BIO·CHEM
FLUIDICS

Isolation Valves

BIO-CHEM VALVE

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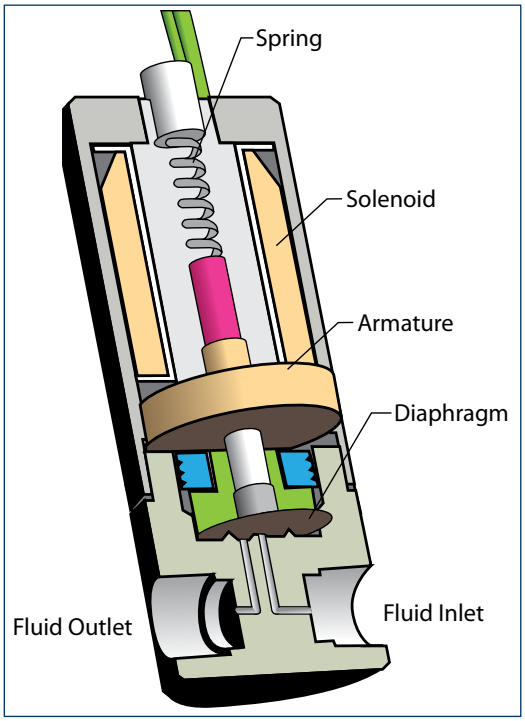
ISOLATION VALVES GENERAL INFORMATION

What is an Isolation Valve?

Bio-Chem Valve™ Isolation Valves are solenoid-operated devices. The valves use a flexible diaphragm to isolate the solenoid actuation mechanism from the fluid path. Isolation Valves are available in three different configurations; normally closed, normally open and 3-way. When the valve is energized, the solenoid retracts the armature that is attached to a flexible diaphragm. In a normally closed valve, this raises the diaphragm allowing fluid to flow between the inlet and outlet ports. For a normally open valve, the operation is reversed. When the valve is energized, the diaphragm presses down to close the fluid path.



3-way valves have three ports referred to as normally closed, normally open and common. When the valve is de-energized, fluid flows between the normally open and the common port. When the valve is energized, the valve switches and fluid flows between the normally closed and the common port.

Features of an Isolation Valve

- **Choice of valve function.**
  2-way normally closed
  2-way normally open
  3-way
- **Inert fluid path.** The fluid path in a Bio-Chem Valve™ Isolation Valve can be made entirely from extremely inert materials such as PTFE and PEEK.
- **Choice of materials.** Valve bodies are available in PPS, PEEK and PTFE. Diaphragms are available in FFKM, EPDM and PTFE. (Not all combinations of materials are available in all sizes or configurations).
- **Choice of valve orifice sizes.** Precisely machined valve orifice sizes from 0.032" (0.81mm) to 0.125" (3.2mm) in three different dimensional frames ensures that the most appropriate design for your application can be selected from standard configurations.
- **Bi-directional.** Bio-Chem Valve™ Isolation Valves identify the preferred inlet port on the valve label. However, all valves can be used in any flow direction.

Why choose an Isolation Valve?

Maximum inertness

The use of high performance plastics and polymers such as PTFE, PEEK and FFKM ensures that the liquid being handled by the valve is always in a highly inert environment. There is no contact with any metallic surfaces within the valve.

Fast response times

Switching time from port-to-port is generally less than 20ms across the range of Isolation Valves.

Small footprint

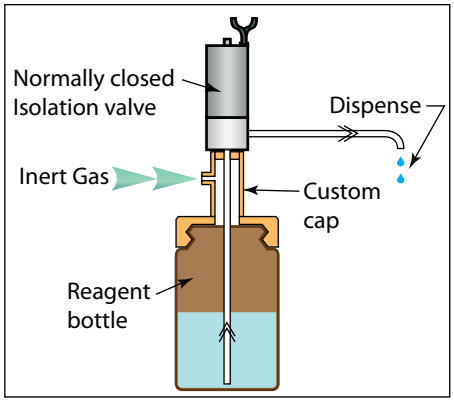
Bio-Chem Fluidics Isolation Valves are specifically designed to be fitted in tight spaces within instruments. The largest valve diameter is 1.25" and longest overall length is less than 3".

Minimal dead volume

Small overall size also helps keep the internal volumes minimized. The valves are machined precisely to ensure that they have very low internal volumes (refer to specific product pages for details).

Applications

Precise, repeatable dispensing of reagents



Maintaining a repeatable dispense of aggressive (and often very expensive) reagents into an analytical instrument can be problematic with conventional pumping equipment.

Some forward thinking instrument designers have abandoned the concept of using a pump and have instead turned to using a Bio-Chem Fluidics Isolation Valve.

In such applications, a standard 2-way normally closed isolation valve is connected to a dip tube, which is inserted into the bottom of a reagent bottle. Low pressure nitrogen (or other appropriate inert gas) is introduced separately to blanket the volume above the liquid in the reagent bottle. The pressure inside the bottle (maintained precisely at a calibrated low value) is sufficient to force the reagent liquid up the dip tube.

Under "normal" conditions, the valve is not energized and remains closed so there is no flow.

When the valve is energized the diaphragm opens and flow through the valve is established. The isolation valve now becomes a very repeatable fluid dispenser - the amount of liquid dispensed is dependent only on the time the valve is open.

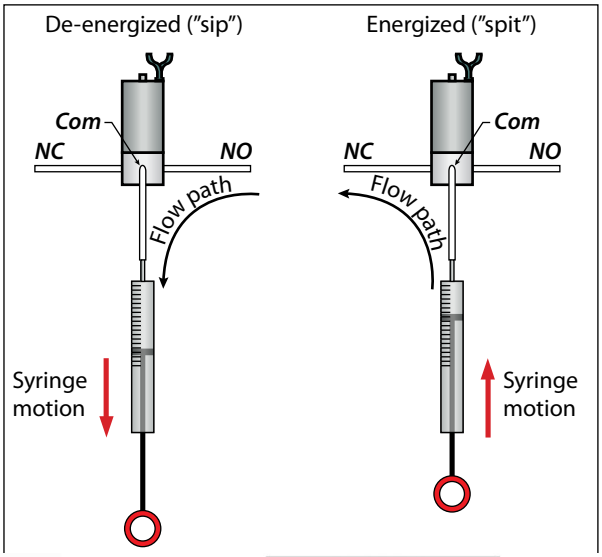
Aspirate and Dispense ("sip and spit")

Sometimes the volume of liquid to be dispensed needs to be either a) very small, b) extremely precise or c) both. In these situations it is very common to use a precision machined syringe to control the dispense volume.

Bio-Chem Fluidics 3-way isolation valves are commonly used as the link between the liquid reservoir, the syringe and the instrument. A 3-way valve has three ports; normally open (NO in illustration), normally closed (NC) and common (Com). The common port is connected to the syringe. When the plunger is withdrawn, the valve is not energized and the flow is between the reservoir and the syringe via the NO port (aspiration or "sip").

When the syringe is pushed in, the valve is simultaneously energized. The flow path switches to the NC port, which is connected to the instrument (dispense or "spit").

Although standard threaded port valves are common in this application, Bio-Chem Fluidics can, as an option, supply valves with luer fittings to allow direct coupling to the syringe (contact your regional sales office for more details).



Isolation Valve Selection Guide

1. Select valve function: 2-way Normally Closed (NC), 2-way Normally Open (NO) or 3-way
2. Select the orifice size / Cv valve
3. Confirm that the appropriate materials of construction are available in the specified valve series.
4. Turn to the page indicated to see full details and ordering information for each valve.

2-way NC

Valve orifice / Cv	Body material		
	PTFE	PPS	PEEK
0.032″ / 0.006	-NA-	038T2 (pg. 5)	
0.054″ / 0.011	-NA-	038T2 (pg. 5)	
0.032″ / 0.011	075T2NC (pg. 7)		
0.062″ / 0.030	075T2NC (pg. 7)		
0.062″ / 0.042	100T2NC (pg. 9)		
0.092″ / 0.080	100T2NC (pg. 9)	-NA-	100T2NC (pg. 9)
0.125″ / 0.105	100T2NC (pg. 9)	-NA-	-NA-

2-way NO

Valve orifice / Cv	Body material		
	PTFE	PPS	PEEK
0.032″ / 0.011	075T2NO (pg. 7)		
0.062″ / 0.030	075T2NO (pg. 7)		
0.062″ / 0.042	100T2NO (pg. 9)		
0.092″ / 0.080	100T2NO (pg. 9)	-NA-	100T2NO (pg. 9)

3-way

Valve orifice / Cv	Body material		
	PTFE	PPS	PEEK
0.032″ / 0.010	075T3MP (pg. 7)		
0.046″ / 0.023	075T3MP (pg. 7)		
0.032″ / 0.010	100T3MP (pg. 9)		
0.062″ / 0.028	100T3MP (pg. 9)		

Polymers referenced in this brochure:

EPDM = ethylene - propylene - diene
FFKM = perfluoro elastomer
PEEK = polyetheretherketone
PPS = polyphenelyne sulfide
PTFE = polytetrafluoroethylene

Trademarks

038T SERIES ISOLATION MINI-VALVES

- 038T Isolation Mini-Valves are 2-way Normally Closed valves
- They are available with either side-located (038T2S) or bottom-located (038T2B) threaded ports
- Two orifice sizes are available: 0.032" / 0.81mm and 0.054" / 1.4mm
- Design based on 0.38" (9.5mm) diameter high efficiency solenoid
- Chemically resistant PPS or PEEK body with a choice of PTFE, EPDM or FFKM diaphragm
- Low power consumption (1.9 Watts, 0.15 amps @ 12VDC; 1.9 Watts, 0.08 amps @ 24VDC) and minimal heat generation
- Maximum operating pressure = 20 psig
- Suitable for vacuum service to 28" Hg

038T2B PEEK body

038T2S PEEK body

Ordering info, 038T2S series

PART NO.	BODY MAT'L	DIA. MAT'L	INT. VOL (µL)
12V DC, threaded side connections, Normally Closed, 0.032" orifice, Cv =0.006			
038T2S12-32-4	PPS	PTFE	20
038T2S12-32-4E	PPS	EPDM	20
038T2S12-32-4P	PPS	FFKM	20
038T2S12-32-5	PEEK	PTFE	20
038T2S12-32-5E	PEEK	EPDM	20
038T2S12-32-5P	PEEK	FFKM	20
12V DC, threaded side connections, Normally Closed, 0.054" orifice, Cv =0.011			
038T2S12-54-4	PPS	PTFE	42
038T2S12-54-4E	PPS	EPDM	42
038T2S12-54-4P	PPS	FFKM	42
038T2S12-54-5	PEEK	PTFE	42
038T2S12-54-5E	PEEK	EPDM	42
038T2S12-54-5P	PEEK	FFKM	42

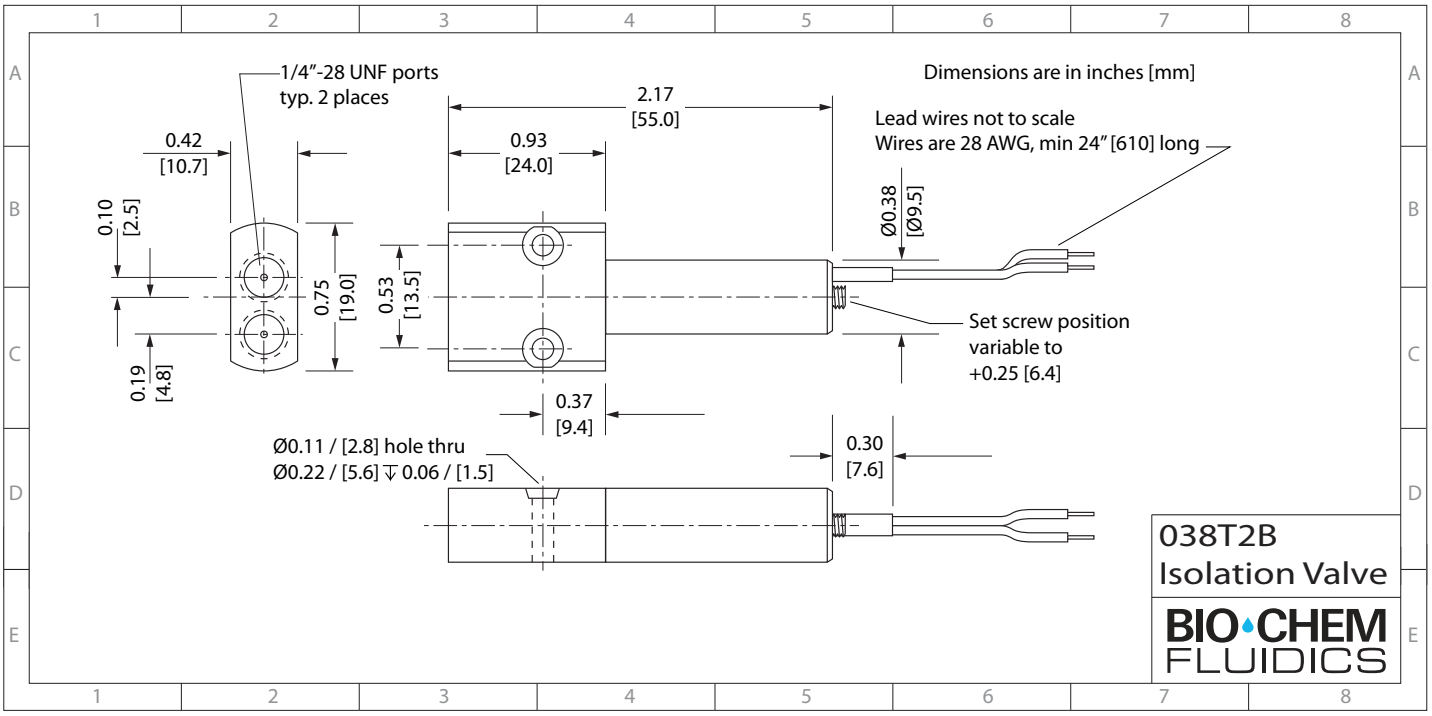
Ordering info, 038T2B series

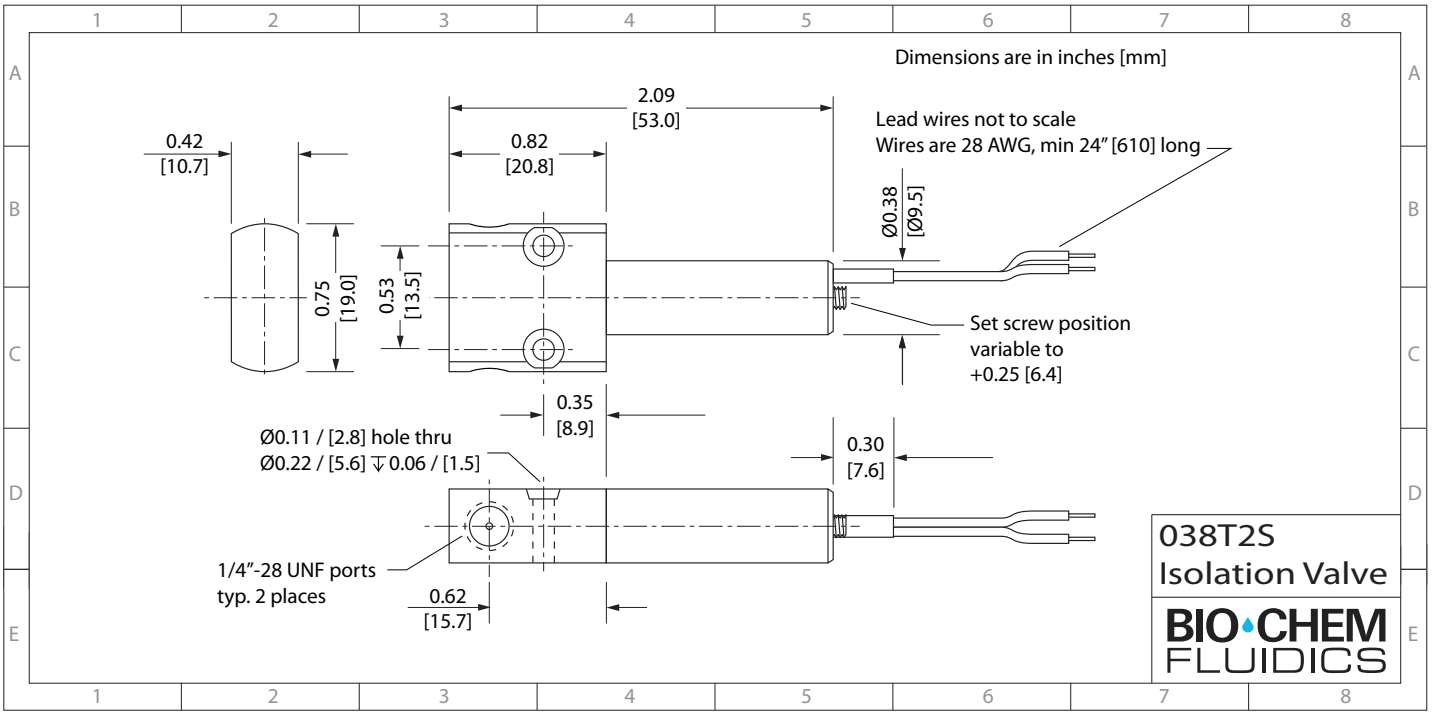
PART NO.	BODY MAT'L	DIA. MAT'L	INT. VOL (µL)
12V DC, threaded bottom connections, Normally Closed, 0.032" orifice, Cv =0.006			
038T2B12-32-4	PPS	PTFE	18
038T2B12-32-4E	PPS	EPDM	18
038T2B12-32-4P	PPS	FFKM	18
038T2B12-32-5	PEEK	PTFE	18
038T2B12-32-5E	PEEK	EPDM	18
038T2B12-32-5P	PEEK	FFKM	18
12V DC, threaded side connections, Normally Closed, 0.054" orifice, Cv =0.011			
038T2B12-54-4	PPS	PTFE	35
038T2B12-54-4E	PPS	EPDM	35
038T2B12-54-4P	PPS	FFKM	35
038T2B12-54-5	PEEK	PTFE	35
038T2B12-54-5E	PEEK	EPDM	35
038T2B12-54-5P	PEEK	FFKM	35

For 24V replace 038T2x12 with 038T2x24 where x=S (side) or B (bottom) ports

038T SERIES ISOLATION VALVES continued

INSTALLATION DRAWINGS





075T SERIES ISOLATION VALVES

- 075T Isolation Valves are available in 2-way Normally Closed, 2-way Normally Open and 3-way styles
- Two orifice sizes are available: 0.032" / 0.81mm and 0.062" / 1.6mm (0.032" / 0.81mm and 0.046" / 1.2mm in the 3-way valve)
- Design based on 0.75" (19.1mm) diameter high efficiency solenoid
- Widest choice of chemically resistant body materials, PTFE, PPS or PEEK body with a choice of PTFE, EPDM or FFKM diaphragm
- Low power consumption (2.9 Watts, 0.24 amps @ 12VDC; 2.9 Watts, 0.12 amps @ 24VDC) and minimal heat generation

075T2NC (2-way Normally Closed), PTFE body

075T2NO (2-way Normally Open), PPS body

075T3MP (3-way), PEEK body

Ordering info, 075T series

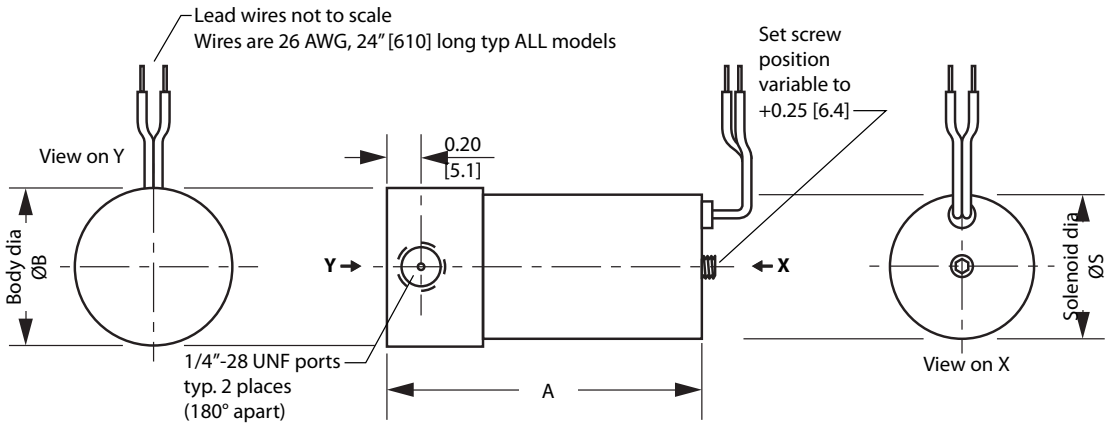
PART NO.	BODY MAT'L	DIA. MAT'L	MAX. PRES. (psig)	INT. VOL (µL)
12V DC, threaded side connections, Normally Closed, 0.032" orifice, Cv =0.011				
075T2NC12-32	PTFE	PTFE	20	19
075T2NC12-32-4	PPS	PTFE	20	19
075T2NC12-32-4E	PPS	EPDM	20	19
075T2NC12-32-4P	PPS	FFKM	20	19
075T2NC12-32-5	PEEK	PTFE	20	19
075T2NC12-32-5E	PEEK	EPDM	20	19
075T2NC12-32-5P	PEEK	FFKM	20	19
12V DC, threaded side connections, Normally Closed, 0.062" orifice, Cv =0.030				
075T2NC12-62	PTFE	PTFE	20	54
075T2NC12-62-4	PPS	PTFE	20	54
075T2NC12-62-4E	PPS	EPDM	20	54
075T2NC12-62-4P	PPS	FFKM	20	54
075T2NC12-62-5	PEEK	PTFE	20	54
075T2NC12-62-5E	PEEK	EPDM	20	54
075T2NC12-62-5P	PEEK	FFKM	20	54
12V DC, threaded side connections, Normally Open, 0.032" orifice, Cv =0.011				
075T2NO12-32	PTFE	PTFE	20	19
075T2NO12-32-4	PPS	PTFE	20	19
075T2NO12-32-5	PEEK	PTFE	20	19

PART NO.	BODY MAT'L	DIA. MAT'L	MAX. PRES. (psig)	INT. VOL (µL)
12V DC, threaded side connections, Normally Open, 0.062" orifice, Cv =0.030				
075T2NO12-62	PTFE	PTFE	20	54
075T2NO12-62-4	PPS	PTFE	20	54
075T2NO12-62-5	PEEK	PTFE	20	54
12V DC, threaded side connections, 3-way, 0.032" orifice, Cv =0.010				
075T3MP12-32	PTFE	PTFE	15	45
075T3MP12-32-4	PPS	PTFE	15	45
075T3MP12-32-4E	PPS	EPDM	10	45
075T3MP12-32-4P	PPS	FFKM	10	45
075T3MP12-32-5	PEEK	PTFE	15	45
075T3MP12-32-5E	PEEK	EPDM	10	45
075T3MP12-32-5P	PEEK	FFKM	10	45
12V DC, threaded side connections, 3-way, 0.046" orifice, Cv =0.023				
075T3MP12-46	PTFE	PTFE	15	52
075T3MP12-46-4	PPS	PTFE	15	52
075T3MP12-46-4E	PPS	EPDM	10	52
075T3MP12-46-4P	PPS	FFKM	10	52
075T3MP12-46-5	PEEK	PTFE	15	52
075T3MP12-46-5E	PEEK	EPDM	10	52
075T3MP12-46-5P	PEEK	FFKM	10	52

For 24 VDC, replace 075Txxx12-xx with 075Txxx24-xx in any of the part numbers listed.

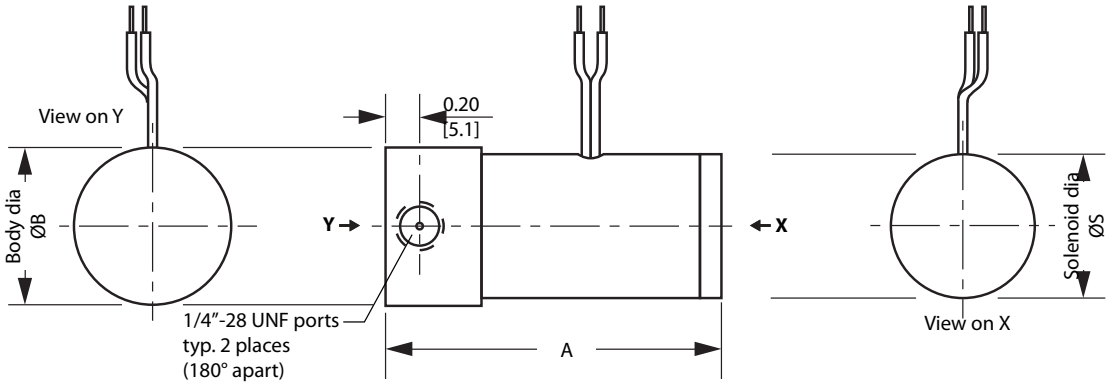
075T SERIES ISOLATION VALVES continued

INSTALLATION DRAWINGS



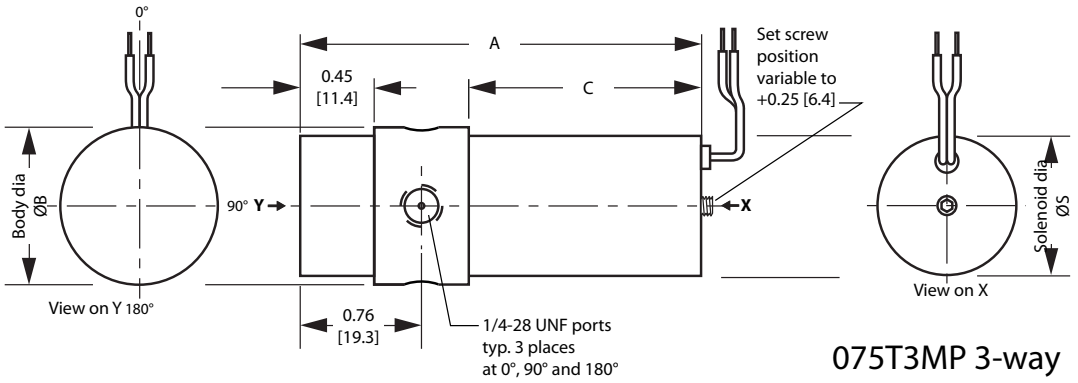
	A	ØB	ØS
075T2NCxx-32	1.83 [46.5]	0.75 [19.1]	0.75 [19.1]
075T2NCxx-62	1.83 [46.5]	0.88 [22.2]	0.75 [19.1]

075T2NC Normally Closed



	A	ØB	ØS
075T2NOxx-32	2.15 [54.6]	0.75 [19.1]	0.75 [19.1]
075T2NOxx-62	2.15 [54.6]	0.88 [22.2]	0.75 [19.1]

075T2NO Normally Open



	A	ØB	C	ØS
075T3MP PTFE body	2.34 [59.4]	0.88 [22.2]	1.27 [32.2]	0.75 [19.1]
075T3MP PPS/PEEK body	2.34 [59.4]	0.75 [19.1]	1.27 [32.2]	0.75 [19.1]

075T3MP 3-way

Dimensions are in inches [mm]

075T series Isolation Valves

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100T SERIES ISOLATION VALVES

- 100T Isolation Valves are available in 2-way Normally Closed, 2-way Normally Open and 3-way styles
- Multiple orifice sizes are available:
  - 2-way NC 0.062" / 1.6mm, 0.092" / 2.3mm and 0.125" / 3.2mm
  - 2-way NO 0.062" / 1.6mm and 0.092" / 2.3mm
  - 3-way 0.032" / 0.81mm and 0.062" / 1.6mm
- Design based on 1.0" (25.4mm) diameter high efficiency solenoid
- Chemically resistant body materials, PTFE, PPS or PEEK body with a choice of PTFE, EPDM or FFKM diaphragm
- Low power consumption (4.0 Watts, 0.32 amps @ 12VDC; 4.0 Watts, 0.16 amps @ 24VDC) and minimal heat generation

100T2NC (2-way Normally Closed), PTFE body

100T2NO (2-way Normally Open), PEEK body

100T3MP (3-way), PTFE body

Ordering info, 100T series

12V DC, threaded side connections, Normally Closed, 0.062" orifice, Cv =0.042

PART NO.	BODY MAT'L	DIA. MAT'L	MAX. PRES. (psig)	INT. VOL (µL)
100T2NC12-62	PTFE	PTFE	30	55
100T2NC12-62-4	PPS	PTFE	30	55
100T2NC12-62-4E	PPS	EPDM	30	55
100T2NC12-62-4P	PPS	FFKM	30	55
100T2NC12-62-5	PEEK	PTFE	30	55
100T2NC12-62-5E	PEEK	EPDM	30	55
100T2NC12-62-5P	PEEK	FFKM	30	55

12V DC, threaded side connections, Normally Closed, 0.092" orifice, Cv =0.080

PART NO.	BODY MAT'L	DIA. MAT'L	MAX. PRES. (psig)	INT. VOL (µL)
100T2NC12-92	PTFE	PTFE	15	133
100T2NC12-92-5	PEEK	PTFE	15	133

12V DC, threaded side connections, Normally Closed, 0.125" orifice, Cv =0.105

PART NO.	BODY MAT'L	DIA. MAT'L	MAX. PRES. (psig)	INT. VOL (µL)
100T2NC12-125*	PTFE	PTFE	10	296

* 100T2NC12-125 & 100T2NC24-125 valves have 8.0 Watts solenoid coils.

For 24 VDC, replace 100Txxx12-xx with 100Txxx24-xx in any of the part numbers listed.

12V DC, threaded side connections, Normally Open, 0.062" orifice, Cv =0.042

PART NO.	BODY MAT'L	DIA. MAT'L	MAX. PRES. (psig)	INT. VOL (µL)
100T2NO12-62	PTFE	PTFE	30	55
100T2NO12-62-4	PPS	PTFE	30	55
100T2NO12-62-4E	PPS	EPDM	30	55
100T2NO12-62-4P	PPS	FFKM	30	55
100T2NO12-62-5	PEEK	PTFE	30	55
100T2NO12-62-5E	PEEK	EPDM	30	55
100T2NO12-62-5P	PEEK	FFKM	30	55

12V DC, threaded side connections, Normally Open, 0.092" orifice, Cv =0.080

PART NO.	BODY MAT'L	DIA. MAT'L	MAX. PRES. (psig)	INT. VOL (µL)
100T2NO12-92	PTFE	PTFE	10	133
100T2NO12-92-5	PEEK	PTFE	10	133

12V DC, threaded side connections, 3-way, 0.032" orifice, Cv =0.010

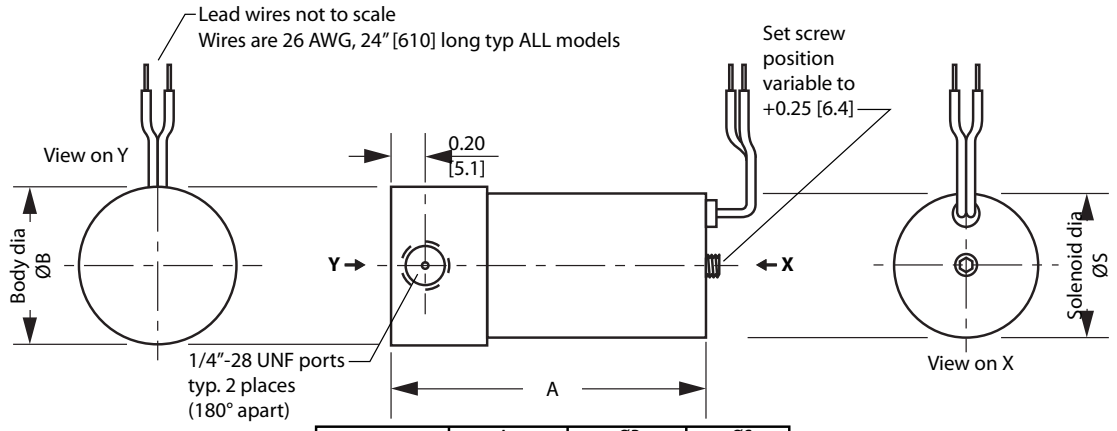
PART NO.	BODY MAT'L	DIA. MAT'L	MAX. PRES. (psig)	INT. VOL (µL)
100T3MP12-32	PTFE	PTFE	30	47
100T3MP12-32-4	PPS	PTFE	30	47
100T3MP12-32-5	PEEK	PTFE	30	47

12V DC, threaded side connections, 3-way, 0.062" orifice, Cv =0.028

PART NO.	BODY MAT'L	DIA. MAT'L	MAX. PRES. (psig)	INT. VOL (µL)
100T3MP12-62	PTFE	PTFE	30	95
100T3MP12-62-4	PPS	PTFE	30	95
100T3MP12-62-5	PEEK	PTFE	30	95

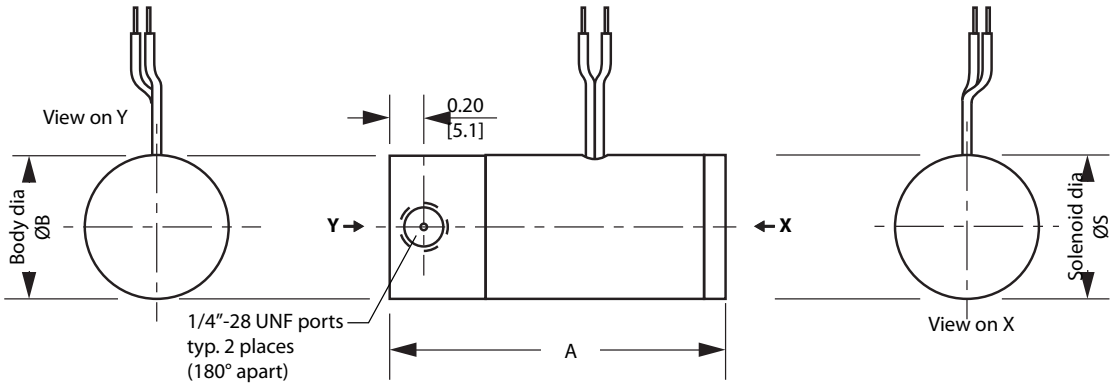
100T SERIES ISOLATION VALVES continued

INSTALLATION DRAWINGS



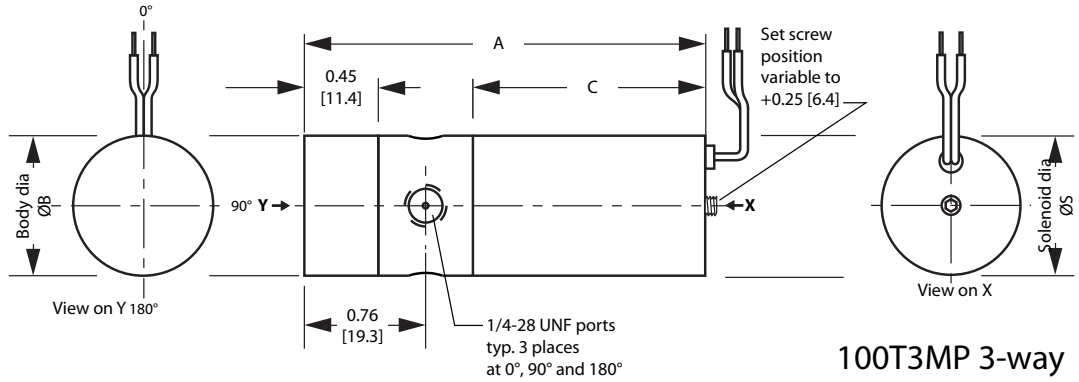
	A	ØB	ØS
100T2NCxx-62	2.20 [56.0]	1.00 [25.4]	1.00 [25.4]
100T2NCxx-92	2.20 [56.0]	1.00 [25.4]	1.00 [25.4]
100T2NCxx-125	2.20 [56.0]	1.25 [31.2]	1.00 [25.4]

100T2NC Normally Closed



	A	ØB	ØS
100T2NO ALL	2.54 [64.5]	1.00 [25.4]	1.00 [25.4]

100T2NO Normally Open



	A	ØB	C	ØS
100T3MP ALL	2.69 [68.3]	1.00 [25.4]	1.67 [42.4]	1.00 [25.4]

100T3MP 3-way

Dimensions are in inches [mm]

100T series Isolation Valves

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MANIFOLD MOUNTING

The Bio-Chem Valve™ Isolation Valves described elsewhere in this brochure are supplied with threaded ports making them suitable for installation with standard ¼"-28 UNF fittings and flexible tubing. However it is common within modern analytical instruments to use manifolds instead of tubing and multiple fittings. Custom manifolds save space and eliminate complicated plumbing inside instruments. To meet this demand, Bio-Chem Fluidics offers both normally closed and normally open isolation valves with a manifold mounting option.

Typically, manifold mounted valves have a threaded collar that attaches the valve to the manifold. A locating pin ensures the correct orientation and an elastomer gasket seals the flow path. Contact your local Bio-Chem Fluidics office for more information and complete manifold interface details.

079NC manifold mounted isolation Valve, showing collar and locating pin

CoolCube™ "HIT AND HOLD" CIRCUIT

CoolCube™

The Bio-Chem Fluidics CoolCube™ "Hit and Hold" circuit has been used very successfully with the full range of Isolation Valves to reduce opening times. The CoolCube™ provides the ability to use a temporary higher voltage "hit" at the start of the energizing cycle. This over-voltage can significantly reduce the valve opening time - depending on the conditions and voltage applied the opening time can be reduced by 50% or more.

After 100ms the CoolCube™ automatically reverts to the normal voltage acting as a fuse to protect the circuitry of the valve. There is no power storage and the valve turns off immediately when power is cut to the circuit. The CoolCube™ includes terminal pins for easy in-line installation.

Availability:

CoolCube™ is available for ALL Isolation Valve configurations. 038T2 Isolation Mini-Valves require the CoolCube-50R, all other sizes use the CoolCube-R.

Specifications:

SERIES	COOLCUBE-R	COOLCUBE-50R
Time from "hit" to "hold" voltage:	100 ms	100 ms
Voltage step down percentage:	67%	50%
Max input voltage:	36 VDC	36 VDC
Max input current:	1 amp	1 amp

For more information please refer to "CoolCube™" spec sheet.

CUSTOMIZED SOLUTIONS

We understand that many applications require customized solutions. Our design and prototyping expertise enables us to offer simple modifications of standard products as well as completely customized designs. Many of the Isolation Valves we sell are customized to one extent or another. Customizable options include (but are not limited to):

- Materials of construction
- Mounting options
- Tagging / labeling
- Length and/or style of connecting leads
- Electrical terminations
- Custom manifolds

We look forward to working with you to meet your design engineering objectives!

THE BIO-CHEM FLUIDICS BRAND FAMILY

Bio-Chem Fluidics is dedicated to providing instrument manufacturers and laboratories with the industry's best choice of inert, miniature fluid handling components.

Under the Bio-Chem Valve™ brand name we offer a complete fluid system solution for a wide range of industries including analytical chemistry, clinical diagnostics and medical device manufacturers as well as the scientific community.

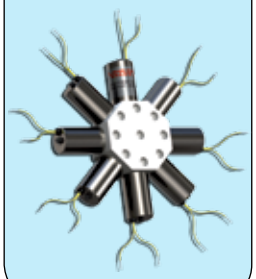
BIO·CHEM FLUIDICS

INERT SOLENOID VALVES AND PUMPS, ELECTRIC ROTARY VALVES

MICRO-PUMPS

ISOLATION VALVES

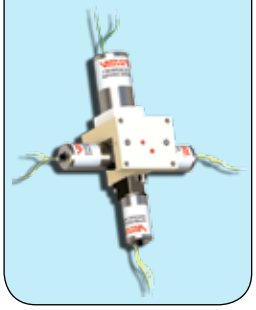
FLOW SELECTION VALVES



PINCH VALVES

ELECTRIC ROTARY VALVES

MANIFOLD ASSEMBLIES



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