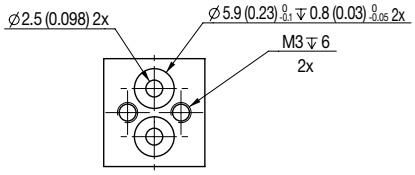
Ordering Example: **R202A542L0V00F1** = 2-way NC (normally closed), orifice size 0.1mm (0.004in), with lead wires L=500mm, FKM seal, 24 VDC

Dimensions: mm (inches)

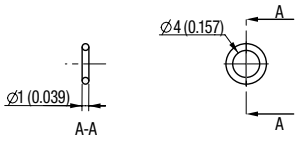


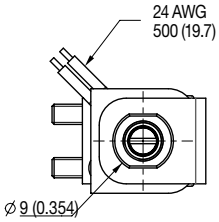
Mounting Pattern

Mounting Face (Proposal)



Sealing
(optional)





Options

- Digital control module Control^{D} for DIN EN 50022 rail mounting (for more information see specifications on page 185)
- Other materials and voltages available on request
- Sealing FKM: 514684-001, FFKM: 514684-002 (minimum order quantity required)
- Subbase with M5 connections and O-ring seals available:
  - 517973-001 --> Subbase with FKM O-rings
  - 517973-002 --> Subbase with FFKM O-Rings

Installation

- The solenoid valves can be mounted in any position without affecting operation
- Manifold and O-Rings not included

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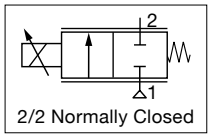
ASCO™ MINIATURE SOLENOID VALVES

PROPORTIONAL VALVES, PRECIFLOW 15 mm

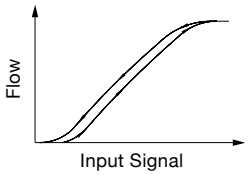
- Preciflow solenoid valves are designed to proportionally control the flow of air and inert gases by varying the electrical input signal to the coil
- Low hysteresis (typ. < 3%), excellent repeatability (typ. < 1%), and high sensitivity (typ. < 1%) make these valves ideal for high precision flow control
- Compact frictionless architecture saves valuable space in analytical and medical instrumentation
- Valves do not require a minimum operating pressure, and are well-suited for vacuum operation
- Power consumption as low as 1 W to meet the most stringent instrument power requirements
- Meets all relevant CE directives, and is RoHS compliant
- Typical applications include:
  - Respiratory Therapy
  - Gas Chromatography
  - Blood Pressure Monitoring
  - Anesthesia Delivery



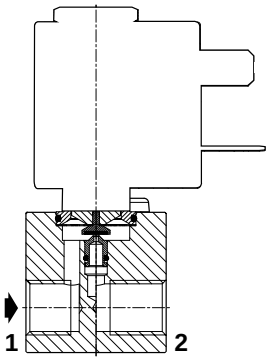
2/2 Normally Closed

Fluids*	Temperature Range	Seal Materials*
Air, Inert Gas[1]	0 °C to 50 °C (32 °F to 122 °F)	FKM

* Ensure that the compatibility of the materials in contact with the fluids is verified.
1 Filtration - M5 or pad mount version: 5µm - 1/8 : 50µm



General Valve Information	
Body	Brass or PVDF
Others	Brass, Stainless Steel



Electrical Characteristics	
Coil Insulation Class	F
Connector	Spade plug; cable Ø4-6mm (0.157 - 0.236in), Ø6-8mm (0.236 - 0.315in), Ø6-10mm (0.236 - 0.394in)
Connector Specification	DIN 43650, 9.4mm (0.370in), industry standard C (type 01) DIN 43650, 11mm (0.433in), industry standard B (type 02) ISO 4400/EN 175301-803, form A (type 03)
Electrical Safety	IEC 335
Electrical Enclosure Protection	Molded IP65 (EN 60529)
Standard Voltages[2]	12 VDC, 24 VDC
Voltage Regulation	0-12 VDC, 0-24 VDC; Pulse-width Modulation (1000Hz)
Flow Regulation Characteristics	Hysteresis typ. < 3%; Repeatability typ. < 1%; Sensitivity typ. < 1%

2 Other voltages on request

Voltage	Max. Operating Current	Power Ratings				Ambient Temperature Ranges	Type[3]
		Inrush	Holding		Hot/ Cold		
V	mA	VA	VA	W	W	°C (°F)	
12	85	-	-	-	1	0 to 50 (32 to 122)	01
	340				4		
	400				5		02
							03
24	40	-	-	-	1	0 to 50 (32 to 122)	01
	170				4		
	230				5		02
	380				9		03

3 Refer to the dimensional drawings on the following page

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ASCO™ MINIATURE SOLENOID VALVES

PROPORTIONAL VALVES, PRECIFLOW 15 mm

Specifications									
Connection	Orifice Size	Flow Coefficient		Operating Pressure bar (psi)		Power Rating	Catalog Number		
				min.	max.		Threaded Body		ISO 15218 (CNOMO, size 15) Interface
	mm (inches)	Kv (m3/h)	Cv		air, inert gas	W	brass	PVDF	brass
M5 or Pad Mount	0.1 (0.0040)	0.0003	0.00035	-0.9 (-13)	10 (145)	1	SCG202A500	-	SCS202A505
	0.2 (0.0079)	0.0012	0.0014			1	-	SCG202A501	SCS202A506
	0.4 (0.0157)	0.0048	0.0055			4	-	SCG202A502	SCS202A507
	0.6 (0.0236)	0.0096	0.0111			4	-	SCG202A503	SCS202A508
	0.8 (0.0315)	0.018	0.021			4	-	SCG202A504	SCS202A509
G1/8	0.8 (0.0315)	0.018	0.021	-0.9 (-13)	10 (145)	5	SCG202A510	-	-
	1.2 (0.0472)	0.041	0.047			5	SCG202A511	-	-
	1.6 (0.0630)	0.071	0.082		8 (116)	5	SCG202A512	-	-
	2.0 (0.0787)	0.096	0.111		6 (87)	5W (12V) / 9W (24V)	SCG202A513	-	-

How to Order

SC G 202A500 xxxx

Prefix — SC

Mounting — G

G = Line Mount
S = Pad Mount

Catalog Number
202A500
202A505

Voltage
12DC
24DC

Options

- Digital control module ControlD for DIN EN 50022 rail mounting (for more information see specifications on page 185)
- Electronic control units for proportional control
- Other materials, connections, and coils available on request
- Plug with visual indication and peak voltage suppression or with cable length of 2m (78.7in)

Installation

- The valves can be mounted in any position without affecting operation
- Pipe connection identifier is: G = G (ISO 228/1)

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ASCO™ MINIATURE SOLENOID VALVES

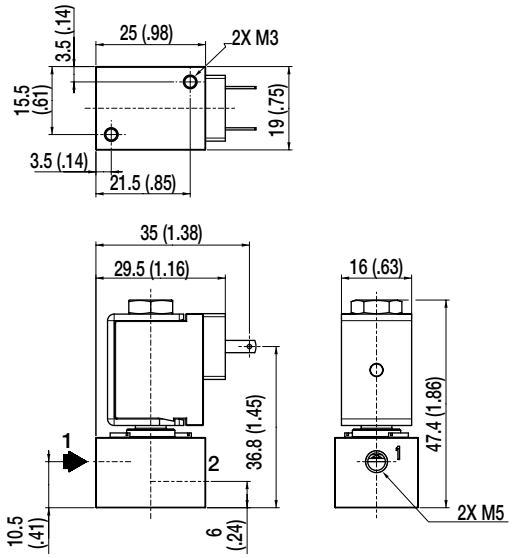
PROPORTIONAL VALVES, PRECIFLOW 15 mm

Dimensions: mm (inches)

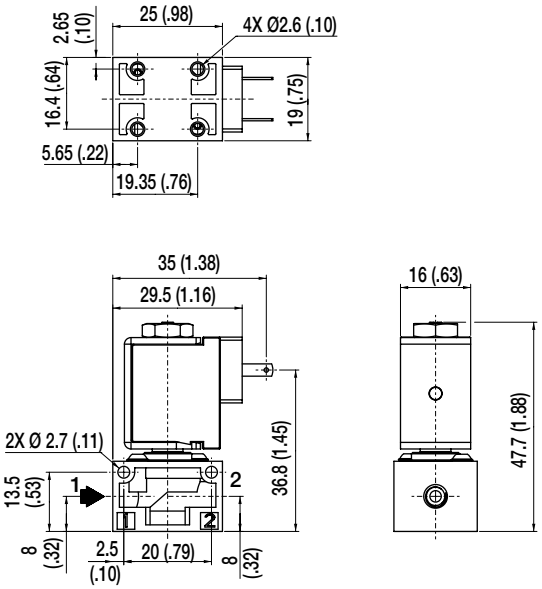
Type 01

Prefix "SC" solenoid, epoxy molded
IEC 335/DIN 43650, 9.4mm (0.37in)
IP65

SCG202A500

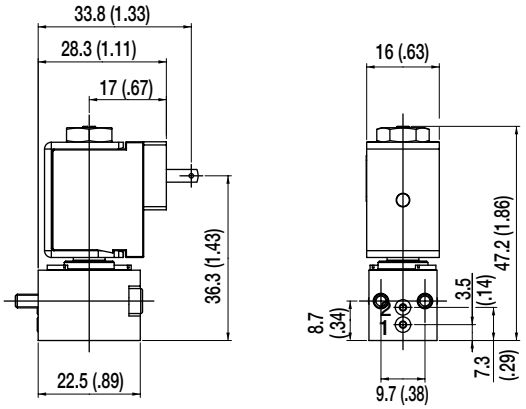


SCG202A501/A502/A503/A504

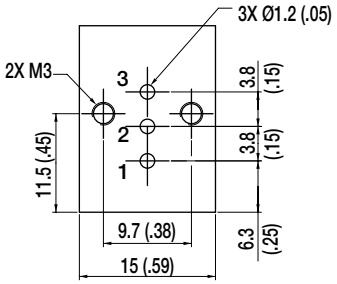


SCS202A505/A506/A507/A508/A509

(Version with ISO 15218 interface for installation on single subbase M5)



ISO 15218 Mounting Pattern



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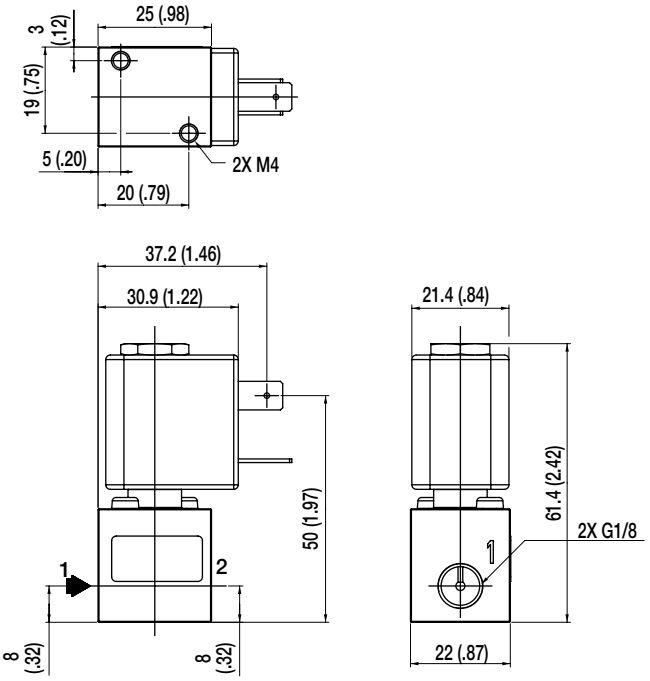
Dimensions: mm (inches)

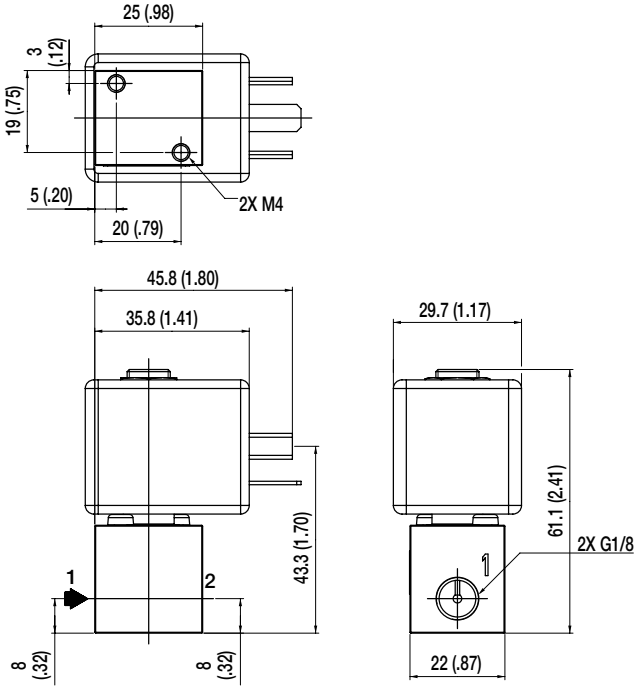
Type 02-03

Prefix "SC" solenoid, epoxy molded
IEC 335/DIN 43650 or ISO 4400
IP65


Type 02 : SCG202A510/A511/A512
Type 03 : SCG202A513
With 22 mm Coil Version



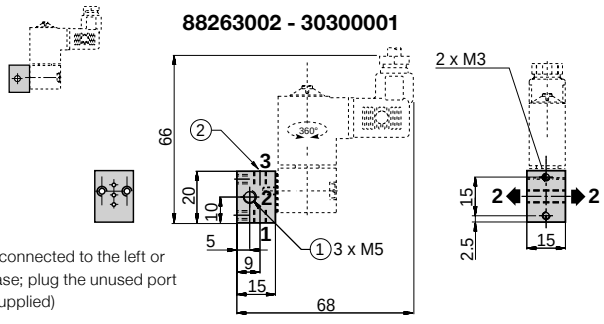
Type 03 : SCG202A513_24V
With 30 mm Coil Version



Single Subbase M5

Aluminum or brass

88263002 - 30300001



(1) Outlet (2) can be connected to the left or right of the subbase; plug the unused port with a M5 plug (supplied)
(2) Port (3) unused

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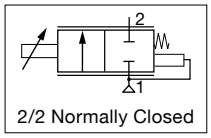
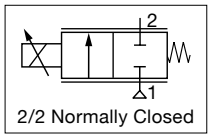
ASCO™ MINIATURE SOLENOID VALVES

PROPORTIONAL VALVES, PRECIFLOW IPC, PRECIFLOW 19mm

- Preciflow solenoid valves are designed to proportionally control the flow of air and inert gases by varying the electrical input signal to the coil
- Low hysteresis (typ. < 5%), excellent repeatability (typ. < 1%), and high sensitivity (typ. < 1%) make these valves ideal for high precision flow control
- Compact frictionless architecture saves valuable space in analytical and medical instrumentation
- Valves do not require a minimum operating pressure
- Low power consumption to meet the most stringent instrument power requirements
- Meets all relevant CE directives, and is RoHS compliant
- Typical applications include:
  - Respiratory Therapy
  - Gas Chromatography
  - Blood Pressure Monitoring
  - Anesthesia Delivery



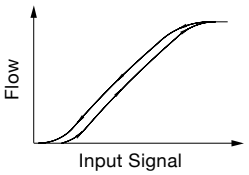
Preciflow IPC



Preciflow 19mm

Version	Fluids*	Temperature Range	Seal Materials*
Preciflow IPC	Air or Inert Gases[1]	10 °C to 50 °C (50 °F to 122 °F)	**Preciflow IPC:** FKM, NBR
Preciflow 19 mm		0 °C to 50 °C (32 °F to 122 °F	**Preciflow 19mm:** FKM (EDPM or FFKM on request)

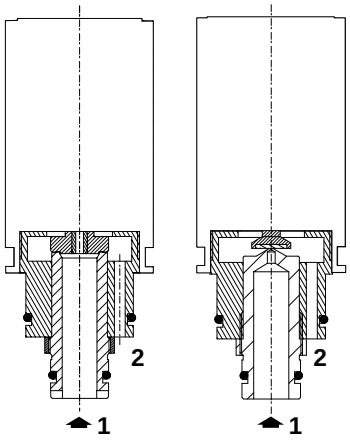
* Ensure that the compatibility of the materials in contact with the fluids is verified.
1 Filtration: 5µm



General Valve Information		
	Preciflow IPC	**Preciflow 19mm**
Body	Stainless Steel and Brass (Line Mount) or POM (Pad Mount)	Stainless Steel
Others	Stainless Steel, FKM, PPS	POM, Brass, Stainless Steel, PPS
Max. Viscosity	50 cSt (mm^2/s)	

Electrical Characteristics	
Coil Insulation Class	F
Connector	Lead Wires (PTFE/ ETFE); 0.23m (9in) length (24 AWG)
Electrical Safety	IEC 335
Electrical Enclosure Protection	IP50 (EN 60529)
Standard Voltages[2]	6 VDC, 12 VDC, 24 VDC
Input signal	0-6 VDC, 0-12 VDC, 0-24 VDC; Pulse-width Modulation (min. 2000Hz), Current control recommended
Flow Regulation Characteristics	Hysteresis < 5%; Repeatability < 1%; Sensitivity < 1%

2 Other voltages on request



Preciflow IPC

Preciflow 19mm

Voltage	Max. Operating Current	Power Ratings				Ambient Temperature Ranges	Type[3]
		Inrush	Holding		Hot/Cold		
V	mA	VA	VA	W	W	°C (°F)	
Preciflow IPC							
6	420	-	-	-	2.5	10 to 50 (50 to 122)	01
12	210						
24	110						
Preciflow 19mm							
6	max. 90	-	-	-	0.5	0 to 50 (32 to 122)	01
	max. 420				2.5		
12	max. 45				0.5		
	max. 210				2.5		
24	max. 25				0.5		
	max. 110				2.5		

3 Refer to the dimensional drawings on the following pages

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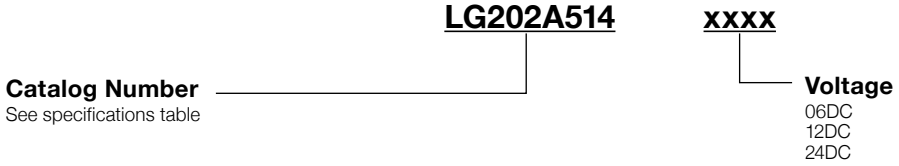
Specifications							
Connection	Orifice Size	Flow Coefficient		Operating Pressure bar (psi)		Power Rating	Catalog Number
				min.	max.		
	mm (inches)	Kv (m^3/h)	Cv		air, inert gas	w	
Preciflow IPC*							
G1/8	3 (0.12)	0.17	0.20	0	7 (102)	2.5	LG202A514
Cartridge	3 (0.12)	0.17	0.20				LS202A515
Pad Mounting	3 (0.12)	0.17	0.20				LS202A516
* Backpressure: max. 10% of inlet pressure							
Preciflow 19mm							
Cartridge	0.1 (0.004)	0.0003	0.00035	-0.9 (-13)	10 (145)	0.5	LS202A517
	0.2 (0.008)	0.0012	0.0014				LS202A518
	0.5 (0.020)	0.0072	0.0083			2.5	LS202A519
	0.8 (0.031)	0.015	0.017				LS202A520
	1.2 (0.047)	0.021	0.024				LS202A521
	1.6 (0.063)	0.028	0.032				LS202A522

How to Order



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ASCO™ MINIATURE SOLENOID VALVES

PROPORTIONAL VALVES, PRECIFLOW IPC, PRECIFLOW 19mm

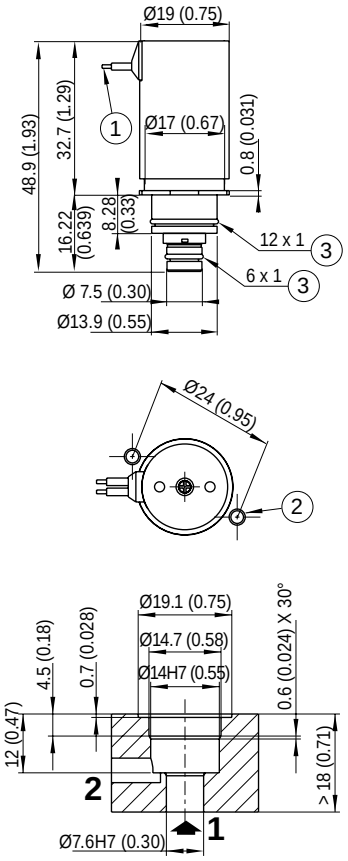
Dimensions: mm (inches)

Preciflow IPC

Type 01 Prefix "L" Leaded Coil
IP50

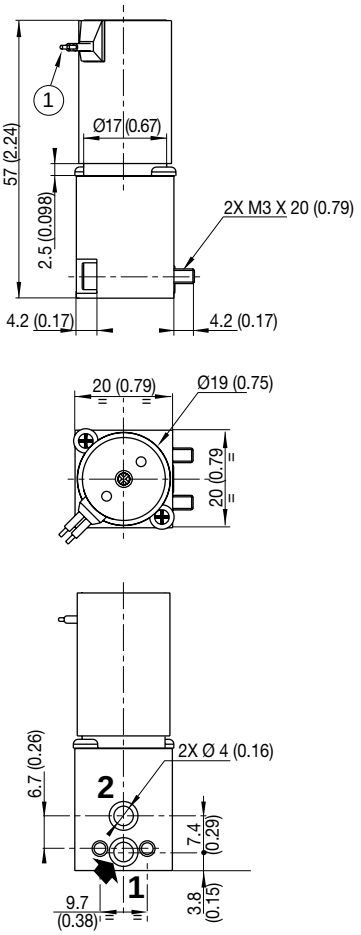
LG202A514 (Brass)

LS202A515 (Stainless Steel)



Mounting Geometry
(Proposal)

LS202A516 (POM)



Mounting Pad

1. 2 electrical supply wires, length: 0.23m (9in)
2. Mounting: 2 screws M3 x 6mm (0.24in) + washers
3. O-ring

Type	Catalog Number	Weight [1] kg
01	LG202A514	0.183
	LS202A515	0.063
	LS202A516	0.073

[1] Including leads, length 0.23m (9in)

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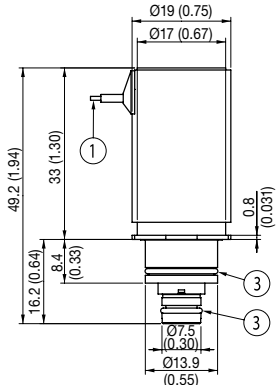
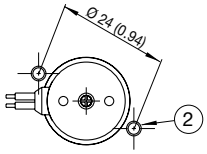
Dimensions: mm (inches)

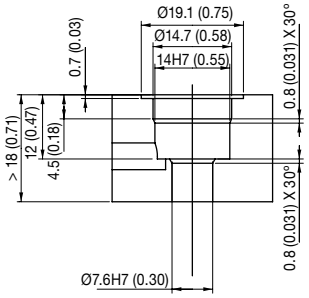
Preciflow 19mm

Type 01 Prefix "L" Leaded Coil
IP50

Preciflow 19mm Cartridge





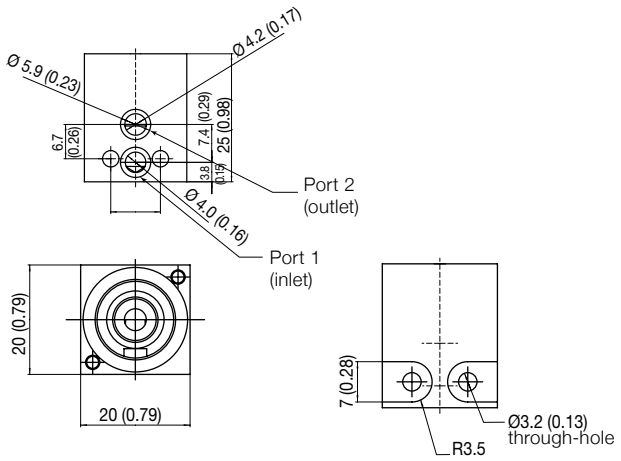


1. 2 electrical supply wires, length: 0.23m (9in)
2. Mounting: 2 screws M3 x 6mm (0.24in) + washers
3. O-ring

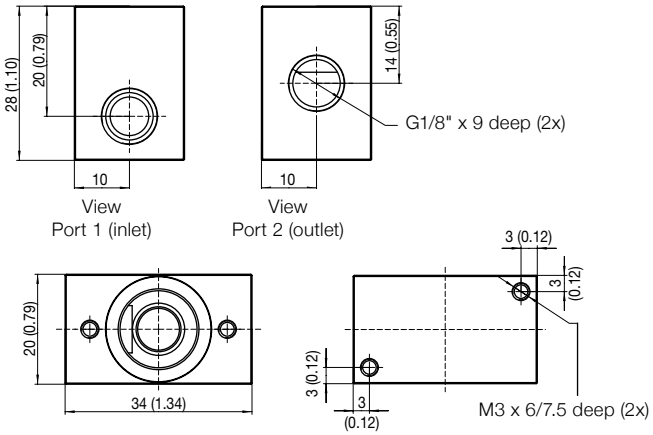
Catalog Number	Weight kg
LS202A517/518/519/520/521/522	0.063 [1]
528190-001	0.012kg
526624-001	0.013kg

[1] Including leads, length 0.23m (9in)

Pad Mount Subbase 526624-001
POM (supplied with 2 screws M3x20 and O-rings)



Inline Subbase 528190-001
Brass (supplied with 2 screws M3x6)



Options

- Digital control module Control^{D} for DIN EN 50022 rail mounting
  (for more information see specifications on page 185)
- Other pipe connections are available on request
- Other seal materials are available on request
- Version for higher backpressure on request
  (only Preciflow IPC)

Installation

- The solenoid valves can be mounted in any position without affecting operation
- Pipe connection identifier is G = G (ISO 228/1)

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AVENTICS™ PROPORTIONAL VALVE SENTRONIC*PLUS* IPC

DIGITAL ELECTRONIC PRESSURE REGULATOR, IO-LINK CLASS A

- SENTRONIC*PLUS* IPC is a highly dynamic 2/2-way proportional valve with digital control.
- IO - Link CLASS A Version
- RoHS, REACH compliant
- The very low friction mechanic delivers precise control behaviour, especially in flowing conditions.

General Valve Information	
Fluids	Air or neutral gases, Class 5 according to ISO 8573-1:2010 [7:4:4]
Ports	G 1/8 , 1/8 NPT
Max. allowable pressure	Varies by outlet pressure range. See How to Order on next page.
Pressure range	See table below
Fluid temperature	0...50 C° (32...122°F)
Ambient temperature	0...50 C° (32...122°F)
Setpoint	Digital setpoint in steps of 1 mbar 0-10000 = 0-10 bar
Hysteresis	0.5 % of span
Linearity / pressure measurement	± 0.5 % of span
Repeatability	± 0,5 % of span

Construction	
Body	Aluminium
Internal parts	Stainless steel and aluminium
Seals	FPM

IO-Link	
Protocol version	Specification V1.1
Baud rate	COM3 (230.4 kBaud)
Minimum cycle time	0.5 ms
Process data	2 Byte IN, 2 Byte OUT
Port type	Class A

Electrical Characteristics

Nominal diameter DN	Voltage *	Max. power (W)	Max. current (mA)	Insulation class	Degree of protection	Electrical connection
3	24VDC +/-10%	5	210	F	IP30	5-pin M12 connector (to be ordered separately)

* Max. ripple: 10 %

Specifications

Pipe size	Orifice size	Flow at 6 bar		
	(mm)	Flow Coefficient		(l/min)
		Kv (m^3/h)	Cv	
G/NPT 1/8	3	0.17	0.20	150

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AVENTICS™ PROPORTIONAL VALVE SENTRONIC*PLUS* IPC

DIGITAL ELECTRONIC PRESSURE REGULATOR, IO-LINK CLASS A

How to Order

CATALOG NUMBER 6 1 4 3 5 7 **B A S I D P P**

B: CONTROL PANEL
B = IO-Link with display
C = IO-Link without display

A: VERSION (ports), body
W = 2/2 NC, G1/8
P = 2/2 NC, 1/8 NPT

S: SETPOINT
B = IO-Link Class A

I: FEEDBACK
B = IO-Link Class A

D: OUTPUT
1 = Standard

PP: PRESSURE RANGE

Relative pressure	Max. allowable pressure (bar)	Vacuum (relative)
40 = 0 - 100 mbar	2	V2 = 0 ... -1 bar Bypass version
50 = 0 - 500 mbar	2	
60 = 0 - 1 bar	2	V3 = 0 ... -1 bar Shut-off valve (vacuum at port 1)
02 = 0 - 2 bar	3	
03 = 0 - 3 bar	7	
05 = 0 - 5 bar	7	
06 = 0 - 6 bar	7	

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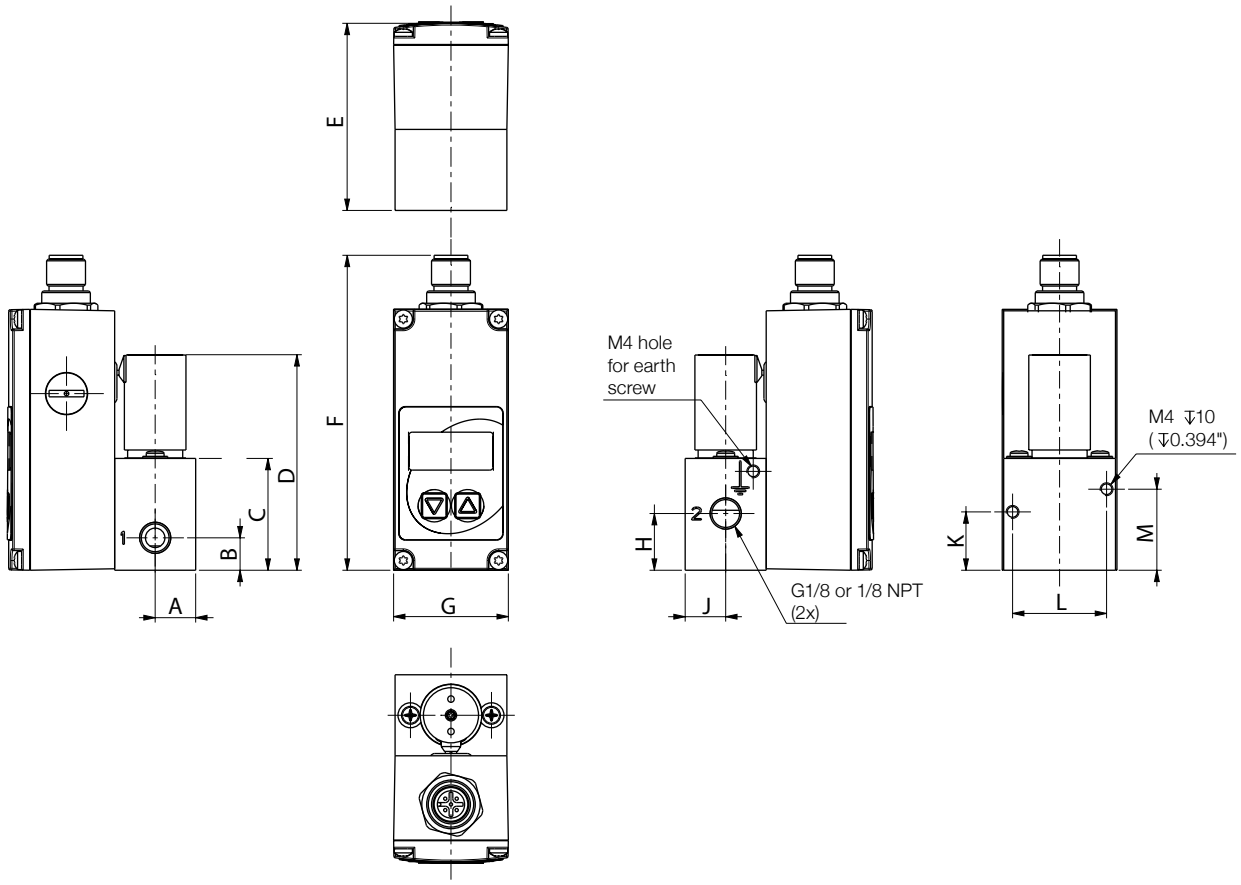
AVENTICS™ PROPORTIONAL VALVE SENTRONIC*PLUS* IPC

DIGITAL ELECTRONIC PRESSURE REGULATOR, IO-LINK CLASS A

Dimensions: mm (inches)

G/NPT 1/8



Catalog Number	A	B	C	D	E	F	G	H	J	K	L	M	Weight kg (lbs)
614357XXXXXXX	12.5 (0.492)	10 (0.393)	34.5 (1.358)	66.5 (2.618)	57.7 (2.27)	97 (3.819)	35.4 (1.393)	17.5 (0.689)	12.5 (0.492)	18 (0.708)	29 (1.142)	25 (0.984)	0.250 (0.551)

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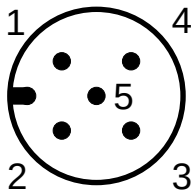
Pin Assignment / Cable Assignment



Pin	Description
1	24V voltage supply
2	not connected
3	Supply ground
4	C/Q
5	not connected
Body	EMC shield

ACCESSORIES	
Description	**Catalog Number**
Connection cable 5m, straight socket, open cable end	N15183710000000
Connection cable 10m,straight socket, open cable end	N15183840000000
Connection cable 5m, straight socket on straight connector	N15184490000000
Connection cable 10m, straight socket on straight connector	N15184520000000

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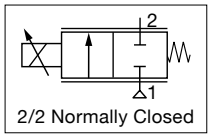
ASCO™ MINIATURE SOLENOID VALVES

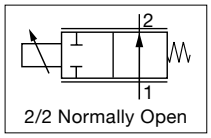
PROPORTIONAL VALVES, MINIATURE PIEZOTRONIC

SERIES **630**

- Miniature, ultra-low power consumption (0.004 W), almost no heat dissipation
- Pad mounting proportional mini piezo-valves available with single subbase M5
- Variable flow, proportional to the control signal
- No wearing parts: practically unlimited service life
- No inductive peaks when switching: no circuit protection necessary
- Valves do not require a minimum operating pressure
- The solenoid valves satisfy all relevant EC directives
- Typical applications include:
  - Gas Chromatography
  - Mass Flow Controllers
  - Dental Equipment
  - Blood Pressure Monitoring



2/2 Normally Closed



2/2 Normally Open

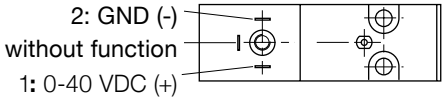
Fluids*	Temperature Range	Seal Materials*
Air or Inert Gases[1]	0 °C to 60 °C (32 °F to 140 °F)	NBR

* Ensure that the compatibility of the materials in contact with the fluids is verified.
1 Filtration: 5µm, unlubricated, condensate free, dew point -10 °C

ELECTRICAL CONNECTION

(Polarized piezo valve)

Version with spade plug connection:



Version with 2 leads:
red wire: +
black wire: -

General Valve Information	
Body	PPS
Others	Piezo Ceramics, Brass, Aluminum

Electrical Characteristics	
Coil Insulation Class	F
Connector	Spade plug or cable 6-7mm (0.24-0.28in)
Connector Specification	DIN 43650, 9.4mm, form C or 2 leads outlet 28 AWG, length 1m (39.4in)
Electrical Safety	IEC 335
Electrical Enclosure Protection	Molded IP65 (EN 60529)
Voltage Regulation	0 – 40 VDC
Flow Regulation Characteristics	Hysteresis < 10% to 15%

Holding Current	Power Ratings				Ambient Temperature Ranges	Type[2]
	Inrush	Holding		Hot/Cold		
mA	VA	VA	W	W	°C (°F)	
< 100	-	-	-	0.004	0 to 60 (32 to 140)	01-02

2 Refer to the dimensional drawings on the following page

Specifications

Connection	Flow Coefficient		Operating Pressure bar (psi)			Holding Power		Catalog Number			
			min.	max.				without manual operator		with impulse manual operator	
	Kv (m3/h)	Cv		air		W		connector	leads	connector	leads
2/2 NC - Normally Closed											
Pad Mounting	0.005	0.006	0	-	8	-	0.004	63000075	63000035	63000079	63000039
	0.007	0.008	0	-	4	-	0.004	63000076	63000036	63000080	63000040
2/2 NO - Normally Open											
Pad Mounting	0.005	0.006	0	-	8	-	0.004	63000077	63000037	63000081	63000041
	0.007	0.008	0	-	4	-	0.004	63000078	63000038	63000082	63000042

Subbases[3]

Connection	Mounting Type	Description	Catalog Number	
			aluminum	brass
M5	individual mounting	M5 lateral connection	88263002	30300001

3 Multiple subbases available upon request

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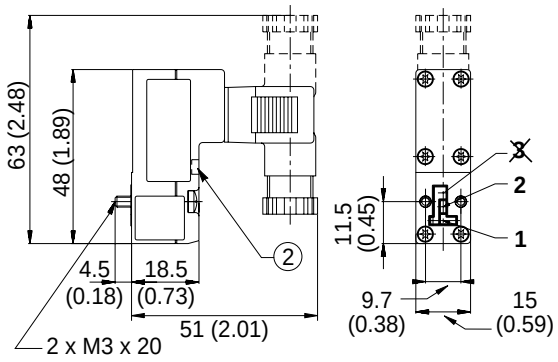
Dimensions: mm (inches)

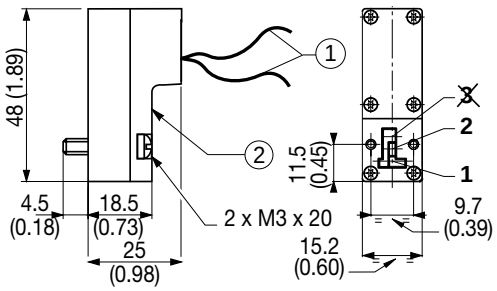
Type 01 IEC 335/DIN 43650
IP65

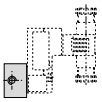
63000075/76/77/78/79/80/81/82



Type 02 IEC 335
IP65

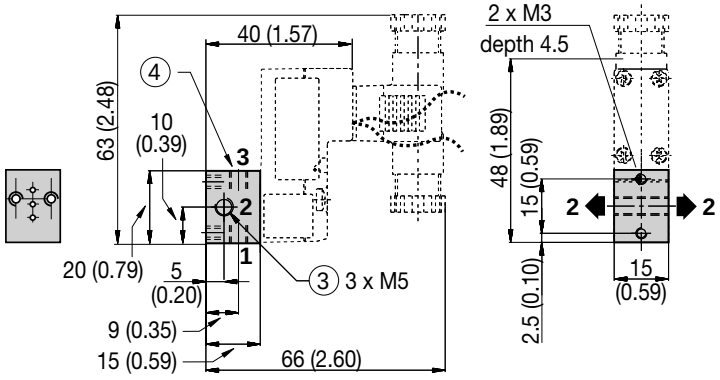
63000035/36/37/38/39/40/41/42



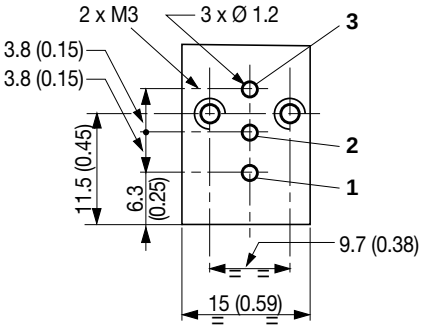


Single Subbase M5
Aluminum or brass

88263002 - 30300001



Subbase Mounting Pattern
ISO 15218/CNOMO
E06.36.120N, size 15



1. 2 leads 28 AWG, length: 1m (39.4in)
2. Manual operator location
3. Outlet (2) can be connected on the left or on the right of subbase;close he unused prort with a Ø M5 plug (supplied)
4. Port (3) not used (to be provided with protection)

Type	Catalog Number	Weight
		kg
01	63000075/76/77/78/79/80/81/82	0.040
02	63000035/36/37/38/39/40/41/42	0.032
-	88263002	0.012
-	30300001	0.034

Options

- Plug with cable length of 2m (78.8in)

Installation

- The solenoid valves can be mounted in any position without affecting operation
- Mounting on single subbases
- Unlike the on/off type, the proportional version is not equipped with electronics. Please check for correct polarity when connecting the valve. The piezo element will be damaged if the polarity of the connections is inversed. The control system of the user must be used for charging and discharging.

Important Note: The peak current must be limited by series resistor greater than 30 ohms

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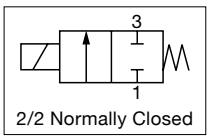
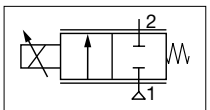
ASCO™ MINIATURE SOLENOID VALVES
DENTAL MANIFOLD

- 3 manifolds with the following configurations:
  - Manifold with 2 microactuators 2/2NC (A-P) and 1 total isolation microactuator 2/2NC (W); all direct acting.
  - Manifold with 1 microactuator 2/2NC (A), 1 total isolation microactuator 2/2NC (W) and 1 proportional solenoid valve 2 ways NC (P); all direct acting.
  - Manifold with 1 total isolation direct acting microactuator 2/2NC (W), 1 water channel (P) and 1 air channel (A).
- Compact and versatile version, designed for dental equipments; equipped with 3 flow regulators. The modular system allows the use as single or as a set (max. 4 manifolds); the manifold is delivered with 3 sealing O-rings and joint pin. Heads group kit (feeding and end side) available separately (see details on the back).
- Suitable to shut off liquid (W) and gaseous (A-P) fluids (verify the compatibility of fluid with materials in contact).Pipette Dispensing



2/2 Normally Closed



2/2 Normally Closed (Proportional)

Series 252 D01

Series 252 D02

Series 252 D03

Fluids*	Temperature Range	Seal Materials*
Liquids or Gases	-10°C to 90 °C (50°F to 194°F)	EPDM

* Ensure that the compatibility of the materials in contact with the fluids is verified..

General Valve Information	
Body	POM
Others	Stainless Steel / PA 66 / Brass
Response Time	< 10ms
Max. Viscosity	22 cSt (mm^2/s)

Electrical Characteristics	
Coil Insulation Class	F
Connector	- DIN 46340 with micro plug connector - Lead Wires
Electrical Safety	EN 60730-1
Electrical Enclosure Protection	IP65 (EN 60529), IP40 (EN 60529)
Standard Voltages*	12 VDC, 24 VDC (-5%/+10%), Proportional valve (P): 70 – 220 mA (24V)

* Other voltages on request

Coil Type	Power Ratings	Ambient Temperature Range	Protection	Electrical Connection
	W	°C (°F)	VA	W
Standard S0	4	10 to 60 (50 to 140)	IP65	Spade terminals 2.8 x 0.5 (DIN 46340)
Standard L0	4	10 to 60 (50 to 140)	IP65	500mm Lead Wire (for D01 and D03) – 460mm/500mm Lead Wire (for D02)
Proportional S0	5.5	10 to 60 (50 to 140)	IP65	Spade terminals 2.8 x 0.5 (DIN 46340)
Proportional L0	5.5	10 to 60 (50 to 140)	IP65	500mm Lead Wire (for D01 and D03) – 460mm/500mm Lead Wire (for D02)

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Specifications								
Type	Orifice Size	Flow Coefficient		Operating Pressure. bar (psi)			Power Rating (W)	Catalog Number
				min.	max.			
	mm (inches)	Kv (m^3/h)	Cv		gases	liquids		
D01	1.6 (0.063)	0.030	0.035	0	6 (87)	-	4	6252AD01
	1.8 (0.071)				6 (87)	-	4	
	1.5 (0.059)				-	3 (43.5)	4	
D02	1.6 (0.063)	0.030	0.035	0	6 (87)	-	4	6252AD02
	1.6 (0.063)	-	-		6 (87)	-	5.5	
	1.6 (0.063)	0.030	0.035		-	3 (43.5)	4	
D03	1.5 (0.059)	0.030	0.035	0	-	3 (43.5)	4	6252AD03

How to Order

6 252 A D01 S0 A00 F1

Connection Type
6 = Barb Fitting

Product Series
252 = Dental Manifold Module

Revision
A = Initial Release

Pipe Size / Orifice
D01 = Orifice size: 1.6 / 1.8 / 1.5. 2-Way N.C.
D02 = Orifice size: 1.6 / 1.6 Proportional / 1.5. 2-Way N.C.
D03 = Orifice size: 1.5. 2-Way N.C.

Voltage
F1 = 24/DC Class F
F3 = 12/DC Class F

Options
A00 = No Options

Electrical Connection Type
S0 = Din Type Coil
L0 = 500mm Leaded coil (for D01 and D03)
460mm/500mm Leaded coil (for D02)

Accessories
Heads group kit

Description	Series	Catalog Number
Heads group kit Consisting of: feeding head, end side head, screw, sealing, pin	252	M252AU529833001

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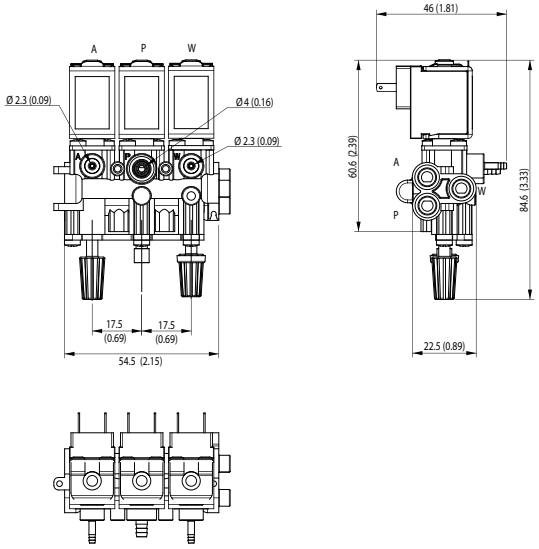
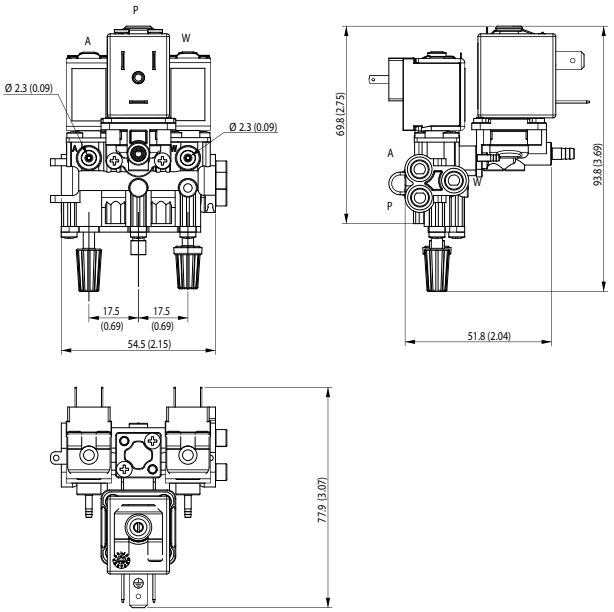
ASCO™ MINIATURE SOLENOID VALVES
DENTAL MANIFOLD

Dimensions: mm (inches)

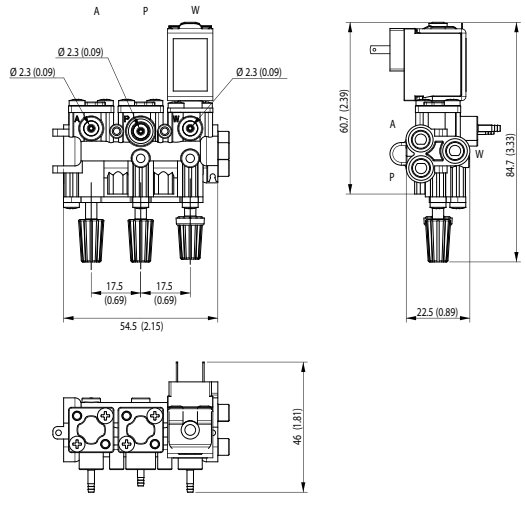
Type 1 / D01



Type 2 / D02



Type 3 / D03



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ASCO™ MINIATURE PRESSURE REGULATOR

NON-RELIEVING MANIFOLD MOUNT

SERIES **624**

The Series 624 non-relieving regulator is designed to control system pressure to a constant maximum set point.

- Lightweight, compact manifold mount interface for easy installation and maintenance
- Output pressure ranges 0-0.7 bar (0-10 psi), 0-1.4 bar (0-20 psi), 0.4 - 2.1 bar (5 - 30 psi)
- Suitable for use in a wide variety of gas applications, and is an excellent choice for use with 95% concentrated oxygen
- Excellent for oxygen therapy and ventilation applications
- Typical applications include:
  - Oxygen Concentrators
  - Respiratory Therapy
  - Ventilators

Fluids	Temperature Range	Seal Materials*
Air, Inert & Neutral gases, or Oxygen	0C° to 60C° (32F° to 140F°)	CR, NBR

* Ensure that the compatibility of the materials in contact with the fluids is verified

Manifold Construction	
Body	POM
Internal Components	POM
Function	Non-Relieving Regulator
Inlet Fitting	1/8" NPT
Outlet Fitting	Barb for 1/4" I.D. Tubing

Alternate Construction Options

Additional options are available including alternative inlet and regulated pressure ranges. Minimum quantities apply.

Specifications

Port Type	Inlet Pressure	Regulated Pressure		Flow (slpm)[1]	Catalog Number
	Max bar (psi)	Min bar (psi)	Max bar (psi)		
Manifold	6.9 (100)	0.0 (0)	0.7 (10)	74	8624A501
	6.9 (100)	0.0 (0)	1.4 (20)	109	8624A502
	6.9 (100)	0.4 (5)	2.1 (30)	112	8624A503

(1) Inlet pressure set at 100psig, outlet set at maximum regulated pressure, flow rate at 15% pressure drop from maximum regulated pressure

To Order

- Select catalog number from specification table above
- Additional seal materials available on request

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ASCO™ MINIATURE PRESSURE REGULATOR

NON-RELIEVING MANIFOLD MOUNT

How to Order

8 624 A 501 0X X00 00

Connection Type
8 = NPT Connections

Product Series
624 = Pressure Regulator

Revision
A = Initial Release

Item Number
501 = 0 - 0.7 bar (0-10 PSI)
502 = 0 - 1.4 bar (0-20 PSI)
503 = 0.4 - 2.1 bar (5-30 PSI)

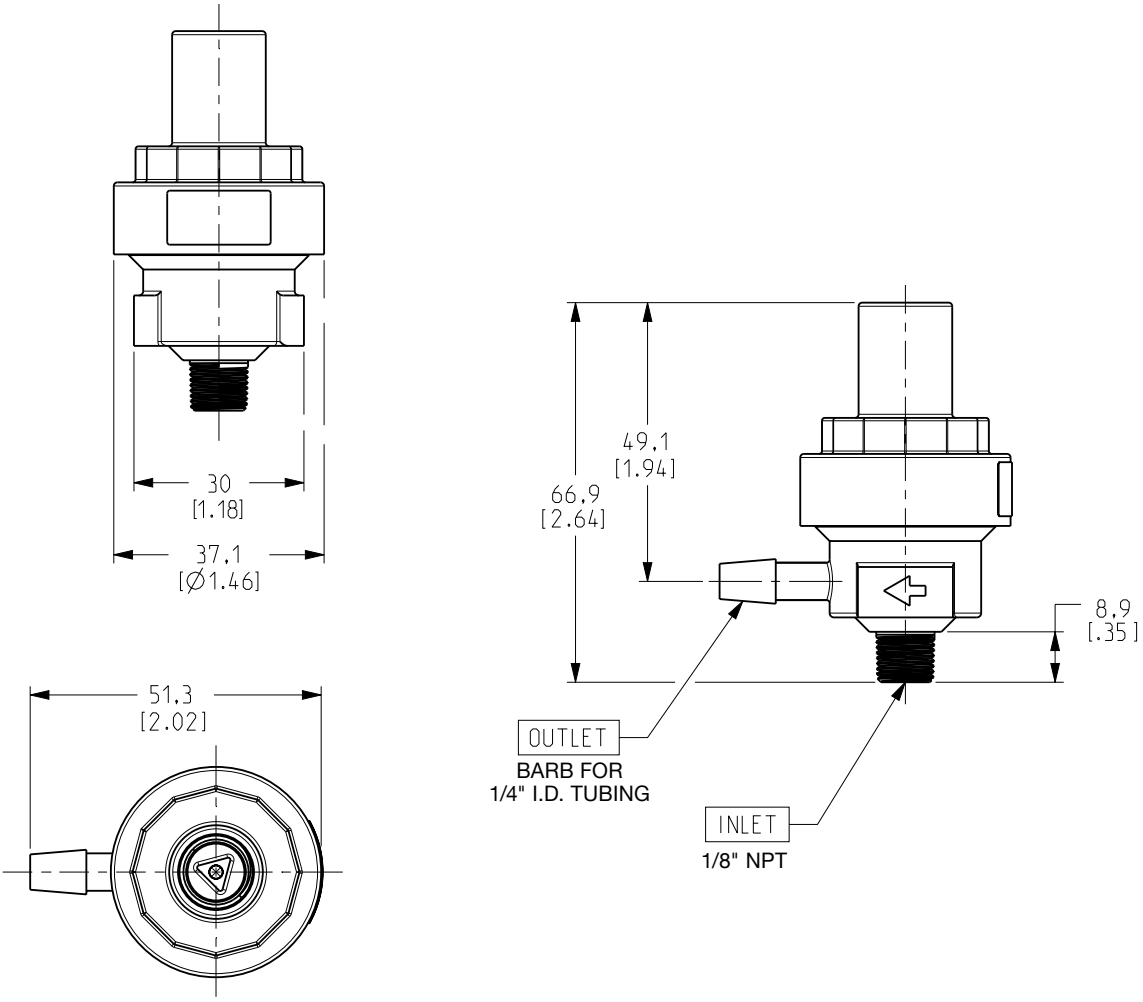
Voltage
00 = No Voltage Required

Elastomer
X00 = NBR Seals, Neoprene Diaphragm

Connection Type
0X = No Connection

Dimensions: mm (inches)

Port Type: Manifold
Weight: 35.4g (1.25oz)



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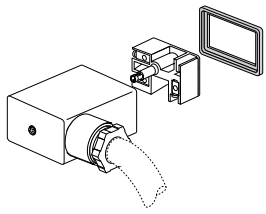
DIN ELECTRICAL CONNECTORS

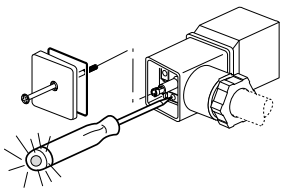
- Spade connector to fit standardized three-pin molded coils:
  - Size 22 connector with 11mm (0.43in) between contacts: EN 175301-803, industry standard form B, for coil types CM5, CM22, C22A, EMX and BMX
  - Size 30 connector with 18mm (0.71in) between contacts: ISO 4400/EN 175301-803 form A, for coil types CM6, CMXX, CM12, CM25, C25A, CM30, CM40, ANX, AMX, JMX, FNX and FMX
- The connectors are available in two versions: standard rotatable version with or without integrated visual LED indicator and electrical protection, or version with non-rotatable 3-core molded-in cable, 2m (78.7in) long
- The standard connector with 18mm contacts is provided with a removable lid allowing access to the wiring for easy checking of power supply without unplugging the connector and without interrupting operation of the solenoid valve

Connector Specification		Max. Operating Temperature
11mm between contacts (0.43in)	18mm between contacts (0.71in)	
EN 175301-803 industry standard form B	ISO 4400/EN 175301-803, form A	-40 °C to 80 °C (-40 °F to 176 °F), -40 °C to 125 °C (-40 °F to 257 °F) with silicone seal [version with molded-in cable -5 °C to 70 °C (23 °F to 158 °F)]



Rotatable Connector

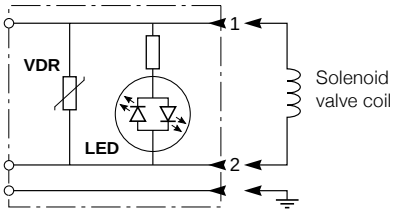
Construction	
Standard version	PA (polyamide), glass-fiber reinforced
Enclosure with LED and protection	PA
Enclosure with PVC cable	PA (polyamide), glass-fiber reinforced
Seals	NBR [option for 18mm contacts: VMQ (silicone)]



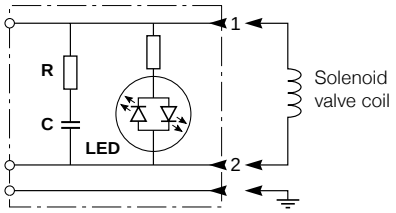
Standard Rotatable Connector with Power Supply Control

Electrical Characteristics		
	11mm between contacts (0.43in)	18mm between contacts (0.71in)
Number of contacts	2 + common ground	2 + common ground
Contact resistance	≤ 4m Ω	≤ 4m Ω
Connector	Spade plug	Spade plug
Electrical safety	IEC 335	IEC 335
Electrical enclosure protection	IP65 (EN 60529)	IP65 (EN 60529)
Number of wires (with cable)	3	3

LED Indicator and Electrical Protection Diagrams



Connector with 11mm contacts



Connector with 18mm contacts

VDR Varistor absorbing the self-inductance of the coil
RC RC circuit absorbing the self-inductance of the coil
LED Green light-emitting diode, bidirectional, signalling the presence of voltage across the coil terminals

Specifications

Description	Cable Length	Cable O.D.		Wire Cross-Section	Max. Voltage	Type	Catalog Number		
		11mm	18mm				11mm	18mm	
	m (inches)	mm (inches)		mm²	V		NBR	NBR	VMQ*
Rotatable Connector									
Standard, Without LED Indicator	-	6 to 8 (0.24 to 0.31)	6 to 10 (0.24 to 0.40)	1.5	250	01-02	290414-001	290411-001	88122625
With Integrated LED Indicator and Electrical Protection	-	6 to 8 (0.24 to 0.31)	8 to 10 (0.31 to 0.40)	1.5	12	01-02	-	88122611	-
					24		290415-024	290412-024	-
					48		-	290412-048	-
					115		290415-120	290412-120	-
					230		290415-240	290412-240	-
Non-rotatable Connector with Cable									
Without LED Indicator	2 (78.7)	-		1.5	250	03- 04	88122413	88122612	-

* For use within class H temperature limits

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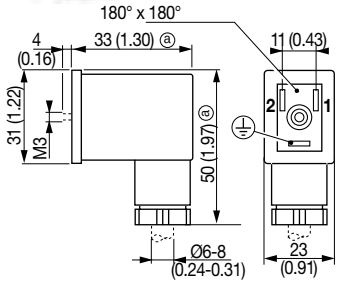
Dimensions: mm (inches)

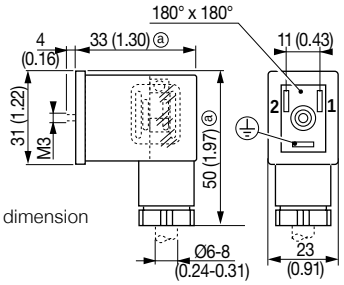
Type 01

11mm (0.43in) Lead Wires
EN 175301-803, industry standard form B
IP65

290414-001

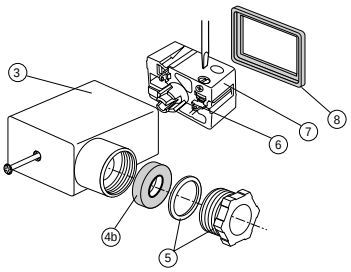


290415-024/120/240



ⓐ Max. dimension

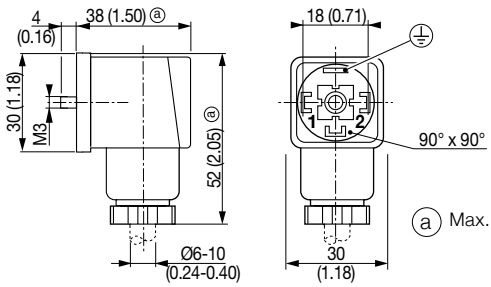
290414-001/024/120/240



Type 02

18mm (0.71in) Lead Wires
ISO 4400/EN 175301-803, form A
IP65

290411-001
88122625



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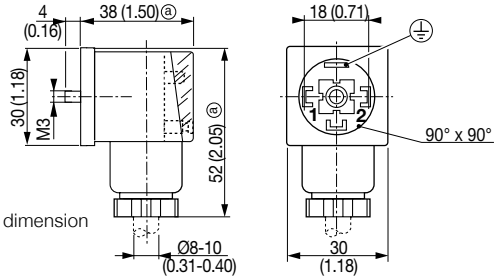
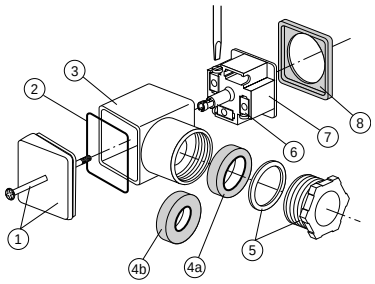


ⓐ Max. dimension

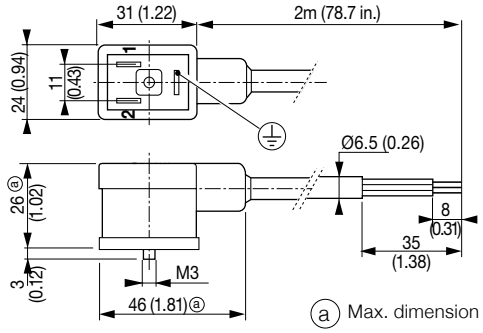
290411-001
88122625



Type 03

11mm (0.43in) Lead Wires
EN 175301-803,
industry standard form B
IP65 (non-rotatable terminal holder)

88122413

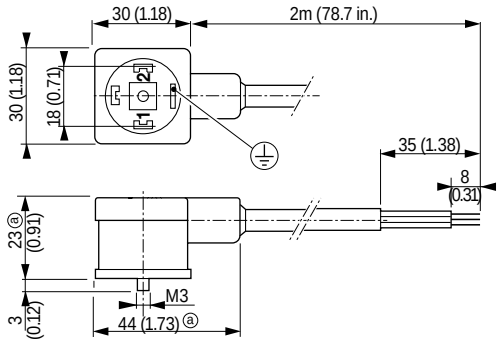


ⓐ Max. dimension

Type 04

18mm (0.71in) Lead Wires
ISO 4400/EN 175301-803, form A
IP65 (non-rotatable terminal holder)

88122612



1. Fastening screw/cover
2. Cover seal
3. Enclosure
4. **88122602/625**:
   2 seals for cable dia. 8 to 10mm (4a) or cable dia. 6 to 8mm (4b)
   88122611/603/604/605/608:
   1 seal for cable dia. 8 to 10mm (4a)
   88122404/405/406/407/410:
   1 seal for cable dia. 6 to 8mm (4b)
5. Stuffing box washer and nut
6. Cable connection terminal
7. Terminal holder
8. Connector seal

Sizes 03 and 04	
brown wire	terminal 1 (+)
blue wire	terminal 2 (-)
green/yellow wire	ground

Type	L	Weight[1] (kg)	
	m (inches)	without LED indicator	with LED indicator
01	-	0.025	0.025
02	-	0.030	0.032
03	2 (78.7)	0.150	-
04	2 (78.7)	0.155	-

[1] Including seals and screws

Installation

- The connectors can be mounted in any position without affecting operation

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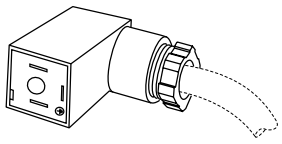
DIN ELECTRICAL CONNECTORS

- Spade connector to fit standardized three-pin molded coils:
  - EN 175301-803, industry standard form C (9.4mm), for coil type CM15 (202 Series), DMX and 302, 630, 519, 520, 521 and 578 Series (MEGA)
  - EN 175301-803, form C (8mm), for 302, 630 and 202 Series
- The connectors are available in three versions: standard rotatable version, or version with non-rotatable 3-core molded-in cable, 2m (78.7in) or 5m (196.9in) long, with or without integrated visual LED indicator and electrical protection

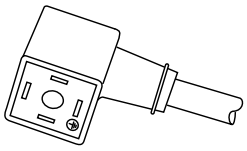
Connector Specification		Max. Operating Temperature
9.4mm between contacts (0.37in)	8mm between contacts (0.31in)	
EN 175301-803 industry standard form C	EN 175301-803, form C	-25 °C to 60 °C (-13 °F to 140 °F), [version with molded-in cable]

Construction	
Standard version	PA, glass-fiber reinforced
Enclosure with LED and protection	PA or PP
Enclosure with PVC cable	PP, glass-fiber reinforced
Seals	NBR



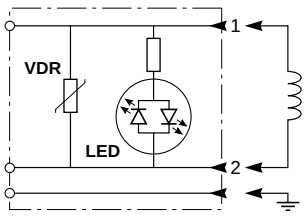
Rotatable Connector
9.4mm or 8mm

Electrical Characteristics		
	9.4mm between contacts (0.37in)	8mm between contacts (0.31in)
Number of contacts	2 + common ground	2 + common ground
Contact resistance	≤ 4m Ω	≤ 4m Ω
Connector	Spade plug	Spade plug
Electrical safety	IEC 335	IEC 335
Electrical enclosure protection	IP65 (EN 60529)	IP65 (EN 60529)
Number of wires (with cable)	3	3



Non-rotatable Connector
with Cable

LED Indicator and Electrical Protection Diagram



VDR Varistor absorbing the self-inductance of the coil
LED Green light-emitting diode, bidirectional, signalling the presence of voltage across the coil terminals

Specifications							
Description	Cable Length	Cable O.D.	Wire Cross-Section	Max. Voltage	Type	Catalog Number	
	m (inches)	mm (inches)	mm²	V		9.4mm	8mm
Rotatable Connector							
Standard, Without LED Indicator	-	4 to 6 (0.16 to 0.24)	0.6	250 V	01 - 02	290417-001 (US customers) 88143581 (all other customers)	88130211
Non-rotatable Connector with Cable							
Without LED Indicator	2 (78.7)	-	0.6	250 V	03	272852-004	*
With Integrated LED Indicator and Electrical Protection	2 (78.7)	-	0.6	24 V	04	-	-
	5 (196.9)					88143593	-

* Contact us

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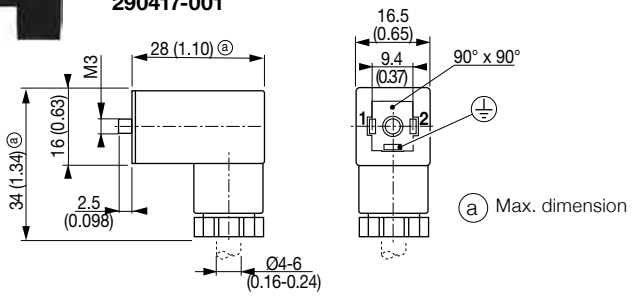
Dimensions: mm (inches)

Type 01

9.4mm (0.37in) between contacts
EN 175301-803, industry standard form C
IP65

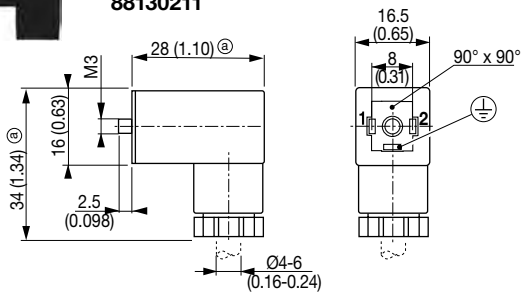
290417-001



Type 02

8mm (0.31in) between contacts
EN 175301-803, form C
IP65

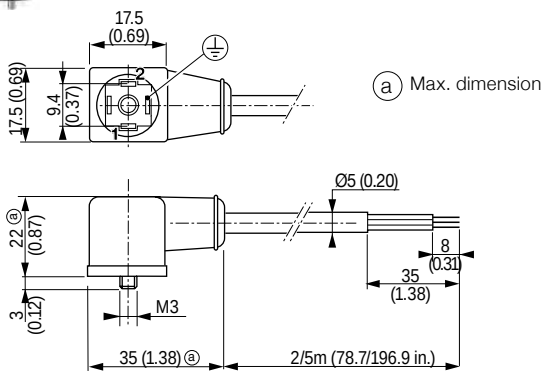
88130211



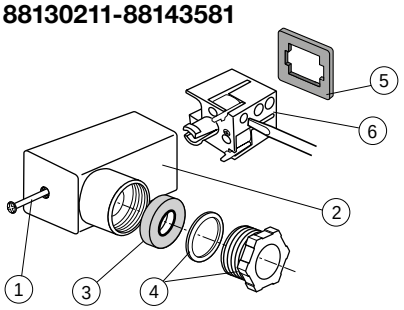
Type 03

Lead wires, without LED indicator
EN 175301-803, industry standard form C (9.4mm)
IP65 (non-rotatable terminal holder)

272852-004



88130211-88143581



1. Fastening screw/cover
2. Enclosure
3. Seal for cable diameter 4 to 6mm
4. Stuffing box washer and nut
5. Connector seal
6. Terminal holder
7. Cable connection terminal

Sizes 03 and 04	
brown wire	terminal 1 (+)
blue wire	terminal 2 (-)
green/yellow wire	ground

Type	L	Weight[1] kg	
	m (inches)	without LED indicator	with LED indicator
01-02	-	0.015	-
03	2 (78.7)	0.100	-

[1] Including seals and screws

Options

- Connectors with cable 5m (196.9in) long available on request

Installation

- The connectors can be mounted in any position without affecting operation

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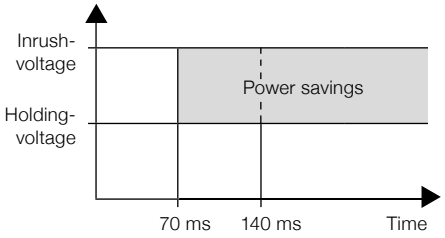
Asco

POWER-SAVE CONNECTORS

Once a DC-type solenoid valve is activated, only the holding current, which corresponds to 50% of the inrush voltage, is necessary to keep the valve in position. The power-save connector switches to holding voltage after approx. 70 ms (size 30) or 140 ms (size 22). The holding power is thereby reduced to a quarter of the inrush power. During power reduction, the valve's coil is piloted via PMW voltage pulses.

- The main advantages of a connector with voltage reduction are:
  - Power savings (lower current consumption)
  - Low heat development in the solenoid valve



Construction	
Enclosure	PA

Electrical Characteristics		
	Size 22	**Size 30**
Input Voltage	12/24 VDC ± 10%	10 to 30 VDC
Output Voltage	12 VDC ± 10%	6 to 30 VDC
Power Rating	Max. 12 W	Max. 30 W
Connector	Spade plug	Spade plug
Electrical Safety	Industry standard, form B	ISO 4400/EN 175301-803, form A
Number of Contacts	2 + 1 common ground	2 + 1 common ground
Electrical Enclosure Protection	IP65	IP65
Cable Diameter	6 to 8mm (0.24in to 0.31in)	6 to 8mm (0.24in to 0.31in)
LED Green	Solenoid valve actuation	Solenoid valve actuation
LED Red	-	Overcurrent or overvoltage
Voltage Reduction	After 140ms	After 70ms
PWM Frequency	7 KHz	50 KHz

Specifications

Description	Size	Input Voltage	Catalog Number
Power-save connector with voltage reduction	22	24 VDC ± 10%	88100934
		12 VDC ± 10%	88100944
	30	10 to 30 VDC	88100945

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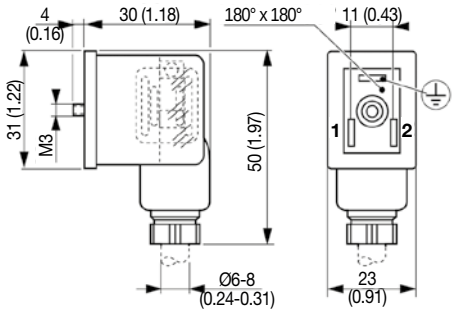
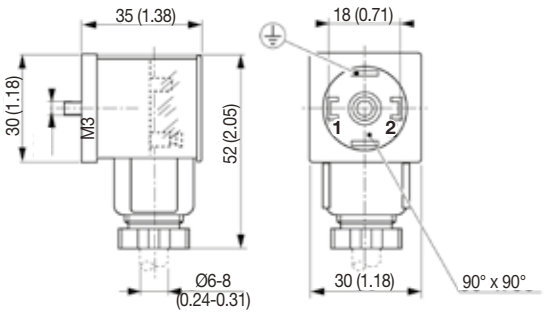
Dimensions: mm (inches)

Size 22 11mm (0.43in) between contacts

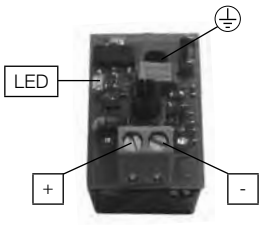


Size 33 18mm (0.71in) between contacts



Electrical Connection

Size 22 11mm (0.43in) between contacts

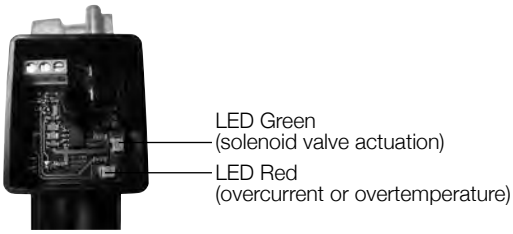


Screw terminals: up to 1mm^2 cable

+	Pilot voltage + (12/24 V)
-	Pilot voltage - (GND)
⏚	Ground terminal, straight through

1	Valve voltage +
2	Valve voltage -
3	Ground terminal (PE)

Size 33 18mm (0.71in) between contacts



Screw terminals: up to 1mm^2 cable

+	Pilot voltage + (10-30 V)
-	Pilot voltage - (GND)
⏚	Ground terminal (PE)

1	Valve voltage +
2	Valve voltage -
3	Ground terminal (PE)

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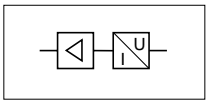
CONTROL DEVICE
ELECTRONIC CONTROL UNIT

- Converts analog input control signals to coil current of a proportional solenoid valve by means of pulse width modulation
- LED-Display integrated in the connector
- Adjustable UP/DOWN ramp control
- Output coil current independent of coil resistance (temperature) and supply voltage variations
- The electronic circuit is integrated in a standard housing according to DIN EN 175301-803, form A
- Parameter setting via PC interface and programming adapter or, optionally, via the switches integrated in the connector



General Information	
Nominal Voltage	12/24 VDC
Maximum Current	1.2/2.5A
Housing	PA
Cover	PA
Screw	Zinc plated steel
Seals	NBR

Electrical Characteristics	
Connector	M12, 5 pins
Connector Specification	DIN EN 175301-803, form A
Electrical Safety	IEC 335
Electrical Encloseure Protection	IP65 (EN 60529)
Supply Voltage	12 V...30 VDC (incl. ripple)
Ramp	Selectable ON/OFF, adjustable between 50 ms to 5 s, Up/Down
Adjustable Switching Frequency	60 to 1500Hz

Max. Full Load Current	Input Control Signal		Ambient Temperature Range
I_{FL}	U_C	I_C	
mA	V	mA	°C (°F)
1200/2400	0 - 10	4 - 20	-20 to 65 (-4 to 149)

Specifications

Catalog Number: Proportional Valves for Digital Control Unit	Type[1]	Setpoint	Catalog Number	
			Control Unit	Adapter
202A001V to 202A087V 203B001V and 203B002V 60200001, 60200002, 60200004	01	0 - 10 V	X90850164500100	-
		4 - 20 mA	X90850164500200	
202A201V to 202A208V and 202A513V	02	0 - 10 V	X90850164500100	833-064154
		4 - 20 mA	X90850164500200	

1 Refer to the dimensional drawings on the following page

Proportional Valves Suitable for Control Applications

Description	Series	Illustration
3-port proportional valve for pressure control	602	
Posiflow/Preciflow proportional solenoid valves, Flapper proportional	202-203, 068	

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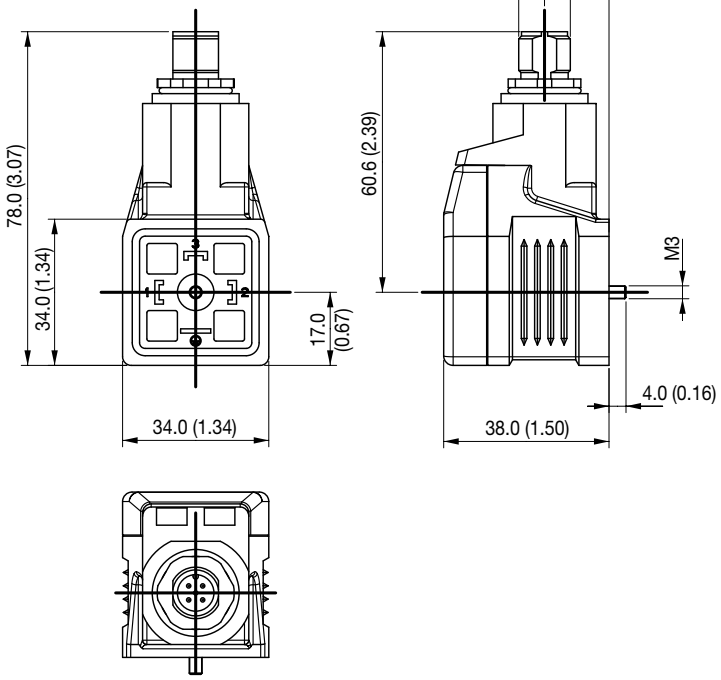
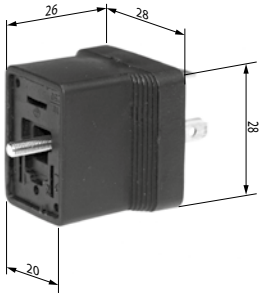
Dimensions: mm (inches)

Type 01 **Control Unit**



Type 02 **Adapter**
from form A to form B



Programming Adapter

Input and Output Signals	
Pin	**Supply**
1	Voltage supply (see “Electrical Characteristics”)
3	Analog ground 0 V (GND)
	Analog signals
2 4	Setpoint input (differential input) The range 0...100% corresponds to an input voltage of 0...10 V or an input current of 4...20 mA (depending on version used)
	Communication
5	LIN Bus connection The parameters for the device can be set via this connection and our programming adapter

Accessories	
Description	**Catalog Number**
Straight M12 female connector, 5 pins, with screw terminals	88100256
Right-angle M12 female connector, 5 pins, with screw terminals	88100725
Supply cable 2m, 2 x 0.25mm², straight connector	88100726
Supply cable 2m, 2 x 0.25mm², right-angle connector	88100727
Supply cable 5m, 6 x 0.56mm², straight connector	88100728
Supply cable 5m, 6 x 0.56mm², right-angle connector	88100729
Supply cable 10m, 6 x 0.56mm², straight connector	88100730
Supply cable 10m, 6 x 0.56mm², right-angle connector	88100731
Adapter DIN EN 175301-803 from form A to form B for Type 02	833-064154
Programming adapter	X90850164500300

Installation

- The control unit can be mounted in any position without affecting operation

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PINCH VALVE TUBING & GUIDE

Tubing

- Platinum-cured Bio-Medical Grade silicone tubing designed specifically for analytical and medical devices
- Suitable for a wide range sterilization techniques such as steam autoclaving, gamma radiation, and ethylene oxide
- Excellent flexibility
- No peroxide cure chlorophenyl or PCB by-products
- Meets ISO 10993 guidelines for body contact applications
- Manufactured to the principles of FDA 21 CFR 210/211 cGMPs for Pharmaceutical products
- Available in 5' and 50' lengths

Specifications	
Tubing Material	Platinum Cured Silicone
Durometer	50 Shore A
Tensile Strength at Break	1388 psi
Elongation at Break	815%
Tear Strength	263 psi
Standards	Manufactured to the principles of FDA 21 CFR 210/211 cGMPs for Pharmaceutical products

Tubing Catalog Numbers

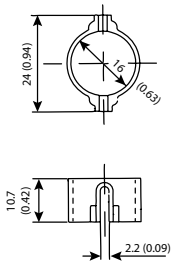
Tubing for 045, 284, 384 Series				
Tubing Sizes mm (inches)			Length m (ft)	Tubing Catalog Number
ID	OD	Wall		
0.762 (0.030)	1.65 (0.065)	0.444 (0.0175)	1.52 (5)	P099AU521738105
			15.2 (50)	P099AU521738150
0.794 (1/32)	2.38 (3/32)	0.794 (1/32)	1.52 (5)	P099AU521738205
			15.2 (50)	P099AU521738250
1.59 (1/16)	3.17 (1/8)		1.52 (5)	P099AU521738305
			15.2 (50)	P099AU521738350
1.59 (1/16)	4.76 (3/16)	1.59 (1/16)	1.52 (5)	P099AU521738405
			15.2 (50)	P099AU521738450
3.17 (1/8)	6.35 (1/4)		1.52 (5)	P099AU521738505
			15.2 (50)	P099AU521738550
4.76 (3/16)	7.94 (5/16)		1.52 (5)	P099AU521738605
			15.2 (50)	P099AU521738650
6.35 (1/4)	9.52 (3/8)		1.52 (5)	P099AU521738705
			15.2 (50)	P099AU521738750

Tubing Guide

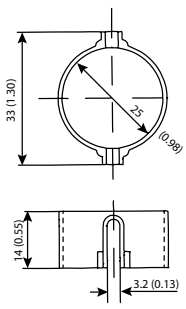
ASCO offers plastic tubing guides that slide easily onto the valve body of the pinch valves to retain small OD tubing in the pinch valve body.

Dimensions: mm (inches)

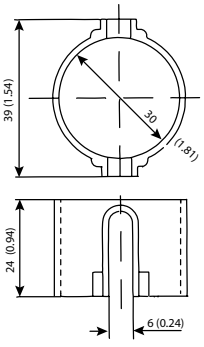
Tubing Guide



25978 01



25984 01



25995 01

Tubing Guide Catalog Number	Max OD of Tubing	Valve Series
2597801	2.2 (0.09)	SCH284A001
		SCH284A002
		SCH284A003
		SCH284A004
		SCH284A009
		SCH284A010
		SCH284A011
		SCH284A012
		SCH384A001
		SCH384A002
		SCH384A003
		SCH384A004
2598401	3.2 (0.13)	SCH284A005
		SCH284A013
		SCH394A005
2599501	6 (0.24)	SCH284B006
		SCH284B007
		SCH284B014
		SCH284B015
		SCH384B006
		SCH384B007

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SOLENOID VALVES
INFORMATION & TERMINOLOGY

Solenoid Valves

A solenoid valve is a combination of two functional units:

1. A solenoid operator essentially consisting of a coil, core, core tube, shading coil and spring(s).
2. A valve body containing orifices in which a disc, diaphragm or piston, etc. is positioned according to the type of technology used.

The valve is opened or closed by movement of the magnetic core which is drawn into a solenoid when the coil is energized.

Solenoid Valve Terminology

(Fig. 1)

Coil

Electrical part of the valve consisting of a spool wound with insulated copper wire creating a magnetic flux when energized.

The coil is held in place on the tube with a retaining clip.

Core

Soft-magnetic component moved by magnetic forces (flux generated by the coil).

Core spring

Spring which keeps the core in fixed position when the coil is de-energized.

Core tube

Stainless steel tube closed at one end, installed to improve the magnetic flux of the solenoid coil upon energization.

Cover

Cover mounted on the valve body and incorporating a number of orifices.

Diaphragm

Seal-tight diaphragm isolating the fluid from the control system.

Disc

Sealing material on the core or disc-holder which shuts off the seat orifice.

Manual operator

Manual operation of the lever to open or close the orifices.

Manual operator spring

Drawback spring ensuring return of the pulse control device to its initial position.

Orifices

Orifices for fluid transit.

Plugnut

Stationary core pressed in the closed end of the core tube, installed to improve the magnetic flux of the solenoid coil upon energization.

Retainer clip

Clip anchoring the coil to the yoke.

Rocker

Moving part serving to open and close the orifices for the passage of fluid.

Valve seat

Specially formed border of the main valve.

Solenoid enclosure

Metal housing around the coil for electrical and mechanical protection, as well as protection against ingress of water or dust.

Valve body

Main part of the valve with all ports and main seats.

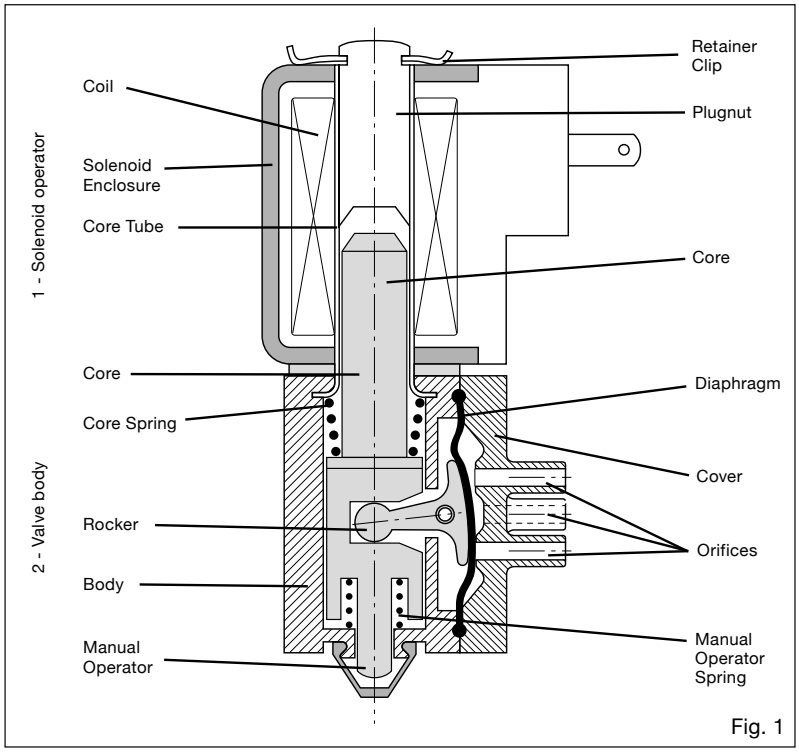

Fig. 1

Types of Solenoid Valves

2/2-3/2 Solenoid Valves with Fluid Isolation

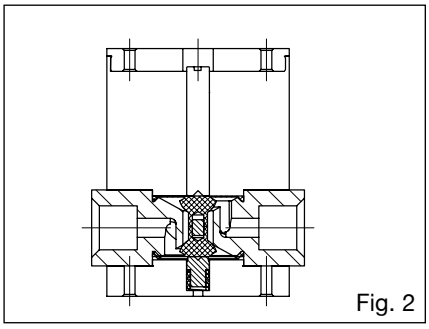
Fig. 2

Diaphragm (Fig. 2)

Diaphragm type solenoid valves are compact, have a very extended service life and a very small internal volume. They are ideal for handling agressive fluids. The valve body is in stainless steel or plastic (PVDF/PP), with a diaphragm in VMQ (silicone), FKM or PTFE. Low power rating.

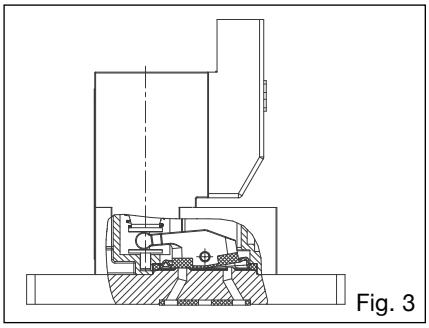
Fig. 3

Rocker (Fig. 3)

Rocker type solenoid valves are compact, and designed to incorporate a hermetic seal between fluid and control system. These valves are ideal for handling aggressive fluids, or where a maximum level of fluid purity is required. Low power rating and fast response times.

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Lever (Fig. 4)

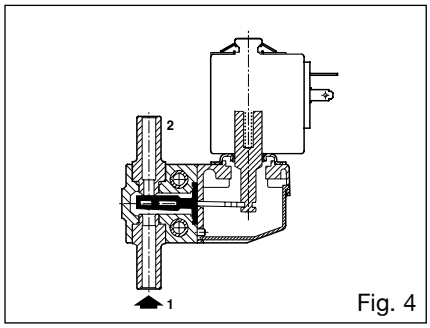

Fig. 4

Lever type solenoid valves are designed for high differential pressures and flow rates. Heat dissipation for the electromagnetic part is optimised by separating the control system from the valve itself. These valves are ideally suited for high ambient temperatures. Threaded or spigot connections.

Bellows (Fig. 5)

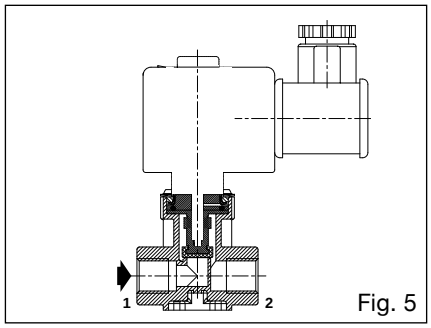

Fig. 5

Bellows solenoid valves ensure exceptional operating reliability under severe service conditions and extended life service. A body in PEEK or stainless steel, bellows in PTFE and disc in FFKM make these valves suitable for handling highly corrosive fluids at substantial flow rates. Threaded connections.

Pinch (Fig. 6)

Pinch type solenoid valves provide full bore flow (no internal volume) and extended service life. This is achieved by means of the pinch device, designed specially to operate smoothly with a balanced load. No contamination of the fluid is possible, and operation of the valve is silent. Bidirectional fluid flow.

Direct operated 2/2 solenoid valves

The core is mechanically connected to the disc and opens or closes the orifice, depending on whether the solenoid coil is energized or de-energized.

Core-disc valve construction (Fig. 7)

Operation is not dependent upon line pressure or rate of flow (zero or maximum rated pressure). These valves are generally available in 2/2 NC/NO and 3/2 NC/NO/U versions.

NC = Normally Closed

NO = Normally Open

U = Universal

Pressures

Maximum operating pressure differential – MOPD

The maximum operating pressure differential (DP) is the pressure the solenoid operator has to overcome to open (NC function) or

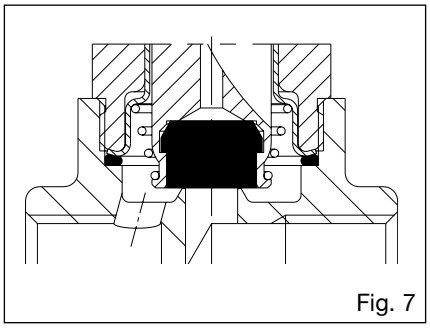
Fig. 7

close (NO function) a solenoid valve.

The maximum operating pressure differential refers to the maximum difference in pressure between the inlet and outlet.

If the pressure at the outlet is zero, the supply pressure is to be regarded as the maximum operating pressure differential. In this case, in order to prevent coil burnout, the pressure at the inlet must not exceed the maximum operating pressure differential specified for each valve.

The maximum operating pressure differential may vary according to the fluid or type of power used (AC valves usually have higher pressure ratings than DC valves).

Minimum operating pressure differential

Minimum operating pressure differential (bar) is that which is required to open the valve and keep it open. The valve will start to close below the minimum operating differential pressure.

Maximum allowable pressure

(according to EN 764)
The maximum allowable pressure is the maximum line or system pressure to which the valve may be subjected in normal service and at a given temperature, generally, ambient temperature, without causing damage.

Temperatures

Normal ambient temperature

The normal ambient temperature is assumed to be in accordance with standard conditions as specified in ISO 554

ambient temperature	:	20 °C (68 °F)
ambient pressure	:	1013 mbar (14.69 psi)
relative humidity	:	65%

Maximum ambient temperature

The maximum ambient temperature is based on test conditions to determine safe limits for coil insulation. The temperature is determined under continuously energized conditions and with maximum fluid temperatures (as listed) existing in the valve.

Minimum ambient temperature

The minimum ambient temperature of a valve is greatly affected by application and construction.

Damage may occur when liquids solidify above the specified minimum temperature. Be sure to observe minimum and maximum limits.

Maximum fluid temperature

The maximum fluid temperature listed is valid for an ambient temperature of 20 °C (68 °F) and 100% RD (Relative Duty Time).

Viscosity

Viscosity is the resistance of a fluid to flow, due to internal friction. Viscosity affects the flow rate of a valve considerably and the flow factor is reduced when viscous fluids are to pass through the valve.

There are two types of viscosity:

a) dynamic viscosity, expressed in Pa.s (Pascal seconds) or Poises

b) kinematic viscosity, which is the ratio between dynamic viscosity and density of the fluid

Kinematic viscosity is expressed in mm^2/s or cStokes; in this catalog only kinematic viscosity is considered.

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VALVE CONSTRUCTION MATERIALS

Rubbers

CR (chloroprene)
Principally used in refrigeration systems (Freon 22) as an external seal. Neoprene is also utilized for oxygen service valves. Suitable for alcohol, mild acids, water, air, ammonia, argon gas and other gases.

It has a temperature range of -20 °C (-4 °F) to 90 °C (194 °F).

CSM (chlorosulfonated polyethylene)
Used to handle strong oxidizing fluids, edible liquids, and many other common chemicals, etc. Not recommended for aromatic or chlorinated hydrocarbons. It has a temperature range of -40 °C (-40 °F) to 120 °C (248 °F).

Hypalon® is an example for CSM; it is part of the family of elastomers.

(Hypalon® is a registered trademark of Dupont Performance Elastomers)

EPDM (ethylene-propylene)
Suitable for temperatures above the NBR range (i.e. excellent for phosphate ester type fluids; not recommended for use with petroleum base fluids), except ethylene-propylene has a somewhat higher temperature range than NBR. Useful as "O" ring gaskets on steam valves due to low compression set.
Ethylene-propylene is generally suitable for most photographic solutions as well as numerous chemical solutions.

Ethylene-propylene is selected for applications which have a wider temperature range than the NBR temperature range, such as handling hot water and steam. Ethylene-propylene has an extremely wide range of fluid compatibility but has the distinct disadvantage that it cannot be used with petroleum-based fluids or contaminated fluids (such as lubricated air). It has a temperature range of -20 °C (-4 °F) to 180 °C (356 °F).

FFKM (perfluoroelastomer)
Elastomer used in the manufacture of joints and seals, combining resistance to aggressive chemical environments, swelling and high temperatures. Particularly suitable for pharmaceutical applications requiring extreme conditions of cleanliness.

Kalrez® is an example for FFKM; it is part of the family of elastomers.

(Kalrez® is a registered trademark of Dupont Performance Elastomers)

FKM (fluoroelastomer)
Suitable for temperatures above the NBR range. Excellent resistance to many petroleum oils, gasoline, dry-cleaning fluids and jet fuels. Not compatible for ketones, halogenated hydrocarbons and freons.

FKM is a fluorocarbon elastomer which was primarily developed for handling hydrocarbons such as jet fuels, gasolines, solvent, etc., which normally caused detrimental swelling to NBR. FKM has a high temperature range similar to ethylene-propylene but has the advantage of being somewhat more resistant to "dry heat". FKM has a rather wide range of chemical compatibility. It has a temperature range of -40 °C (-40 °F) to 190 °C (374 °F).

Viton® is an example for FKM; it is part of the family of elastomers.

(Viton® is a registered trademark of Dupont Performance Elastomers)

FVMQ (fluorosilicone)
A silicone with a trifluoropropyl group on each siloxane unit. Good resistance to heat and most solvents. Good low temperature characteristics.

NBR (nitrile)
Standard compound for service in petroleum oils, air, water, mild acids, acetylene, kerosene, lime solutions, liquified petroleum gases and turpentines. Not recommended for highly aromatic gasolines or acids.

NBR is commonly referred to as a nitrile rubber and is standard synthetic elastomer for accomplishing resilient-type seating or sealing in most values. It has excellent compatibility for most air, water and light oil applications. It has a temperature range of -20 °C (-4 °F) to +90 °C (194 °F).

Buna® is an example for NBR; it is part of the family of elastomers.

(Buna® is a registered trademark of DuPont de Nemours and Company or its affiliates)

SBR (styrene butadiene)
SBR is a polymer used in the manufacture of seals. Good resistance to swelling in acids, non-organic and organic bases, alcohols and water.

UR (urethane)
Used for water, air at normal ambient temperatures, alcohol, non-aromatic compounds, ether, edible fats and oils and hydraulic fluids. Its principal assets are high strength and excellent abrasion resistance. It is not recommended for ketones and strong oxidizing agents. It has a temperature range of -30 °C (-22 °F) to 40 °C (104 °F).

VMQ (silicone)
Known as the only elastomer which, under certain conditions, can be utilized for both high and low temperature, which is its principal use. Also handles hydrogen peroxide and some acids. Not good for steam; poor disc life. Fluorosilicone compounds are noted to have better fuel resistance.

Note:
Temperature limitations for elastomers are somewhat dependent on their specific functional usage in a valve.

Obviously, a diaphragm which stiffens at low temperature is objectionable while an "O" ring gasket of similar material which stiffens at low temperature may still be performing its sealing function.

Generally, temperatures down to -20 °C (-4 °F) can be considered tolerable and special elastomers such as silicone and low temperature NBR must be selected for use below this temperature.

These elastomers can extend the lower limit to approximately -40 °C (-40 °F) depending on specific usage. The upper limit for elastomers is generally around 100 °C (212 °F), except FKM, EPDM and VMQ which can, on specific applications, be utilized up to 190 °C (374 °F).

PTFE (see following page) is a commonly used gasket or disc material not considered an elastomer. This unique chemical-resistant material can be used from -270 °C (-454 °F) to 250 °C (482 °F) with proper design limitations.

Plastics

PA (polyamide)
Polyamide resins are known to be very durable and also resistant to many chemicals. A heat resistant type polyamide is always used in ASCO valves.

PARA (polyarylamide)
Aromatic polyamide in which at least one monomer contains a benzene ring, giving it improved mechanical, thermal and chemical resistance.

Ixef® is an example for polyarylamide; it is part of the family of thermoplastics.

(Ixef® is a registered trademark of Solvay S.A.)

PC (polycarbonate)
Good with polar solvents, salt solutions and water applications. Not recommended for non-polar solvents. A polycarbonate type thermoplastic known for having high impact strength and good resistance to inorganic acids and aliphatic hydrocarbons. Not suitable for use with air containing phosphate esters (found in synthetic oils).

PE (polyethylene)
A family of plastics varying from low melting point to high heat distortion temperature; and from flexible to rigid. Although somewhat soft, they offer good electrical, chemical and moisture resistance and physical properties.

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PEEK (polyetheretherketone)

High performance thermoplastic with exceptional resistance to a wide range of chemical environments and high temperatures.

PEI (polyetherimide)

This resin has good heat deflection characteristics. Good chemical resistance to non-oxidizing acids and polar solvents. Questionable usage on alkaline solutions.

Ultem® is an example for PEI; it is part of the family of plastics.

(Ultem® is a registered trademark of General Electric Company)

POM (polyacetal or polyoxymethylene)

Acetal resin type thermoplastics are extremely rigid but not brittle. They provide good toughness, tensile strength, stiffness and long life. They are non-toxic and resistant to most solvents.

Delrin® is an example for polyacetal; it is part of the family of plastics.

(Delrin® is a registered trademark of DuPont de Nemours and Company or its affiliates)

PP (polypropylene)

A thermoplastic known to have excellent resistance to inorganic salts, mineral acids and gases. It offers good resistance to photographic solutions and is one of the few plastics that has the ability to withstand steam sterilization.

PPS (polyphenylene sulfide)

This resin has outstanding chemical resistance and no known solvents below 200 °C (392 °F) It has low friction, good wear resistance and high tensile strength.

Ryton® is an example for PPS; it is part of the family of plastics.

(Ryton® is a registered trademark of Chevron Philips Chemical Company)

PSU (polysulfone)

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

PTFE (polytetrafluoroethylene)

A fluorcarbon resin known to be suitable for disc material where all other synthetic materials have failed. Teflon® is not easily fabricated and is known to have objectionable "cold flow" characteristics.

Teflon® is an example for PTFE; it is part of the family of plastics.

(Teflon® is a registered trademark of DuPont de Nemours and Company or its affiliates)

PTFE Reinforced

PTFE reinforced is a form of PTFE having fillers which have been added for improved mechanical properties. PTFE and TPFE with fillers are considered more of a plastic than a resilient-type material. They are virtually unattacked by any fluid. Their temperature usage ranges from discs for cryogenic valves to discs for steam valves. The "cold flow" characteristics may contribute to leakage particularly on gases. They have a temperature range of -270 °C (-454 °F) to 250 °C (482 °F).

Rulon® is an example for reinforced PTFE, it is part of the family of plastics.

(Rulon® is a registered trademark of Saint Gobain Performance Plastics Corporation)

PUR (polyurethane)

Polyurethane is a multipurpose, robust product. It has good adhesion to a variety of substrates, providing resistance to humidity and impact strength.

PVC (polyvinyl chloride)

Known for its chemical inertness but has somewhat less temperature resistance than most other plastics. PVC has excellent resistance to strong alkalies, mineral acids, salts and many chemicals corrosive to conventional materials.

PVDF (polyvinylidene fluoride)

Polymer resistant to atmospheric agents and the majority of chemical products at ambient temperature. High purity PVDF compounds are particularly recommended for medical applications.

TPE (thermoplastic polyester elastomer)

Used in some diaphragm applications. HYT elastomers show high strength in tension, compression and flex. They are superior to polyurethane rubbers in load-bearing capacity.

Hytrel® (HYT) is an example for a polyester elastomer, it is part of the family of plastics.

(Hytrel® is a registered trademark of DuPont)

Metals

Ag (silver)

Shading coil material for stainless steel valves.

Al (aluminum)

Shading coil material for special fluids or for making washers, etc. Die cast aluminum is generally used for bodies for low pressure gas valves and can only be used with "water free" systems. It can be noted that die cast aluminum is successfully used in oil and gasoline applications.

Cu (copper)

Primarily used for shading coil.

Cu Sn (bronze)

Casting bronze is used for body forging. Good sealing and casting properties, resistant to abrasion.

Cu Zn Pb (brass)

Forging brass is used in our body forgings. Forging brass has a composition of 59% copper, 2% lead and 39% zinc.

Fe Cr Ni (stainless steel AISI 303 or 304)

One of the most widely used steels containing 18% chromium and 8% nickel. Used for valve bodies, springs and internal parts. Known as stainless steel type 303 or 304.

Fe Cr Ni Mo (stainless steel AISI 316)

Alloy containing approx 17% chromium, 12% nickel and 2% molybdenum. Highly corrosion resistant.

Fe Cr Ni Mo (stainless AISI 316L)

Alloy containing 16 to 18% chromium, 11 to 14% nickel and 2.5 to 3% molybdenum. Valve bodies made from this material provide excellent resistance to particularly aggressive fluids.

Ni Fe (nickel iron)

Core material for low temperature fluids (below -100 °C) particularly for "long stroke" solenoids.

Pb (lead)

Used for lead-clad copper gaskets.

Zamak

Zinc alloy containing approx. 4% aluminum, 0.04% magnesium and 1% copper. Used, for example, for the bodies of air treatment equipment.

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CHEMICAL RESISTANCE GUIDE

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	Aluminum	Bronze	Cast Iron	Brass	PA	PEEK	PPS	Silver	Copper	CR	EPDM	FFKM	FKM	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)	↑	↑	↑	↑	→	↑	↑	↓	↑	-	↑	↑	→	↑	↑	↑	↓	↑	↓	↑	↑	↑	↑
Aluminum 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	Aluminum	Bronze	Cast Iron	Brass	PA	PEEK	PPS	Silver	Copper	CR	EPDM	FFKM	FKM	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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Asco

Fluids	**body materials**														**other materials in contact with fluid**									
↑ = Excellent → = Acceptable ↘ = Not recommended ↓ = Do not use - = No data available	Steel	Stainless Steel AISI 303/304	Stainless Steel AISI 316	Stainless Steel AISI 316L	Aluminum	Bronze	Cast Iron	Brass	PA	PEEK	PPS	Silver	Copper	CR	EPDM	FFKM	FKM	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%)	→	↑	↑	↑	↓	↘	↘	↓	↘	↑	→	→	↘	→	→	↑	↘	↘	→	↑	↑	↑	↑

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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	Aluminum	Bronze	Cast Iron	Brass	PA	PEEK	PPS	Silver	Copper	CR	EPDM	FFKM	FKM	NBR	UR	PET	POM	PTFE	TPE
Potassium nitrate	→	↘	↑	↑	↑	↑	→	→	→	↑	↑	↘	→	↑	↑	↑	↑	↑	↑	↑	→	↑	-
Potassium phosphate	→	→	→	→	↓	-	↓	→	→	↑	-	-	-	↑	↑	↑	↑	→	-	-	-	↑	-
Potassium sulfate	↑	→	↑	↑	↓	→	↓	→	→	↑	↑	→	→	↑	↑	↑	↑	↑	↑	-	-	↑	-
Propane	↑	↑	↑	↑	↑	↑	→	→	→	↑	↑	-	↑	↘	↓	↑	↑	↑	↘	↓	↑	↑	→
Propanol	↑	↑	↑	↑	-	-	↑	↑	→	↑	↑	-	-	↑	↑	-	↓	↓	↓	-	-	↑	-
Propylene	↑	↑	↑	↑	↑	-	↑	↑	-	-	-	↑	↑	↓	↓	↑	↑	↓	↓	↑	↑	↑	-
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.
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Asco

CONVERSION TABLES

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	1.102×10^{-3}	0.9843×10^{-3}
1 lb	0.4536	1	0.500×10^{-3}	0.4464×10^{-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	1×10^{-4}	0.155	1.0764×10^{-3}	1.196×10^{-4}
1 m^2	1×10^{4}	1	1550	10.764	1.196
1 sq in	6.4516	0.64516×10^{-3}	1	0.00694	0.772×10^{-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^2 = 10^{-4} ha = 100 dm^2 = 10^{6} mm^2

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	1×10^{-3}	61.024	0.03531	0.2642	0.220
1 m^3	1000	1	61024	35.31	264.2	220
1 cu in	16.387×10^{-3}	16.387×10^{-6}	1	0.5787×10^{-3}	4.329×10^{-3}	3.606×10^{-3}
1 cu ft	28.320	28.320×10^{-3}	1728	1	7.481	6.229
1 US gal	3.785	3.785×10^{-3}	231	0.1337	1	0.8327
1 Imp gal	4.546	4.546×10^{-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 = $10^5 \frac{N}{m^2}$	1 at = 1 $\frac{Kp}{cm^2}$	$\frac{poundal}{sq\ ft}$	$\frac{poundal}{sq\ in}$ = Psi	1 atm = 760 Torr = 760 mm Hg (0 °C)	Hg column (0m °C)		H_2O column (WC) (4 °C)	
						mm Hg = Torr	in Hg	m H_2O	ft H_2O
1 Pa = 1 N/m2	1×10^{-5}	1.02×10^{-5}	0.0209	1.45×10^{-4}	9.87×10^{-6}	0.0075	2.95×10^{-4}	1.02×10^{-4}	3.35×10^{-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	0.4790×10^{-3}	0.4882×10^{-3}	1	6.944×10^{-3}	0.4725×10^{-3}	0.359	0.141	4.88×10^{-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	1.330×10^{-3}	1.360×10^{-3}	2.78	0.0193	1.316×10^{-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 m H_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, and 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 kp m h / s	imperial 550 ft. lb h / s		
1 kcal	1	427.0	3.968	3088	1.163×10^{-3}	1.581×10^{-3}	1.560×10^{-3}	13.779×10^{-6}	4190
1 kpm	2.342×10^{-3}	1	9.294×10^{-3}	7.233	2.723×10^{-6}	3.704×10^{-6}	3.653×10^{-6}	32.270×10^{-6}	9.807
1 Btu	0.252	107.59	1	778.0	0.293×10^{-3}	0.398×10^{-3}	0.3931×10^{-3}	3.472×10^{-6}	1055
1 ft pdl	0.3238×10^{3}	0.13826	1.285×10^{-3}	1	0.377×10^{-6}	0.512×10^{-6}	0.505×10^{-6}	4.462×10^{-9}	1.356
1 kWh	860	367.1×10^{-3}	3412.8	2.655×10^{6}	1	1.360	1.341	11.850×10^{-3}	2.6×10^{6}
1 PSh	632.3	270×10^{-3}	2509	1.953×10^{6}	0.7353	1	0.9863	8.713×10^{-3}	2.65×10^{6}
1 hph	641.1	273.7×10^{-3}	2545	1.980×10^{6}	0.7457	1.014	1	8.834×10^{-3}	2.68×10^{6}
1 ton-day	72.57×10^{-3}	30.99×10^{-3}	288×10^{3}	244.1×10^{6}	84.39	144.78	113.2	1	304×10^{6}
1 J	0.239×10^{-3}	0.102	0.948×10^{-3}	0.738	0.278×10^{-6}	0.378×10^{-6}	0.372×10^{-6}	3.280×10^{-9}	1

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

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Capacity, Energy Flow, and 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

1 cal / g = kcal / kg

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

Formulas for temperature calculation

[°C] = ([°F] – 32) × 5/9 | **[°F] = [°C] × 9/5 + 32** | **[K] = [°C] + 273.15**

Temperatures

Common temperatures in degrees Kelvin and corresponding Celsius and Fahrenheit equivalents

Kelvin (K)	Celsius (°C)	Fahrenheit (°F)
0	-273	-459
17	-256	-429
33	-240	-400
49	-224	-371
65	-208	-342
81	-192	-314
97	-176	-285
113	-160	-256
129	-144	-227
145	-128	-198
161	-112	-170
177	-96	-141
193	-80	-112
209	-64	-83
225	-48	-54
241	-32	-26
257	-16	-3

Kelvin (K)	Celsius (°C)	Fahrenheit (°F)
273	0	32
289	16	61
305	32	90
321	48	118
337	64	147
353	80	176
373	100	212
385	112	234
401	128	262
417	144	291
433	160	320
449	176	349
465	192	378
481	208	406
497	224	435
513	240	464
529	256	493

(Orifice) Sizes

Common valve orifice sizes and equivalents in mm

inches		mm
3/64	(0.0469)	1.19
1/16	(0.0625)	1.59
5/64	(0.0781)	1.98
3/32	(0.0937)	2.38
1/8	(0.1250)	3.18
5/32	(0.1562)	3.97
11/64	(0.1719)	4.37
3/16	(0.1875)	4.76
7/32	(0.2187)	5.55
1/4	(0.2500)	6.35
9/32	(0.2812)	7.14
5/16	(0.3125)	7.94

inches		mm
7/17	(0.4375)	11.11
1/2	(0.5000)	12.70
5/8	(0.6250)	15.88
11/16	(0.6875)	17.46
3/4	(0.7500)	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

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